

Chapter 1

Introduction

1.1 Background to the Study

Energy is an important driver of development. It is a power engine that drives social and economic change in a country or region.¹ The necessity of energy cannot be over-emphasized. It is fundamental to the fulfilment of basic individual and community needs in modern society. Lighting and heating a house, running a factory, lighting a street, keeping a hospital open and operational, provision of potable water, and many other human endeavours and services require energy.² These services propelled by energy are the factors by which the index of the progress and level of development of a country are measured. This implies that the volume of energy consumed by a country at a given period largely determines the level of the country's economic and social development.³

Similarly, energy is critical to a country's economic growth, advancement, and development and to eradicating poverty and security. Uninterrupted energy supply is an urgent concern for every government nowadays.⁴ Future economic growth heavily depends on the long-term energy supply from affordable, readily available, and environmentally friendly acceptable sources.⁵ Energy has a significant role in all aspects of a country's economy. A country's level of living correlates with its *per capita* energy use. As *per capita* energy consumption reflects both *per capita* wealth and national prosperity.⁶

¹ Moses Kabeyi and Oludolapo Olanrewaju, 'Economic Evaluation of Decentralised Energy Sources for Power Generation' (2025) 60 Energy Strategy Reviews, 2.

² Anne Maczulak, *Renewable Energy: Sources and Methods Facts on File* (1st ed, Infobase Publishing, 2010).

³ Abdulkarim Yusuf, 'Dynamic Effects of Energy Consumption, Economic Growth, International Trade and Urbanization on Environmental Degradation in Nigeria' (2023) 50 Energy Strategy Reviews, 1.

⁴ Sunday Oyedepo, 'Energy and Sustainable Development in Nigeria' (2021) 2(15) Energy, Sustainability and Society, 1.

⁵ Ramchandra Pode and Baye Boucar Diouf, *Green Energy and Technology* (Springer, London Dordrecht Heidelberg, New York, 2011) 17.

⁶ *ibid.*

There are two types of energy resources: non-renewable or conventional, and renewable.⁷ Non-renewable energy sources are fossil fuels which include coal, oil, and gas.⁸ Fossil fuels are energy sources formed over billions of years from the remnants of live species.⁹ Fossil fuels cannot be replenished due to its slow formation and rapid depletion. This implies they will eventually run out. Fossil fuel combustion emits greenhouse gasses, contributing significantly to climate change caused by humans. Relying on them for energy generation is not sustainable.¹⁰ On the other hand, renewable energy includes wind, ocean wave and tides, solar, biomass, hydro, and geothermal. Renewable resources are regenerated naturally on a regular basis and are termed to be clean, less damaging and environmentally friendly.¹¹

Nigeria is blessed with conventional (non-renewable) and renewable energy resources adequate to meet its population's need while exporting the excess to surrounding nations as a marketable commodity to create revenue.¹² Renewable energy is growing in the world but not in Nigeria where burning of fossil fuel for energy generation is the standard practice.¹³ Fossil fuels accounts for around 80 per cent of energy generation, with hydro-sourced energy making up the remaining.¹⁴ Despite its abundant energy resources, Nigeria is plagued by insufficient and epileptic energy supply concerns, energy poverty, corruption, and environmental degradation. Fuel supply issues, contribute to energy insecurity as well as

⁷ Importance of Energy in the Society <<https://www.nios.ac.in/media/documents/333courseE/27B.pdf>> accessed 14 August 2024.

⁸ *ibid.*

⁹ Energy Envoys: Non-renewable and Renewable Sources <http://www.energyenvoys.org.uk/sites/default/files/Non-renewable%20and%20renewable%20resources_0.pdf> accessed 14 August 2024.

¹⁰ *ibid.*

¹¹ Ahmad Abdulsalam Abdallah and Odetoke Blessing Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) Journal of Ariz Zone Economy, 101.

¹² Yusuf Chanchangi *et al*, 'Nigeria's Energy Review: Focusing on Solar Energy Potential and Penetration' (2022) 25 Environment, Development and Sustainability, 5756.

¹³ L Chinwo and D Samuel, 'Analyzing the Challenges of Renewable Energy Resources in Nigeria: Lessons from Other Jurisdictions' (2020) 4(1) The Journal of Jurisprudence, International Law and Contemporary Issues, 79.

¹⁴ Andrea Ajibade, 'National Strategies to Promote Renewable Energy Development: Whither Nigeria?' (2019) 10(1) Journal of Sustainable Development Law and Policy, 79.

social crises and communal conflicts, particularly in the Niger Delta region.¹⁵ For instance, Nigerian homes typically receive an average of five hours of electric energy every day from the national grid.¹⁶ This is because Nigeria's national system has not produced enough energy to fulfil demand. These problems have forced private homes, different economic organizations, religious worship centres, and government agencies to depend on their own electricity generating plants as an alternative source of energy which uses fossil fuels.¹⁷ This situation is also responsible for high indices of economic inflation in the country.¹⁸ Consequently, many businesses have shut down as a result of financial losses as they are unable to keep up with the country's financial burden for alternative electricity energy to produce goods and services.¹⁹

While fossil fuels may be economical and efficient to generate energy, they emit enormous volumes of greenhouse gases during burning²⁰ and the Nigeria's oil and gas industry is responsible for these significant carbon emissions.²¹ In essence, when fossil fuels are burned, they release nitrogen oxides into the environment, which contributes to pollution, and adverse climate change.²² As a developing country, Nigeria is facing significant environmental pollution problems and climate change due to overdependence on fossil fuels in generating

¹⁵ Ahmad Abdulsalam Abdallah and Odetoke Blessing Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) *Journal of Ariz Zone Economy*, 102.

¹⁶ Yinka Omorogbe, *Perspectives on Energy Security and Renewable Energies in Sub-Saharan Africa: Practical Opportunities and Regulatory Challenges* (2nd Revised and Expanded edn, Macmillan, Namibia, 2016) Chapter 10, p. 207.

¹⁷ *ibid.*

¹⁸ Henry Falaiye, 'Nigerians opt for Alternative Energy Sources amid High Fuel Costs' (Punch, 14 February, 2024) <<https://punchng.com/nigerians-opt-for-alternative-energy-sources-amid-high-fuel-costs/>> accessed 28 July 2024.

¹⁹ *ibid.*

²⁰ Melissa Denchak, 'Fossil Fuels: The Dirty Facts' (NRDC, 1 June, 2022)

<<https://www.nrdc.org/stories/fossil-fuels-dirty-facts#sec-what-is>> accessed 28 July 2024.

²¹ L Chinwo and D Samuel, 'Analyzing the Challenges of Renewable Energy Resources in Nigeria: Lessons from Other Jurisdictions' (2020) 4(1) *The Journal of Jurisprudence, International Law and Contemporary Issues*, 79.

²² United States Environmental Protection Agency, 'Sources and Solutions: Fossil Fuels' <<https://www.epa.gov/nutrientpollution/sources-and-solutions-fossil-fuels#:~:text=Cars%20and%20trucks%20release%20nitrogenof%20smog%20and%20acid%20rain.>> accessed 28 July 2024.

energy and other energy needs.²³ The pollutants from fossil fuel energy contribute to pollution of water, air, and land among others, which all have negative health impacts on human and the environment.²⁴ It is reported that in 2019, Nigeria contributed 7,825 million cubic meters to global greenhouse gas emissions.²⁵

It is noteworthy that environmental pollution is a breach of human rights to a clean and healthy environment.²⁶ Hence, every human being is entitled to live in a clean healthy environment devoid of contamination and pollution.²⁷ Other human rights adversely impacted by environmental pollution include, the right to life and the right to health respectively.²⁸ The nexus existing between environmental pollution and human rights appears to be self-evident, in that, when air is polluted by toxic fumes, people who breathe the fumes are injured. They may even be killed. When water becomes contaminated, people who drink such may become sick. Contaminated water also causes damage to marine life.²⁹ The duty to individually or collectively ensure that every person enjoys this right is imposed upon the State.³⁰ However, environmental pollution and climate change still persist in Nigeria as the overdependence on

²³ Olusola Joshua Olujobi and Temilola Olusola-Olujobi, 'Nigeria: Advancing the Cause of Renewable Energy in Nigeria's Power Sector Through its Legal Framework' (2020) 50 Environmental Policy and Law, 433.

²⁴ Yusuf Chanchangi *et al*, 'Nigeria's Energy Review: Focusing on Solar Energy Potential and Penetration' (2022) 25 Environment, Development and Sustainability, 5755.

²⁵ Fatima Bello, 'Towards a Legal Framework for Deploying Carbon Technologies to Address the Environmental Impacts of Gas Flaring in Nigeria' (2022) 13(2) Journal of Sustainable Development Law and Policy, 102.

²⁶ Article 24 of the *African Charter on Human and Peoples' Rights 1981*. See also K Omidire, 'Resolving the Challenges of Enforcing Environmental Rights by the Application of Procedural Environmental Rights' in Adeyemo, K. A. *et al* (eds) Pursuit of Legal Education – Essays Marking the 20th Anniversary of Faculty of Law, Lead City University, Ibadan (College Press, Ibadan, Nigeria, 2025 – ISBN: 978-978776-511-9) 351 <<https://www.scribd.com/document/862513193/Resolving-the-Challenges-of-Enforcing-Environmental-Rights-by-the-Application-of-Procedural-Rights>>, Lawrence Atsegbua, Vincent Akpotaire and Folarin Dimowo, *Environmental Law in Nigeria: Theory and Practice* (2nd ed, Ambik Press, Benin City, 2010) 172.

²⁷ Principle 2 of the *Stockholm Declaration 1972*.

²⁸ Article 3 of the *Universal Declaration of Human Rights 1948*. See also The International Convention on Civil and Political Rights 1966, article 2(1) of the *European Convention on Human Rights 1950*, article 4 of the *American Convention on Human Rights, 1969*, article 2 of the *African Charter on Human and Peoples' Rights 1981* and Section 33 of the *Constitution of the Federal Republic of Nigeria 1999*. See also the case of *Nasiru Bello v Oyo State Government* [1986] 5 NWLR (Pt. 45) 828.

²⁹ Kumbha Ram Mahala, 'The Impact of Air Pollution on Living Things and Environment: A Review of the Current Evidence' (2024) 24(03) World Journal of Advanced Research and Reviews, 3207.

³⁰ See article 22-24 of the *African Charter on Human and Peoples' Rights 1981*.

fossil fuels to generate energy is still a major concern with respect to environmental pollution.³¹

Further to the consequences of the overreliance on fossil fuels in generating energy, it has resulted in present and future risks to the nation such as heightened effect of climate change.³²

According to the United Nations, fossil fuels are the largest contributor to climate change through human activities which emit greenhouse gases.³³ These activities include burning of fossil fuels, and gas flaring among others.³⁴ Climate change poses significant risks, including desertification, sea-level rise, floods, and water salination.³⁵ These consequences may include food security issues, infrastructural damage, and societal disruptions.³⁶ Climate change impacts citizens, the environment, and natural resources, affecting all aspects of life, including the economy, and urban/suburban growth. Climate change in Nigeria has led to severe thunderstorms, floods, and droughts causing environmental transformations that result in environmental pollution, shifting rain patterns, heat waves, biodiversity loss and desertification among others.³⁷

³¹ Olusola Joshua Olujobi, Adetutu-Aina Pelemo and Uchechukwu Okorie, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector Amidst Fossil Fuel Disruptions and Low-carbon Energy Transition' (2023) 9 Heliyon, 5.

³² Lawrence Atsegbua, Vincent Akpotaire and Folarin Dimowo, *Environmental Law in Nigeria: Theory and Practice* (2nd ed, Ambik Press, Benin City, 2010) 26.

³³ United Nations Climate Action < <https://www.un.org/en/climatechange/science/causes-effects-climate-change#:~:text=Causes%20of%20Climate%20Change&text=Generating%20electricity%20and%20heat%20by,and%20trap%20the%20sun's%20heat.> > accessed 19 August 2024.

³⁴ United Nations Framework Convention on Climate Change <https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf> accessed 19 August 2024.

³⁵ Geoffrey Ukala, Ukamaka Theresa Ugwu and Philomena Chinonye Chukwuemeka, 'Impact of Climate Change on the Environment and Human Health in Nigeria: Implication for Sustainable Development' (2023) 19(1) International Journal of Studies in Education, 382.

³⁶ *Ibid.*

³⁷ Geoffrey Ukala, 'Influence of Location on Students' Level of Knowledge of Topical Environmental Issues in Delta State' (2020) 5(1) African Journal of Science, Technology and Mathematics Education, 95.

In addition, climate change has had a significant impact on Nigeria's energy sector through conflicts over water resources.³⁸ In addition, excessive drought has resulted in decreased energy production due to evapo-transpiration, which affects water volume and energy plant efficiency.³⁹ As discussed earlier, the increase in the incessant energy outages in Nigeria has forced citizens to rely on fossil fuels-generated alternatives to produce energy, which continues to be a significant cause of climate change. If the current percentage of usage fossil fuels is maintained resulting in potentially doubled energy demand by 2050, emissions will far exceed the limit of two degrees Celsius (2°C) carbon emission if global average temperature change is to be maintained at current levels. Such levels of emissions would have catastrophic climate effects for the world.⁴⁰

To this extent, there is a rising demand globally that energy sources should be environmentally friendly and affordable, to ensure that environmental pollution and climate change is reduced, and that energy security is reasonably guaranteed to people who are poor and vulnerable.⁴¹ There appears to be a consensus that renewable energy sources have the potential to satisfy those criteria. Hence, countries are expected to work towards a transition from the use of fossil fuels to renewable energy for energy generation.⁴²

As explained above, environmental pollution and degradation, as well as climate change, are unavoidable consequences of the extraction and use of fossil fuels, which pose numerous risks to humans and the environment. Renewable energy sources, on the other hand, benefit the environment as they are less damaging and inexhaustible. Renewable energy refers to –

³⁸ David Obada *et al*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 3.

³⁹ Lawal Badru, 'Climate Change in Nigeria: Causes and Effects' (2020) 4(1) UNILAG Law Journal, 193.

⁴⁰ United Nations Chronicle <<https://www.un.org/en/chronicle/article/role-fossil-fuels-sustainable-energy-system>> accessed 6 September 2024.

⁴¹ Muhamed Fargahli *et al*, 'Social, Environmental, and Economic Consequences of Integrating Renewable Energies in the Electricity Sector: A Review' (2023) 21 Environmental Chemistry Letters, 1384.

⁴² *ibid*.

...energy obtained from energy sources whose utilization does not result in the depletion of earth's resources. Renewable energy includes energy sources and technologies that have minimal environmental impacts, such as less intrusive hydro's and certain biomass combustion. These sources of energy normally will include solar energy, wind, biomass, small and medium hydro, geothermal, tide and wave energy.⁴³

Consequently, increasing renewable energy sources will enhance environmental quality by helping to reduce global greenhouse gas emissions.⁴⁴ Another advantage of renewable energy is that it helps to ensure the energy sector's sustainability. Renewable energy may be replenished naturally at a rate proportional to the amount of energy consumed. Furthermore, the collection, processing, and use of renewable energy are often carried out in an environmentally sustainable manner and the supply of alternative energy is cheaper.⁴⁵ In contrast to fossil fuels, it prevents negative impacts on the practicability of energy and the inherent rights of residents in the communities where it is used, as well as the natural environment.⁴⁶

To tackle climate change and reduce greenhouse gas emissions, countries throughout the world are transitioning away from fossil fuels and toward renewable energy. Countries like Sweden, Denmark and Norway have led the way in this paradigm shift, and African countries like Kenya and South Africa have made significant progress.⁴⁷ In the 1970s, Sweden heavily relied on oil, with fossil fuels accounting for over 75 percent of the country's energy needs.⁴⁸ As of 2023 till date, Sweden generates over 60 per cent of its electricity from renewables, primarily hydropower (45 percent) and wind power (20 percent) annually, significantly

⁴³ Paragraph 1.3 of the *National Renewable Energy and Energy Efficiency Policy* (NREEP) 2015.

⁴⁴ Olusola Olujobi and Daniel Ufua, 'The Legal Regime on Renewable Energy as Alternative Sources of Energy in Nigeria's Power Sector: The Impacts and Potentials' (2020) 19(3) *Academy of Strategic Management Journal*, 11.

⁴⁵ *ibid.*

⁴⁶ *ibid.* 12

⁴⁷ ⁴⁷ Heinrich Boll Stiftung, 'The Green Transition in the Nordic Countries: Lessons in Sustainable Development' (2022) <<https://il.boell.org/en/2022/11/15/green-transition-nordic-countries-lessons-sustainable-development>> accessed 6 September 2024

⁴⁸ *ibid.*

reducing its dependence on fossil fuels.⁴⁹ Sweden's renewable energy generation is driven by incentives from the Electricity Certificate System,⁵⁰ the Swedish Energy Policy Agreement,⁵¹ the Carbon Tax,⁵² and the *Climate Act*.⁵³

In 1990, Denmark relied on coal for nearly 90 percent of its energy generation. Today, wind energy accounts for over 50 per cent of Denmark's energy supply.⁵⁴ Denmark's renewable energy generation is driven by the *Danish Renewable Energy Act* 2008,⁵⁵ and the *Energy Agreement* 2018.⁵⁶

Historically, Norway has relied on hydropower for most of its electricity needs. Hydropower currently supplies about 98% of Norway's electricity. Currently, Norway generates approximately 143 TWh of renewable energy annually, making it one of the world's cleanest energy producers,⁵⁷ which is as a result of the legislative success of the Green Electricity Certificate Scheme,⁵⁸ and the *Norwegian Climate Change Act* 2018.⁵⁹

Some countries in Africa have also made appreciable progress. For instance, as at 2000, Kenya's electricity generation was heavily reliant on hydropower at about 70 percent, supported with diesel generators.⁶⁰ Today, geothermal, wind, and solar energy have

⁴⁹ Lucia Fernandez, 'Renewable Energy in Sweden – Statistics and Facts' (Statista, 15 April 2024) <<https://www.statista.com/topics/1-734/renewable-energy-in-sweden/#topicOverviews>> accessed 6 September 2024.

⁵⁰ *Electricity Certificate System*, 2003.

⁵¹ *Energy Policy Agreement*, 2016.

⁵² *Carbon Tax*, 1991.

⁵³ *Sweden Climate Act*, 2008.

⁵⁴ Espen Moe, *Denmark: An Energy Transformation in the Making? Wind Power in the Inside of the System*. In: *Renewable Energy Transformation or Fossil Fuel Backlash* (Energy, Climate and the Environment Series, Palgrave Macmillan, London, 2015) 166.

⁵⁵ *Renewable Energy Act*, 2008.

⁵⁶ *Energy Agreement*, 2018.

⁵⁷ Nils Kilippenberg, 'Energy Transition Norway 2022: A National Forecast to 2050' (2022) 2 <https://norskindustri.no/site/assets/dokumenter/rapporter-og-brosjyrer/energy-transition-norway/2022/energy-transition-norway-2022_web.pdf> accessed 6 September 2024

⁵⁸ *Green Electricity Certificate Scheme* 2012.

⁵⁹ *Norwegian Climate Change Act*, 2018. See also Rolf Golombek and Michael Hoel, 'Climate Policy and Climate Goals in Norway' (2023) *Nordic Economic Policy Review*, 7

⁶⁰ Oladimeji Ayamolowo and Kanzumba Kusakana, 'Assessment of Renewable Energy Development in Africa Using the Swot Analysis Model: The Cases of South Africa, Nigeria, Egypt, and Kenya' (2024) *SSRN*, 1.

transformed the landscape, with geothermal alone contributing nearly 48 percent of the country's energy.⁶¹ This borders on the efficient legal frameworks promoting renewable energy, which is the *Kenyan Energy Act of 2019*,⁶² the Feed-in Tariff Policy⁶³ and the *Geothermal Resource Act of 1982*.⁶⁴ For example, Kenya mandated the installation of solar water heaters in all buildings where daily water consumption exceeds 100 litres.⁶⁵

In South Africa, electricity generation was largely dominated by coal, accounting for more than 90 percent of its energy mix in the early 2000s.⁶⁶ However, currently, renewable energy contributes over 12 percent of South Africa's electricity supply, with significant increases from wind, solar PV, and hydro through the Renewable Energy Independent Power Producer Procurement Program (REIPPPP),⁶⁷ the Renewable Energy White Paper,⁶⁸ the *Electricity Act of 2006*⁶⁹ and the *Climate Act of 2024*.⁷⁰

In essence, the firm and cogent enforcement of these countries' renewable energy legal framework allowed for the successful integration of renewable energy into their energy systems. Observing the success rate of these countries transitioning to renewable energy, it is apparent that Nigeria still depends so much on fossil fuels as a main driver of its economy and government revenue thus making it hard to adapt to cleaner and sustainable practices.⁷¹

⁶¹ Tze-Zhang Ang *et al*, 'A Comprehensive Study of Renewable Energy Sources: Classifications, Challenges and Suggestions' (2023) 43 Energy Strategic Reviews, 2.

⁶² *Energy Act*, 2019.

⁶³ *Feed-in Tariff Policy*, 2008.

⁶⁴ *Geothermal Resource Act*, 1982.

⁶⁵ Olusola Olujobi, Oluwatosin Olujobi and Daniel Ufua, 'The Legal Regime of Renewable Energy as Alternative Sources of Energy in Nigeria's Power Sector: The Impacts and the Potentials' (2020) 19(3) Academic of Strategic Management Journal, 3.

⁶⁶ Nasi Hako, 'Coal Still Dominating South Africa's Energy Mix, Says CSIR Report' (Enlit Africa, 28 June 2022) <<https://www.esi-africa.com/energy-efficiency/coal-still-dominating-south-africans-energy-mix-says-csir-report/>> accessed 7 September 2024.

⁶⁷ Olusola Akinbami, Samuel Oke and Michael Bodunrin, 'The State of Renewable Energy Development in South Africa: An Overview' (2021) 60(6) Alexandria Engineering Journal, 5079.

⁶⁸ *Renewable Energy White Paper*, 2003.

⁶⁹ *Electricity Act*, 2006.

⁷⁰ *Climate Act*, 2024.

⁷¹ UI Nkemjika and MA Okonkwo, 'Climate-smart Agriculture in Nigeria' (2023) Position Paper, 1 <<https://eerce.org/wp-content/uploads/2024/03/CLIMATE-CHANGE-IN-NIGERIA-.pdf>> accessed 3 September 2024.

These acts have resulted in increasing sea levels, variable rainfall, droughts, flooding, high temperatures, and extreme weather events. Nigeria was named one of the top ten most susceptible countries to climate change in the world. Regrettably, there is no evidence that Nigeria is addressing the problems of environmental pollution and climate change caused by reliance on fossil fuels as sources of energy, notwithstanding the benefits derivable from renewable energy sources.

Despite the abundant renewable energy sources and policy frameworks for their utilization, the contribution of renewable energy sources to Nigeria's overall energy basket is next to nothing. If renewable energy sources can be properly harnessed and utilized in the energy generation mix, Nigeria's enormous renewable energy potential may completely address the country's issues with environmental pollution and climate change.

1.2 Statement of the Problem

The reliance on fossil fuels as primary sources of energy has led to significant environmental problems such as greenhouse gas emissions, air and water pollution, global warming, and ecological degradation, all of which threaten environmental sustainability and human health. To address environmental pollution and encourage sustainable development in Nigeria, the transition from fossil fuels to renewable energy sources is essential, so that renewable energy sources can serve as an alternative to generating energy. The development of renewable energy promotes energy efficiency, and climate change mitigation has to be encouraged and if necessary mandated.

Renewable energy sources have the potential to address the challenges of fossil fuel-based energy by providing clean, sustainable, and locally available alternatives that reduce greenhouse gas emissions, minimize environmental pollution, conserve natural ecosystems, enhance energy security, and promote long-term economic and environmental sustainability.

This is because renewable energy sources are clean, safe, inexhaustible, and less damaging. They meet the requirements for sustainability as prescribed by the United Nations, that is, the capacity to meet the energy needs of the present generation without compromising the ability of the future generations to meet their needs.⁷² As things stand presently, it is unlikely that renewable sources would become a dominant source of energy in Nigeria. This is because there is an absence of an effective regulatory framework designed to encourage the adoption and use of renewable energy. Presently, there is no sole legislation for renewable energy in Nigeria. The policies and regulations available on renewable energy are scattered. The dependence on fossil fuels for energy generation has negative impacts on human health and environment, due to the smoke inhalation and constant use of generators to generate power. The lack of an effective framework presents a substantial obstacle to making the transformation from fossil fuel-based energy to renewables transformation.

Existing policies and regulations on renewable energy in Nigeria have been estimated as insufficient to meet the particular requirements and difficulties involved with integrating renewable energy, which would obstruct the creation and implementation of low-carbon energy solutions. Investment, innovation, and the broad adoption of renewable energy technology might be hampered by the lack of clear and comprehensive legislative requirements linked to promoting renewable energy, such as feed-in tariffs, net metering, and power purchase agreements. The use of renewable energy sources is constrained by the lack of a legislative framework and procedures to facilitate the development of enable decentralized energy systems. This impedes attempts to cut greenhouse gas emissions and alleviate environmental damage as well as the efficient integration of renewable energy into the national grid.

⁷² United Nations Sustainable Development Goals (SDGs).

The problems highlighted here necessitates that solutions must be devised to facilitate the development of an effective legal framework to foster the advancement of low-carbon energy through renewable energy sources to address environmental pollution and climate change challenges in Nigeria. That is the crux of this study, as highlighted in the aims and objectives of the study in the next section.

1.3 Aim and Objectives

The aim of this study is to investigate the laws on non-renewable energy and environmental pollution in Nigeria, with reference to laws of selected Jurisdictions that have transitioned from fossil fuel to renewable energy sources, with a view to develop a model legal framework that can facilitate the transition towards low-carbon energy in Nigeria.

Specifically, the primary objectives of the study are to:

- i. Critically examine the adequacy and effectiveness of existing legislations regulating energy production and environmental pollution in Nigeria, with a view to identifying legal and policy reforms necessary to advance the transition toward renewable energy sources.
- ii. Examine the laws and policies of selected jurisdictions that have successfully recorded meaningful transition from fossil fuels to renewables as sources of energy.
- iii. Develop a model legal framework that can facilitate the transition to low-carbon energy through renewable energy sources in Nigeria.

1.4 Research Questions

1. How adequate and effective are the existing legislations regulating energy production and environmental pollution in Nigeria in facilitating the transition toward renewable energy sources?

2. How have the selected foreign jurisdictions successfully transitioned from fossil fuels to renewable energy through legal frameworks, and what legislative lessons can inform the development of an effective legal framework for Nigeria's energy transition?
3. To what extent can the development of a model legal framework facilitate the transition to low-carbon energy sources through renewable energy in Nigeria?

1.5 Methodology

To achieve the objectives enumerated above, this study adopts a doctrinal approach, with the use of qualitative research method. A desk top study of extensive literature will be conducted to determine the current state of environmental pollution and challenges of climate change in Nigeria. The study will critically discuss the potential of renewable sources of energy as an alternative for Nigeria. The essence of the critical consideration of the *status quo* is to determine the possibility of fortifying the extant legal framework to facilitate clean energy production and use, thereby guaranteeing environmental sustainability. Secondary sources including those in books, journals, the internet, and reports will be consulted and critically discussed, in addition to primary sources in the form of legislation, case law, as well as international global and regional instruments.

1.6 Scope of the Study

The focus of the study is to fortify existing legal framework relating to energy sources and use to effectively address the challenges of environmental pollution and climate change in Nigeria. It provides a clear understanding of the impacts of the utilization of fossil fuels on human health and environment, climate change, alongside the sources, benefits and potentials of renewable energy, as well as the policies, guidelines and regulations governing renewable energy in Nigeria. The study also reviews the theories governing renewable energy. While the

study is not a comparative study, the experience of selected jurisdictions that have achieved significant success in transitioning from total dominance of fossil fuel-based energy to the adoption and significant use of renewable energy sources will be examined.

1.7 Significance of the Study

The ultimate significance of this study is to develop a model legal framework that will facilitate the transition to low-carbon energy through renewable energy sources in Nigeria, which could play a role in the quest of Nigeria to evolve from a country that is virtually totally dependent on fossil fuel to produce energy to a situation where renewable energy sources increase significantly. Such evolution will assist Nigeria to reduce the adverse impacts of environmental pollution and climate change. The recommendations envisaged from the study regarding the legal framework for the regulation of energy production and use could facilitate the realization of those objectives through necessary changes in policy.

Given the large oil and gas reserves present in Nigeria, the country is heavily reliant on the oil and gas industry for the sustenance of its economy. Although there may be concerns that a transition from fossil fuels to renewables for the production of energy could adversely impact the economy, it is important to indicate that oil and gas would still remain one of the sources of energy. The quest for change in global development is that there should be a mix which includes renewables.⁷³ At present, renewables as sources of energy is not accorded any meaningful attention in Nigeria. This study is likely to facilitate a change of attitude on the part of the relevant stakeholders.

1.8 Limitations of the Study

⁷³ Chukwuemeka Ogbonna *et al*, 'Understanding Nigeria's Transition Pathway to Carbon Neutrality using the Multilevel Perspective' (2023) 2(24) Carbon Neutrality, 1.

A major limitation of this study is the fragmented and overlapping nature of renewable energy policies and regulations in Nigeria, which are dispersed across various sectors and institutions, leading to lack of coherence and effective implementation. This fragmentation makes it difficult to identify a unified legal framework for renewable energy development and poses challenges in evaluating the adequacy and effectiveness of existing laws. In addition, examining the legal frameworks of the selected Nordic jurisdictions, that is, Sweden, Denmark, and Norway, this study relied on Google translations of legislation and regulations that are not officially available in English. These translations served as the primary means of interpreting statutory provisions and regulatory language. Every effort has been made to cross-check the translated texts against secondary literature and policy documents to ensure consistency. Nonetheless, it must be acknowledged that certain provisions of the original texts may not be fully conveyed through automated translation. The interpretations presented should therefore be understood within this limitation.

1.9 Operational Definition of Terms

1.9.1 Climate change mitigation: Climate change mitigation refers to attempts to minimize or avoid greenhouse gas emissions. Mitigation might take the form of implementing new technologies and renewable energy sources, improving the energy efficiency of current equipment, or altering management procedures or customer behaviour.⁷⁴

1.9.2 Climate change: Climate change is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.⁷⁵

⁷⁴ United Nations Environment Programme (1972-2022) <<https://www.unep.org/explore-topics/climate-action/what-we-d-/mitigation>> accessed 6 June 2024. See also Oluwatoyin Ajayi, 'Examining Nigeria's Institutional Response to Climate Change' (2022) 126 *Journal of Law, Policy & Globalization*, 20.

⁷⁵ Article 1(2) of the *United Nations Framework Convention on Climate Change* 1992. See also D Hunter, J Salzman and D Zaelke, *International Environmental Law and Policy* (Foundation Press, New York, 2002) 119.

1.9.3 Energy: Energy is defined as the capacity to do work, that is, the strength and vitality needed for sustained physical or mental capacity.⁷⁶ Energy is the inherent property of a system or substance that enables it to perform work, induce motion, generate heat, produce light, or cause transformations. It exists in diverse forms and flows within and between systems, sustaining life processes, powering machines, and driving natural phenomena.⁷⁷ Energy, in the sustainable development context, refers to the harnessing of natural and technological resources to produce power for human activities in ways that are efficient, inclusive, affordable, and environmentally responsible. It recognizes that equitable access to reliable, clean, and modern energy is fundamental to improving quality of life,⁷⁸ fostering innovation, and combating climate change.⁷⁹ Energy, in legal and policy terms, represents the regulated production, distribution, and utilization of power derived from natural and technological sources, forming the foundation for industrial growth, infrastructure development, and environmental stewardship. It encompasses the legal principles, rights, and obligations governing the exploration, generation, transmission, storage, and efficient use of energy resources within a jurisdiction.⁸⁰

1.9.4 Environmental pollution: Environmental pollution refers to the introduction, accumulation, or persistence of harmful substances, energy, or agents whether chemical, physical, biological, or radiological into the natural environment in ways that exceed its capacity to absorb, neutralize, or recover from them. It includes a wide range of phenomena, including air, water, soil, noise, thermal, and radioactive contamination, as well as emerging

⁷⁶ Nick Jelley, *A Dictionary of Energy Science* (Oxford University Press, 2019); Renewable Energy and Energy Efficiency Dictionary; Michael Hordeski, *Dictionary of Energy Efficiency Technologies* (Fairmont Press, West Virginia, 2004).

⁷⁷ Paolo Bussotti, 'Introducing the Concept of Energy: Educational and Conceptual Considerations Based on the History of Physics' (2023) Proceedings of the 5th International Baltic Symposium on Science and Technology Education, Baltic, STE2023, 38.

⁷⁸ Goal 7 of the United Nations Sustainable Development Goals 2015.

⁷⁹ *ibid.* Goal 13.

⁸⁰ David Obada *et al.*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 4.

challenges such as microplastic pollution and greenhouse gas emissions. From a legal and policy standpoint, environmental pollution represents a breach of ecological sustainability thresholds, triggering regulatory obligations for prevention, control, and remediation. In the broader socio-economic context, it affects human health, food security, biodiversity, climate stability, and economic development, making it one of the most critical global challenges of the 21st century.⁸¹

1.9.5 Fossil fuels: Fossil fuels are energy sources formed over billions of years from the remnants of live species.⁸² Fossil fuels consist of a class of hydrocarbon⁸³ (such as coal, petroleum, oil shale, bitumen, tar sands or natural gas) forms within the earth crust that can be used as a source of energy.⁸⁴

1.9.6 Low-carbon energy: Low-carbon energy refers to the generation, utilization, and regulation of energy derived from technologies, resources, and systems that produce substantially lower greenhouse gas emissions compared to conventional fossil fuel-based sources. It encompasses renewable energy solutions, transitional technologies, and efficiency-driven innovations aimed at achieving a sustainable energy transition.⁸⁵ As a strategic pillar of global climate policy, low-carbon energy seeks to balance economic development, environmental protection, and energy security by enabling nations and industries to reduce their carbon footprints while meeting rising energy demands. Within legal and institutional

⁸¹ S Khasanova, E Alieva and A Shemilkhanova, 'Environmental Pollution: Types, Causes and Consequences' (2023) BIO Web od Conferences 63 <https://www.bio-conferences.org/articles/bioconf/pdf/2023/08/bioconf_ase2023_07014.pdf> accessed 19 June 2024.

⁸² Francesco Gerali, 'Fossil Fuels' (2021) <https://www.researchgate.net/publication/348305878_Fossil_Fuels> accessed 30 October 2025; Energy Envoys: Non-renewable and Renewable Sources <http://www.energyenvoys.org.uk/sites/default/files/Non-renewable%20and%20renewable%20resources_0.pdf> accessed 14 August 2024.

⁸³ C Kopp, 'Fossil Fuel Britannica' (2020) <<https://www.britannica.com/science/fossil-fuel>> accessed 19 June 2024.

⁸⁴ Merriam Webster, 'Definition of Fossil Fuels' <<https://www.merriam-webster.com/dictionary/fossil%20fuel>> accessed 19 June 2024.

⁸⁵ Vikas Pawar and Safia Farooqui, 'The Effectiveness of Renewable Energy Technologies in Reducing Greenhouse Gas Emissions' (2023) XXI(33) South India Journal of Social Sciences, 151.

frameworks, it reflects a coordinated approach to mitigating climate change, driving technological innovation, and achieving net-zero emission targets by mid-century.⁸⁶

1.9.7 Model legal framework: A model legal framework is a structured, often multi-tiered template of laws, regulations, and institutional arrangements, crafted as a normative guide for drafting or reforming legal systems in specific domains such as public investment management, official statistics, or public-private partnerships. It embodies best practice principles, adapts to diverse legal traditions, and integrates broader policy goals serving not as binding law, but as a flexible foundation for jurisdictions to tailor according to local objectives and institutional realities.⁸⁷

1.9.8 Renewable energy: This comes from resources found in nature that can be regenerated throughout time without exhaustion. Renewable energy means “energy generated from natural non-depleting resources including solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy.”⁸⁸ Renewable energy can be extracted, generated and/or consumed without any significant negative impact to the environment. It includes energetic process that can be harnessed with little or minimal harm to available natural resources. In other words, renewable energy sources replenish themselves naturally without being depleted in the earth. They include bioenergy, hydropower, geothermal energy, solar energy, wind energy and ocean (tide and wave) energy.⁸⁹ Renewable energy is obtained from energy sources whose utilization does not result in depletion of the earth’s resources. Renewable energy includes energy sources and

⁸⁶ Science Direct – Low-carbon Energy Transition <<https://www.sciencedirect.com/topics/earth-and-planetary-sciences/low-carbon-energy-transition>> accessed 19 June 2024.

⁸⁷ The Electoral Knowledge <https://aceproject.org/ace-en/topics/lf/explore_topic_new> accessed 19 June 2024.

⁸⁸ Section 1 of the *National Energy Act* (Act No. 34) 2008.

⁸⁹ Paragraph 1.3 of the *Nigerian Renewable Energy and Energy Efficiency Policy* (NREEP), 2015.

technologies that have minimal environmental impacts, such as less intrusive hydros and certain biomass and combustion.⁹⁰

1.10 Structure of the Study

This study is divided into six parts:

Chapter 1 is the introductory chapter. It discusses the background to the study, statement of the problem, the aim and objectives of the study. The chapter also discusses the research questions underlying the study, research methodology, scope of the study, significance of the study, limitations of the study, operational definition of terms, and structure of the study.

Chapter 2 presents a contextual study of the Nigerian energy sector. The chapter considers a systematic investigation of the historical context of Nigeria's energy environment. In addition, the chapter undertakes a critical review of related literature, conceptual and theoretical frameworks of renewable energy, renewable energy sources, environmental pollution, and climate change, as well as the consequential challenges and impacts of environmental pollution in Nigeria.

Chapter 3 examines the extant legal framework for the regulation of energy production and use in Nigeria, and the extent to which the framework as it exists could be reinforced to address any adverse impacts of environmental pollution and climate change through increased adoption of renewable energy sources.

Chapter 4 examine renewable sources of energy as a panacea to the challenges of pollution and climate change, drawing examples from legal developments on the subject, from jurisdictions that have successfully recorded meaningful transition from fossil fuels to

⁹⁰ *ibid.*

renewables as sources of energy and critically consider fossil fuels as main sources of energy in Nigeria.

Chapter 5 proffers a model legal framework for the advancement of low-carbon energy through renewable energy sources in Nigeria, critically suggesting modifications to extant legislations, policies, and regulations that could facilitate the required transition from the dominance of fossil fuels to renewables as sources of energy.

Chapter 6 presents the conclusion of the study, with recommendations to address any lacuna identified in course of the study, while highlighting the contribution of the study to existing body of knowledge. Suggestions are made for further investigation in the area of the study.

Chapter 2

Literature Review

Nigeria stands as the foremost economy in Sub-Saharan Africa, with its energy sector serving as the primary source of government revenue and foreign exchange. Due to the abundance of fossil fuels and crude oil reserves, Nigeria is often referred to as the “Giant of Africa.”¹ Despite the recognition of the necessity of renewable energy sources for economic diversification to foster stability and clean environment, the country remains predominantly reliant on fossil fuels for energy generation which have adverse effects on the environment.² In addition, considering the demand and supply ratio of energy despite the series of laws and policies that have been developed to improve the Nigerian energy sector, the demand for energy continues to outweigh the supply.³ This is reflected in the historical context of the Nigerian energy sector discussed in the next section.

2.1 Historical Context of the Nigerian Energy Sector

The growth of the Nigerian energy sector has been inextricably linked to the country's political and economic transformations, from the pre-independence to the current democratic dispensation.⁴ The history of the evolvement of the Nigerian energy sector, is conveniently classified into the pre-independence era, the developmental plan era, the post structural adjustment era and the democratic era.

¹ OO Okorafor *et al*, ‘Biomass Energy in Nigeria: Prospects, Challenges and Solutions’ (2024) 78 Innovations, 1.

² Ihuoma Grace Chukwuma-ekwueme, ‘Impact of Crude Oil Trade on Nigeria’s Economy: A Time Series Approach’ (Dissertation, World Maritime University 2023).

³ Ramchandra Pote and Baye Boucar Diouf, *op cit.* n5.

⁴ Ahmad Abdulsalam Abdallah and Odetokun Blessing Odeleke, ‘Energy Security in Nigeria: Challenges and Prospects’ (2023) 1(1) Journal of Arid Zone Economy, 102.

2.1.1 The Pre-independence Era (pre-1960)

The bedrock of the Nigerian energy sector, notably the oil and gas industry, was founded during the colonial era.⁵ The British colonial government played a significant role in the early discovery and exploitation of Nigeria's natural resources.⁶ Oil exploration in Nigeria began in 1908, when the Nigerian Bitumen Corporation, a German company, began exploring in the Araromi and Okitipupa area, of the present-day Ondo state. However, the start of the World War 1 brought an end to these attempts.⁷ The quest for oil resumed in the 1930s, when Shell D'Arcy was granted an exploration license spanning the entire Nigerian mainland.⁸

In 1958, Shell British Petroleum (BP) now Shell Petroleum Development Company (SPDC), discovered oil for the first time, and produced oil in Oloibiri in commercial quantities.⁹ This commercial activity in the Niger Delta region was what propelled Nigeria to the league of the world's top crude oil producers, which marked the foundation of what later became the bedrock of Nigeria's economy.¹⁰

In relation to electricity, while the exploration of oil started in 1908, the history of the Nigerian power sector dates back to 1896 when two energy generating plants were established to serve the then colony of Lagos.¹¹ In 1929, an energy utility business entity called the Nigerian Electricity Supply Company (NESCO) was established, which built a hydro-electric station in central Nigeria, that mainly supplied energy to the Northern part of

⁵ Faisal Emetuma and Fatima Emetuma, 'Nigerian Oil and Gas Industry in an Era of Energy Transition: Analysis of TotalEnergies' Activities in Nigeria' (2025) 4(1) American Journal of Environmental Economics, 104.

⁶ Okeke Ahizechukwu, 'British Colonial Economic System and Foreign Trade in Nigeria, 1900 – 1960' (2025) 2(5) Sarcouncil Journal of Arts Humanities and Social Sciences, 7.

⁷ *ibid.*

⁸ *ibid.*

⁹ Stephen Nyeenenwa and Maraizu Elechi, 'Oil Operations in the Nigeria's Niger Delta Region: A Legal-Philosophical Perspective' (2023) 5(4) International Journal of Public Administration and Management Research, 95.

¹⁰ *ibid.*

¹¹ Adewumi Adebayo, 'Electricity, Agency and Class in Lagos Colony, c.1860s–1914' (2024) 262(1) Past & Present, 2.

the country.¹² In 1946, the Public Works Department was established by the colonial government to take over and oversee the energy supply industry.¹³ In order to effectively coordinate the energy development, the colonial government enacted the *Electricity Corporation of Nigeria* Statute No.15 of 1950 thereby establishing the Electricity Corporation of Nigeria (ECN).¹⁴ During this period, energy production and generation was largely based on hydroelectricity and thermal energy plants.¹⁵

2.1.2 The Developmental Plan Era (1960 – 1985)

Following Nigeria's independence in 1960, the energy industry witnessed significant growth, driven by the government's focus on national development to accelerate economic growth and improvement in energy infrastructure.¹⁶ In 1961, the Niger Dams Authority (NDA) was created to meet the energy demands in the country.¹⁷ The NDA was in charge of discovering, developing and operating hydroelectric dams, as well as other energy generating sources in the country, which included fossil fuels.¹⁸ Furthermore, the NDA was granted permission to construct, maintain, and operate the country's energy transmission grid. The NDA succeeded in increasing the energy generation capacity and also created equivalent energy transmission grid between 1961 and 1972.¹⁹ In 1972, the ECN and NDA were merged to form the National Electric Power Authority (NEPA), creating a vertically integrated energy industry

¹² Yusuf Chanchangi *et al*, 'Nigeria's Energy Review: Focusing on Solar Energy Potential and Penetration' (2023) 25 Development and Sustainability, 5758.

¹³ *ibid*.

¹⁴ Charlotte Remteng *et al*, 'Nigeria Electricity Sector' (2021)

<https://energypedia.info/wiki/Nigeria_Electricity_Sector> accessed 20 September 2024.

¹⁵ *ibid*.

¹⁶ LN Chete, JO Adeoti, FM Adeyinka and O Ogundele, 'Industrial Development of Growth in Nigeria: Lessons and Challenges' (2016) Working Paper, 1 <https://www.brookings.edu/wp-content/uploads/2016/07/L2C_WP8_Chete-et-al-1.pdf> accessed 20 September 2024.

¹⁷ Olusina Sipasi, Crystal Okwurionu and Maranatha Abraham, 'Nigeria Power Sector Review' (2019) 3 <<https://www.aellex.com/wp-content/uploads/2019/07/Power-Sector-Guide-Nigeria-final-24.07.2019.pdf>> accessed 20 September 2024.

¹⁸ *ibid*.

¹⁹ *ibid*.

monopoly.²⁰ Thus, NEPA then controlled the energy industry value chain, which includes the generation, transmission, and distribution of energy.²¹ The development plan era is divided into 4 sub-eras discussed hereunder:

2.1.2.1 First National Development Plan (1962 – 1968)

The First National Development Plan was Nigeria's first comprehensive attempt to map the post-independence growth, which included the energy industry.²² The Nigerian Coal Corporation was named as a key player in energy production, contributing a substantial amount of the country's energy through thermal energy plants.²³ Coal mining, which was a key energy resource since the early twentieth century, but it began to wane in the 1960s as oil became more readily available.²⁴ Although several national energy projects were completed and commissioned as scheduled, these include the Afam I, Afam II, Ijora I, Delta I and the Kanji I energy generation plants. These energy generation plants significantly increased the energy capacity inherited from the colonial government.²⁵

2.1.2.2 Second National Development Plan (1970 – 1974)

As discussed earlier, the discovery of oil in commercial quantities in Oloibiri in 1956 marked the commencement of significant shift in Nigeria's economic focus from agriculture to oil

²⁰ Nigerian Authority System Operators, History of System Operations <<https://nsong.org/AboutUs/History.aspx>> accessed 20 September 2024.

²¹ Ebigenibo Genuine Saturday, 'Nigerian Power Sector: A New Structure Required for Effective and Adequate Power Generation, Transmission and Distribution' (2021) 7(1) Global Journal of Engineering and Technology Advances, 02.

²² Uche Emmanuel, 'Development Plan and Policies in Nigeria: Observed Impediments and Practical Best Alternatives' (2019) 6(7) International Journal of Research and Scientific Innovation, 27.

²³ Akeem Adebesein and Taiwo Amosun, 'Review of Utilization of Coal, Natural Gas and Hydro for Sustainable Power Generation' (2022) 2(2) Borobudur Engineering Review, 114.

²⁴ *ibid.*

²⁵ Chijindu Igwe, 'A Review of Power Generation in Nigeria: Limitations and Recommendations' (2021) 7(1) Futo Journal Series, 157. See also Stanley Nwani, 'An Overview of Nigerian Energy Sector: Prospects and Challenges' (2018)

<https://www.academia.edu/37834838/AN_OVERVIEW_OF_NIGERIAN_ENERGY_SECTOR_PROSPECTS_AND_CHALLENGES_BY> accessed 23 September 2024.

production.²⁶ Oil production increased significantly in the 1960s, and by the 1970s, Nigeria had established itself as a major oil exporter. This marked the era of the Second National Development Plan.²⁷ In 1971, Nigeria joined the Organization of Petroleum Exporting Countries (OPEC), firmly establishing itself as a major participant in global oil markets.²⁸ In the same year, the Nigerian National Oil Corporation (NNOC) was established to control and participate in the petroleum sector on behalf of the government.²⁹ By 1977, the NNOC was merged with the Ministry of Mines and Power to establish the Nigerian National Petroleum Corporation (NNPC),³⁰ which became the state-owned oil company responsible for oil exploration, production, and commercialization, while regulatory functions remained under government oversight, later formalized under the Department of Petroleum Resources (DPR) in 1988.³¹ However, from 1970 to 1974, the second national development plan only prioritized post-civil war reconstruction, reconciliation, and rehabilitation efforts, to the detriment of the development of the energy sector. Hence, no major energy projects were commissioned.³²

2.1.2.3 Third National Development Plan (1975 – 1980)

The Third National Development era witnessed a significant oil boom as oil prices increased globally providing the Nigerian government with substantial revenues.³³ In addition, there

²⁶ Alexander Ugwukah and Obinna Ohaja, 'A Histogramic Assessment of the Petroleum Industry and Its Impact on the Nigerian Economy' (2016) 36, Historical Research Paper, 12.

²⁷ *ibid.*

²⁸ Bedford Fubara, 'The Ethics of Nigeria's Proposed Withdrawal from the Organization of Petroleum Exporting Countries' (1986) 5(4) Journal of Business Ethics, 328.

²⁹ *ibid.*

³⁰ *ibid.*

³¹ Ministry of Petroleum Resources Federal Republic of Nigeria <<https://petroleumresources.gov.ng/our-history/>> accessed 4 February 2025.

³² Chijindu Igwe, 'A Review of Power Generation in Nigeria: Limitations and Recommendations' (2021) 7(1) *Futo Journal Series*, 159.

³³ PO Akinbulire, PO Oluseyi, CO Awosope and OO Okoro, 'Data-Based Analysis of Power System Crisis in Nigeria' (2008) ESPTAEE National Conference, University of Nsukka, 193. See also A.I Adekitan, Ayobami Olajube and Isaac Adekunle Samuel, 'Data-Based Analysis of Power Generation and Transmission Losses in Nigeria' (2019) Conference Paper <https://www.researchgate.net/publication/340966159_Data-based_Analysis_of_Power_Generation_and_Transmission_Losses_in_Nigeria> accessed 23 September 2024.

was a significant expansion in energy developments, with seven gas-powered and two hydroelectric energy plants. These energy plants include, Delta II, Kanji II, Afam II, Afam III, Kanji III, Ijora Undertaking, and Sapele I.³⁴ Among the established energy plants, the Sapele I energy plant in Delta state, accounted for over 30% of the total energy generating capacity. It is worthy to note that, in this same era, corruption and incompetence had begun to shackle many of these initiatives, and regrettably, most of the revenues gotten from oil did not result in any meaningful long-term economic development.³⁵

2.1.2.4 Fourth National Development Plan (1981 – 1985)

During the Fourth National Development era, few energy plants with larger capacities were built and commissioned than in previous decades.³⁶ 4 energy plants, namely the Sapele II, Afam IV, Jebba and Egbin energy plants were established, and despite only four energy plants being commissioned, the capacities were significantly higher than the previous energy plants.³⁷ The success of these energy projects was attributed to their strategic placement and careful consideration of prospective new sites.³⁸ The Egbin and Jebba energy plants generated almost 70% of the energy capacity required.³⁹ However, with the increased energy capacities of the newly commissioned energy plants, the Fourth National Development Plan was affected by the dwindling oil prices characterizing the 1980s.⁴⁰ During this time, the changes in the energy sector were insufficient to address the rising inefficiencies in energy generation and delivery.⁴¹ This was the period immediately preceding the Post-Structural Adjustment Programme Era discussed below.

³⁴ *ibid.*

³⁵ *ibid.*

³⁶ Chijindu Igwe, op cit. n32.

³⁷ *ibid.*

³⁸ *ibid.*

³⁹ *ibid.*

⁴⁰ LN Chete *et al*, 'Industrial Development and Growth in Nigeria: Lessons and Challenges' (2016) Working Paper No. 8, 3.

⁴¹ *ibid.*

2.1.3 Structural Adjustment Programme Era (1986 – 1999)

The 1980s marked a turning point for Nigeria's economy and energy sector due to the introduction of the Structural Adjustment Program (SAP) by the military government under General Ibrahim Babangida. The SAP, initiated in 1986, was designed to address economic decline by implementing market-oriented reforms, including the liberalization of the economy, privatization of state-owned enterprises, which would end the monopolistic era of NEPA and removal of subsidies.⁴² For instance, the oil and gas industry remained under the governance of the NNPC, but the government encouraged more foreign investment through production-sharing contracts and joint ventures.⁴³ However, corruption, mismanagement, and declining oil prices continued to hamper the growth of the oil and gas industry.⁴⁴

In addition, the SAP era led to a significant decline in the energy industry. In the sense that, NEPA, which had been created in 1972 to manage energy generation, transmission and distribution, became increasingly inefficient.⁴⁵ Chronic energy outages, poor maintenance, and underinvestment in new infrastructure became persistent challenges.⁴⁶ The government attempted to reform the energy industry by introducing new policies. One of which was the Energy Policy of Nigeria of 1993, with the aim of diversifying the Nigerian energy mix by encouraging the growth of renewable energy. However, the implementation of this policy was delayed, Nigeria's refineries were operating far below capacity, and the energy industry continued to rely heavily on fossil fuels.⁴⁷ Incidentally, not much was done in terms of energy projects in this era, as only one energy plant, which was the Delta IV was commissioned.⁴⁸

⁴² Murtal Muhammad, 'Structural Adjustment Programme and Its Impact on the Nigerian Manufacturing Sector (1986 – 2016)' (2018) 15(2) *Techno Science Africana Journal*, 118.

⁴³ *ibid.*

⁴⁴ *ibid.*

⁴⁵ Nasir Adam, 'Privatization of Electricity Industry in Nigeria, where did We Get It Wrong?' (2020) Centre for Energy, Petroleum and Mineral Law and Policy, 2.

⁴⁶ *ibid.*

⁴⁷ National Energy Policy 2022.

⁴⁸ *ibid.*

2.1.4 Democratic Era (1999 – Present)

Nigeria's return to democratic rule in 1999 under President Olusegun Obasanjo, marked a new chapter in the energy industry with renewed attempt at reform, through privatization aimed at addressing NEPA's inefficiencies.⁴⁹ In this era, seven energy plants were built and commissioned. These energy plants were, Egbin-IPP, Papalanto, Omotosho, Geregu, Alaoji, IPP (oil co.) and IPP (non-oil co.).⁵⁰ Although these additional energy plants were supposed to engender hope, the energy industry continued to suffer significant challenges with respect to governance, corruption and infrastructural deterioration.⁵¹ Study shows that, from 1999 – 2007, a sum of \$16 billion was spent on the energy sector, while \$5.3billion between 2007 and 2009. Despite spending \$21 - 375 billion on the energy industry with advancements, energy generation remained lower than the required capacity.⁵² To further increase energy generation, the Federal government established the Niger Delta Power Holding Company (NDPHC) in 2004, as an “emergency intervention scheme” in the form of a limited liability company funded by the public sector to manage the National Independent Power Projects (NIPPs) in the Niger Delta region, yet, energy generation crisis continued.⁵³

In 2005, the *Electric Power Sector Reform Act, 2005* (EPSRA) was established, to dissolve NEPA as a monopoly, and promote competition in the energy industry.⁵⁴ Through the EPSRA, NEPA was transformed and renamed to Power Holding Company of Nigeria (PHCN) following subsequent changes.⁵⁵ The EPSRA aimed to improve the efficiency, accessibility,

⁴⁹ John Campbell, 'The Legacy of Nigeria's 1999 Transition to Democracy' (Council on Foreign Relations, 4 October, 2019) <<https://www.cfr.org/blog/legacy-nigerias-1999-transition-democracy>> accessed 26 November 2024.

⁵⁰ Arinze Okoye, 'Review of the Nigerian Power Sector' (2024) 16(8) Journal of Energy Research and Reviews, 46.

⁵¹ *ibid.*

⁵² *ibid.*

⁵³ Sunday Olayinka Oyedepo *et al*, 'Towards a Sustainable Electricity Supply in Nigeria: The Role of Decentralized Renewable Energy System' (2018) 2(4) European Journal of Sustainable Development, 3.

⁵⁴ The Electric Power Sector Reform Act 2005, s1.

⁵⁵ Sunday Olayinka Oyedepo *et al*, *op cit.* n53.

reliability, and affordability of energy supply, promoting economic growth and change in the country.⁵⁶ In addition, the ESPRA established a new regulatory authority known as Nigerian Electricity Regulatory Commission (NERC).⁵⁷ NERC is an independent regulatory body with the authority to regulate the licensing of energy companies, establish energy tariffs, enforce standards and protect consumer rights in the energy industry.⁵⁸ The ESPRA replaced the *National Electric Power Authority Act 1972*, establishing independent organizations to control the energy industry rather than the Federal government.⁵⁹ This action led to the emergence of 18 energy successor companies: 6 power generating companies, 1 power transmission company, and 11 power distribution companies.⁶⁰

The two main types of energy generation sources for the GenCos are gas and hydro.⁶¹ The DisCos include the Abuja, Benin, Eko, Enugu, Ibadan, Ikeja, Jos, Kaduna, Kano, Port Harcourt, and Yola energy distribution companies.⁶² The six GenCos and other IPP's were structured to sell the energy generated to the distribution companies.⁶³ While the energy industry's generation and distribution were completely privatized, the Federal government retained control of the energy transmission process being operated by Manitoba Hydro International (MHI).⁶⁴ The emergence of these energy successor companies paved way for the

⁵⁶ Section 30 of the *Electric Power Sector Reform Act*, 2005.

⁵⁷ *ibid.* s 31.

⁵⁸ *ibid.* s 32.

⁵⁹ Preamble of the *Electric Power Sector Reform Act*, 2005.

⁶⁰ Ebigenibo Genuine Saturday, 'Nigerian Power Sector: A New Structure Required for Effective and Adequate Power Generation, Transmission and Distribution' (2021) 1(1) *Global Journal of Engineering and Technology*, 6.

⁶¹ Transmission Company of Nigeria, A Brief History <https://tcn.org.ng/page_history.php> accessed 26 November 2024.

⁶² *ibid.*

⁶³ *ibid.*

⁶⁴ Edino Ojonimi Ferdinand and Audu Enojo, 'The Impact of Privatization of Nigeria's Electricity Industry on the Quality of Electricity Service Delivery in Lokoja Metropolis' (2024) 4(2) *AKSU Journal of Administration and Corporate Governance*, 157.

privatization of the energy industry, with the aim to increase energy efficiency and attract investment.⁶⁵

The process of the energy industry's privatization has been criticized to be poorly implemented as energy inefficiency and outages persists. The privatization of Nigeria's energy industry has been met with persistent criticism, not simply because it failed to deliver expected results, but because of the structural and procedural weaknesses that accompanied its implementation. Critics argue that the process was marred by a lack of transparency, inadequate regulatory preparation, and the hurried transfer of assets to private investors who were neither technically equipped nor financially prepared to take on the enormous task of revamping the sector.⁶⁶ The promise was that privatization would usher in efficiency, competition, and reliable power supply; yet, years later, Nigeria still struggles with erratic electricity, frequent grid collapses, and a glaring mismatch between generation capacity and actual supply to consumers.⁶⁷

One of the major criticisms centers on the failure to establish a robust framework to support the new private operators. The electricity tariff system, for example, remained artificially low for years, discouraging investment and rendering the sector financially unsustainable. The government's continued subsidy of electricity tariffs also created distortions that limited the autonomy and financial viability of the new distribution companies.⁶⁸ Furthermore, the privatization process did not adequately address the massive technical and infrastructural

⁶⁵ *ibid.*

⁶⁶ Nasir Adam, 'Privatization of Electricity Industry in Nigeria, Where did We Get it Wrong?' (2020) Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee, 2. See also Victor Chukwuma, 'The Persistent Predicament of Nigeria's Power Sector Privatization Scheme: Is Deprivatization an Alternative Step to Take?' (2020) 7 Benin Journal of Public Policy, 154.

⁶⁷ *ibid.*

⁶⁸ Enojo Audu, Salisu Paul and Abraham Ameh, 'Privatization of Power Sector and Poverty Power Supply in Nigeria: A Policy Analysis' (2017) 6(10) International Journal of Development and Sustainability, 1219.

deficits that plagued the sector. Transmission bottlenecks, aging equipment, and inadequate metering systems were largely ignored in the rush to privatize.⁶⁹

Stakeholders also point to the absence of strict performance benchmarks and enforcement mechanisms. Many of the private companies acquired assets without committing to clear, measurable timelines for improvement, and when performance lagged, regulators often lacked the political will or legal backing to impose penalties. As a result, consumers have borne the brunt of an electricity system that is neither public nor fully private in accountability, trapped in a cycle of poor service and rising costs without corresponding improvements in delivery.⁷⁰

In 2010, the Nigeria Bulk Electricity Trading (NBET) Plc was established to serve as a broker between energy distribution companies and Independent Power Producers (IPPs). The Federal government also established the Nigerian Electricity Liability Management Company (NELMCO) to manage PHCN's assets and liabilities.⁷¹ Meanwhile, in response to the demand for improvement in the access and supply of energy, another reform was established same year called the Road Map for Power Sector Reform.⁷² This road-map was aimed at promoting private sector investment with a view of government divesting at least fifty-one percent ownership in seventeen of the eighteen successor companies while retaining state ownership with private management; reforming the problematic tariff system through NERC to establish fairer pricing; setting up a bulk purchaser to centralize power purchases from generating companies, IPPs, and other licensed providers for distribution resale; encouraging

⁶⁹ *ibid.*

⁷⁰ Nasir Adam, *op cit* 66.

⁷¹ Francis Agboola and Kognam Owudumopu Alex, 'Nigeria's Energy Sector Privatization: Reforms, Challenges and Prospects' (2019) 1(2) South Asian Research Journal of Humanities and Social Sciences, 192.

⁷² CG Monyei *et al.*, 'Nigeria's Energy Poverty: Insights and Implications for Smart Policies and Framework towards a Smart Nigeria Electricity Network' (2018) 81 Renewable and Sustainable Energy Reviews, 1587.

federal investments in new power plant construction; and enhancing the licensing framework to align licensing periods with investor recovery timelines.⁷³

In 2014, the privatization of Nigeria's energy generation and distribution companies was finalized, with assets handed over to the respective private purchasers. While the reform was intended to resolve long-standing inefficiencies in the power sector and improve electricity supply for both businesses and households, the reality fell short of expectations. Energy outages continued as a daily reality, highlighting the inadequacies of the privatization process.⁷⁴ One of the key criticisms was that the reform focused too heavily on the transfer of ownership without first resolving critical infrastructural and regulatory deficiencies.⁷⁵ Additionally, many of the new investors lacked the technical and financial capacity to make the necessary long-term investments, resulting in minimal improvements to power delivery. Compounding the issue was the continued absence of an effective tariff structure and reliable metering, which further weakened service delivery and consumer trust.⁷⁶

In 2015, the National Renewable Energy and Energy Efficiency Policy (NREEEP) was implemented to promote sustainable energy development, reduce reliance on fossil fuels, and address the country's enormous energy deficit.⁷⁷ The NREEEP aims to diversify Nigeria's energy mix by incorporating renewable energy sources into the national energy supply mix, while enhancing energy efficiency to reduce environmental impacts, foster economic growth, and increase energy access and supply to meet the demands of the populace.⁷⁸ Through the NREEEP, the Federal government sought to align with global environmental standards and

⁷³ *ibid.*

⁷⁴ Obianuju Agu, 'An Analysis of the Legal Framework on Privatization of the Nigerian Power Sector' (2019) 6(1) Nnamdi Azikiwe University Journal of Commercial and Property Law, 113.

⁷⁵ *ibid.*

⁷⁶ Anthony Udoghe *et al*, 'Performance Evaluation of the Prospects and Challenges of Effective Power Generation and Distribution in Nigeria' (2023) 9(3) Heliyon, 2. See also Francis Oluleye and Koginam Alex, 'Nigeria's Energy Sector Privatization: Reforms, Challenges and Prospects' (2019) 1(2) South Asian Research Journal of Humanities and Social Sciences, 190.

⁷⁷ National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015.

⁷⁸ *ibid.*

commitments to reduce greenhouse gas emissions, thereby supporting Nigeria's broader goals for sustainable development and climate resilience.⁷⁹

In order to modernize Nigeria's energy industry and addressing the limitations of the EPSRA in meeting the current energy demands and promoting sustainable growth, the EPSRA was repealed by the *Electricity Act 2023*.⁸⁰ The Act aimed to decentralize the energy industry by enabling States to generate, transmit and distribute energy their jurisdictions, therefore reducing the Federal government's monopoly.⁸¹ The decentralization of the energy industry encourages the involvement of private sectors, improves the monitoring of regulations, promotes the integration of renewable energy in to the country's energy mix, and improves the energy industry's efficiency and reliability.⁸² In essence, the Act aimed to establish a more competitive, equitable and sustainable energy market that is effectively aligned with the country's economic development goals and environmental obligations.

The historical evolvement of Nigeria's energy industry has traversed change from reliance on coal and hydropower before independence to an overwhelming reliance on fossil fuels especially oil and gas, which had continued post-independence till date. The overreliance on fossil fuels has continued to adversely impact the users and the environment. Despite the establishment and implementation of reforms in the energy industry, throughout the various era discussed above, the infrastructure of the energy industry has not witnessed any meaningful development, and electricity continued to experience periodic outages all over the country. For instance, the national grid has collapsed more than ten times in 2024, with 2 major shutdowns recorded in the month of November, 2024.⁸³ Insufficient and epileptic

⁷⁹ *ibid.*

⁸⁰ *Electricity Act 2023*

⁸¹ *ibid.* section 1(a-s).

⁸² *ibid.*

⁸³ Ajibiewe Samson Ojo, 'Incessant Grid Collapses Plunge Nigeria into Darkness' (Nigerian Tribune, 7 November 2024) <<https://tribuneonlineng.com/incessant-grid-collapses-plunge-nigeria-into-darkness/>> accessed 26 June 2025. See also Cyrus Ademola, 'Blackout as National Grid Collapses for the Tenth Time in 2024'

electricity supply has become the standard practice in Nigeria, making most individuals and institutions to rely on their own source of energy generation which regrettably rely on the use of fossil fuels.⁸⁴

From the above, it is clear that Nigeria's energy industry has long suffered from chronic underinvestment across all major segments, generation, transmission, and distribution, each of which plays a vital role in the overall health of the power sector. This underinvestment has been compounded by inadequate regulatory oversight and weak governance structures, resulting in a fragmented and inefficient system.⁸⁵ Crucially, inefficiencies in one segment inevitably spill over into the others. For instance, even if power generation improves, poor transmission infrastructure limits how much of that power can actually reach distribution networks, and ultimately, consumers. Similarly, if distribution companies are unable to collect revenues effectively due to poor metering or non-cost-reflective tariffs, they cannot reinvest in infrastructure, creating a cycle of failure.⁸⁶

The fact that only about fifty-five to sixty percent of Nigeria's population is connected to the national grid highlights both the scale of exclusion and the fragility of the existing infrastructure.⁸⁷ This figure might suggest progress in terms of reach, but in the broader context, it is deeply concerning. It means that nearly half the population, over 100 million people still rely on off-grid sources like generators, candles, or alternative energy solutions, often at higher costs and greater environmental impact. Moreover, for those who are connected, supply is unreliable, characterized by frequent outages and voltage fluctuations.

(Nairametrics, 7 November, 2024) < <https://nairametrics.com/2024/11/07/breaking-blackout-as-national-grid-collapses-for-the-tenth-time-in-2024/> > accessed 26 June 2025.

⁸⁴ Ahmad Abdallah and Odetokun Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) *Journal of Arid Zone Economy*, 107.

⁸⁵ Francis Boluwatife Elehinafe *et al*, 'Energy Status, Energy Mix and Renewable Energy Potentials in Nigeria' (2021) 11(1) *Energy and Environmental Research*, 51.

⁸⁶ *ibid*.

⁸⁷ Ahmad Abdallah and Odetokun Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) *Journal of Arid Zone Economy*, 107.

Therefore, while grid connectivity statistics may appear to signal development, the underlying reality exposes a sector that continues to underperform and fail to meet the basic energy needs of the population. Addressing these issues requires not just infrastructure investment but a coordinated and accountable governance approach that views energy as a critical driver of national development.

However, the quality and consistency of energy access are significant challenges, with much of the grid-connected population facing frequent outages and limited hours of daily energy supply, which has forced almost every household and institutions to rely on their own generators for energy supply which makes use of fossil fuels.⁸⁸ This leaves around forty to forty-five percentage of Nigerians primarily in rural areas without any connection to the grid, emphasizing the critical need for infrastructure development and renewable energy sources into the Nigeria energy mix, which will reduce the overdependence.⁸⁹

Although there has been an increased interest in renewable energy sources as solution to Nigeria's energy and environmental challenges in recent years, Nigeria is currently at a crucial crossroads, requiring a significant energy transition from fossil fuels to renewable energy sources, with an effective legal framework to regulate every aspect of the sector. That is the crux of this study, presented in a proper context in the succeeding review of literature relevant to the energy sector and its impact on humans and the environment.

2.1.5 Literature Review

The exponential increase in the world population coupled with the present-day industrial development and activities has created a significant gap in the demand and supply of energy resources. In addressing this gap, a transition to the use of substantial, clean, stable and

⁸⁸ Francis Boluwatife Elehinafe *et al*, 'Energy Status, Energy Mix and Renewable Energy Potentials in Nigeria' (2021) 11(1) Energy and Environmental Research, 51.

⁸⁹ *ibid*.

reliable energy sources has become necessary.⁹⁰ The overreliance on fossil fuels for energy generation to meet daily energy demands increasingly affects the environment and human health.⁹¹ In many developing countries, access to sustainable, stable and reliable energy remains an unfulfilled aspiration and this challenge poses a substantial impediment to sustainable development.⁹² Conversely, most industrialized countries have attained impressive levels of stability and efficiency in energy supply and management. It is however a known fact that access to reliable energy is a cornerstone of a country's economic development that enables socioeconomic growth and the enhancement of standard of living of every individual.

According to Uzoma, Nnaji and Nnaji, energy is essential to all aspects of socioeconomic life.⁹³ Increasing energy sources improves energy security and promotes long-term growth in all sectors of the economy, resulting in higher *per capita* income.⁹⁴ In the same vein, Oyedepo opines that energy is essential to the economic advancement of a country, as well as to the eradication of poverty and the promotion of security. This is because access to reliable and affordable energy fuels industrial growth, powers education and healthcare systems, and supports small and medium enterprises, each of which plays a critical role in improving livelihoods and reducing inequality. Moreover, stable energy supply helps reduce social unrest and insecurity by enabling job creation and fostering inclusive economic development, particularly in underserved and rural areas.⁹⁵

⁹⁰ Temidayo Alex-Oke *et al*, 'Renewable Energy Market in Africa: Opportunities, Progress, Challenges, and Future Prospects' (2025) 59 *Energy Strategy Reviews*, 1.

⁹¹ Yeboah Samuel Jonas *et al*, 'Impact and Integration Techniques of Renewable Energy Sources on Smart Grid Operations: A Systematic Review' (2025) 29 *Scientific African*, 2.

⁹² *ibid*.

⁹³ CC Uzoma, CE Nnaji and M Nnaji, 'The Role of Energy Mix in Sustainable Development of Nigeria' (2022) 5(1) *Continental Journal of Social Sciences*, 21.

⁹⁴ *ibid*.

⁹⁵ Sunday Olayinka Oyedepo, 'Energy and Sustainable Development in Nigeria: The Way Forward' (2022) 2(15) *Energy, Sustainability and Society*, 1.

Future economic growth is heavily dependent on the long-term supply of energy from affordable, accessible and environmentally friendly sources.⁹⁶ Furthermore, security, climate change, public health are all inextricably related to the availability of energy in a country, and it plays a significant role in many areas of the country's economy. Olanrewaju *et al* states that, energy enables the provision of basic needs such as cooked food, a comfortable living temperature, lighting, the use of appliances, piped water or sewerage, critical health care (refrigerated vaccines, emergency and intensive care), educational aids, communication (radio, television, electronic mail, the World Wide Web), and transportation.⁹⁷ Energy also drives productive activities such as agriculture, trade, manufacturing, industry, and mining. To a certain extent, the standard of living in a country can be directly linked to the *per capita* energy consumption.⁹⁸ Akinwale *et al*, and Ojo, also emphasized on what the others have said, that the availability of energy resources significantly impact the country's economic growth, as it enables industrialization and improves productivity in the government sectors and overall development.⁹⁹ What can be deduced in the analysis of these authors is that, energy is extremely important, and without it, a country cannot effectively survive, as it is fundamental to all human activities.

⁹⁶ *ibid.*

⁹⁷ Deji Olanrewaju, Olubukola Ogasa, Omodele Oyedele and Ademola Taiwo, 'Energy, Renewable Energy and the Development in Nigeria' (2023) 11(1) African Journal of Environmental Sciences and Renewable Energy, 2.

⁹⁸ *ibid.*

⁹⁹ YO Akinwale, OA Jesuleye and W Siyanbola, 'Empirical Analysis of the Casual Relationship between Electricity Consumption and Economic Growth in Nigeria' (2013) 3(3) British Journal of Economics Management and Trade, 277. See also Oluwaseun Viyon Ojo, 'An Overview of the Legal and Regulatory Framework for Renewable Energy Projects in Nigeria: Challenges and Prospects' (2017) 1(1) Unilag Law Review, 22.

According to Monyei *et al.*,¹⁰⁰ Baurzhan and Jenkins,¹⁰¹ Sanusi and Owoyele,¹⁰² Akinyele, Rayudu, Nair,¹⁰³ and Omoregbe,¹⁰⁴ about 1.2 billion people currently lack access to modern and reliable energy, with about fifty percent living in Sub-Saharan Africa. Nigeria, with the highest population in the region, has over a hundred million people without access to clean and reliable energy.¹⁰⁵ This indicates that Nigeria is experiencing extreme energy poverty.

Even though Nigeria has both conventional (non-renewable) and renewable energy resources adequate to meet demand, with excess to export to neighbouring countries for revenue generation, the country's in-house energy supply is insufficient and unable to meet the country's demand. The shortage and inadequate energy supply in the country has several consequences. Despite the Federal government spending significant amount of money for over two decades to increase energy supply, the country is still plagued with acute energy shortages.¹⁰⁶ The energy supply shortages continue to pose challenges to both the urban and rural areas of the country.¹⁰⁷

Studies show that energy shortages lead to economic decline, low standard of living, poverty, hardship and other negative consequences.¹⁰⁸ A reliable energy supply is fundamental to the

¹⁰⁰ Monyei *et al.*, 'Nigeria's Energy Poverty: Insights and Implications for Smart Policies and Framework towards a Smart Nigeria' (2018) 81 *Renewable and Sustainable Energy Reviews*, 1587.

¹⁰¹ S Baurzhan and GP Jenkins, 'Off-grid Solar PV: Is it an Affordable or Appropriate Solution for Rural Electrification in Sub-Saharan African Countries?' (2016) 8(60) *Renewable and Sustainable Energy Reviews*, 1409.

¹⁰² YA Sanusi and GS Owoyele, 'Energy Poverty and its Partial Differences in Nigeria: Reversing the Trend' (2016) 93 *Energy Procedia*, 54.

¹⁰³ DO Akinyele, RK Rayudu and NKC Nair, 'Global Progress in Photovoltaic Technologies and the Scenario of Development of Solar Panel Plant and Module Performance Estimation: Application in Nigeria' (2015) 48 *Renewable and Sustainable Energy Reviews*, 114.

¹⁰⁴ *ibid.*

¹⁰⁵ A Yakubu and C Ifeanyi-Nwaoha, 'Power to the People: Solving the 100 million People Problem' (2017) 16(1) *EmPower*, 1.

¹⁰⁶ ZG Usman *et al.*, 'Transforming the Nigerian Power Sector for Sustainable Development' (2015) 87 *Energy Policy*, 430.

¹⁰⁷ *ibid.*

¹⁰⁸ Adekoya Akande, Aarinola Akindele and Abayomi Owolabi, 'Socio-Economic Impacts of Energy Poverty on Households in Ikorodu Communities, Lagos State, Nigeria' (2024) 3(2) *Journal of Sustainability and Environmental Management*, 66. See also Innocent Okwanya and Patricia Abah, 'Impact of Energy Consumption on Poverty Reduction in Africa' (2018) 9(1) *Journal of Applied Statistics*, 106. Om Katoch *et al.*, 'Energy Poverty and Its Impacts on Health and Education: A Systematic Review' (2023) 18(2) *International*

growth of a nation. According to Ikem *et al*,¹⁰⁹ the availability of energy is a significant factor in the development of a country. Ayodele and Ogunjuyigbe¹¹⁰, Oyedepo¹¹¹, Rafindad¹¹², Anumaka¹¹³ and Akuru *et al*¹¹⁴ established the stable and reliable energy supply is crucial and an essential tool that plays a significant role in a country's economic development, poverty reduction, industrial, agricultural, manufacturing, infrastructural development, employment and security. It also plays a vital role in ensuring that basic needs and services (food and water, housing, health services, and education) are adequately provided. The world today depends on abundant energy for developmental growth.¹¹⁵

According to Edomah *et al*, Nigeria's energy poverty is alarming with some reports describing the energy performance records as appalling.¹¹⁶ Thus, it becomes imperative for unceasing research on the energy situation to provide possible solutions to mitigate the problem as many people live without access to the grid, making the situation very concerning, affecting the citizens and economic growth of the country according to the World bank.¹¹⁷ Research has been conducted to explore the potential of clean and reliable energy in Nigeria, with many concluding that clean and reliable energy is the solution to Nigeria's acute energy

Journal of Energy Sector Management, 2. Gonzalo Soto and Xavier Martinez-Cobas, 'Energy Poverty and the Green Energy Transition's Impact upon Income Inequality in Latin America' (2025) 72, Structural Change and Economic Dynamics, 221.

¹⁰⁹ IA Ikem *et al*, 'Integration of Renewable Energy Sources to the Nigerian National Grid—Way out of Power Crisis' (2016) 5(8) International Journal of Engineering Research, 697.

¹¹⁰ TR Ayodele and AS Ogunjuyigbe, 'Increasing Household Solar Energy Penetration through Load Partitioning based on Quality of Life: The Case Study of Nigeria' (2015) 18 Sustainable Cities and Society, 27.

¹¹¹ SO Oyedepo, 'On Energy for Sustainable Development in Nigeria' (2012) 16 Renewable and Sustainable Energy Reviews, 2584.

¹¹² AA Rafindad, 'Does the Need for Economic Growth Influence Energy Consumption and CO2 Emissions in Nigeria? Evidence from the Innovation' (2016) 62 Renewable and Sustainable Energy Reviews, 1216.

¹¹³ MC Anumaka, 'Scenario of Electricity in Nigeria' (2012) 1(6) International Journal of Engineering and Innovation Technology, 2289.

¹¹⁴ UB Akuru *et al*, 'Towards 100% Renewable Energy in Nigeria' (2017) 71 Renewable and Sustainable Energy Reviews, 948.

¹¹⁵ *ibid*.

¹¹⁶ Nobert Edomah *et al*, 'A Review of Stakeholders and Interventions in Nigeria's Electricity Sector' (2021) 7(9) *Helyon*, 2. See also WS Ebhota and PY Tabakov, 'Power Inadequacy, the Thorn in Economic Growth of Nigeria' (2018) 13(16) International Journal of Applied Engineering Research, 12609.

¹¹⁷ Worldbank Development Indicators| Databank (2021)

<<https://databank.worldbank.org/indicator/SP.POP.TOTL/1ff4a498/Popular-Indicators>> accessed 15 September 2024.

crisis, especially in rural areas.¹¹⁸ Aliyu *et al* further concluded that there is an urgent need to pursue renewable energy sources in order to address Nigeria's ongoing energy shortage, because renewable energy sources create potential options for sustainable energy production in Nigeria.¹¹⁹

As stated earlier, Nigeria has abundant access to non-renewable and renewable energy sources for energy generation. Yet, meeting the country's energy needs has been a major challenge. According to Akinyele *et al*, Nigeria's poor energy infrastructure has led to the rise in the usage of fossil fuel-powered generators by a large number of individuals and institutions to satisfy their daily energy demands.¹²⁰ This challenge has left many Nigerians without an option other than to rely on these generators.

The national energy grid is prone to collapse, unstable energy supply and frequent energy outages.¹²¹ Oseni found out that a typical Nigerian home has access to an average of five hours of electricity supply each day from the national energy grid.¹²² This means that Nigeria's national grid is not producing enough to fulfil the demands of the people, thereby resulting to being dependent on individual generators that use fossil fuels.

According to Olujobi *et al*, the overreliance on fossil fuels for energy generation in Nigeria has significant detrimental impacts on both human health and the environment.¹²³ Fossil fuel consumption is a major source of greenhouse gas emissions, which contribute to climate

¹¹⁸ Adekoya Akande, Aarinola Akindele and Abayomi Owolabi, *op cit.* 109.

¹¹⁹ *ibid.*

¹²⁰ DO Akinyele *et al*, *op cit.* n104.

¹²¹ 'National Grid Collapse: A Shame to the Nation' (Daily Trust, 11 November 2024) <<https://dailytrust.com/national-grid-collapse-a-shame-to-the-nation/>> accessed 12 November 2024; Oluwatoyin Somoye, 'Energy Crisis and Renewable Energy Potentials in Nigeria: A Review' (2023) 108 *Renewable and Sustainable Energy Reviews*, 109.

¹²² MO Oseni, 'Get Rid of It: To What Extent Might Improve Reliability Reduce Self-generation in Nigeria?' (2016) 93 *Energy Policy*, 248. See also MO Oseni, 'Households' Access to Electricity and Energy Consumption Pattern in Nigeria' (2012) 16 *Renewable and Sustainable Energy Reviews*, 992.

¹²³ Olusola Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector amidst Fossil Fuels Disruptions and Low Carbon Transition' (2023) 9 *Helyon*, 3.

change and environmental degradation.¹²⁴ These emissions not only harm ecosystems but also pose severe health risks to the population.¹²⁵ Air pollution from the burning of fossil fuels leads to respiratory problems and other health issues.¹²⁶ Premium motor spirit and automotive gas oil consumption in Nigeria have been identified as significant contributors to carbon dioxide emissions, particularly in the South-west and South-south regions, raising concerns for public health and environmental safety.¹²⁷ In 2019, Nigeria contributed over 7 million cubic meters to global greenhouse emissions.¹²⁸

The environmental impact of petroleum exploration in Nigeria is significantly worsened by the frequent occurrence of oil spills and gas flaring, especially in the Niger Delta region. These practices have caused widespread environmental degradation, destroying ecosystems, contaminating water sources, and undermining local livelihoods. Oil spills are a recurrent issue, with thousands of incidents recorded over the decades.¹²⁹ One notable example is the 2008–2009 Bodo oil spills, in which two massive spills from Shell’s pipelines devastated the fishing and farming community of Bodo in Rivers State.¹³⁰ According to Amnesty International and the Centre for Environment, Human Rights and Development (CEHRD), these spills released approximately 600,000 barrels of crude oil into the environment. Shell

¹²⁴ Adeyemi Ogundipe, Chiamaka Okwara and Oluwatomisin Ogundipe, ‘CO2 Emissions and Environmental Implications in Nigeria’ (2020) 10(3) *International Journal of Energy Economics and Policy*, 319.

¹²⁵ *ibid.*

¹²⁶ IB Abaje, Y Bello and SA Ahmad, ‘A Review of Air Quality and Concentrations of Air Pollutants in Nigeria’ (2020) 24(2) *Journal of Applied Sciences and Environmental Management*, 374.

¹²⁷ Jamiu Adeniran, et al, ‘Air Quality Assessment and Modelling of Pollutants Emissions from a Major Cement Plant Complex in Nigeria’ (2019) 10(1) *Atmospheric Pollution Research*, 258.

¹²⁸ Fatima Bello, ‘Towards a Legal Framework for Deploying Carbon Technologies to Address the Environmental Impacts of Gas flaring in Nigeria’ (2022) 13(2) *The Journal of Sustainable Development, Law and Policy*, 102.

¹²⁹ Adeshina Bello and Treasure Nwaeke, ‘Impacts of Oil Exploration (Oil and Gas Conflicts; Niger Delta as a Case Study)’ (2023) 11(3) *Journal of Geoscience and Environmental Protection*, 204.

¹³⁰ Scott Pegg and Neni Zabbey, ‘The Bodo Spills and the Destruction of Traditional Livelihood Structures in the Niger Delta’ (2013) 48(3) *Community Development Journal*, 391.

eventually agreed to a £55 million settlement in 2015 to compensate the affected communities.¹³¹

Gas flaring, the burning of natural gas associated with oil extraction, is another major contributor to environmental and health problems in the region. Despite legal bans and regulatory efforts, Nigeria remains one of the top gas-flaring nations globally.¹³² According to the Nigerian National Petroleum Corporation (NNPC) and the World Bank's Global Gas Flaring Reduction Partnership (GGFRP), over 275 billion cubic feet of gas were flared in 2020 alone, causing significant carbon emissions and air pollution.¹³³ The persistent flaring has been linked to respiratory diseases, acid rain, and reduced agricultural productivity across Niger Delta communities.¹³⁴ These environmental issues highlight the urgent need for stronger enforcement of environmental regulations and corporate accountability in Nigeria's oil sector.

Despite the economic benefits derived from fossil fuel exploration, the associated environmental and health costs necessitate a shift towards more sustainable energy solutions.¹³⁵ To mitigate the adverse effects, there is a growing advocacy for adopting renewable energy sources such as solar, wind, biomass, bioethanol from cassava, and biogas. To Akuru *et al*, these alternatives could reduce carbon emissions, enhance energy security, and promote public health as the potentials and benefits of these renewable energy sources

¹³¹ The Bodo 2008 Oil Spill and Its Settlement < <https://cehrd.org.ng/the-bodo-2008-oil-spill-and-its-settlement/>> accessed 27 June 2025.

¹³² Jenigbo Esavwede and Ufuoma Oyibodoro, 'Gas Flaring in Nigeria's Niger Delta: Legal Challenges and Lessons from Norway's Regulatory Framework' (2025) 5(1) *Journal of Environmental Law and Policy*, 150.

¹³³ Jude Okafor and Ernest Aniche, 'Nigeria and the World Bank Global Gas Flaring Reduction (GGFR) Partnership: The Tragedy of the Commons' (2016) 6 *Developing Country Studies*, 45.

¹³⁴ Temitope Akintunde *et al*, 'Assessment of Health Consequences of Fossil Fuel Energy Use in Osun State, Nigeria: Burden and Implications' (2024) 4(5) *Discovery Energy*, 2.

¹³⁵ Nwabimfura Jackson, Bin Xu and Nkusi Revocatte, 'Investigation on Impacts of Oil Exploration and Production on Environment and Its Implications on People's Health' (2020) 10 *International Journal of Scientific and Research Publications*, 69.

outweigh its disadvantages.¹³⁶ Renewable energy sources are known to have fewer damaging effects on human health and the environment, inexhaustive and replenishable.¹³⁷

Nigeria has abundant renewable energy resources, including solar, wind, hydro, and biomass, which remain largely underutilized. However, the government has not been able to provide adequate energy access to a large part of its population.¹³⁸ Renewable energy as defined by Twidell and Weir refers to energy derived from natural processes that are continually replenished.¹³⁹ This includes energy sources such as solar, wind, hydro, geothermal, and biomass. These energy resources are considered sustainable because they can be harnessed without depleting the earth's natural resources and have lower environmental impact compared to fossil fuels.¹⁴⁰ The definition of renewable energy by Twidell and Weir is critical to the understanding of renewability in terms of its continuous replenishment of energy. However, some gaps in this definition merits consideration:

First, the economic viability of renewable energy sources is not addressed. The definition lacks a discussion on the cost-effectiveness and market friendliness of various renewable technologies which are crucial for their widespread adoption. Secondly, the emphasis on replenishment does not fully capture the technological developments necessary to efficiently harness and utilize these resources. Innovation plays a significant role in making renewable energy more accessible and effective. In addition, while renewable energy sources are generally viewed as more sustainable, the definition does not address the potential environmental impacts of certain renewable energy technologies, such as land use changes or

¹³⁶ UB Akuru *et al*, op cit. n115.

¹³⁷ Boniface Ewulum and Obianuju Agu, 'Renewable Energy as an Alternative to Electric Power Sustainability in Nigeria: The Need for a Legal Pathway' (2023) 4 International Journal of Law and Clinical Legal Education, 88.

¹³⁸ Chitzi C Ogbumbada, 'Developing an Effective Legal Framework for Renewable Energy Utilization in Nigeria' (2018) 8(3) Renewable Energy Law and Policy Review, 46.

¹³⁹ John Twidell and Tony Weir, *Renewable Energy Resources* (Second edition, Taylor & Francis, New York, USA 2006) 7.

¹⁴⁰ *ibid*.

resource extraction processes. Finally, the definition appears to overlook the regional variability in the availability and feasibility of renewable energy sources. Different geographic areas may have varying access to resources like wind, solar, or hydroelectric energy, which can affect the practicality of implementing renewable energy solutions. Thus, addressing these gaps would provide a more comprehensive understanding of renewable energy and its broader implications for energy policy and planning.

As highlighted by Yahaya and Nwabuogo, adopting renewable energy technologies could significantly reduce Nigeria's carbon dioxide (CO₂) emissions by 38% by 2025, thus contributing to climate change mitigation.¹⁴¹ Alhassan *et al* reviewed the renewable energy potentials across North eastern Nigeria, highlighting sources such as solar, geothermal, wind, and biomass as viable alternatives to fossil fuels. These sources not only present a path to sustainable energy but also promise economic benefits and reduced environmental impact. The exploitation of these resources requires robust policies and institutional support to realize their full potential.¹⁴²

In addition, it is worthy to note that for harnessing renewable energy sources, investments in technology, infrastructure, and supportive policies and legal frameworks are crucial. As noted by Asemota and Olokoyo, renewable energy financing is essential for supporting sustainable development and addressing the energy crisis. They argue for legal frameworks to attract investment and facilitate the deployment of clean energy technologies.¹⁴³

The advancement of low-carbon energy through renewable sources holds significant potential for addressing environmental pollution and climate change challenges in Nigeria. This

¹⁴¹ Olohotu Yahaya and Oyati Nwabuogo, 'Renewable Energy Deployment as Climate Change Mitigation in Nigeria' (2016) 16(4) Global Journals Inc., 4.

¹⁴² Ahmed Alhassan *et al*, 'Renewable Energy Potentials Across North Eastern Nigeria: A Review' (2023) 12(3) International Journal of Sustainable and Green Energy, 31.

¹⁴³ Franklin Famous-Asemota and Felicia Omowunmi Olokoyo, 'Renewable Energy Financing and Sustainable Industrial Development in Nigeria' (2022) 12(4) International Journal of Energy Economics and Policy, 564.

transition is driven by the need to reduce the country's reliance on fossil fuels, which are the primary culprits of greenhouse gas emissions and environmental degradation. Overall, the transition to low-carbon renewable energy sources is critical for Nigeria to reduce environmental pollution, address climate change challenges, and ensure energy security. Implementing effective policies, fostering investment, and leveraging Nigeria's vast renewable energy resources will be essential steps toward a more sustainable and resilient energy future.

Therefore, transitioning from fossil fuels to renewable energy is critical for achieving sustainable development and environmental justice in Nigeria. This transition will require robust legal frameworks and political will to overcome the challenges associated with energy security, environmental preservation, and public health. Several researchers from different perspectives have written on the need for the use of renewable energy sources to generate energy in Nigeria considering the impacts and potentials, as these sources may completely address the country's issues with environmental pollution and climate change challenges as compared to the attributes of the using fossil fuels.¹⁴⁴

Renewable energy sources constitute a panacea by offering viable solutions to the numerous challenges posed by fossil fuels. These sources, such as solar, wind, hydro, and biomass, are not only clean, safe, and inexhaustible, but they also present significantly less environmental harm compared to fossil-based alternatives.¹⁴⁵ Moreover, they align with and satisfy the key criteria for sustainability as prescribed by the United Nations. The United Nations,

¹⁴⁴ Nnadi John, Chukwubuike Onwuagbu and Chibor Chigozie, 'Potential of Integrated Energy Solution in Nigeria: Opportunities and Challenges for Sustainable Development Multi-Facet Assessment Model' (2025) 6(239) *Discover Sustainability*, 2. See also Olusola Olujobi and Temiola Olusola-Olujobi, 'Nigeria: Advancing the Cause of Renewable Energy in Nigeria's Power Sector through Its Legal Framework' (2020) 50 *Environmental Policy and Law*, 433. Olusola Olujobi, Oluwatosin Olujobi and Daniel Ufua, 'The Legal Regime on Renewable Energy as Alternative Sources of Energy in Nigeria's Power Sector: The Impacts and Potentials' (2020) 19(3) *Academy of Strategic Management Journal*, 10. Chukwuma Okonkwo *et al*, 'Renewable Energy in Nigeria: Potentials and Challenges' (2021) 56(3) *Journal of Southwest Jiaotong University*, 6.

¹⁴⁵ Emmanuel Agbo *et al*, 'Solar Energy: A Panacea for the Electricity Generation Crisis in Nigeria' (2021) 7 *Helyon*, 4.

particularly through its Sustainable Development Goals (SDGs), outlines several criteria that define sustainability. Among these, renewable energy sources fulfill: environmental sustainability; economic sustainability; social sustainability, intergenerational equity; and resilience and adaptability. Although, Nigeria is yet to fully tap into these benefits.¹⁴⁶

Researchers have also argued that the absence of a legal framework to encourage the use of renewable energy presents a substantial obstacle to making the transition from fossil fuels to renewable energy sources as compared to other countries that have legal frameworks governing renewable energy. For instance, according to Ofuani, and Onifade, the current legal frameworks in promoting renewable energy as a solution to environmental pollution and climate change have been deemed to be inadequate.¹⁴⁷ According to Olujobi, the absence of a framework has led to a reliance on fossil fuels, which hinders efforts to control pollution and reduce greenhouse gas emissions.¹⁴⁸

However, to date, a comprehensive legal framework for the use of renewable energy in Nigeria is yet to be developed. Hence, shifting Nigeria's energy industry from excessive reliance on fossil fuels and developing an effective legal framework for the use of renewable energy sources in addressing environmental pollution and climate change challenges is urgently required. This has been done in other countries, and the possibility of realizing that objective is the crux of this study.

Nigeria stands as the foremost economy in Sub-Saharan Africa, with its energy sector serving as the primary source of government revenue and foreign exchange. Due to the abundance of

¹⁴⁶ United Nations Sustainable Development Goals 1, 7, 8, 9, 10, 11, 13. See also the principle of sustainability outlined in the 1987 Brundtland Report, often referenced by the United Nations.

¹⁴⁷ Anwuli Ofuani, 'Conceptualizing a Renewable Energy Legislation for Climate Change Mitigation in Nigeria' (2012) 2(1) Nnamdi Azikiwe University Journal of Commercial and Property Law, 17. See also Temitope Onifade, 'Hybrid Renewable Energy Support Policy in the Power Sector: The Contracts for Difference and Capacity Market Case Study' (2016) 95 Energy Policy, 395.

¹⁴⁸ Olusola Joshua Olujobi, 'The Legal Sustainability of Energy Substitution in Nigeria's Electric Power Sector: Renewable Energy as Alternative' (2020) 5(32) Protection and Control of Modern Power Systems, 5.

fossil fuels and crude oil reserves, Nigeria is often referred to as the “Giant of Africa.”¹⁴⁹ Despite the recognition of the necessity of renewable energy sources for economic diversification to foster stability and clean environment, the country remains predominantly reliant on fossil fuels for energy generation which have adverse effects on the environment.¹⁵⁰ In addition, considering the demand and supply ratio of energy despite the series of laws and policies that have been developed to improve the Nigerian energy sector, the demand for energy continues to outweigh the supply.¹⁵¹ This is reflected in the historical context of the Nigerian energy sector discussed in the next section.

Against this backdrop, the next section of this chapter focuses on the conceptual framework relating to renewable energy sources. This section explores the various sources of renewable energy, including solar, wind, hydro, biomass, geothermal energy, wave and tidal energy, examining their characteristics, functionality, and relevance in the Nigerian and global contexts. It will also consider the advantages and disadvantages of these energy sources, balancing their environmental and economic benefits against challenges such as intermittency, cost, and technological barriers. In addition, the section links renewable energy to broader environmental issues by examining its role in mitigating environmental pollution and addressing climate change. Through this framework, the study articulates how renewable energy can serve as a strategic tool for reducing greenhouse gas emissions, promoting environmental sustainability, and achieving long-term climate goals. This conceptual foundation is crucial for understanding not only the technical aspects of renewable energy but also its legal, ecological, and socio-economic significance in the fight against environmental degradation and climate change.

¹⁴⁹ OO Okorafor *et al*, ‘Biomass Energy in Nigeria: Prospects, Challenges and Solutions’ (2024) 78 *Innovations*, 1.

¹⁵⁰ Ihuoma Grace Chukwuma-ekwueme, ‘Impact of Crude Oil Trade on Nigeria’s Economy: A Time Series Approach’ (Dissertation, World Maritime University 2023).

¹⁵¹ *ibid*.

2.1.6 Conceptual Framework

2.1.6.1 Renewable Energy

Renewable energy has been offered to the world as the energy source of the future for sustainable development.¹⁵² Solar, wind, biomass, hydropower, geothermal, tidal and wave, are examples of renewable energy sources. These energy sources are regarded as critical components of long-term development for the following reasons: they have lower environmental impacts than non-renewable energy sources, and their use has the potential to address current and future environmental concerns about greenhouse gas emissions such as carbon dioxide, nitrogen oxides, and particulate matter caused by the use of energy generated from fossil fuels.¹⁵³

Renewable energy sources are non-exhaustible throughout the course of a human lifetime, unlike fossil fuels which are done through extraction and consumption. Renewable energy sources promote system decentralization and autonomy by enabling local solutions to be employed independently of national or central networks, enhancing system flexibility in terms of delivering economic benefits and services.¹⁵⁴ Nigeria has a number of well-known renewable energy sources with potential prospects. Only a small portion of these energy sources have been used domestically to generate energy, but there are many chances to do so to create enough energy to meet the demands of the populace.¹⁵⁵

2.1.6.1.1 Solar Energy

¹⁵² Z Elum and A Momodu, 'Climate Change Mitigation and Renewable Energy for Sustainable Development in Nigeria: A Discourse Approach' (2017) 76 *Renewable and Sustainable Energy Reviews*, 74.

¹⁵³ M Shaban and JO Petinrin, 'Renewable Energy Potentials in Nigeria: Meeting Rural Energy Needs' (2014) 29 *Renewable and Sustainable Energy Reviews*, 72.

¹⁵⁴ SO Oyedepo, 'Energy and Sustainable Development in Nigeria: The Way Forward' (2015) 2(15) *Energy Sustainable Society*, 6.

¹⁵⁵ Oladapo Esan, Edward Anthony and Oluwatosin Obaseki, 'Utilization of Renewable Energy for Improved Power Generation in Nigeria' (2019) IOP Conference Series: Journal of Physics, 7.

Sunlight is one of our planet's most abundant and freely available resources. Solar energy is energy derived from sunlight, capable of producing heat or generating energy. Solar energy is noted for its potential to satisfy all energy needs due to its inexhaustible supply and non-polluting nature, especially when compared to fossil fuels.¹⁵⁶ Solar energy is also an efficient renewable source of energy utilized to power smaller grids in places that are not currently connected to the national grid.¹⁵⁷ Solar energy is acknowledged as an abundant renewable energy source and a feasible alternative for energy generation in Nigeria. It is largely gathered from photovoltaic (PV) panels and thermal collectors, offering a solution to the growing energy demands.¹⁵⁸ It is largely recognized as the most dependable renewable energy resource.¹⁵⁹

In similar words, solar energy is defined as an endless and convenient energy source that is used in generating energy. The importance of harnessing energy through solar is pollution free and vital in addressing Nigeria's energy supply challenges.¹⁶⁰ Solar energy is depicted as an inexhaustible resource capable of replacing fossil fuels, as it provides various advantages including mitigating climate change and boosting energy security in Nigeria among others.¹⁶¹ This definition emphasizes solar energy as Nigeria's cleanest and most abundant renewable energy source, and it is important in addressing climate change challenges and desertification.¹⁶²

2.1.6.1.1.1 Advantages of Solar Energy

¹⁵⁶ United Nations: What is Solar Energy? <<https://www.un.org/en/climatechange/what-is-renewable-energy>> accessed 19 November 2024. See also Yusuf Chanchagi *et al*

¹⁵⁷ T Olaoye *et al*, 'Energy Crisis in Nigeria: Need for Renewable Energy Mix' (2016) 4(1) American Journal of Electrical and Electronics Engineering, 3.

¹⁵⁸ Bashir Musa Adavuruku *et al*, 'Geospatial Analysis of Solar Energy Potentials in Niger State, Nigeria' (2022) 11(6) American Journal of Modern Physics, 95.

¹⁵⁹ *ibid*.

¹⁶⁰ David O Obada *et al*, A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 2.

¹⁶¹ Emmanuel P Agbo *et al*, 'Solar Energy: A panacea for the Electricity Generation Crisis in Nigeria' (2023) 7(5) *Heliyon*, 3.

¹⁶² ST Ogunjo, AA Obafaye and AB Rabi, 'Solar Energy Potentials in Different Climatic Zones in Nigeria' (2020) 1032 IOP Conference Series: Materials Science and Engineering, 1.

a. Constant Availability

Solar energy is a limitless resource.¹⁶³ Since solar energy is inexhaustible, it produces abundant energy everywhere sunlight is present.¹⁶⁴ It is available every day and may be used anywhere in the world. Unlike some of the other energy sources, solar energy never runs out. In contrast to fossil fuels, which need a lot of work, time, and costly heavy equipment to produce, renewable energy sources turn a natural resource in the case of solar energy.¹⁶⁵

b. Zero Carbon Emissions

Solar energy is a clean and green source of energy.¹⁶⁶ It is considered to be the cleanest form of energy as it does not produce any carbon emissions or other greenhouse gases and environmentally friendly.¹⁶⁷ Where there are appropriate legal and institutional strictures in place to enhance the use of solar energy as a major source of energy, there is an assurance that its use addresses environmental pollution and climate change challenges as opposed to the use of fossil fuels.

c. Low Maintenance Cost:

Solar energy is mostly inclined with low maintenance costs. Cleaning any dirt or debris on a solar energy system is the main task of the low maintenance required. However, the inverters

¹⁶³ Maradin Dario, 'Advantages and Disadvantages of Renewable Energy Sources Utilization' (2021) 11(3) International Journal of Energy Economics and Policy, 178.

¹⁶⁴ Ali Maka and Jamal Alabid, 'Solar Energy Technology and Its Roles in Sustainable Development' (2022) 6 Clean Energy, 478.

¹⁶⁵ *ibid.*

¹⁶⁶ T Olaoye *et al*, Energy Crisis in Nigeria: Need for Renewable Energy Mix' (2016) 4(1) American Journal of Electrical and Electronics Engineering, 6.

¹⁶⁷ *ibid.*

used may need to be changed after a limited period of time, but the cost of refurbishing is usually minimal.¹⁶⁸

d. Availability of Employment:

As evidenced by statistics, the solar energy generation sector of a country employs high number of personnel.¹⁶⁹ In addition to producing energy, the advancement and use of solar energy technologies will lead to the creation of jobs across a range of industries, thereby strengthening the national economy. As the sector improves, more employment opportunities may be created.¹⁷⁰

2.1.6.1.1.2 Disadvantages of Solar Energy

a. High Initial Cost:

One of the major disadvantages of solar energy projects is the high initial cost of installing the solar panels needed to harness the energy.¹⁷¹ However, once the panels have been successfully installed and the energy sources are properly harnessed, it becomes a cost effective model.¹⁷² Therefore, transforming to this should involve taking a long-term approach because its benefits are not immediate.¹⁷³ In addition, apart from the monetary cost of installing solar panels, another form of initial cost incurred is termed “energy cost”.¹⁷⁴ The manufacturing of solar panels requires raw materials whose extraction involves a high cost in

¹⁶⁸ Qussay Hassan *et al*, ‘A Review of Hybrid Renewable Energy Systems: Solar and Wind-powered Solutions: Challenges, Opportunities and Policy Implications’ (2023) 20 Results in Engineering, 3.

¹⁶⁹ Emmanuel Agbo *et al*, *op cit*. n146.

¹⁷⁰ International Renewable Energy Agency: Renewable Energy and Jobs Annual Review 2023 <https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_895772.pdf> accessed 20 November 2024

¹⁷¹ Mohd Shaikh *et al*, ‘A Review Paper on Electricity Generation from Solar Energy’ (2017) 887(5) International Journal for Research in Applied Sciences and Engineering Technology, 1889.

¹⁷² Tze-Zhang Ang *et al*, ‘A Comprehensive Study of Renewable Energy Sources: Classifications, Challenges and Suggestions’ (2022) 43 Energy Strategy Reviews, 4.

¹⁷³ Grace Shiru *et al*, Availability of Raw Materials for Indigenous Manufacturing of Solar Photovoltaic Modules in Nigeria’ (2023) Nile Journal of Engineering and Applied Science, 2. See also Asadullah Saad, ‘Analyzing the Lifecycle of Solar Panels including Raw Material Sourcing, Manufacturing, and End-of-life Disposal’ (2024) 13(1) World Journal of Advanced Engineering Technology and Sciences, 967.

¹⁷⁴ Abel Owotemu Ezeoghene, ‘Adoption of Alternative Energy as a Cost Reduction Strategy for SME’s in Nigeria’ (2021) 1(2) World Journal of Management and Business Studies, 78.

terms of energy, especially with respect to greenhouse gas and carbon emitting energy generation sources. Some of these raw materials include quartz, silicon, polymers, aluminium and copper.¹⁷⁵

b. Weather Dependence

The amount of energy derived from solar is largely dependent on the atmospheric conditions of each day.¹⁷⁶ Despite the assurance that the availability of sunlight makes for an abundance of solar energy, the level of energy generated on cloudy or rainy days cannot be the same as sunny days, as well as in the night. This limitation has an impact on total energy production, particularly in areas with irregular sunshine.¹⁷⁷ Therefore, it is important to seek appropriate measures to store energy derived from the solar panels which impliedly necessitates the use of more batteries which can be more costly.¹⁷⁸

c. Recycling Problem

Solar panels have a lifecycle of twenty to thirty years, and are associated with the production of a large number of wastes that is difficult to recycle.¹⁷⁹ In Nigeria, solar energy is yet to be fully harnessed due to several impediments.¹⁸⁰ However, it would be beneficial to factor in ways in which solar panels could be disposed of at the end of their cycle, with stringent legal consequences for breach of such procedures. This would ensure that the same environmental

¹⁷⁵ *ibid.*

¹⁷⁶ O Bamisile *et al*, 'A Review of Renewable Energy Potential in Nigeria: Solar Power Development over the Years' (2017) 44(4) Engineering and Applied Science Research, 242.

¹⁷⁷ Muysin Alikulov, 'The Dependence of the Amount of Energy Obtained by Solar Cells on the Temperature of the Environment' (2024) E3S *Web of Science*, 1.

¹⁷⁸ *ibid.*

¹⁷⁹ Ali Al-Aqqad and Menyhart Joysef, 'Solar Panels Problems after End-of-life and Waste Management (SWOT Analysis for the Global Directives of PV's and Waste Management)' (2023) 14(67) International Review of Applied Sciences and Engineering, 5.

¹⁸⁰ HN Amadi *et al*, 'Renewable Energy in Nigeria: Prospects and Challenges' (2024) 11(4) European Journal of Advances in Engineering and Technology, 53.

degradation challenges that necessitates the transition to renewable energy sources in the first instance would not re-occur.¹⁸¹

d. Insecurity

In order to harness solar energy in large capacity in Nigeria, the Northern region of the country is the most suitable area for its generation. This is because the States in the Northern region are closer to the Sahara Desert and have higher heights above the sea level.¹⁸² However, the insecurity occurring in that area as a result of banditry can make the initiative be dead on arrival.¹⁸³

2.1.6.1.2 Wind Energy

Wind energy is derived by using wind turbine and other elements to transform kinetic energy of moving air into energy or other forms of energy as required (wind mills).¹⁸⁴ These wind turbines are usually in one or two forms: large wind turbines that generate energy and feed it into the grid, or small turbines that are erected specifically to provide energy directly to consumers such as individual homes, small business or farms.¹⁸⁵ Although wind blows day and night, its strength varies according to a place's location and/or the time of year. It varies in degree and consistency and is very sporadic in nature.¹⁸⁶ Study shows the presence of wind energy in Nigeria, particularly in the Northern region of the country where there is abundance of wind. For example, states like Adamawa, Plateau, and Sokoto. Nigeria currently has relatively low levels of wind in use because wind energy has been primarily used for

¹⁸¹ Ali Al-Aqqad and Menyhart Joysef, op cit. n177.

¹⁸² Emmanuel Agbo et al, 'Solar Energy: A Panacea for the Electricity Generation Crisis in Nigeria' (2021) 7(5) Heliyon, 18.

¹⁸³ *ibid.*

¹⁸⁴ FI Abam and OS Ohunakin, 'Economics of Wind Energy Utilization for Water Pumping and CO2 Mitigation Potential in Niger Delta, Nigeria' (2017) 38(3) International Journal of Ambient Energy, 231.

¹⁸⁵ Henrik Lund, *Renewable Energy System: A Smart Energy Systems Approach to the Choice and Modelling of 100% Renewable Solutions* (2nd ed., Academic Press Elsevier Corporation, 2015) 13.

¹⁸⁶ Y Noorollahi, H Yousefi and M Mohammed, 'Multi-criteria Decision Support System for Wind Farm Site Selection Using GIS' (2016) 13 Sustainable Energy Technologies and Assessments, 41.

irrigation. Thus, wind energy is yet to be in use for commercial generation of energy in Nigeria.¹⁸⁷

2.1.6.1.2.1 Advantages of Wind Energy

a. Non-usage of Fuel:

Wind energy does not use fuel because wind turbines and windmills are entirely powered by wind. The turbine does not require fuel or an energy source to function after it has been installed. Once installed, the turbine operates without the need for additional fuel or external power input. Unlike certain other renewable technologies that may involve ongoing energy consumption during operation, wind power significantly reduces maintenance costs for large-scale wind farms.¹⁸⁸

b. Clean Form of Energy

Wind energy does not impact climate change in that greenhouse gases are not released into the environment during energy generation since the turbines or mills are not powered by fossil fuels.¹⁸⁹ Wind energy is considered one of the cleanest sources of power generation, with virtually no direct emissions during operation.¹⁹⁰ However, it is important to acknowledge that greenhouse gases are indirectly emitted during certain stages of the wind energy lifecycle, particularly during the manufacturing, transportation, and installation of wind turbines.¹⁹¹ These emissions primarily arise from the use of fossil-fuelled vehicles and

¹⁸⁷ *ibid.*

¹⁸⁸ Mohammadamin Yarahmadi and Pounja Zarshenas, 'Harnessing the Wind How Wind Energy Fuels Economic Growth and Progress' (2024) 1(4) International Journal of Modern Achievement in Science, Engineering and Technology, 39.

¹⁸⁹ AG Olabi *et al.*, 'Wind Energy Contribution to the Sustainable Development Goal: Case Study of London Array' (2023) 15(5) Sustainability, 4.

¹⁹⁰ *ibid.*

¹⁹¹ Tolga Kara and Ahmet Sahin, 'Implications of Climate Change on Wind Energy Potential' (2023) 15(20) Sustainability, 2.

machines, which are typically employed to transport heavy equipment such as turbine blades and tower components to installation sites, as well as to erect the structures themselves.¹⁹²

Nonetheless, these emissions are relatively minimal and occur only once during the setup phase.¹⁹³ Once a wind turbine is installed and operational, it generates electricity continuously without further reliance on fossil fuels, making it a long-term, low-emission solution. In this sense, the carbon footprint of wind energy is significantly lower than that of conventional energy sources, and the initial emissions are often offset within the first few months to years of operation through the clean energy produced.¹⁹⁴

c. Limited Disruption Farmland Operations

Wind turbines can be installed by energy providers on existing farmlands in exchange for contracts or leases from the owners. This is believed to be a huge benefit for farmers who might use additional finances. Furthermore, due to the fact that, wind turbine's footprints are small on the ground, it does not affect the productivity of the farm.¹⁹⁵

2.1.6.1.2.2 Disadvantages of Wind Energy

a. Wildlife Endanger

Wildlife is known to be endangered by wind turbines.¹⁹⁶ The rotor blades that move on the fan-like structure of wind turbines as they are spinning can hurt or kill birds that cross their habitats or migratory routes.¹⁹⁷

b. Noise Pollution

¹⁹² *ibid.*

¹⁹³ *ibid.*

¹⁹⁴ Jan Emblemsvag, 'Wind Energy is not Sustainable when Balanced by Fossil Fuel' (2022) 305 *Applied Energy*, 1.

¹⁹⁵ Gabriel Sampson, Edward Perry and Mykel Taylor, 'The On-Farm and Near-Farm Effects of Wind Turbines on Agricultural Land Values' (2020) 45(3) *Journal of Agricultural and Resource Economics*, 411.

¹⁹⁶ Wind Energy Development Programmatic EIS, Wind Energy Development Environmental Concerns <<https://windeis.anl.gov/guide/concern/index.cfm>> accessed 22 November 2024.

¹⁹⁷ Weldemariam Tesfahunegny et al, 'Impact of Wind Energy Development on Birds and Bats/; The Case of Adama Wind Farm, Central Ethiopia' (2020) 81(41) *The Journal of Basic and Applied Zoology*, 4.

Wind turbines are typically situated in relatively rural regions where people dwell. In addition to wildlife that flies in the air, people living around the turbine areas may also be impacted by noise pollution from the spinning blades.¹⁹⁸

c. High Initial

The enormous structures of wind turbines frequently reach heights of several hundred feet and demand a large initial investment.¹⁹⁹ In order to generate energy into more inhabited areas where it is required, placing wind turbines necessitates additional investment in underground connections. The early building and installation phase accounts for the bulk expense, but after those stages are completed, wind energy generates infinite supply of energy for as long as there is wind, thereby saving money in the long run²⁰⁰

d. Weather Dependence

Due to the erratic nature of the wind, wind energy experiences a problem known as intermittency.²⁰¹ One of the inherent challenges associated with wind energy is its variability and dependence on weather conditions. This is because wind does not blow at a constant speed and can fluctuate significantly from one moment to the next, it becomes difficult to accurately predict how much electricity will be generated at any given time. This intermittency implies that during periods of low or no wind, sometimes lasting for hours or even days, energy providers and consumers must rely on alternative strategies to ensure a continuous power supply.²⁰²

¹⁹⁸ Yael Seker *et al*, 'Noise Pollution from Wind Turbines and Its Effects on Wildlife: A Cross-national Analysis of Current Policies and Planning Regulations' (2022) 168 *Renewable and Sustainable Energy Reviews*, 2.

¹⁹⁹ JF Akinbami, 'Renewable Energy Resources and Technologies in Nigeria: Present Situation, Future Prospects and Policy Framework' (2017) 6(2) *Mitigation and Adaptation Strategies for Global Change*, 155.

²⁰⁰ *ibid*.

²⁰¹ Tarang Agarwal, Shivank Verma and Ashutosh Gaurh, 'Issues and Challenges of Wind Energy' (2016) *International Conference on Electrical, Electronics, and Optimization Techniques*, 1.

²⁰² *ibid*.

To address this challenge, energy storage systems play a crucial role in stabilizing renewable energy output.²⁰³ Typically, this involves the use of inverter-based storage systems, where excess electricity generated during high-wind periods is stored in batteries or other forms of energy storage. Inverters are essential in this process as they not only store the energy but also convert the direct current (DC) produced by wind turbines into alternating current (AC), which is usable on the grid. This stored energy can then be released when wind speeds drop, maintaining a steady supply.²⁰⁴

Moreover, many energy systems incorporate a hybrid model, allowing for a seamless switch between renewable and non-renewable sources when necessary.²⁰⁵ For instance, in times of extended calm weather or wind droughts, energy providers can fall back on gas or hydroelectric plants, ensuring grid reliability. This flexible integration of storage technologies and backup sources makes it possible to overcome the intermittency of wind, ensuring that users continue to receive electricity without disruption.²⁰⁶

Therefore, while wind energy is weather-dependent, advances in energy storage and hybrid system design have significantly mitigated the risk of supply failure, enhancing the reliability and practicality of renewable energy integration into national power systems.²⁰⁷

2.1.6.1.3 Hydro Energy

²⁰³ Qusay Hassan *et al*, 'A Review of Hybrid Renewable Energy Systems: Solar and Wind-powered Solutions: Challenges, Opportunities, and Policy Implications' (2023) 20 Results in Engineering, 3.

²⁰⁴ *ibid*.

²⁰⁵ Tolga Kara and Ahmet Sahin, 'Implications of Climate Change on Wind Energy Potential' (2023) 15(20) Sustainability, 2.

²⁰⁶ REN21: Why is Renewable Energy Important? < <https://www.ren21.net/why-is-renewable-energy-important/> > accessed 27 June 2025.

²⁰⁷ *ibid*.

Hydro energy is produced by converting the potential energy of water into electrical energy through the use of turbines and generator.²⁰⁸ Hydro energy is one of the largest renewable energy sources across the world.²⁰⁹ Almost one-fifth of the world's electrical energy and more than four-fifths of the energy produced by renewable energy sources comes from hydro energy.²¹⁰ In Nigeria, hydro energy is conceivably regarded as the major source of energy generation and supply as the country is endowed with large rivers, waterfalls and dams. Prominent among these are the famous Niger and Benue rivers, and Lake Chad basin with a good amount of water resources available in them.²¹¹ Unlike fossil fuels, hydro energy is renewable and can supply uninterrupted energy, except for the question of water levels. Nigeria's current energy supply mix shows that hydropower accounts for 27.3% of the entire energy grid.²¹²

2.1.6.1.3.1 Advantages of Hydro Energy

a. Clean Source of Energy

Hydro energy is categorized as a clean source of energy because it is powered by water.²¹³ It does not pollute the environment as compared to energy plants that uses fossil fuels before generating energy. Hydro energy is sustainable and environmentally friendly. As a result, it

²⁰⁸ Oladapo Christopher Esan, 'Utilization of Renewable Energy for Improved Power Generation in Nigeria' (MSc Thesis, Cranfield University, United Kingdom, 2018).

²⁰⁹ *ibid.*

²¹⁰ OM Aderoju, GA Dias and ZE Chakraoui, 'Assessment of Renewable Energy Sources and Municipal Solid Waste for Sustainable Power Generation in Nigeria' (2017) 95 IOP Conference Series: Earth and Environmental Science, 3.

²¹¹ *Ibid.*

²¹² Omono Okonkwo, 'As of 2022, 70.5% of Our Electricity if rom Gas, 27.3% from Hydro, 2.2% from Solar and others – Adebayo Adelabu' (Nairametrics, 3 December, 2023) < <https://nairametrics.com/2023/12/13/as-of-2022-70-5-of-our-electricity-is-from-gas-27-3-from-hydro-2-2-from-solar-and-others-adebayo-adelabu/> > accessed 27 June 2025. See also the World Fact Book Nigeria <<https://www.cia.gov/the-world-factbook/countries/nigeria/>> accessed 23 November 2024. See also YO Akinwale and IO Ogundari, 'Exploration of Renewable Energy Sources for Sustainable Development in Nigeria: A Study of the Federal Capital Territory' (2017) 7(3) International Journal of Energy Economics and Policy, 69.

²¹³ Solar Reviews, Hydropower Pros and Cons <<https://www.solarreviews.com/blog/hydroelectric-energy-pros-and-cons>> accessed 23 November 2024.

has no detrimental effects on water quality, biological diversity, aquatic and human habitat resettlement. Above all, it emits little or no greenhouse gas into the atmosphere.²¹⁴

b. Cheap Source of Energy

According to reports, hydro energy is often one of the least expensive methods of producing energy.²¹⁵ The main expenses associated with building a hydro energy plant are the cost of building the dam and the equipment needed to generate energy. However, by volunteering their labour, communities can significantly lower this initial capital investment cash outlay. Furthermore, Nigeria has a variety of steel resources that allows for the local sourcing or manufacturing of equipment like turbines.²¹⁶ As a result of the reportedly extremely low maintenance and operating expenses, hydro energy generation is comparatively affordable in the long run.

c. Source of Sustainable Energy

Energy security is assured through sustainable energy sources, which provide a reliable supply that meets current energy demands without compromising the needs of future generations.²¹⁷ One of the key sources of sustainable energy is hydro energy, alongside other forms such as solar, wind, geothermal, and biomass. These energy sources are widely regarded as “renewable” because they are naturally replenished on a human timescale and are

²¹⁴ MM Muhammadu and J Usman, ‘Small Hydropower Development in North Central of Nigeria: An Assessment’ (2020) 69 *Journal of Advanced Research for Applied Mechanics*, 9.

²¹⁵ International Renewable Energy Agency, ‘Renewable Energy Technologies: Cost and Analysis Series – Hydropower’ (2012) 1(3/5) 10 <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2012/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf> accessed 23 November 2024.

²¹⁶ C Ocheri *et al*, ‘Harnessing Local Materials for Engineering and Technological Development in Nigeria’ (2017) 6(1) *Journal of Powder Metallurgy and Mining*, 2.

²¹⁷ Collins Ugwu, Paul Ozar and C Mbohwa, ‘Small Hydropower as a Source of Clean and Local Energy in Nigeria’ (2022) 10 *Fuel Communications*, 5.

not depleted through use.²¹⁸ For instance, hydro energy relies on the Earth's water cycle, rainfall, river flow, and evaporation, which is constantly renewed through solar radiation.²¹⁹

Similarly, solar energy is derived directly from the sun, a resource expected to shine for billions of years. Wind energy is driven by atmospheric movements caused by the uneven heating of the Earth's surface, and geothermal energy taps into the Earth's internal heat, which is essentially inexhaustible over geological time. Biomass, while involving organic material that is consumed, can also be renewed sustainably through responsible cultivation and replanting practices. The sustainability of these energy sources is not only defined by their inexhaustibility but also by their relatively low environmental impact. Unlike fossil fuels, they emit little to no greenhouse gases during operation, making them crucial tools in the fight against climate change.²²⁰

Renewable energy fosters sustainability by promoting energy security, reducing dependence on imported fuels, and encouraging local energy production. It also supports environmental protection, as it minimizes air and water pollution, conserves ecosystems, and reduces carbon footprints.²²¹ In addition, renewable energy drives economic sustainability by creating jobs in installation, maintenance, and research, and by offering energy access to remote communities, thereby enhancing social inclusion and development.²²² In essence, the continual regeneration of renewable resources and their minimal ecological footprint make them not only viable alternatives to fossil fuels but also essential pillars of a sustainable future. Their adoption represents a conscious alignment with the principles of intergenerational equity, responsible resource use, and long-term environmental stewardship.

²¹⁸ Sarvapriya Singh, 'Sustainable Sources of Energy' (2025) 11(1) Innovative Research Thoughts, 126.

²¹⁹ Olusola Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector Amidst Fossil Fuel Disruptions and Low Carbon Energy Transition' (2023) 9 Heliyon, 12.

²²⁰ Ezinwa Onu and MA Nwanyanwu, 'Renewable Energy as a Panacea for Promoting Environmental Stability: Legal and Institutional Challenges' (2022) 6 African Journal, 46.

²²¹ Olusola Olujobi *et al*, *op cit* 219.

²²² *ibid*.

d. Reliable

Hydro energy is a particularly dependable source of energy.²²³ When choosing the location for a hydro energy plant, either on a river that is actively flowing or created with a dam to control water flow, it is taken into account that water flow is quite often predictable. The output of energy can also be changed. Water may be diverted away from the turbines and less energy produces if there is less demand for energy. On the other hand, more water can enter the plant for the purpose of producing electricity if more energy is required.²²⁴

2.1.6.1.3.2 Disadvantages of Hydro Energy

a. High Up-front Installation

Hydro energy is a significant source of renewable power, but it comes with notable challenges, particularly for developing countries. One of the main concerns is its high up-front installation cost, regardless of plant size. This is largely due to the expensive equipment required, such as turbines, penstocks, and generators, as well as the complex infrastructure involved in dam construction. These costs are further compounded by economic constraints in less developed nations.²²⁵

Moreover, hydropower is not readily achievable everywhere. It depends heavily on suitable geographic conditions, especially the availability of consistent water flow and elevation, such as a waterfall or a river with sufficient gradient to turn turbines effectively. Another important issue is the potential for transboundary water disputes. When a country builds a dam, it can alter the flow of rivers shared with other nations, possibly depriving them of water. A well-known example is the Grand Ethiopian Renaissance Dam, which has caused tensions

²²³ Olutola Fakehinde *et al*, 'Viability of Hydroelectricity in Nigeria and the Future Prospect' (2019) 157 Energy Procedia, 873.

²²⁴ *ibid*.

²²⁵ EnergySage Staff, 'The Top Pros and Cons of Hydropower' (Energy Sage, 22 April, 2022) <<https://www.energysage.com/about-clean-energy/hydropower/pros-cons-hydropower/>> accessed 28 June 2025.

between Ethiopia, Egypt, and Sudan over water rights and access to the Nile.²²⁶ Hence, while hydro energy is renewable and low-emission once operational, its feasibility is limited by high upfront costs, geographical constraints, and international water politics.²²⁷

b. Contamination during and after Construction

The installation of hydro energy equipment can affect water quality and disrupt water flow. Low levels of dissolved oxygen in the water can be caused by some of the equipment used in the hydro energy facilities. The ecosystems along the riverside are seriously harmed by this issue. By using different aeration procedures to oxygenate the water, it can be lessened. Maintaining a limited water flow downstream of the erected hydropower plant is an additional strategy for the ecosystems along the riverbanks to survive.²²⁸

c. Dumping of Hazardous Wastes into the River

People who live close to these hydro energy plants have a very high risk of using the nearby rivers or the environment as a place to dump various types of garbage.²²⁹ The dangerous groups that are tricked by the majority of businesses are the most detrimental of all. Aquatic life may perish as a result of this terrible attitude, which can also occasionally reduce the effectiveness of installed equipment.²³⁰ Additionally, this degrades the quality of water,

²²⁶ Victor Mlambo and Mfundo Nkasuku, 'Trouble in the Nile Basin: Ethiopia, Egypt, and Sudan and the Nile Stalemate' (2025) 11(1) Cogent Social Sciences, 6. See also Gashaw Endaylalu and Yacob Arsano, 'Grand Ethiopian Renaissance Dam Project Controversies: Understanding the Role of Worldviews and Nexus' (2024) 22(2) African Anthropologist, 216. Veronica Souza and Esteban Jara, 'The Dispute Over the Nile River involving the Grand Ethiopian Renaissance Dam' (2023) 15(2) Jejaring Administrasi Publik, 79.

²²⁷ MM Muhammadu and J Usman, 'Small Hydropower Development in North Central of Nigeria: An Assessment' (2020) 69 Journal of Advanced Research for Applied Mechanics, 9.

²²⁸ U.S. Department of Energy, Energy Efficiency and Renewable Energy - Wind and Hydropower Technologies Program Advantages and Disadvantages of Hydropower <<https://www.envirothonpa.org/documents/19bHydropowerAdvantagesandDisadvantages.pdf>> accessed 28 June 2025.

²²⁹ ME Emetere *et al*, 'Parametric Study of a Proposed Small Hydropower Project at Gurara-Nigeria' (2021) 8 Cogent Engineering, 5.

²³⁰ *ibid*.

making it unfit for human consumption. The proliferation of water infections might result in fatalities if ignored or addressed with less care.²³¹

d. Weather Dependence

Drought presents a significant obstacle to the effective operation of hydro energy facilities.²³² This challenge arises primarily because hydropower generation depends on the availability and flow of water to drive turbines. During extended dry seasons or periods of drought, river levels and reservoir capacities can drop sharply, reducing the volume and pressure of water needed to produce electricity.²³³ In extreme cases, water levels may fall below the minimum operational thresholds of the turbines, rendering the plant incapable of generating power altogether. This vulnerability makes hydropower particularly sensitive to climate variability. Hydropower output has already been affected in several regions due to shifting rainfall patterns and prolonged droughts linked to climate change. For instance, in 2021, Brazil, where hydropower accounts for over 60% of electricity generation, faced one of its worst droughts in 90 years, leading to a significant drop in power supply from hydro sources and prompting emergency use of fossil fuel plants.²³⁴

Similarly, a report notes that climate-induced water stress can not only reduce the efficiency of hydro plants but also increase competition between energy production, agriculture, and human consumption, especially in water-scarce regions. This raises concerns about energy security, particularly in developing countries where alternative sources may not be readily available. Thus, while hydro energy is a clean and renewable source, it is highly weather-dependent. Droughts can severely limit its reliability, highlighting the need for integrated

²³¹ *ibid.*

²³² Piotr Borowski, 'Water and Hydropower – Challenges for the Economy and Enterprises in Times of Climate Change in Africa and Europe' (2022) 14(22) Water, 12.

²³³ *ibid.*

²³⁴ Luz Cuartas *et al.*, 'Recent Hydrological Droughts in Brazil and their Impact on Hydropower Generation' (2022) 14(4) Water, 1.

water and energy management and the diversification of renewable energy sources to build climate resilience.²³⁵

e. Sedimentation

One of the major issues in installing hydro energy plants is sedimentation. It causes remarkable erosion at the riverbanks and riverbeds.²³⁶ Additionally, it puts the turbines, generators, and other installed equipment at serious risk of wear and tear. It reduces the installed reservoirs' storage capacity and raises the possibility of upstream floods.²³⁷ In addition to the above-mentioned adverse effects, it may result in decreased water flow. This is partially brought about by the water body's decreased ability to transfer material, which increases sediment deposition. This raises the riverbed, which in turn increases the risk of flooding.²³⁸ Sediment buildup can break down and release some toxic gasses that are bad for both people and the environment.²³⁹ Decomposing flora and soil organic matter in hydro energy reservoirs can be a major source of greenhouse gasses. Nearly all living things are harmed by the increased ultra violet (UV) radiation caused by these toxic chemicals' ability to destroy the ozone layer.²⁴⁰

2.1.6.1.4 Biomass Energy

Biomass energy refers to the type of energy derived from food crops and their wastes, agricultural by-products and farm residues; municipal solid wastes; and other organic materials for power production.²⁴¹ Despite being abundant in Nigeria, biomass has not yet

²³⁵ *ibid.*

²³⁶ Aloyce Amasi *et al*, 'Drivers, Impacts and Mitigation of Increased Sedimentation in the Hydropower Reservoirs of East Africa' (2021) 10 MDPI Land, 6.

²³⁷ Collins Ugwu, Paul Ozar and C Mbohwa, 'Small Hydropower as a Source of Clean and Local Energy in Nigeria' (2022) 10 Fuel Communications, 5.

²³⁸ *ibid.*

²³⁹ *ibid.*

²⁴⁰ *ibid.*

²⁴¹ Oladapo Christopher Esan, 'Utilization of Renewable Energy for Improved Power Generation in Nigeria' (MSc Thesis, Cranfield University, United Kingdom, 2018).

been developed for energy generation.²⁴² Although a notable pioneering attempt to determine the viability of biomass as a useful source of energy in Nigeria was made by the All Power Labs (APL) by developing a technology that makes renewable energy from waste.²⁴³ In Lagos state for instance, research shows that 13,000 tonnes of garbage per day is generated, comprising 50% of which is organic waste.²⁴⁴ In response to this, the government collaborated with Midori Environmental Solutions (MES), an environmental company in Lagos state to research the viability of generating energy through waste.²⁴⁵ This was a major indication of the state government's interest in improving energy access.²⁴⁶ However, the project was abandoned years later due to lack of supervision.²⁴⁷

2.1.6.1.5 Geothermal Energy

Geothermal energy is a form of renewable energy that is derived from the earth's internal heat. It could be derived in the form of hot water or hot rock usually found under the surface of the earth.²⁴⁸ Geothermal heat pumps are often used to tap these sources, and other techniques used in obtaining energy from geothermal sources are geothermal springs from energy plants, dry stem powder plants, flash steam energy plants and binary-cycle energy plants.²⁴⁹ One of the most prominent uses of geothermal energy is the generation and supply of electricity,

²⁴² Davidson Onwumelu, 'Biomass to Power: Opportunities and Challenges for Nigeria' (2023) 20(2) World Journal of Advanced Research and Reviews, 9.

²⁴³ Chukwuebuka Okafor *et al*, 'Biomass Utilization for Energy Production in Nigeria: A Review' (2022) 3 Cleaner Energy Systems, 3.

²⁴⁴ David Olukanni and Ola Oresanya, 'Progression in Waste Management Processes in Lagos State, Nigeria' (2018) 35(9) International Journal of Engineering Research in Africa, 14.

²⁴⁵ Oladosu Amos *et al*, 'Evaluating Urban Service Delivery in Lagos State Nigeria: A Bid to Enhance Sustainable Waste Management' (2024) 60 Discovery, 1.

²⁴⁶ MA Alao *et al*, 'Multi-criteria Decision Based Waste to Energy Technology Selection using Entropy-weighted TOPSIS Technique: The Case Study of Lagos, Nigeria' (2020) 201 Energy, 13.

²⁴⁷ David Ibekwe, 'Biomass Energy: An Untapped Abundant Energy Resources in Nigeria' (2024) 4(1) International Journal for Multidisciplinary Research, 6.

²⁴⁸ Ana Monteriro *et al*, 'Chapter 26 – An Overview of Geothermal Energy as Technology and Its Use in the Current Modern Context' (2024) 16 Developments in Environmental Science, 603.

²⁴⁹ *ibid*.

however, not many countries have exploited the use as a source of renewable energy generation due to limited accessibility.²⁵⁰

In Nigeria, there is a potential presence of geothermal energy in some States like Benue, Gombe and Plateau in the Northern region of the country where there are rocks and over 80 volcanoes, the Ikogosi warm spring in Ekiti State, located in the south western region of Nigeria, and in the Niger Delta region, located in the southern part of the country.²⁵¹ Like other types of renewable energy, it is usually costly to design and establish the geothermal plant. However, its long-term benefits outweigh this initial cost.²⁵² Some of these benefits include its natural source, the unlimited production of magma by the earth, the impossibility of climatic variations to affect its availability, environmentally friendly and reliable nature.²⁵³

2.1.6.1.6 Wave and Tidal Energy

Wave and tidal energy are sources of renewable energy that harness the energy of ocean movements.²⁵⁴ Wave energy is generated from the surface movement of the sea, while tidal energy is derived from the gravitational pull of the sun and moon, resulting in the rise and fall of sea levels.²⁵⁵ Countries with lengthy coasts, such as Nigeria which has more than 800 kilometres of shoreline along the Atlantic Ocean, stand to benefit greatly from these energy

²⁵⁰ Chijindu Igwe, 'Geothermal Energy: A Review' (2021) 10(3) International Journal of Engineering Research and Technology, 655.

²⁵¹ FM Kelechi and OI Owoka, 'The Future Perspective: Geothermal Energy in Nigeria – An Option to be Explored' (2023) Paper presented at the SPE Nigeria Annual International Conference and Exhibition, Lagos, Nigeria, July 2023.

²⁵² Dario Maradin, 'Advantages and Disadvantages of Renewable Energy Sources Utilization' (2021) 11(3) International Journal of Energy Economics and Policy, 179.

²⁵³ E Abraham and E Nkitman, 'Review of Geothermal Energy Research in Nigeria: The Geoscience Form' (2017) 3(1) International Journal of Earth Science and Geophysics, 1.

²⁵⁴ TM Thennakoon *et al*, 'Harnessing the Power of Ocean Energy: A Comprehensive Review of Power Generation Technologies and Future Perspectives' (2023) 4(3) Journal of Research Technology and Engineering, 73.

²⁵⁵ Masood Ahmad, Amit Kumar and Raushan Ranjan, 'Recent Developments of Tidal Energy as Renewable Energy: An Overview' (2022)

<https://www.researchgate.net/publication/362458194_Recent_Developments_of_Tidal_Energy_as_Renewable_Energy_An_Overview> accessed 24 November 2024.

sources.²⁵⁶ Significant wave heights occur across the nation, especially in the southern areas, and these might be used to generate energy.²⁵⁷ Additionally, there are prospects for tidal energy projects due to the tide patterns along the coast, particularly in places like the Niger Delta.²⁵⁸ Nigeria is experiencing a severe energy shortage as a result of its expanding population and increased industrial activity. There is an urgent need for clean and dependable energy sources. Wave and tidal energy have the potential to improve national energy security and diversify the energy mix.²⁵⁹

Furthermore, wave and tidal energy are still mostly unexplored in Nigeria, although, there has not been much funding for pilot projects.²⁶⁰ Moreso, the potential for wave and tidal energy is found more in a state like Lagos that is closer to the ocean.²⁶¹ However, advanced infrastructure and technology are needed to construct wave and tidal energy systems. It does not appear that Nigeria currently has the industrial capacity and technical know-how required to develop and maintain such systems domestically, although it is technology that could be acquired. Another challenge however lies in the fact that the implementation of wave and tidal technologies is made more difficult by the lack of a strong marine energy supply chain. This is because installing maritime energy devices may have an influence on nearby ecosystems, necessitating that environmental effects must be considered.²⁶²

Nigeria has not fully utilized its enormous potential for renewable energy sources, such as solar, wind, hydro, biomass, geothermal, wave and tidal energy. The lack of a strong and

²⁵⁶ Olakunle Kayode and Olufemi Koya, 'Wave Energy Potential along the Guld of Guinea Coast of Nigeria' (2019) 4(4) Applied Engineering Letters, 129.

²⁵⁷ *ibid.*

²⁵⁸ *ibid.*

²⁵⁹ David Bada *et al*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 4.

²⁶⁰ David Efeturi Ateme, 'Developing Marine and Coastal Resources in Nigeria: Prospects and Challenges' (2021) 3(4) Maritime Technology and Research, 340.

²⁶¹ *ibid.*

²⁶² David Obada *et al*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 4.

efficient legislative framework that can aid in the creation and execution of renewable energy projects is a major contributing factor to this underutilization. Nigeria has a wealth of natural resources that, with the right management, might help meet the country's energy demands and offer sustainable substitutes for fossil fuels which contributes to environmental pollution and emission of greenhouse gases. As explained earlier, the country possesses many water bodies that may be used to generate hydro energy, has significant wind resources in some areas, and experiences high levels of solar radiation all year round. Hence, by harnessing these energy sources, Nigeria can produce energy with minimal emissions. Solar panels, for instance, generate electricity without air pollutants, leading to cleaner air and improved public health outcomes. The vast coastline of Nigeria also offers prospects for energy mix diversification through wave and tidal energy. However, the lack of capacity to develop infrastructure, coupled with the absence of coherent legal framework designed especially for the renewable energy industry has prevented this potential from being realized. The legislative structures in place are frequently, disjointed, and unsuitable for encouraging investment in renewable technology.

As indicated in chapter 1 above, the study's main objective is to uncover inefficiencies and inadequacies in Nigeria's current regulatory framework controlling renewable energy and to advocate for improvements. It is necessary to create a transparent, uniform, and an effective legal framework that promotes investment and innovation in renewable energy. Nigeria can increase energy access, unleash its potential for renewable energy, and support sustainable economic growth by resolving these legal issues. This study highlights the fact that Nigeria's abundant renewable energy resources would go mostly unexplored in the absence of an efficient legislative framework, which will hinder the country's ability to meet its energy and environmental objectives.

Having examined the concept of renewable energy, its sources, advantages, and disadvantages, it is important to now consider environmental pollution, particularly in light of the objectives of this study, which include evaluating the environmental impact of conventional energy systems and advocating for sustainable alternatives. Given that one of the major motivations for transitioning to renewable energy is to reduce the environmental footprint of energy generation, it becomes imperative to understand the extent, sources, and consequences of pollution under current energy regimes. This next section will therefore examine the nature and impact of environmental pollution, providing a foundation for assessing how renewable energy can serve as a viable tool for mitigation and sustainable development.

2.1.7 Environmental Pollution

Pollution is derived from the word ‘pollute’ which means to corrupt or defile.²⁶³ With respect to the environment, pollution refers to the contamination of soil, air, water by obnoxious substances and other materials, including noise.²⁶⁴ In the case of *Boomer v Atlantic Cement Co.*²⁶⁵ pollution was described as the contamination of the environment by a variety of sources including but not limited to hazardous substance, organic wastes and toxic chemicals. Pollution also means “man-made or man-aided alteration of chemical, physical or biological quality of the environment to the extent that it is detrimental to that environment or beyond acceptable limits.”²⁶⁶

The Organization for Economic Co-operation and Development (OECD) defined pollution as:

the introduction by humankind, directly or indirectly, of substances or energy into the environment resulting in deleterious

²⁶³ UD Ikoni, *An Introduction to Nigerian Environmental Law* (Malthouse Press Limited, 2010) 22.

²⁶⁴ *ibid.*

²⁶⁵ 26 N.Y 2d 219, 309.

²⁶⁶ Section 38 of the *Federal Environmental Protection Agency Act*, Cap. 131 LFN 1990 (as amended by Decree 59 of 1992).

effects of such a nature as to endanger human health, harm living resources and eco-systems, impair amenities or interfere with other legitimate uses of the environment.²⁶⁷

The *European Union Council Directive* defined pollution as the introduction by man into the environment of substances or energy liable to cause hazards to human health, harm to living organisms, and change in the ecological system.²⁶⁸ Thus, the introduction of dangerous substances or pollutants (pollutants may be chemical, physical, or biological in nature, and can originate from both natural processes and human activities) into the environment that have a negative impact on ecosystems, human health, and general quality of life is referred to as environmental pollution.²⁶⁹ This includes a variety of contaminants that might come from different anthropogenic activities, such as chemicals, waste products, and noise.²⁷⁰ Globally, urbanization, industrialization, and excessive consumption of natural resources have all contributed to the concerning levels of pollution, particularly the overreliance on fossil fuels.²⁷¹ As economies flourished and populations increased over the 20th century, pollution levels significantly increased. Pollution of the air, water, and soil has grown to be a serious problem that endangers human health and biodiversity.²⁷² According to estimates from the World Health Organization (WHO), diseases linked to pollution are directly responsible for millions of preventable deaths annually.²⁷³

²⁶⁷ OECD, *Recommendation for the Implementation of a Regime of Equal Right of Access and Non-Discrimination in Relation to Transfrontier Pollution*, C(77)28(Final), adopted May 17, 1977, 3 cited by ML Larsson, 'Legal Definitions of the Environment and of Environmental Damage', 5.

²⁶⁸ Article 2 of the *European Union Council Directive*, 1996.

²⁶⁹ Paul Aidonojie *et al*, 'Environmental Law in Nigeria: A Review on Its Antecedence, Application, Judicial Unfairness and Prospects' (2020) 1(2) *Archive of Science and Technology*, 212.

²⁷⁰ Muhammed Ladan, *Trend in Environmental Law and Access to Justice in Nigeria* (Lambert Academic Publishing, Germany, 2012) 19.

²⁷¹ Ngozi Arihilam and EC Arihilam, 'Impact and Control of Anthropogenic Pollution on the Ecosystem' (2019) 4(3) *Journal of Bioscience and Biotechnology*, 55.

²⁷² United Nations Environment Programme <<https://www.unep.org/news-and-stories/press-release/rate-environmental-damage-increasing-across-planet-there-still-time>> accessed 25 November 2024.

²⁷³ World Health Organization (WHO), Ambient (outdoor) Pollution < [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)> accessed 25 November 2024.

The declining state of Nigeria's natural resources and the health of its people are clear indicators of the effects of environmental pollution.²⁷⁴ Due to pollutants from factories and automobiles, the air quality in cities is frequently poor, which aggravates respiratory conditions and other health problems.²⁷⁵ Communities that depend on these water sources for drinking and sanitation are at risk of health problems due to the regular contamination of water bodies by agricultural runoff and industrial effluents.²⁷⁶ Furthermore, abundant oil reserves in Nigeria have turned out to be a source of pollution. The Niger Delta area from which the bulk of Nigeria's oil is being exploited frequently experiences oil spills that ruin livelihoods, displace communities, and harm local ecosystems. The incessant contamination of the area's water and land resources emphasizes how urgently comprehensive environmental management and sustainable practices are needed.²⁷⁷

One practical way to lessen environmental pollution and its effects is to transition to renewable energy sources. Solar, wind, hydropower, and biomass energy are examples of renewable energy sources that provide sustainable substitutes that may drastically cut down on greenhouse gas emissions and other pollutants. Nigeria can minimize environmental damage and use its abundant renewable resources to generate electricity for homes, businesses, and transportation by transitioning from fossil fuels. Thus, Nigeria needs an efficient legislative framework in order to effectively utilize the advantages of renewable energy in tackling environmental degradation. The consistency and specificity required to fully support the growth of renewable energy are sometimes lacking in current policies.

2.1.8 Climate Change

²⁷⁴ K Omidire, 'Challenges of human rights protection in the sustainable development of natural resources in South Africa' in Domestic and Regional Environmental Laws and Policies in Africa edited by JC Ashukem and SM Sama (Routledge, London 2023) 180, DOI: 10.4324/9781003382256-13.

²⁷⁵ Adaku Jane Echendu, Henry Favour Okafor and Olayinka Iyiola, 'Air Pollution, Climate Change and Ecosystem Health in the Niger Delta' (2022) 11(11) Social Sciences Review, 1.

²⁷⁶ *ibid.*

²⁷⁷ *ibid.*

According to the *United Nations Framework Convention on Climate Change* 1992 (UNFCCC), climate change is defined as a change in the composition of the global atmosphere across comparable time periods that is related directly or indirectly to human activities.²⁷⁸ According to the Intergovernmental Panel on Climate Change, the rapid increase of climate change is attributed specifically to human activities, the overuse of fossil fuels for energy, transportation and industrial processes.²⁷⁹ Emissions of global greenhouse gases (GHGs), principally carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) trap heat in the atmosphere, thereby causing rise sea levels, rise in global temperature and extreme weather conditions.²⁸⁰

The over reliance on fossil fuels is a primary cause of climate change.²⁸¹ The majority of the world's greenhouse gas emissions are caused by these energy sources. The main greenhouse gas, which is CO₂, is usually released in enormous quantities when fossil fuels are used for transportation, heating, and energy. The need for energy increased as nations became more industrialized, which in turn led to a rise in the exploitation and use of fossil fuels. In addition to contributing to climate change, this dependence causes habitat degradation, air and water pollution, and public health emergencies.²⁸²

One of the most pressing issues confronting the world today is climate change, which is characterized by notable changes in weather patterns that are mostly attributable to human activity.²⁸³ Climate change has become a serious, cross-border environmental and socioeconomic issue that calls for coordinated international action to lessen its damaging

²⁷⁸ Article 1(2) of the *United Nations Framework Convention on Climate Change* 1992

²⁷⁹ Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report* <https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf> accessed 25 November 2024.

²⁸⁰ *ibid.*

²⁸¹ *ibid.*

²⁸² Damilola S Olawuyi, *The Principles of Nigerian Environmental Law* (Revised ed., Afe Babalola University Press, Ado Ekiti, 2015) 108.

²⁸³ Lawal Badru, 'Climate Change in Nigeria: Causes, Effects and Legal Framework' (2020) 4(1) *Unilag Law Review*, 186.

effects.²⁸⁴ In this regard, Nigeria, the most populous country in Africa, is at an impasse in its history as it struggles to overcome its reliance on fossil fuels and its susceptibility to the effects of climate change.²⁸⁵

Climate change has serious and far-reaching effects. Storms, floods, droughts, and heatwaves are among the most common and severe weather occurrences brought on by rising global temperatures.²⁸⁶ Vulnerable groups are disproportionately affected by these phenomena, which also disturb agriculture, jeopardize food security, and increase the frequency of natural catastrophes.²⁸⁷ Sea level rise is another effect of climate change that puts coastal towns at serious risk. Ecosystems are also impacted; as species struggle to adapt to changing temperatures, biodiversity loss quickens, resulting in changed ecosystems and depletion of natural resources.²⁸⁸ Nigeria, is especially susceptible to the consequences of climate change. Desertification, floods, and changes in rainfall patterns are just a few of the environmental issues the country faces. The country's overreliance on fossil fuels does not only increase greenhouse gas emissions, but also put the country's economy at risk from volatile global oil prices, making these problems worse.²⁸⁹

Thus, transitioning from fossil fuels to renewable energy sources is crucial to addressing the urgent problems caused by climate change.²⁹⁰ A sustainable substitute that can drastically lower GHG emissions is renewable energy, which includes solar, wind, hydropower, and

²⁸⁴ Huma Haider, 'Climate Change in Nigeria: Impacts and Responses' (2024)

<https://opendocs.ids.ac.uk/articles/report/Climate_Change_in_Nigeria_Impacts_and_Responses/26429638?file=48078583> accessed 25 November 2024.

²⁸⁵ Samuel Chukwujindu Nwokolo, Edson Meyer and Chinedu Christian Ahia, 'Credible Pathways to Catching Up with Climate Goals in Nigeria' (2023) 11(9) *Climate*, 2.

²⁸⁶ Athanasios Valavanidis, 'Global Warming and Climate Change: Fossil Fuels and Anthropogenic Activities have Warmed the Earth's Atmosphere, Oceans and Land' (2022) *Scientific Reviews*, 3.

²⁸⁷ Aderonke Adegbite, Matida Chukwuemeka and Yewande Fatoki, 'Legal Perspectives of the Framework Protecting Vulnerable Communities Against Climate Change in Nigeria' (2024) 2(1) *African Journal of Legal Research*, 143.

²⁸⁸ Kashif Abass *et al*, 'A Review of the Global Climate Change Impacts, Adaptation, and Sustainable Mitigation Measures' (2022) 29 *Environmental Science and Pollution Research*, 42540.

²⁸⁹ *ibid*.

²⁹⁰ Hosam Saleh and Amal Hassan, 'The Challenges of Sustainable Energy Transition: A Focus on Renewable Energy' (2024) 7(2) *Applied Chemical Engineering*, 16.

biomass. Due to their abundance, these energy sources are good choices for nations looking to improve their energy security and lessen the effects of climate change.²⁹¹ Renewable energy has tremendous potential in Nigeria. The country has a lot of solar activity, wind, and water resources to generate energy. Nigeria can, therefore, diversify its energy mix, lessen its reliance on fossil fuels, and drastically cut its carbon emissions by investing in these renewable sources.

However, for Nigeria to fully harness and benefit from renewable energy sources in addressing climate change challenges, an efficient legal framework is necessary, as the current policies often lack coherence and specificity regarding the growth and usage of renewable energy in the Nigerian energy mix. A robust legal framework will not only facilitate the transition to renewable energy but also enhance the country's resilience to climate change, promoting a sustainable and prosperous future for all its citizens.

2.2 Theoretical Framework

In order to ground this study within a solid jurisprudential context, two major theories of law which include legal positivism and legal realism are adopted as the theoretical lenses through which Nigeria's renewable energy framework will be critically examined. These theories are selected because they illuminate both the formal structure of Nigerian law and the realities of its implementation, which together are essential to understanding the challenges and opportunities in developing an effective legal framework for renewable energy transition. In addition, two theories, namely – the Resource Curse Theory, and the Sustainable Development Theory, which are also relevant to the utilization of renewable energy in addressing environmental problems and climate change challenges are also examined in this study to contextualise the issues relevant to the study. However, it is important to reiterate

²⁹¹ *ibid.*

here that the Legal Positivism Theory, and the Legal Realism Theory underscore the consideration of Nigeria's renewable energy framework throughout this study. The theories are discussed in the next succeeding sections.

2.2.1 Legal Positivism

Legal positivism is one of many schools of thought in jurisprudence.²⁹² Its origin is attributed to John Austin and Jeremy Bentham.²⁹³ The central idea of legal positivism is that there is a separation between what the law as it currently is and what the law ought to be.²⁹⁴ Legal positivism emphasizes that what makes a norm legally valid is not whether it is just, moral, or ethically desirable, but rather whether it can be traced back to the appropriate legal source and form within a recognized legal system.²⁹⁵ In other words, the question for the positivist is not whether a law is good, but whether it has been duly enacted, promulgated, or recognized by the authority empowered to make laws.²⁹⁶ John Austin famously articulated this in his command theory, which defined law as the command of the sovereign, issued to subjects and backed by the threat of sanctions in cases of disobedience.²⁹⁷ HLA Hart, while refining Austin's theory, argued that legal systems are structured by both primary rules (rules that impose duties and obligations) and secondary rules (rules about how laws are created,

²⁹² HLA Hart, 'Positivism and the Separation of Law and Morals' (1958) 71 Harvard Law Review, 593.

²⁹³ *ibid.* at 594.

²⁹⁴ John Austin, *The Province of Jurisprudence Determined* (Cambridge University Press, 1995) 278.

²⁹⁵ Preetam Pradham *et al*, 'Legal Positivism vs. Natural Law Theory: Implications for Morality in Legal Systems' (2024) 11(3) Journal of Emerging Technologies and Innovative Research, 3.

²⁹⁶ Business Bliss Consultants FZE, 'Overview of Legal Positivism' (Lawteacher.net, September 2025) <<https://www.lawteacher.net/free-law-essays/jurisprudence/legal-positivism.php?vref=1>> accessed 22 September 2025.

²⁹⁷ Rajib Hassan, 'Law is a Command of the Sovereign Backed by Sanction: Austinian Command Theory of Law – Revisited' (2023) 6(1) International Journal of Law, Management & Humanities, 2109.

recognized, and applied).²⁹⁸ Central to Hart's framework is the "rule of recognition," a social rule that tells us how to identify which norms count as valid law within a given legal order.²⁹⁹

When this theoretical framework is applied to Nigeria's renewable energy sector, an important gap becomes apparent. There are indeed various documents, policies, and statutory references that touch upon renewable energy, such as the *Electricity Act 2023*, *Climate Change Act 2021*, *National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015* and provisions in the *Petroleum Industry Act 2020*. However, these legal frameworks are more programmatic than enforceable as they lay down objectives, targets, and aspirations without creating clear legal obligations or enforceable rights. This means that the legal framework in Nigeria's renewable energy sector, mainly outline intentions and goals rather than establishing binding rules. They describe what the government hopes to achieve, for example, increasing renewable energy use, improving efficiency, or setting future targets, but they do not create specific legal duties for individuals, agencies, or companies to follow. Since they do not impose obligations that can be enforced by courts or regulators, they function more like guiding frameworks or aspirations rather than actual laws. In other words, they provide direction and vision but lack the compulsory force that would make compliance a legal necessity.

For the positivist, these policy declarations cannot qualify as binding law unless they are embedded in legislation or regulations that can be recognized under the rule of recognition, that is, as emanating from the law-making authority in a manner prescribed by the Constitution or valid statutes. Thus, under a positivist lens, Nigeria's renewable energy regime currently lacks the comprehensive, authoritative legal framework needed to mandate a

²⁹⁸ John Bonfiglio, 'H.L.A. Hart's Theory of Law and the Supreme Court's Use of State Decisis' (2024) eRepository @ Seton Hall University, 2.

²⁹⁹ Nومه Monday, 'H.L.A. Hart's Concept of Rules as the Key to the Science of Jurisprudence' (2024) 8(4) Irish International Journal of Law, Political Sciences and Administration, 109.

genuine national transition. The existing legal framework resembles statements of intent, administrative guidelines, and sectoral plans, which may guide government action but do not bind actors in the way statutes or regulations would. This is why they fall short of what legal positivists would accept as valid law as they are not sufficiently backed by the authority of the legislature, nor do they impose binding obligations on individuals, institutions, or government bodies. Until Nigeria consolidates its renewable energy vision into a coherent legal framework, the goal of advancing low-carbon energy through renewable sources will remain stalled in the realm of good intentions rather than binding commitments.

2.2.2 Legal Realism

Legal positivism and legal realism offer complementary insights into the nature and operation of law.³⁰⁰ While positivism is primarily concerned with identifying what the law is by reference to its formal sources, realism moves beyond to examine how the law functions in practice.³⁰¹ The realist school, associated with scholars such as Oliver Wendell Holmes Jr. and Karl Llewellyn, emphasizes that law cannot be reduced to statutes or regulations alone.³⁰² Instead, it is shaped by the conduct of judges, regulators, and officials who apply and interpret it in real situations.³⁰³ Holmes' well-known "bad man" theory, which defines law as a prediction of how courts will act, illustrates this practical orientation by shifting attention from abstract rules to tangible outcomes.³⁰⁴

³⁰⁰ Ricardo Guatini, 'Legal Realism as a Positivist Theory of Law' (2020) 53 *Isonomia – Revista de Teoria y Filosofia de derecho*, 128.

³⁰¹ Leslie Green, 'Positivism, Realism, and Sources of Law' <<https://ora.ox.ac.uk/objects/uuid:15d525a8-5049-4369-b1a4-eb80227e30d3/files/m86bd2c7c6311b3388b72a2bc23909537>> accessed 22 September 2025.

³⁰² William Twining, *Karl Llewellyn and the Realist Movement* (2nd edn., Cambridge University Press, New York, USA) 375.

³⁰³ *ibid.*

³⁰⁴ Alexander Lian, 'Thirteen Ways of Looking at the Bad Man' in *Stereoscopic Law: Oliver Wendell Holmes and Legal Education* (Cambridge University Press, USA, 2020) 131. See also Donny Widiyanto and Zainal Hoesein, 'Positivism Theory in the Context of Modern Legal Thought' (2024) 1(4) *International Journal of Law and Society*, 261.

Through the lens of legal realism, Nigeria's renewable energy framework starkly reveals the gap between "law in the books" and "law in action." Statutes such as the Electricity Act and policy instruments like the National Renewable Energy and Energy Efficiency Policy (NREEEP) outline ambitious goals, yet their translation into practice has been inconsistent. The issue lies not in the absence of legal instruments but in weak institutional capacity, poor enforcement, and political interference, all of which prevent these instruments from achieving their intended impact.

For instance, the NREEEP, which sets out clear objectives for diversifying Nigeria's energy mix and promoting renewable sources.³⁰⁵ Despite these commitments, a decade after its adoption, the country has made limited progress. This is because the policy lacks binding force, and articulates aspirations without imposing enforceable obligations. Regulatory agencies such as the Nigerian Electricity Regulatory Commission (NERC) face underinvestment and limited independence, which restrict their ability to compel compliance.³⁰⁶ Similarly, the Renewable Energy Master Plan (REMP),³⁰⁷ designed to increase renewable energy's share in Nigeria's energy supply, has largely remained aspirational because of insufficient enforcement and weak institutional follow-through.

This disconnect is evident in Nigeria's solar mini-grid initiatives.³⁰⁸ Although the policy environment is nominally supportive, projects frequently stall because investors perceive regulatory uncertainty and weak enforcement of contracts. Inconsistent tariff regulation and

³⁰⁵ Paragraph 1.2 of the *National Renewable Energy and Energy Efficiency Policy* (NREEEP) 2015.

³⁰⁶ CJP Ogugbara, 'Critical Evaluation of the Institutional Regulatory Frameworks for Electricity Regulation and Investments in Nigeria' (2024) 20(1) *Unizik Law Journal*, 20.

³⁰⁷ Paragraph 1.4 of the *Renewable Energy Master Plan*, 2005.

³⁰⁸ Nigeria Electrification Project (NEP) 2018, ENGIE Energy Access Mini-Grids 2022, Mbiabet Esieyere Solar Mini-Grid 2022, Zawaciki Interconnected Mini-Grid 2024, CrossBoundary and ENGIE \$60 Million Mini-Grid Project 2022, and WeLight \$200 Million Mini-Grid Initiative 2025.

bureaucratic bottlenecks, such as delays in securing permits, further undermine progress.³⁰⁹ Courts, meanwhile, have been reluctant to strictly enforce environmental and energy-related obligations, particularly where powerful political or economic interests are involved.³¹⁰ These realities illustrate how Nigeria's renewable energy laws, though well-intentioned, remain ineffective without credible enforcement.

The integration of positivism and realism therefore provides a balanced framework for analysing Nigeria's renewable energy regime. Positivism helps map and evaluate the statutory and regulatory landscape, showing what the law is. Realism, however, interrogates the practical realities that prevent these laws from delivering results. Together, they highlight the urgent need for reforms that go beyond drafting stronger legislation. Nigeria must also empower regulatory institutions, reduce bureaucratic inefficiencies, and encourage judicial assertiveness in enforcing climate-related obligations.

Only by bridging the divide between formal legal structures and their practical enforcement can Nigeria create a renewable energy framework capable of driving meaningful change. Thus, when law is coupled with institutional strength and enforcement, ambitious renewable energy goals can be realized. For Nigeria, adopting such an approach would not only close the gap between law in the books and law in action but also place the country on a credible path toward a low-carbon future.

2.2.3 Resource Curse Theory

³⁰⁹ Nigeria Country Economic Memorandum: Charting a New Course – Charting a New Corse (2022) <<https://documents1.worldbank.org/curated/en/099020112132213046/pdf/P176197054acf60380a7cf05e6db6e3df2d.pdf>> accessed 22 September 2025.

³¹⁰ Henry Awodezi, 'Prospects and Challenges to Prove Environmental Harm in Litigation: Status Quo in Nigeria' (2022) 2(3) Grassroots Journal, 139. See also Esmat Zaidan and Imad Ibrahim, 'Achieving Energy Justice: The Role of Supervisory and Compliance Mechanisms in Global Frameworks and the International Community' (2024) 52 Energy Strategy Reviews, 2. Akeem Amodu, 'Globalization and Biodiversity: Issues in Environmental Justices' (2019) 6(1) The International Journal of Sciences and Humanities Invention, 5241.

The resource curse theory evolved in the year 1970-1990.³¹¹ The term “resource curse” is referred to the paradoxical situation by which a country underperforms economically, despite the fact that the same country is enriched with abundant natural resources.³¹² Nigeria is a prime example of this paradox, since the country’s wealth in oil and gas has not led to sustainable growth but rather a host of environmental and socioeconomic problems.³¹³ The resource curse is also known as the resource trap or the paradox of abundance.³¹⁴

Nigeria is renowned as Africa’s top crude oil producer with large oil reserves, ranking as one of the world’s top crude oil producers.³¹⁵ The economic growth of Nigeria is dependent and focused on its oil rent, which accounts for most of the government revenue. This revenue accounts for around 90 percent of Nigeria’s total export. As a result of its over dependence on its oil sector, Nigeria has become a mono-economy. Nigeria’s oil income dependence is referred to as the live wire of the Nigerian economy³¹⁶ claiming that it accounts for about 70% of federal government revenue.³¹⁷ The irony is that, despite its abundant resources, Nigeria remains one of the world’s poorest countries, with over 62% of its over 170 million

³¹¹ OJ Olujobi and OM Olujobi, ‘The Legal Regime on Renewable Energy as Alternative Sources of Energy in Nigeria’s Power Sector: The Impacts and Potentials’ (2020) *Academy of Strategic Management Journal* <<https://www.researchgate.net/publication/346570803>> accessed 16 October, 2021.

³¹² Richard Auty, *Sustainable Development in Minerals Economics: The Resource Curse Theory* (London Routledge 1993).

³¹³ Olusola Olujobi, ‘The Legal Sustainability of Energy Substitution in Nigeria’s Electric Power Sector: Renewable Energy as Alternative’ (2022) 5(32) *Protection and Control of Modern Power Systems*, 5.

³¹⁴ *ibid.*

³¹⁵ *ibid.*

³¹⁶ IT Chukwuma, ‘The Resource Curse in Nigeria: Lessons and Policy Option’ (2015) 2(8) *International Journal of Research in Humanities and Social Studies*, 38.

³¹⁷ C McPherson, ‘Petroleum Revenue Management in Developing Countries’ (2004) 2(2) <<https://www.ogel.org/article.asp?key=1161>> accessed 14 September, 2024.

people living in severe poverty,³¹⁸ surviving on less than US\$1 per day³¹⁹, and a low Gross Domestic Product (GDP), with oil accounting for 40% of GDP.³²⁰

As a result of this, the wealth produced from Nigeria's oil sector does not reflect in the lives of its people or the country's degree of socioeconomic growth, as both the state and federal governments struggle to pay wages, and pensions, while unemployment, scarcity of food supplies, inflation, exchange rates fluctuation, and other financial problems characterize the society. Regrettably, fluctuating oil price, coupled with significant corruption among governmental officials, has resulted in mismanagement of Nigeria's oil revenue.³²¹

Prior to the existence of the resource curse theory, natural resources were known to be a blessing with the potential to progress and secure the state's long-term development and socioeconomic growth.³²² According to Auty, who originally proposed the resource curse theory, he opined that instead of natural resources' abundance contributing to economic progress, it has led to underdevelopment and decreased economic growth.³²³ According to him, less-developed nations with abundant natural resources tend to have lower economic growth than those with few or no natural resources.³²⁴ According to John, he further emphasized that in developing nations, abundant natural resources become a burden rather than a gift when there is evidence of negative developmental consequences such as excessive

³¹⁸ Central Intelligence Agency, The World Fact Book Economy Overview: Country Comparison to The World (2016) <<https://www.cia.gov/library/publications/the-world-factbook/fields/2116.html#ni>> accessed 16 October 2024.

³¹⁹ OL Omoregie, 'Renewable Energy Resource Utilization in Nigeria: A Case for Accelerated Investment and Development' (2018) 2(2) *The Nigerian Journal of Business Management Sciences*, 107.

³²⁰ C McPherson, op cit. n318.

³²¹ IT Chukwuma, 'The Resource Curse in Nigeria: Lessons and Policy Option' (2015) 2(8) *International Journal of Research in Humanities and Social Studies*, 38.

³²² Paul Stevens, Glada Lahn and Jaakko Kooroshy 'The Resource Curse Revisited' (2015) *Energy Environment and Resources*, 8.

³²³ Richard Auty, *Sustainable Development in Minerals Economics: The Resource Curse Theory* (London Routledge 1993).

³²⁴ *Ibid.*

violence, low economic performance and growth, inefficient governance, and a high level of corruption.³²⁵

Researchers such as Mahler,³²⁶ Auty, and Peterson have identified Nigeria as a country that is blessed with abundant petroleum resources, and suffering from the resource curse syndrome because the enormous oil revenue derived from exploring oil has instead resulted in high poverty, violence, corruption, and less socioeconomic development.³²⁷ This view is consistent with that of Van der Ploeg and Venables, who attributed the resource curse to governments' failure to convert their oil resources into surface assets that provide sustainable future income streams resulting in sustainable economic development.³²⁸ Wenar agreed that the resource curse afflicts poor and developing nations that draw a major portion of their revenue from extractive resources such as petroleum as the situation in Nigeria³²⁹

Flowing from the above, there is a relationship between a low degree of socioeconomic development and an abundance of oil wealth. The curse of natural resources is a barrier to long-term growth.³³⁰ Especially since Auty reasoned that a country's abundance of natural resources renders it vulnerable to price instability and windfall gains from exporting commodities.³³¹ This is consistent with the empirical finding that commodity volatility is a significant component of the resource curse identified by Van der Ploeg and Poelhekke.³³²

However, there is another argument contrary to that of Autys that a country's excessive

³²⁵ Jonathan Di John, "The Resource Curse: Theory and Evidence" (2010) Real Institute Elcano, 1.

³²⁶ A Mähler, 'Nigeria: A Prime Example of the Resource Curse? Revisiting the Oil-Violence Link in the Niger Delta' (2010) 120 German Institute of Global and Area Research Programme: Violence and Security, 1.

³²⁷ Richard Auty, *Sustainable Development in Minerals Economics: The Resource Curse Theory* (London Routledge 1993).

³²⁸ Frederick van der Ploeg and Anthony J Venables, 'Natural Resource Wealth: The Challenge of Managing a Windfall' (2011) 4(1) Annual Review of Economics, 3.

³²⁹ Scott Wisor, 'Property Rights and the Resource Curse: A Reply to Wenar' (2012) 37 Journal of Philosophical Research, 185.

³³⁰ Thomas Walde, 'Natural Resources and Sustainable Development: From Good Intentions to Good Consequences' (2014) 2(1) OGEL Energy Law Journal, 4.

³³¹ Richard Auty, *Sustainable Development in Minerals Economics: The Resource Curse Theory* (London Routledge 1993).

³³² Steven Poelhekke and Frederick van der Ploeg, 'Volatility and the Natural Resource Curse' (2019) 61(4) *Oxford Economic Papers*, 730.

dependence on oil income as the primary source of government revenue exposes it to the economic impact of oil price shock.³³³ This leads its currency to appreciate or lose value relating to oil price, distorting the country's GDP growth, as it was found that oil price shock has a long-run substantial influence on Saudi Arabia's GDP.³³⁴

According to the resource curse theory, rich and diverse natural resources have a detrimental influence on economic growth, since nations that export natural resources have slower economic growth and environmental challenges than those that export non-mineral resources.³³⁵ It has, however, been shown that there is little evidence to show that rich and diverse natural resources have an impact on growth, concluding that the concept of a resource curse caused by an abundance of natural resources is a farce.³³⁶ Other significant ideas that aim to explain the resource curse theory have been examined over the years as the resource curse theory has progressed.

There are three major theoretical approaches to explaining the resource curse, which will be discussed in turn. These are the economic explanation, the political explanation, and the violent conflict theory. According to economic theory, the resource curse is connected with over-reliance on oil and a lack of economic diversification, which crowds out other sectors and causes the state to suffer from the "Dutch Disease".³³⁷ The political theory, explains the contradiction in terms of abundance as a result of corruption and rent-seeking among government officials, which impedes wise resource management and efficient policy execution. The violent conflict theory explains that natural resource dependent countries are

³³³ Goblan Algahtani, 'The Effect of Oil Price Shocks on Economic Activity in Saudi Arabia: Econometric Approach' (2016) 11(8) International Journal of Business and Management, 126.

³³⁴ *ibid.*

³³⁵ Jeffrey Sachs and Andrew Warner, 'Natural Resource Abundance and Economic Growth' (1995) NBER Working Papers 5398, National Bureau of Economic Research Natural Resource Abundance and Economic Growth, 2.

³³⁶ *ibid.*

³³⁷ Halimat Atinuke Laguda, 'The Impact of Dutch Disease: The Case of Nigeria' (Masters Thesis, Eastern Illinois University, 2019) 6.

more prone to violent conflicts than less resource dependent countries. The Democratic Republic of Congo (DRC) War, and the Sierra Leone Civil War are cases in point.

2.2.3.1 Economic Theory

Prior to the concept of the resource curse theory, it was a conventional knowledge that abundant natural resources allowed countries' economies to flourish and develop.³³⁸ This is the situation in Norway, where the country's natural resources have been considered as a godsend for fostering long-term economic and social growth.³³⁹ However, this assumption has been disproved that, countries with abundant natural resources, such as Nigeria, have seen less economic development and growth than those without natural resources.³⁴⁰ This gave rise to the notion that a lack of economic diversification might result in the resource curse theory, in which countries with abundant natural resources rely on their natural resources as the foundation of their economy.³⁴¹

The "Dutch Disease" which is described as the most common cause of low economic growth, occurs when resource-rich developing countries are insufficient in terms of promoting and creating competitive manufacturing sectors, and instead rely heavily on their natural resource wealth for state budget.³⁴² According to Oxfam International, the over-reliance on oil wealth abundance, which has resulted in less economic growth, is caused by the fact that natural resources are not pro-poor because they do not create low-skilled jobs and crowd out other

³³⁸ AK Ahmadov and F Guliyev, "Tackling the Resource Curse: The Role of Democracy in Achieving Sustainable Development in Resource-Rich Countries" (2016) *IDEA Discussion Paper* <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2746878> accessed 20 June, 2024.

³³⁹ *ibid.*

³⁴⁰ Terry Lynn Karl, 'Understanding Resource Curse' cited in Svetlana and Anya Schiffrin, *Covering Oil: A Reporter's Guide to Energy and Development* (Open Society Institute, USA, 2005) 22. See also Mingcong Li, 'Corruption, Transparency and the Resource Curse' (2013) 3(6) *International Journal of Social Science and Humanity*. 573.

³⁴¹ Saudi Arabian Monetary Agency (SAMA) "*First Fifty Annual Report*" (2015) No. 51 <https://www.sama.gov.sa/en-US/EconomicReports/AnnualReport/5600_R_Annual_En_51_Apx.pdf> accessed 17 October 2024

³⁴² JI Otaha, 'Dutch Disease and Nigeria Oil Economy' (2012) 6(1) *African Research Review*, 5.

pro-poor sectors such as manufacturing and agriculture, which typically create less skilled employment.³⁴³

Financial advancement will in general diminish when the inflow of oil income expands the worth of these nations' monetary standards. This is because of the way that they import more than they export, which raises the conversion standard of non-business merchandise in Nigeria, deterring unfamiliar purchasers as its different commodities become excessively costly for them, and de-industrialization is the undeniable underlying change that happens because of over reliance on its plentiful normal assets. This has a detrimental impact on growth, particularly as the state's reliance on oil exports grows and the state's economic diversification declines. This parallel growth is known as the Dutch Disease, and it is the cause of slow economic progress in emerging countries endowed with natural resources. This is one of the reasons why Nigeria, despite its abundant natural resources, has a high poverty rate and environmental problems.

The third economic reason of the resource curse theory, according to Weinthal and Loung, is the volatility or instability of global oil prices over short periods of time. This frequently has an influence on a state's economic development and progress by hindering the government's capacity to sustain its budget, public goods supply, and investment, as well as deterring private investment in the sector,³⁴⁴ which, according to Karl, raises the poverty rate.

The price of oil has an impact on the economic growth of the majority of oil-rich countries.³⁴⁵

One could argue that the volatile and uncertain nature of oil revenue makes resource dependence harmful to a state's economy, especially since it was found that higher

³⁴³ *Ibid.*

³⁴⁴ E Weinthal and PJ Luong, 'Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth' (2006) 4(1) *Perspective on Politics*, 37.

³⁴⁵ M Mehrara and K Oskoui, 'The Sources of Macroeconomic Fluctuations in Oil Exporting Countries: A Comparative Study' (2017) *Economic Modelling*, 368.

macroeconomic volatility swamps any direct effect of resources on economic growth and that countries with poor financial systems tend to be more vulnerable to price shocks as borrowing causes people to become indebted.³⁴⁶ This viewpoint contends that the resource boom-bust cycle is the primary cause of natural resource reliance, which is worsened by volatile commodity prices and debt overhang.³⁴⁷

2.2.3.2 Political Theory

The political theory, which is also referred to as “the Rentier State Model” postulates that where the resource curse occurs when income obtained from natural resources is not managed correctly, which can therefore lead to poor economic growth.³⁴⁸ This is commonly the situation when the economy has inadequate and inexperienced organizations prior to oil extraction.³⁴⁹ As a result, oil extraction actively encourages corruption and rent-seeking activities among political actors and elites, which thwarts institutional development and, as a result, diminishes project investment, hampering economic progress. This theory is sometimes referred to as the “boom or bust” of the economy, and based on how successfully a state manages its natural resources.³⁵⁰

The second political argument blamed the resource curse theory on inadequate institutions, arguing that the government’s easy access to oil income reduces incentives to develop strong

³⁴⁶ Steven Poelhekke and Frederick van der Ploeg, op cit. n248.

³⁴⁷ Jeffrey Frankel, The Natural Resource Curse: A Survey of Diagnoses and Some Prescriptions <<https://www.elibrary.imf.org/display/book/9781616353797/ch002.xml>> accessed 26 November 2024.

³⁴⁸ John Di John, ‘Oil Abundance and Violent Conflict: A Critical Assessment’ (2007) 43(6) The Journal of Development Studies, 962.

³⁴⁹ Anar Ahmadov and Farid Guliyev, ‘Tackling the Resource Curse: The Role of Democracy in Achieving Sustainable Development in Resource-Rich Countries’ (2016) International Institute for Democracy and Electoral Assistance, <https://www.researchgate.net/publication/297914128_Tackling_the_Resource_Curse_The_Role_of_Democracy_in_Achieving_Sustainable_Development_in_Resource-Rich_Countries> accessed 26 November 2024.

³⁵⁰ E Weinthal and PJ Luong, ‘Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth’ (2006) 4(1) Perspective on Politics, 37.

and effective institutions, such as a tax system. The enormous revenue generated by oil wealth encourages rent-seeking, patronage, and reduces state citizen dialogue, because state citizens do not participate in the creation of state revenue, which reduces political bargaining between interest groups and states, making the government less accountable to the people. The failure of the federal government to develop a sustainable tax structure is identified as a barrier to economic progress.³⁵¹

The third political argument of the resource curse theory is the “flooding out of human capital”, because most developing resource-rich countries generally disregard education and forget that economic growth is a result of individual abilities.³⁵² The demand and price for simple commodities are inconsistent, and as a result, the collapse of the manufacturing sector curtails economic growth, resulting in a decrease in the need for and supply of skilled employment.³⁵³ The above, in consequence, diminishes employment, economic disparity, and educational prospects.

2.2.3.3 Violent Conflict Theory

Another resource curse theory is that natural resource dependent countries seem to be more prone to violent conflicts than less resource dependent countries.³⁵⁴ They suggest that increasing a state’s dependence on natural resources from zero to 32 percent increases the probability of civil conflict by roughly 22 percent.³⁵⁵ Similarly, it is claimed that less-developed nations, such as Nigeria, that rely heavily on petroleum rent for government

³⁵¹ *ibid.*

³⁵² *ibid.*

³⁵³ *ibid.*

³⁵⁴ P Collier and A Hoeffler, ‘Greed and Grievance in Civil War’ (2011) 56(4) Oxford Economic Papers 565.

³⁵⁵ *Ibid.*

revenue are generally vulnerable to three overlapping curses, one of which is a high probability of unrest and conflict.³⁵⁶

On the other hand, violence is linked to the Rentier theory, even though there is currently no evidence that there is indeed a significant correlation with both oil abundant supply and violence, resulting in the resource curse, as he questioned the purported link between violence and the resource curse.³⁵⁷ It has, however, been discovered that the Rentier State theory, in which oil resources obscures socio-economic growth due to rent-seeking and corrupt practices within and between ruling classes, is clearly apparent in Nigeria's resource curse theory and deduced that resource capital really does have a major influence on and prompts wars and conflicts.³⁵⁸

On the other hand, John opined that, while these theories aim to explain the resource curse theory, the political theory that corruption and rent-seeking are development stifling is lacking in evidence.³⁵⁹ This is due to the fact that the political theory has still not been backed by realistic or substantial evidence, but the link between oil abundant amount and the development of economic growth is heavily influenced by the nature of the state's politics as well as the structure of ownership in the oil sector.³⁶⁰

In summary, the resource curse theory is not a sham; it highlights a problem that has indeed afflicted, especially resource-rich developing countries, by adversely affecting socioeconomic development and environmental degradation. A state that reflects any of the problems described in the theories is deemed to be inadequate in sustainable growth. The resource

³⁵⁶ Chenge Andrew and David Onu Salifu, 'The Paradox of Plenty: Natural Resource Revenues and the Resource Curse in Nigeria' (2020) 3(2) International Affairs, 12.

³⁵⁷ John Di John, 'Oil Abundance and Violent Conflict: A Critical Assessment' (2007) 43(6) The Journal of Development Studies, 962.

³⁵⁸ Williams Okpebenya *et al*, 'Revisiting the Resource Curse in Nigeria: The Case Study of Niger Delta' (2023) 4(1) KIU Interdisciplinary Journal of Humanities and Social Sciences, 260.

³⁵⁹ John Di John, *op cit*. n264.

³⁶⁰ *Ibid*.

curse theory therefore, highlights that developing countries must secure the growth and development of renewable energy sources by legislative framework to protect and promote the social, economic, and ecological interests of the current generation while also securing the same for coming generations. Developing markets must guarantee that their extractive resources do not encourage economic stagnation as well as other economic crises inherent with resource-rich countries, such as poverty and inadequate social infrastructure.³⁶¹

2.2.4 Sustainable Development Theory

The sustainable development theory is another relevant theory that is used in this study. The theory of sustainable development was developed when concerns were raised over the coexistence of ecological degradation, social inequality, and economic advancement.³⁶² Studies shows that these goals could not actually be fully achieved without jeopardizing the sufficiency of the others, even if they were quite near to catching up with natural essentialness, improving monetary accomplishment, and increasing overall human happiness.³⁶³ With respect to this, governments need to use their extractive resources in a way that promotes sustainable growth and meets present demands without sacrificing capacity or the requirements of coming generations.³⁶⁴

The roots of sustainable development theory can be traced back to the 1970s modern green economy movement. The *United Nations Conference on the Human Environment* (also

³⁶¹ OJ Olujobi and OM Olujobi, 'Theories of Corruption: Public Choice Extractive Theory as Alternative for Combating Corruption in Nigeria's Upstream Petroleum Sector' (2020) 11(2) International Journal on Environmental Sustainability Green Technologies (IJEST), 12.

³⁶² David Amanawa and Ogechi Ebiegberi, 'A Theoretical Perspective in Sustainable Development Tactics in Nigeria' (2024) 8(6) International Journal of Academic Information Systems Research, 1.

³⁶³ Michael Hauschild, Sami Kara and Inge Ropke, 'Absolute Sustainability Challenges to Life Cycle Engineering' (2020) 69 CIRP Annals – Manufacturing Technology, 533.

³⁶⁴ Adenike Akinsemolu, 'Contribution of the Extractive Industry to Sustainability in the Middle East and North African (MENA) Region' (2020) 11(1) Journal of Sustainable Development Law and Policy, 227.

known as the Stockholm Conference) was an international conference convened under the auspices of the United Nations which has been held in Stockholm, Sweden since 1972. It was the UN's first major conference on international environmental issues, and marked a turning point in the development of international environmental policies.³⁶⁵ This conference's most important output addressed the effort to discover favourable correlations between environmental concerns and economic challenges such as development, growth, and employment.³⁶⁶

The 1980 World Conservation Strategy underlined that responsible resource consumption might be in the best interests of humanity.³⁶⁷ It provided a very different definition of sustainable development from that of development. Sustainable development as claimed means the integration of conservation and development to ensure that modifications to the planet do indeed secure the survival and well-being of all people. Development, however, means the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of human life.³⁶⁸

The concept of sustainable development, as articulated by the World Commission on Environment and Development (WCED), is fundamentally about balancing the needs of the present with those of future generations.³⁶⁹ This definition, famously stated in the 1987 *Brundtland Report* titled "Our Common Future", has since become a cornerstone in global

³⁶⁵ United Nations Conference on the Human Environment, 5-16 June 1972, Stockholm
<<https://www.un.org/en/conferences/environment/stockholm1972>> accessed 27 November 2024.

³⁶⁶ *ibid.*

³⁶⁷ C Berwick, 'The International Union for Conservation of Nature and Natural resources: Current Activities and Situation' (1969) 3 *Biological Conservation*, 192.

³⁶⁸ Dresner Simon, *The Principles of Sustainability* (Earthscan Publications, London 2002).

³⁶⁹ World Commission on Environment and Development (WCED), 'From One Earth to One World: An Overview' (Oxford, Oxford University Press 1987) <[https://www.World Commission on Environment and Development \(1987\) \(wsu.edu\)](https://www.WorldCommissiononEnvironmentandDevelopment(1987)(wsu.edu))> accessed 27 November 2024.

environmental discourse. It underscores the idea that economic growth, environmental protection, and social inclusion must be pursued simultaneously and responsibly.³⁷⁰

However, while the principle is clear, sustainable development remains difficult to operationalize. Challenges arise in defining what constitutes sustainability in practical terms, determining the scope and limits of sustainable actions, and striking a fair balance across geographical regions and generational timelines. These complexities highlight the need for guiding principles that can help governments and institutions implement sustainability in ways that are both equitable and effective.³⁷¹

This is where the *Rio Declaration on Environment and Development*, 1992 becomes critical. Building on the Brundtland Report, the Rio Declaration was adopted at the United Nations Conference on Environment and Development (UNCED), often referred to as the Earth Summit, held in Rio de Janeiro. The Declaration sets out 27 principles designed to guide countries in achieving sustainable development while protecting the environment. Among these principles are the precautionary principle, the polluter pays principle, and the notion of common but differentiated responsibilities, which recognizes that while all countries share the obligation to protect the environment, their historical contributions to environmental degradation and their capacities to address it vary.

Together, the Brundtland Report and the Rio Declaration provide a conceptual and ethical foundation for sustainability. They assert that environmental protection is not a hindrance to development but an essential part of it. As this study engages with issues surrounding renewable energy and environmental pollution, these foundational documents offer both a

³⁷⁰ *Brundtland Report*, 1987.

³⁷¹ C Berwick, 'The International Union for Conservation of Nature and Natural resources: Current Activities and Situation' (1969) 3 *Biological Conservation*, 192.

moral framework and a practical guide for aligning energy development with long-term environmental sustainability.³⁷²

In principle, the theory of sustainability and sustainable development appears clear and exact; nevertheless, its application in the actual world leads in compounded and sometimes unexpected complications. The use of the precautionary principle is crucial to sustainable development. Where there are dangers of substantial or permanent damage, lack of full scientific confidence should not be used as a rationale for deferring steps to avoid environmental deterioration.³⁷³ The essence of the theory of sustainability is to meet the needs of the present without compromising the ability of future generations to meet their own needs.³⁷⁴ There are three main areas of influence, and they are referred to as the “*Three Pillars of Sustainability*”, which are the environmental, economic and social aspect.³⁷⁵

It should be noted however, that these three aspects are interconnected and if they are combined and applied in real world situations, they can create a steady base for a sustainable world from which everybody can benefit, because when natural resources are preserved, the environment is protected, and the economy is not harmed and the quality of life for our people is improved or maintained.³⁷⁶ The “*Three Pillars of Sustainability*”, which are the environmental, economic, and social aspect, are discussed below:

2.2.4.1 Environmental Sustainability

³⁷² Dresner Simon, *The Principles of Sustainability* (Earthscan Publications, London 2002).

³⁷³ *ibid.*

³⁷⁴ United Nations Sustainability <<https://www.un.org/en/academic-impact/sustainability>> accessed 25 November 2024.

³⁷⁵ *Ibid.*

³⁷⁶ *Ibid.*

To achieve environmental sustainability, the natural environment must keep its full functionality and utility for a long period of time.³⁷⁷ It is desirable for activities to support positive development rates while also encouraging a balance in our natural environment. Any activities that upset the environment's balance should be avoided, but if they do occur, they should be confined to a smaller extent. The environmental consequences of each activity or choice should be considered.³⁷⁸ Environmental sustainability encompasses a wide range of concerns, from pollution to natural resource management. The primary goal of environmental sustainability is to reduce pollution.³⁷⁹

In essence, the theory emphasizes the necessity of using natural resources for the benefit and worth of current and future generations without having an adverse impact on the environment. Therefore, to address environmental pollution and climate change challenges through the overreliance on fossil fuels in Nigeria, renewable energy sources must be accepted as an alternative energy source in the country's energy sector.

2.2.4.2 Economic Sustainability

The intersection of economic sustainability theory and sustainable development theory highlights the necessity of balancing economic growth with environmental preservation and social equity.³⁸⁰ In the Nigeria context, a nation rich in both fossil fuels and renewable energy resources, this interplay becomes particularly significant as the country grapples with the challenges posed by its reliance on oil and gas.³⁸¹ This theory advocates for practices that

³⁷⁷ Ziaul Islam and Wang Shuwei, 'Environmental Sustainability: A Major Component of Sustainable Development' (2023) 4(2) International Journal of Environmental Sustainability and Social Science, 621.

³⁷⁸ *ibid.*

³⁷⁹ *ibid.*

³⁸⁰ Mohd Ali, M Kamraju and Devka Sonaji, 'Economic Policies for Sustainable Development: Balancing Growth, Social Equity, and Environmental Protection' (2023) 3(1) ASEAN Journal of Economic and Economic Education, 24.

³⁸¹ Ahmad Abdusallam Abdallah and Odetokun Blessing Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) Journal of Arid Zone Economy, 105.

ensure economic growth while safeguarding natural capital for future generations.³⁸² In Nigeria, where the economy is heavily dependent on oil revenues, the theory underscores the vulnerabilities associated with fossil fuel reliance specifically, the volatility of global oil prices and the associated economic instability. The boom-and-bust cycles of oil markets have historically led to periods of economic growth followed by severe downturns, highlighting the need for a more resilient framework.³⁸³

Sustainable development theory expands upon the principles of economic sustainability by incorporating social and environmental dimensions into the equation. It advocates for development that meets the needs of the present without compromising the ability of future generations to meet their own needs.³⁸⁴ In Nigeria, this theory calls for a re-evaluation of energy policies that have favored fossil fuels, given their significant environmental impacts, such as pollution and greenhouse gas emissions, which contribute to climate change and adversely affect public health and livelihoods.³⁸⁵

The transition towards renewable energy sources aligns closely with both economic sustainability and sustainable development theories. Renewable energy such as solar, wind, and biomass offers a path to economic resilience by diversifying the energy mix and reducing dependence on fossil fuels. This transition can mitigate the economic risks associated with fluctuating oil prices while promoting job creation in new industries and technologies.³⁸⁶

³⁸² *ibid.*

³⁸³ Nafi Chinery and Tengi George-Ikoli, 'Ending Nigeria's Oil Dependency: Not If, But When... and How' (Natural Resource Governance Institute, 9 March 2022) <<https://resourcegovernance.org/articles/ending-nigerias-oil-dependency-not-if-whenand-how>> accessed 27 November 2024.

³⁸⁴ Justice Mensah, 'Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review' (2019) 5(1) Cogent Social Science, 2.

³⁸⁵ Samuel Nwokolo, Edson Meyer and Chinedu Ahia, 'Credible Pathways to Catching Up with Climate Goals in Nigeria' (2023) 11 *Climate Perspective*, 3.

³⁸⁶ Satar Bakhsh et al, 'Strategy Towards Sustainable Energy Transition: The Effect of Environmental Governance, Economic Complexity and Geopolitics' (2024) 52 *Energy Strategy Reviews*, 2.

Moreover, renewable energy is inherently more sustainable. It generates minimal pollution and has a lower carbon footprint compared to fossil fuels, thereby supporting environmental sustainability. Emphasizing the use of renewable energy over fossil fuels not only supports economic resilience but also aligns with broader goals of environmental protection and social equity.³⁸⁷ As Nigeria seeks to navigate the complexities of its energy landscape, embracing renewable resources represents a crucial step toward achieving a sustainable future that benefits both the economy and its people. Thus, by investing in renewable energy infrastructure through an effective legal framework, Nigeria can enhance energy access, particularly in rural areas, fostering social equity and improving quality of life for marginalized communities.

2.2.4.3 Social Sustainability

Social sustainability theory calls for a re-evaluation of energy policies that have historically favoured fossil fuels, which contribute to environmental degradation and exacerbate social inequalities in Nigeria as the reliance on oil and gas has often marginalized local communities, particularly in resource-rich regions like the Niger Delta, where environmental pollution from oil extraction has led to health crises, loss of livelihoods, and social unrest.³⁸⁸

The transition to renewable energy sources presents an opportunity to enhance social sustainability in Nigeria. Renewable energy technologies, such as solar, wind, and biomass, can provide decentralized energy solutions that empower local communities.³⁸⁹ By investing in renewable energy infrastructure, Nigeria can facilitate greater access to energy, particularly in rural areas where many lack reliable energy sources. This access not only improves living

³⁸⁷ *ibid.*

³⁸⁸ Idoko Idoko *et al*, 'Renewable Energy Policies: A Comparative Analysis of Nigeria and the USA' (2024) 21(1) World Journal of Advanced Research and Reviews, 896.

³⁸⁹ David Amanawa and Ogech Ebiegberi, 'A Theoretical Perspective on Sustainable Development Tactics in Nigeria' (2024) 8(6) International Journal of Academic Information Systems Research, 2.

standards and economic opportunities but also promotes social equity by reducing the disparities between urban and rural populations.³⁹⁰ Moreover, the deployment of renewable energy can create jobs and stimulate local economies, fostering community engagement and participation in the energy transition.³⁹¹ By involving local communities in the planning and implementation of renewable energy projects, Nigeria can ensure that the benefits are shared equitably, thus addressing historical grievances associated with fossil fuel exploitation.³⁹²

Therefore, the relationship between social sustainability theory and sustainable development theory underscores the importance of transitioning to renewable energy sources in Nigeria. By embracing renewables, Nigeria can address social inequalities, empower communities, and mitigate the environmental pollution and climate change challenges associated with fossil fuels. Although, an effective legal framework is critical to facilitating this transition, ensuring that renewable energy development is equitable, environmentally sustainable, and aligned with the needs and aspirations of all Nigerians. This approach can pave the way for a more inclusive and sustainable energy future, benefiting both people and the environment.

This study, which aims to develop an effective legal framework for the advancement of renewable energy sources to reduce environmental pollution in Nigeria, rests upon the intersection of law, policy, and sustainable development. This intersection naturally demands a theoretical foundation capable of explaining not only what the law is, but also how it functions in society, how it fails, and how it can be restructured to achieve transformative environmental outcomes. Among the theories discussed, Legal Positivism, Legal Realism, Resource Curse Theory, and Sustainable Development Theory, each provides insight into

³⁹⁰ Chiemezie Umeh *et al*, 'The Role of Renewable Energies for Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Nigeria' (2024) 2(2) European Journal of Applied Science, 73.

³⁹¹ *ibid.*

³⁹² *ibid.*

different layers of the research problem. However, when critically examined, Legal Realism emerges as the most relevant and operationally significant to this study.

Legal Realism, originating from the works of scholars such as Oliver Wendell Holmes Jr., Karl Llewellyn, and Jerome Frank, is grounded in the idea that the law should be understood not merely as a body of rules but as a living instrument shaped by social, political, and economic realities. In contrast to Legal Positivism, which confines analysis to statutes, regulations, and judicial decisions, Legal Realism interrogates how the law actually operates in practice. It shifts focus from abstract principles to the real behaviour of legal institutions, lawmakers, and implementers.

This theory is particularly relevant to this study because it captures the practical dysfunction at the heart of Nigeria's energy and environmental law. This study reveals that although Nigeria possesses numerous energy-related legal frameworks, they have largely failed to produce tangible progress in renewable energy adoption. This failure, as the study suggests, stems not from the absence of law but from the absence of effective implementation, enforcement, and institutional coherence. These are precisely the issues Legal Realism is designed to interrogate.

In essence, Legal Realism allows this study to move beyond normative legal analysis toward empirical institutional critique. It provides the conceptual apparatus to examine how corruption, bureaucratic inefficiency, and weak regulatory capacity hinder the realization of Nigeria's energy transition goals. Through this lens, this study underscores that for Nigeria to transition successfully from fossil fuels to renewable energy, legal reform must be accompanied by institutional strengthening, regulatory transparency, and policy accountability, all of which are realist imperatives.

In addition, while Legal Realism offers a pragmatic jurisprudential foundation, Sustainable Development Theory introduces the ethical and policy dimension necessary for the normative justification of the proposed legal framework. This theory integrates environmental, social, and economic considerations within a single developmental paradigm. In this study, Sustainable Development Theory provides the goalpost toward which the legal reforms must aim. It frames renewable energy not merely as a technological or economic concern, but as a legal and moral imperative for intergenerational justice, environmental protection, and economic equity. The Sustainable Development Theory ensures that the proposed model legal framework transcends mere institutional efficiency and embeds broader values of human welfare, environmental stewardship, and equity between present and future generations.

Thus, while Legal Realism examines how the law functions, Sustainable Development Theory addresses why it must function in a particular way to sustain human and ecological balance. The complementarity of these two theories gives this study both analytical precision and moral depth.

Moreso, Resource Curse Theory, also known as the “paradox of plenty,” helps contextualize Nigeria’s persistent dependence on fossil fuels. It posits that nations rich in natural resources often experience economic stagnation, corruption, and poor governance due to overreliance on those resources. In this study, this theory explains the historical and structural roots of Nigeria’s fossil fuel dependency, how the abundance of oil revenue has discouraged diversification into renewables and fostered institutional inertia. Despite the Resource Curse Theory primarily operates in the field of political economy, its incorporation into this framework deepens the understanding of why Nigeria’s legal system has failed to evolve toward sustainability. It demonstrates that the weakness of renewable energy law is not accidental but structurally embedded within a rentier state model. Therefore, any proposed

legal reform must simultaneously address these systemic governance and accountability deficits.

By synthesizing the above frameworks, this study can advance a new theoretical model that is context-specific, interdisciplinary, and transformative, a theory that speaks to the unique legal and developmental realities of Nigeria. Such a theory could be called “The Realist Theory of Sustainable Legal Transition” or alternatively “The Theory of Legal Realism for Sustainable Energy Development.” This new theory would hold that the effectiveness of environmental and energy law in developing countries is contingent upon the practical functionality of legal norms, the institutional capacity for their enforcement, and their normative alignment with sustainability objectives. It would argue that for legal systems in resource-dependent economies like Nigeria to foster a genuine transition toward low-carbon energy, they must combine realist insights, focusing on what works in practice with sustainability imperatives, emphasizing long-term environmental and social balance. This hybrid theory thus recognizes law as both an instrument of social engineering and a moral vehicle for environmental justice.

The “Realist Theory of Sustainable Legal Transition” could therefore become a theoretical contribution to legal scholarship in energy and environmental law. It encapsulates the notion that achieving a low-carbon future in Nigeria requires laws that are not only well-drafted but effectively operational, socially contextualized, and normatively committed to sustainability.

Having explored the historical context of the Nigerian energy sector, literature review, conceptual and theoretical frameworks surrounding renewable energy, environmental pollution, climate change and theoretical framework, it is essential to now turn to the legal, regulatory, and institutional frameworks that shape the governance of energy in Nigeria, which forms the core focus of the next chapter.

This chapter examines the laws, policies, and institutional mechanisms that regulate energy production, distribution, and environmental protection in Nigeria. The relevance of this analysis lies in the fact that effective legal and institutional structures are critical for steering the country toward a more sustainable and low-carbon energy future. Given Nigeria's reliance on fossil fuels and its growing interest in renewable alternatives, the legal framework must not only address issues of energy access and economic development but also integrate strong environmental safeguards in line with global sustainability commitments. Thus, this chapter lays the groundwork for understanding the extent to which Nigeria's legal and institutional environment supports or constrains the transition to clean energy, and how these frameworks can be improved to align with international best practices and sustainable development goals.

Chapter 3

Legal, Policy and Institutional Framework Governing Energy Production and Environmental Pollution in Nigeria

This chapter examines the legal, policy, and institutional framework governing energy production and environmental pollution in Nigeria, offering a comprehensive analysis of the legislative and institutional tools that shape the operational landscape of the energy sector. The energy sector in Nigeria is overseen by various institutions tasked with the formulation of policies, regulation, and enforcement activities. These institutions govern the generation, transmission and distribution of energy sources including fossil fuels and renewable energy. Despite having a wealth of energy resources, Nigeria does not appear to find it easy to control and regulate how much energy it produces, especially when considering fossil fuels and the potentials of developing a renewable energy sector. The intricacies of these issues demand a deep comprehension of the law and policies that influence the energy sector. In addition to Nigeria legislation governing energy production, international and regional frameworks that support sustainable energy practices have a significant influence on Nigeria's energy sector. These frameworks are necessary to progress partnership, attract investment in renewable energy, and match Nigeria's energy policy with global sustainability objectives. These issues are discussed in the following sections.

3.1 International Instruments

3.1.1 United Nations Framework Convention on Climate Change (UNFCCC)

In 1992, the *United Nations Framework Convention on Climate Change* (UNFCCC) was adopted as the foundation for a response to the challenges of climate change globally.¹ In its

¹ Adeola Kehinde and Olufemi Abifarin, 'Legal Framework for Combating Climate Change in Nigeria' (2022) 9(3) Kutafin Law Review, 409.

preamble, the UNFCCC reiterates the right of states to exploit their own resources pursuant to their environmental and developmental policies, and the overarching responsibility to ensure their activities do not cause damage to the environment of other States.² Although, the UNFCCC does not create legally binding emission reduction targets or commitments, the Convention established a set of mutual understanding between parties on the reality of climate change, especially that climate change is a pressing challenge and that there is an urgent need to tackle it by reducing the cumulative level of emission of greenhouse gases.³ It also urges States to enact effective environmental legislation.⁴ The preamble places the onus of taking immediate action towards the remediation of climate change and its effect on developing countries, based in part on the consideration of their contributions to the enhancement of the greenhouse gas effect from their industrialization process.⁵ The preamble also reiterates the effect of climate change on vulnerable and developing countries whose economies are particularly dependent on fossil fuel production, use and exportation.⁶

The main objective of the UNFCCC is to even out the levels of greenhouse gases in the atmosphere within a time frame that is adequate to permit 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.⁷ The UNFCCC is therefore a major international Convention that aims to tackle climate change via worldwide collaboration and promises to reduce greenhouse gas emissions. However, the efficiency of its provisions, particularly in relation to Nigeria's energy production, raises serious issues. Nigeria's energy

² Preamble, *The United Nations Framework Convention on Climate Change 1992*.

³ Damilola S Olawuyi, *The Principles of Nigerian Environmental Law* (Revised Edition, Afe Babalola University Printing Press, Ekiti, 2015) 110.

⁴ *ibid.*

⁵ *ibid.*

⁶ Preamble of the *United Nations Framework Convention on Climate Change 1992*.

⁷ *ibid.* Article 2.

sector is significantly dependent on fossil fuels, which has serious consequences for greenhouse gas emissions and, by extension, human health and the environment.

For instance, till date, Nigeria's energy production is characterized by overreliance on fossil fuels, which account for approximately 86% of its energy generation.⁸ This overreliance has resulted in high levels of greenhouse gas emissions, primarily carbon dioxide (CO₂) and methane (CH₄), contributing to climate change and environmental degradation and has serious consequences for both human health and the environment. Air pollution caused by the burning of fossil fuels has been related to a variety of health conditions, including respiratory and cardiovascular ailments, which disproportionately impact Nigeria's vulnerable communities.⁹ Furthermore, environmental degradation caused by fossil fuel extraction and usage, such as oil spills and gas flaring, worsens the detrimental consequences on ecosystems and biodiversity.¹⁰ Even though Nigeria is committed to reduce emissions under the UNFCCC through its Nationally Determined Contributions (NDCs) to reduce emissions,¹¹ the country has had difficulty in putting in place efficient laws and policies that facilitates the transition from overreliance on fossil fuels to the advancement of low-carbon energy through renewable energy sources for energy generation.¹² In addition, the NDCs target for countries is 20% reduction of emissions unconditionally and up to 45% with international help in 2030.¹³ However, these emission targets have not been converted into significant action, and

⁸ Martins Eze, 'Nigeria's Energy Sector: Unleashing Potential Amidst Challenges' (The Electricity Hub, 24 October, 2024) <<https://theelectricityhub.com/nigerias-energy-sector-unleashing-potential-amidst-challenges/>> accessed 2 April 2025.

⁹ Faatihah Niyi-Odumosu *et al*, 'Exploring the Impact of Climate Change on Respiratory Health in Nigeria: A Scoping Review of Current Research, Government Policies and Programs' (2025) 178(35) *Climate Change*, 34.

¹⁰ Edem Okon *et al*, 'Systematic Review of Climate Change Impact Research in Nigeria: Implication for Sustainable Development' (2021) 7 *Heliyon*, 2.

¹¹ United Nations Climate Change: Nationally Determined Contributions (NDCs) <<https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>> accessed 2 April 2025.

¹² Chukwuemeka G Ogbonna *et al*, 'Understanding Nigeria's Transition Pathway to Carbon Neutrality using the Multilevel Perspective' (2023) 2(24) *Carbon Neutrality*, 3.

¹³ United Nations Climate Change: Nationally Determined Contributions (NDCs) <<https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>> accessed 2 April 2025.

greenhouse gas emissions continue to increase enormously due to the continuing overreliance on fossil fuels to generate energy.

Although the UNFCCC offers a framework for addressing climate change, Nigeria's energy production has not successfully transitioned from fossil fuels.¹⁴ The continuous overreliance on fossil fuels remains to enormously contribute to emissions of greenhouse gas which impacts the human health and environment negatively. Thus, in order to better align with the objectives of the UNFCCC, Nigeria must invest in and adopt the use of renewable energy sources to generate energy through an efficient legal framework and enforceable NDCs.¹⁵ Nigeria can only meet its international obligations and emission targets under the UNFCCC and reduce environmental pollution and climate change challenges caused by overreliance on fossil fuels by fulfilling its international obligations under the UNFCCC.¹⁶

3.1.2 Kyoto Protocol to the United Nations Framework Convention on Climate Change

As earlier discussed, the UNFCCC does not establish any legally binding emission reduction targets or commitments, its establishment is to formally recognize climate change as a global challenge and to espouse aspirational goals on the need to collectively tackle climate change.¹⁷ As such, the Convention only urges and encourages countries to tackle climate change, it does not contain any binding obligation for countries to do so, or a sanction if they fail to do so.¹⁸ It soon became apparent that there was a need to do more if climate change was to be effectively tackled.¹⁹ Parties to the *UNFCCC* met in Berlin (the first Conference of Parties (COP) to the *UNFCCC* to discuss the need for legally binding emission reduction

¹⁴ Augustine Okoh and Eyene Okpanachi, 'Transcending Energy Transition Complexities in Building a Carbon-neutral Economy: The Case of Nigeria' (2023) 6 Clean Energy Systems, 1.

¹⁵ *ibid.*

¹⁶ Olusola Olujobi and Ikiyouleimo Odogbo, 'Strategic Evaluation of the 2021 Nigeria Climate Change Act: Surmounting Challenges, Paving the Way for Success, and Envisioning Future Trajectories' (2024) 10 Social Sciences and Humanities Open, 2.

¹⁷ *ibid.*

¹⁸ Catherine Higham *et al.*, 'Accountability Mechanisms in Climate Change Framework Laws' (2021) Gratham Research Institute on Climate Change and the Environment, 14.

¹⁹ *ibid.* p20.

commitments as a stronger response to the problem of climate change in 1995. This led to negotiations to develop an instrument that could strengthen global response to climate change.²⁰

The *Kyoto Protocol* was thereupon adopted in 1997 in Kyoto, Japan as an extension of the *UNFCCC* to become the first international agreement that establishes legally binding emission reduction targets on climate change.²¹ The *Kyoto Protocol* commits developed countries to stabilize greenhouse gas emissions by setting a legally binding emission reduction targets and obligations based on the *UNFCCC*.²² The major feature of the *Kyoto Protocol* is that it sets legally binding targets for the reduction of greenhouse gas emissions for thirty-seven developed countries and the European community.²³ The *Kyoto Protocol* only sets emission reduction targets for these developed countries because it recognizes that they are largely responsible for the current high levels of greenhouse gas emissions in the atmosphere. It places a heavier burden on developed countries under its central principle: that of “common but differentiated responsibility.”²⁴

The *Kyoto Protocol* is recognized as one of the most important international agreements of the late twentieth century, not only for fixing greenhouse gas emissions limits to be achieved by developed countries,²⁵ but also providing three flexible mechanisms through which developed countries can achieve their emission reduction objectives.²⁶ These mechanisms

²⁰ Lindsay Maizland and Clara Fong, ‘Global Climate Agreements: Successes and Failures’ (*Council on Foreign Relations*, 21 January 2025) <<https://www.cfr.org/background/paris-global-climate-change-agreements>> accessed 27 January 2025.

²¹ United Nations Climate Change: What is the Kyoto Protocol? <https://unfccc.int/kyoto_protocol> accessed 27 January 2025.

²² *ibid.*

²³ United Nations Climate Change: What is the Kyoto Protocol? <https://unfccc.int/kyoto_protocol> accessed 27 January 2025.

²⁴ Article 10 of the *Kyoto Protocol to the United Nations Framework Convention on Climate Change* 1997, UN Doc FCCC/CP/1997/7/Add.1.

²⁵ *ibid.* Article 17.

²⁶ Damilola Olawuyi, ‘Legal Preparedness for Climate Change in Africa’ in S Mason-Case, Liliana del Villar, Damilola Olawuyi and B Meyer, *Compendium of Legal Best Practices on Climate Change Policy* (International Development Law Organization, 2011).

include emissions trading, joint implementation, and the clean development mechanism that encourage greenhouse gas abatement where it is most cost-effective in the developing world.²⁷ Joint implementation²⁸ and emission trading²⁹ take place between two developed countries with emission targets. While emission trading allows countries with commitments under the *Kyoto Protocol* to buy emission units from other countries with commitments and use them towards meeting a part of their emission targets; joint implementation is a project-based mechanism that allows developed countries to meet their greenhouse gas emission reduction commitments by investing in joint emission reduction projects and acquiring emission reduction credits resulting from such projects.³⁰ Since developing countries do not have emission reduction targets under the *Kyoto Protocol*, they are only eligible to take part in the Clean Development Mechanism (CDM).³¹

The CDM allows countries with emission targets to earn credit towards their targets by participating in emission reduction or emission removal projects in developing countries. Its main objectives are to assist countries without emission targets, that is developing countries, in achieving sustainable development by boosting their economies and promoting environmentally friendly investment from developed countries, and to help those countries with emission reduction targets under *Kyoto Protocol*, that is, developed countries, to meet their reduction targets by purchasing emission reduction credits created by CDM projects.³² The CDM therefore provides an incentive for government and companies in developed countries to invest in greenhouse gas reduction projects in developing countries and to be

²⁷ Article 3, 6 and 12 of the *Kyoto Protocol to the United Nations Framework Convention on Climate Change* 1997, UN Doc FCCC/CP/1997/7/Add.1.

²⁸ *ibid.* Article 6.

²⁹ *ibid.* Article 4 and 17.

³⁰ *ibid.* Article 4 and 6.

³¹ *ibid.* Article 12.

³² United Nations Climate Change: The Clean Development Mechanism <<https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism>> accessed 28 January 2025.

credited for greenhouse gas reduction achieved in developing countries to host emission reduction projects sponsored by developed countries.³³

From the analysis above, one of the significant limitations of the Kyoto Protocol is its enforcement procedures. It only set specific targets for developed nations; it did not establish strong measures to guarantee compliance and accountability. That is very much the situation in Nigeria, where not only have the emissions continued, but they have also increased.³⁴ Without a punitive measure for non-compliance, there is no strong motivation for the Nigerian government and other developing countries to adopt strict climate policies or transition from the overreliance fossil fuel sources to renewable energy sources.³⁵ In Nigeria, the result has been continued dependence on fossil fuels with very serious dangers to human health and the environment at large.

Furthermore, to promote investments in renewable energy in developing countries, the *Kyoto Protocol* placed a strong emphasis on adaptable mechanisms such as the CDM.³⁶ However, due to financial and structural limitations, Nigeria has not profited from these systems in an effective way. For example, Nigeria's CDM projects have been small in comparison to the magnitude of its energy problems, concentrating mostly on reduction of gas flaring rather than the widespread adoption of renewable energy.³⁷ Although the *Kyoto Protocol* established the framework for global climate action, the particular issues confronting Nigeria's energy sector have not been adequately addressed by its provisions.³⁸ Nigeria's continued reliance on fossil fuels and growing greenhouse gas emissions are partly due to the absence of legally

³³ *ibid.*

³⁴ Akeem Olabanji Olasunkanmi, 'Analysis of the Health Effect of Carbon Emission in Nigeria' (2024) 5(1) *Journal of Applied Financial Econometrics*, 27.

³⁵ BC Anwadike, 'Kyoto Protocol and the Challenges of Implementation in Nigeria' (2017) 13(1) *Journal of Geography, Environment and Earth Science International*, 5.

³⁶ *United Nations Framework Convention on Climate Change 1992*.

³⁷ Agaptus Nwozor et al, 'Transition to Green Energy and Sustainable Development in Nigeria: A Prospective and Evaluative Analysis' (2021) 665 *IOP Conference Series: Earth and Environmental Science*, 4.

³⁸ *ibid.*

binding agreements for developing nations, lax enforcement, and a lack of attention to local settings. Nigeria has to invest in renewable energy technology, prioritize capacity building, and seek more ambitious and enforced national policies in order to better line with international climate goals. Nigeria can only achieve its international commitments and lessen the negative effects of its reliance on fossil fuels on the environment by implementing an effective legal framework for the adoption of renewable energy to reduce the effect of environmental pollution and climate change.

3.1.3 Paris Climate Change Agreement

The *Paris Climate Change Agreement*, also known as the *Paris Agreement*, adopted in 2015 aimed to reduce global warming, marking a significant turning point in global climate policies.³⁹ The *Paris Agreement* was established under the umbrella of the *UNFCCC*.⁴⁰ As earlier discussed, the *UNFCCC* was the first treaty to address climate change globally and collectively.⁴¹ Unfortunately, it did not garner the strong responses needed to reduce climate change.⁴² Under the *UNFCCC*, Nigeria did not commit in taking significant steps towards climate change mitigation.⁴³ This lack of progress among other obstacles, led to the adoption of the *Paris Agreement*, as part of the *Paris Legal Outcome*.⁴⁴ The *Paris Legal Outcome* is a part of the *Paris Agreement*, and the *Paris Decision*,⁴⁵ the latter being a resolution by the member states of *UNFCCC*, which led to the establishment of the *Paris Agreement*.⁴⁶

³⁹ Ngozi Chinwa Ole and Onyekachi Eni, 'Towards the Implementation of the Paris Climate Agreement 2015: Opportunities and Challenges for the Network of Universities Legal Aid Institutions (NULAI) Nigeria' (2020) 27(3) *International Journal of Clinical Legal Education*, 148.

⁴⁰ Michele Stua, *From the Paris Agreement to a Low-Carbon Bretton Woods: Rationale for the Establishment of a Mitigation Alliance* (Springer, 2017) 10,11.

⁴¹ Eike Albrecht *et al*, *Implementing Adaptation Strategies by Legal, Economic and Planning Instruments on Climate Change* (Springer, 2014) 56.

⁴² Doaa Abdel Motaal, 'Durban: A Success and a Failure' (2012) 42(2) *Environmental Policy*, 85.

⁴³ Ngozi Chinwa Ole, 'The Paris Agreement as Primer for Developing the Nigerian Off-grid Solar Electricity' (2018) 26(3) *African Journal of International and Comparative Law*, 426, 430.

⁴⁴ Susana B. Adamo, 'About Mitigation, Adaptation and the UNFCCC's 21st Conference of the Parties' (2015) 32 (3) *R. bras. Est. Pop. (Rio de Janeiro)* 609.

⁴⁵ *ibid*.

⁴⁶ Daniel Bodansky, 'The Legal Character of the Paris Agreement' (2016) 2 *RECIEL*, 143.

However, while the *Paris Agreement* is a treaty within the context of the *Vienna Convention on the Law of Treaties*,⁴⁷ with its provisions fully binding, the *Paris Decision* is not.⁴⁸ Although, alternative can be validly made to its provisions for a detailing of the *Paris Agreement*.⁴⁹

The *Paris Agreement* is the current international instrument that coordinates global responses to the problem of climate change.⁵⁰ It stipulates ‘long-term global climate goals and short-term procedural steps that outline how these goals should be achieved.’⁵¹ The long term mitigation goal is to ‘strengthen the global response to the threat of climate change, ... holding the increase in the global average temperature to well below 2° C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5° C above pre-industrial levels ...’⁵² Consequently, member states are under obligation to prepare, communicate and implement successive *Nationally Determined Contributions* (NDCs) to achieve the mentioned objective.⁵³ It is expected that such communicated NDCs should contain low greenhouse gas emission strategies for mitigating climate change.⁵⁴ The Nigerian government is a signatory to the *Paris Agreement* 2015.⁵⁵ As such, it has communicated core actions that

⁴⁷ *Viena Convention on the Law of Treaties* 1969.

⁴⁸ *ibid.* Article 2(1).

⁴⁹ *ibid.* Article 31. See also Yves le Bouthillier, ‘Vienna Convention of 1969’ in Olivier Corten et al, *The Vienna Convention on Law of Treaties: A Commentary 1* (eds, Oxford University Press, 2011) 846.

⁵⁰ David Freestone, ‘The United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Kyoto Mechanisms’, in David Freestone and Charlotte Streck (eds), *Legal Aspects of Implementing the Kyoto Protocol Mechanisms: Making Kyoto Work* (Oxford University Press, 2008) 4.

⁵¹ Sylvia I. Karlsson-Vinkhuyzen *et al*, ‘Entry into Force and Then? The Paris Agreement and State Accountability’ (2018) 18 (5) *Climate Policy*, 593.

⁵² *The Paris Climate Change Agreement 2015*, Article 2(1).

⁵³ *ibid.* Article 4(2).

⁵⁴ *ibid.* Article 4(19). See also Lavanya Rajamani, ‘The 2015 Paris Agreement: Interplay Between Hard, Soft and Non- Obligations’ (2016) 28 *Journal of Environmental Law*, 331, 343.

⁵⁵ UNFCCC, ‘Paris Agreement: Status of Ratification’ (2020)

<https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27> accessed 17 November 2024.

will precipitate the reduction of GHGs emission in the energy, agriculture and land-use sector by 2030.⁵⁶

Additionally, the *Paris Agreement* mandates member states to prepare, communicate, and maintain successive nationally determined contributions which will contain mitigation measures in the context of the objective of the Treaty, which is to reach global peaking of greenhouse gas emissions as soon possible.⁵⁷ All member states were expected to have communicated their *Nationally Determined Contributions* (NDCs) by 2020.⁵⁸ Subsequent NDCs, which must show progress from previous efforts to address climate change, are to be submitted at least every five years.⁵⁹ In line with this requirement, the Nigerian government submitted its first biennial update of its NDCs in 2018.⁶⁰ After the original five-year term, Nigeria submitted its revised NDC on 27 May 2021.⁶¹ Nigeria reiterates in its updated pledge its unqualified commitment to contribute 20% less than the business-as-usual scenario by 2030.⁶² Furthermore, Nigeria has increased its conditional contribution from 45% to 47% below the baseline of business as usual by 2030.⁶³ As a result, Nigeria's current NDC calls for a conditional contribution of 47% and an unconditional commitment of 20% to the reduction of emissions by 2030.⁶⁴

⁵⁶ 19UNFCCC, 'Nigeria NDC' (2015) <www.unfccc.int/submissions/NDC/Published%20Documents/Nigeria/1/Approved%20Nigeria's%20INDC_271115.pdf> accessed 17 November 2024.

⁵⁷ Paris Agreement 2015, Article 4(1)-(2).

⁵⁸ The *Paris Climate Change Decision 2015*.

⁵⁹ The *Paris Climate Change Agreement 2015*, Article 4(3) and (9).

⁶⁰ Olumide Idowu, 'Nigeria Develops Third Paris Agreement National Communication' (2018) <www.climatecorecard.org/2018/09/nigeria-develops-third-paris-agreement-national-communication/> accessed 19 November 2024.

⁶¹ Nigeria's First Nationally Determined Contribution – 2021 Update <<https://www.climatechange.gov.ng>> accessed 23 November 2024.

⁶² *ibid.*

⁶³ *ibid.*

⁶⁴ *ibid.*

These NDCs outline various actions to mitigate climate change, focusing on important sectors which include agriculture and energy.⁶⁵ To start with, it advocates replacing traditional gas-powered energy technologies with modern, more efficient alternatives.⁶⁶ Additionally, it emphasizes the use of cost-effective renewable energy solutions in promoting rural electrification,⁶⁷ and to achieve this, the government plans to create off-grid solar photovoltaic energy systems for rural areas.⁶⁸ Furthermore, it highlights the need for widespread adoption of energy efficiency measures, particularly in the energy sector, so as to reduce greenhouse emissions by 179 million tonnes.⁶⁹

Although the Paris Agreement sets high expectations for the reduction of greenhouse gas emissions, its success has depended on the commitments made by different countries.⁷⁰ As for Nigeria, the requirements stipulated in the Paris Agreement have faced serious stumbling blocks, especially as the country remained highly dependent on fossil fuels with regard to energy generation and because greenhouse gas emissions continue to persistently rise which poses serious environmental threats.⁷¹ While the flexibility included in the NDC accommodates diverse national situations, it can also lead to commitments that are not ambitious enough.⁷² Nigeria's NDC, while acknowledging the need to reduce emissions, may not have the urgency required to effectively address the crisis at hand.⁷³ Scholars argue that the lack of binding commitments in the Paris Agreement makes countries avoid indispensable

⁶⁵ J Akinbunmi and C Akinbunmi, 'Climate Change Mitigation and Adaptation Studies in Nigerian Universities: Achievements, Challenges and Prospects' in Walter Lee Filho (eds), *Climate Change Research at Universities: Addressing the Mitigation and Adaptation Gaps* (Springer, 2017) 139.

⁶⁶ *ibid.*

⁶⁷ *ibid.*

⁶⁸ C Onyejelam, 'Building an Effective Implementation Process to Nigeria's Climate Change Policies and Intended Nationally Determined Contributions (INDC)' (2016) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2843279> assessed 20 November 2024.

⁶⁹ *ibid.*

⁷⁰ Mathilde Hautereau-Boutonnet and Sandrine Maljean-Dubois, 'The Paris Agreement on Climate Change: A Subtle Combination of Tools and Actors for Better Enforcement?' (2022) 52 *Environmental Policy and Law*, 3.

⁷¹ Samuel Nwokolo, Edson Meyer and Chinedu Ahia, 'Credible Pathways to Catching Up with Climate Goals in Nigeria' (2023) 11(9) *Climate*, 12.

⁷² *ibid.*

⁷³ *ibid.*

actions, hence bringing about less accountability.⁷⁴ This leniency has unfortunately led to a situation where Nigeria's greenhouse gas emission continues to rise steadily, particularly because of the country's dependence on fossil fuel energy sources.⁷⁵

Based on the foregoing, the *Paris Agreement* lacks adequate implementation mechanisms to guarantee adherence to emissions reduction commitments by member States. This weakness has intensified Nigeria's difficulties in transitioning to the use of renewable energy sources in energy production, and without strict penalties for non-compliance, there is little motivation for the Nigerian government to implement effective climate policies or make substantial changes in energy production. Currently, Nigeria's energy sector faces significant challenges, necessitating a comprehensive legal framework to promote renewable energy adoption, reduce environmental pollution, and mitigate climate change through stricter emission standards and a shift from fossil fuel dependence. Therefore, integrating renewable energy into Nigeria's energy mix can help reduce greenhouse gas emissions, mitigate climate change and also alleviate the health problems linked to the use and overreliance on fossil fuels.

3.1.4 United Nations Sustainable Development Goals (SDGs)

The *United Nations Sustainable Development Goals* (UN SDGs) are 17 interlinked global goals established in 2015 and designed to address a variety of social, economic, and environmental challenges, and to also achieve a better and more sustainable future by all in 2030.⁷⁶ One of these goals is Goal 7 on ensuring access to affordable, reliable, sustainable

⁷⁴ Noah Izoukumor, 'Nigeria's Climate Change Act, Conditional and Unconditional Nationally Determined Contributions, and the Principle of Common but Differentiated Responsibilities, (2024) Environmental Law Review, 6. See also HP Faga and U Uchechukwu, 'Oil Exploration, Environmental Degradation, and Future Generations in the Niger Delta: Options for Enforcement of Intergenerational Rights and Sustainable Development Through Legal and Judicial Activism' (2019) 34 *Journal of Environmental Law & Litigation*, 192. Eghosa Ekhator and Edward Okumagba, 'Climate Change and Multinationals in Nigeria: A Case Study for Climate Justice' in *Climate Litigation and Justice in Africa* (Bristol University Press, United Kingdom, 2024) 255.

⁷⁵ *ibid.*

⁷⁶ United Nations Sustainable Development Goals: 17 Goals to Transform Our World
<<https://www.un.org/en/exhibits/page/sdgs-17-goals-transform-world>> accessed 9 January 2025.

and modern energy for all. Nigeria is a signatory to the UN SDGs.⁷⁷ Along with other UN member States, the country adopted the SDGs in 2015.⁷⁸ Since then, Nigeria has pledged to adopt these goals to tackle a wide range of social, economic, and environmental challenges, in a bid to achieve sustainable development by 2030.⁷⁹ In line with the global concern for sustainable development, the Nigerian government has also adopted the SDGs in its body of national development plans and policies.⁸⁰

Although the SDGs promote sustainable energy practices by providing a relatively comprehensive framework for implementing related initiatives, their pragmatic effectiveness, in the case for Nigeria (and countries with a similar approach towards energy production), is heavily impeded by the country's dependence on fossil fuels energy which results in the continued emission of greenhouse gases.⁸¹ Indeed, the SDGs chart a broad course for sustainable development, but they frequently fall short when it comes to the precision and specificity that are required for individual countries to meet their unique challenges, especially true for a developing economy like Nigeria.⁸² The progress of SDGs especially the ones related to socio-economic dynamics neglected the socio-economic challenges that constrain sustainable energy transition.⁸³ Certain factors, such as poverty and infrastructures, or a politically unstable environment, can thwart energy policies that are meant to be sustainable development goals in Nigeria.⁸⁴

⁷⁷ *ibid.*

⁷⁸ *ibid.*

⁷⁹ Ignatius Nnamdi Aguene, 'An Appraisal of the Implementation of Sustainable Development Goals 2030 in Nigeria' (2021) 6(2) Journal of Social Sciences, 200.

⁸⁰ *ibid.*

⁸¹ Sustainable Development Goals: Nigeria <<https://sustainabledevelopment.un.org/memberstates/nigeria>> accessed 9 January 2025.

⁸² Rotimi Jaiyesimi, 'The Challenge of Implementing the Sustainable Development Goals in Africa: The Way Forward' (2016) 20(3) African Journal of Reproductive Health, 4.

⁸³ Sophia Balogun, 'Sustainable Development Goals (SDGs) and the Challenges of Poverty Reduction in Nigeria' (2023) 16(2) African Journal of Politics and Administrative Studies, 684.

⁸⁴ *ibid.*

As a result, the gap between policy and ground realities, where text is disconnected from context, leads to policies that are perhaps well-meaning but ultimately do not fit the needs of a local population.⁸⁵ Moreover, the SDGs do not have robust compliance mechanisms to ensure that countries fulfill their promises, and in particular their commitments to transitioning to sustainable energy. In short, Nigeria's implementation of SDG 7 is undermined by a lack of binding targets and mechanisms for accountability within the framework. This limitation creates an ability to delay the response to the persistent and growing challenges posed by fossil fuel dependency which include ongoing greenhouse gas emissions and their corollary health and environment impacts.⁸⁶ Without penalties for non-compliance, there is little incentive for the Nigerian government to implement meaningful policies to address the impact of climate change.⁸⁷

Thus, one of the suitable measures that may effectively help Nigeria to address the environmental pollution and climate change challenges posed by fossil fuel dependence in energy production is to have an effective legal framework for the adoption of renewable energy.⁸⁸ A framework of this nature is observed to enable investment into renewable technologies, eliminate red tape regulations, and encourage public-private partnerships. The framework should include safeguards for stricter emissions standards and measures that drive a notable transition from fossil fuels to renewable energy sources, thereby reducing greenhouse gas emissions and the associated health impact from emitting sources like

⁸⁵ Ayesha Alazmi and Huda Alazmi, 'Closing the Gap Between Research and Policy-making to Better Enable Effective Educational Practice: A Proposed Framework' (2023) 22 Educational Research for Policy and Practice, 102.

⁸⁶ Policy Briefs in Support of the High-Level Political Forum Leveraging Energy Action for Advancing the Sustainable Development Goals < https://sdgs.un.org/sites/default/files/2021-06/2021-POLICY%20BRIEFS_3.pdf > accessed 9 January 2025.

⁸⁷ Paul Tamuno and Ibinabo Matthew, 'Legal, Regulatory and Institutional Responses to Climate Change in Nigeria: Challenges and Options' (2022) 7 African Journal, 63.

⁸⁸ David Obada *et al*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 Case Studies in Chemical and Environmental Engineering, 4.

respiratory diseases, and cardiovascular problems as well.⁸⁹ That is one of the underlying objectives of this study.

3.1.5 International Renewable Energy Agency (IRENA) Framework

The *International Renewable Energy Agency* (IRENA), established in 2009 is an intergovernmental organization that supports countries in their transition to sustainable energy future, and is the global voice for renewable energy and the principal platform for international co-operation, a centre of excellence and a repository of policy, technology, resource and financial knowledge on renewable energy.⁹⁰ IRENA's framework supports countries in their transition to sustainable energy and promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.⁹¹

However, as a member, Nigeria's energy sector remains overdependent on fossil fuels which results in virtually unregulated greenhouse gas emissions limits and their negative effects on public health and the environment.⁹² The framework of IRENA prompts member States to create and tailor renewable energy policies in a carbon-neutral context, more diversified energy sources and, ultimately, a more stable energy regime.⁹³ However, these goals have

⁸⁹ Guidebook on Nigeria's Energy Transition <<https://resourcegovernance.org/sites/default/files/2024-05/Guidebook%20on%20Nigeria%20Energy%20Transition.pdf>> accessed 10 January 2025.

⁹⁰ IRENA Climate Change and Renewable Energy: National Policies and the Role of Communities, Cities and Regions (2019) <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jun/IRENA_G20_climate_sustainability_2019.pdf> accessed 3 December 2024.

⁹¹ *ibid.*

⁹² Rosario Montella and Vera Domenica Giustino, 'Barriers to Renewable Energy Development in Nigeria and How to Overcome Them' (2021) <https://research-api.cbs.dk/ws/portalfiles/portal/68333846/1113099_Final_project_S133844_S133384.pdf> accessed 10 January 2025.

⁹³ Scaling Up Renewable Energy Deployment in Africa Detailed Overview of IRENA's Engagement and Impact (2020) <<https://www.irena.org/>>

not been fully met in Nigeria as fossil fuels largely dominates the energy mix of the country.⁹⁴ According to IRENA, renewable energy provides a feasible pathway to address both emissions reduction and sustainable development, but Nigeria has found the pathway effectively untraversable with chronic underinvestment in renewables, poor energy infrastructure and even more poor regulatory infrastructure.⁹⁵ As a result, greenhouse gas emissions keep increasing enormously, thereby compromising both national and global climate targets.⁹⁶

Although IRENA has established a broad framework around renewable energy promotion, it does not always tailor its advice on this matter to the unique socio-economic and political realities of member countries, especially in developing countries such as Nigeria.⁹⁷ The framework focuses instead on technical solutions and best practices that are often not sufficiently grounded in the on-the-ground realities that complicate the energy transition.⁹⁸ Nigeria is characterized by high levels of poverty, inadequate infrastructure, and political instability that ultimately inhibits the effective implementation of renewable energy projects. This gap can result in policy frameworks that, though theoretically coherent, simply does not match the realities of national priorities.⁹⁹ Moreover, IRENA's framework does not have effective enforcement mechanisms in place to hold countries accountable for their renewable energy commitment.¹⁰⁰ While this agency offers constructive and expert resources and technical assistance, there are no legally binding agreements or any pathways to enforce

/media/Files/IRENA/Agency/Publication/2020/Feb/IRENA_Africa_Impact_Report_2020.pdf> accessed 10 January 2025.

⁹⁴ *ibid.*

⁹⁵ IRENA: Renewable Energy Roadmap Nigeria <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Jan/IRENA_REMap_Nigeria_2023> accessed 10 January 2025

⁹⁶ *ibid.*

⁹⁷ IRENA: Renewable Energy Benefits: Measuring the Economics <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Measuring-the-Economics_2016.pdf> accessed 11 January 2025.

⁹⁸ *ibid.*

⁹⁹ Peter Onuh *et al*, Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23(2) World Journal of Advanced Research and Reviews, 2356.

¹⁰⁰ *ibid.*

accountability that would contribute the urgency with which the actual fossil fuel nature of all mentioned solutions might be addressed. Making the commitment to transition to renewable has been followed by slow meaningful action and accordingly, greenhouse gas emissions have continued to rise.¹⁰¹

As a result of the absence of penalties for non-compliance, Nigeria has little incentive to pursue any meaningful climate policy or make any detrimental changes to energy generation.¹⁰² Meanwhile, there are still challenges in Nigeria's energy sector providing an urgent need for supportive and efficient legislative framework to facilitate the adoption of renewable energy. A framework is required to facilitate the mobilization of investment for renewable technologies, while simplifying regulatory processes and promoting public and private partnerships. It should also include stricter emission standards and mechanisms to incentivize the transition from fossil fuels. There is a need for Nigeria to provide an improved enabling environment for renewable energy investment to facilitate the diversification of its energy mix (based on expanded renewable energy generation systems), thereby, significantly reducing greenhouse gas emissions as well as minimizing the adverse health impacts related to fossil fuel utilization.¹⁰³

3.1.6 International Energy Charter

The *International Energy Charter* (IEC) was adopted in 2015, and it builds upon the framework of the *European Energy Charter* (EEC)¹⁰⁴ and *Energy Charter Treaty* (ECT)¹⁰⁵ expanding its scope to include broader range of countries and energy problems.¹⁰⁶ The *IEC* is a multilateral framework designed to strengthen international cooperation in the energy

¹⁰¹ *ibid.*

¹⁰² David Obada *et al*, 'A Review of Renewable Energy Resources in Nigeria for Climate Change Mitigation' (2024) 9 *Case Studies in Chemical and Environmental Engineering*, 4.

¹⁰³ *ibid.*

¹⁰⁴ The *European Energy Charter* 1991.

¹⁰⁵ The *Energy Charter Treaty* 1994.

¹⁰⁶ The *International Energy Charter* 2015.

sector.¹⁰⁷ The signatories are committed to sustainable energy development, increasing energy security and maximizing the efficiency of production, conversion, transport, distribution and use of energy in a way that is socially acceptable, economically viable and environmentally sound, in order to improve safety.¹⁰⁸ Nigeria is a signatory to this multinational framework, which promotes the reduction of greenhouse gas emissions and the shift to cleaner energy sources.¹⁰⁹ However, even with its adherence to the Charter, Nigeria still has a lot of problems in the energy sector, especially because it depends so heavily on fossil fuels to generate energy.

It is observed that while the *IEC* espouses ambitious goals for sustainable energy transitions, it does not carry any legal enforcement mechanisms that can compel participating countries like Nigeria to abide by its provisions.¹¹⁰ As a consequence, Nigeria has had a slow progress in embracing renewable energy technologies and decreasing its carbon footprint. In short, the lack of strict accountability procedures and incentives for renewable energy development lends the Charter's objectives to little use in the Nigeria context.¹¹¹ Although the *IEC* is a great initiative in promoting sustainable energy, it is limited in its effect in the Nigerian energy sphere since it is unenforceable.¹¹² In order to make significant strides towards reducing greenhouse gas emissions and addressing the adverse environmental and health implications of fossil fuel dependency, it is vital for Nigeria to put in place an overarching and effective legal framework that facilitates a transition from fossil energy to renewables

¹⁰⁷ *ibid.*

¹⁰⁸ Title I of the International Energy Charter 2015 <<https://www.italaw.com/sites/default/files/laws/180307.pdf>> accessed 13 December 2024.

¹⁰⁹ Nigeria became a Signatory to the IEC in 2017. See Eghosa Ekhaton and Godswill Agbatoro, 'Energy Law and Policy in Nigeria with Reflection on the International Energy Charter and Domestication of the African Charter' <https://www.pulp.up.ac.za/images/edocman/editedcollections/governance_in_nigeria/Chapter%208.pdf> accessed 27 December 2024.

¹¹⁰ Olusola Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector amidst Fossil Fuel Disruptions and Low Carbon Energy Transition' (2023) 9(7) *Heliyon*, 9.

¹¹¹ *ibid.*

¹¹² *ibid.*

and aligns with the goals of the Charter and international commitments, which would provide clear regulations, financial incentives for renewable energy projects, and penalties for non-compliance.

3.2 Regional Instruments

3.2.1 African Union Commission Agenda 2063

The *African Union Commission Agenda* (AU) 2063, established in 2015, serves as a strategic framework for the socio-economic transformation of the African continent over the next five decades.¹¹³ This Agenda envisions a prosperous Africa based on inclusive growth and sustainable environment,¹¹⁴ with a focus on achieving energy security and transitioning to renewable energy sources as opposed to depending on fossil fuels to generate energy.¹¹⁵ Nigeria, as a member of the AU, is a signatory to this agenda, aligning its national development plans with the objectives of the Agenda, particularly the development of renewable energy sources to reduce greenhouse gas emissions.¹¹⁶

The Agenda reinforces the urgent need for effective and abundant access to clean energy across Africa, encouraging member States to commit to harnessing renewable energy technologies to mitigate the continent's greenhouse gas emissions.¹¹⁷ Despite Nigeria's commitments to the AU Agenda, the current state of Nigeria's energy production reveals

¹¹³ Chapter 2 of the *African Union Agenda – 2063*, 2015.

¹¹⁴ *ibid.*

¹¹⁵ *ibid.*

¹¹⁶ African Union: Agenda 2063: The Africa We Want <<https://au.int/en/agenda2063/overview>> accessed 14 January 2025.

¹¹⁷ African Union: African Union Launches the African Energy Efficiency Programme and the African Energy Efficiency Alliance at COP 29 to Advancing Energy Productivity in the Continent 2024 <<https://au.int/en/pressreleases/20241115/african-union-launches-african-energy-efficiency-programme-and-african-energy>> accessed 14 January 2025.

significant challenges that undermine the objectives of the Agenda. In the sense that, Nigeria's energy sector is heavily dependent on fossil fuels, which accounts for 80% of its energy generation. This overreliance on fossil fuels has resulted in high level of greenhouse gas emissions, contributing to environmental degradation and climate change.¹¹⁸ Although renewable energy is a major focus of the AU Agenda, because renewable energy sources are sustainable, reliable, and environmentally friendly, compared to the adverse effects of fossil fuels, Nigeria has been slow to fully tap into the benefits and potentials of renewable energy sources for its energy generation. This is likely due to the fact that there is lack of an effective legal framework for the adoption of renewable energy and enforcement mechanisms.¹¹⁹

Although, the AU Agenda sets a visionary agenda for sustainable development, it has little or no legal effect on Nigeria's energy sector without an effective legal framework for the adoption of renewable energy, and in order to realize the Agenda's aspirations and avert the continuous disastrous consequences of dependence on fossil fuels, Nigeria has to place high priority on renewable energy development and an effective legal framework that will aid smooth transition in addressing environmental pollution and climate change challenges.¹²⁰

3.2.2 African Charter on Human and Peoples' Rights

The *African Charter on Human and Peoples' Rights* (the ACHPR), also known as the Banjul Charter was, was adopted in 1981 and came into force in 1986.¹²¹ This is a regional human

¹¹⁸ Samuel Nwokolo, Edson Meyer and Chinedu Ahia, 'Credible Pathways to Catching Up with Climate Goals in Nigeria' (2023) 11(9) *Climate*, 12.

¹¹⁹ Chukwuemeka Emenekwe, Uchenna Nnamani and Ayodeji Stephen, 'GREEN INDUSTRIALIZATION IN AFRICA: Opportunities and Tensions in Africa-Europe Relations' (2024) Scoping paper on Nigeria <https://www.iddri.org/sites/default/files/PDF/Publications/Catalogue%20Iddri/Rapport/Ukama_NIGERIA.pdf> accessed 15 January 2025.

¹²⁰ Chimezie Umeh *et al*, 'The Role of Renewable Energies for Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Nigeria' (2024) 2(2) *European Journal of Applied Science, Engineering and Technology*, 88.

¹²¹ A Conscientious Objectors Guide to the International Human Rights System: African Charter on Human and Peoples' Rights <<https://co-guide.org/legal-basis/african-charter-human-and-peoples-rights#:~:text=The%20African%20Charter%20on%20Human,Africa's%20oldest%20human%20rights%20instrument.>> accessed 28 December 2024.

rights instrument that promotes and protects human and peoples' rights on the African continent. Generally, the ACHPR recognizes the rights of all people to a satisfactory environment favourable to their development.¹²² As a signatory to the ACHPR since its ratification by the Nigerian government in 1983,¹²³ Nigeria is therefore under a legal obligation to adopt legislative and other measures to give effect to this right.¹²⁴

The ACHPR, however, is very relevant especially as it relates to Nigeria's energy production and its accompanying environmental challenges. Article 24 of the ACHPR states that:

all peoples shall have the right to a general satisfactory environment favourable to their development.¹²⁵

In other words, Nigeria's commitment to the protection and enforcement of human rights is demonstrated by its domestication of the African Charter on Human and Peoples' Rights (ACHPR) through the *African Charter on Human and Peoples' Rights (Ratification and Enforcement) Act*, Cap A9, Laws of the Federation of Nigeria, 2004. This legislation effectively incorporates the provisions of the ACHPR into Nigerian domestic law, making them enforceable in Nigerian courts. The legal foundation for this domestication is further reinforced by Section 12 of the Constitution of the Federal Republic of Nigeria 1999 (as amended), which stipulates that no international treaty shall have the force of law in Nigeria unless it has been enacted into domestic legislation by the National Assembly. Since Nigeria ratified the ACHPR in 1983 and subsequently enacted the enabling Act, the Charter's provisions now carry the same weight as any other Nigerian law.

In addition, the Nigerian judiciary has played a crucial role in affirming the applicability of the ACHPR through landmark decisions. In *Kim v The State*, the court emphasized that

¹²² *The African Charter on Human and Peoples' Rights* 1986.

¹²³ *The African Charter on Human and Peoples' Rights (Ratification and Enforcement) Act*, CapA9, Laws of the Federation of Nigeria (LFN), 2004.

¹²⁴ Article 1 of the *African Charter on Human and Peoples' Rights* 1986.

¹²⁵ *ibid.* Article 24.

international treaties must be domesticated before they can be enforced in Nigeria, thereby reinforcing the necessity of legislative adoption.¹²⁶ More significantly, in *Gani Fawehinmi v Sani Abacha*, the Supreme Court held that the ACHPR, having been domesticated, is binding and takes precedence over any conflicting domestic laws (except the Constitution itself).¹²⁷ This ruling established the ACHPR as a vital legal instrument for human rights protection in Nigeria, allowing individuals to directly invoke its provisions in court.¹²⁸

Thus, the combined effect of the ACHPR, Section 12 of the 1999 Constitution, and judicial precedents ensures that the ACHPR is not merely an international obligation but an integral part of Nigeria's legal framework for safeguarding human rights. This domestication underscores Nigeria's alignment with regional and international human rights standards, providing an additional layer of protection for citizens beyond the constitutional guarantees. However, despite the provisions of the ACHPR which advocates for the right to a healthy environment, Nigeria still struggles towards transitioning to renewable energy sources, as Nigeria's energy sector remains heavily dependent on fossil fuels, which has led to persistent greenhouse gas emissions.

It is obvious that a lacuna exists between Nigeria's current energy production and the provisions of the ACHPR and their practical implementation. The case, *Jonah Gbemre v Shell Petroleum Development Company Nigeria Ltd, Nigerian National Petroleum Corporation and Attorney-General of the Federation*,¹²⁹ is a landmark judgment where a Nigerian court recognized the connection between human rights and environmental degradation. The applicant instituted an action for himself and for the benefit of the Iwhereken community in the Niger Delta region against the defendants, maintaining a contravention of right to life,

¹²⁶ [1992] 4 NWLR (Pt. 233) 17.

¹²⁷ [1996] 9 NWLR (Pt 475) 710.

¹²⁸ Onyeka Anaabo and Eghosa Ekhaton, 'Realising Substantive Rights to Healthy Environment in Nigeria: A Case for Constitutionalisation' (2015) 17(2) Environmental Law Review, 83.

¹²⁹ [2005] AHRLR 151 (NgHC 2005), FHC/B/CS/53/05.

dignity of persons, right to health and right to a general satisfactory environment as a result of gas flaring activities in the area. The court ruled in favour of the community, emphasizing that the right to life and right to clean environment is fundamental and must be protected.¹³⁰

In addition, the landmark case of *Social and Economic Rights Action Centre (SERAC) v Nigeria* represents a pivotal moment in the evolution of human rights protection in Africa, particularly regarding economic, social and environmental rights.¹³¹ Brought before the African Commission on Human and Peoples' Rights (ACHPR), this case fundamentally challenged traditional notions of state responsibility and corporate accountability in the context of environmental degradation and human rights violations. The case emerged from the tragic circumstances surrounding oil exploration activities in Nigeria's Niger Delta region, where the Ogoni people suffered severe environmental damage and human rights abuses allegedly perpetrated by government security forces and facilitated by the operations of multinational oil companies, particularly Shell Petroleum Development Company. The petitioners, SERAC and the Center for Economic and Social Rights, presented compelling evidence demonstrating how oil extraction activities had led to widespread pollution of water sources, destruction of farmland, and consequent deterioration of health conditions among local communities.

The petitioners alleged that the Nigerian government, through its military repression of Ogoni protests and its failure to regulate Shell's operations, violated multiple provisions of the African Charter on Human and Peoples' Rights (ACHPR), including: right to life,¹³² right to health,¹³³ right to a healthy environment,¹³⁴ right to property,¹³⁵ and right to economic and

¹³⁰ Sections 33(1) and 34(1) of the *Constitution of the Federal Republic of Nigeria, 1999*, and Articles 4, 16 and 24 of the *African Charter on Human and Peoples' Rights (Ratification and Enforcement) Act*, Cap A9, Laws of the Federation of Nigeria, 2004.

¹³¹ [2001] AHRLR 60.

¹³² Article 4 of the *African Charter on Human and Peoples' Rights (Ratification and Enforcement) Act*, Cap A9, Laws of the Federation of Nigeria, 2004.

¹³³ *ibid.* Article 16.

social development.¹³⁶ In its groundbreaking decision, the ACHPR made several crucial determinations that would reshape human rights discourse in Africa. Firstly, the Commission affirmed the justiciability of economic and social rights under the African Charter, rejecting arguments that these rights were merely aspirational. Secondly, it established that environmental degradation could constitute a violation of fundamental human rights, particularly the right to health and the right to a satisfactory environment. Perhaps most significantly, the decision clarified the nature of state obligations in regulating corporate activities, holding that governments must take positive measures to protect their citizens from human rights abuses by private actors.

The case's legacy extends far beyond its immediate context. It has served as an important precedent in subsequent environmental rights cases across the continent and has influenced the development of international standards on business and human rights. However, the case also highlights the persistent challenges in implementing human rights decisions, as many of the underlying issues in the Niger Delta remain unresolved decades later. Nevertheless, the *SERAC v Nigeria* case stands as a testament to the potential of regional human rights mechanisms to address complex intersections of corporate activity, environmental protection and fundamental rights.

Indeed, these cases highlight the legal acknowledgment of environmental rights, and the necessity of adhering to human rights standards in energy production.¹³⁷ Nonetheless, the enforcement of these environmental rights is inadequate, as evidenced by the ongoing gas flaring activities in Niger Delta, which reflects the difficulties in holding corporations and the

¹³⁴ *ibid.* Article 24.

¹³⁵ *ibid.* Article 14.

¹³⁶ *ibid.* Article 22.

¹³⁷ Section 2(2) of the *Environment Impact Assessment Act*, Cap E12, Laws of the Federation of Nigeria, 2004. See also Section 3(2)(a), (b) of the *Associated Gas Re-injection Act*, Cap A25, Laws of the Federation of Nigeria, 2004 and Paragraph 1.43 of the *Associated Gas Re-Injection (continued flaring of gas) Regulations*, 1984.

government accountable.¹³⁸ Hence, in order to align with the objectives of the ACHPR and successfully address the issues posed by climate change and environmental degradation, Nigeria requires an effective legal framework that supports the development of renewable energy.

3.2.3 Economic Community of West African States Energy Protocol

The *Economic Community of West African States (ECOWAS) Energy Protocol* was established in 2003. This Protocol is a regional framework created with the aim to promote long-term cooperation among West African states in the energy sector, so as to guarantee energy trade, energy security, sustainable development, and energy market investment.¹³⁹ Nigeria is a signatory to this Protocol. The Protocol emphasize how crucial it is to develop an energy market that is effective, sustainable, and environmentally friendly. To guarantee adherence to its environmental goals, the treaty does not, however, include strict enforcement measures.¹⁴⁰

This shortfall, is most noticeable in Nigeria, where the ongoing gas flaring in Niger Delta area serves as an example in the difficulties in reducing greenhouse gas emissions.¹⁴¹ As discussed, when fossil fuels are burnt during the process of extraction, they release enormous amounts of carbon dioxide and methane into the atmosphere, which contributes significantly to environmental pollution and climate change.

3.2.4 Economic Community of West African States Renewable Energy Policy

¹³⁸ Ayodele Morocco-Clarke, 'The Case of Gbemre v Shell as a Catalyst for Change in Environmental Pollution Litigation?' (2021) 12(2) NAUJILJ, 43. See also Bukola Faduroti, Godswill Agbaitoro and Obinna Onya, 'Environmental Protection in the Nigerian Oil and Gas Industry and Jonah Gbemre v Shell PDC Nigeria Limited: Let the Plunder Continue?' (2019) 27(2) African Journal of International and Comparative Law, 225.

¹³⁹ The *ECOWAS Energy Protocol 2003*, Article 2.

¹⁴⁰ *ibid.* Article 1(6)-(8).

¹⁴¹ Olusola Olujobi et al, 'The Legal Framework for Combating Gas Flaring in Nigeria's Oil and Gas Industry: Can it Promote Sustainable Energy Security?' (2022) 14 *Sustainability*, 1. See also PricewaterhouseCoopers: 'Assessing the Impact of Gas Flaring on Nigeria Economy' (2020) <<https://www.pwc.com/ng/en/assets/pdf/gas-flaring-impact1.pdf>> accessed 2 January 2025.

The *Economic Community of West African States (ECOWAS) Renewable Energy Policy* (the EREP) was established in 2012. The purpose of the Policy is to ensure increased use of renewable energy sources for grid energy supply, promote sustainable development, reduce greenhouse gas emissions, and provide adequate access to energy services of West African states, including Nigeria.¹⁴² Nigeria, as a member of ECOWAS, is a signatory to the EREP, Nigeria is expected to align its national policies on energy with the objectives outlined in the Policy framework.¹⁴³ Notwithstanding the Policy's progressive objectives, Nigeria's energy sector continues to heavily rely on fossil fuels for energy production.¹⁴⁴

As stated, the EREP sets ambitious goals for the adoption of renewable energy sources, that include solar, wind, biomass, and hydro energy, and aims to create an environment that is favorable for investments in renewable energy through regulatory frameworks, financial incentives, and capacity-building initiatives.¹⁴⁵ However, a number of factors, such as lack of political will, ineffective enforcement mechanisms and insufficient funding have been observed to have limited the policy's impact on the Nigerian energy sector.¹⁴⁶ While burning fossil fuels has detrimental effects on the environment and human health, communities close to oil extraction facilities continue to suffer from air and water pollution, particularly the Niger Delta region, which raises the risk of diseases and even deaths.¹⁴⁷

In essence, the legal difficulties in upholding environmental rights are exemplified in cases like *Jonah Gbemre v. Shell Petroleum Development Company of Nigeria Ltd*¹⁴⁸ and *Social*

¹⁴² ECOWAS Renewable Energy Policy (EREP) 2012 <https://www.agora-parl.org/sites/default/files/agora-documents/151012_ecowas_renewable_energy_policy_final.pdf> accessed 2 January 2025.

¹⁴³ Moustapha Maman Ali and Qian Yu, 'Assessment of the Impact of Renewable Energy Policy on Sustainable Energy for All in West Africa' (2021) 180 *Renewable Energy*, 548.

¹⁴⁴ *ibid.*

¹⁴⁵ Article 2 of the *ECOWAS Energy Protocol*, 2003.

¹⁴⁶ HN Amadi *et al*, 'Renewable Energy in Nigeria: Prospects and Challenges' (2024) 11(4) *European Journal of Advances in Engineering and Technology*, 56.

¹⁴⁷ *ibid.*

¹⁴⁸ [2005] AHRLR 151 (NgHC 2005), FHC/B/CS/53/05.

and Economic Rights Action Centre (SERAC) v Nigeria.¹⁴⁹ According to the Courts, gas flaring infringed upon the Nigerian Constitution's guarantees of life¹⁵⁰ and dignity,¹⁵¹ as provided for under the Nigerian Constitution. The practice persists in spite of this verdict, underscoring the need for more robust legal frameworks and enforcement mechanisms.

3.3 Nigerian Legislation

3.3.1 Constitution of the Federal Republic of Nigeria 1999 (as amended)

The Constitution serves as the primary foundation for all laws governing the people.¹⁵² The Constitution of the Federal Republic of Nigeria 1999 (as amended) stands as the supreme legal instrument governing the country, providing the foundational framework for all laws, policies, and institutional operations.¹⁵³ Its supremacy is unequivocally established in Section 1(1), which declares that its provisions are binding on all authorities and persons within Nigeria, and any law inconsistent with it shall be null and void.¹⁵⁴ It directs the process of governance, specifies the duties and functions of the various arms of government, and portrays the fundamental rights and obligations of citizens.¹⁵⁵ This constitutional supremacy ensures uniformity in legal interpretation, upholds the rule of law, and serves as the ultimate safeguard for the protection of fundamental rights, including environmental and energy-related rights.

In addition, the Constitution guarantees fundamental rights under Chapter IV, which includes the right to life,¹⁵⁶ dignity of the human person,¹⁵⁷ and freedom from discrimination.¹⁵⁸ These

¹⁴⁹ (Communication No. 155/96) (Communication 155 of 1996) [2001] ACHPR 35.

¹⁵⁰ The Constitution of the Federal Republic of Nigeria 1999 (as amended), section 33 (1).

¹⁵¹ *ibid.* section 34(1).

¹⁵² Olubisi Oluduro, 'Combating Climate Change in Nigeria: An Appraisal of Constitutional and Legal Frameworks' (2021) 38(2) *Wisconsin International Law Journal*, 283.

¹⁵³ *The Constitution of the Federal Republic of Nigeria 1999* (as amended) Cap C 23 LFN 2004.

¹⁵⁴ *ibid.* s1(3).

¹⁵⁵ *ibid.* s1(2).

¹⁵⁶ *ibid.* s33.

¹⁵⁷ *ibid.* s34.

provisions empower citizens to seek judicial redress for violations, creating a legal avenue to hold the government and private actors accountable. For instance, Courts have invoked these rights in environmental cases like *Jonah Gbemre v Shell* (2005), where gas flaring was deemed a violation of constitutional rights to life and dignity. Moreso, the African Charter on Human and Peoples' Rights (ACHPR), domesticated via Cap A9 LFN 2004, supplements these rights, as affirmed in *Gani Fawehinmi v Abacha*, where the Supreme Court upheld the Charter's justiciability.

3.3.1.1 Environmental Rights under the Constitution of the Federal Republic of Nigeria, 1999

Environmental rights, though fundamental to human existence and sustainable development, occupy an ambiguous and somewhat fragile position in Nigeria's constitutional framework. The Constitution of the Federal Republic of Nigeria, 1999 (as amended) does not expressly enshrine a justiciable right to a safe, healthy, or sustainable environment under its Chapter IV, which provides for fundamental human rights. However, Section 20 of the Constitution, found under Chapter II (Fundamental Objectives and Directive Principles of State Policy), provides that:

The State shall protect and improve the environment and safeguard the water, air, and land, forest and wildlife of Nigeria.¹⁵⁹

On the face of it, this provision appears to place an obligation on the State to take into action in preventing Nigeria from the contributing factors of environmental degradation in addition to protecting the country from the adverse effects caused by it.¹⁶⁰ According to Olubisi Oluduro, the addition of this environmental provision in the Constitution can be said to be a

¹⁵⁸ *Ibid.* s42.

¹⁵⁹ *ibid.* s20.

¹⁶⁰ Vahyala Adamu Tari and Emmanuel Christopher Diah, 'Challenges and Prospects of the Legal Frameworks Combating Climate Change in Nigeria' (2024) 4(1) *AKSU Journal of Administration and Corporate Governance*, 112.

breakthrough in the pursuit for the protection and sustainability of the Nigerian environment, even though the provision is far from meeting the prospects of the people and those who work to preserve the environment. This is because, the provision has not given a clear recognition to environmental rights and a healthy environment as a fundamental right.¹⁶¹

It is, however, unfortunate, that this provision which is placed under Chapter II of the Constitution¹⁶² has been deemed to be non-justiciable under Section 6(6)(c) of the Constitution.¹⁶³ This provision states that the judicial powers vested in the Nigerian courts under the Constitution “shall not, except as otherwise provided by this Constitution, extend to any issue or question regarding whether any act or omission by any authority or person, or whether any law or judicial decision, conforms to the Fundamental Objectives and Directive Principles of State Policy set out in Chapter II of this Constitution.”¹⁶⁴ Due to the fact that this provision denies people to petition the courts for an order requiring the government to enact laws or regulations for the protection of the environment and right to a healthy environment, Section 20 is therefore rendered ineffective in addressing environmental degradation and climate change in Nigeria.¹⁶⁵ As a result, while Section 20 declares an environmental ideal, it does not confer an enforceable right on individuals or communities, thereby weakening the capacity of citizens to invoke it in court to compel environmental protection.

This constitutional dilemma was exposed in the case of *SERAP v. Federal Republic of Nigeria & Anor* supra, the ECOWAS Court of Justice departed from Nigerian constitutional constraints by recognizing the right to a healthy environment as part of the broader economic and social rights under international human rights law, including the African Charter on

¹⁶¹ Olubisi Oluduro, ‘Combating Climate Change in Nigeria: An Appraisal of Constitutional and Legal Frameworks’ (2021) 38(2) *Wisconsin International Law Journal*, 283.

¹⁶² *The Constitution of the Federal Republic of Nigeria 1999* (as amended) Cap C 23 LFN 2004, Chapter II.

¹⁶³ *ibid.* s6(6)(c).

¹⁶⁴ *ibid.*

¹⁶⁵ *Attorney-General Lagos State v Attorney-General Federation & Ors.* [2003] 12 NWLR 177-179.

Human and Peoples' Rights (ACHPR), to which Nigeria is a signatory. This judgment, although persuasive and regionally binding, exposed the limitations of domestic constitutional protections.

Furthermore, scholars have criticized the non-justiciability of environmental provisions under the Nigerian Constitution. Emiri argues that in a country severely plagued by environmental degradation, particularly from oil exploration and gas flaring in the Niger Delta, environmental rights should be lifted into the domain of enforceable rights, especially considering Nigeria's international environmental obligations.

While Section 20 of the Constitution reflects a moral and policy-driven commitment to environmental protection, its non-justiciable nature severely limits its effectiveness as a tool for enforcing environmental rights. Bridging this gap is critical to any legal framework that seeks to promote low-carbon energy solutions and respond to climate change challenges in Nigeria.

3.3.1.2 Energy Trilemma under the Constitution of the Federal Republic of Nigeria, 1999

Energy law, as a distinct field of legal study and practice, addresses the regulation, production, distribution, and consumption of energy resources, with a central concern for balancing economic, social, and environmental objectives.¹⁶⁶ In the Nigerian context, energy law is anchored in both statutory provisions and constitutional principles, particularly those enshrined in the Constitution of the Federal Republic of Nigeria 1999 (as amended), which provides the framework for federal and state responsibilities in energy governance, natural

¹⁶⁶ Olusola Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector Amidst Fossil Fuel Disruptions and Low Carbon Energy Transition' (2023) 9(7) Heliyon, 1.

resource management,¹⁶⁷ environmental protection,¹⁶⁸ and human welfare.¹⁶⁹ Effective energy law in Nigeria must, therefore, grapple with the complex interplay of what is often referred to as the “energy trilemma” - energy security, energy equity or rights, and environmental sustainability.

Energy Security refers to the availability and reliability of energy supply to meet national demand.¹⁷⁰ Nigeria, despite being richly endowed with oil, natural gas, and renewable resources, faces persistent challenges in ensuring stable electricity supply and adequate access to modern energy services. Energy law must address these challenges by establishing clear regulatory frameworks that promote investment in infrastructure, encourage diversification of energy sources, and ensure resilience against disruptions. In line with the provisions of the Constitution, which charge the government with the responsibility to secure national development and welfare,¹⁷¹ the law should mandate policies that guarantee the availability of energy as a public good while balancing national interests with private sector participation. For instance, legal frameworks should facilitate the development of a diversified energy mix, encompassing fossil fuels, hydroelectric power, solar, wind, and other renewables while ensuring strategic reserves and contingency mechanisms for periods of energy scarcity.

Energy equity or rights emphasizes the fair distribution of energy resources and the accessibility of energy services to all segments of the population, including marginalized and low-income communities.¹⁷² The Constitution recognizes the principles of federalism and

¹⁶⁷ Section 44(3) of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended). See also Item 39 and 41 of the Second Schedule to the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

¹⁶⁸ Section 20 of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

¹⁶⁹ *ibid.* section 16

¹⁷⁰ Ahmad Abdallah and Odetokun Odeleke, ‘Energy Security in Nigeria: Challenges and Prospects’ (2023) 1(1) *Journal of Arid Zone Economy*, 101.

¹⁷¹ Section 16 of the *Constitution of the Federal Republic of Nigeria*, 1999 (as amended).

¹⁷² Oyeniyi Abe and Victor Azubike, ‘(Re)examining the Intersection between Energy Justice and Energy Transition in Africa’ (2024) 42(3) *Journal of Energy & Natural Resources Law*, 279.

equity in resource management, and underscores the directive for the state to harness natural resources to enhance citizens' welfare. Legal frameworks should operationalize these constitutional imperatives by guaranteeing non-discriminatory access to electricity and other energy forms, regulating tariffs to be fair and affordable, and protecting consumers' rights. Energy law must also address rural electrification, off-grid solutions, and community-based energy initiatives, ensuring that energy poverty does not undermine social justice and economic development. Regulatory oversight should establish mechanisms for public participation and accountability in energy decision-making, recognizing energy as both a commodity and a fundamental enabler of human development.

Environmental sustainability in energy law pertains to ensuring that energy production and consumption do not compromise ecological integrity or exacerbate climate change. As earlier discussed, the Constitution mandates that the state protect and improve the environment, while obliging the government to ensure sustainable development in the use of natural resources. Energy laws, therefore, must embed environmental safeguards in all aspects of energy governance, including licensing, permitting, and monitoring of energy projects. Legal provisions should enforce emissions standards, regulate environmental impact assessments, promote energy efficiency, and incentivize renewable energy deployment to reduce dependence on carbon-intensive fossil fuels. Environmental sustainability must be considered not as an afterthought but as a central pillar of energy policy, ensuring that present energy needs are met without compromising the ability of future generations to meet theirs.

A legal framework addressing the energy trilemma must harmonize these three dimensions, security, equity, and sustainability, while reflecting constitutional mandates. The law should be designed to: ensure reliable and resilient energy supply; promote fair and affordable access to energy; protect the environment; and establish clear responsibilities for both federal and state authorities. It should also provide enforcement mechanisms, regulatory oversight, and

incentives for innovation and investment in renewable technologies. Importantly, Nigerian energy law should recognize that the trilemma is interdependent: policies that prioritize one dimension at the expense of the others may lead to inefficiencies, social unrest, or environmental degradation. For example, expanding energy supply through fossil fuels alone may enhance security but undermine sustainability, while pursuing strict green energy policies without addressing access disparities may exacerbate inequities.

In essence, energy law under the Nigerian legal framework must operate as a balancing instrument, guided by the constitutional principles of welfare, equity, sustainability, and federal oversight. By addressing the energy trilemma, legal frameworks can provide the structure for a resilient, inclusive, and environmentally responsible energy sector, contributing to national development, social justice, and global climate commitments.

3.3.2 Petroleum Industry Act

The *Petroleum Industry Act* (PIA) was enacted in 2021 as the principal legislation governing Nigeria's oil and gas sector, by the government of President Muhamadu Buhari. The PIA repealed the Petroleum Act of 1969 which was noted to be ineffective in addressing contemporary challenges and best practices in the oil and gas sector.¹⁷³ Unquestionably, the PIA represents a significant advancement in Nigeria's oil and gas sector.¹⁷⁴ However, it still has certain shortcomings, such as the continuous gas flaring that it has not sufficiently addressed.¹⁷⁵ Similarly, in a time where decarbonization is a global requirement, there is a need for a sustainable energy transition in light of global demand from fossil fuels.¹⁷⁶

¹⁷³ Kasirim Nwuke, 'Nigeria's Petroleum Industry Act: Addressing Old Problems, Creating New Ones' (*Brookings*, 24 November 2021) <<https://www.brookings.edu/articles/nigerias-petroleum-industry-act-addressing-old-problems-creating-new-ones/>> accessed 3 January 2025.

¹⁷⁴ David Oladeji Ehijie Borha and Olusola Josua Olujobi, 'An Examination of the Petroleum Industry Act 2021: Prospects, Challenges and the Way Forward' (2023) 12(551) F1000 Research, 3.

¹⁷⁵ Olusola Olujobi et al, 'COVID-19 Pandemic: The Impacts of Crude Oil Price Shock on Nigeria's Economy, Legal and Policy Options' (2022) 14(18) Sustainability, 7.

¹⁷⁶ *ibid.*

For instance, study shows that no provision of PIA demonstrates a sufficient commitment of the Nigeria government towards sustainable energy transition and climate change.¹⁷⁷ This position may not be accurate as there are provisions in the PIA on the use of natural gas for the country in reducing gas flaring.¹⁷⁸ The PIA established a Midstream and Downstream Gas Infrastructure Fund ('the fund'), which shall be a body corporate with perpetual succession and a common seal and reside in the authority as prescribed by this act.¹⁷⁹ It shall have a governing council which shall supervise and make investment decisions for it.¹⁸⁰ It shall be financed primarily from the levy on the wholesale price of petroleum and natural gas sold and produced.¹⁸¹ It is expected that the fund shall be used to make equity investments in infrastructure related to midstream and downstream gas operations to increase the domestic consumption of natural gas in Nigeria in projects which are financed in part by private investment; encourage private investment; reduce or eliminate gas flaring.¹⁸² Further to this argument, another study avers that the provisions of the PIA are insufficient to effectively address climate change, as the role of natural gas in the energy transition and its production continue to have detrimental effects on global warming and climate change.¹⁸³

In addition, the PIA provides for a financial contribution to an environmental remediation fund set up by the Authority for the restoration or management of negative environmental impacts of the licence or lease, being a prerequisite for the award of the oil licence or lease and before the approval of the environmental management plan by the Authority.¹⁸⁴ The amount to be contributed is based on the size of the operations and the level of environmental

¹⁷⁷ Meshach Umenweke and William Chukwuma, 'An Examination of the Petroleum Industry Act 2021 and the Quest for a New Nigeria' (2021) 2(2) Law and Social Justice Review (LASJURE), 67.

¹⁷⁸ David Oladeji Ehijie Borha and Olusola Josua Olujobi, op cit. n92 p4.

¹⁷⁹ The *Petroleum Industry Act 2021*, section 52(1)(a)-(b).

¹⁸⁰ *ibid.* section 52(3).

¹⁸¹ *Ibid.* section 52(7)(a).

¹⁸² *ibid.* section 52(10)(a)-(c).

¹⁸³ Olusola Olujobi *et al*, 'Fossil Fuel Disruptions and Low Carbon Transition: Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector' (2023) 26(S3) Journal of Legal, Ethical and Regulatory Issues, 6.

¹⁸⁴ The *Petroleum Industry Act 2021*, section 103(1).

risk that may exist in the operations.¹⁸⁵ A licensee or lessee is to assess the environmental liability annually and increase the financial contribution to the satisfaction of the Authority.¹⁸⁶ An independent assessor may be appointed by the Authority if it is dissatisfied with the licensee or lessee's assessment to conduct the valuation and to determine the financial contribution.¹⁸⁷ However, where a licensee or lessee fails to rehabilitate or manage the negative impact of their activities on the environment, the Authority after written notice to the licence holder may apply the fund to rehabilitate or manage such negative environmental impact in the affected part of the country.¹⁸⁸

Furthermore, the PIA allows gas flaring or venting only in emergencies or with an exemption from the Commission for safety reasons.¹⁸⁹ It also permits a licensee or lessee to flare when it is necessary for facility start-up or testing equipment, and failure would occasion a fine which is then used for environmental remediation and relief of host communities.¹⁹⁰ Despite the enactment of the PIA, Nigeria remains heavily reliant on fossil fuels for its energy needs. One of the most pressing environmental concerns linked to fossil fuel dependency is gas flaring, a significant contributor to greenhouse gas emissions and climate change. Although the PIA makes some attempts to address environmental issues related to petroleum operations, the impact and effectiveness of these provisions have been underwhelming in practice.

Crucially, the PIA fails to provide a comprehensive legal or institutional framework for the integration of renewable energy into Nigeria's energy mix. Rather than promoting a strategic shift towards sustainable alternatives, the Act reinforces the existing fossil fuel-based infrastructure. It focuses predominantly on optimizing petroleum operations, rather than transitioning the energy sector toward low-carbon or renewable energy sources. In terms of

¹⁸⁵ *ibid.* section 103(2).

¹⁸⁶ *ibid.* section 103(5).

¹⁸⁷ *ibid.* section 103(6).

¹⁸⁸ *ibid.* section 103(4).

¹⁸⁹ *ibid.* section 104(1)-(4).

¹⁹⁰ *ibid.* section 107.

regulatory oversight, the core agencies established under the PIA namely, the Nigerian Upstream Petroleum Regulatory Commission (NUPRC),¹⁹¹ and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA),¹⁹² are primarily mandated to oversee petroleum operations. Their statutory roles do not extend to the promotion or regulation of renewable energy development, leaving a critical gap in Nigeria's energy governance architecture.

Furthermore, enforcement mechanisms under the PIA are generally weak, especially in compelling compliance with climate-sensitive practices such as gas flaring reduction. Penalties for non-compliance are often inadequate or poorly enforced, thus undermining efforts to curtail environmental degradation and reduce carbon emissions. Ultimately, while the PIA represents a long-overdue reform of Nigeria's petroleum sector, its contribution to environmental sustainability and the advancement of renewable energy is minimal. Without deliberate policy and legislative efforts to integrate renewable energy and strengthen environmental accountability, Nigeria's transition to a sustainable energy future remains uncertain.

3.3.3 Electricity Act

Nigeria's energy sector has faced challenges across all of its subsectors despite years of investments and structural reforms meant to address these persistent issues. Energy supply has been epileptic, and insufficient. The national grid has been prone to malfunctions and blackouts. On June 8, 2023, His Excellency President Bola Ahmed Tinubu, GCFR, signed the *Electricity Act 2023* into law.¹⁹³ In addition to repealing several previous legislations,¹⁹⁴ the

¹⁹¹ *ibid.* section 4.

¹⁹² *ibid.* section 29.

¹⁹³ KPMG, 'Commentaries on the Electricity Act 2023'

<<https://assets.kpmg.com/content/dam/kpmg/ng/pdf/commentaries-on-the-electricity-act--2023.pdf>> accessed 14 January 2025.

Electricity Act established a comprehensive institutional and legal framework for the energy sector in Nigeria, particularly, in the areas of energy generation, transmissions, system operation, distribution, supply, trading, enforcement of consumer rights and obligations, and integrates the laws governing the Nigerian Electricity Industry (NESI) with the goal of reforming Nigeria's energy sector, while incorporating renewable energy into Nigeria's energy mix, and attracting the required investments to develop the sector.¹⁹⁵

Among other things, one of the Electricity Act's main objectives is to implement new laws and regulations that will solve some of the present challenges and in private sector capital for the NESI value chain so as to create an industry that is adequate, lucrative, and self-sustaining.¹⁹⁶ While the Act provides a framework for the integration of renewable energy and the adoption of sustainable green energy practices in the NESI, it particularly, mandates the Nigerian Electricity Regulation Commission (NERC) to promote the development and utilization of renewable energy services and increase its contribution to Nigeria's energy mix.¹⁹⁷ On the case of the utilization of sustainable green energy in Nigeria's energy mix, the Supreme court in the case of *Centre for Oil Pollution Watch v Nigerian National Petroleum Corporation*,¹⁹⁸ the Court held that "there is no gain saying in the fact that there is increasing concern about climate change, depletion of the ozone layer, waste management, flooding and global warming etc... Both nationally and internationally, countries and organizations are

¹⁹⁴ *Electric Power Sector Reform Act (EPSRA) 2005, Hydroelectric Power Producing Areas Development Commission (Establishment, Etc.) Act 2010, Hydroelectric Power Producing Areas Development Commission (Establishment, Etc.) Act 2010 (Amendment) Act 2013, Hydroelectric Power Producing Areas Development Commission (Establishment, Etc.) Act 2010 (Amendment) Act 2018, and the National Electricity Management Services Agency (Establishment) Act 2015.*

¹⁹⁵ *Explanatory Memorandum of the Electricity Act 2023.*

¹⁹⁶ Section 1 of the *Electricity Act 2023.*

¹⁹⁷ *ibid.* sections 34(1)(i), 80, 128(f)(i-vi), 164-171.

¹⁹⁸ [2019] 5 NWLR (pt. 1666) 518.

adopting stronger measures to protect and safeguard the environment for the benefits of the present and future.”¹⁹⁹

Despite that the *Electricity Act* promotes the use and growth of renewable energy in Nigeria’s energy mix, it does not go far enough in establishing strict enforcement mechanisms to drastically reduce greenhouse gas emission, as Nigeria persistently depends heavily on fossil fuels in energy generation till date which exacerbates the environment, resulting to environmental pollution and climate change. Internationally, for instance, the *European Renewable Energy Directive*,²⁰⁰ which is the legal framework for the development of clean energy across all sectors in the European Union (EU) economy,²⁰¹ supporting cooperation between EU countries towards achieving this goal compels member states to achieve specific renewable energy targets,²⁰² including penalties for non-compliance²⁰³ and substantial subsidies for renewable energy projects, leading to notable reduction of greenhouse gas emissions across Europe.²⁰⁴ However, similar binding obligations are absent in Nigeria’s legal framework as presented in the Act.

In addition, the *Electricity Act* does not provide sufficient financial and legislative incentives to motivate significant investments in renewable energy infrastructure. It is obvious that Nigeria’s transition to the adoption of renewable energy into its energy mix is stalled because the private sector is fully deterred from fully committing to the renewable energy market by the absence of clear and compelling incentives. Hence, Nigeria not only needs a legal framework that encourages the use and development of renewable energy, but also requires

¹⁹⁹ *ibid.*

²⁰⁰ European Commission, *Renewable Energy Directive 2018/2001/EU* <https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en> accessed 15 January 2025.

²⁰¹ *ibid.* paragraphs 2 – 5.

²⁰² *ibid.* paragraphs 8 – 10.

²⁰³ *ibid.* paragraph 11.

²⁰⁴ *ibid.* paragraph 19.

an effective legal framework that imposes mandatory emission reduction targets to address environmental pollution and climate change challenges.

3.3.4 Environmental Impact Assessment Act

The *Environmental Impact Assessment Act* 1992 (EI Act) is an Act that basically set out the fundamental guidelines, protocols, and techniques that allow environmental impact assessments to be taken into account beforehand for specific public or private projects.²⁰⁵ The EI Act serves as a vital legislation intended to guarantee that the environmental effects of development projects including those involving the production of energy are assessed and reduced prior to execution.²⁰⁶ The EI Act seeks to reduce negative environmental effects by requiring that all major projects go through an environmental review. However, in spite of its objectives, the EI Act has shown a number of shortcomings, especially when it comes to tackling the persistent problems caused by Nigeria's dependence on fossil fuels.

For instance, the EI Act prohibits both public and private entities from starting or approving projects without taking the environment's consequences into account.²⁰⁷ However, in reality, it frequently happens that development projects start without an environmental impact assessment.²⁰⁸ Even where an assessment is carried out by these entities, there may still be violations of the provisions of the EI Act concerning the right of information and participation.²⁰⁹ Since the EI Act was enacted, the majority of host communities and stakeholders have been uninformed of proposed activities, which may indicate that public access to information through the public registry is deficient.²¹⁰ According to an independent panel of specialists from the US, UK, and Nigeria, the Niger Delta is among the ecosystems

²⁰⁵ The *Environmental Impact Assessment Act* 1992, Cap E12 Laws of the Federations of Nigeria (LFN) 2004.

²⁰⁶ *ibid.* section 1(a).

²⁰⁷ *ibid.* section 2.

²⁰⁸ Lilly-Taria Abbiba, 'The Application of the Environmental Impact Assessment Act on Petroleum Projects in Nigeria: An Analysis' (2024) AELN Journal of Multidisciplinary and Current Studies, 23.

²⁰⁹ *ibid.*

²¹⁰ *ibid.*

most negatively harmed by fossil fuels worldwide.²¹¹ Another typical example is the dredging of the Lower River Niger²¹² without regard for and adherence to the provisions of the Act.²¹³ Throughout the project's duration, an environmental impact assessment was conducted. Additionally, some residents of the impacted communities were not given the assessment report or contacted. The Act's enforcement provision may be one of the causes of non-compliance as the monetary punishment that has been set is woefully insufficient. The penalty for an offending individual is one hundred thousand naira fine or liable to conviction of five years imprisonment and the penalty for offending corporate entities is a fine of fifty thousand naira and not more than one hundred thousand naira.²¹⁴ From the observation of the fact, not only are the penalties of fines too low and unfair to compel adherence, they are also hardly ever imposed on the offenders. The study contends that merely listing the criteria to be taken into account and the requirements to be met before an evaluation on a proposed activity is made is inadequate. There are many more prerequisites than these. It is necessary to acknowledge the rights of those impacted by development projects as provided in the Act.

Furthermore, the Niger Delta region has suffered serious consequences from a number of environmental hazards, including smoke, contaminated water, and soil degradation, as a result of gas flaring and oil spills. Study shows that crude is found and exploited in the area without an assessment.²¹⁵ These environmental risks demonstrate how ineffectual the Act is as a tool for protecting the environment, particularly, in Nigeria's oil and gas sector. The EIA now appears inadequate unless its standards are transformed into a useful tool for

²¹¹ Report on Niger Delta Natural Resources Damage Assessment and Restoration Project of the Federal Ministry of Environment: Nigerian Conservation Foundation Lagos, WWF (2006) UK and CEESP-IUCN Commission on Environmental, Economic and Social Policy.

²¹² Maxwell Kadiri, 'Access to information on the Dredging of the lower River Niger' (Vanguard News, 8 October 2009) <<https://www.vanguardngr.com/2009/10/access-to-information-on-the-dredging-of-the-lower-niger-river/>> accessed 15 January 2025.

²¹³ Section 55(1) of the *Environmental Impact Assessment Act* 1992.

²¹⁴ Section 60 of the *Environmental Impact Assessment Act* 1992.

²¹⁵ Orish Ebere Orisakwe, 'Crude Oil and Public Health Issues in Niger Delta, Nigeria: Much Ado about the Inevitable' (2024) 194 *Environmental Research*, 2.

environmental protection.²¹⁶ The inability to sue is a challenge for victims seeking restitution in court when contamination results from inadequate assessment methods and processes. In the case of *Jonah Gbemre v Shell Petroleum Development Corporation*, Shell's continuous gas flaring in Iwehrekan community and its failure to perform an assessment were among the prayers upheld by the court.²¹⁷ These actions violated the people's right to life and dignity under the 1999 Constitution and the ACHPR. Among other things, the flaring of gas by the Shell pollutes and destroys the environment, producing carbon dioxide, the main greenhouse gas.²¹⁸ Till date, the government and oil companies have not complied with the current court ruling, which has led to the continuance of gas flaring and the lack of assessment with minor fines. Although the existing provisions of this Act falls short in addressing the intricate challenges posed by climate change and the transition to sustainable energy, enhancing the Act to incorporate climate-related assessments, bolster enforcement, and promoting the adoption of renewable energy is Nigeria's energy mix is essential for the reduction of environmental pollution and advancing sustainable development in Nigeria.

3.3.5 Climate Change Act

The *Climate Change Act*, established in 2021 embodies a momentous phase toward addressing the country's environmental challenges,²¹⁹ particularly concerning greenhouse gas emissions and climate change adaptation and mitigation, and provides a legal and institutional framework for ensuring climate change Action Plans, programs and projects, long-term social and economic sustainability and resilience that aligns with Nigeria's

²¹⁶ *Oronto Douglas v Shell Development Company of Nigeria Limited & 4 Ors* [1992] 2 NWLR 466-467.

²¹⁷ *Supra*. See also *Social and Economic Rights Action Centre (SERAC) and Centre for Economics and Social Rights (CESR) v Nigeria* (Communication No. 155/96) (Communication 155 of 1996) [2001] ACHPR 35.

²¹⁸ *ibid*.

²¹⁹ Olusola Olujobi and Ikiyouleimo Odogbo, 'Strategic Evaluation of the 2021 Climate Change Act: Surmounting Challenges, Paving the Way for Success, and Envisioning Future Trajectories' (2024) 10 Social Sciences and Humanities Open, 6.

international climate change commitments.²²⁰ The Act sets a goal of achieving net-zero greenhouse gas emissions between 2050 and 2070, which is consistent with the Paris Agreement's goal of limiting the global average temperature rise to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5°C.²²¹

In addition, one of the important provisions of the Act is the establishment of the National Council on Climate Change, which is a corporate body with the authority to make policies and decisions on all matters relating to climate change in Nigeria.²²² The Council is responsible for coordinating the implementation of sectorial targets, regulating greenhouse gas emissions, and approving and monitoring the National Climate Action Plan, and also manages the Climate Fund.²²³ The Act mandates the federal ministries of environment and land use planning to develop a carbon budget to limit the global temperature rise to 2 °C and make efforts to limit it to 1.5 °C above pre-industrial levels.²²⁴ The Council, through its Secretariat, is responsible for developing a national action plan on climate change every five years, the first of which is expected no later than twelve months after the commencement of the Act.²²⁵ The national action plan outlines the strategies, actions, and measures for achieving the objectives and targets of the Act.²²⁶

Furthermore, the Act provides a strong framework for climate action, addressing Nigeria's short, medium, and long-term objectives for climate reduction and adaptation as it places obligations on public and commercial institutions to promote a low-carbon economy and

²²⁰ Section 1 of the *Climate Change Act* 2021 Cap P41 Laws of the Federation of Nigeria (LFN) 2004. See also Chukwumerije Okereke and Sam Onuigbo, 'Key Features and Significance of Nigeria's New Climate Change Law' (*Business Day*, 21 November 2021) <https://businessday.ng/opinion/article/key-features-and-significance-of-nigerias-new-climate-change-law/#google_vignette> accessed 16 January 2025.

²²¹ Section 1(f) of the *Climate Change Act* 2021. See also Federal Ministry of Environment 2021: National Climate Change Policy for Nigeria: 2021-2030.

²²² *ibid.* section 3.

²²³ *ibid.* section 4.

²²⁴ *ibid.*

²²⁵ *ibid.* section 8.

²²⁶ *ibid.*

sustainable lifestyles.²²⁷ The Act also emphasizes collaboration with relevant parties, including civil society organizations. These measures create a solid legal foundation for potential climate-related legal disputes and climate change activism.²²⁸ The Act also provides for penalties for violation of its provisions, as well as remedies and compensation for victims of climate change.²²⁹

Despite the Act's aspirational objectives, some major difficulties remain regarding its provisions, notably in respect to Nigeria's present energy production practices, particularly the continued reliance on fossil fuels. It is argued that the Act lacks precise, legally binding measures to effectively cut greenhouse gas emissions, even while it states the need for a national climate policy and the creation of a Climate Change Council.²³⁰ Although the Act highlights how crucial it is to incorporate climate factors into national development objectives, it offers no precise implementation recommendations or procedures.²³¹ Hence, the ability of such an entity to promote cooperation and enforce compliance at all governmental and private sector levels is crucial to its efficacy.²³² It is, however, unclear if the council will be able to influence change in the Nigeria's energy sector that highly depends on fossil fuel for energy generation.

Although, the Act highlights the significance of energy efficiency and renewable energy,²³³ Nigeria's energy production is still mostly dependent on fossil fuels, it does not offer specific methods or incentives to promote the transition from fossil fuels to renewable sources. Given Nigeria's excessive reliance on fossil fuels which still greatly contributes to greenhouse gas emissions and environmental deterioration, this disparity is crucial. Thus, without an effective

²²⁷ *ibid.* section 19.

²²⁸ *ibid.* section 25.

²²⁹ *ibid.* section 34.

²³⁰ Peter Onuh *et al*, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23(2) World Journal of Advanced Research and Reviews, 2363.

²³¹ *ibid.*

²³² *ibid.* 2364.

²³³ Section 20(4)(vii) of the *Climate Change Act* 2021.

legal framework that fully supports the adoption of renewable energy in Nigeria's energy mix, Nigeria is at the risk of being behind in the global transition to cleaner energy sources.

3.3.6 National Environmental Standards and Regulations Enforcement Agency (Establishment) Act

The *National Environmental Standards and Regulations Enforcement Agency (NESREA) (Establishment) Act* established in 2007, repealed the Federal Environmental Protection Agency (FEPA) Act of 1988. The Federal government in 1999, made a prudent decision in creating a unified Federal Ministry of Environment by merging the FEPA with pertinent departments from other Ministries. Nevertheless, the new Ministry of Environment did not have the laws required to make enforcement possible. As a result, the country's environmental laws, standards, and regulations were no longer as effective. As a parastatal of the Federal Ministry of Environment, the National Environmental Standards and Regulations Enforcement Agency (NESREA), a corporate entity, was created by the Federal Government to fill this void by virtue of the provision of section 20 of the Nigerian Constitution,²³⁴ through the NESREA Act.²³⁵ The Act also charged the Agency to protect the environment, enforce laws and regulations on the environment, maintain environmental standards, create environmental awareness, and engage in partnership in the protection of the environment.²³⁶

In order to increase the effectiveness of its operations, the Agency is equipped with a broad variety of authorities. The Agency has the authority to 'prohibit processes and use of

²³⁴ Monsurat Suleiman, Olalekan Raimi and Olawale Sawyerr, 'A Deep Dive into the Review of National Environmental Standards and Regulations Enforcement Agency (NESREA) Act' (2019) 1(4) International Research Journal of Applied Sciences, 110.

²³⁵ Section 1(1) of the *National Environmental Standards and Regulations Enforcement Agency (Establishment) Act* 2007, Cap N164 LFN 2004, s1(1).

²³⁶ *ibid.* section 2.

equipment or technology that undermine environmental quality’,²³⁷ ‘conduct field follow-up compliance with set standards, and take procedures prescribed by law against any violator’,²³⁸ and ‘establish mobile courts to expeditiously dispense cases of environmental infringements’ in the context of environmental protection.²³⁹ Nevertheless, this must be carried out in accordance with the Nigerian Constitution and in consultation with the ‘relevant judicial authorities’.²⁴⁰ The Agency has the authority to carry out public investigations²⁴¹ and provide recommendations to the Minister for the revision of current environmental standards, laws, and guidelines.²⁴²

Furthermore, with the exception of the oil and gas sector, it can create networks for environmental monitoring and gather environmental data from other industries.²⁴³ It can encourage the growth of research experiments, surveys, and studies in collaboration with public or private agencies, institutions, and organizations.²⁴⁴ In order to prevent, reduce, and eliminate pollution and other types of environmental degradation in the country’s air, land, oceans, seas, and other water bodies, as well as to restore and improve the environment and natural resources, the Agency may ‘establish programs for setting standards and regulations with the Minister’s approval’.²⁴⁵ The Agency can gather and disseminate fundamental scientific data on environmental standards through publications and other suitable channels, and the Agency has the authority to charge for its services.²⁴⁶ From the above, it is worthy of

²³⁷ *ibid.* section 8(d).

²³⁸ *ibid.* section 8(e).

²³⁹ *ibid.* section 8(f).

²⁴⁰ *ibid.*

²⁴¹ *ibid.* section 8(g).

²⁴² *ibid.* section 8(k).

²⁴³ *ibid.* section 8(l).

²⁴⁴ *ibid.* section 8(m).

²⁴⁵ *ibid.* section 8(o).

²⁴⁶ *ibid.* section 8(p)-(q).

note that the authority of the Agency does not cover environmental problems caused by the oil and gas sector.²⁴⁷

Asides the limited enforcement capabilities the NESREA Act has, another major shortcoming of this Act in effectively reducing greenhouse gas emission, is that, it functions independently of Nigeria's larger energy policies, which still give fossil fuel development priority over renewable energy projects. This discrepancy is especially troubling because Nigeria's energy production is largely dependent on natural gas and oil, which results in high levels of greenhouse gas emissions that have a negative impact on the environment and human health.

3.3.7 National Oil Spills Detection and Response Agency (Establishment) Act

The *National Oil Spills Detection and Response Agency (Establishment) Act*, established in 2006, is the principal legislation governing the response to oil spill incidents in Nigeria.²⁴⁸ The Act established the National Oil Spills Detection and Response Agency (NOSDRA).²⁴⁹ This Agency is statutorily empowered to coordinate and control responses to oil spill incidents in Nigeria.²⁵⁰ In addition, the Agency is responsible for the restoration and preservation of the environment by making sure that the best practices are employed in the exploitation of oil in Nigeria.²⁵¹ This, in particular, includes the constant case of gas flaring the Niger Delta region.²⁵²

However, the objectives, functions and special functions of the Agency are meant to mitigate immediate environmental harm, but they do not go far enough in addressing the underlying sources of pollution, especially greenhouse gas emissions from the burning of fossil fuels as

²⁴⁷ *ibid.* section 8(g), (k), (n), (s).

²⁴⁸ Ayobami Olaniyan, 'The Multi-Agency Response to the Management of Oil Spill Incidents: Legal Framework for Effective Implementation in Nigeria' (2015) 6(1) Afe Babalola University Journal of Sustainable Development, Law and Policy, 115.

²⁴⁹ Section 1(1) of the *National Oil Spills Detection and Response Agency (NOSDRA) (Establishment) Act* No.15 2006, Cap N157 LFN 2004.

²⁵⁰ *ibid.*

²⁵¹ *ibid.* sections 5,6,7.

²⁵² Olubisi Oluduro, op cit. n208.

the Act mainly focuses on managing oil spills without addressing the more general problem of greenhouse gas emissions and climate change. Nigeria's energy production is still mostly dependent on fossil fuels, which greatly increases greenhouse gas emissions and degrades the environment. In order to cut emissions and fight climate change, the Act does not include provisions for encouraging the use of renewable energy sources for energy generation, so as to reduce the impact of fossil fuels on human health and the environment. Moreover, penalties for violating oil spill restrictions are outlined in the Act. However, many oil corporations continue to operate with little accountability, leading to environmental damage, and regulation has been lax, particularly in the Niger Delta region of the country.²⁵³

3.3.8 National Renewable Energy and Energy Efficiency Policy

As part of Nigeria's commitment to diversifying its energy sources and promoting sustainable energy practices, the *National Renewable Energy and Energy Efficiency Policy* (NREEEP) was established in 2015. This policy document aims to provide a strategic framework for the development and utilization of renewable energy and energy efficiency in Nigeria.²⁵⁴ Similarly, since energy is multifaceted, this policy document covers a wide range of issues, including the supply and use of renewable energy, pricing and financing for renewable energy, legislation, regulations, and standards; energy efficiency and conservation; problems with the implementation of renewable energy projects; research and development; capacity building and training; gender and environmental issues; planning and policy implementation. Making the best use of the country's energy resources for sustainable development is the main goal of this policy.²⁵⁵

The NREEEP proposes a sustainable energy system that encourages the growth of renewable energy sources and energy efficiency. Diversifying the energy mix, lowering reliance on

²⁵³ *Centre for Oil Pollution Watch v. Nigerian National Petroleum Corporation* [2019] 5 NWLR (pt. 1666) 518.

²⁵⁴ *The National Renewable Energy and Energy Efficiency Policy (NREEEP)* 2015.

²⁵⁵ *ibid.* paragraph 1.1.

fossil fuels, and lowering greenhouse gas emissions are some of its objectives.²⁵⁶ The policy's implementation has been inconsistent and uneven, despite the fact that these goals are in line with international best practices. The NREEEP describes how several government agencies will carry out the policy.²⁵⁷ However, these entities' unclear coordination has resulted in disjointed and ineffective efforts to promote renewable energy. Thus, the NREEEP is a step in the right direction for Nigeria's energy transition, but its implementation has been fraught with challenges. Strengthening the policy through an effective legal framework that enforces renewable energy adoption, addresses economic barriers, and enhances regulatory oversight is imperative. By doing so, Nigeria can reduce its GHG emissions, improve human health and the environment, and foster sustainable development, aligning with both national and international environmental objectives.

3.3.9 National Energy Policy

The *National Energy Policy* (NEP) was established by the Federal Executive Council in 2003, and later reviewed in 2013, 2018 and 2021 respectively.²⁵⁸ According to Tade Oyewunmi, NEP is the first coherent policy framework on "energy" in Nigeria.²⁵⁹ The NEP provides the framework for sustainable energy development in Nigeria with the overall objective of providing clean, affordable, adequate, and reliable energy with the active participation of the private sector.²⁶⁰ The development of alternative energy sources has been slowed down by overreliance on fossil fuels. Nigeria will have more energy security if diversification is implemented to create a larger variety of energy sources. This means that, through the

²⁵⁶ *ibid.* paragraph 1.12.

²⁵⁷ *ibid.* paragraph 1.10-1.11.

²⁵⁸ The *National Energy Policy* 2003.

²⁵⁹ Tade Oyewunmi, 'Nigeria: Energy Policy' (2017) 3

<https://www.researchgate.net/publication/320408123_Nigeria_Energy_Policy> accessed 22 January 2025.

²⁶⁰ The *National Energy Policy* 2003.

diversification of Nigeria's energy resources, the dependence on fossil fuels can be reduced. through the diversification of the nation's energy resources²⁶¹

Nigeria is still mostly dependent on fossil fuels for energy generation, even though the NEP's declared objective is to diversify the nation's energy mix. Due to this dependence, considerable greenhouse gas emissions have been produced, which has accelerated environmental deterioration and climate change. There has been little progress in the transition to renewable energy due to the NEP's poor implementation. In addition, the NEP's provisions, especially those pertaining to environmental preservation and the use of renewable energy, are not adequately enforced by a strong regulatory structure. This disparity has made it more difficult to effectively reduce pollution from energy producing activities, including gas flaring in the Niger Delta, which nevertheless has a negative impact on the environment and human health.

Although the NEP recognizes the value of renewable energy, its development and utilization is slowed down. The policy limits the expansion and impact of renewable energy projects on lowering greenhouse gas emissions by not offering enough incentives or support systems to draw in investment. Hence, Nigeria needs a comprehensive legal framework that encourages the use of renewable energy sources and upholds environmental protection regulations in order to solve the NEP's flaws and successfully reduce environmental pollution and climate change.

3.3.10 Renewable Electricity Policy Guidelines

In an effort to encourage the development and utilization of renewable energy resources for the production of energy, the Nigerian government created the *Renewable Electricity Policy*

²⁶¹ *ibid.*

Guidelines (REPG) in 2006.²⁶² The REPG, which was created to supplement the *National Energy Policy* (NEP), provides goals and tactics for attaining a diverse and sustainable energy mix. The overall objective of this policy is to expand the role of renewable electricity in sustainable development through effective promotional and regulatory instruments.²⁶³

It is clearly not in line with its ambitious goals as there are no enforceable components in the REPG, significantly weakening its effectiveness. It does not impose mandatory obligations on energy stakeholders to prioritize renewable energy, nor does it establish any penalties for their non-comportment. This has sustained Nigeria's reliance on fossil fuels, which constitute more than 80% of the nation's energy generation. The policy also highlights the need to protect the environment, but contains few concrete regulatory measures against pollution. As one concrete example, the guidelines are not clear on how to eliminate harmful practices like gas flaring, which continues unchecked in the oil producing area, particularly the Niger Delta region.

3.3.11 Renewable Electricity Action Programme

One of the most important elements of Nigeria's initiatives to include renewable energy into its energy framework is the *Renewable Electricity Action Programme* (REAP), established in 2006. REAP was created to hasten the nationwide rollout of renewable energy projects as part of the larger *Renewable Energy Master Plan* (REMP).²⁶⁴ In order to diversify Nigeria's energy mix and lessen its reliance on fossil fuels, REAP promotes energy technologies like solar, wind, biomass, and small hydro energy.²⁶⁵ Targeting marginalized and rural communities by promoting off-grid renewable options is one of the specific objectives, promoting investments in renewable energy to supplement fossil fuels and eventually take

²⁶² The *Renewable Electricity Policy Guidelines* (REPG) 2006.

²⁶³ *ibid.* paragraph 4.0.

²⁶⁴ Nnaemeka Emodi and Nebedum Ebele, 'Policies Promoting Renewable Energy Development and Implications for Nigeria' (2017) 6(1) *British Journal of Environment and Climate Change*, 3.

²⁶⁵ Paragraph 1.4 of the *Renewable Electricity Action Programme* (REAP) 2006.

their place, putting in place structures for technical education and research to encourage the use of renewable energy, and offering incentives for private funding and public-private collaborations on renewable energy projects.²⁶⁶

REAP, akin to numerous policy frameworks in Nigeria, is devoid of enforceable legal provisions to actualize its objectives. The lack of legal mandates for energy stakeholders to prioritize renewable energy initiatives has facilitated the persistent prevalence of fossil fuels, which account for over 80% of Nigeria's energy generation. Despite outlining the possibilities of renewable energy sources like solar, wind, and biomass, REAP does not establish legally obligatory goals for their adoption. Attempts to transition to cleaner energy sources are hampered by the lack of clear objectives. Nigeria may take inspiration from nations who have effectively enacted laws with specific goals for renewable energy, in order to promote a more sustainable energy future. In addition, REAP insufficiently tackles pollutants resulting from fossil fuel-based energy generation, especially the prevalent issue of gas flaring in the Niger Delta region. Efforts to reduce air and water pollution, which have detrimental effects on human health and the ecosystem, are hampered by laidback environmental regulations.

3.3.12 National Renewable Energy Action Plans

Another important policy document in Nigeria's renewable energy landscape is the *National Renewable Energy Action Plans* (NREAP), which encourages the use of clean energy sources to diversify the country's energy mix and lower pollution levels. The NREAP was first introduced in 2015 as a plan for accomplishing Nigeria's renewable energy goals, in accordance with the country's pledges to the *ECOWAS Renewable Energy Policy*.²⁶⁷ Although there has been a slight increase in the use of renewable energy in recent years, the

²⁶⁶ *ibid.*

²⁶⁷ The National Renewable Energy Action Plans (NREAP) 2015-2030.

deployment of renewable energy must be significantly increased over the next decade in order to meet the target of 16% of Nigeria's energy coming from renewable sources by 2030, up from just 0.8% in 2012.²⁶⁸

According to the NREAP, Nigeria's energy supply security is under jeopardy due to the country's declining fossil fuel reserves and the anticipated rise in the world's energy consumption.²⁶⁹ The nation's energy needs will be significantly met by utilizing its renewable resources, which will also enable it to become less dependent on traditional, foreign-traded energy supplies. In addition to improving the security of Nigeria's energy supplies, the push to raise the share of energy derived from renewable sources would open up new business and technological prospects. Although the NREAP established challenging goals for Nigeria's adoption of renewable energy, their efficacy is weakened by the absence of legally binding commitments, poor implementation techniques, and insufficient funding. For Nigeria to reduce pollution, combat climate change, and promote sustainable energy development, NREAP must be strengthened into a legally binding framework that is supported by strict environmental regulations and strong financial incentives.

3.3.13 Renewable Energy Master Plan

The Renewable Energy Master Plan (REMP) established in 2006 and later reviewed in 2012, is a policy framework developed by the Energy Commission of Nigeria (ECN). The REMP was introduced in Nigeria through the support of the United Nations' Development Programme (UNDP). This policy aims to increase the contribution of renewable energy to account for 10% of total energy consumption of Nigeria by 2025. In addition, this policy articulates Nigeria's vision and sets out a road map for increasing the role of renewable energy in Nigeria's energy mix in achieving sustainable development. The policy primarily

²⁶⁸ *ibid.*

²⁶⁹ *ibid.*

addresses Nigeria's need for increased energy supply, improved grid reliability, and security in meeting the needs of the populace.²⁷⁰

The REMP emphasized the need for the integration of renewable energy in buildings, energy grids and off-grid energy systems. The importance of solar energy in the country's energy mix was also highlighted in the policy document. By the provisions of the REMP, Nigeria intends to increase the supply of renewable energy from 13% of the total energy generation in 2015 to 23% in 2025 and 36% by 2030. Renewable energy would then account for 10% of Nigeria's total energy consumption by 2025. About 18.20% of Nigeria's total energy consumption as of 2015 came from renewable sources.²⁷¹ Projections indicate that by 2025, the share of renewables in Nigeria's total final energy consumption is likely to reach 86.4%.²⁷² However, it is crucial to note that a sizable amount of this comprises conventional biomass, which, despite being categorized as renewable, presents health and environmental risks because of its ineffective and toxic combustion techniques. The contribution of contemporary renewable energy sources, like hydro, solar, wind, and modern biomass, to the production of power in Nigeria is still quite small. For instance, in 2022, non-renewable sources accounted for 73% of electricity generation, while renewable sources contributed 27%, with hydropower being the predominant renewable source.²⁷³

Nigeria seems to be having trouble reaching all of the particular goals specified in the REMP, based on the data that is currently available and the country's current trajectory. Even while renewable energy capacity has increased, the dominance of conventional biomass and the low

²⁷⁰ The *Renewable Energy Master Plan* 2006.

²⁷¹ Nigeria Renewable Energy 1990-2025 < <https://www.macrotrends.net/global-metrics/countries/NGA/%20nigeria/renewable-energy-statistics>> accessed 22 January 2025.

²⁷² International Trade Administration, Electricity. Power Systems and Renewable Energy <<https://www.trade.gov/country-commercial-guides/electricity-power-systems-and-renewable-energy>> accessed 22 January 2025.

²⁷³ International Renewable Energy Agency (IRENA), Renewable Energy RoadMap Nigeria 2023 <https://www.irena.org/media/Files/IRENA/Agency/Publication/2023/Jan/IRENA_REMap_Nigeria_2023.pdf> accessed 22 January 2025.

penetration of modern renewables raise the possibility that the 2025 targets may not be fully met without increased efforts and legislative changes. Nevertheless, the National Assembly has not given its approval for the REMP to become law.

To address these legal barriers, it is essential for Nigeria to develop a unified, comprehensive and efficient legal framework that integrates renewable energy policies with broader energy sector regulations. By doing so, Nigeria can create a more conducive environment for renewable energy investments and accelerate the transition towards a sustainable energy future.

3.4 Institutional Framework Governing Energy Production in Nigeria

3.4.1 Federal Ministry of Power

The Federal Ministry of Power is one of the executive arms of the Federal government. It is charged with providing energy to the country, deals with policy formulation, and provides general direction to other agencies involved in the energy sector.²⁷⁴ The Ministry in discharging these duties is guided by the provisions of the *National Electric Power Policy (NEPP)* of 2001, the *Roadmap for Power Sector Reform* of 2010, and the *Electric Power Sector Reform Act* of 2005 which has been repealed by the *Electricity Act* 2023.²⁷⁵

The Ministry of power is charged with the responsibility to initiate and coordinate broad sectoral policies and implementation frameworks for overall development of the electric power sector in Nigeria.²⁷⁶ This include overseeing concessions in the energy sector, licensing electric generating sets, and regulating electrical contractors.²⁷⁷ The Ministry also ensures

²⁷⁴ Section 2 of the *Electricity Act* 2023.

²⁷⁵ Federal Ministry of Power <<https://power.gov.ng/about-nigeria-federal-ministry-of-power/>> 27 January 2025.

²⁷⁶ Section 5(2) of the *Electricity Act* 2023.

²⁷⁷ *ibid.*

safety in the industry by investigating electrical accidents and conducting statutory tests on electric poles and other materials before their use in the national grid.²⁷⁸ Additionally, it advises the Minister on all matters pertaining to conventional and renewable energy development and utilization,²⁷⁹ coordinates renewable energy initiatives such as solar, wind, biomass, and small hydropower projects.²⁸⁰ Generally promoting the utilization of fossil fuels and renewable energy sources for energy generation.²⁸¹ It plays a crucial role in research and development,²⁸² promotes hydropower projects through public-private partnerships (PPPs), and manages bilateral and multilateral relations concerning the power sector.²⁸³ Furthermore, it facilitates the coordination of parastatals under its supervision to ensure efficient power sector operations in Nigeria.²⁸⁴

3.4.2 Nigerian Electricity Regulation Commission

The *Electricity Power Sector Reform Act* of 2005 (EPSRA), which has been repealed, by the *Electricity Act* of 2023 authorized the creation of the Nigerian Electricity Regulatory Commission (NERC) in 2005. According to the Electricity Act, NERC is referred to as the apex regulatory agency in the Nigerian Electricity Supply Industry (NESI).²⁸⁵ The NERC creates, promotes and preserves efficient industry and market structures, and also ensures the optimal utilization of resources for the provision of electricity services in Nigeria.²⁸⁶ It is also the duty of the NERC to ensure policing of the electricity environment to ensure fair tariff regimes,²⁸⁷ quality and consumer satisfaction in electricity supplies.²⁸⁸ In order to achieve

²⁷⁸ *ibid.*

²⁷⁹ *ibid.* section 5(2)(e).

²⁸⁰ *ibid.* section 5(2)(l), (m), (o).

²⁸¹ *ibid.* section 5(2)(n).

²⁸² *ibid.* section 5(2)(i).

²⁸³ *ibid.*

²⁸⁴ *ibid.*

²⁸⁵ *ibid.* section 33(3).

²⁸⁶ *ibid.* section 34(1)(a).

²⁸⁷ *ibid.* section 34(1)(d, and j).

²⁸⁸ *ibid.* section 34(1)(b, c, e).

protection and quality for consumers, the NERC relatively promotes a competitive electricity market.²⁸⁹ In furtherance of this, the NERC makes the electricity market rules,²⁹⁰ issue licenses²⁹¹ and penalizes defaulters through sanctions.²⁹²

Apart from issuance of licenses, the Commission has powers to monitor and ensure standard compliance and performances of the licenses in tune with the terms of their respective licenses. In the case of *Petadis Enterprise v HFP Properties Ltd*, NERC tribunal held that the electricity rates must be in line approved by NERC.²⁹³ Additionally, in the case of *Funke Adekoya v Victoria Garden City Management and Maintenance Co. Ltd and Elo Electricity Distribution Company*, the Respondent funded the design, construction and commissioning of a 15MVA (33/11kv) injection sub-station. Under this project, the respondent provided electricity to the residents of the Victoria Garden City Estate. In a challenge filed by the applicant challenging the rates, NERC stated that the Respondent cannot increase the electricity tariffs payable by the residents of VGC Estate, as all the IPPs are under a legal obligation to abide by the NERC approved electricity tariffs or rates.²⁹⁴ This ruling makes it clear that only NERC is obligated with the power to determine the general prices of electricity, and the distribution of models agreed to by distribution companies. The ruling also reestablished the principle of consumer protection and fairness, which are the functions of the NERC.²⁹⁵

The Act further permits the NERC to create platforms that allows it to interface with groups, stakeholders, consumers and licenses alike.²⁹⁶ NERC is also charged to promote the development and utilization of renewable energy services and increase the contribution of

²⁸⁹ *ibid.* section 34(2)(a).

²⁹⁰ *ibid.* section 34(2)(e).

²⁹¹ *ibid.* section 34(2)(d).

²⁹² *ibid.* section 34(2)(f and h).

²⁹³ NERC/10/0011/08.

²⁹⁴ NERC/H/061.

²⁹⁵ Section 34(1)(d) of the *Electricity Act 2023*.

²⁹⁶ *ibid.* section 34(3).

renewable energy in Nigeria's energy mix.²⁹⁷ In line with this, a number of regulations have been passed under NERC's jurisdiction to improve the supply of renewable energy, with an emphasis on encouraging the production and delivery of clean electricity. They include the *Nigerian Electricity Regulation 2012*, the *Mini-grid Regulations 2017*, and the *Renewable Energy Feed-in-Tariff Regulations 2015*.²⁹⁸

3.4.3 National Hydroelectric Power Producing Areas Development Commission

Until recently, the National Hydroelectric Power Producing Areas Development Commission Act governed the National Hydroelectric Power Producing Areas Development Commission (N-HYPPADEC).²⁹⁹ The N-HYPPADEC was established on the basis of the presence of hydroelectric in State of the Federation,³⁰⁰ with the overarching goal of physically developing hydroelectric power projects in Nigeria,³⁰¹ which includes developing policies and programs.³⁰² The Commission creates plans to encourage the physical growth of regions that produce hydroelectric power and calculates the cost of putting those plans into action.³⁰³ In addition to advising the federal and state governments on flood prevention and control, they address ecological issues brought on by dam overloading in regions that produce hydroelectric power.³⁰⁴ In addition, the commission also carries out all federally authorized plans for the growth of hydroelectric power-producing regions and supports states in creating and enforcing laws that guarantee prudent and effective resource management in these regions.³⁰⁵ Without a doubt, the establishment of N-HYPPADEC's is an attempt to establish

²⁹⁷ *ibid.* section 34(1)(i).

²⁹⁸ Peter Onuh *et al*, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23(2) World Journal of Advanced Research and Reviews, 2362.

²⁹⁹ The *Hydroelectric Power Producing Areas Development Commission Act*, 2010 Cap. H5, Laws of the Federation of Nigeria, 2004.

³⁰⁰ Section 82(2) of the *Electricity Act* 2023.\

³⁰¹ *ibid.* section 89(1)(a-h).

³⁰² *ibid.* section 86(a and b).

³⁰³ *ibid.* section 89(1)(d).

³⁰⁴ *ibid.* section 89(1)(h).

³⁰⁵ *ibid.* section 89(1)(f).

an institutional framework that governs the operations of hydroelectric projects and investments made by the corporations that generate hydroelectric power in different host communities.³⁰⁶

The previous HEPADC Act was faulted for concentrating just on areas where hydroelectric power generation was present.³⁰⁷ Unfortunately, by preventing a broader inclusion of other States, the *Electricity Act* has perpetuated the same pattern.³⁰⁸ Therefore, hydroelectric development would cannot exist in states with little or no water. For a country that is in dire need of energy security, this is a completely incorrect strategy for energy development. This trend has led to the decline of hydroelectric generation, as many generation companies (GenCos) are shifting towards gas, wind, solar, and other renewable alternatives.³⁰⁹

3.4.4 Rural Electrification Agency

The Rural Electrification Agency (REA) is established by the *Electricity Act* 2023, functioning as a body corporate with perpetual succession.³¹⁰ It encompasses various objectives, as outlined in the Act. The Agency is tasked with making sure that rural, unserved, and underserved electrification services are delivered effectively, affordably, and at performance criteria that logically satisfy the agricultural, industrial, and social needs of rural areas.³¹¹ The REA is tasked with providing framework to support the development and utilization of renewable energy sources and an enabling environment to attract investment for rural communities.³¹²

³⁰⁶ Yemi Oke, *Nigerian Electricity Law and Regulation* (Law Lords Publications, 2013) 21.

³⁰⁷ *ibid.* 22.

³⁰⁸ Section 84(1)(b), (3) of the *Electricity Act* 2023.

³⁰⁹ CJP Ogugbara, 'Critical Evaluation of the Institutional Regulatory Frameworks for Electricity Regulation and Investments in Nigeria' (2024) 20(1) UNIZIK Law Journal, 30.

³¹⁰ Section 127 of the *Electricity Act* 2023.

³¹¹ *ibid.* section 128(b).

³¹² *ibid.* section 128(f)(i-vi).

It further promotes the productive use of renewable energy, diversification of supplies to safeguard energy sources, improved access to electricity through various rural electrification and renewable energy technologies.³¹³ Additionally, the agency is tasked with public education initiatives for rural electrification and renewable energy production and consumption, as well as the deployment of bio-energy technology for rural electrification.³¹⁴ Recently, the Federal Government of Nigeria officially introduced the NEXTGEN RESCO Programme, aimed at empowering 60 young Nigerians in the renewable energy sector.³¹⁵ This initiative is being carried out in collaboration with the Rural Electrification Agency (REA), the National Power Training Institute of Nigeria (NAPTIN), and the Ecological Innovation Empowerment Initiative (EIEI).³¹⁶ According to the REA, the programme is designed to cultivate a new generation of skilled professionals who will drive the development and sustainability of Nigeria's renewable energy industry.³¹⁷

3.4.5 Nigerian Electricity Management Services Agency

The Nigerian Electricity Management Services Agency (NEMSA) was previously regulated by the *Nigerian Electricity Management Services Agency (NEMSA) Act, 2015*,³¹⁸ which has been repealed by the Electricity Act of 2023 and incorporated into the provisions of the Act.³¹⁹ The Agency is the technical warehouse of the NESI.³²⁰ It was primarily set up to manage technical and engineering standards regulation of the NESI for safety and consumer

³¹³ *ibid.*

³¹⁴ *ibid.*

³¹⁵ Rosalia Ozibo, 'FG launches NEXTGEN RESCO Programme to empower Nigerian Youths in renewable energy' (Nairametrics, 24 January 2025) <<https://nairametrics.com/2025/01/24/fg-launches-nextgen-resco-programme-to-empower-nigerian-youths-in-renewable-energy/>> accessed 2 February 2025.

³¹⁶ *ibid.*

³¹⁷ Rural Electrification Agency <<https://rea.gov.ng/federal-government-set-empower-60-outstanding-young-nigerians-rea-naptin-eiei-launches-nextgen-resco-programme/>> accessed 3 February 2025.

³¹⁸ CJP Ogugbara, 'Critical Evaluation of the Institutional Regulatory Frameworks for Electricity Regulation and Investments in Nigeria' (2024) 20(1) UNIZIK Law Journal, 30.

³¹⁹ Section 172 of the *Electricity Act 2023*.

³²⁰ *ibid.* section 176(a).

satisfaction.³²¹ It was set up as the police or taskforce that monitors compliance with technical standards issued by NERC.³²² This particular function places the Agency as a subordinate of the NERC.³²³ The Agency conducts electrical inspectorate services in the NESI.³²⁴ Knowing the umpteenth move of technology and development, the Act creates the linkage between the Agency and the Standard Organization of Nigeria (SON).³²⁵ Basically, the SON ensures compliance with standards for electrical installations targets that falls within the frontline its regulatory boundaries,³²⁶ while the NEMSA would be for electrical installation targets that are outside the reach of SON.³²⁷ It is also the responsibility of the NEMSA to ensure standard in the qualities of the Meters installed for end-user; Customers and Consumers.³²⁸

3.4.6 Energy Commission of Nigeria

The Energy Commission of Nigeria (ECN) was established by the *Energy Commission Act* No. 62 of 1979, which was later amended the *Energy Commission Act* No. 32 of 1988 and Act No. 19 of 1989,³²⁹ with the statutory mandate for the strategic planning and co-ordination of national policies in the field of Energy in all its ramifications.³³⁰ By the Mandate, the ECN is the apex government organ empowered to carry out overall energy sector planning and policy implementation,³³¹ promote the diversification of the energy resources through the development and optimal utilization of all, including the introduction of new and alternative energy resources like solar, wind, biomass and nuclear energy.³³² This is achieved through inquiring into and advising the government of the federation or the state on adequate funding

³²¹ *ibid.*

³²² *ibid.* section 176(b).

³²³ CJP Ogugbara, 'Critical Evaluation of the Institutional Regulatory Frameworks for Electricity Regulation and Investments in Nigeria' (2024) 20(1) UNIZIK Law Journal, 30.

³²⁴ *ibid.* section 176(a).

³²⁵ *ibid.* section 176(c).

³²⁶ *ibid.*

³²⁷ *ibid.* section 176(e-f).

³²⁸ *ibid.* section 176(g-n).

³²⁹ Energy Commission of Nigeria < <https://energy.gov.ng/> accessed 31 January 2025.

³³⁰ Section 1 of the *Energy Commission Act* No. 62 1979, Cap E10, Laws of the Federation, 2004.

³³¹ *ibid.* section 5.

³³² *ibid.* section 5(a-k).

of the energy sector, including research and development, production, and distribution, and also monitoring the performance of the energy sector in the execution of government policies on energy.³³³ Energy Commission of Nigeria also serves as a center for gathering and disseminating information relating to national policy in the field of energy.³³⁴

3.4.7 Transmission Company of Nigeria

The Transmission Company of Nigeria (TCN) was established from the defunct National Electric Power Authority (NEPA) as a product of the merger of the Transmission and Operations sectors on April 1, 2004.³³⁵ TCN was incorporated in November 2005.³³⁶ Being one of the 18 unbundled Business Units under the Power Holding Company of Nigeria (PHCN), TCN was issued a transmission License on 1st July, 2006.³³⁷ It was subsequently issued two licences on June 10, 2013 for electricity transmission and system operations.³³⁸ The TCN manages the electricity transmission network in the country, and presently fully owned and operated by the government and as part of the reform programme of the government, which is to be reorganized and restructured to improve its reliability and expand its capacity.³³⁹ TCN's major licensed activities include: electricity transmission, system operation and electricity trading.³⁴⁰ It is responsible for evacuating electric power generated by the electricity generating companies (GenCos) and wheeling it to distribution companies (DisCos).³⁴¹ It provides the vital transmission infrastructure between the GenCos and the DisCos' Feeder Sub-stations.³⁴²

³³³ *ibid.*

³³⁴ *ibid.*

³³⁵ Transmission Company of Nigeria <https://tcn.org.ng/page_about_us.php> accessed 31 January 2025.

³³⁶ *ibid.*

³³⁷ *ibid.*

³³⁸ *ibid.*

³³⁹ Transmission Company of Nigeria: 'About Transmission Company of Nigeria' <https://tcn.org.ng/page_history> accessed 31 January 2025.

³⁴⁰ *ibid.*

³⁴¹ *ibid.*

³⁴² *ibid.*

From the analysis of the legal and institutional framework governing energy production in Nigeria, it is clear that the country's dependence on fossil fuels significantly contributes to environmental pollution and climate change. Nigeria has implemented a number of laws and regulations to include renewable energy into its energy mix, but the process is still slow and mostly unsuccessful because of poor enforcement, insufficient incentives, and infrastructure issues. The next chapter examines selected jurisdictions that have effectively made the transition from fossil fuels to renewable energy, emphasizing the important laws, regulations, and strategic plans that made this possible. Nigeria can create an effective and enforceable legal framework that encourages the use of renewable energy by learning from these jurisdictions.

Chapter 4

Developments in the Law of Selected Jurisdictions that Facilitated Transition from Fossil Fuels to Renewable Energy

The urgent need for reducing environmental pollution, tackling climate change, and addressing our energy security has led to a global transition from fossil fuels to renewable energy sources. For many it is not an eventuality, but a necessity. It has almost universally been accepted that we are facing climate disruption, manifested in rising temperatures, extreme weather, loss of biodiversity, and ecosystem collapse, yet climate action is yet to be widely adopted.¹ At the same time, the instability of fossil fuel markets and geopolitical battles over energy sources have proven the limitations and disadvantages of relying on finite external resources, that is, fossil fuels imported from other countries rather than produced domestically.² Governments from around the world are taking up solar, wind, hydro, and geothermal renewable energy sources, not only to address environmentally-negative impacts but also as a choice for economic resilience and energy independence.³

An increasing number of jurisdictions have taken the helm of this transition, showing that a large-scale transition to renewable energy can be achieved and can prove beneficial to people and businesses. Countries like Sweden, Denmark, and Norway, make the case for the potential gain from strong policy-based frameworks supported by technology and public acceptance. Some countries in Africa including Kenya and South Africa have also recorded positive strides. Developments in the law which facilitated the transition from fossil fuels to

¹ Rusell Taylor, 'Biodiversity Loss and Climate Change: Interdependent Global Challenges' (House of Lords Library, 9 January, 2025) <<https://lordslibrary.parliament.uk/biodiversity-loss-and-climate-change-interdependent-global-challenges/>> 19 April 2025.

² OJ Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector amidst Fossil Fuel Disruptions and Low-carbon Transition' (2023) 9 Heliyon, 2.

³ V Dirma *et al*, 'The Impact of Renewable Energy on Economic Growth' (2024) 17 Journal of Energies, 2.

renewable energy sources in the countries are discussed in this chapter with a view to seeing the possibility of Nigeria learning from their experiences.

For instance, and pending a detailed examination in this chapter, Sweden has taken advantage of its tremendous abundance of hydropower, and also developed one of the most effective carbon pricing mechanisms in the world which has substantially reduced its reliance on fossil fuels overall.⁴ Similarly, Denmark, a world leader in wind energy, is producing more than 50% of the electricity from wind and has involved the public through community, private, and government incentives.⁵ Other countries, like Norway despite having large oil reserves has transitioned to primarily renewable electricity. Norway has incentivized electric vehicles through a series of subsidies plus land development.⁶ These countries have set the standard for other jurisdictions while reducing environmental, social, and political issues plus transitioning to sustainable transportation.

In Africa, Kenya and South Africa, have made appreciable efforts in becoming highly invested in renewable energy. Kenya has tapped into its geothermal potential with projects like the Olkaria plant, which provides a significant share of the country's electricity, and the Lake Turkana Wind Power Project has become one of the largest wind farms on the continent.⁷ These renewables not only generated energy and increased electricity access, but reduced the reliance on fossil fuels generated electricity, thereby reducing pollution in the

⁴ IEA, Energy System of Sweden < <https://www.iea.org/countries/sweden> > accessed 19 April 2025. See also Ou Tang *et al*, 'Hydrogen Production in the Swedish Power Sector: Considering Operational Volatilities and Long-term Uncertainties' (2021) 148 Energy Policy, 1.

⁵ Julia le Maitre, 'Price or Public Participation? Community Benefits for Onshore Wind in Ireland, Denmark, Germany and the United Kingdom' (2024) 114 Energy Research & Social Science, 7.

⁶ DNV – Energy Transition Outlook Norway 2024
<<https://www.norskindustri.no/siteassets/dokumenter/rapporter-og-brosjyrer/energy-transition-norway/energy-transition-norway-2024.pdf>> accessed 19 April 2025.

⁷ Xavier Shioya Musonye, 'The Role of Geothermal in Energy Mix: Kenya's Case Study' (2022) Presentation for a Short Course VI on Exploration for Geothermal Resources, 1. See also Kenya's Menengai Geothermal Project to Half a Million Homes with Clean Energy (African Development Bank Group, 15 October, 2024) <<https://www.afdb.org/en/success-stories/kenyas-menengai-geothermal-project-power-half-million-homes-clean-energy-74832#:~:text=It's%20also%20part%20of%20Kenya's,Menengai%20power%20plant%20in%20Kenya.>>> accessed 19 April 2025.

short run, and costs, in the long run. Furthermore, although South Africa had built itself as a coal-based energy provider over the years, the country has taken major strides in renewable energy through its Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) which has attracted significant investment in private solar and wind energy, adding more diversity to the energy mix and creating green job opportunities.⁸

The thrust of this chapter is to examine the legislative frameworks, policies, and strategies, that allowed these jurisdictions to be successful in their energy transitions. Legislative initiatives such as renewable energy mandates and feed-in tariffs, financial incentives such as tax breaks and green bonds, and investments in grid upgrades and energy storage to maintain reliability are all crucial, but so too are the sociopolitical dimensions of the project, such as community outreach, worker retraining initiatives, and public education campaigns, have facilitated a broad base of social acceptance of renewable energy. By considering these jurisdictions, this chapter has the potential to highlight experiences that could assist other countries, especially Nigeria, to make a transition from fossil fuels to renewable energy sources, and thereby benefit from the economic and environmental advantages attendant to such transition. Ultimately, the experiences of these leading countries convey a central theme, which is that transition to renewable energy is not merely an environmental consideration, but a critical opportunity to undertake a deliberative transition to sustainable growth, energy security, and lasting prosperity. A consideration of the legal framework in the named jurisdictions is undertaken in this chapter, starting with Sweden in the next part.

4.1 Sweden

⁸ Jonathan Hanto *et al*, 'South Africa's Energy Transition – Unraveling its Political Economy' (2022) 69 *Energy for Sustainable Development*, 164. See also Koketso Mamabolo, *Ushering in a Just Transition: Hope for the Future of Renewable Energy* (The Future of Sustainability, 29 February, 2024) <<https://futureofsustainability.co.za/ushering-in-a-just-transition-hope-for-the-future-of-renewable-energy/>> accessed 19 April 2025.

In the past century, the energy scene in Sweden has changed dramatically, going from a near complete reliance on fossil fuels to an example of how to integrate and use renewable energy in an energy portfolio.⁹ Given Sweden's abundance in forests, woody biomass was the most commonly used fuel throughout the 19th century.¹⁰ Like many industrialized nations, Sweden relied heavily on coal, and oil to power the economy, enable industrialization, and meet domestic energy requirements as economic growth resulted in increasing energy consumption.¹¹ Even with this dependence, along with the true challenges of fossil fuel dependence, such as the unpredictable impact of oil price changes, climate degradation due to fossil fuel carbon, there was a growing national awareness of the limitations of fossil fuel determining the Swedish energy landscape.¹² However, with greater demands on energy supply from the Industrial Revolution, Sweden started to employ major river systems for electricity energy demands. The earliest hydroelectric systems, developed in the 1880s and '90s, became a foundation for establishing Sweden's renewable energy system.¹³

As Sweden continued its journey of industrialization, its energy needs burgeoned and fossil fuels, particularly coal and oil, became fundamental to satisfy the expanding demand for energy in industry and urbanized areas.¹⁴ By the early 1900s coal became the dominant fuel used for production, railroads, and heating, with oil gaining acceptance as modern vehicles and shipping expanded. Sweden had limited fossil fuel resources, and progressively became reliant on imports, leaving the Swedish economy open to volatile changes in global

⁹ Michel Cruciani, 'The Energy Transition in Sweden' (2016) Centre for Energy, 4.

¹⁰ Anuj Kumar *et al*, 'Forest Biomass Availability and Utilization Potential in Sweden' (2021) 12 Water and Biomass Valorization, 66.

¹¹ *ibid*.

¹² Diego Puyo *et al*, 'Key Challenges Faced by Fossil Fuel Exporters during the Energy Transition' (2024) 001 IMF Staff Climate Notes 2. See also Sikandar Qadir *et al*, 'Incentives and Strategies for Financing the Renewable Energy Transition: A Review' (2021) 7 Energy Reports, 3591.

¹³ Milestone in Sweden's Sustainable Energy Development < https://www.business-sweden.com/4976f2/globalassets/insights/reports/invest/si_ip_energy_overview.pdf > accesses 20 April 2025.

¹⁴ Magnus Lindmark and Fredrik Spjut, 'From Organic to Fossil in-between: New Estimates of Energy Consumption in the Swedish Manufacturing Industry during 1800-1913' (2017) 66(2) Scandinavian Economic History Review, 2.

commodity markets. The newfound reliance on fossil fuel imports increased following the World War II, as urbanization and industrialization expanded energy use. In the post-war economic environment, oil overtook coal to become Sweden's primary energy source, with over 70% of energy consumption being supplied by oil by the 1960's.¹⁵

The oil embargo in the form of an oil crisis during 1973 and the energy crisis in 1979 were transformative events for Sweden. As global oil prices shot through the roof and supply chains suffered, Sweden was forced, like many industrialized countries, to deal with an economic shrivel which exposed the perils of dependency on fossil fuels and forced countrywide review of energy policy. The government quickly introduced measures to limit oil usage, including fuel rationing, speed limits and a public campaign encouraging energy conservation.¹⁶

More importantly, Sweden began actively diversifying its energy. Again, nuclear power emerged as a viable alternative and the government launched a nuclear program to build 12 reactors from the 1970s to the 1980s.¹⁷ By the mid-1980s, nuclear energy provided almost half of electricity consumption in Sweden that saved considerable oil usage in electricity production. While nuclear power was conflicted, ultimately, it led to referendum in 1980 where it was decided to shut down at least the new nuclear investment (the government allowed to operate existing plants well beyond their natural life), but it did lead to a renewed social conscience and a radical change in government direction.¹⁸

¹⁵ *ibid.*

¹⁶ Noraini Zulkifli and Daniel Haqem, 'The Opec Oil Shock Crisis (1973): An Analysis' (2022) 4(1) Asian Journal of Research in Business Management, 136. See also Ariane Millot, Anna Krook-Riekkola and Nadia Maizi, 'Guiding the Future Energy Transition to Net-zero Emissions: Lessons from Exploring the Differences between France and Sweden' (2020) Elsevier, 1. Ken Koyama, 'What the World Should Learn from the Oil Crisis 50 Years Ago? Overview' (2023) IEEJ, 1. Frederic Pearson and Michael Nyden, 'Welfare States and Energy Crisis Sweden and the Netherlands, 1973-74' (1980) UMSL Global, 1. USA Office of the Historian: Oil Embargo, 1973-1974 <<https://history.state.gov/milestones/1969-1976/oil-embargo>> accessed 20 April 2025.

¹⁷ Nuclear Power in Sweden <<https://world-nuclear.org/information-library/country-profiles/countries-o-s/sweden>> accessed 20 April 2025.

¹⁸ *ibid.*

By the early 1990s, climate change was globally recognized, and Sweden, with its strong pro-environment culture, responded swiftly. In 1991, Sweden introduced the world's first carbon tax, marking a groundbreaking shift in energy policy that increased fossil fuel costs and incentivized clean energy alternatives. This was followed by substantial investments in renewable energy, particularly wind and bioenergy, built upon Sweden's existing hydropower foundation and supported by its sustainable forestry sector.¹⁹

In the early 2000s, Sweden advanced its renewable energy transition through key measures like green certificates, market-based subsidies for renewable producers, and stricter emissions standards for all energy sources.²⁰ Wind energy rapidly expanded to supply nearly 20% of national electricity, while district heating systems, used by over 90% of apartment buildings, were largely fossil-free due to widespread bioenergy use.²¹

Sweden's energy evolution reflects a pragmatic, stepwise approach, from biomass to coal, oil, nuclear, and finally to wind, hydro, and bioenergy. The country now sources over 60% of its energy from renewables and aims for 100% renewable electricity by 2040, phasing out fossil fuels and nuclear energy entirely.²² This transformation was underpinned by strong political consensus across all parties on climate action, energy efficiency, and innovation. Public support for environmental protection further strengthened national resolve.²³ Ultimately, Sweden's energy transition is a result of several factors: historical awareness, political unity,

¹⁹ Samuel Jonsson, Anders Ydstedt and Elke Asen, 'Looking Back on 30 Years of Carbon Taxes in Sweden' (2020) Tax Foundation Fiscal Fact No. 727, 2.

²⁰ Michel Cruciani, 'The Energy Transition in Sweden' (2016) Centre for Energy, 4.

²¹ Bengt Johansson, 'Energy Governance in Sweden' (2021). In: M Knodt and J Kemmerzell (eds) Handbook of Energy Governance in Europe, 3.

²² IEA Bioenergy, Implementation of Bioenergy in Sweden – 2024 Update <https://www.ieabioenergy.com/wp-content/uploads/2024/12/CountryReport2024_Sweden_final.pdf> accessed 7 July 2025.

²³ Sweden Sverige, 'Swedes Use a Lot of Energy, Yet Emissions are Low. The Key? Renewable Energy' <<https://sweden.se/climate/sustainability/energy-use-in-sweden>> accessed 7 July 2025.

environmental values, and progressive legislation, which makes it stand as a global model for sustainable energy development.²⁴

4.1.1 Legal Framework Regulating Energy in Sweden

4.1.1.1 Carbon Dioxide Tax Act 1990

The *Carbon Dioxide Tax Act*, enacted in 1990 and which became operative in 1991, was a landmark environmental fiscal legislation, enacted to reduce carbon dioxide (CO₂).²⁵ Although it was repealed,²⁶ its structure and underlying objectives laid the foundation for Sweden's aggressive decarbonization strategy, which includes the promotion of renewable energy into Sweden's energy mix.

The primary objective of the *Carbon Dioxide Tax Act* was to internalize the environmental cost of fossil fuel consumption, by levying taxes proportionate to the carbon content of various fuels such as coal, heating oils, natural gas and liquefied petroleum gas (LPG), recognizing them as carbon emitting fuels.²⁷ In essence, the *Carbon Dioxide Tax Act* aimed to create economic disincentives for carbon-intensive energy sources and encourage cleaner energy alternatives.²⁸ In other words, by making fossil fuels more costly, these taxes were observed to provide economic incentives for industries and consumers to adopt non-carbon or low-carbon energy sources.

The aim of facilitating greater opportunities for cleaner energy alternatives was also closely linked to the objectives of the *Carbon Dioxide Tax Act*, as it made a clear distinction between conventional fossil fuels and renewable biofuels, where it specifies that any part of the mixture that is made from vegetable or animal fats and oils or methyl/ethyl esters of such fats

²⁴ Energy Use in Sweden < <https://sweden.se/climate/sustainability/energy-use-in-sweden> > accessed 20 April 2025.

²⁵ *Carbon Dioxide Tax Act* (Act 1990:582 on Carbon Dioxide) 1990.

²⁶ *Carbon Dioxide Tax Act* (SFS 1994:1776) 1995.

²⁷ Annex to the *Carbon Dioxide Tax Act* (1990:582 on Carbon Dioxide) 1990.

²⁸ Section 1 of the *Carbon Tax Act*, (Act 1990:582 on Carbon Dioxide) 1990.

and oils would be exempt from being taxed.²⁹ This partial exemption was said to create a financial advantage for fuel producers and users who integrated renewable materials into their energy mix, which therefore, aligns with Sweden's long-term energy transition strategy by stimulating the development of biofuel markets, especially from forestry and agricultural residue sectors where Sweden has natural advantages.

Moreso, the *Carbon Dioxide Tax Act* established a mechanism to refund or compensate entities that had already paid CO₂ tax but successfully reduced emissions during fuel combustion. Both tax-paying producers and third parties, for example, energy service companies, were eligible for refunds in proportion to the CO₂ emissions avoided.³⁰ This provision effectively encouraged innovation and investments in carbon capture and storage (CCS) technologies, high-efficiency combustion systems, fuel transitioning to renewable energy sources, and it opened the door for performance-based incentives, aligning carbon taxation with real-world emission outcomes.

The *Carbon Dioxide Tax Act* recognized that certain industrial activities might require time to adjust. For instance, greenhouse heating in professional horticulture received a delay in full tax implementation until 1996, acknowledging the time needed to transition toward cleaner energy.³¹ With respect to this, the *Carbon Dioxide Tax Act* limited refunds to only 75% of tax, thereby discouraging long-term dependence on fossil fuels and indirectly promoting investment in renewable energy systems, such as biomass-based district heating, which Sweden has widely adopted.³²

²⁹ *ibid.* section 2.

³⁰ *ibid.* section 4.

³¹ *ibid.* section 3.

³² *ibid.*

The rapid growth of biomass, particularly in district heating systems, was one of the tax's most notable effects.³³ Prior to the carbon tax, imported oil dominated Sweden's heating sector, making the country susceptible to oil price fluctuations. However, as a result of the tax, biofuels which are manufactured from agricultural waste, forestry wastes, and even municipal trash, were significantly less expensive than fossil fuels.³⁴

In addition, district heating systems underwent a revolution, with towns switching from oil boilers to bioenergy facilities.³⁵ Thereafter, Sweden converted coal and oil-based heating systems with biomass-powered facilities by utilizing its ample forest resources.³⁶ Study shows that over 90% of the cities' heating demands are currently met by the combined heat and power (CHP) plant, which mostly uses wood pellets and forest residue, and by generating demand for biomass, this changes not only decreased emissions but also boosted local economies.³⁷

A notable example of the transformation in energy profile is evident in cities like Linköping and Uppsala where biogas was to replace fossil fuel in their public transportation system. Linköping established a biogas plant to produce biogas as a fuel from organic waste and livestock manure to supply biogas for the entire city bus fleet.³⁸ The initiative is a prime example of the enforcement mechanisms of the *Carbon Dioxide Tax Act* working together to provide both an economic feasibility for avoiding fossil fuels and generating revenue to pay for a renewable alternative. In addition, fossil fuels were no longer competitive due to the

³³ Cecilia Higa, Marcelo Cunha and Semida Silveira, 'Coalitions Towards the Carbon Tax in the Swedish Heating Sector' (2020) 12(20) Sustainability, 1.

³⁴ *ibid.*

³⁵ Karin Ericsson and Sven Werner, 'The Introduction and Expansion of Biomass Use in Swedish District' (2016) 94 Biomass and Energy, 57.

³⁶ *ibid.*

³⁷ Johanna Beiron, Fredrik Normann and Filip Johnsson, 'Carbon Capture from Combined Heat and Power Plants – Impact on the Supply and Cost of Electricity and District Heating in Cities' (2023) 129 International Journal of Greenhouse Gas Control, 1.

³⁸ IEA Bioenergy Task 37: 100% Biogas for Urban Transport in Linköping, Sweden (Biogas in Buses, Cars and Trains) <https://www.iea-biogas.net/_download/linkoping_final.pdf> accessed 20 April 2025. See also Ulrik Svedin, 'From Waste to Wealth with Biogas' (Linköping University, 29 April, 2024) <<https://liu.se/en/news-item/de-ville-se-hur-sopor-kan-bli-biogas>> accessed 20 April 2025.

carbon tax as Sweden's state-owned forestry firm, Sveaskog, increased the production of wood pellets and biofuel. Moreso, black liquor, a byproduct of paper creation, is now used to create power in pulp mills that once burned coal, converting waste into a useful energy source.³⁹

Furthermore, throughout the energy supply chain, the *Carbon Dioxide Tax Act* was a potent market signal that influenced decisions about energy investment. The law's most remarkable result was also the rise in wind energy in Sweden, which was essentially non-existent in the early 1990s but is currently one of the key foundations of the country's energy generation mix.⁴⁰ In this sense, the carbon tax increased the cost of energy generated from fossil fuels, making clean energy, and renewable energy solutions more competitive, and a strong economic justification for the expansion of wind energy was made possible by the introduction of green certificates, a supplementary subsidy mechanism for renewable electricity.⁴¹

As a result, the capacity of wind energy grew from nothing in the 1990s and currently generates more than 20% of Sweden's electricity, a significant increase from its previous proportion. A steady and predictable carbon pricing regime that guaranteed investors long-term profits on renewable projects was the actual cause of this expansion, not an accident. The Markbygden Wind Farm in northern Sweden is a perfect illustration of this change. With 1,101 turbines dispersed across a huge area in Norrbotten County, this project is the largest onshore wind farm in Europe. Every year, it produces around 8 terawatt-hours (TWh) of

³⁹ Svebio – Swedish Bioenergy Association: How Restrictions on “Primary Woody Biomass” will Impact Swedish Energy and Climate Development (2022) 3 <<https://www.svebio.se/wp-content/uploads/2022/11/Primary-woody-biomass-impact-assessment.pdf>> accessed 20 April 2025.

⁴⁰ The Carbon Tax in Sweden: Fact Sheet (2018) European Climate Initiative <<https://www.euki.de/wp-content/uploads/2018/09/fact-sheet-carbontax-se.pdf>> accessed 20 April 2025.

⁴¹ *Carbon Dioxide Tax Act* (Act 1990:582 on Carbon Dioxide) 1990. See also Julius Anderson, ‘Carbon Taxes and CO2 Emissions: Sweden as a Case Study’ (2019) 11(4) American Economic Journal Economic Policy, 2.

electricity, which is sufficient to power more than 400,000 houses in Sweden.⁴² The carbon tax increased the operating expenses of fossil fuel-based energy generation, making wind energy a more cost-effective alternative, which made the Markbygden project commercially viable. The Swedish government's steadfast commitment to carbon pricing gave investors' confidence that renewable energy sources will continue to be favoured, ensuring the long-term profitability and feasibility of major projects like Markbygden.⁴³

In addition, offshore wind also became more popular as a result of the carbon tax. The Kriegers Flak offshore wind farm, located in the Baltic Sea and jointly developed by Sweden and Denmark, is a testament to how national carbon pricing policies can have regional ripple effects.⁴⁴ In the sense that, offshore wind projects, which often have greater upfront costs, were able to successfully compete in the energy market as a result of the tax's influence on the cost of fossil fuels generated electricity. Sweden's carbon tax scheme greatly hastened Kriegers Flak's construction timeframe, reducing financial risks and increasing the project's appeal to partners in the public and commercial sectors.⁴⁵

Simultaneously, the carbon tax promoted advancements in Sweden's hydropower industry, which was already well established prior to 1990. Even though Sweden did not need to construct many new hydropower plants, the tax made it economically justifiable to modernize and upgrade existing infrastructure.⁴⁶ An important illustration of this may be seen along the Lule River, where a number of hydropower plants were modified to increase production and

⁴² Markbygden Onshore Wind Farm (Green Investment Group, 1 December, 2017) <<https://www.greeninvestmentgroup.com/en/projects-and-perspectives/markbygden-onshore-wind-farm.html>> accessed 20 April 2025.

⁴³ Wind Farm Management Engineering Wind: Challenges amid Progress – Markbygden 1101 Wind Farm in a Restructuring Phase (Wind News, 30 November, 2023).

⁴⁴ Kriegers Flak – The Largest Offshore Wind Farm in the Baltic Sea <<https://www.en.kefm.dk/media/8690/factsheet-kriegers-flak.pdf>> accessed 20 April 2025.

⁴⁵ Kriegers Flak Offshore Wind Farm, Denmark <<https://www.power-technology.com/projects/kriegers-flak-offshore-wind-farm/>> accessed 20 April 2025.

⁴⁶ Stanislav Shmelev and Stefan Speck, 'Green Fiscal Reform in Sweden: Econometric Assessment of the Carbon and Energy Taxation Scheme' (2018) 90(3) *Renewable and Sustainable Energy Reviews*, 973.

efficiency without creating more environmental disturbance.⁴⁷ The carbon tax's reasoning for these improvements was that it made financial sense to extract more clean energy from the current renewable infrastructure if the cost of producing electricity from fossil fuels increased.⁴⁸

Currently, hydropower accounts for approximately 45% of Sweden's electricity supply, providing the steady base load for the country's electricity system.⁴⁹ This reliability is crucial, especially given the intermittency of wind energy.⁵⁰ Study shows that hydropower, coupled with upgraded electricity grid systems, has enabled Sweden to successfully harness variable renewable energy sources, such as wind and solar energy, in order to ensure a reliable electricity supply for the entire country.⁵¹

In short, the *Carbon Dioxide Tax Act* set in motion a complex evolution of Sweden's energy renewable system. It did not just penalize pollution, it rewrites Sweden's energy economy, making renewable energy sources the default choice of energy generation.⁵² Through a structure of economic incentives to render fossil fuels relatively less attractive that created processes and possibilities for investment in wind and hydropower, examples such as the Markbygden Wind Farm, the Kriegers Flak offshore project, and the upgrades to the hydropower stations on the Lule River are not just illustrative of technology having positive ramifications for carbon pricing, but more broadly, how smart, predictable carbon pricing can help transform a country's energy future into one that is predominantly reliant on renewable

⁴⁷ Kristina Ek *et al*, 'Challenges in Swedish Hydropower – Politics, Economics and Rights' (2017) 3 Research Ideas and Outcomes, 7.

⁴⁸ Samuel Jonsson, Anders Ydstedt and Elke Asen, 'Looking Back on 30 Years of Carbon Taxes in Sweden' (2020) Tax Foundation Fiscal Fact No. 727, 3.

⁴⁹ Uniper Energy – Sweden: Facts about Hydropower <<https://www.uniper.energy/sweden/about-uniper-sweden/advantages-hydropower/facts-about-hydropower>> accessed 22 April 2025.

⁵⁰ *ibid*.

⁵¹ Jin Zhong, Math Bolen and Sarah Ronnberg, 'Towards 100% Renewable Energy Electricity Generation in Sweden' (2021) 171 Renewable Energy, 812.

⁵² Government Offices of Sweden – Sweden's Carbon Tax <<https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>> accessed 21 April 2025.

energy sources. Since the tax eliminated the economic benefit of fossil fuels and replaced it with a booming market for wind, bioenergy, and hydropower, Sweden is now able to produce more than 60% of its energy from renewable sources.⁵³

Although the *Carbon Dioxide Tax Act* underwent major reforms, notably with the launch of the European Union (EU) Emission Trading Scheme (ETS) in 2005, which took over emissions regulation in certain sectors, and moved large emitters into the European carbon market, while Sweden retained its carbon tax for non-ETS sectors such as transport and heating. Over time, rates were increased and exemptions reduced, and today the regime, that is, taxing most fossil-fuel emissions outside the ETS at one of the world's highest rates remains a cornerstone of Sweden's climate policy.⁵⁴

The key objectives such as pricing carbon to reflect environmental costs, exempting or reducing taxes on renewable components, providing performance-based refunds, and promoting fuel switching and innovation, all played vital roles in making renewable energy economically competitive, even in the early 1990s.⁵⁵ As a result, Sweden rapidly accelerated the integration of bioenergy, hydropower, and wind into its national energy mix, a path it continues to lead globally.

4.1.1.2 Environmental Code 1998

The *Environmental Code* (Miljöbalken) was issued in 1998 by the Swedish Ministry of the Environment and Energy, and came into force in 1999.⁵⁶ The *Environmental Code* is referred to as the most extensive environmental legislation which unifies and harmonizes fifteen laws

⁵³ IEA Bioenergy Country Reports, Implementation of Bioenergy in Sweden – 2024 Update, 1.

⁵⁴ The Carbon Tax in Sweden Fact Sheet <<https://www.euki.de/wp-content/uploads/2018/09/fact-sheet-carbontax-se.pdf>> accessed 21 April 2025.

⁵⁵ *ibid.*

⁵⁶ Preface, Swedish Environmental Code (1998:808)

<<https://www.government.se/contentassets/be5e4d4ebdb4499f8d6365720ae68724/the-swedish-environmental-code-ds-200061/>> 19 April, 2025.

into a single legal framework.⁵⁷ The *Environmental Code* lays out the basic environmental standards that regulate almost every aspect of Swedish society, including the energy industry, and is based on the idea of sustainable development. Water operations, chemical use, environmental impact assessments, general provisions, ecologically hazardous activities, and nature protection are all included in the 33 chapters that make up the *Environmental Code*.

By promoting sustainable development, the main objective of the *Environmental Code* is to “safeguard the environment for present and future generations”.⁵⁸ It acknowledges the inherent worth of nature and strikes a balance between responsible management and human resource utilization. The *Environmental Code* mandates the protection of the environment and human health from harm, including pollution or other environmental harm; preservation of important cultural and ecological settings; preservation of biological diversity; management of natural resources, including land and water, to maintain ecological, social, cultural, and economic sustainability over the long run; and the promotion of recycling, reuse, and effective resource management in order to preserve natural cycles.⁵⁹

A significant feature of the *Environmental Code* is the precautionary principle, which mandates all parties adopt protective measures as soon as they have reason to suspect environmental harm, regardless of the level of scientific certainty.⁶⁰ The *Environmental Code* also reinforces the polluter pays principle, which asserts that whoever causes the

⁵⁷ The *Nature Conservation Act* 1964 which protected natural areas and species. The *Environmental Protection Act* 1969 which regulated pollution and industrial emissions. The *Water Act* 1983 managed water resources and pollution control. The *Waste Management Act* 1979 governed waste disposal and recycling. The *Chemical Products Act* 1985 controlled hazardous substances. The *Biotope Protection Act* 1994 safeguarded critical habitats. The *Public Cleansing Act* 1979 addressed litter and sanitation. The *Natural Resources Management Act* 1987 regulated forestry and land use. The *Contaminated Sites Act* 1985 dealt with soil and groundwater pollution. The *Agricultural Land Management Act* 1979 controlled pesticide and fertilizer use. The *Environmental Liability Act* 1986 established liability for environmental damage. The *Genetically Modified Organisms Act* 1994 regulated GMO use. The *Environmental Impact Assessment Act* 1992 required assessments for major projects. The *Environmental Courts Act* 1998 established specialized courts for environmental disputes. The *Environmental Inspection Act* 1998 governed compliance monitoring.

⁵⁸ Chapter 1, Section 1 of the *Environmental Code* (1998:808).

⁵⁹ *ibid.*

⁶⁰ Chapter 2, Section 3 of the *Environmental Code* (1998:808).

environmental damage should be the responsible for the economic costs associated with addressing the damage,⁶¹ which is the cornerstone of Sweden's wider taxation and regulatory framework around fossil fuels. In terms of practical terms, the *Environmental Code* mandates that all significant energy infrastructure projects, for example, power plants, wind farms, and transmission lines, undergo thorough environmental impact assessment.⁶² The environmental permitting process guarantees that only projects that adhere to Sweden's climate and biodiversity objectives are permissible.

By embedding environmental considerations into every legislation/policy implementation level, from civil service to the private sector, the *Environmental Code* serves as a legal foundation for maintaining and legitimizing Sweden's low-carbon energy transition from fossil fuels to renewable energy sources. For example, it requires that all energy projects undergo rigorous environmental impact assessments before they are approved.⁶³ This mechanism has created a regulatory environment where renewable energy projects, especially those with lower environmental footprints, are more likely to receive approval. It has also enabled authorities to impose conditions on fossil-fuel-based projects or to deny them outright when cleaner alternatives are feasible.

One exemplary project that aligns with the goals and enforcement mechanisms of the *Environmental Code* is the Markbygden Wind Farm in Norrbotten County, northern Sweden. This is one of Europe's largest onshore wind power projects and, when fully completed, is expected to produce up to 12 TWh of electricity annually, equivalent to about 8% of Sweden's total electricity consumption.⁶⁴ The environmental approval processes for this project involved extensive public consultations and EIAs in line with the provisions of the

⁶¹ *ibid.* Chapter 2, Section 8.

⁶² *ibid.* chapters 6 and 16.

⁶³ *ibid.* chapter 6

⁶⁴ Hitachi – Markbygden Wind Farm in Sweden <<https://www.hitachienergy.com/latam/es/news-and-events/customer-stories/markbygden-wind-farm-sweden>> accessed 22 April 2025.

Environmental Code, ensuring minimal disruption to ecosystems while maximizing renewable output.⁶⁵

Another illustrative case is the widespread development of bioenergy plants, which has been promoted under the requirements of the *Environmental Code* for waste management and efficient resource use. Facilities such as the Växjö combined heat and power (CHP) plant, which runs on biomass from forestry residues, showcase how Sweden has implemented the principles of the *Environmental Code* to achieve dual objectives, reducing waste and generating renewable heat and electricity.⁶⁶ The facility not only provides heat and electricity to thousands of residents but also complies with emission limits and monitoring protocols as stipulated under the provisions of the *Environmental Code*.⁶⁷ Municipalities are therefore, empowered to incorporate environmental quality objectives and national energy targets into local planning, thus giving room for solar panel installations on public buildings and encouraging private investment in photovoltaic systems.⁶⁸

The enforcement of the *Environmental Code* is carried out by the Environmental Protection Agency (Naturvårdsverket) and regional county administrative boards, which have ensured that legal provisions translate into practical outcomes.⁶⁹ These agencies regularly monitor compliance, assess license applications, and can impose sanctions or require remediation when breaches occur.⁷⁰ Their consistent enforcement has fostered investor confidence and

⁶⁵ Chapter 6 of the *Environmental Code*.

⁶⁶ Shahnaz Amiri and Vlatko Milic, 'Exploring Residential Energy Efficiency Measures and Distribution of Renewable Energy Generation through Sector Interactions: A Case Study in Visby, Sweden' (2024) 11(42) Sustainable Energy Research, 2; Green City: Växjö, Sweden < <https://www.greencitytimes.com/vaxjo/>> accessed 22 April 2025.

⁶⁷ *ibid.*

⁶⁸ Chapter 5 of the *Environmental Code*.

⁶⁹ *ibid.* chapter 3.

⁷⁰ Naturvårdsverket globalt program 2020 – 2024. Swedish Environmental Protection Agency 2020 - 2024 - Swedish Environmental Protection Agency – utvärdering <<https://d-portal.org/savi/?aid=SE-0-SE-6-61050903-6105090303>> accessed 22 April 2025.

ensured that renewable energy projects not only start but also operate within the bounds of environmental sustainability.

Overall, the *Environmental Code* has not only provided a legal structure for the protection of the environment but has also actively shaped the country's energy landscape by incentivizing and legitimizing renewable energy development. Through its robust principles, procedural requirements, and enforcement mechanisms, it has underpinned Sweden's emergence as a global leader in clean energy.

4.1.1.3 Electricity Certificate Act 2011:1200

The *Electricity Certificate Act* represents a carefully crafted legislative framework designed to accelerate the country's transition to renewable energy through market-based mechanisms and long-term planning.⁷¹ At its core, the *Electricity Certificate Act* establishes a system of tradable electricity certificates that incentivizes renewable electricity production while ensuring Sweden meets its determined climate and energy targets.⁷²

One of the primary objectives of the *Electricity Certificate Act* is to significantly increase Sweden's renewable electricity generation capacity, as it sets clear quantitative targets, including financing 15.2 terawatt-hours of new renewable electricity production by 2020 through a joint market with Norway, expanding the certificate system by an additional 18 terawatt-hours by 2030, and fulfilling volume-related obligations through 2045.⁷³ These targets are complemented by a national goal of achieving 30 terawatt-hours of new renewable electricity production by 2020 compared to 2002 levels. By establishing these measurable benchmarks, the *Electricity Certificate Act* provides a structured pathway for Sweden to

⁷¹ Swedish Energy Agency – The Electricity Certificate System < <https://www.energimyndigheten.se/en/sustainability/the-electricity-certificate-system/> > accessed 10 April 2025.

⁷² *ibid.*

⁷³ Section 1 of the *Electricity Certificate Act* 2011:1200.

reduce its reliance on fossil fuels and systematically increase the proportion of renewables in its energy mix.

The innovative market-driven mechanism of the *Electricity Certificate Act* revolves around a quota obligation system.⁷⁴ This system requires electricity suppliers, large-scale consumers, and certain industries to obtain and surrender electricity certificates in proportion to their electricity sales or usage. Renewable energy producers receive one certificate for each megawatt-hour of electricity generated, which they can then sell on the open market.⁷⁵ This creates a financial incentive for renewable energy development while allowing obligated parties flexibility in meeting their requirements through certificate purchases. The market-based approach avoids direct subsidies, instead relying on supply and demand dynamics to drive competition, innovation, and cost efficiency in the renewable energy sector. The tradable nature of certificates further enhances the system's effectiveness by enabling cost-effective compliance and price discovery through market mechanisms.⁷⁶

Recognizing the importance of technological diversity in building a resilient energy system, the *Electricity Certificate Act* includes specific provisions for different renewable energy sources, as it provides precise definitions of eligible technologies, including hydropower, wind power, bioenergy, solar energy, and geothermal energy.⁷⁷ For hydropower, the *Electricity Certificate Act* establishes a particular criteria, limiting certificate eligibility to new plants commissioned after 2002 or existing plants that have undergone significant upgrades.⁷⁸ This prevents over-reliance on Sweden's existing hydroelectric infrastructure while encouraging modernization and capacity expansion. The *Electricity Certificate Act* also accommodates the unique characteristics of wind power development by allowing clustered

⁷⁴ *ibid.* sections 4(1-12).

⁷⁵ *ibid.* section 3(2).

⁷⁶ *ibid.* section 3(3).

⁷⁷ *ibid.* section 2.

⁷⁸ *ibid.* section 2(5-6).

wind farms to register as separate units, simplifying participation in the certificate system.⁷⁹ For bioenergy, the *Electricity Certificate Act* incorporates sustainability requirements for biofuels, ensuring alignment with broader environmental objectives and European Union directives.⁸⁰

A particularly innovative aspect of the *Electricity Certificate Act* is its provision for international cooperation, which enables the creation of a joint Swedish-Norwegian electricity certificate market.⁸¹ This cross-border integration serves multiple purposes; it increases market liquidity, provides greater stability for investors, allows for mutual recognition of certificates between the two countries, and reduces administrative costs through shared infrastructure such as the electronic registry system.⁸² The combined market effectively doubles the demand base for renewable energy certificates while harmonizing renewable energy policies across Scandinavia, demonstrating how national legislation can facilitate regional energy transition efforts.

To ensure the long-term viability of renewable energy investments, the *Electricity Certificate Act* incorporates several provisions aimed at providing stability and predictability. The *Electricity Certificate Act* provides that certificates can be allocated for periods of up to fifteen years, giving project developers assurance of sustained revenue streams.⁸³ The *Electricity Certificate Act* also includes a clear sunset provision, with the certificate system scheduled to conclude in 2045, providing market participants with a defined timeline for transition, and empowers supervisory authorities to revoke approvals and impose penalties

⁷⁹ *ibid.* section 2(3).

⁸⁰ *ibid.* section 2(4).

⁸¹ *ibid.* section 5.

⁸² *ibid.* section 3(1).

⁸³ *ibid.* sections 2(7) and 2(11).

for false reporting or non-compliance, thereby maintaining market integrity and preventing abuse of the system.⁸⁴

The *Electricity Certificate Act* also demonstrates a careful consideration of economic impacts through targeted exemptions and protections, as it provides special provisions for electricity-intensive industries, exempting qualifying enterprises from quota obligations if they meet specific energy consumption thresholds.⁸⁵ Additional exemptions, such as those for grid losses and small-scale self-production below 60 megawatt-hours annually, prevent undue burdens on certain sectors while maintaining the overall effectiveness of the certificate system.⁸⁶ These calibrated exemptions reflect a pragmatic approach to balancing industrial competitiveness with the objectives of renewable energy.

Through this comprehensive framework, Sweden's *Electricity Certificate Act* has proven remarkably successful in transforming the country's energy landscape. The combination of binding targets, market incentives, technology-specific rules, international cooperation, and investment safeguards has contributed significantly to Sweden's achievement of over 60% renewable electricity generation. The emphasis on wind power development in particular by the *Electricity Certificate Act* has driven substantial growth in that sector, while its flexible market mechanisms have allowed for cost-efficient expansion of renewable capacity. As a model of market-based environmental policy, Sweden's electricity certificate system offers valuable insights for other nations seeking to accelerate their renewable energy transitions through economically sustainable approaches.

During the program's active years, Sweden emerged as one of the top wind energy markets in Europe because of the steady and predictable income stream from electricity certificates,

⁸⁴ *ibid.* section 5(6-7).

⁸⁵ *ibid.* section 2(8).

⁸⁶ *ibid.* section 4(5).

which provided investors with a favourable risk profile.⁸⁷ In addition to wind energy, the certificate system has aided in the growth of biomass energy, particularly in cogeneration facilities that generate both electricity and heat.⁸⁸ For example, the certificate system was used to partially encourage the Fortum Värme biofuel facility in Stockholm.⁸⁹ The plant supports Sweden's circular economy and climate mitigation objectives in addition to generating power sustainably by using forestry wastes and other renewable biomass.⁹⁰

A merged Swedish-Norwegian electricity certificate market started in 2012 as a result of the later expansion of the *Electricity Certificate Act*, in collaboration with Norway. By expanding the market and harmonizing certificate trade regulations, this cross-border system boosted efficiency and competitiveness.⁹¹ Additionally, it supported legal clarity, predictability, and transparency, all of which are essential components of long-term investments in renewable energy. The global collaboration gave the *Electricity Certificate Act's* enforcement procedures even more validity, particularly with regard to certificate monitoring and compliance audits.⁹²

Furthermore, the Swedish Energy Agency (Energimyndigheten) is crucial to the administration of the *Electricity Certificate Act*, from an enforcement perspective.⁹³ It checks claims of renewable energy, keeps an eye on certificate issuing and compliance, and makes sure electricity providers meet their quota requirements. Financial penalties for noncompliance serve as a reminder to follow the system's guidelines. Ensuring that only

⁸⁷ Swedish Energy Agency – The Electricity Certificate System, op cit 68.

⁸⁸ Jan Kjarstad and Filip Johnsson, 'The Role of Biomass to Replace Fossil Fuels in a Regional Energy System: The Case of West Sweden' (2016) 20(4) Thermal Science, 2.

⁸⁹ IEA Bioenergy Success Stories, Large Biomass CHP Plant in Stockholm, Sweden – 2018, 1.

⁹⁰ *ibid.*

⁹¹ IEA/IRENA Policy, Norway-Sweden Green Certificate Scheme for Electricity Production <<https://www.iea.org/policies/3987-norway-sweden-green-certificate-scheme-for-electricity-production>> accessed 23 April 2025.

⁹² Jessica Coria and Jurate Jaraite, 'Ownership Structure and Prices: A Case Study of the Swedish Tradable Green Certificate Market' (2023) 183 Energy Policy, 1.

⁹³ Chapters 1-3 of the *Electricity Certificate Act* 2011:1200.

renewable energy benefits from the system and preserving the integrity of the certificate market have been made possible by this strict control.⁹⁴

The certificate system was initially intended to last until 2035, but because of its success, there was a considerable overabundance in subsequent years, which decreased the certificates' worth. However, there is no denying that the program's early and mid-term stages set the stage for Sweden's remarkable growth in renewable energy. The country was significantly ahead of schedule, surpassing its goal of creating 28.4 terawatt-hours of additional renewable energy by 2020.⁹⁵

Thus, the Swedish *Electricity Certificate Act* offered a creative and useful tool for policymakers looking to support renewable energy. Its market-based strategy sparked technical innovation, raised private funding, and promoted the nationwide rollout of renewable energy projects. It had a direct impact on changing Sweden's energy mix through initiatives like the Mörttjärnberget Wind Farm, biomass cogeneration in Stockholm, and small-scale hydropower revitalizations. It continues to serve as an example for other countries who are yet to transition from the use of fossil fuels to renewable energy sources, of how economic tools and strict regulatory control may lead to significant changes in the energy and environmental sectors.

4.1.1.4 Energy Policy Agreement 2016

The *Energy Policy Agreement*, although not considered an Act of Parliament, nevertheless has significant authority and agency, and serves as a *de facto* binding policy framework. This binding Agreement was not derived from any aspect of law, but from the broad and deliberate political consensus behind it. The *Energy Policy Agreement* is a substantial political

⁹⁴ *ibid.*

⁹⁵ Samuel Jonsson, Anders Ydstedt and Elke Asen, 'Looking Back on 30 Years of Carbon Taxes in Sweden' (2020) Tax Foundation Fiscal Fact No. 727, 2.

consensus of five of the largest political parties in Sweden, describes Sweden's long-term objectives to transition the energy system toward environmental sustainability, economic competitiveness, and security of supply. Each political party was situated at different places along the ideological spectrum; the Social Democrats (located center-left), the Moderate Party (located center-right), the Green Party (progressive and environmentally oriented), the Centre Party (liberal and agrarian), and the Christian Democrats (conservatively moralistic).⁹⁶ The broad coalition of these parties meant that the agreement was not only comprehensive, but it was also resilient to the nature of political power that shifts with elections.

What is particular and direct to the development of renewable energy in Sweden is a detailed commitment to the development and expansion of renewable energy in its energy mix. The *Energy Policy Agreement* sets a clear national goal for Sweden, that, by 2040, Sweden will have increased its electricity generation from renewables to 100%.⁹⁷ However, this 2040 goal is defined as a target state rather than a legally binding requirement, meaning it does not establish a mandatory phase-out deadline for nuclear energy. Nuclear power may still operate beyond 2040 if it is economically viable and consistent with safety standards.⁹⁸ Hence nuclear energy can coexist with renewables throughout its useful economic life, regardless of political expediency, this allows for a continued focus and commitment of the system to an ecological outcome. These outcomes support Sweden's wider environmental commitment to 2045 net-zero greenhouse gas emissions, on and after that, negative emissions. The 2040 target state is indicative of a radical transformation of the country's electricity generation toward a future climate neutrality.

⁹⁶ Preamble of the Swedish Energy Policy Agreement of 10 June 2016 – Unofficial English Translation <<https://analys.se/wp-content/uploads/2016/06/swedish-political-energy-agreement-2016.pdf>> accessed 1 May, 2025.

⁹⁷ Goal of the Swedish Energy Policy Agreement of 10 June 2016 – Unofficial English Translation <<https://analys.se/wp-content/uploads/2016/06/swedish-political-energy-agreement-2016.pdf>> accessed 1 May, 2025.

⁹⁸ *ibid.*

The agreement stipulates an extension and expansion of the existing system, to enable an additional 18 TWh of renewable electricity generation through certificates, by 2030, thereby driving investment and the development of new renewable energy assets based on market determined demands for generation.⁹⁹

In addition to refining the system to improve market confidence without raising the ambition level before 2020, the Swedish Energy Agency (SEA) has been given the task of refining the quota system after 2020 to make electricity generation more cost-efficient, indicating a shift to economic efficiency in renewable integration.¹⁰⁰ In addition, the *Energy Policy Agreement* stipulates that national grid connection fees for off-shore wind energy should be eliminated in order to reduce entry barriers and send strong political signals for the growth of off-shore wind capacity, which is a renewable source whose development can be rapidly scaled up.¹⁰¹ The *Energy Policy Agreement* also recognizes that increased renewable electricity production can lead to specific challenges in the energy system, particularly seasonal and hourly fluctuations of wind and solar energy output.¹⁰² The *Energy Policy Agreement* stipulates that policies must not only be focused on ensuring sufficient energy is available (TWh), but also that the energy developed to support initiatives are sufficient as defined in capacity (MW).¹⁰³ This distinction recognizes the need for physical capacity and stability of the grid as intermittent renewables develop.

The *Energy Policy Agreement* further expresses that, regulatory and market design changes should be made to accommodate a mix of scales of renewable generation, from small to large scale, and efforts to ensure energy is available during the entire year considering low prices

⁹⁹ *ibid.* Support to Renewable Energy, 3.

¹⁰⁰ *ibid.* Conditions on the Swedish Electricity Market, 1.

¹⁰¹ *ibid.* Support to Renewable Energy, 3.

¹⁰² *ibid.* Use of Energy and Energy Efficiency, 3.

¹⁰³ *ibid.* Conditions on the Swedish Electricity Market, 1.

and high demand. In order to balance unpredictable renewables, hydropower is still crucial.¹⁰⁴ The *Energy Policy Agreement* permits energy uprating at current hydro plants while protecting some rivers from growth, simplified the permitting procedures for improvements, striking a balance between dependability and environmental considerations.¹⁰⁵

Moreso, the *Energy Policy Agreement* embraces the role of bioenergy and efficient district heating for providing energy during cold weather events that will support the adequate electricity supply; this implies a systems-level approach to merging renewable energy resources into a more global energy use.¹⁰⁶ By facilitating small-scale electricity production, the *Energy Policy Agreement* emphasizes the significance of democratizing energy. In order to promote energy efficiency, storage, and small-scale power sales, the Agreement demands reforms to the fiscal and regulatory frameworks, promotion of technology that enable the production, storage, and sale of renewable power by homes and businesses.¹⁰⁷ This demonstrates Sweden's goal of developing a decentralized, adaptable energy infrastructure that can accommodate both local demands and technical advancements.

Another important rule of the *Energy Policy Agreement* is energy research, particularly in the development of technology that facilitate renewable energy.¹⁰⁸ Moreso, supporting technological development, pilot projects, and demonstrations are among the top priorities, encouraging development and export prospects while ensuring innovation in all renewable energy sources to satisfy national energy and climate goals.

A multifaceted, strategic strategy to the use of renewable energy is outlined in the *Energy Policy Agreement*. Concrete policy tools like the expanded certificate system, regulatory changes, and support for decentralized energy production help to achieve its main objective,

¹⁰⁴ *ibid.* Hydropower, 2.

¹⁰⁵ *ibid.* Use of Energy and Energy Efficiency, 3.

¹⁰⁶ *ibid.* Use of Energy and Energy Efficiency, 3.

¹⁰⁷ *ibid.* Small-scale Production, 3.

¹⁰⁸ *ibid.* Research, 4.

which is to have 100% of electricity come from renewable sources by 2040.¹⁰⁹ Furthermore, it acknowledges the necessity of integrating renewables in a stable, competitive, and forward-looking energy market while striking a balance between the desire for ecological change and concerns about economic and system dependability.¹¹⁰ With this *Energy Policy Agreement*, Sweden establishes itself as a model for balancing environmental responsibilities with market-based energy regulation, in addition to being a national leader in the clean energy transition.

A key example is the Blakliden Fäbodberget Wind Farm, jointly developed by Vattenfall and Swedish and international investors. Located in northern Sweden, this project was one of the largest onshore wind farms in Europe when completed, contributing over 1 TWh of renewable electricity annually to the Swedish grid.¹¹¹ The project embodies the principles of the *Energy Policy Agreement* which consists of cross-sector collaboration, regional development, and a strong contribution to the national energy transition.

Additionally, the *Energy Policy Agreement* resulted in more government funding for grid expansion and upgrading, especially to assist large-scale renewable energy projects in rural regions.¹¹² For example, new transmission lines were put into service to connect renewable energy to the national grid in Sweden's sparsely populated northern areas, which are rich in wind resources but far from industrial demand centers.¹¹³ This made it easier to build wind parks like Markbygden Wind Farm, a multi-phase, gigawatt-scale project that would eventually power more than half a million homes. The *Energy Policy Agreement* promoted

¹⁰⁹ *ibid.* Support to Renewable Energy, 3.

¹¹⁰ *ibid.*

¹¹¹ Vattenfall, Blakliden Fäbodberget Onshore Wind Farm, Vasterbotten (Power Technology, 23 June 2020) <<https://www.power-technology.com/projects/blakliden-fabodberget-onshore-wind-farm-vasterbotten/>> accessed 1 May 2025.

¹¹² Financing, The Swedish Energy Policy Agreement of 10 June 2016 – Unofficial English Translation <<https://analys.se/wp-content/uploads/2016/06/swedish-political-energy-agreement-2016.pdf>> accessed 1 May, 2025.

¹¹³ *ibid.*

innovation in solar energy and energy storage in addition to wind energy. Sweden's northern latitude has historically made solar energy a small factor, but regulatory incentives including tax breaks for solar systems and assistance for energy cooperatives started to increase utilization.¹¹⁴

The *Energy Policy Agreement* also highlighted the importance of flexible and resilient energy systems, including demand-side management, smart grids, and energy storage solutions. In line with this, pilot projects such as Stockholm's Virtual Power Plant (VPP) were developed to balance supply and demand by aggregating distributed renewable sources, batteries, and consumer flexibility into a coordinated system.¹¹⁵ These innovations aligned with the *Energy Policy Agreement's* goal of ensuring reliability and efficiency even as intermittent renewable energy sources became dominant in the Sweden's energy generation mix. Moreover, enforcement and accountability were embedded in the governance of the *Energy Policy Agreement* through regular energy policy evaluations, environmental performance reporting, and close monitoring by the Swedish Energy Agency (Energimyndigheten). This ensured that goals remained on track and that market distortions or delays were promptly addressed. Additionally, the agreement gave clear signals to the financial sector, utilities, and the private sector that investments in fossil-based infrastructure were increasingly at odds with Sweden's energy trajectory.

Furthermore, the *Energy Policy Agreement* created a stable and predictable environment for international cooperation and private sector investment, including joint ventures and partnerships with Norway, Denmark, and EU-based entities, to develop renewable energy corridors and knowledge-sharing platforms. Sweden's leadership in this area also enabled

¹¹⁴ Sweden's Long-term Strategy for Reducing Greenhouse Gas Emissions – 2020

<https://unfccc.int/sites/default/files/resource/LTS1_Sweden.pdf> accessed 30 June 2025.

¹¹⁵ Stefano De Marzo, 'Stockholm-based Green Secures €8 million to Reshape how Households Interact with Energy Market' (EU Startups, 26 July, 2024) <<https://www.eu-startups.com/2024/07/stockholm-based-greenly-secures-e8-million-to-reshape-how-households-interact-with-the-energy-market/>> accessed 30 June 2025.

participation in broader initiatives like Nord Pool, the Nordic electricity market, where its renewable surplus could be traded efficiently across borders.¹¹⁶

Thus, *Energy Policy Agreement* served as a foundation for Sweden's progress in renewable energy. It ensured continuity, legal clarity, and financial attractiveness for investments in renewable energy by fusing political agreement with concrete pledges. The agreement was realized in concrete, significant contributions to Sweden's green energy revolution through large-scale projects like Blakliden Fäbodberget, Markbygden, and localized solar initiatives. It serves as an example of how infrastructural assistance, coherent policy, and unambiguous enforcement procedures may all work together to move a country closer to a future powered entirely by renewable energy.

4.1.1.5 Climate Act and Climate Policy Framework 2017:720

Sweden's approach to climate governance underwent a fundamental transformation with the introduction of the *Climate Act* in 2017. This landmark legislation marked a significant shift from voluntary or policy-driven climate action to a legally binding framework that holds all current and future Swedish governments accountable for the country's long-term climate objectives.¹¹⁷

The *Climate Act* forms the cornerstone of Sweden's comprehensive *Climate Policy Framework*, which was formally adopted in 2017.¹¹⁸ This framework was the result of years of in-depth political negotiation and extensive consultation with various stakeholders, including scientific experts, environmental groups, industries, and the general public. The

¹¹⁶ Luis Mundaca, Carl Dalhammar and David Harnesk, *The Integrated NORDIC Power Market and the Deployment of Renewable Energy Technologies: Key Lessons and Potential Implications for the Future ASEAN Integrated Power Market* (2013) in Kimura, S., H. Phoumin and B. Jacobs (eds.), *Energy Market Integration in East Asia: Renewable Energy and its Deployment into the Power System*, ERIA Research Project Report 2012-26, Jakarta: ERIA, 25

¹¹⁷ Mikael Karlsson, 'Sweden's Climate Act – Its Origin and Emergence' (2021) 21(9) *Climate Policy*, 1133.

¹¹⁸ Sweden's Climate Act and Climate Policy Framework <<https://www.naturvardsverket.se/en/topics/climate-transition/sveriges-klimatarbete/swedens-climate-act-and-climate-policy-framework/>> accessed 30 June 2025.

inclusive nature of this process was intended to build broad political consensus and societal support, thereby increasing the resilience and legitimacy of the climate framework.¹¹⁹ The *Climate Policy Framework* not only establishes the legal mandate for the government to take action but also sets procedural mechanisms for planning, monitoring, and reporting progress towards climate goals, including the overarching aim of achieving net-zero greenhouse gas emissions by 2045.¹²⁰ Together, the *Climate Act* and the broader policy framework represent a model of climate governance grounded in law, transparency, and long-term planning.

The main objective of *Climate Act* is to guide the government's climate policy in a way that ensures both environmental responsibility and long-term sustainability. At its core, the *Climate Act* mandates that the government's climate work must aim to prevent dangerous disruptions to the climate system, reflecting a precautionary approach to global warming.¹²¹ It emphasizes the protection of ecosystems and the safeguarding of both current and future generations from the harmful consequences of climate change.¹²² The *Climate Act* further prioritizes the reduction of greenhouse gas emissions and the preservation or enhancement of natural systems that help mitigate climate impacts.¹²³ Importantly, all climate policy decisions under the *Climate Act* must be grounded in scientific evidence while also taking into account technical feasibility, social implications, economic realities, and environmental factors.¹²⁴ This holistic and forward-looking approach ensures that Sweden's climate policy remains both ambitious and practical.

At the heart of the *Climate Act*, it should be noted that there are two critical provisions that institutionalize climate accountability across the machinery of government, ensuring that climate considerations are not treated as peripheral or optional, but as a central component of

¹¹⁹ *ibid.*

¹²⁰ *ibid.*

¹²¹ Section 2(1) of the *Climate Act* 2017:720.

¹²² *ibid.* section 2(2).

¹²³ *ibid.* section 2(3).

¹²⁴ *ibid.* section 2(4).

governance and policy-making. First, the *Climate Act* requires the sitting government to present an annual Climate Report to the Swedish Parliament (Riksdag) as part of the national budget Bill.¹²⁵ This report functions as a mechanism for transparency and democratic oversight, allowing elected representatives and the public to scrutinize the government's climate actions, evaluate progress toward national targets, and hold leaders accountable for any shortcomings. By embedding the report within the budget process, the *Climate Act* also ensures that climate policy is not sidelined but is instead integrated into the core financial planning of the state.¹²⁶

Secondly, *Climate Act* mandates that the government must conduct a climate impact assessment for all new policy proposals.¹²⁷ This requirement compels policymakers to evaluate and disclose how each new policy initiative aligns with Sweden's climate goals before it is implemented. As a result, climate considerations are embedded at the earliest stages of the policy development process, preventing the adoption of measures that might undermine climate objectives.

Together, these provisions make climate accountability a structural feature of Swedish governance, as they require that climate action be tracked continuously, debated publicly, and factored into every significant political and financial decision. This design not only reinforces Sweden's commitment to sustainability, it also sets a precedent for how legal instruments can effectively put climate responsibility in the mainstream across all sectors of government.¹²⁸

Meanwhile, the *Climate Act* does not stand alone; it is reinforced by Sweden's legally binding long-term emissions targets, which provide a clear and measurable pathway toward the

¹²⁵ *ibid.* section 4.

¹²⁶ *ibid.*

¹²⁷ *ibid.* section 5.

¹²⁸ Report of the Swedish Climate Policy Council – 2024 <<https://www.klimatpolitiskaradet.se/wp-content/uploads/2024/06/reportoftheswedishclimatepolicycouncil2024.pdf>> accessed 30 June 2025.

country's climate ambitions.¹²⁹ Central to these targets is Sweden's commitment to achieving net-zero greenhouse gas emissions by the year 2045.¹³⁰ This means that by that point, the country's total emissions will be balanced by an equivalent amount of emissions removed from the atmosphere, through natural sinks like forests or technological solutions such as carbon capture and storage. Importantly, Sweden's ambition extends beyond neutrality after 2045, the country intends to move into a phase of negative emissions, where it will actively remove more greenhouse gases than it emits, thereby contributing to the global effort to reverse climate change.¹³¹

To stay on course toward this long-term goal, Sweden has also established intermediate milestones. By 2030, the country aims to reduce its emissions by 63% compared to 1990 levels, and by 2040, that reduction should reach 75%.¹³² These interim targets serve as crucial benchmarks for tracking progress and maintaining momentum. They also ensure that climate action is not postponed to a later date, but undertaken steadily and consistently.¹³³ By embedding both long-term and intermediate targets into law, Sweden has created a structured and accountable framework that requires successive governments to take sustained, science-based action in the fight against climate change.

To ensure that Sweden's climate policies remain aligned with its ambitious targets and legal commitments, the government established the Climate Policy Council (Klimatpolitiska rådet) as an independent expert advisory body. The Council's primary role is to monitor and evaluate the government's climate policies, assessing whether they are consistent with the

¹²⁹ Preamble, Sweden's Climate Act 2017:720.

¹³⁰ *ibid.*

¹³¹ Sweden's Long-term Strategy for Reducing Greenhouse Gas Emissions – 2020, op cit. 109.

¹³² Nils Meyer-Ohlendorf *et al*, 'Implementing the EU 2040 Climate Target: Building Blocks and Measures' (2025) Ecologic Report, 7.

¹³³ *ibid.*

goals set out in the *Climate Act* and the broader *Climate Policy Framework*.¹³⁴ Each year, the Council publishes a public report that scrutinizes the government's actions and provides recommendations for improvement.¹³⁵ This process of transparent, evidence-based review not only promotes accountability but also helps build public trust in the country's climate governance.

In addition, the Council functions as a critical watchdog, ensuring that climate action remains a priority regardless of changing political agendas.¹³⁶ By offering objective assessments, it holds policymakers accountable for their decisions and helps guard against short-termism or policy drift. Its presence reinforces the legal and institutional architecture of Sweden's climate strategy, ensuring that the country stays on track to meet its long-term environmental goals. The *Climate Act* itself plays a pivotal role in securing long-term policy stability. By embedding climate targets and obligations into law, it protects climate policy from being weakened or reversed due to political shifts or changes in government. This legal stability is particularly important in a democratic system, where political leadership can change frequently. Thus, the *Climate Act* is widely regarded as one of the most legally sound and visionary instruments of climate governance globally, offering a model for other nations seeking to create durable, science-based, and accountable climate policies.¹³⁷

A few examples of notable renewable energy projects in Sweden demonstrate how the *Climate Act* and *Climate Policy Framework* have created actionable results. Most notably is the rapid deployment of wind power across the country. Sweden has become one of Europe's leading producers of wind energy and has large-scale projects such as the Markbygden Wind Farm in northern Sweden. Once completed, this will likely be Europe's largest wind farm

¹³⁴ BEACON – Bridging European and Local Climate Action, 'The Swedish Climate Act Study,' 6 <https://www.euki.de/wp-content/uploads/2019/09/20181205_SE_Swedish-Climate-Act_Study.pdf> accessed 30 June 2025.

¹³⁵ *ibid.*

¹³⁶ *ibid.*

¹³⁷ Mikael Karlsson, 'Sweden's Climate Act – Its Origin and Emergence' (2021) 21(9) *Climate Policy*, 1133.

with a planned capacity of over 4,000 MW; this will provide enough electricity for over one million households each year.¹³⁸ The project seems to have benefited from a favourable government policy, a streamlined permitting process, and investment incentives, all of which underpin the legal obligations of the *Climate Policy Framework*.

Another notable example is Sweden's headway on bioenergy, especially through forest biomass, given the rampant biomass resources available. The Värtaverket biomass plant in Stockholm has emerged as a major bioenergy project in line with Sweden's renewable energy objectives.¹³⁹ The Värtaverket plant uses sustainably sourced biomass to provide heat and electricity to Stockholm, primarily replacing coal and other fossil-based fuels.¹⁴⁰ The development of such infrastructure further illustrates how Sweden's legal climate obligations are affecting the operations of energy utilities and municipalities towards cleaner fuel options.

With cities and industries increasing their solar energy capacity, government support programs for local solar energy installations and local community energy assistance programs have emerged due to climate policy and related incentives associated with recent Swedish climate aligned policies around local energy generation and engagement.¹⁴¹ This is despite the fact that solar energy is not as common due to Sweden's geographic location. These programmes make it easier for companies and local residents to interact with renewable energy sources and increase their involvement in the production of renewable energy.¹⁴²

¹³⁸ IVL Swedish Environmental Research Institute, 'Markbyden 1101 – Europe's Largest Onshore Windfarm' <<https://smartcitysweden.com/best-practice/423/markbygden-1101-europes-largest-onshore-wind-farm/>> accessed 30 June 2025.

¹³⁹ IEA Bioenergy, 'Large Biomass CHP Plant in Stockholm, Sweden – 2018' <https://www.ieabioenergy.com/wp-content/uploads/2018/02/8-LargeCHP-Va%CC%88rtaverket_SE_Final.pdf> accessed 7 July 2025. See also IEA Bioenergy, 'Biomass Supply and the Sustainable Development Goals – International Case Studies' (2021) Technology Collaboration Programme, 20.

¹⁴⁰ *ibid.*

¹⁴¹ G Ulpiani *et al.*, 'Let's Hear from the Cities: On the Role of Renewable Energy in Reaching Climate Neutrality in Urban Europe' (2023) 183 *Renewable and Sustainable Energy Reviews*, 1.

¹⁴² *ibid.*

In the majority of these events, the Climate Policy Council has been a key player. The Council ensures that renewable energy stays at the forefront and authorizes the execution of government policies that are in line with climate goals. In addition to facilitating procedures that provide guidance for things like spending on improving grid infrastructure to accommodate more renewable energy and cutting or doing away with subsidies for the use of fossil fuels, the reports have continuously recommended speeding up the shift to clean and renewable energy.¹⁴³

All things considered, the Swedish *Climate Act* and the *Climate Policy Framework* for its implementation have established the institutional and legal foundation required for a significant transition to renewable energy. They have created an atmosphere in which climate goals inform not only environmental policy but also economic development, infrastructural investment, and energy planning. Sweden is now a global leader in climate-conscious governance and the integration of renewable energy with the help of this all-encompassing strategy.¹⁴⁴

4.2 Denmark

Denmark's transition from reliance on fossil fuels to becoming a renewable energy success story is a remarkable tale of resilience, ingenuity, and robust legal governance. In the early 1970s, Denmark was heavily reliant on imported oil, deriving over 90% of its energy from fossil fuels.¹⁴⁵ The oil shocks of 1973 and 1979, however, exposed the precarious nature of this reliance, resulting in a nationwide shift in energy policy.¹⁴⁶ Denmark recognized a

¹⁴³ Paragraph 1.2 of the Report of the Swedish Climate Policy Council – 2024, 14.

¹⁴⁴ Simon Matti, Christer Petersson and Charlotta Soderberg, 'The Swedish Climate Policy Framework as a Means for Climate Policy Integration: An Assessment' (2021) 21(9) *Climate Policy*, 1154.

¹⁴⁵ James Haselip, 'Denmark and Energy Diversification' (2024) EBSCO <<https://www.ebsco.com/research-starters/power-and-energy/denmark-and-energy-diversification>> accessed 7 July 2025.

¹⁴⁶ Mogens Rudiger, 'The 1973 Oil Crisis and the Designing of a Danish Energy Policy' (2014) 39 *HSR*, 93.

pressing need for energy security, and for the environment, and began to create a new pathway focused on diversification and energy independence.¹⁴⁷

Denmark's transition was not circumstantial. It was developed pursuant to a coherent policy framework and a number of strategic legislative decisions. The introduction of Denmark's first energy policy in 1979 outlined a pathway that accommodated energy conservation, energy efficiency, and development of indigenous energy systems, including wind and biomass.¹⁴⁸ Subsequent legislation expanded renewable energy development with legislative measures.¹⁴⁹ The various laws and legal protections, provided an attractive and stable context for both public and private capital investment in renewables. By the early 2000s, wind power had emerged as a central pillar of Denmark's energy mix.¹⁵⁰ The country also prioritized combined heat and power (CHP) systems and bioenergy, further diversifying its supply.¹⁵¹

Today, Denmark stands as a global leader in renewable energy.¹⁵² As at 2023, more than 75% of Denmark's electricity consumption was supplied by renewable sources, with wind energy alone accounting for around 55%. The country has committed to phasing out fossil fuels entirely by 2050 and aims to reach 100% renewable electricity production by 2030.¹⁵³ These milestones reflect Denmark's successful shift from fossil fuel dependence to a sustainable and

¹⁴⁷ Katinka Johansen, 'Wind Energy in Denmark: A Short History' (2021) 19(3) IEEE Power and Energy Magazine, 94.

¹⁴⁸ Niels Meyer, 'Renewable Energy Policy in Denmark' (2004) 8(1) Energy for Sustainable Development, 25. See also Thierny Laroche Lambert, 'Denmark's Energy Transition: A Model of European Democratic Planning' (2016) International Atlantic Energy Agency <<https://inis.iaea.org/records/dpyt7-rg969>> accessed 7 July 2025.

¹⁴⁹ For example, feed-in tariffs, tax credits, and guaranteed grid access for energy producers.

¹⁵⁰ United Nations Climate Change, 'Wind Energy in Denmark – Sace Study: Good Practices and Lessons Learned on the Setup and Implementation of National Systems of Innovation, 3 <https://unfccc.int/ttclear/misc/_StaticFiles/gnwoerk_static/TEC_NSI/63eb6ced5b1e43429a6eccdef95ff61e/85bd141304c5486fb7f2ef71f8d2d45f.pdf> accessed 7 July 2025.

¹⁵¹ Leire Albizu, Daniele Pagani and Tonny Brink, 'Denmark' (2018) WWEA Policy Paper Series (PP-02-18-A) 1.

¹⁵² Danish Ministry of Energy, Utilities and Climate, 'Denmark: Energy and Climate Pioneer: Status of the Green Transition' (2018) <https://www.kefm.dk/media/7127/denmark_energy_and_climate_pioneer_pdfa.pdf> accessed 7 July 2025.

¹⁵³ IEA Denmark 2023 "Executive Summary" <<https://www.iea.org/reports/denmark-2023/executive-summary>> accessed 7 July 2025.

resilient energy system driven by innovation and strategic governance. The legal framework regulating energy, including renewables in Denmark is considered in the next section.

4.2.1 Legal Framework Regulating Energy in Denmark

For over 50 decades, Denmark's energy environment has been significantly shaped by a number of progressive laws, regulations, and strategic frameworks that have supported the country's shift from reliance on fossil fuels to an economy powered by renewable energy.¹⁵⁴ This change was the consequence of intentional legislative and policy decisions, motivated by the need for energy security as well as environmental concerns after the oil crises of the 1970s.¹⁵⁵ Below is the analysis of the main laws and regulations that facilitated this momentous change.

4.2.1.1 Electricity Supply Act 1999

The *Electricity Supply Act* of 1999, as described in the *European Commission Decision* of 1999, illustrates Denmark's forward-looking strategy to incorporate renewable energy into its energy mix while complying with European Union (EU) electricity market liberalization rules with a determined pursuit of environmental sustainability.¹⁵⁶ Even though the *European Commission Decision* is decision on Denmark's request for a transitional regime,¹⁵⁷ it also gives critical insight into the objectives and mechanisms of the *Electricity Supply Act* (ESA), especially with respect to renewable energy.

The provisions of the ESA, especially following its amendment are underpinned by a distinctive commitment to public service obligations, particularly, environmental protection,

¹⁵⁴ Andrew Baker, Helene Blake and Patrick Lenain, 'Towards a Net Zero Emissions in Denmark' (2022) Economics Department Working Papers No. 1705, 6.

¹⁵⁵ *ibid.*

¹⁵⁶ *European Commission Decision* of 8 July 1999 (1999/798/EC).

¹⁵⁷ Article 24 of the *European Commission Directive* 96/92/EC.

security of supply, and consumer welfare.¹⁵⁸ This objective directly links to renewable energy, as renewables are central to environmental goals and reducing reliance on fossil fuels. The ESA therefore ensures that market liberalization does not come at the expense of Denmark's environmental commitments. In addition, the ESA acknowledges that renewable energy sources, particularly wind and biomass, are becoming increasingly significant in Denmark's electricity production.¹⁵⁹ This explains that the ESA is not only responsive to market reforms but also proactively aligned with Denmark's environmental and renewable energy goals.

In support of the ESA's environmental and renewable energy agenda, Denmark also maintained and legally supported a system of incentives for electricity generation from combined heat and power (CHP) plants. The ESA "CHP guarantee," under which Danish distribution companies are obliged to purchase electricity generated from CHP plants at cost-covering prices if the electricity cannot be sold profitably on the open market.¹⁶⁰ This guarantee, examined and approved by the *European Commission under State Aid Procedures* (State Aid N 305/96),¹⁶¹ serves as a vital policy instrument for promoting efficient and often renewable energy-based CHP generation. The scheme was in effect until 2006 and played a critical role in shielding environmentally favourable producers, especially those utilizing biomass from market risks that could undermine their viability.¹⁶²

Further supporting the transition toward a more sustainable energy system, the ESA includes provisions related to the closure of outdated power plants.¹⁶³ The ESA required that the dismantling of power plants could only proceed with a licence from the Danish Energy Agency, pursuant to article 5(1) of the ESA.¹⁶⁴ This provision ensured that decommissioning

¹⁵⁸ Article 3(11) of the *Electricity Supply Act*, 1999.

¹⁵⁹ *ibid.* Article 2(8).

¹⁶⁰ *ibid.* Article 4.2(20).

¹⁶¹ State Aid procedures (State Aid N 305/96).

¹⁶² Article 4.2(21) of the *Electricity Supply Act*, 1999.

¹⁶³ *ibid.* Article 4.3(26).

¹⁶⁴ *ibid.* Article 4.3(28).

processes, often undertaken for environmental reasons were regulated and aligned with national policy objectives. The planned closures of around 30 production units between 1999 and 2025, and six units already being dismantled at the time, signal a strategic shift away from conventional fossil-fuel-based infrastructure, clearing the path for renewable energy sources to expand their share in the national mix.¹⁶⁵

Recognizing the financial implications of such a large-scale transition, the Danish government instituted mechanisms for addressing stranded costs, which are the financial liabilities arising from earlier investments and obligations that might not be recoverable under new market conditions.¹⁶⁶ The ESA detailed how these stranded costs, particularly those associated with take-or-pay gas contracts that extend to 2020, were calculated.¹⁶⁷ The anticipated exposure, should electricity prices drop dramatically, was estimated at DKK 8.9 billion.¹⁶⁸ However, under more realistic assumptions, the expected stranded cost exposure was revised down to DKK 993 million over the period 1999–2020.¹⁶⁹ To manage these obligations, the ESA allowed electricity undertakings to recover losses through consumer surcharges, calculated ex post and subject to refund in cases of overcompensation.¹⁷⁰

The ESA further allowed for a similar cost-recovery mechanism related to the decommissioning of power plants as it clarifies that costs associated with dismantling production units could be covered under the new ESA, with subsidies of up to DKK 170 million per unit available for companies applying for a dismantling licence before 1 January 2001.¹⁷¹ These subsidies would decline in subsequent years, reflecting the urgency of timely compliance. Again, recovery was to be financed through a surcharge on electricity

¹⁶⁵ *ibid.*

¹⁶⁶ *ibid.* Article 4.2 (22).

¹⁶⁷ *ibid.* Article 4.2(23).

¹⁶⁸ Approximately USD 1.3 billion.

¹⁶⁹ *ibid.* Article 4.2(24).

¹⁷⁰ *ibid.* Article 4.2(25).

¹⁷¹ *ibid.* 4.3(30).

consumption, transparently indicated on consumer bills and governed by rules designed to prevent cross-subsidization.¹⁷²

Lastly, the ESA addressed pension obligations, particularly those affecting former municipal electricity employees employed under civil servant terms. It explains that such pension liabilities were historically paid on an “as-and-when” basis and funded through tariffs.¹⁷³ However, the liberalized market conditions meant this was no longer viable. Under the transitional regime, a specific case was addressed. The Københavns Belysningsvæsen¹⁷⁴ was authorized to recover up to DKK 700 million¹⁷⁵ over a ten-year period from electricity consumers to meet its outstanding pension obligations.¹⁷⁶ This provision further underscores the ESA’s approach to ensuring a just and financially stable transition toward market liberalization without undermining social obligations.

Denmark’s approach under its Electricity Supply Act (ESA) aligns closely with the EU’s broader objectives on renewable energy and climate change, but with some distinctive national emphasis. Like the *European Union’s Directive*,¹⁷⁷ Denmark has liberalized its electricity market to promote competition and efficiency. At the same time, Denmark explicitly integrates environmental and climate priorities, actively promoting renewable energy sources such as wind, solar, and biomass. Unlike some EU member states that may prioritize market liberalization alone,¹⁷⁸ Denmark ensures that the transition considers both sustainability and social equity, including fair distribution of costs associated with green

¹⁷² *ibid.* Article 4.3(33-35).

¹⁷³ *ibid.* Article 4.4(36).

¹⁷⁴ Københavns Belysningsvæsen was a municipally owned utility in Copenhagen, responsible for supplying gas, electricity, and district heating. Established in 1891, it built major power stations using direct current to meet the city’s energy needs. It played a key role in developing Copenhagen’s energy infrastructure. In 1999, it was renamed Københavns Energi and merged with Københavns Vand in 2001. Electricity activities were sold in 2005, ending its direct involvement in supply. Overall, it was central to modernizing Copenhagen’s energy services.

¹⁷⁵ Approximately USD 150 million.

¹⁷⁶ Approximately USD 25 million. See also *ibid.* Article 4.4(41).

¹⁷⁷ European Union’s Directive 96/92/EC.

¹⁷⁸ Some Eastern European member states, for example Poland, Hungary, or the Czech Republic.

energy adoption. In this sense, Denmark both implements EU directives and reinforces them with stronger domestic climate and renewable energy policies. The ESA's legal structure and accompanying financial mechanisms have not only provided a stable foundation for market reform but also facilitated Denmark's emergence as a leader in renewable energy integration.

4.2.1.2 Heat Supply Act 2000

The *Heat Supply Act* 2000, establishes a comprehensive legislative framework that has played a pivotal role in Denmark's transition towards a low-carbon and sustainable energy system. One of the aims of the *Heat Supply Act* is to support the integration of renewable energy sources such as biomass, biogas, solar thermal, and geothermal energy into the national heat supply infrastructure, and it does this by setting out a combination of strategic objectives, operational mechanisms, and regulatory provisions that encourage environmental sustainability, energy efficiency, and the reduction of fossil fuel dependency.¹⁷⁹

The overarching objective of the *Heat Supply Act* is “to promote the most socio-economic and environmentally friendly utilization of energy for heating buildings, supplying them with hot water and reducing the dependency of the energy system on oil.”¹⁸⁰ This objective clearly underscores Denmark's dual commitment to both environmental protection and economic efficiency. Importantly, it also expresses an explicit intention to reduce reliance on oil, thereby opening the door for the promotion of alternative, cleaner energy sources.¹⁸¹ In addition, the *Heat Supply Act* emphasizes that the supply of heat should be organized so as to promote “the highest possible degree of cogeneration of heat and power.”¹⁸² The inclusion of cogeneration commonly implemented via combined heat and power systems demonstrates a

¹⁷⁹ The *Heat Supply Act* of 2000, officially consolidated as Act No. 772 of 24 July 2000.

¹⁸⁰ *ibid.* Article 1.

¹⁸¹ Paragraph 1.2.1 of the Addendum to Denmark's Recovery and Resilience Plan, 2023.

¹⁸² Article 1(2) of the *Heat Supply Act* of 2000, officially consolidated as Act No. 772 of 24 July 2000.

strong legislative preference for energy-efficient technologies, many of which, in Denmark's context, are increasingly powered by renewable sources such as biomass.

Moreso, the *Heat Supply Act* deals with the economic integration of renewable energy into the pricing structure of heat supply systems, as it states that geothermal plants, solar heating plants, as well as biogas and biomass-fuelled heat or combined heat and power plants, may incorporate a revenue stream into the price charged for delivering hot water, steam, or gas (excluding natural gas) to the collective heat supply system.¹⁸³ In addition, the same pricing mechanism is extended to industrial enterprises that supply surplus heat to these systems. This provision is particularly important as it creates a financial model that allows renewable energy plants to recover costs and remain competitive with conventional heat sources. It further allows the Minister for Environment and Energy, to expand this economic support to other plants based on renewable energy.¹⁸⁴ This flexibility enables the legal framework to accommodate technological innovation and the emergence of new renewable solutions over time.

To further the economic objectives, the *Heat Supply Act* provide detailed guidance on pricing, cost recovery, and regulatory oversight.¹⁸⁵ It allows the inclusion of necessary operational expenses such as fuel, wages, administrative costs, and reinvestments into the pricing scheme,¹⁸⁶ and mandates that all tariffs and cost distributions must be submitted to an independent regulatory authority, known as the *Energitilsynet* (Energy Regulatory Authority), which is tasked with ensuring that such financial structures are fair, efficient, and aligned with the broader objectives of the *Heat Supply Act*.¹⁸⁷ These provisions together create a

¹⁸³ *ibid.* Article 20b.

¹⁸⁴ *ibid.* Article 20b(2).

¹⁸⁵ *ibid.* Articles 20-21.

¹⁸⁶ *ibid.* Article 20.

¹⁸⁷ *ibid.* Article 21.

supportive economic environment that encourages investment in renewable heat production technologies while maintaining regulatory accountability.

At the municipal level, the *Heat Supply Act* empowers local authorities with key responsibilities that significantly influence the uptake of renewable energy. It requires each district council to prepare a municipal heat supply plan in cooperation with energy suppliers and other stakeholders.¹⁸⁸ Notably, the *Heat Supply Act* stipulates that any proposed collective heat supply project must explore options for ensuring the most economical use of energy, coordinate operations with other plants, and, crucially, consider conversion to combined heat and power production for any plant exceeding 1 MW.¹⁸⁹ This requirement effectively encourages the decentralization of heat production and supports the integration of renewable energy technologies at the local level.

Furthermore, the *Heat Supply Act* provides legal authority for district councils to mandate the use of specified types of energy implicitly including renewable energy in the operation of heat supply plants.¹⁹⁰ It allows councils to require that production facilities be organized in such a way that certain fuels (biomass, biogas) can be used, and even stipulates the extent to which these fuels must be utilized.¹⁹¹ This is a powerful legal tool for ensuring that collective heat supply systems are aligned with national climate objectives and capable of incorporating renewable sources.

The *Heat Supply Act* also contains several public service obligations that further reinforce the promotion of renewable energy and sustainability. The Minister of Environment and Energy may require collective heat supply enterprises to engage in activities aimed at improving energy efficiency, conducting research and development in environmentally friendly

¹⁸⁸ *ibid.* Articles 3-6.

¹⁸⁹ *ibid.* Article 6.

¹⁹⁰ *ibid.* Article 7.

¹⁹¹ *ibid.*

production technologies, and advising consumers on rational energy use.¹⁹² These obligations serve both to strengthen public awareness and to stimulate innovation in renewable heating technologies.

Finally, the transparency and accountability mechanisms established ensure that the implementation of the *Heat Supply Act* including its renewable energy provisions is monitored, evaluated, and publicly reported.¹⁹³ These provisions mandate the publication of tariffs and operating costs, the preparation of periodic performance reports by the Energy Regulatory Authority, and the collection of operational data from regulated plants.¹⁹⁴ Such transparency is critical in building trust, enabling informed policy adjustments, and ensuring that renewable energy targets are met in practice.

Thus, the *Heat Supply Act* provides a clear and supportive legal framework for the incorporation of renewable energy into Denmark's heat supply sector. Through its combination of environmental objectives, financial incentives, planning obligations, regulatory oversight, and public service mandates, the *Heat Supply Act* establishes both the vision and the practical mechanisms necessary for a successful transition to a sustainable, low-carbon heat economy.

4.2.1.3 Renewable Energy Act 2008:1392

The *Renewable Energy Act* (*Lov om fremme af vedvarende energi*), also known as the Promotion of Renewable Energy Act,¹⁹⁵ represents a landmark piece of legislation that aimed to establish Denmark as a global leader in the transition to sustainable energy. The *Renewable Energy Act* sought to create a cohesive and strategic framework for increasing the share of renewable energy in the country's energy mix. Specifically, the objectives of the *Renewable*

¹⁹² *ibid.* Article 29.

¹⁹³ *ibid.* Articles 23–23d.

¹⁹⁴ *ibid.*

¹⁹⁵ *Renewable Energy Act* no. 1392 of 2008.

Energy Act, include promoting the use of renewable energy sources in Denmark's energy supply in accordance with climate, environmental, and macroeconomic considerations, in order to reduce dependence on fossil fuels, ensure security of supply and reduce emissions.¹⁹⁶ In doing so, it emphasized not only climate change and environmental degradation, but also social inclusion and economic efficiency through clean energy investments.

The *Renewable Energy Act* provides for the integration of various of renewable energy into the Danish electricity system, laying more emphasis on the promotion of wind energy, and other renewable energy sources.¹⁹⁷ It also emphasizes technological neutrality and the importance of an economically and environmentally efficient deployment of these technologies.¹⁹⁸ In addition, the *Renewable Energy Act* provides detailed frameworks for subsidies and financial support for renewable energy producers: by introducing a feed-in tariff system for onshore and offshore wind, biomass, and other eligible technologies,¹⁹⁹ laying out guaranteed price premiums above market prices, encouraging investment in renewable energy by ensuring economic viability,²⁰⁰ allowing subsidies in connection with the installation of renewable energy systems, such as solar photovoltaic installations on buildings.²⁰¹ These financial incentives and support schemes deemed to be essential instruments for guaranteeing the feasibility and appeal of investments, particularly for individual investors and local communities.

Additionally, the *Renewable Energy Act* pioneered the concept of "shared ownership".²⁰² This provision mandated that developers of new onshore wind projects must offer at least 20% of

¹⁹⁶ *ibid.* Article 1(1).

¹⁹⁷ *ibid.* Article 2(1-2).

¹⁹⁸ *ibid.*

¹⁹⁹ *ibid.* Article 6.

²⁰⁰ *ibid.* Article 8.

²⁰¹ *ibid.* Article 12.

²⁰² *ibid.* Article 13.

the project's shares to local residents living within a certain proximity to the installation.²⁰³ This measure had dual purposes: first, it ensured that the economic benefits of wind energy were distributed among the local population, and second, it significantly improved public acceptance of wind energy developments. By giving communities, a tangible stake in renewable projects, the *Renewable Energy Act* helped overcome the "Not In My Backyard" (NIMBY) phenomenon that had historically slowed the expansion of wind farms in Denmark and elsewhere. This provision fosters community engagement, public acceptance, and equitable distribution of benefits derived from renewable energy projects.

The *Renewable Energy Act* further provides that electricity generated from renewable energy sources shall have guaranteed and prioritized access to the transmission and distribution grid.²⁰⁴ This provision removes a critical technical barrier and ensures that renewable energy can be delivered to consumers without undue delay or competition with fossil fuel-based generation. For planning and administrative procedures, the *Renewable Energy Act* streamlined planning approval procedures for renewable projects from the Minister of Climate and Energy.²⁰⁵ For instance, it emphasizes the simplification of permitting processes,²⁰⁶ and assigns responsibilities to municipalities and national authorities to develop and implement local plans for renewable energy deployment.²⁰⁷ These provisions reduce bureaucratic delays and supports more rapid implementation of renewable projects. Furthermore, the *Renewable Energy Act* prioritizes innovation by promoting research, development and demonstration. It mandates the provision of support for pilot projects and

²⁰³ *ibid.*

²⁰⁴ *ibid.* Article 17.

²⁰⁵ *ibid.* Article 22.

²⁰⁶ *ibid.*

²⁰⁷ *ibid.* Article 23.

the testing of new renewable energy technologies, fostering continuous improvement and leadership in renewable energy innovation.²⁰⁸

The *Renewable Energy Act* was also aligned with Denmark's broader climate and energy policy goals, such as those reflected in the Energy Strategy 2050 and subsequent climate action plans. This means that the *Renewable Energy Act* was not enacted in isolation. Rather, it was a crucial component of Denmark's long-term roadmap to achieve a carbon-neutral and fossil fuel-free society by the year 2050. The *Energy Strategy 2050*, released by the Danish government, laid out comprehensive goals for reducing greenhouse gas emissions, increasing energy efficiency, and transitioning entirely to renewable sources.²⁰⁹ The *Renewable Energy Act* provided the legal and operational tools necessary to achieve these goals by promoting the deployment of renewable energy technologies, such as wind, solar, and biomass, in a coordinated and systematic manner.²¹⁰ By legally entrenching mechanisms for citizen participation, competitive development, and long-term investment security, the *Renewable Energy Act* became a foundational instrument in Denmark's successful energy transition.

As a result of these comprehensive measures, Denmark was able to steadily increase its share of renewable energy, achieving 67% of the electricity supply (of which wind energy contributes 46.8% while biomass contributes 11.2%).²¹¹ This achievement illustrates how well-designed legislation, underpinned by clear objectives and enforceable provisions, can drive systemic transformation in the energy sector. The *Renewable Energy Act* thus remains a model for other countries aiming to transition towards a low-carbon economy with strong community engagement and policy coherence.

²⁰⁸ *ibid.* Article 27.

²⁰⁹ Energy Strategy 2050

<https://moodle.polymtl.ca/pluginfile.php/413972/mod_page/content/70/Denmark_Energy%20Strategy%20for%202050_2011.pdf> accessed 5 May 2025.

²¹⁰ *ibid.*

²¹¹ Denmark County Commercial Guide, Renewable Energy Products – 2024 <<https://www.trade.gov/country-commercial-guides/denmark-renewable-energy-products>> accessed 7 July 2025.

A notable example of a project that aligns with the provisions of the *Renewable Energy Act* is the Middelgrunden Offshore Wind Farm, located just off the coast of Copenhagen.²¹² Although it was initiated before the enactment of the *Renewable Energy Act*, the project gained momentum and institutional backing through the *Renewable Energy Act*'s provisions that promoted citizen participation and cooperative ownership, in which approximately 50% of the wind turbines are owned by a cooperative of local citizens.²¹³ This model of democratic energy ownership was further supported under the *Renewable Energy Act*, which mandated that a portion of all new wind projects be offered to local citizens, thereby increasing acceptance and reducing opposition to such projects.²¹⁴

Another key project is the Anholt Offshore Wind Farm, one of the largest of its kind in Denmark. Constructed after the enactment of the *Renewable Energy Act*, Anholt was a direct beneficiary of the streamlined permitting and public tendering systems introduced by the *Renewable Energy Act*.²¹⁵ With a total capacity of 400 MW, the farm contributes significantly to Denmark's renewable electricity supply.²¹⁶ Its development was facilitated by the Danish Energy Agency's enhanced regulatory oversight, which ensures that large-scale projects comply with environmental standards while meeting national renewable energy goals.²¹⁷

Moreover, under the *Renewable Energy Act*, the Danish Energy Agency (Energistyrelsen) was assigned a central role in coordinating renewable energy planning, enforcement of policies, monitoring compliance, issuing licenses, coordinating research, innovation grants, and

²¹² Jens Larsen, 'The World's Largest Offshore Windfarm, Middelgrunden 40 MW' (2001) World Sustainable Energy Day, 1. See also Jens Larsen, 'Middelgrunden Off-shore Windfarm Organizing and Fianans' (2003) Case Study for Predac, 1. Jens Larsen *et al*, 'Experiences from Middelgrunden 40 MW Offshore Wind Farm' (2005) Copenhagen Offshore Wind, 2.

²¹³ Copenhagen Environment and Energy Office, 'The Middelgrunden Offshore Wind Farm, 6 <https://base.socioeco.org/docs/a118_doc1.pdf> accessed 7 July 2025.

²¹⁴ Section 13 of the *Renewable Energy Act*, 2008:1392.

²¹⁵ Katinka Johansen, 'Wind Energy in Denmark: A Short History' (2021) 19(3) IEEE Power and Energy Magazine, 94.

²¹⁶ Paragraph 3.1.2.2 of the Energinet.dk Anholt Offshore Wind Farm, 2009.

²¹⁷ Katika Johansen, *op cit.* 204.

administration of support schemes.²¹⁸ In fact, the Danish Energy Agency itself was established prior to the enactment of the *Renewable Energy Act*.²¹⁹ Through enforcement mechanisms such as mandatory grid connection for renewable energy projects and penalties for non-compliance with emissions targets, the *Renewable Energy Act* ensures a high level of regulatory integrity. Denmark has become one of the global leaders in wind energy, where over 50% of electricity consumption is now covered by renewables,²²⁰ with plans to reach 100% renewable electricity by 2030 and net-zero emissions by 2050.²²¹

Biomass also received a considerable boost under the *Renewable Energy Act*. Denmark has since converted several coal-fired power stations, such as the Avedøre Power Station near Copenhagen, to operate using biomass. This conversion was supported by subsidies and tax incentives provided under the *Renewable Energy Act*, which promoted the use of waste products and sustainable forestry residues for energy generation. The integration of biomass has not only reduced dependence on fossil fuels but has also improved waste management and circular economy practices within Denmark.

Finally, the *Renewable Energy Act* emphasized research and development, facilitating investments into cutting-edge technologies like energy storage, smart grids, and offshore wind innovation. The Danish Technical University (DTU), for example, has partnered with government agencies and private companies to develop wind turbine technologies that have since been exported globally, showcasing the synergy between legal policy and technological advancement. Thus, the *Renewable Energy Act* did not merely facilitate the adoption of renewable energy; it revolutionized the national energy landscape by embedding

²¹⁸ Sections 22, 30, 35 (d-e), 49 of the *Renewable Energy Act*, 2008:1392.

²¹⁹ Energistyrelsen, 'About the Danish Energy Agency' <https://ens.dk/en/about-us/about-danish-energy-agency?utm_source=> accessed 7 July 2025.

²²⁰ Pioneers in Clean Energy (Denmark.dk) <<https://denmark.dk/innovation-and-design/clean-energy>> accessed 7 July 2025.

²²¹ Nordic Energy Research, Denmark: 100% Renewable Energy Supply <<https://www.nordicenergy.org/figure/ambitious-climate-targets-and-visions-for-all-nordic-countries/100-renewable-energy-supply/>> accessed 7 July 2025.

sustainability into legal, social, and economic systems. Through targeted incentives, citizen engagement, regulatory clarity, and robust enforcement, the *Renewable Energy Act* transformed Denmark into a global exemplar of how law and policy can drive meaningful climate action and energy innovation.

4.2.1.4 Climate Act 2020

The *Climate Act* of 2020 outlines Denmark's overarching legal and institutional framework to address climate change.²²² Although it does not focus exclusively on renewable energy, it establishes a strategic direction and institutional mechanisms that inherently support and promote the adoption of renewable energy as a central component of Denmark's energy mix. The purpose of the *Climate Act* is to ensure that Denmark reduces its greenhouse gas emissions by 70% by 2030 relative to 1990 levels, and becomes a climate-neutral society by 2050 at the latest.²²³ Although the *Climate Act* does not prescribe technologies, achieving such deep reductions necessarily requires a fundamental shift from fossil fuels to renewable energy sources, particularly in the electricity, heating, and transport sectors.

In addition, the *Climate Act* emphasizes Denmark's commitment to the Paris Agreement's goal of limiting global temperature rise to 1.5 degrees Celsius,²²⁴ reinforcing the need for renewable energy to replace carbon-intensive energy systems. However, the *Climate Act* sets out guiding principles that implicitly promote renewable energy: Denmark, as a global leader, is to act as a role model in climate action, showing how a wealthy, industrialized country can decarbonize its economy.²²⁵ Given Denmark's legacy in wind energy and clean technology, expanding renewable energy is an essential way to maintain this leadership. In addition,

²²² Climate Act No. 965 of 26 June 2020.

²²³ *ibid.* Article 1(1).

²²⁴ *ibid.* Article 1(2).

²²⁵ *ibid.* Article 1(3)(1).

emphasis is placed on cost-effective realization of climate targets,²²⁶ aligning with strategies that scale up renewable technologies such as wind and solar energy. Moreso, the *Climate Act* supports long-term green transition and sustainable development of Danish industries, implying investment in renewables as a growing economic sector.²²⁷ The principle of a strong welfare society and social cohesion suggests that renewable energy should be accessible, not elitist, and should contribute to just transitions in all communities.²²⁸ In all, emissions reductions must be real and domestic, which encourages in-country investments in wind farms, solar arrays, and bioenergy projects rather than outsourcing solutions or relying on carbon offsets abroad.²²⁹

For climate targets and action plans, the Minister for Climate, Energy and Utilities is required to set national climate targets every five years with a 10-year perspective.²³⁰ Importantly, these targets must be progressively ambitious.²³¹ The key targets include a reduction of greenhouse gas emissions by 50–54% by 2025 compared to 1990 levels, a legally binding 70% reduction by 2030, and achieving climate neutrality by 2045. By 2050, Denmark aims for a 110% reduction in emissions, relying on carbon dioxide removal strategies to achieve net-negative emissions.²³² These legally binding targets drive planning in energy policy and budget allocation, where renewable energy projects are prioritized to meet such goals. The *Climate Act* also requires the publication of a climate action plan every five years, which will outline strategies to meet those targets.²³³ These plans are expected to include the scaling up of renewable energy sources as part of Denmark's strategic decarbonisation path.

²²⁶ *ibid.* Article 1(3)(2).

²²⁷ *ibid.* Article 1(3)(3).

²²⁸ *ibid.*

²²⁹ *ibid.* Article 1(3)(4).

²³⁰ *ibid.* Article 2(1).

²³¹ *ibid.*

²³² *Ibid.*

²³³ *ibid.* Article 2(2).

Subsequently, the Danish Council on Climate Change, established and strengthened through the *Climate Act*,²³⁴ plays a vital role in advising the government and assessing progress. The Council must issue annual recommendations based on the guiding principles which include sustainable development and real domestic reductions, linking to renewable energy deployment.²³⁵ The *Climate Act* requires the Minister for Climate, Energy and Utilities to produce an annual climate status and projection, including emissions data by sector, implicitly highlighting the need for renewable energy development in sectors lagging behind,²³⁶ and the climate programme presented to the Danish Parliament must include planned climate measures with their short- and long-term effects, including technology pathways and mitigation measures, which necessarily concern renewable energy strategies.²³⁷ Furthermore, the *Climate Act* states that if it is not probable that national targets will be reached, the Minister must propose new initiatives with both short- and long-term impacts.²³⁸ This provision ensures a course correction mechanism, including likely acceleration of renewable energy projects where necessary.

Finally, the *Climate Act* mandates the Danish Council on Climate Change²³⁹ to consist of experts in areas such as energy, transport, agriculture, environment, and climate science,²⁴⁰ ensuring that renewable energy issues are adequately represented and scrutinized. The Council is supported by a secretariat and a climate dialogue forum, which allows for stakeholder engagement and public input, including actors from the renewable energy sector.²⁴¹

²³⁴ *ibid.* Article 3-5.

²³⁵ *ibid.* Article 1(3).

²³⁶ *ibid.* Article 6(1-3).

²³⁷ *ibid.* Article 7(2).

²³⁸ *ibid.* Article 7(4).

²³⁹ *ibid.* Article 10(1).

²⁴⁰ *ibid.* Article 10(3).

²⁴¹ *ibid.* Article 12.

From the foregoing, the *Climate Act* establishes a legally enforceable, institutional structure that significantly encourages the spread of renewable energy as a way of achieving its climate goals, despite the fact that it does not provide particular limits or requirements for the utilization of renewable energy sources. However, within Denmark's climate governance, the adoption of renewable energy is both a strategic necessity and a legal expectation due to key provisions, especially those pertaining to national targets,²⁴² principles,²⁴³ climate action planning,²⁴⁴ and expert oversight.²⁴⁵ In line with both national interests and international climate requirements, these factors collectively guarantee that renewable energy sources will progressively dominate the country's energy mix in the future.

One of the most distinctive features of the *Climate Act* is its emphasis on accountability and systematic implementation. It established a mechanism whereby the government must present an annual Climate Action Plan, complete with sector-specific roadmaps.²⁴⁶ These plans must be backed by scientific advice and independent assessment from the Danish Council on Climate Change (Klimarådet), ensuring that every action taken is both ambitious and evidence-based.²⁴⁷ In practical terms, the *Climate Act* has encouraged large-scale investment in renewable energy infrastructure. A prime example is the North Sea Energy Island project, which is a direct response to the 70% emissions reduction goal.²⁴⁸ This artificial island, set to be completed by the 2030s, will function as a hub for 10 GW of offshore wind energy, enough to supply electricity to millions of European households.²⁴⁹ The project reflects the government's strategy to utilize Denmark's geographical advantage for wind energy while

²⁴² *ibid.* Article 1 and 2.

²⁴³ *ibid.* Article 1(3).

²⁴⁴ *ibid.* Article 7.

²⁴⁵ *ibid.* Articles 3-5 and 10-12.

²⁴⁶ *ibid.* Article 12.

²⁴⁷ *ibid.* Article 10.

²⁴⁸ Sun Cole Seeberg Dyremose, 'Bog Projects, Political Ambitions and Preparing for the Green Transition – the North Sea Energy Island in Denmark' (2025) 24(32) *Maritime Studies*, 1.

²⁴⁹ Rafael Martinez-Gordon et al, 'Benefits of an Integrated Power and Hydrogen Offshore Grid in a Net-zero North Sea System' (2022) 7 *Advances in Applied Energy*, 1.

also aligning with the enforcement requirements of the *Climate Act*, such as annual monitoring and climate accounting.²⁵⁰

Another significant project that emerged in line with the purpose of the *Climate Act* is the expansion of the Thor Offshore Wind Farm. With a capacity of 1 GW, it is one of the largest in Denmark and is expected to be operational by the end of the decade.²⁵¹ The Thor Offshore Wind Farm is a major renewable energy project initiated by the Danish government as part of its climate and energy transition goals, particularly under the framework of the *Climate Act*.²⁵² The project officially began its development phase in 2021, when the Danish Energy Agency launched the tender process for the wind farm. In December 2021, the tender was awarded to RWE Renewables, a major energy company based in Germany. The construction of Denmark's Thor Offshore Wind Farm has commenced. In April 2025, RWE installed the first monopile foundation at the site, marking a significant milestone in the project's development.²⁵³ As of July 2025, approximately half of the monopile foundations have been installed, and the installation of the offshore substation has been completed.²⁵⁴ The turbine installation is scheduled to begin in 2026, with the wind farm expected to be fully operational by the end of 2027.²⁵⁵ The Danish government awarded the tender for the project under a framework that requires bidders not only to meet technical and economic benchmarks but

²⁵⁰ State of Green: North Sea Energy Island Will Supply Green Electricity to Millions of Households <<https://stateofgreen.com/en/news/north-sea-energy-island-will-supply-green-electricity-to-millions-of-households/>> accessed 8 July 2025.

²⁵¹ RWE, 'Thor Offshore Windfarm' <<https://thor.rwe.com/>> accessed 8 July 2025.

²⁵² *ibid.*

²⁵³ Sarah Knauber, 'RWE Installs First Foundation at Thor Offshore Wind Farm' (RWE, 30 April, 2025) <<https://www.rwe.com/en/press/rwe-offshore-wind-gmbh/2025-04-30-rwe-installs-first-foundation-at-thor-offshore-wind-farm/>> accessed 13 September 2025.

²⁵⁴ Majal Moskal, 'Half of the Monopile Foundations Installed at Thor Offshore Wind Farm Off the Danish Coast' (Baltic Wind.EU, 17 July, 2025) <<https://balticwind.eu/half-of-the-monopile-foundations-installed-at-thor-offshore-wind-farm-off-the-danish-coast/>> accessed 13 September 2025.

²⁵⁵ Sara Knauber, 'Topping-out Ceremony: Operations and Maintenance Base for Thor Offshore Wind Farm Nearing Completion' (RWE, 13 June, 2025) <<https://www.rwe.com/en/press/rwe-offshore-wind-gmbh/2025-06-13-operations-and-maintenance-base-for-thor-offshore-wind-farm-nearing-completion/>> accessed 13 September 2025.

also to contribute to Denmark's legally binding climate goals.²⁵⁶ These highlights how the enforcement mechanisms of the *Climate Act* influence the regulatory structure of renewable energy projects, ensuring they contribute directly to national targets.

In summary, the *Climate Act* has provided not just aspirational targets but also a legally binding framework for action, complete with enforcement mechanisms that demand transparency, consistency, and scientific oversight.²⁵⁷ It has led to transformative projects such as the North Sea Energy Island, the Thor Offshore Wind Farm, and innovations in energy systems, all of which demonstrate how legislation can drive real and measurable progress in renewable energy deployment. Through these mechanisms and outcomes, Denmark stands as a model for integrating legislative ambition with practical renewable energy advancement.

Innovation in the development of renewable energy sources is not limited to Sweden and Denmark. Norway has made significant strides in the area. The achievements of Norway in that regard, and the legal framework facilitating same are discussed in the next section.

4.3 Norway

Norway's energy sector has evolved significantly over the past century, transitioning from coal dependence to global leadership in renewable energy, especially hydropower. This shift was enabled by abundant natural resources, political will, and progressive legislation.²⁵⁸ Hydropower development began in the early 1900s, quickly becoming the foundation of domestic electricity supply, while public investment helped build energy-intensive

²⁵⁶ Sarah Knauber, 'Thor: RWE Signs Concession Agreement to Build Denmark's Hitherto Largest Offshore Windfarm' <<https://www.rwe.com/en/press/rwe-renewables/2022-01-25-rwe-signs-concession-agreement-to-build-denmarks-hitherto-largest-offshore-wind-farm/>> accessed 8 July 2025.

²⁵⁷ Article 1 of the *Climate Act*, 2020.

²⁵⁸ Solomon Lartey, 'Norway's Contribution to Renewable Energy Development and Oil in Advancing Long-Term Sustainability' (2024) <https://www.researchgate.net/publication/383748414_Norway's_Contribution_to_Renewable_Energy_Development_and_Oil_in_Advancing_Long-Term_Sustainability> accessed 8 July 2025.

industries.²⁵⁹ Despite its wealth from fossil fuels, Norway remained reliant on hydropower for over 90% of domestic electricity, creating a dual structure of renewable-powered consumption and fossil-fuel-driven exports.²⁶⁰ By the 1990s, growing environmental awareness led to increased investments in sustainability, including wind, solar, and carbon reduction efforts.²⁶¹

In addition, Norway has led in electric vehicle adoption through strong incentives and in developing carbon capture and storage technologies, such as the Northern Lights project.²⁶² These efforts align with the country's international climate commitments and are supported by institutions like Enova and the Norwegian Water Resources and Energy Directorate.²⁶³

Through strategic governance, Norway has balanced fossil fuel wealth with environmental responsibility. Its transition stands as a global example of how energy-rich nations can move towards sustainability by aligning natural advantages with forward-looking policy and innovation.²⁶⁴ Development of renewable energy sources and the attendant legal framework is discussed in the succeeding paragraphs.

4.3.1 Legal Framework Regulating Energy in Norway

4.3.1.1 Energy Act 1990 (Energiloven)

²⁵⁹ Synne Movik and Jeremy Allouche, 'States of Power Energy Imaginaries and Transnational Assemblages in Norway, Nepal and Tanzania' (2020) 67(1) *Energy Research & Social Science*, 3.

²⁶⁰ Johannes Idso, 'Small Scale Hydroelectric Power Plants in Norway. Some Microeconomic and Environmental Considerations' (2017) *MDPI Sustainability*, 1.

²⁶¹ *ibid.*

²⁶² Avi Mersky *et al.*, 'Effectiveness of Incentives on Electric Vehicle Adoption in Norway' (2016) 46(3) *Transportation Research Part D Transport and Environment*, 56. See also TotalEnergies, 'Northern Lights: A CO₂ Transport and Storage Project to Reduce Industrial Emissions in Europe' <<https://totalenergies.com/company/projects/carbon-capture-and-storage/northern-lights-norway>> accessed 8 July 2025. Paragraph 2.1 of the Northern Lights Project Concept report RE-PM673-00001 <<https://ccsnorway.com/app/uploads/sites/6/2020/05/Northern-Lights-Project-Concept-report.pdf>> accessed 8 July 2025.

²⁶³ Paragraph 1.1 of the Norwegian Water Resources and Energy Directorate National Report, 2015.

²⁶⁴ Kacper Szulecki *et al.*, 'Norwegian Oil and Gas Transition: Building Bridges Towards a Carbon Neutral Future' (2021) *OGT Oil & Gas Transition*, 8. See also, Benjamin Sovacool *et al.*, 'Competing Values, Ideologies and Lock-in Dependencies in Sociotechnical Pathways for Industrial Decarbonization' (2025) 165 *Environmental Science and Policy*, 6.

The *Energy Act* of 1990, officially titled Act No. 50 of 29 June 1990 relating to the production, conversion, transmission, trading, distribution and use of energy, lays the legislative framework for regulating Norway's energy sector.²⁶⁵ It reflects a strong emphasis on market-oriented principles, efficient resource use, and increasingly, the integration of renewable energy sources into the national energy mix. The overarching purpose of the *Energy Act*, is to ensure that, energy is produced, converted, transmitted, traded, distributed, and used in a way that is socio-economically efficient, safe, and that minimizes environmental harm,²⁶⁶ and also aims to promote efficient utilization of resources and facilitate a well-functioning energy market.²⁶⁷ This provision reflects the *Energy Act*'s primary policy goal, which is to promote an efficient, secure, and socially responsible energy system. Although it does not explicitly mention renewable energy, the "interests of society" and environmental considerations implied here form the legislative basis for renewable energy integration.²⁶⁸ This aligns with Norway's broader policy to use renewable sources such as hydropower, wind, and bioenergy in its energy strategy.

For licensing and environmental impact, the *Energy Act* outlines the procedure for applying for energy licenses, and that an environmental impact assessment shall be submitted with the application.²⁶⁹ This gives the Ministry and licensing authorities the power to assess projects based on their environmental consequences, which favours renewable projects due to their typically lower ecological impact compared to fossil-based energy production. It can be argued that, this environmental review mechanism effectively prioritizes cleaner technologies in the licensing process.

²⁶⁵ Preamble of the *Energy Act* No. 50, 1990.

²⁶⁶ *ibid.* section 1-1.

²⁶⁷ *ibid.*

²⁶⁸ Energy Facts Norway – The Energy Supply System <<https://energifaktanorge.no/en/utskrift/>> accessed 14 September 2025.

²⁶⁹ *ibid.* section 2-1.

The *Energy Act* requires licensing for the construction and operation of installations for the production, conversion, and transmission of energy,²⁷⁰ which includes renewable energy installations such as wind farms or solar power stations in the literal sense, as it allows the energy authorities to assess the environmental impact and socio-economic benefit of proposed energy facilities, which thereafter provides an entry point for authorities to favor renewable energy developments over fossil-based projects, as they often have lower environmental footprints.

In addition, the *Energy Act* charges the transmission system operator with the responsibility of ensuring that the electricity supply system operates in a coherent and coordinated manner, and obliges operators to provide non-discriminatory access to the grid.²⁷¹ This provision is crucial for renewable energy producers, who typically generate electricity in decentralized and intermittent ways, therefore, guarantee of grid access ensures that small-scale and variable renewable energy sources can participate in the national energy system.

In relation to the restructuring of energy use and generation, the *Energy Act* authorizes the Ministry to direct grid operators to add a mark-up to electricity tariffs, with proceeds paid into an energy fund, which is key to renewable energy adoption.²⁷² This fund supports the transition from conventional to renewable and energy-efficient solutions, including subsidies or grants for clean energy projects. The mark-up mechanism is a direct policy tool to: fund green infrastructure, support innovation in renewable technologies, and facilitate the shift to low-carbon energy systems.

Although the *Energy Act* does not specifically name renewables as earlier discussed, it indirectly supports them, especially renewable heating solutions like biomass and solar

²⁷⁰ *ibid.* section 3-1.

²⁷¹ *ibid.* section 4-2.

²⁷² *ibid.* section 4-4.

thermal. It mandates a licence for building or operating district heating plants.²⁷³ In addition, it allows the Ministry to impose conditions related to the operation of such plants,²⁷⁴ and enables mandatory connection between heating systems to increase efficiency.²⁷⁵ These provisions give the Ministry flexibility to require or incentivize renewable heat sources as part of district heating operations, thereby supporting emissions reductions in the heating sector. Moreso, the *Energy Act* mandates that entities holding licenses to take part in energy planning.²⁷⁶ The Ministry sets the terms for this planning, and it includes considerations such as: optimal resource allocation, system efficiency, and environmental sustainability. In practice, this energy planning framework enables regional and national authorities to incorporate renewable energy goals into coordinated planning processes, often supporting decentralized generation (wind, solar), integration of renewable heat (via district heating), and sustainable development strategies.²⁷⁷

Furthermore, the *Energy Act* establishes the basis for a competitive energy market, where producers and consumers can trade energy.²⁷⁸ This liberalized market system supports the entry of new and innovative renewable energy companies, thereby encouraging diversification of the energy mix. The *Energy Act* provides a legal basis for coordinated energy and environmental planning at the municipal and national levels. It encourages municipalities to consider sustainable energy solutions, including renewable energy projects, in their planning processes.²⁷⁹ This means that, energy plans under this provision must account for environmental consequences, thus encouraging the prioritization of clean and renewable energy sources.

²⁷³ *ibid.* section 5-1.

²⁷⁴ *ibid.* section 5-2.

²⁷⁵ *ibid.* section 5-3.

²⁷⁶ *ibid.* section 5B-1.

²⁷⁷ Section 1 of the *Energy Act Regulations* No. 959, 1990.

²⁷⁸ *ibid.* section 7-1.

²⁷⁹ *ibid.* section 8.

One of the most profound impacts of the *Energy Act* was its facilitation of open access to the energy grid. This enabled independent electricity producers, including those relying on renewable energy sources such as wind, small-scale hydro, and later solar, to connect to the national grid and sell electricity on equal footing with established players. By separating the generation of electricity from its transmission and distribution, the *Energy Act* ensured that newcomers, often those with innovative, sustainable technologies could enter the market. This regulatory environment stimulated competition, reduced barriers to entry, and encouraged investment in cleaner energy technologies.

A remarkable example of how the *Energy Act* laid the foundation for renewable energy development is Norway's expansion in wind energy projects. One such project is the Fosen Vind project, which is the largest onshore wind power project in Europe. Located in Trøndelag County.²⁸⁰ Fosen Vind comprises six wind farms and delivers a combined output of about 1,057 MW.²⁸¹ The success of this project can be attributed to the legal certainty, market access, and investor confidence made possible by the *Energy Act*. The open market structure facilitated by the *Energy Act* allowed companies like Statkraft, a state-owned enterprise, and Nordic Wind Power to form public-private partnerships and secure financing for large-scale renewable projects.²⁸²

Another notable project that aligns with the enforcement mechanisms of the *Energy Act* is the increased development of small-scale hydropower plants. Norway, with its abundant water resources, already relied heavily on hydropower, but the *Energy Act* allowed smaller producers to contribute to the national grid. This not only diversified energy sources but also promoted rural development and supported local economies. For instance, the Lio Power

²⁸⁰ Statkraft, 'Fosen Vind' <<https://www.statkraft.com/about-statkraft/where-we-operate/norway/fosen-vind/>> accessed 9 July 2025.

²⁸¹ *ibid.*

²⁸² Lilja Mosesdottir, 'Energy (in)justice in the Green Energy Transition: The Case of Fosen Wind Farms in Norway' (2024) 77 *Technology in Society*, 1.

Plant and several other community-led hydro projects including Seimsdalen Hydro Project,²⁸³ Brandåa, Kysinga Power Station,²⁸⁴ Flateland Hydropower Plant,²⁸⁵ Gullbergelva Hydropower Plant,²⁸⁶ and the Russvikelva projects²⁸⁷ came into existence after the market liberalization, benefiting from streamlined licensing procedures and fair access to infrastructure mandated by the *Energy Act*.

Enforcement mechanisms under the *Energy Act*, such as the supervision role of the Norwegian Water Resources and Energy Directorate, ensured that all players complied with technical, environmental, and market regulations. The Norwegian Water Resources and Energy Directorate was instrumental in granting licenses for renewable energy projects, monitoring energy markets, and ensuring non-discriminatory access to the grid.²⁸⁸ This oversight helped maintain investor confidence and reinforced Norway's environmental commitments while promoting energy innovation.

Therefore, the *Energy Act* was initially framed to introduce competition and efficiency in the power sector, it inadvertently became a catalyst for renewable energy development. Through its liberalized market structure, equitable grid access, and robust regulatory oversight, it laid the legal and institutional groundwork for Norway's continued leadership in sustainable energy. The successful implementation of large-scale wind projects like Fosen Vind and the proliferation of small hydropower plants underscore how the *Energy Act's* principles have translated into tangible outcomes in the renewable energy space.

²⁸³ Johannes Idso, 'Small Scale Hydroelectric Power Plants in Norway: Some Microeconomic and Environmental Considerations' (2017) 9(7) Sustainability, 1.

²⁸⁴ *ibid.*

²⁸⁵ Carrieann Stocks, 'Small Hydro: Powering Local Energy Solutions' (*International Water Power and Dam Construction*, 14 November, 2014) <https://www.waterpowermagazine.com/analysis/small-hydro-powering-local-energy-solutions/?utm_source=> accessed 9 July 2025.

²⁸⁶ Robin Whitlock, 'Gullbergelva Hydropower Plant in Norway begins Commercial Operation' (Renewable Energy Magazine, 16 October, 2024) <https://www.renewableenergymagazine.com/small_hydro/gullbergelva-hydropower-plant-in-fjord-municipality-norway-20241016?utm_source=> accessed 9 July 2025.

²⁸⁷ South Tyrolean Hydro-technology double proves its worth in Norwegian Fjord (Hydrozek International, 21 September, 2022) <https://hydoint.zek.at/projects/south-tyrolean-hydro-technology-double-proves-its-worth-in-the-norwegian-fjord/?utm_source=> accessed 9 July 2025.

²⁸⁸ The Norwegian Water Resources and Energy Directorate National Report, 2015.

4.3.1.2 Climate Change Act 2018 (Klimaloven)

The *Climate Act* (Klimaloven) is a legislative measure that sets out the legal framework for Norway's long-term climate policy. Enacted on January 1, 2018, the *Climate Act* seeks to align national climate action with the international objectives of the Paris Agreement and to guide the country toward a low-emission society by 2050.²⁸⁹ The primary objective of the *Climate Act* is to promote the implementation of Norway's climate goals as part of its transition to a low-emission society by 2050.²⁹⁰ This includes taking comprehensive and coordinated actions to reduce greenhouse gas emissions significantly. It also seeks to enhance transparency and stimulate public debate about progress and direction in climate efforts. Importantly, the *Climate Act* permits these national climate targets to be fulfilled in cooperation with the European Union, enabling Norway to participate in shared climate mechanisms like the EU Emissions Trading System (ETS). In other words, the *Climate Act* makes it clear that cooperation with the EU on shared climate goals is both possible and permissible.

With respect to the coverage of greenhouse gas emissions, the *Climate Act* applies to emissions and removals of greenhouse gases covered under Norway's first nationally determined contribution (NDC) submitted under the Paris Agreement.²⁹¹ This allows for expansion by royal decree to include additional sources or types of emissions and removals. This means that, the King in Council may issue regulations to extend the scope of the *Climate Act* to cover other emissions and removals of greenhouse gases not included in the first paragraph. Additionally, the *Climate Act* legally enshrines a target for 2030, to reduce

²⁸⁹ Preamble of the *Climate Act* (Act No. 965) 2018.

²⁹⁰ *ibid.* section 1.

²⁹¹ *ibid.* section 2.

greenhouse gas emissions by at least 40% compared to 1990 levels.²⁹² This aligns with both Norway's NDC and the EU's collective goals.²⁹³

Similarly, Norway aims to become a low-emission society by 2050, which is known as one where emissions are reduced by 80–95% from 1990 levels.²⁹⁴ This long-term goal is bordered in line with the best available scientific evidence, global emission trends, and Norwegian national circumstances.²⁹⁵ This 2050 goal is explicitly linked to Article 2(1)(a) of the *Paris Agreement*, which refers to limiting global temperature rise to well below 2°C.²⁹⁶ Emissions reductions will consider Norway's participation in the EU ETS, acknowledging the role of market-based mechanisms in the transition. In order to maintain policy relevance and scientific integrity, the *Climate Act* mandates that the government must present updated climate goals every five years, beginning in 2020.²⁹⁷ These revised goals must be based on scientific evidence, be quantifiable and measurable to the greatest extent possible, represent progress beyond previous goals, and be compatible with the Paris Agreement and potential joint implementation with the EU. The *Climate Act* also allows for the establishment of additional, complementary targets to support the overall transition.²⁹⁸

Moreso, in order to ensure accountability and policy alignment, the Norwegian government is required to submit an annual report to the Parliament (Storting) as part of the budget proposal. This report is required to address how Norway plans to achieve its climate targets, the climate impact of the proposed budget, emissions data and projections, including removals and progress toward targets adaptation strategies for climate change, sector-specific emission

²⁹² *ibid.* section 3.

²⁹³ Regulation 2 of the Regulation (Eu) 2021/1119 of the European Parliament and of the Council, 2021.

²⁹⁴ Section 4 of the *Climate Act*, 2018.

²⁹⁵ *ibid.*

²⁹⁶ Article 2(1)(a) of the *Paris Agreement*, 2015.

²⁹⁷ Section 5 of the *Climate Act*, 2018.

²⁹⁸ *ibid.*

pathways, especially for non-ETS sectors, and status of the carbon budget, including within EU collaboration frameworks.²⁹⁹

Although the *Climate Act* does not specifically mention or regulate renewable energy sources, its broader ambitions and legally binding targets clearly point toward a necessary shift in the country's energy system. The design of the *Climate Act* encourages a transformation from a fossil fuel-dependent economy to one increasingly powered by clean and renewable energy.³⁰⁰ This implication can be understood by examining several key provisions of the law. First, the *Climate Act* sets a national goal to reduce greenhouse gas emissions by 80–95% by the year 2050, aiming to make Norway a low-emission society.³⁰¹ Achieving this dramatic level of emissions reduction would be impossible without fundamentally overhauling the country's energy infrastructure. Given Norway's traditional reliance on oil and gas, this goal implicitly demands a move toward renewable energy sources such as hydropower (already well-developed), wind energy, solar power, and offshore renewables.

Second, the *Climate Act* require that all climate goals be updated every five years based on the best available science, and that they include sector-specific pathways for emission reductions.³⁰² This scientific and sectoral approach underscores the need to shift energy generation, transport, industry, and heating systems toward low-carbon alternatives, all of which naturally encourage the growth of the renewable energy sector. Moreover, the *Climate Act* reflect Norway's alignment with broader EU climate strategies, including participation in mechanisms like the EU Emissions Trading System (ETS).³⁰³ These mechanisms often incentivize or mandate the adoption of renewables, reinforcing the shift as part of an integrated European climate agenda.

²⁹⁹ *ibid.* section 6.

³⁰⁰ *ibid.* sections 3–4. See also International Energy Agency – 2022, 'Act Relating to Norway's Climate Targets' < <https://www.iea.org/policies/14569-act-relating-to-norways-climate-targets?> > accessed 14 September 2025.

³⁰¹ *ibid.* section 4.

³⁰² *ibid.* sections 5–6.

³⁰³ *ibid.* sections 1 and 4.

Finally, the *Climate Act* ensures public accountability by requiring the government to report annually to Parliament on the country's progress in meeting its climate targets.³⁰⁴ These reports are required to address sectoral emissions, adaptation efforts, and the overall carbon budget. As a result, there is continual political and public pressure on authorities to demonstrate real progress, especially through investments in renewable energy infrastructure and technologies. However, a key example is the expansion of Norway's wind energy sector, notably the Fosen Vind project, one of Europe's largest onshore wind farms,³⁰⁵ which aligns with the *Climate Act*'s requirement for annual climate reviews and cross-sectoral responsibility for emissions reduction. Similarly, the supported the growth of hydropower modernization projects like the upgrade of the Sira-Kvina and Øvre Otta plants, emphasizing improved efficiency and sustainability.³⁰⁶ These initiatives demonstrate how the enforcement mechanisms of the *Climate Act*, such as mandatory government reporting to Parliament and sectoral accountability, translated into real, large-scale renewable energy projects, ensuring climate policy continuity and action. In essence, while the *Climate Act* is not a renewable energy legislation in itself, it creates a legal and policy environment in which the adoption of renewables becomes both a practical necessity and a policy priority.

4.3.1.3 Electricity Certificate Act 2011

The *Electricity Certificate Act*, commonly referred to as the *Elcertificate Act*, serves as a key legislative instrument in promoting renewable energy in Norway.³⁰⁷ Its primary objective is “to contribute to increased generation of electrical energy from renewable energy sources.”³⁰⁸ This overarching goal is realized through the introduction of a market-based support system

³⁰⁴ *ibid.* section 6.

³⁰⁵ Statkraft, ‘Fosen Vind’ op cit. n263.

³⁰⁶ L Lia et al, ‘The Current Status of Hydropower Development and Dam Construction in Norway’ (2015) 3 Hydropower & Dams, 38.

³⁰⁷ Preamble, *Electricity Certificate Act* (Act No. 39) 2011.

³⁰⁸ *ibid.* section 1.

that incentivizes the production and use of renewable energy, encouraging a greener energy mix in Norway.

The *Electricity Certificate Act* establishes a framework whereby electricity producers can earn elcertificates for generating energy from renewable sources. These certificates are issued per megawatt hour (MWh) of eligible renewable electricity produced.³⁰⁹ The entitlement to these certificates stipulates that a production facility must: generate electricity from renewable sources;³¹⁰ including hydropower, wind, solar, ocean, geothermal, and bioenergy;³¹¹ be accredited³¹² upon written application from the owner, accredit production devices that qualify for the right to elcertificates;³¹³ comply with metering and reporting standards³¹⁴ particularly, electrical energy metered and reported to the registry responsible on the basis of a system for metering generation and verification of the metering results.³¹⁵ Thus, this structure is critical as it aligns financial incentives with the environmental goal of expanding renewable energy production.

In addition, there is a defined operational period for the certificates. The *Electricity Certificate Act* states that elcertificates can be issued for production occurring up to 31 December 2035, with final cancellation allowed by 1 April 2036.³¹⁶ This timeline ensures a long-term horizon for investments in renewable infrastructure while also setting a predictable endpoint for the support scheme, encouraging timely development. However, in order to create demand for elcertificates and ensure that they retain value, the *Electricity Certificate Act* introduces a quota obligation for certain electricity consumers.³¹⁷ These include, suppliers

³⁰⁹ *ibid.* section 3(a).

³¹⁰ *ibid.* section 6(a).

³¹¹ *ibid.* section 7.

³¹² *ibid.* section 6(b).

³¹³ *ibid.* section 8.

³¹⁴ *ibid.* section 6(c).

³¹⁵ *ibid.* section 9.

³¹⁶ *ibid.* section 4.

³¹⁷ *ibid.* Chapter 4, section 16.

to end-users; self-producers of electricity; and purchasers on the Nordic power exchange or through bilateral agreements.³¹⁸ These entities must acquire and cancel a specified number of elcertificates annually, proportional to their electricity consumption. The annual quotas started at 3% in 2012 and gradually decreasing after peaking in 2020 at 18.3%.³¹⁹ This quota system underpins the market mechanism of the *Electricity Certificate Act* by creating stable demand for elcertificates.

Although primarily a national scheme, the *Electricity Certificate Act* acknowledges the potential for international cooperation, especially within the European Economic Area (EEA), as it allows the Ministry to make provisions for the use of foreign elcertificates, opening avenues for cross-border trading and harmonization with other renewable energy systems.³²⁰ By issuing tradable electricity certificates to producers of renewable energy, the *Electricity Certificate Act* ensured that energy suppliers contributed to a set quota of green energy, effectively making clean energy generation both profitable and essential.

A notable outcome of this mechanism is the development of large-scale wind power projects such as the Raskiftet Wind Park³²¹ and the Tellenes Wind Farm,³²² which were directly supported through electricity certificates. These projects not only increased the share of renewables in Norway's energy mix but also underscored the effectiveness of the *Electricity Certificate Act's* market-driven enforcement. By requiring buyers to purchase a specific share of their electricity from certified renewable sources, the *Electricity Certificate Act* guaranteed sustained demand, driving forward Norway's clean energy transition in a transparent,

³¹⁸ *ibid.* section 16(a-c).

³¹⁹ *ibid.* section 17.

³²⁰ *ibid.* section 5.

³²¹ GlobalData, Powerplant Profile: Raskiftet Vindkraftverk, Norway (Power Technology, 21 October, 2024) <<https://www.power-technology.com/data-insights/power-plant-profile-raskiftet-vindkraftverk-norway/?cf-view>> accessed 9 July 2025.

³²² GlobalData, Powerplant Profile: Tellenes, Norway (Power Technology, 21 October, 2024) <<https://www.power-technology.com/data-insights/power-plant-profile-raskiftet-vindkraftverk-norway/?cf-view>> accessed 9 July.

accountable, and economically viable way. In the same vein, the *Electricity Certificate Act* mandates the establishment of an elcertificate registry, which tracks the issuance, trading, and cancellation of certificates.³²³ The registry ensures transparency, and provide mechanisms for trading, pledging, and publishing pricing information.³²⁴ This fosters a transparent, accountable, and efficient certificate market.

Furthermore, in order to ensure compliance, the *Electricity Certificate Act* includes various enforcement provisions, such as introducing coercive fines, violation fees, and even criminal penalties for non-compliance or misinformation.³²⁵ These provisions underscore the seriousness with which Norway approaches its renewable energy commitments. Importantly, the *Electricity Certificate Act* excludes certain facilities from elcertificate eligibility, particularly those that have received investment support from the Norwegian state unless such support has been repaid by a stipulated deadline.³²⁶ This rule can be said to prevent double-subsidization and aligns the market-based system with fair competition principles.

Therefore, the *Electricity Certificate Act* serves as a cornerstone in Norway's transition toward a sustainable energy mix. Through a market-oriented quota and certification system, it not only stimulates investment in renewable energy but also aligns Norway's domestic energy policy with broader European objectives under the EEA framework. Its deliberate structure, emphasizing eligibility criteria, quota obligations, market transparency, and legal enforcement ensures a robust mechanism for achieving long-term renewable energy growth.

Africa may not yet be as advanced as the Nordic countries in the shift from fossil fuels to renewable energy, but several countries are working to change this narrative. Across the continent, governments are increasingly prioritizing clean energy as a pathway to sustainable

³²³ Section 11 of the *Electricity Certificate Act* (Act No. 39) 2011.

³²⁴ *ibid.* sections 12-15.

³²⁵ *ibid.* sections 25-27.

³²⁶ *ibid.* section 8.

development. Kenya and South Africa stand out for their remarkable strides in expanding renewable energy capacity. Their efforts demonstrate that Africa can play a leading role in the global energy transition. The following sections examine these two countries more closely.

4.4 Kenya

Kenya's energy sector has transformed significantly over recent decades, shifting from heavy reliance on imported fossil fuels to a diverse, locally sourced renewable energy mix.³²⁷ Initially, energy demand was met primarily through biomass and imported petroleum, with limited electricity access concentrated in urban areas and largely dependent on hydropower, which proved unreliable during droughts. By the 1990s, rising demand, economic growth, and vulnerability to oil shocks highlighted the need for energy diversification and sustainability.³²⁸ This prompted legal and policy reforms, beginning with the *Energy Act* of 2006, which consolidated laws on electricity, petroleum, and renewables, and established the Energy Regulatory Commission (now the Energy and Petroleum Regulatory Authority, EPRA) to oversee licensing, tariffs, and private sector participation.³²⁹

Momentum increased with the enactment of the *Energy Act*, 2019, which repealed the *Energy Act* 2006 and modernized Kenya's energy laws to support renewable energy expansion and climate commitments. It introduced stronger regulatory mechanisms, established institutions like the Rural Electrification and Renewable Energy Corporation (REREC), and aligned energy policy with Vision 2030 and the Paris Agreement. Incentive schemes such as the

³²⁷ Mohammed Takase, Rogers Kipkoech and Paul Essandoh, 'A Comprehensive Review of Energy Scenario and Sustainable Energy in Kenya' (2021) 7 Fuel Communications, 1.

³²⁸ *ibid.*

³²⁹ Agnieszka Kazimierzczuk, 'Wind Energy in Kenya: A Status and Policy Review' (2019) 107 Renewable and Sustainable Energy Review, 434.

Feed-in Tariff and Auction System attracted significant private investment.³³⁰ As a result, Kenya has become a continental leader in renewables, with geothermal energy anchored by the Olkaria fields playing a central role.³³¹ Wind and solar also expanded rapidly, exemplified by the Lake Turkana Wind Power Project and rural solar mini-grids.³³²

Today, over 80% of Kenya's electricity comes from renewable sources.³³³ When compared with Nigeria, the difference is striking. Nigeria's electricity generation is still overwhelmingly dependent on fossil fuels. Although the country has published renewable energy policies and strategies, implementation has been weak, and the renewable contribution to the grid remains minimal.³³⁴ Nigeria's power sector also faces more fundamental challenges, including under-investment in transmission and distribution, unreliable grid performance, financial non-viability of many utilities, and the continued burden of fossil fuel subsidies.³³⁵

Kenya, as discussed, has moved further in aligning its legal framework with renewable energy development, and this has produced tangible results in the electricity mix. Nigeria has yet to achieve a comparable transformation, despite its abundant solar potential and the growing need to diversify away from fossil fuels. This contrast illustrates both the significance of Kenya's achievement and the pressing need for Nigeria to undertake deeper reforms if it is to emulate Kenya's progress towards a clean energy future. Despite challenges,

³³⁰ Mohammed Takase, Rogers Kipkoech and Paul Essandoh, 'A Comprehensive Review of Energy Scenario and Sustainable Energy in Kenya' (2021) 7 Fuel Communications, 11.

³³¹ Exploring Kenya's Renewable Energy Sector: Potential and Challenges < <https://clgglobal.com/exploring-kenyas-renewable-energy-sector-potential-and-challenges/> accessed 9 July 2025.

³³² Stephen Kimutai, Isaiah Kimutai and Kibet Kiplagat, 'East Africa's Renewable Energy Diversity Landscape: A Case of Kenya's Potential, Progress and Future Prospects' (2024) 16(9) Journal of Energy Research and Reviews, 14.

³³³ Ibrahim Kipngeno Rotich, Hilda Chepkirui and Peter Musyimi, 'Renewable Energy Status and Uptake in Kenya' (2024) 54 Energy Strategy Reviews, 2.

³³⁴ Ekele Dinneya-Onuoha, 'Unlocking Renewable Energy Materials in Nigeria: Availability, Application, and Roadmap for Sustainability' (2025) 3 RSC Sustainability, 2534.

³³⁵ G Ofosu-Peasah *et al*, 'Assessment of Energy Security in West Africa: A Case Study of Three Countries' (2024) 10 Heliyon, 1.

Kenya's evolving legal framework has enabled stable, sustainable energy development and positioned the country as a model for clean energy transition in the Global South.³³⁶

4.4.1 Legal Framework Regulating Energy in Kenya

4.4.1.1 Constitution of Kenya

The foundation of Kenya's transition toward renewable energy can be traced to the *Constitution of Kenya* 2010. With respect to the 'environment' the *Constitution of Kenya* guarantees every person the right to a clean and healthy environment, as it clearly states that-

“...every person has the right to clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures.”³³⁷

While the provision does not mention energy explicitly, it requires that the environment must be “clean and healthy,” hence, it can be said that the relevance of this provision sets a constitutional obligation for environmental protection, which logically supports a shift away from the pollution from the use of fossil fuels to cleaner renewable energy sources. Legislation like *Geothermal Resources Act* 1982, and the *Climate Change Act* 2016 have been enacted to further that objective. These are discussed alongside other initiatives in the succeeding paragraphs.

In addition, the *Constitution of Kenya* outlines specific obligations of the State in respect of the environment, including: ensuring sustainable exploitation, usage, managing and protecting the environment and natural resources, and ensuring the equitable sharing of accruing benefits;³³⁸ encourage public participation in the management, protection and

³³⁶ Stephen Kimutai, Isaiah Kimutai and Kibet Kiplagat, op cit. n332.

³³⁷ Article 1(a) of the *Constitution of Kenya*, 2010.

³³⁸ *ibid.* Article 69(1)(a).

conservation of the environment;³³⁹ and establish systems of environmental impact assessment, environmental audit and monitoring of the environment.³⁴⁰ From these provisions, although they do not mandate the use of renewable energy, but they provide a constitutional mandate for sustainable development, which underpins the laws and policies that directly promote renewable energy sources.

Furthermore, the *Constitution of Kenya* makes provision for sustainable and productive management of land resources,³⁴¹ which can relate to the land use for renewable energy projects, thereby aligning land governance with environmental sustainability. While distributing the functions between the national government and the county governments, the *Constitution of Kenya* states that creation of energy policy including electricity and gas reticulation and electricity regulation is the duty of the national government,³⁴² and the county public works and services, including energy regulation at the county level for small-scale projects is the duty of the county government.³⁴³ This schedule thereby facilitates decentralized energy planning, including support for off-grid and mini-grid renewable energy systems in counties. Thus, the *Constitution of Kenya*, does not directly legislate renewable energy, but it provides a broad and binding environmental and sustainability framework. This framework enables and supports legislation and policy instruments that have explicitly driven Kenya's transition toward renewable energy sources.

4.4.1.2 Climate Change Act 2016

The *Climate Change Act* sets out a robust legal and institutional framework designed to guide Kenya's transition towards a low-carbon, climate-resilient development pathway.³⁴⁴ Among

³³⁹ *ibid.* Article 1(d).

³⁴⁰ *ibid.* Article 69(1) (f).

³⁴¹ *Ibid.* Article 60(1)(c).

³⁴² Part I, schedule 31 of the Fourth Schedule to the *Constitution of Kenya*, 2010.

³⁴³ Part II, schedule 8(e) and 10 of the Fourth Schedule to the *Constitution of Kenya*, 2010.

³⁴⁴ Preamble of the Climate Change Act 2016 (Act No. 11 of 2016, Revised Edition 2023).

its key objectives, the *Climate Change Act* emphasizes the promotion and adoption of renewable energy as a central strategy in combating climate change and reforming the country's energy mix. By virtue of its provisions, the *Climate Change Act*, is to be applied for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.³⁴⁵ Particularly to promote low carbon technologies, improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support low carbon, and climate resilient development;³⁴⁶ and provide mechanisms for, and facilitate climate change research and development, training and capacity building.³⁴⁷ These provisions of the *Climate Change Act*, therefore establish the legal foundation for advancing renewable energy technologies as a means of reducing reliance on fossil fuels and cutting greenhouse gas emissions.

In addition, the provision of the *Climate Change Act* details the required contents of the National Climate Change Action Plan (NCCAP),³⁴⁸ and mandates same to enhance energy conservation, efficiency and use of renewable energy in industrial, commercial, transport, domestic and other uses.³⁴⁹ This requirement can be said to institutionalize the inclusion of renewable energy policies and actions in the country's central climate action plan, ensuring that renewable energy adoption is not incidental but strategic and cross-sectoral. The *Climate Change Act* further calls for the identification of national infrastructure requiring "climate proofing,"³⁵⁰ implicitly encouraging the development and deployment of resilient renewable energy infrastructure as a long-term solution to vulnerabilities in the energy sector.

³⁴⁵ *ibid.* section 3(1-2).

³⁴⁶ *ibid.* section 3(2)(g).

³⁴⁷ *ibid.* section 3(2)(j).

³⁴⁸ *ibid.* section 13(1).

³⁴⁹ *ibid.* section 13(3)(j).

³⁵⁰ *ibid.* section 13(3)(h).

Furthermore, the *Climate Change Act* mandates the mainstreaming of climate change measures into both national and county governance structures. In the sense that it requires public entities to integrate the NCCAP into their sectoral strategies and plans.³⁵¹ This includes ministries responsible for energy and infrastructure, and allows the imposition of climate change obligations on private entities, many of which operate in the energy sector.³⁵² This could include mandates to use renewable sources or report on their emissions and energy use. These provisions create a whole-of-government and whole-of-society framework that supports the systematic uptake of renewable energy across all actors.

In order to encourage participation in renewable energy initiatives, the *Climate Change Act* establishes a financing mechanism through the Climate Change Fund (CCF), as a vehicle for financing “priority climate change actions,”³⁵³ which include finance, through grants and loans, the implementation of climate change adaptation and mitigation actions.³⁵⁴ Since renewable energy is both an adaptation and mitigation strategy, this fund can directly support solar, wind, hydro, and biomass energy projects. Moreover, the *Climate Change Act* empowers the Cabinet Secretary to grant incentives to persons who encourage and put in place measures for the elimination of climate change including reduction of greenhouse emissions and use of renewable energy.³⁵⁵ These incentives, potentially including tax breaks, subsidies, or regulatory relief, provide further encouragement for individuals, businesses, and investors to participate in the renewable energy sector in Kenya.

Lastly, the *Climate Change Act* emphasizes the importance of public awareness and education, as it mandates the facilitation of capacity development for public participation, including on

³⁵¹ *ibid.* section 15(5)(a).

³⁵² *ibid.* section 16.

³⁵³ *ibid.* section 25(1-).

³⁵⁴ *ibid.* section 25(8)(c).

³⁵⁵ *ibid.* section 26(1)(a).

issues like renewable energy.³⁵⁶ The *Climate Change Act* also directs the Kenya Institute of Curriculum Development to integrate climate change (including renewable energy themes) into the national education curriculum.³⁵⁷ This public engagement is critical for building broad-based support for renewable energy policies and cultivating a knowledgeable workforce to develop and maintain renewable energy infrastructure.

From the above, the *Climate Change Act* provides a strong legal scaffold for integrating renewable energy into the country's energy mix. It does so by promoting low-carbon technologies, mandating renewable energy integration in national planning, imposing obligations on both public and private actors, creating a dedicated CCF and incentive structures, and embedding renewable energy education and public participation into national life. These comprehensive provisions indicate that Kenya's commitment to expanding its renewable energy portfolio is not just policy rhetoric but is enshrined in law, with clearly defined mechanisms for implementation, oversight, and accountability.

Concrete examples of projects aligned with this legal framework include the Lake Turkana Wind Power Project, the largest wind energy project in Africa. This project, with a capacity of 310 megawatts, was developed in part due to the regulatory certainty provided by the *Climate Change Act*.³⁵⁸ The demand of the *Climate Change Act* for low-carbon strategies helped attract international investors who were reassured by Kenya's statutory commitment to climate-resilient development. Similarly, the Olkaria geothermal energy plants, especially Olkaria IV and Olkaria V, represent another significant rise in clean energy development.³⁵⁹ Kenya tops the African nations in terms of geothermal electricity generation and is one of the

³⁵⁶ *ibid.* section 3(2)(h).

³⁵⁷ *ibid.* section 21.

³⁵⁸ Paragraphs 1-3 of the Updated Environmental and Social Impact Assessment Summary – Lake Turkana Wind Power Project, 2011. See also Agnieszka Kazimierzczuk, *op cit.* n311.

³⁵⁹ Abdek Mahamoud *et al.*, 'Determinants of Community Acceptance of Geothermal Energy Projects: A Case Study on a Geothermal Energy Project in Kenya' (2024) 50 *Renewable Energy Focus*, 1.

fastest-growing geothermal power producers in the world.³⁶⁰ The installation of the Olkaria V geothermal power plant (172 MW) in November 2019 pushed the country's geothermal production capacity up to 865 MW with more than 35% of the households in Kenya depending on geothermal electricity.³⁶¹ Currently, Kenya has over-taken Iceland (755 MW), to rank eighth worldwide.³⁶²

Kenya's electricity supply is now heavily dominated by renewables, which contributed approximately 81.2% of total generation. Geothermal energy remains the leading source, supplying 39.8% of Kenya's electricity. Hydropower follows with around 24.7%, and wind energy accounts for 13.5% of the mix.³⁶³ In addition, solar energy contributes around 3.5% of electricity generation, offering a smaller yet growing share within the national energy mix³⁶⁴

The enforcement mechanisms of the *Climate Change Act*, such as the establishment of the Climate Change Directorate (CCD) and the National Climate Change Council (NCCC) ensure that these projects are not isolated events but part of a broader systemic shift. The NCCC, chaired by the President, monitors compliance and evaluates the performance of climate interventions, including those in the energy sector. This structure ensures

³⁶⁰ Lilian Kong'ami and Raphael Kweyu, 'Toward Sustainable Implementation of Geothermal Energy Projects; the Case of Olkaria I Projects in Kenya' (2022) In book: Geothermal Energy - Impacts and Improvements Edited by D.Sc. Zayre Ivonne González Acevedo and Dr. Marco Antonio García Zarate (IntechOpen) 22.

³⁶¹ EPRA. Energy & Petroleum Statistics Report. Kenya: Energy & Petroleum Regulatory Authority. 2020 <<https://www.epra.go.ke/wp-content/uploads/2021/03/Energy-and-Petroleum-Statistics-Report-2020.pdf>> accessed 9 July 2025.

³⁶² UNESCO. UNESCO Science Report: The Race Against Time for Smarter Development. 2021. UNESCO Publishing, Paris: The United Nations Educational, Scientific and Cultural Organization <https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usmarcdef_0000377433&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_07223302-8f4a-4e99-9997-d370ea8d1818%3F_%3D377433eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf0000377433/PDF/377433eng.pdf#%5B%7B%22num%22%3A2656%2C%22gen%22%3A0%7D%2C%7B%22name%22%3A%22XYZ%22%7D%2C-1%2C842%2C0%5D> accessed 9 July 2025.

³⁶³ Renewables Dominate as Regional Power Trade Expands – EPRA Report (Kurunzi News, 27 March, 2025) <https://kurunzinews.com/the-report-covering-the-first-half-of-the-2024-2025-financial-year-highlights-a-6-13-surge-in-electricity-generation-with-peak-demand-climbing-to-2288-35-mw-up-from-2170-56-mw-the-previous/?utm_source=> accessed 10 July 2025.

³⁶⁴ Kenya's Energy Mix: Key Sources as of December 2024 <<https://www.the-star.co.ke/news/infographics/2024-12-03-kenyas-energy-mix-key-sources-as-of-december-2024?>> accessed 10 July 2025.

accountability and continuity, critical factors that support long-term investment in renewable infrastructure. In conclusion, the *Climate Change Act* has done more than just articulate environmental goals, it has laid down binding obligations and built institutional muscle to see them through. The proliferation of wind, geothermal, and solar energy projects since its enactment is a testament to its effectiveness in facilitating Kenya's shift toward a sustainable energy future.

4.4.1.3 Feed-in Tariff (FiT) Policy 2008 (revised in 2012)

The *Renewable Energy Feed-in Tariff (FiT) Policy*, originally launched in 2008 and modified in 2010 and subsequently in December 2012, is an instrument designed to promote investment and integrate renewable energy into Kenya's energy mix. It achieves economic and environmental goals by guaranteeing a stable and favourable environment for private renewable energy investment. One of the foremost objectives of the *FiT Policy* is to mobilize resources by providing investment security and market stability for private sector investment in electricity generation from renewable energy sources.³⁶⁵ By guaranteeing pre-determined tariffs over a 20-year period for different technologies including wind, biomass, small hydro, geothermal, biogas, and solar, the FiT Policy eliminates revenue uncertainty, making the sector more attractive to Independent Power Producers (IPPs).

The FiT Policy also aims to make the development pathway easier and more accessible by reducing the transaction and administrative burdens inherent in procurement processes used for conventional procurement methods.³⁶⁶ This is accomplished through the use of standardized Power Purchase Agreements (PPAs) for projects less than 10 MW connection to the electricity grid, and involve less time consuming negotiations for the buyers and sellers of

³⁶⁵ Paragraph 8(a) of the Feed-in Tariff (FiT) Policy, 2008 (Revised in 2012).

³⁶⁶ *ibid.* paragraph 8(b).

electricity, and create an easier on ramp to the market for smaller investor groups.³⁶⁷ In addition, the *FiT Policy* emphasizes the importance of encouraging private investors to operate their power plants prudently and efficiently so as to maximize returns.³⁶⁸ By fixing tariffs based on cost-plus-return models and ensuring the tariffs are competitive, the *Fit Policy* drives efficiency and innovation among project developers.

For environmental sustainability and local economic development, the FiT Policy outlines several key benefits of adopting electricity from renewable energy sources, which include the reduction of greenhouse gas emissions,³⁶⁹ enhancement of energy security by reducing dependence on imported fossil fuels,³⁷⁰ and promotion of economic competitiveness and job creation.³⁷¹ These objectives align with Kenya's national policy on sustainable development and climate change mitigation. Moreover, the *FiT Policy* ensures that renewable energy producers have a secured buyer for their energy, addressing a significant barrier to entry for many prospective developers. This is as result of its provision for guaranteed access (transmission and distribution) to the national grid and a purchase obligation for electricity generated from renewable energy sources.³⁷²

Furthermore, the FiT Policy employs a technology-specific tariff design, ensuring that tariffs reflect the actual generation costs for each renewable energy technology.³⁷³ This approach is intended to; accurately reflect capital and operational costs, provide fair investor returns, encourage development of a diverse energy mix for small renewable energy projects, including wind, solar, biomass and biogas, small hydro, and geothermal.³⁷⁴ These tariffs are

³⁶⁷ *ibid.* paragraph 24(a-d).

³⁶⁸ *ibid.* paragraph 8(c).

³⁶⁹ *ibid.* paragraph 9(a).

³⁷⁰ *ibid.* paragraph 9(b).

³⁷¹ *ibid.* paragraph 9(c).

³⁷² *ibid.* paragraph 68.

³⁷³ *ibid.* paragraphs 33-36.

³⁷⁴ Appendix 1 and 2 of the Feed-in Tariff (FiT) Policy, 2008 (Revised in 2012).

structured with a portion indexed to inflation (based on the US Consumer Price Index), ensuring that returns remain viable throughout the PPA's 20-year duration.³⁷⁵

It is important to note that, as the FiT Policy provides for small renewable energy projects (less than 10 MW), it also provides for large scale renewable energy projects (greater than 10 MW) recognizing their characteristics and risks. For small renewable energy projects, the FiT Policy mandates the use of a standardized PPA and non-competitive first-come-first-served approach.³⁷⁶ While a more rigorous process is used for larger scale renewable energy projects, including resource assessments, load-flow analyses, and competitive bidding, especially where national-scale resources are at stake.³⁷⁷ We can say that this dual-track approach allows a broad range of investors and developers, from community-based projects to international investors to participate in Kenya's energy sector. The *FiT Policy* provides for regular review every three years from the date of publication. However, a policy review may be undertaken earlier than three years in exceptional cases.³⁷⁸

From the above, the *FiT Policy* is a comprehensive and forward-looking framework that promotes the integration of renewable energy into Kenya's electricity generation mix. It does this by providing investment certainty through fixed tariffs and guaranteed grid access, tailoring incentives to specific technologies and project sizes, streamlining administrative processes to reduce entry barriers, supporting environmental and socioeconomic development goals, offering mechanisms for policy evolution and continuous improvement. Altogether, the *FiT Policy* reflects Kenya's commitment to a cleaner, more diversified, and resilient energy future.

4.4.1.4 Geothermal Resources Act 1982

³⁷⁵ Paragraph 25(e) of the Feed-in Tariff (FiT) Policy, 2008 (Revised in 2012).

³⁷⁶ *ibid.* paragraphs 23-27.

³⁷⁷ *ibid.* paragraphs 29-32.

³⁷⁸ *ibid.* paragraph 75.

The *Geothermal Resources Act* 1982, plays a foundational role in shaping the country's renewable energy policy, particularly in positioning geothermal energy as a core component of Kenya's energy mix.³⁷⁹ The *Geothermal Resources Act* was enacted to create a legal and institutional framework for the exploration, development, regulation, and use of renewable energy sources, particularly geothermal resources as a sustainable alternative to the dominant hydropower and imported fossil fuels, with a clear emphasis on government control, environmental safety, and regulated private sector participation.³⁸⁰

The *Geothermal Resources Act* declares that all unextracted geothermal resources are vested in the Government.³⁸¹ The provision emphasizes state stewardship over natural energy resources, ensuring that development aligns with national interests and long-term energy planning, and by retaining ownership, the Government retains strategic control over how geothermal energy contributes to Kenya's renewable energy transition. The *Geothermal Resources Act* authorizes the Minister to declare certain lands as "geothermal resources areas" through publication in Gazette.³⁸² This formal designation ensures legal protection and prioritization of areas with geothermal potential. It prevents unauthorized exploitation,³⁸³ thereby maintaining resource integrity and promoting sustainable energy development.

A key objective of the *Geothermal Resources Act* is to establish a licensing regime for geothermal resource development by empowering the Minister for Energy to authorize exploration activities, including entry on land, surveying, and drilling,³⁸⁴ and to grant geothermal resource licenses for up to 30 years, providing a long-term horizon for investment

³⁷⁹ Preamble of the *Geothermal Resources Act*, No. 12 of 1982.

³⁸⁰ Ibrahim Rotich, Hilda Chepkirui and Peter Musyimi, 'Renewable Energy Status and Update in Kenya' (2024) 54 *Renewable Energy Strategy Reviews*, 1.

³⁸¹ Section 3 of the *Geothermal Resources Act* 1982.

³⁸² *ibid.* section 4.

³⁸³ *ibid.* section 5.

³⁸⁴ *ibid.* section 6.

and development.³⁸⁵ The *Geothermal Resources Act* defines the rights conferred under a license, including drilling, resource extraction, infrastructure development, and the generation of electricity.³⁸⁶ These provisions provide legal certainty and structure necessary for private sector involvement, while ensuring that such involvement adheres to national policy goals.

In addition, sustainable development is reinforced through the *Geothermal Resources Act*, addressing safety and environmental protection. The *Geothermal Resources Act* holds licensees liable for loss, damage, or injury caused by their operations.³⁸⁷ It permits the Minister for Energy to order the closure of geothermal bore that poses environmental safety, or public interest concerns, including where it affects other bores or tourist attractions, or threatens ground water.³⁸⁸ In line with this provision, the *Geothermal Resources Regulation* of 1990 stipulates that all operations must prevent waste, protect water and air quality, minimize land disturbance and noise, and protect wildlife and natural habitats.³⁸⁹ This underscores the commitment of the *Geothermal Resources Act* to responsible and environmentally sensitive renewable energy development.

The *Geothermal Resources Act* makes clear provisions for compensation and land use, reflecting its social sustainability goals, as it entitles land owners to compensation for injury or damage resulting from geothermal operations.³⁹⁰ It also mandates fair compensation for disturbance or damage to the land or property,³⁹¹ and requires a 21-day notice before any private land is disturbed, and allows landowners to demand financial security from licensees of geothermal production.³⁹² These protections ensure that geothermal development does not occur at the expense of local communities, reinforcing a just and equitable energy transition.

³⁸⁵ *ibid.* section 7.

³⁸⁶ *ibid.* section 8. See also, section 14.

³⁸⁷ *ibid.* section 16.

³⁸⁸ *ibid.* section 17.

³⁸⁹ Regulation 13 of the *Geothermal Resources Regulation*, 1990.

³⁹⁰ Section 18 of the *Geothermal Resources Act*, 1982.

³⁹¹ *ibid.* section 19.

³⁹² *ibid.* section 20.

It is worthy to note that the *Geothermal Resources Act* explicitly enables licensees to generate, transmit, and supply electricity from geothermal resources.³⁹³ This provision integrates geothermal development with national electricity infrastructure, affirming the government's objective to expand the renewable energy share in Kenya's energy mix through geothermal generation. To ensure geothermal resource development contributes to national revenue, the *Geothermal Resources Act* authorizes the Minister for Energy to levy fees, rentals and royalties for industrial or commercial use of geothermal energy.³⁹⁴ This financial framework can be said to support the fiscal sustainability of the renewable energy sector while incentivizing efficiency and production of electricity from geothermal resources.

A key success story stemming from the enforcement of the *Geothermal Resources Act* is the Olkaria Geothermal Project, located in the Hell's Gate National Park in Nakuru County.³⁹⁵ The Olkaria I power station, whose groundwork was laid in the 1970s, significantly expanded after the *Geothermal Resources Act* came into force. With the regulatory backing of the *Geothermal Resources Act*, Kenya was able to implement subsequent phases; Olkaria II, III, IV, and V, which cumulatively contribute over 800 MW to the national grid.³⁹⁶ This growth not only reflects the scalability enabled by the *Geothermal Resources Act* but also underscores how legal structures can support long-term infrastructure planning.

Another notable example is the Menengai Geothermal Project, launched as part of the government's Geothermal Development Company (GDC) initiative, established in 2008.³⁹⁷ The GDC was formed to accelerate geothermal exploration and production, building on the legal foundation laid by the *Geothermal Resources Act*. Menengai has since become a flagship program, targeting the generation of over 100 MW of electricity in its initial phases

³⁹³ *ibid.* section 14.

³⁹⁴ *ibid.* section 21.

³⁹⁵ Lilian Kong'ami and Raphael Kweyu, op cit. n339.

³⁹⁶ *ibid.*

³⁹⁷ Samuel Owuor *et al.*, 'Unintended Socio-economic Transformations Associated with Larger-scale Renewable Energy Projects: The Case of Menengai Geothermal Project in Kenya' (2025) Review of Regional Research, 1.

and aiming to support independent power producers (IPPs) through public-private partnerships, a model enabled by the legislative clarity and licensing regime introduced in the *Geothermal Resources Act*.³⁹⁸

The *Geothermal Resources Act* also laid down enforcement mechanisms that ensured sustainable resource use and accountability.³⁹⁹ Licensing provisions were tied to performance obligations, requiring licensees to report findings, comply with environmental standards, and adhere to timelines for development. These enforcement provisions helped prevent speculative hoarding of resource-rich sites and ensured that only serious investors advanced geothermal projects.

Moreover, the influence of the *Geothermal Resources Act* extended beyond energy production to institutional strengthening. It formed the legal basis for capacity building and the establishment of agencies like the Kenya Electricity Generating Company (KenGen), which has become a regional leader in geothermal energy. KenGen's expertise is now being exported to other African countries like Ethiopia, Djibouti, Tanzania, Zambia, Eswatini,⁴⁰⁰ Rwanda, Uganda, Sudan, South Sudan, and Comoros,⁴⁰¹ further cementing Kenya's status as a continental leader in renewable energy.

The *Geothermal Resources Act* thereby reflects a visionary approach by the Kenyan government in recognizing the strategic value of geothermal energy, a clean, reliable, and domestically abundant resource. By vesting resource ownership in the state, regulating development, promoting environmental sustainability, and linking geothermal activity to

³⁹⁸ Edwin Kirarcy and DR Paul Sang, 'Geothermal Projects Implementation and the Livelihoods of Adjacent Communities in Kenya: A Case Study of Menengai Geothermal Power Project' (2019) 3(6) *International Journal of Current Aspects*, 271.

³⁹⁹ Sections 11 and 93 of the *Geothermal Resources Act*, 1982.

⁴⁰⁰ Erastus Gichohi, Five African countries look to KenGen for geothermal expertise (*Government Advertising Agency*, 4 March, 2025) < https://www.mygov.go.ke/five-african-countries-look-kengen-geothermal-expertise?utm_source=> accessed 11 June 2025.

⁴⁰¹ Brian Ngugi, KenGen Eyes Geothermal Tenders in 8 African States (*Prime*, 19 September, 2020) < https://www.businessdailyafrica.com/bd/economy/kengen-eyes-geothermal-tenders-in-8-african-states-2281012?utm_source=> accessed 11 June 2025.

electricity generation and rural development, the *Geothermal Resources Act* lays a solid legislative foundation for integrating geothermal into Kenya's renewable energy mix. It anticipates modern energy needs and exemplifies a proactive legal framework for clean energy transition.

4.4.1.5 Energy Act 2019

The *Energy Act* of 2019 provides the legal and institutional framework governing the regulation and promotion of renewable energy within Kenya's national energy mix.⁴⁰² The *Energy Act* explicitly vests all unexploited renewable energy sources in the National Government,⁴⁰³ establishing a foundation for central planning and regulation. The *Energy Act* mandates the Cabinet Secretary to conduct a comprehensive survey and develop a renewable energy resources inventory and resource maps. These tools are to be reviewed and updated biennially, enabling evidence-based decision-making policy planning.⁴⁰⁴

The *Energy Act* underscores the importance of integrating renewable energy into the national energy planning, as it requires the Cabinet Secretary to develop integrated energy plan, incorporating county and national service provider inputs, and specifically including plans for renewable energy. These plans guide infrastructure investments and technology selection and are to be reviewed every three years.⁴⁰⁵ In line with this provision, Section 10(a)(iii) is one of the most significant provisions of the Energy Act, for the regulation and development of renewable energy in Kenya as it assigns a key regulatory authority to the Energy and Petroleum Regulatory Authority (EPRA) to-

“...regulate, monitor and supervise the production, conversion, distribution, supply, marketing and use of renewable energy.”⁴⁰⁶

⁴⁰² The *Energy Act* (Act No. 1) 2019.

⁴⁰³ Section 73 of the *Energy Act*, 2019.

⁴⁰⁴ *ibid.* section 74.

⁴⁰⁵ *ibid.* section 5.

⁴⁰⁶ *ibid.* section 10(a)(iii).

This provision entrusts the EPRA with broad and comprehensive oversight functions over the entire renewable energy value chain in Kenya.

In addition, the *Energy Act* outlines Government's responsibility to promote the development and use of renewable energy technologies including but not limited to biomass, solar, wind, hydropower, biogas and municipal waste. It also mandates the formulation of a national strategy for coordinating renewable energy research and facilitating the efficient and sustainable marketing of such resources.⁴⁰⁷ To support structured governance, the *Energy Act* established the Renewable Energy Resource Advisory Committee (RERAC). This inter-ministerial body is tasked with advising the Cabinet Secretary on the allocation, licensing, and management of renewable energy resources. The committee ensures coordination among various sectors that depend on water and land use, such as irrigation, drinking water, and flood control, especially in the context of multipurpose projects.⁴⁰⁸

One of the important mechanisms for incentivizing investment in renewables is the Feed-in Tariff system established by the *Energy Act*.⁴⁰⁹ The objectives of this system include catalysing the generation of electricity from renewable energy sources,⁴¹⁰ encouraging decentralized generation to reduce grid pressure and transmission losses,⁴¹¹ stimulating innovation in renewable energy technologies,⁴¹² and reducing greenhouse gas emissions by decreasing reliance of fossil fuels.⁴¹³ In relation to this provision, the Cabinet Secretary is empowered to make regulations concerning grid connection requirements, tariff durations, and the priority of electricity purchase from renewable energy, while the EPRA is charged

⁴⁰⁷ *ibid.* section 75.

⁴⁰⁸ *ibid.* section 76.

⁴⁰⁹ *ibid.* section 91.

⁴¹⁰ *ibid.* section 91(a).

⁴¹¹ *ibid.* section 91(b).

⁴¹² *ibid.* section 91(c).

⁴¹³ *ibid.* section 91(d).

with ensuring transparency, sustainability, and competitive implementation of the FiT system.⁴¹⁴

The *Energy Act* establishes a transparent licensing process that includes environmental impact considerations and supports the development of renewable energy projects.⁴¹⁵ Although not exclusive to renewable energy, the provisions on energy efficiency complement the renewable energy agenda by reducing overall energy demand, thereby making renewable energy inputs more viable.⁴¹⁶ Moreso, the *Energy Act* established the Rural Electrification and Renewable Energy Corporation (REREC), with a dual mandate to accelerate electricity access in rural areas and promote renewable energy.⁴¹⁷ This institution plays a vital role in deploying renewables at the grass roots level supporting both social equity and sustainable development.

Several renewable energy projects stand out as illustrative examples of the positive influence of the *Energy Act*. The Lake Turkana Wind Power Project, which is Africa's largest wind energy farm, was completed shortly before the *Energy Act* was passed but gained increased regulatory support and operational stability through the new legal framework. Spanning 310 MW, the project has significantly contributed to Kenya's electricity grid and exemplifies the country's potential in harnessing wind energy.⁴¹⁸ Another notable project is the Garissa Solar Power Plant, which began operations in 2019 and was developed by REREC.⁴¹⁹ The plant, with a capacity of 54.6 MW, is the largest grid-connected solar power plant in East and Central Africa. It has not only reduced reliance on fossil fuels but also significantly enhanced

⁴¹⁴ *ibid.* section 92.

⁴¹⁵ *ibid.* sections 117-121.

⁴¹⁶ *ibid.* sections 187-202.

⁴¹⁷ *ibid.* sections 43-44.

⁴¹⁸ Jeremy Lind and Daniel Rogei, 'Contestation, Conflict and Claims-making around the Lake Turkana Wind Power Windfarm, Northern Kenya' (2025) 188 *World Development*, 1.

⁴¹⁹ Paragraph 1 of the Report of the Auditor-General on Kenya Development of Solar Power Plant in Garissa Project (GCL No. 2015(10)).

energy access in the northeastern region of Kenya, aligning with the decentralization of the objectives of the *Energy Act*.⁴²⁰

Kenya ranks among the top ten countries globally in geothermal energy production.⁴²¹ The Olkaria geothermal fields, particularly Olkaria IV and V, which added nearly 300 MW of capacity, were enhanced and better integrated into the national energy mix due to the regulatory clarity and planning support offered by the *Energy Act*.⁴²²

The *Energy Act* reflects a comprehensive, multi-tiered approach to integrating renewable energy into the national energy framework. By combining institutional mechanisms, regulatory incentives such as feed-in tariffs, coordinated planning, and efficiency mandates, the *Energy Act* positions Kenya to increase its reliance on sustainable energy sources while balancing economic, environmental, and social objectives. Its emphasis on long-term planning, public-private cooperation, and local content further underscores its strategic vision for energy transformation. In the next section, the discussion will turn to South Africa, with a focus on the country's legal framework governing the transition from fossil fuels to renewable energy. This section will examine the laws, regulations, and policies that guide South Africa's efforts to diversify its energy mix, as well as the legal challenges and opportunities associated with promoting a sustainable and low-carbon energy future.

4.5 South Africa

South Africa's energy sector has long relied on its abundant coal reserves, with coal historically supplying over 90% of the country's electricity through a centralized grid

⁴²⁰ *ibid.*

⁴²¹ Emad El-Din Sharouda, Sayed Gaber and Ossama Gouda, 'Strategic Management of Egyptian-African Geothermal Power Plant Project 60-MW Associated with Sustainable Development in Kenya' (2024) 2830 *Journal of Physics: Conference Series*, 1.

⁴²² Lilian Kong'ami and Raphael Kweyu, *op cit.* n339.

operated by Eskom.⁴²³ Although fossil fuel dependence supported industrial development and economic growth, it also led to significant greenhouse gas emissions and environmental degradation, making South Africa one of the continent's largest carbon emitters.⁴²⁴ By the early 2000s, rolling blackouts, aging infrastructure, and the growing urgency of climate change exposed the fragility of this coal-dominated model, prompting the government to begin shifting toward renewable energy.⁴²⁵

Study shows that legal and policy reforms played a pivotal role in this transition. The *Electricity Regulation Act* of 2006 laid the groundwork for market liberalization, enabling the launch of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011.⁴²⁶ This programme introduced competitive bidding, legal clarity on power purchase agreements, and ensured access to the grid, attracting both local and international investment in wind, solar, and small hydro projects. The REIPPPP not only added thousands of megawatts to the national grid but also generated jobs and supported community development.⁴²⁷

Complementing this, the Integrated Resource Plan (IRP) was developed as a policy tool to guide long-term electricity planning.⁴²⁸ Anchored in legislation, the IRP supports a phased reduction in coal use and a growing share of renewables and gas, aligning with South Africa's

⁴²³ Pegah Mirzania *et al*, 'Barriers to Powering Past Coal: Implications for a Just Energy Transition in South Africa' (2023) 101 Energy Research & Social Science, 3.

⁴²⁴ Pegah Mirzania *et al*, 'Barriers to Powering Past Coal: Implications for a Just Energy Transition in South Africa' (2023) 101 Energy Research & Social Science, 3.

⁴²⁵ Kingsley Ukoba, Tien-Chien Jen and Abdulfata Yusuf, 'Transformation of South Africa's Energy Landscape: Policy Implication, Opportunities, and Technological Innovations in the Fourth Industrial Revolution' (2025) 59, Energy Strategy Reviews, 1.

⁴²⁶ Easwaran Narassimhan, 'What Shapes Green Industrial Policy Objectives and Design? A Comparative Policy Analysis of Renewable Energy Auctions in India and South Africa' (2025) Journal of Comparative Policy Analysis, 12.

⁴²⁷ *ibid*.

⁴²⁸ Gaylor Montmasson-Clair and Georgina Ryan, 'Repositioning Electricity Planning at the Core: An Evaluation of South Africa's Integrated Resource Plan – 2014' <https://www.tips.org.za/files/u72/tips_nedlac_review_of_irp_november_2014.pdf> accessed 11 July 2025.

commitments under the Paris Agreement.⁴²⁹ Although challenges remain such as governance issues within Eskom, policy delays, and infrastructure constraints, the evolving legal framework has opened the energy sector to private participation and diversified power generation.⁴³⁰ South Africa's energy transition is still underway, but it is clearly guided by law and policy that prioritize sustainability, investment, and a just shift to a low-carbon future.

4.5.1 Legal Framework Regulating Energy in South Africa

4.5.1.1 Electricity Regulation Act 2006

South Africa is at a turning point in its energy journey. For years, the country has struggled with energy shortages, overdependence on coal, and the growing pressures of climate change. At the same time, millions still lack reliable access to electricity.⁴³¹ It is clear that the old ways of producing and supplying power are no longer enough. This is where renewable energy comes in, not just as a cleaner option, but as a practical and necessary solution for the future. To guide this transition, the South African government introduced the *Electricity Regulation Act* of 2006.⁴³² This law lays the foundation for reshaping the electricity sector, making room for new technologies, cleaner sources, and fairer access.

One of the objectives of the *Electricity Regulation Act* is to “promote the use of diverse energy sources and energy efficiency.”⁴³³ This provision clearly underpins the strategic intent of incorporating renewable energy into South Africa's broader energy system. It mandates the diversification away from an overreliance on coal (which has historically dominated the energy landscape) and towards cleaner alternatives such as solar, wind, hydro, and biomass.

In addition, this objective aligns with international climate commitments and responds to

⁴²⁹ Article 2.1(c) of the *Paris Agreement*, 2015.

⁴³⁰ Iain Todd and Darren McCauley, ‘Assessing Policy Barriers to the Energy Transition in South Africa’ (2021) 158 *Energy Policy*, 1.

⁴³¹ Kingsley Ukoba, Tien-Chien Jen and Abdulfata Yusuf, op cit. n402.

⁴³² Olusola Akinbami, Samuel Oke and Michael Bodunrin, ‘The State of Renewable Energy Development in South Africa: An Overview’ (2021) 60 *Alexandria Engineering Journal*, 5080.

⁴³³ Section 2(e) of the *Electricity Regulation Act* (Act No. 4) 2006.

South Africa's own energy security and sustainability goals.⁴³⁴ The emphasis on energy efficiency also complements the renewable energy drive, as reduced demand can alleviate pressure on existing fossil-fuel-based infrastructure.

The *Electricity Regulation Act* also aims to “facilitate investment in the electricity supply industry,” which is critical for the deployment of renewable energy infrastructure. Renewable energy projects, particularly large-scale solar and wind farms, require significant capital investment.⁴³⁵ By establishing a regulatory framework that is transparent and predictable, the *Electricity Regulation Act* seeks to create an enabling environment for private sector participation. This is supported by further provisions, such as the ability of the Minister to initiate tender processes for new generation capacity,⁴³⁶ including capacity that must derive from renewable sources. These mechanisms are designed to attract both domestic and foreign investors into South Africa's renewable energy sector.

The objective “to achieve the efficient, effective, sustainable, and orderly development and operation of electricity supply infrastructure” explicitly calls for a planned and environmentally responsible evolution of the energy sector.⁴³⁷ This is particularly relevant for integrating variable renewable energy sources, which require careful grid planning and infrastructure upgrades. The Integrated Resource Plan (IRP), is a critical planning tool that aligns new generation capacity with national development priorities.⁴³⁸ Hence, all generation licence applications must demonstrate compliance with the IRP, and deviations require ministerial approval.⁴³⁹ This ensures that renewable energy integration is guided by a broader strategic vision.

⁴³⁴ Article 2.1 of the Paris Agreement, 2015.

⁴³⁵ *ibid.* section 2(c).

⁴³⁶ *ibid.* section 46.

⁴³⁷ *ibid.* section 2(a).

⁴³⁸ *ibid.* sections 1 and 11(2)(h).

⁴³⁹ *ibid.* section 47.

Renewable energy is uniquely positioned to support the objective of “facilitating universal access to electricity,” particularly in remote and rural areas where grid extension may be economically unviable.⁴⁴⁰ The *Electricity Regulation Act* supports off-grid and self-generation solutions through exemptions from licensing requirements,⁴⁴¹ for instance, generation for own use or non-grid supply not used for commercial purposes. This provision encourages the deployment of decentralized renewable energy systems, such as mini-grids and solar home systems, thereby accelerating access while avoiding the costs and timeframes associated with grid expansion.

Furthermore, the *Electricity Regulation Act* explicitly allows the National Energy Regulator (NER)⁴⁴² to impose licence conditions relating to “the types of energy sources from which electricity must or may be generated.”⁴⁴³ This provision gives legal teeth to policy directives promoting renewable energy, ensuring that licensing decisions reflect national priorities. In addition, the *Electricity Regulation Act* empowers the Minister to determine not only that new generation capacity is needed, but also, the types of energy sources from which it must be generated, the required percentages to be generated from those sources, and that such capacity be developed through competitive tendering, with room for private sector involvement.⁴⁴⁴ This provision is pivotal for implementing South Africa’s Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), through which most large-scale renewables have been introduced into the grid.

The *Electricity Regulation Act* mandates compliance with environmental standards and energy efficiency requirements as conditions for licensing.⁴⁴⁵ This further ensures that renewable energy projects align with sustainable development goals, and it creates an

⁴⁴⁰ *ibid.* section 2(d).

⁴⁴¹ Schedule 2 of the *Electricity Regulation Act* (Act No. 4) 2006.

⁴⁴² Section 1 of the *Electricity Regulation Act* (Act No. 4) 2006.

⁴⁴³ *ibid.* section 15(1)(r).

⁴⁴⁴ *ibid.* section 46(1)(a-e).

⁴⁴⁵ *ibid.* section 15(1)(s), (t), (u).

additional regulatory incentive to move away from polluting fossil fuels. The National Energy Regulator (NERSA), empowered by the *Electricity Regulation Act*,⁴⁴⁶ plays a crucial role in enforcing this framework. It is responsible for issuing generation licenses, setting tariffs, monitoring compliance with environmental and efficiency norms, supporting integration of renewables through tariff incentives and non-discriminatory grid access.⁴⁴⁷ In particular, *Electricity Regulation Act* require that transmission and distribution licensees provide non-discriminatory access to their networks.⁴⁴⁸ This is essential for independent renewable energy producers seeking to supply electricity to the grid.

As earlier discussed, a clear and notable example of how the *Electricity Regulation Act* facilitated renewable energy adoption is the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which was launched in 2011 under the authority of the Department of Energy. Although the REIPPPP was a policy initiative, its implementation and effectiveness were heavily reliant on the regulatory infrastructure provided by the *Electricity Regulation Act*. Through this programme, NERSA was able to license independent power producers (IPPs), allowing non-utility entities to generate electricity and sell it to the national grid, managed by Eskom, South Africa's state-owned utility. This licensing function, authorized by the *Electricity Regulation Act* ensured that renewable energy projects were subjected to fair regulatory scrutiny, including compliance with technical standards, environmental regulations, and socioeconomic obligations.⁴⁴⁹

Under the REIPPPP, a range of renewable energy projects were successfully developed, covering solar photovoltaic, concentrated solar power, wind, biomass, and small hydroelectric energy. For instance, the Jasper Solar Energy Project in the Northern Cape,

⁴⁴⁶ *ibid.* sections 3-4.

⁴⁴⁷ *ibid.* section 22.

⁴⁴⁸ *ibid.* sections 22(3-4).

⁴⁴⁹ *ibid.* section 7.

which came online in 2014, is one of the largest solar PV plants on the African continent, with a capacity of 96 MW.⁴⁵⁰ Similarly, the Cookhouse Wind Farm in the Eastern Cape, which became operational in 2014 as well, delivers around 138.6 MW to the grid and is a flagship project⁴⁵¹ showcasing the effectiveness of combining regulatory support and private investment.

Another significant example is the Kathu Solar Park, a 100 MW project also located in the Northern Cape, which uses parabolic trough technology to provide reliable, dispatchable solar energy even during evening hours due to its thermal storage capacity.⁴⁵² This project not only aligns with the goals of the *Electricity Regulation Act* by diversifying the energy mix but also contributes to grid stability, addressing one of the key concerns in integrating intermittent renewable energy sources. The Kathu Solar Park provides clean, reliable energy to about 179,000 South African homes and demonstrates how legal frameworks can spur investments in renewable technologies.⁴⁵³

The enforcement mechanisms of the *Electricity Regulation Act*, particularly the provisions on licensing, compliance monitoring, and penalties, have ensured that project developers meet specified requirements related to grid connectivity, environmental sustainability, and socio-economic development. For instance, as part of the licensing and bidding processes under the REIPPPP, projects are evaluated not only on price but also on their contributions to job creation, local content, ownership by historically disadvantaged South Africans, and

⁴⁵⁰ Jasper Solar Power Plant, Northern Cape, Kimberley (Energy Monitor, 14 April, 2014) < <https://www.energymonitor.ai/projects/jasper-solar-power-plant-northern-cape-kimberley/> accessed 12 July 2025.

⁴⁵¹ Ngwarai Shambira, Patrick Mukumba and Golden Makaka, 'Assessing the Wind Energy Potential: A Case Study in Fort Hare, South Africa, Using Six Statistical Distribution Models' 92(2025) 15 Applied Sciences, 1.

⁴⁵² Power Plant Profile: Kathu Solar PV Park, South Africa < <https://www.power-technology.com/data-insights/power-plant-profile-kathu-solar-pv-park-south-africa/> accessed 11 July 2025.

⁴⁵³ *ibid.*

community development.⁴⁵⁴ These requirements are monitored and enforced under the regulatory powers granted to NERSA by the *Electricity Regulation Act*, thereby institutionalizing social and environmental accountability within the renewable energy sector.

Thus, the *Electricity Regulation Act* has indeed facilitated the growth and integration of renewable energy sources by creating a strong legal and regulatory framework. Through its licensing and enforcement mechanisms, and in synergy with policy instruments such as the REIPPPP, it has enabled the successful development of several landmark renewable energy projects that continue to diversify and stabilize South Africa's energy mix. The *Electricity Regulation Act* remains a central pillar in the country's transition toward a more sustainable and inclusive energy future.

4.5.1.2 National Energy Act 2008

The *National Energy Act* 2008, of South Africa is a statute that seeks to ensure a sustainable, diversified, and secure energy supply to support the country's economic growth, social upliftment, and environmental management.⁴⁵⁵ Among its many objectives, the promotion of renewable energy is a central and recurring theme. The main objectives of the *National Energy Act* are-

“...to promote diversity of supply of energy and its resources,”⁴⁵⁶ “to provide for optimal supply, transformation, transportation, storage and demand of energy that are planned, organized and implemented in accordance with a balanced consideration of security, economics, consumer protection and sustainable development,”⁴⁵⁷ and “to contribute to sustainable development of South Africa's economy.”⁴⁵⁸

These provisions of the *National Energy Act* directly encourage the integration of renewable technologies such as solar, wind, biomass, and hydro into the national energy mix,

⁴⁵⁴ Zoheb Khan *et al*, ‘Communities in Transition: The Role of Community Ownership in South Africa's Renewable Energy Independent Power Producer Programme (REIPPPP)’ (2021) Stuart Theobald's Lab, 9.

⁴⁵⁵ Preamble of the *National Energy Act* (Act No. 34) 2008.

⁴⁵⁶ *ibid.* section 2(b).

⁴⁵⁷ *ibid.* section 2(g).

⁴⁵⁸ *ibid.* section 2(l).

‘sustainable development’ in this sense, can be said to serve as a legal impetus for the development of renewable energy, and the use and development of renewable energy plays a significant role in reducing environmental degradation and greenhouse gas emissions.

In addition, the *National Energy Act* mandates the annual publication of 20-year forecast of energy demand and supply, including possible scenarios.⁴⁵⁹ These models support the analysis of renewable energy contributions and potential, promoting long-term strategic planning. However, the *National Energy Act* requires measures that ensure universal access to “appropriate forms of energy” at “affordable prices,” taking into account environmental sustainability and cost-effectiveness.⁴⁶⁰ This opens the door for decentralized renewable energy systems, particularly electricity generation in rural areas.

The Minister⁴⁶¹ is mandated by the *National Energy Act* to develop and publish an Integrated Energy Plan (IEP) which must account for environmental concerns, social equity, affordability, and security of supply, take into account greenhouse gas mitigation, and explore and consider all viable energy supply options.⁴⁶² By requiring environmental and greenhouse gas considerations, this provision compels the government to factor in low-carbon, renewable energy options in South Africa’s energy mix. The establishment of the South African National Energy Development Institute (SANEDI) by the *National Energy Act*, provides it with the capacity to promote energy efficiency, conduct research and innovation, and support commercialization of renewable energy technologies.⁴⁶³

The *National Energy Act* also grants the Minister the authority to issue regulations to set minimum contributions to national energy supply from renewable energy sources, determine the types of renewable energy sources allowed, and create measures and incentives to

⁴⁵⁹ *ibid.* section 3.

⁴⁶⁰ *ibid.* section 5.

⁴⁶¹ *ibid.* section 1.

⁴⁶² *ibid.* section 6.

⁴⁶³ *ibid.* section 7.

promote renewable energy production, consumption, investment, and research.⁴⁶⁴ This regulation-making power of the Minister can be said to provide legal flexibility for policy evolution, such as the implementation of renewable energy auctions, subsidies, or feed-in tariffs.

In this context, it is important to note that the enforcement mechanisms of the *National Energy Act* are crucial, as the Minister is given the authority to make regulations concerning the energy industry, issue directives to ensure compliance with national energy policy, and develop IRPs to guide long-term planning. These IRPs, which include renewable energy targets and scenarios, are legally enforceable planning tools that align with the objectives of the *National Energy Act*. For instance, the 2019 IRP, which was developed in the spirit of the *National Energy Act*, projected an increased share of renewable energy, particularly wind and solar, in the national energy mix over the following decade. Additionally, the *National Energy Act* promotes energy efficiency and conservation through various monitoring and enforcement tools. It supports the development of energy data repositories and information systems to monitor progress and compliance with energy policies, which translated into the establishment of institutions like SANEDI, which plays a key role in coordinating energy research and innovation.

In conclusion, the National Energy Act of 2008 created a strong legislative platform that not only recognized the importance of renewable energy but also provided clear mandates and regulatory tools to foster its growth. Through mechanisms such as the REIPPPP, the Integrated Resource Plan, and institutions like SANEDI, the Act has enabled the realization of numerous renewable energy projects, reinforcing South Africa's transition towards a more sustainable and resilient energy system.

⁴⁶⁴ *ibid.* section 19(1).

4.5.1.3 Carbon Tax Act 2019

The *Carbon Tax Act* of South Africa is a significant legislative measure intended to reduce greenhouse gas emissions by introducing a tax on carbon dioxide equivalent emissions. In doing so, it aims to encourage a shift in the country's energy mix toward cleaner, renewable sources. Although, the *Carbon Tax Act* does not explicitly legislate renewable energy adoption, it lays an economic foundation for such a transition by changing the relative costs of carbon-intensive versus low-carbon or carbon-free energy options.⁴⁶⁵

It should be noted that the Preamble to the *Carbon Tax Act* sets out several critical policy motivations that directly and indirectly support the adoption of renewable energy. The *Carbon Tax Act* is introduced in response to scientific confirmation of the link between anthropogenic emissions and climate change. South Africa aims to reduce its carbon footprint and contribute to global climate stabilization.⁴⁶⁶ This creates a strong legal justification for transitioning from fossil fuels to renewable energy sources. In addition, the *Carbon Tax Act* embodies the “polluter pays principle”, where those who pollute must pay the cost for the environmental and health harm of their emissions.⁴⁶⁷ By imposing a cost on greenhouse gas emissions, the *Carbon Tax Act* incentivizes energy producers to seek cleaner energy alternatives such solar, wind, and hydroelectric energy, which does not incur such tax. The *Carbon Tax Act* also forms part of a broader policy “package of measures,” which includes

⁴⁶⁵ Argus, South Africa Adopts Climate Change Law <<https://www.argusmedia.com/en/news-and-insights/latest-market-news/2591302-south-africa-adopts-climate-change-law>> accessed 12 July 2025.

⁴⁶⁶ Preamble of the *Carbon Tax Act* (Act No. 15) 2019.

⁴⁶⁷ *ibid.*

appropriate carbon pricing and economic incentives.⁴⁶⁸ This framework aims to nudge the South African economy towards a more sustainable growth path.⁴⁶⁹

The *Carbon Tax Act* establishes that a tax will be levied on the carbon dioxide (CO₂), equivalent of greenhouse gas emissions.⁴⁷⁰ By making fossil fuels more costly, it creates a strong financial disincentive for their use, thereby indirectly enhancing the competitiveness of renewable energy alternatives. Although, the initial rate of the carbon tax is set at R120 per ton of CO₂, equivalent of the greenhouse gas emissions of the taxpayer, which is subject to inflation and future increases.⁴⁷¹ Over time, the rising cost of carbon emissions will further incentivize businesses and energy producers to invest in renewable technologies to avoid high carbon tax liabilities.

Under the *Carbon Tax Act*, the tax calculation for electricity generation from fossil fuels deducts two values: the renewable energy premium, which is an amount determined by the Minister, representing the cost-saving benefit from using renewable energy; and the environmental levy on electricity, providing relief to electricity producers who already pay an environmental levy under the Customs and Excise Act.⁴⁷² Basically, this adjustment lowers the effective carbon tax on fossil fuel-based electricity generation only where renewable alternatives are used, thereby creating a differential that encourages the transitioning the energy generation mix to renewable energy sources. Moreover, the *Carbon Tax Act* allows taxpayers to reduce their carbon tax liability by purchasing carbon offsets.⁴⁷³ These offsets can be generated by renewable energy projects, thus creating an additional revenue stream for clean energy producers and making renewable energy a financially attractive investment.

⁴⁶⁸ *ibid.*

⁴⁶⁹ South Africa's Low-Emission Development Strategy (LEDS) – 2015 <<https://cer.org.za/wp-content/uploads/2020/10/South-Africas-Low-Emission-Development-Strategy-2050.pdf>> accessed 14 September 2025.

⁴⁷⁰ *ibid.* section 2.

⁴⁷¹ *ibid.* section 5.

⁴⁷² *ibid.* section 6(2).

⁴⁷³ *ibid.* section 13.

In essence, the Minister is empowered to make detailed regulations regarding the types of projects eligible for offset generation.⁴⁷⁴ Renewable energy sources are commonly included in such schemes, and this provision opens the door for formalizing their participation in the carbon market, potentially increasing uptake of wind, solar and biomass energy sources.

One of the most notable examples of renewable energy projects that align with the spirit and enforcement of the *Carbon Tax Act* is the Jasper Solar Energy Project in the Northern Cape province. Commissioned in 2014 and fully operational by 2016, Jasper is one of the largest solar photovoltaic (PV) plants in Africa, with a capacity of 96 MW.⁴⁷⁵ Despite the fact developed under the REIPPPP framework, the economic environment shaped by the looming implementation of carbon taxation created favorable conditions for such projects by increasing the relative attractiveness of clean energy investments. The carbon tax reinforced these initiatives by enhancing the cost burden of fossil-fuel energy generation, particularly from coal, which had historically dominated South Africa's energy sector.⁴⁷⁶

In terms of enforcement, the *Carbon Tax Act* was structured with a tiered system of tax-free allowances during its first phase (2019–2022), allowing industries to adapt gradually.⁴⁷⁷ However, it clearly signalled that the cost of emissions would increase over time, thereby making renewable projects more appealing in the long run. Businesses that failed to reduce emissions could be taxed up to R120 per ton of CO₂ equivalent, with increases in line with inflation.⁴⁷⁸ The existence of this clear, enforceable mechanism can be said to give renewable energy investors and developers a predictable regulatory environment in which to operate.

⁴⁷⁴ *ibid.* section 19(c).

⁴⁷⁵ Olusola Akinbami, Samuel Oke and Michael Bodunrin, op cit. n409.

⁴⁷⁶ Abayomi Adebisi and Katleho Moloi, 'Renewable Energy Source Utilization Progress in South Africa' (2024) 17(14) *Energies*, 3.

⁴⁷⁷ Sections 7-13 of the *Carbon Tax Act*, 2019.

⁴⁷⁸ *ibid.* section 5(1).

Furthermore, the IRP, which aligns with the objectives of the *Carbon Tax Act*, emphasized a diversification of the energy mix by including more renewables, particularly solar PV and wind, into the national grid. Therefore, though the *Carbon Tax Act* may not have been the sole driver of renewable energy adoption in South Africa, it played a critical catalytic role by altering the financial calculus of energy producers. It reinforced other policy mechanisms and programs, facilitated investor confidence in clean energy projects, and laid the groundwork for a gradual but meaningful transformation of South Africa's energy sector. Through its enforcement structure and integration into the broader climate policy framework, the *Carbon Tax Act* has helped shepherd the country toward a more sustainable and diversified energy future.

4.5.1.4 Climate Change Act 2024

The *Climate Change Act* is a legislative framework set out to guide South Africa's transition towards a climate-resilient, low-carbon economy.⁴⁷⁹ Among the objectives of the *Climate Change Act* are provisions aimed at supporting the adoption of renewable energy within South Africa's energy mix, thereby, reflecting the broader goal of sustainable development seeking to "make a fair contribution to the global effort to stabilize greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system."⁴⁸⁰ This objective directly aligns with transitioning to renewable energy, as the use of fossil fuels in generating energy is a key driver of greenhouse gas emissions, and a shift towards renewable energy sources is essential to achieve this objective.

In addition, the *Climate Change Act* mandates to "ensure a just transition towards a low-carbon economy and society considering national circumstances."⁴⁸¹ It should be understood that a low-carbon economy cannot be achieved without transforming the energy sector, hence,

⁴⁷⁹ Preamble of the *Climate Change Act* (Act No. 22) 2024.

⁴⁸⁰ *ibid.* section 2(c).

⁴⁸¹ *ibid.* section 2(d).

this objective implicitly supports increasing renewable energy sources, while ensuring that affected communities are not left behind, which is in line with the principle central to energy justice. The *Climate Change Act* significantly reinforces the aim to “protect and preserve the planet for the benefit of present and future generations.”⁴⁸² One of the potentials of the use of renewable energy sources is that, it supports this intergenerational equity by reducing environmental degradation and depletion of natural resources.

Whereas other provisions of the *Climate Change Act* do not explicitly mention renewable energy, they provide institutional and legal support necessary for its promotion. For instance, the *Climate Change Act* mandates that every organ of the State must “review and, if necessary, revise, amend, coordinate and harmonize their policies, laws, measures, programmes and decisions” to ensure that climate risks and vulnerabilities are considered, and that they give effect to the principles and objectives of the *Climate Change Act*.⁴⁸³ This means that national and local policies must support renewable energy development as part of integrated climate governance. In addition, the *Climate Change Act* provides for the development of “Sectoral Emission Targets,” which are to be guided by sector-specific policies and measures.⁴⁸⁴ In the energy sector, this may inevitably promote the phasing out of fossil fuels and the scaling up of renewable energy sources to meet emission targets.

Furthermore, the *Climate Change Act* makes provision for phase-down and phase-out of synthetic greenhouse gas emissions,⁴⁸⁵ which supports overall decarbonization and gives room for renewable energy sources to fill the energy supply gap. Public participation, consultation, and the development of regulations are encouraged by the *Climate Change*

⁴⁸² *ibid.* section 2(f).

⁴⁸³ *Ibid.* section 7(1).

⁴⁸⁴ *Ibid.* section 24.

⁴⁸⁵ *ibid.* section 28.

Act.⁴⁸⁶ This participatory approach is critical for gaining support for renewable energy projects, especially in communities that may be impacted by the energy transition.

Several flagship renewable energy projects serve as compelling examples of how the *Climate Change Act* has facilitated tangible progress in South Africa. One notable project is the Oya Hybrid Power Station in the Western Cape, a 333 MW facility combining solar – 155 MW, wind – 86 MW, and battery storage – 92 MW/242 MWh. This project reached financial closure in February 2024 under a 20-year Power Purchase Agreement (PPA) with Eskom.⁴⁸⁷ It exemplifies the integrated approach encouraged by the *Climate Change Act*, thereby, producing dispatchable, low-carbon electricity that irons out the variability of renewables.

Another exemplary project is the Castle Wind Farm in the Northern Cape, a privately funded 89 MW wind facility under construction to supply electricity directly to mining giant Sibanye-Stillwater.⁴⁸⁸ Slated for commissioning in 2025, it underscores how reforms in grid access and the enforcement of carbon obligations have encouraged large private energy consumers to pursue cleaner alternatives.⁴⁸⁹ Similarly, the Seriti Wind Power Station in Mpumalanga, with a planned capacity of 155 MW, will be South Africa's largest privately owned wind project, providing electricity to Seriti Resources, a mining company with deep roots in the coal sector.⁴⁹⁰ The shift by such a company towards renewables is a powerful testament to the influence of carbon budgeting and tax mechanisms embedded in the *Climate Change Act*.

⁴⁸⁶ *ibid.* section 30-32.

⁴⁸⁷ Ifeanyi Anekwe *et al*, 'Renewable Energy Investments in South Africa: Potentials and Challenges for a Sustainable Transition: A Review' (2024) 107(2) *Ecology & Environmental Sciences – Review*, 2.

⁴⁸⁸ AIIM consortium achieves financial close on 89MW Castle Wind Farm for Sibanye-Stillwater <<https://aiimafrica.com/media/media-centre/aiim-consortium-achieves-financial-close-on-89mw-castle-wind-farm-for-sibanye-stillwater/>> accessed 13 July 2025.

⁴⁸⁹ *ibid.*

⁴⁹⁰ Martin Creamer, Seriti Green to construct 155 MW wind farm in Mpumalanga (Creamer Media's Mining Weekly, 17 February, 2023) <<https://www.miningweekly.com/article/seriti-green-to-construct-155-mw-wind-farm-in-mpumalanga-2023-02-17>> accessed 15 July 2025.

In the North West province, the Doornhoek Solar Power Station, a 120 MW solar photovoltaic project procured under the sixth REIPPPP bid window, achieved financial close in June 2024.⁴⁹¹ Once operational, it will supply electricity to approximately 97,000 homes while offsetting around 300,000 tons of carbon dioxide annually.⁴⁹² These projects highlight how transparent procurement processes, long-term PPAs, and state backing have aligned with the objectives of the *Climate Change Act*.

Moreover, the establishment of energy platforms such as Ampli Energy by major companies like Discovery and Sasol in May 2025 demonstrates how the *Climate Change Act* has fostered innovation and private sector engagement. Ampli Energy sources 69 MW from Msenge Emoyeni wind farm and supplies commercial clients, including Impala Platinum and Nando's, via power wheeling agreements.⁴⁹³ This model not only reduces reliance on Eskom but also enables large consumers to cut their emissions, aligning business operations with South Africa's climate targets.⁴⁹⁴

At the municipal level, the Atlantis solar-plus-battery hybrid project in Cape Town illustrates how local governments are taking advantage of the enabling environment created by the *Climate Change Act*. As of June 2025, over 2,400 of 12,850 panels have been installed, delivering clean energy to support the city's net-zero goals.⁴⁹⁵ This is consistent with the requirement of the *Climate Change Act*, that municipalities develop and implement climate adaptation and mitigation plans tailored to their jurisdictions.

⁴⁹¹ Abha Rustagi, AMEA Power Achieves Financial Close on 120 MW Doornhoek Solar PV Project in South Africa (Energetica India, 12 June, 2024) < <https://www.energetica-india.net/news/amea-power-achieves-financial-close-on-120-mw-doornhoek-solar-pv-project-in-south-africa> > accessed 15 July 2025.

⁴⁹² *ibid.*

⁴⁹³ Edd Stoddard, Discovery Green, Sasol launch Ampli Energy to widen renewable offerings for SA business (Daily Maverick- Going Green, 15 May 2025) < <https://www.dailymaverick.co.za/article/2025-05-15-discovery-green-sasol-launch-ampli-energy-to-widen-renewable-offerings-for-sa-business/> > accessed 15 May 2025.

⁴⁹⁴ *ibid.*

⁴⁹⁵ Robin-Lee Francke, Cape Town's Atlantis solar plant: A groundbreaking step towards renewable energy (IOL, 6 June, 2025) < <https://iol.co.za/news/energy/2025-06-06-cape-towns-atlantis-solar-plant-a-groundbreaking-step-towards-renewable-energy/> > accessed 15 July 2025.

In terms of enforcement, the *Climate Change Act* has made climate reporting and emissions disclosures mandatory for large emitters, with tax penalties imposed for any overages beyond assigned carbon budgets. The creation of the Climate Change Response Fund in early 2024 has further supported the implementation of clean projects, facilitating upgrades in grid infrastructure, storage capacity, and skills development.⁴⁹⁶ These mechanisms are not only legal instruments but also practical tools to steer the energy sector toward sustainability. The results of this legal framework are apparent, as there has been a surge in utility-scale renewable projects, with solar and battery systems, both private and municipal, contributing to improved grid reliability and reduced load shedding. Rooftop and commercial solar installations added an estimated 3 GW in 2023 alone, raising total photovoltaic capacity from approximately 4.2 GW to over 7 GW within a single year.⁴⁹⁷

It should therefore be noted that, though the *Climate Change Act* does not explicitly legislate the adoption of specific renewable technologies, it provides a robust legal mandate and policy alignment framework to encourage the transition to renewable energy. The emphasis on mitigation, just transition, emissions reductions, and sectoral integration by the *Climate Change Act* firmly positions renewable energy as a necessary element in South Africa's climate response. It calls on all sectors and spheres of government to act in concert, review existing policies, and pursue a developmental agenda that is both environmentally sustainable and socially inclusive.

From the above analysis, it is clear that the transition from use of fossil fuels to renewable energy sources is not a fanciful ideal reserved for developed countries alone, it is a strategic imperative, a moral undertaking, and above all, a tangible reality demonstrated across varied

⁴⁹⁶ A Climate Change Response Fund for South Africa – A Presidential Climate Commission Recommendations Report (December, 2024) 8.

⁴⁹⁷ Webster Makhubele, Bonginkosi Thango and Kingsley Ogudo, 'Techno-Economic Optimization of a Grid-Tied PV/Battery System in Johannesburg's Subtropical Highland Climate' (2025) 17 Sustainability, 1.

jurisdictions. From the icy expanse of Sweden to the windswept shores of Denmark and the hydro-endowed terrain of Norway, each of these countries tells a compelling transition, one not just of technological advancement or legislative dexterity, but of vision, resilience, and purposeful governance.

These countries have shown that meaningful energy transitions are not merely matters of engineering or economics, but deeply embedded in legal architecture, political will, cultural values, and societal consensus. They embraced innovative policy reforms; from Sweden's bold carbon taxation and electricity certificates, to Denmark's democratization of energy ownership, to Norway's delicate balancing of hydro-dominance with fossil wealth and environmental stewardship. Each policy, legal, and institutional framework did more than manage kilowatts, they sculpted trust, redirected investment, and realigned national identities around sustainability.

Perhaps the most powerful lesson from this chapter is that the shift toward renewable energy is a journey of transformation, transforming not just our energy systems, but the way societies relate to the environment, to their economies, and to future generations. The legal frameworks explored here offer more than just regulatory mechanisms; they represent instruments of hope and pragmatism, capable of guiding even the most fossil-dependent nations toward a cleaner, more equitable future.

For countries like Nigeria, the exploration of the legal framework governing energy, particularly renewable energy from the above selected jurisdictions is both cautionary and inspiring. It challenges us to rethink inertia and embrace bold reform, it urges us to see renewable energy not as an alternative, but as an anchor for inclusive development, economic diversification, and climate resilience. These global models are not blueprints to be copied

blindly, but dynamic illustrations of what becomes possible when law, policy, and purpose converge.

The energy transitions of Sweden, Denmark, Norway, Kenya and South Africa teach us that change is not only possible, but already happening. It is driven not by inevitability, but by intentionality. If these countries each with distinct geographies, economies, and energy legacies can achieve such monumental shifts, then the pathway is open for others.

As this chapter has demonstrated, the transition to renewable energy is not an abstract ideal but a practical, measurable process that depends fundamentally on well-crafted legal frameworks, strategic policymaking, and institutional commitment. For Nigeria, these global experiences hold concrete lessons. The lessons are not necessarily for comparative analysis, but tangible lessons that may assist Nigeria in enacting an effective legal framework capable of addressing its unique energy challenges and ambitions. The jurisdictions examined, Sweden, Denmark, Norway, Kenya, and South Africa, demonstrate that success in renewable energy development and usage, depends not solely on technical capacity, but on coherent legal reform, policy vision, sustainable political will and efficient institutions.

One of the most consistent lessons is the critical importance of having a clear, comprehensive legal framework that clearly defines the role of renewable energy in the national energy mix. For instance, Sweden's *Electricity Certificate Act* created a market-based system to promote renewable electricity generation through tradable certificates.⁴⁹⁸ This framework provided legal certainty and economic incentives for investors and developers, ensuring stable revenue streams for renewable projects. Denmark's *Renewable Energy Act* established legally enforceable targets and financial instruments such as feed-in tariffs.⁴⁹⁹ In South Africa, the *Electricity Regulation Act* formed the legislative basis for the country's Renewable Energy

⁴⁹⁸ Section 1 of the *Electricity Certificate Act* 2011:1200.

⁴⁹⁹ Article 6 of the *Renewable Energy Act* 2008:1392.

Independent Power Producer Procurement Programme (REIPPPP),⁵⁰⁰ a structured procurement process that has attracted over US\$15 billion in clean energy investment.⁵⁰¹

For Nigeria, a similar legislative approach, clearly setting out the scope, structure, and incentives for renewable energy, could fill a long-standing regulatory vacuum and signal serious national intent. In essence, a *Renewable Energy Act* that incorporates enforceable targets, eligibility criteria for support schemes, and long-term guarantees for producers would help reduce investment risk and promote transparency in the sector.

In tandem with robust legislation, institutional strength is paramount. Sweden's Swedish Energy Agency (Energimyndigheten),⁵⁰² Denmark's Energy Regulatory Authority⁵⁰³ and South Africa's Department of Mineral Resources and Energy (which oversees REIPPPP) show how empowered energy institutions can monitor compliance, administer support mechanisms, and coordinate implementation across sectors. Nigeria's institutions, including the Nigerian Electricity Regulatory Commission (NERC) and the Rural Electrification Agency (REA), must be reformed and empowered by law to carry out similar functions. These institutions need clearer statutory mandates, enhanced operational independence, and inter-agency collaboration mechanisms to ensure consistency between environmental, economic, and energy policies.

A particularly salient lesson comes from Sweden's *Carbon Dioxide Tax Act*, which placed a cost on fossil fuel emissions and, by doing so, shifted market performance decisively in favor of renewables.⁵⁰⁴ The carbon tax incentivized industries to adopt cleaner technologies and

⁵⁰⁰ Section 46(1)(a-e) of the *Electricity Regulation Act*, 2006.

⁵⁰¹ Renewable Energy IPP Procurement Programme: Overview – 2024 < <https://www.ipp-renewables.co.za/>> accessed 19 July 2025.

⁵⁰² Chapters 1-3 of the *Electricity Certificate Act* 2011:1200.

⁵⁰³ Article 21 of the *Heat Supply Act* of 2000, officially consolidated as Act No. 772 of 24 July 2000.

⁵⁰⁴ Annex to the *Carbon Dioxide Tax Act* (Act1990:582 on Carbon Dioxide) 1990.

made biomass and wind energy economically attractive.⁵⁰⁵ Similarly, Kenya's feed-in tariff policy, alongside its *Geothermal Resources Act*, created a framework that attracted private investment into geothermal, wind, and solar energy.⁵⁰⁶ Nigeria can adopt a phased introduction of carbon pricing mechanisms or levies on high-carbon fuels could generate revenue for clean energy investment while discouraging continued over-reliance on fossil fuels. Even in a context of subsidy reform, reallocating fossil fuel subsidies toward renewable development and clean technology would echo the fiscal restructuring seen in these jurisdictions.

From Denmark's *Renewable Energy Act*, Nigeria can draw lessons on how to foster inclusive and democratic participation in renewable energy projects.⁵⁰⁷ Denmark's legal requirement that developers of onshore wind projects offer at least 20% ownership to local residents created widespread public support and reduced opposition,⁵⁰⁸ and Kenya's success with solar mini-grids and solar home systems underscore the importance of placing communities at the heart of the transition.⁵⁰⁹ In a country like Nigeria, where energy infrastructure projects often face community resistance and where access to electricity is uneven, embedding community participation into renewable energy legal framework could ensure that renewable energy development is not just technically successful but socially legitimate. Legal provisions could be introduced to promote cooperative models, local ownership of mini-grids, and financial support for rural energy enterprises. In the same vein, Nigeria's Mini-Grid Regulation, although promising, needs to be codified into national law and supported by legislation that promotes off-grid renewable development, simplifies licensing, and mandates inclusive

⁵⁰⁵ Section 1 of the *Carbon Tax Act*, (Act 1990:582 on Carbon Dioxide) 1990.

⁵⁰⁶ *Geothermal Resources Act*, 1982.

⁵⁰⁷ Article 2(1-2) of the *Renewable Energy Act*, 2008:1392.

⁵⁰⁸ *Ibid.* Article 13.

⁵⁰⁹ Paragraph 1 of the Report of the Auditor-General on Kenya Development of Solar Power Plant in Garissa Project (GCL No. 2015(10)).

access particularly in underserved and rural areas.⁵¹⁰ Kenya's model demonstrates that decentralized solutions, backed by law, can rapidly expand electricity access without relying on grid extension alone.

Moreso, decentralized energy access also emerges as a dominant theme across successful jurisdictions and is especially relevant to Nigeria, where centralized grid extension has proven inadequate in reaching remote and off-grid communities. In Kenya, although briefly mentioned, the rise of decentralized, community-based energy solutions, especially in solar mini-grids has been enabled by supportive policies and performance-based financing mechanisms. Similarly, Denmark's *Heat Supply Act* empowered municipalities to plan and regulate heat supply systems in a decentralized manner, ensuring energy planning was responsive to local needs while aligned with national policy.⁵¹¹ Nigeria can learn from this by developing a legal framework that supports state and local government authority in renewable energy planning, while establishing legal standards for mini-grid licensing, interconnection, and consumer protection. As mentioned earlier, the Mini-Grid Regulation by NERC already exists, but its uptake has been modest due to weak legislative support, limited incentives, and regulatory delays. Embedding decentralized renewable energy explicitly in national legislation would legitimize such efforts, enable funding, and guide private-public collaboration in rural electrification.

As explained, grid access and integration laws offer instructive insights. Norway's *Energy Act* mandates open, non-discriminatory access to the grid for all electricity producers, including renewables, and ties licensing to environmental assessments.⁵¹² South Africa's REIPPPP process offers legally binding power purchase agreements (PPAs), supported by standard

⁵¹⁰ *Mini-Grid Regulation*, 2016.

⁵¹¹ Articles 3-6 of the *Heat Supply Act*, 2000.

⁵¹² Section 4(2) of the *Energy Act*, 1990.

templates and a clear risk allocation framework.⁵¹³ Nigeria can replicate these strategies by enacting a legislation that mandates grid openness, simplifies interconnection, and legally obliges the national transmission company to accommodate renewable sources. This would reduce bureaucratic delays and ensure project bankability.

Moreover, cross-sectoral integration is essential. A common thread running through the legislative instruments of Sweden, Denmark, and Norway is that renewable energy was never treated in isolation, it was linked to transport, housing, land use, forestry, and even public health. For instance, Sweden's integration of bioenergy into its district heating systems, supported by fiscal incentives from the *Carbon Dioxide Tax Act*, demonstrates how multiple sectors can be aligned under a coherent energy-environment strategy. Nigeria must avoid the siloed approach that has long characterized its energy sector. Legal reform should promote harmonization between the Federal Ministry of Power, the Ministry of Environment, the Ministry of Finance, and the Ministry of Science and Technology. This could be institutionalized through inter-ministerial councils or joint regulatory platforms, with shared mandates for climate action, emissions reduction, and energy diversification. Sectoral laws, such as the *Environmental Impact Assessment Act* and the National Renewable Energy and Energy Efficiency Policy should be reviewed to align with national climate goals and reinforce renewable energy adoption as a cross-cutting development priority.

The importance of incorporating environmental sustainability within a renewable energy legal framework is another vital insight. Sweden's *Environmental Code* mandates environmental impact assessments (EIAs) and integrates sustainable development principles into every aspect of infrastructure planning, including energy projects.⁵¹⁴ Nigeria can adopt similar legal requirements to ensure that renewable energy development does not replicate the

⁵¹³ Easwaran Narassimhan, op cit. n405.

⁵¹⁴ Chapters 6 and 16 of the *Environmental Code*, 1998:808.

environmental harms associated with fossil fuels. Such legislation should mandate EIAs, promote land-use efficiency, protect biodiversity, and ensure that new projects contribute positively to Nigeria's climate goals under the Paris Agreement. In other words, Nigeria's existing *Environmental Impact Assessment Act*⁵¹⁵ should be updated and integrated into renewable energy legislation, mandating climate-resilient project designs, sustainable land use practices, and community consultation processes.

A key lesson from South Africa is the importance of a just and equitable transition. Through its Integrated Resource Plan (IRP)⁵¹⁶ and the Just Energy Transition Investment Plan (JET-IP),⁵¹⁷ South Africa has prioritized social justice by allocating resources for worker retraining, economic diversification in coal-dependent communities, and public participation. Nigeria, particularly in the Niger Delta and other fossil fuel-producing regions, must follow suit by embedding social safeguards into energy transition legal framework ensuring that no community is left behind and that clean energy investments contribute to local development, environmental remediation, and social inclusion.

Another critical area of reform lies in planning and coordination. Sweden's *Energy Policy Agreement*, although not a law, represented a long-term political consensus that set clear goals for 100% renewable electricity generation by 2040 and directed market design, offshore wind policy, and energy storage reform.⁵¹⁸ Nigeria would benefit greatly from a national, legally-backed energy roadmap that aligns energy, environmental, and economic development strategies. Such a roadmap should be developed through an effective legal

⁵¹⁵ *Environmental Impact Assessment Act*, 1992.

⁵¹⁶ Paragraph 1 of the Integrated Resource Plan 2019.

⁵¹⁷ South Africa's Just Energy Transition Investment Plan (JET-IP) <<https://www.climatecommission.org.za/south-africas-jet-ip>> accessed 3 August 2025.

⁵¹⁸ Preamble, The Swedish Energy Policy Agreement of 10 June 2016 – Unofficial English Translation <<https://analys.se/wp-content/uploads/2016/06/swedish-political-energy-agreement-2016.pdf>> accessed 8 August 2025.

framework, with statutory provisions for implementation oversight, institutional collaboration, and periodic review.

Additionally, Norway's *Energy Act* offers valuable lessons on how grid regulation and licensing procedures can facilitate renewable integration.⁵¹⁹ The *Energy Act* mandates non-discriminatory grid access for all electricity producers, including small-scale and renewable energy generators, and ties energy licensing to environmental assessments.⁵²⁰ Nigeria can adapt this model to simplify and expedite grid connection for independent renewable power producers, while ensuring that licensing requirements prioritize sustainability and technical compliance. These legal reforms would reduce bureaucratic bottlenecks and attract private sector engagement.

Furthermore, Norway's success in promoting electric vehicles (EVs) through legislative incentives, including tax exemptions and free access to transport infrastructure, demonstrates how sector-specific legislation can drive renewable adoption beyond electricity generation.⁵²¹ Nigeria, facing growing urban pollution and fuel import dependency, could legislate support for EVs, solar charging infrastructure, and clean transportation, thus extending the impact of renewable energy into mobility and urban planning.

Furthermore, legal predictability and investor confidence are also recurring themes in the jurisdictions studied. Sweden's *Electricity Certificate Act*,⁵²² and Denmark's *Renewable Energy Act*,⁵²³ were notable not only for their content but for their clarity, enforceability, and long-term policy horizons. Investors were given measurable targets, secure returns, and regulatory transparency. Nigeria, in contrast, continues to experience disruptions due to

⁵¹⁹ Section 2(1) of the *Energy Act*, 1990.

⁵²⁰ *ibid.* section 4(2).

⁵²¹ DNV – Energy Transition Outlook Norway 2024

<<https://www.norskindustri.no/siteassets/dokumenter/rapporter-og-brosjyrer/energy-transition-norway/energy-transition-norway-2024.pdf>> accessed 3 August 2025.

⁵²² *Electricity Certificate Act*.

⁵²³ *Renewable Energy Act*.

sudden tariff revisions, unclear licensing procedures, and the absence of a centralized registry of renewable energy projects. A unified *Renewable Energy Investment Code*, backed by an effective renewable energy legal framework, could help bridge this gap. It should include provisions for power purchase agreements (PPAs), land acquisition procedures, tax exemptions, arbitration mechanisms, and timelines for project approval, providing the kind of legal and financial environment in which serious investors can operate confidently.

In terms of long-term governance, Sweden's *Climate Act* is exemplary in institutionalizing climate accountability across government structures. The *Climate Act* requires annual climate reporting to parliament and integrates emissions reduction goals into national policy formulation.⁵²⁴ For Nigeria, embedding renewable energy goals into law through climate-focused legislation would ensure that energy transition efforts are not left to discretionary policy but are part of a legally binding national commitment. This would also improve alignment with Nigeria's Nationally Determined Contributions (NDCs) and attract climate finance and international partnerships.

Beyond the foundational pillars of legislation, fiscal instruments, and institutional design, another important lesson from the jurisdictions studied is the importance of institutional enforcement mechanisms, a detail that often distinguishes aspirational policy from transformative practice. In Sweden, the Climate Policy Council (Klimatpolitiska rådet)⁵²⁵ plays a critical watchdog role, mandated by the *Climate Act*, to independently assess government progress and issue public reports on climate policy coherence.⁵²⁶ This system ensures that renewable energy targets are not only set but regularly monitored and reviewed in light of scientific evidence and policy developments. For Nigeria, establishing an independent renewable energy or climate policy council backed by an effective legal

⁵²⁴ Section 4 of the *Climate Act*, 2017:720.

⁵²⁵ Climate Policy Council <<https://www.klimatpolitiskaradet.se/en/>> accessed 3 August 2025.

⁵²⁶ Section 4 of the *Climate Act*, 2017:720.

framework could serve to protect the energy transition from political inconsistency, while fostering transparency, accountability, and evidence-based corrections over time. Such a council could be tasked with auditing emissions data, reviewing implementation progress under the *Electricity Act*,⁵²⁷ and offering strategic recommendations to the National Assembly or relevant executive ministries.

Crucially, the case of Norway illustrates that even resource-rich countries with strong fossil fuel sectors can shift course through intentional governance. Despite its large oil reserves, Norway maintains an electricity system that is over 90% hydropower-based and continues to lead globally in electric vehicle (EV) adoption,⁵²⁸ as a result of a combination of tax laws, incentives, and infrastructure investments. The Norwegian model reveals that natural resource wealth need not be a barrier to renewable energy reform indeed, it can be a strategic advantage if managed wisely. Nigeria, with its abundant solar radiation, significant hydropower potential, and agricultural biomass capacity, has the natural capital required to make a successful transition. What is lacking is not potential, but structure and that structure must be built in law.

Therefore, the legal and institutional reforms undertaken by Sweden, Denmark, Norway, Kenya and South Africa provide Nigeria with a valuable repository of tested ideas and strategies. These are not templates to be copied wholesale, but adaptable mechanisms that, if grounded in Nigeria's local realities, can form the basis for a robust legal transition to renewable energy. Nigeria has the opportunity to build an energy future that is clean, secure, inclusive, and economically empowering. To do so, it must legislate with purpose, govern with vision, and act with urgency. The time to lay the legal foundation for this transformation is now.

⁵²⁷ Electricity Act, 2023.

⁵²⁸ DNV – Energy Transition Outlook Norway 2024.

In essence, the path to renewable energy in Nigeria cannot rely on isolated interventions or temporary initiatives. It must be rooted in law, sustained by institutions, supported by coherent policy, and active by public participation. The jurisdictions studied in this chapter have demonstrated that transformation is not a matter of wealth or geography, but of will, design, and legislative resolve. Nigeria has the chance to shape its own energy future, one that is clean, resilient, equitable, and economically empowering.

Having drawn extensively from the experiences of Sweden, Denmark, Norway, Kenya, and South Africa, it becomes evident that legal reform lies at the heart of any meaningful transition to renewable energy. These jurisdictions have demonstrated each in their own unique legal, institutional, and socio-economic contexts that carefully designed laws can serve as both the foundation and the driving force of an effective energy transition. For Nigeria, the insights gleaned from their trajectories offer lessons that highlight the urgent need for a coherent, enforceable, and forward-looking legal framework governing the adoption of renewable energy.

Against this backdrop, the next chapter undertakes the crucial task of developing a model legal framework that is specifically tailored to Nigeria's energy realities, environmental vulnerabilities, and development aspirations. This proposed framework will seek to facilitate the transition to a low-carbon energy system through renewable energy sources, with the broader objective of addressing Nigeria's persistent challenges of environmental pollution, energy insecurity, and climate change. Building on the policy implications and legal insights discussed thus far, Chapter 5 aims to present a structured legal pathway that could be practical, and transformative, offering a foundation upon which Nigeria can build a cleaner, more resilient, and more equitable energy future.

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Chapter 5

A Model Legal Framework for Nigeria's Transition to Low-carbon Energy through Renewable Energy Sources

Nigeria, despite being richly endowed with renewable energy resources particularly solar, hydro, and biomass continues to rely heavily on fossil fuels for power generation, transportation, and export revenues. This dependency has not only contributed to widespread environmental pollution but has also made the country vulnerable to the economic instabilities associated with the global fossil fuel market.¹ Hence, the time has come for a strategic and legally grounded transition toward a low-carbon energy future.

The purpose of this chapter is to design a model legal framework that will facilitate Nigeria's transition to renewable energy sources as a core strategy for reducing greenhouse gas emissions, curbing environmental degradation, and improving access to clean, affordable, and reliable energy. This framework is not conceived in isolation; it is informed by the preceding chapter's analysis of selected jurisdictions that have successfully made substantial progress in moving away from fossil fuels. Though each of these selected jurisdictions, that is, Sweden, Denmark, Norway, Kenya, and South Africa operate under different legal systems, economic structures, and political settings, their experiences demonstrate the transformative role that an effective legal framework can play in steering energy systems toward sustainability.

The chapter is structured into four interconnected parts, each contributing to the formulation of a proposed comprehensive and actionable legal framework: The first part discusses the guiding principles underpinning the proposed legal framework, highlighting their relevance in ensuring that Nigeria's energy transition is not only environmentally sustainable but also economically inclusive, socially equitable, and aligned with both national policies and

¹ Ahmad Abdulsalam Abdallah and Odetoke Blessing Odeleke, 'Energy Security in Nigeria: Challenges and Prospects' (2023) 1(1) *Journal of Ariz Zone Economy*, 101.

international climate commitments. The second part examines the core components of the framework, focusing on the institutional, regulatory, financial, and mechanisms necessary for its effective implementation. These components provide the structural foundation upon which the proposed legislation is built.

The third part explores the implementation strategies required to translate the framework into measurable outcomes. This section is noteworthy because it addresses the “how” of Nigeria’s energy transition, offering practical approaches for mobilizing investments, strengthening institutional capacity, fostering public-private partnerships, and monitoring progress to ensure that the framework’s objectives are achieved effectively and sustainably. Finally, the fourth part discusses the assessment of the Model Renewable Energy Act.

Together, this chapter can provide an all-inclusive, context-specific, and implementation-ready legal framework capable of guiding Nigeria’s energy transition via drawing valuable insights from international best practices and tailoring them to the country’s unique socio-economic and legal realities. However, it is noteworthy that the proposed model renewable energy legal framework in this chapter is not intended as a transplant of foreign legal systems. Rather, it is a context-specific response to Nigeria’s constitutional structure, institutional challenges, socio-economic dynamics, and environmental vulnerabilities. Without a coherent, enforceable, and forward-looking legal framework, policy statements and energy targets risk remaining aspirational. Therefore, it seeks to harmonize Nigeria’s domestic legal obligations with its international commitments under climate and sustainable development treaties, and also ensuring that the transition process is just, inclusive, and economically viable that should shape Nigeria’s renewable energy legislation.

5.1 Guiding Principles for the Model Legal Framework

For any legal framework to be truly effective and capable of standing the test of time, it must be grounded in a coherent set of guiding principles that reflect the underlying values, developmental aspirations, and socio-economic and environmental realities of the society for which it is being designed.² A legal framework that lacks such a foundation risk becoming disjointed, inconsistent, or even obsolete when confronted with evolving national and global circumstances.³ These principles serve as the bedrock for legislative and policy formulation, ensuring that laws are not only technically sound but also socially legitimate, ethically defensible, and aligned with national priorities.

In the context of Nigeria's transition to a low-carbon energy future through renewable energy sources, the need for clearly articulated and context-specific guiding principles is particularly pressing.⁴ Nigeria, as a developing country with significant fossil fuel dependence, is at a pivotal point in redefining its energy trajectory. The transition to low-carbon energy sources such as solar, wind, hydro, and bioenergy is not merely a technical or economic shift, it is also a profound legal and institutional transformation that touches on issues of environmental justice, energy access, sustainability, and intergenerational equity.

These guiding principles thus serve a dual purpose. On one hand, they offer a philosophical and conceptual foundation for lawmakers, providing clarity and direction during the drafting and reform of relevant legislation. On the other hand, they function as normative benchmarks that enable policymakers, regulators, and civil society to assess the adequacy, coherence, and

² Local Economic and Employment Development (LEED) Policy Guide on Legal Frameworks for the Social and Solidarity Economy, (2023) 10.

³ *ibid.*

⁴ Kim Kaze, Nazmiye Balta-Ozkan and Elisabeth Shrimpton, 'Connecting Power to People: Integrating Community Renewable Energy and Multi Level Governance towards Low-carbon Energy Transition in Nigeria' (2025) 121 Energy Research & Social Science, 1.

impact of the legal framework as it is implemented over time.⁵ They create a standard against which success or failure can be measured, and they help ensure consistency in legal interpretation and policy application.⁶

Accordingly, the principles proposed herein are not abstract ideals, but practical and adaptable cornerstones upon which Nigeria's renewable energy legal regime should be constructed. These principles are intended to infuse the legal framework with a sense of purpose, legitimacy, and resilience, ensuring that it not only facilitates an effective transition to renewable energy but also safeguards the broader developmental and environmental interests of the Nigerian people now and in the future. The following principles are therefore proposed as the cornerstones upon which Nigeria's renewable energy legal regime should be built.

5.1.1 Sustainability and Environmental Stewardship

A significant pillar of any renewable energy legal framework especially in a developing country like Nigeria must lie on the principle of sustainability and environmental stewardship which serves as a foundational worth that underscores the need to balance present developmental demands with the responsibility to protect the environmental integrity of the country for future generations by meeting present energy needs without compromising the ability of future generations to meet theirs.⁷ This principle reflects a long-term vision that transcends short-term gains, insisting that while it is imperative to meet today's energy needs,

⁵ OD Oliver-Lalana, 'Due Post-Legislative Process? On the Lawmakers' Constitutional Duties of Monitoring and Revision in K Messerschmidt and AD Oliver-Lalana (eds), *Rational Lawmaking under Review. Legisprudence According to the German Federal Constitutional Court* (Springer, 2016) 259. See also Maria Mousmouti, 'Making Legislative Effectiveness an Operational Conceptual Tool for Law Making' (2018) 9(3) *European Journal of Risk Regulation*, 446.

⁶ *ibid.*

⁷ Michael Ben-Eli, 'Sustainability: Definition and Five Core Principles, a Systems Perspective' (2018) 13 *Sustainability Science*, 1337. See also Asif Siddiqui, Ruchira Nigam and Monowar Khalid, 'Environmental Ethics and Sustainability' cited in MA Khalid *et al*, *Environmental Problems, Protection and Policies* (Academic Publishers and Distributors, India, 2024) 328.

such efforts must not jeopardize the rights and wellbeing of those who will inhabit the nation tomorrow.

Sustainability, in this context, demands a deliberate and strategic shift away from environmentally harmful energy practices such as those associated with fossil fuel exploitation and use towards clean, renewable, and low-carbon energy sources like solar, wind, hydro, and biomass.⁸ It calls for the adoption of technologies and policies that significantly reduce Nigeria's greenhouse gas emissions, promote energy efficiency, and safeguard the health of ecosystems that are increasingly under threat from pollution, deforestation, and climate change.⁹

Environmental stewardship, which goes hand-in-hand with sustainability, embodies a moral and legal duty to manage natural resources in a way that is both responsible and forward-looking.¹⁰ It requires the legal framework to go beyond merely allowing for environmental considerations as optional or secondary to economic development. Instead, environmental protection must be enshrined as a core objective integrated into the very design and implementation of all energy-related laws, policies, and projects.¹¹

It is important to that this principle is not merely theoretical, as it is grounded in a growing body of domestic legislation, policy instruments, and international commitments that collectively mandate a shift toward environmentally responsible energy development.¹²

Domestically, this principle finds expression in the *Constitution of the Federal Republic of*

⁸ HN Amadi *et al*, 'Renewable Energy in Nigeria: Prospects and Challenges' (2024) 11(4) European Journal of Advances in Engineering and Technology, 55.

⁹ Rimamsikwe Kituase, Comfort Gemade and Franca Jando, 'Sustainability of the Nigerian Environmental Resources Conservation and Management: Interrogating the Principles of Conservation in Biblical Christian Perspective' (2020) 16(29) European Scientific Journal, 56.

¹⁰ Raphael Mathevet, Francois Bousquet and Christopher Raymond, 'The Concept of Stewardship in Sustainability Science and Conservation Biology' (2018) 217 Biological Conservation, 363. See also Lynette McLeod *et al*, 'Environmental Stewardship: A Systematic Scoping Review' (2024) PLoS One, 1.

¹¹ Aldona Kipane and Andrejs Vilks, 'Legal Framework for Environmental Protection in the Context of Sustainable Development' (2022) 11(4) European Journal of Sustainable Development, 169.

¹² MD Qamruzzaman and Salma Karim, 'Green Energy, Green Innovation, and Political Stability led to Green Growth in OECD Nations' (2024) 55 Energy Strategy Reviews, 1.

Nigeria 1999 (as amended), which mandates the state to “protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria.”¹³ Although housed within the non-justiciable provisions of the Constitution,¹⁴ this provision reflects a constitutional vision that prioritizes environmental protection as a core state responsibility.

Further operationalizing this vision is the *Environmental Impact Assessment Act* (EIA), which requires that any project likely to significantly affect the environment must undergo a comprehensive environmental assessment prior to implementation.¹⁵ This legal requirement ensures that sustainability is integrated at the planning stage of energy development, and that potential environmental harms are addressed proactively.

Additionally, the *National Environmental (Energy Sector) Regulations*, 2014, issued by the National Environmental Standards and Regulations Enforcement Agency (NESREA), provide sector-specific environmental standards for energy production and use.¹⁶ These regulations mandate emission controls, waste management procedures, and environmental monitoring, thereby embedding the principle of stewardship into the regulatory structure of Nigeria’s energy sector.¹⁷ They form a crucial part of the regulatory architecture for ensuring that energy production, whether from fossil fuels or renewable energy sources complies with environmental best practices.

At the policy level, the *National Renewable Energy and Energy Efficiency Policy* (NREEEP) of 2015, articulates the federal government’s commitment to diversify the national energy mix through renewable sources, reduce greenhouse gas emissions, and promote energy efficiency.¹⁸ It acknowledges the role of clean energy not only in meeting Nigeria’s

¹³ Section 20 of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

¹⁴ Paragraph 3.3.1.1 in chapter 3.

¹⁵ Section 1(a) of the *Environmental Impact Assessment (EIA) Act*, Cap E12 LFN 2004.

¹⁶ Section 34 of the *National Environmental Standards and Regulations Enforcement Agency* (NESREA) 2007.

¹⁷ Regulations 1-2 of the *National Environmental (Energy Sector) Regulations*, 2014

¹⁸ Paragraph 1.1 of the *National Renewable Energy and Energy Efficiency Policy* (NREEEP), 2015.

development goals but also in preserving the country's environmental integrity. This commitment is further strengthened by Nigeria's Energy Transition Plan (ETP) of 2022, which outlines a structured pathway to achieve net-zero emissions by 2060.¹⁹ The Plan integrates environmental considerations across all stages of the energy value chain and highlights the need for cleaner technologies, just energy transitions, and institutional reforms to support sustainability, and underscores the urgency of adopting sustainable technologies and renewable energy solutions as central components of Nigeria's climate and energy policy frameworks.²⁰

Nigeria's obligations under the international legal framework further strengthen the imperative of sustainability in energy governance. As a party and signatory to the *United Nations Framework Convention on Climate Change* (UNFCCC)²¹ and *Paris Climate Change Agreement*, also known as the *Paris Agreement*,²² both of which obligate the country to pursue sustainable development pathways that limit carbon emissions and protect environmental health. Nigeria has committed to reducing its greenhouse gas emissions through nationally determined contributions (NDCs).²³ These commitments necessitate a robust legal framework that prioritizes clean energy development and environmental conservation. In addition, the African Charter on Human and Peoples' Rights, recognizes the right of individuals and communities to "general satisfactory environment favourable to their development."²⁴ This includes a human right dimension to environmental stewardship, reinforcing the need for participatory and inclusive energy laws that protect both the environment and the communities that depend on it.

¹⁹ Nigeria's Energy Transition Plan (ETP) of 2022 <<https://energytransition.gov.ng/>> accessed 16 August, 2025.

²⁰ *ibid.*

²¹ The *United Nations Framework Convention on Climate Change*, 1992.

²² The *Paris Climate Change Agreement*, 2015.

²³ United Nations Climate Change: Nationally Determined Contributions (NDCs) is committed to reduce emissions, and the target for countries is 20% reduction of emissions unconditionally and up to 45% with international help in 2030.

²⁴ Article 24 of the *African Charter on Human and Peoples' Rights (Ratification and Enforcement)*, Cap A9 LFN 2004.

In light of these legal and policy instruments, sustainability and environmental stewardship must be treated not as peripheral concerns, but as central and enforceable elements of Nigeria's renewable energy legal regime. The legal framework must establish binding environmental standards and ensure that all energy development activities whether public or private are subjected to rigorous and transparent environmental impact assessments, environmental safeguards, empower regulatory agencies to enforce compliance, ensure that affected communities have legal standing and access to justice in cases of environmental harm, and align with Nigeria's constitutional, statutory, and international obligations. Only by doing so can Nigeria ensure a just, inclusive, and resilient energy transition that respects both people and the environment.

5.1.2 Energy Justice and Equity

In developing an effective and inclusive renewable energy legal framework for Nigeria, it is imperative that the principle of energy justice and equity is not only acknowledged but embedded as a guiding norm.²⁵ This principle recognizes that access to energy is a fundamental human right and a prerequisite for social development, economic inclusion, and environmental sustainability.²⁶ It also calls for the fair distribution of both the benefits and burdens associated with energy production and consumption across all segments of the country, particularly as Nigeria undertakes the process of transitioning to a low-carbon energy future.²⁷

Energy justice is especially critical in Nigeria, where millions of citizens mostly in rural, off-grid, and economically disadvantaged communities remain without access to reliable and

²⁵ Oyeniyi Abe and Victor Azubike, '(Re)examining the Intersection between Energy Justice and Energy Transition in Africa' (2024) 42(2) *Journal of Energy & Natural Resources Law*, 279.

²⁶ Portia Oduro, Peter Simpa and Darlington Ekechukwu, 'Addressing Environmental Justice in Clean Energy Policy: Comparative Studies from the United States and Nigeria' (2024) 19(2) *Global Journal of Engineering and Technology Advances*, 176.

²⁷ Mark Danung *et al.*, 'The Imperatives of a Legal Framework for Renewable Energy in Nigeria' (2025) 12(2) *Unizik Journal of Commercial and Property Law*, 85.

affordable electricity.²⁸ It should be understood that, even urban areas suffer same, as they often rely on costly and environmentally harmful alternatives such as generators, firewood, kerosene, which all pose risks to human health, limit economic productivity, and worsen poverty.²⁹ These inequalities have persisted despite decades of legal, policy reform and sectoral restructuring.³⁰ A new legal framework must therefore confront this inequity head-on, ensuring that the transition to renewable energy does not leave behind those who have historically been excluded from the benefits of electrification. For these population, the promise of renewable energy is not merely about climate goals, it is about inclusion, empowerment, and basic justice.

In essence, a legal framework rooted in energy justice must therefore go beyond the mere development of renewable energy technologies, it must actively work to correct existing disparities in energy access and ensure that the transition to low-carbon energy does not replicate or worsen social and economic inequalities. This involves a deliberate legal and policy measures that prioritize energy infrastructure development and make clean energy affordable and accessible to all.

This imperative can be seen to be consistent with the provision of the *Constitution of the Federal Republic of Nigeria* (the Constitution), which provides that the “security and welfare of the people shall be the primary purpose of government.”³¹ Access to energy services can therefore be observed to be inseparable from this obligation, given that energy underpins welfare-related sectors such as health, education, water, and economic opportunity. In the

²⁸ Maame Twum and Eric Beecham, ‘Nigerians Lack Reliable Electricity, leaving most Discontent with Government’s Efforts’ (NOIPolls, Disoatch No. 814, 20 June 2024) <<https://www.afrobarometer.org/wp-content/uploads/2024/06/AD814-Nigerians-lack-reliable-electricity-Afrobarometer-19june24.pdf>> accessed 23 August, 2025. See also Augusta Ikevuje *et al*, ‘Energy Justice: Ensuring Equitable Access to Clean Energy in Underprivileged Communities’ (2023) 8(2) *Magna Scientia Advanced Research Reviews*, 211.

²⁹ Eleanya Nduka, ‘How to get Rural Households Out of Energy Poverty in Nigeria: A Contingent Valuation’ (2021) 149 *Energy Policy*, 1.

³⁰ *ibid*.

³¹ Section 14(2)(b) of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

same vein, the Constitution mandates the State to “control the national economy in such manner as to secure the maximum welfare, freedom and happiness of every citizen.”³² Thus, a legal framework that denies the larger parts of the population access to clean energy would violate the essence of these constitutional provisions.

Although the *Electricity Act* of 2023 marks a turning point in Nigeria’s electricity laws.³³ It introduces a decentralized electricity market, empowering states, local governments, and private sectors to participate more actively in electricity generation, transmission, and distribution.³⁴ Importantly, the *Electricity Act* recognizes off-grid and embedded generation as legitimate forms of electricity supply, opening the door for rural communities to be served by mini-grids and decentralized energy systems.³⁵ In addition, the *Electricity Act* establishes a Rural Electrification Fund, which can be structured to support same marginalized and low-income communities, and provides for state-level electricity markets, enabling subnational governments to tailor energy access policies and licensing to local needs, potentially improving rural electrification outcomes if inclusivity is prioritized in the implementation.³⁶ However, while the *Electricity Act* creates enabling conditions, it does not automatically guarantee equity. Hence, without deliberate legal provisions and regulatory action focused on the all communities, the benefits of decentralization may concentrate on commercially viable urban areas, further encouraging existing inequalities.

To address existing disparities, the National Renewable Energy and Energy Efficiency Policy (NREEEP), explicitly outlines the need to increase access to modern energy services in rural

³² *ibid.* section 16(1)(b).

³³ Razaq Obe at the PwC’s Annual Power & Utilities Roundtable (14th edition): The Electricity Act 2023 – Powering Nigeria (April 2024) 12 <<https://www.pwc.com/ng/en/assets/pdf/power-roundtable-2024.pdf>> 23 August 2025.

³⁴ Sections 1-2 of the *Electricity Act*, 2023.

³⁵ *ibid.* sections 1(1)(m) and 164.

³⁶ *ibid.* sections 142-143.

and underserved areas through off-grid and mini-grid renewable energy systems.³⁷ However, while the policy sets ambitious goals, its implementation must be backed by enforceable legislation that mandates rural electrification and equitable energy planning. The Rural Electrification Strategy and Implementation Plan (RESIP), although administrative in nature serves as a foundational policy document that guides the activities of the Rural Electrification Agency (REA).³⁸ An effective legal framework should recognize and strengthen the mandate of this agency by integrating rural electrification targets into binding legislative instruments, including incentives for private sector participation in community-based solar and mini-grid projects.

Moreover, energy justice must ensure that vulnerable and marginalized groups especially women, youth, low-income households, and indigenous communities are protected from bearing disproportionate burdens during the energy transition. The *Environmental Impact Assessment Act*, though traditionally focused on environmental risks,³⁹ can be reinterpreted or amended to include social impact assessments as a legal requirement. These assessments would consider displacement risks, affordability, access, and community participation essential tools in preventing unjust outcomes in energy project implementation.

Importantly, Nigeria's international legal obligations reinforce the energy justice mandate. As a party and signatory to the *International Covenant on Economic, Social and Cultural Rights* (ICESCR), Nigeria is bound to progressively realize the right to an adequate standard of living... and to the continuous improvement of living conditions, which can include access to energy as an essential component.⁴⁰ The *African Charter on Human and Peoples' Rights*,

³⁷ Paragraph 1.1 of the *National Renewable Energy and Energy Efficiency Policy* (NREEEP), 2015.

³⁸ Rural Electrification Strategy and Implementation Plan (RESIP), 2016.

³⁹ *Environmental Impact Assessment Act* (Cap E12, LFN 2004).

⁴⁰ Article 11 of the *International Covenant on Economic, Social and Cultural Rights* (ICESCR) 1967.

also guarantees the right to development,⁴¹ and to a satisfactory environment,⁴² both of which intersect with the equitable distribution of energy services. Additionally, Nigeria's Nationally Determined Contributions (NDCs) under the Paris Agreement make repeated references to ensuring energy access and equity while pursuing climate mitigation and adaptation goals.⁴³ These international commitments demand an effective legal framework that is not only environmentally sound but also socially just.

In order to further operationalize energy justice, the legal framework must provide for mandated energy access targets for rural and marginalized communities, legally binding on the federal and state governments; support for decentralized renewable energy systems, including licensing reforms that reduce bureaucratic barriers for small-scale solar and mini-grid developers; legal protection of community rights in land use and project siting, to prevent displacement and exploitation; incentives and financing mechanisms, for example, subsidies, tax reliefs targeted at renewable energy solutions for poor and underserved populations; participatory governance mechanisms, such as community consultation requirements, energy cooperatives, and grievance redress systems, to give affected populations a voice in decision-making.⁴⁴

In essence, energy justice and equity must be seen not as aspirational addendums but as legally enforceable standards that define the moral and structural integrity of Nigeria's renewable energy framework. By including this principle in both domestic constitutional and statutory law, as well as international human rights and climate obligations, Nigeria can develop a legal regime that ensures that no one is left behind in the energy transition. Only

⁴¹ Article 22 of the *African Charter on Human and Peoples' Rights*, 1986.

⁴² *ibid.* Article 24.

⁴³ *Article 4 of the Paris Agreement*, 2015.

⁴⁴ Augusta Ekevuje *et al*, *op cit.* n28.

through such a deliberate and inclusive approach can the country realize its developmental ambitions while upholding fairness, dignity, and opportunity for all.

5.1.3 Legal Certainty and Predictability

An important foundation of any effective legal framework, particularly one aimed at guiding energy transition is the principle of legal certainty and predictability.⁴⁵ This principle holds that the laws and regulations governing the energy sector must be clear, stable, and consistently applied so that all stakeholders, government parastatals, investors developers, communities, and regulators can rely on the legal framework in making long-term decisions.⁴⁶ Without clarity and consistency, it may become extremely difficult for stakeholders to plan, commit resources, or engage confidently in the energy transition.

The nature of renewable energy development demands this stability, as projects in this sector often require substantial upfront capital investments, long-term financing arrangements, infrastructure planning, and multi-year implementation timelines.⁴⁷ Private investors and development partners, particularly international development partners, will only commit resources if the legal and regulatory environment is perceived as reliable, enforceable, and free from arbitrary change. Equally, communities that host energy projects must have confidence that the rights and obligations set out in law will be honoured and enforced consistently over time.

⁴⁵ Maras Gbomagba, 'Role of Law Driving Energy Transitions: A Critical View of China and Selected African Countries' (2025) 16 Beijing Law Review, 76. See also Kaisa Huhter, 'The Contribution of Energy Law to the Energy Transition and Energy Research' (2020) 73 Global Environmental Change, 1.

⁴⁶ Blanka Vitez and Saskia Lavrijsen, 'The Energy Transition: Democracy, Justice and Good Regulation of the Heat Market' (2020) MPDI Energies, 2.

⁴⁷ Suzana da Silva and Antonio Martins, 'Renewable Energies, Sustainability and Law, in: Maria Garcia and Antonio Cortes (eds) *Blue Planet Law: Sustainable Development Goals Series* (Springer, 2023) 146.

In the Nigerian context, the need for legal certainty is amplified by the country's history of legal and policy inconsistency, overlapping regulatory mandates, and weak enforcement mechanisms, all of which undermine confidence in the energy sector.⁴⁸ Therefore, a robust renewable energy legal framework must address these historical weaknesses and provide coherent, transparent, and enforceable structure that goes beyond electoral cycles or changes in administration.

This necessity is already recognized in part within the *Electricity Act* of 2023, which repealed the *Electric Power Sector Reform Act* (EPSRA) 2005. The *Electricity Act* introduces key structural reforms, most notably, the decentralization of electricity regulation, allowing states to establish their own regulatory authorities and licensing regimes.⁴⁹ For legal certainty, however, this decentralization must be matched by harmonized legal frameworks, defined jurisdictional boundaries, and clear dispute resolution mechanisms. Without these, the risk of regulatory overlap or contradictory frameworks and policies across the federal and state level could erode predictability and increase in investment risk. Additionally, the *Electricity Act* provides for the Rural Electricity Fund,⁵⁰ which if properly structured could offer stable financing instruments for renewable energy projects. However, to build investor confidence, the legal framework must include statutory guarantees of access to fund, transparent eligibility criteria, and long-term budgetary commitments enshrined in law.

Beyond statutory instruments, the *Environmental Impact Assessment (EIA) Act* also plays a vital role in ensuring predictability, particularly in project planning. It provides procedural certainty by requiring that energy developers undertake environmental assessments before

⁴⁸ Peace Ogbodo-Nathaniel, Olusola Olujobi and Vera Monehin, 'An Examination of the Legal, Policy and Institutional Framework for Promoting Renewable Energy Projects as Panaceas for Sustainable Development in Nigeria' (2024) 15(3) *The Journal of Sustainable Development Law and Policy*, 87.

⁴⁹ Section 63 of the *Electricity Act*, 2023.

⁵⁰ *ibid.* sections 142-143.

project approval.⁵¹ However, in practice, the EIA Act is often weakened by delays, lack of enforcement, and vague compliance standards. Strengthening it to include enforceable timelines, community participation requirements, and appeals process can enhance both clarity and reliability of the permitting process.

Furthermore, contractual certainty, particularly through Power Purchase Agreements (PPAs),⁵² land use agreements, and licensing terms, must be legally protected. These contracts should be enforceable under an effective legal framework, and shielded from retroactive government interference. The legal framework should explicitly limit the unilateral cancellation or renegotiation of energy contracts, except in accordance with predefined legal procedures and in the interest of the public.

International commitments, such as those under the Paris Agreement, also require a predictable legal environment. Nigeria's climate goals, as reflected in its Nationally Determined Contributions (NDCs),⁵³ can only be achieved if the legal framework encourages long-term private sector participation and enables strategic planning. An unpredictable or incoherent legal framework could compromise the country's credibility in meeting these obligations.

In essence, to uphold legal certainty and predictability, the renewable energy legal framework must incorporate the following: clearly defined mandates for federal, state, and local government authorities to avoid overlapping jurisdictions; codified licensing procedures, including processing timelines, duration of approvals, and grounds for denial or revocation; enforceable dispute resolution mechanisms, including recourse to court with competent jurisdiction, administrative tribunals or independent alternative dispute resolution institutes;

⁵¹ Section 2 of the *Environmental Impact Assessment Act* 1992 Cap E12, LFN 2004.

⁵² Oyetola Atoyebi, 'Power Purchase Agreements, and their Role in Energy Development in Africa' (Law Pavillion, 19 July, 2023) < <https://lawpavilion.com/blog/power-purchase-agreements-and-their-role-in-energy-development-in-africa/> > accessed 28 August, 2025.

⁵³ Article 11 of the *Paris Agreement*, 2015.

protection of acquired rights and legitimate expectations, especially for investors and host communities; and periodic legal reviews that allow for adaptation without undermining prior commitments or creating legal uncertainty.⁵⁴

Thus, legal certainty and predictability are indispensable to the success of Nigeria's energy transition, as they provide the legal assurance necessary for long-term investment, responsible governance, and stakeholder trust. By grounding the renewable energy framework in clarity, consistency, and enforceability, and aligning it with existing laws like the *Electricity Act*, *EIA Act*, and Nigeria's constitutional and international obligations, the country can foster a stable environment in which the goals of energy access and affordability, environmental sustainability, and economic development can thrive.

5.1.4 Public Participation and Transparency

Public participation and transparency are fundamental to building both the legitimacy and effectiveness of Nigeria's renewable energy legal framework.⁵⁵ A successful energy transition cannot be driven solely by government policies or private sector investments; it must also be shaped by the voices, needs, and rights of the citizens especially those most directly affected by new energy projects.⁵⁶ This means public involvement ensures that policies are not only technically sound but socially acceptable, and that the benefits of the transition are widely shared.

Public participation goes beyond mere consultation. It requires creating formal, accessible mechanisms through which citizens and communities can contribute to decisions on energy

⁵⁴ Peter Onuh *et al*, 'Challenges and Opportunities in Nigeria's Renewable Energy and Policy Legislation' (2024) 23(2) World Journal of Advanced Research and Reviews, 2354, 2570, 2371.

⁵⁵ Mark Danung *et al*, 'The Imperatives of a Legal Framework for Renewable Energy in Nigeria' (2025) 12(2) Unizik Journal of Commercial and Property Law, 92.

⁵⁶ Jorg Radtke and Orwin Renn, 'Participation in Energy Transitions: A Comparison of Policy Styles' (2024) 118 Energy Research & Social Sciences, 1.

planning, project approvals, and environmental management.⁵⁷ For example, environmental impact assessments (EIAs), a process reinforced under the *Environmental Impact Assessment Act*, should not only be technical evaluations but opportunities for communities to review, question, and influence proposed projects before they commence. This aligns with the principles enshrined in international environmental governance, such as those under the Aarhus Convention, which emphasize access to information, public participation, and access to justice in environmental matters.⁵⁸

Transparency is the necessary counterpart to participation. Citizens can only engage meaningfully if they have access to clear, accurate, and timely information.⁵⁹ The legal framework should therefore require that all relevant documents energy policy drafts, subsidy frameworks, licensing criteria, environmental impact reports, and monitoring results be publicly available, preferably in easily accessible digital formats. Transparency also helps address the trust deficit that exists in many Nigerian communities due to past experiences with extractive industries. In regions where oil and gas operations have caused environmental degradation without delivering promised socio-economic benefits, communities are understandably cautious about new energy projects.⁶⁰ By ensuring that the decision-making process is open, that funding flows are traceable, and that environmental and social safeguards are enforced, the law can help repair this trust and prevent future conflicts.

⁵⁷ Otelemate Dokubo Maria Radulescu and Lorenzo Squintani, 'What Law does not Understand about Public Participation' (2024) 10 Heliyon, 1. See also Laura Berry *et al*, 'Making Space: How Public Participation Shapes Environmental Decision' – Stockholm Environmental Institute <<https://www.sei.org/wp-content/uploads/2019/01/making-space-how-public-participation-shapes-environmental-decision-making.pdf>> accessed 28 August, 2025.

⁵⁸ Articles 5-9 of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) 1998.

⁵⁹ Joao Rodrigues, 'Publicity, Tranparency, and Openness in Public Administration' (2023) 58(58) Revista de Derecho Uninorte, 11.

⁶⁰ Anna Zalik and Isaac Osuoka, 'Beyond Transparency: A Consideration of Extraction's Full Costs' (2020) 7 The Extractive Industries and Society, 781.

Moreover, public participation can improve the quality of policy outcomes. Local communities often possess valuable knowledge about environmental conditions, land use patterns, and social dynamics that may not be captured in top-down planning. By integrating these insights into decision-making, the renewable energy framework can avoid costly mistakes, ensure fair compensation where necessary, and design projects that genuinely meet local needs.⁶¹

In short, public participation and transparency are not procedural formalities, they are structural guarantees of fairness, accountability, and sustainability. A renewable energy legal regime that embeds these principles will not only comply with democratic governance standards but will also stand a better chance of achieving its objectives with broad public support.

5.1.5 Institutional Coordination and Accountability

Institutional coordination and accountability are indispensable for the success of Nigeria's transition to a low-carbon energy future.⁶² For decades, the energy sector has been plagued by overlapping mandates, bureaucratic inefficiencies, and a culture of institutional silos, all of which have delayed critical projects and discouraged investment. In some instances, different agencies have pursued overlapping or even conflicting objectives, leading to duplication of efforts, waste of resources, and inconsistent implementation of laws and policies.⁶³ An effective legal framework must therefore go beyond merely allocating responsibilities, it must ensure that these responsibilities are clearly delineated among relevant ministries, regulatory agencies, and all tiers of government involved in the energy sector, supported by effective

⁶¹ European Environmental Agency – The Case for Public Participation in Sustainability Transitions <<https://www.eea.europa.eu/en/analysis/publications/the-case-for-public-participation>> accessed 28 August, 2025.

⁶² Kingsley Erifeta, 'Sustainable Building Decarbonization in Nigeria: Challenges, Opportunities, and Policy Recommendations' (2025) 4(1) International Journal of Climatic Studies, 1.

⁶³ Dominion Okhirebhu *et al*, 'Overcoming Policy and Regulatory Barriers: Accelerating Nigeria's Transition to Renewable Energy' (2025) 11(2) IIARD International Journal of Geography & Environmental Management, 89.

monitoring, transparent reporting obligations, and independent oversight bodies with enforcement powers. For example, under the *Electricity Act*, the duties of the Nigerian Electricity Regulation Commission (NERC) are explicitly defined, including licensing, tariff setting, and consumer protection functions, while the state governments are now empowered to generate, transmit, and distribute electricity within their territories. This legal clarity reduces jurisdictional ambiguity and opens pathways for collaborative rather than competitive governance.

However, mere allocation of roles is not enough, coordination mechanisms must be built into the system. This includes statutory inter-agency committees, joint planning platforms, and shared data systems to avoid duplication and promote synergy. For instance, coordination between the Rural Electrification Agency (REA), the Ministry of Power, and NERC is essential to ensure that off-grid renewable energy projects are developed in line with national energy strategies and meet regulatory requirements without necessary bureaucratic delays.

With respect to accountability, a coherent legal framework should embed monitoring and evaluation systems that track progress against clearly defined performance indicators. The *Environmental Impact Assessment Act* and related provisions under the *Electricity Act* already require certain reporting and compliance obligations, but these must be paired with strong enforcement and independent oversight. An independent body or parliamentary committee with the authority to scrutinize reports, investigate lapses, and impose sanctions would help ensure that institutions deliver on their mandates. This emphasis on accountability also extends to fiscal transparency. Agencies should publish annual reports detailing budget allocations, expenditures, and project outcomes. Public disclosure builds trust and allows civil society, the media, and affected communities to play an informal watchdog role, supplementing formal oversight mechanisms.

The Mambilla Hydropower Project, established in early 1980s, was intended to generate over 3,000 MW of electricity. However, the project has suffered decades of delays largely due to inter-agency conflicts, unclear procurement processes, and political changes.⁶⁴ The Federal Ministry of Power, Ministry of Finance, Bureau of Public Procurement, and state governments have at various times disagreed over contract awards, environmental assessments, and compensation for affected communities.⁶⁵ The absence of a single coordinating legal mechanism meant that each agency operated in isolation, and no one was directly accountable for the delays. This case underscores the need for clearly defined institutional mandates and an independent oversight body to ensure energy projects remain on track.

Similar challenges have beset rural electrification efforts under the National Integrated Power Project (NIPP) that was launched in 2004 to expand electricity access nationwide, including rural communities.⁶⁶ However, the programme has often faltered because the Rural Electrification Agency, state energy ministries, and local governments failed to align on land acquisition procedures, community engagement, and environmental safeguards.⁶⁷ The absence of binding accountability mechanisms meant that contractors who abandoned projects or delivered substandard work often escaped sanction. A reformed and coherent legal framework should require periodic audits, public reporting of progress, and the application of penalties where obligations are not met.

By embedding strong provisions for inter-agency coordination, clarifying institutional mandates, and enforcing accountability through independent oversight, Nigeria's renewable

⁶⁴ The Mambilla Hydropower Project: The Journey So Far (Business Day, January 18, 2021) < <https://businessday.ng/energy/power/article/the-mambilla-hydropower-project-the-journey-so-far/> > accessed 28 August, 2025.

⁶⁵ *ibid.*

⁶⁶ Abdulrahman Olaniyan, Stephane Caux and Pascal Maussion, 'Rural Electrification in Nigeria: A Review of Impacts and Effects of Frugal Energy Generation Based on Some of E-waste Components' (2024) 10(11) *Heliyon*, 2.

⁶⁷ *Ibid.*

energy legal regime can avoid the costly mistakes of the past. Such legal framework will not only accelerate project delivery but also foster the trust, efficiency, and transparency needed to achieve a just and sustainable energy transition.

5.1.6 Economic Efficiency and Innovation

Economic efficiency and innovation are critical pillars for driving Nigeria's transition to a low-carbon energy system that is both sustainable and competitive.⁶⁸ A legal framework must therefore be designed not only to meet energy needs at the lowest possible cost but also to stimulate creativity, technological advancement, and private sector dynamism.⁶⁹ This involves embedding market-based mechanisms that reward efficiency, incentivizing the use of local materials and expertise, and creating an enabling environment for diverse players, ranging from multinational investors to grassroots energy cooperatives to participate in the renewable energy space.⁷⁰

The Electricity Act 2023 already takes a step in this direction by opening up the electricity market to increased private sector participation and granting states more autonomy to develop and regulate power generation, transmission, and distribution within their territories.⁷¹ However, the potential of these provisions will only be fully realized if complemented by

⁶⁸ Michele Okocha, 'Low Carbon Development in Support of Improving Environmental Quality in Nigeria' (2023) 4(4) *International Journal Paper Advance and Scientific Review*, 55. See also OS Fayomi *et al*, 'Pillars of Effective and Efficient Energy Systems in Nigeria' (2021) 665 *IOP Conference Series: Earth and Environmental Science*, 6.

⁶⁹ Miria Pigato *et al*, *Technology Transfer and Innovation for Low-Carbon Development* (International Bank for Reconstruction and Development/The World Bank, Washington, DC, 2020) 2.

⁷⁰ Aisha Ajia, 'Renewable Energy Policy and Sustainable Development in Nigeria: A Systematic Scoping Review' (2025) 17(6) *Journal of Energy Research and Reviews*, 11.

⁷¹ Section 1 of the *Electricity Act*, 2023.

targeted legal incentives for research and development, tax breaks for renewable technology manufacturers, and policies that promote indigenous technical capacity.

Innovation also requires flexibility, and Nigeria's renewable energy legal framework must allow for experimentation with emerging business models such as peer-to-peer energy trading, energy-as-a-service platforms, and community-owned solar microgrids.⁷² For example, under the Rural Electrification Agency's Nigeria Electrification Project, several mini-grid developers, such as PowerGen Renewable Energy,⁷³ Rubitec Solar,⁷⁴ and Husk Power Systems⁷⁵ have piloted hybrid systems combining solar, biomass, and battery storage. Despite the fact these projects have shown promise in reducing costs and improving reliability, they have sometimes been slowed by the regulatory laws that fail to accommodate non-traditional generation and distribution models. Updating the legal definitions and licensing structures to accommodate these innovations would unlock faster deployment.

Economic efficiency on the other hand cannot be separated from the local context. Legal provisions should mandate life-cycle cost analysis in project approvals to ensure that investments deliver value over time, rather than focusing solely on upfront capital expenses. Additionally, local content requirements, if designed carefully, can stimulate domestic manufacturing of renewable energy components, create jobs, at the same time reducing

⁷² Ayooluwa Adewole *et al*, 'Peer-to-Peer Energy Trading, Independence Aspirations and Financial Benefits among Nigerian Households' (2023) 174 Energy Policy, 1. See also Hani Muhsen *et al*, 'Business Model of Peer-to-Peer Energy Trading: A Review of Literature' (2022)14(3) Sustainability, 1.

⁷³ Eunice Kalu, *REA Commissions Interconnected Hybrid Solar Mini-grid Plant* (Sweet Crude Reports, 12 November, 2023) < <https://sweetcrudereports.com/rea-commissions-interconnected-hybrid-solar-mini-grid-plant/?>> accessed 29 August 2025.

⁷⁴ Samuel Babalola, Michael Daramola and Samuel Iwarere, 'Socio-economic Impacts of Energy Access through Off-grid Systems in Rural Communities: A Case Study of Southwest Nigeria' (2022) 380 Philosophical Transactions A, 5. See also Gbamu Gbamu Mini Grid <https://energypedia.info/images/9/9b/PeopleSuN_CaseStudy_4_GbamuGbamu.pdf?> accessed 29 August 2025.

⁷⁵ Darrell Proctor, *Nigeria Group Announces More Mini-Grid Deployments* (Power, 2 January, 2024) <<https://www.powermag.com/nigeria-group-announces-more-mini-grid-deployments/?>> accessed 29 August 2025.

reliance on costly imports. The challenge lies in balancing these requirements so they do not inadvertently inflate project costs or deter foreign investment.⁷⁶

By embedding these principles in law, Nigeria can create a renewable energy market that is both cost-effective and innovation-friendly. Such a framework will not only accelerate the country's energy transition but also position Nigeria as a competitive player in the global clean energy economy.

5.1.7 Alignment with Constitutional and International Obligations

Alignment with constitutional and international obligations is a cornerstone for ensuring that Nigeria's renewable energy legal framework is not only domestically enforceable but also consistent with the country's broader environmental and developmental commitments.⁷⁷ At the national level, the *Constitution of the Federal Republic of Nigeria* 1999 (as amended) explicitly mandates the state to "protect and improve the environment and safeguard the water, air, and land, forest and wildlife of Nigeria."⁷⁸ Although this provision falls under the non-justiciable Fundamental Objectives and Directive Principles of State Policy,⁷⁹ its inclusion in the Constitution establishes an important moral and political imperative. A well-crafted renewable energy framework should give practical effect to this mandate by embedding environmental protection and sustainable energy development as enforceable legal duties rather than aspirational goals.

However, to strengthen compliance, the framework should integrate specific renewable energy targets, emission reduction benchmarks, and environmental safeguards into the core

⁷⁶ Julian Gaus *et al*, 'Economic Stability by Using Life Cycle Cost Information in the Buying Center: Insights from the Public Sector' (2022) 14 Sustainability, 1. See also Giles Atkinson *et al*, *OECD – Cost-Benefit Analysis and the Environment: Further Developments and Policy Use* (OECD Publishing, Paris, 2018) 19.

⁷⁷ Mark Danung *et al*, *op cit.* n. See also Sunday Daudu and Stella Idehen, 'Navigating Nigeria's Renewable Energy Laws: An Overview of the Legal Framework for Sustainable Development' (2025) 8(2) Grassroots Journal of Natural Resources, 189.

⁷⁸ Section 20 of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

⁷⁹ *ibid.*

legislative text, thereby making them binding on all actors in the energy sector. Internationally, Nigeria is a party to the Paris Agreement, which obligates it to submit and periodically update its nationally determined contributions towards global climate mitigation and adaptation goals.⁸⁰ These NDCs include commitments to expand renewable energy generation and reduce greenhouse gas emissions. Similarly, the United Nations Sustainable Development Goals (SDGs), particularly on affordable and clean energy,⁸¹ climate action,⁸² and life on land⁸³ provide a comprehensive framework for integrating social, economic, and environmental priorities into the energy transition.

At the regional level, the ECOWAS Renewable Energy Policy (EREP) sets ambitious targets for member states, including achieving 19% renewable energy penetration in the electricity mix by 2030.⁸⁴ As a signatory, Nigeria is expected to harmonize its national policies with these regional targets, which would not only improve coordination with neighboring states but also enhance opportunities for cross-border renewable energy trade and infrastructure development.

Incorporating these constitutional and international commitments into the renewable energy legal framework ensures coherence, predictability, and accountability. It also strengthens Nigeria's credibility in the global climate arena, demonstrating that the country's domestic actions match its diplomatic pledges. Ultimately, this alignment fosters investor confidence, facilitates access to international climate finance, and promotes a just, inclusive, and environmentally sound energy transition.

⁸⁰ Article 2 of the *Paris Agreement*, 2015.

⁸¹ Goal 7 of the United Nations Sustainable Development Goals (SDGs).

⁸² *ibid.* Goal 13.

⁸³ *ibid.* Goal 15.

⁸⁴ ECOWAS Renewable Energy Policy (EREP) 2012 <https://www.agora-parl.org/sites/default/files/agora-documents/151012_ecowas_renewable_energy_policy_final.pdf> accessed 29 August 2025.

Together, these guiding principles offer a clear moral and legal compass for structuring Nigeria's transition to low-carbon energy. They help ensure that the legal framework is not only technically sound but also socially responsive, economically viable, and environmentally responsible. The next section will translate these principles into concrete legal provisions, institutional arrangements, and enforcement strategies that can guide Nigeria's pathway toward a sustainable energy future.

5.2 Components of a Model Legal Framework to Facilitate Nigeria's Transition to Renewable Energy

Nigeria is at a critical juncture in its energy development, facing the urgent need to transition from fossil fuel-based systems to low-carbon energy derived from renewable sources. To achieve this, the country requires a comprehensive legal framework that provides clarity, coordination, and enforceable mechanisms to promote renewable energy, safeguard the environment, and ensure equitable access to clean energy. The proposed Model Renewable Energy Act offers a detailed blueprint for such legislation, integrating Nigeria's constitutional obligations, international commitments under the Paris Agreement, and existing national laws, including the Electricity Act, 2023, and the Climate Change Act, 2021. The following are what the Act should entail:

The Act should begin with a preamble recognizing the federal government's responsibility to protect the environment, reduce greenhouse gas emissions, and facilitate sustainable development. It sets out preliminary provisions defining key terms, establishing the Act's objectives, and outlining its nationwide scope, applying to public and private actors, mini-grid and off-grid systems, and state governments. Its objectives emphasize the creation of a

coherent legal and institutional framework, the attraction of private investment, and the harmonization of renewable energy development with existing laws.

Institutionally, the Act should designate the Nigerian Electricity Regulatory Commission (NERC) as the lead regulatory authority, supported by a dedicated Renewable Energy Compliance Unit. The Federal Ministry of Power retains policy oversight, coordinates national planning, and manages funding mechanisms, while the Renewable Energy Transition Commission (RETC) serves as an independent statutory body for coordination, monitoring, and technical assistance. State governments are tasked with implementing state-level policies, promoting off-grid access, and facilitating local participation. The Act should also ensure alignment with the National Council on Climate Change (NCCC) to integrate energy planning with climate targets.

Renewable energy planning under the Act should include the establishment of national and technology-specific targets, off-grid electrification goals, and emission reduction projections, supported by a five-year National Renewable Energy Development Plan (NREDP). These plans are harmonized with Nigeria's Nationally Determined Contributions (NDCs) under the Paris Agreement, ensuring that renewable energy programs directly contribute to emission reductions, energy efficiency, and sustainable development.

The Act should outline a licensing framework requiring all commercial renewable energy operators to obtain NERC approval, with tiered licenses based on project scale, technology, and grid connectivity. Exemptions are provided for small-scale, community-based, or pilot projects. A centralized digital portal streamlines licensing, regulatory access, grid information, and public engagement, while NERC sets technical standards and interconnection requirements to ensure safety, reliability, and grid compatibility.

To incentivize investment, the Act should mandate feed-in tariffs (FiTs) with guaranteed payments for renewable energy supplied to the grid, tax incentives, import duty exemptions, accelerated depreciation, and investment allowances. It also establishes the Renewable Energy Development Fund (REDF) to finance projects, support innovation, and build local capacity, complemented by market-based mechanisms such as carbon pricing and renewable energy credits.

The legislation should ensure fair access to the national grid, obligates transmission and distribution operators to upgrade infrastructure, and designates Renewable Energy Zones (REZs) for priority development. Guidelines for mini-grid interconnection, energy storage, and smart grid adoption further strengthen integration.

Environmental and social safeguards should be central to the Act, requiring Environmental and Social Impact Assessments (ESIAs) for large or sensitive projects, public consultations, Free, Prior, and Informed Consent (FPIC) for affected communities, and compliance with land acquisition and compensation laws. Projects must implement Environmental and Social Management Plans (ESMPs) and contribute to remediation funds where necessary.

Public participation and community empowerment are to be embedded throughout the Act. Developers must implement Community Engagement Plans, support energy cooperatives and local ownership, and enter into Community Development Agreements (CDAs) for projects above five megawatts. Gender equality, youth inclusion, and education initiatives are integrated into all programs to ensure social inclusion and capacity-building.

Compliance, monitoring, and enforcement mechanisms include the Renewable Energy Compliance Unit under NERC, regular reporting, independent verification, public dashboards, and dispute resolution procedures. Penalties for non-compliance range from fines and imprisonment to administrative sanctions such as license suspension or revocation.

The Act should provide legal harmonization and transitional provisions to ensure consistency with existing laws, resolve conflicts, and integrate ongoing programs. The Minister of Justice is tasked with reviewing and aligning conflicting legislation within twelve months, ensuring a smooth transition to the new legal framework.

Furthermore, the Act should establish a phased roadmap for Nigeria's transition from fossil fuels to renewable energy between 2025 and 2040. Its objectives are to diversify energy sources, promote economic growth, reduce greenhouse gas emissions, and position Nigeria as a regional leader in clean energy. This sets national renewable energy capacity targets, aiming to increase the share of renewables in electricity generation from 20% in 2025 to 65% by 2040, corresponding to 8,000 MW rising to 40,000 MW. Sector-specific targets prioritize solar energy as the cornerstone, complemented by wind, biomass, and hydropower development. Nigeria should aim to expand electricity access from 70% in 2025 to near-universal coverage by 2040, while reducing emissions from 10 million tonnes CO₂ equivalent to 50 million tonnes. The Renewable Energy Transition Commission monitors progress, supported by state governments and the Renewable Energy Development Fund, with review mechanisms every five years to adapt to technological and market developments. International lessons from Sweden, Denmark, Norway, Kenya, and South Africa guide the roadmap.

In addition, the Act should identify eligible renewable energy technologies and establishes guiding principles for tariffs to ensure affordability for consumers while attracting private investment. Eligible technologies include solar (PV, rooftop, CSP, hybrid systems), wind (onshore, offshore, hybrid), biomass (agricultural residues, municipal waste), hydropower (run-of-river, mini-hydro, dam retrofits), and geothermal resources. Tariff-setting principles include feed-in tariffs (FiTs), competitive auctions for large projects, and net-metering for distributed generation. The Renewable Energy Transition Commission coordinates with

NERC and state regulators to review technologies, ensure alignment with national targets, and publish annual performance reports. This is designed to create a stable policy environment, encourage investment, enhance affordability, and promote community participation in energy generation.

The Act should also provide a framework for State Governments to develop, regulate, and manage renewable energy programs in line with national objectives. States are encouraged to establish State Renewable Energy Agencies (SREAs) to oversee policy implementation, licensing, funding, and technical support. Licensing and regulatory coordination with NERC ensures consistency between state and national frameworks. States are tasked with setting fair tariffs, supporting private-sector and community participation, and integrating local content policies, including prioritizing Nigerian-made equipment and training local workers. Funding is to be mobilized through State Renewable Energy Funds, climate finance, and private contributions. Dispute resolution panels handle local conflicts, with appeals to national bodies where necessary. States must align their programs with national targets and report progress annually. Effective implementation is expected to accelerate rural electrification, attract investment, empower communities, strengthen federal-state collaboration, and drive Nigeria toward an inclusive, low-carbon energy future.

In essence, Nigeria needs this Renewable Energy Act to establish a robust, transparent, and accountable framework for renewable energy development. It would facilitate the energy transition, attract private investment, protect communities and the environment, and fulfill national and international climate obligations, positioning Nigeria as a leader in sustainable energy in Africa. The following sections of this chapter are the components of what a model renewable energy act for Nigeria should contain, which are designed to provide legislative clarity, operational structure, and legal enforceability, all tailored to Nigeria's specific constitutional context, energy landscape, and developmental priorities.

5.2.1 Legislative Mandate and Purpose

At the foundation of any legal framework lies its legislative mandate which includes the clear articulation of its purpose, scope, and legal authority.⁸⁵ It should be an all-encompassing instrument which addresses the gaps highlighted in the Nigerian legal framework discussed in chapter 3 above. For Nigeria, the first step in constructing a meaningful renewable energy transition is the enactment of a dedicated legislation, tentatively titled the “*Renewable Energy Transition and Climate Action Act*” or simply the “*Renewable Energy Act*.” This model legal framework would serve as the principal legal instrument guiding the transition from fossil fuel energy production to a low-carbon energy system powered by renewable energy sources.

The model legal framework’s purpose clause should be unambiguous and far-reaching. It should state that the primary aim of the legislation is to promote and regulate the development, deployment, and integration of renewable energy sources in Nigeria’s energy mix, with a view to reducing greenhouse gas emissions, enhancing energy access and security, combating environmental pollution, and meeting international climate obligations. This legislative mandate should clearly reflect Nigeria’s national interest in transitioning toward a cleaner, more sustainable, and inclusive energy future.

In addition to outlining these encompassing goals, the model legal framework should specify the areas to which it applies, including electricity generation, transmission, distribution, off-grid and mini-grid systems, energy efficiency, fiscal incentives, and institutional governance. This scope ensures that renewable energy is not treated as a peripheral concern, but as a central component of Nigeria’s broader energy and development strategy.

Importantly, the model legal framework should include a statement of authority indicating the constitutional basis upon which the legislation rests. Under the *Constitution of the Federal*

⁸⁵ Natural Resource Governance Institute – Legal Framework
<https://resourcegovernance.org/sites/default/files/nrgi_Legal-Framework.pdf> accessed 29 August 2025.

Republic of Nigeria, 1999 (as amended), the National and State Assemblies are empowered to make laws⁸⁶ for electricity and energy policy under the Concurrent Legislative List,⁸⁷ as well as for matters relating to the environment.⁸⁸ A well-drafted legal framework must establish its legitimacy by anchoring itself in these constitutional provisions, while also allowing for the cooperative involvement of state governments where appropriate. Furthermore, the legislative mandate should set in a commitment to justice and equity, recognizing that the transition to low-carbon energy through renewable energy sources must leave no region, community, or social group behind. This involves prioritizing access to clean energy in rural and marginalized areas, and ensuring that the benefits of the energy transition are shared widely across country.

Lastly, the model legal framework should emphasize its binding nature by including a legal status clause, making it the primary law governing renewable energy development in Nigeria, and specifying that, in the event of any conflict with pre-existing energy regulations that contradict its aims, the provisions of the model legal framework shall prevail. This legislative foundation sets the tone for a coherent, principled, and actionable legal framework. With a clear purpose and scope, the model legal framework would not only define Nigeria's energy future in legal terms but also send a strong signal both domestically and internationally that the country is committed to achieving a low-carbon, climate-resilient economy through the rule of law.

5.2.2 Institutional Framework

⁸⁶ Section 4 of the Constitution of the Federal Republic of Nigeria, 1999 (as amended).

⁸⁷ *ibid.* Item 13-14, Schedule II, Part II.

⁸⁸ *ibid.* section 20.

No legal framework, however well-drafted, can succeed without competent, coordinated, and accountable institutions to implement its provisions.⁸⁹ The transition to a low-carbon energy future requires more than legislation, it demands institutional architecture that is responsive, efficient, and aligned with the country's development goals.⁹⁰ In Nigeria, where institutional fragmentation and overlapping mandates often hinder progress, a key objective of the model legal framework must be to streamline responsibilities, clarify roles, and build synergy among relevant agencies.

At the federal level, the principal regulatory body for electricity, the Nigerian Electricity Regulatory Commission (NERC)⁹¹ must be empowered through the model legal framework to take a lead role in regulating and overseeing renewable energy markets. Even though NERC already exercises some authority over off-grid electrification and mini-grid regulation,⁹² the model legal framework should mandate the Commission to establish specific licensing guidelines, tariff structures, and interconnection rules that promote the development and integration of renewable energy sources. The model legal framework should also broaden NERC's mandate to include oversight of emissions compliance, power purchase agreements involving renewable energy, and consumer protection in the renewable energy sector.

Closely tied to NERC's role is that of the Rural Electrification Agency (REA), which has made important strides in advancing off-grid and mini-grid solutions across underserved communities.⁹³ The model legal framework should formally recognize and expand the REA's mandate, tasking it with coordinating rural renewable energy initiatives, managing donor-

⁸⁹ United Nations Development Programme (UNDP) – Institutional and Coordination Mechanisms, 2017 < https://sustainabledevelopment.un.org/content/documents/2478Institutional_Coordination_Mechanisms_GuidanceNote.pdf > accessed 29 August 2025.

⁹⁰ Mahyar Saraji and Dalia Streimikiene, 'Challenges to the Low Carbon Energy Transition: A Systematic Literature Review and Research Agenda' (2023) 49 *Energy Strategy Reviews*, 8. See also Niklas Kreander, Ken McPhail and Frank Geels, 'Institutional Investors and Low-Carbon Transitions: A Multi-Level Analysis of Lead Firm Reorientation in Northern Europe' (2025) 123 *Energy Research & Social Science*, 1.

⁹¹ Section 33 of the *Electricity Act*, 2023.

⁹² *ibid.* section 34.

⁹³ *ibid.* sections 127-128.

funded renewable energy programs, and supporting state-level electrification projects. Legal provisions should also empower the REA to partner with community organizations, cooperatives, and state governments to promote bottom-up energy access solutions.

Given the multidimensional nature of energy transition, other federal ministries and agencies will also have significant roles. The Federal Ministry of Power⁹⁴ should retain policy leadership and national planning functions, while the Federal Ministry of Environment⁹⁵ should be legally mandated to oversee environmental standards, emission reporting, and climate alignment. The model legal framework should also facilitate institutional linkages with the National Environmental Standards and Regulations Enforcement Agency (NESREA),⁹⁶ which can assist in ensuring that renewable energy projects adhere to national environmental guidelines and contribute to Nigeria's broader climate targets.

A central innovation proposed in this framework is the establishment of a Renewable Energy Transition Commission (RETC), an independent, multi-stakeholder agency created by the model legal framework to monitor the implementation of the "*Renewable Energy Act*". This Commission should include representatives from NERC, REA, the ministries of power and environment, state governments, the private sector, academia, civil society, and local communities. The RETC would be legally tasked with publishing an annual National Renewable Energy Progress Report, advising the National Assembly and executive on policy gaps, and serving as a national forum for dialogue on the energy transition.

Importantly, the model legal framework must provide for state and local governments involvement. Despite the fact electricity is a concurrent matter under the Constitution of the

⁹⁴ Federal Ministry of Power <<https://power.gov.ng/>> accessed 29 August 2025.

⁹⁵ Federal Ministry of Environment <<https://environment.gov.ng/>> accessed 29 August 2025.

⁹⁶ Section 1 of the *National Environmental Standards and Regulations Enforcement Agency (Establishment) Act*, 2007.

Federal Republic of Nigeria 1999 (as amended),⁹⁷ most state governments currently lack the legal instruments and institutional capacity to regulate or promote renewable energy.⁹⁸ Hence, the model legal framework should include provisions encouraging states to establish their own renewable energy agencies or units, adopt state-level laws in line with the national model legal framework, which would in turn become an “Act”, and co-invest in projects with the federal government or private actors. This cooperative federalism approach is essential in a country as large and diverse as Nigeria.

Finally, institutional success depends on capacity-building and accountability mechanisms.⁹⁹ The model legal framework should provide for regular training, technical support, and funding for institutions tasked with renewable energy oversight. It should also require each relevant agency to submit periodic performance reports, subject to public scrutiny and legislative review. In addition, enforcement agencies like the Economic and Financial Crimes Commission (EFCC) and the Independent Corrupt Practices Commission (ICPC) should be empowered to investigate and prosecute fraud or mismanagement in renewable energy financing and procurement.

In essence, the institutional framework proposed in this model seeks to strike a balance between centralized coordination and decentralized implementation. It recognizes that successful energy transition requires the active involvement of diverse stakeholders, regulators, ministries, communities, and investors working within a legal system that encourages transparency, cooperation, and accountability. With the right institutions in place,

⁹⁷ Item 13, Schedule II, Part II of the *Constitution of the Federal Republic of Nigeria* 1999 (as amended).

⁹⁸ Ngozi Ole, ‘The Nigerian Electricity Regulatory Framework: Hotspots and Challenges for Off-grid Renewable Electricity Development’ (2020) *Journal of Energy & Natural Resources Law*, 1.

⁹⁹ Governance Principles, Institutional Capacity and Quality – Towards Human Resilience: Sustaining MDG Progress in an Age of Economic Uncertainty
<https://www.undp.org/sites/g/files/zskgke326/files/publications/Towards_SustainingMDGProgress_Ch8.pdf> accessed 29 August 2025.

Nigeria can begin to transform its energy sector from a source of persistent crisis to a driver of sustainable development.

5.2.3 Renewable Energy Targets and Timelines

A central feature of an effective legal framework governing the transition to low-carbon energy through renewable energy sources is the inclusion of clearly defined, legally binding targets.¹⁰⁰ These targets serve not only as performance benchmarks but also as signals of national commitment both to domestic stakeholders and the international community. For Nigeria, the absence of enforceable, time-bound renewable energy goals has long contributed to policy inconsistency, low investor confidence, and slow uptake of clean energy technologies.¹⁰¹ It is therefore imperative that the model legal framework introduces mandatory national targets for renewable energy adoption, backed by statutory enforcement mechanisms and measurable timelines.

The model legal framework should also establish a National Renewable Energy Target (NRET), setting minimum percentage thresholds for renewable energy contribution to Nigeria's total electricity generation. For instance, the model legal framework may mandate that at least 30% of electricity generated nationally must come from renewable sources by 2030, scaling up to 50% by 2040, and aiming for net-zero emissions from the power sector by 2060 in line with Nigeria's Nationally Determined Contributions (NDCs) under the Paris Agreement. These targets must be enshrined in the legal framework, so that they become legally binding on the relevant institutions and are insulated from political shifts which would be continuous till the goal is finally achieved and Nigeria becomes greenhouse gas emission free.

¹⁰⁰ Olusola Olujobi *et al*, 'Legal Responses to Energy Security and Sustainability in Nigeria's Power Sector amidst Fossil Fuel Disruptions and Low Carbon Energy Transition' (2023) Heliyon, 2.

¹⁰¹ *Ibid.* at page 3.

To promote transparency and ensure progress, the model legal framework should require the Federal Ministry of Power, in coordination with the Renewable Energy Transition Commission (RETC), to publish a “Renewable Energy Implementation Plan” (REIP) every five years. This Plan would outline the specific measures, budget allocations, and sectoral pathways by which the national targets will be achieved. The REIP should be subject to public consultation and legislative review, ensuring that the planning process remains inclusive and accountable. In addition to national targets, the model legal framework should empower states to set their own subnational renewable energy targets that reflect local resource availability, infrastructure readiness, and energy access needs. For example, solar-rich northern states may be encouraged to aim for higher solar generation by 2030, while states with hydro potential in the middle belt and southeast may focus on small and medium-scale hydro projects. The model legal framework should include a clause encouraging interstate collaboration and allow the Federal Government to provide matching grants or technical support to states that meet or exceed their targets, thereby creating healthy competitions interstate for the benefits of citizens and the country at large.

To reinforce these commitments, the model legal framework should establish a penalty and incentive mechanism. Regulatory agencies should be empowered to impose administrative sanctions on licensees or utilities that fail to comply with renewable generation obligations without any exemption, such as renewable portfolio standards. Conversely, the model legal framework should authorize incentives such as feed-in tariff bonuses, carbon credits, or fast-tracked approvals for entities that exceed their renewable generation quotas.

Equally important is the integration of monitoring and evaluation mechanisms.¹⁰² Hence, the model legal framework should mandate annual reporting on progress toward national and

¹⁰² Anable Santos and Alex Coad, ‘Monitoring and Evaluation of Transformative Innovation Policy: Suggestions for Improvements’ (2023) 90 Socio-Economic Planning Sciences, 1.

subnational targets, to be compiled by the RETC and presented before the National Assembly. These reports must include disaggregated data on installed renewable capacity, generation output, regional implementation, and socio-economic impact. It should further require an independent review of national progress every five years, possibly conducted by universities, think tanks, or development partners. Finally, it should adopt a flexibility clause, allowing for the periodic adjustment of targets in response to new technological developments, funding realities, or climate obligations, and such adjustments should be subject to parliamentary approval and grounded in evidence-based assessments to prevent arbitrary changes or backsliding.

By establishing clear, and enforceable renewable energy targets with realistic timelines, Nigeria can move from policy aspiration to structured implementation. These legal commitments provide direction for public agencies, assurance for investors, and hope for communities still waiting for reliable, sustainable electricity. More importantly, they place Nigeria firmly on a trajectory toward environmental responsibility, energy security, and long-term resilience.

5.2.4 Licensing and Regulatory Mechanisms

An effective legal framework for renewable energy must include clear, streamlined, and accessible licensing and regulatory procedures.¹⁰³ Licensing serves as the legal gateway through which energy producers enter the market.¹⁰⁴ However, in Nigeria, the licensing process has often been marred by excessive bureaucracy, lack of coordination, and prolonged delays, which discourage investment and stall project implementation particularly for small-

¹⁰³ Peter Onuh *et al*, op cit. n.

¹⁰⁴ Licensing in the Energy Sector

<https://www.energycharter.org/fileadmin/DocumentsMedia/EU4Energy/20171005_Licencing_en.pdf> accessed 29 August 2025.

scale and community-based renewable energy initiatives.¹⁰⁵ To address these challenges, the proposed model legal framework should provide for a dedicated licensing regime for renewable energy projects, distinct from the broader electricity sector licensing process. This regime should be managed primarily by the Nigerian Electricity Regulatory Commission (NERC), in coordination with the Rural Electrification Agency (REA) for off-grid and mini-grid projects. The model legal framework should require NERC to issue renewable energy licensing guidelines, which will clearly outline the procedures, documentation, timelines, and fees associated with obtaining licenses for different categories of renewable projects utility-scale, embedded generation, and off-grid installations.

Importantly, the licensing process must be tiered and proportionate in the sense that small-scale and community-based renewable energy projects should not be subject to the same regulatory burden as large, utility-scale developers. The model legal framework should therefore establish simplified licensing procedures or in appropriate cases, license exemptions for systems below a certain capacity threshold, for example, renewable energy projects that less than 100 KW. This would remove unnecessary legal barriers for rural cooperatives, SMEs, and community energy developers who often lack the resources to navigate complex regulatory frameworks.

The model legal framework should also mandate the creation of a “One-Stop Legal and Regulatory Portal” for renewable energy. This online platform, operated by NERC or the Ministry of Power, would serve as a centralized hub for all licensing-related applications, submissions, tracking, and updates. It should integrate other relevant agencies, for instance, environmental authorities, land registration offices, and customs to reduce duplication,

¹⁰⁵ Ekele Onuoha, ‘Unlocking Renewable Energy Materials in Nigeria: Availability, Application, and Roadmap for Sustainability’ (2025) 3(6) RSC Sustainability, 2535.

eliminate back-and-forth delays, and provide real-time transparency on the status of applications.

To ensure that licenses are not used as speculative instruments or allowed to stagnate, the model legal framework should include time-bound validity periods and performance-based conditions. For example, a project license may lapse if the developer fails to reach financial close or commence construction within a defined timeframe, unless an extension is granted based on valid reasons on one time basis. This would promote efficiency and discourages hoarding of energy development rights.

Similarly, it must ensure regulatory consistency and fairness. All licensing decisions should be guided by publicly available criteria, and applicants should have a legal right to appeal decisions through a designated tribunal or administrative review process. NERC, as the lead regulator, should also be required to conduct periodic stakeholder consultations to update and improve the licensing framework based on market trends, technological advancements, and user feedback.

Additionally, for renewable energy projects that seek to export electricity or operate across multiple states, the model legal framework should establish inter-jurisdictional coordination mechanisms. This is especially important in a federal structure like Nigeria's, where regulatory authority can be fragmented. The model legal framework should include provisions encouraging states to adopt harmonized licensing standards and cooperate with federal agencies through formal Memoranda of Understanding (MoUs) or intergovernmental councils.

Finally, the model legal framework must address licensing for hybrid systems and energy storage, which are increasingly vital for grid stability and reliability. It should explicitly recognize and regulate systems that combine solar, wind, battery storage, and backup

generators, ensuring that such innovations are not excluded by outdated or narrow licensing definitions. Thus, the success of Nigeria's renewable energy transition depends in no small measure on the establishment of a licensing and regulatory system that is transparent, efficient, and responsive to different scales and types of renewable energy deployment. By removing procedural obstacles and building trust in the regulatory process, the model legal framework can help unlock the country's vast renewable energy potential and accelerate the pace of implementation across all regions.

5.2.5 Fiscal and Market-based Incentives

A coherent legal framework for renewable energy must not only regulate, it must also stimulate. To drive investment, innovation, and widespread adoption of clean energy technologies, Nigeria's model legal framework must be designed to create strong economic incentives and reduce the financial risks associated with renewable energy development.¹⁰⁶ Fiscal and market-based incentives are therefore essential legal tools that can bridge the gap between policy aspirations and practical outcomes.

The proposed model legal framework should include a dedicated section on incentive structures for renewable energy, outlining a group of legally established financial mechanisms that will support project development, attract private capital, and encourage local participation. These incentives must be clearly defined to ensure transparency, stability, and investor confidence. One of the most effective legal tools available is the feed-in tariff (FiT), a fixed payment guaranteed by law to renewable energy producers for the electricity they supply to the grid. In essence, the model legal framework should authorize NERC to establish a legally binding feed-in tariff regime for eligible renewable energy sources, differentiated by technology type and project size. It should ensure that these tariffs are cost-

¹⁰⁶ Olusola Olujobi and Temilola Olusola-Olujobi, 'Nigeria Renewable Energy as Alternative Sources of Energy: Impacts and Potentials' (2023) 50(25) Environmental Policy and Law, 1.

reflective yet attractive enough to offer a reasonable return on investment, especially for early-stage and small-scale developers.

In addition to FiTs, the model legal framework should provide for tax-based incentives, including: import duty exemptions for renewable energy equipment such as solar panels, inverters, batteries, and wind turbines; tax holidays or reduced corporate income tax rates for renewable energy companies during their initial years of operation; accelerated depreciation allowances for capital expenditures on clean energy infrastructure. These fiscal provisions should be codified in the model legal framework to eliminate uncertainty and reduce reliance on executive discretion or budgetary cycles. They should also be harmonized with Nigeria's tax laws to ensure legal coherence and enforceability.

A further critical provision should be the creation of a proposed "Renewable Energy Development Fund" (REDF). This fund, having the backing of a binding legal framework and housed within the Ministry of Finance or an independent financial authority, would be mandated to provide concessional financing, grants, and loan guarantees to qualifying renewable energy projects, particularly those in rural, underserved, or economically marginalized areas. The model legal framework should specify the fund's sources, which may include: government budget allocations; levies on fossil fuel-based generation; climate finance from international donors; and private sector contributions through public-private partnerships. The REDF should operate transparently, with clear eligibility criteria, public calls for proposals, and independent auditing. It should prioritize projects with strong social, environmental, and developmental impact, including those led by women, youth, and local communities.

In line with global best practices, the model legal framework should also empower the government to implement carbon pricing mechanisms, such as a carbon tax or emissions

trading scheme.¹⁰⁷ While such measures may require gradual introduction, it should provide an enabling legal basis for their future adoption, particularly to discourage carbon-intensive practices and raise revenue for renewable investments.

In addition to supporting innovation and local industry development, the model legal framework should include provisions for: start-up grants and seed capital for renewable energy entrepreneurs; local content requirements, which mandate the use of Nigerian labour, materials, or technology in project development; research and development incentives, such as funding for universities and technical institutes engaged in renewable energy research.¹⁰⁸ Thus, fiscal and market-based incentives are not optional, they are foundational. If embedded firmly in law, they have the power to shift investment patterns, reduce project risk, and unlock the full potential of Nigeria's renewable energy sector. For a country facing both an energy crisis and a climate emergency, these legal incentives can accelerate the clean energy transition in a way that is inclusive, strategic, and sustainable.

5.2.6 Grid Access and Infrastructure Integration

One of the most persistent barriers to scaling up renewable energy in Nigeria is the limited and often discriminatory access to the national electricity grid.¹⁰⁹ Insufficient infrastructure and outdated grid systems remain major obstacles even though legal reforms have facilitated the entry of renewable energy actors into the market.¹¹⁰ To realize the full benefits of renewable energy generation particularly from solar, wind, and hydro projects, the model

¹⁰⁷ OECD - The FASTER Principles for Successful Carbon Pricing, 2015 <<https://thedocs.worldbank.org/en/doc/843401442592428599-0020022015/original/TheFASTERPrinciplesforSuccessfulCarbonPricing.pdf>> accessed 30 August 2025. See also World Trade Report 2022 - Carbon Pricing and International Trade <https://www.wto.org/english/res_e/booksp_e/wtr22_e/wtr22_ch4_e.pdf> accessed 30 August 2025. Assessment of Carbon Pricing Initiatives in Nigeria – 2023 <<https://unfccc.int/sites/default/files/resource/Carbon%20Pricing%20Assessment%20in%20Nigeria.pdf>> accessed 30 August 2025.

¹⁰⁸ Aba Aliyu, Rural Communities Enjoying Stable Electricity Pay Tariffs More Than Band A (Channels, 26 August, 2025) <<https://youtu.be/4MxS419wcX8?si=exicGdfEnPWEL3O2>> accessed 30 August 2025.

¹⁰⁹ Paragraph 1.2 of the Renewable Electricity Policy Guidelines, 2006.

¹¹⁰ Aisha Ajia, op cit. n.

legal framework must include robust provisions to guarantee fair, transparent, and prioritized grid access, as well as infrastructure readiness for variable energy input.

It should contain a dedicated section on “grid access and integration” mandating that all licensed renewable energy producers are entitled to non-discriminatory access to the national grid. This right should be clearly articulated and backed by enforceable obligations on the Transmission Company of Nigeria (TCN), as well as Distribution Companies (DisCos), to provide interconnection services on a transparent, cost-reflective, and timely basis. Grid operators must be legally required to upgrade infrastructure where necessary to accommodate the integration of renewable energy sources, especially in regions with high generation potential but low current access.

In addition, to operationalize this component, the model legal framework should empower the NERC to issue grid code amendments for renewable integration. These amendments should therefore define technical standards for interconnection of renewable energy facilities, set timelines for processing grid connection requests, outline fair cost-sharing mechanisms for interconnection upgrades require publication of available grid capacity and connection points to promote transparency. Moreover, it should prioritize renewable energy projects in grid expansion and rehabilitation plans. This includes legally mandating that national grid planning through instruments like the transmission expansion plan or distribution network investment plans must consider the needs of upcoming renewable energy projects and allocate capacity accordingly. Renewable energy zones may be legally established through ministerial orders or regulatory notices, identifying geographic areas with high renewable energy potential and mandating infrastructure investments to support project clustering.

For off-grid and mini-grid systems, the model legal framework should also offer clear rules for optional grid integration. This is particularly relevant for mini-grids currently operating in

rural areas that may later choose to connect to the main grid., and it should guarantee legal protections for developers and communities by allowing voluntary interconnection agreements under fair terms, requiring compensation for displaced off-grid operators in cases of grid encroachment, ensuring local ownership and service continuity where appropriate.

Moreover, the model legal framework should address the emerging importance of energy storage and grid flexibility. To manage the intermittency of renewable energy sources, particularly solar and wind, legal provisions must authorize and regulate the deployment of battery storage systems and other grid-balancing technologies. Storage operators should be granted legal recognition as distinct market participants, with rights to connect to the grid, offer ancillary services, and participate in future capacity markets. Furthermore, the model legal framework should encourage the digitization and smartening of the grid. This includes legal mandates for the adoption of smart meters, grid automation, and data transparency tools that help integrate variable renewables more efficiently. Incentives may be offered to DisCos and private investors who modernize grid operations in line with renewable energy objectives.

Lastly, legal measures must be included to promote cross-border and regional interconnection, especially within the context of the West African Power Pool (WAPP).¹¹¹ Nigeria's role as a regional energy hub can be enhanced if the legal framework enables renewable energy exports and harmonizes grid protocols with regional partners. Thus, ensuring fair and strategic access to the electricity grid is not only a technical issue, it is a legal imperative. A renewable energy transition cannot succeed unless the legal framework actively supports the integration of new, clean power sources into the energy system. By enshrining grid access rights, modernizing regulatory obligations, and promoting infrastructure development, the proposed model legal framework can lay the groundwork for a more reliable, decentralized, and climate-resilient electricity network in Nigeria.

¹¹¹ Article 1 of the West African Power Pool (WAPP), 2005.

5.2.7 Environmental Safeguards

Although renewable energy is considered environmentally sustainable, its large-scale deployment like any major infrastructure project can generate adverse ecological and social impacts without proper regulation.¹¹² From land displacement and biodiversity loss to water usage and social disruption, renewable energy projects must be planned and implemented in ways that respect ecological systems and human rights.¹¹³ Therefore, a model legal framework for Nigeria's transition to low-carbon energy must embed strong environmental safeguards to ensure that the transition to clean energy does not come at the cost of environmental integrity or community well-being.

The first step in institutionalizing environmental protection is to mandate environmental and social impact assessments (ESIAs) for all renewable energy projects above a specified capacity threshold. This requirement should be codified in the model legal framework and aligned with existing obligations under the *Environmental Impact Assessment Act* and Nigeria's national environmental regulations, overseen by the National Environmental Standards and Regulations Enforcement Agency (NESREA). The model legal framework should specify that no license for a renewable energy project shall be granted or deemed valid without the submission and approval of a satisfactory ESIA report.

It is important to note that these assessments must be more than procedural checklists. Thus, the model legal framework should set clear standards for ESIA content, including detailed analysis of land use, deforestation risks, water impacts, and biodiversity, community engagement and consent procedures, gender-disaggregated impact analysis, mitigation and

¹¹² Abdul Olabi *et al*, 'Renewable Energy Systems: Comparisons, Challenges and Barriers, Sustainability Indicators, and the Contribution to UN Sustainable Development Goals' (2023) 20 *International Journal of Thermofluids*, 2.

¹¹³ Chimezie Umeh *et al*, 'The Role of Renewable Energies for Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Nigeria' (2024) 2(2) *European Journal of Applied Science Engineering and Technology*, 71.

compensation plans. Furthermore, the ESIA process must include legally required public consultation, especially for communities living within or near the proposed project sites, and should require project developers to hold public hearings, make environmental reports available in local languages, and document how stakeholder concerns are addressed in project planning. In regions with histories of environmental exploitation such as the Niger Delta, such provisions are essential for rebuilding trust and ensuring community support for energy development.

The model legal framework should also provide for the monitoring and enforcement of environmental compliance throughout the life cycle of renewable energy projects. NESREA, or a designated environmental audit body, should be empowered to conduct site inspections, issue environmental compliance certificates, and impose penalties for violations. The model legal framework should establish a progressive penalty system, with fines, suspension of licenses, or even criminal sanctions for repeat or egregious offenders.

Moreover, special attention must be given to land use and rights. Renewable energy projects, particularly utility-scale solar farms and wind installations, often require large tracts of land, which can trigger conflicts over ownership, compensation, or displacement.¹¹⁴ Thus, the model legal framework should mandate transparent land acquisition processes, fair compensation, and, where applicable, resettlement assistance in accordance with international best practices and Nigeria's Land Use Act.¹¹⁵ Therefore, projects on communal or indigenous lands should only proceed with free, prior, and informed consent from affected populations, codified explicitly within the legal framework.

¹¹⁴ Muhammad Hussain, Suleyman Atiparmak and Emre Hatipoglu, 'Collaborative Currents: The Promise of Conflict Resolution in Public Acceptance of Utility-Scale Renewable Energy Projects' (2025) 14 MPDI Land, 2. See also Columbia Centre on Sustainable Investment – Enabling a Just Transition: Protecting Human Rights in Renewable Energy Projects (A Briefing for Policymakers), 2023 <[https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/final_RenewablesAndHumanRights%20\(Brief\).pdf](https://ccsi.columbia.edu/sites/ccsi.columbia.edu/files/content/docs/publications/final_RenewablesAndHumanRights%20(Brief).pdf)> accessed 30 August 2025.

¹¹⁵ Land Use Act, 1987.

To complement these protective measures, the model legal framework should promote environmentally sensitive technologies and project design.¹¹⁶ This includes provisions that encourage dual land use, for instance, agrivoltaics, where farming and solar generation coexist, wildlife-friendly siting for wind projects, use of recyclable and non-toxic materials in solar installations, circular economy practices for battery disposal and e-waste management. It may also require developers to establish environmental management plans (EMPs) and contribute to environmental remediation funds, particularly for large-scale projects or those located in ecologically sensitive areas. These funds, managed by NESREA or state-level environmental agencies, would be used to restore land, water, and ecosystems affected by energy development activities. The model legal framework should include provisions for climate risk assessments. All major renewable energy infrastructure proposals should be evaluated for their resilience to climate-related threats such as flooding, desertification, and extreme heat. This ensures that the infrastructure designed to address climate change is itself not rendered vulnerable by it.

Therefore, renewable energy deployment, as a critical climate change mitigation strategy, requires rigorous planning, oversight, and accountability measures. Nigeria's integration of binding environmental safeguards into its legal and policy frameworks can transform its clean energy transition into a vehicle for advancing three key objectives: environmental justice, biodiversity preservation, and sustainable land use. Within this paradigm, the model legal framework assumes dual functionality, simultaneously preventing ecological harm while structurally enabling responsible development pathways.

5.2.8 Public Participation and Community Rights

¹¹⁶ Lyytinen Lescrauwaet *et al*, 'Adaptive Legal Frameworks and Dynamics in Emerging Technologies: Navigating the Intersection for Responsible Innovation' (2022) 16(2) Law and Economics, 203.

A legal framework for renewable energy cannot be considered complete unless it deliberately incorporates the voices and rights of the people it seeks to serve.¹¹⁷ In a diverse and democratic society like Nigeria, where historical injustices and developmental inequalities persist, the transition to renewable energy must be not only a technical or environmental shift, but also a social transformation, one that puts local communities, especially the most vulnerable, at the heart of policy and implementation. Public participation and the protection of community rights must therefore be enshrined in the model legal framework as fundamental pillars of Nigeria's low-carbon energy transition.¹¹⁸

In essence, the proposed model legal framework should establish the right of citizens and communities to participate meaningfully in renewable energy decision-making, particularly in project siting, development, implementation, and monitoring. This right should not be symbolic, it must be backed by enforceable obligations on project developers and government institutions to consult, inform, and secure consent from affected populations at every critical stage of the project cycle. To operationalize this, the model legal framework should require early-stage consultations with local communities before licensing or land acquisition begins, disclosure of relevant project information such as environmental impacts, community benefits, and timelines in accessible formats and local languages, documentation of community input and consent, especially in areas where land is communally owned or where local livelihoods may be affected.

The model legal framework should also recognize and enforce the principle of free, prior, and informed consent (FPIC), especially for indigenous and ethnic minority groups, in line with

¹¹⁷ Olubunmi Afinowi, 'A Review of the Legal Framework on Renewable Energy and the Drive for Energy Sustainability in Nigeria' (2024) SSRN < https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5049671 > accessed 30 August 2025.

¹¹⁸ Oyeniyi Abe, 'Towards a Human Rights-based Approach to Energy Transition in Africa' (2025) 10 Business and Human Rights Journal, 11. See also Opeyemi Gbadegesin, 'Gendered Implications of Climate Change: Empowering Women in Climate Law and Policymaking in Nigeria' (2024) 16(2) The Journal of Sustainable Development Law and Policy, 155.

international human rights standards. No project should therefore proceed where FPIC has not been meaningfully obtained. It must outline what constitutes valid consent, including the right of communities to withhold approval without coercion or misinformation.

Beyond participatory rights, the model legal framework should create space for community ownership and benefit-sharing models. In many parts of the world, including Kenya and South Africa, community-driven renewable energy projects have proven to be effective in improving access, building local support, and creating sustainable jobs.¹¹⁹ Hence, Nigeria's model legal framework should encourage community energy cooperatives, local equity participation in larger projects, revenue-sharing schemes where a percentage of project earnings is legally allocated to host communities, and community development agreements (CDAs) as part of project licensing, particularly for projects above a certain scale.

The model legal framework should also require that a portion of government or donor-funded renewable energy programs be specifically allocated to marginalized groups including women, persons with disabilities, youth, and rural dwellers. Legal incentives may be introduced for companies that meet gender equity or local employment quotas in their project workforce.

To safeguard these rights, the model legal framework should provide accessible mechanisms for community grievances and dispute resolution. This could include the establishment of renewable energy ombuds offices at the federal and state levels, tasked with mediating conflicts between developers and communities, or handling complaints about land use, compensation, or environmental harm. The model legal framework should also ensure that

¹¹⁹ Nnadozie Ifeanyi-Nwaoha, *Energising Africa: Enabling Private Sector Development in Renewable Energy* (Africa Policy Research Institute, 30 June, 2025) <<https://afripoli.org/energising-africa-enabling-private-sector-development-in-renewable-energy>> accessed 30 August 2025. See also Frank Ndi, 'Justice Concerns in Large-scale Renewable Energy Projects: A Study Echoing the Importance of Procedural Justice in WIND Energy Development in Kenya' (2024) 14(47) *Energy, Sustainability and Society*, 2. Obadia Bishoge, Godlisten Kombe and Banatus Mvile, 'Community Participation in the Renewable Energy Sector in Tanzania' (202) 28 *Journal of Sustainable Energy Planning and Management*, 121.

affected individuals and communities have standing to pursue judicial or administrative remedies in the event of rights violations. In the spirit of inclusion and civic engagement, the it should further mandate public representation in regulatory and advisory bodies, such as the proposed Renewable Energy Transition Commission (RETC). Community leaders, civil society organizations, and consumer associations should have seats at the table where energy decisions are made, ensuring that policies reflect lived realities and not only expert perspectives. This model legal framework must promote education and awareness-raising. A successful energy transition requires not just technological change, but also cultural shifts. Public campaigns, school curricula, and adult education programs on renewable energy, climate change, and environmental rights should be supported by law and budgetary commitment. Legal awareness empowers communities to assert their rights, hold institutions accountable, and participate more confidently in shaping their energy futures.

Thus, public participation and community rights are not add-ons to a legal framework, they are essential components that determine its legitimacy, inclusiveness, and effectiveness. By embedding these components into law, Nigeria can ensure that its renewable energy transition does not replicate the extractive patterns of the past, but instead cultivates a new, more democratic energy paradigm, one in which the people are not merely beneficiaries, but active co-creators of a just and sustainable future.

5.2.9 Compliance, Monitoring, and Enforcement Mechanisms

A legal framework, no matter how visionary or well-articulated, can only succeed if it is accompanied by comprehensive systems for compliance, monitoring, and enforcement.¹²⁰ The transition to renewable energy in Nigeria, therefore, must be governed by more than declarations of intent, and supported by legal mechanisms that ensure all actors, public and

¹²⁰ Olubunmi Afinowi, *op cit.* n117.

private alike, fulfil their obligations. Without such mechanisms, such legal framework risks being undermined by inaction, poor governance, or non-compliance.¹²¹

Hence, the proposed model legal framework must therefore establish a multi-tiered enforcement system, anchored by clear roles for regulatory bodies, independent oversight, and judicial or quasi-judicial remedies. These mechanisms should cover not only violations of licensing, environmental, or financial provisions, but also failure to meet national renewable energy targets or to uphold community rights.

Fundamentally, this system should be NERC, legally mandated to monitor compliance with renewable energy generation standards, grid access rules, consumer protection provisions, and tariff regulations.¹²² The model legal framework should empower NERC to carry out routine inspections, audits, and performance reviews of licensees and service providers. Regulatory breaches, such as exceeding permitted emissions, failing to meet local content requirements, or violating licensing conditions should attract a range of administrative penalties, including fines, license suspension or revocation, and public blacklisting.

To support NERC's regulatory authority, the model legal framework should provide for the establishment of a renewable energy compliance unit within the Commission. This unit would specialize in enforcement of renewable energy-related obligations and act as a centralized repository for compliance records, complaints, and investigation reports. Beyond regulatory oversight, the model legal framework should establish a strong monitoring and reporting regime, and all licensed renewable energy producers, public agencies, and beneficiaries of government incentives must be required by law to submit annual compliance reports, disclosing generation data, environmental performance, community benefit metrics, and financial records, disclose project progress to the Renewable Energy Transition

¹²¹ Olusola Olujobi, Oluwatosin Olujobi and Daniel Ufua, op cit. n100.

¹²² Section 34 of the *Electricity Act*, 2023.

Commission (RETC) for evaluation and public accountability, and notify authorities of any material changes in project scope, ownership, or environmental impacts.

Furthermore, the RETC, as an independent advisory and oversight body, should also be legally tasked with producing an annual state of renewable energy report, evaluating national progress toward targets, policy implementation, regulatory bottlenecks, and institutional performance. This report should be submitted to the National Assembly and made publicly available, thereby reinforcing transparency and accountability. In the event of legal or rights-based disputes, the model legal framework should establish accessible dispute resolution mechanisms. These may include a Renewable Energy Tribunal or designated court divisions with jurisdiction over licensing appeals, land use conflicts, and environmental claims, administrative review panels within NERC or RETC for resolving non-judicial grievances, ombudsman services at the state level for community complaints and project-related mediation.

Importantly, the model legal framework must ensure that affected communities and individuals have legal standing to challenge non-compliance, whether through the courts, regulatory complaints, or parliamentary petitions. Civil society organizations and environmental defenders should also be granted legal protection and institutional access to contribute to oversight processes without fear of reprisal. To reinforce the seriousness and effectiveness of this model legal framework, it should provide for criminal liability in cases of deliberate fraud, corruption, or environmental destruction within the renewable energy sector. For example, companies that misappropriate public funds meant for clean energy projects, or developers that violate environmental conditions with reckless disregard, should be subject to prosecution under applicable criminal laws, and coordination with the Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and Other Related

Offences Commission (ICPC), and NESREA should be established within the model legal framework to ensure integrated enforcement.

Thus, effective compliance, monitoring, and enforcement mechanisms are the backbone of a credible legal framework. By embedding them into law, Nigeria can move beyond symbolic commitments and build a renewable energy transition that is governed by accountability, backed by data, and protected by legal consequence. Only then can the transition deliver on its promises of cleaner air, reliable power, and a more equitable energy future for all.

5.2.10 Harmonization with Nigeria's Constitutional and International Obligations

For a renewable energy legal framework to be effective, enforceable, and resilient, it must be designed in alignment with Nigeria's existing constitutional order and its international commitments. Legal harmonization ensures that the framework is not only domestically legitimate but also globally credible, enabling Nigeria to fulfil its environmental duties, attract international support, and ensure constitutional consistency.¹²³

At the national level, the Constitution of the Federal Republic of Nigeria 1992 (as amended) provides a compelling foundation for environmental and energy governance, which obligates the state to “protect and improve the environment and safeguard the water, air, and land, forest and wildlife of Nigeria.”¹²⁴ Although this provision is currently non-justiciable under Chapter II of the Constitution, the proposed model legal framework can give it statutory effect by anchoring its objectives in environmental protection and public interest. In doing so, the model legal framework translates constitutional aspirations into enforceable legislative obligations. For instance, by specifically citing this particular provision in its preamble and purpose clause, the model legal framework can signal that Nigeria's shift to renewable energy

¹²³ Marl Danung *et al*, op cit. n.99.

¹²⁴ Section 20 of the *Constitution of the Federal Republic of Nigeria* 1992 (as amended).

is not just a policy choice, but a constitutional aspiration rooted in environmental protection and public welfare.

Furthermore, under the concurrent legislative list, both federal and state governments are empowered to make laws on electricity and power generation.¹²⁵ The model legal framework must therefore be crafted in a way that encourages intergovernmental cooperation, respects subnational autonomy, and provides legal templates for states to adopt and adapt in line with the national framework. It may include a schedule or annex with model provisions that states can legislate into their own renewable energy laws, ensuring unity in diversity and operational clarity across jurisdictions.

Importantly, the model legal framework must also work in harmony with Nigeria's evolving body of energy and environmental legislation. Most notably, the recently enacted *Electricity Act*, which repealed the *Electric Power Sector Reform Act* (EPSRA) of 2005, represents a transformative transition in Nigeria's power governance architecture. It devolves authority over electricity regulation to the states and creates a liberalized national electricity market, whole also promoting mini-grids, off-grid solutions and private sector participation.¹²⁶ The proposed model legal framework must therefore complement the *Electricity Act* by focusing specifically on scaling renewable energy sources through clear mandates, incentive structures, and institutional linkages, without duplicating existing regulatory functions. Legal references to the *Electricity Act* should be embedded within the text to guide interpretative harmony, especially in areas of licensing, market access, and technical standards.

On the other hand, the *Climate Change Act* of 2021, provides a legal anchor for Nigeria's national climate ambitions and mandates a transition to net-zero emissions by the year

¹²⁵ *ibid.* Schedule II, Part II.

¹²⁶ Section 1 of the *Electricity Act*, 2023.

2060.¹²⁷ It established the National Council on Climate Change (NCCC), which is responsible for coordinating climate action across sectors.¹²⁸ The model legal framework must be framed as a core implementation tool of the *Climate Change Act*, helping to operationalize emission reduction goals by legally mandating the scale-up of clean energy. It should also recognize the NCCC as a stakeholder institution in renewable energy oversight and reporting, especially in climate-related planning, budgeting, and compliance monitoring. Beyond these central statutes, the proposed model legal framework must align with other key legislation, including the *Environmental Impact Assessment Act* of 1992, which governs project-level environmental evaluation, the *Land Use Act* 1978, which regulates land acquisition, which is a significant issue for utility-scale renewable energy projects, the *Petroleum Industry Act* 2021, which contains provisions on energy diversification and just transition, and state-level electricity laws, which are becoming increasingly relevant given the decentralization of power governance under the *Electricity Act*.

In terms of global commitments, the model legal framework should also reflect Nigeria's international environmental and climate obligations under treaties and conventions. As a signatory to the Paris Agreement, Nigeria has pledged to reduce its greenhouse gas emissions and transition to a low-carbon economy. These commitments are articulated in Nigeria's nationally determined contributions (NDCs), which form the bedrock of its international climate credibility.¹²⁹ The model legal framework must directly reference the NDCs and include a provision that mandates all relevant institutions such as NERC, the Ministry of Power, and the Ministry of Environment to integrate NDC targets into their strategic plans and implementation tools.

¹²⁷ Section 1 of the *Climate Change Act*, 2021.

¹²⁸ *Ibid.* section 3.

¹²⁹ Article 2 of the Paris Agreement, 2015.

Nigeria is also party to the United Nations Framework Convention on Climate Change (UNFCCC), the Sustainable Development Goals (SDGs), particularly Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action), the ECOWAS Renewable Energy Policy (EREP), which sets regional targets for renewable energy penetration, and the African Union Agenda 2063, which advocates for green industrialization and clean energy access. The model legal framework should therefore include a harmonization clause stating that it shall be interpreted, where possible, in conformity with these instruments. This provision ensures that Nigerian legal framework remains responsive to evolving international standards and enhances the country's eligibility for climate finance, technical support, and international cooperation.

Moreover, the model legal framework should empower Nigeria's diplomatic and trade institutions to leverage renewable energy as a tool of international engagement. Legal incentives and mandates for cross-border renewable energy infrastructure, energy technology exchange, and participation in international climate forums can position Nigeria as a regional leader in the clean energy transition.

In essence, harmonizing the renewable energy framework with Nigeria's constitutional provisions and international commitments is not just a legal formality, it is a strategic imperative. It provides the framework with legal authority, coherence, and legitimacy, while anchoring Nigeria's clean energy transition in both national vision and global solidarity. With this foundation, Nigeria can confidently pursue a path toward a sustainable, just, and resilient energy future.

5.3 Implementation Strategies

An effective renewable energy legal framework can only achieve its purpose if it is backed by a deliberate and sustained implementation strategy. Nigeria's experience with past reforms

shows that the enactment of legislation, no matter how well-drafted, is only the beginning.

¹³⁰The *Electricity Act* 2023, for example, consolidated the country's electricity laws and expanded the legislative powers of states, but its real impact depends on the issuing of subsidiary regulations, market rules, and technical codes by NERC. Without such operational instruments, the provisions of any legislation risk remaining on paper. The same will be true for a model legal framework, which will require immediate follow-up with detailed implementing regulations and guidelines from bodies such as NERC, the Ministry of Power, the Rural Electrification Agency (REA), and the National Council on Climate Change (NCCC). Each provision should be assigned to a responsible body with clear timelines for action and mechanisms for periodic review.

Yet, the most carefully designed legal framework will falter if the institutions tasked with its enforcement lack the capacity to perform their roles. For instance, Nigeria's *Climate Change Act* 2021 created a dedicated national council,¹³¹ but its implementation has been hampered by gaps in technical expertise, particularly at state and local levels. Renewable energy governance presents similar challenges, requiring targeted programmes to train regulators, legislators, and policymakers in energy law and policy, strengthen environmental and energy auditing systems, equip judicial officers with the knowledge to adjudicate complex renewable energy disputes, and provide vocational training for engineers, technicians, and entrepreneurs who will build and maintain the new energy infrastructure. The Court has itself recognized this challenge in *Centre for Oil Pollution Watch v NNPC*, where the Supreme Court affirmed the right of civil society to approach the courts on environmental matters,¹³² but such victories are hollow when agencies lack the capacity to enforce judgments or monitor compliance.

¹³⁰ Sunday Daudu and Stella Idehen, 'Navigating Nigeria's Renewable Energy Laws: An Overview of the Legal Framework for Sustainable Development' (2025) 8(2) Grassroots Journal of Natural Resources, 190.

¹³¹ Section 3 of the *Climate Change Act*, 2021.

¹³² [2018] 17 NWLR (Pt. 1648) 576.

Financing is another pillar without which the transition cannot succeed. Even though the proposed Renewable Energy Development Fund (REDF) could provide a domestic financing mechanism, it must be underpinned by legal guarantees for annual budgetary allocations, coupled with innovative financing tools such as green bonds and climate finance instruments.

Strategic use of public–private partnerships (PPPs) and targeted subsidies for energy-poor communities will also be essential to bridge investment gaps. It should be noted that lack of such financing mechanisms has historically slowed compliance with environmental remediation orders, as seen in *Gbemre v Shell Petroleum Development Company*,¹³³ where despite a landmark ruling recognizing environmental rights, financial and institutional inertia delayed actual enforcement.

Given the scale and complexity of the transition, the rollout projects should proceed in phases rather than all at once. Pilot projects, like those implemented under the REA’s Solar Power Naija initiative,¹³⁴ can provide valuable lessons in deployment, community engagement, and cost management before nationwide expansion. Such pilots should prioritize areas with high renewable energy potential and acute energy poverty, ensuring that the benefits of the transition are felt early and visibly.

The process must also remain transparent and participatory. Laws can mandate open access to information on licensing, subsidies, and environmental impacts, as well as require public hearings for major projects. This approach aligns with the public consultation provisions of the Climate Change Act 2021¹³⁵ and reflects international principles on environmental democracy, such as those embodied in the Aarhus Convention. Inclusive stakeholder engagement, involving civil society, academia, private sector actors, and community-based

¹³³ [2005] AHRLR 151 (NgHC 2005).

¹³⁴ Damilola Aina, *FG to Tackle Energy Cost in Public Institutions with N100bn Solar Initiative* (Punch Newspaper, 8 August, 2025) <<https://punchng.com/fg-to-tackle-energy-cost-in-public-institutions-with-n100bn-solar-initiative/>> accessed 30 August 2025.

¹³⁵ Part VI of the *Climate Change Act*, 2021.

groups, will help secure local buy-in and reduce resistance, particularly in regions historically affected by extractive energy practices. The court has consistently emphasized the role of public participation, in *SERAP v Federal Republic of Nigeria & Anor*, the ECOWAS Court held that citizens have a right to be informed and involved in decisions affecting their environment,¹³⁶ a principle that is equally relevant to renewable energy governance.

Monitoring and evaluation should not be an afterthought. A Renewable Energy Transition Commission (RETC), working in concert with NERC and independent evaluators, could be legally mandated to prepare annual progress reports for the National Assembly, tracking compliance, target achievement, environmental outcomes, and social impacts. Making these reports public will enhance accountability and enable mid-course corrections where necessary.

Finally, the entire implementation process must be insulated from the volatility of political change. Nigeria's power sector reforms under the now-repealed Electric Power Sector Reform Act 2005 suffered repeated policy reversals with each change in administration. The model legal framework can guard against such disruptions by introducing legal safeguards, such as statutory earmarking of funds and sunset clauses that trigger review rather than repeal. Thus, implementation is not merely a technical exercise, it is a legally grounded, multi-layered process that must combine regulatory clarity, institutional capacity, stable financing, community participation, and political resilience. Only through such a coordinated effort can Nigeria transform a legislative commitment into a lived reality, bringing clean, affordable, and equitable energy to millions while honouring its constitutional, environmental, and international obligations.

5.4 Assessment of the Model Renewable Energy Act

¹³⁶ (ECW/CCJ/APP/08/09).

This chapter has developed a comprehensive and context-specific model legal framework designed to facilitate Nigeria's transition from an energy system heavily dependent on fossil fuels to one that integrates renewable energy as a central pillar of sustainable development. The framework does not advocate for the total elimination of fossil fuels but rather seeks to reduce Nigeria's overdependence on them in a deliberate, balanced, and phased manner. By expanding the role of renewable energy sources, the framework aims to minimize the harmful impacts of fossil fuel consumption on human health and the environment, in the same way simultaneously promoting energy access, affordability, and security for present and future generations.

The chapter provided a structured approach to designing this framework by first identifying the guiding principles underpinning a just and inclusive energy transition, then outlining the key components necessary to operationalize these principles within Nigeria's existing legal and policy landscape. It presented a fully drafted model "*Renewable Energy Act*" tailored to Nigeria's context, aligned with the *Electricity Act*, 2023, the *Climate Change Act*, 2021, and other relevant policies. Furthermore, the inclusion of Schedules provided the necessary operational detail, offering measurable renewable energy targets, identifying eligible technologies, establishing tariff-setting guidelines, and outlining model State-level frameworks for decentralized implementation. Finally, the chapter discussed implementation strategies, ensuring that the framework moves beyond theory into practical, actionable pathways capable of driving real change.

Collectively, this chapter demonstrates that Nigeria's renewable energy transition is both a necessity and an opportunity. It is a necessity because the environmental and health consequences of continued fossil fuel dominance are unsustainable, and an opportunity because a deliberate shift towards renewables can unlock economic growth, social inclusion, job creation, technological innovation, and climate resilience. By leveraging lessons from

jurisdictions such as Sweden, Denmark, Norway, Kenya, and South Africa, the proposed framework draws on proven strategies while remaining sensitive to Nigeria's unique socio-economic and institutional realities.

Having highlighted examined the model legal framework, the next chapter provides a comprehensive summary of the entire study, highlighting the key insights gained, drawing together the overall conclusions, and presenting practical recommendations for policymakers, regulators, and stakeholders. It also outlines the study's contributions to knowledge and identifies priority areas for future research, thereby setting the stage for advancing Nigeria's transition towards a more sustainable, inclusive, and legally grounded renewable energy future.

Chapter 6

Summary, Conclusion and Recommendations

6.1 Summary

This study is undertaken in response to the urgent need to address Nigeria's growing energy challenges arising from its heavy dependence on fossil fuels for electricity generation and economic development. With a national energy structure dominated by fossil fuels, Nigeria faces severe pressures ranging from widespread energy poverty to environmental degradation, public health risks, and increasing vulnerability to climate change. Recognizing these challenges, the study worked on developing a comprehensive and legally grounded framework to guide Nigeria's gradual transition towards a more sustainable, inclusive, and low-carbon energy future. It underscores that the aim is not to abruptly eliminate fossil fuels but to diversify the country's energy mix, reduce overdependence on a single source, mitigate

the adverse environmental and health impacts of fossil fuel consumption, enhance energy access and affordability, and unlock opportunities for economic growth, technological advancement, and climate resilience.

To achieve this aim, the study examined Nigeria's existing legal and policy landscape governing energy generation and environmental protection. Domestic laws such as the *Electricity Act*, 2023, the *Petroleum Industry Act*, 2021, the *Environmental Impact Assessment Act*, 1992 and the *Climate Change Act*, 2021 were examined to determine their adequacy in driving a just and effective transition. Even though these instruments reflect Nigeria's commitment to restructuring its energy sector, they revealed persistent gaps and inconsistencies in policy design and implementation. For instance, the *Electricity Act* introduces innovative reforms, including the decentralization of power generation and empowerment of States to develop local electricity markets, but it lacks strong mechanisms to integrate renewable energy development as a national priority. Similarly, the *Climate Change Act* sets out emission-reduction obligations and establishes a carbon budget but fails to provide a coordinated legislative framework for scaling up renewable energy solutions. These gaps highlight the urgent need for a coherent and forward-looking legal framework that harmonizes Nigeria's energy and environmental laws while supporting investment, innovation, and inclusive governance.

Beyond the domestic context, the study also considered Nigeria's obligations under international and regional instruments that influence its energy transition pathway. Globally, Nigeria is a signatory to the Paris Agreement, which commits the country to reduce greenhouse gas emissions and achieve sustainable development through the adoption of low-carbon technologies. The country is also bound by the *Kyoto Protocol*, the *Sustainable Development Goals* (SDGs), particularly Goal 7 on affordable and clean energy and Goal 13 on climate action, as well as the *United Nations Framework Convention on Climate Change*

(UNFCCC), which underpins its Nationally Determined Contributions (NDCs). Regionally, Nigeria's commitments under the *ECOWAS Renewable Energy Policy* (EREP) set ambitious targets for scaling renewable energy penetration, improving energy efficiency, and promoting off-grid solutions. Additionally, the *African Union's Agenda 2063* envisions an Africa powered by sustainable energy systems, placing Nigeria under increasing pressure to align its legal framework with continental aspirations for low-carbon growth and energy access for all. Integrating these international and regional obligations into the analysis ensures that the proposed model framework is not only locally relevant but also globally compliant and strategically positioned to attract foreign investments, climate financing, and technical partnerships.

Towards developing an effective solution to address the challenge of transition from fossil-based energy to renewables, the study examined the experiences of selected jurisdictions: Sweden, Denmark, Norway, Kenya, and South Africa, that have successfully advanced their energy transitions through targeted legal, policy, and institutional mechanisms. Denmark and Sweden demonstrate how legally enforceable renewable energy targets combined with technological innovation and political will, backed by effective legislation can accelerate progress towards sustainability. Norway's success with community-driven hydropower systems highlights the importance of decentralization and local participation in ensuring equitable energy access.

In Africa, Kenya provides valuable lessons in the deployment of mini-grids and geothermal systems, showing how a combination of legal reforms and innovative financing models can expand rural electrification and empower underserved populations. Similarly, the South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) illustrates the potential of transparent procurement frameworks in attracting private investments and driving large-scale renewable energy development. By adapting these

lessons to Nigeria's unique socio-economic, legal, and institutional realities, the study demonstrates that Nigeria can draw from global best practices without uncritically transplanting foreign models.

Building on these insights, the study proposed a comprehensive model legal framework in Chapter 5. The proposed model legal framework is designed to guide Nigeria's energy transition to the adoption of renewable energy sources. The proposal first establishes the guiding principles for an effective legal framework, as being rooted in sustainability, inclusivity, and social equity while setting out the institutional, regulatory, and financial structures required to operationalize renewable energy integration, supported by detailed schedules translating legislative provisions into actionable measures.

Specifically, in section 5.2 of Chapter 5, a comprehensive discussion of the components of the elements of an effective legal framework that could facilitate Nigeria's transition to a low-carbon energy system through renewable energy sources was undertaken. Finally, the framework incorporates clear implementation strategies, including steps to mobilize investments, strengthen institutional capacity, foster collaboration among stakeholders, and ensure transparent monitoring and evaluation of Nigeria's progress.

This study demonstrates that Nigeria's renewable energy transition must be seen not merely as an environmental obligation but as a strategic opportunity to address multiple developmental priorities. A carefully designed legal and policy framework can reduce Nigeria's overdependence on fossil fuels, improve public health outcomes, enhance energy affordability, and accelerate economic growth, all while fulfilling Nigeria's commitments under international and regional frameworks. The proposed model framework offers a realistic, forward-looking, and implementation-ready pathway that harmonizes domestic legislation with global sustainability objectives, allowing Nigeria to position itself

competitively in an increasingly low-carbon world. Above all, the study underscores the importance of adopting a phased and balanced transition approach, one that enables renewable energy to complement, rather than abruptly replace, fossil fuels, ensuring energy security, affordability, and long-term resilience.

In essence, this study makes a significant contribution by bridging the gap between policy aspirations and practical implementation. By integrating Nigeria's domestic legislation with global and regional obligations, applying lessons from leading jurisdictions, and designing a comprehensive model legal framework, the study provides a solution-driven, context-specific, and academically rigorous foundation for achieving sustainable energy transformation in Nigeria.

6.2 Conclusion

This study has confronted one of Nigeria's most urgent developmental challenges, which is the urgent need to transform its energy system into one that is environmentally sustainable, socially inclusive, economically viable, and resilient to the growing threats of climate change. Through an extensive examination of Nigeria's legal, policy, and institutional frameworks governing energy production and environmental management, the study uncovered a persistent misalignment between the country's abundant renewable energy potential and its continued overdependence on fossil fuels. This imbalance has deepened the cycle of environmental degradation, public health risks, and energy poverty while slowing national progress toward sustainable development.

The study reveals that Nigeria's current reliance on fossil fuels is no longer tenable in the long term. However, the transition to renewable energy must not be abrupt; instead, it requires a deliberate, structured, and phased approach aimed at diversifying the country's energy mix

and gradually integrating renewable energy as a central component of electricity generation. By adopting this pathway, Nigeria can begin to address the harmful consequences of fossil fuel dependency, such as air and water pollution, rising greenhouse gas emissions, and health-related burdens, while simultaneously improving energy access and affordability for households, industries, and underserved communities.

Importantly, the study demonstrates that achieving this transition is not simply a technical or economic challenge but a legal and governance imperative. A significant contribution of this study lies in its development of a comprehensive model legal framework specifically designed to address Nigeria's institutional and policy gaps. Drawing upon the lessons and experiences of Sweden, Denmark, Norway, Kenya, and South Africa, the framework introduces innovative legal mechanisms, institutional arrangements, and financial incentives that can accelerate renewable energy deployment while remaining sensitive to Nigeria's socio-economic realities. In doing so, it bridges the divide between policy aspirations and the practical realities of energy governance.

The study also highlights the importance of policy coherence, decentralized governance, and stakeholder inclusion in achieving meaningful progress. With the enactment of the *Electricity Act*, 2023, Nigeria is presented with a rare opportunity to restructure its energy governance model by empowering State Governments to regulate their own electricity markets. This opens the door for greater community participation, private-sector investment, and innovation-driven partnerships at subnational levels. However, realising these benefits will require a coordinated national effort to align federal and state policies, harmonize regulatory frameworks, and establish effective monitoring and accountability mechanisms.

Beyond its domestic implications, the study positions Nigeria's energy transition within the broader context of its international and regional obligations. As a signatory to the Paris

Agreement, the UNFCCC, and the Sustainable Development Goals (SDGs), Nigeria has pledged to reduce its greenhouse gas emissions and expand access to clean energy through its Nationally Determined Contributions (NDCs). Furthermore, under frameworks such as the *ECOWAS Renewable Energy Policy* (EREP) and the *African Union's Agenda 2063*, Nigeria has committed to strengthening renewable energy integration across West Africa and advancing regional cooperation for sustainable power generation. The proposed model framework, therefore, not only addresses domestic needs but also provides a pathway for Nigeria to fulfil its international responsibilities while attracting foreign investments and climate financing opportunities.

Ultimately, the study underscores that Nigeria's transition to renewable energy represents far more than an environmental necessity; it is a transformative opportunity to redefine the country's development trajectory. By diversifying the energy mix, Nigeria can unlock new avenues for inclusive economic growth, job creation, and technological innovation while ensuring that affordable, sustainable, and reliable energy reaches all Nigerians, including those in rural and marginalized communities. Yet, achieving this vision demands deliberate legal reforms, sustained political will, and a strong institutional framework capable of converting ambitious policies into measurable outcomes.

Therefore, this study offers more than a diagnosis of Nigeria's energy challenges; it provides a structured, solution-driven, and implementation-ready roadmap to guide the country toward a low-carbon future. By aligning domestic legislation with global best practices and international obligations, the study contributes a practical framework that can improve investments, foster collaboration among stakeholders, and accelerate Nigeria's energy transition. This conclusion sets the stage for the next section of this chapter, where recommendations are presented. These recommendations translate the findings of the study into actionable steps for legislators, regulators, investors, and energy development partners

who must collectively drive the shift toward a cleaner, more resilient, and more inclusive energy future for Nigeria.

6.3 Recommendations

In light of this study and in alignment with its three specific objectives, several policy recommendations are proposed to guide Nigeria's transition towards a sustainable, low-carbon energy future while improving environmental protection, energy access, and affordability.

The first objective of the study sought to examine the existing legislations regulating non-renewable energy and environmental pollution in Nigeria, and this was comprehensively addressed in Chapter 3. The study revealed that while Nigeria has enacted several important laws such as the *Electricity Act*, 2023, the *Petroleum Industry Act*, 2021, the *Environmental Impact Assessment Act*, 1992, and the *Climate Change Act*, 2021, there are significant gaps and inconsistencies that hinder the country's effective management of its fossil fuel dependence and environmental challenges. It is therefore recommended that:

- i. Nigeria undertakes a harmonization of its energy and environmental laws to create a unified legal framework that integrates renewable energy objectives and emission-reduction commitments into its broader energy governance structure. The components of an effective model legal framework to facilitate Nigeria's transition to renewable energy sources proposed in Chapter 5 will go a long way in addressing the challenge.
- ii. Specifically, the *Climate Change Act*, 2021 should be amended to incorporate binding renewable energy targets aligned with Nigeria's international obligations under the *Paris Agreement* and its Nationally Determined Contributions (NDCs).
- iii. Additionally, there is an urgent need to strengthen the institutional capacity of the Nigerian Electricity Regulatory Commission (NERC) to provide robust oversight,

enforce compliance, and coordinate effectively with State-level regulators in light of the decentralization introduced by the *Electricity Act, 2023*.

- iv. Furthermore, Nigeria should consider adopting a progressive system of pollution-based energy taxation targeting high-emission fossil fuel operations, with the revenues channelled into a Renewable Energy Development Fund (REDF) that would directly support investments in clean energy technologies.
- v. Strengthening the enforcement powers of the National Environmental Standards and Regulations Enforcement Agency (NESREA) will also be essential to ensure stricter monitoring, accountability, and remediation of environmental damage caused by energy production.

The second objective of the study, examined in Chapter 4, was to critically assess the experiences of selected jurisdictions that have successfully transitioned from fossil fuels to renewable energy and identify relevant lessons for Nigeria. The analysis of Sweden, Denmark, Norway, Kenya, and South Africa revealed several important strategies that Nigeria can adapt to its own context. One significant lesson is the value of setting clear and legally enforceable renewable energy targets, as demonstrated by Denmark's ambitious offshore wind expansion policies and Sweden's long-term transition plans, which provide direction and ensure accountability. Kenya's successful deployment of mini-grids and geothermal energy systems, combined with Norway's community-based hydropower projects, highlights the importance of promoting decentralized energy governance by empowering States and local communities to manage energy resources more effectively. Similarly, South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) illustrates the potential of transparent, competitive procurement frameworks to attract private investment and accelerate the deployment of large-scale solar and wind projects. Drawing from these jurisdictions, Nigeria should:

- i. Promote community participation and ownership in renewable energy projects by introducing legal incentives, tax reliefs, and grants that support community cooperatives and social enterprises.
- ii. Additionally, the study recommends fostering innovation and technology transfer through partnerships with leading renewable energy nations, supporting the development of battery storage, smart grids, and offshore wind solutions while simultaneously building Nigeria's local technical capacity. These lessons collectively highlight that Nigeria's energy transition can succeed if guided by strategic legal reforms, robust institutions, and inclusive participation at all levels of governance.

The third objective, addressed in Chapter 5, focused on developing a model legal framework that can facilitate Nigeria's transition to low-carbon energy through renewable energy sources. The proposed model "*Renewable Energy Act*" represents a comprehensive and implementation-ready blueprint that can be adopted by the National Assembly to complement existing energy policies. For this framework to be effective, deliberate steps must be taken to ensure its successful integration into Nigeria's legal system. It is recommended that:

- i. The model legal framework be adopted and domesticated as a guiding instrument, harmonized with the Electricity Act, 2023, and aligned with Nigeria's broader environmental and energy objectives. A key element of this framework is the establishment of a Renewable Energy Development Fund (REDF) to provide grants, subsidies, and concessional loans to developers, community cooperatives, and small enterprises investing in renewable technologies. Funding for the REDF can be drawn from pollution taxes, international climate finance mechanisms, green bonds, and carbon credit schemes.
- ii. In addition, the creation and strengthening of State Renewable Energy Agencies (SREAs) are essential to support the decentralization of energy regulation, enabling

States to license mini-grids, coordinate community-based energy initiatives, and attract private investments into local renewable energy projects. To ensure transparency and accountability, the study recommends establishing an independent Renewable Energy Transition Commission (RETC) tasked with monitoring implementation, publishing annual progress reports, and coordinating inter-agency actions.

- iii. Finally, the success of this framework will depend on capacity building, stakeholder engagement, and public awareness, requiring sustained efforts to equip regulators, developers, investors, and communities with the knowledge and tools necessary to drive Nigeria's clean energy transition effectively.

Taken together, these recommendations provide a coherent, actionable, and context-sensitive roadmap for reducing Nigeria's overdependence on fossil fuels while scaling up renewable energy adoption in a phased and balanced manner. They reflect a vision of an energy transition that safeguards environmental and human health, enhances energy access and affordability, promotes economic development, and aligns with Nigeria's commitments to global sustainability goals. The next section highlights the contribution of this study to knowledge by demonstrating how it advances legal theory, policy design, and practical approaches to facilitating Nigeria's renewable energy transition.

6.4 Contribution to Knowledge

This study makes a significant contribution to knowledge by addressing one of Nigeria's most critical contemporary challenges; the urgent need to establish a comprehensive legal framework that facilitates a transition from overdependence on fossil fuels to the integration of renewable energy into the country's energy mix. While much of the existing literature on Nigeria's energy sector tends to prioritize technical, economic, or environmental analyses,

this study distinguishes itself by adopting a normative, legal, and policy-driven approach. Through the development of a model renewable energy framework, it provides a context-specific response that engages directly with Nigeria's distinctive socio-economic, environmental, and institutional dynamics

First, the study contributes to knowledge by offering a comprehensive legal analysis of Nigeria's current energy and environmental governance framework. Through an in-depth examination of laws such as the *Electricity Act*, 2023, the *Petroleum Industry Act*, 2021, the *Environmental Impact Assessment Act*, 1992 and the *Climate Change Act*, 2021, the study identifies the gaps, overlaps, and inconsistencies that have hindered Nigeria's ability to harness its abundant renewable energy resources effectively. By exposing these weaknesses and proposing targeted legal reforms, the study provides a structured foundation for policymakers, legislators, and regulators seeking to realign Nigeria's legal framework with its sustainable energy ambitions.

Second, this study contributes by drawing practical lessons from international best practices and contextualizing them within Nigeria's unique legal and socio-economic environment. By critically examining the successful renewable energy transitions in Sweden, Denmark, Norway, Kenya, and South Africa, the study highlights tested legal and policy mechanisms that can be adapted for Nigeria's benefit. These include Denmark's legally enforceable renewable energy targets, Kenya's decentralized mini-grid and geothermal energy systems, South Africa's competitive procurement framework under its Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), Norway's community-driven hydropower schemes, and Sweden's strategic long-term planning and innovation-driven policies. By synthesizing these insights, the study provides Nigeria with a rich body of comparative knowledge while avoiding the pitfalls of a purely transplant-based approach.

Third, the most significant contribution of this study lies in the development of a model legal framework for renewable energy transition in Nigeria, presented in Chapter 5. The framework provides a comprehensive and implementation-ready legislative proposal, bridging the gap between policy aspirations and practical action. Unlike previous studies that have focused solely on highlighting challenges, this study goes further by offering a workable legislative solution, complete with guiding principles, institutional structures, operational schedules, and implementation strategies. By integrating existing policies with a forward-looking legal structure, the framework positions renewable energy as a central driver of Nigeria's environmental protection goals, climate change commitments, and sustainable economic development.

Additionally, the study contributes to scholarly discourse by demonstrating how law can serve as a catalyst for technological innovation, private-sector participation, and social inclusion in the energy transition process. By emphasizing decentralization, capacity building, and community ownership, the research provides a new approach to inclusive energy governance in Nigeria. It highlights that legal reforms must be coupled with institutional restructuring, financial innovation, and stakeholder collaboration if Nigeria is to achieve meaningful change.

Finally, the study contributes to the broader body of knowledge on climate change governance, energy transition, and environmental law in developing countries. By combining legal analysis, comparative insights, and practical legislative design, the study provides a replicable framework that other fossil fuel-dependent nations in Africa and beyond can adapt in crafting their own energy transition strategies. In essence, this study extends the boundaries of academic inquiry and policy development by producing an original, context-specific, and solution-oriented legal framework for renewable energy adoption in Nigeria. It not only enriches existing literature but also provides actionable tools for policymakers,

legislators, private-sector actors, and civil society stakeholders seeking to drive a just, inclusive, and sustainable energy future.

6.5 Suggested Areas for Further Research

This study has laid a strong foundation by developing a comprehensive model legal framework to guide Nigeria's transition from a fossil fuel-dependent energy system to one that prioritizes renewable energy as a central pathway to sustainability, energy security, and economic growth. However, the energy transition remains a dynamic, evolving, and multi-dimensional process, requiring continuous research, innovation, and collaboration. Achieving a balance between environmental sustainability, economic development, social equity, and energy access demands further scholarly inquiry to strengthen the foundations established in this work and to address emerging challenges and opportunities.

A key area that requires further investigation is the economic and financial dimension of Nigeria's renewable energy transition. This study has proposed strategies such as the creation of a Renewable Energy Development Fund (REDF), the adoption of climate financing tools, the issuance of green certificates, and the introduction of carbon taxes. However, future studies should evaluate the long-term cost-effectiveness of these mechanisms by examining the feasibility, affordability, and scalability of renewable energy financing models. Such research would provide critical insights for policymakers on subsidy levels, pricing structures, and investment incentives needed to ensure both financial sustainability and consumer affordability.

Another important avenue for research lies in understanding the technological pathways best suited to Nigeria's unique geographical, climatic, and socio-economic realities. Although this study identifies solar, wind, hydro, biomass, and geothermal energy as key opportunities, future work should assess the scalability, efficiency, and long-term viability of these

technologies in the Nigerian context. Emerging innovations such as smart grid systems, energy storage solutions, and green hydrogen technologies also require deeper exploration to inform strategies that keep pace with global advancements in renewable energy deployment.

Attention should also be directed toward the social dimensions of Nigeria's energy transition. Building on the lessons drawn from Kenya, Norway, and South Africa, this study highlights the importance of community participation, equity, and inclusivity in renewable energy adoption. Future research could investigate public perceptions of renewable energy projects, the effectiveness of local ownership models, and strategies to ensure that vulnerable and marginalized groups, particularly in rural and off-grid areas are not excluded from the benefits of clean energy development.

Further inquiry is also necessary to explore Nigeria's place within the global and regional energy landscape. As a signatory to the *Paris Agreement*, the *United Nations Framework Convention on Climate Change* (UNFCCC), the *Sustainable Development Goals* (SDGs), the *ECOWAS Renewable Energy Policy* (EREP), and the *African Union's Agenda 2063*, Nigeria's energy transition must be understood in relation to its international obligations. Research into cross-border energy integration, carbon markets, regional power-sharing arrangements, and climate financing mechanisms would provide valuable perspectives on how Nigeria can better align its domestic framework with evolving international commitments and opportunities.

Finally, there is significant value in conducting empirical studies to evaluate the implementation and monitoring of the model renewable energy framework developed in this research. Examining the practical performance of renewable energy targets, tariff-setting mechanisms, decentralized governance approaches, and community-driven deployment strategies would offer evidence-based insights for refining the framework over time. This

would ensure continuous learning, adaptation, and policy improvement as Nigeria progresses towards its renewable energy and climate goals.

In essence, this study provides a strong platform upon which future scholarship can build. A successful transition to a low-carbon, renewable-based energy system will require continuous innovation, adaptive governance, and collaborative engagement among policymakers, researchers, investors, and local communities. Future studies can deepen the insights offered here, strengthen institutional capacity, and enhance Nigeria's ability to deliver on its environmental, economic, and social development objectives through a just, inclusive, and sustainable energy transition.

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Appendix

Model Renewable Energy Act

Preamble

WHEREAS the Federal Republic of Nigeria recognizes the urgent need to transition from fossil fuel-based energy systems to low-carbon energy through renewable energy sources in

order to safeguard the environment, reduce greenhouse gas emissions, promote energy security, and enhance sustainable development;

AND WHEREAS Section 20 of the Constitution of the Federal Republic of Nigeria, 1999 (as amended), obliges the State to protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria;

AND WHEREAS Nigeria is party and signatory to the Paris Agreement, 2015 under the United Nations Framework Convention on Climate Change and is committed to reducing its greenhouse gas emissions and promoting renewable energy in accordance with its Nationally Determined Contributions (NDCS);

AND WHEREAS the Electricity Act, 2023 and the Climate Change Act, 2021 provide legal foundations for electricity reform, climate action, and subnational participation, which this Act seeks to complement and reinforce;

NOW THEREFORE, BE IT ENACTED by the National Assembly of the Federal Republic of Nigeria as follows:

Part I – Preliminary Provisions

1. Short Title

This Act may be cited as *the Renewable Energy Act, 2025*.

2. Commencement

This Act shall come into force on such date as may be appointed by the President through a notice published in the Federal Government Gazette.

3. Interpretation

In this Act, unless the context otherwise requires:

“Act” means the Renewable Energy Act, 2025;

“Agency” means any ministry, department, or agency of government charged with functions under this Act;

“Commission” or “NERC” means the Nigerian Electricity Regulatory Commission;

“Climate Change Act” means the Climate Change Act, 2021;

“Community Development Agreement (CDA)” means a legally binding agreement entered into between renewable energy project developers and host communities outlining the benefits, obligations, and participatory mechanisms;

“Distributed generation” means electricity generation from small-scale technologies located close to the point of use, including mini-grids and rooftop solar systems;

“Feed-in Tariff (FiT)” means a regulatory mechanism that guarantees renewable energy producers a fixed payment for electricity supplied to the grid over a defined period;

“Minister” means the Minister charged with the responsibility for power;

“Mini-grid” means a system of electricity generation and distribution serving a limited geographic area or community not connected to the main grid;

“National Council on Climate Change (NCCC)” means the body established under the Climate Change Act, 2021;

“NDC” means Nigeria’s Nationally Determined Contribution under the Paris Agreement;

“Renewable energy” means energy derived from naturally replenishing sources such as solar, wind, hydro, geothermal, biomass, and other clean technologies as may be prescribed;

“Renewable Energy Development Fund (REDF)” means the fund established under this Act to support investment in renewable energy;

“State Electricity Market Regulator” means a regulatory body established by a State under the Electricity Act, 2023 to regulate electricity activities within the State;

“Transition Commission” or “RETC” means the Renewable Energy Transition Commission established under this Act.

4. Objectives of this Act

The objectives of this Act are to:

- (a) Establish a coherent legal and institutional framework for the development, regulation, and promotion of renewable energy in Nigeria;
- (b) Facilitate the transition from fossil fuels to low-carbon energy sources in alignment with Nigeria’s international climate commitments and national development goals;
- (c) Provide legal certainty and incentives to attract private investment, innovation, and financing in renewable energy projects;
- (d) Promote equitable access to clean and affordable energy;
- (e) Ensure the environmental sustainability, social inclusion, and public accountability of renewable energy projects;
- (f) Harmonize renewable energy development with existing energy laws, including the Electricity Act, 2023 and the Climate Change Act, 2021.

5. Scope and Application

- (1) This Act shall apply throughout the Federation and shall govern the promotion, development, regulation, financing, and monitoring of renewable energy projects and systems;
- (2) The provisions of this Act shall apply to:
 - (a) All public and private actors engaged in renewable energy generation, distribution, and supply;

- (b) Mini-grid and off-grid systems developed or supported by government programs
 - (c) State governments, subject to constitutional and statutory imitations;
 - (d) Any activity or project seeking access to incentives, licensing, or recognition under this Act.
- (3) Where there is a conflict between the provisions of this Act and any other enactment in respect of renewable energy, the provisions of this Act shall prevail to the extent of the inconsistency.

Part II – Institutional Framework

6. Designation of the Nigerian Electricity Regulatory Commission as Lead Regulatory Authority
- (1) The Nigerian Electricity Regulatory Commission (NERC), established under the Electricity Act, 2023, is hereby designated as the primary regulatory authority for renewable energy under this Act.
- (2) In addition to its power under the Electricity Act, NERC shall, for the purpose of this Act:
- (a) Regulate the licensing, tariff setting, and interconnection of renewable energy projects;
 - (b) Develop technical standards, codes and operational rules for renewable energy systems;
 - (c) Monitor compliance with renewable energy obligations and standards;
 - (d) Collaborate with State electricity regulators to ensure coherence and interoperability;
 - (e) Publish guidelines and regulations necessary for the effective implementation of this Act;
 - (f) Maintain a national register of licensed renewable energy projects.

- (3) NERC shall establish within its structure a dedicated Renewable Energy Compliance Unit with the specific mandate to oversee the implementation, enforcement, and monitoring of obligations arising under this Act.

7. Functions of the Federal Ministry of Power

- (1) The Federal Ministry of Power shall retain overall policy oversight of the renewable energy sector and shall:

- (a) Formulate national strategies and policies on renewable energy in collaboration with relevant Ministries, Departments, and Agencies (MDAs);
- (b) Coordinate national planning on renewable energy targets and ensure integration with national development plans;
- (c) Represent Nigeria in regional and international forums related to renewable energy;
- (d) Facilitate inter-ministerial and federal-state coordination on energy transition matters;
- (e) Oversee the administration and disbursement of funds appropriated for renewable energy development, including the Renewable Energy Development Fund (REDF).

- (2) The Ministry shall work closely with NERC and the Renewable Energy Transition Commission (RETC) to ensure policy coherence, stakeholder engagement, and program alignment.

8. Establishment and Functions of the Renewable Energy Transmission Commission (RETC)

- (1) There is hereby established the Renewable Energy Transition Commission (RETC) as an independent statutory body under this Act.

- (2) The RETC shall consist of:

- (a) A Chairperson appointed by the President on the Recommendation of the Minister of Power;
 - (b) One representative each from the Federal Ministry of Power, Environment, Finance, and Science & Technology;
 - (c) One representative of State Governments, nominated by the National Council of State;
 - (d) One representative of civil society with expertise in renewable energy or environmental justice;
 - (e) One representative of the private renewable energy sector;
 - (f) One academic or technical expert in energy law or energy transition;
 - (g) A Director-General who shall serve as the chief executive and accounting officer of the Commission.
- (3) The RETC shall:
- (a) Serve as a national coordination platform for renewable energy planning, tracking, and oversight;
 - (b) Monitor and evaluate the implementation of this Act and all related national renewable energy policies;
 - (c) Publish an Annual State of Renewable Energy Report, including progress towards targets, investment trends, and regulatory challenges;
 - (d) Serve as the secretariate for stakeholder consultations and participatory governance in the sector;
 - (e) Recommend updates to legislation and policy based on periodic review and stakeholder feedback;
 - (f) Provide technical assistance to state governments in developing local renewable energy strategies and legislation.

9. Collaboration with the National Council on Climate Change (NCCC)

(1) The Renewable Energy Transition Commission and the Ministry of Power shall coordinate with the National Council on Climate Change, established under the Climate Change Act, 2021, to ensure alignment between energy transition strategies and national climate targets.

(2) All agencies implementing this Act shall:

- (a) Submit periodic updates to the NCCC on renewable energy projects relevant to Nigeria's Nationally Determined Contributions (NDCs);
- (b) Cooperate with the NCCC in carbon accounting, emissions reporting, and climate adaptation planning;
- (c) Harmonize project planning timelines with climate resilience assessments conducted by the NCCC or its designated technical institutions.

10. Responsibilities of State Governments

(1) State Governments shall, in line with the Constitution of the Federal Republic of Nigeria, 1999 (as amended) and the Electricity Act, 2023:

- (a) Develop and implement a state-level renewable energy policies and legislation that are consistent with this Act;
- (b) Establish or designate State Electricity Regulatory Authorities to regulate electricity activities within the State, including renewable energy generation and distribution;
- (c) Coordinate with federal institutions to ensure harmonized licensing, tariffs, and standards for renewable energy systems that cross jurisdictional boundaries;
- (d) Promote off-grid and min-grid renewable energy access within underserved communities;

- (e) Support local participation in renewable energy projects through land access facilitation, infrastructure support, and tax incentives.
- (2) State institutions may enter into partnership agreements with federal agencies, private sector actors, or community organizations to implement programs under this Act, provided such agreements are consistent with national policy objectives and legal requirements.

Part III – Renewable Energy Planning and Target Setting

11. National Renewable Energy Targets

- (1) The Federal Government shall upon the recommendation of the Ministry of Power and in consultation with the Renewable Energy Transition Commission (RETC) set a medium-term and long-term renewable energy targets to guide the development and deployment of renewable energy sources across the country.
- (2) The targets shall specify:
 - (a) The percentage contribution of renewable energy to total electricity generation capacity for each planning period;
 - (b) Technology-specific targets, including solar, wind, hydro, biomass, and geothermal sources;
 - (c) Off-grid electrification targets;
 - (d) Emission reduction projections attributable to renewable energy deployment.
- (3) Targets shall be published in the official Gazette and uploaded at intervals not exceeding five years, based on national energy demand forecasts, resource availability, and climate obligations.

12. Renewable Energy Development Plans

- (1) The Ministry of Power, in collaboration with the RETC and relevant agencies, shall prepare and publish a National Renewable Energy Development Plan (NREDP) every five years, outlining the roadmap for achieving the target set under this Act.
- (2) The NREDP shall:
 - (a) Identify priority zones and projects for renewable energy development;
 - (b) Outline required infrastructure, grid integration, and market reforms;
 - (c) Provide investment projection and financing strategies;
 - (d) Set annual implementation milestones and evaluation indicators;
 - (e) Align with the national electricity demand plan and the Climate Change Act, 2021.
- (3) The NREDP shall be developed through an inclusive consultative process involving representatives of State Governments, private sector stakeholders, civil society, academia, and affected communities.
- (4) The RETC shall be responsible for coordinating the implementation, tracking, and periodic review of the NREDP in conjunction with implementing ministries and agencies.

13. Integration with Nationally Determined Contributions (NDCs)

- (1) The renewable energy targets and development plans established under this Act shall be harmonized with Nigeria's Nationally Determined Contributions (NDCs) under the Paris Agreement.
- (2) All implementing agencies shall ensure that the planning and execution of renewable energy programs under this Act contribute directly to the fulfillment of the NDC commitments on:
 - (a) Greenhouse gas emission reduction;
 - (b) Energy efficiency;

- (c) Sustainable development co-benefits, including poverty alleviation and gender equality.
- (3) The RETC shall report annually to the National Council on Climate Change (NCCC) on progress made toward the energy-related elements of Nigeria's NDCs, including data on renewable generation, emissions voided, and investments mobilized.

Part IV – Licensing and Regulation

14. Licensing Requirements and Exemptions

- (1) No person shall construct, own, operate, or modify a renewable energy generation facility for commercial purposes unless such person is duly licensed by the Nigerian Electricity Regulatory Commission (NERC) in accordance with this Act and applicable regulations.
- (2) Notwithstanding subsection (1), the following shall be exempted from licensing requirements under this Act:
 - (a) Stand-alone renewable energy systems not connected to the grid and generating less than 1 megawatt (MW) of electricity;
 - (b) Mini-grids or community-based systems supplying fewer than 100 kilowatts (kW), provided they meet technical and safety standards prescribed by NERC;
 - (c) Pilot or demonstration projects approved by the Ministry of Power for research or capacity development purposes.
- (3) Exempted systems shall be subject to registration and compliance with applicable safety, technical, and consumer protection regulations issued by NERC or relevant state electricity regulators.

15. Tiered Licensing Categories

- (1) NERC shall develop and publish a tiered licensing regime for renewable energy activities, differentiated by:

- (a) Project scale (small, medium, and large-scale generation);
 - (b) Grid connectivity (on grid, mini-grid, and off-grid);
 - (c) Technology type, including solar photovoltaic (PV), wind, hydro, biomass, geothermal, and hybrid systems.
- (2) Each license category shall specify:
- (a) The applicable licensing process and documentation requirements;
 - (b) Duration, renewal conditions, and revocation criteria;
 - (c) Fees and charges payable;
 - (d) Obligations related to environmental and social safeguards, local content, and data reporting.
- (3) The Commission shall ensure that the licensing process is streamlined, transparent, and concluded within statutory timelines to encourage private sector participation.
16. One Stop Legal and Regulatory Portal
- (1) The Ministry of Power, in collaboration with NERC and RETC, shall establish and maintain a Renewable Energy Investment Portal to serve as a centralized digital platform for:
- (a) Licensing applications, approvals, and tracking;
 - (b) Access to relevant regulations, technical standards, and guidelines;
 - (c) Disclosure of grid availability and resource mapping;
 - (d) Public notices, consultation schedules, and government incentives;
 - (e) Complaint resolution and citizen feedback mechanisms.
- (2) The Portal shall be interoperable with state-level regulatory platforms and integrated with existing government e-governance systems.
17. Technical Standards and Interconnection Requirements

- (1) NERC, in consultation with relevant technical bodies, shall prescribe minimum technical, safety, and operational standards for the design, construction, installation, and operation of renewable energy systems.
- (2) The standards shall include:
 - (a) Quality assurance requirements for equipment and technologies;
 - (b) Grid compatibility and interconnection protocols;
 - (c) Metering, data reporting, and performance monitoring systems;
 - (d) Cybersecurity and data privacy standards where applicable.
- (3) All licensed operators shall comply with these standards, and failure to do so shall constitute a ground for regulatory sanctions, including license suspension or revocation.
- (4) The Commission shall review and update such standards at least once every three years to reflect technological advancements and evolving best practices.

Part V – Fiscal and Market-Based Incentives

18. Feed-in Tariffs (FiTs)

- (1) The Nigerian Electricity Regulatory Commission (NERC) shall develop and periodically update a Feed-in Tariff (FiT) scheme for eligible renewable energy technologies and generation capacities.
- (2) The FiT scheme shall:
 - (a) Guarantee fixed, cost-reflective payments for electricity generated from renewable energy sources and supplied to the national grid;
 - (b) Establish different tariff rates for various technologies, including solar PV, wind, hydro, biomass, and hybrid systems;
 - (c) Provide differentiated tariffs based on project size, location, and grid proximity to encourage decentralized generation;

- (d) Be valid for a minimum duration of ten (10) years from the date of commissioning.
- (3) NERC shall review the FiT scheme rates every two (2) years and may adjust them in accordance with inflation, market trends, and national energy priorities.
- (4) The costs of the FiT scheme shall be transparently distributed through the electricity market and subsidized, where necessary, through allocations from the Renewable Energy Development Fund (REDF), established under this Act.

19. Tax Incentives and Import Duty Exemptions

- (1) The Minister of Finance shall, in accordance with the Federal Inland Revenue Service (FIRS), issue regulations granting the following incentives to qualified renewable energy developers:
 - (a) Full import duty exemption on renewable energy equipment, including solar panels, inverters, wind turbines, and energy storage systems;
 - (b) Value Added Tax (VAT) exemption on renewable energy technologies and associated installation services;
 - (c) Tax holidays of up to five (5) years for approved large-scale renewable energy infrastructure projects.
- (2) To benefit from these incentives, renewable energy developers must:
 - (a) Be licensed or registered under this Act;
 - (b) Meet minimum local content and environmental compliance requirements;
 - (c) Submit annual reports on operations and tax utilization to the Ministry of Finance.
- (3) The incentives shall be published in the Gazette and may be revised every five (5) years to reflect realities and sectoral performance.

20. Accelerated Depreciation and Investment Allowances

- (1) A company engaged in renewable energy generation and duly licensed under this Act shall be entitled to:

- (a) Accelerated depreciation of up to 50% on capital equipment and infrastructure in the first year of installation;
 - (b) Investment tax allowance of up to 20% on qualifying capital expenditure incurred for renewable energy generation or distribution projects.
- (2) These benefits shall apply for a period not exceeding five (5) years from the commencement of commercial operations and shall be subject to compliance with accounting and audit requirements as specified by the FIRS.
21. Establishment of the Renewable Energy Development Fund (REDF)
- (1) There is hereby established a Renewable Energy Development Fund (REDF) to provide financial support for renewable energy generation, transmission, access, and capacity-building initiatives.
- (2) The REDF shall be managed by the Ministry of Power in collaboration with the Renewable Energy Transition Commission (RETC), and its resources shall be applied to:
- (a) Subsidized capital costs for renewable energy projects in all areas;
 - (b) Support feasibility studies, pilot projects, and innovative clean energy technologies;
 - (c) Facilitate access to credit through loan guarantees, concessional lending, or matching grants;
 - (d) Promote public education and workforce development in renewable energy.
- (3) The REDF shall be funded from:
- (a) Annual budgetary appropriations from the National Assembly;
 - (b) International climate finance, donor contributions, and bilateral aid;
 - (c) Levies or surcharges from fossil fuel operations as determined by regulation;
 - (d) Any other legal source approved by the Ministry of Finance and disclosed to the public.

- (4) The Fund shall operate under transparent financial management guidelines and be subject to independent audit and annual reporting to the National Assembly.

22. Carbon Pricing and Emission Instruments

- (1) The Federal Government shall, within the framework of the Climate Change Act, 2021, develop market-based mechanisms to support renewable energy deployment through:
- (a) Carbon pricing instruments, including carbon taxes or emissions trading schemes;
 - (b) Clean energy certificates or renewable energy credits;
 - (c) Offset programs linked to renewable energy investments and verified emission reductions.
- (2) The Ministry of Environment, in consultation with the RETC and relevant market regulators, shall develop regulations to implement such instruments in accordance with global best practices and national climate goals.

Part VI – Grid Access and Infrastructure Integration

23. Right to Non-Discriminatory Grid Access

- (1) All licensed renewable energy generators shall have the right to access the national grid on a fair, transparent, and non-discriminatory basis, subject to technical feasibility and applicable regulations.
- (2) The Nigerian Electricity Regulatory Commission (NERC) shall issue and enforce Grid Connection Codes and Interconnection Standards to facilitate the safe, efficient, and reliable integration of renewable energy into the transmission and distribution networks,
- (3) No transmission or distribution licensee shall unreasonably refuse access to a renewable energy generator that meets the prescribed technical, commercial, and environmental standards.

- (4) Any denial of access must be accompanied by a written justification, and affected parties shall have the right to appeal such decisions to the Commission.

24. Obligations of Transmission and Distribution Operators

- (1) Transmission and distribution licensees shall be obligated to:

- (a) Expand and upgrade infrastructure to accommodate increasing shares of renewable energy;
- (b) Provide timely and accurate information to renewable energy developers on grid capacity, connection points, and technical requirements;
- (c) Prioritize the evacuation of electricity from sources, subject to grid stability and security;
- (d) Submit annual renewable energy integration plans to NERC and Ministry of Power.

- (2) NERC may prescribe performance standards and penalties for failure to fulfill obligations under this section.

25. Designation of Renewable Energy Zones (REZs)

- (1) The Ministry of Power, in consultation with the Renewable Energy Transmission Commission (RETC), NERC, and relevant State Governments, shall identify and designate REZs across the Federation.

- (2) Each REZ shall represent a geographic area with high renewable energy potential and grid accessibility, suitable for priority investment and infrastructure development.

- (3) The objectives of establishing the REZs include:

- (a) Facilitating coordinated transmission planning and projects siting;
- (b) Streamlining licensing and land access for project developers;
- (c) Attracting domestic and foreign investment to high-potential areas.

- (d) REZs shall be gazetted and updated every five (5) years, and shall be integrated into the National Renewable Energy Development Plan (NREDP).

26. Rules of Off-Grid and Mini-Grid Interconnection

- (1) NERC shall develop interconnection guidelines that allow off-grid and mini-grids renewable energy systems to connect to the national grid or to each other, where technically and economically feasible.
- (2) The guidelines shall include:
 - (a) Conditions under which existing mini-grids may interconnect with grid infrastructure;
 - (b) Standards for grid arrival, ensuring fair compensation to off-grid operators for existing infrastructure;
 - (c) Provisions for “islanding” in case of grid instability, enabling energy resilience in remote communities;
 - (d) Clear dispute resolution mechanisms in the event of grid encroachment or conflicting service areas.
- (3) Mini-grids operators shall not be unfairly displaced by public or private grid expansion, and may apply for compensation or partnership arrangements through mechanisms provided by NERC.

27. Support for Energy Storage and Smart Grid Technologies

- (1) The Ministry of Power and NERC shall promote the adoption of energy storage systems and smart grid technologies to enhance grid flexibility, reliability, and renewable energy integration.
- (2) The REDF may allocate specific funding windows for:
 - (a) Pilot and demonstration projects on battery storage and hybrid systems;
 - (b) Deployment of advanced metering infrastructure (AMI) and demand-response tools;

- (c) Research, development, and local manufacturing of storage components and control systems.
- (3) NERC shall issue technical standards and licensing procedures for energy storage operators and hybrid grid managers.

Part VII – Environmental and Social Safeguards

28. Mandatory Environmental and Social Impact Assessments (ESIAs)

- (1) All renewable energy projects with a generation capacity exceeding 1 megawatt (MW), or located in environmentally sensitive areas, shall be subject to an Environmental and Social Impact Assessment (ESIA) in accordance with the Environmental Impact Assessment Act (Cap E12, LFN 2004) and applicable regulations.
- (2) The ESIA shall:
 - (a) Assess potential impacts on land, water, biodiversity, air quality, and local livelihoods;
 - (b) Include public consultations with affected communities and stakeholders;
 - (c) Be reviewed and approved by the Ministry of Environment or its designated authority before the project can proceed.
- (3) No environmental permit shall be issued for a project unless the ESIA has been conducted and approved in line with the law.

29. Public Consultation and Free, Prior, and Informed Consent (FPIC)

- (1) Developers of renewable energy projects shall conduct public consultations with communities, landowners, and relevant stakeholders prior to project commencement.
- (2) In cases involving indigenous peoples or customary landowners, Free, Prior, and Informed Consent (FPIC) must be obtained in accordance with national and international best practices.

(3) Consultation process shall:

- (a) Conducted in the local language;
- (b) Documented transparently;
- (c) Inclusive of women, youth, and vulnerable groups;
- (d) Repeated at critical stages of project design and implementation.

(4) Failure to conduct genuine consultations or obtain FPIC where required shall be grounds for denial or revocation of a project's license or permit.

30. Land Use, Compensation, and Resettlement

(1) All renewable energy projects requiring land acquisition shall comply with the Land Use Act, 1978 and any applicable state laws

(2) Where land is acquired from communities or individuals, the project proponent shall:

- (a) Provide fair and prompt compensation for land, crops, and livelihoods;
- (b) Ensure proper valuation in accordance with national standards;
- (c) Where necessary, prepare and implement Resettlement Action Plan (RAP) approved by relevant authorities;
- (d) Ensure that resettled persons are not left worse off economically or socially as a result of the project.

(3) Land disputes arising from renewable energy projects shall be referred to the appropriate dispute resolution mechanisms provided under this Act or other applicable laws.

31. Environmental Management Plans and Remediation Funds

(1) Every licensed renewable energy operator shall prepare and submit an Environmental and Social Management Plan (ESMP) prior to commissioning, detailing:

- (a) Monitoring and reporting obligations;
- (b) Emergency response procedures;

- (c) Waste disposal and pollution prevention measures;
 - (d) Long-term commitments for site decommissioning and environmental restoration.
- (2) Where large-scale infrastructure is involved, the developer may be required to:
- (a) Contribute to an Environmental Remediation Fund to cover future restoration or damage remediation;
 - (b) Enter into environmental performance agreements with regulators;
 - (c) Submit periodic environmental audits.
- (3) The Ministry of Environment shall supervise implementation of ESMPs and shall have powers to impose administrative sanctions for non-compliance, including fines, suspension of activities, or revocation of environmental clearances.

Part VIII – Public Participation and Community Empowerment

32. Community Engagement Requirements

- (1) Every developer of a renewable energy project with a capacity of 1 megawatt (MW) and above, or any project receiving public subsidies, shall be required to implement a Community Engagement Plan (CEP) prior to project commencement.
- (2) The CEP shall:
 - (a) Identify all potentially affected stakeholders and host communities;
 - (b) Outline methods for effective dialogue, consultation, and participation throughout the project life cycle;
 - (c) Include grievance redress mechanisms to ensure complaints are addressed promptly and fairly;
 - (d) Be submitted to the NERC and the RETC for approval.
- (3) Project developers shall maintain records of community engagements and submit annual updates as part of their compliance reports.

33. Support for Energy Cooperatives and Local Ownership

(1) The Federal Government shall encourage the establishment and registration of energy cooperatives and community-owned renewable energy enterprises, particularly in rural areas.

(2) NERC and state regulators shall:

- (a) Develop simplified licensing and registration procedures for cooperatives;
- (b) Offer preferential access to FiTs, micro-finance schemes, and public grants;
- (c) Provide technical assistance and training through designated support programs.
- (d) Public or donor-funded renewable energy projects implemented in host communities shall, where practicable, reserve not less than 10% equity participation for locally registered cooperatives or community enterprises.

34. Benefit-Sharing Mechanisms and Community Development Agreements (CDAs)

(1) All unity-scale renewable energy projects (exceeding 5 MW capacity) shall be required to enter into a Community Development Agreement (CDA) with affected host communities.

(2) The CDA shall:

- (a) Specify agreed contributions by the project developer toward community development, including education, health, infrastructure, or livelihood initiatives;
- (b) Establish a community trust fund or equivalent financial mechanism for managing local benefits;
- (c) Identify beneficiaries, implementation timelines, and governance arrangements;
- (d) Be jointly negotiated, signed, and monitored by community representatives, the developer, and an independent observer.

(3) The RETC shall publish model CDA templates and facilitate capacity-building programs for community leaders to participate in negotiations effectively.

- (4) A copy of the signed CDA shall be lodged with the RETC and shall form part of the licensing and compliance requirements for the project.

35. Gender and Social Inclusion

- (1) All renewable energy programs and projects implemented under this Act shall mainstream gender equality, youth inclusion, and the participation of vulnerable groups in their planning, design, and execution.
- (2) The RETC, in consultation with the Ministry of Women Affairs and relevant stakeholders shall:
- (a) Develop gender-responsive guidelines for renewable energy policy and program implementation;
 - (b) Promote employment, leadership and entrepreneurship opportunities for women and youth in the renewable energy sector;
 - (c) Monitor and report annually on inclusion outcomes and equity performance indicators.
 - (d) No renewable energy developer shall discriminate on the basis of gender, disability, or social status in project recruitment, community benefit distribution, or stakeholder engagement.

36. Education and Awareness Programs

- (1) The Ministry of Power, in collaboration with the Federal Ministry of Education and RETC, shall integrate renewable energy education into school curricula, technical institutions, and public campaigns.
- (2) Programs shall include;
- (a) Renewable energy science and policy modules in primary, secondary, and tertiary education;

- (b) Vocational and entrepreneurship training for renewable energy system installation and maintenance;
 - (c) Public awareness campaigns on energy efficiency, climate change, and consumer rights under this Act.
- (3) The RETC shall support non-governmental organizations, local governments, and community groups to deliver grassroots energy education and behavioral change programs, particularly in off-grid and rural areas.

Part IX – Compliance, Monitoring, and Enforcement

37. Establishment of the Renewable Energy Compliance Unit (RECU)

- (1) The NERC shall establish within its institutional structure a dedicated Renewable Energy Compliance Unit (RECU) tasked with:
- (a) Monitoring licensee compliance with all technical, environmental, social, and financial obligations under this Act;
 - (b) Investigating breaches or violations of licensing conditions or statutory duties;
 - (c) Collaborating with other agencies for joint inspections and enforcement;
 - (d) Recommending sanctions, penalties, or remedial measures to NERC as necessary.
- (2) The RECU shall have powers to conduct on-site inspections, request information, audit records, and summon relevant parties for compliance hearings, subject to procedural fairness.

38. Monitoring and Reporting obligations

- (1) All licensed renewable energy developers shall:
- (a) Submit quarterly and annual reports to NERC and RETC detailing operational performance, community engagement, environmental compliance, and financial date;

(b) Maintain a compliance register to document adherence to license conditions, grid codes, and benefits-sharing obligations;

(c) Allow periodic audits and independent verification as required by law or by the RETC.

(2) The RETC shall consolidate reports from across the sector and publish an annual State of Renewable Energy in Nigeria report, to be submitted to the National Assembly and made available to the public.

39. Independent Ownership and Public Reports

(1) The RETC shall establish an Independent Advisory Panel consisting of civil society representatives, academic experts, professional bodies, and development partners.

(2) The Panel shall:

(a) Review sector performance, compliance trends, and grievance outcomes;

(b) Advise the RETC and NERC on systemic challenges, policy gaps, and areas for legal reform;

(c) Publish a biennial Renewable Energy Governance Review to enhance public trust and transparency.

(3) The RETC shall also establish a public-facing Renewable Energy Dashboard to track key indicators including:

(a) Total renewable energy capacity installed;

(b) Number and type of projects by state;

(c) Tariff trends and investment flows;

(d) Progress toward national targets.

40. Dispute Resolution and Access to Remedies

(1) The NERC shall develop and publish procedures for the expeditious resolution of disputes arising under this Act, including:

- (a) Grid access disputes;
 - (b) Licensing and regulatory complaints;
 - (c) Community grievances related to land, benefit-sharing, or social impacts;
 - (d) Disagreements between developers and off-takers.
- (2) Disputes may be resolved through:
- (a) Arbitration or mediation;
 - (b) Sectoral adjudication panels within NERC;
 - (c) Referral to courts of competent jurisdiction as a last resort.
- (3) All parties shall be entitled to fair hearing, timely decisions, and access to appeal mechanisms as prescribed by the law.

41. Offences and Penalties

- (1) Any person or entity that:
- (a) Undertakes renewable energy generation or distribution without a license where one is required;
 - (b) Provides false or misleading information in any application or report;
 - (c) Fails to comply with environmental safety, or community development obligations;
 - (d) Tamper with renewable energy infrastructure or equipment; commits an offence and shall be liable on conviction to:
 - i. A fine not exceeding ₦10,000,000.00 for individuals, and ₦50,000,000.00 for corporate bodies;
 - ii. Imprisonment for a term not exceeding three (3) years; or
 - iii. Both fine and imprisonment.
- (2) Where the offence is a continuing one, an additionally daily penalty of ₦500,000.00 may apply until full compliance is achieved.

- (3) In addition to criminal sanctions, NERC or the RETC may impose administrative sanctions including:
- (a) Suspension or revocation of licenses;
 - (b) Publication of non-compliance notices;
 - (c) Disqualification from future incentives or REDF funding.

Part X – Legal Harmonization and Transitional Provisions

42. Consistency with the Electricity Act, 2023

- (1) All provisions of this Act shall be implemented in a manner consistent with the Electricity Act, 2023, particularly with respect to:
- (a) State electricity market regulation and decentralization;
 - (b) Licensing and tariff-setting responsibilities of NERC and State regulators;
 - (c) Role of the Transmission Company of Nigeria (TCN) and market operators.
- (2) Where conflicts arise between the two Acts, the relevant authority shall interpret them harmoniously to promote the objectives of clean energy development, energy access, and regulatory clarity.

43. Integration with the Climate Change Act, 2021

- (1) This Act shall complement the Climate Change Act, 2021 by providing the energy transition framework necessary to achieve Nigeria's:
- (a) Net-zero commitments;
 - (b) Sectoral carbon budgets; and
 - (c) Nationally Determined Contributions (NDCs).
- (2) The RETC shall serve as the technical liaison to the NCCC and submit periodic reports to support national climate planning, emissions tracking, and climate finance mobilization.

44. Amendment of Conflicting Legislation

- (1) The Minister of Justice/Attorney General of the Federation shall, within twelve (12) months of the coming into force of this Act, initiate a review of all extant laws, regulations, and policies that conflict with or duplicate the provisions of this Act.
- (2) Such review shall identify:
 - (a) Overlapping mandates among federal and state agencies;
 - (b) Barriers to renewable energy investment embedded in land, finance, and customary laws;
 - (c) Obsolete definitions, requirements, or procedures inconsistent with modern renewable energy standards.
- (3) The review shall result in a Renewable Energy Legal Harmonization Bill to be submitted to the National Assembly for consideration.

45. Legal Supremacy and Conflict Resolution

- (1) Where the provisions of this Act conflict with any other legislation, policy, regulation, or guideline in relation to renewable energy development, the provision of this Act shall prevail to the extent of the inconsistency.
- (2) State laws on renewable energy shall align with the principles, objectives, and minimum standards prescribed under this Act and the Electricity Act, 2023.

46. Savings and Transitional Provisions

- (1) All valid licenses, permits, or approvals granted for renewable energy projects prior to the commencement of this Act shall continue to be valid for the duration stated therein, provided the holder remains in compliance with the terms of issuance.
- (2) Ongoing renewable energy programs, incentives, or pilot schemes established under previous legal instruments shall be reviewed by the Ministry of Power within (12) months and harmonized with the provisions of this Act.

(3) The Ministry of Power may, by regulation, prescribe transitional arrangements necessary to ensure orderly implementation of this Act, including:

- (a) Migration of existing licensees to new regulatory categories;
- (b) Interim guidelines for REDF administration;
- (c) Phased application of fiscal incentives or reporting obligations.

Proposed Schedules to the Model Legal Framework

Schedule 1

1. Objective of the Schedule

The primary objective of this Schedule 1, relating to Section 11 of the proposed model legal framework is to establish a clear, phased roadmap for Nigeria's transition from fossil fuels to renewable energy from 2025-2040. These targets are intended to provide a strategic roadmap for energy diversification, economic growth, and environmental sustainability, drawing critical lessons from the successful renewable energy transitions in Sweden, Denmark, Norway, Kenya, and South Africa. By adopting these milestones, Nigeria seeks to align its renewable energy deployment with the Electricity Act, 2023 and Climate Change Act, 2021, fulfil its Nationally Determined Contributions (NDCs) under the Paris Agreement, reduce greenhouse gas emissions and environmental degradation, and position itself as a regional leader in clean energy innovation and climate action.

2. National Renewable Energy Capacity Targets

Nigeria aims to progressively increase the share of renewable energy in its total electricity generation mix, starting from 20% by 2025, scaling to 35% by 2030, 50% by 2035, and reaching 65% by 2040. In absolute generation capacity, this translates into achieving at least

8,000 megawatts (MW) of installed renewable energy capacity by 2025, increasing up to 15,000 MW by 2030, 25,000 MW by 2035, and ultimately 40,000 MW by 2040.

To achieve these milestones, the Federal Government, in collaboration with State Governments, the Renewable Energy Transition Commission (RETC), and the Nigerian Electricity Regulatory Commission (NERC), shall implement targeted programs designed to accelerate the development of renewable energy infrastructure nationwide. This phased approach draws inspiration from Sweden, which successfully set ambitious renewable energy milestones and exceeded its targets well before schedule, and Denmark, whose gradual scaling of renewable capacity has been carefully aligned with technological readiness and investor sureness.

3. Sector-Specific Deployment Targets

a. Solar Energy

Nigeria's transition strategy positions solar energy as the cornerstone of its renewable energy development due to its vast solar irradiation potential, particularly in the northern regions. By 2025, Nigeria targets the deployment of at least 4,000 MW of solar capacity through a mix of utility-scale farms, rooftop installations, and mini-grids. By 2030, this capacity should reach 8,000 MW, with solar electrification providing power to at least 40% of rural households. By 2040, Nigeria intends to achieve 18,000 MW of installed solar capacity, making solar energy its single largest renewable source.

This approach draws lessons from South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which successfully mobilized private sector investment into solar energy projects, and Kenya's innovative off-grid and mini-grid policies, which have proven effective in expanding electricity access in rural and underserved communities.

b. Wind Energy

Nigeria also seeks to leverage its moderate wind resources, particularly in Sokoto, Katsina, Jos Plateau, and coastal regions. By 2025, the goal is to commission at least 500 MW of wind power, scaling up to 2,500 MW by 2030 through hybrid systems integrating solar and wind. By 2040, Nigeria targets 7,000 MW of installed wind capacity, including offshore demonstration projects in Lagos, Ondo, and Delta States. This strategy follows Denmark's globally acclaimed offshore wind framework, where early government-led investments combined with predictable tariffs created one of the world's most competitive wind energy markets. South Africa's REIPPPP also provides a replicable model for attracting private capital into large-scale onshore wind developments.

c. Biomass Energy

Recognizing Nigeria's significant agricultural output and growing municipal waste challenges, the country plans to deploy 200 MW of biomass and waste-to-energy capacity by 2025, scaling up to 1,200 MW by 2030 and 3,500 MW by 2040. This approach promotes circular economy practices by converting agricultural residues, forestry by-products, and urban waste into reliable energy sources while simultaneously reducing environmental pollution. This pathway draws inspiration from Sweden's integrated waste-to-energy systems, which process over 50% of municipal waste into energy, and Norway's advanced bioenergy initiatives, where agricultural residues are transformed into low-carbon heating and power solutions.

d. Hydropower

Hydropower remains central to Nigeria's renewable energy mix, particularly for decentralized generation along river basins. By 2025, Nigeria aims to develop 1,500 MW of capacity from small- and medium-scale hydropower projects. By 2030, this figure is expected to reach

3,000 MW, largely through upgrades to existing dams and the deployment of new community-based hydro systems. By 2040, installed capacity is projected to rise to 6,000 MW. This goal reflects lessons from Norway, which has successfully integrated small-scale hydropower into its national energy plan, demonstrating how distributed hydro resources can ensure energy security, rural development, and reliable base-load power without large-scale environmental disruption.

4. National Electrification Targets

This renewable energy deployment strategy is closely tied to Nigeria's ambition to close its electricity access gap. By 2025, the Federal Government targets 70% national electricity access, ensuring that at least 40% of supply derives from renewable sources. By 2030, electricity access should reach 85%, supported by widespread deployment of mini-grids and solar home systems. By 2040, Nigeria seeks to achieve near-universal access to clean and affordable electricity, effectively eliminating energy poverty in most regions. This approach is informed by Kenya's Last Mile Connectivity Programme, which successfully combined renewable-based mini-grids with strategic grid expansion to reach millions of rural households.

5. Emission Reduction Targets

The renewable energy roadmap under this Schedule is expected to deliver significant reductions in greenhouse gas emissions. By 2025, the energy sector is projected to cut emissions by approximately 10 million tonnes of CO₂ equivalent (MtCO₂e), rising to 25 MtCO₂e by 2030 and 50 MtCO₂e by 2040. This aligns with Nigeria's obligations under the Climate Change Act, 2021 and builds on lessons from Sweden's Net-Zero Climate Policy and Denmark's legally binding emissions reduction pathways, which demonstrate the importance of integrating energy sector reforms with broader climate targets.

6. Implementation and Review Mechanism

The Renewable Energy Transition Commission shall be responsible for monitoring progress annually, publishing reports, and recommending policy adjustments where necessary. The Renewable Energy Development Fund (REDF) will provide grants, low-interest loans, and climate financing to support renewable energy deployment. State Governments, empowered by the Electricity Act, 2023, shall develop localized energy action plans aligned with the national targets. This Schedule shall be reviewed every five (5) years to reflect technological advancements, market trends, and Nigeria's evolving climate change commitments.

By aligning with the practical successes of Sweden, Denmark, Norway, Kenya, and South Africa, Nigeria positions itself to undertake a deliberate, structured, and economically beneficial transition to renewable energy. These international lessons emphasize that a well-planned renewable roadmap creates not only environmental gains but also energy security, economic diversification, and social prosperity.

Schedule 2

1. Objective of the Schedule

The primary objective of this Schedule, relating to Sections 18, 19, and 25 of the proposed model legal framework identifies the renewable energy technologies eligible for support and provides guiding principles for the design of tariff mechanisms to ensure affordability for consumers while attracting sufficient private investment. By defining eligibility criteria and tariff-setting frameworks, this Schedule ensures transparency, stability, and predictability within Nigeria's renewable energy sector. The provisions here are informed by the experiences of Sweden, Denmark, Norway, Kenya, and South Africa, whose legal frameworks demonstrate that carefully designed tariff policies are critical for accelerating renewable energy deployment and ensuring equitable access to clean energy.

2. Eligible Renewable Energy Technologies

For the purposes of this model legal framework, the following renewable energy technologies shall be considered eligible for incentives, tariffs, and other forms of regulatory support:

a. Solar Energy Technologies

Technologies include photovoltaic (PV) solar farms, rooftop solar installations, concentrated solar power (CSP), and solar hybrid systems integrated with battery storage. Nigeria shall prioritize the development of utility-scale solar farms in regions with high irradiation potential while simultaneously supporting decentralized mini-grids and solar home systems to expand rural electrification. Kenya's successful deployment of decentralized solar mini-grids demonstrates the critical role of community-driven electrification models in reaching underserved areas. Nigeria can adopt similar strategies while leveraging fiscal incentives to attract private investors into large-scale utility projects, as seen in South Africa's solar procurement framework under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

b. Wind Energy Technologies

Technologies include onshore and offshore wind farms, small-scale distributed turbines, and hybridized systems combining wind and solar. Nigeria will focus on resource-rich regions such as Sokoto, Katsina, Jos Plateau, and coastal corridors, while also exploring offshore wind pilot projects in Lagos, Ondo, and Delta States. Denmark's offshore wind policy is globally recognized for combining state-backed infrastructure investment with private-sector participation under stable tariff regimes. Similarly, South Africa's REIPPPP shows how competitive bidding processes can attract billions in private financing, offering Nigeria a replicable model for scaling its wind market.

c. Biomass Energy Technologies

Biomass technologies include agricultural residue conversion, municipal solid waste processing, and forestry by-product utilization for rural communities. Nigeria intends to prioritize bioenergy development in agricultural hubs, especially in the north central and south-south regions, where large volumes of agricultural and forestry residues are currently wasted. Sweden has transformed more than 50% of municipal waste into energy through efficient waste-to-energy facilities integrated with district heating systems. Similarly, Norway's bioenergy framework has successfully incentivized agricultural waste conversion into electricity and heat, creating new value chains while reducing environmental pollution. Nigeria can adopt hybrid financing schemes and implement tax incentives to encourage private investment in these sectors.

d. Hydropower Technologies

Hydropower technologies include run-of-river projects, dam retrofits, and community-scale hydro stations with installed capacities of up to 30 MW. Nigeria will prioritize mini-hydro projects for rural communities in river basin authorities and irrigation zones where small water systems can sustainably provide base-load power. Norway's success in integrating small-scale hydropower projects into its national grid demonstrates how localized generation can provide reliable, low-carbon electricity without the environmental risks associated with large dams. Nigeria can adopt a similar framework, ensuring that hydropower development aligns with environmental safeguards and community benefit-sharing mechanisms.

e. Geothermal Technologies

Geothermal technologies include low-temperature direct-use applications, geothermal power generation, and hybrid geothermal-solar systems where viable resource basins are identified. While geothermal potential in Nigeria remains underexplored, pilot studies in states such as Plateau, Cross River, and Benue suggest possible opportunities for deployment. Kenya has become Africa's global leader in geothermal energy, generating over 40% of its national electricity from geothermal resources at the Olkaria and Menengai fields. Nigeria can replicate Kenya's approach by prioritizing resource mapping, attracting donor-funded exploration grants, and adopting enabling policies that reduce the risk for early-stage geothermal investors.

3. Tariff-Setting Principles

The Nigerian Electricity Regulatory Commission (NERC), working jointly with State-level regulators established under the Electricity Act, 2023, shall establish fair, predictable, and technology-specific tariff structures for renewable energy projects under the following guiding principles:

a. Feed-in Tariffs (FiTs)

FiTs shall be designed to guarantee long-term purchase agreements at predetermined rates for renewable energy producers, thereby providing price stability and investor confidence. Tariffs shall vary depending on the technology type, project size, and location, ensuring that high-potential regions and underserved communities remain attractive for investment. Kenya's Renewable Energy Feed-in Tariff Policy (REFIT) successfully drove private sector participation by offering differentiated tariff bands based on technology and project capacity. Nigeria can adopt a similar FiT framework tailored to its diverse geographic and resource conditions.

b. Competitive Auctions and Procurement

For large-scale renewable energy projects above a threshold capacity to be determined by NERC, Nigeria shall adopt competitive bidding processes to drive down costs while ensuring high-quality project delivery. Under the South Africa's REIPPPP, competitive auctions have attracted over US\$20 billion in private investment while achieving some of the lowest renewable energy tariffs in Africa. Nigeria can replicate this model to expand utility-scale solar and wind projects at competitive pricing.

c. Net Metering and Distributed Generation

Nigeria shall adopt net-metering regulations to allow consumers generating electricity from rooftop solar, small wind turbines, or mini-hydro systems to export excess energy to the grid and receive credits against their electricity bills. Sweden and Denmark have successfully implemented consumer-friendly net-metering frameworks that incentivize household and business participation in renewable deployment, fostering community ownership and lowering overall system costs.

4. Role of the Renewable Energy Transmission Commission (RETC)

The RETC shall:

- a. Continuously review eligible technologies and propose updates to the Minister of Power every three (3) years.
- b. Coordinate with NERC and State-level regulators to ensure tariff-setting aligns with national renewable energy targets.
- c. Publish annual performance reports assessing tariff effectiveness, investor participation, and consumer affordability.

5. Key Outcomes Expected from this Schedule

By clearly defining eligible technologies and establishing a clear tariff framework, Nigeria will:

- a. Create a stable policy environment to attract local and foreign investment.
- b. Increase renewable energy affordability through competitive tariffs.
- c. Empower communities and consumers to participate directly in electricity generation.
- d. Align pricing policies with Nigeria's net-zero emissions pathways and climate goals;
and
- e. Ensure rapid, decentralized, and equitable access to clean energy.

Schedule 3

1. Objective of the Schedule

The primary objective of this Schedule, relating to Sections 30, 32, and 36 of the proposed model legal framework provides for State Governments to develop, regulate, and manage renewable energy programs within their jurisdictions in alignment with the Electricity Act, 2023 and the objectives of the Model Renewable Energy Law. It seeks to: provide States with policy and regulatory guidance for renewable energy development, ensure harmonization between federal and state-level energy strategies, encourage private-sector participation in mini-grids, off-grid solutions, and utility-scale renewable projects, enhance energy access in underserved communities; and establish a uniform standard for licensing, tariffs, and investment incentives across States. By adopting this framework, States can unlock their renewable energy potential while ensuring consistency with Nigeria's national transition plan.

2. Establishment of State Renewable Energy Agencies (SREAs)

Each State Government is encouraged to establish a State Renewable Energy Agency (SREA) or designate an existing institution to:

- a. Develop State-level renewable energy policies and implementation plans;
- b. Regulate intra-State renewable energy projects in collaboration with the Nigerian Electricity Regulatory Commission (NERC);
- c. Manage State Renewable Energy Funds, where applicable; and
- d. Provide technical support to local governments and private developers deploying renewable energy technologies.

It is noteworthy that Kenya's decentralized electrification strategy, supported by county-level agencies, has successfully expanded rural energy access by promoting mini-grids and community-based renewable projects. Nigeria's States can replicate this model to bridge electricity access gaps more effectively.

3. Licensing and Regulatory Coordination

a. Licensing Authority

Under the Electricity Act, 2023, States have the power to issue licenses for electricity generation, transmission, and distribution within their territories, provided the systems are not interconnected with the national grid. State regulators, working with SREAs, shall issue licenses for:

- i. Mini-grid developers;
- ii. Off-grid renewable energy operators;
- iii. Community-based energy developers; and
- iv. Small-scale renewable energy producers up to a threshold capacity prescribes by NERC.

b. Harmonization with NERC

To avoid conflicting regulations, SREAs shall work collaboratively with NERC to ensure that Stat-level licenses, tariffs, and technical standards are consistent with national energy

objectives. This ensures regulatory certainty for investors while allowing States the flexibility to adopt policies tailored to local energy needs. The success of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) highlights the importance of coordinated governance between national and provincial authorities to attract large-scale private investments while retaining regional autonomy.

4. Tariff Setting at the State Level

State regulators, in consultation with NERC, shall adopt fair and cost-effective tariffs for renewable energy projects within their jurisdictions. These tariffs shall:

- a. Ensure affordability for low-income households while maintaining investor confidence;
- b. Allow for differentiated pricing models based on the technology deployed, system size and location;
- c. Enable cross-subsidization mechanisms, where feasible, to expand access in rural areas; and
- d. Support net-metering policies allowing household and small businesses to sell excess electricity back to the local grid.

Denmark and Sweden have achieved rapid renewable energy adoption by implementing consumer-friendly tariffs and localized energy pricing systems that incentivized individual participation while sustaining private-sector involvement. Nigeria's State governments can adapt these lessons to encourage household-scale solar and mini-grid investment.

5. Private Sector and Community Participation

States shall prioritize public-private partnerships (PPPs) and community-driven models for renewable energy deployment by:

- a. Offering tax incentives, low-interest loans, or grants for private sectors and cooperatives developing clean energy solutions;
- b. Support community-owned energy cooperatives to foster local ownership and equitable benefit-sharing;
- c. Encouraging partnerships between State agencies, local governments, and development partners to fund mini-grid and off-grid solutions in rural areas.

Norway's community-based hydropower ownership model demonstrates how local participation creates public acceptance, accelerates project implementation, and ensures the equitable distribution of economic benefits. Nigeria can adapt similar strategies for rural renewable projects.

6. Integration of Local Content Policies

States shall implement Local Content Development Guidelines requiring renewable energy developers to:

- a. Prioritize Nigerian-made equipment and components wherever technically and economically viable;
- b. Employ and train local workers in project design, construction, and maintenance; and
- c. Partner with technical institutions within the State to build a skilled renewable energy workforce.

South Africa's REIPPPP successfully integrated local content requirements into its procurement model, boosting domestic manufacturing capacity and creating thousands of jobs in renewable energy value chains.

7. Funding and Incentives for State-level Renewable Energy Projects

State Governments shall create State Renewable Energy Funds (SREFs) to finance clean energy projects, in collaboration with the Renewable Energy Deployment Fund (REDF) at the federal level. Sources of funding may include:

- a. Annual budgetary allocations from the State Government;
- b. Climate finance mobilized from international development partners;
- c. Private sector contributions; and
- d. Grants from the RETC or donor-funded programs.

Funds shall be applied to support mini-grids, small-scale renewable energy projects, and incentives for rural electrification. Through innovative financing partnerships with multilateral development banks, Kenya successfully scaled rural electrification by combining public funds with private capital, a model Nigeria's State governments can adapt to accelerate clean energy access.

8. Dispute Resolution Mechanisms

State regulators shall establish Renewable Energy Dispute Resolution Panels to handle disputes arising between developers, consumers, communities, and investors, within their jurisdictions. Appeals from these panels may be escalated to NERC or RETC for review, ensuring transparency, accountability, and regulatory fairness.

9. Harmonization with National Targets

States shall align renewable energy deployment strategies with Nigeria's National Renewable Energy Targets under Schedule 1. Each State shall prepare annual performance reports detailing progress toward deployment, investment, and electrification milestones, which shall be submitted to RETC for integration into the national monitoring framework.

10. Key Outcomes Expected from this Schedule

If effectively implemented, this Schedule will enable States to:

- a. Accelerate energy access in underserved and rural communities;
- b. Create investor-friendly environments tailored to local resource potentials;
- c. Encourage community ownership of renewable energy projects;
- d. Strengthen collaboration between federal and state regulators; and
- e. Drive Nigeria toward a unified, inclusive, and low-carbon energy future.

Bio-data

A. Personal Data

1. **Full Name:** Matilda Adedoyin CHUKWUEMEKA
2. **Date and Place of Birth:** 25-03-1993, Ibadan
3. **Nationality:** Nigerian
4. **Marital Status:** Married
5. **No. of Children & their age:** 1 & 2years
6. **Name and Address of Spouse:** Abel Nnamdi CHUKWUEMEKA, Block G, Flat 6, Staff Quarters 2, Lead City University Housing Estate, Toll-gate, Ibadan
7. **Name and Address of Next of Kin:** Abel Nnamdi CHUKWUEMEKA, Block G, Flat 6, Staff Quarters 2, Lead City University Housing Estate, Toll-gate, Ibadan
8. **Date of Assumption of Duty in Current Establishment:** 18th October, 2021
9. **Status of First Appointment in Current Establishment:** Assistant Lecturer
10. **Present Position:** Lecturer II
11. **Date of Last Promotion:** 1st October, 2023
12. **Date of Confirming of Appointment:** 5th November, 2024
13. **If not Confirmed, Why?**
14. **Present Salary:** LCU ASSS 03 Step 1
15. **Faculty:** Law
16. **Department:** Private and Business Law

B. Educational Background:

I. Primary Education:

Caroline Headstart Nursery and Primary School 1995-2002

II. Secondary Education:

Royal College, Basorun, Ibadan 2002-2007

Success High School, Ibadan 2007

III. Higher Educational Institutions Attended with Dates and Qualifications

Lead City University
LL.B (Second Class Upper Division) 2014-2018

Nigerian Law School, Yola
B.L (Second Class Lower Division) 2019-2020

Lead City University
Master of Laws 2020-2022

Lead City University
PhD in Law 2022 till date

C. AWARDS AND FELLOWSHIPS:

D. Work Experience: With Dates (including courses taught where relevant):

Kunle Sobaloju & Co. (Intern) 2016-2017

Oladipo Olasope SAN & Co. (Extern) 2019

Ministry of Justice, Oyo State (Associate N.Y.S.C) 2020-2021

Olakunle Akintola & Co. (Associate Counsel) 2021

Lead City University (Assistant Lecturer) 2021-2023

Courses taught within the current Academic Sessions: Environmental Law, Oil & Gas Law, ICT Law, Law of Contract

Lead City University (Lecturer II) 2023

Courses taught within the current Academic Sessions: Environmental Law, Oil & Gas Law, and Conflict of Laws, Criminal Law, Privacy and Data Protection Law, Legal Methods

Current Undergraduate Studies Supervision (no. of students): 22

Current Graduate Studies Supervision (no. of students): 5

E. Membership of Academic Professional Bodies:

Institute of Personality Development and Customer Relationship Management

Nigerian Bar Association (NBA)

Chattered Institute of Arbitrators (CiArbUK)

National Association of Law Teachers (NALT)

Young Scholars Initiative (YSI)

Global Alliance for Justice Education (GAJE)

Association of Environmental Lawyers of Nigeria (AELN)

F. Publications:

1. Thesis/Dissertation:

- M.A. Adepoju, 'The Legal Analysis of the Concept of Surrogacy: Nigeria in Perspective' (2018) LLB Dissertation, Lead City University, Ibadan, Oyo State, Nigeria
- Matilda Chukwuemeka, 'Effective Implementation of Renewable Energy Legal Regime in Nigeria and Ghana: A Mitigator to Climate Change and Improvement of Power Supply' (2022) LLM Thesis, Lead City University, Ibadan, Oyo State, Nigeria

2. Books/Monographs:

a. Authored Books:

b. Edited Books:

c. Chapter Contribution to Books:

- **MA Chukwuemeka**, Role of University Law Clinics in Providing Pro Bono Services as Bridging the Justice Gap in Nigeria' in KA Adeyemo, SO Oni and GE Oyedokun, Pursuit of Legal Education (Eds), Essays Marking the 20th Anniversary of Lead City University, Ibadan, Faculty of Law, Lead City University (College Press, Ibadan, 2025) Chapter 5, 65-80.

3. Published Refereed Conference Proceedings:

- **MA Chukwuemeka**, 'Critical Analysis of the Nexus between Energy Poverty and Human Rights Violations in Nigeria' (2025) at the SLSS International Research Conference, Robert Gordon University, Aberdeen, United Kingdom.

Theme: Law as a Catalyst for Social Development.

- **MA Chukwuemeka**, 'Strengthening Data Subject Rights in Nigeria: The Role of Digital Literacy, Access to Remedies, and Institutional Accountability'

(2025) at the 4th University of Central Punjab, Pakistan, International Conference.

Theme: *Navigating the Legal Challenges of Cyber Security and Forensic Evidence in the Digital Era.*

4. Papers Accepted for Publication:

- **MA Chukwuemeka**, ‘Enhancing the Enforcement of Legal Frameworks for Renewable Energy: A Key Strategy for Mitigating Climate Change in Nigeria and Ghana’ (2025) 8(2) *African Journal of International Energy and Environmental Law*.
- **MA Chukwuemeka**, ‘Enhancing the Execution of Renewable Energy Legal Regime: A Step Towards Improved Power Supply in Nigeria’ (2025) *Journal of World Energy Law & Business*

5. Book Reviews and Commentaries in Scholarly Journals:

6. Technical Reports:

7. **Journals:**

- **Matilda Adedoyin Chukwuemeka**, Femi Adeoye Alabi, Olaosebikan Johnson Olusola & David Joseph Olusegun, ‘Role of the National Oil Spill Detection and Response Agency (NOSDRA) in Resolving Oil Spill Disputes in Nigeria’ (2025) 20(1) *Interdisciplinary Journal of Information, Knowledge and Management*, 261-272.
- **Matilda Adedoyin Chukwuemeka**, Femi Adeoye Alabi, Olaosebikan Johnson Olusola & David Joseph Olusegun, ‘Joint Venture Agreements in Nigeria’s Oil and Gas Sector: Legal Challenges and Opportunities for Local Content Development’ (2025) 20(2) *Interdisciplinary Journal of Information, Knowledge and Management*, 1-19.
- Godwin Emmnuel Oyedokun & **Matilda Chukwuemeka**, ‘Examining Legal Impediments to Renewable Energy Development in Nigeria’s Regulatory Landscape’ (2025) 6(1) *OAU Journal of Public Law*, 1-18.
- Aderonke Adegbite, **Matilda Chukwuemeka** & Yewande Fatoki, ‘Legal Perspectives of the Frameworks Protecting Vulnerable Communities Against Climate Change in Nigeria’ (2024) 2(1) *African Journal of Legal Research* <<https://researchafrica/2024/07/12/legal-perspectives-of-the-frameworksprotecting-vulnerable-communities-againstclimate-change-in-nigeria-aderonke-adegbite-matilda-chukwuemeka-yewande-fatoki/>>

- Yewande Fatoki, Dolapo Olutayo & **Matilda Chukwuemeka**, ‘An Examination of Access to Reporting Mechanisms within Regional Human Rights Systems’ (2024) 5(1) *Kampala International University Law Journal*
- Olajumoke Shaeab, Yakusak Aduak & **Matilda Chukwuemeka**, ‘Clinical Legal Education and the Future of Pro-bono in Nigeria: A Guarantee for Access to Justice for Accused Persons Awaiting Trial’ (2024) 31(1) *International Journal of Clinical Legal Education* <<https://journals.northumbria.ac.uk/index.php/ijcle/article/view/1347>>
- **MA Chukwuemeka**, ML Abimbola & W Sakpere, ‘Overview of Dispute Resolution Mechanisms and Information and Communications Technology in Nigeria’ (2024) 6(1) *African Journal of Law, Ethics, and Education*, 52-76.
- **MA Chukwuemeka**, TO Olorunnipa & IO Adisa-Ibojo, ‘Copyright Protection in Nigeria: An Analysis of Infringement and Enforcement Mechanisms’ (2023) 5 *Ifè Business Law Review*, 1-15.
- Dominic Obilor Akabuiro & **Matilda Adedoyin Chukwuemeka**, ‘The Laws and Practice of Arbitration in Nigeria and South Africa: A Comparative Analysis’ (2023) 4(1&2) *Lead City University Law Journal*, 156-170.
- **Matilda Chukwuemeka** & Tobiloba Awotoye, ‘The Effective Implementation on the Laws Regulating Noise Pollution by Religious Worship Centres and Freedom of Worship in Nigeria’ (2023) SSRN <<https://dx.doi.org/10.2139/ssrn.4343719>>
- Olu Ojedokun & **Matilda Chukwuemeka**, ‘Legal and Ethical Issues in Nigerian Surrogacy Practice: A Comparison with South Africa and United Kingdom’ (2020) 2(4) *RAGA, Journal of Social Inclusion and Educational Advancement*, 288-309.

8. Creative Work:

G. **Notable Scholarly or Professional Accomplishments:**

H. **Major Conferences/Workshops Attended:**

<i>Oct/2016</i>	African Human Rights Conference, University of Pretoria, South Africa.
<i>Nov/2022</i>	Global Alliance for Justice Education Worldwide Conference, Stellenbosch University, South Africa.
<i>Aug/2023</i>	Nigerian Bar Association Annual General Conference, Lagos.
<i>Sept/2023</i>	Lead City University International Conference, Ibadan.
<i>Oct/2023</i>	Women and Youth Education Institute (Canada) Conference, Ibadan.

<i>June/2024</i>	Research and Job Ethics Training – Lead City University Postgraduate College, Ibadan.
<i>Oct/2024</i>	National Association of Law Teachers (NALT) Conference, Ilorin.
<i>Feb/2025</i>	SLSS International Research Conference, Aberdeen, United Kingdom.
<i>April/2025</i>	4th UCP International Conference, Pakistan.
<i>May/2025</i>	Liprorich Consulting Ltd. Training, Lead City University, Ibadan.
<i>July/2025</i>	4th Durham Energy Disputes Conference, 2025, United Kingdom.

I. Services in Lead City University:

1. Services within the University Dept:

2. Services within the Faculty:

- Staff Adviser, Law Students' Association (2025)
- 100 level Adviser (2023 till date)
- Member, Examination Committee (2021 – 2023/2024)
- Coordinator, Clinical Legal Education (2021 – 2024)

3. Services within the University:

4. Services outside the University (Local, State, or National or International):

- Counsel, Olakunle Akintola & Co.
- Principal, Riah & Riah Attorneys and Solicitors

J. Extra-Curricular Activities: Advocacy, Research, Writing

K. Others

L. Names and Addresses of Referees:

1. Professor Kolapo Omidire, North-West University, Potchefstroom, South Africa.
2. Dr. Olanike Adelakun, Faculty of Law, Lead City University, Ibadan.

M. Date and Signature:

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