



THE PLACE OF PETROLEUM IN ENERGY TRANSITION IN NIGERIA

Eduardo G Pereira¹, Ngozi Chinwa Ole², Lilian Adat³, Temiloluwa Omidiji⁴, and Adefisayo Oyedeji⁵

1. Professor at the Siberian Federal University and Research Fellow at the University of São Paulo. For Further Details, Contact: www.eduardogpereira.com.
2. Consultant (Director), Alliance Law Firm/ Associate Professor of Law, Christopher University, Mowe, Nigeria. Email: olengozi@gmail.com.
3. Senior Associate, Alliance Law Firm, Lagos State.
4. Law Librarian, Faculty of Law, Redeemers University, Nigeria.
5. Lecturer, Faculty of Law, Federal University, Oye-Ekiti.

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Fossil fuels, which produce massive volumes of greenhouse gases (GHGs) that cause climate change and other major effects on our planet, are the foundation of the global energy mix. Renewable energy sources have been more prevalent in reducing climate impacts within the past 20 years. This study assesses the contribution of the petroleum and gas industry contribution to the energy transition in Nigeria, while taking energy policies and funding issues into account. It turns out that renewable energy sources and natural gas, a more ecologically friendly fossil fuel, cannot provide all of the demand. Additionally, there are intrinsic prospects for the LNG industry to grow and for energy consumption to rise. Accordingly, natural gas will serve as a bridging fuel during the switch to greener energy sources. Therefore, completely abandoning petroleum and gas during this transition could be detrimental because the petroleum and gas industry possesses the expertise and infrastructure necessary for large-scale energy projects.

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1. INTRODUCTION

The next generation of energy could depend more on renewable energy sources like solar and wind power if there will be a shift toward sustainable energy.¹ This is due to anticipations that transitioning to a decarbonised and sustainable energy system will be essential to reversing the adverse effects of global warming, security, well-being, and sustainable development.² The agenda for sustainable development seeks to accomplish many goals, including promotion of sustainable economic growth, affordable and reliable energy access, availability and sustainable management of water resources, food security, and actions to combat climate change.³ Thus, it is important to understand that climate change, the increasing temperature of the earth's surface and its interrelated structures pose tremendous difficulties to humanity. The primary cause of these occurrences is high human energy consumption, particularly of fossil fuels like coal and crude oil, which cannot be outrightly stopped since energy is a necessary component of all human activity. Energy use has become inevitable in today's world. Consequently, present initiatives are focused on developing clean, renewable energy sources and reducing or eliminating consumption of traditional fossil fuels.⁴ Globally, the transition to a low-carbon economy is still in progression⁵ as an increasing number of policies are been made as well as actions being taken in this regard. Major concerns bothering on the transitioning process includes, the length of time required and associated cost for the process. The aim of transitioning to a low-carbon economy is backed by the ratification of the 2015 COP 21 Paris Agreement by 193 countries.⁶ Due to the increasing complexity in energy system and models, energy systems are frequently required to envision potential routes to identifying the effects of this transition.⁷ Therefore, it is crucial to ascertain the appropriate degree and condition in which people are willing to accept and adopt renewable energy sources to achieve a sustainable energy transition.⁸ To meet the energy needs of people and households worldwide, the overall energy demand must be decreased, at least in developed nations. Doing so will

¹ J. Huber, 'Towards Industrial Ecology: Sustainable Development as a Concept of Ecological Modernization' (2000) 2 J. Environ. Policy Plan 269–285.

² A. Checchi, 'IOGP Global Production Report 2019 and Production Indicator' (2020) 60(2) The APPEA Journal 417–420.

³ J. Tovar-Facio, and others, 'Sustainable Energy Transition: Modeling and Optimization' (2021) 31 Current Opinion in Chemical Engineering.

⁴ L. M. Thong and T. V. Hiép, 'Vietnam's Energy Transition To 2050: Is Importing Liquefied Natural Gas a Good Solution?' (2023) 16 (5) The Journal of World Energy Law & Business 414–424.

⁵ R. J. Heffron, *Achieving a Just Transition to a Low-Carbon Economy* (1st edn, Springer 2021).

⁶ United Nations, 'The Paris Agreement' (2023) <<https://www.un.org/en/climatechange/paris-agreement>> accessed 17 June 2024.

⁷ T. Horschig and D. Thrän, 'Are Decisions Well Supported for the Energy Transition? A Review on Modelling Approaches for Renewable Energy Policy Evaluation' (2017) 7 (5) Energy, Sustainability and Society 1–14.

⁸ J. Huber, 'Towards Industrial Ecology: Sustainable Development as a Concept of Ecological Modernization' (2000) 2 (4) J. Environ. Policy Plan 269–285.

encourage people to make energy-efficient investments by modernizing their homes and buying energy-efficient appliances, as well as assist in controlling their daily energy consumption.⁹ Attempting to lower CO₂ emissions would require a switch from fossil fuels to renewable energy sources, a process known as energy transition. This transition would on one hand require a set of adjustments to energy production, distribution, and consumption practices in order to eliminate greenhouse gas (GHG) emissions;¹⁰

Nigeria currently has one of the highest levels of energy poverty in the world. One-third of homes do not have access to power, and biomass and waste are the predominant sources of energy for cooking, particularly in rural areas.¹¹ In contrast, Nigeria has one of the highest electricity rates in the world, with an average of US\$0.52/kwh. This is owing to the widespread use and expensive cost of diesel generators, estimated between twenty to thirty million active diesel generators in the nation. According to a new analysis by Sustainable Energy for All (SEforALL), Nigerians spend an astounding \$10 billion each year on petrol and generator maintenance. This expensive expenditure demonstrates the country's reliance on fossil fuels for energy generation, despite substantial obstacles and environmental concerns.¹² In spite of being Africa's greatest oil producer, Nigeria's oil refineries are in such poor condition that fuel must be imported, raising the cost of producing energy. Generators powered by diesel are used by industrial, commercial, and residential customers because the nation's electrical infrastructure is in poor condition. Due to unreliable gas supply and completely inadequate distribution and transmission facilities, the daily average electricity generated is just between 4 to 5GW, even though the installed generating capacity is 12.5GW, of which about 80% is gas fuelled and the remaining portion is hydropower. When the Federal Government of Nigeria ("FGN") presented its Energy Transition Plan at COP26 and the UN General Assembly on High Level Dialogue on Energy in September 2021, it said that more than US\$400 billion would need to be invested throughout the Nigerian economy (above and beyond business-as-usual spending) in order for Nigeria to reach its net-zero goal by 2060. The total amount needed for generating capacity is US\$155 billion, followed by US\$135 billion for transmission and distribution infrastructure, US\$79 billion for buildings, US\$21 billion for industry, and

⁹ Ibid.

¹⁰ Repsol, 'Green Valley with Windmills Energy Transition Reduce Emissions and Turn Them into Energy' (Repsol, 2024) <<https://www.repsol.com/en/energy-and-the-future/future-of-the-world/what-is-the-energy-transition/index.cshtml>> accessed 8 May 2024.

¹¹ A. P. Ifegbesan, 'Nigerian Households' Cooking Energy Use, Determinant of Choice and Some Implications for Human Health and Environmental Sustainability' (2016) 55 *Habitat International* 17-24 <<https://www.sciencedirect.com/science/article/abs/pii/S0197397515300503>> accessed 20 October 2024.

¹² A. Ibrahim and F. Esifiho, 'Nigerians Spend \$10bn Annually on Petrol, Generator Maintenance- Report' (Business Day 2024) <<https://businessday.ng/business-economy/article/nigerians-spend-10bn-annually-on-petrol-generator-maintenance-report/>> accessed 20 October 2024.

US\$12 billion for transportation.¹³ Along with enacting laws to address energy transition and climate change, the FGN has implemented a number of reforms to the oil and gas and power industries in support of this ambitious strategy.¹⁴

Principally, the underlying foundation for this proposition of this paper is that the oil and gas sector providing around 60% of the world's energy, it is still a vital part of the global energy mix. The industry has chances to improve efficiency and lessen its environmental effect through technical innovation, even though it faces considerable hurdles connected to energy price instability and environmental concerns. The oil and gas sector is contributing significantly to the energy transition by generating the cheap, dependable energy required to enable equitable growth and better living circumstances for all, while reducing emissions to support a net-zero society.¹⁵ Since natural gas burns cleaner than coal or oil for producing power, it has become more popular in the last few decades across all economic sectors. Natural gas is frequently seen as a bridge fuel towards a low carbon energy system. With the development of technologies to liquefy natural gas (LNG) for transportation, the transition to LNG is becoming more commonplace. Nigeria possesses one of Africa's greatest natural gas deposits. It has the ability to utilise LNG and, consequently, L-CNG, or liquefied compressed natural gas. These fuels have enormous potential as more economical, ecologically friendly, and clean energy sources. This fuel source can help the transportation industry. The local economy, which is mostly dependent on conventional fossil fuels like petrol and diesel, can benefit greatly from it.¹⁶

The remaining part of the article is organised as follows: Section 2 offers a summary of drivers of energy transition and the implication for the Nigerian petroleum and gas industry. Section 3 discusses the potential contributions of the Nigerian petroleum and gas industry to the transition. Section 4 examines the legal gaps that may hinder the Nigerian extractive industry from maximising its contributions and comparative advantage during the transition. This article makes recommendations and concludes with Section 5.

¹³ B. S. Dokubo, 'Nigeria: Energy Transition (Gas)' (LinkedIn 2022) <<https://www.linkedin.com/pulse/nigeria-energy-transition-gas-boma-dokubo/>> accessed 23 October 2024.

¹⁴ Nigeria Energy Transition Plan, 'Nigeria Energy Transition Plan' <<https://www.energytransition.gov.ng/implementation/>> accessed 23 October 2024.

¹⁵ L Bennett, 'The Role of Oil and Gas in the Global Energy Mix' <<https://www.linkedin.com/pulse/role-oil-gas-global-energy-mix-luke-bennett/>> accessed 8 September 2024.

¹⁶ C. Alozie and others, 'Road to Decarbonisation: The Role of Liquefied Natural Gas (LNG) as a Transitioning Energy Source for Transportation in Nigeria' [2024] SPE Annual International Conference and Exhibition, Lagos, Nigeria (OnePetro 2024) <<https://onepetro.org/SPENAIC/proceedings-abstract/24NAIC/24NAIC/D031S018R001/547900>> accessed 20 October 2024.

2. TRANSITION TO LOW CARBON ENERGY IN NIGERIA

2.1 Methodology

The main forces behind the global energy shift in Nigeria are profiled in this section along with its ramifications. The technique used in this study is predicated on an examination of the extent of policies, programs and knowledge regarding energy transition in the Nigerian petroleum and gas sector. This has made it possible to draw conclusions about the causes and effects of the global low-carbon energy transition as well as how Nigeria's existing policies and initiatives could contribute to it. Additionally, because previous studies in the subject have adequately collated the consequences of the global energy transition for Nigeria's economic development, an analytical examination of published literature is employed.

2.2 Drivers of Energy Transition in Nigeria

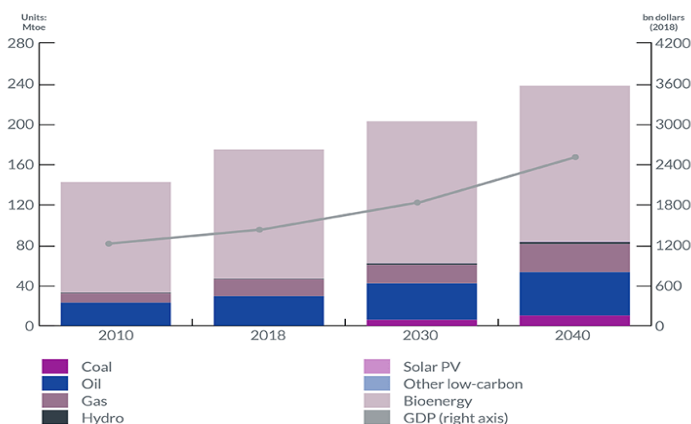
Nigeria submitted its initial Nationally Determined Contribution (NDC) in 2015 and an updated version in 2021 in response to the Paris Agreement. An NDC is a nation's goal to aid in emissions reduction and climate change adaptation. Every five years, each nation must submit and update its NDC. Nigeria is ranked 108th out of 120 countries on the World Economic Forum's Energy Transition Index (ETI). The ETI is a tool used by the international energy community to track national energy system performance. Nigeria's system performance scores have dropped by 1% over the past ten years, while the country's total ETI score has improved by 3%. Based on the Paris Agreement, the FGN unveiled its Energy Transition Plan (ETP) in August 2022 with the goal of addressing both energy poverty and climate change issues. The ETP lays out the energy transition pathways in major sectors of the country's economy, which contribute to 65 percent of total emissions. The main goals of the ETP are to: Provide universal access to electricity for all citizens; Encourage private sector participation and investments by creating substantial market opportunities in the energy transition process; and End poverty for over 100 million people by raising living standards.¹⁷

Two noteworthy power sector policies and initiatives implemented by the Federal Government of Nigeria (FGN) are the National Renewable Energy and Energy Efficiency Policy ("NREEEP"), which describes Nigeria's strategy to boost the use of renewable energy sources, and the Solar Power Naija initiative, which aims to electrify 5 million households and 25 million people using decentralised solar energy solutions. Nigeria's Renewable Energy Master Plan ("REMP") also aims to raise the country's share of renewable electricity from 13% in 2015 to 36% throughout 2030.¹⁸ Supported

¹⁷ EMRC, 'What Does the Energy Transition Mean for Nigerians' <<https://www.energymrc.ng/what-does-the-energy-transition-mean-for-nigeria/>> accessed 25 October 2024.

¹⁸ Ashurst, 'Nigeria's Energy Transition' (Ashurst March 2022) <<https://www.ashurst.com/en/insights/nigerias-energy-transition/>> accessed 23 October 2024.

by the World Bank, African Development Bank, and Africa Growing Together Fund, this is a significant first step towards reducing Nigeria's energy deficit by 2030. The FGN and other state actors, such as the Nigerian National Petroleum Corporation (NNPC), have underlined the importance of gas and the possibility that Nigeria's energy transition and net-zero path could be jeopardised by a lack of international funding in a number of forums, including COP26. They have also emphasised how crucial it is to acknowledge gas' crucial role as the transition fuel and how developed nations and global energy corporations must support gas's status as a "clean fuel" in the FGN's Energy Transition Plan. The difficulties Nigeria has in transitioning from bioenergy and fossil fuels to a balance with renewables are depicted in the most recent forecasts from the International Energy Agency ("IEA").¹⁹



I. The Reform of the Gas Sector

The FGN is committed to developing Nigeria's gas reserves in order to support the country's economic growth. President Buhari's "Decade of Gas" declaration has been supported by substantial legislative reform and the implementation of gas-centric policies in an attempt to attract both foreign and domestic investment in the gas sector. These policies are based on the Petroleum Industry Act 2021 (PIA).

a. Enactment of the Petroleum Industry Act 2021: Regarding gas, the PIA incorporates several significant modifications to earlier oil and gas laws, such as the Petroleum Act 1969. Among the fundamental measures are: New petroleum concessions that acknowledge that gas is being used in addition to oil. A fund is created to encourage private sector investment in the midstream and downstream gas projects

¹⁹ International Energy Agency, 'Net Zero by 2050' (IEA 2021) <<https://www.iea.org/reports/net-zero-by-2050>> accessed 14 June 2024.

is the Midstream and Downstream Gas Infrastructure Fund;²⁰ Licenses to operate gas: granting permits tailored to gas operations in the midstream and downstream regions.²¹ The law introduces a hydrocarbon tax that offers particular exemptions for gas processing, natural gas liquids ("NGLs"), non-associated gas ("NAG"), and certain associated gas ("AG"). also, there are allowable expenses for taxation and deduction for gas reinjection well expenses.²² Royalties for natural gas and NGLs will only be determined on production, the Royalty rates will be based on output, natural gas and NGLs will be distributed at a rate of 5% and 2.5%, respectively, for domestically generated and used natural gas.²³ Pricing formula for gas and gas industries formula is also provided, offering a structure for determining the minimum price of gas for commercial, gas-based, and power sectors; and Domestic petrol price revision.²⁴ In order to enable more competitive pricing that reflects the state of the market, the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA or the Authority) will evaluate the domestic base price. A three-year initial tax-free period (which can be extended by two more years) or, alternatively, a 35% additional investment allowance or tax-free dividends during the tax-free period provided by the Nigerian Companies Income Tax Act ("CITA") are among the other tax incentives at maintained under the PIA. Furthermore, there are also tax credit incentives that are available to NAG in greenfield developments whether located onshore and or shallow water where the first gas is produced before January 1st, 2029, if the content of the Hydrocarbon Liquids (HCL) is not above 30 barrels per million standard cubic feet (SCF) amongst others.²⁵

b. The Nigerian National Gas Policy of 2017: The goal of the National Gas Policy ("NGP"), which took the place of the Gas Master Plan of 2008, is to transition Nigeria from an oil-based economy to an industrial one based on both oil and gas. The NGP's guiding principles include maximising the value of Nigerian liquefied natural gas (NLNG), following a project-based strategy to domestic gas development as opposed to a centrally planned one, and forging close ties across the economy's power, agricultural, transportation, and industrial sectors. The objectives of the NCP include: governance, industry structure, development of gas resources, development of gas infrastructure, building gas markets, developing national human resources and setting a timeline action plan to achieve the gas policy roadmap.²⁶

²⁰ PIA 2021, s 51.

²¹ PIA 2021, Cap 2 Part IV.

²² PIA 2021, Cap 4, Part II.

²³ PIA 2021, Seventh Schedule.

²⁴ PIA 2021, Fourth Schedule.

²⁵ Oil and Gas Companies (Tax Incentives, Exemption Remission, etc.) Order, 2024.

²⁶ Banwo & Ighodalo, 'Synopsis of the 2017 National Gas Policy' <<https://banwo-ighodalo.com/assets/resources/07f626c12fbf7095122004ad5eaa137e.pdf>> accessed 20 October 2024.

c. Flare Gas Regulations:²⁷ Eliminating gas flaring through gas utilisation projects is a key component of Nigeria's comprehensive strategy to increase its energy efficiency and fulfil its commitments under the Paris Agreement. An essential regulatory step in accomplishing was the formulation of the Flare Gas (Prevention of Waste and Pollution) Regulations of 2018. Reduced environmental and social impact from natural gas flaring, environmental protection, preventing natural resource waste, and generating social and economic advantages from gas flare capture are the goals of the Regulations.²⁸ It also transfers ownership of FGN at no cost and without royalty payments.²⁹ This regulations was made pursuant to the section 9 of Petroleum Act 1969 and section 5 of the repealed Associated Gas Reinjection Act 1979. It should be mentioned, nonetheless, that the FGN halted the Gas Flaring Regulation's implementation and the flared AG processing licence sale in 2021 because of funding and legal issues.³⁰

d. National Gas Expansion Programme (NGEP): Another gas-focused project is the NGEP introduced in 2020, which aims to make liquid petroleum gas (LPG) the preferred fuel for home cooking, captive electricity and small industrial complexes, and compressed natural gas (CNG) the preferred fuel for transportation.³¹ The Central Bank of Nigeria launched a 250 billion (about US\$60 million) intervention facility to support the NGEP and encourage investment in the gas value chain. The intervention facility's goals are to: Increase financing availability for private sector investments, Encourage the construction of gas infrastructure to maximise the usage of gas for economic growth. Accelerate CNG and LPG development and utilisation, accelerate the growth of gas-based industries, Give the private sector power to invest in the domestic gas market. Currently, at the federal level, Femadec Group, a CNG transport business, have inked a deal for Abuja's civil service mass transit vehicles to run on CNG, as stated by the Ministry of Petroleum Resources, and the first 20 of these buses were just introduced, and by 2023, another 200–500 will be available. Furthermore, a memorandum of understanding (MoU) on a CNG bus conversion plan for the Lagos states Bus Rapid Transport System (BRT) has been signed between Oando and Lagos State at the subnational level. The conversions of the first batch have started. Additionally, the CNG vehicle firm Omaa and the Road Transport Employers Association of Nigeria (RTEAN) have inked a deal for the purchase of 2,300 locally built buses. Overall, between 3,000 and 4,000 new CNG buses ought to be operating

²⁷ NUPRC, 'Flare Gas (Prevention of Waste and Pollution) Regulations of 2018' <<https://www.nuprc.gov.ng/wp-content/uploads/2020/06/Flare-Gas-Prevention-of-Waste-Pollution-Regulations-2018.pdf>> accessed 20 October 2024.

²⁸ Flare Gas Regulations 2018, Reg 1.

²⁹ Reg 2(1) of the Regulation; IEA 50, 'Flare Gas (Prevention of Waste and Pollution) Regulations 2018' (IEA 50 2022) <<https://www.iea.org/policies/8675-flare-gas-prevention-of-waste-and-pollution-regulations-2018>> accessed 22 October 2024.

³⁰ Ashurst (n18).

³¹ OPEC Bulletin, 'Nigeria and OPEC: 50 Years of Partnership' <https://www.opec.org/opec_web/flipbook/OB06072021/> accessed 19 October 2024.

on Nigerian roads by the end of the year. This will be on top of the more than 8,000 cars that are now in use nationwide.³²

e. Nigeria's Climate Change Reform: The long-term role that petrol will continue to play in the world's energy supply should not be overlooked in the development and use of petrol as a transition fuel towards the goal of net-zero emissions. Gas consumption rises dramatically in all of the global energy scenarios that the IEA models in its World Energy Outlook 2021. By 2050, half of the gas utilised will be used to create low-carbon hydrogen, and 70% of gas will be used in facilities that have carbon capture, utilisation, and storage (or "CCUS"). The IEA predicts that the use of CCUS technology will rise from around 40 million tonnes of CO₂ captured annually in 2020 to approximately 1.6 gigatons of CO₂ annually by 2030 and 7.6 gigatons of CO₂ by 2050. CCUS has been acknowledged by the FGN as a crucial technology to help Nigeria achieve its climate goals and promote its energy transformation. In addition to supporting the long-term growth and usage of gas, CCUS can serve as a catalyst for the industrial sector's decarbonisation and the creation of new gas applications, such as the manufacture of low-carbon hydrogen. A framework for attaining low greenhouse gas emissions while fostering sustainable economic growth is the main objective of the Climate Change Act 2021 (CCA). Nigeria's updated climate change policy, which is overseen by the Department of Climate Change within the Department of Environment, is reflected in the CCA. Nigeria has acknowledged its international commitment to fight climate change, which is shown in its growing use of its gas reserves. A framework for attaining low greenhouse gas emissions while fostering sustainable economic growth is the main objective of the CCA.³³ Nigeria's updated climate change policy, which is overseen by the National Council of Climate Change within the Department of Environment, is reflected in the CCA.³⁴

II. Nigeria's Energy Transition: Gas

The years 2021–2030 have been declared the "Decade of Gas." The FGN's goals are to: develop shallow water offshore gas reserves; transport gas from the Niger Delta to the central and northern states; exploit AG and NAG reserves; and establish a gas-based economy powered by policies and projects funded by the public and private sectors.³⁵ Natural gas's adaptability is essential to its anticipated significant contribution to the energy shift, since it may be used as a source of energy for a variety of purposes, such as industrial uses, power generation, heating, and cooking. Given Nigeria's vast gas deposits and the need for quick scaling up of energy systems, the Nigeria Energy

³² Nairametrics, 'National Gas Expansion Programme (NGEP) is Still Ongoing Despite Paltry N18.26 Million Budget' <<https://nairametrics.com/2022/10/14/national-gas-expansion-programme-ngep-is-still-ongoing-despite-paltry-n18-26-million-budget/>> accessed 20 October 2024.

³³ CCA 2021, s 1.

³⁴ CCA 2021, Part II.

³⁵ Nigeria International Energy Summit, 'The Decade of Gas' <<https://nigeriaenergysummit.com/the-decade-of-gas/>> accessed 19 October 2024.

Transition Plan (NETP) acknowledges natural gas as a vital weapon in the battle against energy poverty. Nigeria's energy transition is best suited for natural gas since it can supply a steady, adaptable energy supply when combined with sporadic output from solar and wind. This allows for the development of new energy pathways and the scaling up of storage technologies, especially for hydrogen.³⁶

a. Gas Reserves: About 37% of Africa's total proven gas reserves are found in the Niger Delta, both onshore and offshore. There are ~201Tcf of proven reserves, of which ~102Tcf is AG and ~99Tcf is NAG. An extra 600Tcf of untested gas resources exist. Nigeria's domestic gas market has historically been underdeveloped, with the majority of gas being flared, re-injected to improve oil recovery, and exported as LNG and GTL (gas-to-liquids). It exported over 29.7 billion standard cubic meters of natural gas in 2022.³⁷

b. Gas Production: The gas-to-oil ratio is high in most oil fields. The IOCs continue to be the primary producers of AG and NAG, but local E&P firms are playing a bigger role. Seplat, ND Western, and FIRST E&P are just a few of the enterprises that are concentrating on developing gas for domestic use, both onshore and in shallow sea OMLs. In 2020, the average daily gas output was 7,461 mmscfd, and it was distributed as follows among JVs, PSCs, and NPDC:

	JV	pscs	npdc
Gas Vol (mmscfd)	5,346	1,551	831
% of Total	69%	20%	11%

³⁶ Templars, 'Nigeria's Energy Transition Plan: A Journey Towards Equity, Fairness and Inclusion' <<https://www.templars-law.com/app/uploads/2022/10/Nigerias-Energy-Transition-Plan-.pdf>> accessed 20 October 2024.

³⁷ Statista, 'Proved Natural Gas Reserves in Nigeria from 2011 to 2023' <<https://www.statista.com/statistics/1387331/proved-natural-gas-reserves-in-nigeria/>> accessed 23 October 2024.

Source: NNPC Monthly Operations Report Sept 2020³⁸

c. **Gas Projects:** In July 2018, NNPC approved seven critical gas development projects, which constitute a key component of the FGN's gas policy. When the projects are finished, they will have a big impact on how gas is processed, transported, and used domestically, particularly in businesses that rely on gas for power production. Nigeria's economic transition from one reliant on oil exports (which account for 70% of government revenue) to an industrial economy centred on petrol is outlined in the NGP. This is essential for Nigeria's future economic growth as well as for supplying its fast-expanding population with dependable and reasonably priced gas and power.³⁹ The following factors are crucial to the development and commercialisation of gas for home use: tax breaks for gas projects, application of the NGP's and the PIA's gas clauses, Major East-West and East-Central-North gas trunklines are either being built or are scheduled to be constructed, sustained commercial rivalry in the price of petrol, increased availability and output of CNG and LPG, AG and NAG use in household settings.

Nigeria must keep developing and using gas as it moves closer to its goal of net zero emissions by 2060, even if renewable energy — mostly solar — will have an influence in the long run, particularly through micro-grids. In Nigeria, the main energy sources are biomass and garbage, particularly for cooking, which has a major negative influence on the environment due to rising carbon emissions and deforestation.⁴⁰

2.3 Implication of Energy Transition for the Petroleum Industry

Although the Nigerian government has implemented policies, plans, and regulations over the years to promote the drive towards renewable energy, such as the 2009 Draft Renewable Electricity Policy, Renewable Energy Master Plan 2012, the National Energy Policy 2013, and the Draft National Energy Master Plan (NEMP) 2014, among others, these policy documents have, in many respects, failed to turn the country's energy sector in the right direction.⁴¹ The Nigeria Energy Transition Plan, or "The Plan," was introduced by the Nigerian government in August 2022 in an effort to reassert the country's commitment to renewable energy. "A homegrown, data-backed,

³⁸ Edcliff Energy Advisors, 'Nigeria's Energy Transition Challenges and Opportunities in the Utilisation of Gas as a Transition Fuel' (Redcliff 2022) <<https://redcliffenergy.com/wp-content/uploads/2022/03/Nigerias-Energy-Transition.pdf>> accessed 20 October 2024.

³⁹ Vanguard, 'Nigeria Signs Agreement for Seven Critical Gas Projects' *Vanguard* (2018) <https://www.vanguardngr.com/2018/07/nnpc-signs-agreement-for-seven-critical-gas-projects/#google_vignette> accessed 20 October 2024.

⁴⁰ C. C. Okafor and others, 'Biomass Utilisation for Energy Production in Nigeria: A Review' (2022) 3 *Cleaner Energy Systems* <<https://www.sciencedirect.com/science/article/pii/S2772783122000413>> accessed 20 October 2024.

⁴¹ E. Bassey and I. Oyemade, 'Energy Transition And The Future of Oil in Nigeria' (*Mondaq* 2022) <<https://www.mondaq.com/nigeria/renewables/1261952/energy-transition-and-the-future-of-oil-in-nigeria>> accessed 23 October 2024.

multi-pronged energy transition plan," the plan aims to get Nigeria closer to achieving net-zero emissions in five crucial areas by 2060: power, cooking, oil and gas, transportation, and industry.⁴² Nigeria plans to use natural gas as a springboard to move away from crude oil and towards a less carbon-intensive economy that is fuelled more and more by natural gas in the near future. Natural gas is predicted to eventually surpass crude oil as Nigeria's primary revenue source, laying the groundwork for a dependable electrical supply and a cleaner environment. Wind, water, biomass, and solar energy will eventually dominate the nation's energy mix.⁴³ Nigeria will eventually follow the rest of the globe in creating a hydrogen economy and utilising the enormous amount of energy that is contained in the Earth's crust and seas.⁴⁴ Nigeria is expected to require at least \$10 billion to launch the Plan and \$410 billion to complete the transition by 2060.⁴⁵ It is anticipated that foreign investment will hasten Nigeria's net-zero goals and generate a number of employment opportunities in the renewable energy industry. The demand for oil is expected to progressively fall but the need for petrol will continue to grow until the mid-2030s, despite the fact that there is little doubt that there won't be an immediate switch from fossil fuels to renewable energy sources.⁴⁶ The oil and gas sectors will remain essential to the Nigerian economy for the foreseeable future. Nigeria must, however, develop specific policies to mitigate the short- and long-term impacts of the transition process on government revenue. Using natural gas as a transition energy is a wonderful place to start. However, that will only be beneficial as long as natural gas is still the primary energy source for the rest of the world. The majority of the industrialised world's energy transition plans do not call for a sustained reliance on natural gas as a source of energy, which always predicts that natural gas may not be commercially viable in the long run. In order to lessen the nation's reliance on revenue generated from the exploitation of non-renewable energy sources in the oil and gas industry since the 1970s, it is implied that both the country's energy mix and its revenue sources need to be diversified.⁴⁷ Some barriers to the energy transition include: energy politics, funding for infrastructure and gas development, utilisation and implementation of policies, interagency and regulatory synergy, innovation and technology, security of

⁴² T. Oluwatola, 'Analysis: Nigeria's Energy Transition Plan: Challenges for Decade of Gas' *Premium Times* (2022) <<https://www.premiumtimesng.com/news/headlines/553662-analysis-nigerias-energy-transition-plan-challenges-for-decade-of-gas.html>> accessed 24 October 2024.

⁴³ S. Nadig, 'Nigeria launches energy transition plan, including doubling of gas' (*Offshore Technology*, 2022) <<https://www.offshore-technology.com/news/nigeria-launches-energy-transition-plan-including-doubling-of-gas/>> accessed 22 October 2024.

⁴⁴ A. Sambo and others, 'Implementation of Energy Plans: A Solution to Nigeria's Energy Crisis', <https://www.researchgate.net/publication/321342659_IMPLEMENTATION_OF_ENERGY_PLAN_S_A_SOLUTION_TO_NIGERIA%27S_ENERGY_CRISIS> accessed 22 October 2024.

⁴⁵ T. Daka, 'Osinbajo leads energy mission to USA, meets Kamala Harris, W'Bank Group Seeks \$410b to Deliver Transition Plan' *The Guardian* (2022) <<https://guardian.ng/news/osinbajo-leads-energy-mission-to-usa-meets-kamala-harris-wbank-group-seeks-410b-to-deliver-transition-plan/>> accessed 22 October 2024.

⁴⁶ Ibid.

⁴⁷ National Bureau of Statistics, 'Annual Abstract of Statistics, 2019' <<https://nigerianstat.gov.ng/elibrary/read/1241069>> accessed 24 October 2024.

assets related to oil and gas, halt of production as a result of pipeline integrity problems and oil theft, PIA transition and Climate Change Act 2021 implementation, High export petrol volumes relative to domestic sales.⁴⁸

a. Cost of the Transitioning: According to the IEA, Nigeria will need to invest US\$445 billion on its energy supply overall by 2040, with the oil and gas industry accounting for 80% of that total.⁴⁹ As banks, multilateral lenders, and investors shift funds from fossil fuels to renewable energy sources, financing oil and gas projects is getting increasingly complex. The international adoption of net zero carbon targets and the pledges made by several nations and financial institutions to cease funding fossil fuel projects during COP26 are creating serious challenges for Nigeria as it attempts to strike a balance between the need to continue developing its oil reserves for revenue generation and the development of petrol as a transition fuel.⁵⁰ The attitude towards natural gas must be examined from the perspectives of energy access and energy poverty because cutting off capital in energy infrastructure will not lead to a just energy transition. As a result, creative finance arrangements are required to draw in funds from both conventional and unconventional sources and give project sponsors financial flexibility.⁵¹

b. Safety Regulations: Another significant area of government responsibility, in collaboration with EV, LPG, and CNG producers, vehicle converters, and OEMs (Original equipment manufacture), is technical and safety requirements. Harmonised operating standards must be established and enforced by the government for all facets of alternative fuel distribution and vehicle equipment, including installation. Low-quality conversions might compromise engine and emission performance and endanger the market's ability to grow sustainably. Everywhere, safety ought to be the top priority for legislators. It is necessary to ensure fuel suppliers and end users that there are no safety hazards associated with the handling, storage, and transportation of auto petrol. However, an unbiased evaluation of risk must serve as the foundation for the creation and application of safety rules unique to auto petrol.⁵²

⁴⁸ NUPRC, 'Oil & Gas Industry in Nigeria and the Quest for Energy Transition' (NUPRC 2022) <[https://www.energy.gov.ng/papers/NES%202022%20NUPRC%20_Oil%20and%20Gas%20Industry%20\(Nigeria\)%20Quest%20for%20Energy%20Transition.pdf](https://www.energy.gov.ng/papers/NES%202022%20NUPRC%20_Oil%20and%20Gas%20Industry%20(Nigeria)%20Quest%20for%20Energy%20Transition.pdf)> accessed 25 October 2024.

⁴⁹ National Daily Newspaper, 'Energy Transition, Oil Theft and Nigerian Economy' *National Daily* (2022) <<https://nationaldailyng.com/energy-transition-oil-theft-and-nigerian-economy/>> accessed 20 October 2024.

⁵⁰ Council on Foreign Relations, 'COP26: Here's What Countries Pledged' <<https://www.cfr.org/in-brief/cop26-heres-what-countries-have-pledged>> accessed 20 October 2024.

⁵¹ Nigeria Energy, 'The Role of Gas in Nigeria's Energy Transition' <<https://www.nigeria-energy.com/content/dam/markets/emea/nigeria-energy/en/2023/docs/NE24-Role-of-Gas-Nigeria-Energy-Transition.pdf>> accessed 24 October 2024.

⁵² W. Musa, 'Nigeria Needs Right Procedures for Safe, Sustainable CNG Adoption' *The Guardian* (2024) <<https://guardian.ng/energy/nigeria-needs-right-procedures-for-safe-sustainable-cng-adoption/>> accessed 24 October 2024.

c. Challenges of Financing Gas Projects: Sponsors of oil and gas projects face a number of obstacles that make planning and completing funding difficult, including: Several domestic E&P (exploration and production) businesses have excessive leverage and limited domestic bank liquidity. International lenders' and investors' retreat due to sponsor liquidity concerns, onshore operational risks in the Niger Delta, and ESG credit policies.⁵³ It is impossible to overstate the difficulties independent E&P firms face when trying to purchase properties being sold by the IOCs, yet clearly defined and bankable structures, in conjunction with reputable and well-established sponsors, will draw in and be able to organise funds for acquisition and development. Furthermore, the implementation of significant gas infrastructure projects, and the shift to bankable contractual frameworks for gas are some of the ways that these issues have been and are being handled. The FGN, project sponsors, and capital providers must collaborate closely to identify, distribute, and mitigate the complex risks and issues that affect major gas projects in order to successfully raise the capital needed to fully utilise gas as the transitional fuel and meet Nigeria's long-term energy goals.

3. POTENTIAL CONTRIBUTIONS OF THE NIGERIAN PETROLEUM INDUSTRY TO THE TRANSITION

Nigeria's journey to a carbon neutral future will require public and private initiatives as well as a collective effort to deliver on the objectives. These includes the initiatives put in place by both the Nigerian government and other key players in the Nigerian petroleum and gas industry.

Some of ongoing initiatives by the FGN include the following:

a. Solar Programmes by Rural Electrification Agency (REA): With financial assistance from the World Bank, Nigeria formed the Rural Electrification Agency (REA) to carry out its solar electrification strategy. Through both off-grid and on-grid electrification solutions, REA was tasked with implementing a "quick and economical expansion of electricity access in un-electrified rural areas evenly across the different geopolitical zones in Nigeria." The World Bank provides \$350 million for the REA initiative, of which \$150 million is allocated for small grids. Targeting 200,000 families and 50,000 SMEs, the focus will be on solar small grids (less than 1MW) and solar residential systems which will all be put into practice using a market-based strategy.⁵⁴

b. Clean Cooking Stoves: This program is one of the main initiatives launched by the Nigerian government as part of its commitment to enhance energy availability in

⁵³ I. Anyaogu, 'Gas Project Lenders, Sponsors Must Use Right Structure' *Business Day* (2021) <<https://businessday.ng/energy/oilandgas/article/gas-project-lenders-sponsors-must-use-right-structure-mama/>> accessed 22 October 2024.

⁵⁴ Rural Electrification Agency, 'Catalysing the Off Grid Market to Increase Access to Rural and Underserved Communities Through Public & Private Sector Engagement' <<https://rea.gov.ng/>> accessed 25 October 2024.

Nigeria and lessen dependency on kerosene and wood for cooking. The Nigerian Alliance for Clean Cookstoves is creating and managing the initiative. Important Points: § More than 160,000 stoves (ethanol and smokeless) were sold. Ethanol cooking fuel production and sales totalled 800,000 litres; the next phase is expected to benefit 10 million people over five years.⁵⁵

Private Sector Initiatives

a. Seplat Energy: As it launches its energy transformation program, which will be carried out by its New Energy Unit, Seplat Energy, one of Nigeria's development partners, is setting the standard for independent and oil companies doing business in the nation. The firm has changed its name to Seplat Energy Plc as a declaration of its commitment to the goal of "achieving carbon neutrality towards a sustainable future single most important hub for supply of gas into the AKK and ELPS. o ANOH Hub – FID taken on 300MMSCFD. Its processing facility links demand centres in the Western market and the newly developing Northern AKK-linked market to the extensive gas reserves in the Eastern gas grid. In order to bridge the infrastructure gap in the industry, it focus on the growth of the LPG and CNG fuel gas market channels as well as cylinder manufacturing. It supports the government's CNG and LPG policies. Development of the Electricity Market Plans to set up gas-to-power plants for both off-grid and on-grid generating. The Seplat new energy strategy is currently a template for oil companies, corporate organisations, and stakeholders to follow in order to complement government efforts and help deliver energy security and a place in the committee of nations attaining Carbon Neutrality by 2050 or beyond.⁵⁶

b. The Greenville LNG Model: Greenville LNG's Virtual Pipeline System is a creative way to address the issue of natural gas accessibility to hinterland areas that are not connected to the pipeline grid. The map below, which depicts LNG's accessibility to the northernmost regions, serves as an illustration of this paradigm. Until the AKK is finished and local distribution networks are established, this model serves as a stopgap solution for NG access and a foundation for the statewide rollout of the Natural Gas Vehicles program using L-CNG systems. This paradigm also makes off-grid power options possible.

⁵⁵ Seplat Energy Summit 2021, 'Hidden in Plain Sight Nigeria's Energy Transition' (*Seplat*, 2021) <<https://www.seplatenergy.com/media/03gkdkju/hidden-in-plain-sight-final-summit-with.pdf>> accessed 24 October 2024.

⁵⁶ *Ibid*

4. LEGAL GAPS THAT MAY HINDER THE NIGERIAN PETROLEUM INDUSTRY FROM MAXIMISING ITS CONTRIBUTIONS AND COMPARATIVE ADVANTAGE DURING THE TRANSITION

4.1 Legal and Regulatory Challenges

Nigeria's renewable energy growth is severely constrained by a number of legislative and regulatory obstacles.

1. Overlapping Functions: Nigeria's renewable energy growth is severely constrained by a number of legislative and regulatory obstacles. The insufficiency and inconsistency of the current legislative frameworks are among the main obstacles. Nigeria has put in place a number of laws and policies to support renewable energy, but these frequently don't match up with the more general rules governing the energy sector.⁵⁷ For example, overlapping requirements and conflicting laws make it difficult to implement the National Renewable Energy and Energy Efficiency Policy (NREEEP) and the Renewable Energy Master Plan (REMP), which both seek to enhance the contributions of renewable energy.

2. Lack of a Comprehensive Renewable Energy Law: Clear rules for the creation, funding, and implementation of renewable energy projects are not provided by any laws. The Electric Power Sector Reform Act (EPSRA) of 2005 and other current laws mainly aim to liberalise the power industry and promote private sector involvement, but they fall short in meeting the unique requirements of the development of renewable energy. The implementation and effective use of ecologically friendly renewable energy have been hampered by the absence of adequate legislation.⁵⁸ Thus, potential investors and project developers are frequently discouraged from entering the renewable energy sector by regulatory uncertainty resulting from this lack of precision.

3. Non-Effective Enforcement Mechanism: Although policies and regulations are in place, they are frequently not well enforced because of a lack of institutional ability and funding. Regulatory agencies like the Rural Electrification Agency (REA) and the Nigerian Electricity Regulatory Commission (NERC) are in charge of monitoring the

⁵⁷ Energy Commission of Nigeria, 'National Energy Masterplan 2022' <https://www.energy.gov.ng/Energy_Policies_Plan/APPROVED_NEMP_2022.pdf> accessed 25 October 2024.

⁵⁸ S. O. Daudu and S. O. Idehen, 'An Examination of the Implementation of Existing Policies on Renewable Energy in Nigeria: How Effective' <<https://www.scirp.org/journal/paperinformation?paperid=109470>> accessed 25 October 2024.

execution of renewable energy projects, but they usually lack the funding and expertise needed to carry out their duties efficiently.⁵⁹

4. Bureaucracy: Approval and execution of renewable energy projects are made more difficult by the regulatory environment's bureaucratic inefficiencies and procedural delays. It can take a long time to obtain the required licenses and approvals, involving several entities with overlapping jurisdictions⁶⁰ In addition to raising the expenses and risks of renewable energy projects, these delays deter investment and innovation in the field.

Nigeria must create a cohesive and all-encompassing legal framework that incorporates renewable energy policy with more general energy sector laws in order to overcome these legal and regulatory obstacles. Clear project development rules, streamlined regulatory procedures, and improved regulatory institutions' ability to enforce compliance are all goals of this framework. Nigeria can hasten the shift to a sustainable energy future and improve the climate for investments in renewable energy by doing this.⁶¹

4.2 Institutional Barriers

Nigeria's renewable energy growth is hindered by a number of institutional issues that make it difficult to scale and implement renewable energy projects.

1. Lack of Co-ordination Among Agencies: Inefficiencies and delays in project implementation are frequently caused by the overlapping duties and responsibilities of organisations like the Nigerian Electricity Regulatory Commission (NERC), the Rural Electrification Agency (REA), and the Energy Commission of Nigeria (ECN).⁶²

2. Lack of Expertise to Manage Renewable Energy Projects: Many of these organisations lack the manpower and funding needed to effectively fulfil their

⁵⁹ Energy Commission of Nigeria (n57).

⁶⁰ International Renewable Energy Agency, 'Renewable Energy and Jobs- Annual Review 2020' <<https://www.irena.org/publications/2020/Sep/Renewable-Energy-and-Jobs-Annual-Review-2020>> accessed 26 October 2024.

⁶¹ P. Onuh and others, 'Challenges and Opportunities in Nigeria's Renewable Energy Policy and Legislation' (2024) 23 (2) World Journal of Advance Research and Reviews. <https://www.researchgate.net/publication/383661742_Challenges_and_Opportunities_in_Nigeria's_Renewable_Energy_Policy_and_Legislation> accessed 25 October 2024.

⁶² O. J. Olujobi and others, 'Legal responses to Energy Security and Sustainability in Nigeria's Power Sector Amidst Fossil Fuel Disruptions and Low Carbon Energy Transition' (2023) 9(18) Heliyon <[https://www.cell.com/heliyon/fulltext/S2405-8440\(23\)05120-4?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2405844023051204%3Fshowall%3Dtrue](https://www.cell.com/heliyon/fulltext/S2405-8440(23)05120-4?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2405844023051204%3Fshowall%3Dtrue)> accessed 25 October 2024.

missions.⁶³ This lack of institutional ability makes it difficult to plan, carry out, and oversee renewable energy projects, which results in less than ideal results. Both domestic and foreign players are deterred from investing because of the existing legislative and regulatory environment's perceived instability and unpredictability.⁶⁴

3. Changes in Policies: For investors to commit to long-term renewable energy projects, a stable and encouraging regulatory environment is necessary. However, investors find it challenging to successfully plan and carry out projects due to the uncertainty created by the constant changes in laws and regulatory standards.

4. Corruption: Significant obstacles are presented by bureaucratic red tape and corruption in these institutions. Permitting and approving renewable energy projects is frequently a difficult process plagued by inefficient bureaucracy. This further discourages possible investors by raising the time and expense needed to build projects and providing opportunities for unethical behaviour.⁶⁵

For Nigeria's renewable energy sector to grow sustainably, several institutional issues must be resolved. Overcoming these obstacles requires strengthening regulatory bodies' capabilities, enhancing agency coordination, and creating a stable and open policy environment. The development of Nigeria's renewable energy sector can be facilitated by fortifying institutional frameworks and lowering administrative barriers.

5. RECOMMENDATIONS

1. Law Reform: To advance Nigeria's renewable energy industry, remove current obstacles, and foster an atmosphere that is favourable to investment and growth, legislative reforms are essential. Harmonising current renewable energy policies and regulations is one of the main topics for legislative reform. Confusion and inefficiencies are currently caused by overlapping and sometimes contradicting policies and laws.

⁶³ O. B. Adekoya and others, 'How Critical are Resource Rents, Agriculture, Growth and Renewable Energy to Environmental Degradation in Resource-rich African Countries? The Role of Institutional Policy' (2022) 164 *Energy Policy* <<https://www.sciencedirect.com/science/article/abs/pii/S0301421522001136?via%3Dihub>> accessed 26 October 2024.

⁶⁴ O. A. Mafimidiwo and A. K. Saha, 'The Challenges Of Sustainable Energy Development In Developing Nation - A Case Study Of Nigeria' <https://www.researchgate.net/profile/Akshay-Saha-2/publication/344172104_THE_CHALLENGES_OF_SUSTAINABLE_ENERGY_DEVELOPMENT_IN_DEVELOPING_NATION_-A_CASE_STUDY_OF_NIGERIA/links/5f588f3892851c250b9fe1e5/THE-CHALLENGES-OF-SUSTAINABLE-ENERGY-DEVELOPMENT-IN-DEVELOPING-NATION-A-CASE-STUDY-OF-NIGERIA.pdf> accessed 25 October 2024.

⁶⁵ A. O. Adewumi and O. B. Awodumi, 'Environmental Pollution, Energy Import, and Economic Growth: Evidence of Sustainable Growth in South Africa and Nigeria' <<https://link.springer.com/article/10.1007/s11356-020-11446-z>> accessed 25 October 2024.

Simplifying various rules into a single, coherent framework would improve policy implementation and give stakeholders more precise instructions.

2. Harmonisation of Renewable Energy Laws and Policies: All laws and regulations pertaining to the energy transition should be harmonised by the federal government, with distinct roles and duties for the pertinent government agencies specified. Establishing a unified and all-encompassing policy framework will lower regulatory ambiguities and promote an atmosphere that is more favourable for project development and investment. Furthermore, the policy must include methods for putting into practice the SPI and the transition preparedness enabling dimensions as stated in the WEF publications and described in this study.

3. Financing: To finance investments in grid infrastructure and technological innovation, creative funding options including public-private partnerships (PPPs) and carbon markets should be used. The ETP should also place a strong emphasis on programs meant to raise public awareness and rally support for the use of renewable energy. Furthermore, a plan for expanding oil production through cleaner exploration with a clear route to divestiture following adequate exploitation of the plentiful resources and within the net-zero target timetable is another suggestion. This will improve our energy transition performance and raise some of the funding required for the transition.

4. Public Awareness Campaigns: Civil society actors should increase public knowledge, encourage better openness, and hold the government more accountable. The public should be given access to statistics and information about the energy transition, and the media should question the government's energy transition strategy.

5. Technical Capacity: A concentrated effort should be made to increase the technical proficiency of industry players and regulatory agencies, in addition to promoting knowledge transfer through international partnerships, this entails offering training programs for staff members at important organisations like the Nigerian Electricity Regulatory Commission (NERC) and the Rural Electrification Agency (REA). These institutions will be better equipped to manage and assist renewable energy projects if their technical knowledge is strengthened.

6. Sustainable Business Environment: In order to encourage and maintain private sector involvement, a strong enabling environment must be established. In this regard, effective laws and market force incentives would be crucial for propelling Nigeria's economic expansion. This will necessitate constant communication between the public and commercial sectors as well as regulatory flexibility. To encourage more private sector investment in the renewable energy sector, financial incentives have to be improved. The financial burden on investors can be greatly decreased by putting in place strong feed-in tariffs, granting tax benefits, and offering subsidies for renewable energy projects. Furthermore, creating funds for renewable energy and providing

grants and low-interest loans can aid in filling the funding gap and promoting market expansion.

7. Improved Access to Energy: Nigeria continues to have difficulties in obtaining inexpensive, dependable energy for industrial and other use. Thus, Nigeria should use renewable energy sources to increase energy access as part of its short- and medium-term objectives.

8. Improved Energy Infrastructure: Integrating renewable energy sources into the national grid requires improving infrastructural development. It is essential to upgrade the current grid infrastructure in order to lower transmission losses and increase dependability.

5.1. CONCLUSION

Nigeria must continue to develop its substantial gas reserves and resources while simultaneously advancing the introduction of renewable energy sources, especially solar, at the local level, for instance by setting up micro-grids, if it hopes to advance and succeed in its energy transition plan. In order to move Nigeria from an oil-based economy to a diversified industrial economy that can both fulfil the requirements of its expanding population and meet the net-zero goals set forth at COP26, petrol will undoubtedly play a role as the transition fuel. To exploit the economic and environmental benefits of Nigerian gas, technological solutions and financial innovation are needed to address the considerable problems and opportunities brought about by the concentration on gas. Creating gas-based solutions, such as LPG and CNG, would help advance gas-based industries and address the nation's ongoing power sector deficiency. To finance the development of gas as Nigeria's transition fuel, investors and international lenders will need to continue to play a crucial role. This would necessitate a more balanced approach to supporting oil and gas. It will continue to be the participation of bilateral funds, development banks and institutions, and infrastructure funds, along with creative and adaptable capital structures that acknowledge the risks, timelines, and possible rewards of funding gas projects. Nigeria's renewable energy development offers enormous potential and formidable obstacles. The legal, financial, technical, and institutional obstacles must be removed if the nation is to realise its full potential for renewable energy. A more favourable climate for investment and project implementation will be created by establishing a thorough and coherent policy framework and strong financial incentives. Achieving a sustainable energy future requires improving infrastructure, encouraging technological innovation, and strengthening regulatory organisations' capabilities. Promoting public-private collaborations can produce technological improvements and solutions suited to Nigeria's particular energy needs. Furthermore, enhancing the socioeconomic effects

of renewable energy projects such as creating jobs and local economic growth—will win over the public and guarantee the projects' long-term viability.