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ECONOMIC AND RENEWABLE ENERGY TRANSITION IN NIGERIA

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ABSTRACT

This study examined the Nigeria's transition to renewable energy and its effects on the country's economy between 2000 to 2023, Utilizing secondary data from national policy documents, international energy databases, and empirical research, the analysis investigates changes in installed renewable capacity, GDP growth, employment patterns, and renewable energy use. Even though Nigeria uses a significant amount of renewable energy, traditional biomass use is mostly responsible for this dominance, which reflects ongoing energy poverty rather than contemporary technological advances. Modern renewable capacity, especially solar and hydropower grew steadily over the research period to decentralized energy projects and legislative changes. In comparison to population growth and national demand, this rise is still small. The period's economic growth was erratic, mostly due to changes in the price of oil and structural limitations in the energy industry. According to the findings, the macroeconomic impact of modern renewable deployment is still developing, even though it has started to improve rural electrification and small-scale firm development. To make renewable energy a strong force behind structural diversification and sustained economic growth in Nigeria, infrastructure, funding sources, and regulatory uniformity must all be strengthened.

Keywords: Economic growth, renewable energy transition, Nigeria.

1. INTRODUCTION

Energy is essential to economic growth because it affects investment choices, human wellbeing, industrial productivity, and technological development. One of the nation's largest issues is the energy sector. One of the reasons Nigeria's energy sector is so vulnerable to shocks is its over-reliance on fossil fuels. Nigeria's energy sector is especially vulnerable to the consequences of climate change, bad governance, and widespread poverty, all of which add to the system's vulnerability (Ajayi et al, 2022). Energy is essential to the development of the economy, society, and sustainability in many nations across the world. A country's future economic development is ensured by affordable, easily available, eco-friendly energy sources that don't interfere with service. Security, climate change, and public health are all related to energy.

However, in the majority of countries, the amount of energy consumed per person is directly correlated with the standard of living. Recent years have seen a global energy crisis due to a number of issues, including population growth and rising living standards (Bunting et al., 2022). Nigeria, the most populous country in Africa, possesses a wealth of energy resources, such as

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hydropower, natural gas, oil, and solar energy. However, a significant reliance on fossil fuels, insufficient grid infrastructure, and ongoing power outages have limited economic progress and impeded sustainable development (Statista, 2025). Global climate obligations, energy security concerns, and domestic economic objectives all drive the need for an energy transition, moving away from conventional fossil fuels and toward cleaner renewable energy (Chanchangi et al., 2023).

Due to its reliance on traditional biomass (wood, charcoal), Nigeria's renewable energy contribution has traditionally been high in final energy consumption, reaching over 80% in many years. However, this reflects energy poverty and does not necessarily suggest modern renewable deployment (World Bank statistics, 2021). The economic effects of modern renewable energy (wind, hydro, and solar) are becoming more significant for Nigeria's growth plan, even though their capacity is still small in comparison to demand (about 3 GW in 2023) (Statista, 2025; Guardian, 2025).

1.2 Problem Statement

Nigeria's shift has been sluggish, despite the country's potential for renewable energy. Energy shortages continue to exist, electrification in rural and industrial areas is still erratic, and power outages cause significant financial losses (NCCC, 2023). The transition to renewable energy has been hampered by inadequate infrastructure, a lack of policies, and a lack of funding (Statista, 2025). Furthermore, the economic ramifications are not entirely understood in the Nigerian context, especially with regard to how the adoption of renewable energy affects macroeconomic performance (Žarković et al., 2022). A review of previous studies such as Ajayi et al, (2022); Bunting et al. (2022); Chanchangi et al. (2023); Scagnelli et al. (2024) indicated that no research has covered a reviewed period between 2000 and 2023.

This study is important because it will add to the conversation about energy policy by objectively evaluating the connections between Nigeria's energy transformation and economic growth. The results will help researchers, investors, and politicians understand how renewable energy may promote sustainable development agendas. Therefore, the study asks the following questions: What are Nigeria's trends in the capacity and consumption of renewable energy? What is the relationship between Nigeria's economic growth and the switch to renewable energy? and what enablers and impediments influence the shift to renewable energy?

1.3 Research Objectives

This study aims to investigate the relationship between economy and renewable energy transition in Nigeria. Specifically, the study:

a. Assess the relationship between renewable energy transition indicators and economic growth.
b. Determine the trends in renewable energy consumption and capacity in Nigeria.
c. Evaluate the literature reviewed to identify the opportunities in Nigeria’s renewable energy transition.
d. Propose policy recommendations to support economic development through renewable energy expansion.

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2. LITERATURE REVIEW

2.1.1 Renewable Energy Transition:

Power derived from infinite, continuous sources such as the sun, wind, rain, tides, waves, and geothermal heat is referred to as renewable energy (Muhammed et al., 2022). No matter how much we use, renewable energy sources will always be accessible. Renewable energy is defined as energy that can be replenished during a person's lifespan (Scagnelli et al., 2024) . This implies that we will always have access to this energy source. Renewable energy sources include biomass, geothermal, solar, wind, and water. No matter how much energy is used, renewable energy sources can be naturally regenerated and will never run out. Using these energy sources has little to no effect on the environment (Okonkwo et al., 2021). Regarding the availability of renewable energy, Nigeria is not exempt from the vast majority of people worldwide.

The term "renewable energy transition," on the other hand, describes the methodical move away from fossil fuel-based systems and toward greener, lower-carbon alternatives including geothermal, hydropower, wind, solar, and contemporary biomass (Umar et al., 2024). Beyond technology, this shift also involves modernizing infrastructure, electrifying end-use industries, reorganizing investment patterns, and implementing institutional reforms (EIA, 2023). Significant reliance on conventional biomass, progressive hydropower growth, expanding solar mini-grid deployment, and regulatory actions targeted at renewable development are characteristics of Nigeria's transition. Grid inefficiencies, financial limitations, and inconsistent regulations, however, continue to be challenges (IEA, 2024).

The installed renewable capacity, which is expressed in megawatts or gigawatts and represents the development of infrastructure and future supply potential, is one of the primary indicators of renewable energy (UNFCCC, 2022/2023). Energy access rates show the percentage of the population that has access to electricity while emphasizing social effect and inclusivity. The pace and scope of the shift are indicated by the inflows of renewable investment, which include climate finance, foreign investment, and local spending (World Bank, 2023). It is anticipated that increases in these metrics taken together will boost capital formation, create jobs, increase productivity, and promote sustainable economic growth. Energy expenditure can be used to quantify renewable energy (UNFCCC, 2022/2023). The total amount spent on energy production, imports, distribution, and consumption within an economy is referred to as energy expenditure. It encompasses capital investments in infrastructure, household energy bills, industrial energy costs, and government subsidies. Energy expenditure can be expressed in monetary terms as the portion of household income allocated to energy or as a percentage of GDP (Umar et al., 2024).

2.2 Nigerian Trends on Renewable Energy

Nigeria's use of renewable energy (as a percentage of total final energy) decreased marginally from around 86% in 2000 to about 80% in 2021 (Ajayi et al, 2022), indicating a slow reduction in traditional renewables (mostly biomass) and changes in the energy mix. From less than 2 GW in 2015 to over 2.98 GW in 2023, renewable power capacity increased, demonstrating fast expansion in installed renewable infrastructure, particularly solar and hydropower deployments (Bunting et al., 2022). However, high energy costs can worsen trade balances when imports predominate, reduce competitiveness, raise production costs, and put a strain on state budgets, particularly in cases when subsidies are significant (IEA, 2024). However, long-term growth advantages might result from prudent investment in energy infrastructure (Chanchangi et al., 2023).

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Large fuel subsidies have historically put strain on Nigeria's national finances, and the country's unstable electricity supply has forced businesses and households to rely on pricey diesel generators (EIA, 2023). Making the switch to renewable energy can lower long-term operating costs, lessen reliance on fluctuations in the price of oil, lighten the burden of subsidies, and enhance fiscal sustainability. Long-term macroeconomic stability is supported by lifespan costs that are generally lower than those of fossil fuels, notwithstanding the large initial capital requirements (Muhammed et al., 2022). To do this, EU member states would have to abandon carbon-intensive economic strategies. The possibility of lowering greenhouse gas emissions in comparison to other sustainability factors is another factor that policymakers take into account when selecting a sustainability strategy. Therefore, officials at the EU level and in individual member states must establish enough rules to limit carbon emissions (NCCC, 2023).

2.3 Economic Growth in Nigeria:

Economic growth, which is frequently expressed in terms of real GDP, shows how production of goods and services has increased over time (Ajayi et al, 2022). Economic performance is thought to be significantly influenced by the accessibility and cost of energy. Whether the economy is growing or decreasing is shown by the growth rate (UNFCCC, 2022/2023). Sustained increases in a country's productive output are reflected in economic growth, which is commonly measured by real GDP. Expanded inputs like labor and capital or productivity gains fueled by innovation and employment rates could be the cause (Bunting et al., 2022).

One of the main measures of economic performance is GDP growth. Increased production, investment, and consumption are indicators of sustained growth and are critical for reducing poverty and creating jobs (Muhammed et al., 2022). Growth fueled by extractive businesses, like the oil industry, may not lead to inclusive development, hence growth quality is important. The percentage change in a nation's total economic production over a given time period, usually annually or quarterly, is measured by the Gross Domestic Product (GDP) growth rate. The total monetary value of all finished goods and services produced inside a nation's boundaries is represented by its GDP (Chanchangi et al., 2023).

The employment rate is another measure of economic growth (Okonkwo et al., 2021). The percentage of people of working age who are employed for pay is known as the employment rate. It is computed by multiplying by 100 and dividing the number of employed people by the total number of people of working age. The employment rate offers a more comprehensive view of labor market involvement, despite its close relationship to the unemployment rate. Income generation, aggregate demand, poverty alleviation, and social stability all depend on employment. While long-term unemployment limits growth and increases societal vulnerability, high employment levels promote consumption and the efficient use of human resources. Between 2000 and 2023, underemployment and unemployment, especially among youth, have continued to be major issues in Nigeria.

Job creation has been constrained by the predominance of informal work and the capital-intensive oil sector (Okonkwo et al., 2021). Opportunities in solar manufacture and installation, hydropower development, wind projects, rural electrification, and maintenance services are presented by the shift to renewable energy. Renewable systems have the ability to create green jobs and foster inclusive growth because they require a lot of labor throughout the installation and expansion stages (Statista, 2025).

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2.4 Economic and Renewable Energy (E&RE) in Nigeria

Depending on the structural circumstances, there may be a unidirectional, bidirectional, or neutral link between growth and energy use. Oil exports and the growth of the telecommunications industry were the main drivers of Nigeria's comparatively robust GDP growth, which averaged above 6% per year between 2000 and 2014. But recessions were brought on by shocks to oil prices in 2016 and 2020 (the COVID-19 pandemic). Although there has been a modest resurgence in more recent years, fundamental limitations including energy shortages still restrict industrial growth (Statista, 2025). Economic performance and structural change are significantly influenced by the availability of energy. A consistent supply of renewable energy lowers production costs, boosts industrial output, increases energy security, and makes a nation more appealing to foreign investors (Scagnelli et al., 2024).

Contemporary renewable infrastructure, including wind, hydropower, and solar facilities, supports agro-processing, manufacturing, and internet businesses, all of which boost GDP growth (World Bank, 2023). On the other hand, a strong reliance on outdated and ineffective biomass does little to boost sustainable economic growth or increase productivity. Therefore, increasing contemporary renewable energy systems can act as a stimulant for sustained growth and competitiveness in developing economies.

2.5 Opportunities and Challenges of the Transition to E&RE

A few of the difficulties include the growth of distributed energy systems, which is hindered by shortages of experienced workers, a lack of local ability to run and maintain solar and battery installations, and poor component manufacturing in the country (World Bank, 2023). To promote long-term deployment and sustainability, it is crucial to develop strong vocational training programs, bolster regional service industries, and set standards and certification procedures (Statista, 2025).

Further undermining actual output are frequent obstacles such as supply shortages, plant failures, vandalism, pipeline interruptions, and systemic transmission flaws. The effective available supply is significantly less than the tens of gigawatts of installed generation capacity that is officially listed. Low per-capita energy provision results from these operational inefficiencies as well as institutional and infrastructure limitations. Because of this, decentralized diesel and gasoline generators are widely used by Nigerian households and businesses, which contributes to the country's high energy prices, air pollution, and susceptibility to fuel price shocks (Scagnelli et al., 2024).

However, Nigeria has some of the greatest sun radiation levels in Africa, making solar photovoltaics (PV) the country's most important renewable energy source. Opportunities for deployment include large-scale grid-connected solar farms, rooftop photovoltaic systems for commercial and industrial customers, and the quickly expanding decentralized market for solar home systems (SHS) and community mini-grids (World Bank, 2023). Due to donor-supported projects and private sector innovation, the adoption of decentralized solutions has increased recently (Statista, 2025). The Rural Electrification Agency (REA) has been instrumental in promoting mini-grid and SHS programs. However, a number of barriers still exist, including the need for imported panels and system components, the scarcity of reasonably priced local funding, the high upfront costs of utility-scale projects, and the technical difficulties in incorporating

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variable, solar power into a grid that is already vulnerable without corresponding investments in modernization and storage (Scagnelli et al., 2024).

Furthermore, Nigeria's shift to renewable energy tackles fiscal challenges, environmental deterioration, energy poverty, and economic diversification. Climate pledges, declining costs for renewable technologies, worries about energy security, the instability of fossil fuel prices, and the goal of inclusive growth are some of the main motivators. Energy is a vital component of production, driving services, transportation, and industry. Energy shortages limit output in many developing economies, highlighting the significance of a steady supply (Scagnelli et al., 2024). By decreasing reliance on imports, developing new businesses, increasing productivity, extending rural electrification, and drawing in green investment, renewable energy can spur growth.

More so, Nigeria's energy system is still largely reliant on fossil fuels. Natural gas is becoming more and more positioned as a vital industrial feedstock and a domestic transition fuel, whereas oil is the main source of export revenue and powers transportation and small-scale electrical production. The nation has enormous proved gas reserves, and gas-fired power has historically produced a sizable portion of electricity, according to national statistics and international energy profiles (Žarković et al., 2022)

Theoretical Review

This study is pinned on the Energy Economics Theory, which holds that energy is a crucial production input and that its availability affects economic output, serves as the foundation for this investigation (Žarković et al., 2022). The combined goals of environmental sustainability and economic growth are also emphasized by the Sustainable Development Framework (Žarković et al., 2022). By acknowledging energy as a crucial component of production, alongside labor and capital, energy economics theory offers a framework for comprehending these relationships. It makes the assumptions that prices have an impact on decisions about investment and consumption, energy availability influences productivity, and technical advancements increase efficiency. Increasing the supply of renewable energy can boost productivity, lessen susceptibility to outside shocks, and encourage innovation spillovers (Statista, 2025). Renewable diversity improves energy security and stabilizes economic performance in situations when fossil fuel-based electricity is unstable. Adoption of the Renewable Energy Directive (EU) 2018/2001 established a strong basis for harmonizing national laws with the EU legal framework in this field (Statista, 2025). This theory is therefore relevant in the current research as it examined how energy availability influences productivity, and technical advancements

Empirical Studies

The complex relationships between energy variables and economic performance were highlighted in a study by Umar et al. (2024) that used ARDL analysis for Nigeria and found mixed effects of renewable energy usage on GDP growth. In several models, long-run dynamics revealed negative statistical significance for renewables, potentially as a result of data and structural constraints. Studies conducted in different contexts usually demonstrate positive causation between the deployment of renewable energy and economic growth, which is commonly mediated by employment, investment, and technological adoption impacts.

Ajayi et al. (2022) investigated how Nigeria's environment, food supply, and job opportunities are affected by renewable energy. This study looked at global data on the relationships between energy

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and renewable energy adoption, country development, population growth, job creation, rural-urban integration, and other factors. Renewable energy resources have inherent benefits in alleviating climate change and global warming events. Nigeria's rural development program should incorporate renewable energy sources for power production, according to the study's conclusions, if the government is serious about maintaining economic growth, particularly in the agricultural sector and food security. It also illustrates how renewable energy sources might lessen their influence on climate change brought on by humans.

The study by Žarkovic et al. (2022) is titled "The Effects of Renewable and Non-Renewable Energy Consumption, GHG, and ICT on Sustainable Economic Growth: Evidence from Old and New EU Countries." According to the research, modest but consistent changes must be made to the economy, society, and environment in order to ensure sustainable economic development. Given their positive impact on economic development, the study's conclusions offer compelling evidence in favor of the EU's political decisions to increase the proportion of renewable energy in total energy consumption. These measures ought to be strengthened even more and included into next EU and member state projects.

Evaluation of Literature Reviewed

A review of literature in this research indicates that, there is widespread agreement in the research on the transition to renewable energy and economic growth that energy is a key factor in determining macroeconomic success (NCCC, 2023). Together with labor and capital, energy is continuously recognized as a crucial production input by theoretical viewpoints, especially those based on Energy Economics Theory. Modern renewable energy deployment can boost GDP through increased productivity, technological innovation, job creation, and less reliance on imports, according to empirical research conducted in both developed and developing nations. However, structural factors, institutional quality, and economic growth stage all affect the intensity and direction of this link.

The reviewed literature highlights significant subtleties in the Nigerian situation. Although a significant portion of energy consumption is derived from renewable sources, traditional biomass use is mostly responsible for this dominance, reflecting energy poverty rather than technological improvement. The economic benefits of renewable energy depend on the type and efficiency of deployment, according to studies like Umar et al. (2024), which present conflicting findings about the effect of renewable energy consumption on GDP growth. On the other hand, data from European economies (“arković et al., 2022) shows a more pronounced positive correlation between the expansion of renewable energy sources and sustainable growth, primarily because of technological integration and supportive regulatory frameworks.

The examined literature also emphasizes Nigeria's ongoing structural limitations, such as reliance on fossil fuels, inadequate infrastructure, financial obstacles, and inadequate grid systems. Opportunities including a wealth of solar resources, the growth of decentralized mini-grids, and the increasing involvement of the private sector are apparent despite these obstacles. The limited integration of sectoral transition dynamics, macroeconomic indicators, and policy research into a single framework is a significant gap in the literature. Therefore, this study makes a contribution by combining trends in renewable capacity, policy realities, and economic growth indicators into a cohesive analytical narrative that is specific to Nigeria.

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4. METHODOLOGY

Based on a systematic desk-based literature analysis, this study used a qualitative research design. Because the goal was to synthesis existing empirical information, policy documents, and international statistics databases to create an integrated knowledge of Nigeria's renewable energy transition and its economic implications—rather than to generate raw data—the approach was appropriate. Systematic searches in academic databases including Scopus, Web of Science, and Google Scholar were used to find pertinent peer-reviewed literature. To guarantee contextual relevance, policy papers such as Nigeria's Energy Transition Plan and climate strategy frameworks were reviewed. The inclusion of reports from global institutions like the World Bank, IEA, and IRENA enhanced the credibility of the data.Reputable data on installed capacity, GDP growth rate, employment patterns, and renewable energy demand from 2000 to 2024 were highlighted.

Thematic synthesis and comparative analysis were part of the process. Indicators of renewable energy trends were first looked at. Second, in order to find discernible trends, macroeconomic indicators—specifically GDP growth and employment—were examined in conjunction with energy data. Third, by comparing empirical results with policy frameworks, possibilities and problems were examined. Without depending on speculative modeling, this integrated approach guarantees analytical depth, improves reliability by triangulating numerous sources, and offers insights that are pertinent to policy.

5. RESULT AND DISCUSSION

Table 4.1: Summarized Data on Renewable Energy Transition Economy in Nigeria (2000–2023)

Indicator	2000-2022	2023	Source
Renewable Energy Consumption (% of total final energy)	≈ 86%	≈ 80%	World Bank (2023); IEA (2024); Statista (2025)
Installed Renewable Power Capacity (GW)	≈ 1.9 GW	≈ 2.98–3.0 GW	IRENA (2025); Statista (2025)
GDP Growth Rate	≈ 5.3%	≈ 2.9%	World Bank (2023); Statista (2025)
Population with Access to Electricity	≈ 40%	≈ 62%	World Bank (2023); Statista (2025)
Share of Hydropower in Renewable Capacity	Dominant source	Major share (~80% of grid renewables)	IEA (2024); Statista (2025)

Note: This report summarizes quantitative indicators from secondary data on Nigeria's macroeconomic performance and transition to renewable energy from 2000-2023.

Source: Data Adopted by Author, 2000-2023

According to the report in Table 4.1, Nigeria's renewable energy market is undergoing a complicated transformation between 2000 and 2023. Consumption of renewable energy continuously accounted for a sizable amount of overall final energy use, frequently exceeding 80 percent. However, a closer look reveals that conventional biomass like charcoal and firewood dominated this share. This suggests that large percentages of renewable energy were a reflection of limited access to modern power rather than industry modernization or productivity advances. Over time, installed renewable power capacity gradually improved. While solar installations

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gained traction after 2015, especially through mini-grid and solar home system programs, hydropower continued to be the mainstay of grid-connected renewables.

As a result of gradual infrastructural expansion, renewable capacity exceeded 3 GW by 2023. However, this growth was impeded by larger economic restructuring as it trailed behind population increase and rising energy demand. Data on GDP growth show instability. Oil was a major factor in the early 2000s' strong growth. The vulnerability of reliance on fossil fuels was made clear by economic contractions in 2016 and 2020. Renewable energy projects made a moderate contribution to the expansion of rural businesses and the service sector during recovery periods, but not enough to drastically alter the composition of the national output. Employment trends point to new prospects in small-scale energy services, decentralized solar installation, and maintenance. However, inadequate local manufacturing capacity and reliance on imported components limited broader industrial linkages.

According to the research, Nigeria's transition to renewable energy has started, but it is still structurally limited. Although modern renewable development has the ability to promote economic diversity, significant macroeconomic impact requires deeper investment, grid change, and institutional strengthening.

6. DISCUSSION OF FINDINGS

This study's results show that Nigeria's transition to renewable energy is moving forward, but unevenly and at a rate that isn't fast enough to achieve the country's objectives for economic change. Even if a large portion of final energy consumption comes from renewable sources, traditional biomass use is mostly to blame for this. Industrial competitiveness and productivity are not greatly increased by such dependency. Rather, it represents restricted availability of contemporary energy services.

In recent years, the capacity of modern renewable energy, especially solar and hydropower, has gradually increased. This expansion is in line with increased private sector involvement in decentralized energy systems and better rural electrification initiatives. According to the report, modern renewable deployment improves economic performance by cutting long-term operating costs, lowering exposure to the volatility of fossil fuel prices, and assisting small and medium-sized businesses.

The connection between GDP growth and renewable energy is still complicated, though. Nigeria's economy is susceptible to external shocks because oil exports have historically been the main driver of economic growth. The growth of renewable energy has not yet reached a level that can fundamentally change macroeconomic systems. The revolutionary potential of renewables is limited by structural impediments, such as insufficient transmission infrastructure, financial limitations, reliance on imports for renewable components, and inconsistent regulations. The results also highlight the job opportunities that come with using renewable energy. Local manufacturing, mini-grid administration, installation, and maintenance provide labor-intensive routes that may help reduce youth unemployment. These findings are inline with the prevous studies results by Ajayi et al, (2022); Bunting et al. (2022); Chanchangi et al. (2023); Scagnelli et al. (2024). However, these prospects can go untapped if intentional skill development and industrial policy alignment are not made.

7. CONCLUSION

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This study based on the findings concluded that Nigeria's shift to renewable energy offers both structural difficulties and economic potential. A move toward more sustainable energy systems is indicated by the steady growth of contemporary renewable capacity, even though the consumption of renewable energy is still high because of reliance on biomass. The transition's economic benefits are beginning to materialize, but they are still limited by a lack of infrastructure, inconsistent policy, and a small investment size.

This research advances our understanding in a number of ways. First, it offers a comprehensive synthesis that connects Nigeria's macroeconomic performance with renewable energy data, connecting disparate literary threads. Second, it explains why high renewable shares do not always result in growth advantages by differentiating between the effects of conventional and modern renewable energy. Third, it develops a framework for policy-oriented analysis that links Nigeria's actual transition circumstances with theoretical understandings from energy economics. The research contributes to the conversation on sustainable development paths in resource-dependent economies by integrating empirical data, policy analysis, and macroeconomic evaluation.

8. POLICY RECOMMENDATIONS

Nigeria has to implement a coordinated and forward-thinking policy plan in order to expedite the economic benefits of the transition to renewable energy. First, public-private partnerships, blended financing methods, and focused incentives that lower perceived investment risks should be given priority when it comes to investment mobilization. For both utility-scale and decentralized renewable projects to scale, it will be crucial to increase access to reasonably priced local funding. Additionally, in order to guarantee consistent policies, clear tariff structures, and efficient grid integration mechanisms, institutional and regulatory frameworks should be reinforced. Investor confidence will increase with well-defined long-term renewable targets and enforcement procedures.

Then, modernizing the grid is essential. The dependability and effectiveness of renewable integration will be improved by adding storage options and upgrading transmission infrastructure. The economic benefits of expanding renewable capacity will be restricted in the absence of grid change. Also, efforts for renewable energy should incorporate the creation of local content. Supporting homegrown production of batteries, solar parts, and other technologies can lessen reliance on imports and generate jobs. Lastly, energy transition initiatives must be accompanied by the development of human capital. The skilled labor needed for long-term, renewable growth can be developed through technical training programs, vocational education, and collaborations between academic institutions and business. When taken as a whole, these policy initiatives have the potential to change renewable energy from a minor addition to a major force behind Nigeria's sustainable growth and economic diversification.

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