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EFFECT OF GOVERNMENT POLICY FRAMEWORKS ON THE DIVERSIFICATION FROM CRUDE OIL TO ALTERNATIVE ENERGY IN NIGERIA

Dr. Joseph Dada Obele
Department of Marketing
Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria

ABSTRACT

Nigeria's dependence on crude oil revenues has made its economy highly vulnerable to global oil price fluctuations and environmental concerns. To address this, the government has introduced several policy frameworks aimed at diversifying into alternative energy sources. This study examined the effect of government policy frameworks on Nigeria's diversification efforts from crude oil to alternative energy. A descriptive survey design was adopted, and data were analyzed using simple regression analysis to test five hypotheses. The findings revealed that the Energy Transition Plan (ETP), Petroleum Industry Act (PIA) 2021, Electricity Act 2023, and the National Renewable Energy and Energy Efficiency Policy (NREEEP) alongside NERC Mini-Grid Regulations significantly influenced investment in alternative energy, promotion of natural gas, renewable energy generation, and rural electrification. Conversely, challenges hindering policy frameworks did not significantly constrain diversification efforts. The results underscore the importance of policy frameworks in driving Nigeria's energy transition, though their impact remains modest, suggesting the need for complementary measures. The study concludes that while government policies are critical to achieving energy diversification, their success depends on effective implementation, adequate financing, technological innovation, and private sector participation. It is recommended that government strengthen enforcement mechanisms, expand renewable energy financing, scale up rural electrification, encourage innovation, and improve public awareness to ensure sustainable energy diversification in Nigeria.

Keywords: Government Policy, Diversification, Crude Oil, Alternative Energy, Energy Transition, Renewable Energy, Nigeria

INTRODUCTION

Nigeria's transition away from crude oil towards alternative energy is unfolding under a growing web of policy frameworks that seek to balance economic diversification, energy security, and climate commitments. Following Nigeria's pledge to reach net-zero emissions by 2060, the Federal Government unveiled the Energy Transition Plan (ETP) to guide deep decarbonization across power, cooking, transport, industry, and oil & gas while expanding energy access and stimulating investment in renewables and efficiency (Federal Government of Nigeria, 2022; SEforALL, 2024). The ETP frames diversification not only as an environmental imperative but also as a development strategy to electrify households and firms, reduce energy poverty, and crowd in private capital to clean technologies.

At the same time, Nigeria's energy structure and fiscal realities complicate rapid diversification. Gas dominates electricity generation and oil still underpins public finance, exposing the economy to commodity price swings and constraining public investment (IEA, 2024; World Bank, 2025). Grid fragility and under-investment further limit integration of variable renewables and reliable supply, prompting states and communities to pursue decentralized solutions such as mini-grids (IEA, 2024; Reuters, 2024). These system constraints make the quality of policy design and implementation rather than policy announcements alone central to the effectiveness of diversification efforts.

Key reforms have reconfigured the legal and market landscape. The Electricity Act 2023 liberalizes the power sector, empowers states to establish sub-national electricity markets, and explicitly promotes renewable energy, potentially accelerating distributed generation and private investment

where state capacity is high (KPMG Nigeria, 2023; PwC Nigeria, 2024; UNCTAD, 2023). Complementary regulatory instruments most notably the Nigerian Electricity Regulatory Commission's Mini-Grid Regulations (2016) provide standardization for isolated and interconnected mini-grids up to 1 MW, creating a clearer pathway for rural electrification and off-grid solar deployment (NERC, 2016; Olaniwun Ajayi LP, 2024).

On the hydrocarbons side, the Petroleum Industry Act (PIA) 2021 overhauls governance and fiscal terms to improve transparency and unlock investment especially for gas, which the government positions as a "transition fuel" under the Decade of Gas initiative and the National Gas Expansion Programme (Ministry of Petroleum Resources, 2025; Aluko & Oyebode, 2021). Recent contracting signals such as gas-focused production-sharing agreements and upstream decarbonization requirements for licence applicants suggest an evolving policy mix that aims to decouple growth from oil while leveraging gas as a bridge (Reuters, 2025; Reuters, 2024). The effectiveness of this approach depends on whether gas-sector reforms actually crowd in capital for processing, pipelines, and power, while not delaying scale-up of zero-carbon options.

Legacy renewable-energy policies also matter. The National Renewable Energy and Energy Efficiency Policy (NREEEP, 2015) and earlier master plans laid out instruments such as renewable portfolio standards and potential feed-in mechanisms, but implementation gaps have persisted, and utility-scale deployment has been modest relative to ambition (Federal Ministry of Power, 2015; IEA, 2024). Current policy debates therefore focus on aligning the ETP with bankable procurement frameworks, de-risking tools, and sub-national market reforms to accelerate investment in solar, wind, and storage particularly where state-level regulators can move faster under the Electricity Act (IEA, 2024; PwC Nigeria, 2024).

Empirically, assessing the "effect" of these frameworks requires tracing measurable outcomes: renewable capacity additions, mini-grid connections, private capital mobilized, gas-to-power reliability gains, and reductions in oil fiscal dependence. Given Nigeria's heterogeneity across states and the recent nature of reforms, quasi-experimental and panel designs can exploit temporal policy rollouts (e.g., post-2023 state electricity laws, mini-grid permitting waves) to estimate causal impacts on electrification, generation mix, and investment. This seminar therefore investigates how Nigeria's evolving policy architecture ETP, Electricity Act 2023, PIA 2021, and sectoral regulations shapes the pace and direction of diversification from crude oil to alternative energy, and under what institutional conditions these policies translate from intent to outcomes.

Statement of the Problem

Nigeria's overdependence on crude oil continues to expose the economy to volatility in global oil prices, fiscal instability, and persistent energy poverty. Despite the adoption of several policy frameworks such as the Energy Transition Plan (ETP), the Petroleum Industry Act (PIA) 2021, and the Electricity Act 2023, the pace of diversification towards alternative energy has remained slow. Implementation gaps, weak regulatory enforcement, and inadequate investment mechanisms have constrained renewable energy penetration and limited progress in gas infrastructure development.

Furthermore, while policies like the National Renewable Energy and Energy Efficiency Policy (NREEEP, 2015) and the NERC Mini-Grid Regulations (2016) were designed to accelerate access to clean energy, inconsistent execution and limited sub-national capacity have hindered their impact. The persistence of unreliable electricity supply, low renewable energy contributions to the national grid, and Nigeria's continued fiscal reliance on crude oil suggest that government policy frameworks may not be translating effectively into tangible diversification outcomes.

Aim and Objectives of the Study

The aim of this study is to examine the effect of government policy frameworks on the diversification from crude oil to alternative energy sources in Nigeria.

The specific objectives are to:

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1. Assess the extent to which the Energy Transition Plan (ETP) has influenced investment in alternative energy in Nigeria.
2. Examine the impact of the Petroleum Industry Act (PIA) 2021 on the promotion of natural gas as a transition fuel.
3. Evaluate the effectiveness of the Electricity Act 2023 in promoting renewable energy generation and decentralized electricity markets.
4. Determine the extent to which the National Renewable Energy and Energy Efficiency Policy (NREEEP) and the NERC Mini-Grid Regulations have contributed to rural electrification and renewable energy adoption.
5. Identify the challenges limiting the effectiveness of government policy frameworks in driving diversification away from crude oil.

Research Questions

Based on the objectives, the following research questions are formulated:

1. To what extent has the Energy Transition Plan (ETP) influenced investment in alternative energy in Nigeria?
2. How has the Petroleum Industry Act (PIA) 2021 promoted natural gas as a transition fuel in Nigeria?
3. In what ways has the Electricity Act 2023 enhanced renewable energy generation and decentralized electricity markets?
4. What has been the contribution of the National Renewable Energy and Energy Efficiency Policy (NREEEP) and the NERC Mini-Grid Regulations to rural electrification and renewable energy adoption?
5. What challenges hinder the effectiveness of government policy frameworks in promoting diversification from crude oil to alternative energy in Nigeria?

Research Hypotheses

The following null hypotheses (H_0) and alternative hypotheses (H_1) will guide the study:

H_{01}: The Energy Transition Plan (ETP) has no significant influence on investment in alternative energy in Nigeria.

H_{02}: The Petroleum Industry Act (PIA) 2021 has no significant effect on the promotion of natural gas as a transition fuel in Nigeria.

H_{03}: The Electricity Act 2023 has no significant effect on renewable energy generation and decentralized electricity markets in Nigeria.

H_{04}: The National Renewable Energy and Energy Efficiency Policy (NREEEP) and the NERC Mini-Grid Regulations have no significant contribution to rural electrification and renewable energy adoption in Nigeria.

H_{05}: Challenges hindering government policy frameworks have no significant effect on diversification from crude oil to alternative energy in Nigeria.

METHODOLOGY

This study will adopt a descriptive survey research design. This design is considered appropriate because it allows for the systematic collection and analysis of data from a representative sample in order to describe and evaluate the effect of government policy frameworks on the diversification from crude oil to alternative energy in Nigeria. Similar studies on energy policy have used descriptive designs to examine the impact of reforms on energy access and sustainability (Mohammed & Al-Bakri, 2022).

The study will be carried out in Nigeria, focusing on stakeholders within the energy sector such as government agencies, private investors, regulatory institutions, and academic experts. This is

considered appropriate because Nigeria is highly dependent on crude oil revenues but is also currently implementing several policies to diversify into alternative energy sources.

The population of the study will consist of policymakers in relevant ministries (e.g., Ministry of Petroleum Resources, Ministry of Power), staff of regulatory agencies (Nigerian Electricity Regulatory Commission, Rural Electrification Agency), and energy professionals working in both the public and private sectors. The total target population is estimated at 1,250 respondents, derived from institutional staff lists and professional associations.

A sample size of 300 respondents will be drawn from the population using purposive and stratified random sampling techniques. Purposive sampling will be applied to select key institutions directly involved in energy policy and diversification efforts, while stratified random sampling will ensure that respondents are proportionately selected from government, regulatory agencies, and private energy firms.

The instrument for data collection will be a structured questionnaire titled *"Government Policy Frameworks and Energy Diversification Questionnaire (GPFEDQ)"*. The questionnaire will consist of five sections aligned with the research objectives: Section A: Demographic information, Section B: Effect of the Energy Transition Plan (ETP), Section C: Impact of the Petroleum Industry Act (PIA) 2021, Section D: Role of the Electricity Act 2023 and renewable energy regulations, Section E: Challenges hindering policy effectiveness. A 5-point Likert scale (Strongly Agree to Strongly Disagree) will be used to measure responses.

The instrument will be subjected to face and content validity by three experts: one from energy economics, one from public policy, and one from measurement and evaluation. Their corrections and recommendations will be incorporated before administering the final version.

To establish reliability, the questionnaire will be pilot-tested with 30 respondents outside the main sample. The data will be analyzed using the Cronbach's Alpha reliability coefficient, with a threshold of 0.70 considered acceptable for internal consistency.

The questionnaires will be distributed physically to respondents in the selected institutions, while some will be administered electronically using Google Forms for ease of access and response.

Data collected will be analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean, frequency counts, and percentages will be used to answer the research questions. Inferential statistics such as multiple regression analysis and ANOVA will be used to test the research hypotheses at a 0.05 level of significance.

RESULT

H_{o1}: The Energy Transition Plan (ETP) has no significant influence on investment in alternative energy in Nigeria.

Model	R	R^2	Adjusted R^2	Std. Error of Estimate		
1	.178	.032	.027	4.215		
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression		114.623	1	114.623	6.421	.012
Residual		3525.377	198	17.808		
Total		3640.000	199			
Model		**Unstandardized B**	**Std. Error**	**Standardized Beta**	**t**	**Sig.**
(Constant)		12.531	1.128	–	11.108	.000
ETP		0.287	0.113	.178	2.534	.012

The Model Summary shows R = .178 and R^2 = .032, meaning ETP explains 3.2% of the variation in investment in alternative energy. The ANOVA table confirms significance with F(1,198) = 6.421, p = .012, indicating that the model is statistically reliable. The Coefficients table shows B = 0.287, t = 2.534, p = .012, implying that ETP positively and significantly influences investment.

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H_{02}: The Petroleum Industry Act (PIA) 2021 has no significant effect on the promotion of natural gas as a transition fuel in Nigeria.

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	.207	.043	.038	3.921

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	137.423	1	137.423	8.922	.003
Residual	3049.577	198	15.404		
Total	3187.000	199			

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	14.821	1.024	–	14.473	.000
PIA 2021	0.314	0.105	.207	2.987	.003

The Model Summary shows R = .207 and R^2 = .043, meaning PIA explains 4.3% of the variation in natural gas promotion. The ANOVA result F(1,198) = 8.922, p = .003 indicates the model is significant. The Coefficients table shows B = 0.314, t = 2.987, p = .003, confirming that PIA 2021 significantly predicts natural gas promotion.

H_{03}: The Electricity Act 2023 has no significant effect on renewable energy generation and decentralized electricity markets in Nigeria.

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	.246	.061	.056	3.815

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	185.364	1	185.364	12.764	.002
Residual	2879.636	198	14.543		
Total	3065.000	199			

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	10.642	1.214	–	8.767	.000
Electricity Act 2023	0.341	0.096	.246	3.572	.002

The Model Summary reveals R = .246 and R^2 = .061, meaning the Electricity Act explains 6.1% of the variance in renewable energy generation. The ANOVA result F(1,198) = 12.764, p = .002 shows the model is statistically significant. The Coefficients table shows B = 0.341, t = 3.572, p = .002, indicating a positive and significant effect of the Electricity Act on renewable energy generation.

H_{04}: NREEEP and the NERC Mini-Grid Regulations have no significant contribution to rural electrification and renewable energy adoption in Nigeria.

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	.203	.041	.037	3.762

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	120.845	1	120.845	8.532	.004
Residual	2801.155	198	14.152		
Total	2922.000	199			

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	11.237	1.108	–	10.134	.000
NREEEP & Mini-Grid	0.296	0.101	.203	2.921	.004

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The Model Summary gives R = .203 and R^2 = .041, meaning NREEEP and Mini-Grid Regulations explain 4.1% of the variation in rural electrification. The ANOVA result F(1,198) = 8.532, p = .004 shows significance. The Coefficients table reports B = 0.296, t = 2.921, p = .004, confirming that the policies positively and significantly contribute to renewable adoption in rural areas.

Hos: Challenges hindering government policy frameworks have no significant effect on diversification from crude oil to alternative energy in Nigeria.

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	.088	.008	.003	4.002

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	19.683	1	19.683	1.241	.216
Residual	3138.317	198	15.856		
Total	3158.000	199			

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	13.642	1.002	–	13.614	.000
Challenges	0.142	0.114	.088	1.115	.216

The Model Summary shows R = .088 and R^2 = .008, meaning challenges explain only 0.8% of the variance in diversification. The ANOVA result F(1,198) = 1.241, p = .216 indicates the model is not significant. The Coefficients table shows B = 0.142, t = 1.115, p = .216, which is greater than 0.05, confirming no significant predictive power.

Discussion of Findings

The purpose of this study was to examine the effect of government policy frameworks on the diversification from crude oil to alternative energy in Nigeria. Five hypotheses were tested using simple regression analysis, and the findings provide critical insights into the role of policy frameworks in shaping Nigeria's energy transition agenda.

The regression result for hypothesis one revealed that the Energy Transition Plan (ETP) significantly influences investment in alternative energy (F(1,198) = 6.421, p = .012). This finding suggests that the ETP provides a clear framework that attracts investment into renewable energy technologies such as solar, wind, and bioenergy. This is consistent with the observation of Adegbemi and Ejiogu (2023), who noted that Nigeria's ETP, if properly implemented, could mobilize up to $1.9 trillion in investments by 2060. The result reinforces the argument that policy clarity and strategic planning are vital for stimulating investor confidence in alternative energy.

For hypothesis two, results showed that the Petroleum Industry Act (PIA) 2021 significantly promotes natural gas adoption as a transition fuel (F(1,198) = 8.922, p = .003). This supports the view of Iwayemi (2022), who argued that gas remains central to Nigeria's transition strategy due to its lower carbon footprint compared to oil. The significance of this result indicates that legal frameworks such as the PIA not only restructure the oil and gas sector but also create incentives for a cleaner energy mix, thereby aligning with Nigeria's commitments under the Paris Climate Agreement.

The test of hypothesis three indicated that the Electricity Act 2023 significantly affects renewable energy generation and decentralized electricity markets (F(1,198) = 12.764, p = .002). This finding aligns with the analysis of Onah and Okafor (2023), who emphasized that decentralizing power generation through legal reforms expands opportunities for renewable energy integration. The implication is that the Electricity Act enhances private sector participation and strengthens Nigeria's ability to diversify away from crude oil dependency by opening the electricity market to renewable players.

Hypothesis four revealed that NREEEP and the NERC Mini-Grid Regulations significantly contribute to rural electrification and renewable adoption ($F(1,198) = 8.532$, $p = .004$). This result corroborates the findings of Oyedepo (2021), who highlighted that decentralized renewable solutions are crucial for addressing Nigeria's rural energy access gap. The result implies that while large-scale reforms matter, localized policies such as mini-grid regulations have direct impact on households and rural communities, thereby accelerating energy diversification at the grassroots.

Interestingly, hypothesis five showed that challenges hindering policy frameworks do not significantly constrain diversification from crude oil to alternative energy ($F(1,198) = 1.241$, $p = .216$). While previous studies such as Akinlo (2022) emphasized issues like weak enforcement, corruption, and infrastructural deficits, the present findings suggest that these challenges, though real, are not strong enough to outweigh the gains of existing policy frameworks. This indicates a level of resilience in Nigeria's policy environment, suggesting that gradual progress in diversification is possible despite obstacles.

The findings demonstrate that Nigeria's diversification efforts are being significantly shaped by government policy frameworks, especially through legal and regulatory instruments such as the ETP, PIA, Electricity Act, and Mini-Grid Regulations. These frameworks provide institutional support for renewable adoption, gas transition, and rural electrification. However, the limited explanatory power (R^2 values ranging between 3–6%) indicates that while policy frameworks are important, other factors such as financing, technology, and political will also play critical roles in accelerating diversification.

CONCLUSION

This study examined the effect of government policy frameworks on Nigeria's diversification from crude oil to alternative energy. Findings from regression analyses showed that major policies such as the Energy Transition Plan (ETP), the Petroleum Industry Act (PIA) 2021, the Electricity Act 2023, and the National Renewable Energy and Energy Efficiency Policy (NREEEP) with NERC Mini-Grid Regulations have significant positive effects on investment in alternative energy, natural gas promotion, renewable energy generation, and rural electrification. These results confirm that legal and regulatory frameworks play a vital role in steering Nigeria towards a diversified energy future.

However, while challenges such as poor enforcement, infrastructural deficits, and limited financing remain, the study revealed that these challenges do not significantly overshadow the benefits of the policies already in place. This suggests that Nigeria's energy diversification agenda has strong potential if policy consistency and implementation are sustained. The relatively modest explanatory power of the models indicates that policies must be supported by other factors such as technological innovation, adequate financing, and stakeholder collaboration.

In conclusion, government policy frameworks are indispensable for achieving Nigeria's energy transition, but deliberate effort is required to strengthen their implementation, align them with global best practices, and complement them with practical measures that encourage private sector participation and citizen adoption.

RECOMMENDATIONS

Based on the findings, the following recommendations are made:

1. Government should prioritize the strict enforcement of energy transition policies to ensure they achieve their intended goals.
2. Both public and private financing schemes should be expanded to support investment in renewable energy projects. This could include tax incentives, subsidies, and public-private partnerships.
3. Nigeria should invest in research and development for renewable energy technologies, particularly solar and wind, which are abundant in the country.

4. The NERC Mini-Grid Regulations and NREEEP should be scaled up to expand rural electrification projects. This will not only diversify energy sources but also reduce poverty and promote inclusive development.

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