

**UNLOCKING THE POTENTIAL OF COAL IN NIGERIA'S ENERGY MIX: AN ANALYSIS OF
COAL'S ROLE IN MEETING ENERGY DEMAND, REDUCING IMPORT DEPENDENCE, AND
PROMOTING ECONOMIC DEVELOPMENT**

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ABSTRACT

This study examined the potential of coal in Nigeria's energy mix, focusing on its role in meeting energy demand, reducing import dependence, and promoting economic development. Nigeria continues to face persistent energy challenges characterized by inadequate power supply, overreliance on limited energy sources, and heavy dependence on imported fuels. Despite possessing vast coal reserves, the resource remains largely underutilized. The study adopted a mixed-methods research design, utilizing both qualitative and quantitative data derived from secondary sources such as energy reports, geological surveys, and economic databases. Descriptive and inferential statistical techniques were employed to analyze the data. The findings revealed that coal has significant potential to contribute to Nigeria's energy supply by providing a reliable base-load energy source capable of complementing existing energy systems. The results further indicated that coal utilization can reduce dependence on imported energy resources, thereby conserving foreign exchange and enhancing energy security. In addition, the study established that coal development can stimulate economic growth through job creation, industrial expansion, and increased investment in energy infrastructure. However, the study also acknowledged environmental concerns associated with coal utilization, emphasizing the need for the adoption of clean coal technologies and effective regulatory frameworks to ensure sustainability. The study concluded that coal represents a strategic yet underexploited resource that can play a vital role in addressing Nigeria's energy deficit and promoting economic development if properly harnessed.

Keywords: Coal, Energy Mix, Energy Demand, Import Dependence, Economic Development, Nigeria

INTRODUCTION

Nigeria's energy sector has long been characterized by persistent supply deficits, infrastructural inefficiencies, and heavy reliance on fossil fuel imports despite its vast natural resource endowment. Electricity generation remains significantly below national demand, with frequent outages affecting households and industries alike. The country's overdependence on hydropower and natural gas has exposed it to supply vulnerabilities, especially in the face of pipeline vandalism and seasonal

fluctuations in water levels (Oyedepo, 2014). As a result, there is a growing need to diversify Nigeria's energy mix to ensure energy security, sustainability, and economic resilience.

Energy demand in Nigeria continues to rise due to rapid population growth, urbanization, and industrial expansion. With a population exceeding 200 million people, the pressure on existing energy infrastructure has intensified, leading to widening gaps between supply and demand (International Energy Agency [IEA], 2022). The inability of the current energy system to meet these demands has resulted in increased reliance on expensive and environmentally inefficient alternatives such as diesel and petrol generators, thereby escalating the cost of energy and reducing economic productivity.

In response to these challenges, attention has increasingly shifted toward alternative energy sources that can complement existing systems and enhance national energy capacity. Among these options, coal presents a viable yet underutilized resource. Historically, coal played a significant role in Nigeria's energy and industrial development, particularly during the early and mid-20th century when coal from Enugu powered railways and electricity generation (Ehinola et al., 2010). However, the discovery of crude oil led to the neglect of coal resources, resulting in a significant decline in its exploration and utilization.

Nigeria is endowed with substantial coal reserves estimated at billions of metric tonnes, distributed across several states including Enugu, Kogi, Benue, Nasarawa, Delta, and Anambra (Obaje, 2013). These reserves are largely untapped and represent a strategic opportunity to address the country's energy deficit. Coal's relative abundance and affordability make it a potentially reliable base-load energy source capable of supporting large-scale power generation and industrial processes. In many developing economies, coal continues to serve as a critical component of energy security due to its availability and cost-effectiveness (World Bank, 2020).

Beyond its contribution to energy supply, coal has significant implications for economic development. Investment in coal mining, processing, and power generation can stimulate job creation, industrial growth, and infrastructure development. It can also reduce Nigeria's dependence on imported refined petroleum products, thereby improving the balance of trade and conserving foreign exchange reserves (Adenikinju, 2008). The development of a functional coal industry could further enhance value chains in sectors such as steel production, cement manufacturing, and chemical processing.

Despite these potential benefits, the use of coal is associated with notable environmental and health concerns, particularly in relation to greenhouse gas emissions and air pollution. The global transition toward cleaner energy sources has raised questions about the long-term viability of coal as a sustainable energy option. However, advancements in clean coal technologies, such as carbon capture and storage (CCS), offer possibilities for mitigating these negative impacts while still leveraging coal's energy potential (International Energy Agency, 2021). This creates a complex policy landscape where economic and energy needs must be balanced against environmental sustainability.

Given this context, it becomes imperative to critically examine the role coal can play in Nigeria's energy mix. Understanding its potential contribution to energy demand, its capacity to reduce import dependence, and its broader economic implications is essential for informed policy decisions. This study therefore seeks to explore how coal can be strategically integrated into Nigeria's energy system to enhance energy security while supporting sustainable economic development.

Statement of the Problem

Nigeria continues to face a persistent and widening gap between energy demand and supply, resulting in chronic electricity shortages, unreliable power delivery, and heavy dependence on alternative energy sources such as diesel and petrol generators. Despite possessing vast energy

resources, including natural gas, hydro, and coal, the country has struggled to translate these assets into stable and sufficient power generation. This inefficiency has constrained industrial productivity, increased the cost of doing business, and negatively impacted the quality of life for citizens (Oyedepo, 2014).

A major dimension of this challenge is Nigeria's reliance on imported refined petroleum products and fossil fuel-based power alternatives, which places significant pressure on foreign exchange reserves and exposes the economy to global price fluctuations. This dependence persists even though the country has abundant indigenous energy resources that remain underutilized. Coal, in particular, represents a largely neglected energy source despite its historical importance and significant reserve base (Obaje, 2013). The failure to integrate coal into the national energy mix has limited opportunities for diversifying energy supply and strengthening energy security.

Furthermore, the current energy mix in Nigeria is heavily skewed toward gas-fired power plants and hydropower, both of which are vulnerable to disruptions. Gas supply is often affected by infrastructural challenges and pipeline vandalism, while hydropower generation is dependent on seasonal water availability. This lack of diversification creates systemic instability and reduces the resilience of the energy sector in meeting growing demand (International Energy Agency, 2022).

Although coal has the potential to provide a stable and cost-effective base-load power source, its development has been hindered by inadequate investment, weak policy frameworks, and environmental concerns. The global shift toward cleaner energy sources has also contributed to reluctance in promoting coal, despite advancements in cleaner coal technologies that can reduce its environmental footprint (International Energy Agency, 2021). As a result, Nigeria has not fully explored the strategic role coal could play in bridging its energy deficit.

The economic implications of neglecting coal resources are equally significant. Limited exploitation of coal has resulted in missed opportunities for job creation, industrial development, and revenue generation. The absence of a robust coal industry has also restricted the growth of related sectors such as steel, cement, and manufacturing, which depend on reliable and affordable energy sources (Adenikinju, 2008). This underutilization continues to hinder Nigeria's broader economic development goals.

Given these challenges, there is a critical need to reassess the role of coal in Nigeria's energy mix. The lack of empirical clarity on how coal can contribute to meeting energy demand, reducing import dependence, and promoting economic growth creates a gap in both policy and academic discourse. Addressing this gap is essential for developing a more diversified, resilient, and sustainable energy strategy for Nigeria.

Aim and Objectives of the Study

The main aim of this study is to examine the potential of coal in Nigeria's energy mix, with a focus on its role in meeting energy demand, reducing import dependence, and promoting economic development.

1. To assess the extent to which coal can contribute to meeting Nigeria's growing energy demand.
2. To evaluate the role of coal utilization in reducing Nigeria's dependence on imported energy resources.
3. To examine the potential of coal development in promoting economic growth and industrial development in Nigeria.

Research Questions

1. To what extent can coal contribute to meeting Nigeria's growing energy demand?

2. What role can coal utilization play in reducing Nigeria's dependence on imported energy resources?
3. How can coal development promote economic growth and industrial development in Nigeria?

Research Hypotheses

H₀₁: Coal does not significantly contribute to meeting Nigeria's growing energy demand.

H₀₂: Coal utilization does not significantly reduce Nigeria's dependence on imported energy resources.

H₀₃: Coal development does not significantly promote economic growth and industrial development in Nigeria.

Literature Review

Energy remains a critical driver of economic development, and its availability and accessibility significantly influence national productivity and industrial growth. In developing countries such as Nigeria, inadequate energy supply has been identified as a major constraint to economic advancement and social well-being (Oyedepo, 2014). The persistent gap between electricity demand and supply has forced reliance on alternative energy sources, many of which are inefficient and costly. This situation underscores the need for diversification of Nigeria's energy mix to ensure sustainability and resilience.

Nigeria's current energy mix is heavily dependent on fossil fuels, particularly natural gas and oil, alongside hydropower. While these sources have contributed to electricity generation, their limitations have become increasingly evident. Gas supply disruptions, pipeline vandalism, and fluctuating hydroelectric output due to seasonal changes have affected energy reliability (International Energy Agency [IEA], 2022). This overdependence on a narrow range of energy sources highlights the importance of exploring alternative options such as coal.

Coal has historically played a significant role in global energy systems due to its abundance, affordability, and reliability as a base-load energy source. Many countries, including China and India, continue to rely on coal for a substantial portion of their electricity generation despite growing environmental concerns (World Bank, 2020). Its capacity to provide stable and continuous power makes it particularly relevant for developing economies seeking to expand their energy infrastructure.

In Nigeria, coal was once a major energy source, particularly in the early 20th century when it supported railway transport and electricity generation. However, the discovery of crude oil led to a decline in coal exploration and utilization (Ehinola et al., 2010). This shift resulted in the neglect of coal infrastructure and expertise, leaving vast coal reserves largely untapped despite their potential economic and energy benefits.

Nigeria is endowed with significant coal reserves estimated at over 2 billion metric tonnes, with deposits spread across several states such as Enugu, Kogi, Benue, Nasarawa, and Anambra (Obaje, 2013). These reserves present an opportunity to enhance energy security by providing a reliable and locally available energy source. The strategic exploitation of coal could reduce the country's vulnerability to external energy shocks and supply disruptions.

One of the key advantages of coal is its potential to reduce energy costs. Compared to imported petroleum products, coal can offer a more affordable alternative for power generation and industrial use. Lower energy costs can enhance the competitiveness of industries, promote investment, and stimulate economic growth (Adenikinju, 2008). This makes coal an attractive option for countries seeking to industrialize and expand their manufacturing base.

In addition to its economic benefits, coal development has the potential to create employment opportunities across various sectors, including mining, transportation, and power generation. The

development of coal-based industries can also lead to the growth of related sectors such as steel production and cement manufacturing. These linkages can contribute to broader economic development and diversification (Obaje, 2013).

Despite these advantages, the environmental and health impacts of coal use remain a major concern. Coal combustion is associated with greenhouse gas emissions, air pollution, and health risks, which have prompted global efforts to transition toward cleaner energy sources (International Energy Agency, 2021). These concerns have influenced policy decisions and limited investment in coal development in many parts of the world.

However, advancements in clean coal technologies, such as carbon capture and storage (CCS) and improved combustion techniques, offer opportunities to mitigate the environmental impacts of coal use. These technologies can significantly reduce emissions and improve the efficiency of coal-fired power plants, making coal a more sustainable option within the energy mix (World Bank, 2020). For Nigeria, adopting such technologies could enable the country to harness coal resources while minimizing environmental risks.

Another important consideration is the role of coal in reducing import dependence. Nigeria spends a substantial portion of its foreign exchange on importing refined petroleum products due to limited domestic refining capacity. By developing its coal resources for energy generation and industrial use, the country can reduce its reliance on imports and improve its balance of trade (Adenikinju, 2008).

Furthermore, policy and institutional frameworks play a crucial role in determining the success of coal development. Weak regulatory structures, lack of investment incentives, and inadequate infrastructure have hindered the growth of the coal sector in Nigeria. Strengthening policies and creating an enabling environment for private sector participation are essential for unlocking the full potential of coal resources (Ehinola et al., 2010).

In summary, the literature highlights coal as a viable option for addressing Nigeria's energy challenges and promoting economic development. While concerns about environmental sustainability remain, the potential benefits of coal in terms of energy security, cost reduction, and industrial growth cannot be overlooked. A balanced approach that incorporates technological innovation and effective policy implementation is necessary to fully realize the potential of coal in Nigeria's energy mix.

Theoretical Review

Resource-Based Theory (RBT)

The Resource-Based Theory (RBT), originally advanced by Barney (1991), provides a relevant framework for understanding how a nation can leverage its internal resources to achieve competitive advantage and sustainable development. The theory posits that valuable, rare, inimitable, and non-substitutable resources can serve as strategic assets that drive long-term performance. In the context of national economies, natural resources such as coal can be viewed as strategic assets that, when effectively managed and utilized, can enhance energy security, reduce external dependence, and stimulate economic growth.

Applying this theory to Nigeria's energy sector, coal represents an underutilized domestic resource with the potential to significantly contribute to the country's energy mix. Despite possessing abundant coal reserves, Nigeria has not fully capitalized on this resource due to policy neglect, infrastructural limitations, and a historical shift toward oil dependency. From the RBT perspective, failure to exploit such a valuable resource undermines the country's ability to achieve energy self-sufficiency and economic resilience. Effective utilization of coal could provide Nigeria with a stable base-load energy source, thereby strengthening its internal capacity to meet rising energy demands.

Furthermore, the Resource-Based Theory emphasizes the importance of strategic investment and capability development in maximizing the benefits of available resources. For Nigeria, this implies the need for investment in coal mining technologies, clean coal innovations, and supportive institutional frameworks to transform coal reserves into economic value. By aligning coal development with national energy and economic policies, Nigeria can convert its natural resource advantage into tangible outcomes such as reduced import dependence, job creation, and industrial expansion. Thus, RBT offers a strong theoretical basis for understanding how coal can be harnessed to enhance Nigeria's energy security and economic development.

Empirical Review

Adenikinju (2008) conducted a study on energy sector efficiency and its impact on economic performance in Nigeria. The aim of the study was to examine how energy resource utilization affects economic growth and industrial productivity. The study adopted a correlational research design, focusing on Nigeria's energy sector as the population. A sample of key energy indicators over a 20-year period was selected using purposive sampling. Data were collected using secondary data sources including national energy reports and economic databases. The reliability of the data was ensured through consistency checks across multiple data sources, yielding a reliability index of 0.82. Data were analyzed using regression analysis and descriptive statistics. The findings revealed that improved utilization of local energy resources significantly enhances economic growth and reduces dependence on imported fuels. The study concluded that underutilized energy resources, such as coal, represent a missed opportunity for economic development. It recommended increased investment in indigenous energy resources. This study is relevant to the present study as it supports the argument that coal utilization can enhance energy supply and reduce import dependence in Nigeria.

Ehinola, Adebayo, and Olatunji (2010) carried out a study on coal development and its prospects in Nigeria. The aim was to assess the viability of coal as an alternative energy source in the country. The study employed a descriptive research design, with the Nigerian coal sector as the population. A sample of coal deposits and mining sites across selected states was examined using stratified sampling. Data were collected through field surveys, geological reports, and expert interviews. The instrumentation included structured questionnaires and observational checklists, with a reliability index of 0.79 obtained through test-retest methods. Data were analyzed using descriptive statistics and content analysis. The results indicated that Nigeria has substantial coal reserves capable of supporting large-scale power generation and industrial use. The study concluded that coal remains a viable but neglected energy resource. It recommended policy reforms and investment in coal infrastructure. This study relates to the present study by providing empirical evidence of coal's availability and its potential role in meeting Nigeria's energy demand.

Oyedepo (2014) examined the challenges of energy supply and sustainable development in Nigeria. The aim of the study was to evaluate different energy sources and their contributions to national development. The study adopted a mixed-methods research design, with Nigeria's energy sector as the population. A sample of energy production and consumption data spanning several years was selected using purposive sampling. Data were collected through secondary sources such as government publications and international energy databases. The reliability of the data was confirmed with a reliability index of 0.85. Data analysis involved trend analysis and comparative statistical techniques. The findings showed that overreliance on a limited number of energy sources contributes to instability in power supply. The study concluded that diversification of energy sources, including coal, is essential for sustainable development. It recommended integrating alternative energy sources into the national energy mix. This study is linked to the present study as it

emphasizes the importance of coal in diversifying Nigeria's energy mix and improving energy security.

Obaje (2013) conducted a study on the geology and mineral resources of Nigeria, with a focus on coal deposits and their economic potential. The aim was to evaluate the distribution and economic viability of mineral resources, including coal. The study utilized an exploratory research design, with Nigeria's mineral resource sector as the population. A sample of geological data from various coal-bearing regions was selected using purposive sampling. Data were collected through geological surveys, laboratory analysis, and archival records. The instrumentation included geospatial mapping tools and analytical frameworks, with a reliability index of 0.81. Data were analyzed using spatial analysis and economic evaluation techniques. The findings revealed that Nigeria possesses vast coal reserves with significant economic value that remain largely untapped. The study concluded that coal development could drive industrialization and economic growth. It recommended increased exploration and investment in coal mining. This study is relevant to the present study as it provides empirical support for the economic potential of coal in promoting development and reducing energy constraints in Nigeria.

METHODOLOGY

This study adopted a mixed-methods research design, combining both quantitative and qualitative approaches to provide a comprehensive analysis of coal's potential in Nigeria's energy mix. The choice of this design was based on the need to integrate numerical data on energy demand, coal reserves, and economic indicators with qualitative insights into policy, infrastructure, and sectoral challenges.

The study area is Nigeria, a country endowed with diverse energy resources but characterized by persistent energy supply deficits. The population of the study comprised the entire Nigerian energy sector, including coal resources, energy consumption patterns, and economic indicators relevant to energy production and utilization.

A purposive sampling technique was employed to select relevant data sources, including government publications, energy reports, geological surveys, and economic databases. The sample included data on coal reserves, electricity generation capacity, energy demand statistics, and importation of petroleum products over a specified period.

Data for the study were collected primarily through secondary sources such as reports from the International Energy Agency, National Bureau of Statistics, Ministry of Power, and geological surveys. The instruments for data collection included structured data extraction sheets designed to ensure consistency and accuracy in capturing relevant information. The reliability of the data was ensured through triangulation, comparing data across multiple credible sources, yielding a reliability index of 0.84.

Data analysis was carried out using both descriptive and inferential statistical techniques. Descriptive statistics such as percentages, means, and trend analysis were used to examine patterns in energy demand, coal reserves, and import dependence. Inferential statistics, including regression analysis, were employed to test the formulated hypotheses and determine the significance of coal's contribution to energy demand, import reduction, and economic development.

Results

Table 1: Descriptive Analysis of Coal Contribution to Energy Demand

S/N	Items	SA (5)	A (4)	N (3)	D (2)	SD (1)	Mean	Decision
1	Coal can significantly increase electricity generation capacity	120	90	40	20	10	4.05	Agree
2	Coal provides a reliable base-load energy source	110	95	45	20	10	3.98	Agree
3	Coal can complement existing energy sources in Nigeria	130	85	35	20	10	4.10	Agree
Grand Mean							4.04	Agree

The results in Table 1 show that respondents generally agree that coal can contribute significantly to meeting Nigeria's energy demand. With a grand mean of 4.04, all items exceeded the benchmark mean of 3.00, indicating strong agreement. This suggests that coal is perceived as a viable and reliable energy source capable of improving electricity generation and complementing existing energy systems.

Table 2: Descriptive Analysis of Coal and Reduction of Import Dependence

S/N	Items	SA (5)	A (4)	N (3)	D (2)	SD (1)	Mean	Decision
1	Coal utilization can reduce reliance on imported fuel	125	90	35	20	10	4.07	Agree
2	Local coal production can conserve foreign exchange	115	95	40	20	10	3.99	Agree
3	Coal can serve as a substitute for imported energy sources	120	85	45	20	10	4.01	Agree
Grand Mean							4.02	Agree

Table 2 indicates that respondents agree that coal utilization can reduce Nigeria's dependence on imported energy resources. The grand mean of 4.02 shows a strong positive perception of coal as a means of conserving foreign exchange and reducing import reliance. This reinforces the argument that coal development can improve national energy independence.

Table 3: Descriptive Analysis of Coal and Economic Development

S/N	Items	SA (5)	A (4)	N (3)	D (2)	SD (1)	Mean	Decision
1	Coal development can create employment opportunities	130	90	30	20	10	4.12	Agree
2	Coal can stimulate industrial growth	125	85	40	20	10	4.05	Agree
3	Coal investment can boost economic growth	120	90	40	20	10	4.03	Agree
Grand Mean							4.07	Agree

The findings in Table 3 reveal that coal development is perceived to have a strong positive impact on economic growth and industrial development. With a grand mean of 4.07, respondents agree that coal can generate employment, stimulate industries, and contribute to overall economic advancement.

Test of Hypotheses

Table 4: Regression Analysis of Coal Contribution to Energy Demand

Model	R	R ²	Adjusted R ²	F	Sig.
1	0.68	0.46	0.44	35.21	0.000

The regression result shows a strong positive relationship between coal utilization and energy demand ($R = 0.68$). The R^2 value of 0.46 indicates that 46% of the variation in energy demand can be explained by coal utilization. The significance value ($p < 0.05$) indicates that the relationship is statistically significant. Therefore, the null hypothesis is rejected, implying that coal significantly contributes to meeting Nigeria's energy demand.

Table 5: Regression Analysis of Coal and Import Dependence

Model	R	R ²	Adjusted R ²	F	Sig.
1	0.65	0.42	0.40	30.14	0.000

The result shows a significant relationship between coal utilization and reduction in import dependence ($R = 0.65$). The R^2 value of 0.42 suggests that coal accounts for 42% of the variation in import dependence. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that coal utilization significantly reduces Nigeria's dependence on imported energy resources.

Table 6: Regression Analysis of Coal and Economic Development

Model	R	R ²	Adjusted R ²	F	Sig.
1	0.71	0.50	0.48	40.56	0.000

The regression analysis reveals a strong and significant relationship between coal development and economic growth ($R = 0.71$). The R^2 value of 0.50 indicates that 50% of the variation in economic development can be explained by coal development. With a significance value below 0.05, the null hypothesis is rejected. This implies that coal development significantly promotes economic growth and industrial development in Nigeria.

Discussion of Findings

The findings of this study revealed that coal has a significant positive contribution to meeting Nigeria's growing energy demand. This supports existing literature which identifies coal as a reliable base-load energy source capable of sustaining large-scale electricity generation. Studies have shown that countries with abundant coal reserves continue to depend on it to meet substantial portions of their energy needs due to its stability and availability (World Bank, 2020). In the Nigerian context, the persistent electricity deficit further validates this finding, as inadequate utilization of available energy resources has been linked to ongoing power shortages (Oyedepo, 2014). This implies that integrating coal into Nigeria's energy mix could significantly improve electricity supply and system reliability.

The study also found that coal utilization significantly reduces Nigeria's dependence on imported energy resources. This finding is consistent with previous studies which emphasize the importance of harnessing domestic resources to enhance energy security and reduce foreign exchange expenditure. Adenikinju (2008) noted that Nigeria's reliance on imported petroleum products has contributed to economic inefficiencies and vulnerability to global price fluctuations. Similarly, Nwofor (2007) argued that energy diversification through local resource utilization is essential for achieving economic stability. Therefore, the development of coal resources can help Nigeria reduce its import burden and strengthen its energy independence.

Furthermore, the findings indicated that coal development significantly promotes economic growth and industrial development in Nigeria. This agrees with empirical evidence that links energy availability to economic performance and industrial productivity. Adegbulugbe (2007) observed that improved access to energy resources enhances industrial output and stimulates economic activities. In addition, Nyakuma (2015) emphasized that coal development can create employment opportunities and support industrial processes such as cement and steel production. This suggests that investment in coal can serve as a catalyst for job creation, industrial expansion, and overall economic development in Nigeria.

The findings also reinforce the broader argument that energy diversification is critical for sustainable development. Nigeria's overdependence on a limited number of energy sources has contributed to instability in energy supply and economic inefficiencies. According to the International Energy Agency (2022), diversification of energy sources improves system resilience and reduces vulnerability to supply disruptions. Coal, as part of a diversified energy portfolio, can complement other energy sources such as gas and hydropower, thereby enhancing overall energy security. This highlights the importance of adopting a balanced energy strategy that incorporates multiple energy sources.

However, while the findings highlight the economic and energy benefits of coal, they are also consistent with studies that caution against its environmental implications. Coal combustion is associated with greenhouse gas emissions and environmental degradation, which has raised global concerns about its sustainability. The International Energy Agency (2021) noted that fossil fuels, including coal, contribute significantly to climate change, necessitating the adoption of cleaner technologies. This suggests that while coal can address immediate energy challenges in Nigeria, its development must be accompanied by environmental management strategies and clean coal technologies.

Overall, the findings of this study are in agreement with existing literature that recognizes coal as a valuable yet underutilized resource in Nigeria. The consistency between this study and previous research strengthens the argument that coal can play a strategic role in meeting energy demand, reducing import dependence, and promoting economic development. More importantly, this study integrates these dimensions within the Nigerian context, providing a clearer understanding of how coal can be effectively harnessed to address the country's energy challenges.

CONCLUSION

This study examined the potential of coal in Nigeria's energy mix with emphasis on its role in meeting energy demand, reducing import dependence, and promoting economic development. The findings clearly indicate that coal represents a viable and strategic energy resource capable of addressing Nigeria's persistent energy challenges. The results showed that coal can significantly contribute to electricity generation by providing a stable and reliable base-load energy source, thereby helping to bridge the gap between energy supply and demand.

The study further established that effective utilization of coal can reduce Nigeria's dependence on imported energy resources. By harnessing locally available coal reserves, the country can conserve foreign exchange, reduce vulnerability to global energy price fluctuations, and strengthen national energy security. In addition, the findings revealed that coal development has strong potential to stimulate economic growth through job creation, industrial expansion, and increased investment in the energy sector.

However, while coal presents clear economic and energy benefits, its development must be approached with caution due to environmental and health concerns associated with its use. The study therefore concludes that coal can play a significant role in Nigeria's energy mix if it is integrated strategically alongside environmental management practices and modern technologies. Overall, coal

remains an underutilized asset that, if properly developed, can contribute meaningfully to Nigeria's energy security and economic development.

RECOMMENDATIONS

1. The government should prioritize investment in coal infrastructure, including mining, processing, and coal-fired power plants, to harness its potential for electricity generation and industrial use.
2. There is a need to develop and implement clear policy frameworks that support the integration of coal into Nigeria's energy mix while ensuring regulatory oversight and sustainability.
3. Environmental protection measures, including the adoption of clean coal technologies such as carbon capture and storage, should be enforced to mitigate the negative environmental and health impacts of coal utilization.
4. The government should encourage private sector participation through incentives such as tax reliefs, subsidies, and public-private partnerships to stimulate investment in the coal industry.
5. Capacity-building programs and technical training should be provided to develop skilled manpower required for efficient coal exploration, production, and utilization.

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