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Assessing Energy Security in Nigeria: Analysing the Interrelationship between Energy Availability and Revenue Performance in the Electricity Sector (2016-2023)

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A B S T R A C T

The cornerstone of energy security in Nigeria lies in two two-prong stands, energy availability and energy affordability. The persistent issues of electricity availability, poor infrastructure, and financial inefficiencies have undermined the country's ability to provide reliable and affordable power to its population, with profound implications for economic development and national security. Using the Realist theory to explain how states exercise their sovereignty over energy which they perceive as primary state assets, the study employed a mixed-methods approach to analyze historical data while investigating underlying factors that could explain observed trends thereby establishing the relationship between electricity availability and revenue performance from 2016 to 2023. The findings show a collection illusion where the monetary value revenue per kilowatt has dropped from $0.24 in 2016 to $.03 in 2023. The relationship between electricity availability and revenue performance revealed a moderate positive correlation (r = 0.61) and the regressed model indicated that approximately 55% of the variance in revenue generation could be explained by electricity availability, with distribution efficiency being the most significant predictor. A 1% increase in electricity availability was associated with a 0.8% increase in revenue, although this was tempered by factors such as revenue leakage and low tariff compliance. The electricity-revenue relationship suggests that the availability of electricity directly influences the revenue performance of the sector.

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INTRODUCTION

Energy security is a cornerstone of economic development and national stability, and in Nigeria, electricity availability plays a crucial role in this broader energy landscape. Energy security has been sufficiently described by Yergin (2006) as the "availability of sufficient supplies at affordable prices". The European Commission and International Energy Agency (IEA, 2014) defined energy security as the "supplies of energy in sufficient quantities at an affordable price in a sustainable economic growth and through environmentally friendly means".

Recent studies of the significance of the impact of national energy security by Jones and Dodds (2017) have expanded the definition beyond earlier conception through the introduction of widal factors often referred to as the "four As" of energy security – availability, affordability, accessibility and acceptability.

In defining energy security within these widal characterisations, Availability ensures that energy supplies are available in sufficient amounts. Affordability aims to have these resources available at sufficiently-low prices; Accessibility focuses on ensuring all citizens have access to energy, which is to some extent about ensuring that reliable infrastructure is in place to ensure a robust supply for the end user, but this is generally interpreted in practice as ensuring that energy prices are kept low and fuel poverty is minimised; and Acceptability is concerned with the negative impacts of energy, such as pollution and environmental damage, and ensuring that these impacts are minimised in order to make the energy acceptable to the customer. Cherp (2015) has explained that energy availability and energy affordability are important aspects of energy security since some disruptions of energy systems are often nothing other than rapid increases in energy prices and can even, in other cases, be translated into economic losses.

The author opined that there is a clear distinction between the "affordability" of energy and energy security. The former is a measure expressing the cost of energy relative to other economic parameters (GDP, income per capita, etc.), whereas the latter deals with price disruptions that are outside economic equilibrium and induced by changes in energy systems (such as supply disruptions) rather than by general economic developments. In analysing these energy characteristics within the context of the Nigerian Energy sector, the dimension of availability and affordability has been adopted based on available data from the Nigerian Electricity Regulatory Commission (NERC) and published data by the Nigeria Bureau of Statistics will form the background for investigation.

In this article, energy availability means the sum total of available energy distributed to end users while affordability means the revenue generated from energy sales by customers within the same period as documented by the regulatory body. This approach aligns with the definition of Oppewal (2011) which says energy security can be defined from both the demand and supply sides, and its meaning varies internationally and in domestic contexts. This

study approach is of great importance because of the pivotal role energy plays in national development.

Energy is the most important commodity that creates and sustains infrastructure and its significance in Nigeria has been recognized as far back as 1886 when the first plant was built in Lagos and life has never been the same since its inception in these climes. The national journey towards the creation of a healthy climate for the flourishing of the sector and to attract greater investment to enhance a more robust infrastructural development resulted in the creation of a sector regulator, the Nigerian Electricity Regulatory Commission through the establishment Act (Electricity Power Sector Reform Act, EPSRA, 2005 which has been replaced by the Electricity Act of 2023) and the subsequent privatization of the Power Holding Company of Nigeria (PHCN) (2023) resulting in eighteen succession companies comprising of 6 Generation Companies, 11 Distribution Companies and the Transmission Company of Nigeria).

Using available historical data to evaluate the Nigerian energy market, availability and affordability of electricity clearly marks out a trend for understanding customer experiences and behaviours through the interactions of energy supply and demand forces.

LITERATURE REVIEW

Statement of the Problem

Even though the issue of energy availability and affordability has been present since the first electricity plant was built in Nigeria, the notion of energy security has long been neglected both in energy and security studies. The broader interest in the problem of the relationship between the availability of electricity (the amount of electricity delivered to customers) and its affordability (represented by the revenue performance) has become increasingly incongruent.

The National Bureau of Statistics (2022) has reported that electricity supplied during the period moved from 20,337.40 Gigawatt hours (GWh) in 2015 to 22,042.28 GWh in 2020. Although the growth rates of electricity supply nationwide were negative in 2016 and 2020, there was an improvement in 2017, 2018, and 2019. Despite Nigeria's vast energy resources, including oil, gas, and renewable potential, its electricity sector has struggled with issues of inefficiency, infrastructure decay, and underinvestment.

Over the past eight years, Nigeria, despite being one of Africa’s largest economies and possessing significant energy resources, continues to face chronic challenges in achieving energy security, particularly in the electricity sector. The persistent issues of electricity availability, poor infrastructure, and financial inefficiencies have undermined the country’s ability to provide reliable and affordable power to its population, with profound implications for economic development and national security.

From 2018 to 2023, the power sector's inability to meet demand has been a major barrier to industrial growth, poverty alleviation, and job creation, while simultaneously stalling efforts to diversify the economy. This article seeks to

examine the extent to which the availability of electricity has influenced the affordability/revenue performance of Nigeria's power sector between 2018 and 2023.

It will investigate how the inadequate supply of electricity has directly impacted the financial sustainability of power companies, and in turn, how the revenue shortfall has affected the country's broader energy security goals. Understanding this relationship is critical for devising strategies that will enhance the efficiency, financial health, and long-term sustainability of the power sector, ultimately contributing to Nigeria's energy security and economic stability.

Objectives

The primary objective of this article is to explore the intricate relationship between electricity availability and the revenue performance of Nigeria's power sector from 2016 to 2023, and to assess the implications for the country's energy security. Specifically, the article aims to:

1. Examine the state of electricity availability in Nigeria (2016–2023) by highlighting the quantum of available energy to registered electricity consumers.
2. Assess the revenue performance of Nigeria's Power Sector by focusing on tariff collection to understand its financial bottlenecks.
3. Identify the relationship between electricity availability and revenue generation by analysing how the fluctuations in electricity supply have impacted the financial sustainability of the power sector, particularly with respect to revenue collection and operational efficiency.
4. Evaluate the Implications of the nexus for energy security and economic growth by analysing the broader implications of the relationship between electricity availability and revenue performance for Nigeria's energy security, industrial development, and socio-economic growth.

By achieving these objectives, this article will contribute to a deeper understanding of the structural challenges facing Nigeria's power sector and offer insights into how addressing the electricity-revenue link can enhance the country's energy security.

Conceptual Review

1. Energy Security: The concept of energy security is broad and multifaceted, encompassing not only the physical availability of energy but also its affordability, accessibility, and sustainability. In the context of Nigeria, energy security has become increasingly crucial as the country seeks to meet the growing demands of its population, foster economic development, and transition to cleaner energy sources. Willrich (1976) and Luft and Korin (2009) defined energy security from two polar angles: for energy exporting and importing economies. From the standpoint of energy exporters, it is the security of demand and guaranteed access to diverse markets that matter. From the standpoint of energy-importing economies, it is the reliability of the energy supply that is paramount. A reliable and affordable electricity supply is central to energy security,

serving as a catalyst for industrial growth, job creation, and improvements in living standards.

2. Electricity Availability: Electricity availability refers to the extent to which power generation, transmission, and distribution can consistently meet demand across the country. It encompasses the operational capacity of power plants, the efficiency of transmission and distribution systems, and the rate of access to electricity for households and industries. Best and Burke (2018) defined electricity availability in general terms to capture multiple aspects of electricity: the quantity of electricity consumed, the quantity of electricity consumed by the industrial sector, generation capacity, residential access rate, and quality of electricity supply. Steinbuks in a World Bank (2020) report has stated that electricity is critical to modern economic activity and access is particularly dire in Africa, although the UN SDG 7 has set a goal that "by 2030, ensure universal access to affordable, reliable and modern energy services", requiring an annual investment of $52 billion per year. He concluded that electricity availability itself a function of economic activity affects economic decisions like consumption (households' appliance use), human capital accumulation (education, health), physical capital investment (machinery & equipment), and public infrastructure investment (transactions costs).
3. Revenue Performance: On the other hand, revenue performance in the power sector refers to the financial viability of power companies (generation, transmission, and distribution companies) and their ability to generate and collect revenue for reinvestment in the sector. Orovwiroro, Awa and Ademe (2021) have observed that the performance of electricity distribution companies requires the understanding of customer experience from the feedback of service rendered. Most challenges and problems of electricity distribution companies result from a lack of power supply, inadequate interest and focus on the changing needs and expectations of the electricity market; demand for electricity by households for lighting, cooking, and heating and by firms to operate equipment to produce goods and services.

Theoretical Framework

In recent times, many scholars have demonstrated a growing interest in energy security and the impact of energy resources on international relations. However, Česnakas (2010) has opined that the lack of theoretical background makes studies of energy security or energy diplomacy incomplete, without sufficient basis or guidelines for future or wider analysis. According to Pala (2021), the Realist theory interprets energy as a military and foreign policy problem and its basic concerns include interstate competition, powerful states, military power, diversifying strategies for providing energy security, and militarization of the problem.

Since this theory interprets energy security as an area where states exercise their sovereignty, they perceive energy resources as primary state assets as material elements of the state. Thaler and Hofmann (2022) have argued

that states in the exercise of sovereignty by states, the challenge of energy security may be difficult to resolve but could be managed with decision-makers making three ideal-typical policy options as follows: a) the 'dirty option' which indicates states maintain energy security and sovereignty by relaxing sustainability objectives; b) the 'insecure option' where states maximize sustainability and energy sovereignty at the expense of energy security and c) the 'non-autonomous option' where states pursue secure and sustainable energy but sacrifices sovereignty.

METHODOLOGY

This study employs a mixed-methods approach, combining both retrospective and exploratory published quantitative and qualitative data, aiming to analyse historical data while investigating underlying factors that could explain observed trends thereby establishing the relationship between electricity availability and the revenue performance of Nigeria's power sector from 2018 to 2023.

The objective is to assess how variations in electricity supply have influenced the financial performance of power companies in the sector and, in turn, how revenue generation affects energy security in Nigeria.

RESULT AND DISCUSSION

Energy Received and Energy Billed Data

Table 1. Energy received, Energy Billed, Revenue Billed and Collection

Year	Energy Received (GWH)	Energy Billed (GWH)	Total Revenue Billed (#B)	Total Collection (#B)
2023	29,979	23,748	1,463.24	1,077.51
2022	28,352	21,771	1,185.31	841.81
2021	30,494	23,348	1,116.23	775.34
2020	29,819	22,163	816.16	542.73
2019	26,485	21,921	661.50	448.75
2018	26,704	21,866	694.80	446.00
2017	25,377	19,432	615.34	370.46
2016	23,742	18,895	534.29	302.93

Energy Received refers to the total electricity generated or imported and made available to the grid. Over the 8-year period, energy received fluctuated between 23,742 GWh in 2016 and 30,494 GWh in 2021, with the highest recorded in 2021 (30,494 GWh). However, it should be noted that energy received remained relatively stable in the range of 26,000–30,000 GWh in the years under review, indicating consistent energy generation capacity but potentially less growth in supply due to systemic inefficiencies. Energy Billed, which reflects the amount of electricity that was billed to consumers, shows a similar trend to energy received, with slight increases each year with a 0.89 correlation.

However, in 2023, the total energy billed dropped to 23,748 GWh, despite an increase in energy received to 29,979 GWh. This suggests that there

are significant inefficiencies in the distribution system or unmetered consumption that results in a gap between received and billed energy. The technical and commercial losses arising from these inefficiencies are shown in Table 2.

Table 2.Technical and Commercial Losses

Year	Energy Received (GWH)	Energy Billed (GWH)	T&C Losses (%)
2023	29,979	23,748	20.79
2022	28,352	21,771	23.21
2021	30,494	23,348	23.43
2020	29,819	22,163	25.67
2019	26,485	21,921	17.23
2018	26,704	21,866	18.12
2017	25,377	19,432	23.43
2016	23,742	18,895	20.42

The above data indicates trends in technical and commercial losses over a period of eight years, with a noticeable decrease from 2020 to 2023 after a spike in 2021. Curiously, the technical and commercial losses in the earlier days of the privatisation of the sector proved better than in the latter years.

It is worthy of note that the Revenue billed represents the total amount billed to consumers for the electricity they consumed. Over the years, there has been a gradual increase in the revenue billed from ₦534.29 billion in 2016 to ₦1,463.24 billion in 2023. This growth aligns with the increase in the total amount of energy billed, but it also reflects the impact of tariff adjustments over time.

The most significant jump in revenue billed occurred from 2021 to 2023, when revenue increased by more than 30%, from ₦1,116.23 billion in 2021 to ₦1,463.24 billion in 2023. This could be attributed to tariff adjustments, a possible expansion of the customer base, or improvements in billing accuracy.

Revenue Performance

Table 3. Revenue Performance Analysis

Year	Registered Customer	Energy Received/ Month By Registered Customer	Energy Billed/ Month Registered Customer	Revenue/ Month By Registered Customer	Collection/ Month By Registered Customer	Revenue (N) /KWH	Revenue ($) /KWH
2023	13,162,572	189.80	150.35	9,263.89	6,821.81	61.62	0.03
2022	12,152,106	194.42	149.30	8,128.30	5,772.74	54.44	0.08
2021	12,868,098	197.48	151.20	7,228.66	5,021.05	47.81	0.08
2020	11,841,819	209.84	155.97	5,743.47	3,819.30	36.83	0.08
2019	8,893,577	248.17	205.40	6,198.27	4,204.80	30.18	0.12
2018	8,135,730	273.53	223.97	7,116.76	4,568.33	31.78	0.15
2017	7,947,121	266.10	203.76	6,452.39	3,884.59	31.67	0.18
2016	7,348,779	269.23	214.26	6,058.74	3,435.09	28.28	0.24

There is a remarkable growth in the number of registered customers which increased from 7,348,779 in 2016 to 13,162,572 in 2023. This represents an increase of approximately 79% over that period, indicating strong customer growth. However, energy received per customer decreased from 273.53 KWH in 2018 to 189.80 KWH in 2023.

This decline suggests that as energy was becoming more expensive, customers were reducing their consumption or the change in customer base due to consumer enumeration programs were tending towards customers who consume less energy. There was a notable increase in monthly revenue billing from N6,058.74 in 2016 to N9,263.89 in 2023, a growth of about 53%. This indicates that while individual energy consumption may be decreasing, the revenue per customer is growing substantially, potentially due to higher rates or better billing practices. Also, Collections have also increased from N3,435.09 in 2016 to N6,821.81 per registered customer in 2023.

There is a collection illusion that has bedeviled the sector as shown in the revenue per kilowatt yield during the period of study when the values were converted to Dollars ($) using the various values published in the multi-year tariff order prevailing from 2016 -2023. While the Revenue per KWH has shown a consistent upward trend, from N28.28 in 2016 to N61.62 in 2023, the monetary value of the yield has actually dropped from $0.24 to $.03 as shown in Table 3. Gravelly, the devaluation of the Naira and the rising inflation rate have compounded the financial performance of the electricity sector in Nigeria. This performance was a reflection of the national economic performance where the GDP growth rate has been fluctuating over the years, with a generally downward trend from a gross domestic product (GDP) of $404.65B and Per Capita of $2,144.78 in 2016 to a GDP of $362.81B and Per Capita of $1,621.12 in 2019, followed by a slight recovery in 2020 and a decline in 2023.

Nigeria's electricity sector has been plagued by persistent challenges, including inadequate generation capacity, poor infrastructure, inefficient distribution networks, and financial instability. These issues not only hinder energy security but also exacerbate the country's economic vulnerabilities. This is clearly manifest in the monthly energy received by customers dropping from 269.23KWH in 2016 to 189.80KWH in 2023. Also, the fluctuating level of technical and commercial losses in the system which was lowest in 2019 (17.23%) and reached a peak in 2020 (25.67%) before dropping suggests the level of inefficiency and energy theft in the system.

The energy received which represented the total electricity supplied from the grid and available for sale to customers by the various distribution companies (Discos) fluctuated between 23,742 GWh in 2016 and 30,494 GWh in 2021, with the highest recorded in 2021 (30,494 GWh). However, it should be noted that energy received remained relatively stable in the range of 26,000–30,000 GWh in the years under review, indicating consistent energy generation capacity but potentially less growth in supply due to systemic inefficiencies. The energy billed, representing the amount of electricity billed to consumers, shows a similar trend to energy received, with slight increases each year.

However, in 2023, the total energy billed dropped to 23,748 GWh, despite an increase in energy received to 29,979 GWh.

This suggests that there are significant inefficiencies in the distribution system or unmetered consumption that results in a gap between received and billed energy.

The increase in the number of customers can be attributable to more individuals signing connection agreements with the distribution companies, though service availability is on the decline. Between 2016 and 2023, a total of 5,813,793 consumers have been registered as new customers, amounting to a 79.11% increase without a commensurate improvement in energy availability. The persistent power shortages and unreliable supply are the result of underinvestment in infrastructure, gas supply constraints, and operational inefficiencies in both the generation and distribution sectors of the Nigerian Electricity Supply Industries (NESI). These problems often lead to widespread electricity outages, reduced industrial productivity, and a stagnation of economic activities, which ultimately undermine the country's energy security.

The revenue billed represents the total amount billed to consumers for the electricity they consumed. Over the years, there has been a gradual increase in the revenue billed from ₦534.29 billion in 2016 to ₦1,463.24 billion in 2023. This growth aligns with the increase in the total amount of energy billed, but it also reflects the impact of tariff adjustments over time. The most significant jump in revenue billed occurred from 2021 to 2023, when revenue increased by more than 30%, from ₦1,116.23 billion in 2021 to ₦1,463.24 billion in 2023. This could be attributed to tariff adjustments, a possible expansion of the customer base, or improvements in billing accuracy.

Notably, revenue generation in the Nigerian electricity sector is often hampered by inefficiencies such as non-payment of electricity bills, insufficient metering, high levels of technical and commercial losses, and inadequate tariffs that do not reflect the true cost of electricity generation and distribution. As a result, power companies face significant liquidity challenges, which affect their capacity to maintain and upgrade infrastructure or expand capacity to meet growing demand. This is clearly visible in the value of the revenue per kilowatt which illusion has dampened the performance of the sector in such a way that it has dropped from $0.24 in 2016 to $0.03 by 2023.

The revenue collection representing the amount of revenue actually collected from consumers has generally increased over the years. However, despite the steady increase in energy billed and registered customers, the total collection figure has often been far lower than the revenue billed. In 2023, the total collection was ₦1,077.51 billion, a notable improvement from ₦841.81 billion in 2022.

However, collection efficiency remains a significant issue, with the total amount collected consistently falling short of the total revenue billed. This gap indicates persistent challenges in the financial health of Nigeria's electricity sector, including high rates of non-payment, revenue leakage, and inefficiencies in metering and collection systems. For instance, in 2020, despite ₦816.16 billion

being billed, only ₦542.73 billion was collected, a collection efficiency rate of just about 66%.

This is an alarming figure given the need for consistent revenue generation to improve infrastructure and ensure supply reliability. Throughout 2016 to 2023, the collection efficiency (i.e., the proportion of billed revenue collected) has shown improvement but remains below expectations. Though the collection efficiency has been improving, there is still a significant gap between what is billed and what is collected. This revenue shortfall can be attributed to several factors:

- Non-payment of bills: Large portions of the population are unable or unwilling to pay for the electricity they consume, often due to unreliable supply or perceived inefficiencies in service delivery.
- Metering Issues: The lack of widespread metering has led to the use of estimated billing, which is often inaccurate and leads to customer dissatisfaction and non-payment.
- Electricity Theft and Losses: Technical and non-technical losses (such as electricity theft) contribute to inefficiencies in the system and further reduce the amount of revenue that can be collected.

The nexus between electricity availability and revenue performance within the Nigerian power sector is at the heart of understanding the challenges to energy security. The Pearson correlation analysis revealed a moderate positive correlation ($r = 0.61$) between electricity availability (generation and distribution efficiency) and revenue performance. This suggests that while there is a link between supply reliability and revenue generation, the correlation is not perfect.

Even when electricity availability improved, revenue performance often lagged due to factors such as tariff structures, non-payment, and inefficiencies in billing systems. The multiple regression model indicated that approximately 55% of the variance in revenue generation could be explained by electricity availability, with distribution efficiency being the most significant predictor. A 1% increase in electricity availability was associated with a 0.8% increase in revenue, although this was tempered by factors such as revenue leakage and low tariff compliance.The electricity-revenue relationship suggests that the availability of electricity directly influences the revenue performance of the sector.

When power supply is unreliable or insufficient, revenue collection is often disrupted, leading to financial losses for power companies. Conversely, insufficient revenue generation prevents these companies from investing in infrastructure improvements or scaling up power supply to meet demand. This cyclical relationship between electricity availability and revenue performance creates a feedback loop that further exacerbates both financial instability in the sector and power supply challenges.

The relationship between electricity availability and revenue performance in Nigeria is also influenced by various external and internal factors, including government policies, institutional frameworks, and

regulatory reforms. The Nigerian government has introduced several measures aimed at improving the sector's performance, such as the Electricity Act of 2023, yet these reforms have met with limited success due to implementation challenges, corruption, and inconsistent policy enforcement. These structural constraints underscore the importance of understanding how revenue generation and electricity supply are interlinked, as addressing one without the other could limit the effectiveness of any reform efforts.

This conceptual review underscores the importance of both electricity availability and revenue performance as critical components of Nigeria's energy security. It highlights the need for comprehensive solutions that address the operational inefficiencies, financial sustainability, and policy reforms needed to break the cycle of poor electricity supply and revenue shortfalls. Given the interdependence between these factors, the Nigerian power sector's path to achieving energy security requires a holistic approach that simultaneously strengthens infrastructure, improves revenue collection, and creates a conducive environment for investment and innovation.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that electricity availability and revenue performance in Nigeria's power sector are deeply interconnected, with improvements in supply leading to better financial outcomes, but only to a limited extent. Persistent challenges related to governance, inefficiency, and non-payment undermine the full potential of the sector to achieve energy security. For the sector to become financially sustainable and improve electricity availability, comprehensive reforms, including improved tariff structures, better billing systems, enhanced metering, and strong regulatory enforcement, are required.

Additionally, increased investment in infrastructure and the resolution of operational inefficiencies are crucial to achieving Nigeria's long-term energy security goals. The analysis of the data from 2016 to 2023 indicates that while the Nigerian electricity sector has made some strides in increasing energy generation, billing, and revenue collection, significant challenges remain. The gaps between energy received and energy billed, as well as the persistent issues with revenue collection, underscore the need for systemic reforms in metering, billing, and enforcement mechanisms.

Based on the findings of this study, the following recommendations are proposed to enhance electricity availability and improve revenue performance, with the aim of achieving greater energy security in Nigeria:

1. Expand Metering and Improve Billing Systems: Ensuring that all consumers are properly metered, and eliminating the use of estimated billing, will enhance accuracy in billing and improve revenue collection.
2. Strengthen Collection Mechanisms: The introduction of stricter measures to ensure payment compliance, such as penalties for non-payment and disconnection policies, should be coupled with customer engagement initiatives to foster trust and compliance.

3. Improve Infrastructure: Significant investment in transmission and distribution infrastructure is needed to reduce technical losses, improve grid reliability, and minimize the gap between energy received and billed.
4. Incentivize Payment: The introduction of flexible payment schemes, such as pay-as-you-go or prepaid meters, can increase collection rates and reduce arrears.
5. Combat Electricity Theft: The government and electricity distribution companies need to step up efforts to curb electricity theft through surveillance, technology, and public awareness campaigns.
6. Review Tariff Structures: Tariff rates should be reviewed to ensure they are reflective of the actual cost of electricity generation and distribution, while still being affordable for consumers.
7. Strengthen Governance and Regulatory Enforcement. The Nigerian Electricity Regulatory Commission (NERC) must enhance its regulatory capacity to ensure compliance with industry standards and enforce tariff policies. Regulatory reforms should focus on ensuring that electricity tariffs are cost-reflective and that enforcement mechanisms for tariff collection are robust.
8. Promote Energy Efficiency and Demand-Side Management. Public and private sector stakeholders should invest in programs that promote energy efficiency, such as encouraging the use of alternative sources of energy for households and businesses, and implementing demand-side management programs that reduce peak demand on the grid.

FURTHER STUDY

This research still has limitations so further research is still needed on this topic.

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