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Nigeria's Electric Power Sector Reform, Privatization and Post Reform (2000 - Present): An Analysis of the Current State of Generation Companies (Gencos) and their Ongoing Bottlenecks

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ABSTRACT

Before Privatization in 2013, Nigeria's electricity sector was plagued by inefficiencies, inadequate investment, and persistent power shortages. Chronic under-performance in generation, distribution, and transmission led to unreliable supply, necessitating private sector-led reforms to improve efficiency, attract investment, and ensure cost-reflective pricing. However, soon after privatization, the sector began to witness a number of bottlenecks, including liquidity constraints, Disco's under-performance, metering gaps, transmission constraints, financial sustainability risks, erratic contract implementation, vandalism and tariffs issues. These challenges almost brought the whole sector into a halt, with several grid breakdowns and incessant load shedding all over the country. The objective of this paper is therefore, to review the reform and privatization of the power sector from 2000 to date, with a focus on the analysis of the current state of generation companies and their ongoing bottlenecks. To achieve this objective, the study adopts a mixed method approach, which combines data analysis with insights from a variety of reliable sources, such as industry experts, institutional documentations and stakeholders. The outcome of the study indicates that the Nigeria's Power Sector, particularly the generation sub sector though witnesses some level of improvement since privatization, but still grapples with a lot of uncertainties, leading to frequent breakdowns of grids, unstable power supply and recurring black outs. The study thus recommends the tackling of the staggering multi trillion-naira liquidity crisis in the generation sector, among many other issues.

Keywords: Power Sector, Reform, Privatisation, Post Reform, Generation, Under-performance, Industry Experts, Blackouts, Unstable Power, Grids, Liquidity Crisis.

INTRODUCTION

The power sector in Nigeria had historically from the 1980s started to show signs of under-performance due to years of neglect of the sector. By 1999 when the new civilian government was sworn in, the crisis in the power sector had reached its boiling point. This crisis was clearly manifested with the low generation capacity of the country. Out of the four thermal gas power generation plants and three Hydro Generation plants which were constructed by the government between 1963 and 1986 with a combined generation capacity of 5866 MW, it was only generating about 1750 MW and even then, in a very inefficient and unreliable manner, with incessant black outs and load shedding. Furthermore, the then state utility, National Electricity Power Authority (NEPA) had an over bloated workforce, poor maintenance culture, systemic issues, under funding and huge debts and extremely poor financial record among other myriads of problems. At the same time, there was no institutional and regulatory framework to govern progress and development in the sector and that was why the tariff was only recovering about 30% of cost, which informed part of the reason why the then state utility was insolvent, inefficient, and under performing.

Consequently, the history of the power sector reforms, which is the precursor for the privatization of PHCN successor companies, can be traced to 1998 when the Electricity (amendment) decree and the NEPA (amendment) Act were passed, which effectively terminated the monopoly status of NEPA and opened the sector to private sector investment. Since then, the Nigerian Electricity Supply Industry (NESI) has undergone

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several changes. The NESI has evolved from a vertically integrated utility with legislative monopoly (NEPA), into an unbundled system. This has resulted into the privatization of sixteen of the companies and concessioned of two, while the Transmission Company of Nigeria (TCN), was originally assigned to a Management Contractor, Manitoba Hydro for eight years, which was wholly government-owned. In 2024, the TCN was unbundled which led to the separation of Transmission and System Operations, with the creation of the Nigerian Independent System Operation (NISO) separate from the Transmission Company of Nigeria (TCN).

However, inspite of the reform initiatives, the power sector in Nigeria still grapples with a lot of uncertainties, leading to frequent breakdowns of grids, unstable power supply and recurring black outs. The reality of this poor sector performance has left the public with no choice but to disparage privatization with palpable disquiet among electricity customers.

Objectives of the Study

The main objective of this study is to examine the Nigeria's Power Sector Reform and Privatization (2000 - date), with a focus on the operational performance of generation companies (Gencos) and their current bottlenecks.

While the specific objectives are as follows:

- To analyze the Nigeria's Power Sector Reform, Privatization and Post Reform from 2000 to date.
- To appraise the extent to which privatization has improved the generation capacity and efficiency of GenCos.
- To identify the major operational bottlenecks facing GenCos post-privatization.
- To propose strategic recommendations for enhancing generation capacity and sustainability in Nigeria's power sector.

Research Questions

- How do you analyse the Nigeria's Power Sector Reform and Privatization from 2000 to date.
- How has the privatization of Nigeria's power sector affected the operational performance of generation companies?
- What are the key bottlenecks currently hindering optimal electricity generation in Nigeria?
- What strategies can be implemented to overcome the identified bottlenecks and improve generation capacity?

Research Methodology

The study adopts a mixed method approach, which combines data analysis with insights from a variety of reliable sources, such as industry experts, stakeholders and institutional documentations.

LITERATURE REVIEW

Electricity market reforms in Africa are necessary for improving the sector's performance and attracting private sector investment in electricity generation, distribution and transmission. Reforms in Sub Saharan Africa (SSA) involved a set of steps or measures based on a model template. These steps comprise the enactment of an electricity law, corporatization and commercialization of the core utility, the establishment of an independent regulatory authority, the unbundling of the core utility vertically and horizontally, as well as private participation in the delivery and management of electricity assets (Jamasb T., et al., 2005). These reforms aimed at introducing policies, regulations, and institutions that would unfetter the monopoly of state-owned utilities and provide avenues for private actors to participate in competitive markets (Jamasb T., et al.,

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2017). The underlying objectives was that unbundling of the traditional vertically integrated electricity utility would unravel the vertical diseconomies in the electricity supply industry (ESI). Then, liberalization of the generation and retail segment would ease new entrants from the private sector, which would generate and sustain competition to reveal the optimal levels, mix and prices (Joskow, P.L., et al., 1983). On the other hand, regulation of the transmission and distribution networks and sometimes ownership change would provide high-powered incentives and hard budget constraints. This would internalize the problem of information asymmetry and eradicate the perverse incentives associated with natural monopolies while improving governance and fighting corruption (Newbery, D.M., 2003). Regulatory efficiency improvements are expected to be passed on to consumers directly through price and quality competition, or indirectly through re-investment in new assets (Sen A., et al., 2012).

Electric Power Sector Reform in Africa

Several research and studies indicate that energy sector reforms in Africa have improved electricity access and market efficiency (Dertinger and Hirth, 2020; Eberhard and Catrina Godinho, 2017), yet persistent issues remain, such as unreliable grids and limited attention to local institutional contexts (Peterson, 2022). African countries with vertically unbundled markets that allow the private sector's participation include Ethiopia, Angola, Sudan, Uganda, Algeria, Ghana, Zimbabwe, and Kenya (Trimble et al., 2016). The Government of Uganda began one of the most radical power sector reform programmes in Africa in 1998 with a New Strategy Plan and Implementation Plan for restructuring and privatization in the power sector, including full vertical unbundling of the utility. A new Electricity Act was passed in 1999. In the following 2 years, Uganda increased electricity tariffs by 100%, procured the first IPP in 30 years, and established an independent electricity regulator as well as a dedicated fund and board for rural electrification. Ugandan government then vertically unbundled the utility to three companies for generation (UEGCL), transmission (UETCL), and distribution (UEDCL). The Ugandan Distribution Concessionaire (Umeme) has reduced technical losses substantially in recent years, although overall progress in improving performance has been slow, and the implementation of reforms has been criticized. Umeme faces political pressures in the period leading up to the scheduled renewal of its concession. Collections and financial performance are good, but tariffs are high, in part due to some of the early thermal IPPs. Uganda has succeeded in attracting private investment into IPPs. Its early thermal IPPs were expensive and contributed to high consumer tariffs. However, recent procurements have been more competitive, including its acclaimed GETFiT programme which incentivized investments into small hydro, biomass and solar PV power plants (AFDB 2019).

African countries pursued power sector reforms from the 1990s, adapted from a 'standard model' advanced by development finance institutions (DFI). Governments depended on external donor funding, which often came in the form of structural adjustment packages, requiring the Government to reform strategic sectors of the economy through separation of powers and functions, and introducing market-based incentives. But to date, Africa has not adopted the full 'standard model' suite of reforms. Nowhere in Africa do wholesale or retail electricity markets exist, and only a handful of countries have created independent grids, unbundled from state-owned generation (Eberhard and Godinho (2017). Hartley (2012) argues that efficiency is the most important reasons necessitating the reform of the electricity industry. REEP/UNIDO (2008) identified both external and internal factors, which ranges from lack of required technical and management capacity of state and private firms, efforts by government to mobilize investment capital needed to foster competition, introduction of new tariff regime, move to minimize government's regulatory function, the sector investment and fiscal constraint, and response to international investment climate, structural adjustment, and global economic reform. Moreover, Hartley (2012) further identifies technological changes affecting all countries alike, as largely responsible for the pervasiveness of the electricity sector reforms. Thus, suggesting that fast-paced of technological innovations spread fast and greatly influence the sector's operation.

Furthermore, Jamasb T., et al., (2005), identify three main approaches for evaluating electricity sector reform (ESR) performance in Africa. These includes econometric methods, efficiency and productivity analysis, and individual and comparative case studies. The study indicates that econometric studies are best suited for well-defined issues and hypotheses, while efficiency and productivity analysis (which can be based on econometric methods) are preferred for measuring the efficiency of transforming inputs into outputs relative to best

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practice. Case studies, which are typically conducted at macro (country) or micro (household or firm) levels are suitable when in-depth investigation and qualitative analysis are required.

Overall, most of these studies focus on electricity access and efficiency rather than the direct effects of reforms on renewable energy development (Karekezi and Kimani, 2002). While some work highlights the importance of PPPs and supportive policies in expanding renewables (Sovacool, 2013; Yin and Qamruzzaman, 2024; Zhao et al., 2013), the link between electricity market reform and renewable energy market in Africa remains unexplored.

Electric Power Sector Reform in Nigeria

In the case of Nigeria, both academic, administrators and operators of the electricity sector have identified similar central objectives highlighted earlier as the rationale for the sector reforms. Kadiri et al. (2015), Iseolorunkanmi (2014) amongst other contend that the power sector reform is meant to achieve, reduced cost of production, foster national electricity market development, end epileptic electricity supply, attract new investors to the sector, and improve the generation transmission and distribution network in order to meet up with the required global standards. These objectives, as they appear, are Idyllic with shared features of factors noted by REEP/UNIDO (2008). Tinuoye (2017. p. 2) on the other hand, asserts that the Nigeria electricity sector reform is "one of the boldest initiatives globally." However, the low level of power generation in Nigeria which fluctuates between 3500 and 6000 megawatts with the population of over 180,000,000 while South Africa with approximately 52,000,000 population has attained 40,000,000 megawatts (Gberevbie et al., 2017) appears paradoxical and unlikely to yield the concomitant dividends of the reform exercise

The provision of uninterrupted electric power by developing countries to its citizens will reduce poverty and increase productivity and promote economic growth. The countries of sub-Saharan Africa due to their inability to provide the energy needs of their people cannot adequately provide health services, schools, and the provision of clean water, food security and industries efficiently to the people. That is why the Secretary General of the United Nations established the advisory group on Energy and Climate Change, which on 28 April 2010, through the United Nations Industrial Development Organization (UNIDO) presented a recommendation titled "Energy for a Sustainable Future". The key recommendation of the document is that countries like Nigeria should strive to provide universal access of electricity to all its citizens by 2030. The aim should be to attain the SDGs to enable the poorest escape from poverty. The report further recommends that for countries to attain the above target they must come up with national strategies and long-term policy that will attract investment, define the required human capital resources and the institutional framework to achieve the target.

THEORETICAL FRAMEWORK

This research's theoretical framework is therefore built on the synthesis of New Institutional theory, Investment Climate theory as well as New Public Management theory. By applying these theories to this analysis of market reforms and privatization, especially in relation to the power sector in Nigeria, we can observe that privatization is the transfer of means of production from the state ownership to that of private ownership with the sole aim of enhancing the quality and quantity of power to Nigerians for the overall improvement of the Nigerian economy.

New Institutional Theory

This study is based on the new institutional economics theory, which is closely related to North (1990) and Williamson (2000). The theory is an extension of neoclassical economic theory, which suggest that markets are not divorced from institutional arrangement. Instead, it's the formal rules, informal norms, enforcement mechanisms, property rights, and governance structures that govern exchange and mitigate uncertainty that drive economic performance. North (1990) described institutions as the rules of the game in society; Williamson (2000) argues that institutions are important because of their impact on the transaction costs and the efficiency of economic coordination. Predictable and enforceable institutions, then, will increase the likelihood that investors will invest in productive long-term assets. This theory is relevant to this study because

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the quality of the institutional environment is one of the determinant factors influencing domestic investment, which is measured by gross fixed capital formation.

New Institution theory asserts that electric power sector reform relied not just on market economics, but on formal rules, regulatory agencies, cultural norms as well as cognitive beliefs that shapes how organization behave.

Investment Climate Theory

Another important theoretical basis for understanding the effect of institutional conditions on the decision of investors for domestic investment is investment climate theory. The theory has become popular in the work of World Bank and development economists who have suggested that decisions on investment are not made purely based on financial resources, but on the total investment environment in which firms work. The World Bank (2005) defines the investment climate as the policy, institutional, legal and regulatory environment that affects the opportunities and incentives that firms have to invest productively, to generate jobs and to grow their business activities. The theory affirms that investors consider the institutional risks as well as the expected returns before investing in long-term capital projects. As a result, a positive investment climate helps to decrease uncertainty, transaction costs, business confidence and gross fixed capital formation. Recent research also shows that institutional quality is still one of the most important factors influencing investment performance as it creates greater certainty and reliability in government policies (World Bank, 2024; Organization for Economic Co-operation and Development (OECD], 2023)

Furthermore, Investment Climate theory asserts that a transparent, predictable regulatory framework and enforceable property rights reduce private risk, which facilitate capital influx. In the electric power sector, reforms led to the unbundling of state monopolies, introduce private operators in the sector, put in place an independent regulator to foster commercial viability, enhances service delivery and bring about long-term funding of the sector.

New Public Management theory

New Public Management (NPM) theory applies market ideas to government, which explained the shift from state run utilities to private markets. This theory shifts focus from rigid bureaucratic rules to results, efficiency and market competition. This is the reason why privatization took place, shifting from state run to private sector led ensures efficiency, competition, as well as customer choice. The NPM was coined by British Scholar Christopher Hood in 1991, while American authors David Osborne and Ted Gaebler popularized its practical ideas globally through their 1992 book, Reinventing Government.

Empirical Review

The relationship between electricity market reforms and energy sector performance lies at the intersection of public economics, institutional theory, and investment theory. Electricity sector reforms — such as unbundling, wholesale market liberalization, privatization, and the establishment of independent regulatory authorities — aim to correct inefficiencies associated with vertically integrated public monopolies, enhance competition, and improve investment incentives (Newbery, 2002; Joskow, 2008). In theory, these reforms should promote a more efficient allocation of resources, increase sectoral productivity, and stimulate private investment (Nicodème and Sauner-Leroy, 2007; Konte et al., 2022; Gomado, 2024b).

These reforms influence energy sector performance through multiple channels. Market liberalization and the resulting competition alter energy prices, while subsidy rationalization reduces financial assistance to consumers (Loo and Harun, 2019). These mechanisms directly affect energy accessibility—defined as households' capacity to access energy services and afford them based on their income (Tang et al., 2025). However, a substantial body of literature demonstrates that regulatory reforms alone are often insufficient to generate the expected gains in investment and performance, particularly in developing economies. These contexts are frequently characterized by weak institutions, limited regulatory credibility, high political risk,

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and tight fiscal constraints, all of which substantially reduce the attractiveness of the electricity sector for private investors (Besant-Jones, 2006)

The Road to the Nigeria's Power Sector Reform From 2000 to Date

The first major step to holistically reform the Nigeria's Power Sector was taken by the President Olusegun Obasanjo regime under the auspices of the National Council on Privatization (NCP) Chaired by the then Vice-President Alhaji Atiku Abubakar. A 23-member Electric Power Sector Reform Implementation Committee (EPIC) was empowered by the NCP in 2000 to develop strategies and propose recommendations as to how to promote the goals of total liberalization, competition, and private sector development of the electricity sector.

The committee after extensive deliberations submitted its proposals, which became the first National Electric Power Policy of the country by March 2001 after it had been approved by NCP and Federal Executive Council (FEC). The policy document made the following key recommendations.

- Defined the short-, medium- and long-term objectives of the electricity supply industry, which was to modernize and create an efficient market structure with a clear regulatory framework that will encourage competition along the electricity value-chain and attract private investors.
- Recommended the establishment of the Nigerian Electricity Regulatory Commission (NERC) as an independent agency responsible for managing the sector by issuing operational licenses and deciding the tariff that will govern the sector.
- Defined the structure of the industry and recommended the vertical and horizontal unbundling of the power sector into generation, distribution and transmission.
- Recommended the restructuring and privatization of the generation and distribution companies.

On the basis of the above policy document on August 8th, 2005, the national assembly passed the Electric Power Reform Act 2005 that enacted into law, the required processes for the reform and privatization of the nation's power sector.

The key provisions of the act are as follows

- The act established the emergence of the current Nigerian Electricity Regulatory Commission (NERC).
- The formation of the initial and Successor Companies (SCs) and the transfer of the assets and liabilities of the National Electric Power Authority (NEPA) to Power Holding Company of Nigeria (PHCN).
- Enactment into law how the competitive structure of the electricity market will emerge from the pre-privatization stage to the post-privatization stage.
- The establishment of the Rural Electrification Fund (REA-Fund) etc.

Therefore, it was between 2005 and 2006 that the Nigeria Power Sector reform process received a major push, when the pillars of the reform were implemented with the enactment of the Electric Power Sector Reform (EPSR) Act 2005; Establishment of the regulator, Nigerian Electricity Regulatory Commission (NERC); Formation of the Power Holding Company of Nigeria (PCHN) from the defunct NEPA; Unbundling of PHCN into autonomous companies; six (6) generation companies, one (1) transmission company (TCN), and eleven (11) distribution companies; Implementation of ten (10) National Integrated Power Projects (NIPP), and; Establishment of the System and Market Operations Departments of TCN to manage the wholesale electricity market.

Further to this, between 2007 and 2010, three additional milestones for the reform process were achieved. These includes, the approval of the Multi-Year Tariff Order, establishment of the Presidential Action Committee on Power (PACP) with a view to eliminating red tape and the often over-bureaucratic and inefficient nature of decision-making in government and establishment of the Presidential Task Force on Power (PTFP) which was the engine room that drove the vision of the PACP. The mandate of PTFP was to develop a Power Sector Reform Roadmap and provide necessary monitoring to ensure effective implementation of the plan.

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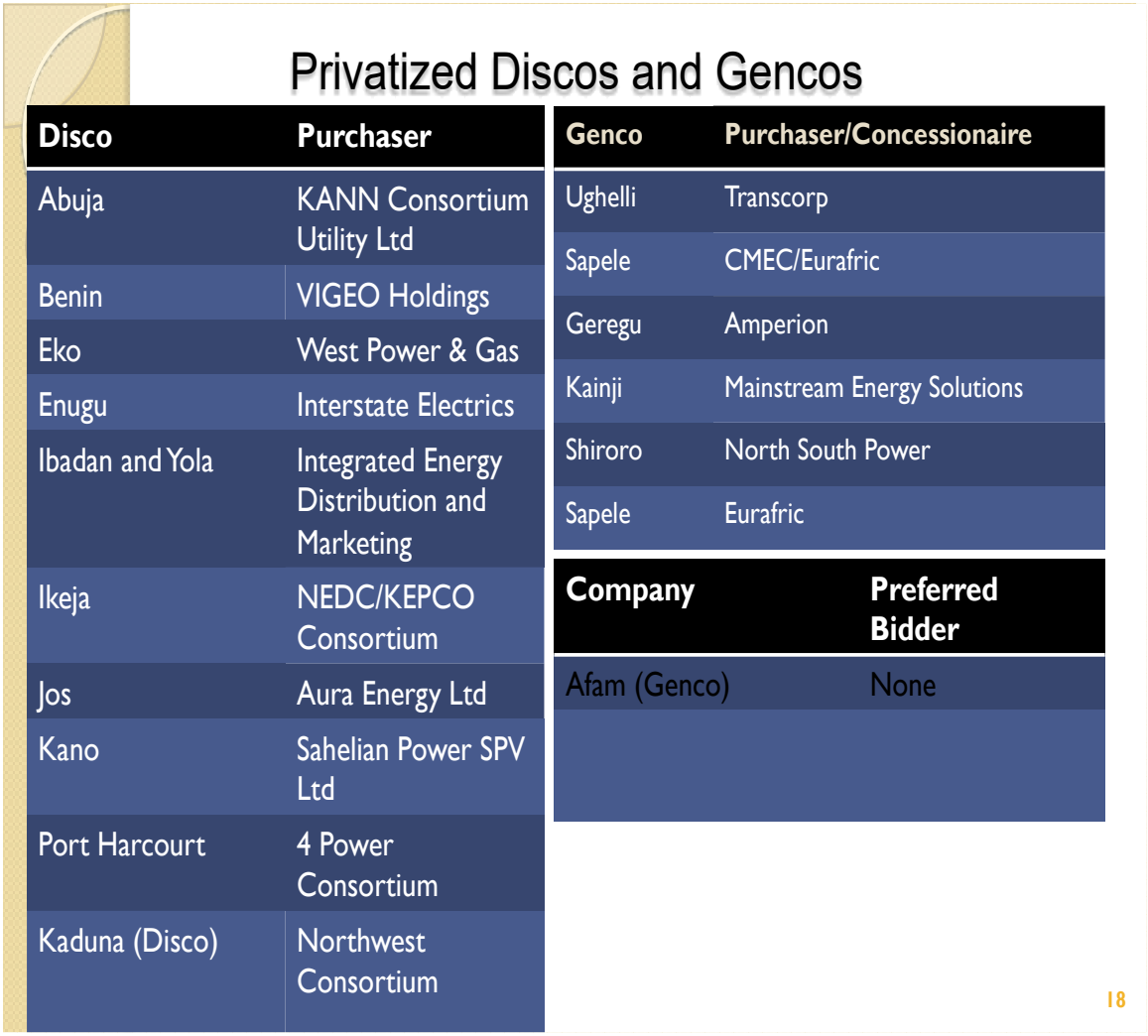
The PACP and PTFP arrangement introduced a greater degree of transparency and accountability on the part of those responsible for the implementation of the power sector reform programme.

In 2010, the Roadmap for Power Sector Reform was released, leading to the establishment of the Bulk Trader (Nigeria Bulk Electricity Trading Company) as credible off-taker of power to guarantee liquidity in the market. In addition, the Bureau of Public Enterprises (BPE), under the leadership of the National Council on Privatization (NCP), was charged with the overall responsibility of implementing the Nigeria policy on privatization and commercialization to ensure the success of the process.

Commencement of the Privatization Process

Between 2010 to 2011, the privatization process commenced with the announcement of the privatization timeline by the Federal Government of Nigeria. By 2012, a competitive bidding process for Gencos and Discos was conducted by the BPE, with evaluation criteria focusing on financial and operational viability. The sale process of the PHCN subsidiaries was concluded in November 2013 with the sale of 11 Discos, 4 Genco's and concession of 2 hydropower companies (Kainji/Jebba and Shiroro) and subsequent handover of the companies to the successful winners, as highlighted in table 1 below.



Privatized Discos and Gencos

Disco	Purchaser
Abuja	KANN Consortium Utility Ltd
Benin	VIGEO Holdings
Eko	West Power & Gas
Enugu	Interstate Electrics
Ibadan and Yola	Integrated Energy Distribution and Marketing
Ikeja	NEDC/KEPCO Consortium
Jos	Aura Energy Ltd
Kano	Sahelian Power SPV Ltd
Port Harcourt	4 Power Consortium
Kaduna (Disco)	Northwest Consortium

Genco	Purchaser/Concessionaire
Ughelli	Transcorp
Sapele	CMEC/Eurafric
Geregu	Amperion
Kainji	Mainstream Energy Solutions
Shiroro	North South Power
Sapele	Eurafric

Company	Preferred Bidder
Afam (Genco)	None

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Table 1: Privatised Discos and Gencos

In October 2019, Afam Power PLC and Afam Three Fast Power Limited was sold to Transcorp Power Consortium, following a competitive bidding process by the BPE. Consequently, the BPE on behalf of the FGN, executed a Share Sale and Purchase Agreement (SSPA) dated 5th November 2020 with Transcorp Consortium for the privatization of Afam Power Plc and Afam Three Fast Power Limited.

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Construction of the 700MW Zungeru Hydroelectric Power Plant (ZHPP)

Further, the Federal Government of Nigeria decided to construct the 700MW hydroelectric power plant at Zungeru Niger State, to provide the much–needed sustainable power supply to Nigeria. Zungeru Hydroelectric Power project (ZHPP) is part of the Federal Government efforts to arrest the issues of perennial power shortage and enhance industrial growth and green investment. The National Council on Privatization (NCP), Nigeria's privatization and commercialization agency, therefore, at its 7th meeting for the year 2020, held on 21st December 2020, approved the concession of ZHPP, with the intention that the proceeds of the concession of ZHPP will be used to repay the Chinese loan used in constructing the Power Plant. Therefore, following a competitive bidding process by the Bureau of Public Enterprises, the FGN finally hands over Zungeru Hydroelectric power plant to the preferred concessionaire, Penstock Energy Limited, in February 2023.

The ZHPP transaction is another example of the desire of the Federal Government of Nigeria (FGN) to engage the services of a competent Private Investor as a concessionaire to operate, maintain, manage and then transfer the 700MW Zungeru Hydropower Plant under an Operation and Maintenance (O&M) concession arrangement that reverts these rights to government after a 30-year period. The government has tried to increase private sector and foreign investor participation in the electric power sector by commissioning independent power producers (IPPs) to generate electricity through the privatisation and by soliciting investors for the construction of new power plants.

Unbundling of TCN

In 2024, the TCN was further unbundled to allow the System Operation arm to function independently from the Transmission role. Nigeria Independent System Operation (NISO) was thus created to operate independently from TCN. The System Operator (NISO) serves as the technical administrator of NESI, ensuring the reliable and efficient operation of the national grid. The following are the major tasks of the NISO:

- **Generation scheduling, commitment, and dispatch**: Coordinating the real-time dispatch of electricity to match demand with supply.
- **Transmission scheduling and generation outage coordination:** Managing planned and unplanned outages to minimize disruptions.
- **Transmission congestion management:** Preventing and mitigating bottlenecks in the transmission network.
- **International transmission coordination:** Overseeing cross-border electricity exchanges.
- **Procurement and scheduling of Ancillary Services:** Securing essential services needed for grid stability.
- **Long-term system planning:** Developing strategies to enhance the grid's capacity and reliability over time.

By overseeing the above roles, NISO plays a crucial role in maintaining the technical integrity and operational stability of Nigeria's power system.

Enactment of Electric Power Sector Reform (EPSR) Act 2005

As part of the reform programme, the EPSR Act 2005 was enacted to create rules and institutional framework for the power sector reform journey and enabled privatization. However, with privatization achieved, the EPSR Act did not adequately address the realities of the Nigerian power sector, resulting in regulatory uncertainty and an erosion of investor confidence. Consequently, Nigeria took on the bold step like many countries and carried out a post privatization legislative reform by repealing EPSR Act 2005 and enacting an all-encompassing Electricity Act (EA) 2023. EA 2023 is a comprehensive framework for dealing with more

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operational and commercial issues that have risen post privatization to boost investors' confidence and positively impact on the overall outlook of the Nigerian power sector.

There is no doubt that Nigeria has made tremendous progress in implementing electricity sector reforms in comparison to its peers in developing nations. However, inspite of all the above initiatives, the power sector in Nigeria still grapples with a lot of uncertainties, leading to frequent breakdowns of grids, unstable power supply and recurring black outs. The reality of this poor sector performance has left the public with no choice but to disparage privatization with palpable disquiet among electricity customers.

The most alarming concern of the sector is its lack of liquidity, particularly, the generation sector. Distribution sector collects revenue from end consumers to pay for all of the costs incurred to produce, transmit and distribute electricity. Unfortunately for variety of reasons the distribution companies have been unable to collect enough revenue to pay all of the costs. The most obvious reasons are:

- Availability of insufficient gas to operate current power plants in system at optimal level and to achieve the energy productions estimated in MYTO; Some progress had been recorded in relation to ring fencing gas produced by gas producers in Nigeria for the sole purpose of fueling the generation of power but the available gas remains insufficient and cannot match the volume of gas necessary to operate the relevant gas-fired power plants.

- Legacy debt owed to gas producers and the Nigerian Gas Company limited. Arising from the accumulated debt owed generation companies by the gas suppliers, these companies were, therefore, reluctant to provide more gas to the privatized power generation companies, until all or some of these debts were settled

- Poor technical condition of electricity sector assets; Due to the inability of the distribution companies to raise cheap funds and given the pressure to repay loans obtained from financial institutions, the distribution companies have not been able to upgrade decaying basic infrastructure for effective and profitable take-off.

- Very high technical, commercial and collection losses.

- Large collectables from Ministries, Departments and Agencies of Government as well as public

- A consumer tariff that is not cost reflective.

- Furthermore, most of the distribution companies do not receive sufficient electric power for on-sale to consumers and consequently they are unable to recover any cost expended on upgrading or improving electricity distribution infrastructure or equipment.

As a consequence, there is a severe liquidity crisis that has resulted in the inability of the new owners (of distribution companies and power generating plants) to fund their debt obligations to the banks that provided funding for the acquisition of the assets and access any additional funding to carry out the much-needed upgrade of the inherited system.

Intervention programmes by the fgn to address the power sector challenges in nigeria

In order to address all the above challenges which ultimately hinder economic growth, the Federal Government of Nigeria (FGN) has developed and implemented several intervention programmes. These include the followings:

- **Presidential Metering Initiative (PMI)** - To distribute 2 million free electricity meters annually, starting from Q1 2025.

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- **Distribution Sector Recovery Programme (DISREP)** - To deliver 3.2 million meters, with 1.44 million meters already contracted for deployment and support Discos to strengthen their operations and processes to suit their current operating environment.

- **Meter Acquisition Fund (MAF)** - To provide financing to Distribution Companies (Discos) to meet their metering targets under the Presidential Metering Initiative.

- **Meter Asset Provider Scheme (MAP)** - To engage third-party investors to provide meters to customers, aiming to close the metering gap and eliminate estimated billing. Customers are to make up-front payments and will be reimbursed through credits overtime.

- **Meter Rollout Programme under the Multi Year Tariff Order** - For each Discos to procure 65,000 meters annually to support plan to phase out estimated billing by 2027. The Cost is factored into the annual CAPEX for Discos as stipulated by NERC.

- **Presidential Power Initiative (PPI)** - This involves the upgrade of the grid infrastructure to unlock 4000MW, through Government-to-Government loan facility with German and Chinese Governments.

- **Transmission Rehabilitation and Expansion Programme (TREP)** - Upgrade and expansion of transmission infrastructure to reduce losses.

- **Distributed Access through Renewable Energy Scaleup Project (DARES)** - Provision of clean and reliable energy to over 17.5 million Nigerians and over 200,000 MSMEs by 2030, through the World Bank with support from USAID, JICA, GIZ, SEforALL, AfDB.

- **Solar Naija Program** - Installations of solar home systems for over 5 million homes by the CBN.

- **Nigeria Electrification Project (NEP)** - Deployment of mini-grids and solar home systems to increase electricity access through the World Bank and African Development Bank (AfDB).

However, despite all the above interventions and initiatives, the power sector in Nigeria continue to witness so many obstacles particularly, arising from the conflicting and overlapping targets of these programmes, network infrastructure upgrades without clear direction and energy access programmes that operates in silos.

Operational Performance of Generation Companies in Nigeria

It is instructive to note that after privatization programme, most of the Gencos have upgraded their generation capacity and hence generated far more energy now compared to their capacity at handover. Therefore, the operational performance of Gencos in the Nigeria's electricity sector value chain could not be over-emphasized, as they play a crucial role in the country's electricity sector, particularly through investments aimed at increasing generation capacity and integrating renewable energy sources. Their efforts in this regard helped to diversify Nigeria's power mix, enhance energy access, and reduce carbon emissions.

Some of the performance of the Gencos are as follows:

Expanding Generation Capacity: Gencos had contributed to expanding the generation capacity of the country through the following methods:

- **Investment in Thermal and Renewable Energy:** Gencos in Nigeria have made substantial investments in gas-fired power plants, which remain a major source of electricity in Nigeria. Companies like Transcorp Power Limited and Sahara Group Limited continue to strengthen the country's grid through their gas-powered facilities. The sector has also seen a push towards renewable energy through off-grid initiatives, renewable energy power generation projects with a combined capacity of approximately 5,000MW are at various stages of development across Nigeria. This includes the 14 solar IPPs, which the Ministry of Power has announced plans to revive.

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- **Innovative Power Projects:** A 20MW solar-hydro hybrid project is currently under development in Shiroro, Niger State, through a joint venture between the Nigeria Sovereign Investment Authority and North South Power Company. This project represents a shift towards integrating renewable energy with existing hydropower infrastructure.

- **Mini-Grid Development:** Investments in mini-grids are helping to provide electricity to underserved communities. Projects like the 200-kilowatt solar hybrid mini-grids in Edo state, developed under the Nigeria Electrification Project, are bringing stable power supply to rural areas, stimulating local economic growth.

Overall Increase in Installed Generation Capacity

Since privatization, installed capacity for Gencos has increased by 100.2 percent. Today, Nigeria's on-grid power generation is supported by 28 power plants, comprising five hydropower plants and 23 thermal (gas-fired) plants. The country's total installed generation capacity stands at 13,610MW. Of the total installed capacity, thermal power plants contribute 10,932 MW, while hydropower plants account for 2,678 MW.

Successful Generation Expansion Projects

Following the privatization of Nigeria's power sector in 2013, several generation expansion projects have been completed. Table 2 below highlights some of these projects:

Project Name	**Capacity (MW)**	**Notes**
Azura-Edo Power Station	461	Commissioned in 2018; a gas-fired plant located in Edo State.
Zungeru Hydroelectric Power Station	700	Commissioned in 2023; a hydroelectric plant in Niger State.
Geometric Power Plant (Aba IPP)	188	Commissioned in 2024; provides dedicated power to Aba Industrial City.
Paras Energy Power Plant	95	Located in Ogun State; developed by Paras Energy & Natural Resources.
Ibom Power Plant	190	Gas-fired plant in Akwa Ibom.

Table 2: Examples of Successful Generation Expansion Projects.

Overview of the Power Generation by the Gencos in Nigeria

In order to further evaluate the operational performance of the Gencos in Nigeria, we present in the tables below a monthly review of power generation in Nigeria, based on data and daily broadcast reports issued by the Nigerian Independent System Operator (NISO) for January 2026. The report consolidates daily peak and off-peak generation data by station; average monthly generation by plant; extracted outage reports and operational remarks from NISO daily briefs and system-wide constraints and disturbances recorded during the month.

The objective is to review generation performance of the generation companies, identify the key factors that constrain output, and highlight priority issues requiring policy, regulatory, or operational attention.**Aggregate System Performance (All Power Plants)**

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- **Average Daily Peak Generation:** 4,908MW
- **Average Daily Off-peak Generation:** 4,039MW

Generation levels were volatile across the month, with notable depressions around 23rd January (total system collapse) and 27th January (partial system collapse), as recorded by NISO.

Hydro plants provided relative stability during peak hours, while thermal generation was significantly impacted by gas constraints, equipment failures, and commercial limitations.

Performance Summary

All Grid-Connected Power Stations – System Monthly Average

The table below presents the system monthly average generation for January from all power plants connected to the national grid across the country. The figures indicate the average peak and off-peak power generation (in MW) recorded by each station during the period under review.

S/N	STATION	AVG. PEAK (MW)	AVG. OFF-PEAK (MW)
1.	Kainji	554.33	474.60
2.	Jebba	401.05	352.25
3.	Shiroro	300.90	180.54
4.	Dadin Kowa	16.92	16.28
5.	Zungeru	338.52	211.05
6.	Kashimbilla	12.01	11.02
7.	MEPP	21.25	18.62
8.	Egbin ST1-6	667.00	615.55
9.	Sapele	21.84	15.67
10.	Delta (Ughelli)	346.86	305.85
11.	AFAM III Fast Power	67.90	61.49
12.	TRANS AFAM	46.05	44.52
13.	Geregu Gas	110.95	85.35
14.	Omotosho Gas	119.20	107.00
15.	Olorunsogo Gas	127.74	109.81
16.	Geregu NIPP	142.48	86.70
17.	Sapele NIPP	94.19	69.97

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18.	Alaoji NIPP	0.00	0.00
19.	Olorunsogo NIPP	110.21	104.28
20.	Omotosho NIPP	83.51	63.82
21.	Calabar/Odukpani NIPP	182.24	165.55
22.	Ihovbor NIPP	62.93	47.74
23.	TAOPEX Energy	16.49	9.25
24.	Okpai	249.00	211.55
25.	Azura-Edo IPP	446.48	386.45
26.	AFAM VI	182.43	149.90
27.	Ibom	0.00	0.00
28.	A.E.S	0.00	0.00
29.	GPAL	42.41	37.17
30.	Omoku NIPP	33.21	27.60
31.	Trans Amadi	9.03	8.41
32.	Rivers IPP	0.00	0.00
33.	Paras Energy	100.92	61.42
34.	Gbarain NIPP	0.00	0.00
AVERAGE TOTAL		**4908.03**	**4039.38**

Table 3: Monthly Average Generation for January from all power plants connected to the National Grid

Privatized & NIPP Power Plants – Monthly Average Output

The table below (**Table 4**), extracted from **Table 3** above, presents the average power output for selected power plants. These include generation companies that were privatized or concessioned as well as the NIPPs. The figures represent the average peak and off-peak generation for the month of January 2026:

S/N	**STATION**	**AVG. PEAK (MW)**	**AVG. OFF-PEAK (MW)**
1.	Kainji	554.33	474.60
2.	Jebba	401.05	352.25

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3.	Shiroro	300.90	180.54
4.	Zungeru	338.52	211.05
5.	Egbin ST1–6	667.00	615.55
6.	Sapele	21.84	15.67
7.	Delta (Ughelli)	346.86	305.85
8.	Afam III Fast Power	67.90	61.49
9.	Trans Afam	46.05	44.52
10.	Geregu Gas	110.95	85.35
11.	Omotosho Gas	119.20	107.00
12.	Olorunsogo Gas	127.74	109.81
13.	Geregu NIPP	142.48	86.70
14.	Sapele NIPP	94.19	69.97
15.	Alaoji NIPP	0.00	0.00
16.	Olorunsogo NIPP	110.21	104.28
17.	Omotosho NIPP	83.51	63.82
18.	Odukpani NIPP	182.24	165.55
19.	Ihovbor NIPP	62.93	47.74
20.	OMOKU NIPP	33.21	27.60
21.	Afam VI	182.43	149.90
AVERAGE TOTAL		**3993.53**	**3279.21**

Table 4: Monthly Average Generation for the Privatised, concessioned Gencos and NIPPs

Note: The data in Table 4 indicates that the privatized and NIPP power plants remain the major contributors to grid generation, accounting for a combined average peak output of **3,993.53MW** and an average off-peak output of **3,279.21MW** in January 2026.

Among the plants, Egbin ST1–6 recorded the highest average generation, contributing **667.00MW** at peak and **615.55MW** off-peak, thereby maintaining its position as the single largest thermal contributor to the grid.

Realized output was materially constrained by gas supply limitations, equipment outages, and commercial dispatch restrictions. Hydro performance was largely shaped by water management directives, including intentional unit shutdowns and derating, particularly at Kashimbilla and intermittently across other hydro assets.

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Challenges and Major Factors That Constrained Gencos Performance in Nigeria

Gas Supply and Gas Quality Constraints (Most Significant)

Irregular gas supply to thermal stations is one of the obstacles to a sufficient electricity supply in the country. Approximately 75.5 percent of the national grid is produced by thermal stations that rely on natural gas. Therefore, when there is a disruption in the gas supply, the national grid drops drastically. Militancy and insecurity in some locations often disrupt the supply of natural gas to stations. The militants often vandalize pipelines that supply natural gas to generation stations. However, militant activities have significantly reduced since the introduction of an amnesty program for Niger Delta militants by the federal government of Nigeria in 2006.

As indicated in tables 3 and 4 above, affected stations with gas constraints includes Omotosho, Olorunsogo, Delta (Ughelli), Afam III Fast Power, Afam VI, Geregu NIPP, Egbin, Odukpani NIPP, Omotosho and Olorunshogo. The main issue has to do with insufficient gas supply, high gas condensate in pipelines, and gas quality limitations affecting combustion.

Hydro Water Management Constraints

Low water levels during the dry season. Generally, the water level decreases drastically during the dry season. This makes the generation of hydroelectric stations very low, which affects the national grid because hydropower plants generate 24.3 per cent of grid electricity (International Energy Agency, 2024). This is the reason for frequent drops in the national grid during the dry season in Nigeria. In this case, a large water reservoir should be built to store adequate water throughout the year to keep the hydropower stations working year-round. The rivers that supply water to hydropower plants require dredging after some periods to ensure adequate flow of water into the dams all year round. As indicated in table 4 above, Kashimbilla units were repeatedly shut down or limited for water management, and voltage fluctuations also forced unit outages at the station.

Low generation capacity:

The country's generation capacity has been observed to be very low. In Nigeria, there is a wide gap between the generation capacity and the available electricity generation capacity. It has been estimated that, most of the time, the country generates only 27 percent of its generation capacity. The highest generation recorded was 60 percent of the generation capacity (National Energy Commission, 2022). This may be attributed to a number of factors, such as;

Equipment Trips, Mechanical Failures & Protection Lockouts.

In the tables above, recurring technical failures were reported at:

- **Odukpani NIPP:** high vibration, generator differential lockout, lube-oil pressure trips, fuel hydraulic pressure failures
- **Delta (Ughelli):** turbine blade failures and defective blades
- **Sapele (Steam):** boiler feed pump and transformer trips, generator CB faults
- **Egbin:** excitation system major fault (ST6)

These events caused repeated forced outages and reduced reliability across key thermal plants.

Planned Maintenance & Inspections: Also, as highlighted in the tables above, capacity was temporarily removed due to Hot-gas path inspection at Okpai, Borescope inspection and post-reliability testing at Afam VI etc.

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Transmission constraints

Even if the existing generation stations operate at full capacity, the transmission company cannot convey electricity owing to poor infrastructure and lack of expansion of the transmission lines to meet the population explosion. According to Babatunde et al. (2023), if a country's total generation capacity is sent to the transmission line, a system collapse would occur.

This implies that improving electricity generation alone cannot address the electricity issues in Nigeria. There is a need to provide adequate transmission infrastructure that can convey the electricity beyond the installed capacity of the generation stations. Historical evidence shows that the highest electricity supply received by a TCN is 5,300 MW, which is less than 50 percent of the total generation capacity (Babatunde et al., 2023). The government prioritizes the generation component of electricity and neglects its transmission. This can be confirmed by the number of generation plants established in the country which stood at 28 as of 2024 (Nigerian Electricity Regulatory Commission, 2024).

Commercial & System Dispatch Constraints

Commercial and System dispatch constraints could also hamper generation performance of the generation companies. As highlighted in the tables above, several plants were limited not by technical faults but by bilateral contract restrictions. These constraints capped output even when units were technically available.

Distribution Constraints

Distribution constraints are other issues in the power sector in Nigeria. In many instances, distribution companies have been rejecting the electricity transmitted to them owing to poor distribution infrastructure and lack of maintenance (Okoje, 2024). On the 30th of August 2024, approximately 5170 MW of electricity was generated but was ramped down by 1400 MW owing to the inability of the distribution companies to pick the supply. Distribution companies failed to expand the distribution facilities to meet population growth and rapid urbanization in the larger cities of the country. As a result of the poor maintenance attitude of distribution companies, some distribution facilities are malfunctioning.

Safety Related Incidents

There are also safety related issues that caused emergency shutdowns and prolonged unavailability of generated power. As indicated in the earlier tables, there was fire outbreak in a gas turbine at Afam VI, fire in load-gear compartment at Sapele (PB202) etc, which led to shut down of these plants. This had resulted in low power generation to the nation.

Grid Disturbance

Grid disturbances could also materially suppressed generation in the affected dates, and this will distort the daily generation capacity of the generation companies. For instance, the total and partial system collapse experienced on 23rd and 27th January, as indicated below, affected power supply to the country

- **23 January 2026:** Total system collapse
- **27 January 2026:** Partial system collapse

Strategies to Overcome the Identified Gencos Bottlenecks and Improve Generation Capacity in Nigeria

In order to overcome Nigeria's power generation constraints, there is need to immediately tackle the staggering multi trillion-naira liquidity crisis in the sector, among many other issues as highlighted below:

Resolving the staggering Multi Naira Liquidity: We are all aware of the staggering multi-million-naira liquidity which has derailed the generation sector's performance, particularly the inability to pay for the gas

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supply to the suppliers, some of whom are refusing to release gas to the Gencos. The Gencos regularly received only about 30% of their monthly invoices from the legacy and current market debts running into trillions of naira. This has seriously impacted on their ability to carry out major overhauls, which requires a lot of resources to execute and many other obligations. This could be achieved within the timelines of **2026 to 2027** via government backed bond issuance, as well as cash trenches, through the Federal Ministry of Power, Finance NBET and other responsible agencies.

Gas Supply Security and Infrastructure: The shortage of gas supply has continuously hindered the availability of gas-fired power stations to generate electricity in sufficient quantities. The lack of a gas pricing framework represents a major hurdle that needs to be crossed. Gas supply is also affected by inadequate gas transportation infrastructure. There needs to be a full implementation of the gas master plan to ensure the adequate supply of gas to the Gencos. This may involve aligning gas pricing with foreign exchange realities, incentivizing domestic gas processing and deployment of military as well as community surveillance to avert pipeline vandalism. There should also be a focus on long term bilateral gas contracts between the Gencos and gas suppliers in order to prevent frequent plant shutdowns due to the gas shortages. The timeline for this is continuous implementation, at least from 2026 until 2030.Federal Ministry of Petroleum, Power and Defense, as well as Office of the National Security Adviser to coordinate implementation of this task.

State Level Embedded Generation: There is need to encourage state-level embedded generation to supply industrial zones and commercial hubs to improve generation capacity all over Nigeria. This could commence immediately, and continuous implementation sustained. State Governments and Federal Ministry of Power to coordinate implementation of this task.

State Led Utility Aggregation: The Federal Government of Nigeria should introduce state-led utility aggregation to allow industrial consumers to bulk-purchase power from multiple sources. Use escrow-backed payments to improve bankability for power suppliers and reduce stranded generation. Also, this could commence immediately and continuously sustained. State Governments and Federal Ministry of Power to coordinate implementation of this task.

Optimize Equipment Performance and Maintenance: Generation companies in Nigeria often face low equipment availability and energy output due to aging infrastructure, which are long overdue for overhauls, and frequent breakdowns. Implementing structured maintenance schedules, predictive maintenance using condition monitoring, and timely overhauls can significantly improve equipment availability and reliability. This should also commence immediately. Federal Ministry of Power and NERC to effectively monitor implementation.

Improve Grid Coordination and System Reliability: Operational viability is closely linked to grid stability. Ensuring effective generation scheduling, dispatch, and frequency management is critical. Companies should collaborate with national control centers to improve visibility of network elements, maintain operating reserves, and implement black start procedures. Weak transmission and distribution infrastructure can limit generation output, so immediate investment in grid modernization and coordination with distribution companies is highly essential in order to address this challenge. Federal Ministry of Power and TCN, NISO and NERC to effectively ensure and monitor implementation.

Upgrading the Aging Plants: By upgrading old turbines, generators, and control systems, as well as incorporating renewable energy sources where feasible, this can improve efficiency, reduce fuel consumption, and enhance overall operational performance. This could be done through the Siemens backed Presidential Power initiative within the timeline of **2026 to 2028**. FGN Power Company with direct monitoring of the Federal Ministry of Power to ensure effective implementation of this task.

Cost Reflective Tariffs: Sustainable pricing frameworks in the sector is a necessary avenue to ensure high collections and sustainable operations of the gencos. This is possible through metering of all the consumers and continuous oversight by the regulators. The ongoing metering exercise should be sustained, with effective oversight by the regulators. NERC and Federal Ministry of Power to ensure effective implementation.

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CONCLUSION

The study focusses on Nigeria's Power sector reform, privatization and post reform, with particular emphasis on the generation sector, and its current obstacles. Nigeria's power sector has faced frequent challenges over the years and hence failed to deliver stable electricity to its consumers. This is despite the fact that billions of dollars have been invested into power generation and transmission in expectation of meeting its growing demand. However, there has been insufficient investment into the distribution infrastructure, which is needed to deliver the generated power to homes and businesses. As a result, only a half of installed power plant capacity is available for generation, and only two thirds of generated power reach Nigerians. One third of all generated electricity is lost in the inefficient networks. Therefore, as highlighted earlier, in order to improve performance of Nigerian power sector, there is need to empower the sectors' policies and regulations, strengthened an effective financial sustainability for the sector, improved the discos operational efficiency and enhanced the network infrastructure for the sector. Similarly, it is believed that with improved transparency, accountability and good governance, the sector is expected to witness a lot of improvements in the years to come.

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List of Abbreviations and Acronyms

S/N	ABBREVIATION	DEFINITION
1.	Gencos	Generation Companies
2.	Discos	Distribution Companies
3.	ESI	Electricity Supply Industry
4.	ESR	Electricity Sector Reform
5.	NERC	Nigeria Electricity Regulatory Commission
6.	EPSR	Electricity Power Sector Reform
7.	PHCN	Power holding Company of Nigeria
8.	REA	Rural Electricity Agency
9.	ZHPP	Zungeru Hydroelectric Power Plant
10.	NISO	Nigeria Independent System Operator
11.	EA	Electricity Act
12.	EPSR	Electric Power Sector Reform
13.	PPI	Presidential Power Initiative
14.	DISREP	Distribution Sector Reform Programme
15.	MYTO	Multi Year Tariff Order
16.	MAF	Meter Acquisition Fund
17.	MAP	Meter Asset Provider
18.	TREP	Transmission Rehabilitation and Expansion Programme
19.	ATC & C	Aggregate Technical and Commercial
20.	DARES	Distribution Access through Renewable Energy Scale-up
21.	O & M	Operations and Maintenance
22.	NESI	Nigeria Electricity Supply Industry
23.	TCN	Transmission Company of Nigeria
24.	NEP	Nigeria Electrification Project
25.	REA	Rural Electricity Agency