

“Electricity Privatization in Nigeria: Issues and Challenges”

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Abstract: Nigeria with a population of over 170 million people and the largest country in West Africa cannot boast of constant electricity supply, more than 60 percent of the population is not served with electricity resulting to 100kWh as per capita consumption of electricity unlike Brazil, China, and South Africa which has 1934kWh, 1379kWh and 4500kWh. This has resulted in poor economic growth, inadequate health service, poor education facilities, and inadequate infrastructure service. The mode of operations of the defunct PHCN such as mode of payment, use of an unreliable database, poor customer services, method of bills distribution and meter reading which is not different from that of the present distribution companies (DISCOs) have also contributed to inefficiency in the sector. This paper takes a comparative look at the present situation of the Nigerian Power sector since the privatization exercise by the government to ascertain the level of success and improvement in the sector. It brings to fore the present available total generating capacity of the system, frequent system collapse as well as the poor capacity of the distribution network to make power available to end-users.

Keywords: Power, Energy, Privatization, Economy, Consumers, distribution, System Operators.

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I. Introduction

The drastic increase in energy demand over the last century globally is a result of a spontaneous increase in the rate of industrialization and the human population, particularly in developing countries. Global energy demand and utilization are mainly from electricity generation. There is no doubt that any country that wants to develop must have uninterrupted electricity supply at the industrial and domestic levels. Theoretically, energy is equally as important as other factors of production such as land, labor, and capital because of its significance to economic growth. This significance is much stronger for electric power energy than other forms of energy. It has been proved further that electricity has been the engine for high productivity and economic growth since every means of a business transaction must be powered by electricity. This finding is hardly surprising given the versatility of electricity in terms of the array of indices of equipment. Its facilities include those for cooking, heating, cooling, lighting, safe storage of food, clean water, and sanitation among other services (Anyahie and Nwadike 2015). This is in addition to the possibilities it provides for distant energy distribution and supply through the system.

Deregulation and Privatization

Deregulation can be defined as the simplification of government rules, policy and regulations that cushion the operation of market forces (Sullivan and Sheffrin, 2002). It means reducing or eliminating government control of how business is executed leading to a free or competitive market. Privatization is a process of transferring ownership of any government organization or public service to the private sector. It does not necessarily mean the complete removal of government ownership to private ownership. It can take the form of a joint-stock venture or company between government and private (Edwards, 1995). Deregulation and privatization in the power sector have started in the late 1980s in Sub-Saharan Africa. New Electricity Acts have been adopted that envisage the reform of state-owned electricity utilities and permit private sector participation. However, the private sector has had only limited involvement in the reforms. Various short term private management contracts were awarded, but few resulted in sustainable improvements in the performance of national utilities (Eberhard and Shkaratan, 2011).

Nigerian electricity sector and privatization

As part of the evolution in the Power Industry in Nigeria, the Federal Government by Decree No. 24 of 1972 created the National Electric Power Authority (NEPA). This was consequent upon the merger of the Electricity Corporation of Nigeria (ECN) and Niger Dams Authority (NDA). In September 1990, the partial commercialization came into being with the appointment of a Managing Director/Chief Executive to superintend over the Corporation. Also, the Authority was divided into four autonomous divisions namely: Generation and Transmission; Distribution and Sales; Engineering; Finance and Administration. Each division was headed by an Executive Director.

The pre- privatization era

At the onset of the democratically elected civilian administration in 1999, the Nigerian electric power sector had reached, perhaps, the lowest point in its 100-year history:

- Of the 79 generation units in the country, only 19 units were operational. The average daily generation was 1,750 MW.
- No new electric power infrastructure had been commenced and completed between 1989-1999. The youngest plant was completed in 1990 and the last transmission line built-in 1987.
- An estimated 90 million people were without access to grid electricity.
- Accurate and reliable estimates of industry losses were unavailable but were believed to be more than 50%.

The Privatization and reform era

The Federal Government of Nigeria (FGN) took further steps towards the Restructuring of the Nigerian Power Sector to establish an electricity supply that is efficient, reliable and cost-effective throughout the country and which will attract private investment. Subsequently, another Power Sector Reform Act was enacted in 2005, transferring the public monopoly of NEPA to Power Holding Company of Nigeria (PHCN) which was unbundled into 18 Business Units (BU); viz eleven (11) Distribution companies:- six (6) Generation companies and one (1) Transmission company.

The ambition of the FGN is to meet the vision 20: 2020 target of 40, 000 MW which requires an investment in power generating capacity alone of at least US \$3. 5 billion per annum for the next 10 years. (Bolanle O. 2011). FG's reform of power sector is gingered mainly by - The need to reduce the cost of doing business in Nigeria to attract new investment through provision of quality and dependable power supply to the economy for industrial, commercial and socio-domestic activities; - The growing demand for stable and reliable power requiring heavy investment in sector; and - The desire and need to be up to global standards. - The need for improvement in the efficiency of the distribution, generation, and transmission network is in a comatose state.

This instrumental Act revolutionized the sector, bringing into existence the current independence and private status of the generation and distribution chains in the Nigerian Power Sector. The Act facilitated the end of the monopoly of NEPA (Nigeria Electricity Power Authority) and laid out the framework and guidelines for NEPA's privatization through the eventual formation of companies to take over its functions, assets, liabilities, and staff in a bid to make the electricity market more competitive.

The Act lays out further guidelines for the licensing and regulation of all parts of the value chain (the generation, transmission, distribution and supply of electricity) and lays out rules to ensure performance standards and uphold consumer rights and obligations. Very importantly, the Act establishes the Nigeria Electricity Regulatory Commission (NERC) to monitor the sector and enforce regulations

It should be noted that the privatization of the generation and distribution subsections stipulated by this Act was completed in September 2013 with the formal handover of the successor companies to private investors as six generation companies (GENCOs) and 11 distribution companies (DISCOs) and the establishment of the Transmission Company of Nigeria (TCN) (Oladele A and Obinna O. 2014).

The Transmission Company of Nigeria (TCN) is one of the successors of the unbundled PHCN and is currently an asset held under the custodianship of the Federal Ministry of Power. It will initially remain publicly owned. TCN has the responsibility for the management of operation, maintenance and expansion of the 132kV and 330kV transmission systems. The Bureau of Public Enterprise (BPE) recently appointed a Management Contractor, Manitoba Hydro International (MHI) for TCN which took over the functions of Transmission Service Provider, System Operator, and Market Operator to undertake the overall management of TCN.

System Operations (SO) function was established as a sector within the defunct Power Holding Company of Nigeria under the Transmission sector. The SO has now evolved into a semi-autonomous sector under TCN and upon acquiring its license would operate as an independent company in the future. The main responsibility of the System Operator is to operate the transmission system and the connected installed generation safely and reliably. SO is also responsible for the overall security and reliability of the grid system, economic dispatch of available generation resources and maintaining system stability. SO has seven functional departments namely; Operations/Control, System Planning, SCADA, Communications, Technical Services, Transitional Electricity Market and System Performance. SO is headed by the Executive Director (System Operation). The operational control hierarchy is as follows:

- National Control Centre (NCC), Osogbo
- Three (3) Regional Control Centres (RCCs) at Shiroro, Ikeja West and Benin. With proposed control centers at Kano, Alaoji, and Gombe
- Eight (8) Regional Operations Coordinating units (ROCs) at Benin, Enugu, Port-Harcourt, Bauchi, Kaduna, Shiroro, Osogbo, and Lagos – several Area Control Centres covering 330kV and 132kV substations which fall under the supervision of the ROCs.

Mission Statement: Exercising grid control to maintain an efficient, coordinated and economical supply of electricity following the grid code and operational procedures

Vision: Operate the grid system efficiently to ensure open access, safe, reliable and economic electricity supply

Core Functions

Some of the core functions of System Operations include the following:

- Monitoring system parameters while identifying the requirements for maintaining system reliability and stability
- Maintaining and enhancing system reliability, stability, and security.
- Ensure a stable frequency within the operational limits of 50Hz \pm - 0.4% with a guaranteed quality voltage at all levels and an uninterrupted power supply with minimal loss.
- Conduct system studies, fault analysis, load flow analysis and planning of the power system (real-time and future).
- Facilitate merit order dispatch.
- Facilitate the operation of power market through bilateral exchange.
- Design, Install and maintain SCADA and Communication Facilities for effective Grid Operations.
- Enforce the grid code and the operational procedures.

The figure below shows the Organizational structure of the system operator (SO).

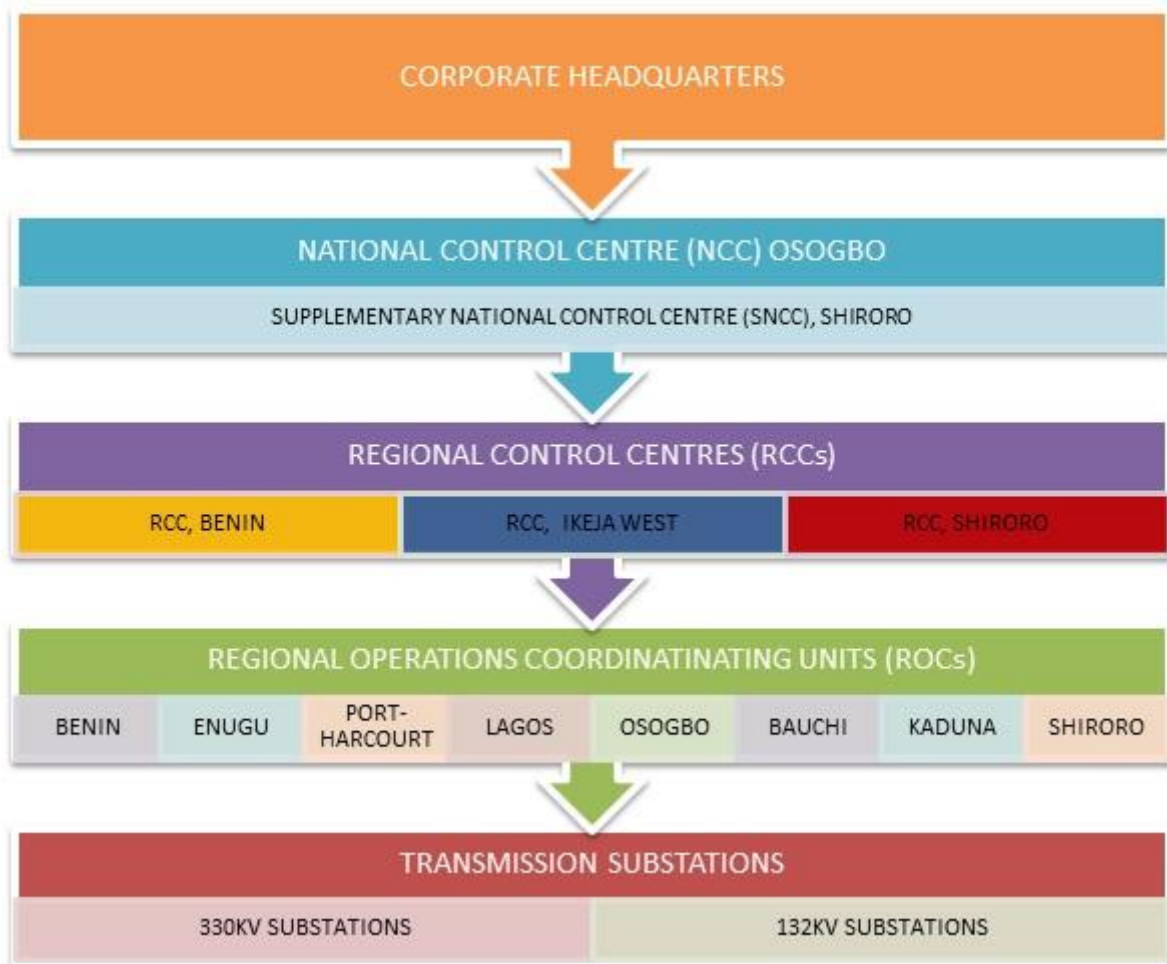


Fig 1: Organizational structure of the system operator

Post- Privatization Era

A summary of some of the opinion from respondents to the question – Has Nigeria benefitted from the privatization of the power sector?, by Punch Newspapers as published in its online version of 8th February 2017 shows that privatization of the power sector has not benefitted the country in any way. Consumers are still groaning because the electricity supply is very poor. What was happening before the privatization of the power sector has continued unabated if it is not even worse now? Consumers, especially those in new areas, are being subtly forced to buy transformers, electric poles, service wire, and other things just to get connected to the

national grid. So, we cannot say the consumers are better off than before the sector was privatized. (Punch Newspaper, 8th Feb. 2017) Despite all these, crazy bills are daily being given to consumers because prepaid meters are not adequate.

Major post-privatization challenges

The economic rationale for the privatization targets a realization of the objectives of the NEPP and the Roadmap, which is primarily the establishment of a long-term electricity market structure in Nigeria wherein multiple operators provide efficient services on a competitive basis for the broadest range of customers.

While the road to success seems far and the challenges seem high, Nigeria has recently recorded some improvement (albeit minimal) in the power sector. By August 2014 for example, Nigeria’s production capacity increased from 3,670MW in January to 4,237MW, a record high in recent times. This improvement is largely due to the Nigerian Gas Company’s increased gas supply to the thermal plants.

Funding

A primary challenge is the issue of funding. Nigerian banks provided 70% of the funds in loans and equity of the N404 billion paid for the power assets. The estimated \$4.28 billion capital and rehabilitation expenditure may also be financed by Nigerian banks with support from international financial institutions. However, there are concerns from many quarters that Nigerian banks may not be capable of providing the capital and rehabilitation expenditure because of the configuration of their balance sheet. Therefore, continuous financing of the projects from their present position may not be as smooth as envisaged by the investors.

To combat the issue of funding, at least to a certain extent, the government-controlled TCN has been provided certain initiatives and several loans from various quarters to overcome the challenge of funding and to improve transmission.

Gas supply

Directly linked to the issue of funding is the insufficient supply of gas to power the power generating systems. DISCOs have decried insufficient capacity generation by the GENCOs. Gas supply challenges are currently being addressed by considered moves by the government to divert about 10-15% of the spot market of the Nigeria Liquefied Natural Gas (NLNG) gas to the plants operated by the GENCOs. The Nigerian Gas Master Plan (NGMP) also establishes a Strategic Gas Aggregator (SGA) to manage gas demand and supply in the Strategic Domestic Sector (SDS) wherein Power has been categorized. The National Integrated Power Project (NIPP) is a key module in the government’s plan to boost power generation. The NERC has also made access to gas a mandatory requirement before licensing Independent Power Projects (IPPs).

The Federal Government, also in August 2014, approved a loan of \$1 billion by the NDPHC to boost the supply of gas in the country.

Pricing and end-user tariffs

The low reliability of electric power supplies has little or no impact on the network operator because whether there is power or not, the normal estimated monthly electricity bills are sent to consumers in the post-paid method. Therefore, the consumers suffer the cost of generating power for their usage and the cost of electricity that was never supplied by PHCN.

The defunct PHCN introduced the digital pre-paid meter in 2006 whose operation is similar to the loading of recharge card in the GSM handset. If power is available and the prepaid meter is loaded with units, the loaded units decreases only when load is connected and stops when power fails.

GENCOs obtain funds by selling what they generate to DISCOs, since DISCOs are unable to realize all money for the energy sold to consumers, losses are incurred through power theft, and hence GENCOs are underperforming in generation. DISCOs incur loss through three basic areas namely: huge unpaid bills by the consumers (**Collection loss**), power leakages due to poor, aged and insufficient generation, transmission and distribution network and power infrastructure (**technical loss**), illegal consumption of power by consumer who are customers of DISCOs and bypass of meters by consumer to reduce the power they pay for (**Commercial loss**). The Aggregate technical, commercial and collection losses (ATC&C) in Nigeria is about 50% and as a result, there is high level of poor payment culture and this invariably leads to low power availability to the end users. (Anyahie M. U. *et al.*, 2018)

One of the great challenges faced by power supply in Nigeria from inception and was aggravated since handover from PHCN to private owners in 2013 is the controversy between the DISCOs and electricity consumers over the inappropriate billing system. There is arbitrary and lack of transparency in the method used by energy providers to cost and assess the customer energy consumption. Such dark practices manifest through estimated billing systems and irregularity in metering. It is noted that the bill for any current month is prepared before the end of the month, sometimes, indiscriminate charging due to loss of revenues incurred by DISCOs

(Ofonyelu C.C and Eguabor R.E., 2014; Jain A, *et al.*, 2011). The tariff system practiced in Nigeria for the electricity distribution, which is regulated by NERC, is called the Multi – Year Tariff Order (MYTO); a methodology to regulate fair electricity prices between consumers and DISCOs for efficient operation costs.

The MYTO-2 Financial Model 2012, was birthed as a result of an early review of its 2008 predecessor following complaints about high tariffs by both domestic and commercial consumers and after consultations with stakeholders and the public. It comprises three new Tariff Orders on distribution, transmission and generation from June 1, 2012 to May 31, 2017. In addition to a major review every five years, it introduced a bi-annual minor review to provide adaptability to variables like, exchange rates, capital and operating expenditure requirements etc. Electricity prices are calculated based on revenue requirements of the whole country and tariffs are either fixed monthly charge or energy charge (consumption based). It created about 14 billing classes and categories of customers including, residential, commercial and industrial. (Oladele A. and Obinna O. 2014). The government also provided a tariff subsidy in MYTO2 on distribution, to aid implementation.

Nigeria power generation capacity before and after privatization

Generation Capacity

The country presently has a total Installed Capacity of 12,522 MW according to Power Africa (2018). A breakdown of these figure shows;

- Thermal: 10,142 MW
- Hydro: 2,380 MW

CONNECTIONS

- Current Access Rate: 45%
- Rural: 36%
- Urban: 55%
- Households without Power: 20 million
- Target: Universal access by 2030
- Power Africa New Off-Grid Connections: 237,000
- Power Africa New Grid Connections: 266,000

The tables below gives the present situation of the amount of generated power sent out between September and June 2018, total electricity Production by generating companies over the last three years, the revenue realized from total power sent out from GENCOs vs revenue lost to various constraints, and statistics of system collapse per year from 2009 to 2018.

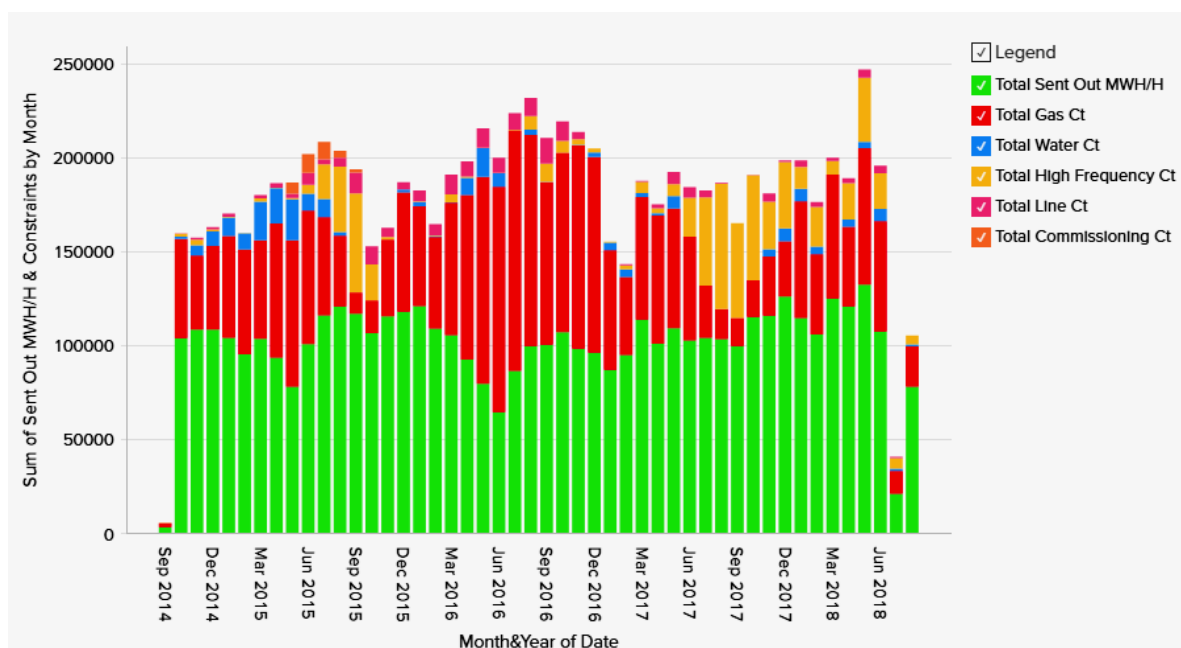


Fig 2a. Generated power sent out (Sept. 2014 – June 2018) Source: NESISTATS, 2018

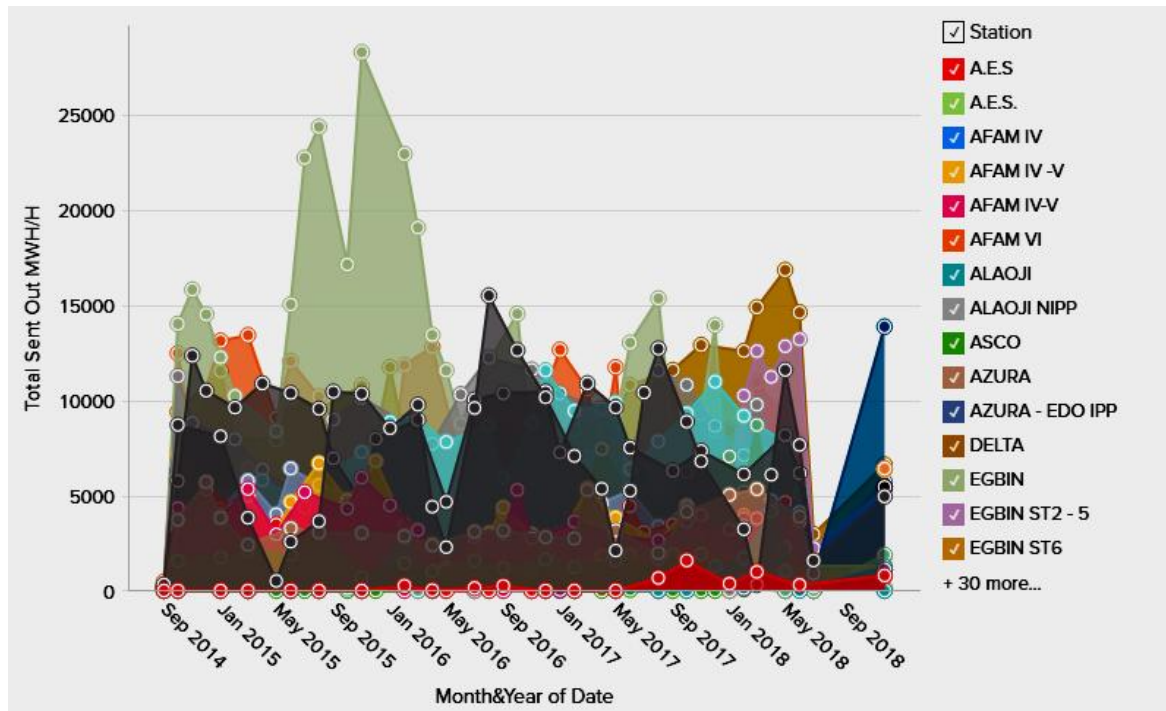


Fig 2b: Total electricity Production by generating companies over the last three years (Source: NESTATS, 2018)

Fig 3. The revenue realized from total power sent out from GENCOs Vs revenue lost to various constraints. Revenue here is in billions of Naira.

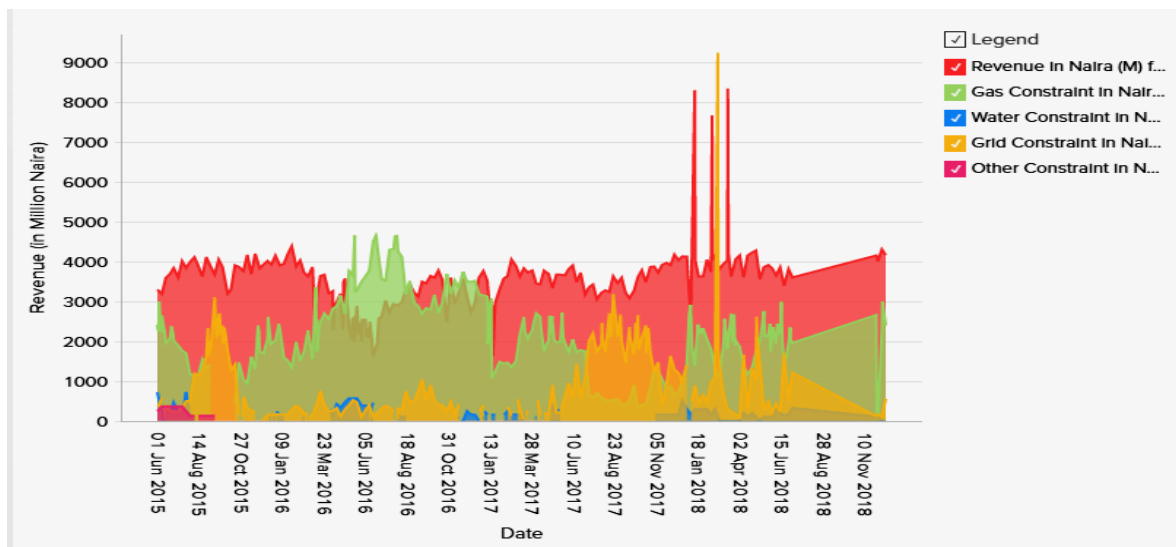


Fig 3: Revenue realized from total power sent out from GENCOs Vs revenue lost to various constraints (Source: NESTATS, 2018)

The fig 4 below shows system collapse per year

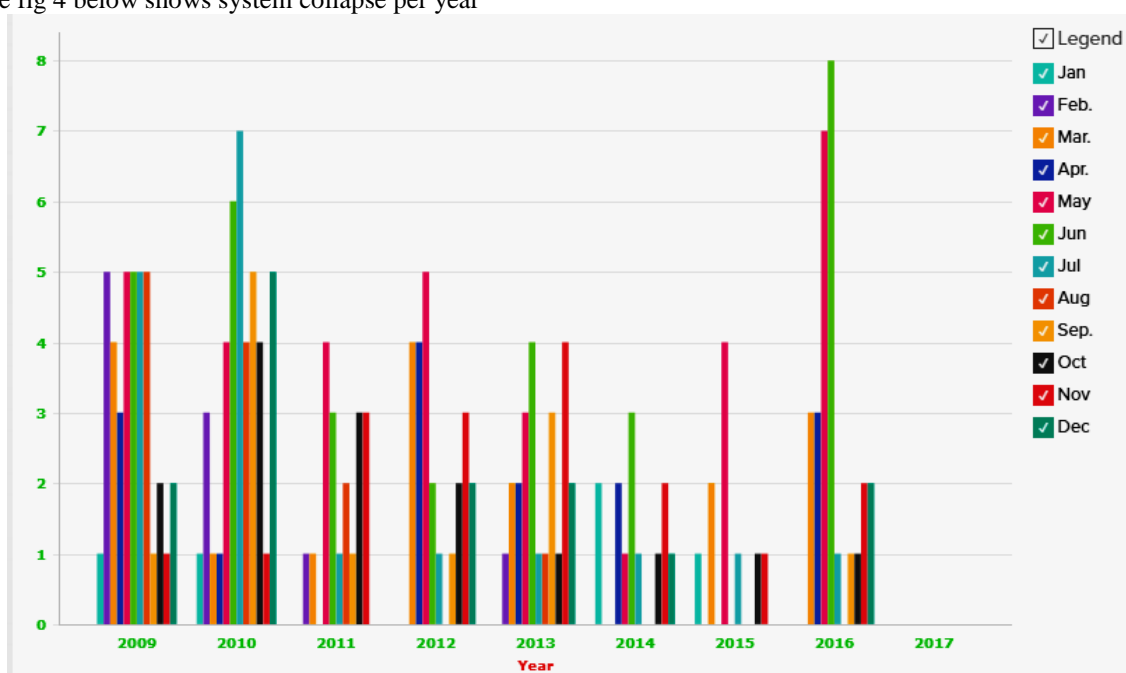


Fig 4: System collapse per year (Source: NESISTATS, 2018)

Present situation

Latest documents obtained from Nigeria’s power System Operator indicated that peak electricity generation crossed the 5,000-megawatt by April 2018.

According to the SO, a peak power generation of 5,090MW was recorded on April 26, 2018, which was the highest quantum of electricity ever witnessed on the national grid throughout that year. An analysis of the documents shows that power generation started moving up gradually from the 2,298.9MW that was recorded on April 20, 2018 and peaked at 5,090MW on April 26, 2018.

It was also gathered that the average power sent out on April 26, 2018 was 4,326MWh/hour, up by 246.86MWh/h from the previous day’s figures. Despite hitting that peak generation in 2018, over 2,500MW of electricity was not generated as a result various constraints in the sector.

The major constraints observed in the sector was unavailability of gas, high frequency, water management issues and lack of transmission infrastructure.

To improve on its technical capacity, TCN installed 14 transformers in the Southwest with total of 1,280MVA energy transmission capacity. In the South-south, it installed seven units with 490MVA capacity; another five units of 289MVA capacity were installed in the Southeast.

In the Northwest, TCN installed 14 transformers that could deliver 750MVA energy to the DisCos; it installed seven transformers with 590MVA capacity in Northeast and then added 12 units with 800MVA energy wheeling capacity in the North-central region (Fidelis M. and Simon E. 2019).

Limitations by constraints

- A total of 1,626MW was not generated due to unavailability of gas.
- About 40MW was not generated due to unavailability of transmission infrastructure.
- 1,075.5MW was not generated due to high frequency, resulting from unavailability of distribution infrastructure.
- About 190MW was not generated due to water management.
- The power sector lost estimated ₦1,407,000,000 on April 26, 2018 due to insufficient gas supply, distribution infrastructure, transmission infrastructure and water reserves.
- The dominant constraint on 26th of April 2018 remained gas, constraining a total of 1,626MW from being available on the grid. Generation peaked at the highest for 2018 at 5,090MW, and the fifth highest ever.

The SO’s documents further showed that the grid recorded two system collapses the same month. After ensuring system stability for more than two months, the country’s power grid collapsed twice within five days in April 2018. Electricity generation figures showed that the grid recorded partial collapses on April 12 and 14 2018.

Generated power on the grid dropped from a height of 3,946.5 megawatts on April 11, to as low as 351.3MW on April 12, 2018 which was the lowest quantum of grid electricity recorded within the period under review.

Further findings showed that power generation remained in a partially collapsed state, as it only moved up marginally from the 351.3MW recorded on April 11, to 596MW on April 14. Electricity on the grid eventually rose to 3,500MW on April 15, according to generation figures obtained from the SO.

Before the two partial collapses of April, 2018, Nigeria’s power generation had hovered around 3,900MW for more than two months. Industry data showed that the last system collapse before that of April 11 was recorded on the first day of February that year.

On February 5, 2018, there was a report of the collapse of the national electricity grid from 4,699.9MW on January 31st, to 219MW on February 1st 2018.

The report also revealed that before the February 1st grid collapse, the country’s power generation system had earlier collapsed six times in the first eight days of 2018. (Source; Punch Newspaper April 29th. 2018).

The Association of Nigerian Electricity Distributors (ANED), the umbrella body of ten DISCOs, except Yola, said TCN's analogue system has caused over 100 electricity grid collapses since the privatization of the power sector in 2013. Nine of the collapses occurred in 2019. Also, the group reported that the TCN recorded about 5,311 interface disruptions in one DISCO in the first 18 days of September 2019, though the affected DISCO was not mentioned.

MYTO Allocation Vs DISCO's energy off-take

MYTO allocation is a percentage of electricity on the grid made available to all the DISCOs while DISCOs actual off-take is what they resolve to take out of the MYTO allocation for the next day. The actual consumption is what the DISCOs eventually take from the available MYTO allocation at the TCN/DISCO interface points.

For instance, on August 22, 2019, the TCN showed that Kano DISCO opted to take only 310.60 megawatts of electricity against the 359.38MW MYTO allocation by TCN. Though Kano DISCO opted to take 310.60MW, the company was able to off-take only 154.17MW, leaving a total of 205.21MW, or 57.10 per cent of its MYTO allocation. On the same day, Kaduna DISCO had requested for 280MW, against the MYTO allocation of about 359.38MW. However, only about 166.52MW was collected from TCN substations, leaving about 192.86MW, or about 53.66 per cent of MYTO allocation unutilized.

Contrary to the TCN's data of September 20, which showed that 19,173 MW of energy was delivered to DISCOs between August 22 and 24, the NCC data showed only 13,963MW was received, a 5,208MW variance within the same company (Bassey U. 2019).

The foregoing raises questions as to the veracity and accuracy of TCN's response, in terms of the energy delivered to the DISCOs. Another worrisome issue is how TCN's supposed sent-out or delivered energy could exceed that recorded by its control centre, the singular source for such information.

DisCos load rejection

Recurring system collapse has been a source of conflict for TCN and the DisCos. The TCN’s System Operator (SO) records in April 2017 shows that the DisCos rejected 10,200MW allocation in just one month. The SO’s daily operational reports and document analyzed for over six months of 2019, shows that over 1,500MW energy is rejected by DisCos daily. TCN reports that of the 737 total interfaces where transmission facilities deliver power to distribution facilities, 421 have adequate protection but 316 others have not (Fidelis M. and Simon E. 2019).

The above record gives the picture of the state of the Nigerian Power sector under privatization era. This is very worrisome and falls far below the expectation of the generality of the citizens of this country who wants nothing but an un-interruptible and reliable power supply. The realization of this target may be a little difficult in the face of the challenges that currently face the privatized power sector.

II. Conclusion

The Nigerian power sector reform has created more opportunities for investors attributable to the increasing demand for sufficient supply of meters, transformers, cables, transmission towers and other generation, transmission and distribution facilities. Several areas still need to be electrified in line with the government’s Vision 2020. For instance, the buyer of the Port Harcourt Disco noted that despite coverage of four states with a population of 14 million, only 530,000 consumers are presently connected to the national grid.

Whereas there is marked improvement in power stability for the consumers, there remains large room for improvement in the realization of the full promises of the Roadmap. The consumers now watch with eager and earnest anticipation of the transition from darkness to light as there is serious need for the Federal

Government to revisit the power sector privatization policy with the view to reappraise its performance and provide framework for more private operators to come into the system. Licenses should be given to willing and able operators to generate, transmit and sell their electric power direct to consumers under the control and supervision of the system operators. This means that the DisCos should build new feeders and injection substations to take more supply from existing and new transmission substations.

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