

The Nigeria Electric Power Sector (Opportunities and Challenges)

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Abstract—Regular and adequate power supply is the hallmark of a developed economy. Any nation whose energy need is epileptic in supply, prolongs her development and risks losing potential investors. Again, it is an unavoidable prerequisite to any nation's development. Electricity generation, transmission and distribution are capital-intensive activities requiring huge resources of both funds and capacity. The call for power sector reform in Nigeria is primarily as a result of inadequate electricity supply, incessant power outages, low generating plant availability and high technical and non-technical losses that have characterized the Nigerian electricity industry. NEPA as a result of unbundling and the power reform process was renamed Power Holding Company of Nigeria (PHCN) in 2005. In accordance with the Electricity Power Sector Reform Act 2005, the privatization of PHCN was finally established in 2013. PHCN was subsequently unbundled into a transmission company, TCN, 6 generating companies, Gen-Cos, and 11 distribution companies, Dis-Cos. Currently, the transmission capacity of the Nigerian Electricity Transmission system is made up of about 5,523.8 km of 330 KV lines and 6,801.49 km of 132 KV lines. About 23 grid-connected generating plants in operation in the Nigerian Electricity Supply Industry (NESI) with a total installed capacity of 10,396.0 MW and available capacity of 6,056 MW. Most generation is thermal based, with an installed capacity of 8,457.6 MW (81% of the total) and an available capacity of 4,996 MW (83% of the total). Hydropower from three major plants accounts for 1,938.4 MW of total installed capacity (and an available capacity of 1,060 MW).

Keywords—Electricity, Generation, Transmission, Distribution, Sector reform, Vision 2020

I. HISTORY, OVERVIEW AND CURRENT STATE OF THE SECTOR

A. Historical Overview

According to [1,2], the history of electricity production in Nigeria dates back to 1896 when electricity was first produced in Lagos, fifteen years after its introduction in England. The total capacity of

the generators used then was 60KW. In other words, the maximum demand in 1896 was less than 60 kW. The Nigeria Electricity Supply Company (NESCO) commenced operations as an electric utility company in Nigeria in 1929 with the construction of a hydroelectric power station at Kurra, near Jos.

In 1946, the Nigerian government electricity undertaking was established under the jurisdiction of the public works department (PWD) to take over the responsibility of electricity supply in Lagos State. The Electricity Corporation of Nigeria (ECN) was established in 1951, while the first 132KV line was constructed in 1962, linking Ijora Power Station to Ibadan Power Station.

However, there was another body known as the Niger Dams Authority (NDA), which was established by an act of parliament. The Authority was responsible for the construction and maintenance of dams and other works on the River Niger and elsewhere, generating electricity by means of water power, improving navigation and promoting fish brines and irrigation [3]. The electricity produced by NDA was sold to ECN for distribution and sales at utility voltages.

Also, Niger Power Review [4] stated in her work, that in April 1972, the operation of ECN and NDA were merged in a new organization known as the National Electric Power Authority (NEPA). Since ECN was mainly responsible for distribution and sales and the NDA created to build and run generating stations and transmission lines, the primary reasons for merging the organizations were:

1. It would result in the vesting of the production and the distribution of electricity power supply throughout the country in one organization which would assume responsibility for the financial obligations.

2. The integration of the ECN and NDA should result in the more effective utilization of the human, financial and other resources available to the electricity supply industry throughout the country.

Okoro & Madueme [5] stated in their research, that since the inception of NEPA, the authority expands annually in order to meet the ever-increasing demand. Unfortunately, majority of Nigerians have no access to electricity and the supply to those provided is not regular. It is against this backdrop that the federal

government embarked on aggressive power sector reforms with the intention of resuscitating NEPA and making it more efficient, effective and responsive to the yawning of the teeming populace. NEPA as a result of unbundling and the power reform process was renamed Power holding Company of Nigeria (PHCN) in 2005.

Again, according to Sambo [6], the Nigerian power sector is controlled by state-owned Power Holding Company of Nigeria (PHCN), formerly known as the National Electric Power Authority (NEPA). In March 2005, President Olusegun Obasanjo signed the Power Sector Reform Bill into law, enabling private companies to participate in electricity generation, transmission, and distribution. The government separated PHCN into eleven distribution firms, six generating companies, and a transmission company, all of which were to be privatized. Several problems, including union opposition, delayed the privatization, which was later rescheduled for 2006.

However, when the administration of President Umaru Musa Yar'adua came on board, the privatisation issue was suspended. He therefore, unveiled a mission, setting an agenda of industrializing Nigeria by 2020. The conference was therefore one of the highest and administrative governing structures that was considered to proffer practicable solutions to the power supply problems in order to achieve this priority goal of the Nigerian government. Unfortunately, he was unable to accomplish the mission, due to ill health which eventually took his life.

In Nnaji [7], a new Power Sector Roadmap was officially launched by Mr President, Good-luck Jonathan, on 26th August, 2010. The Presidential Action Committee on Power (PACP) was created to remove "red-tape", achieve policy consistency and cut-through bureaucracy indecision making by key stakeholders in power and the Presidential Task Force on Power (PTFP) was created for day-to-day planning, developing and driving forward the Reform Plan for the Nigerian Power sector which was the Electric Power Sector Reform Act (EPSRA) enacted in 2005.

This Act was to drive the reform processes as follows:

- Transfer NEPA's assets to PHCN and subsequent unbundling into: A transmission company, TCN, 6 generating companies, GenCos, 11 distribution companies, DisCos
- NELMCO to take over PHCN stranded assets and liabilities
- Establish a bulk trader of power as a broker between power producers and DisCos
- Establish an independent sector regulator: (Nigeria Electricity Regulatory Commission (NERC) charged with the responsibility of tariffs regulation and monitoring of the quality of services of the PHCN
- Provide for a consumer assistance fund

- Develop competitive electricity market
- Licensing of IPPs and ring-fence distribution companies
- Establish a rural electrification agency, (REA).

B. Current state of the sector

In accordance with the Electricity Power Sector Reform Act 2005, the privatization of PHCN was finally established in 2013. PHCN was subsequently unbundled into a transmission company, TCN, 6 generating companies, Gen-Cos, and 11 distribution companies, Dis-Cos.

The Federal Government retains the ownership of the transmission assets. Manitoba Hydro International (Canada) is responsible for revamping TCN to achieve and provide stable transmission of power without system failure. Currently, the transmission capacity of the Nigerian Electricity Transmission system is made up of about 5,523.8 km of 330 KV lines and 6,801.49 km of 132 KV lines [7]. However, the generation and distribution sectors were fully privatised and owned by private individuals.

The operating environment is such that the Dis-COs can purchase power from Gen-COs of their choice while Gen-COs are allowed to optimise production cost and hence make competitive offers for sale of power. The Trans-CO on the other hand is an independent power Operator (IPO), as well as, an energy carrier with the responsibility of ensuring bilateral contracts exist between Dis-COs and Gen-COs with additional responsibility of issuing operational guidelines for efficiency of the system [8].

II. STRUCTURE, DEREGULATION AND LIBERALIZATION OF THE ELECTRICITY INDUSTRY

According to NPSG [9], the structure of the Nigerian Power Sector is made up of 3 major sub-sectors as depicted below:

1. Generation
2. Transmission
3. Distribution

A. Generation

There are currently 23 grid-connected generating plants in operation in the Nigerian Electricity Supply Industry (NESI) with a total installed capacity of 10,396.0 MW and available capacity of 6,056 MW. Most generation is thermal based, with an installed capacity of 8,457.6 MW (81% of the total) and an available capacity of 4,996 MW (83% of the total). Hydropower from three major plants accounts for 1,938.4 MW of total installed capacity (and an available capacity of 1,060 MW).

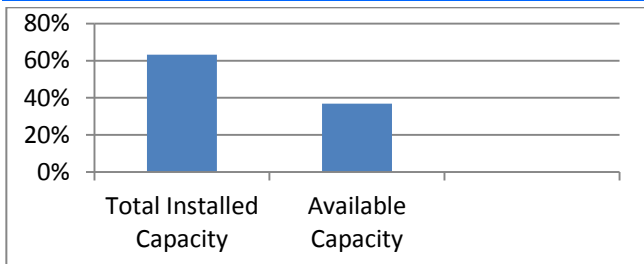


Fig 1: Installed Capacity and Available Capacity in Nigeria

According to IEA, [10], total installed electricity net generation in Nigeria was majorly on the Gas Thermal Plant with 64%, Hydro with 23% and Steam Thermal Plant with 13%.

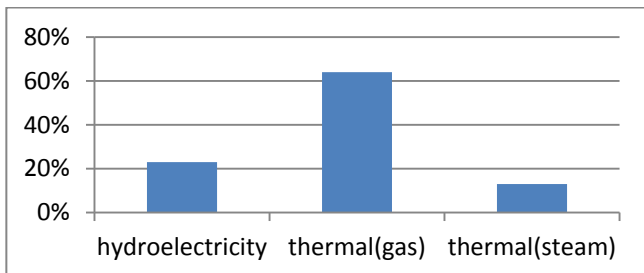


Fig 2: Total installed electricity net generation in Nigeria.

There are 6 successor Gen-Cos in Nigeria.

Table 1: Names and installed capacities of the Gen-Cos

S/n	Generation Company	Plant Type	Capacity (MW)
1	Afam Power Plc (1-V)	Thermal	987.2
2	Egbin Power Plc	Thermal	1320
3	Kainji/ Jebba Hydro Electric Plc	Hydro	1330
4	Sapele Power Plc	Thermal	1020
5	Shiroro Hydro Electric Plc	Hydro	600
6	Ughelli Power Plc	Thermal	924

Source: Nigerian Electricity Regulatory Commission

B. Transmission

The Transmission Company of Nigeria (TCN) is a successor company of PHCN, following the unbundling of the sector, and is currently being managed by a Management Contractor, Manitoba Hydro International (Canada). Manitoba is responsible for revamping TCN to achieve providing stable transmission of power without system failure. Currently, the transmission capacity of the Nigerian Electricity Transmission system is made up of about 5,523.8 km of 330 KV lines and 6,801.49 km of 132 KV lines.

The TCN is made up of two major departments: System Operator and Market Operator. The Market Operations (MO) is a department under TCN charged with the responsibility of administering the wholesale

electricity market, promoting efficiency and where possible, competition. The system operator is focused on system planning, administration and grid discipline. Furthermore, one of the major areas of focus of Manitoba Hydro International is to reorganise TCN and ensure that the Market Operator and the System Operator become autonomous.

C. Distribution

There are 11 electricity distribution companies (discos) in Nigeria. The coverage areas of the 11 companies are indicated in the map below:

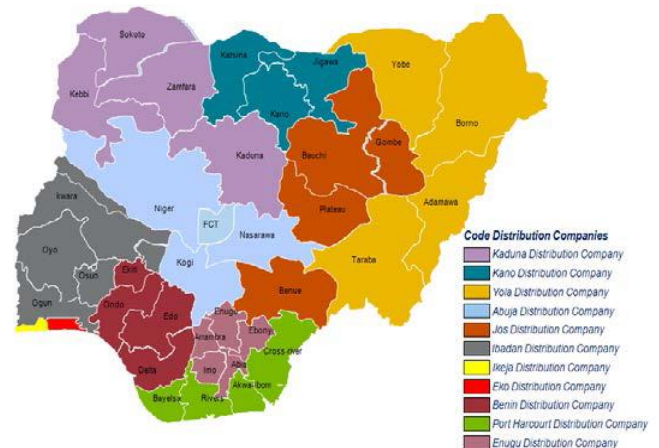


Fig 3: Distribution Companies **Source:** [9]

Table 2: Key information about the 11 discos

S/N	DISCOs	Percentage Load Allocation
1	Abuja Distribution Company	11.50%
2	Benin distribution company	9%
3	Eko Distribution Company	11%
4	Enugu Distribution Company	9%
5	Ibadan Distribution Company	13%
6	Ikeja Distribution Company	15%
7	Jos Distribution Company	5.50%
8	Kaduna Distribution Company	8%
9	Kano Distribution Company	8%
10	Port Harcourt Distribution Company	6.50%
11	Yola Distribution Company	11.50%

Source: Monthly Energy Balance Sheet, October 2013, Transmission Company of Nigeria (TCN)

III. EXISTING POWER PLANTS, IPPs AND NIPPs

A. Independent Power Producers (IPPs)

According to NPSG [9], IPPs are power plants owned and managed by the private sector. Although

there are Independent Power Producers (IPPs) existing in Nigeria prior to the privatisation process, the Nigerian Electricity Regulatory Commission (NERC) has recently issued about 70 licenses to

Independent Power Producers in order to improve the power situation in the country. The existing IPPs include Shell – Afam VI (642MW), Agip – Okpai (480MW) and AES Barges (270MW).

Table 3: Planned total present and future electricity generation infrastructure in Nigeria as at 2009

N/S	POWER STATION	TYPE	STATE	CAPACITY (MW)	STATUS
1	Egbin	Thermal	Lagos	1320.00	Existing
2	Afam	Thermal	Rivers	969.60	Existing
3	Sapele	Thermal	Delta	1020.00	Existing
4	Ijora	Thermal	Lagos	40.00	Existing
5	Kainji	Hydro	Niger	760.00	Existing
6	Jebba	Hydro	Kwara	578.40	Existing
7	Shiroro		Niger	600.00	Existing
8	Delta	Thermal	Delta	912.00	Existing
9	Orji	Coal	Enugu	20.00	Existing
10	Geregu	Thermal	Kogi	414.00	Ongoing
11	Omotosho	Thermal	Ondo	335.00	Ongoing
12	Papalanto	Thermal	Ogun	335.00	Ongoing
13	Alaoji	Thermal	Abia	405.00	Ongoing
14	Omoku	Thermal	Rivers	230.00	New IPP
15	Rain/Ube	Thermal	Bayelsa	225.00	New IPP
16	Sapele	Thermal	Delta	451.00	New IPP
17	Eyaen	Thermal	Edo	451.00	New IPP
18	Egbema	Thermal	Imo	338.00	New IPP
19	Caliber	Thermal	Cross River	561.00	New IPP
20	Mambilla	Hydro	Taraba	2600.00	New
21	Zungeru	Hydro	Niger	950.00	New
22	AES	Thermal	Lagos	300.00	Commissioned IPP
23	AGIP Okpa	Thermal	Delta	480.00	Commissioned IPP
24	Omoku	Thermal	Rivers	150.00	Approved IPP
25	Obajana	Thermal	Kogi	350.00	Approved IPP
26	Ibom Power	Thermal	Akwa Ibom	188.00	Approved IPP
27	Ethiope Energy Ltd			2800.00	Approved Licenses IPP
28	Farm Electric Supply Ltd			150.00	Approved Licenses IPP
29	ICS Power			624.00	Approved Licenses IPP
30	Supertek Ltd			1000.00	Approved Licenses IPP
31	Mabon Ltd			39.00	Approved Licenses IPP
32	Geometric Ltd			140.00	Approved Licenses IPP
33	Aba Power Ltd			0.00	Licensed Distributor
34	Westcom Tech & Energy Service Ltd			1000.00	License Granted IPP
35	Lotus & Bresson Nig Ltd			60.00	License Granted IPP
36	Anita Energy Ltd			136.00	License Granted IPP
37	First Independent Power Co Ltd			95.00	License Granted IPP
38	First Independent Power Co Ltd			150.00	License Granted IPP
39	Hudson Power Station Ltd			200.00	
40	Ibafo Power Station Ltd			640.00	
41	Shell Distribution Coy Ltd			100.00	
42	Agbara Shoeline Power Co Ltd			1800.00	
43	Index thermal power Ltd			1800.00	
	TOTAL			24,106.00	

Source: (Sambo et.al, 2010)

B. National Integrated Power Projects (NIPP)

The National Integrated Power Project ('NIPP') is an integral part of Federal Government's efforts to combat the power shortages in the country. It was conceived in 2004 as a fast-track public sector funded initiative to add significant new generation capacity to Nigeria's

electricity supply system along with the electricity transmission and distribution and natural gas supply infrastructure required to deliver the additional capacity to consumers throughout the country [9]. There are 10 National Integrated Power Projects (NIPPs), with combined capacity of 5,455 MW, scheduled for completion (for ongoing projects) and privatization in 2014.

Table 4: The NIPPs and their capacities

S/N	NIPPs	Capacity (MW)	Expected completion date
1	Alaoji Generation Company Nigeria Limited	1,131	Jun-14
2	Benin Generation Company Limited	508	Dec-13
3	Calabar Generation Company Limited	634	Jun-14
4	Egbema Generation Company Limited	381	Jun-14
5	Gbarain Generation Company Limited	254	Jun-14
6	Geregu Generation Company Limited	506	Jun-13
7	Ogorode Generation Company Limited	508	All units commissioned
8	Olorunsogo Generation Company Limited	754	All units commissioned
9	Omoku Generation Company Limited	265	
10	Omotosho Generation Company Limited	513	All units commissioned

Source: Niger Delta Power Holding Company Limited, Transaction Review Conference, Completion Status of NDPHC Generation Companies

Again, NPSG [9], stated in her work that the Federal Government has set aside N50 billion in escrow accounts in 3 Nigerian Banks to serve as a buffer for losses that the GENCOS may suffer in the course of power transmission. Draw-downs are only possible where the stipulated conditions are met. The Nigerian Bulk Electricity Trading Plc (NBET) will manage the accounts.

IV. OPPORTUNITIES AND CHALLENGES OF THE SECTOR

A. Opportunities

According to [11], Nigeria is Africa's energy giant. It is the continent's most prolific oil-producing country, which, together with Libya, accounts for two-thirds of Africa's crude oil reserves. It ranks second to Algeria in natural gas. Most of Africa's bitumen and lignite reserves are found in Nigeria. In its mix of conventional energy reserves, Nigeria is simply unmatched by any other country on the African continent. Nigeria has Natural Gas resources that are estimated to last over a century.

Table 5: Nigeria's Energy Reserves and Potentials

RESOURCE	RESERVES	Reserves Billion tonnes
Hydro Power	10,000MW	
Hydro Power	734MW	Provisional
Fuel wood	13071464 ha	Estimate
Animal Waste	61 Million tonnes/year	Estimate
Crop Residue	83 Million tonnes/year	Estimate
Solar Radiation	3.5-7.0 kwh/m2-day	Estimate
Wind	2.4m/s (annual average)	Estimate

Source: [12]

Victor and Ismail [8] stated that on successful completion of the Electric power Sector reform, the Sector offers the following significant opportunities for foreign investors.

1. Power sector financing, requirements for export credit financing, construction of natural gas transmission and distribution networks and storage facilities.
2. Operations and management of Power Stations and Transmission infrastructure.
3. Training programmes for capacity building.
4. Consultancy and advisory services.

B. Challenges

In [6], the total installed capacity of the currently generating plants is 7,876 MW, but the installed available capacity is less than 4,000MW as at December 2009. Seven of the fourteen generation stations are over 20 years old and the average daily power generation is below 2,700MW, which is far below the peak load forecast of 8,900MW for the currently existing infrastructure. As a result, the nation experiences massive load shedding.

Through the planned generation capacity projects for a brighter future (Table 3), it can be estimated that the average cost for adding a Mega Watt of electricity is US\$1.5million. This demonstrates the resources required in power supply to develop and particularly industrialized any country on a sustainable manner, are large. Based on this index, it therefore can be estimated that from the staggering current generation capacity of about 3,000MW in the country, Nigeria would have to invest a whopping US\$150 billion (N18 trillion) to generate additional 100,000MW, to attain the required for full industrialization of our economy by 2020 which was computed by the Energy Commission of Nigeria using a growth rate of 13%. The financial requirement is phenomenal.

Also, the transmission system in Nigeria system does not cover every part of the country. It currently has the capacity to transmit a maximum of about 4,000 MW and it is technically weak thus very sensitive to major disturbances. Again, in most locations in Nigeria, the distribution network is poor, the voltage profile is poor and the billing is inaccurate. As the department, which inter-faces with the public,

the need to ensure adequate network coverage and provision of quality power supply in addition to efficient marketing and customer service delivery cannot be over emphasize.

From the above analysis, the following are some of the most critical challenges of the power sector responsible for the generation short falls, transmission bottlenecks, and distribution problems in Nigeria [12]:

D. Generation Challenges:

- Inadequate generation availability due to regular vandalization of gas lines, and cable lines, associated with low level of the surveillance and security on all electrical infrastructures;
- Inadequate and delayed maintenance of facilities;
- Insufficient funding of power stations;
- Obsolete equipment, tools, safety facilities and operational vehicles;
- Inadequate and obsolete communication equipment
- Lack of exploration to tap all sources of energy form the available resources; and
- Low staff morale

C. Transmission Challenges:

- It is funded solely by the Federal government whose resource allocation cannot adequately meet all the requirements;
- It is yet to cover many parts of the country
- Its current maximum electricity wheeling capacity is 4,000 MW which is awfully below the required national needs;
- Some sections of the grid are outdated with inadequate redundancies as opposed to the required mesh arrangement;
- The Federal government lack the required fund to regularly expands, updates, modernize and maintain the network;
- There is regular vandalization of the lines, associated with low level of surveillance and security on all electrical infrastructures;
- The technologies used generally deliver very poor voltage stability and profiles;
- There is a high prevalence of inadequate working tools and vehicles for operating and maintaining the network;
- There is a serious lack of required modern technologies for communication and monitoring;
- The transformers deployed are overloaded in most service areas;
- In adequate of spare-parts for urgent maintenance; and Poor technical staff recruitment, capacity building and training programme.

E. Distribution Challenges:

- Weak and Inadequate Network Coverage;
- Overloaded Transformers and bad Feeder Pillars;
- Substandard distribution lines;

- Poor Billing System;
- Unwholesome practices by staff and very poor Customer relations;
- Inadequate logistic facilities such as tools and working vehicles;
- Poor and obsolete communication equipment;
- Low staff morale and lack of regular training; and
- Insufficient funds for maintenance activities.

F. Overall challenges

Victor and Ismail [8] also stated that in order to enhance generation, distribution and transmission of electricity supply to the Nigerian Populace, several “*challenges needs to be properly addressed*”. These are as follows:

• Policy Somersault

The Power sector suffers from policy somersault because one administration after another identifies the sector as key to economic development of the nation but in trying to address this, it will come up with entirely new policies instead of continuing with that of the previous administration.

• Project Execution

Since attention was turned to the Power Sector, no target ever set for power generation has been met. This can be attributed to the fact that most of the public NIPP projects are at different stages of completion. Although, policy makers keep giving assurances that supply deficit will be addressed in the shortest possible time. Another problem here is the centralised grid structure. Nigeria is too large to operate one grid structure. There is the urgent need to open up so as to minimise the loss in transmission of generated power as much as possible.

• Inadequate Infrastructure

The last transmission line in Nigeria was built over twenty years ago. The transmission Infrastructure are dilapidated and in a state of dis-repair and needing overhaul. Equally as discussed in the paper most of the facilities in the sector were put in place in the 70s when then customer size was very small, today these facilities – not maintained nor expanded are expected to serve the growing customer needs.

• Inadequate Gas Supply

One of the greatest challenges of the Power Sector is inadequate gas supply. Outside from unrest in the Niger Delta region, producers of gas are unwilling to sell to PHCN as the present policy requires they sell to PHCN at a reduced price compared to price sold to other customers. PHCN for whom the government subsidizes gas would not settle their bills while other users of Gas does and because the Gas producers want to stay in business they ignore sale/supply to PHCN and concentrate on the other users of gas and this goes on to affect the operation of the Power stations.

- **Financial Challenges**

The Contract for the construction of Geregu Power Station was put at One Million and ninety four million, eight hundred and thirty three thousand and eight hundred euros (€194,833,800). Check this cost for one against ten NIPPs across different states in the country. This is way too much for government alone to finance. This calls for some other means of financing. Still on financing, the uncertainty in the regulatory environment is hampering private investors from financing electricity projects in Nigeria.

- **Data Inadequacy**

There is no data for correct estimation of the customers to plan for. This greatly accounts for the uneven allocation and distribution of available resources like transformers. This has equally affected decision making in the sector as evident in the poor siting of NIPPs away from areas where gas facility is readily available to far off areas motivated by political reasons.

- **Grid System**

The National Grid control ties the whole country strongly as a single control area. This Control centre is so far from some of the generating stations and this tend to inhibit effective communication in times of crisis and furthermore, the transmission lines are so long that before voltage gets to its destination it would have dropped considerably and so the supply in these areas are not adequate.

V. REFORMS AND PROJECTIONS

The call for power sector reform in Nigeria is primarily as a result of inadequate electricity supply, incessant power outages, low generating plant availability and high technical and non-technical losses that have characterized the Nigerian electricity industry. The federal government in 2000 adopted a holistic approach of restructuring the power sector and privatisation of business units unbundled from NEPA [13].

A. The Reform Act

In [9], the Electric Power Sector Reform Act, 2005 can aptly be described as the foundation of the restructured power sector in Nigeria. The Act, which evolved from the National Electric Power Policy adopted in 2001, established the basis under which private companies can now participate in the generation, transmission and distribution of electricity.

According to Victor and Ismail [8], the Power Sector reform was embarked upon in March, 2005 due to inadequate supply of electricity, high demands, and issues with bills. The main goal of the reform is to accomplish full deregulation of the Electricity Supply Industry (ESI) in two years after its implementation. The objectives include making electricity generation and supply better and available to the customers, making the sector investor-friendly and dismantling NEPA's monopoly. This was achieved through the

passage of the Electric Power Sector Reform (EPSR) Act which came into being on the 11th of March, 2005.

The reasons given for the reform include: introduction of competition in the industry as a means of improving industry efficiency that will result in providing lower energy prices to end users, Lack of price transparency in utility operations hence consumers and regulators demand price transparency and declaration of cross subsidies among different users, like many other public owned institutions, corruption, inefficiency and managerial incompetence prevailed and the electricity industry showed inconsistent policy direction and lack of strategy framework for its sustainable development, policy decisions by past Government in the ESI were based on political or administrative interest instead of efficient resource allocation and cost recovery necessary for economic development and The strategic energy policy for the country was never implemented.

The Act repealed the earlier law establishing NEPA. Consequently the Power Holding Company of Nigeria, (PHCN) was set up and charged with responsibility of providing power supply. It also restructured the Power Sector from a vertically integrated structure into eighteen unbundled autonomous companies comprising one Transmission Company called Trans-CO, six generation companies known as Gens-COs and eleven distribution companies- Dis-COs respectively.

Victor and Ismail [8] also stated that the Act focused on the liberalization and Privatization of the sole Power Provider- PHCN while introducing Independent Power Producers - IPPs. The EPSR Act nurtures a wholesome market starting with a single buyer of electricity produced by PHCN and the IPPs for onward sale to the eleven DisCos that would also be offered for sale. Again, Inugonam [14] stated that the Act further provide for the establishment of the Nigeria Electricity Regulatory Commission (NERC) which is charged with the following:

- Regulate tariffs and quality service
- Oversee the activities of the industry for efficiency
- Institutional and enforcement of the regulatory regime
- Licensing of Generation, Distribution, Transmission and trading companies that result from the unbundling of NEPA. Legislative authority to include special conditions in licenses
- Provision relating to public policy interest in relation to fuel supply, environmental laws, energy conservation, management of scarce resources, promotion of efficient energy, promotion of renewable energy and publication of reports and statistics.
- Providing a legal basis with necessary enabling provisions for establishing, changing, enforcing and regulating technical rules, market rules and standards.

In November, 2005 NERC was inaugurated and took full responsibility. Other aspects of the reform provide for the establishment of the Rural Electrification Agency (REA), the National Electric Liability Management Company (NELMCO) which is a special purpose entity created to manage the residual assets and liability of the defunct NEPA after privatization of the unbundled companies.

According to Balogun [15], the Act also provided for the establishment of a Power Consumer Assistance Fund (POLAF) to subsidize under privileged electricity consumers. These key players and others necessary for the efficient working of the electricity power sector and their roles are shown in the table below.

TABLE 6: Nigeria Power Reform Key Players and Their Functions.

KEY PLAYERS	FUNCTIONS
Presidential Task Force	Drives the reforms by uniting different Stakeholders, monitors, plans and implements projects.
Bureau of Public Enterprise (BPE)	Drives the privatisation of government owned enterprise in the sector like GensCos and DisCos
Nigeria Electricity Regulatory Commission (NERC)	Regulates the sector, issues licences and set tariffs.
Nigeria Electricity Liability Management Company (NELMCO)	Manages legacy liabilities and stranded assets
National Power Training Institute of Nigeria	Provides training required to support the power sector.
Power Consumer Assistance Fund (POLAF)	Subsidizes electricity for consumers

Source: Victor and Ismail [8]

Again, Victor and Ismail [8] also stated that all the successor companies and all the agencies mentioned above have been fully established. The Government on its part as a way of encouraging private sector participation in the power sector granted the following incentives: tax exemptions for the first five years, custom duty exceptions for importation of power plants equipment and its auxiliaries and any other assistance to any IPP that fulfils all technical and commercial requirements towards building power plants.

VI. ROLE OF THE ELECTRICITY INDUSTRY IN ATTAINING NIGERIA'S VISION 20:2020

The Vision 2020 is an economic plan aim at making Nigeria one of the 20 most developed and largest economy in the world in the year 2020 [16].

In order to attain this vision 20:2020, the electricity industry should play the following role:

A. Implementation of the Nigeria Power Policy

There is a need to implement the Nigeria Power Policy as is contained in the EPSR Act 2005; this will allow private sector participation in the sector. This could be achieved by providing favourable platform for private investors such as a cost effective end user tariff structure and a systematic withdrawal of subsidy.

Also there is the need to encourage Public Private Partnership (PPP) as a concession plan for the distribution sector as a step towards privatisation. This will enable the private sector to create demand and will allow IPPs enter into Bi-lateral agreements with concessionaires.

B. Involvement of the Private Investors

Sale or the concession of NIPPs to private investors will ensure the fixing and completion of these projects. Government should transfer or lease out all its NIPPs to private investors for efficient management and implementation as this will involve construction and operation of the plants to meet present day realities such as, selling electricity to identified areas of need and allow for quick generation of power to relieve the present pressure on National grid. Lastly, the burden of worrying and dealing with stranded assets and investments will be taken of the shoulders of government.

C. Right Pricing

The Federal Government of Nigeria should execute the gas pricing regulation as it is enshrined in the Gas Master Plan promptly, just as the infrastructure blueprint is implemented along with the Private sector. This will help in aggregation of prices, as well as, putting in place incentives for private developers.

D. Pre-paid Metering

Efforts should be intensified to provide prepaid meters to consumers as this will ensure both judicious use of power as well as cut down on losses incurred as a result of unsettled bills. It will also reduce the number of illegal connections and make consumers pay for electricity consumed.

E. Distributed Generation

As discussed earlier, there is need to strengthen the Nigeria Grid system from a central controlled system to one of distributed generation as this will increase distribution efficiency and greatly reduced losses incurred from long distance distribution.

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