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Overview of the Nigerian Power Sector

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ABSTRACT: *The power sector in Nigeria through the years have been a tortuous, difficult, painful, devastating and herculean task for both the governments and the populace. A population of about 170 million people with more than half of them living without electric power supply, certainly presents a catastrophic situation for economic and social development of the nation and the people. Consequently, this paper tries to analyze the implications of the reforms propounded by law and policy, the extent to which the said reforms have improved or otherwise aided the power sector in supplying of electricity, the challenges with generation, distribution and transmission, the capacity which the sector can produce to serve the entire Nigerians etc. This paper furthermore made recommendations on how the Nigerian power sector can be reformed through the application of law and its overall benefits to the economic, social and national development of the country and the populace.*
KEY WORDS: *power, sector, electricity, supply, policy, generation, transmission*

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I INTRODUCTION

The history of electricity generation in Nigeria started as far back as 1896 when electricity was first generated in Lagos with total capacity of 60kW the maximum demand was less than the 60kW generated (Emodiand Yusuf, 2015; Sambo, Garba, Zarma andGaji, 2008; Makoju, 2007). This was fifteen years after electricity was first produced in England. Undermining the fact that electricity had existed over a hundred years, its development has been at a slow rate (Obuka, Utazi, OnyechiandAgbo, 2014; Obadote, 2009). In 1946, electricity supply to Lagos, Warri and Port-Harcourt was taken over by the Public Works Department (PWD), while that of Ibadan and Kano were operated by Native Authorities established by the Nigerian Government (Sule, 2010; OkoroandChikuni, 2007; Uwaifo, 1994). They created the Nigeria Electricity Supply Company (NESCO), which started operations as an electricity utility company owing to the construction of hydroelectricity power station at Kura, near Jos. NESCO was a hydroelectric power station because its major source of energy was water through dams. The output of NESCO served some locations majorly in the Northern states (Onyi-Ogelle, 2016; Adebayo, AdejumobiandAdepoju, 2013). In 1950, electricity supply and development was transferred to a central body established by the legislative council called Electricity Corporation of Nigeria (ECN) (Iwoamadiand Dike, 2012). Another body was established in 1962 by an act of parliament called Niger Dams Authority (NDA), the first 132kV line was constructed, connecting Ijora power station to Ibadan power station (Iwuamadiand Dike, 2012). NDA 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 (FolorunsoandOlowu, 2014; Sambo, 2008). The power generated by Niger Dam Authority was sold to Electricity Cooperation of Nigeria for distribution and sales at utility voltages. This actually introduced the now sought after separation of power generation from distribution, and it is now being promoted as a more proactive and beneficial approach (Onyi-Ogelle, 2016). On first of April 1972, the operation of Electricity cooperation of Nigeria and Niger Dam Authority were merged in a new organization known as National Electric Power Authority (NEPA), sole and exclusively responsible for power generation and distribution of electricity in Nigeria. NEPA has since operated as a government-controlled monopoly responsible for power generation, transmission and distribution (Mohammed, Babagana, Bitrusand Mustapha, 2015; Obuka, Utazi, OnyechiandAgbo, 2014; Aliyu, Sani, MuhammedandYakaka, 2013).

The reason offered for the merger was that it will result in the vesting of the production and the distribution and electricity power supply throughout the country in one organization, which will assume

responsibility for the financial duties. The integration of the ECN and NDA should result in more effective utilization of the human financial and other available resources for the electricity supply and industry throughout the country (Niger Power Review, 1989).

After about 40 years, NEPA unsuccessfully managed electricity generation, transmission and distribution in Nigeria. Consumer apathy was at its peak. The National Electricity Power Authority was a vertical integrated utility neck deep in institutional corruption, bureaucratic inconsistencies, and administrative ineptitude (Folorunso and Olowu, 2014). NEPA went through series of transformations and reforms, which in the end, proved to be a pointless exercise. Subsequent to the introduction of the Electric Power Sector Reform act in 2005, NEPA transformed into the Power Holding Company of Nigeria (PHCN), which was setup prior to the privatization of the sector (Emodi, Yusuf and Boo, 2014; Ainah and Afa, 2013; Ossai, 2012).

In March 2005, when President Olusegun Obasanjo signed the Power Sector Reform Bill into law, private companies were given opportunities to participate in electricity geneneration, transmission and distribution. The deregulation of PHCN was to consists eleven eighteen new companies, including 6 generators (GENCOs), 11 distributors (DISCOs), one transmission company (TRANSCOs) and semi-autonomous business units (Emodi and Yusuf, 2015; James and Okafor, 2010). These companies wer responsible to carry out the functions relating to the generation, transmission, trading, distribution and bulk supply as well as resale of electricity (National Technical Working Group Report, 2009). PHCN was divested of it's wholly government interests, with a view to ensuring adequate generation, distribution and utilisation of efficient and stable electricity nationwide. Indeed, the journey from ECN through NEPA to PHCN had been a tortuous and bumpy for Nigerians.

The Nigerian power sector industry had experienced negative growth for over four decades, which had led to the reform that introduced new set of players in the industry such as the Independent Power Producers (IPPs) and Nigeria Electricity Liability Management Company (NELMCO). The duties of regulation is now performed by the National Electricity Regulatory Commission (NERC) under the Federal Ministry of Power. On November 2013, the Federal Government formally handed over the assets unbundled from the Power Holdings Company of Nigeria (PHCN) to private organizations that bought them, with a pledge that they would take over the companies without any liabilities. The ensuing liabilities of PHCN had been pooled together and would be managed by Nigerian Electricity Liability Management Company (NELMCO) (Obuka, Utazi, Onyechi and Agbo, 2014; Igbonovia and Odiase, 2009).

II PRESENT ELECTRICITY SITUATION IN NIGERIA

2.1 Generation

Economic growth and development of any nation requires electrical energy. The electricity sector in Nigeria is presently characterized by chronic power shortages and poor power quality supply. Nigeria as a developing country with an increased population of over one hundred and fifty million, coupled with diversification of economic activities, energy demand is rising but yet, electricity supply is relatively stagnant. Currently energy demand of over 40,000MW is far less than available hovering around 2,900MW – 4,000MW (Omorogiuwa and Okpo, 2015; Onohaebi and Omorogiuwa, 2014). It is therefore obvious that electricity demand is way above its supply, the inefficient generation as well as inadequate transmission facilities to boost electricity supply has also been a major cause of the increasing gap between demand and supply of electricity, hence resulting in the overloading and stressing of the network beyond their stability and thermal limit (Omorogiuwa and Ike, 2014; Omorogiuwa and Odiase, 2012; Odularu and Okonkwo, 2009).

Currently, 15.3 million households lack access to grid electricity; and for those connected to the national grid, supply is erratic characterised by high power losses, damping oscillations, systems instability at both the steady and transient states in generation, transmission and distribution (Onohaebi and Omorogiuwa, 2014). Per capita electricity consumption has been less than 150kWh per annum. Comparative figures for the other countries in Africa are South Africa, 4,000kWh, Libya, 3347kWh, Algeria, 929kWh and Ghana with 286kWh (Ekpenyong, Bam and Anyasi, 2013). Rural areas suffer the most electricity deprivation, unreliable power supply and unscheduled power outages (Obi, Ulasi, Offor and Chidolue, 2013). Energy deprivation in Nigeria goes beyond lack of access to electricity. An estimated 72% of Nigerians depend solely on wood as a source of fuel for cooking. Contrary to the expectations of the National Energy Policy of 2003, deepening poverty has forced a reversal in the transition to modern and efficient energy forms. Today, more Nigerians are climbing down the energy ladder – moving from electricity, gas and kerosene to use as wood and other traditional biomass energy forms (Eleri, Ugwu and Onuvae, 2012)

The total installed capacity of the currently generating plants is 7,914.4MW (Table 2.1). Seven of the fourteen generation stations are over 20 years old and the average daily power generation is far below the installed capacity. Presently, of the seventeen active power generating stations, eight of these are owned by the Federal Government (existing) with installed capacity of 6,256MW but 2,484MW is available. The remaining nine are from both the National Integrated Power Projects (NIPP) and the Independent Power Projects (IPP)

with total designed capacity of 2,809MW, of which 1,336.5MW is available (Omorogiuwa and Ogujo, 2012). The maximum load ever achieved was little above 4000MW for a population of about 160 million. This indeed is grossly inadequate to meet the demand of electricity consumers (Ogbuefi and Madueme, 2015; Ibe and Okedu, 2009). Most generating stations are old and require complete overhaul. By December, 2011 the average generating capacity was about 2,800MW daily owning to corruption, political, grossly inadequate funding and mismanagement reasons. Currently, most of the generating units have broken down due to limited available resources to carry out the needed level of maintenance. Hence, the electricity net-work has been characterized by constant system collapse as a result of low generating capacity by the few generating stations presently in service (Oshevire and Odiase, 2013; Ubi, Effiom, Okon and Oduneka, 2012). As a result, the nation experiences massive load shedding.

Importers of electricity generators continue to flood the Nigeria market with substandard generators that pack up before the actual life span. The generator industries in Nigeria are one of the few industries that have huge foreign exchange outflows associated with generator imports, the huge cost of running these generators have brought significant negative social, economic and environmental impacts on Nigerians. All categories of business spend significant proportion of their start-up costs on acquisition of generators, while maintenance of generators constitute an important operational costs. In 2005, Nigeria was reported to be the largest importer of generators in Africa, spending 152 million on generator imports. This figure includes only diesel fired generators exclude imports from countries outside Europe, USA and Japan (Ekpenyong, Bam and Anyasi, 2013).

Through the planned generation capacity projects for a brighter future Tables 2.1and 2.2; the current status of power generation in Nigeria presents the following challenges:

(i). Inadequate generation availability (ii) Inadequate and delayed maintenance of facilities (iii). Insufficient funding of power stations (iv) Obsolete equipment, tools, safety facilities and operational vehicles (v) Inadequate and obsolete communication equipment (vi) Lack of exploration to tap all sources of energy from the available resources, and (vii) Low staff morale (Obuka, et al., 2014; Sambo, et al., 2008).

Table 1 Existing Power Generation Capacity in Nigeria (Obadote, 2009; Sambo, et al., 2008)

Plant	Age (Years)	No of Units	Installed Capacity (MW)	Current No of Units Available	Capacity Available (MW)	Operational Capability (MW)
Egbin	23	6	1320	4	880	600
Egbin AES	7	9	270	9	270	220
Sapele	26 - 30	10	1020	1	90	65
Okapi	3	3	480	3	480	400
Afam	26	20	702	3	350	300
Delta	18	18	840	12	540	330
Omoku	3	6	150	4	100	70
Ajaokuta	N/A	2	110	2	100	80
Geregu	2	3	414	3	414	414
Omotosho	1	8	335	2	80	75
Olorunsogo	1	8	335	2	80	35
Kainji	38 - 40	8	760	6	440	400
Jebba	25	6	578.4	4	385.6	300
Shiroro	22	4	600	4	600	300
Total		**111**	**7914.4**	**59**	**4809.6**	**3589**

Table 2 Planned Total Present and Future Electricity Generation Infrastructure in Nigeria (Obuka et al., 2014; Sambo et al., 2008)

S/N	POWER STATION	TYPE	STATION	CAPACITY (MW)	STATUS
1	Egbin	Thermal	Lagos	1320	Existing
2	Afam	Thermal	Rivers	969	Existing
3	Sapele	Thermal	Delta	1020	Existing
4	Ijora	Thermal	Lagos	40	Existing
5	Kanji	Hydro	Niger	760	Existing
6	Jebba	Hydro	Niger	578.40	Existing
7	Shiroro	Hydro	Niger	600	Existing
8	Delta	Thermal	Delta	912	Existing

9	Orji	Coal	Rivers	20	Existing
10	Geregu	Thermal	Kogi	414	Ongoing
11	Omotosho	Thermal	Ondo	335	Ongoing
12	Papalanto	Thermal	Ogun	335	Ongoing
13	Alaoji	Thermal	Abia	504	Ongoing
14	Omoku	Thermal	Rivers	230	New IPP
15	Rain/Ube	Thermal	Bayelsa	225	New IPP
16	Sapele	Thermal	Delta	451	New IPP
17	Eyaen	Thermal	Edo	451	New IPP
18	Egbema	Thermal	Imo	338	New IPP
19	Calaber	Thermal	Cross River	561	New IPP
20	Mambilla	Hydro	Taraba	2600	New
21	Zungeru	Hydro	Niger	950	New
22	AES	Thermal	Lagos	300	Commissioned IPP
23	AGIPOkpai	Thermal	Delta	480	Commissioned
24	Omoku	Thermal	Rivers	150	Approved IPP
25	Obajana	Thermal	Kogi	350	Approved IPP
26	Ibom Power	Thermal	AkwaIbom	188	Approved IPP
27	Ethiope Energy Ltd			2800	Approved
28	Farm Electric Supply Ltd			150	Approved
29	ICS Power			624	Approved
30	Supertek Ltd			624.00	Approved Licenses IPP
31	Mabon Ltd			39.00	Approved
32	Geometric Ltd			140.00	Approved Licenses IPP
33	Aba Power Ltd			0.00	Licensed Distributor
34	Westcom Tech and Energy Service Ltd			1000.00	License Granted IPP
35	Lotus andBresson 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	License Granted IPP
40	Ibafo Power Station Ltd			640.00	License Granted IPP
41	Shell Distribution Coy Ltd			100.00	License Granted IPP
42	AgbaraShoeline Power Co Ltd			1800.00	License Granted IPP
43	Index Thermal Power Ltd			1800.00	License Granted IPP
	TOTAL			**24,106.00**	

2.2 Transmission

The first power interconnection in Nigeria was a 132kV link constructed in 1962 between Logos and Ibadan. By 1968 the first National grid structure emerged with the construction of the Kainji hydro station which supplied power via a 330kV, primary radial type transmission network into the three 132kV sub system then existing in the Western, Northern and Eastern parts of the country. The 330kV and 132kV systems were initially run by two separate bodies- Niger Dams Authority (NDA) and Electricity Corporation of Nigeria (ECN) respectively. Central control for the 330kV network was coordinated from Kainji power supply control room. While the 132kV network was run by load dispatcher located at Ijora power supply Lagos. These two bodies were merged formally into single power utility known as NEPA in 1972, thus ushering in centralized regulation

and coordination of the entire rapidly growing 330kV and 132kV National network. Presently, the radial transmission grid (330kV and 132kV) is managed by the Transmission Company of Nigeria (TCN), with the responsibility of undertaking the system operation and market settlement functions, respectively (Folorunso and Olowu, 2014). These networks are characterised by many disturbances, which cause various hindrances and outages (Ogbuefi and Madueme, 2015; Abanihi, Adigo and Ezomo, 2014; Sadiq and Nwohu, 2013). The current transmission system in Nigeria comprises 5523.8km of 330kV, 6801.49km of 132kV, 32No 330/132kV substations with total installed transformation capacity of 7688MVA. 105No. 132/33/11kV substations with total installed transformation capacity of 9130MVA. The average available capacity on 330/132kV is 7364MVA and 8448MVA on 132/33kV (Isaac, Okwechime and Ademola, 2014; Labo, 2010). The Nigeria 330kV transmission grid is characterized by high power losses due to the very long transmission lines. Power losses result in lower power availability to the consumers, leading to inadequate power to operate their appliances. Increased power demand pushes the power transmission network to its upper limits and beyond, resulting to shortening of the life span of the network or total collapse (Airoboman, Okakwu, Alayande and Seun, 2015; Onohaebi and Odiase, 2010). Before the unbundling of the Nigeria existing power network, it comprised 11,000km transmission lines (330kV), it was faced with so many problems such as; Inability to effectively dispatch generated energy to meet the load demand, large number of uncompleted transmission line projects, reinforcement and expansion projects in the power industry, poor voltage profile in most of northern part of the grid, inability of the existing transmission lines to wheel more than 4000MW of power at present, operational problems, voltage frequency control (Onohaebi and Omodamwen, 2010; Onohaebi and Apeh, 2007; Onohaebi and Kuale, 2007). The transmission system in Nigeria Power System does not cover every part of the country. It currently has the capacity to transmit a maximum of about 4,000MW and it is technically fragile and radial in nature thus very sensitive to major disturbances. This show that if the generation sector is to run at full production, the transmission grid will not have the capacity to handle the produced power reliably. (Ayodele, Ogunjuyigbe and Oladele, 2016; Okwe, Akwukwuaegbu, Uneze and Nwaogwugwu, 2015; Aminu and Kangiwa, 2013). In summary, the major problems identified are: (i). It is funded solely by the Federal government, whose resource allocation cannot adequately meet all the requirements; (ii). It is yet to cover many parts of the country; (iii). Its current maximum electricity wheeling capacity is 4,000MW, which is awfully below the required national needs; (iv). Some sections of the grid are outdated with inadequate redundancies as opposed to the required national needs; (v). The Federal government lacks the required fund to regularly expand, update, modernize and maintain the network; (vi). There is regular vandalization of the lines, associated with low level of surveillance and security on all electrical infrastructure; (vii). The technologies used generally deliver very poor voltage stability and profiles; (viii). There is a high prevalence of inadequate working tools and vehicles for operating and maintaining the network; (ix). There is serious lack of required modern technologies for communication and monitoring; (x). The transformers deployed are overloaded in most service areas; (xi). In adequate of spare-parts for urgent maintenance; and (xii). Poor technical staff recruitment, capacity building and training programme (Oshevire, Oladimeji and Onohaebi, 2013; Obadote, 2009; Sambo et al., 2003).

Power Holding Company of Nigeria, in attempt to solve this problems, resulted in its unbundling. Thus, the Nigeria 330kV integrated network intends to improve the grid stability and creates an effective interconnection. It is anticipated to increase transmission strength because of the very high demand on the existing and aging infrastructure by building more power stations and transmission lines, through the Independent Power Projects. The reformed Nigeria power system grid was initiated with system security on the mind of the players, the post reformed grid provided remedies to the inadequacies associated with the pre-reform grid network (Onojo, Inyama, Ononiwu and Uzoechi, 2016). The existing grid lacks the technical adequacy to handle huge electric power injection and meet the future system performance criteria (Izuegbunam, Duruibe and Ojukwu, 2011). The grid interconnect these stations with fifty two buses and sixty four transmission lines of either dual or single circuit lines and has four control centres (one national control centre at Osogbo and three supplementary control centres at Benin, Shiroro and Egbin) (Omorogiuwa and Ogujor, 2012).

The Nigerian 28-bus 330kV transmission system consist of ten generating stations, twenty-three load stations and thirty-two transmission lines. The single line diagram of system, Fig. 2.1, shows that the system is divided into three major regions: North, South-East and South-West regions. North is connected to South by a triple circuit lines between Jebba and Osogbo, while West is linked to the East through one transmission line from Osogbo to Benin and a double circuit line from Ikeja to Benin (Adedayo, 2016; Adebayo, Adejumobi and Adepoju, 2013; Adepoju, Komolafe and Aborisade, 2011). It has only one major loop system involving Benin – Ikeja West – Ayede – Osogbo and Benin. The absence of loops accounts mainly for the weak and unreliable power system in the country (Onohaebi and Apeh, 2007).

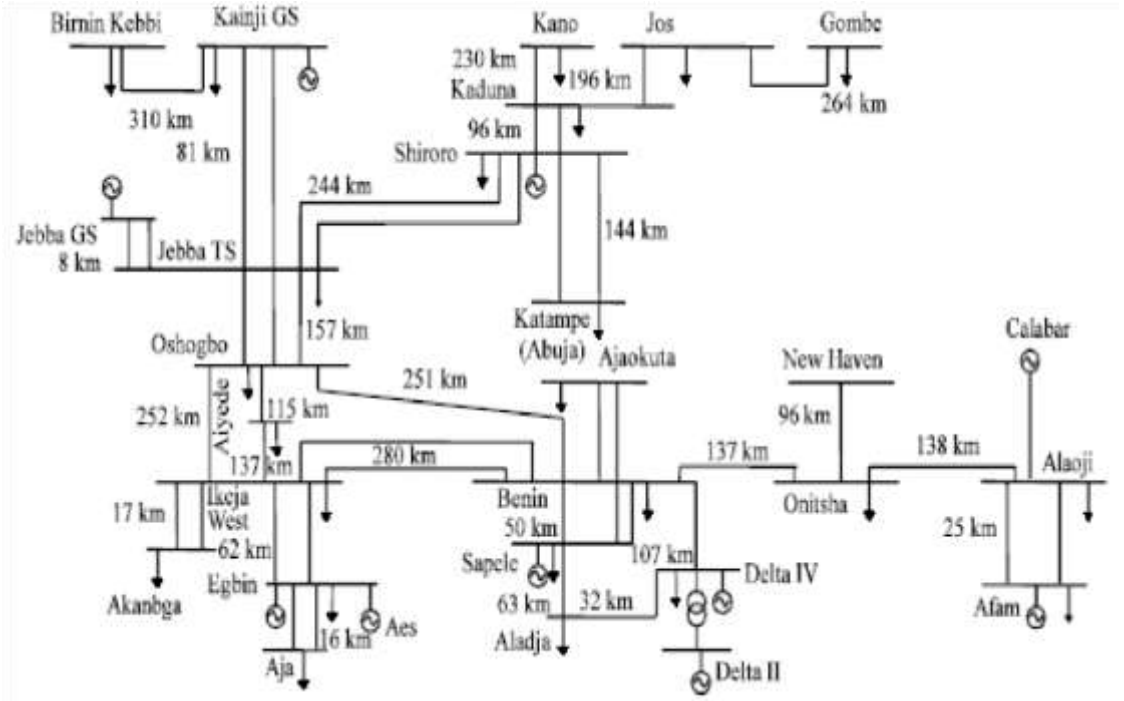

Fig.1 One-line Diagram of Nigeria 330kV Transmission Network as at 1999 (Airoboman, et al., 2015).

2.3 Distribution and Marketing

The distribution system in Nigeria is faced with low voltage and high loss is. These two problems of high voltage drop and losses in the distribution network varies with the pattern of loading on the distribution network (Egwaile, Onohaebi and Ike, 2013). 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. In summary some of the major problems identified are; (i). Weak and Inadequate Network Coverage; (ii). Overloaded Transformers and bad Feeder Pillars resulting in very low voltages; (iii). Substandard distribution lines; (iv). Over/under billing System and payment via unscrupulous business collusion; (v). Unwholesome practices by staff and very poor Customer relations; (vi). Inadequate logistic facilities such as tools and working vehicles; (vii). Poor and obsolete communication equipment; (viii). Low staff morale and lack of regular training; (ix). Insufficient funds for maintenance activities; (x). Cash collection problems; (xi). Illegal manipulation of installed meters; and (xii) Illegal sales of electricity metres to prospective consumers, vandalization of equipment, resold in most cases to public/private electricity institutions (Sambo, et al., 2010; Obadote, 2009).

Presently, there are eleven distribution companies (33kV and below) that undertake the wires, sales, billing, collection and customer care functions within their area of geographical monopoly. The distribution companies are as follows (Folorunso and Olowu, 2014):

(i) Abuja Electricity Distribution Company (AEDC);
(ii) Benin Electricity Distribution Company (BEDC);
(iii) Eko Electricity Distribution Company (EEDC);
(iv) Enugu Electricity Distribution Company (EEDC);
(v) Ibadan Electricity Distribution Company (IBEDC);
(vi) Ikeja Electricity Distribution Company (IKEDC);
(vii) Jos Electricity Distribution Company (JEDC);
(viii) Kaduna Electricity Distribution Company (KEDC);
(ix) Kano Electricity Distribution Company (KEDC);
(x) Port Harcourt Electricity Distribution Company (PHEDC) and
(xi) Yola Electricity Distribution Company (YEDC).

Table 3 Electricity Distribution Companies names, coverage areas and contact addresses. (Nigerian Electricity Regulatory Commission, 2015).

Name	Suburb	State	Head Quater
Abuja Electricity Distribution Company	Wuse Zone 4, Abuja	FCT, Niger, Kogi , and Nassarawa	Abuja
Benin Electricity Distribution Company	No 5 Akpakpava Street, Benin-City	Edo, Delta, Ondo, and part of Ekiti	Benin
Eko Electricity Distribution Company	24/25 Marina, Lagos	Lagos	Eko
Enugu Electricity Distribution Company	No 12 Station Road, Okpara Avenue, Enugu	Enugu, Abia, Imo , Anambra and Ebonyi	Enugu
Ibadan Electricity Distribution Company	Capital Building, 115 Ring Road, Ibadan	Oyo, Ogun, Osun, Kwara and part of Ekiti	Ibadan
Ikeja Electricity Distribution Company	Secretariat Road, Alausa, Ikeja	Lagos	Ikeja
Jos Electricity Distribution Company	No 9 Ahmadu Bello Way, Jos	Plateau, Bauchi, Benue and Gombe	Jos
Kaduna Electricity Distribution Company	Nagwamatse Building, Ahmadu Bello Way, Kaduna	Kaduna,Sokoto, Kebbi and Zamfara	Kaduna
Kano Electricity Distribution Company	No 1 Niger Street, P.M.B. 3089, Kano	Kano, Jigawa and Katsina	Kano
Port Harcourt Electricity Distribution Company	No 42 Obiwali Road, Rumuigbo, Port Harcourt	Rivers, Cross River, Bayelsa and AkwaIbom	PHC
Yola Electricity Distribution Company	No 2 AtikuAbubakar Road, JimetaYola	Yola, Adamawa, Borno, Taraba and Yobe	Yola

2.3.1 Kaduna Electricity Distribution Company Plc.

Kaduna Electricity Distribution Company, or Kaduna Disco, is located in the North Central region of Nigeria. It has a franchise for distribution and marketing of electricity in the Kaduna Zone, which includes the Makera, Doka, BirninKebbi, Gusau, Sokoto and Zaria Districts. Kaduna Disco owns and maintains 37 number 33 KV and 107 No 11 KV circuits. It also operates 79 No 33/11 KV substations and 2, 007 number 11/0.415 KV distribution substations.

In 2005, Kaduna recorded improved collections largely as a result of optimized metering, billing efficiencies. With improved tariff, additional distribution capacity and improved collections, Kaduna Disco projects doubling revenue in the next four- five years.

2.3.2 Abuja Electricity Distribution Plc

Abuja Electricity Distribution Company, or Abuja Disco, serves central Nigeria from its base in Abuja, Nigeria's capital city in the Federal Capital Territory (FCT). Abuja Disco was established in 1997 following the transfer of the capital from Lagos to Abuja in 1991. Abuja Disco has a franchise for distribution and marketing comprising Minna, Suleja, Lokoja and Lafia Districts. Despite past investments in expanding the electricity infrastructure, demand in the Disco's service zone far exceeds supply. Increasing population continues to add to that demand. Abuja Disco distributes an average of 204, 150 MW of electricity annually, and has been ranked fourth among the 11 discos for both sales and electricity purchased/distributed. Abuja Disco infrastructure is among the most modern and best maintained in Nigeria.

Among other infrastructure, Abuja Disco owns and maintains 60 No 15 MVA injection sub stations, in addition to 11 No 7.5 MVA and 35 No 2.5 MVA injection sub stations.

In 2005, Abuja Disco intensified collection efforts with the installation of pre-payment meters, route sequencing, bulk, and feeder-by-feeder energy audits.

2.3.3 Jos Electricity Distribution Plc

Jos Electricity Distribution Plc, or Jos Disco, is located in the northeastern part of Nigeria and serves a significant industrial customer base in Bauchi, Benue, Gombe and Plateau States, as well as Saminaka in Kaduna State. The Jos Zone is subdivided into four districts, namely, Jos, Makurdi, Bauchi and Gombe. Jos is the centre of Nigeria's mining industry. Jos Disco covers more than 610, 000 sq. Km., with a population of more than 13 million.

Jos Disco owns and maintains 31 No 33 KV and 104 No 11 KV circuits, covering 4, 540.56 and 898.609 kilometers, respectively. It also operates 4339 No 11/0.415 KV network circuits and maintains 7,066 kilometers of 0.415 KV circuit. Jos Disco's revenue is projected to increase by much as 80% in the next four-to-five years as a result of new distribution capacity combined with improved tariffs, new metering, billing efficiencies, improved collections, and a growing customer base. Customer Base: 277,626 (2008)

2.3.4 Kano Electricity Distribution Company Plc

Kano Electricity Distribution Plc, or Kano Disco, is located in northwestern Nigeria and has a franchise for distribution of electricity in Kano, Katsina and Jigawa States, through seven districts, namely Nassarawa, Dala, Katsina, Dutse, Kumbotso, Funtua and Dakata. Kano Disco owns and maintains 37 number 33 KVand 107 number 11 KV circuits, covering 4, 145.69 and 2, 1829.95 kilometers, respectively. It also operates 79 No 33/11 KV injection substations and 2, 007 No 11/0.415 KV distribution substations.

Kano Disco distributes approximately 14% of the power generated by its parent company, the Power Holding Company of Nigeria (PHCN). In 2005, Kano Disco distributed a total of 1, 228, 710, 220 GWh of electricity to 286, 622 residential, commercial and industrial end-users. By 2008, its customer base had grown to 489,965.

2.3.5 Yola Electricity Distribution Plc

Yola Electricity Distribution Company, or Yola Disco, is located in the northeastern part of Nigeria, an area dominated by agricultural customers in Adamawa, Bomb, Taraba and Yobe States. Yola Disco is subdivided into four districts, namely, Yola, Maiduguri, Taraba and Damaturu. Yola Disco owns and maintains 22 No 33KV and 59 No11KV circuits, extending over 3, 190.23 and 866.93 kilometres, respectively. It also operates 43 No 33/11 KV injection substations and 999 No 11/0.415 CV distribution substations. Yola Disco's location, near Yoaunde, Cameorun, and the Chad and Niger Republic borders, suggests a market for crossborder export of electricity.

2.3.6 Enugu Electricity Distribution Plc

Enugu Electricity Distribution Plc, or Enugu Disco, located in the southeastern part of Nigeria, distributes and markets electricity in franchise areas that includes Abia, Anambra, Ebonyi, Enugu and Imo States.

The franchise area is further subdivided into 10 districts, namely, Aba, Abakaliki, Abakpa, Awka, Ogui, Onitsha, Owerri, Nnewi, and Umuahia. The Aba and Onitsha districts are home to two of Nigeria's major domestic commercial/industrial centres. Enugu Disco is Nigeria's second largest distribution company in terms of its customer base and the fifth largest in terms of electricity sales. In recent years, Enugu Disco has enhanced its revenue generation Capacity, leading to the increase of its monthly collection by an average of 32% over 3 years. It has also put in place operational improvements that led to a 52% increase in its bulk distribution capacity, from 467.25 MVA to 710.75 MVA.

2.3.7 Benin Electricity Distribution Company

Benin Electricity Distribution Plc, or Benin Disco, serves a primarily industrial customer base in Delta Edo, Ondo and Ekiti States, in' Nigeria's Southern region, an area dominated by companies that produce oil and nergy. The districts under Benin Disco include Ado-Ekiti, AfenonesanAkure, Asaba, Akpakpava, ' Ugbowo and Warri, Benin Disco owns and maintains 39 number 33 KV and 200 number 11 KV circuits, covering 4,979. 391 and 5,7085 kilometres respectively, It also operates 153 number 33/11KV injection substations and 124 number 6.6/0.415 KV dittribution substations, It also owns and maintains 7 No 6.6 KV circuit, 92.14 kilometers of 6.6 KV/3.3 KV. Customer Base: 529,341 (2008)

2.3.8 Eko Electricity Distribution Company Plc

Eko Electricity Distribution Plc, or Eko Disco, located in Lagos. Nigeria's commercial and financial hub and the Agbara industrial region. Eko Disco's franchise includes Festac, Ijora,Lagos Island, Ajah and

Agbara/Badagry districts of the Lagos South zone, with the Republic of Benin as a potential target of electricity export.
Eko Disco owns and maintains 51 No 33 KV and 217 No 11 KV circuits, covering 508 and 2, 137.95 kilometers respectively, It also operates 48 number 33/11 KV injection substations and 4, 019 number 116/0.415 kV distribution substations.

2.3.9 Ikeja Electricity Distribution Company Plc

Ikeja Electricity Distribution Plc, or Ikeja Disco, is located in Lagos and has a franchise for distributing and marketing electricity in the Ikeja Zone which includes parts of Lagos, Shomolu, Alimosho, Ojodu, Ikorodu, Oshodi and Abule-Egba. In 2005, Ikeja Disco delivered a total of 3, 520, 324, 310 GWh of electricity to 464, 756 registered Customers.

2.3.10 Ibadan Electricity Distribution Company Plc

Ibadan Electricity Distribution Plc, or Ibadan Disco, is located in the south-western region of Nigeria and has a franchise for distributing and marketing electricity in parts of Ogun, Osun and Kwara States. Ibadan Disco's service area is subdivided into eight districts, namely, Abeokuta, Dugbe, Molete, Ijebu-Ode, Osogbo, Ilorin, Sango-ota and Oyo.
Ibadan Disco owns and maintains 65 No 33 kV and 155 No 11 kV circuits, covering 4,154 and 14, 760.58 kilometers respectively, it also operates 122 No 33/11 kV injection substations and 3,431 No 116/0.415kV distribution substations and 9,095 number 0.415 KV network circuits covering 12,315 kilometers. Customer Base: 812,000 (2008)

2.3.11 Port Harcourt Electricity Distribution Company Plc

Port-Harcourt Electricity Distribution Plc, or Port Harcourt Disco, Serves Bayelsa, Cross River Akwa-Ibom and parts of Delta States in Nigeria's south-south zone. The Disco is in turn subdivided into six districts, namely, Calabar, Diobu, Ikom/Ogoja, Borikiri, Uyo and Yenegoa. Port-Harcourt Disco owns and maintains 22 No 33 kV and 64 No 11 kV circuits. It also operates 22 No 33/11kV injection Substations and 3,431 number 116/0.415kV distribution substations. In addition, it possesses 1, 793 number 11/0,415kV substations and 5,662 number 0.415 kV circuits. In 2005, Port-Harcourt Disco delivered a total of 1,163,064, 600 GWh of electricity to 206,545 Customers.

III CONCLUSIVE REMARKS AND RECOMMENDATIONS

Efficient and effective electricity generation, transmission and distribution are central to and at the heart of the development in all societies. This assertion is premised on the reasoning that socio-economic growth and development cannot be successfully actualized without the critical input from the electricity (power) sector. Essentially, individuals groups and governmental as well as business organizations and institutions require adequate and stable electricity supply for their day to day operations. However, the epileptic and unstable nature of the electricity generation, transition and distribution evident in the operations of the Power Holding Company of Nigeria has largely constituted an enduring and in-grained factor that has constrained and is still constraining the developmental activities and aspirations of the Nigerian entity. There is therefore the exigency for a genuine commitment by the Nigerian government to its electricity reform efforts and action plans, a favourable predisposition by the operators in the electricity industry in Nigeria, particularly the management and staff of the Power Holding Company of Nigeria as well as a stimulating competitive and environment with an entrenched service and maintenance culture.

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