Electricity Generation and the Present Challenges in the Nigerian Power Sector

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Abstract

Adequate power supply is an unavoidable prerequisite to any nation's development, and electricity generation, transmission and distribution are capital-intensive activities requiring huge resources of both funds and capacity. In the prevailing circumstances in Nigeria where funds availability is progressively dwindling, creative and innovative solutions are necessary top address the power supply problem.

Nigeria has an estimated 176 trillion cubic feet of proven natural gas reserves, giving the country one of the top ten natural gas endowments in the world and the largest endowment in Africa. Natural gas is a natural occurring gaseous mixture of hydrocarbons gases found in underground reservoirs. It consists mainly of methane (70% - 95%). With small percentage of ethane, propane, butane, pentane and other heavier hydrocarbons with some impurities such as water vapour, sulphides, carbon dioxides, etc.

1.0 INTRODUCTION

Nigeria is a vast country with a total of 356, 667 sq miles (923,768 sq km), of which 351,649 sq miles (910,771 sq km or 98.6% of total area) is land. The nation is made up of six Geo-Political Zones subdivided into 36 states and the Federal Capital Territory (FCT). Furthermore, the vegetation cover, physical features and land terrain in the nation vary from flat open savannah in the North to thick rain forests in the south, with numerous rivers, lakes and mountains scattered all over the country. These national physical and political attributes themselves present challenges for the effective provision of power needs to all nooks and crannies of the country.
To provide adequate power to ensure that Nigeria is among the industrialized nations, three critical activities must be effectively achieved.

- Adequate power must be generated;
- The power must effectively be transmitted to all parts of the country; and

- Finally be efficiently distributed to the consumers.

Since development and population growth in any country are highly dynamic, these three activities must also be carefully addressed in a dynamic, creative and logical manner.

Adequate power supply is an unavoidable prerequisite to any nation's development, and electricity generation, transmission and distribution are capital-intensive activities requiring huge resources of both funds and capacity. In the prevailing circumstances in Nigeria where funds availability is progressively dwindling, creative and innovative solutions are necessary top address the power supply problem.

The administration of President Umaru Musa Yar'adua has already unveiled a mission, setting an agenda of industrializing Nigeria by 2020, which is in the next 10 years. This conference is therefore one of the highest and administrative governing structures that must consider and proffer practicable solutions to the power supply problems in order to achieve this priority goal of the Nigerian Government.

This paper therefore presents a brief history of the attempts and efforts to supply power to the nation. It also briefly reviews the current status of energy resources, energy demand and supply, power generation, transmission and distribution, power sector national policy, summary of the major challenges and the way forward.

2.0 OVERVIEW

To discuss the power sector in Nigeria in a realistic and practical context, some brief review is necessary to give an insight into the sector since independence.

Electricity supply in Nigeria dates back to 1886 when two (2) small generating sets were installed to serve the then Colony of Lagos. By an Act of Parliament in 1951, the Electricity Corporation of Nigeria (ECN) was established, and in 1962, the Niger Dams Authority (NDA) was also established for the development of Hydro Electric Power. However, a merger of the two (2) was made in 1972 to form the National Electric power Authority (NEPA), which as a result of unbundling and the power reform process, was renamed Power holding Company of Nigeria (PHCN) in 2005.

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 has separated PHCN into eleven distribution firms, six generating companies, and a transmission company, all of which will be privatized. Several problems, including union opposition, have

delayed the privatization, which was later rescheduled for 2006. In February 2005, the World Bank agreed to provide PHCN with $100 million to assist in its privatization efforts.

The Nigerian government has made an effort to increase foreign participation in the electric power sector by commissioning independent power projects (IPPs) to generate electricity and sell it to PHCN. In April 2005, Agips 450-MW plant came online in Kwale in Delta State. The NNPC and Joint Venture (JV) partners, ConocoPhillips and Agip, provided the $480 million to construct the plant. IPPs currently under construction include the 276-MW Siemens station in Afam, Exxon Mobils 388-MW plant in Bonny, ABBs 450-MW plant in Abuja, and Eskoms 388-MW plant in Enugu. Several state governments have also commissioned Oil majors to increase generation including Rivers State, which contracted Shell to expand the 700-MW Afam station. The Nigerian government also approved the construction of four thermal power plants (Geregu, Alaoji, Papalanto, and Omotosho), with a combined capacity of 1,234 MW to meet its generating goal of 6,500 MW in 2006. In addition fourteen hydroelectric and Natural Gas plants were planned for kick-up but yet to commence since then. Chinas EXIM Bank Su Zhong and Sino Hydro have committed to funding the Mambilla (3,900-MW) and Zungeru (950-MW) hydroelectric projects. In addition, Sino Hydro proposed that it should construct the two power projects. Also, NNPC, in a JV with Chevron are to construct a 780-MW gas-fired thermal plant in Ijede, Lagos State. The project is expected to be constructed in three phases, with the first two phases expected to have capacity of 256 MW each. The plant is expected to be operational in 2007 but yet to commence construction.

While Nigerians development of the Oil sector has been good for the country's economy, oil sector development has had an adverse impact on the country's environment. Oil extraction in the Niger Delta region has caused severe environmental degradation, owing to the legacy of oil spills, lax environmental regulations, and government complicity during military regimes that once governed the country. Although the situation is improving with more stringent environmental regulations for the oil industry, marine pollution is still a serious problem. Air pollution from Natural Gas flaring, exhaust emissions from the explosion in car ownership, and electricity generators continue to leave Lagos which is the most industrialized and most populated city shrouded in smog. The use of solid biomass, such as fuel wood, is prevalent and constitutes a major energy source for rural Nigerians. The production and consumption of commercial renewable energy in Nigeria remains quite limited. With Nigerians population continuing to increase, the pressure on the country's environment appears likely to increase as well, even with the added focus on cleaning up the Niger Delta and tightening environmental laws and regulations.

3.0 ENERGY RESOURCES IN NIGERIA

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. It is not surprising; therefore, that energy export is the mainstay of the Nigerian economy. Also, primary energy resources dominate the nation's industrial raw materials endowment.

Electricity energy production in Nigeria over the last 40 years varied from gas –fired, oil – fired, hydroelectric power stations to coal-fired with hydroelectric power system and gas – fired system taking precedence.

This is predicated by the fact that the primary fuel sources (coal, oil, water, gas) for these power stations are readily available. Nigeria's coal reserves are large and estimated at 2 billion metric tonnes of which 650 million tonnes are proven reserves. About 95% of Nigeria's coal production has been consumed locally; mainly for railway transportation, electricity production and industrial heating in cement production.

Nigeria has an estimated 176 trillion cubic feet of proven natural gas reserves, giving the country one of the top ten natural gas endowments in the world and the largest endowment in Africa. Natural gas is a natural occurring gaseous mixture of hydrocarbons gases found in underground reservoirs. It consists mainly of methane (70% - 95%). With small percentage of ethane, propane, butane, pentane and other heavier hydrocarbons with some impurities such as water vapour, sulphides, carbon dioxides, etc. [10]. Apart from the export potential of the Nigerian gas, local demand opportunities are power generation, cement industry, iron and steel plants. The largest single consumer of natural gas in Nigeria is PHCN and it accounts for about 70% used to operate electricity generating gas plants at Afam, Ughelli, Sapele and Egbin.

4.0 ENERGY DEMAND AND SUPPLY SCENARIO

Electricity plays a very important role in the socio-economic and technological development of every nation. The electricity demand in Nigeria far outstrips the supply and the supply is epileptic in nature. The country is faced with acute electricity problems, which is hindering its development notwithstanding the availability of vast natural resources in the country. It is widely accepted that there is a strong correlation between socio-economic development and the availability of electricity.

The Energy Commission of Nigeria (ECN) was established by Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989, with the statutory mandate for the strategic planning and co-ordination of national policies in the field of energy in all its ramifications. By this mandate, the Commission which is the apex government organ empowered to carry out overall energy sector planning and policy co-ordination. As part of its contribution to the

resolution of the problems of the electricity sector along the line of its mandate, the ECN has been collaborating with the International Atomic Energy Agency (IAEA) under an IAEA regional project titled "Sustainable Energy Development for Sub-Saharan Africa (RAF/0/016)".

The project entails capacity building for energy planning and the determination of the actual energy demand and the strategies for supply for each participating country over a 30-year time horizon. The implementation of the project requires the establishment of a Working Team (WT) and a Country Study Team (CST) both of which include the major public and private stakeholders in the energy sector of the country. The working team consists of technical experts that directly implement the project and reports to the CST, which serves as the steering committee for the project on a regular basis. Members of the WT were trained on the use of the IAEA models and have computed the Nigeria energy demand and supply projections covering the 2005-2030. The project involves the use of the following IAEA Energy Modelling tools:

- Model for the Analysis of Energy Demand (MAED)
- Model for the Energy Supply Strategy Alternatives and their General Environmental Impact (MESSAGE).

Energy Demand Projection

The energy demand projections were computed using MAED with the key drivers of energy demand, namely demography, socio-economy and technology. The application of MAED requires detailed information on demography, economy, energy intensities and energy efficiencies. This information is first assembled for a base year which is used as the reference year for perceiving the evolution of the energy system in the future. Selection of the base year is made on the basis of availability of data, assessment that the data are representative of the economic and energy situation of the country.

MAED allows the breakdown of the country's final energy consumption into various sectors and within a sector into individual categories of end-uses in a consistent manner. The breakdown helps in the identification of the social, economic and technical factors influencing each category of final energy demand. In modelling the Nigeria's energy case, four economic scenarios were developed and used as follows:

- Reference Scenario - 7% GDP Growth;
- High Growth Scenario - 10% GDP Growth;
- Optimistic Scenario I – 11.5% GDP Growth; and
- Optimistic Scenario II – 13% GDP Growth (based on Presidential Pronouncement for the desire to be among the first 20 economies by 2020).

Economic growth and structure of the economy are the major driving parameters in the four scenarios. Projected electricity demand has been translated into demand for grid electricity and peak demand on the bases of assumptions made for T&D losses, auxiliary consumption, load factor and declining non-grid generation. Table 1 shows the electricity demand projections for the scenarios. It must be emphasized that the demand indicated for 2005 represents suppressed demand, due to inadequate generation, transmission, distribution and retail facilities. Suppressed demand is expected to be non-existent by 2010.

For the 13% GDP growth rate, the demand projections rose from 5,746MW in the base year of 2005 to 297,900MW in the year 2030 which translates to construction of 11,686MW every year to meet the demand. The corresponding cumulative investment (investment & operations) cost for the 25-year period is US$ 484.62 billion, which means investing US$ 80.77 billion every five years within the period. In conducting the studies, all the available energy resources in the country were considered in order to broaden the nation's energy supply mix and enhance its energy security.

Table 1: Electricity Demand Projections per Scenario, MW

Scenario	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Reference (7%)	5,746	15,730	28,360	50,820	77,450	119,200
High Growth (10%)	5,746	15,920	30,210	58,180	107,220	192,000
Optimistic I (11.5%)	5,746	16,000	31,240	70,760	137,370	250,000
Optimistic II (13%)	5,746	33,250	64,200	107,600	172,900	297,900
Presidential Pronouncement						

Energy Supply Projection

The total energy supply were computed using MESSAGE and utilizes the projected energy demand as an input to produce a supply strategy. MESSAGE is an energy supply model, representing energy conversion and utilization processes of the energy system (or its part) and their environmental impacts for an exogenously given demand of final energy. It is used for development of medium-term strategies, the planning horizon being in the order of 30 years. The time scope is limited due to uncertainties associated with future technological development. The energy system dynamics are modelled by a multi -period approach. It is an optimization model which from the set of existing and possible new technologies selects the optimal in terms of selected criterion mix of technologies able to cover a country's demand for various energy forms during the whole study period.

MESSAGE takes into account demand variations of various final energy forms during the day, week and year, as well as different technological and political constrains of energy supply. It is an energy and environmental impact model, enabling the user to carry out integrated analysis of the energy sector development and its environmental impacts. The application of the MESSAGE model results in a least-cost inter-temporal mix of primary energy, energy conversion and emission control technologies for each scenario. For the computation of Nigeria's Energy Supply the same scenario that was used in MAED are used. The result for the electricity supply projections is shown in table 2.

Table 2:

Scenario	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Reference (7%)	6440	15668	28356	50817	77450	136879
High Growth (10%)	6440	15861	30531	54275	107217	192079
Optimistic I (11.5%)	6440	15998	31235	71964	177371	276229

5.0 KEY SECTOR INDICATOR

Nigeria currently has 14 generating plant, which supply electric energy to the National Grid. Of the 14 generating plants, 3 are hydro and 11 are thermal (gas/steam). The national grid is made up of 4,889.2km of 330kV line, 6,319.33km of 132kV line, 6,098MVA transformer capacity at 330/132kV and 8,090MVA transformer capacity at 132/33kV.

Due to the importance of the sector, President Umaru Musa Yar'Adua, immediately after he was sworn in on may 29th 2007, recognized the urgency of the emergency on the Sector by specifically addressing the problems of the Sector in an urgent and immediate basis and eliminating the usual bureaucratic time wasting procedures of treating issues of the sector, while ensuring that Due Process is not compromised.

Accordingly, a program of action is currently being formulated to address the problems of the Sector in the Short term, Medium term and Long term. In the next nine months in the Short Term (2005), it may be realistic to concentrate mainly on the effective and efficient utilization of the existing generation and transmission infrastructures as well as completing the NIPP. The following should be achieved:

- Maintaining and sustaining a minimum generation of the available capacity of 5,800MW;
- Reduce Transmission and Distribution power outages by at least 75%;
- Reduce Transmission and Distribution technical losses;
- Increase revenue collection in PHCN by 50%;
- Improve on Customer Service Delivery in the Distribution and Marketing section of PHCN; and

- Improve on Health, Safety and Environmental measures in generation, transmission and distribution of electricity.

To achieve these, the issues that must be addressed in generation, transmission, distribution and marketing are as follows;

Generation

The Total Installed Capacity of the currently generating plants is 7,876 MW (Table 3), 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 4); 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 form the available resources; and
vii. Low staff morale.

TABLE 3: EXISTING POWER GENERATION CAPACITY IN NIGERIA

S/N	PLANT	PLANT TYPE	LOCATION STATE	AGE (YEARS)	INSTALLED UNITS	INSTALLED CAPACITY (MW)	UNITS AVAILABLE
1	Egbin	Thermal	Lagos	22	6	1320	4
2	Egbin AES	Thermal	Lagos	6	9	270	9
3	Sapele	Thermal	Delta	25-29	10	1020	1

4	Okapi	Thermal	Cross River	2	3	480	2
5	Afam	Thermal	Rivers	25	20	702	3
6	Delta	Thermal	Delta	17	18	840	12
7	Omoku	Thermal	Rivers	2	6	150	4
8	Ajaokuta	Thermal	Kogi	Na	2	110	2
9	Geregu	Thermal	Kogi	1	3	414	3
10	Omotosho	Thermal	Ondo	New	8	335	2
11	Olorunsogo/ Papalanto	Thermal	Ogun	New	8	335	2
	SUB-TOTAL (THERMAL)				**93**	**5976**	**44**
12	Kainji	Hydro	Niger	38-40	8	760	6
13	Jebba	Thermal	Niger	24	6	540	6
14	Shiroro	Thermal	Niger	22	4	600	2
	SUB-TOTAL (HYDRO)				**18**	**1900**	**14**
	GRAND TOTAL				**111**	**7876**	**58**
SUMMARY		**% Thermal**			**84**	**76**	**76**
		% Hydro			**16**	**24**	**24**

TABLE 4: PLANNED TOTAL PRESENT AND FUTURE ELECTRICITY GENERATION INFRASTRUCTURE IN NIGERIA

S/N	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	Niger	578.40	Existing
7	Shiroro	Hydro	Niger	600.00	Existing
8	Delta	Thermal	Delta	912.00	Existing
9	Orji	Coal	Rivers	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	504.00	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 Okpai	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	License Granted IPP
40	Ibafo Power Station Ltd			640.00	License Granted IPP
41	Shell Distribution Coy Ltd			100.00	License Granted IPP
42	Agbara Shoeline Power Co Ltd			1800.00	License Granted IPP
43	Index thermal power Ltd			1800.00	License Granted IPP
	TOTAL			**24,106.00**	

Transmission

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. 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. It's current maximum electricity wheeling capacity is 4,000 MW which is awfully below the required national needs;
iv. Some sections of the grid are outdated with inadequate redundancies as opposed to the required mesh arrangement;
v. The Federal government lack the required fund to regular 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 a 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.

Distribution & Marketing

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;
iii. Substandard distribution lines;
iv. Poor Billing System;
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; and
ix. Insufficient funds for maintenance activities.

5.0 POWER SECTOR NATIONAL POLICY

A liaison office in the Corporate Headquarters of the PHCN which coordinates activities of the unbundled companies pending their full privatization was also set up, with a plan that by December 2006, all these 19 companies would take off and PHCN would be phased out.

Presently, a Chief Executive Officer can operate independent of any other unbundled company heads each unbundled company. They all, including the Coordinator in the liaison office, receive funds for their day-to-day operations from the market operator who disburses the funds according to certain laid down criteria. Each company is also empowered, through with limitations to operate as a commercial company. It is currently planned that each of the successor companies shall operate as a fully commercialized company. The PHCN structure shall also be retained to oversee the activities of the Managing Director/CEOs of the successor companies. This structure should operate for a limited period of 5 years, which should be adequate time to enable the companies to be privatized.

In addition, to restructuring NEPA Government through the NIPP and PHCN also made attempts to develop the infrastructure in generation, transmission and distribution on fast track basis. The aim was to improve power supply to consumers. In order to achieve that, the Federal government in collaboration with state Government embarked on the implementation of new

generation, new gas pipelines, a new transmission and new distribution networks in 2005, using the excess crude account. The projects were estimated to cost N1.23 Trillion out of which about N361 billion was released.

7.0 MAJOR CHALLENGES

From the above brief presentation, 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:

i. Poor utilization of existing assets and deferred maintenance;
ii. Delays in the implementation of new projects;
iii. Lack of sustained, sound and practicable relationship between the Federal Government and other stakeholders particularly the JV international oil companies and the Independent Power Producers (IPP);
iv. Inadequate power evacuation at newly completed and fictionalized power plants;
v. Erratic supply of gas domestic resources for power generation;
vi. The National Grid is yet to cover many parts of the country;
vii. Vulnerable and overloaded existing transmission system;
viii. Poor voltage profile to the tail-end consumer;
ix. Current maximum electricity wheeling capacity is 4,000 MW which is awfully below the required national needs;
x. Some sections of the National Grid are outdated with equipments in a state of poor and inadequate maintenance;
xi. The Federal Government being the only provider of funds to expand to the National Grid did not commit the required funds to regularly expand, update, modernize and maintain the sector;
xii. Regular vandalization of the gas lines, and cable lines, associated with low level of the surveillance and security on all electrical infrastructure;
xiii. High prevalence of inadequate working tools, vehicles and spare-parts for operating and maintaining the power system;
xiv. There is a serious lack of required modern technologies or communication and monitoring of the generation, transmission and distribution infrastructure;
xv. Low customer satisfaction (load shedding, poor voltage profile, inaccurate billing, difficulties in paying bills, no-notice disconnections, etc);
xvi. Poor technical staff recruitment, capacity building and training programme; and
xvii. Inappropriate tariff that would enable the utility to get adequate funds to maintain and expand the infrastructure.

8.0 WAY FORWARD

To address the challenges listed above, a drastic and innovative strategy is required, most especially as energy generation, transmission and distribution in Nigeria for appropriate development is a priority issue of government.

Planning and Operations

A comprehensive review of the operation and management of Power Sector targeted at efficiency and effectiveness is required. In that respect, the following should be undertaken:

i. A detailed national load demand study should be carried out with a view to providing reliable information on the current practical and detailed power requirements and a futuristic forecast for the next 25 years. (The World Bank is currently supporting some work on this);
ii. A detailed and practicable Power generation, transmission and distribution master plan for Nigeria for today and the next 25 years should be produced;
iii. A detailed cost implication on a phased development and operating the power supply system on state-by-state basis is required;
iv. Strategic roles of the States and Local Governments in the implication of the National Masterplan must be explicitly stated;
v. A cost sharing formula for all tiers of Government to fully participate in the development of national power supply must evolve;
vi. The institutional arrangement on how the Power Sector will function with the Federal Government as the central implementation organ, working in tandem with the States and Local Governments should evolve; and
vii. The clear roles of the States in the energy sector, specifically required to serve as the state monitoring facility on resource contributions, utilization and system efficiency should be strategize.

Funding

To demonstrate the urgency and resource requirements on power supply which give the additional power and resources required in countries that could be defined as less fortunate with resources compared with Nigeria. While the Per Capita power generation ranges from 3kW to 6.6kW in those countries, the corresponding figure for Nigeria is 0.05. This is literally shameful and unacceptable

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.

The combined determination of Mr. President to declare a state of Emergency on power supply in the country, and the administration's firm commitments of industrializing Nigeria by 2020 must be taken very seriously. However, it is worth nothing closely that the Federal Government has, since independence, remained the major financier of power supply in Nigeria. This might have followed a political history of the country since independence, where the Military Governments that dominated the administration, institutionalized the concept of establishing and developing the power sector as the sole responsibility of the Federal Government. Furthermore, under the military traditions, the Military Head of State ((Federal government) had always directly appointed the State Governors and had dictated resource allocations to the States from the Federation Accounts and literally also tele-guided the implementation of most capital projects executed in the States. This scenario under a democratic system of Government as currently practiced in Nigeria is not feasible. A deliberate and proactive strategy is required to ensure that all tiers of Government fully participate in this National Priority sector.

It is therefore opined that, in view of the vision for power to be provided on a sustained stable basis to the entire nation, all tiers of Government, similar to the strategy deployed on the provision of roads/highways network that we currently operate in the country.

The concept being proposed is that, in view of the large investment required for the development of the Generation, Transmission and Distribution networks, States and Local Government should contribute a certain percentage of the total cost similar to the concept on road-network where all tiers of Government participate in development, maintenance and repairs.

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