

“DEVELOPMENT OF NIGERIAN ELECTRICITY SUPPLY INDUSTRY: CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE DEVELOPMENT”. A PAPER PRESENTED BY PROF. JAMES MOMOH, CHAIRMAN/CEO OF NIGERIAN ELECTRICITY REGULATORY COMMISSION (NERC) AT THE 4TH ANNUAL DISTINGUISHED LECTURE IN HONOR OF ENGR. OTIS O.T. ANYAEJI, ORGANIZED BY THE NIGERIAN SOCIETY OF ENGINEERS (NSE) MAITAMA BRANCH, ABUJA ON TUESDAY 24TH JULY 2018

PROTOCOLS

1.0 INTRODUCTION

This paper focuses on the development of the sector from the date of establishment of the first power plant in Marina, Lagos to the current state. The paper presents the history of the NESI and its major players, issues and challenges that lead to the sector reform, the lingering constraints, opportunities and the sustainable solutions to overcome developmental constraints.

In this paper, I would like examine how the Nigerian Power Sector could be put on the path of self sustenance and uninhibited development that is attendant and correspondent to an expectedly ascending economy. Achieving this feat entails soliciting some externalities, which will transform the domestic operational and management landscape of the power sector. The paper then went on to identify international investment as the central auspices via which the national power industry can attain these desired transformations.

The paper also explores the factors that are likely to positively or negatively influence international investment in the power sector of an emerging country such as Nigeria. It was discovered that, though the fear of political and security risks are indeed key factors for prospective investors, they are not decisive considerations or deal breakers for serious investors. While higher levels of security and political risks discourage entry, impacts of these negative factors are rather significantly lower for renowned firms with greater levels of international experience. It was also discovered that past experience is an important factor in explaining variations in investors’ market entry conditionality.

Particularly, the paper observes that investors might appear edgy and nervy in monopsony generation markets – where investors must still somewhat depend, even if indirectly, on governments for investment recoup. This leads to tedious contract negotiations, with demands for overgenerous, onerous and even absurd conditions as risk mitigation measures, even when it is known that the state of monopsony is brief and transitional.

Overall, the paper observes that expanding into developing economies is actually highly beneficial to investors due to the potential of a virgin-market giving them a competitive and unassailable edge. The paper anticipatorily concludes by reviewing some key trajectories of the on-going Power Sector Reforms in Nigeria. It optimistically concludes that the future of the Nigerian Electricity Supply Industry is bright.

2.0 HISTORY OF THE POWER SECTOR IN NIGERIA

2.1 PRE-REFORM ERA

- Electricity generation in Nigeria began in 1896 with 60 kW at Marina, Lagos.
- The Nigerian Electricity Supply Company (NESCO) was the first private utility company created in 1929 in Jos, Plateau State, with about total capacity of 30MW.
- The Electricity Corporation of Nigeria (ECN) responsible for distribution was established in 1951.
- The Niger Dams Authority (NDA) was established in 1962 started with about 50MW to utilize the nation's water resources by developing and operating hydroelectric power plants.
- ECN and NDA were merged in April 1972 to form National Electric Power Authority (NEPA) by the enabling NEPA Decree 24.
- NEPA, a statutory and vertically integrated utility had monopoly over electricity generation, transmission, distribution and sales. Over the following few decade, NEPA built about six different power plants and expanded the power system to serve more than 2 million customers nationwide. The last which was Shiroro hydroelectric power station commissioned in 1990.

- The Electricity Act of 1990 replaced the NEPA Act and was the operating framework that governed the generation, transmission, distribution and supply of electricity in Nigeria.
- Between 1990, when Shiroro hydroelectric power station was commissioned, and 1999 the nation's load was increasing while no new generation capacity was added and virtually no investment made in the sector.
- During the period, the various issues besetting the sector included:
 - **Operational**
The sector witnessed high and unaccounted energy losses (due to poor metering, billing, and collections), weak management information system and poor infrastructure maintenance.
 - **Financial**
There was serious dip in total government funding in the sector while the NEPA was unable to recover energy sales. NEPA also had rising debt profiles and persistent growth in Operating Expenditure (OPEX).
 - **Human Capital**
Inadequate skills in both technical and commercial areas of operations coupled with non-recruitment of qualified staff (though there also exists a conflicting issue of overstaffing when considering Productivity Index i.e. MW/Staff).
 - **Policy/Regulatory**
NEPA existed as its own regulator with Inspections carried out by the Ministry. This created vacuum of check-and-balance in the system.
 - **Tariff Structure**
NEPA developed loosened and unrecoverable tariff schedules augmented by huge subsidies that are not paid by the government.

The Nigerian Electricity Supply Industry (NESI) has undergone massive and lasting changes through the power sector reforms programme. The Industry had undergone various reforms started by the Governments from early 80s till date. The power sector reform was designed

in expectation to achieve stability in the sector, adequacy of supply of electricity, technical proficiency and aid the transformation of the economy to target set goals for Nigeria's economic development.

2.2 POWER SECTOR REFORM ERA

In 1999, a new reform programme was launched with the adoption of the National Electric Power Policy (NEPP) drafted by the Electric Power Implementation Committee (EPIC). The reform focuses on significantly increasing power supply, providing greater access and a more private sector-driven regime.

The reform's major milestone was the passing of the Electric Power Reform Act 2005 by National Assembly and Presidential assent in March 2005. The EPSR Act repealed the NEPA Act effectively transferring the assets and operations of NEPA to an initial holding entity (the Power Holding Company of Nigeria, PHCN). Thereafter, transferring same to the successor companies (18 in numbers), in preparation for divestment to private capital.

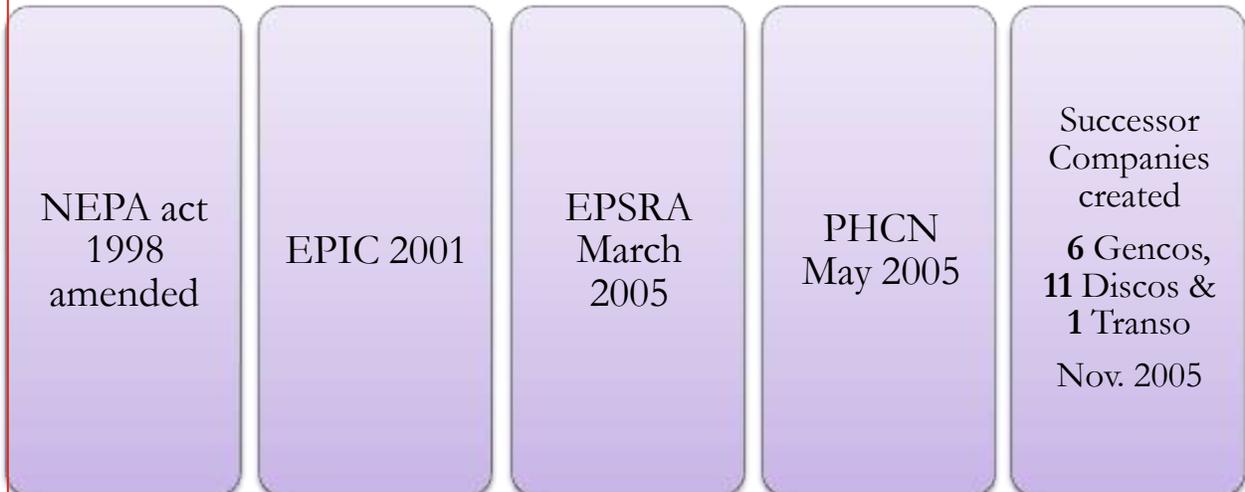
The reform also created the following entities to support the development of the power sector:

1. Nigerian Electricity Regulatory Commission, NERC
2. Rural Electrification Agency (REA),
3. Nigerian Electricity Liability Management Company (NELMCO),
4. Nigerian Bulk Electricity Trading Company (NBET),
5. National Power Training Institute of Nigeria (NAPTIN) and
6. Electricity Management Services Company (EMS), now known as Nigerian Electricity

Management Services Agency (NEMSA).

Reform Institutional Framework

NERC Oct 2005, NELMCO August 2006 & NBET July 2010



3.0 SUSTAINABLE DEVELOPMENT OF THE NIGERIAN POWER SECTOR

3.1 A VIBRANT ECONOMY DEPENDS ON A SUSTAINABLY DEVELOPED POWER SECTOR

The role of electricity in development has long been recognized. Wider access to electricity contributes to poverty reduction and economic growth. Almost all the problems Nigeria faces today are linked to the un-sustainable state of our public electricity supply. As the biggest ever global research¹, the World Commission on Environment and Development (WCED) 1987 Brundtland Report² found, the state of energy services in a country is directly indexed to its state of economic development³. The WCED Report consequently started the Rio movement with its attendant Millennium Development Goals (MDGs) mark, which was set for only the third world or emerging economies as target for the provision of basic amenities which the West now take for granted.

¹ The Report is documented as the largest and most encompassing global survey ever conducted. It reached out to all the developmental needs of all the peoples of the world.

² UN Doc A/42/427. Our Common Future: Report of the World Commission on Environment and Development

³ "Our Common Future" Chapter 7.1. Energy, Economy, and Environment. Page 119 clearly states that "Future development crucially depends on its (energy) long-term availability increasing quantities".

The World Commission on Sustainable Development (WCSD) which the UN authorized to assist third world countries achieve the MDG's found sustainable electricity to be the missing link between developing countries and MDG's. Often, the electric power sector has focused researches on its contribution to national economic development, with less emphasis on the social and environmental impacts. To redress this, the Asian-Pacific Expert Group Meeting⁴ conducted a study which was aimed at monitoring the effectiveness and impact of the electric power sector in fostering social and environmental development. The outcome of these discussions revealed yet again, strong linkages between the electric power sector, social development and environmental sustainability.

Given that effective electricity services goes beyond the frontiers of economic development, to equally support social development and environmental sustainability, the provision of electricity services in a sustainably structured and managed manner thus becomes even multiple critical to the overall development of a nation state. The Nigerian Electricity Supply Industry (NESI) therefore must transit towards **sustainability** if it is to partner the nation in achieving social, environmental and economic growth. At this point, it becomes vital to get a working definition of the term, 'sustainable development'. The Brundtland Commission which coined the term defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

When contextualized, this means that a nation's power sector can only be said to be **sustainably developing** if it is effectively positioned to support and anchor the economic and human development needs of today's people, while primed to meet the energy needs of future generations. The power sector of almost every industrialized country has been positioned to correspondently expand in the wake of an ever growing global reliance on electric power. On the other hand, the power sector of a 190 million peopled country like Nigeria is still abjectly stuck and hovering around 4,000MW. Until the recent concerted efforts to reform, the Nigerian power sector in it then state, could never have been able to develop sustainably. The World Bank in Nigeria recently reiterated⁵ the need for financial sustainability of the Nigerian power sector. The bank in issuing a \$400 million partial risk guaranty (PRG), noted that no amount of 'guarantees' or subsidies could in the long term prop a utility sector that is unable to generate enough revenue to fund its operations.

⁴ The Ad hoc Expert Group Meeting (EGM) on Sustainable Development Indicators for the Power Sector held from 17 to 19 July 2007

⁵ Erik Fernstorm, Senior Energy Specialist for the World Bank, during a recent stakeholder's forum on the Partial Risk Guarantee (PRG) in Abuja noted that the project is a cornerstone of the improvement that the World Bank and the government were trying to put in place for the Nigerian power sector. He added that the sector is a difficult problem to solve because it's a chain of interlinked centres of activities.

Economics theory⁶ argues that a combination of competitiveness and profit orientation result in production (internal) and market (external) efficiencies, and that the benefits are ultimately passed on to consumers and the economy at large in the form of lower prices and costs.

In this paper, this desirable premise is applied to the Nigerian electricity supply industry (NESI). Tooraj and Pollitt⁷ have supportively found that there are important physical characteristics that distinctively characterize the electricity industry, which in their opinion, leads to the industry's particularly peculiar regulatory design.

This they identified to include;

- (i) large sunk costs which limit entry possibilities,
- (ii) vertical stages (generation, transmission, distribution and retailing) of production with different optimal scales, and
- (iii) a non-storable good delivered via a network which requires instantaneous physical balance of supply and demand at all nodes. In effective, a close study will reveal that the liberalization of such an industry to market forces will entail the engendering of an amalgamation of competitive wholesale and retail markets, and a controlling regulatory and transmission activities.

Experience drawn from countries where the electricity industry has been opened up to international investments and market forces have generated some sort of template on steps for achieving functional market-oriented industry. Competitive power market often requires the execution of one or more of the following inter-connected steps; sector restructuring, introduction of competition in wholesale generation and retail supply, incentive regulation of transmission and distribution networks, and most importantly, setting up an independent industry regulator.

3.2 INTERNATIONAL OPERATIONAL & MANAGERIAL COMPETENCE HOLDS THE KEYS TO A SUSTAINABLY DEVELOPED POWER SECTOR

⁶ David Besank, D. Dranvoe, Mark Shanley. Economics of Strategy. New York, John Wiley & Sons Inc, 2000.

⁷ Tooraj Jamasb, Michael Pollitt. Electricity Market Reform in the European Union: Review of Progress toward Liberalization & Integration. The Energy Journal, vol.26, special edition, pp. 11-41, 2005)

As severally argued, for several factors, State Operated Enterprises (SOEs) have traditionally notoriously delivered sporadic and second-rate services in Nigeria. This is despite their consumption of obscene amounts of funds. In their classic research, Callaghy and Wilson⁸ worryingly revealed that State owned industrial enterprises in the sub continent operate at an abysmal average of 10–35% of capacity. The chances of profitability on these often expansive and gargantuan investments have been few and far between, irrespective of the hefty amount of capital injected in them. Eventually, they sadly mutate into sentimental national legacies, rather than purely economic concerns.

They are often discussed and referenced in terms national pride and symbols rather than gauged on economic performances. As far back as 1988, it was projected⁹ that Nigeria had pumped in well over US\$35 billion, consisting of US\$12.5 billion in equity, US\$10.2 billion in government loans, and another US\$11.5 billion in unstipulated and largely undocumented subventions to various State run enterprises. All these investments cumulatively yielded a derisory return of under US\$1.5 billion in dividends and loan repayments from 1980 to 1987.

This unsustainable situation was further aggravated by the fact that about 40% of non-wages recurrent overheads and 30% of capital expenditure were expended on yearly basis on these public enterprises. Net spending from the federal government to publicly run enterprises had been estimated at US\$2 billion annually.

The ugly side of these wastages was eventually revealed when the first batch of privatization of these poorly run State enterprises ensued. The depth of rot that was wrought upon these enterprises by incompetence, both innocent and deliberate, and persistent corruption, resulted in serious difficulties in carrying out what should have been routine sectoral reforms and liberalization. For instance, the aviation, railways, aluminum smelting, pulp and paper, insurance, fertilizer, sugar, steel industries and the power sector were all defying what should have been basic textbook routine reforms.

It has always been argued that, it is the failure to ensure the optimal performance and sustainable development of our electricity sector that has been at the core of our inability to make any state run enterprise profitable. For example, the unreliable power supply from the

⁸ Callaghy, T.M. and Ernest J. Wilson III. 1988. "Africa: Policy, reality or ritual?" In Raymond Vernon, ed., *The Policy of Privatization: A Challenge for U.S. Foreign Policy*. New York: Council on Foreign Relations.

⁹ See Federal Government of Nigeria, *Economic Gazette* 1986

National Electric Power Authority (NEPA) as at 1995 was estimated by World Bank¹⁰ to be imposing an additional cost of around US\$1 billion annually on the nations fledgling economy.

Perhaps the key feature that is essential for a power sector to attain the desirable ‘sustainably developed’ status is the ability to attract international investment. International investment could now be safely argued to be the singular factor that unleashes the full potentials of a national power sector. It is international investment that enables the power industry to:

- attract private funds for expansion activities;
- move towards complete self sustenance;
- financially attract and retain best human capital available become transparently administered, so as to flush out corrupt tendencies;
- adopt international sectoral best practices;
- generate, transmit and distribute sufficient and reliable electricity on demand.

3.3 PREREQUISITES FOR ATTRACTING INTERNATIONAL INVESTMENT INTO THE POWER SECTOR

Studies have shown that because the power sector is a very capital intensive industry with an occasioning long gestation period. And given that it is equally administratively complex and chain dependent. There are therefore not many reputable international enterprises that engage in power business. Equally, the participating firms have from experience, evolved a standard ‘investment climate’ criteria, which a prospective country’s power sector must attain in order to attract international investors.

3.4 PUBLIC SECTOR/MULTILATERAL GUARANTEES

Upon the commencement of the sector reforms, the regulator inherited a rudimentary revenue recoup system. In the larger proportion of cases, the apparatuses for gauging consumption (functional and fit for purpose meters) are non-existing. This problem is compounded by the fact that the subsidy-run monopoly that was NEPA, had a lethargic and lackluster attitude towards tariff collection¹¹. This has mutated into a situation where the

¹⁰ The World Bank, country Report, 1995.

¹¹ Non Technical Losses (NTL) is projected by WB to be as high as 53% in Nigeria, because MDAs, and a majority of private consumers were equally not paying. Also, in the wake of epileptic services, and very high customer dissatisfaction levels, NEPA totally lost the moral integrity to enforce a strict revenue regime.

populace now require an entirely fresh orientation on the need to be proactive in paying their bills. This is a continental problem, and the investing community are very much aware of it. To indemnify themselves from the problem of revenue losses, they demand as conditionality for investing in a developing economy like Nigeria, that State should guarantee payments prior to their financial commitment to projects until such a time when the transiting market finally evolves to a self sustaining status.

It is often very important that the regulator who is independent, transparent, and best practice oriented, is allowed to negotiate and enforce such financial guarantees on behalf of the country. Experiences from States in India, and Pakistan have shown that government officials do easily short change the industry when they handle these negotiations. Agreements have in the past been heavily influenced in the investors' favour by corrupt officials. This in turn often manifests in the form of unnecessary high sectoral reform costs. Inevitably, in the absence of carpet subsidies, the multiyear tariff order (MYTO) which is currently in place, will innocently capture these corruption engineered costs as part of actual transaction and operational costs, which must be recovered. Ultimately, this can lead to the imposition of a heavy, but unwarranted financial burden on the purchasing authority, its employees and consumers in general.

3.5 LOCAL FINANCING OF PROJECTS

International investors are sought for the power sector principally because of their administrative and acumen and corporate discipline. As for capitalization, they often use their financial clout to obtain funding for power projects from financial institutions¹².

To this effect, it has been often argued, that domestic financial houses are best suited to provide loan facilities to international investors for local projects. This has multiple positives.

First, it gives confidence to the international investor. Second, it makes the projects far cheaper by eliminating costly foreign interest and exchange rates, which cumulatively culminate in overall high cost of project execution. It must be noted that these costs these costs must be captured in the eventual tariff payable by the consumers. A World Bank report on the problems experienced with privatized power projects in Asia-pacific supports

¹² A key argument for privatization has been that multinationals will bring new finance into a country. In practice, this happens only to a small extent. Finance is invariably raised by the multinationals from a number of sources, including multilateral agencies (such as the World Bank, the African Development Bank, etc); international banks; and local banks inside the country itself.

this view by finding that as a result of currency depreciation. One of the best protections against currency crisis is in to use a high proportion of local finance¹³.

3.6 CORRUPTION AND ETHICS

Central to concerns and considerations by international investors prior to investing in a county's power sector, are the issues of corruption, bribery, and ethical behaviour. This fact is heightened by the Transparency International¹⁴ (TI) survey which found the ***engineering and construction industry to be the second largest source of global corruption.*** Ideally, investors must be guaranteed that corruption, political meddlesomeness and sundry unethical behaviours which characterized and marred the governments' era of electricity administration have been eliminated through open and transparent processes as driven by the independent Regulator.

Investors must be assured that the emerging Nigerian power market will be regulated in a transparent and predictable manner. The regulator must inspire and exude confidence, discipline and rapid positioning towards the acquisition of sufficient human resources with the ability oversee a global multibillion dollar industry in an international best practice manner. The regulator must depict the ability to make sectoral laws that are responsive to Nigerian peculiarities. The regulator also has the duty to ensure that the government and consumers of electricity in Nigeria understand and attune themselves to the all important international practices in the emerging market based power sector. For instance, it is the regulator's duty to insist on adherence to global rules on transparency and fighting corruption.

Government equally has a major role to play in incentivizing investors and their capital into the nation's power sector. Below are some conditions that government must put in place to attract and retain international investment in the power sector:

3.7 MINIMAL INTERFERENCE

Series of political turbulence in sub Saharan Africa in the 80's and 90's did raise the level of apprehensiveness of would be regional electricity investors, because most of these power

¹³ "The East Asian Financial Crisis—Fallout for Private Power Projects" by R. David Gray and John Schuster Note No. 146 August 1998 (www.worldbank.org/html/fpd/notes/notelist.html).

¹⁴ www.transparency.org/. Note that the power sector is part of the engineering industry.

changes often lead to policy truncation. According to studies¹⁵, many power sector investment decisions in developed economies in the 1990s were based on basic positive assumptions—that collections would increase, that sectoral rules would be enforced and that government commitments would be constant. It is the inability of developing countries like Nigeria to satisfy these assumptions that undermine sectoral reforms in the sub Saharan continent. To reassure investors and attract or retain their interest, governments need to focus attention on some of investors’ basic priorities.

To this effect, investors would seek guarantees that their installations are free from the risks of politicization, nationalization, re-nationalization, undue forced subsidies or any other form of government interference. Conducive investment atmosphere for the power sector is one where investors are allowed to exercise effective operational and management control over their investments. It should be the sole duty of the regulator to adjudicate on such operational and management remits, boundaries and excesses.

To this effect, the greatest factor that a power sector investor would consider, before investing in a country, is the independence of regulatory processes from political interference.

Contrary to claims by critics of electricity sector privatization, Investors are not in a hurry to recover their capital from the power sector. It is only apprehensiveness over political uncertainty that can lead to investment panic. Power sector investors are knowledgeable enough in sectoral facts. Prior to fund commitment, they are aware of the long gestation periods required, and their business plans and fiscal regimes include provisions for such.

A World Bank¹⁶ survey of multi-nationals investing in developing countries, reveal that overwhelmingly, sectoral investors are ready to do whatever is necessary to ensure that the “financial and technical performance” of the assets is improving. However, they equally expect governments to ensure that the operational environment considered necessary by international standards are in place.

Therefore, in executing the reform of the NESI, government must respond to these concerns from investors.

¹⁵ World Bank 2003, What International Investors Look for When Investing in Developing Countries.

¹⁶ The World Bank 2003 survey of power sector investment trend in Asia.

3.8 STABILITY, ENFORCEABILITY OF RULES AND CONTRACTS

Investors understand quite clearly that laws mean nothing without appropriate enforcement mechanisms in place. To this effect, clear and enforceable legal framework has also been identified among the top priorities for investors. They dread any attempt by the government to shift the goalposts after they have made investment decisions based on set rules.

Closely related to this condition, is the investor's desire that *adequate cash flow is maintained in the sector*. Setting cost-reflective tariffs, devising a workable collection methodology and ensuring collection discipline has been the albatross of the Nigerian power sector. Investors are unlikely to consider investing if these deficits are not adequately taken care of. In the absence of a clear indication that the twin problem of appropriate tariff and effective collection methodology have been solved, investors will continue to remain panicked, and this would result in *most investors seeking higher than average percentages of returns*. Experts have warned that investors would naturally seek higher returns in *less-predictable or riskier markets* and this should be hardly surprising.

The above condition reiterates the criticality of improving our sectoral investment climate for sustainable development. Failure to address these legitimate concerns of investors may mean paying higher percentages of returns. That will in turn drive electricity tariffs higher than most average consumers can afford, which in turn may undermine the much sought sustainability of NESI. *Given that the national investment climate is yet to meet the desired international levels*, the smart thing and reasonable action that the present administration has taken to calm investor's worries is to deploy risk guarantee instruments and financial interventions to provide greater assurance that contractual agreements will be honoured. The Regulator on its part is using the instrument of the multiyear tariff order (MYTO) to create pricing building blocks and predictability.

The survey by World Bank of experiences by power investors in Asia, emphatically allude to international investors being desirous of a "good legal framework". They interpret good legal framework to be that which is clear, makes provisions for easy enforceability of contracts therein, particularly contracts with government agencies. Investor's resolution to invest in the long-term is based on the consistency, applicability, and enforceability of laws and contracts. To be assured of the chances of success for the investments, investors want to be absolutely certain that the rights and obligations of international investors are undoubtedly stipulated. Indeed, the World Bank warns that investors identify a legal

framework that has clarity and defines their rights and obligations as by far the most important factor in decisions to invest in a developing country.

3.9 PREDICTABILITY OF REGULATOR'S ACTIONS AS A PANACEA FOR ATTRACTING PRIVATE INVESTMENTS

Being a highly capital intensive sector with gestation periods spanning over 30 years, investors will inevitably pay detailed attention to risk management. An essential factor that must guide risk allocation from the perspectives of the investors, governments and contractors is the predictability of outcomes. The predictability factor helps sector participant's in long and short term planning of the various aspects and stages of operations, and most importantly, the associated risks and possible ensuing scenarios. Since engineering, procurement, construction, commissioning and operational activities occur over long periods, participants require a sense of predictability so as to know how to react and manage the risks that they face. Predictability underlies the all aspects of project execution, from decisions on project financing to engineering, procurement, construction, and operation. To establish an atmosphere of predictability, regulatory instruments are deployed. Contracts are the primary means of providing such predictability. Through contracts, risks are allocated between the stakeholders. This process requires identification, allocation options, and management plans under various contracting strategies. For instance, the regulator has licensed the bulk trader to ensure prompt settling of transactions through the vesting contracts it enters into with investors.

4.0 HIGHLIGHTS OF THE FUTURE OF THE NIGERIAN POWER SECTOR

- A lot more capacity in the system. A lot more investment expected – from 2019,
- Competitive entry for embedded and on-grid generation,
- A huge amount of project planning, engineering, construction and financing will be generated,
- A lot more disputes within daily operations and in the rest of the market generally,
- Cross – sectional disaggregation:
 - Discos will break up along local lines,
 - Regional power pools with their own independent System Operator's will evolve,
 - Regulatory capacity will be more wide spread,

- State governments will have to develop capacity to develop power projects within their states.
- NERC to remain relevant, will evolve into managing a framework and new market space that relies on its capacity to identify, anticipate and eliminate potential harm either directly but probably more often through industry panels, committees and prudent and judicious use of its portfolio of regulatory instruments.

5. THE ROLES OF PROFESSIONAL BODIES, RESEARCH AND INNOVATION IN THE DEVELOPMENT OF NESI

a. The role of the Nigeria Engineers and the leadership expected from NSE and academies:

The role of professional bodies like the Nigerian Society of Engineers in the development of the power sector cannot be overemphasized. The traditional way of operating NSE should be radically changed from rent seeking sponsorships to supporting the sector through research and development, capacity development, innovations and solutions providing roles in partnership with other sister institutions such as Universities, Research Centers etc. This is the sure way Nigerian Society of Engineers can make impacts on the power sector. Engineers should develop the capacities in other professional fields such as economics, law, applied sciences, business administration and other non-engineering fields that are necessary for the development of the society.

b. Research, Technology and Innovation:

There is no country that can advance its economy and develop its electricity industry with the linkage necessary between the Industry and Research Centers. Deliberate Promotion of technology and innovation through Research and Development should be a priority of both government and private sector. The current deplorable state of the power sector in Nigeria cannot be divorced from seeming lack of linkages between the sector and research, technology and innovation. Modernization of the distribution system and national grid should be a priority going forward.

c. **The Need to Promote Local Content in the Power Sector:**

Local capacity development is the key to a successful economic development. It is popular saying that **‘we should not re-invent the wheel’**. In my opinion, I strongly believe that **‘we can improve the wheel’**. It therefore becomes imperative that we focus on internal development of our resources through local productions of products and services that we believe we have the capacities for. Deliberate efforts should be targeted at encouraging local entrepreneurs, manufacturers and service providers in all fields of our lives. The successes and failures of the local content initiative of the petroleum sector in Nigeria should serve as a guiding principle for the power sector.

6. CHALLENGES WE FACE:

- Inadequate investments.
- High Technical and Non-Tech. Losses (estimated average of over 50%).
- Long response time to technical failures.
- Inadequate systems for fault detection, trouble shooting and monitoring
- Low Billing and collection Efficiencies.
- Low level of customer metering (less than 50% penetration).
- Aged distribution networks and equipment.
- Inadequate generation, transmission and distribution capacities.
- Poor maintenance management.
- Frequent power outages (SAIDI and SAIFI).
- Credible Data Procurement and Management Mechanisms.

7. OUR DESIRE:

- Reduction of System Losses - *Capture Lost Revenue, Tech/Commercial Losses.*
- Efficient and more Flexible Transmission and Distribution System Operations – Reliability and Quality of Service.
- Better Communication and Data Management.
- Real Time Monitoring and Automatic Meter Reading (AMR), Time of Use (ToU), Pre-payment etc.
- Improved Energy Resource Management – Energy Efficiency and Conservation.
- Balanced Operational Costs and Performance.
- Improved Cash Collection.
- Better Customer Debt Management.
- Reduction of Personnel Overhead Costs and errors in Human-Machine Interface.
- Improved overall Customer Satisfaction.
- Corporate Governance – Improved Transparency and Prudence.
- A robust Information & Communication Technology infrastructure will significantly boost the power distribution systems and contribute to reliable and quality supply of electricity to customers.
- Such infrastructure should offer a comprehensive solution encompassing the following activities:
 - Monitoring of Aggregate Technical, Commercial & Collection losses (ATC&C).
 - Smart metering

- Enhancing Customer Service
 - Enhancing Reliability and quality of power
 - Smart Distribution Management System (DMS)
 - Systems automation and integration
 - Embedded Generation / Renewable Energy integration
 - Demand Side Management - Energy Conservation and Efficiency etc.
- Quantitative and qualitative Data Acquisition, Monitoring and Control of power systems using SCADA.
 - Optimizes asset management, utilization and operating efficiency.
 - Trouble shooting mechanism through real-time fault/failure detection.
 - Evaluation of benchmarks, targets set & achieved by distribution licensees.
 - Improving maintenance strategies, a departure from Breakdown and Time-based maintenance to Condition-based and Reliability Centered Maintenance Programme.
 - Sensing and detection of electrical faults and failures.
 - Communication between plants, substations and monitoring entities (EMS).
 - Provision of data services and other Government backed, communication based education programs.
 - Ease of Policy and Regulatory Overview etc.

8. TECHNOLOGY & INNOVATION AS PART OF THE SOLUTIONS:

- Technologies exist for full smart Metering and Grid implementation but for the high initial costs.
- High Capital Requirements may be an impediment initially but long term benefits outweigh the initial high costs. The Gains are immeasurable and unquantifiable.

- One of the major challenges is giving utilities regulatory incentives to implement smart systems allowing full recovery of Revenue Requirements arising from implementing smart systems. Regulatory disincentives still need to be overcome on a global basis.
- Solution may be to set High Utility Efficiency Targets and Rewards - Set targets and/or rewards to utilities for energy efficiency, including through the use of a Smart Metering and highly automated Grid.
- Various Security Solutions have been developed and are available to effectively and continuously address security challenges being faced by Users of Smart Grid and Distribution Systems.
- Distribution Companies should leverage on the advancement of smart systems and applications to improve reliability, quality of service and Customer satisfaction.

9.0 ROLE OF NERC IN ENSURING DEVELOPMENT OF NESI

Despite the creation of Government institutions to handle the Vision of having 24/7 electricity supply in Nigeria, the performance of the power sector is still abysmal and in a chaotic state.

Understanding the issues and challenges, NERC has embarked on a lot of activities that involve measurements, monitoring/verification, development of new regulations to open up the market space for more participants to engender competition, improve power supply and access to electricity, ensure full metering of customers, improve reliability of supply, improve market liquidity, improve market discipline, controlled licensing process, etc.

Some of the specific initiatives to address the above issues include amongst others:

- Meter Assets Providers (MAP) Regulation to reduce the metering gaps. The Commission had already issued 53 'No Objection' (Permits) to potential Investors,
- Eligible Customers Regulation to improve power supply availability to major consumers and market liquidity. At-least 20 applicant are being considered,

- Mini-Grid Regulation to improve electricity supply to local communities where majority of Nigerians live,
- Independent Electricity Distribution Networks (IEDN) Regulation which is being applied to promote independent supply of electricity to some clusters of customers such as Markets, Universities etc.,
- Embedded Generation Regulation provides for Independent Power Generators to supply directly at the distribution Voltage level near the power consumption (Load) centers.
- Customer Enumeration to determine the actual customer population. This exercise has already increased the customer numbers from 5.9 million to 8.8million,
- Benchmarking procedure for the establishment of minimum remittance levels for the distribution companies. This will reduce the market liquidity challenge,
- NERC is working on the mechanism for revenue tracking through direct payment to NBET by the 132kV and 330kV customers and also tracking payments by MD customers,
- Capping of customers estimated billing will take effect on 31st October 2018. This will ensure a controlled and transparent estimation of customer bills,
- In view of the need to open up the distribution sector more for third parties participation, the Commission is working on distribution franchising framework.

10.0 OUR NEXT STEPS

NERC is working on the following to enhance the development of the power sector:

- Electricity Market Reset: contract-based market where sanctity of agreements is fully observed;
- Load Rejection by DisCos and Innovative Metering Solutions;
- Review of electricity tariffs to support businesses and improve employment opportunities, market liquidity,

- Re-strengthen Compliance and Enforcement;
- Transmission Interface Challenges, Review of Expansion Plan, GAR and Dispatch Issues;
- Creation of market space for new businesses such as distribution Franchising;
- Implementation of a near real-time customer complaints handling mechanism to closely monitor response to customer complaints;
- Support on the Modernization of the grid to meet future challenges;
- Human Capacity Development and Partnerships;
- Promotion of Local Content.

11.0 CONCLUSION

It can be deduced that the Nigeria's power sector is on the path of a sustainable development despite the long years of neglect, underfunding, mismanagement, technical inefficiencies and non-aligned policy and regulatory structures in the Nigerian Electricity Supply Industry (NESI).

I am confident that keeping with the right momentum and even added zeal from all stakeholders particularly the Engineering Professionals, the barriers to development of the sector shall be eliminated steadily and confidently to make the much desired and deserved leap for Nigeria into league of advanced economies in the world.

It is pertinent to note that Engineers have very critical roles to play in the development of the power sector. I therefore urge all Engineers to rise up to the occasion and provide solutions to the problems militating against the fast development of the power sector.

Finally, I would like to congratulate my brother, HRH, Engr. Otis O.T. Anyaeji FNSE, and the organizers of this important event and wish all participants safe trip back to their various destinations.

Thank you and God bless.

Prof. James Momoh
Chairman/CEO – NERC
Tuesday, 24th July 2018