**EmPower Nigeria** 

Improving Nigeria's electricity supply industry through public education

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Nextier Power is a consulting firm that provides policy advisory, investment advisory, and support services to the electricity supply industry. The firm aims to use this weekly publication to educate Nigerians on the intricacies of the Nigeria electricity supply industry on the assumption that a more informed public would advocate for the right policies and programmes which, in turn, would lead to a robust market that delivers the electricity needs of Nigerians. This column will cover everything from the basics of the industry to the more intricate, sometimes, complex policies and programmes.

# How Transmission Works: The Organisation, Network, Challenges, and the Future

Transmission is an integral segment of the power sector value chain. Technically, its core responsibility is to receive highvoltage power from generation facilities across the country and send the electricity to distribution companies across Nigeria. This power is stepped down via the appropriate transformers prior to sending to distribution companies for further distribution to the final consumers. The Transmission Company of Nigeria (TCN) is the organisation responsible for managing the operations within this network. Currently, TCN sends out approximately 3,500MW to be rationed nationwide for various purposes including residential, commercial and industrial.

# **The Organization**

The Transmission Company of Nigeria (TCN) is a wholly government-owned entity that emerged as one of the successor companies of the defunct Power Holding Company of Nigeria (PHCN). It was not privatized during the November 2013 privatisation of the Nigeria electricity supply industry; rather it was placed under a management contract from 2012 to 2015. Manitoba Hydro International (MHI), a Canadian power company, was engaged by the government of Nigeria to take up the management responsibilities of TCN that encompasses the functions of the System Operations, Market Operations, and Transmission Service Provider. The company had significant challenges in discharging its mandate such that in 2015, the Buhari administration decided to end the contract. TCN is currently under management of a team of directors (Nigerians) under the supervision of a Managing Director, while awaiting the constitution of the board of directors.

#### **Roles and Operations**

TCN was issued two licenses by the Nigerian Electricity Regulatory Commission (NERC) to engage in activities as a **Transmission Service Provider** (TSP), and a **Systems Operator** (SO). The SO license also permits it to carry out **Market Operation** (MO).



transmission infrastructure while the SO license permits the implementation of the **Grid Code** and **Market Rules** that govern the activities of the System Operations and Market Operations.

The Grid Code is simply the SO's guiding document for the daily operations: principles and procedures governing the development, maintenance and operation of the transmission system. The Market Rules guide the MO processes in establishing a trading system for the power sector. It also stipulates the trading systems as the electricity market evolves over time.

#### The Transmission Network

Transmission infrastructure is made up of feeders, circuit breakers, several high voltage transmission lines, transformer substations, and supervisory control and data acquisition (SCADA) system. These components interconnect to receive power from the generating facilities and to send the power to distribution networks. The interconnectivity of generation, transmission and distribution infrastructure constitute the national grid. As stated above, TCN is responsible for transmission of power in Nigeria.

annum for the next 10 years to rehabilitate its transmission infrastructure nationwide. The 2017 TCN budget for capital projects is a mere \$160 million. Unfortunately, the economic situation in Nigeria means that the government cannot meet the required investments alone therefore there is need to open up the company to private sector investments.

The weak capacity of the transmission grid infrastructure has affected its ability to adequately deploy power. TCN has a transmission capacity of about 6GW made up of approximately 6,680 km of 330kV lines, 7,780 km of 132kV lines with installed transmission capacity 10,504 MVA. With an installed generation capacity of about 13,400MW, Nigeria has a high amount of stranded generation: power that cannot be evacuated from the point of generation. This means that even if Nigeria were to increase its Actual Generation or Energy Sent Out, power supply to customers will still be constrained by the capacity of the transmission infrastructure.

The Electric Power Sector Reform Act (EPSRA) of 2005 envisions that when the sector is sufficiently privatised, the SO functions will be hived off from TCN to form the Independent Systems Operations (ISO). The ISO will still encompass the functions of the SO and the MO, while TSP would remain with TCN. The aim of this structure is to achieve operational efficiency and independence as the market develops.

While it is commendable to see the actions being taken by the current administration to improve various aspects of the power sector, there is need for significant focus to be placed on the transmission segment. This is because of the pivotal role it plays in the electricity value chain. TCN must be quickly transformed to make it attractive for investments. The government alone cannot afford the resources required to expand the grid.

The EPSRA clearly outlines the steps to be taken to secure the future of TCN. The regulator is to advise the Honourable Minister on the state of the Market; and options for ownership and governance of the new organizations (ISO and TSP) and more. The future of TCN is vital to the creation of a competitive market where buyers and sellers of electricity trade freely guided by contracts.

The need for capacity development cannot be underplayed in a competitive market. Transmission trading across the world is mostly computerised to ensure access to real-time data required for transactions. Unfortunately, the current system is not suitable for capacity development due to the mostly manual processes still in use. The lack of competition in the segment is one of the reasons why there has not been more rapid advancement in the segment.

# Final Word

In conclusion, without clarity on the plans

The TSP is responsible for maintaining and building transmission facilities to secure reliable evacuation of power and ensure new interconnection points. The SO is responsible for improving the reliability of the national grid while the MO's core responsibility is the financial settlement in the market. The MO generates invoices on a monthly basis for power traders and, in the long run, would be able to guarantee competitive pricing of electricity.

### The Code and Rule

The TSP license provides for the maintenance and operation of the

# Transmission as the weakest Link

Most power sector experts consider the transmission network as the weakest link in the Nigerian Electricity Supply Industry (NESI). The network has multi-faceted challenges including low investments in requisite infrastructure resulting in low transmission capacity, vandalism or sabotage, acts of nature, poor management capacity, and many more.

Transmission is a **highly capitalintensive** venture with a long timeframe to recoup the investment. It is estimated that Nigeria needs about \$10 billion per The lack of capacity for effective management of the transmission infrastructure has been a significant challenge since Nigeria's industrialisation boom. Prior to the privatisation, there was no significant investment in human capital within the power industry. It is not strange therefore that TCN still needs significant improvements in its capacities: technology, human resources, operations, etc. In February 2017, Federal Government of Nigeria (FGN) appointed Mr. Usman Mohammed, as Chief Executive of TCN, as a way of shoring up the management capacity. He comes with impressive experiences in the power sector and international finance.

#### **The Future**

for TCN, Nigeria would be hard-pressed to secure the investments required to transform the segment. The government must prioritise efforts to ensure effective management talent and to transform the company to be receptive to investments. This is critical to ensure increased electricity supply to customers.

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