

# Transmission and Concession of TCN: Restructuring for Performance Improvement and Expansion

## Executive Summary

- **Government recently announced its plan to unbundle and concession TCN, the public sector enterprise responsible for national power grid operations and development.**
- **TCN's dismal operational and financial performances, despite colossal investments and public expenditures, provide ostensible rationale for proposed plan, but there are suspicions that there are other forces at play.**
- **Plans to restructure TCN should be welcomed - just as the reform of the whole industry should be revisited, if, and only if, it is done right and will lead to improved electricity services for driving economic growth and development.**
- **Appropriate restructuring would need to address the relevance of grid architecture as presently configured vis-à-vis economic growth and development (integrated vs. regional grid), operational and financial autonomy necessary for efficiency and responses to local demand and fuel sources (centralized vs. decentralized) in light of technology advancements and environmental concerns.**
- **Improving activities of the constituent parts of TCN - grid development, system and market operations - should focus on coordination, loss reduction, promotion of competitive market development, etc., as integral aspects of restructuring and not unbundling for its own sake.**
- **Restructuring should precede private sector participation via concession.**
- **Moving transmission sector forward should be premised on specific and pre-determined goals and objectives, and heuristics to avoidable pitfalls if past mistakes of EPSR and TCN concession to Manitoba Hydro are not to be repeated.**
- **Broader restructuring, rather than narrow unbundling, and concession can, and ought to, lead to improvement, as countries such as Brazil that successfully attracted private investment and improved performance of the sector.**

## Introduction

BPE, in a recent announcement, made known the marching orders it received from the National Council on Privatisation (NCP) – directing it to develop a strategy for the unbundling and concession of TCN to boost efficiency. This instruction has two distinct components:

restructuring of TCN, and in effect the transmission sector, since TCN is a monopoly; and introducing participation of the private sector in the operations of TCN without divesting government ownership to the private sector. The decision suggests two things:

1. FGN is frustrated with the Nigerian Electricity Supply Industry (NESI), and perhaps more so with TCN given the countless accusations of poor performance levelled against it. Its inability to wheel no more than 5,000MW for the past 10 years has stifled the development of NESI and engendered poor electricity service to consumers, and deleteriously impacted the economy. Despite FGN injecting massive sums, in part through international loans, into TCN, its operational and financial performance remains dismal, and it has been unable to attract private capital.
2. The dire state of government finances, exacerbated by recession and the consequences of the coronavirus pandemic, price volatility and structural changes to global demand of oil and gas industry, and the crippling effect of public debt may have forced the decision.

There has been much scepticism surrounding the proposal. After all, TCN was not included in the list of 36 public sector enterprises to be privatised by way of core investor sale, concession or restructuring, which was sent to NASS for approval for privatisation early March 2021. Restructuring and concession are complex and challenging.

Nevertheless, the truth is the decision should be welcomed. The key is to make sure that the appropriate restructuring is carried out and the concession for private sector participation is well thought through and designed. The overarching objective is the achievement of the twin-goal of efficiency and expected investments.

### **Background: TCN and Nigerian Electricity Industry**

TCN has sole responsibility for the development and operations of the transmission sector of NESI. Transmission is the interface between electricity production and consumption. Thus, TCN is responsible for activities that are critical to the operational and commercial performance of the whole industry.

TCN is an integrated company set up to build and operate the high voltage transmission system in Nigeria. Organisationally, it is comprised of three functional units, namely, the Transmission Service Provider (TSP), the System Operator (SO) and the Market Operator (MO), and eight operational regions. The arrangement allows TCN to carry out its statutory responsibilities of: (a) construction, operation and maintenance of the high voltage transmission system (the grid) within Nigeria and the interconnection with neighbouring countries; and (b) system operation, which includes the procurement of ancillary services as

well as administration of wholesale electricity market, payment settlement in accordance with market rules; etc.

Technically and economically speaking, transmission is a natural monopoly, and recognised as such in electricity industries the world over. The monopoly status is conferred on TCN by legislation. The unfettered market power this confers on operations, if not properly regulated and held to account can also be the cause of operational inefficiencies and commercial indiscipline. This has manifested in TCN in poor technical and financial performance, respectively.

Specifically, the national grid, like the distribution networks, has always been weak with a radial configuration, which makes it prone to unplanned outages and regular system collapses. Transmission has always been perceived as the weakest link in the electricity supply chain. It has barely been able to transmit 5,000MW of power in any sustained period, despite colossal investments in capacity expansion. The national grid requires a few billion dollars of investment to be able to break through the 6,000MW barrier and beyond. This has been seen most recently in the Presidential Power Initiative which envisaged committing over US\$ 1 billion to improving grid efficiencies.

The reality is that the industry has been chronically unable to deliver reliable electricity to consumers, retarding economic growth and exacerbating socio-economic factors such as unemployment, income inequality and poverty. A combination of industry structure, lack of appropriate regulation, poor management and governance, political interference have compounded the poor electricity services.

The problems in a nutshell are:

- Technical losses at the high voltage level stand at 9 - 12 percent of electricity generated compared to global best practice of 2 - 3 percent, approximately 10 percent of electricity generated is lost as line losses in the high voltage network and remain stubbornly high.
- Low-capacity utilisation of line and transformation capacities
- Unplanned outages and national system collapses are embarrassingly high. Organisational structure of TCN is unwieldy with operational and financial autonomies consolidated at the centre/headquarters.
- Technically speaking, the binding constraint in supply is distribution injection substation with capacity of 8,000MW.
- High cost of service with negative impact on tariffs

Supply considerations have played a greater role in planning and development of

infrastructure rather than customer demand and engineering imperatives. This approach has compounded the fiscal position of government. Poor performance has thus incorrectly been ascribed to inadequate capacity and has led government to commit public funds to what can be best described as injudicious expansion of the transmission infrastructure. Overall, this has neither improved operations nor addressed the systemic challenges with which the organisation has contended.

A proper assessment of the challenges would have revealed that alongside poor governance and the capacity inadequacies TCN grapples with, organisational structure and management are not aligned to the trading arrangement the market design recommended in the reform blueprint, let alone the precepts of market rules that are meant to guide operations of the industry. These, combined, have undermined TCN's critical role in the development and administration of an electricity market, where efficiency, competition and choice were envisaged as the basis of improved and cost-effective services.

## **Criteria for Restructuring and Concession of TCN**

### **Integrated vs. Regional Grid**

If imbued with the luxury of starting the electricity industry from scratch, the first consideration would focus on the overarching structure for the transmission sector. Broadly speaking, the choices are between an integrated national grid or a set of interconnected regional grids. The former is the more common configuration around the world. Some countries, such as US, where size, government type, the needs the industry was meant to serve informed their development and evolution. In Nigeria, where the development of the industry evolved from the blueprint laid down by the colonialists, which in turn was based on the industrial arrangement of the electricity in their home country, Britain.

Prior to the development of the national, power supply under the auspices of PWD was characterised by proliferation of small diesel power plants and standalone networks that served the interest of the colonialists. National development aspirations post-independence and the construction of Kainji plant ushered in big plants and high-voltage network to transmit power to different parts of the country. The 1970s and 1980s saw rapid development of large power plant development, premised on economies of scale and "big is beautiful", also saw the expansion of the high voltage national grid. The power system that emerged is one that electricity production is predominantly concentrated in two regions - the North Central (hydropower plants) and the South South (gas-fired plants) with TCN wheeling and transmitting power over great distances to every part of the country with the high voltage (330kV and 132kV) network. The eleven distribution companies operate the medium and low voltage networks comprised of 33kV, 11kV and 415V systems to supply power to

consumers.

## **Centralised vs Decentralised Grid**

To enhance performance, integrated grids usually have internal demarcations. The transmission grid in Nigeria comprised of eight operational regions, with the headquarter responsible for coordination of operations and development. The grid is highly centralised in Nigeria with the regions having limited operational autonomy, and even less financially autonomy. The common practice is a centralised sector overlaid with political and administrative interferences, which compromised integrity of the grid, and exacerbated technical and financial performances.

In the early 2000s, with plummeting performance typified by national system collapses, erstwhile NEPA demarcated two grids to contain frequent cascading failures. Political motives were adduced to this arrangement and was abruptly ended.

Unfortunately, EPSR that was meant to address some of the systemic and structural challenges did not go far enough with transmission. Worse, the pursuit of private sector participation as the panacea to the difficult restructuring decisions government failed to address has inadvertently left the sector in a worse position. This is where the sector is right now, and where the difficult decisions must start from.

Technological advancement (distributed generation, smart grid, small efficient turbines, renewable technologies, etc.), and the economic realities of the country have made some ask whether the national grid as constituted today is fit for purpose. The philosophy on which the grid is presently configured takes a holistic view without due consideration given to technical feasibility or commercial viability criteria of the investments. While government has responsibility to drive development from a national perspective, private capital works quite differently. The implication is that areas where government is desirous of expanding transmission infrastructure, it has subsidised the development, which distorts and pushes electricity prices up and hurts customers, not to mention losses witnessed on great distances to meet dispersed and marginal electricity demands. This reality is strengthening arguments for promotion of distributed generation and systems augmented by local fuel sources to deliver cost effective power to different areas of the country. This will encourage exploitation and development of local fuel resources, and the harnessing of multitudes of hydro schemes that government substantially invested but lay moribund or sub-optimally operated.

## **Basis of Performance Improvement and Restructuring**

Nigeria is expansive with marked differences in regions and economies. Some areas are highly concentrated with significant electricity demand centres, others are sparsely

populated with dispersed electricity. The approach to date for grid development does not distinguished between these two extremes and continue to treat them as same, at great cost to the system and the economy.

Increasing access to electricity grid need not be based on wanton extension of the grid even when it weakens the system and increases technical and commercial losses. As mentioned above, advances in power generation technology, renewable energy usage, local conditions, environmental concerns, etc., have seen the growth of distributed generation and promotion of localised grid and smart grid technologies. These systems are decentralised, modular, and more flexible, and are located near the load they serve. Generally, their capacities are low and usually in the 10 - 25MW range. Their advantages are low system losses, swift responsiveness to demand, and strong environmental credentials.

The choice of option should be informed by our current realities. The generating plants are mostly in the southern parts of the country. Although transmission line and transformation capacities have been significantly increased, this cannot, and should not, be expected to translate into better power supply. The system losses that ensue in this reality are commercially crippling, such that more investment is throwing good money after bad money.

## **The Way Forward: Goals and Objectives for Restructuring TCN**

### **Heuristics**

**Proposition 1:** If government's decision is genuinely to improve operational and financial performances of NESI, then the design of the restructuring and concession of TCN will be premised on efficiency in its totality and the precept that it has no business in business.

**Proposition 2:** It is important the restructuring of TCN also takes cognisance of the fact that monopolies, public or private, especially those conferred with de jure monopoly status are much more susceptible to inefficiencies. It is only when the plethora of issues and challenges that invariably lead to poor performance despite spirited government determination can we expect to see restructuring and the concession that will advance the industry.

**Proposition 3:** Restructuring or private sector privatisation by concession cannot, and should not, be embarked upon simply because government is frustrated with TCN, unable to hold it accountable, or unable to mobilise capital and investment to address problems appropriately and specifically. What will essentially happen is the public monopoly will only be transformed to a private money, and the latter will be a lot more difficult to control especially were regulation is inchoate and susceptible to capture.

**Proposition 4:** For TCN to be restructured as the fulcrum for the development of a

competition-based electricity market, the first thing to bear in mind is contextual: **The desire to see competition should not lead to balkanisation of TCN into mini-TCNs, as that would only result in multiple monopolies.** It is not the number that determine competition but the characteristics of the industry and the conduct of the participants.

Where industry is defined as natural monopoly, as in transmission, the antidote is effective regulation, which serves as surrogate competition when the latter is absent or infeasible. Not restructuring properly will lead to transforming an inefficient public monopoly into an inefficient private monopoly with more deleterious consequences.

It is folly to think that a private monopoly would fare any better than a public monopoly as has been abundantly shown in the case of the PHCN successor distribution companies that were privatised in 2013. The successor distribution companies were not a natural monopoly, they were, to all intents and purposes, local monopolies, given that the country was divided into eleven distribution areas, with the franchise customers having no choice in supply of electricity.

### **Goals and Objectives**

1. Improvements in operations with focus on technical and cost efficiencies in realignment of transmission with generation and distribution.
2. Improvements in operations and better coordination between system, market operations, and grid development.
3. Reduction of losses to global best practices and standards.
4. Promotion of competition and choice, and the development of a competitive electricity market.
5. Promote and support economic activities, growth and development taking cognisance of local electricity requirements and primary fuel availability in system expansion plan.
6. Complement and enhance infrastructure growth and development.
7. Strengthen and expand interregional electricity interconnections and supply.

### **Lessons from Brazil's Successful Transmission Experience**

Given that competition is not feasible or desirable, strong and effective regulation, which NERC has not been able to provide to date, is the key to sub-optimal monopoly behaviour. Here, we could take our cue from Brazil, to name one peer-group example. Turkey would have been another possible role model.

Brazil has experienced high levels of electric load growth recently. Energy consumption has grown 4.4 percent per year in the last decade. The country stands out among other emerging economies in terms of capital mobilised for transmission expansion projects, amounting to \$15.9 billion involving public-sector participation (PSP) in the past two decades. Long-term concessions, such as BOOT contracts, have dominated the expansion projects.

While Eletrobras, owned by the federal government, continues to own the majority of Brazil's transmission grid, new concessionaires have actively entered the transmission sector. Thirty-year renewable concessions have been awarded to bidders offering the largest discount on the initial Permitted Annual Revenues of the auction, meaning the lowest transmission tariff.

Investor confidence is achieved by fixing annual inflation-adjusted revenues for the entire concession period, subject to periodically reset rate-of-return caps. The revenues are insulated from risks beyond control of a transmission operator, including generation volume. At the same time, bidding prices and resulting end-user costs are kept in check by the *competitive auctions* mechanism for the concession, run by the sector regulator. Auctions to build and operate transmission assets have been used for more than a decade. Although the process does not discriminate between publicly or privately owned companies participating in the auctions, the results demonstrate that projects with PSP tend to supply an ample amount of capital to build new transmission capacity.

**From 1999 to 2010, 15 auctions were held, with 67 projects awarded, for a total of 21,317 kilometres of new transmission lines. The auctions attracted both public and private capital, with the latter prevailing (Tolmasquim 2012). In more recent years, however, companies controlled by state-owned Eletrobras became more successful in winning the auctions due to lower return requirements by both Eletrobras itself and its foreign partners, such as China's State Grid (UBS 2014).**

### **TCN Restructuring and Policy Implications**

The good news, with clarity on what needs to be achieved, is that success is possible. This depends on avoiding the pitfalls of NESI privatisation and the lacklustre TCN management contracts. BPE, NERC, Ministry of Power and other relevant authorities must undertake difficult and complex restructuring that will deliver improved operational and financial performances. Otherwise, the whole exercise will not deliver and may best be avoided if improvement cannot be guaranteed.

The issues surrounding the restructuring and concession of TCN will have to be intricately woven into policies. They will require strengthening of legislation to ringfence the development of the transmission sector and NESI.

The following are some of the key Issues that must be given prominent policy consideration:

1. Improvements in operation and financial performances will need to focus on reduction of technical losses, system outages, and reduction in cost of service.
2. The structure of TCN and its conduct has serious implications for the development of the wholesale electricity market. Thus, the restructuring of TCN should not focus narrowly on improvement in operations, but how to galvanise the sector by promoting choice and competition.
3. Energy is crucial to economic activities and is expected to drive economic growth and development. To ensure energy is available adequately and reliably for all, the rigidity on which the national grid is built should be revisited and assessed to determine its continued relevance considering benefits regional grid configuration (structural or operational), distributed generation, promotion of competition with the necessary framework for open and non-discriminatory access to the network, etc. can deliver.
4. Nigeria has interconnections with neighbouring countries, the operations of these links and supply of power is the preserve of TCN. Some of these interconnections are not commercial in orientation but strategic. For instance, the connection and supply to Niger Republic is to secure the flow of River Niger to power Kainji and Jebba HEPPs. This connection and others can be used to foster Nigeria's interest in the West African region.
5. With respect to financing and funding issues, the concession of key functions of TCN to the private sector or a third party, this will not absolve government of funding responsibilities in its entirety. At best, government may have to give some guarantee or cede more features of control and ownership to enable the private sector to recoup their investment. This must be clearly understood to avoid future policy reversals.

How well these issues are managed will depend not just on the attention given to restructuring but also how well the concession contract is designed. It is a tall order, but it is doable.