

MUCH ADO ABOUT THE INDEPENDENT SYSTEM OPERATOR: An Analysis of the need for the Independent System Operator under the Electricity Act

1. Rachael Omidiji, "FULL LIST: Times, dates national grid collapsed in 2024" The Nigerian Tribune (online) (Nigeria, 7 November, 2024) <<https://tribuneonline.com/full-list-times-dates-national-grid-collapsed-in-2024/>> accessed 27 November 2024.

2. In 2022, it was reported that over fifty (50) companies had shut down and some had exited the country between 2017 and 2022 due to power crises and forex. These include Surest Foam Limited, Delifoods, Universal Rubber, amongst others: Odinaka Anudu: Over 50 companies shut down over forex, power crises-Investigation, Punch Newspaper (Nigeria, 02 May 2022) <<https://punchng.com/over-50-companies-shut-down-over-forex-power-crisis-investigation/>> accessed 04 December 2024.

3. At the level of generation, there is the inadequacy of gas supply, improper coordination of plants and gas pipelines, and poor generation availability. Under the transmission value chain, the challenges include lack of operating/spinning reserve and voltage support scheme, lack of reliable SCADA facility, vandalism, tripping of critical infrastructure lines, transition line redundancy and lack of reliable communication facility are the causes for grid collapse. At the distribution end, there are challenges such as weak distribution networks, load allocation violation, and lack of visibility on the Distribution Companies (DisCos) network, etc. Mary Izuaka, "Why grid collapse persists in Nigeria – TCN" The Premium Times, Nigeria, (Nigeria, 23 April 2024) <<https://www.premium-timesng.com/business/business-news/688452-why-grid-collapse-persists-in-nigeria-tcn.html>> accessed 04 December 2024.

4. When there is an imbalance in the demand-supply matrix within the power system, the grid frequency drops outside the safe operational range, leading to its collapse.

5. Joy Ogaji, "Independent System Operator: Exploring its Dynamics in the Current Ailing Power Sector (I)" BusinessDay Newspaper, (Nigeria, 01 March 2021) <<https://businessday.ng/energy/power/article/independent-sys-tem-operator-exploring-its-dynamics-in-the-current-ailing-g-power-sector-i/>> accessed 27 November 2024; Joy Ogaji, "Independent System Operator: Exploring its Dynamics in the Current Ailing Power Sector (II)", BusinessDay Newspaper, (Nigeria, 08 March 2021) <https://businessday.ng/energy/power/article/independent-sys-tem-operator-exploring-its-dynamics-in-the-current-ailing-g-power-sector-ii/#google_vignette> accessed 27 November 2024

6. A succinct yet comprehensive history of the unbundling of PHCN and subsequent privatization is outlined in: Dr. Ayodele Oni, Renewables, Electric Power Transactions & The Electricity Act 2023; (self-published, 2024), pp 50-53.

7. The Bureau of Public Enterprise ("BPE") recently appointed a Management Contractor, Manitoba Hydro International (MHI) for TCN, which took over the functions of Transmission Service Provider, System Operator and Market Operator to undertake the overall management of TCN.

Introduction

Electricity is a crucial socio-economic need in every society. An epileptic power supply situation can limit a country's economic growth and ultimately hinder its investment attractiveness. On the other hand, quality, reliable, and affordable electricity can significantly contribute to a country's economic growth. It can stimulate job creation, boost revenue, and attract investments. Undoubtedly, an efficient grid system is a major contributor to stability in public electricity supply.

In the case of Nigeria, the grid supply of electricity within the Nigerian Electricity Supply Industry ("NESI") has been far from ideal. For instance, three collapses occurred in 2023, and ten collapses have so far been recorded in 2024¹ leading to disruptions in business activities and negatively impacting the business climate.²

These collapses have been attributed to several challenges cutting across the electricity generation, transmission and distribution value chains³ leading to imbalances in electricity demand and supply within the power system.⁴ Arguably, with a well-equipped system operator, these factors can be well managed so that they are quickly predicted and acted upon to mitigate their impact on the power system, thereby preventing incessant system collapses.

It is thus imperative to interrogate the capacity of the Transmission Company of Nigeria ("TCN") as the system operator in Nigeria vis-à-vis the need for a truly Independent System Operator ("ISO") that is well-equipped with the necessary resources to properly monitor and supervise the effective functionality of the power system.⁵

Who is the System Operator in the Nigerian National Grid?

A System Operator ("SO") is the operator of one or more transmission systems. An SO generally operates within the transmission aspect of an electricity value chain and is usually tasked with monitoring, managing, and controlling the operations of the power grid or power system. An SO further ensures the reliable delivery of electricity to consumers.

The Nigerian electricity supply chain follows the classic model consisting of three major sub-sectors: Generation, Transmission and Distribution. Hitherto, all three sub-sectors were operated by a vertically integrated government-owned monopoly, the National Electric Power Authority ("NEPA"), later known as Power Holding Company of Nigeria ("PHCN"), up until November 2013 when an unbundling and subsequent privatization process was completed. The reforms commenced with the unbundling which culminated in the privatisation of the generation and distribution sub-sectors of the country's electricity value chain. Whilst the transmission sub-sector was, not privatized, the government entered into a management contract for the management of the transmission system with Manitoba Hydro of Canada.⁶

Historically, the Federal Government of Nigeria ("FGN") set up the Transmission Company of Nigeria ("TCN"), as one of the unbundled companies, to take over transmission duties from the defunct PHCN⁷ as stipulated in section 25 of the now-repealed Electric Power Sector Reform Act, 2005 ("EPSRA" or "Repealed Act").



8. Under the Electricity Act, such declaration is now a function of the Commission. See section 8 of the EA.

9. The EPSRA defined an ISO as an SO (unaffiliated with an entity holding a transmission licence) to whom TCN's functions of system operations were to be transferred.

10. The SO is also known as the Nigeria Electricity System Operator- Nigeria Electricity System Operator, 'About SO', available at <https://nsong.org/>

11. Market Rules and Grid Codes are the commercial and technical procedures by which GenCos and DisCos are permitted to use the transmission system and how they trade energy imbalances arising from differences between bilateral contract arrangements and the actual production and consumption of energy. Grid Code also means the instructions, rules, procedures, guidelines, etc., for the operation and planning of an interconnected power system and accounting requirements relating to its provisions. The following are the links to download the Grid Code and Market Rules, respectively: https://nems.gov.ng/wp-content/uploads/2019/11/Grid-Code_2014.pdf; <https://www.nbet.com.ng/pdf/market-rules.pdf>

12. SCADA refers to technological systems comprising software and hardware components used for controlling, monitoring, and analyzing industrial devices and processes. They are tools which facilitate greater visibility and better operational control of a transmission system.

13. Obas Esiedesa, "TCN deploys \$56m World Bank SCADA system to curb grid collapses", Vanguard (Abuja, 18 September 2024) <<https://www.vanguardngr.com/2024/09/tcn-deploys-56m-world-bank-scada-system-to-curb-grid-collapses/>> accessed 18 December 2024.

14. Nigeria Electricity System Operator, "NERC Set to Create ISO from TCN" (01 June 2015) <<https://www.nsong.org/MediaPublicity/NewsDetails.aspx?NewsID=24>> accessed 03 December 2024.

15. Adekunle Rasak, "NERC begins consultation process to unbundle TCN" Nigerian Tribune, (Nigeria, 10 July 2020), <<https://tribuneonlineeng.com/nerc-begins-consultation-process-to-unbundle-tcn/>> accessed 04 December 2024.

16. Even so, we are not aware of any declaration by a Minister in charge of Power at the time, for the initiation of a more competitive electricity market, which was a condition precedent for the transfer of TCN's system operation functions to an ISO under the EPSRA regime.

17. A point to note here is that, whereas under the EPSRA, the setting up of an ISO was subject to the fulfilment of a condition precedent (i.e., a declaration by the Minister of Power that a more competitive electricity market be initiated), there is no such condition precedent required to be fulfilled before the incorporation of an ISO under the EA.

It is essential to mention that the TCN obtained a Transmission Licence and a System Operation Licence in 2006 from the Nigerian Electricity Regulatory Commission ("**NERC**"), which enabled it to perform transmission, system operation and market operation duties pending a declaration by the Minister of Power that a more competitive electricity market be initiated⁸ to pave the way for the transfer of TCN's system operation functions to an ISO.⁹

The TCN, as a federal government-owned electric utility company, is currently under the custodianship of the Federal Ministry of Power and has the responsibility of overseeing activities undertaken within the transmission aspect of the electricity supply chain. The TCN carries out its functions through its three (3) departments: the Transmission Service Provider ("**TSP**"), the Market Operator ("**MO**") and the SO.

The TSP is responsible for developing, expanding, and maintaining the 132kV and 330KV transmission systems. It also manages grid connections, ensures proper metering at all connection points, and obtains necessary information from transmission network users to enable it to perform adequate planning operations and development of the transmission network. The MO, on the other hand, is tasked with overseeing the administration of the Nigerian Electricity Market ("**NEM**") in compliance with the NERC Market Rules.

The SO, on its part, generally undertakes control of the physical operation of the power system.¹⁰ It likewise manages the transmission grid lines, ensuring their reliability and maintaining the technical stability of the grid through its operations of planning, dispatch, and control of the grid. The SO's functions revolve around the monitoring of grid operations and ensuring compliance with the Grid Code and Market Rules.¹¹

The Need for an ISO within the NESI

The capacity of a power system to provide appropriate services almost continuously with minimal disruptions spanning a considerable amount of time is considered as reliability.

Notwithstanding the roles well-outlined in the Grid Code, Market Rules, the EPSRA (as it were), and the current Electricity Act, 2023, there are obvious setbacks in the functionality/performance of the SO, as the primary party responsible for the operationalisation of the national grid. This defect in functionality is also evidenced in the underdeveloped status of the transmission network and the power evacuation infrastructure, which is still being operated majorly by manually controlled network devices.

The SO, thus, requires structural upgrading, both in technological advancement and expertise.

Unfortunately, the TCN has expressed that it has not had the requisite funding to acquire the equipment needed for its optimal performance.

Interestingly, the Supervisory Control and Data Acquisition ("**SCADA**") system¹²— a globally recognized requirement for SO's and Energy Management System ("**EMS**") — currently undergoing installation, is funded by the World Bank.¹³

Hence, understandably, the need for a well-funded and equipped SO and TCN's inability to provide the needed funding and equipment, have influenced the consideration of the establishment of an ISO (a separate entity from the TCN) as a viable option towards the proper management of the Nigerian national grid and to ensure its stability and reliability in the future. The idea here is to have a distinct entity that gives dedicated and proper attention to system operation and market facilitation — the distinguishing functions of an ISO.

Previous Efforts to Establish an ISO under the EPSRA Regime

On June 1, 2015, NERC announced that it had commenced necessary steps towards creating an ISO, from the existing TCN.¹⁴ In 2020, it made a similar announcement in a stakeholder consultation meeting on the readiness of the electricity industry for the unbundling of the SO function to an ISO, taking into consideration the stage of market development and the key technical prerequisites for an efficient ISO; and to also recommend the degree of independence that may currently be granted to the operator of the system without causing disruptions in market stability.¹⁵

In essence, while there were attempts to establish an ISO previously under the EPSRA, these efforts were aborted halfway and thus did not lead to the establishment of an ISO.¹⁶

The ISO under the Electricity Act 2023

On June 8, 2023, President Bola Ahmed Tinubu signed the Electricity Bill into law: the Electricity Act, 2023 ("**EA**" or the "**Act**"), which replaces the 2005 EPSRA. The Act defines the ISO as an SO licensed by the Commission under Part IV of the Act.

The Act further outlines in Section 15 of the Act that the TCN being the successor company that has been issued the license that covers Transmission Service Provider, market and system operation functions under the repealed Act shall, *per the terms of its license and within such stage or period of the market as the Commission may in a written directive specify*, take such steps as are necessary under the Companies and Allied Matters Act, 2020 ("**CAMA**") to incorporate an entity, the ISO ("**Nigerian ISO**" or "**NISO**"), which may be a company limited by shares or have such ownership and governance structure as the Commission may specify.¹⁷



18. See section 15(2)(b) of the EA.

19. NERC ORDER NO: NERC/2024/45, Order on the Establishment of the Independent System Operator for the Nigerian Electricity Supply Industry", available at <https://nerc.gov.ng/wp-content/uploads/2024/05/Order-on-the-Establishment-of-the-Independent-System-Operator-for-NESI-1.pdf>. Further, we note that whereas the NISO was incorporated on 29 May 2024, with the name "Nigerian Independent System Operator Limited", however, we are not aware of the official transfer of all market and system operation assets and liabilities held by TCN to the NISO and this was required to be concluded no later than 31 August 2024.

20. The entity is known as PJM Interconnection LLC.

21. PJM's members include electricity distributors, transmission and generator owners, organizations that can sell electricity to end-users, marketing firms as well as end-user customers. Additionally, as an LLC (limited liability company), PJM combines certain features of a corporation (credibility and limited liability of its members) and some features of a partnership (flexibility and pass-through taxation).

22. This is known as the National Energy System Operator (NESO). The NESO was launched on 01 October 2024 as a government-owned but operationally independent entity following the nationalisation of the National Grid ESO which was owned by National Grid Plc. Jonathan Spencer Jones, "Britain's National Energy System Operator launched" Smart Energy International, (Oct 02, 2024) <<https://www.smart-energy.com/industry-sectors/energy-grid-management/britains-national-energy-system-operator-launched/>> accessed 06 December 2024.

23. Joy Ogaji (I), (n 7).

24. Interestingly, the ITSO model shares similarities with the outgoing SO model housed under the TCN structure, in the sense that both system and transmission operations are performed by the TCN albeit under two different departments (TSP and the SO, respectively). Because of its fully integrated nature, the ITSO model is expected to incentivise growth in transmission capacity, aid trading and promote competition. This has however not worked for Nigeria – prompting the change from SO model to ISO model.

25. System operations and transmission operations will be unbundled. Consequent upon the unbundling, the TCN will transfer all assets and liabilities held by it pertaining to its market and system operation functions to the ISO. The transferred assets and liabilities will then become subject to such powers and duties of an ISO under the terms of its systems operations licence. See section 15(2) of the EA. The TCN will however retain its TSP licence and will be responsible for transmission assets and liabilities and perform such functions as are relevant to the development and maintenance of the power transmission infrastructure per the terms of its license as may be issued by the Commission and the provisions of the EA.

The section also notes that once incorporated, the NISO shall immediately apply to the Commission and be licensed by the Commission as an ISO to carry out such market and system operation functions as stipulated under the Act, its license and such terms and conditions as the Commission may direct. In order to ensure that the TSP licence is separated from the SO licence, the TCN will retain its TSP licence and shall be responsible for transmission assets and liabilities and perform such functions as are relevant to the development and maintenance of the power transmission infrastructure per the terms of its license.¹⁸ By so doing, the TSP license will be distinct from the System Operation Licence.¹⁹

In light of this development, on April 30, 2024, NERC issued an order on the "Establishment of the Independent System Operator" which took effect from May 1, 2024.

The Order, in compliance with the EA, encapsulates the procedure which the BPE will take in incorporating the ISO which will be named the "Nigerian Independent System Operator of Nigeria Limited (NISO)" (sic). It also outlines the clear directives on the timelines for the incorporation of the ISO and further stipulates the procedure for the transfer of the assets and liabilities of the market and system operations aspect of the TCN's business to the ISO.

Functions of the NISO under the EA

The primary functions of an ISO under an ISO model, include the management of applications for transmission service, allocation of transmission capacity and network expansions, transparent regional transmission expansion planning process, market monitoring and mitigation programs, and regulated transmission, amongst others. These functions are captured in the EA.

Section 67 of the EA stipulates the functions of an NISO (as may be specified in the system operation license) as follows:

- a. generation scheduling, commitment and dispatch;
- b. transmission scheduling and generation outage coordination;
- c. transmission congestion management;
- d. international transmission coordination;
- e. procurement and scheduling of ancillary services and system planning for long-term capacity;
- f. administration of the wholesale electricity market, including the activity of administration of settlement payments, in accordance with the market rules; and
- g. such other activities as may be required for reliable and efficient system operation.

Observably, the functions of the NISO under the EA are fundamentally the same as those stipulated in the EPSRA and the NISO will be subject to the same system operation powers and duties as have been imposed on the TCN.

A Comparison of the Nigerian ISO model under the EA with ISO models in the United States of America and the United Kingdom

The Nigerian ISO model stipulated in the EA can be compared with the system operation model utilised in the United States of America ("US") and the United Kingdom ("UK").

In the US, the ISO is saddled with certain functions such as tariff administration and design, congestion management, and ancillary services amongst others. Also, the term SO generally refers to an ISO in organised wholesale markets or a utility-based SO in non-competitive wholesale markets. States in the US such as Pennsylvania, New Jersey and Maryland operate an ISO system with a model for its organisational structure ("**PJM model**")²⁰ similar to that of the NISO as envisaged in the EA in the sense that, under both the PJM model and the Nigerian ISO model, an ISO operates independently of the transmission system and has no ownership title over the transmission assets.

The Nigerian ISO model under the EA however differs from the PJM model in the sense that, under the PJM model, the ISO is framed as a membership organisation providing services on a non-profit basis to its members.²¹ The Nigerian ISO on the other hand, is an incorporated entity (company) limited by shares which will provide services to relevant market participants who are not necessarily its shareholders/subscribers.

In the UK, the SO for its national grid also owns and maintains the transmission system.²² This type of system operation is referred to as the Independent Transmission System Operator ("**ITSO**" or "**UK ITSO**") and has the primary functions of grid operation, market administration, and power system planning. The ITSO combines both system operations with transmission system operations.²³ It differs from an ISO on the basis that an ISO does not own transmission lines or provide transmission services.²⁴

Investment Opportunities under the ISO Model

Upon the establishment of the NISO, the Commission is expected to licence the NISO to perform such market and system operation functions in accordance with section 15 of the EA.²⁵ Moreover, the Nigerian ISO is empowered by virtue of its objects to hold and manage all assets and liabilities pertaining to market and system operations on behalf of market participants and consumer groups or such stakeholders as the Commission outlines.

Section 16 (2)(d) of the EA clearly outlines that the income and property transferred to the Nigerian ISO by TCN or whenever derived should be applied solely **towards the promotion of its objects and no portion should be paid** or transferred directly or indirectly by way of dividend or bonus otherwise howsoever, by way of profit to the subscribers. This provision reflects that the ISO should operate similar to a non-profit organisation.



26. Already, states such as Lagos, Ondo, Ekiti, Enugu, Imo, Oyo, Edo and Kogi, have enacted their respective electricity laws.

27. Section 96 & 99 of the Lagos State Electricity Law 2024

28. Earlier in 2023, the Nigerian billionaire and businessman, Mr. Femi Otedola announced his intention to partner with the Lagos state government and the African Development Bank ("AfDB") towards developing a power transmission project. See Aghogho Udi, "Otedola partners Lagos state and AfDB to develop Nigeria's first PPP power transmission project" Nairametrics, (Nigeria, 11 July 2023) <<https://nairametrics.com/2023/07/11/ot-edola-partners-la-gos-state-and-afdb-to-develop-nigerias-first-ppp-power-transmission-project/>> accessed 18 December 2024.

Notwithstanding the above, the proviso to section 16(2)(d) of the EA allows for payment in good faith of remuneration to any contractor or staff of the company in return for any services rendered to the company. This implies that albeit being a non-profit entity, the ISO is not precluded from remunerating its staff and contractors for services provided to the ISO. Also, the ISO is empowered to enter into arrangements with any entity or expert to provide the ISO with technical support and expertise in relation to the performance of its functions.

The Impact of the Establishment of the Nigerian ISO on States' Electricity Markets

It is notable that the EA now grants states the power to establish their electricity market and regulate the generation, transmission and distribution of electricity.²⁶

The NISO model at the federal level will thus serve as a template or catalyst for the states to design their respective system operation models with respect to the operation of their intra-state electricity markets. For instance, in its recently enacted electricity law (Lagos State Electricity Law 2024), Lagos State seeks to establish the Lagos Independent System Operator to carry out functions identical to those of the NISO under the EA.²⁷

Further, the introduction of an ISO in the transmission sub-sector of the NESI and its expected efficiency will provide potential business opportunities for private investors to input resources into the development of transmission infrastructure both at the national and state levels.²⁸

Conclusion

We have established that in consideration of the peculiarities facing Nigeria's NESI, there is a critical need for the independence of the SO to enable it to provide non-discriminatory, efficient system operation and market administration services, assuring the relevant stakeholders of its complete independence on issues of emergency grid management, data disputes, and other critical functions.

Furthermore, it is believed that as an efficient model (as seen in the US PJM example), the establishment of the NISO will lead to a marked improvement in system (and market) operation services within the NESI, as well as efficiency and reliability of the national grid.

A reliable national grid will, in turn, encourage investment security and opportunities in the country thereby leading to increased revenue, propelling economic development, and increasing job opportunities, amongst others.

Conclusively, to achieve the expected results, the NISO should be innovative in its approach and be ready and available to give its best at all times. In the same light, the full support of market participants is required.

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