UKNIAF
United Kingdom Nigeria Infrastructure Advisory Facility

Fixing The Nigerian Electricity Grid – Trends, Learnings & Recommendations

January 2025

Introduction

Nigeria's Power sector features a layered and dynamic mix of people, interests, challenges and opportunities. Over the last five years, the United Kingdom Nigeria Infrastructure Advisory Facility (UKNIAF) programme has been providing the Nigerian Government with technical advisory support in this sector.

Against this backdrop and using data from electricity feeders, the Quarterly Reports of the Nigerian Electricity Regulatory Commission (NERC) and feedback from programme partners, UKNIAF has been able to identify trends around the performance of some indicators of the Nigerian power system.

These trends form part of reflections around what changed in the sector, what challenges persist, what we learnt over the programme lifespan and what future actions are required.[1]

[1] The detailed reports (M1: Report on Identified Trends in Power Sector Performance over UKNIAF lifespan, M2 – Report on Impact of Grid Efficiency on Carbon Emissions, M3 – Relationship of UKNIAF to Sector Metrics) which form the basis of this piece are available on the UKNIAF MIS.

…what was it like at the start?

There were **gaps in regulatory oversight** because the Regulator relied on second-hand information from the Distribution Companies rather than on access to information obtained from direct monitoring and tracking

There was not much synergy between different stakeholders and there was **no comprehensive long-term plan for the sector**

Electricity tariffs were not cost reflective. Alleviating the tariff shortfall by increasing electricity prices proved politically difficult, resulting in an impasse between unsustainable but concrete subsidies and a government reluctant to continue their funding

Distribution side inefficiencies were evident through recurring technical and commercial losses as well as significant under delivery in terms of power supplied to customers across all tariff bands

Understandably, the sector was more focused on the addressing the overwhelming myriad of challenges as outlined and **not as focused on actualising emerging climate-related policy commitments** such as the Nationally Determined Contributions..

Transmission grid efficiency - **aged grid infrastructure manually managed** using Operating Procedures that had not been revised since 2010

…what did we do?

UKNIAF undertook interventions aimed at bringing about improvements in Liquidity and Tariff, Regulatory Environment, Value Chain Transparency and Transmission Grid Efficiency…

1 Tariffs

Informed, in part by customer-based survey advocacy from UKNIAF, the Nigerian Electricity Regulatory Commission (NERC) **introduced Service Based Tariffs (SBTs)** in 2020 to reduce tariff shortfalls.

Supported **the tariff review process** (Multi-Year Tariff Order (MYTO))

2 Grid Management

UKNIAF worked with TCN to review the 19 Operating Procedures and **revised the 5 managed at the National Control Center,** including Merit Order Dispatch, Transmission Off-take and Balancing, System Restoration after a Collapse, Transition Ancillary Services and Instructions Recording

3 Policy & Governance

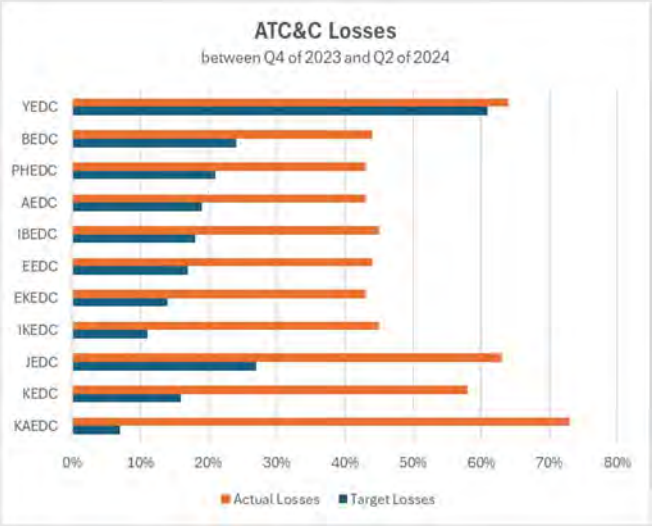
UKNIAF also facilitated a **sector-wide open book review**, the production of a sector **Integrated Resource Plan**, the **review of the tariff structure** and supported transition planning for the **emergence of State electricity markets** in some States.

4 Data

UKNIAF supported NERC to access real-time information for improved regulatory oversight. E.g., the **development of the SBT Dashboard, the Power Flow Dashboard, the Outage Monitor and the Universal Customer Dashboard**.

...what has changed and what stayed the same?

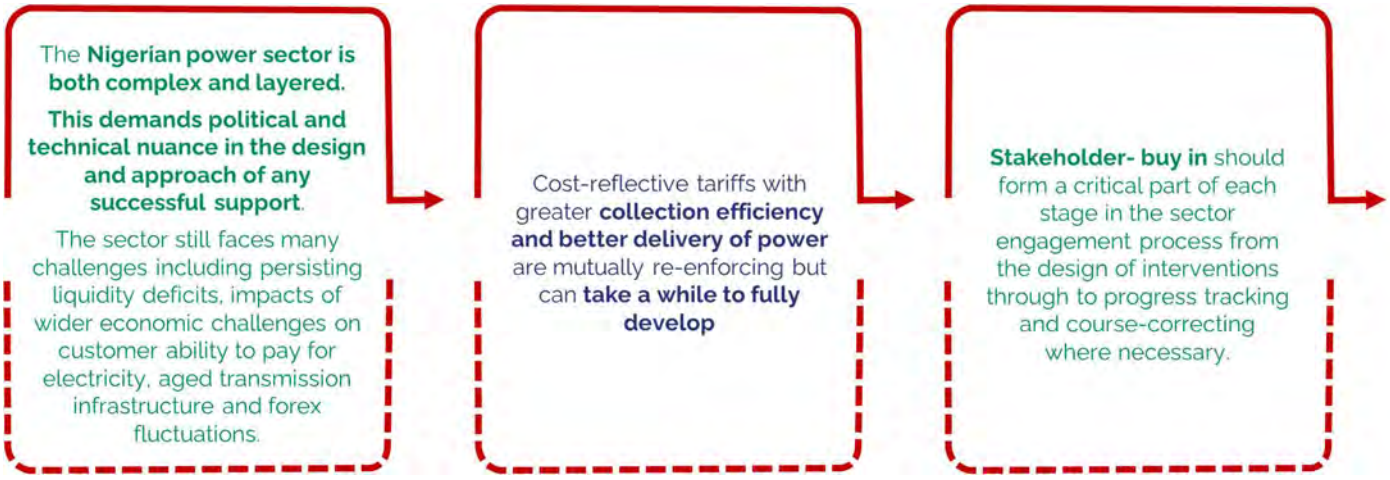
- Interruptions caused by ***grid vandalism, theft and an aged national grid*** caused recurring grid collapses throughout the duration of the UKNIAF programme.
- Electricity **reliability improved over the period of UKNIAF intervention** though it continues to be a challenge: there was a strong reduction in unmet demand[2] in 2022 versus in 2021 and 2020.
- There has been **little discernible change in generation and transmission losses** between 2022 and Q2 2024, with transmission losses averaging 8.02%.



- All **Distribution Companies showed an improvement** in their energy supply performance between 2022 and 2023, but the 2024 figures as of the end of August 2024 were lower than both 2022 and 2023.
- **Customer satisfaction levels have been mixed** with some experiencing less hours of electricity supplied than promised in the tariff band they are placed on.
- The **sector policy context has shifted**. A long-term plan is in place, the electricity market has been decentralised and climate change continues to feature concrete climate-change-related targets, which reflect the more general shift in national focus.
- The **performance in percentage of energy billed has improved** by a noticeable amount – from 77% of in 2022 to 81% in the first two quarters of 2024.
- The overall remittances to the Nigeria Bulk Electricity Trader and **remittance performance levels improved** from 74% in 2022 to 82% in 2024.
- The performance of distribution companies is strongly correlated to the population density of the area served as **more densely populated States have better performance** in terms of reduced power outages.
- Based on assessing the reported electricity delivery versus levels of unmet demand, the **total GHG emissions savings are substantial** – at 3 million tCO2eq during the period of 2022 to 2024 compared to business as usual. Further, use of diesel generators to make up for grid delivery shortfall **almost doubles the marginal cost of electricity to the consumer,** from an average of US $49.13/MWh to US $82.45/MWh

[2] Note that "unmet demand" in this context refers to the difference between what was promised in Service Level Agreements of Distribution Companies and what was actually delivered. As such it is electricity which was not delivered to customers for myriad reasons including power outages, insufficient generation and infrastructure constraints.

...what have we learned?



...what are the recommendations for the future?

1. **On Data and Transparency – sector data repository; disaggregation by State; supply interruption duration**

   UKNIAF's support has prompted greater engagement and strategic alignment within NERC as to the path to, and value of evidence-based regulation. It is recommended that there is a strengthening of data collection and accessibility for not just NERC but market participants and stakeholders to enable evidence-based decision-making and sector accountability.

   NERC and State regulators should enhance data credibility via mandating and enforcing the installation of IoT Meters at 33kv and 11kv feeders while establishing a central data repository system (*single source of truth'*). Efforts to achieve universal consumer metering should also continue.

   It is further recommended that:

   - NERC and State Regulators work with DisCos, Energy Retailers and TCN to procure more granular data that would enable identification of cross-subsidies sources i.e. which feeders carry the 'heavy hitters' in terms of commercial / industrial Maximum Demand users. Further, with the shift to Sub-National Markets following the Electricity Act 2023, it is necessary for information coming from DisCos to be disaggregated by state.
   - Data and reports on the average number of interruptions a customer experiences and the duration of interruptions should be collected by TCN and DisCos and collated by NERC/State Regulators. This will enable the assessment of sector performance using standard customer-facing measures like the System Average Interruption Frequency Index (SAIFI) & System Average Interruption Duration Index (SAIDI).
   - NERC complete the establishment of a central data repository system accessible to all market stakeholders including State Regulators and upheld as the 'single source of truth'

for industry data with real-time data dashboards. It can then enforce value-chain transparency taking quick action to sanction any compromise or complacency by market participants.

2. **On Tariff, Sector Liquidity and Investments - flexible tariff methodology; different approach to subsidies; concessional financing**

   High inflation (34% in 2024) and currency depreciation make infrastructure investments and foreign funding more expensive. This is even more-so where tariffs are not able to provide a return on investment. While, on the one hand, there is increased difficulty in securing affordable financing for grid upgrades and renewable energy projects, there is also consumer pushback against higher tariffs due to declining purchasing power.

   It is recommended that:

   - NERC consider enabling the tariff setting methodology to be more cost-reflective for most customer types and use targeted subsidies for consumers that are unable to pay for power thus balancing affordability for consumers with financial viability for utilities, and that the methodology be flexible with regards to adjusting to foreign exchange changes.
   - FMoP and NERC, in consultation with relevant ministries for social protection, develop ways to move away from broad-based population-wide energy subsidies and focus on households which require subsidies. The income / asset threshold for these subsidies could be quite high initially and reduce over time. This will allow for cost-reflective tariffs on the one hand, without huge social upheavals due to increased tariffs.
   - FMoP advocate for concessional financing from international development partners for grid projects.

3. **On Grid Reliability and Efficiency – grid infrastructure; ATC & C losses**

   It is recommended that:

   - TCN continue to address the weak transmission grid infrastructure, which suffers from technical limitations and vandalism, contributing to frequent collapses and unreliable supply,
   - TCN and DisCos invest in reducing Aggregate Technical, Commercial and Collection (ATC&C) losses, which have not significantly changed from their high range of 40-70% (compared to 15.65% in Brazil as of 2023) indicating severe inefficiencies.
   - NERC continue to closely monitor (and where necessary, enforce) reliability standards and performance benchmarks set out in TCN and DisCo Performance Improvement Plans.

4. **On Environmental Impact and Climate Change Mitigation- demand side management; progressing renewables on to the grid**

   It is recommended that:

   - NERC and TCN continue to prioritise dispatch of renewable and / or more efficient energy sources (e.g., hydro, solar, combined cycle natural gas plants).
   - NERC, REA and the FMoP support larger-scale renewable energy projects, including on-grid solar, and distributed solar PV, that can interconnect to the grid to meet growing

energy demands sustainably. This will reduce reliance on fossil fuels, especially diesel generators, which are major contributors to greenhouse gas emissions

- NERC and DisCos to reinforce demand side management initiatives and incentivise energy efficient practices by customers

5. **On Institutional Cohesion – strengthen inter-agency coordination around distributed renewable energy projects, state electricity markets, centralised data repository**

   The sector will benefit from greater, more proactive and better-structured institutional partnerships. In this light it is recommended that:

   - NERC collaborate with the National Information Technology Development Agency (NITDA) for digital infrastructure support as it evolves the sector's central data repository
   - FMoP, Sub-Nationals and the Central Bank of Nigeria (CBN) collaborate around creating concessional funding mechanisms for distributed renewable energy projects
   - NERC collaborate with the Federal Ministry of Environment and the Energy Transition Office on tracking and reporting grid carbon emissions as such data will be valuable in creating or engaging with carbon markets to access finance.
   - There is a strengthening of inter-agency coordination through clear roles under the National Integrated Electricity Policy.
   - State Governments, NERC, DisCos, Bureau for Public Enterprises collaborate in the development of Sub-National Electricity Markets

6. **On Donor Programming - FCDO and donor programmes should**

   - prepare for longer-term programming and investments in the power sector especially given the current growth trajectory of the sector.
   - increase programme flexibility in addressing emerging sector challenges.
   - combine institutional support with tackling some of the root causes of grid-collapses that are primarily the need for more infrastructure which is capital intensive.
   - stay on the push for Energy Transition and implementing Climate specific policies that have already been committed to.
   - minimise length of time between programmes in order to ensure sustained momentum and avoid loss of traction, networks and influence.