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Metering – Key to revamping the distribution landscape in Nigeria

Providing a step-by-step play to reducing collection losses for DisCos - Nigeria

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MAKING AN IMPACT THAT MATTERS since 1845

Nigeria urgently needs to accelerate the deployment of meters for all electricity consumers in line with the Electricity Act. This will help address commercial and collection losses and drive financial health of the Nigerian Electriticy Supply Industry.

Introduction to the Nigerian Electricity Supply Industry

In 2023, Nigeria observed the tenth anniversary of the pivotal partial privatization of its power sector. This strategic move was part of the country's broader efforts to enhance efficiency and effectiveness in the power sector through private sector participation. Despite transitioning to partial privatization, the Nigerian Electricity Supply Industry (NESI) continues to grapple with inconsistent electricity supply and subpar consumer experiences.

The new Electricity Act, which ratified the relocation of the power sector from the exclusive legislative list (i.e. federal government only) in the 1999 Constitution to the concurrent list (i.e. both State and Federal), was enacted in 2023. This shift significantly reshaped the sector's landscape, empowering state governments with the authority not only to issue energy licenses but also to oversee the generation, transmission, and distribution of electricity within the respective states[1]. This development has unlocked new avenues for state-level initiatives and investments in the power sector.

As we delve deeper into the complexities of Nigeria's power sector, it becomes evident that the challenges extend beyond infrastructure and regulatory reforms. Access to electricity remains a significant concern, with 55% of the population having access, yet 66% are either underserved or completely unserved, experiencing frequent power outages across both rural and urban areas[2]. This discrepancy highlights the critical gap between the current state of electricity supply and the actual needs of the Nigerian populace. Furthermore, with electricity demand expected to grow by 4-5% annually, from 262TWh in 2015 to about 419TWh by 2025[3], the urgency for a robust and forward-thinking approach to address these issues becomes even more pronounced.

In the past years, the performance of electricity distribution companies in Nigeria was notably subpar[4], primarily due to failures in making necessary investments in network infrastructure and metering systems. This lack of investment significantly impeded progress in collection efficiencies. According to NERC[5], only 45% of registered customers were equipped with meters in 2023. This underscores the urgent need for a comprehensive strategy across the industry to enhance billing accuracy and improve revenue collection through metering.

2023 was a transformative year for the power sector's regulatory framework. This change was marked by the enactment of the new Electricity Act, which followed the relocation of the power sector from the exclusive legislative list in the 1999 Constitution to the concurrent list.

Metering challenges are significant obstacles to the sector's efficiency and financial viability. Some of these issues are outlined below:

1. Metering Gap: As at September 2023, there were about 12.8 million registered electricity customers, with only 44.51% being metered[6]. This gap in metering contributes to billing inefficiencies and collection losses. Efforts are underway to bridge this gap, with nationwide initiatives such as the National Mass Metering Programme, funded by World Bank loans to supply millions of smart meters[7].

2. Relatively high cost of acquiring meters for consumers. With the recent forex devaluation and price fluctuations in Nigeria[8], costs of meters are as high as yearly energy consumption for 50% of households.

3. Energy theft and Vandalism: Illegal connections and meter tampering are rampant, with delayed punitive measures to deter such practices. This not only results in lost revenue but also poses safety risks and damages to utility infrastructure.

Effective metering is crucial to the electricity distribution sector as it furthers actual consumption-based billing and reduces commercial losses. Accuracy in billing directly improves the financial health of the Discos via revenue collection commensurate with energy consumed. Metering also provides requisite data to manage increasing electricity demand, invariably supporting grid stability and benefiting the entire electricity value chain.

The current state of customer (end-user) metering in Nigeria

Although the importance of metering cannot be overemphasized (i.e., billing accuracy, commercial loss reduction, enhanced revenue collection and consumer empowerment), a large % of end-user retail consumers is bereft of these benefits.

TABLE 1: METERING COVERAGE AMONG DISCOS IN NIGERIA AS OF 30TH SEPTEMBER 2023

DisCos	Registered Customers	Metered Customers	Metering Rate
Ikeja	1,232,688	887,485	72.00%
Abuja	1,388,325	835,961	60.21%
Eko	724,480	424,552	58.60%
Benin	1,291,181	639,162	49.50%
Enugu	1,396,440	604,405	43.28%
Ibadan	2,350,136	1,011,630	43.05%
Port Harcourt	1,179,194	483,491	41.00%
Jos	722,731	239,442	33.13%
Aba	189,043	50,397	26.66%
Kano	861,466	209,153	24.28%
Kaduna	856,991	203,718	23.77%
Yola	632,330	118,442	18.73%
Total	12,825,005	5,707,838	44.51%

Very clearly, Ikeja (IKEDC), Abuja (AEDC), and Eko (EKEDC) Electricity Distribution Companies are the best performers on metering customers with 72%, 60.21%, and 58.60% respectively. It is worthy of note that Ibadan Electricity Distribution Company (IBEDC) has the highest number of registered customers but with 43.05% metering performance. On the lower end of the spectrum, Aba, Kano (KEDCO), Kaduna (KAEDCO) and Yola (YEDC) had below 30% metering performance as at the reporting period. These indicate that significant effort is required to close these gaps.

The Nigerian government through NERC has developed 5-metering frameworks to close the gaps[9]:

1. **Meter Asset Provider:** This framework facilitates third-party provision and upkeep of customer meters, with beneficiaries remitting a Metering Service Charge (MSC) to offset the metering costs.

2. **National Mass Metering Programme:** This is a policy intervention with support from the CBN for the provision of long-term (10-year tenure) single-digit interest loans to DisCos strictly for the provision of locally manufactured/assembled meters to customers. The first phase of the NMMP covered the delivery and installation of one million meters (2021), with an additional four million meters expected in the second phase[10].

3. **Vendor Finance:** This is a mutual agreement between a DisCo and a Local Meter Manufacturer/Assembler (LMMA) or Meter Asset Provider (MAP) on a deferred payment arrangement where the base cost of meters is not expected to exceed the regulated price approved by the regulatory Commission.

4. **Self-funded by DisCos:** This involves procurement of meters from other sources not including MAP and NMMP frameworks. This scheme determines that the allowable costs of meters, accessories, installation and warranties do not exceed the regulated pricing approval by the Commission and the terms of supply do not conflict with terms of existing MAP and NMMP contracts.

5. **Other External Efficient Meter Financing:** NERC also approved other external meter financing that are efficient, cost-effective, and in tune with the terms of existing MAP and NMMP contracts.

These efforts reflect a concerted push by the government and DisCos to improve metering coverage in Nigeria, reduce estimated billing, improve collection, and enhance the transparency and efficiency of electricity distribution.

The role of down stream metering, considering the Electricity Act

The Electricity Act obligates that no customer shall have access to electricity without a meter. This emphasizes the critical role played by metering to address several challenges that bedevil the electricity distribution players, ranging from high commercial and collection losses, impeded insight into the performance of the distribution networks, electricity theft and estimated billing.

Collection losses recorded in Q3, 2023 across all 11 Discos was 23.44%[11]. The top two complaints from customers in the same reporting period were metering (57.31%) and billing (12.88%) related[12]. These highlight the root cause of low liquidity within the sector. These complaints have reprioritized NESI's core obligations to curbing energy theft, increasing billing efficiency and closing the metering gap nationwide.

A mass metering approach targeted at retail, commercial and industrial customers that leverages smart meters will significantly increase collection efficiencies of DISCOs. Smart meter deployment especially improves the operational efficiencies of Discos, as these meters possess two-way communication (customer – DISCo) via sim-cards, and thus eliminate any manual processes to read consumption data. Meter technology has consequently empowered both consumers and Discos. In addition, mass metering unlocks greater data transparency for the consumer in terms of consumption (no estimated bills), improved business intelligence to the DISCo on by-pass (comparative analysis of data at the feeder level to household/commercial/industry meter data), meter tampering and consumption patterns in its network. Tamper-proof metering technologies easily bolster meter security and deter energy theft. With data from meters and other macro factors, cost reflective tariffs can be governed by the industry regulator benefitting all stakeholders.

Large scale metering is required to substantially address the chronic issue of estimated billing (often times resulting in unfair bills[13]). A regulatory Order has been issued on "capping" of retail estimated bills[14] chargeable to unmetered customers, for fairness to the customer as well as to encourage Discos to accelerate the deployment of meters. DISCOs (via MAPs and other means) should ramp up deployment to unmetered customers, with targeted focus on certain States with significant metering gaps. This of course includes marketing campaigns and value propositions presented to customers to accept metering solutions.

The strategic role played by downstream metering in the NESI is required to be structurally supported by changes in legislations, policies, and regulations. The new Electricity Act provides such framework. The Act dictates:

1. That Discos simultaneously meter every new customer connected to the distribution network.

2. That customers accept the installation of electricity meters duly certified by Nigerian Electricity Management Service Agency ("NEMSA") on their premises. Customers who refuse to comply with this provision are directed to be disconnected for the duration the supplier is refused access to the customer's premises. This regulatory requirement will facilitate a two-way handshake between suppliers and customers to guarantee seamless implementation of the metering drive.

3. The criminalization of energy theft. The Act puts regulatory weight on eliminating energy theft cases by making provisions to prosecute customers caught in any infraction.

Beyond the excerpts highlighting the role of metering, mass metering of downstream customers will spur investment in the NESI, unlock job opportunities, and lead to increased profitability for players within the industry.

Learning from India's metering milestones: insights for enhancing Nigeria's electricity distribution efficiency

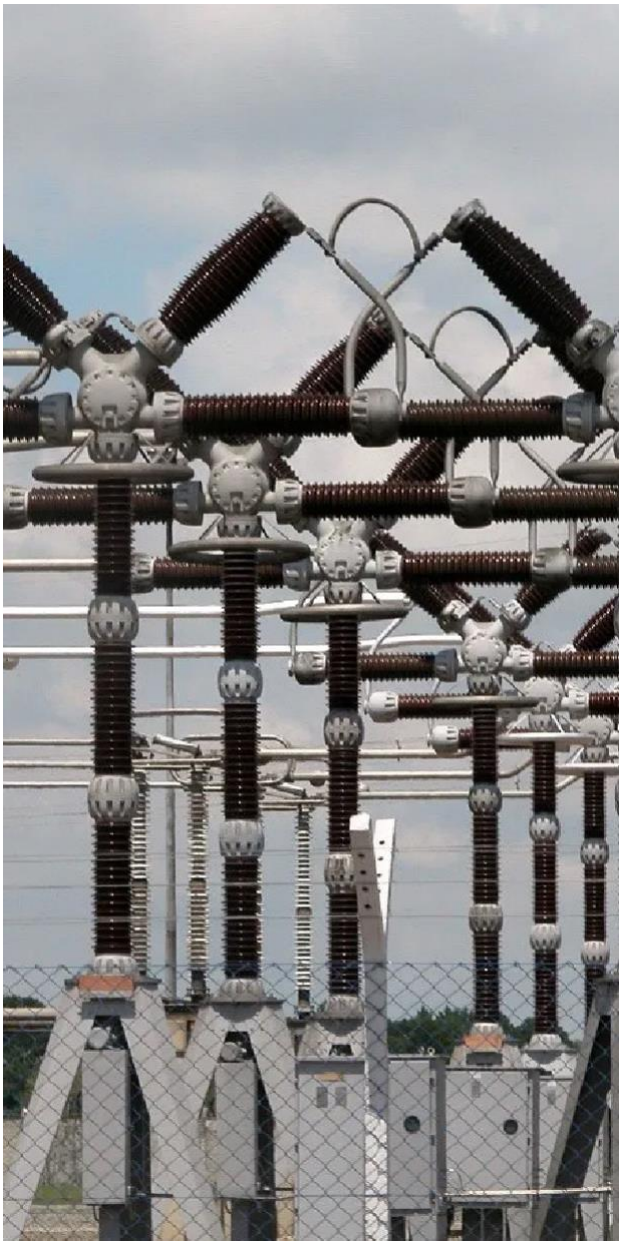
With a population of 1.408 billion[15] and an urbanization rate of 36%[16], India has successfully achieved an on-grid electrification rate of 96.7%[17] and metering of 93%[18] of grid-connected households. This rate of electrification and metering has enabled distribution companies in India to achieve a reduction in ATC&C losses, and increased levels of customer satisfaction. To enhance efficiency for power distribution companies, India continues to drive the adoption of smart metering technology with a total of 7.05 million installations as of August 2023 according to the National Smart Grid Mission dashboard[19]. Some policies and actions that charted an inspiring path toward greater metering coverage and associated operational improvements include:

1. **Launch of the Saubhagya scheme:** The Saubhagya scheme is among the leading global universal electrification initiatives. A key feature of this initiative includes the provision of free metered connection for economically poor households with the aim of providing last mile connectivity and electricity connection to all un-electrified households in rural areas[20].

2. **National Smart Grid Mission (NSGM):** The National Smart Grid Mission (NSGM) has proven the concept for the adoption of technology in power by conducting pilots focused on evaluating various aspects. These include the impact of smart metering on ATC&C losses, establishment of communication standards, assessment of consumer acceptance, and overcoming regulatory hurdles. Additionally, pilot programs were implemented to test services such as billing utilizing Advanced Metering Infrastructure (AMI), peak load management, power quality management, and outage management[21].

3. **Ministry of Power (MoP) Smart Meter National Programme (SMNP):** The initiative's objective is the replacement of the nation's 250 million conventional meters with Advanced Metering Infrastructures (AMIs). The Smart Meter National Programme (SMNP) is structured as a Build-Own-Operate-Transfer (BOOT) model, entrusting a private firm with implementation. As of November 2020, the implementing partner successfully deployed 1.45 million smart meters. Notably, the prepaid smart meter stands as a key element within the restructured Distribution Company Reform Scheme[22].

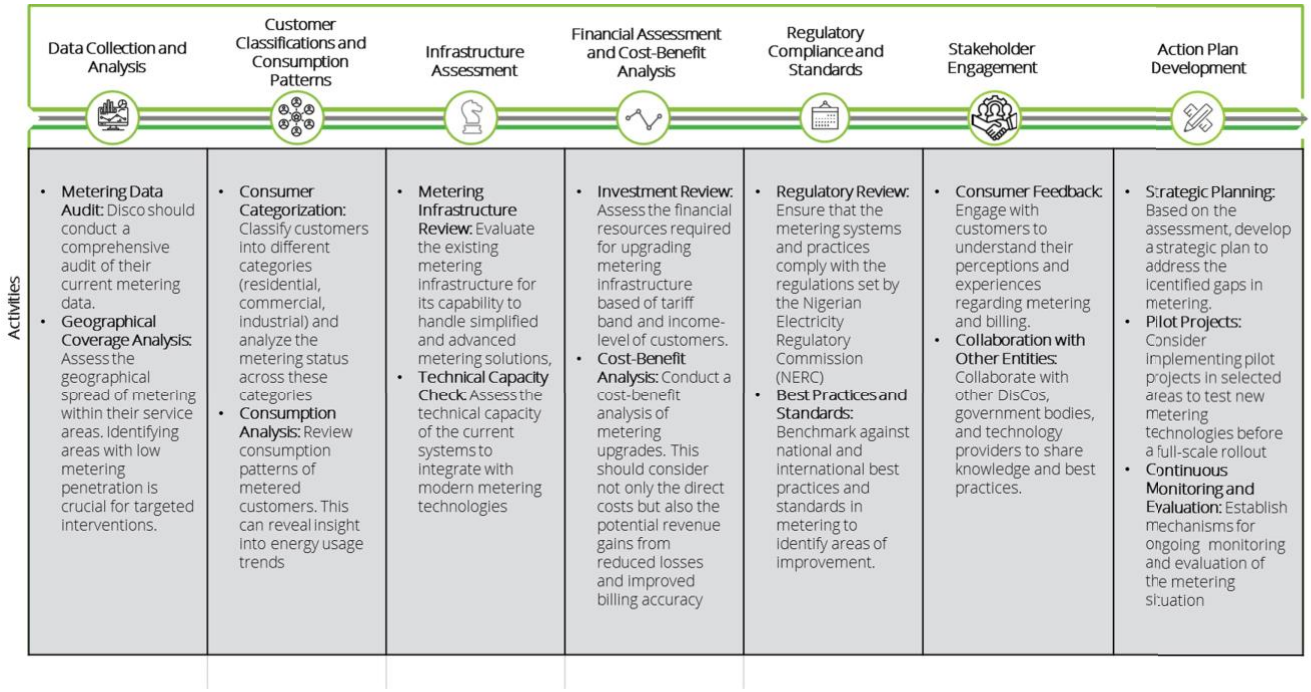
4. **Prepaid metering:** Widespread rollout of prepaid metering coupled with tamper-proof techniques to tackle illegal connections[23].



A step-by-step guide to reduce collection losses

For Distribution Companies (DisCos in Nigeria to effectively reduce collection losses, a critical first step is assessing the current metering situation. This assessment can be structured as follows:

FIGURE 1: APPROACH TO ASSESSING CURRENT METER SITUATION IN DISCOS



The insights gained from assessing the current metering situation is instrumental in guiding the development of tailored strategies to addressing the metering situation in Nigeria. These strategies may be effectively implemented through:

1 **Meter Deployment schemes:**

a. ***Targeted Deployment:*** Focusing on high-loss areas first. Using data analytics to identify where metering can have the most significant impact on reducing losses.

b. ***Partnerships with Meter Manufacturers:*** The Nigeria Electricity Act 2023 emphasizes the importance of accurate metering and fair billing, achieving this would require a public-private partnership such as the collaborating with meter manufacturers for consistent supply and potentially exploring opportunities for local meter production to reduce costs and ensure timely deployment.

c. Financing Models:

i. **Government-backed Financing:** Developing government-subsidized customer-friendly financing options, such as pay-as-you-go or subsidized meters, to accelerate deployment in lower income segments.

ii. **Consumer-backed Financing:** This approach allows consumers to pay for their meters over time through their regular electricity bills. It is form of financing that spreads the cost of the meter over several months or years, making it more affordable.

2 **Deeper Customer Engagement by DISCOs:**

a. ***Customer Education Programs:*** Educating consumers on the benefits of metering, energy conservation, and how to read and understand their bills.

b. ***Feedback Mechanisms:*** Establishing robust channels for customer feedback and complaints to build trust and address issues promptly.

c. ***Incentivizing Timely Payments:*** Offering incentives for timely bill payments and introducing flexible payment plans for outstanding bills.

d. ***Community Outreach:*** Engaging with community leaders and groups in high-loss areas to promote understanding and cooperation in the metering process.

3 **Technology Adoption:**

a. ***Data Analytics Tools:*** Using advanced data analytics to analyze consumption patterns, predict load, and identify areas of non-technical losses leading to enhanced customer segmetation, improved demand forecasting and identification of non-technical losses.

b. ***Mobile and Web-Based Platforms:*** Deploying customer-centric platforms for bill payments, monitoring usage, lodging complaints, and receiving notifications leading to improved transparency and trust.

c. ***Integration with Renewable Energy:*** Adopting technologies to integrate renewable energy sources efficiently into the grid, enhancing overall sustainability of the electricity supply system.

d. ***Smart Metering Technology:*** Implementing smart meters that provide real-time data, which helps in better load management, detects theft, and facilitates remote billing and disconnection for customers with high energy demand.

Effective meter deployment, enhanced customer engagement, and the adoption of modern technology are essential strategies to reduce collection losses in Nigeria's electricity sector. These initiatives require collaboration across various stakeholders, including government bodies, private companies, and consumers. Regular assessment and adaptation of these strategies will be crucial to their success in improving the efficiency and sustainability of the electricity supply industry in Nigeria.

Practical steps to implementation of metering strategies

1 Financing:

a. **Private Sector Investment:** Encourage private sector investment in metering infrastructure. This can be facilitated through public-private partnerships (PPPs) or other investment models such as equity investment, Build-Operate-Transfer (BOT).

b. **International Funding:** Explore international funding opportunities, such as loans or grants from development banks and international financial institutions. It is important to effectively monitor and report on the output, outcome and impact of such loans or grants.

c. **Innovative Financing Models:** Implement innovative financing models such as metering-as-a-service or pay-as-you-go systems, enforceable by regulation, allowing consumers to pay for their meters over time.

d. **Government Funding and Subsidies:** Leverage government funding and subsidies, especially for initiatives like the National Mass Metering Programme (NMMP). This requires collaboration with government agencies to access power sector focused fund by the federal government

2 Technical Training

a. **Capacity Building:** Collaborate with educational institutions or specialized training centers to build capacity in metering technology and grid management.

b. **Training Programs:** Establish twinning programs that pair institutions or regulatory bodies from countries such as Turkey, India with installation, maintenance, and operation of modern metering systems with those in need of support. This partnership approach allows for knowledge transfer and mentoring ensuring that metering practices are aligned with international standards and best practices.

c. **Certification and Standards:** Develop certification programs to ensure that technicians meet national and international standards in meter installation and maintenance.

3 Local Manufacturing and Supply Chain Development:

a. **Supply Chain Resilience:** Expansion of the existing Meter Asset Provider (MAP) to diversify supply sources for a resilient supply chain.

b. **Installation Scheduling:** Organize systematic installation schedules to ensure timely and effective deployment of meters across different regions.

c. **Monitoring and Quality Control:** Implement strict monitoring and quality control measures during the meter installation process to ensure compliance with technical standards.

The successful implementation of a plan to reduce collection losses in Nigeria's electricity sector requires a well-cordinated approach involving a seamless mesh among sound investment schemes, technical capacity, and efficient logistics systems.

Global trends on metering

Global trends in electricity metering are increasingly focused on technological innovation, sustainability, and enhanced consumer engagement. These trends indicate a move towards more intelligent, efficient, and user-friendly metering system, which play a critical role in the evolution of energy systems worldwide. Key global trends include:

a. Smart Metering: There's a significant shift towards smart meters, which provide real-time data on electricity usage. Smart meters facilitate better energy management, enable dynamic pricing, and are crucial for integrating renewable energy sources into the grid.

b. Internet of Things (IoT) Integration: IoT technology is increasingly being integrated into metering systems, allowing for remote monitoring and control, predictive maintenance, and enhanced grid management.

c. Advanced Data Analytics: With the influx of data from smart meters, there is a growing use of advanced analytics to optimize grid operations, improve demand forecasting, and enhance customer service.

d. Customer-Focused Solutions: Metering solutions are becoming more customer-centric, offering users detailed insights into their energy consumption patterns and helping them reduce their energy bills and carbon footprint.

e. Grid Modernization: As part of broader efforts to modernize electricity grids, metering is seen as a key component. This includes the deployment of meters that can handle bidirectional flows of electricity, crucial for systems with distributed generation like solar panels.

f. Regulatory Push for Upgrades: Many countries are implementing regulations to encourage or mandate the upgrade to smart metering systems, recognizing their benefits in terms of efficiency, sustainability, and grid reliability.

g. Energy Theft Reduction: Advanced metering infrastructure helps in combating energy theft, a significant issue in many regions, through improved monitoring and tamper detection.

h. Interoperability and Standardization: There is an increasing focus on developing meters and systems that are interoperable and adhere to international standards, facilitating easier integration and scalability.

i. Sustainability and Environmental Concerns: Metering is also being tailored to address environmental concerns, with an emphasis on reducing energy waste and supporting the transition to renewable energy sources.

Stakeholder engagement is key to addressing the metering gaps in the NESI

The role of government policies and support in Nigeria, particularly in the electricity sector, is central to driving improvements and addressing existing challenges. Government involvement typically includes financial subsidies, investment facilitation, and regulatory support essential for creating a stable and efficient electricity market that drivies economic growth and ensuring environmental sustainability.

Educating consumers is another important factor inaddressing the metering gap

The importance of consumer education and community involvement cannot be overemphasized, particularly within the framework of Nigeria's evolving energy landscape, cannot be overstated. Engaging consumers is necessary for awareness and understanding, behavior change (specifically around and energy conservation), feedback and accountability, and policy support.

Conclusion and call to action

The journey to revamping Nigeria's electricity distribution landscape is both challenging and promising. A comprehensive approach, encompassing accurate metering, stakeholder engagement, strategic partnerships, and leveraging technology, holds the key to unlocking the sector's vast potential. By addressing the metering gap, engaging customers effectively, and adopting advanced technological solutions, DisCos can significantly reduce collection losses and improve service delivery.

The implementation of these strategies is not just a pathway to improved efficiency and revenue generation for Distribution Companies (DisCos) but also a step towards sustainable economic growth for Nigeria. Enhanced reliability and transparency in electricity supply will not only foster trust among consumers but also attract much-needed investments, both local and international, into the sector.

Outlook for the future

Looking ahead, if positive steps are implemented effectively, the future of Nigeria's electricity supply industry is bright. We envision a landscape where energy is not only abundant and reliable but also efficiently managed and sustainably sourced. This transformation will contribute significantly to the nation's economic development, making Nigeria a more attractive destination for investment and innovation in the energy sector.

Call to action

To achieve this vision, concerted efforts from all stakeholders are crucial.

a. **Government Bodies:** We call upon government agencies to continue and enhance their support through favorable policies, funding, and regulatory frameworks that encourage innovation and investment in the electricity sector.

b. **Private Sector:** We urge private entities to seize the investment opportunities presented in the sector, particularly in the areas of technology, financing and infrastructure development.

c. **International Partners:** We invite international partners and financial institutions to collaborate in this transformative journey by providing technical and financial support where necessary.

d. **Local Communities and Consumers:** Engage actively in the initiatives put forth by DisCos and the government. Participation and feedback are invaluable in shaping a more efficient and customer-centric electricity supply industry.

e. **DisCos:** Continue to innovate, collaborate, and prioritize the needs of customers. Embrace new technologies and efficient practices to drive the sector forward.

[1] Electricity Act 2023
[2] US Agency for International Development (USAID), 2022.- https://pdf.usaid.gov/pdf_docs/PA00Z7NS.pdf
[3] All On, 2017-https://www.allon.com/media/publications/_ jcr_content/par/textimage_284420566.stream/1513077569229/633c8eee26fd508ff930708bba6fbd9c3d1bc594/2017-needs-assessment2.pdf
[4] https://www.vanguardngr.com/2024/01/power-supply-fails-to-improve-10-years-after-privatization/
[5] NERC Third Quarter 2023 report, pg. 53
[6] NERC Third Quarter 2023 report, pg. 53
[7] https://www.mondaq.com/nigeria/government-contracts-procurement--ppp/1024824/national-mass-metering-programme-nmmp#:~:text=It%20means%20National%20Mass%20Metering%20Programme.%20It%20is,Manufacturers%20%28for%20the%20manufacturing%20and%20assembling%20of%20meters%29.
[8] https://www.bloomberg.com/news/articles/2024-01-30/usd-ngn-naira-devaluation-sees-nigeria-s-currency-plunge-to-record
[9] NERC Third Quarter 2023 report, pg. 55
[10] https://punchng.com/discos-plan-to-close-8-1-million-metering-gap-in-18-months/#:~:text=Oduntan%20said%20the%20first%20phase%20of%20the%20NMMP,the%20homes%20and%20businesses%20of%20unmetered%20power%20users.
[11] NERC Third Quarter 2023 report, pg. 35
[12] NERC Third Quarter 2023 report, pg. 59
[13] NERC Fourth Quarter 2022 report
[14] https://nerc.gov.ng/index.php/library/documents/NERC-Orders/Amended-Orders-on-the-Capping-of-Estimated-Bills/
[15] World Bank 2021
[16] World Bank - Rural population (% of total population) – India (https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=IN)
[17] CEEW, State of Electricity Access in India: Insights from the India Residential Energy Survey (IRES) 2020, pg. 17
[18] CEEW, State of Electricity Access in India: Insights from the India Residential Energy Survey (IRES) 2020, pg. 31
[19] Power Line, Technology Upgrades: Smart metering trends and outlook, November 2023
[20] Government of India, Ministry of Power (https://powermin.gov.in/en/content/saubhagya)
[21] RMI India, Turning around the power distribution sector 2021, pg. 33
[22] RMI India, Turning around the power distribution sector 2021, pg. 33
[23] RMI India, Turning around the power distribution sector 2021, pg. 35

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