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FG TARGETS ADDITIONAL 7000MW AS IT EXPANDS AND UPGRADES CRITICAL TRANSMISSION INFRASTRUCTURE

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By Joy Egbase

n the bid to attain 7000MW electricity in the grid, the Federal Government has through the Presidential Power Initiative (PPI) commenced the expansion and upgrade of the nation's transmission and distribution critical infrastructure.

The Honourable Minister of Power, Engr. Abubakar Aliyu FNSE made this known while marking his first 50days in office, on Wednesday, 27th October 2021, in Abuja.

According to him, the first phase of the PPI is the upgrading and expansion of vital infrastructure of the Transmission Company of Nigeria (TCN) and the Distribution Companies (DisCos) to achieve the 7,000MW target, adding that the selected contractors would soon be contacted officially so that work on the identified projects could commence.

The Minister disclosed that the Ministry of Power would focus on addressing the issue of liquidity in the NESI, improving services in terms of hours of supply, billing transparency and accuracy, and wider access to electricity while bringing consumer, operator and investor confidence back to the sector to attract foreign and local investment. He also gave an update on some projects that have recently come on stream or on-going to boost generation capacity.

In his words, "Kashimbilla 40MW power station has already started generating power into the national grid. Gurara phase 2 being developed in partnership with the Ministry of Water Resources will soon be ready to deliver 30MW to the grid. Zungeru Hydroelectric Power Project is progressing towards completion next year to deliver another 700MW of renewable power.

He also stated that the Katsina wind farm, with a full capacity of 10MW, is already generating and feeding part of its capacity to the grid. The Dadin Kowa 40MW Power Station has also started generating power into the national grid under a concession arrangement with a private sector investor while outstanding regulatory and Power Purchase Agreement issues were being addressed.

The Mambilla Hydroelectric Power Project was contracted in 2017. The Minister disclosed that discussions aimed at resolving encumbrances preventing the full take-off of the project were ongoing. TCN's Transmission Rehabilitation and Expansion Programme funded by various multilateral financial institutions to ensure adequacy and stability of the national grid are part of systematic implementation of the Presidential Power Initiative (PPI) of this administration, he said.

Engr. Aliyu further stated that Government was reinvigorating important policies and regulations, especially the Eligible Customers and related regulations that would move the electricity industry from the present interim commercial structure to full commercial structure in compliance with sections 25 and 26 of the Electric Power Sector Reform Act 2015, whereby consumers contract for better services directly with willing GenCos and service providers that are ready to make new investments to deliver quality services.

He also remarked that the Nigerian Electrification Roadmap (NER) was a partnership aimed at expanding Nigeria's electricity generation capacity from the current average output of 4,500MW to 25,000MW. He expressed optimism that NER will succeed because its partners, including Siemens were reputable power companies.



Engineers on site at the collapsed 21 storey building in Lagos

Aliyu Tasks Nigerian Engineers on Standard Professional Practice

By Uloma Osuagwu

n the wake of increasing incidence of building collapses in the country, the Honourable Minister of Power, Engr Abubakar D. Aliyu, FNSE, has called on Engineers, especially those in the building sector, to be proactive and ensure standard operations in the discharge of their duties.

The Minister made the call when the Deputy President/ President-elect of the Nigerian Society of Engineers (NSE), Gidari-Wudil, paid him a courtesy visit in his office on Monday, 22nd November 2021.

Speaking against the backdrop of recent building collapses, the Minister said that the Government was making

investments in infrastructure where engineers are critical stakeholders.

Engr. Aliyu, while congratulating the NSE President-elect, reminded him of

"...he synergizes with Government, to help curb further calamities occasioned by infrastructural defects by applying professionalism through proper procedures and specifications." the enormous responsibility bestowed on him as the President and advised that he synergizes with Government, to help curb further calamities occasioned by infrastructural defects by applying professionalism through proper procedures and specifications.

Responding, the President-elect assured the Minister that the Nigerian Society of Engineers under his watch would be proactive and up and doing, adding that the Society will work closely with the Council for the Regulation of Engineering in Nigeria (COREN) and other relevant bodies to ensure observance of professionalism due to the strategic nature of the engineering profession.

Chairman House Committee on Power, TCN Management, Inspect 2x40MVA, 132/33kV Walalambe Substation

By Grace Sambo-Jauro



R-L; Chairman, House Committee on Power, Honourable Magaji Da'u Aliyu, Honourable Nassir Ahmed Ali representing Nasarawa Federal Constituency and Ag. MD/CEO, TCN Engr. Dr Sule Abdulaziz

he Chairman, House Committee on Power, Honourable Magaji Da'u Aliyu, alongside Honourable Nassir Ahmed Ali representing Nasarawa Federal Constituency and Ag. MD/CEO, TCN Engr. Dr. Sule Abdulaziz have inspected the ongoing construction work at 2x40MVA 132/33kV Transmission Substation in Walalambe, Kano State, to ascertain the progress of work in the Substation.

The Chairman expressed dissatisfaction with the level of progress of work since his last visit to the substation nine months ago, and sought to know the challenges that have delayed the timely completion of the project.

He reiterated the importance of the substation to Kano State as a whole when completed and called for the speedy completion of the project. Hon. Aliyu pledged his support to assist TCN in fast-tracking work on the substation, which may include assisting TCN engineers take over and complete the project. He restated the support of President Muhammadu Buhari's administration towards completing projects such as this across the country and assured TCN of National

Assembly's support in such cases.

In his response, the Ag MD/CEO, TCN, Engr. Dr. Sule Abdulaziz, revealed that work on the substation was stalled by the contractor, and lack of funds, until recently when TCN Management reviewed the contract. He explained that the new procurement process was almost completed and that within a fortnight, TCN would award the completion of this substation to another contractor. According to him, "we have already done preprocurement, we have about 120 contractors that were pre-qualified; once the procurement process is completed, we will re-award the contract", he said.

The MD/CEO said that the alternative for TCN was to obtain approval for funds from the Service Level Agreement (SLA), which is an interface between the Transmission Company and the DisCos, especially as the substation has been listed among the projects to be addressed under SLA.

He then appealed to the law makers to liaise with the distribution company supplying the area to make provision for new feeders as the area has become densely populated. "This area is highly built so getting the feeders out after the completion of the project is another challenge. At the time we acquired the land in 2005, all these houses were not built. The distribution company will also have to figure out how they are going to radiate their feeders from this station", he said.

Speaking, Hon. Nassir Ahmed Ali, the Honourable member representing Nasarawa Federal Constituency where the project is located, commended Engr. Abdulaziz and his team for their efforts on the project, and noted that the speedy completion of the project will not only improve power supply, but also boost socio-economic activities in the area.

The completion of the 2X4OMVA 132/33kV transmission substation is expected to boost electricity supply to communities such as Walalambe, Hotoro and parts of Katsina and Jigawa States.

The site visit was on Monday 18th, October 2021.

Speaking, Hon. Nassir Ahmed Ali, the Honourable member representing Nasarawa Federal Constituency where the project is located, commended Engr. Abdulaziz and his team for their efforts on the project, and noted that the speedy completion of the project will not only improve power supply, but also boost socio-economic activities in the area.



Ongoing construction work at the site of the 2x4OMVA ,132/33kV Transmission Substation in Walalambe, Kano State,

AfDB Engages TCN on Nigeria Transmission Expansion Project

By Eric Ephraim Ene



cross section of AfDB and TCN management team during the meeting

he African Development Bank (AfDB) has indicated readiness for more participatory intervention in the Power Sector in Nigeria, for improved service delivery.

The Bank made this known when the Vice President, Power, Energy, Climate and Green Growth, Dr. Kevin Kariyuki led a delegation from the Bank on a fact-finding visit to TCN Corporate Headquarters, Abuja on Friday, 22nd October 2021.

Speaking during the visit, Dr Kariyuki stated that the more participatory a process was, the greater the ownership

of the process and invariably better outcomes. He acknowledged the critical role the transmission system plays in the Nigeria power value chain and requested TCN to identify challenges confronting the Company in areas such as evacuation capacity, system losses and in particular, interface issues with the Distribution Companies (DisCos) for possible intervention by AfDB.

According to him, the interface relationship with the DisCos was essential in ensuring that the consumers were efficiently serviced and that revenue or cash flow was available to meet the financing of projects in the value chain.

Dr. Kariyuki further requested for updates on ongoing projects, especially those encapsulated in the Transmission Rehabilitation & Expansion Programme (TREP), and the Nigerian Transmission Expansion Project (NTEP I & II). In his words "we will love to hear any challenges so far associated with the programmes and likely timeline for the launch of the projects as we understand there is a significant crossover".

Responding, the Acting Managing Director and Chief Executive Officer of TCN, Engr. Dr. Sule Abdulaziz restated TCN's commitment to planned systematic expansion of the nation's transmission grid through the implementation of the Nigerian Transmission Expansion Project (NTEP I and II). He commended the AfDB for the approval to construct sub-stations for the project, and noted that the approval for the transmission line was being expected from the Bank for work to commence. 'We have gotten approval for the sub-stations but for the lines, it has taken a long time. We have not received anything from AfDB" he said.

He promised to come up with a list of projects that TCN would want the AfDB to invest in with priority given to the proposed construction of Double Circuit transmission lines from Bauchi through Jigawa to Kano.

On his part, the Executive Director, Independent System Operations (ISO), Engr. Maman Lawal, while responding to the question of DisCos' capacity to take the load wheeled by TCN, noted that the performance of DisCos has not been adequate, based on their inability to evacuate load available to them at the "...lauded TCN for its ability to meter all DisCos and used the occasion to appeal to all market participants to comply with its obligations to ensure flow of liquidity."

distribution load centers across the country. Engr. Lawal, disclosed that transmission losses have been reduced substantially as the Transmission Service Provider (TSP) has been able to surpass the given threshold of 8.05%.

Speaking also at the occasion, the Executive Director, Transmission Service Provider (TSP), Engr. Victor Adewumi, explained that security measures had been put in place by TCN to checkmate vandalism of TCN equipment.

On his part, the General Manager, Programme Coordination in TCN, Engr.

Joseph Ciroma, gave a detailed breakdown of various interventions by donor agencies for the development of transmission infrastructure in Nigeria, indicating allocated fund from each agency. He stated that the total allocated funds from donor agencies was \$1.6billion, out of which only \$1.1b has been made available for the execution of projects. On NTEP 1 projects, he disclosed that environmental issues have been concluded, with the Federal Government provision in the 2021 Appropriation Bill to take care of environmental issues.

Contributing to the discussion, the Market Operator, Engr. Edmund Eje informed the AfDB team that though the GenCos and DisCos signed Service Level Agreements (SLA) to improve their capacity and networks during the privatization process, DisCos have been unable to meet up with the requirement of TCN Market Rules. He, however, lauded TCN for its ability to meter all DisCos and used the occasion to appeal to all market participants to comply with obligations to ensure flow of liquidity.



Participants at the meeting

Energy Commission of Nigeria Seeks Better Understanding of TCN Operations

By Jumoke Dare



L-R; DG ECN, Prof. Eli Jidere Bala, ED ISO, TCN, Engr. Maman Lawal and GM, R&D, Dr. Tom Inugonum

he Energy Commission of Nigeria (ECN) is a body set up by the Federal Government to provide strategic plans and coordinate national policies in the energy sector in Nigeria. In furtherance of this mandate, the Director-General of ECN, Prof. Eli Jidere Bala led a Management delegation to TCN on a mission to have first-hand knowledge about TCN's operations, to enable the Commission update its policies as it relates to agencies and stakeholders.

Receiving the delegation on behalf of the Ag. MD/CEO Engr. Dr. Sule Abdulaziz on 12th November 2021, the Executive Director ISO, Engr. Maman Lawal expressed appreciation for the initiative of ECN, describing it as the requisite synergy that can drive the industry going forward. He assured the visiting team that TCN would always welcome such collaborative efforts that aim at enhancing the attainment of it's mandate, as well as improvement in the power sector generally. He thanked the delegation for the initiative they took in acquainting themselves with the activities of TCN, especially at the present time when TCN is striving to increase grid capacity and reduce technical losses in its operations, to ensure that the core objectives for which TCN was established were achieved.

Responding, the Director-General of ECN, Prof. Eli Bala said that the visit was

aimed at getting to know more about TCN as one of the major stakeholders in the power sector and also monitoring the performance and challenges associated with its operations.

The General Manager, Research & Development, Dr. Tom Inugonum presented an overview of TCN and its activities and afterwards led the visiting team to the Katampe 330/132kV Transmission Sub-station, Abuja, for first-hand exposure to the practical aspect of TCN's operations. The Principal Manager, System Operations of the Katampe

Sub-station, Engr Thomas Oladeji-Ojo conducted the DG and his team around the facility and explained TCN's operations and challenges from the substation perspective including its

> "...TCN would always welcome collaborative efforts that aim at enhancing the attainment of it's mandate, as well as improvement in the power sector generally."

operations in connection with the National Control Centre (NCC) Osogbo and its relevance to the supply of power to Abuja and the nation at large.

Prof. Eli Bala applauded the technical expertise demonstrated by TCN engineers who took them on the tour of the facilities, remarking that such expertise was a clear attestation of TCN's capacity to execute its mandate. He further commended TCN Management for the milestones achieved so far, despite the challenges encountered as it strives to ensure the full actualization of its mandate.



ECN and TCN team at the 33O/132/33kV Katampe Transmission Substation, Abuja

Ghana Firm Seeks Collaboration on New Ways to Tackle Electricity Challenges

By Joy Egbase

s the implementation of the West African Programme for regional inter-connectivity for the expansion of cross border electricity trade and integration of cooperative approaches to addressing electricity challenges in the West African sub region intensifies, Volta River Authority (VRA), the Ghanaian utility for power generation and operator of the national energy supply grid recently visited TCN to seek further collaboration with the Transmission Company of Nigeria (TCN).

The team, led by the Manager, Strategy and Planning Department, Mr. Clement Boakye, sought to understand specific aspects of the Nigerian Power sector and explored the possibility of experience sharing and knowledge exchange between the two regional utilities.

According to him, "We believe that the two systems even by virtue of interconnection are similar and we would want to look at some of the things that you have overcome and see what we can learn and possibly, also share some of the things we have been able to overcome"

In his response, the Ag. Managing Director of TCN, Engr. Dr. Sule Abdulaziz welcomed the team and commended the initiative of VRA, assuring them of TCN's preparedness to share from their common experiences as critical stakeholders of the power sector in West Africa. He added that TCN engineers would assist them with all necessary information concerning Nigeria's transmission system and answer their questions on the Generation and Distribution companies in Nigeria. He commended VRA's efforts to seek information to further improve their operations.

Arrangements were made to ensure that the team from the VRA were able to readily access the information they required from TCN. In attendance at the meeting were the Executive Director, Transmission Service Provider (TSP), Engr. Victor Adewumi, Executive Director, Independent System Operations, Engr. Maman Lawal, Market Operator, Engr. Edmund Eje, General Manager, Public Affairs, Mrs. Ndidi Mbah, and the Technical Adviser to the Ag. MD/CEO, Engr. Aminu Tahir.



Volta River Authority and TCN team



L-R; Ag. MD/CEO TCN, Engr. Sule Abdulaziz and MD Ashaka Cement, Mr. Ibrahim Aminu

ASHAKA CEMENT SEEKS TCN SUPPORT FOR STABLE POWER SUPPLY TO THE COMPANY By Stanford Nucli

nadequate power supply has remained the bane of the manufacturing industry in Nigeria. Companies affected by this unfavorable situation have adopted varying strategies to deal with the power supply challenge. In continuation of efforts to address the power situation as it affects Ashaka Cement Company, its Management paid a courtesy visit to TCN at its Corporate Headquarters in Abuja recently to explore ways the company could have more stable supply from the grid.

The Ashaka Cement team led by its Managing Director Mr. Ibrahim Aminu met with TCN Management to make a case for improved power supply to the company and by extension, the North East region. He said that as the largest manufacturing industry and also the highest company taxpayer in the North East, the company has not been able to operate optimally due to unstable power supply.

In his response while receiving the delegation, Engr. Dr. Sule Abdulaziz, the Ag. MD/CEO of TCN disclosed that major projects were being undertaken in the North East to improve bulk electricity transmission and assured the team of stable supply of power to the company as soon as the projects were completed. He further disclosed TCN's plan to install a new power transformer as soon as funds were available, to boost bulk power supply in the area and invariably to the company.

The MD remarked that Ashaka Cement

was a very important stakeholder that provides employment to a large number of Nigerians which is a focus of the Muhamadu Buhari Administration, and promised that TCN would go to great length to ensure adequate supply to the cement company for it to operate more profitably to the benefit of Nigerians.

Speaking in the same vein, the Executive Director, Transmission Service Provider, Engr. Victor Adewumi, further explained that part of the supply challenge in the North East was voltage disparity which is due to the long stretch of the transmission line. He said the situation was bound to improve with the installation of a reactor around Jos and Makurdi lines to increase voltage profile and reduce voltage spike and surge.

We are certain that the Grid will be more Reliable with SCADA Applications in place

-Engr. Maman Lawal



Engr. Maman Lawal

The ED (ISO) Engr. Maman Lawal is in charge of System and Market Operations and as the year comes to an end, the Transmission News crew sought to hear from the man who wears the cap of the System Operator on achievements of ISO as a Business Unit in TCN and how the unit has fared in the power sector. Excerpts;

Achievements in 2021:

The grid recorded an All-time Peak Generation and Maximum Daily Energy ever attained within the year. Peak generation was 5,801.60MW on 01/03/2021 while the maximum daily energy of 119,471.15MWH was recorded on O5/O3/2O21. This is also a year where TCN recorded the least number of system collapses - 2 partial and 2 total.

Impact of SLA on relationship with the DisCos:

Service Level Agreement (SLA) is an agreement between TCN and DisCos, designed by the Nigerian Electricity

Regulatory Commission (NERC) to improve electricity delivery to end users. Because the SLA attempts to address TCN/DisCos interface challenges, the two companies have held several meetings, workshops, seminars and other consultative sessions to discuss factors hindering adequate supply along the value chain. This has created better synergy between the power utilities. Recently, a workshop was organized by the Association of Nigeria Electricity Distributors (ANED) in conjunction with National Power Training Institute of Nigeria (NAPTIN) to discuss Protective Relay Coordination, Operations and other

related network challenges. The collaborative workshop was successful and a resolution to form committees to resolve the problems was reached. Notwithstanding the gains, room still exists for further consultations and improvement.

Update on SCADA and Communication:

Evaluation for procuring a consultant for the Supervisory Control and Data Acquisition (SCADA) project has been completed while evaluation for Engineering Procurement and Construction (EPC) contractor is almost concluded. The importance of SCADA/EMS with robust telecommunication network cannot be over emphasized.

Reactivation of SCADA equipment:

We are certain that the grid will be more reliable with the Supervisory Control and Data Acquisition (SCADA) Applications in place. This is why our in-house engineers carried out the reactivation of moribund SCADA equipment, restoration of Remote Terminal Units (RTUs) using Virtual Private Network (VPN) and capturing of critical lines using Internet of Things (IoT) to improve grid visibility at National Control Center (NCC) for effective monitoring and supervision. Due to recent technology, all our stations are equipped with GSM lines of different network services, while consultants were used in activation and re-latching of some Optical Ground Wire (OPGW) in improving our communication network.

It is pertinent to state here that quality of power system parameters – frequency and voltages have improved considerably which has reduced the number of stations equipment damage across the network, compared to previous years where numerous transformers and associated equipment either caught fire. Finally, our staff are given modern on-the-field training that enhances their performance.

Request: More on TCN's Use of Network Automation System

Network Automation System (NAS) is the use of a software for network management. In TCN, we deployed it as a stop gap solution to improve grid monitoring and transmission of data to the National Control Centre. Of course you know that it involves deploying Internet of Things (IoT) solution and use of Virtual Private Network (VPN) using GSM provided by commercial telecommunication providers.

We have deployed this system to mitigate the absence of Remote Terminal Units at the stations that were not captured in the last SCADA World Bank Project of 2004 and those that use Substation Automation System which are proprietary in design and could not be integrated with the existing SCADA System.

Basically, the SCADA System for grid control and operation is a complete network automation and information system that performs real-time monitoring and control by using telemetries acquired from remote stations, consisting of specialized power system operational and information technology hardware and software used at the Master Station and Remote Stations.

Management of the grid involves control at different levels in order to

ensure grid security and stability. Such controls like Automatic Generation Control which involves a real-time interaction of the SCADA System algorithm at the Master Station with a Plant or Generator at a Power Station, Ancillary services activation and automatic load shedding which define the control level (primary, secondary, tertiary) operations of the grid which is obtainable in Transmission Service Provider (TSP) or Independent System Operation (ISO) of many countries.

We believe that the function of the stop-gap solution will provide some data that will enable us have insight on the situation of the power flow of the grid even though it cannot compete with SCADA effectiveness.

Market Operations

Recall that earlier remittances to the service providers had improved tremendously through dexterous application of the Market Rules by the Market Operator. Presently, modern software are being procured to enhance the efficiency of billing and market settlement.

Training:

Several trainings (Technical and Management) took place within the year and more are still on going. The trainings are TCN and World Banksponsored. Benefits of training the staff are more significant to the sustainability and smooth running of the grid. TCN customises the trainings to meet the specific needs of our goals and objectives.

Transfer of skills is enhanced because staff would have an immediate link between the training exercise and their actual work as this are customized to suit TCN equipment/machines and installations.

TCN staff will contribute to the efficiency and effectiveness of production processes since they would have acquired sound/new theoretical background and hands-on practical knowledge. The training likewise promote consistency of approach within the TCN as all staff are working through the same issues, with the same organizational emphasis and direction.

Outlook for next year on grid performance:

TCN aims to achieve zero system collapse, wheel power of high-quality values, have a robust functional SCADA and with the cooperation of all stakeholders attain highest peak of load and generation.

Advice to the participants in the sector:

To collaborate in achieving our primary goal irrespective of our professional background and work as a team in order to attain targeted a milestone.



FOCUS ON Kaduna Region

By Maimuna Isah-Laden



Kaduna Regional Office

he Kaduna Regional office is located along Kaduna Airport Road in the Mando area of Kaduna Metropolis. The Region covers: Kaduna, Zamfara, and Kebbi States, and a part of Niamey in Niger Republic.

Kaduna Region is made up of Kaduna Sub – Region, Birnin Kebbi Sub– Region, and Gusau Work Centre. The substations in the region include the 33O/132/33kV Kaduna Substation, 132/33kV Kaduna Town Substation, 132/33kV Zaria Substation, 33O/132/33kV Birnin Kebbi Substation, 132/33kV Sokoto Substation, 132/33kV Funtua Substation, and 132/33kV Talata– Mafara Substation.

In 1973, the 33O/132/33kV Kaduna Substation was upgraded with a 15OMVA 33O/132/22kV transformer. In 1983, another 15OMVA 33O/132/22kV, was commissioned at the 33O/132/33kV Mando Substation in Kaduna. Again, in 2010, a 90MVA 33O/132/33kV was installed at the Mando Substation. In 2010 one number 150 MVA 330/132/33kV transformer was also commissioned at the Mando 330/132/33kV Substation in Kaduna by the then President Goodluck Ebele Jonathan. These upgrades brought the transformer capacity of the region to 540MVA.

With the growing population and increasing demand for power supply in Kaduna State and environs, in the year 2018, under the administration of President Muhammadu Buhari, a 150MVA 330/132/33kV transformer was installed bringing the total capacity of the Mando Transmission substation to 690MVA.

After the Kano Sub-Region was upgraded and given a regional status, the Birnin Kebbi Sub- Region was merged with the Kaduna region, bringing the total capacity of the region to 1020MVA. The Birnin Kebbi Sub-Region has two 90 MVA 330/132/33kV transformers, installed in 1976 and 2006 respectively, while a 50MVA 132/33kV transformer was added to the substation in 2013.

Kaduna Region interfaces largely with Kaduna Electricity Distribution Company (KAEDCO), but also interfaces with the Kano Electricity Distribution Company (KEDCO) through the 132/33kV Funtua Substation.

The Regional Transmission Manager, Engr. Aminu Haruna under the Transmission Service Provider Unit and the Regional Operations Manager Engr. Akanle. S. Olusola under the Independent System Operators (ISO) Unit of TCN both run the Region. The region has a combined staff strength of two hundred and seventy-two (272) persons.

Transmission installations including substations, towers, and lines in the Kaduna Region have undergone a series of upgrades to meet the ever-increasing demand of the rapidly growing population of Kaduna, Zamfara, and Kebbi States.

PROJECTS

TCN has completed a lot of projects in Kaduna Region recently. The completed projects include:

•The reconductoring of 132kV double circuit Mando-Kaduna Town T/S to increase its wheeling capacity from 120MW to 240MW.

o Installation of 2x6OMVA 330/132/33kV transformer and associated 3 number feeders in Power Station, Kakuri, Kaduna State.

o Installation of 150MVA 330/132/33kV transformer in 330/132/33kV Kaduna Sub-Station in Mando, Kaduna State.

o Installation of 1X6OMVA 132/33kV transformer and associated 3 number feeders at the Zaria 132/33kV Sub-Station, Kaduna State..

o Installation of 1X6OMVA 132/33kV transformer in 132/33kV Sub - Station in Gusau, Zamfara State.

o Installation of 1X 60 MVA 132/33kV transformer in Funtua Sub- Station, Katsina State.

o Installation of 1X4OMVA 132/33kV transformer in Zaria Sub- Station, Kaduna State.

TCN has a lot of projects that are still ongoing in Kaduna region to boost wheeling capacity. These projects include:

LOCATION

PROJECT

Kaduna 330/132/33kV

The construction of 330kV double circuit line from Kaduna to Jos. The project has reached 90% completion stage.

Kudenda Power Station;	Construction of 132kV double circuit line from Kudenda power station Mando. The project has r e a c h e d 75% completion.
Kaduna 330/132/33kV Substation	Construction of132kV bay Extension. The project has reached 98% completion.
Kaduna 330kV Line	Construction of new 33OkV 204km DC CCT Quad Conductor Transmission line from Mando to Rimin Zakara, Kano State.
Zaria 330/132/33kV Substation	1.5km turn in- turn out at the new Zaria 330/132/33kV Substation.
Millennium city Substation	10km turn in- turn out at 330/132/33kV Millennium City, Kaduna.
Jaji 132/33k Substation	1km turn in- turn out at 132/33kV Jaji Sub- Station.

Rigasa Substation

2.5km turn in, turn out at Rigasa Substation.



Kaduna – Jos 330kV double circuit transmission line

ENCROACHMENT

There are several cases of encroachment on transmission lines Right of Way (RoW) in areas such as Barakallahu, Rigasa, and many other communities within the Region. This has continued despite several meetings with community leaders to draw attention to the inherent dangers of erecting structures under high tension power lines.

Most of the culprits claim to be the owners of the land while others simply say that they have nowhere else to go. This is in spite of the fact that community leaders and original landowners were adequately compensated before the erection of transmission structures on the affected areas.

IN-HOUSE CAPACITY

TCN engineers in Kaduna Region have installed/repaired several transformers in the Region. Some of the recent installations include the 60MVA 132/33kV transformer in Gusau Substation, Zamfara State, installation of a 60 MVA 132/33kV transformer in Funtua Sub-Station, Katsina State, installation of 40MVA 132/33kV transformer in Zaria Sub-Station, Kaduna State, among others.

Other jobs carried out by the Region are:

Replacement of shattered 330kV Shiroro 1 red phase Circuit Breaker, installation of 110Volt and 50Volt direct current battery banks, resuscitation of burnt 60MVA 132/33kV transformer, and Installation of 132kV Current Transformer on 60MVA 132/33kV transformer at Mando Substation, Kaduna.

Replacement of 33kV Circuit Breaker on 33kV Hanwa feeder, and installation of a new set of 33kV Voltage Transformer on 40MVA 132/33kV transformer at Zaria Substation, Zaria. Also, installation of a new protection and control panel for 60 MVA 132/33kV transformer at Kaduna Town Substation.



Engr. Aminu Haruna, RTM, Kaduna Region



Engr. Akanle. S. Olusola, ROM, Kaduna Region

Transfer of protection from old to the new control room at Gusau.

Installation of 110volt Direct Current battery bank at the power station and installation of 132kV Circuit Breaker on 150MVA 330/132kV transformer at Birnin Kebbi Substation among others.



THE MARKET RULES IN RELATION TO THE SERVICE LEVEL AGREEMENT(SLA)

BY MRS JOY A. AMEH (SM) Regulation, Compliance & Market Dev. Dept. ISO

Market Rules

Market Rules" is a regulatory instrument designed to establish and govern efficient, competitive, transparent and reliable market for the sale and purchase of wholesale electricity and Ancillary Services in the Nigerian Electricity Supply Industry as approved by the President.

Market Rules Set out responsibilities of Market Participants, including the Transmission Service Provider (TSP), System Operator (SO), Market Operator (MO) in trading, co-ordination, dispatch and contract nomination, pricing of imbalances, ancillary services, metering, settlement and payments. Specifically the Market Rules :

- o Set out the operation and pricing system of the balancing mechanism
- Establish a market governance mechanism and a market monitoring system
- Provide a framework for resolution of disputes amongst TSP, MO, SO and Participants on matters relating to the Market Rules & Grid Code.
- o Provide an efficient and transparent process for amending the Market Rules and the Grid Code.

Section 26 (3) of the EPSR Act provides as follows:

In respect of markets for electricity and ancillary services, the Market Rules may include provisions:

- (a) Governing the making and publication of the Market Rules
- (b) Settlement of payment among different participants
- (c) Authorizing and governing the making of orders byt he System Operator, including orders:
- (i) Imposing financial penalties on market participants;

- (ii) Authorizing a person to participate in the markets; or
- (iii) Terminating, suspending or restricting a person's rights to participate in the markets; and
- (d) Concerning the administration and enforcement of the Market Rules, including provisions for market rule amendments, dispute resolution, penalties and market surveillance.

THE SLA IS BOUND BY THE PROVISIONS OF THE MARKET RULES RELATING TO FORCE MAJEURE

Force majeure is that unforeseen event or circumstance that occurs which affects the performance of a party in an agreement to the extent that it prevents that party from fulfilling his obligations in a contract.

Clause 8 of the SLA discusses the Force Majeure event and conditions warranting force majeure which include; fire, flood, civil unrests/ disturbances, acts of war, etc which is detailed in the Market Rules 46.8 .4

Clause 8 SLA

Force Majeure in relation to a party, means any event or circumstance, or combination of events or circumstances: (a) that is beyond reasonable control of the party; (b) that adversely affects the performance by the party of its obligations under this Agreement; and (c) the adverse effects of which could not have been foreseen, prevented, overcome, remedied or mitigated in whole or in part by the party through the exercise of diligence and reasonable care and includes, but is not limited to, acts of war (whether declared or undeclared), invasion, armed conflict or act of a foreign enemy, blockade, embargo, revolution, riot, insurrection, civil disobedience or disturbances, vandalism or acts of terrorism; strikes, lockouts, restrictive work practices or other labour disturbances; unlawful arrests or restraints by governments or governmental, administrative or regulatory agencies or authorities; orders, regulations or restrictions imposed by governments or governmental, administrative or regulatory agencies or authorities unless such order, regulation or restriction is imposed as a result of a violation by the party of a permit, license or other authorization or of any applicable law; and acts of God including lightning, earthquake, fire, flood, landslide, unusually heavy or prolonged rain or accumulation of snow or ice or lack of water arising from weather or environmental problems; provided however, for greater certainty,

- The lack, insufficiency or non-availability of funds shall not constitute a Force Majeure Event,
- (ii) An act of the System Operator or the Market Operator effected in accordance with these Rules shall not constitute a Force Majeure in respect of a Participant,

(iii) an act of a Participant effected in accordance with these Rules shall not constitute Force Majeure in respect of the System Operator or the Market Operator; and

(iv) The TSP, or the System Operator or the Market Operator shall not, for the purposes of this definition, be considered a governmental, administrative or regulatory agency or authority;

Section 46.8.2 of the Market Rules; Liability of the System Operator and the Market Operator:

Subject to this Rule, and except as otherwise provided in these Rules or the Grid Code, the System Operator and the Market Operator shall not be liable, whether in contract, tort or otherwise, for any claims, losses, charges, damages, demands, liabilities, judgments, costs, penalties, fees, obligations, expenses and or disbursements made or incurred by a Participant or its directors, officers, employees or agents, arising out of any act or omission of the TSP in the exercise or performance, or in the execution of an intention to exercise or perform any authority, power or duty under these Rules or the Grid Code,

except to the extent that such claims, losses, charges, damages, demands, liabilities, judgments, costs, penalties, fees, obligations, expenses and or disbursements arise out of any wilful misconduct by, or wilful omission of the System Operator or the Market Operator.

Non- Compliance and different Levels of Non- Compliance Penalty in Market Rules

A Level "L1" non-compliance shall be found where the Participant has not fully complied, but has complied in part with any Rule or Section and where the Participant has, on its own initiative, informed the Market Operator on a timely basis of the non-compliance, the reasons therefor and the manner in, and the time within which such non-compliance will be remedied;

A Level "L2" non-compliance shall be found where the Participant has failed to comply with all of the requirements of any Rule or Section and where the Participant has, of its own initiative, informed the Market Operator on a timely basis of the non-compliance, the reasons therefor and the manner in, and the time within which such non-compliance will be remedied;

A Level "L3" non-compliance shall be found where the Participant has failed to comply, in whole or in part, with all of the requirements of a Rule or a Section and has failed to inform the Market Operator of the non-compliance on a timely basis and on its own initiative but, upon request by the Market Operator and within the time specified in the request, informs the Market Operator of the reasons for non-compliance and the manner in, and the time within which such non-compliance will be remedied; and

A Level "L4" non-compliance shall be found where the Participant has failed to comply, in whole or in part, with all of the requirements of a Rule or a Section and has failed to inform the Market Operator of the non-compliance on a timely basis and on its own initiative, and has failed to respond to the Market Operator's request, for a statement of the reasons for such non- compliance and of the manner in which and the time within which such non-compliance will be remedied, within the time specified in the request.

DISPUTE RESOLUTION Clause 9 SLA

The SLA under clause 9 aligns its dispute resolution mechanism with that of the Market Rules which is Abtration. Arbitration and Conciliation Act CAP A18 LFN 2004 is the enabling law that guides Arbitration proceedings in Nigeria. MR 43.1.3 provides that A Mediator or Conciliator may in the interest of Justice, alter or vary the provisions of the Arbitration proceedings with the consent of the Parties.

MR 43.2.1 provides that:

"Subject to Rules 43.2.3, the Dispute resolution procedure provided for in this Rule 43 shall apply to:

(d) Any Dispute between the System Operator or the TSP and a Participant, in connection with, in relation to or arising from the terms of any agreement, including an agreement between the TSP and such Participant for connection of the facilities of such Participant to transmission system, unless the applicable agreement or contract or the license of a party to the dispute either provides for an alternative dispute resolution mechanism or provides that the dispute resolution regime provided in this Rule 43 shall not be applicable;

MR 43.3.2:

Where a dispute in respect of which the dispute resolution process under this Rule 43 has been initiated involves the implementation of an order made or a direction given by the Market Operator pursuant to Rule 45 (45.2.6, 45.3.10, 45.4.5, 45.5.2 or 45.5.9), then, subject to Rule 43.2.4(c), the obligation of the Participant to comply with the order or direction, or to discharge the financial penalty, as is applicable, shall be stayed until 15 days after the appointment of a Mediator/Conciliation body or an Arbitrator, and thereafter for such period, if any, as may be determined by such Mediator/ Conciliation body or Arbitrator.

MR 45.2.7;

Subject to Rules 43.3.2, 43.3.3 and 45.3.4(c), any order issued by the Market Operator pursuant to Rule 45.2.6 shall be effective from the sixteenth (16) Business Day following the receipt of the order by the Participant.

Other sanctions include Suspension and Disconnection Orders in 45.3; Termination Orders and Disconnection Orders in Article 45.4; Non-compliance Letters and Financial Penalties in Rule 45.5, Financial Penalty listed in Rule 45.5.7

CONFIDENTIALITY

Parties are at liberty to declare any document they are required to produce during Arbitration as Confidential pursuant to Rule 43.8.1 of the Rules. It provides thus:

"Any party may declare any document, or information contained in any document required to be produced during arbitration as Confidential Information and the party making such declaration shall provide written justification thereof to the Arbitrator. If the claim of the Arbitration Tribunal confirms the confidentiality of the document or information, having regard, where applicable, to the provisions of Rule 46.4, the Arbitration Tribunal shall establish such procedures as may be necessary to protect the confidentiality and commercial value of such document or information, including:

MR 46.4.3

The following information shall be available for open access to the public on the Website:

The Participant's Application Form;

o The Market Participation Agreement;

- o The Market Rules;
- o The Grid Code;
- Any proposal for amending the Rules that is under consideration;
- o The Market Procedures and the Operating Procedures;
- o Participants' Register;
- o Load forecasts and load statistics; and
- o The prices on the Balancing Market, once the Balancing Market is in operation.

MR 46.4.4

The following information shall be available for open access to Participants and the Commission on the Website: the reports prepared by the System Operator or the Market Operator when the Market Rules or the Grid Code establish that such report must be sent to Participants;

- o Maintenance outage plans;
- o Expected and actual Transmission Constraints;
- o Day-ahead Dispatch Schedules;
- o Ex-post Dispatch analysis;
- o Ancillary Services provided and costs;
- o Expected and actual Must Run Generation, and its cost

MR 46.4.7

Each Participant and the System Operator and the Market Operator shall:

prevent access to Confidential Information which is in its possession or control, by any person not authorized to have access to such Confidential Information pursuant to these Rules or the Grid Code, and shall in all cases, take appropriate measures to ensure destruction or disposal of records of Confidential Information in its possession whenever such Confidential Information is no longer required to be retained by it pursuant to these Rules or the Grid Code; and ensure that any person to whom it discloses Confidential Information observes the provisions of this Rule 46.4 in relation to that Confidential Information.

SLA's financial remedies shall be based on Liquidated Damages, factors and penalties as stated in the Market Rules. This makes the Market Rules key in guiding dispute resolution, force majeure, liabilities and confidentiality in NESI SLA Era.

SNAPSHOT OF TECHNICAL REQUIREMENTS

REQUIRED TECHNICAL STANDARDS AND SPECIFICATIONS FOR THE REVAMPING / REHABILITATION OF EXISTING NETWORKS NATIONWIDE BY THE DISCOS

NIGERIAN ELECTRICITY MARKET STABILIZATION FACILITY

By Engr. Peter O. Ewesor Managing Director/CEO of NEMSA & Chief Electrical Inspector of the Federation

Referring to the above subject matter issued to DisCos, it is important to state that this proposed program aimed at repositioning and enhancing the stability of the Electricity Distribution networks to deliver safe, reliable and sustainable electricity supply and also to ensure safety of lives and property, is a good initiative and highly welcomed.

In order to ensure the full realization and reaping of the full benefits of the objectives and purposes of the program, it is necessary at this stage to quickly draw DisCos' attention to the following Technical Standards and Specifications requirements:

1. Electric Concrete Poles and Spannages

•All Electric Concrete Poles must be procured from only NEMSA Certified Electric Concrete Pole Manufacturers to ensure compliance and for traceability.

•Special Electric Concrete Poles of appropriate minimum height of 12.2m should be used in areas where additional heights above 10.36m poles are required for adequate clearances.

•Appropriate Poles Supports for Bracket Insulators must be used for constructions.

2. Unacceptable Unsafe Construction Practices

•Poles with channel irons; the use of extended channel irons to increase concrete poles heights is unsafe and prohibited. Below are pictorial illustrations of the unsafe/prohibited construction practices



Unsafe use of inadequate length of channel iron to extend pole height; Inadequate strength and stability of network results into network failure and danger to lives and property.



One end of the bracket bolted to the pole while the other end was left open without bolt. This shows the holes are not provided as the concrete pole is not designed for this type of installation practice. Detachment of any upper phase conductor will fall on the lower phase conductors. The above 33kV double circuit primary feeder lines were seen dangerously passing over an existing 11kV substation.

•Using a Single Pole structure for more than one T-offs: the use of single poles structure for T-offs is prohibited, because it creates a weak point along the source existing feeder thereby leading to possible collapse of the power lines.





Poorly constructed T-off lead to instability of the networks and low availability of power supply to consumers



This type of four pole structure with galvanised channel iron can be used to correct this type of wrong connections on the left hand picture



The above design cannot stand the test of time. The high-tension pole has been extended with un-galvanized channel (substandard materials) already rusted, bent and waiting to collapse as indicated in the above photograph. This network is defective in design and construction and is not acceptable. Special poles of 40ft (12.2 meters high) or 33kV steel tower, galvanized pole of appropriate height should be used for this type of construction to guarantee the stability and durability of the network as well as safety of lives and property. The factor of safety of this type of construction and pole arrangement is zero.

For Specific Spacings: requirements -

•double circuits should be carried on cross-arms mounted on double poles structures to give the required safe spacing between the overhead circuit lines. However, if it is along a constrained corridor, the single poles to be used must have been designed for requirements of firm grip and such purpose. Examples of these would be 12.2m and special poles



Dangerous double circuit construction of different voltage levels (33kV, 11kV) as well as wrong T-off





Fig 2: This pole mounted transformer was installed on un-galvanised rusted angle iron which could collapse any time. The split low voltage cables pass between the conservator tank and the transformer body with a spacer between them. This is an unsafe condition as the cable insulation may peel off and the spacer may also be removed which would energize the transformer body. The transformer should be mounted on galvanised support well re-enforced and armoured cable should be used.

Restrictions on Pole mounted Transformers:

•The capacities of transformers to be mounted on poles should not exceed 100kVA and must be mounted using galvanized channel irons.

•The pole mounted transformers must be firmly bolted on the supporting structures at multiple/equally distributed points to maintain balance / equilibrium at all times. Find below pictorial illustrations



Fig 1: Pole mounted transformer installed on ungalvanized (rusted) channel iron and in close proximity to a building. This is unsafe for the occupants of the house.



Overhead Conductors with severe kinks

•All Conductors must be properly checked

out/gauged as there are a lot of undersize Conductors in the market. For example, 120mm2 being sold as 150mm2, also 90/95mm2 being sold as 100mm2

.Avoid splitting of conductors and do not use conductors with kinks as these are likely to fail prematurely.

Transformers Standards and Specifications

Transformers must have correct specified Vector group in line with NESIS Regulations 2015 Provisions/requirements as follows;

- a. Distribution Transformers (TRF) must be Dyn11 Vector group.
- b. Power Transformers for Injection Substation must be Dyn1 Vector group.
- c. The TRFs low voltage must be 400volts.

d. Exercise restraint/caution to avoid being deceived into buying Transformers with Aluminum Alloy windings as we had similar cases in the past which then defeated the aim/objective and purpose/essence for which the program was designed.

1. Steel Cross Arms and Angle Irons

All Steel Cross Arms and Angle Irons must be fully Galvanized type and of correct dimensions (length of 2.7m

and 1.8m for 33kV and 11kV Overhead lines respectively). Non-galvanized types are unsafe and normally result in sudden collapse of networks.

2. Equipment and Materials Matching

Proper Equipment and Materials matching should be ensured for each substation. For example;

•Don't install 400Amps feeder pillar (F/P) for a 500kVA substation with 696Amps output rather 800Amps F/P should be used.

•Don't use 150mm2 armored cable for 300kVA transformer, rather use 185m2.

3. Lightning Arrester

Lightning Arresters must be of appropriate Voltage Rating (kA) and should be correctly positioned to serve the intended purpose and area of coverage.

4. Protection Drop out fuses

All Substations must have appropriate Drop out Fuse fittings that are functional with appropriate / proper fuse carriers.

5. Conductor Type and Sizes

All Conductors must be of correct sizes as follows:

•Primary feeder lines must be constructed with minimum of 150mm2ACSR Conductors

 $\bullet 11 \text{KV}$ feeder lines must be constructed with 100/150 mm2 ACSR/AAC Conductors.

Use of appropriate bi-metal line taps for connections.

It is of paramount importance that all connections/joints between dissimilar Conductors (All + & Copper) must be through Bi-metallic Line Taps to avoid sparkings, Corrosion etc due to reactions between the two dissimilar Conductors.

Use of only NEMSA Certified Electrical Installation Contractors for

Project Execution

In line with Extant Electricity Supply Regulations, you are to ensure the use of only NEMSA Certified Electrical Installation Contractors for projects execution.

Substation Fencing

In line with extant electricity supply regulations, you are to ensure that all substations are appropriately fenced and secured with locks and keys to prevent unauthorized access. Also appropriate danger sign in Red on White background with skull symbol should be displayed on the entrance and side of the fence. Find below pictorial illustrations of an acceptable fenced substations.

It is Important to Note the following:

1. That the Inspection, Testing and Certification by NEMSA is mandatory for any New and Rehabilitated Network before they are put back into use.



A newly constructed standard substation with danger sign, standard fencing and graveling



A well designed and constructed substation in GRA, Sokoto.

2. Also Note that these Exercises in 3(i) will attract statutory fees.

3. Note also that from our field experiences with BEMES of Similar Projects, the actual costs of Standard Electrical Materials and Equipment are not always properly reflected which has invariably encouraged Contractors to buy substandard Electrical Materials/Equipment and refurbished transformers. For example; 33kV and 11kV galvanized cross arm and angle irons are priced in some BEMES as N15,000.00 instead of about N25,000.00 for the correct type.

4. Further to the reviews above, if these projects are executed in line with the required technical Standards and Specifications, the following expected benefits would be realized:

- 1. Reduced technical losses;
- ii) Improved Revenues;

vi)

- iii) Improved safety in the networks;
- Reduced maintenance cost as the project may not require maintenance as soon as it is commissioned for use;
- v) Prolonged Network Service life;
 - Reduced incidents of electrical accidents
 - / electrocution within the networks; and above all
 - 1. Meeting the requirements of extant Regulations, codes and standards.
 - 2. Otherwise, the networks may go into state of disrepair soon after commissioning for use with attendant high maintenance cost, with consequences to safety of lives and property.

5. The DisCos are expected to use this opportunity of the Nigerian Electricity Market Stabilization fund scheme to among others revamp their networks/primary feeder lines conductors with the appropriate minimum size of 150mm2 (ACSR) conductors etc.

6. Finally, it is hoped and advised that the execution of the rehabilitation/stabilization projects should be preceded by proper study and design in order to avoid haphazard construction that violates safety requirements and extant Regulations/codes. Also, the anomalies described/provided above should be completely avoided in order to realize all the benefits of the program.



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With our **diligent execution** of the Nigerian electricity grid maintenance, expansion and rehabilitation programme, **the power transmission** system has become more stable.

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