



*TCN ...transmitting electricity in the most efficient and effective manner*



## **IMPLEMENTATION MILESTONES** OF **TRANSMISSION REHABILITATION AND EXPANSION PROGRAM**



FEBRUARY 2017 - OCTOBER 2019

**Proposed National Control Centre**



**Proposed Regional Control Centre**





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OF  
**TRANSMISSION REHABILITATION  
AND EXPANSION PROGRAM**



FEBRUARY 2017 - OCTOBER 2019

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# MD'S MESSAGE

**T**he Transmission Company of Nigeria is currently undergoing significant transformation which has changed it into a pragmatic and innovative company, aimed at resolving major challenges of NESI. TCN is currently leading all efforts expected to take the Nigerian Electricity Supply Industry (NESI) to sustainability.

In the last two years, TCN has concluded the 20-Year Least Cost Transmission Expansion Plan through the support of the World Bank. It established the Transmission Rehabilitation and Expansion Program (TREP) with the Development Objective "to rehabilitate, stabilize, provide redundancy consistent with

international best practice N-1 and expand the willing capacity of TCN to 20,000MW in four years".

TREP has four strategies; critical investment in lines and substations, frequency control, spinning reserve and effective Supervisory Control and Data Acquisition (SCADA).

TCN has employed different strategies in its expansion drive, starting with the use of in-house capacity to install transformers and equipment across the country, and had also completed previously slow and non-performing contracts. These have resulted in the installation of 67 transformers across Nigeria, contributing to capacity increase

## MD'S MESSAGE

from 5,000MW in February 2017 to 8,100MW in December 2018. In addition, TCN recovered 775 containers out of 800 containers with power equipment stranded in the port, which were utilized in executing some of the projects.

Management established implementation structures that gave confidence to donors under which \$1.661 billion was raised; management also changed procurement methods and introduced strategies that have mitigated risks associated with joint-venture/consortium. TCN requested and obtained the support of most donors to use advance procurement, which has significantly improved projects implementation in the company.

TCN achieved the best frequency control of band of 49.80Hz to 50.20Hz from December 23, 2018 to May 5, 2019. Generators connected to the Grid now comply with Free Governor

Control. TCN is making effort to put in place an effective SCADA; is currently installing OPGW across its network through contracts financed by donors, and has also competitively procured 260MW spinning reserve

TCN has equally simulated the required investment of 11 Distribution Companies (DISCOs) in Nigeria and hired a consultant who reviewed the simulation and came up with investment requirements of the DISCOs to be about \$4.3 billion. The decision of "Market Operator to enforce Market Rules" has been applauded and is necessary for direction and Market sustainability. Staff of the company on the other hand have been trained both locally and internationally to boost capacity.

**UG Mohammed**

Managing Director/Chief Executive Officer



# INTRODUCTION

**T**ransmission Company of Nigeria (TCN) is the only company, out of the 18 successor companies unbundled from the former PHCN, that was not privatised. A Management Contract of four years was signed between the Federal Government of Nigeria (FGN) and Manitoba Hydro International (MHI) to provide technical and managerial expertise to improve the operational efficiencies and overall performance of the company. The MHI contract ended on August 31, 2016 without achieving its objective, Government, in its wisdom, refused to further extend it.

The Deputy Managing Director under MHI took over the Management of the company after the departure of MHI on August 31, 2016 and managed the company until February 01, 2017 when a new Management was appointed to take over the leadership of TCN. MHI left TCN in total disarray. There was no audit of the company's transactions throughout the period it was managed by MHI and procurements were done without regard to technical and economic efficiencies. Management of TCN was bloated by MHI to 46 General Managers and 134 Assistant General Managers against 10 General Managers and 11 Assistant General Managers inherited from PHCN (which was deemed top heavy by the Change Management Consultancy study done by Red Electrica/Accenture in 2005).



## **Transmission Rehabilitation and Expansion Program**

TCN Management, in February 2017, under the current Managing Director/CEO, U. G. Mohammed established the Transmission Rehabilitation and Expansion Program (TREP). The Development Objective (DO) of the Program is to Rehabilitate; Stabilize; Provide Necessary Flexibility & Redundancies and Expand the Wheeling Capacity to 20,000MW by 2022. To achieve the DO, TCN needs to successfully implement the following four-point strategy: achieve System Frequency Control; procure adequate Spinning Reserve; provide functional Supervisory Control and Data Acquisition (SCADA) and achieve Critical Investment in Lines and Substations.



## THE IMPLEMENTATION MILESTONE OF TREP AS AT AUGUST 31, 2019.

### 1. Achieve System Frequency Control:

Basically, the System Frequency is the speed at which generators are running at any given time. Quality System Frequency is said to be achieved when it stabilizes within designated limits over the operations period. This is essentially controlled by the balance between power generation and the load demand at any given time. The quality degrades with the level of imbalance between the total generation and the total load demand; therefore, an objective for qualitative power supply is adequate and responsive frequency control to balance the generation with the ever-changing demand. This is necessary because the National Demand (aggregate of all the loads taken by DISCO's and other class of customers connected to the Grid) is constantly changing. The automatic monitoring and controlling of speed of generators in response to changes in demand is called "Governor Control".

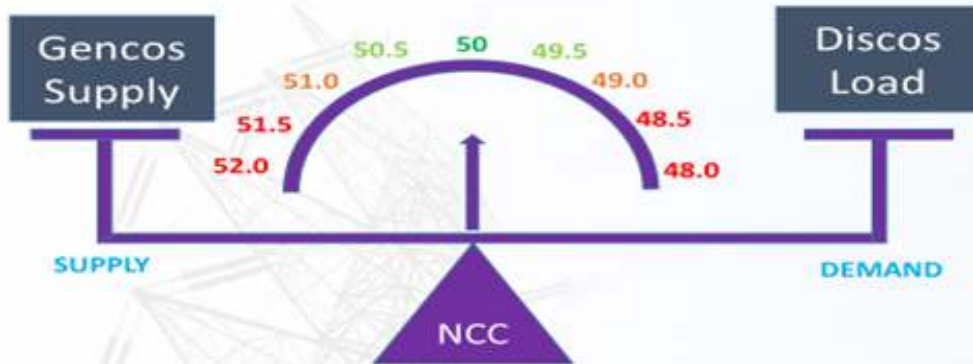
TCN established the strategy that compelled generating companies (GENCOs) to install and operate free governor control system consistent with the Grid Code. As a result of stringent



enforcement of the rule, TCN achieved the WAPP standard frequency control of 49.80Hz and 50.20Hz for 66% and Nigerian Electricity Regulatory Commission (NERC) Standard of 49.75Hz and 50.25Hz for over 85% of the time between December 23, 2018 and May 23, 2019.

However, from May 6, 2019 to date, TCN has been struggling to achieve half the above frequency control performance due to grid instability. The DISCOS' networks lack significant investment and are poorly maintained hence it is difficult to manage the balance between demand and supply due to incessant dropping of load by the DISCOs especially when it rains.

## TCN/ISO Frequency Control



- Better Frequency Control
- Movement Towards WAPP Range

	Lower (Hz)	Upper (Hz)
WAPP Limit	49.80	50.20
Normal Limit	49.75	50.25
Stress Limit	48.75	51.25

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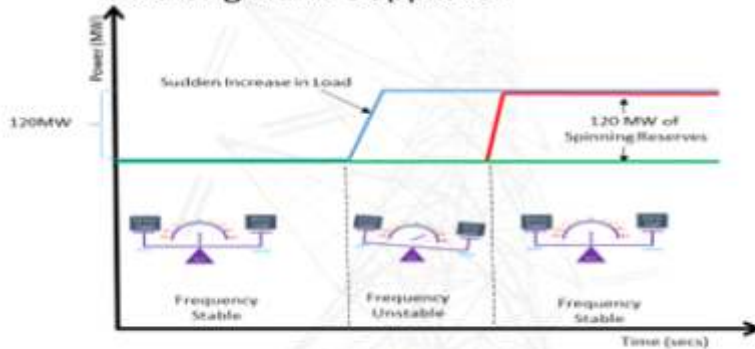


**2. Adequate Spinning Reserve.** Spinning Reserve is an ancillary service expected to mitigate the effect of huge shocks which could lead to system instability. For a generation of 4,000MW for instance, the standard Spinning Reserve is supposed to be about 400MW. Management constituted a committee to procure spinning reserve in 2017 with membership from GENCOs.

The committee submitted its report, which was forwarded to NERC in 2017. NERC eventually approved for TCN to procure spinning reserve competitively. TCN procured 260MW of Spinning Reserve, which was forwarded to NERC for approval but has been pending since December 2018. Due to lack of fund for payment for the Spinning Reserve, NERC is yet to make a decision.

## Spinning Reserve

- Spinning Reserves are needed to quickly provide frequency balance when there is a sudden change in load or generation.
- Spinning Reserve of 260MW has been procured
  - Awaiting NERC's approval.



TRANSMISSION COMPANY OF NIGERIA



### 3. Supervisory Control and Data Acquisition (SCADA).

SCADA is a system that operates on coded signals over a communication channel to facilitate real-time access to system information from remote locations. Nigeria awarded contract for SCADA/EMS three times and each in succession failed. The current SCADA/EMS was financed by the World Bank and it can 'see' 40% of the Grid, yet with lots of deficiencies. Upon assumption of office, the Management in February 2017 established a SCADA committee with the objectives of finding the causes of the failures of the three previous attempts to establish functional SCADA system. The three failed

contracts were awarded and implemented by Siemens AG. The findings of the committee led to modifications of the SCADA Scoping consultancy report. The scoping report was submitted in December 2017.

To improve the quality of the scoping report, ensure there is adequate competition such that all previous bottlenecks are mitigated, TCN organized an international conference on SCADA in July 2018 where three National Grids (Power Grid of India, GridCo of Ghana and TARNA of Italy attended). All known SCADA Original Equipment Manufacturers (OEMs) also attended. The outcome of the conference has significantly improved the report.

**Figure 3**



**(SCADA Control Room)**

The SCADA conference established among others that TCN should fix its communication back bone before launching the SCADA procurement. This further confirmed that the decision to cancel the two fibre optics concession contracts was indeed the right decision.

TCN has concluded the evaluation of the procurement of OPGW for Jos to Gombe, Ajaokuta-Benin, Ikeja West-Egbin and Aja-Lekki-Alagbon line. TCN is also evaluating the option of replacing the substandard ADSS on Oshogbo-Ayede-Ikeja West, Shiroro-Jebba-Ganmo-Oshogbo line segments installed by Phase 3 under the defunct agreement.



### **MD TCN Addressing Critical OPGW Installation Contract Bidders at the Conference in Abuja**

Other 330kV and 132kV lines like, Alaoji-Oweri-Onitsha, Yeneguo-Baharin-Owerri-Alaoji, Afam-P/H, Delta-Benin, Kaduna-Kano, Osogbo-Akure-Benin, Kudenda-Mando, Omotosho-Erukan (Lagos), Kumbotso-Rimin Zakara-Katsina, Benin-Auchi-Okpela-Okene, Kaduna-Kano, Oshogbo-Ife-Ondo, Ayede-Shagamu, Kainji-Birnin Kebbi-Sokoto-Kauran Namoda-Katsina, Katsina-Daura-Gwiwa-Jogana-Kura, Akure-Ado Ekiti, Kumbotso-Dakata, Kumbotso-Gagarawa-Hadeja, Gombe-Biu-Dambua, Lafiya-Abuja, etc. financed mainly by Donor Agencies would also

have OPGW installed on them.

TCN consulted widely and it was established that for the new SCADA to be successful there must be adequate training of staff. Management is training fifteen young engineers on SCADA (five on System Communication, five on SCADA software and five on SCADA hardware).

#### **4. Critical Investment in Lines and Substations.**

Under this component, TCN is rehabilitating

and expanding the transmission lines and substations across the country, consistent with N-1 reliability criteria in line with international standards. TCN is also using in-house capacity to install abandoned transformers and other equipment, string transmission lines and assist contractors complete various uncompleted projects.

### a) Use of In-house TCN Engineers to Install Transformers

**Table A**

S/No.	Location	Transformer Capacity
1	Dambua 132/33kV Substation	1X40MVA
2	Aja Lagos 330/132/33kV Substation	1X60MVA
3	Aja Lagos 330/132/33kV Substation (Mobile)	1X60MVA
4	Ejigbo 132/33kV Substation	1X40MVA
5	Umuhia 132k/33kV Substation	1X40MVA
6	Zaria 132/33kV Substation	1X40MVA
7	Funtua 132/33kV Substation	1X60MVA
8	Gombe 132/33kV Substation	1X30MVA
9	Auchi 132/33kV Substation	1X40MVA
10	Ilashe 132/33kV Substation	1X40MVA
11	Dan Agundi (rehabilitated burnt transformer)	1X60MVA
12	Ayede (Ibadan)	1X60MVA
13	Egbin Substation in Lagos	1X30MVA
14	GCM Onitsha	1X60MVA
15	Benin TS	1X60MVA
16	Benin TS	1X60MVA
17	Kumbotso	1X150MVA
18	Kubwa	1X60MVA
19	Kankia	1X30MVA

The use of in-house capacity started with the installation of 1X40MVA at Damboa. This innovation assisted TCN to install transformers cheaper using its staff (sometimes at a cost less than 10% what the company used to pay its contractors). TCN engineers also successfully completed and commissioned 132/33kV substation on an island (Ilashe in Oriade LGA, Lagos State).

Below are some of the installations by TCN engineers.



Minister of State II Suleman Hassan at the Commissioning of 1X30MVA 132/33kV at the Gombe 330/132/33kV Substation in June 2018

### **Lines Completed since February 2017**

1. Completed Asaba-Benin 330kV Transmission Line which was partially completed three years ago.
2. Energised the 2nd circuit of the Ajaokuta-Gwagwalada 330kV energised on single circuit in 2015.
3. Brought the 2nd line of the Jebba-Kainji 330kV transmission line that was out for more than five years due to lack of 330kV breaker
4. Reconductored the Mando-Old Power Station 132kV transmission line between January to June 2018 using higher capacity conductors.
5. Tee off on the New Haven-Oturkpo and constructed 5 KM 132kV transmission line through in-house capacity/collaboration with Enugu State Government and have energised the 1X40MVA Substation at Nsukka.

**b) Use of in-house engineers to complete old contracts.**

This has assisted greatly in completing several projects across the country. It has also assisted

in resolving budget overrun which previously characterised TCN project implementation. Some of the completed contracts include are listed in the table below:

**Table B**

S/N	Contractor	Location	Capacity
1	News Engineering	Kukuwaba Abuja	2X60MVA
2	GIT	Karu Abuja	1X60MVA
3	GIT	Uyo, Akwa Ibom	1X60MVA
4	GIT	Aba, Abia State	1X60MVA
5	GIT	Ekim Akwa Ibom (Cooperation)	1X60MVA
6	Fedders LLOYD	Dan Agundi	1X60MVA
7	Fedders LLOYD	Ijebu Ode	1X60MVA
8	Sahel	Bauchi	1X60MVA
9	Con Engineering	Wudil Substation	1X40MVA
10	Cartlak	Damaturu Substation	1X150MVA 1X60MVA
11	Crompton Greaves	Maiduguri Substation	1X150MVA 1X60MVA
12	KEC	Gombe-Damaturu Line	NA
13	Optic One	Katsina-Daura 132kV line	NA
14	KEC	Damaturu-Maiduguri Line	NA
15	Vallance	Yawuri 132kV S/S	1X40MVA

**c) Contracts Completed by Contractors.**

It is no longer news to all contractors working on TCN projects, that several contracts have been cancelled and are either completed or being

completed by TCN engineers. This has sent the right signal which assisted greatly in the speed of implementation. Below are projects completed since February 2017.



**Table C**

S/N	Contractor	Location	Capacity
1	JSPDI	Abeokuta (replacement)	2X60MVA
2	JSPDI	Ejigbo (replacement)	2X100MVA
3	JSPDI	Alimosho (replacement)	1X100MVA
4	JSPDI	Zaria	1X60MVA
5	JSPDI	Mando (330kV)	1X150MVA
6	JSPDI	Bida Niger State	1X60MVA
7	JSPDI	Akure	1X60MVA
8	JSPDI	Kaduna Town (Re placement.)	2X60MVA
9	JSPDI	Ado Ekiti	1X60MVA
10	JSPDI	Bida Niger State	1X60MVA
11	JSPDI	Mando Kaduna(330kV)	1X150MVA
12	Power Control	Ukpela Edo State	1X60MVA
13	MBH	Katampe Abuja	1X100MVA
14	MBH	Keffi Nassarawa	1X60MVA
15	MBH	Apo Abuja	1X100MVA
16	MBH	Calabar	1X60MVA
17	MBH	New Haven	2X60MVA
18	MBH	Jos	1X60MVA
19	MBH	Mayo Belwa	1X40MVA
20	MBH	Suleja (replacement)	2X60MVA
21	MBH	Ikeja West (330kV)	1X300MVA
22	Junot	Hadeja	1X60MVA
23	Junot	Katsina	1X60MVA
24	Junot	Kontagora	1X60MVA
25	Televeras	Afam River State	1X150MVA
26	Lagacy	Odogunyan	2X60MVA
26	Kailash-Busdor	Nibo-Awka	1X60MVA
27	JSPDI	Papalento	1X60MVA
28	Power Control	Alaoji	1X300MVA



**MD and Head TCN Inspecting 2X60MVA Installed by MBH at New Haven 330kV S/S**

**d) Implementation of Donor Funded Project was also Re-invigorated.**

TCN introduced prequalification for complex and large projects. To avoid project failure that characterised the past, the Management increased qualification criteria for TCN procurement. The company also reviewed risk allocation for procurement in respect of parties in Joint-Venture or Consortium Agreement (this is expected to mitigate the risk of contract failures that led to 800 stranded containers in Nigerian ports).

The four Project Management Units that replaced the two previous PMUs are doing exceptionally well. All the key staff of the four PMUs were selected through a competitive selection method. They have since settled properly in their various assignments. Each of the PMU is headed by a Project Manager, 2 Substation and Line Coordinators, Project Accountant, Procurement Officer and about five support staff.

Currently, TCN has raised concessionary funding from Donors in the sum of \$1.661

Billion for the implementation of several projects:

### **I. Abuja Transmission Ring Scheme-French Development Agency (\$170 M)**

All six contracts are effective and implementation is without slippage. The project

is building five new substations and a new 330kV supply backbone to Abuja through Lafia (an entirely green field project).

With the active support of the Hon. Minister of FCT, all issues on ROW in FCT were resolved. Details of the Abuja Project as follows:



**Engr Lious Edozien, Permanent Secretary Power with Director of AFD at Ground Breaking of Abuja Transmission Scheme**

**Table D**

<b>ABUJA TRANSMISSION RING SCHEME</b>				
<b>S/N</b>	<b>REGION</b>	<b>ABUJA</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>
<b>TRANSMISSION LINES</b>				
1	NORTH CENTRAL	ABUJA	New Apo	Construction of about 172km of new 330kV double circuit line from Lafia 330kV Substation (new) to the proposed New Apo 330/132/33kV Substation.
2	NORTH CENTRAL	ABUJA	Old Apo	Construction of about 7km of new 132kV double circuit line from new Apo 330/132/33kV substation to Old Apo 132/33kV substation:
3	NORTH CENTRAL	ABUJA	Old Kuje	Construction of 35km of new 132kV double circuit line from New Apo 330/132/33kV substation to the proposed Kuje 132/33kV substation.
4	NORTH CENTRAL	ABUJA	West Main Lugbe	Construction of 29km of new 132kV double circuit line from the proposed Kuje 132/33kV Substation to West Main (Lugbe) 330/132/33V substation.
<b>TRANSMISSION SUBSTATIONS</b>				
5	NORTH CENTRAL	ABUJA	New Apo	Construction of complete new 330/132/33kV substation at New Apo to be equipped with 2No150MVA, 330/132kV transformers and 3No. 60MVA, 132/33kV transformers including 6 X 132kV line bay and 2 X 132kV line bay extension at Old Apo 132kV Substation.

6	NORTH CENTRAL	ABUJA	West Main Lugbe	Construction of complete new 330/132/33kV substation at West Main (Lugbe) to be equipped with 2X150MVA, 330/132kV transformers and 3N o. 60MVA, 132/33kV Transformers (with 132kV outdoor GIS Switchgear) including 2 x 330kV line bay, 4X132kV line bays.
	NORTH CENTRAL	ABUJA	Kuje	Construction of complete new 132/33kV substation at Kuje to be equipped with 3No. 60MVA, 132/33kV transformers including 4 x 132kV Line Bay
7	NORTH CENTRAL	ABUJA	Wumba/Lokogoma	Construction of complete new 132/33kV Substation at Wumba / Lokogoma to be equipped with 2No.60MVA, 132/33kV transformers, 2 X 132kV line bay including 5km underground 132kV XLPE Cable line, from New Apo to Wumba/Lokogoma
	NORTH CENTRAL	ABUJA	Gwarimpa	Construction of complete new 132/33kV GIS substation at Gwarimpa to be equipped with 2No. 60MVA, 132/332kV transformers including OHL / Underground Cable termination of the existing 132KV Katampe - Suleja Transmission line.
	NORTH CENTRAL	ABUJA	SCADA	
	NORTH CENTRAL	ABUJA	ERM	Establishment of ERP in TCN for effective management of its assets
	NORTH CENTRAL	ABUJA	Project Management	Consultancy and other Running cost

**b)Nigeria Electricity Transmission Access Project (NETAP)**

This project is entirely brown field and is upgrading most of the transmission substations and many transmission lines consistent with redundancy criteria.

The rehabilitation and upgrading of substations are being procured under three packages. Packages 1 and 2 are at advanced stage of procurement while the prequalification report for Package 3 is with the World Bank awaiting no

objection. The contract for the screening of various 132kV lines to be reconducted has been signed and is being implemented.

NETAP will resolve deficiencies in various control rooms in substations it is upgrading or rehabilitating by automating them in readiness for SCADA procurement. The project will also automate other substations that were not earmarked for rehabilitation under this project. Detailed scope of NETAP includes:

**Table E**

NIGERIA ELECTRICITY TRANSMISSION ACCESS PROJECT (NETAP)				
	LOCATION	REGION	SUBSTATION	DESCRIPTION
<b>Lot 1</b>				
1	North West	Kaduna	Kumbotsho	Reinforcement with 1 x 300MVA 330/132kV Power Transformer, High Voltage Switchgears and Associated Equipment, Replacement of Control and Relay Panel with Digital Control System
2	North West	Kaduna	Dakata	Reinforcement with 1 x 100MVA 132/33kV Power Transformer, Switchgears , Associated Equipment, Digital Control System. Supply & Installation of Additional 3 No. Feeders Bay and Rehabilitation of Control Room
3	North west	Kaduna	Kankia	Replacement of Faulty 1 x 30MVA and Upgrading of 1 x 30MVA Transformers to 2 x 60MVA 132/33kV Transformers, High Voltage Switchgears and Associated Equipment Including Digital Control System.

4	North west	Kaduna	Dan Agundi	Reinforcement of 1 x100MVA 132/33kV Transformers, High Voltage Switchgears and Associated Equipment including Digital Control System and Rehabilitation of Control Room
5	North West	Shiroro	Birin kebbi	Reinforcement with 2 x150MVA 330/132kV and Installation of 1 x 60MVA 132/33kV Power Transformers with associated 3no. Outgoing 33kV Feeders and Rehabilitation of Control Room
5	North Central	Shiroro	Shiroro	Replacement of Obsolate Control and Relay Pannels with Didital Control System, High Voltage 330kV Switchgears and Associated Equipment
6	North Central	Shiroro	Abuja Central Area	Upgrading of 2 x 45MVA with 2x 100MVA 132/33kV Power Transformer, High Voltage Switchgears, Associated Equipment Including Gas Insulated Substation. Rehabilitation of Civil Structures of the Control Room and Digital Control System.
7	North central	Shiroro	Kainji	Rehabilitation of the 330kV Substation, High Voltage Switchgears, Associated Equipment. Rehabilitation of Control Room including Digital control System.
				<b>Lot 2</b>
1	South East	Port Harcourt	Alaoji	Rehabilitation of 330kV Substation, 330kV Control room, Digital Control System and Replacement of High Voltage Switchgears and Associated Equipment.
2	South East	Port Harcourt	Aba	Rehabilitation of 132kV Substation, 132kV Control room, Digital Control System and Replacement of High Voltage Switchgears.

3	South East	Port Harcourt	Port Harcourt Main	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
4	South East	Port Harcourt	Port Harcourt Town	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
5	South south	Port Harcourt	Itu TS	Reinforcement with 1x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment. Rehabilitation of Control Room including Digital control System.
6	South East	Enugu	New Haven, Enugu	Reinforcement with 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers with Associated Equipment, Replacement of High Voltage Switchgears and Rehabilitation of Control Room with Digital Control System.
7	south East	Enugu	G C M TS, Onitsha	Reinforcement of 1Nos. 60MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated equipment.
8	South East	Enugu	Abakaliki	Upgrade of 1x30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears, and Associated Equipment.
9	south East	Enugu	Orji river	Reinforcement of 1Nos. 60MVA 132/33kV power Transformers, Switchgears, associated equipment and devices.
10	south East	Enugu	Ugwuaji	Supply and Installation of 1x75MVar Reactor and 1 x 60MVA 132/33kV High Voltage Switchgears, and Associated Equipment.
11	North Central	Enugu	Otukpo	Upgrading of 7.5MVA Power Transformer to 1x 60MVA 132/33kV Transformer, High Voltage Switchgears and Associated Equipment.
12	North Central	Enugu	Apir, Makurdi	Reinforcement with 1x150MVA 330/132/33kV and 1x 60MVA 132/33kV Power Transformers High Voltage Switchgears and Associated Equipment.



13	south East	Enugu	Umuahia	Reinforcement with 100MVA 132/33kV Power Transformer and Extension of 132kV Bus with 3 No Additional Feeder Bays.
				<b>SUB TOTAL LOT 2</b>
1	North East	Bauchi	Yola	Reinforcement with 1 x 150MVA 330/132kV and 2x 100MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated equipment with 3 No Additional Feeder Bays
2	North East	Bauchi	Mayo Belwa	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
3	North East	Bauchi	Jalingo	Upgrading from 132kV to 330kV Substation with 1x150MVA, 330/132/33kV Power Transformers and 1 x 100MVA 132/33kV Transformer, High Voltage Switchgears and Associated Equipment. Construction of 330/132kV Control Room
4	North East	Bauchi	Damaturu	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
5	North East	Bauchi	Biu	Reinforcement of 1 x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment and Complete Rehabilitation of Substation
<b>LOT 4</b>				
1	North East	Bauchi	Damboa	Reinforcement of 2x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment and Complete Rehabilitation of Substation

2	North East	Bauchi	Gombe	Reinforcement with 1 x 300MVA 330/132kV and 1x 100MVA 132/33kV Transformers with High Voltage Switchgears, and Associated equipment Bus with 3 No Additional Feeder Bays.
3	North Central	Bauchi	Jos TS	Reinforcement of 1x 300MVA 330/132/33kV & 1 x 100MVA Power Transformers, 330kV High Voltage Switchgears and Associated Equipment. Rehabilitation of Civil Structures of the Control Room and Digital Control Sytem.
4	North East	Bauchi	Maiduguri	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
5	North East	Bauchi	Bauchi	Upgrading of 22.5MVA and 30MVA Transformers to 2X 60MVA 132/33kV Transformers, Rehabilitation of Control Room with Digital Control System and Associated High Voltage Switchgears.
<b>Lot 5</b>				
1	South West	Osogbo	Osogbo	Upgrading of 1x 90MVA with 1x300MVA 330/132kV and Reinforcement with 1x100MVA Power Transformers, High Voltage Switchgears and Associated Equipment and 75MX Reactor including the renovation of control room
2	South West	Osogbo	Ilorin	Reinforcement of 2 x100MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated Equipment. Construction of New Control Room with Digital Control System (DCS)

3	South West	Osogbo	Ondo	Upgrading of 2x 30MVA with 2x 60MVA, 132/33kV Power Transformers, Replacement of High Voltage Switchgears, Conversion of 6nos. 33kV Indoor to Outdoor. Rehabilitation of Control Room with Digital Control System, and Perimeter Fencing.
4	South South	Benin	Irrua	Supply and installation of 100MVA 132/33KV power Transformer and associated Switchgears.
5	South South	Benin	Delta IV TS	Reinforcement with 1 x 150MVA 330/132kV Interbus Transformer, 1 x 100MVA Power Transformer, High Voltage Switchgears, and Associated Equipment. Replacement of Obsolete Control and Relay Panels with Digital Control System
6	South South	Benin	Effurun	Replacement of defective 1x 60MVA 132/33kV with a new 1x 100MVA 132/33KV Power Transformer, High Voltage Switchgears, and Associated Equipment with 4 No Additional Feeder Bays
7	South South	Benin	Benin TS	Reinforcement with 1 x 150MVA 330/132kV Power Transformers and 100MVA 132/33KV Power Transformer, High Voltage Switchgears and Associated Equipment. Replacement of Obsolete Control and Relay Panels with Digital Control System
<b>LOT 6</b>				
1	Lagos Area	Lagos	Ijora	Upgrading of 2 x 30MVA with 2 x 100MVA 132/33kV Rehabilitation of Civil Structures of the Control Room and Digital Control System. Equipment. High Rehabilitation of Civil Structures of the Control Room and Digital Control System

2	Lagos Area	Lagos	Lekki	Supply and installation of 1x 300MVA 330/132kV, 2 x 100MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment .
3	Lagos Area	Lagos	Alagbon	Supply and Installation of 1x 300MVA 330/132kV, 2x 100MVA 132/33kV Power Transformers, Swit chgears, associated Equipment and Devices.
<b>LOT 7</b>				
1	Lagos Area	Lagos	Alausa	Reinforcement of 1x 100MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment.
2	Lagos Area	Lagos	Akoka	Complete Rehabilitation of the Gas Insulated Substation (GIS).
3	Lagos Area	Lagos	Amowu Odoffun	Complete Rehabilitation of the Gas Insulated Substation (GIS) ,
4	Lagos Area	Lagos	Itire	Complete rehabilitation of the Gas Insulated Substation (GIS) ,
5	Lagos Area	Lagos	Otta TS	Upgrading the 1x 30 MVA and 1x40MVA with 2x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.
6	Lagos Area	Lagos	Maryland	Upgrading of 2 x 30MVA to 2 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.
7	Lagos Area	Lagos	Egbin	Replacement of Obsolate Control and Relay Panels with Digital Control System, Rehabilitation of Control Room, High Voltage Switchgears and Associated Equipment.

132kV LINES RECONDUCTORING				
1	South West	Osogbo	Osogbo- Offa -Ganmo - Ilorin	Reconductoring of 150km, 132kV Line Between Osogbo -Offa/Omuaran to Ganmo and Ilorin TS
2	South West	Osogbo	Ayede - shagamu	Reconstruction and Conversion to Double Circuit of Ayede -Shagamu 132kV Line (54km) and Creation of Additional Bays 1 32kV Line Bays at Ayede and Shagamu.
	South West	Osogbo	Osogbo- Ife / Ilesha	Reconstruction and Conversion to Double Circuit of Osogbo - Ife/Ilesha 132kV Line (39.21 km) and Osogbo-Ilesha 132kV Line <b>Tie-Off</b> (22.1km) and Creation of Additional 132kV Line Bays at Osogbo abd Ilesha.
3	South East	Port Harcourt	Afam - PH Main	Reconstruction of Existing Double 132kV Line Circuit to 4 x 132kV Line Circuit Using the Same Right of Way from Afam to Port Harcourt Main (37.8km), and Creating Additional 3 x 132kV Line Bays
4	South East	Port Harcourt	PH Mian - PH Main	Reconductoring of 132kV Double Circuit of Port Harcourt Main to Port Harcourt Town 132kV Line (6km)
5	North West	Kaduna	kumbotso - Hadelja	Reconductoring of Kumbotsho- Hadeji 132kV Line ( 165km)
6	North West	Kaduna	kumbotso - Kankia	Reconductoring of Kumbotsho- Kankia 132kV Line ( 100km)
7	south East	Enugu	Onitsha - Oji River	Reconductoring of Onitsha - Orji 132kV Line (87km) with Turn In - Turn Out Tower at Nibo in Awka 132kV Substation.

8	South East	Enugu	Alaoji to Aba Town	Reconductoring of Alaoji - Aba Town Double Circuit 132kV line (8km) Including Rehabilitation of Two Nos. Towers along the Line.
9	South South	Benin	Irrua - Benin	Reconductoring of Irrua - Benin 132kV line (81km) with Turn In - Turn Out Tower at NIbo - Awka 132kV Substation.
10	South South	Benin	Irrua - Okpila	Reconductoring of Irrua - Okpilai 132kV line (43km) with Turn In - Turn Out Tower at NIbo - Awka 132kV Substation.
11	South South	Benin	Okpila - Okene	Reconductoring of Okpilai - Okene 132kV line (65km) with Turn In - Turn Out Tower at NIbo - Awka 132kV Substation.
12	South South	Benin	Ajakuta-Okene	Reconductoring of Ajakuta- Okene 132kV line (60km) with Turn In - Turn Out Tower at NIbo - Awka 132kV Substation.
13	North East	Bauchi	Gombe-Biu-Damboa-Maiduguri	Reconductoring of the Entire Route Length from Gombe - Biu -Damboa - Maiduguri 132kV line of 356km Route Length
<b>SUPPLY OF POWER EQUIPMENT</b>				
1	Supply of Equipment to Ojo			3 x 150MVA, 10 x 100MVA, 10 x 60MVA and Earthing Transformers
2	Additional supplies to OJO			330kV, 132kV and 33k V Instrument Transformers, Isolators, Circuit Breakers and Insulators
	SCADA Device			SCADA/EMS/Telcoms supply & installation of SVC at Gombe 330kV substation

## CONSULTANCY SERVICES

	<b>Consultancy Services</b>			Consultancy Services on SCADA, SVC, Environmental and Social Related Studies, Contract Supervisions and other Studies (Such as Double Circuit Lines Quad Conductor from Bauchi - Gombe, Ugwuaji - Aliade - Makurdi - Jos, Omotosho - Akure - Oshogbo, Gashua - Hadejia - Damaturu, Delta - Benin, Benin - Omotosho, Zungeru - Shiroro, Onitsha - Aba and Kano - Kaduna)
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Hon. Minister of Power Engr Sale Mamman Inspecting Implementation of TREP at Mando 330/132kV S/S in Kaduna

### c) Ogun/Lagos Transmission Project Financed by JICA - \$238 Million

Compensation has been finalised and forwarded to BPP by Federal Ministry of Power for review and approval. The Environmental Impact Assessment (EIA), Resettlement Action Plan (RAP) and design of the project have been finalised. TCN is awaiting final appraisal mission

by JICA. This project will construct 6 substations and associated 330kV and 132kV lines (4No. 330kV and 2No. 132kV substations) in Ogun and Lagos States. One 132kV substation each will be constructed in Badagry and beside the Redeemed Christian Church of God, while 330kV substations will be constructed at Arigbajo, Ajegunle, near Mountain of Fire Church and Ogijo.

#### Details of the project include:

Lagos/Ogun Transmission Project				
S/N	REGION		LOCATION	DESCRIPTION
<b>TRANSMISSION LINES</b>				
1	SOUTH WEST	Lagos	New Abeokuta	Arigbajo – New Abeokuta 132kV D/C Transmission Line (37.8km)
2	SOUTH WEST	Lagos	Arigbajo	Olorunsogo – Arigbajo 330kV D/C Transmission Line (12.9km)
3	SOUTH WEST	Lagos	Ikeja West	Arigbajo – Ikeja West / Osogbo 330kV D/C Turn in - out (5.9km)
4	SOUTH WEST	Lagos	Arigbajo	Ogijo – Arigbajo D/C Transmission Line (43.7km)
5	SOUTH WEST	Lagos	Shagamu	132kV Quad Line (2.3km) from Ogijo – Existing Ikorodu/Shagamu 132 kV 2x D/C Transmission Line
6	SOUTH WEST	Lagos	Redeem	132kV D/C Transmission Line (10.3km) from Ogijo – Redeem.
7	SOUTH WEST	Lagos	Ikeja West	MFM – Existing Benin (Omosho)/Ikeja West 330kV 2 x D/C Transmission Line (4.2km)



8	SOUTH WEST	Lagos	New Agbara	Arigbajo – New Agbara 330kV D/C Transmission Line (30.6km)
9	SOUTH WEST	Lagos	Agbara	New Agbara – Agbara 132kv D/C Transmission Line (20.8km)
10	SOUTH WEST	Lagos	Badagry	New Agbara – Badagry 132kv D/C Transmission Line (34.2km)
<b>TRANSMISSION SUBSTATIONS</b>				
11	SOUTH WEST	Lagos	Ogijo	2x300MVA 330/132kV + 2 x 100MVA 132/33kV Transformer capacity at Ogijo, Lagos
12	SOUTH WEST	Lagos	Redeem	2x60MVA, 132/33kV Substation at Redeem.
13	SOUTH WEST	Lagos	MFM	2x150MVA, 330/132kV + 2x100MVA 132/33kV Substation at MFM
14	SOUTH WEST	Lagos	New Agbara	2x150MVA, 330/132kV + 2x100MVA 132/33kV Substation at New Agbara
15	SOUTH WEST	Lagos	Badagry	2x60MVA, 132/33kV substation at Badagry.
16	SOUTH WEST	Lagos	Arigbajo	Installation of 2x150MVA 330/132/33kV Transformers with 6 bay extension and 2x60MVA 132/33kV transformers with 6 bay extension

#### **d) Northern Corridor Transmission Project - AFD and EU (\$300M & €25M)**

The prequalification evaluation report was forwarded to AFD for no objection. This will construct three new 330kV DC lines; Kainji-Birnin Kebbi-Sokoto, Katsina-Daura-Gwiwa-Jogana-Kura and Sokoto-Kaura Namoda-Katsina. The project will also re-construct one out of the two Shiroro-Kaduna old and limited 330kV SC line into a quad line and build initially four 330kV

substations in Sokoto, Daura, Jogana-Kano and Kaura Namoda. Additionally, the project would also execute the Sokoto-Kaura Namoda-Katsina 330kV line and 330kV substation at Kaura Namoda. During the appraisal mission, both Federal Ministry of Finance and AFD agreed to finance Sokoto-Kaura Namoda-Katsina 330kV line.

The design of the project, EIA and RAP have all been completed.

## Details of the Original Scope of the Project :

**Table F**

<b>NORTHERN CORRIDOR TRANSMISSION PROJECT</b>				
<b>S/N</b>	<b>REGION</b>		<b>SUBSTATION</b>	<b>DESCRIPTION</b>
1	North West	SHIRORO	Kainji - Birnin Kebbi 330kV Double Circuit (DC) Line (310km)	330kV DC Transmission Line Kainji - Birnin Kebbi (following the existing ROW of the SC 330kV line) and 4x 330kV bay extension at B/ Kebbi and 2 x 330kV bay extension at Kainji
2	North West	SHIRORO	Birnin Kebbi - Sokoto 330kV Double Circuit (DC) Line (130km)	(1) Birnin Kebbi - Sokoto 330kV DC Transmission Line on the existing 132KV Birnin-Kebbi Sokoto ROW and reconducting the existing 132KV Single circuit Birnin - Kebbi Line to double its capacity
4	North Central	SHIRORO	Lambata (Mina Suleja Rd)	Turn in Turn out Mina - Suleja 132KV DC and Construction of 1 x 60MVA 132/33kV Complete substation
5	North West	SHIRORO	Fakon Sarki Argungu	Turn in Turn Out on Brinin Kebbi - Sokoto 132KV Line and Construction of 2 x 60MVA 132/33kV Complete substation
6	North West	SHIRORO	Yelwa- Yawuri	Construction of 1 x 60MVA 132/33kV Complete substation and High Voltage Switchgears and Associated Euipeunt.
7	North Central	SHIRORO	Birnin Gwari	Construction of 1 x 60MVA 132/33kV Complete substation and High Voltage S witchgears and Associated Euipeunt.

8	North West	SHIRORO	330kV Sokoto Transmission Substation	Installation of 2x150MVA 330/132/33kV Transformers at Sokoto New 330 Double Circuit Substation and with associated 132kV bay extension and Installation of 2x60MVA 132/33kV transformers, 6number outgoing 33kV feeder bays
9	North Central	SHIRORO	Shiroro – Kaduna (Mando) 330kV Lines 1 & 2 SC Transmission Lines (96km)	Reconstruction and upgrading of 2 Single Circuit 330kV Transmission Lines 1 & 2 from Shiroro PS to Mando (Kaduna) to a 2 Double Circuit, Quad conductor Shiroro -Mando (Kaduna) Transmission lines 1 and 2. The line bay extension at Mando and Shiroro
10	NORTH EAST	BAUCHI	Bauchi 330kV Transmission Substation (2km)	Turn in -out of the existing 330kV SC Jos-Gombe line at Bauchi, and installation of 2x150MVA 330/132/33kV Transformers with associated 132kV bay extension and 2x60MVA 132/33kV transformers, 6number outgoing 33kV feeder bays
11	North Central	SHIRORO	Rehabilitation work at Kainji TS	Urgent Replacement of Kainji/Jebba 330kV line 1- 330kV Circuit Breaker at Kainji TS.
12	North Central	SHIRORO	Rehabilitation Work at Jebba TS	Replacing the existing very old(1968) Marilli 80MVA 330/132/13.8kV, 2T1 transformer with 1x150MVA 330/132/33kV plus 1X60MVA, 132/33kV transformer and 3 number 33KV Feeder Control and protection panels

13	North Central	SHIRORO	Rehabilitation Work at Jebba TS	Urgent Replacement of 1nos. Jebba T/S 75MX reactor 2R2 CB - that exploded.
14	North Central	SHIRORO	Rehabilitation Work at Jebba TS	Replacement of 11nos. 330KV Circuit Breakers at Jebba 330kV Switchyard. The existing CB's are obsolete no parts and spares available.
15	North Central	SHIRORO	Rehabilitation Work at Jebba TS	Replacement of 9 spans of Sky wire for 330kV Jebba - Osogbo lines 1 & 2 and 330kV Jebba- Ganmo line
16	North Central	SHIRORO	Rehabilitation work at Jebba Power Station Transmission Switch yard.	Replacement of 8nos. 330KV obsolete Circuit Breakers.. The existing CB's are obsolete no parts and spares available.
17	North Central	SHIRORO	Rehabilitation work at Shiroro TS	Replacement of 330KV obsolete hydraulic SF6, Circuit Breakers and associated motorized Isolators at Shiroro TS
18	North Central	SHIRORO	Rehabilitation work at Shiroro TS	Replacement of 28 spans of Sky wire for 330kV 330kV Shiroro- Jebba line 2
19	North Central	SHIRORO	Rehabilitation work at Minna TS	Reinforcement of Minna with 1x60MVA 132/33kV Transformer to relief the existing overloaded 1x30MVA 132/33kV Transformer with complete 132kV Bay extension and additional 3 number 33kV Feeder Control and protection panels. Control room rehabilitation

20	North Central	SHIRORO	Rehabilitation work at Minna TS	Replacement of 32 spans of Sky wire for 132kV Minna- Bida line
21	North Central	SHIRORO	Karu - Keffi - Akwanga 132kV Transmission line ( 103km)	Reconductoring of 132kV SC Karu - Keffi-Akwanga transmission Line
22	North Central	SHIRORO	Keffi TS Transmission Line Rehabilitation	Replacement of 36 spans of Sky wire for 132kV Apo- Keffi line

**e) Nigeria Transmission Expansion Project - AFDB (\$410M)**

The project will reconstruct the Alaoji-Owerri-Onitsha 330 SC and Ughelli-Benin 330kV lines into quad lines and construct a 330kV quad line

between Kaduna (Mando) to Kano (Kumbotso). The project will also construct several 132kV lines in Borno, Adamawa and Yobe State plus 2no. 330kV substations at Millennium City-Kaduna and in Zaria.

**Details of the project are as follows:**

**Table G**

<b>NIGERIA TRANSMISSION EXPANSION PROJECT (NTEP 1)</b>				
S/NO		Region	Station	SCOPE/BACKGROUND
1	North West	Kaduna	Construction of Quad 330KV on Kaduna-Kano 330KV Single DC Transmission Line (212KM)	Construction of Double Circuit 330kV Quad Conductor Kaduna -Kano Transmission line.

2	North West	Kaduna	Zaria	Turn-in Turn -out and Installation of 2x150MVA 330/132/33kV Transformer, 6x330kV bay e xtension, 2x60MVA 132/33kV Transformer, associated 132kV line bays and 6 number 33kV feeder bays at Zaria
3	North West	Kaduna	Millenium City Kaduna	Turn-in Turn -Out and Installation of 2x150MVA 330/132/33kV Transformer, 2 x330kV bay extension, and 2x60MV A 132/33kV Transformer and 2x3number associated outgoing 33kV feeders.
4	North West	Kaduna	Rigasa town, Kaduna	Turn-in Turn -out and Installation of 2x60MVA 132/33kV Transformer and 5 number outgoing 33kV feeders
5	North West	Kaduna	Jaji, Kaduna	Turn-in Turn-out and Installation of 2x60MVA 132/33kV Transformer and 6 number outgoing 33kV feeders
6	South South	Benin	Reconstruction of Delta to Benin 330kV Transmission Line (107KM)	Reconstruction of one of Delta - Benin 330kV Transmission Line Double Circuit to Quad Conductor 330 Double Circuit Line
7	South South	Port Harcourt	Reconstruction of Alaoji to Onitsha 330kV Transmission Line(138KM)	Double Circuit Alaoji -Ihiala-Onitsha to Quad conductor 330kV transmission line

8	South South	Ahoda, Gilili and Sapele	Environmental Impact Assessment and Resettlement Action Plan and Payment of Compensation	Double Circuit(DC) 132kV Ahoda -Gilli-Gilli DC Transmission Line and 2x60MVA 132/33KV Transformer at Gilli Gilli plus associated 6 number outgoing 33kV feeders and DC 132kV Sapele - Odilli DC Transmission Line and 2x60MVA 132/33KV Transformer at Gilli Gilli plus associated 6 number outgoing 33kV feeders
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**Table H** (NTEP 2)

<b>NORTH EAST TRANSMISSION INFRASTRUCTURE PROJECT</b>				
	<b>REGION</b>		<b>SUBSTATION</b>	<b>DESCRIPTION</b>
1	North East	Bauchi	Manguno	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Old Maiduguri 132/33kV Substation.
2	North East	Bauchi	Marte	Construction of 2 x 60MVA 132/33kV Complete substation
3	North East	Bauchi	Dikwa	Construction of 1 x 60MVA 132/33kV Complete substation
4	North East	Bauchi	Bama	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at New Maiduguri 330/132kV Substation.
5	North East	Bauchi	Gwoza	Construction of 1 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Gulak132/33kV Substation.

6	North Central	Bauchi	Jada	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Mayo Belwa 330/132kV Substation.
7	North East	Bauchi	Ganye	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Mayo Belwa 330/132kV Substation.
8	North East	Bauchi	Uba	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Mubi 132/332kV Substation.
9	North East	Bauchi	Chibok	Construction of 1 x 60MVA 132/33kV Complete substation
10	North East	Bauchi	Biu	Construction of 1x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension at Biu 132/33kV Substation.
11	North East	Bauchi	Bunyadi	Construction of 1 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension each at Damaturu 330kV Substation and Biu 132/33kV Substation respectively
12	North East	Bauchi	Kwaya Kusar	Construction of 2 x 60MVA 132/33kV Complete substation including 2 x 132kV Line Bay Extension each at Damaturu 330kV Substation and Biu 132/33kV Substation respectively
13	North East	Bauchi	Maiduguri - Manguno - Marte - Dikwa - Bama	Construction of a New 321km, 132kV Double Circuit Line Between Maiduguri-Manguno - Marte - Dikwa -Bama



14	North East	Bauchi	Maiduguri - Bama - Goza - Gulak	Construction of a New 165km, 132kV Double Circuit Line from Maiduguri - Bama - Goza - Gulak
15	North East	Bauchi	Mayo Belwa - Jada - Ganye	Construction of a New 78km, 132kV Double Circuit Line from Mayo Belwa - Jada - Ganye.
16	North East	Bauchi	Biu - BuniYadi - Damaturu	Construction of a New 134km, 132kV Double Circuit Line from Biu - BuniYadi - Damaturu
17	North East	Bauchi	Dambua - Chibok - Uba - Mubi	Construction of a New 130km, 132kV Double Circuit Line from Dambua - Chibok - Uba - Mubi

NTEP is subdivided into NTEP 1 and NTEP 2 respectively for 330kV lines and substations and 132kV lines and substations in the North East. Based on their classification and importance to the National Grid NTEP 1 projects have been appraised. It is expected to be approved by the Board of AfDB in November 2019 while NTEP 2 will be appraised in 2020.

Advance procurement was adopted for NTEP 1, hence it is expected that the procurement will be near completion when the project is presented to the Board of the Bank in November 2019.

**Closing the 330kV loop Supply to Lagos Island** and Supply of Eko Atlantic through Underground cables are at various stages of the procurement process. While procurement for supply to Eko

Atlantic has been advertised, the preliminary study for closing the 330kV loop which is expected to construct 330kV DC line from Akangba through Ijora to Alagbon has been finalised. The RFP for the detailed study is now being prepared and will soon be advertised. Savings from Euro Bond and AfDB loan will be used to finance the project.

### **Eastern Back Bone Transmission Project**

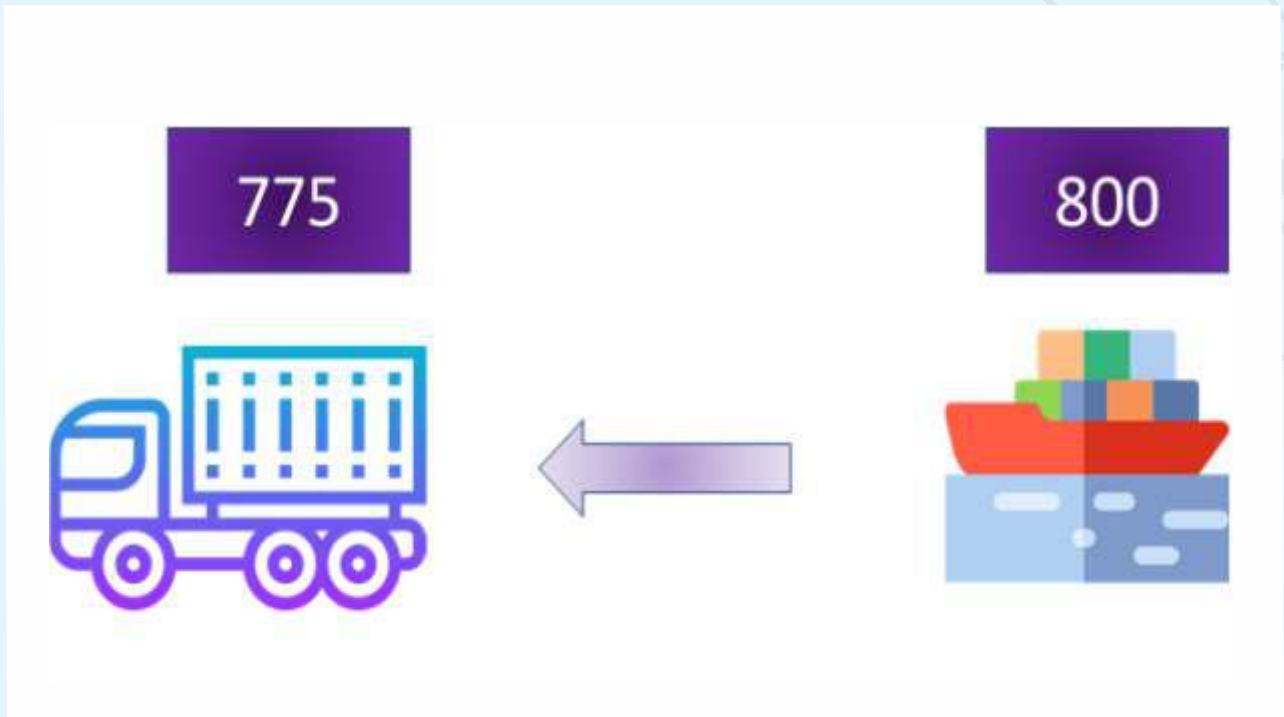
This project is at the preparatory stage. It includes a 330kV DC line and associated substations at Kano-Dutse-Azare-Potiskum-Damaturu-Biu-Hong-Yola-Jalingo-Mambila-Kashimbila-Ogoja-Ikom-Calabar. The Eastern Backbone is one of the projects in the 2019-2033 Generation and Transmission plan for WAPP.

### Recovery of Stranded Power Equipment from various Nigerian Ports

The current Management inherited about 800 Power equipment Containers that were stranded in various Ports within the country with huge accumulated demurrage. The Containers were abandoned by incompetent contractors that were awarded projects beyond their capacities; they stalled implementation of projects after

huge expenditures were incurred for purchase of equipment. Some of the equipment were in demurrage for over ten years. The Management initiated a process in collaboration with relevant stakeholders to clear them. So far, 775 out of the 800 Containers have been cleared and delivered to various project sites where most have been installed. This exercise led to the recovery of equipment worth about USD83Million.

Figure 4



## **Grant Support Projects from Donors**

TCN attracted the largest grant in its history during this period. TCN got and implemented a JICA grant for \$13 million capacitor banks for Apo and Keffi, which was launched in 2018. It is also implementing a \$21 million JICA grant for the rehabilitation and upgrading of Apapa Road 132kV substation and rehabilitation of Akangba 330kV substation. TCN also got a grant of €25 million from EU as part of the finance for Northern Corridor projects (to evacuate solar IPP complex power generation in Gwiwa Jigawa State). TCN is in discussion with JICA on more grant support from Japan.

## **Collaboration with State Government.**

Given the difficulties in securing Right of Way (RoW) for the expansion of transmission network (25 meters on both sides for 330kV lines and 15 meters on both sides for 132kV lines), TCN under the current Management devised a strategy for collaborating with State Governments on RoW. In this regard, TCN is collaborating with Edo, Kaduna, Ogun, Lagos, Kano, Abia, Ondo, Kebbi, Katsina, Yobe and Borno State Governments. Under similar arrangement, TCN entered into agreement with Enugu State Government under which the 132kV substation built by NDPHC over four years ago was energised within two months

after the stringing of the 5KM Transmission line off the New Haven-Oturkpo 132kV line. Enugu State Government provided the RoW while TCN did the electro-mechanical work.

TCN is also collaborating with several state governments on substation construction. The states include: Bauchi (Jama'are, Alkaleri and Toro), Akwa Ibom (Ekim), Kebbi (Yauri) and Delta (Kwale).

TCN entered into collaboration with some states for specific investment expansion. These include; Ekim 132kV substation with Akwa Ibom State, Construction of 330kV substation, 132kV substation and line at Okpai and Kwale between TCN, Delta and Agip Joint Venture, Onitsha-Ogba and Nnewi RoW and 330kV Substation at Awka, 132kV line and substation at Aguleri with Anambra State, RoW for the construction of Abakaliki-Amasiri 132kV line and a substation to be constructed under MOU with Ebonyi State. TCN is finalising a MoU that will construct 132kV line and substations at Kazaure, Danbatta, Babura, Misau, Gwaram and Ningi with both Jigawa and Bauchi states. TCN is discussing the possibility of constructing the 330kV line that will close the loop between New Apo and West Main (Lugbe), and 132kV lines and substations

at the Federal Ministry of Defence and Beside World Trade Centre in Abuja. TCN is also

collaborating with Lagos State on the connection of Eko Atlantic to the National Grid.



**Governor Obiano with TCN MD after Signing MOU on Onitsha-Nnewi 132kV Project**

### **Revalidation of TCN Organizational Structure Consultancy**

Given the significant increase in the number of management staff of TCN, the Government mandated the Management of TCN to propose a management structure that is consistent with the

desire of government to improve the performance of TCN. The Management made the proposal and engaged Messrs H. Pierson that carried out the revalidation of the management structure proposed by Management. The report was concluded and

approved by the Minister of Power, Works and Housing. Staff Records Review Consultancy carried out within the period under review, showed some level of discrepancies in some staff records. Finding solutions to them, strengthened the management of staff records.

The report of the revalidation of management structure of TCN consultancy is being implemented through attrition; that is no staff will lose his/her job but given that there was aging work force, the management will smoothen up in the next two to three years.

### **20 Year Least Cost Transmission Expansion Plan**

The 20 Year Least Cost Transmission Expansion Master Plan was eventually completed when the new Management took over the leadership of TCN. The Transmission Rehabilitation and Expansion Program has been prepared in line with the 20 Year Least Cost Transmission Master Plan prepared by Messrs Fitchner of Germany. The study reviewed transmission expansion at various voltage levels, 330kV, 500kV and 750kV (Super Grid) and the conclusion is that given the level of development of Nigeria, it is more economical at this stage to still continue to expand the Grid at 330kV. TCN has since accepted the report and put into us. While TCN will

continue to expand at 330kV level, it will no longer construct 330kV Single circuits. In addition, TCN has introduced 330kV Quad Line for the first time in her history. The use of GAP conductor has also been introduced.

### **JICA Transmission and Generation Master Plan**

The JICA National Power System Development Master Plan which updated the 20 Year Least Cost Transmission Master Plan has been concluded and circulated. Given that it came later than the Fitchner 20 Year Least Cost Expansion Plan, it will henceforth provide the guide for transmission expansion going forward.

### **Enforcement of Market Rules**

Since handover of the privatized companies on the 31st of October, 2013, the Market has been characterized by low compliance with various provisions of Industry Ruling Documents leading to unsatisfactory Market performance. Given that the Market Operations sector of TCN is empowered by the Market Rules to enforce compliance with the rules by all Market Participants, the current Management took the decision to strongly support and encourage the MO to enforce relevant provisions of the Market Rules with a view to instilling discipline in the

Market. Interestingly, the enforcement, since its commencement in May 2019, has resulted in 100% remittance of the MO invoice by the

distribution companies - as against the usual poor performance of less than 45% monthly.



### **Public Hearing Session on Enforcement of Market Rules**

#### **Improvement in the Performance of WAPP**

WAPP also witnessed tremendous improvement in its activities. TCN led the strategy that resulted in successful commencement of the implementation of the North Core Project. The 2nd Coastal backbone (new 330kV DC from Nigeria to Benin Republic) studies has also been intensified and about to be concluded. WAPP, in collaboration with

ERERA, was able to launch the commencement of the 1st phase of the West African Power Market in June 2018.

The WAPP 2018 Generation and Transmission Master Plan for 2019-2033 was approved by the Council of Heads of States and Governments on December 22, 2018. This includes the Eastern Backbone in Nigeria (a

330kV line and Substations: Calabar-Ikom-Ogoja-Kashinbila-Mambilla-Jalingo-Yola-Hong-Biu-Damaturu-Potiskum-Azare-Dutse-Kano) and Median backbone: 330kV line and substations from Shiroro in Nigeria up to Senegal.

### **Re-introduction of Pupillage Training by TCN**

Under the new leadership, TCN re-introduced the pupillage training program under which young engineers work under the tutelage of senior engineers for a period of one year before they can start work on their own. The pupillage program existed in PHCN where young engineers were trained for a period of two years. However, since generation and distribution are no longer in the same company as transmission, a committee established by the new Management to review the possibility of re-introducing the pupillage program, suggested only one year because the young engineers will be restricted to tutelage in transmission related services only. The re-introduction of pupillage does not in any way undermine the capacity of NAPTIN; it is meant to ensure engineers get the necessary practical

experience before they are exposed to the demands and hazards of High Voltage network.

### **Collaborations with other Organizations**

**a) AGIP JV & NNPC:** TCN is collaborating with AGIP JV with NNPC on the Okpai Phase 2 project. Under the agreement, the JV is helping TCN sand-fill two towers on the Okpai-Onitsha 330kV DC lines, which are currently footed in the River Niger. The JV is supporting TCN with GIS and sand-filling the access road to locations for 330/132kV and 132/33kV substations at Okpai and Kwale respectively.

**b) JICA:** TCN has intensified collaboration with JICA under which capacitor banks installation worth over \$13 Million was completed and commissioned at Apo, Abuja and Keffi (in Nassarawa State) as grant to FGN by the Government of Japan. Under similar collaborative arrangement, JICA is upgrading the Apapa GIS substation from 90MVA to 160MVA and rehabilitating Akangba 330kV substation. Discussion has started on the rehabilitation of Isolo, Ikeja West and Ojo Substations by the JICA under similar grant arrangement.



**UG Mohammed signing MOU with AGIP Vice Chairman/CEO (on the right) and Company Secretary of TCN on the left.**

c) TCN under the new leadership paid outstanding annual membership fees to the Association of Power Utilities in Africa (APUA) in the sum of US\$25,000. 00. This paved the way for the participation of TCN in the assistance offered by APUA and its partners. APUA got

support from the African Development Bank to train members utilities staff. TCN benefited from the training of over 300 engineers. The training was performed by the National Power Training Institute (NAPTIN) in quarters 3 and 4 in 2017. Over 300 engineers were trained



severally by ISO and TSP in 2018/2019 respectively.

d) **USAID:** Using Power Africa, USAID is supporting TCN in various capacities. It embedded a Business and Market Development Consultant in the Office of the MD and an Asset Register Consultant who has started documenting the assets of TCN. The organization is in the process of recruiting a firm for Relay Setting and Coordination/ Under-frequency Load Shedding, GIS Information System Experts and a Financial Management Specialist - all of whom will be embedded to support the organization.

e) TCN collaborated with the DFID through a support arrangement that recruited Phillips Consulting, to build the capacity of the nine regional transmission offices on project implementation. This was successfully carried out and result have started manifesting especially with the successful preparation of Eko Atlantic Lagos Grid Connection Project by the Lagos Region.

### **Staff Welfare**

TCN under the current management has made

the welfare of staff top most priority. Many of the staff Allowances that were stagnant since the time of privatization were at various times increased. Staff salary was also increased by 60%.

A consultant has also been hired to review the current medical administration of TCN. This includes a comprehensive review of TCN's current medical retainership. The consultant is also reviewing options for optimising other methods, including the NHIS and others that may give the best value for money for the organization in terms of health care.

The TCN Fitness Club has become a reality. At least 30 staff attend the morning jogging and other fitness exercises every Saturday. The motivation for the creation of the TCN Fitness Club came from a presentation by the MD when he contrasted his previous and current body sizes. The MD revealed that since he started his journey to healthy living in 2009, he commits to jogging a minimum of 10km almost every day. According to him, anybody that wants to be physically fit should make it a habit to exercise do so between 6am and 7am, for at least five days in a week.



**Minister of State Power Goddy with Members  
of TCN Fitness Club at Jabi Lake**