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Managing Power Distribution Projects

Introduction

The peculiar features of the distribution network of NIPP include:

- **Robustness of Substations** by initiating a 60m x 40m compact injection substation to accommodate bigger control room, outdoor equipment spacing to IEC standards, and address inadequacies of existing DISCO networks.
- **Security of supply & Reduction of losses** through adoption of (i) modern and quality line materials, (ii) High Voltage Distribution System of 11/0.415kV, 25kVA and 50kVA CSP transformers, located very close to residential consumers, thereby guaranteeing satisfactory and reliable receiving voltage with minimal outages.
- **Modernisation of Substation** through incorporation of: (i) 33/11kV injection transformer(s), Equipment gantry structures and cabling (ii) Ventilated Control room building for indoor switchgear, protection, automation and tripping unit panels, cash office, engineer's and maintenance rooms. (iv) Borehole and communication facilities; all of which are absent in existing DISCO sub-stations

Coverage and Locations

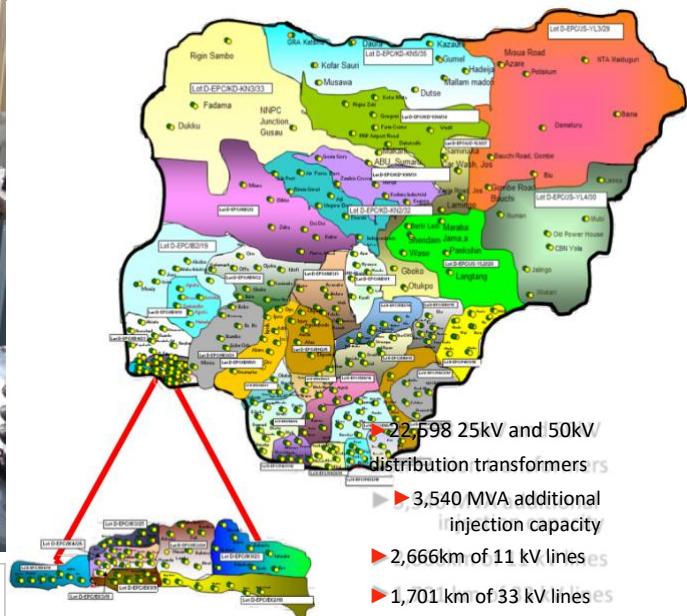
A total of 297 distribution injection substation projects and 933 Lines Projects, are being executed. The injection substations have respective capacities ranging from 2.5MVA to 30MVA. The lines projects are of 11kV and 33 kV capacities. These are located all over the country at the designated locations of the zones namely: Abuja, Kaduna/Kano, Jos/Yola, Enugu, Benin, Port Harcourt, Eko, Ikeja and Ibadan.

33 No. Distribution EPC contractors are involved in these projects that were conceived to reinforce the existing distribution network, by reducing the high losses on the lines, thereby improving the quality of power supply to consumers nation - wide. This has been achieved by using the High Voltage Distribution System (HVDS) as against the existing Low Voltage Distribution System . In the HVDS method, Completely Self- protected (CSP) 11/0.415kV transformers of lower rating than the conventional sizes have been deployed to serve fewer customers. Thus transformer faults will affect only few customers, maybe five houses, rather than the whole community

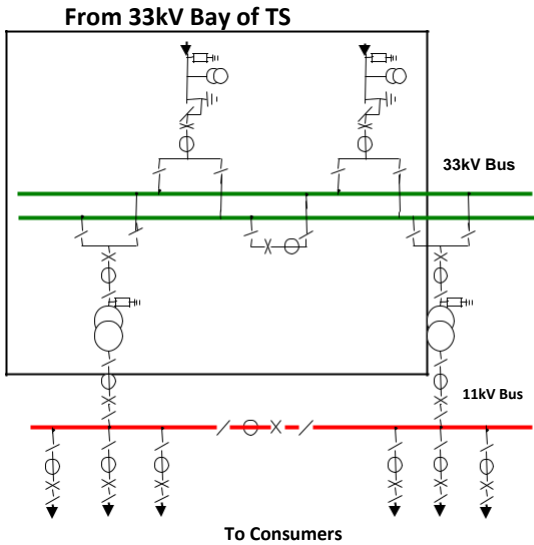


Completely Self Protected (CSP) Transformers for NIPP Distribution Projects

Locational Map of Distribution Substations Project Sites in the country



**Designed Single Line Diagram of A Typical
2x15MVA or 2x 7.5MVA, 33/11kV
Injection Substation (Double Bus, 2Nos
33kV lines Arrangement. TYPE A1**



Tour of Projects



Pankshin Injection Substation

Configuration of NIPP Distribution Projects

- 22,598 Amorphous Core Completely Self-Protected (CSP) transformers
 - 388 Nos Power Transformers (from 2.5 MVA to 15 MVA)
 - 190 Nos 11kV Switchgears,
 - 1,230 Nos 33kV outdoor switchgears,
 - 18 sets(of 9 panels each) of 33kV outdoor switchgears,
 - 3,540MVA additional injection capacity, 2,666km of 11kV lines and 1,701km of 33kV lines
- O.T. Otis Engineering (OTIS) as Project Consultant, OEM, supervises the manufacture, inspection , factory acceptance tests and supply of electro-mechanical equipments to distribution project sites



1x7.5MVA Kaduna Industrial S/S

Role of OTIS Distribution Team

As the Design and Management Consultant on the Project, OTIS deployed a team that directly coordinates the activities of the Project Consultants (appointed by the Client for each of the zones) and ensures that the projects are executed by the EPC contractors as designed and intended.



Gantry Structures Under Construction

Managing NIPP Distribution Projects

The NIPP Distribution Projects consist of 297 Distribution Substation Projects and 933 Lines Projects, making a total of 1230 Distribution Projects. Most of the projects comprise Injection Substations and 11kV lines with CSP transformer clusters, and 33kV Feeders. Because of the complexity and size of the projects, OTIS deployed expert resources for elaborate monitoring, planning and management. We thereby assist and advise the client in all managerial, technical and financial aspects of the projects .

Basic Engineering of NIPP Distribution Projects

- In conceptualizing the NIPP distribution projects, we considered the projected additional megawatts to be added to the national grid from ongoing Power Generation Projects (which we also supervise), based on which we prepared the preliminary design showing the load to be distributed to various zones of the country.
- During the power distribution planning, we ascertained different methods of arrangements and schemes by which power will be taken from the existing and proposed transmission stations (and existing distribution networks) to the consumers located across the country.
- In scoping of the NIPP distribution projects, capacities of the injection substations and the lengths of 33kV and 11kV lines that were efficient enough to satisfy the load consumption of the people in all the locations were determined.
- Specifications of all the power system components or equipment were prepared in order to meet the power demand in each of the injection substations, in line with relevant acceptable international standards and codes.
- From the developed scopes, designs, drawings and specified equipment for a given project, we prepared the Bill of Engineering Measurements and Evaluation (BEME) and developed cost estimates for each of the projects.
- The preliminary schedules for projects implementation. were worked out
- The tender documents required for the bidding exercise which specified the relevant information for tender ranging from standard letter of invitation, conditions of contract, terms of reference, standard forms of contract, technical specifications and requirements, bid submittals, technical proposals to financial proposals, were prepared.
- The tenders for the Engineering, Procurement and Construction Contracts, and Project Consultancy Contracts were evaluated. In doing this, we applied evaluation criteria and point system already specified, to all the technical and financial proposals from the competing firms.
- Negotiations with the successful firms were conducted in order to reach agreement on the philosophy of project execution, and clarify other issues of specification, schedule and budget that the client or the contractor might have.



Pre-commissioning Exercises in Progress

Activities of Otis Engineering in Managing NIPP Distribution EPC Contracts

- Support the Client in her daily business and strategic decision making;
- Monitor project planning, organization and implementation schedules through the Work plans submitted by the individual EPC Contractors through their Project Consultants;
- Supervise the project implementation with emphasis on time and budget. This is done through review and analysis of weekly/bi-weekly work plans submitted by the EPC contractors for daily activities.
- Regularly monitor the activities of the Project Consultants and EPC contractors on the basis of the information provided by EPC contractors/project consultants. The overall monitoring of the projects is concentrated on three major elements: the monitoring of the implementation schedules; the risk analysis of the project schedules; and monitoring of the payment schedules.



Works at Advanced Stages at an Injection Substation

Activities of Otis Engineering in Managing NIPP Distribution EPC Contracts

- Supervise the project quality management system through random site visits by our engineers.
- Evaluate and monitor projects' risks and advise the Client on their mitigation strategies.
- Monitor and advise the Client on any deficiencies to enable her take corrective measures, in order that slippages are minimized or eliminated, and ensure that the projects are completed on schedule and within budget. Our team regularly conducts assessment of current overall project status.



Completed - Installation of substation indoor panels

Project Reporting

In order to provide constant information on project implementation, the levels of progress are published in project reports and produced at regular intervals, usually monthly (for Distribution projects). The reports generally include a statement of major activities and events, including design meetings, submittals, approvals received, and decisions reached which will have an effect on the project. Such reports will also have information on any problems or constraints, together with recommendations.

As part of the reporting function, regular coordination design meetings are held to facilitate information exchange between parties, coordinate interfaces between the various lots, overcome difficulties pertaining to design, evaluate and control all financial matters and attend to miscellaneous questions.



A 7.5 MVA Transformer on Plinth

About Us



O. T. OTIS ENGINEERING

Corporate Headquarters of O.T. otis Engineering



O.T. OTIS Engineering is an indigenous Nigerian company with its Head Office at NO 30/23, Olu Agabi Close, Cadastral Zone CO2, Gwarinpa 1, Abuja, and branch offices in Warri, Benin, Calabar, Omoku, Yenogoa, and Katsina. It is a multi-disciplinary Consultancy company primarily established to provide Engineering Services/Support in the energy, industrial and allied sectors of the Nigerian economy with particular emphasis on Consultancy Services and Project Management, Cost Engineering, Operation and Maintenance of Electro-Mechanical Equipment. **OTIS Engineering** has successfully completed projects in virtually all the facets of the Industrial sector in Nigeria from Machine Tools/Metal Working through Iron and Steel to Automotive Manufacture, Petroleum Refining and Petrochemicals, Electric Power to Pulp and Paper, in over 20 years of existence.