

TRANSMISSION COMPANY OF NIGERIA PLC

Transmission Procedure No.1:

Application Process for New and Modified Connections

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1. INTRODUCTION

This procedure is required under the Grid Code; (1) to enable new and modified connections to the TCN network, and (2) to set out cost recovery issues including termination fees.

2. DEFINITIONS & ABBREVIATIONS

All words or phrases with capitalised initial letters are defined as stated here under.

However, where not defined, definitions are derived from the Grid Code.

“**connection**” has the meaning in the Grid Code – but is not capitalised due to its constant use.

“**Connecting User**” means a potential new User of the Transmission System asking for a new connection or an existing User asking for an increased/improved connection or for termination of connection.

“**Grid Connection Agreement**” has the meaning ascribed in the Grid Code.

“**Connection Offer**” has the meaning ascribed in the Grid Code.

“**Spur Line**” means a transmission circuit connecting a Connecting Users Generation Substation to the TCN Network.

“**Transmission Line Agreement**” means an agreement between the Connecting User and TCN where the User has constructed the Spur line and hands it over to TCN, this may or may not include rebates to the User over the asset life.

3. ISSUANCE OF DOCUMENT

This document shall be made available to all potential and existing connection users.

4. OBJECTIVE OF PROCEDURE

The objective of this procedure is to ensure that the connection process is clear, timely and that all financial obligations are clear, and that the connection process facilitates competition, reflects costs and takes into account the development of the network.

5. SCOPE

TCN is responsible for operating the Transmission Grid system and allowing equal and fair access to the network by making Grid Connection Agreements with all Users.

This process involves the issuing of the National Power System Master Plan and the Transmission Plan to interested parties advising users on locational opportunities and technical connection matters;

The Grid Code covers the application data requirements for this procedure.

This procedure gives timeline for the TSP connection design and approval process.

This procedure also covers termination of a connection.

6. FINANCIAL RESPONSIBILITIES

TCN shall be financially responsible for its Transmission System and any connecting equipment it owns.

The Connecting User shall be financially responsible for the sub-station it owns.

Where the Connecting User is a generator that builds a Spur Line to Connect to the Transmission System this shall be handed over to TCN under a Transmission Line Agreement.

7. RESPONSIBLE PARTIES AND REVISION PROCESS

The ED (TSP) is responsible for reviewing, revising and reissuing this procedure, following initial approval by NERC and non-disapproval thereafter.

The General Manager of Regulatory Affairs TCN is responsible for the operation of this procedure.

8. OVERVIEW

8.1. Timeline

The new User will make an application for connection specifying the physical location of its proposed substation and may specify the point at which he wants to connect to the Transmission System, and all relevant technical information as per the Grid Code.

TSP will:

- a) Perform system studies to verify the validity of the proposed connection.
- b) Make a firm offer as soon as reasonably possible, but in any case within four (4) months of a user supplying all necessary data and paying the relevant fee.

Action/Document	Discussion	Timeline
Informal discussion of the connection point	No formal rights or duties apply at this point. The applicant will however be informed of the application fee.	Open ended
Submission of Connection Application	TSP required to process it: <ul style="list-style-type: none"> • Review Data • Inform applicant if data is obviously incorrect or that additional data is required 	Three weeks (repeated)
Inform applicant that the data is correct	At this point the applicant will be asked to pay the required fee (See table of fees below).	TSP is to inform the applicant of this date
Perform system studies	TSP – but the applicant may ask for system data to do his own studies	No more than four months for the study Network data to be provided within two weeks of request
TSP confirms receipt of complete payment	at this point <ul style="list-style-type: none"> • Carryout system impact study • The Grid Connection Agreement is in draft form • A connection offer letter is drafted 	This should be no later than 4 months
Or if the study shows risk to the transmission system	Reject the application	Two weeks
Negotiate an improved	If this fails it becomes a dispute	Six weeks

application	under GC.	
Study confirmed alright by TCN	A connection offer letter is sent containing: <ul style="list-style-type: none"> • a timeline which shall state the time period for which the offer is open; • a system study showing the validity of the connection; and • a draft Grid Connection Agreement. 	One week, Time period which shall be at least 45 days;
The Connecting User shall submit an acceptance letter to TSP	This will mean the conditions of TSP offer are accepted by him. However there may be small items in the drafting to be sorted out.	This must be done within the validity of offer.
Acceptance of the offer shall be affected by execution of the Grid Connection Agreement		Within 1 month of the letter
If the applicant wishes to negotiate some clauses	This will depend on what TSP and NERC are willing to see changed	Up to three months
The Connecting User shall supply the data pertaining to the Connecting User's development		This shall be done within sixty (60) business days of acceptance of the connection offer.

8.2. Outputs

The outputs shall be:

- a connection offer letter which shall state the time period for which the offer is open, which shall be at least 45 days;
- a system study showing the validity of the connection; and
- a draft Grid Connection Agreement.

9. PROCEDURE FOR THE APPLICATION

9.1. Assumptions

A user has a requirement to connect to the Transmission system or to modify an existing connection. This can be termination of an existing connection.

The user has had discussions with TSP about the location of the connection(s), and the best places to connect to the system.

TCN makes connection offers on the basis of the Least Cost Technically Acceptable (LCTA) design. The Least Cost Technically Acceptable connection design is one that:

1. Complies with the Transmission System Planning Security Standards;
2. Complies with all other applicable standards, rules and codes;
3. Takes into account the committed developments in the Transmission System (including any dismantling of the system); and
4. Represents the least overall cost for implementation of the minimum standard of connection.

In order to make an application the user must provide data to TSP, (as set out in Part 3, Section 4 of Grid Code Version 01). The user is requested to use the attached form (Appendix 1) to provide this data.

Application fees are payable in respect of applications for new Grid Connection Agreements and modifications to existing agreements based on the reasonable costs transmission licensees connection studies as shown in Clause 9.5.

An application starts on the payment of the initial fee or when TSP accepts the technical data as being complete and fit for purpose as required under the Grid Code.

On receipt of the technical data TSP shall within two (2) weeks inform the Connecting User of any data that is missing or inconsistent, this shall also apply to resubmitted data. When the technical data provided is correct in accordance with the Grid Code, TSP shall inform the user.

TSP will advise the applicant of this date.

TSP will prepare a connection offer as soon as is reasonable practical, but in any case within four (4) months of the above date.

The Connecting User shall submit an acceptance letter to TSP if the conditions of TSP offer are accepted by him within the validity of offer.

9.2. System studies:

Based on the data supplied by the Connecting User, TSP will co-ordinate with the System Operator to perform the system impact studies required to evaluate in detail the impact of the proposed Connecting User development on the Transmission System. (The magnitude and complexity of any Transmission System extension or reinforcement varies according to the nature, location and timing of the proposed Connecting User's development.)

9.3. Connecting User(s) studies:

Upon request of the Connecting User, TSP shall provide to the Connecting User with adequate and sufficient information regarding the Transmission System, to enable the Connecting User to conduct impact Studies on the Connecting User's system, and/or the Transmission System as it considers appropriate.

9.4. Point of Connection and Connection Voltage

During the application for connection process, based on the results of the System Studies, TSP will agree with the Connecting User the voltage level and point of connection to the Transmission System. TSP may, eventually, specify a different Connection Point or connection voltage in order to avoid potential disturbance caused by the Connecting User's Equipment to existing Users or for other technical reasons, or may agree alternative methods for minimizing the effects of disturbing loads. This alternative connection point or connection voltage may be offered to minimise costs.

Should the Connecting User through its own studies disagree with the connection, this shall be discussed with TCN and in extremis, the Grid Code disputes procedure shall be utilised.

In determining the point of connection, including the voltage level, the following aspects shall be taken into consideration:

- 1) No discrimination: In assessing the technical requirements of a Connecting User's connection, TSP shall not unfairly discriminate between the Connecting User and another Connecting User of a similar category, location or size, although it shall not be technically or economically practicable to achieve uniformity of method of connection at all times.
- 2) Generator connection point and voltage level: The Transmission System voltage level and the busbar configuration at which a Generator shall be connected to the Transmission System shall depend upon, but shall not be limited to the following:
 - a. the size of the Generating Units and the number of Generating Units comprised in the Connecting User's System, plus any intended future expansion of the power station;
 - b. consistency with future development of the Transmission System;
 - c. proximity to the existing Transmission System.
- 3) Directly Connected Customers connection point and voltage level: The Transmission System voltage level at which a Directly Connected Customers shall be connected to the Transmission System shall depend upon, but shall not be limited to the following:

- a. the size of the Active Power Demand at the Connection Point;
 - b. consistency with future development of the Transmission System;
 - c. proximity to the existing Transmission System;
 - d. the existence of generation on the Connecting User's System; and
 - e. the cost of the proposed connection.
- 4) Distribution Company connection point and connection voltage level: the Transmission System voltage level at which a Distributor shall be connected to the Transmission System shall depend upon but shall not be limited to the following:
- a. the size of the Active Power Demand at the Connection Point;
 - b. consistency with future development of the Transmission System;
 - c. proximity to the existing Transmission System;
 - d. the existence of generation on the Connecting User's System
 - e. consistency with co-ordinated planning of the Transmission System and of the Distribution System; and
 - f. the cost of the proposed connection.
- 5) Method of connection: The method of connection used may exceed the relevant standards where this is required by the Connecting User. In this case TSP shall accept this provided:
- a. it has no consequent negative impacts on the System or on other Connected parties; and
 - b. the Connecting User pays all relevant costs associated with this higher standard.

After evaluating the application submitted by the Connecting User, TSP shall inform the Connecting User whether the proposed application is acceptable or not. TSP may disapprove an application for connection or a modification of an existing connection to the Transmission System only if it is determined through the System Studies that the proposed connection or modification does not fulfil the technical requirements or results in the degradation of the Transmission System.

If the application of the Connecting User is not acceptable:

- 1) TSP shall notify the Connecting User within two weeks as to why its application is not acceptable.
- 2) TSP shall include in its notification, details of the amendments required to make the Connecting User's application acceptable to the Transmission System.
- 3) TSP and the Connecting User shall negotiate the modified application so as to minimise Connecting User costs while maintaining TSP's technical standards.
- 4) If after six weeks TSP and the Connecting User have not come to agreement the matter shall become a dispute under the Grid Code.
- 5) TSP shall promptly report any rejected application to NERC.

9.5. Connection Fees

The Connection fee is made up of;

1. Cost of conducting Evacuation Study
2. Cost of conducting meetings to discuss the Connection Agreement
3. Cost of the Connecting Equipment.

1.0 Evacuation Study

The cost evacuation study for the three levels of voltage is as shown below

	Voltage Level		
	330kV	132kV	33kV
Generator	₦10m	₦10m	---
Load	₦7.00m	₦6m	₦5m

2.0 Conduction of connection negotiation meetings

To conduct Connection Agreement negotiation meetings a flat rate of ₦10m will be charged on each applicant. This will take care of transportation, meeting space and incidental expenses

3.0 Cost of Connecting Equipment

This is the cost of all electrochemical and civil works for the equipment used to connect the user to the TCN grid.

Transformer Configuration	Connecting equipment	Cost (₦)
2x60MVA 132/33kV and 6No 33kV feeders	2busbar and 6No fully equipped 33kv feeders	205m

Note that this price does not include the power transformer, all 132kV equipment, grounding reactor etc. on the 33kV transformer incomer.

Payment for Connecting Equipment

The payment of the Connecting equipment can be by two options (option A or B) as agreed with TCN.

Option A:

Transmission Line and Associate Substation extension equipment (TLA) Agreement.

TCN and the User will enter into a contract agreement whereby the process of contract award to an EPC contractor for the construction and installation of the connecting equipment while the User will pick up the bill. However, TCN will be fully involved in the contract procurement process and also in the construction and commissioning of the project. The procurement process must follow open and competitive bidding.

Option B:

User to pay TCN for the cost of Connecting Equipment.

This cost depends on the type of busbar arrangement at the receiving substation and the length of the line to be constructed. This cost is better determined when the substation configuration and the length of the line has been determined.

For Disco connecting to TCN network at 33kV of 2x60MVA, 132/33kV substation.

The connecting equipment are;

- 1) 2no. 33kV busbar isolators at TCN side.
- 2) 2no. 33kV busbar arrangement.
- 3) 6no. fully equipped 33kV feeders.
- 4) Fully equipped automated control and relay system
- 5) A/C and D/C supply system.
- 6) Air conditioned Control Room environment.

Please note that the prices indicated above are indicative only. They are subject to changes and modifications as the reality on ground during procurement dictates.

9.6. Offer Detail:

Where an application to connect is accepted by the TSP, the TSP shall submit to the Connecting User an offer to connect to the Transmission System. This Connection Offer shall include, but shall not be limited to, the following:

- 1) A connection offer letter:
 - a) This shall state the time for which the offer is open:
 - i) This must be at least 45 days;
- 2) A system study showing the validity of the connection:
 - a) This shall include load flows, security studies and stability studies or as determined by the Commission from time to time;
 - b) It may include requirements for reactive compensation and/or harmonic filtering; and
- 3) A draft Grid Connection Agreement which will include:
 - a) Proposed substation layout (provided by the Connecting User)
 - b) Boundary points between TCN and Connecting User assets
 - i) Ideally all boundaries (ownership, maintenance, control, commercial/metering) should be the same;
 - c) Other technical details as per the Grid Code;
- 4) Where there is a spur line to be constructed by the Connecting User and handed over to TCN there will be a separate Transmission Line Agreement which will contain:
 - a) Technical requirements on the line construction;
 - b) Outline line route and TCN substation connection; and
 - c) Commercial rebate information.
- 5) Where issues of metering are mentioned in the procedure, the Metering Code Version 02 shall apply.

9.7. Acceptance of the offer:

A connection offer is valid for a period stated in the offer, which shall not be less than forty five (45) days, after which the offer shall automatically lapse.

Acceptance of the offer shall be affected by execution of the Grid Connection Agreement by both parties, which renders TSP works relating to that Connecting User development committed and shall bind both parties in accordance with its terms.

Where the Connecting User accepts the offer but needs to negotiate details of the Grid Connection Agreement, it shall inform TSP in writing of the Clauses it wishes to negotiate. However, clauses relating to Orders, Regulations, Standards and Codes issued by the Commission are non-negotiable.

If TSP agrees that it is reasonable to negotiate these clauses it will inform the Connecting User and begin negotiation. The offer shall remain open during the negotiation. However after a period of three (3) months from the date of the letter TSP will have the right to withdraw the offer.

If TSP believes that changing the clauses would unfairly discriminate against other Users it can refuse to negotiate. The Connecting User can either accept the Grid Connection Agreement as it stands or appeal to NERC.

The above two paragraphs can be applied to individual clauses rather than the agreement as a whole.

The Connecting User shall supply the data pertaining to the Connecting User's development within sixty (60) business days of acceptance of the connection offer.

Committed planning data: Once a connection offer has been accepted, all data supplied in the application form and any other data submitted along with the application form, shall be treated as committed project planning data.

9.8. Termination of Connection

Where the request is for termination of a connection with TSP:

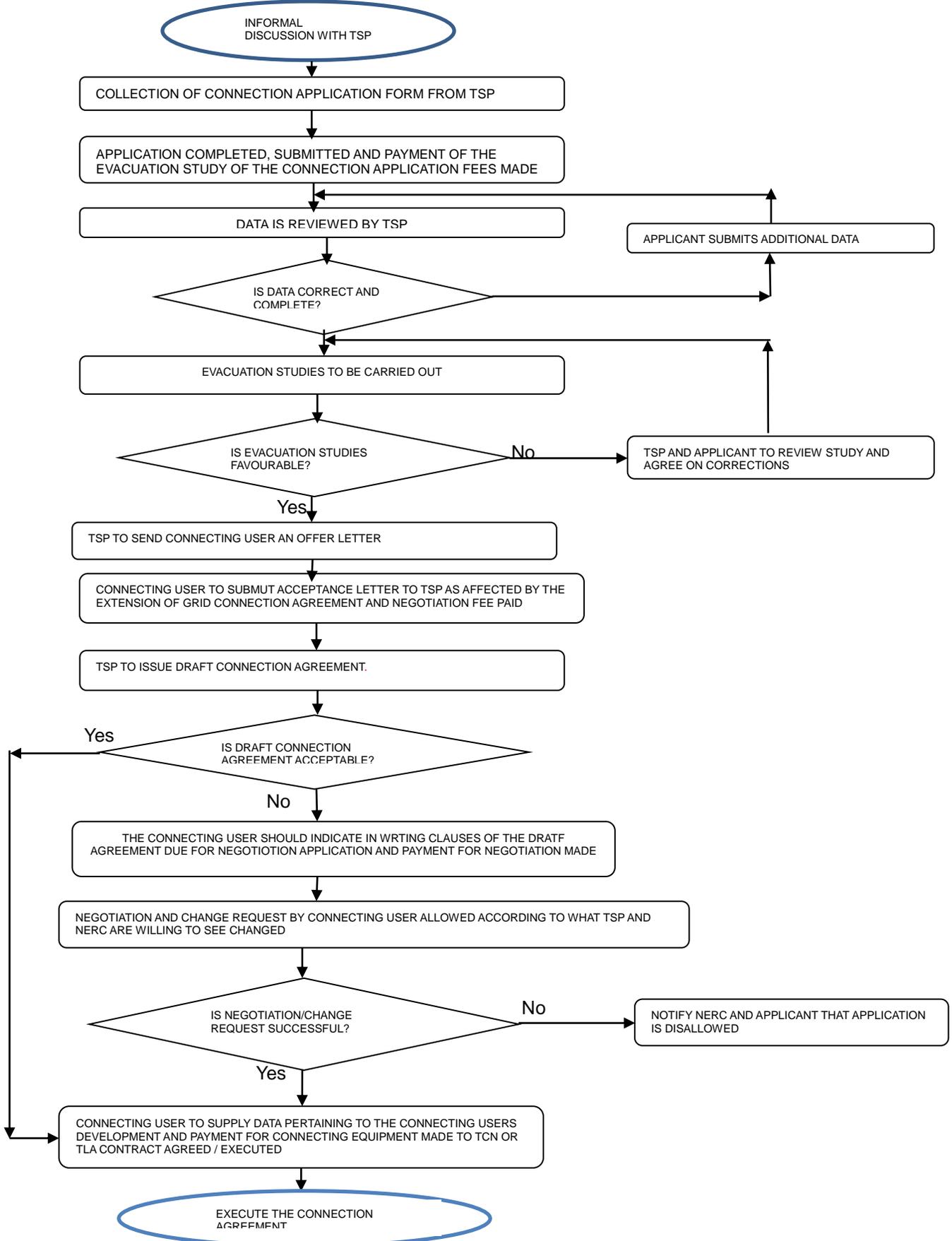
- 1) If connection remains as is upon termination, there will be no cost.
- 2) If connection is disturbed on termination then the parties will assess what needs to be done with parties then agreeing to the fees for work required by TSP.

Examples of reasonable costs of removal and making good include the following:

- 1) If a circuit breaker is removed as a result of the disconnection this may require the protection systems to be modified.
- 2) If an asset is terminated and its civil works removed the levels would need to be made up to safe/standard status.

The procedures under Clause 9 is represented by the flow chart below.

FLOWCHART OF APPLICATION PROCEDURE FOR NEW AND MODIFIED CONNECTIONS



10. CONTRACTUAL FRAMEWORK

10.1. The Grid Code

The Grid Code is a multi-user document creating contractual obligations among and between users of the transmission system and TCN. Persons wishing to connect to and use the network must accede to the Grid Code and enter into a Grid Connection Agreement with TSP.

The Grid Code and the Grid Connection Agreement together with the Transmission Use of System Agreement set out the users obligations to:

- Pay all use of system charges.
- Comply with the Grid Code.
- Enter into an appropriate mandatory Ancillary Services Agreement.

All Connecting User's should make themselves familiar with the Grid Code and the obligations that it places on users of the Power System. The following sections of the Grid Code are specifically related to connections to the Transmission System, however it is important these are considered within the context of the Grid Code as a whole and any Connecting User should ensure they are in full compliance of all obligations stipulated in the Grid Code.

10.2. Relevant Sections of the Grid Code

Connecting Users and the TSP should be fully aware of all sections of the Grid Code.

The following sections of the Grid Code relate to new connections and this Procedure (numbering is given for the current Gazetted Version of the GC and then the final draft submitted under GC Amendment 3). There are over 250 uses of the word connection in both versions of the GC hence only the major sections are pointed out here.

This section listing is to guide the ED (TSP) as to when it is necessary to consider reviewing, revising and reissuing this procedure. I. e. when any of these sections of the Grid Code change this procedure must be reviewed. Note however that changes to other sections of the Grid Code might also be a cause for review.

Reference	Clause in Current Gazetted GC	Clause in GC under Amendment 3
connection planning data	Planning Code 4.1.6	Clause 8.1.6
standard planning data	Planning Code 4.2	Clause 8.2
generating unit data	Planning Code 4.3	Clause 8.3
connection conditions	GC Part 3	GC chapter 3
connections	Operations Code 7.6	Clause 19.6
safety and co-ordination	Operations Code 13	Clause 25
data provision	Appendices 5, 6 and 7	Appendices 5, 6 and 7

Grid Code Appendices 5, 6 and 7 are copied in at the end of this procedure.

ANNEXURE 1: CONNECTION / MODIFICATION APPLICATION FORM

This application form is for applications for new or changed connections from:

- DIRECTLY CONNECTED POWER STATIONS
- DIRECTLY CONNECTED CUSTOMERS
- DISTRIBUTION SYSTEMS DIRECTLY CONNECTED TO THE TRANSMISSION SYSTEM

PLEASE CAREFULLY STUDY THE FOLLOWING NOTES.

PLEASE ENSURE THE APPLICATION COMPLYS FULLY WITH ANY REQUESTS FROM TSP BEFORE SIGNING AND SUBMITTING THE APPLICATION FORM.

Please note that certain terms used in the application form are defined in the Interpretation and Definitions of the Grid Code. If the Applicant has any queries regarding this application or any related matters then the Applicant is recommended to contact TCN (the Company) where our staff will be pleased to help.

It is sensible for the Connecting User to inform TSP that it wishes to build facilities at a particular location or in an area of the country. TSP will then informally advise the Connecting User of the potential connection point options for applicant to choose.

1. The Company requires the information requested in this application form for the purpose of preparing an Offer (the "Offer") to enter into an agreement for connection to and in the case of a directly connected power station, use of the Electricity Transmission System. It is essential that the Applicant (user) supplies all information requested in the application form and that every effort should be made to ensure that such information is accurate.
2. Where the Company considers that any information provided by the Applicant is incomplete or unclear, or further information is required, the Applicant will be requested to provide further information or clarification. The provision/clarification of this information may impact on the Company's ability to commence preparation of an Offer.
3. Should there be any change in the information provided by the Applicant then the Applicant should immediately inform the Company of such a change. Where this is a change in the information provided for Sections B to D then the Applicant should contact the Company to see if such a change can be accommodated as it is unlikely that material changes could be accommodated. If the Company cannot accommodate such a change bearing in mind the timescales within which the Offer must be made then the application will be processed on the original information although it is open to the Applicant to withdraw the application.
4. The Company shall charge the Applicant, and the Applicant shall pay to the Company, the Company's Engineering Charges in relation to the application. A fee will be charged by the Company *in accordance with this Operating Procedure*. No application will be considered until such payment has been received.
5. The effective date upon which the application is made shall be the later of the date when the Company has received the application fee pursuant to paragraph 4 above or the date when the

Company is reasonably satisfied that the Applicant has completed Sections A-D. The Company shall notify the Applicant of such date.

6. The Company will make the Offer in accordance with the terms of this operating procedure.
7. The Company will make the Offer as soon as is reasonably practicable and, in any event, **WITHIN FOUR (4) MONTHS** of the effective date of the application or such later period as the Authority may agree. The Offer may, where it is necessary to carry out additional extensive system studies to evaluate more fully the impact of the proposed development, indicate the areas that require more detailed analysis. Before such additional studies are required, the Applicant shall indicate whether it wishes the Company to undertake the work necessary to proceed to make a revised Offer within the Four (4) month period or, where relevant the timescale consented to by the Authority. To enable the Company to carry out any of the above mentioned necessary detailed system studies the Applicant may, at the request of the Company, *be required to provide some or all of the Detailed Planning Data listed in the Grid Code.*
8. In accordance with the Grid Code the Company will need to disclose details of Bilateral Agreements entered into and shall need authorisation from the Applicant in respect of this.
9. If the Applicant is not already a Grid Code Party the Applicant will be required as part of this application form to undertake that he will comply with the provisions of the Grid Code for the time being in force. Copies of the Grid Code are available from the Company's and the Applicant is advised to study them carefully. Data submitted pursuant to this application shall be deemed submitted pursuant to the Grid Code.
10. The Company's Offer will be based upon its standard form terms of Connection Offer and the Applicant should bear in mind the Company's standard form terms of Offer when making this application.
11. In particular, the Company prepares Offers upon the basis that each party will design, construct, install, control, operate and maintain, in the case of the User, the Plant and Apparatus which he will own and, in the case of the Company, Transmission Plant and Transmission Apparatus.
 - a. Where the Connecting User is a generator it may construct the Spur Line and hand it over to the Company under a Transmission Line Agreement.
12. Applicants of a type set out in Grid Code, Generators should appreciate that they will be required to perform Mandatory Ancillary Services to ensure that System Operational Standards can be achieved. This requirement may have implications towards Plant specification. You should be satisfied that before an application is made that your intended Plant design can meet the requirements.
13. The Company has additional requirements in respect of information where the Applicant doesn't intend to connect at all locations, but intends to choose which location or locations to connect at on the basis of the offers it receives. Question 5 in Section A is intended to assist the Company in early identification of this situation arising.
14. Applicants have the option to request a Connection Offer on the basis of a Design Variation. In requesting such an Offer, the Applicant acknowledges that the connection design (which provides for connection to the Electricity Transmission System) will fail to satisfy the deterministic criteria detailed in (security standards). In making such an Offer, the Company may include Restrictions on Availability. If Applicants require further assistance on this option they are recommended to contact the Company before completing this application form.

15. The Applicant will pay a fixed price application fee in respect of their application.
16. The Company will provide an Offer based upon the System Security and Quality of Supply Standards applying. These criteria represent the minimum requirements for the planning and operation of the National Electricity Transmission System. The Security Standards allows for a generation or demand Applicant to request a variation to the connection design. For example, such a connection design variation may be used to take account of the particular characteristics of a power station, the nature of connection of embedded generation or particular load cycles.
17. Any variation to connection design must not reduce the security of the Transmission System to below the minimum planning standard, result in any additional costs to any particular customer and compromise a transmission licensee's ability to meet other statutory obligations or licence obligations.
18. Please complete this application form in **BLACK PRINT** and return it together with the appropriate application fee to TCN.

SECTION A. DETAILS OF APPLICANT (in respect of this application)

1.

Registered Company

Name:.....

Address (of Registered Office in the case of a Company)

.....
.....
.....

Company Number:.....

Parent Company Name (if applicable):.....

2.

Company Secretary or person to receive notices

Name:.....

Email:.....

Telephone:.....

3.

Commercial Contact/Agent (person to receive Offer if different from
Company Secretary or person to receive notices identified in 2 above)

Name:.....

Title:.....

Address:.....

.....
.....

Email:.....

Telephone:.....

4. This is a fixed price fee application

5. Have you made any applications for connection to the Transmission System which are being processed prior to Offer by the Company or where an Offer has been made that Offer has not yet been accepted by you but remains open for acceptance?

If so, are such applications intended as alternatives to this one i.e. you intend to choose which of this or those other applications to proceed with on the basis of the offer made.

Yes – please list the applications.

.....

.....

No

Not sure (The Company will contact you to clarify.)

SECTION B. THE PROPOSED POINT OF CONNECTION

1. Please identify (preferably by reference to an extract from a Map for locations the intended location (the "Connection Site") of the Plant and Apparatus (the "User Development") which it is desired should be connected to the Electricity Transmission System and where the application is in respect of a proposed New Connection Site other than at an existing sub-station. Please specify the proposed location and name of the New Connection Site (which name should not be the same as or confusingly similar to the name of any other Connection Site) together with details of access to the Connection Site including from the nearest main road.

.....
.....
.....

2. Please provide a plan or plans of the proposed Connection Site indicating (so far as you are now able) the position of all buildings, structures, Plant and Apparatus and of all services located on the Connection Site.

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.....
.....

3. Give details of the intended legal estate in the Connection Site in so far as you are aware.

.....
.....
.....

4. Who occupies the Connection Site in so far as you are aware?

.....
.....

5. If you believe that a new sub-station will be needed, please indicate by reference to the plan referred to in Section B question 2 above the Applicant's suggested location for it - giving dimensions of the area.

.....
.....

6. If you are prepared to make the land necessary for the said sub-station available to the Company please set out brief proposals for their interest in it including (if relevant) such interest and the consideration to be paid for it.

.....
.....

7. Is space available on the Connection Site for working storage and accommodation areas for please indicate by reference to the plan referred to in Section B question 2 above the location of such areas, giving the approximate dimensions of the same?

.....
.....
.....

8. For Connection Sites, please provide details (including copies of any surveys or reports) of the physical nature of land in which you have a legal estate or legal interest at the proposed Connection Site including the nature of the ground and the sub-soil.

.....
.....

9. Please give details and provide copies of all existing relevant planning and other consents (statutory or otherwise) relating to the Connection Site and the User Development and/or details of any pending applications for the same.

.....
.....

10. Is access to or use of the Connection Site for the purposes of installing, maintaining and operating Plant and Apparatus subject to any existing restrictions? If so, please give details.

.....
.....
.....
.....

11. If you are aware of them, identify by reference to a plan (if possible) the owners and (if different) occupiers of the land adjoining the Connection Site. To the extent that you have information, give brief details of the owner's and occupier's estates and/or interests in such land.

.....
.....
.....

SECTION C. TECHNICAL INFORMATION

1.

Summary of Application (brief description of plant to be connected):

.....
.....
.....

2.

Please provide full details of the proposed application together with the relevant data as listed in Appendices 5 and 6 of the Grid Code which are applicable to you. Note: the data concerned forms part of the Planning Chapter and Connection Conditions Chapter. Applicants should refer to these sections of the Grid Code for an explanation.

3. Please provide a copy of your Safety Rules if not already provided to the Company.

- a. Included
- b. Already provided
- c. Will be provided later

4. Please indicate if your plant may be able to provide (or you could consider providing) the following technical capability):-

- a. Generation from Auxiliary Units (Reserve Services)
- b. Spinning Generation
- c. Fast Start capability
- d. Frequency Response above Mandatory requirements
- e. Demand Reduction / Management
- f. Reactive capability above Mandatory requirements
- g. Synchronous Compensation
- h. Black Start Capability
- i. Emergency Maximum Generation
- j. Intertrip
- k. Other (please detail below)

.....
.....

5. Please confirm your intended Connection Entry Capacity (MW) at the Connection Site

- a. Generating Unit(s) (if applicable)
- b. Generating Unit 1
- c. Generating Unit 2
- d. Generating Unit 3
- e. Generating Unit 4

Details of additional Generating Units are to be provided here

6. Please state the required Transmission Entry Capacity.....MW

7.

- a. You would like an offer that is compliant with the deterministic criteria Detailed in {security standards} YES/NO

and/or

- b. You would like an offer on the basis of a Design Variation. YES/NO
- c. If YES, please provide any information relevant to such an offer below:

.....

If yes, please confirm if you require information from the Company in relation to the probability of Notification of Restrictions on Availability being issued.

YES/NO

8. Please give details of the proposed ownership boundary.

.....

10. Are you considering building any assets that would be identified as Transmission Connection Assets?

If you indicate yes the Company will contact you to discuss further details.

Yes [] No []

SIGNED BY

.....

For and on behalf of the Applicant

Date:

ANNEXURE 2: (GC APPENDIX 5) – DATA REGISTRATION REQUIREMENTS

5.1 Introduction:

The System Planning specifies the technical and design criteria and procedures to be adopted by the TCN for the planning and development of the Transmission System. The Users of the Transmission System shall take the Data Registration for system planning into account for planning and development of their own Equipment or Apparatus.

5.1.1 Reinforcements and extensions to the Transmission Network arise due to many reasons of which a few are mentioned below:

1. A development on a User's Equipment or Apparatus already connected to the Transmission Network as a User development.
2. Introduction of a new connection point between a User's Equipment or Apparatus and the Transmission Network.
3. The need to increase Transmission Network capacity, removal of operational constraints, maintenance of Security Standards and meeting general increases in Demand.
4. Steady state and transient stability considerations.
5. Cumulative effects of any combination of the above four.

5.1.2 The work of such reinforcement and extension to the Transmission Network may also involve work at a connecting point (entry or exit) of a Power Station/Distributor to the Transmission Network.

5.1.3 The development of the Transmission Network must be planned in advance duly allowing sufficient lead time, considering the following:

1. Time required for obtaining all the necessary statutory approvals like Environmental Impact Assessment clearance, Forest clearance, Road or Railway clearance, clearance from aviation authorities, etc., and the right of way permissions wherever required,
2. Time required for detailed engineering, design and construction work to be carried out. This Network Planning, therefore, enforces the time scales for exchange of information between the TCN and the User(s). All the concerned parties, wherever appropriate, shall have due regard to the confidentiality of such information.

To enable the TCN to discharge its responsibilities under its Transmission Licence Conditions by conducting System Studies and preparation of perspective plans for Demand, Generation and Transmission Network expansion as detailed under the Grid Code, all Users of the Transmission Network shall furnish all the data to the TCN from time to time detailed below under Data Registration Requirement of Sections 8 and 12.

BASIC DATA REQUIREMENTS BASED ON SECTIONS 8 AND 12,

Configurations of sites will vary hence the data requirements below are broadly phrased.

The interpretation of the requests for data is to be based on what the User owns or has necessary access to.

Ancillary Services (Power Quality Services)

The provision of Ancillary Services by generators is critical to the secure operation of the Power System. The requirement to provide them is compulsory on generators under the MR, GC and the Generator Licence.

On all timescales the Generator must provide the SO with its AS capability covering:

- 1) Reserve and Frequency Control
 - a) Reserve capability at all operating levels
 - i) Based on Frequency drop

- ii) Response time
- iii) Sustainability
- b) automatic deloading capability at high frequencies
- 2) Voltage Control
 - a) Maximum and minimum MVAR levels
 - b) MVAR response to Voltage change
- 3) Black Start
 - a) This is a compulsory service.

PART-1 - GENERATION

To be furnished by Generators to TCN

5A Standard Planning Data (Generation)

THERMAL

I. GENERAL: -

1. Site:	<ul style="list-style-type: none"> i. Furnish location map to scale showing roads, Railway lines, Transmission lines, Rivers, and reservoirs if any. ii. Fuel linkage (Natural Gas, Naphtha, Oil pipeline) iii. Furnish information on means of Coal transport from mines or means of coal carriage if coal is to be brought from distance. iv. In case of other fuels, furnish details of sources of fuel and their transport. v. Water Sources (furnish information on availability of water for operation of the Power Station). vi. Environmental (State whether forest, lands mining clearance areas are affected).
2. Site Map: (To scale)	Showing area required for Power Station coal linkage, coal yard, water pipe line, ash disposal area, colony etc.
3.	Approximate period of construction.
4.	Guaranteed Plant Load Factor.
5.	Annual Generation.

II. <u>Connection:</u>	
1. Point of connection	Furnish Single Line Diagram of the proposed connection with the system.
2. Step up voltage for connection in kV	
III. <u>Station Capacity:</u>	
1. Total Power Station capacity (MW).	MW
2. Ancillary Services provided	
3. No. of Units and Unit size MW.	State whether development will be carried out in phases and if so, furnish details.
4. Generator Unit Data:	<p>3 Steam Turbine- State Type, capacity, steam pressure, steam temperature, heat rate, efficiency etc.</p> <p>4 Generator:</p> <p>a) Type</p> <p>b) Rating (MVA)</p> <p>c) Terminal Voltage (kV)</p> <p>d) Rated Power Factor</p> <p>e) Frequency Response Table</p> <p>f) Reactive Power capability (MVA_r) in the range 0.95 leading and 0.85 lagging.</p> <p>g) Short Circuit Ratio</p> <p>h) Direct axis transient reactance (% on MVA rating)</p> <p>i) Direct axis sub-transient reactance (% on MVA rating)</p> <p>j) Auxiliary Power requirement</p> <p>5 Generator Transformer / Station Transformer</p> <p>a) Rated Capacity (MVA)</p> <p>b) Voltage Ratio (HV/LV)</p> <p>c) Tap change range (+% to -%)</p> <p>d) On-load or off-load tap change</p> <p>e) Percentage Impedance (Positive Sequence at Full load).</p>

5B Hydro Electric:**1. General:**

1. Site	Furnish location map to scale showing roads, railway lines, Transmission lines
2. Site Map (To scale)	Map showing proposed dam, reservoir area, water pipe system, fore bay, powerhouse etc.
3. Submerged Area	Furnish information on area of villages submerged, forestland, agricultural land etc.
4. Approximate period of construction.	
5. Commissioning Date	
6. Annual Generation: expected water flow, expected Energy, annual load factor	

5B.1. Connection:

1. Point of connection	Furnish Single Line Diagram of proposed connection with the Transmission System
Step up voltage for connection kV	

5B.2. Station Capacity:

1. Total Power Station capacity MW	State whether development would be carried out in phases and if so furnish details
2. No. of Units and unit size MW.	

5B.3 Generating Unit Data:

1. Operating Head (In Mtr)	Maximum Minimum Average
2. Turbine	State type and capacity

3. Generator	<ul style="list-style-type: none"> a) Type b) Rating (MVA) c) Terminal Voltage (kV) d) Rated Power Factor e) Reactive Power capability (MVA_r) in the range of 0.95 leading and 0.85 of lagging. f) Short Circuit Ratio g) Direct axis transient reactance (% on rated MVA) h) Direct axis Sub-transient reactance (% on rated MVA) i) Auxiliary Power Requirement
4. Generator – Transformer	<ul style="list-style-type: none"> a) Type b) Rated Capacity (MVA) c) Voltage Ratio HV/LV d) Tap change Range (+ % to - %) e) On-load or off-load tap change f) Percentage Impedance (Positive sequence at Full load rating)

5C Detailed Planning Data (Generation)

5C.1 Thermal Power Stations

I. General:

1. Name of Power Station:
2. No. and capacity of Generating Units (MW):
3. Ratings of all major equipment:
 - a) Boilers and Major accessories (Steam temperature/pressure)
 - b) Coal Mill (KW)
 - c) Feed water Pumps (KW)
 - d) Major Fans (KW)
 - e) Turbines
 - f) Alternators
 - g) Generating Unit Transformers (MVA)
 - h) Station Transformers
4. Auxiliary Transformers (MVA)
5. Single Line Diagram of Power Station and switchyard.
6. Relaying and metering diagram.
7. Neutral Grounding of Generating Units.
8. Excitation control (type - E.g. Static Excitation System, Fast Brushless)
9. Earthing arrangements with earth resistance values.

5C.2. Protection and Metering:

1. Full description including settings for all relays and protection systems installed on the generating Unit, Generating Unit Transformer, Auxiliary Transformer and electrical motor of major equipment listed.
2. Full description including settings for all relays installed on all outgoing circuits from Power Station substation switchyard, tie circuit breakers, incoming circuit breakers.
3. Full description of inter-tripping of Breakers at the point or points of Connection with the Transmission System.
4. Most probable fault clearance time for electrical faults on the User's system.
5. Full description of operational and commercial metering schemes.

5C.3 Switchyard:

1. In relation to interconnecting transformers between High Voltage Transmission System and the Generator:
 - a) Rated MVA
 - b) Voltage Ratio
 - c) Vector Group
 - d) Positive sequence reactance (maximum, minimum, normal Tap(% on MVA)
 - e) Positive sequence resistance (maximum, minimum, normal Tap (% on MVA)
 - f) Zero sequence reactance (% on MVA)
 - g) Tap changer Range (+ % to - %) and steps
 - h) Type of Tap changer (off-load/on-load)
2. In relation to switchgear including circuit breakers, isolators on all circuits connected to the points of connection:
 - a) Rated Voltage (KV)
 - b) Type of Breaker (MOCB/ABCB/SF6)
 - c) Rated short circuit breaking current (kA) 3 Phase
 - d) Rated short circuit breaking current (kA) 1 Phase
 - e) Rated short circuit making current (kA) 3 Phase
 - f) Rated short circuit making current (kA) 1 Phase
 - g) Provisions of auto reclosing with details.
3. Lightning Arresters: technical data.
4. Communication- Details of PLC equipment installed at points of connections.
5. Basic Insulation Level (kVp).
 - a) Busbar.
 - b) Switchgear.
 - c) Transformer Bushings.
 - d) Transformer windings.

5D. Generating Units: -

5D.1. Parameters of Generating Units:

1. Rated terminal voltage (KV)
2. Rated MVA
3. Rated MW
4. Inertia constant (MW Sec./MVA) of Generator, Exciter and Turbine
5. Short circuit ratio
6. Direct axis synchronous reactance (% on MVA)
7. Direct axis transient reactance (% on MVA)
8. Direct axis sub-transient reactance (% on MVA)
9. Quadrature axis synchronous reactance (% on MVA)
10. Quadrature axis transient reactance (% on MVA)
11. Quadrature axis sub-transient reactance (% on MVA)
12. Direct axis transient open circuit time constant (Sec)
13. Direct axis sub-transient open circuit time constant (Sec)
14. Quadrature axis transient open circuit time constant (Sec)
15. Quadrature axis sub-transient open circuit time constant (Sec)
16. Stator Resistance (Ohm)
17. Stator leakage reactance (Ohm)
18. Stator time constant (Sec)
19. Rated Field current (A)
20. Open Circuit saturation characteristic for various terminal voltages giving the exciting current to achieve the same.
21. Generator Capability Chart
22. SCADA details
23. Communication details

5D.2 Parameters of Excitation control system:

1. Type of Excitation
2. Maximum Field voltage
3. Minimum Field voltage
4. Rated Field voltage
5. Gain Factor
6. Feedback Strength
7. Time constant for control amplifier
8. Time constant for Exciter
9. Time constant for Feedback
10. Output voltage of control amplifier

11. Maximum Output voltage of control amplifier
12. Minimum Output voltage of control amplifier
13. Details of excitation loop in Block Diagrams showing transfer functions of individual elements using IEEE symbols along with set values.
14. Dynamic characteristics of over - excitation Limiter
15. Dynamic characteristics of under -excitation Limiter

Note: Using IEEE Committee Report symbols the following parameters shall be furnished: D , A , BS_x , K_a , K_e , K_f , T_a , Y_f , $V_r(\max)$, $V_r(\min)$, S_a , S_b .

5E. Parameters of Governor:

1. Governor average gain (MW/Hz)
2. Speeder motor setting range
3. Time constant of steam or fuel Governor valve
4. Governor valve opening limits.
5. Governor valve rate limits.
6. Time constant of Turbine
7. Governor Block Diagram showing transfer functions of individual elements using IEEE symbols along with set values.

5F. Plant Performance:

1. Daily Demand Profile (Last Year)	Peak and Average in time marked 30 minutes throughout the day.
2. Daily Demand Profile (forecast)	In time marked 30 minutes throughout the day.
3. Units Generated (MWh)	
4. Units consumed in Auxiliaries (MWh)	
5. Units supplied from system to Auxiliary Load	
6. Seasonal Generation	

5G Operational Parameters:

1. Min. notice required for synchronizing a Generating Unit.
2. Min. time between synchronizing different Generating Units in a Power Station.
3. The minimum block load requirements on Synchronizing.

4. Time required for Synchronizing a Generating Unit for the following conditions:
 - a) Hot
 - b) Warm
 - c) Cold
5. Maximum Generating Unit loading rate for the following conditions:
 - a) Hot
 - b) Warm
 - c) Cold
6. Maximum Generating Unit deloading rate
7. Minimum on-load time
8. Minimum off-load time
9. Minimum load
10. Minimum load without oil support (MW)
11. Any staffing constraints (e.g. only day and evening shifts are employed so no overnight operation)

5H Hydroelectric Stations:

I. General:

1. Name of Power Station:
2. No. and capacity of Units (MVA)
3. Expected level of Generation
4. Impeller type: only in exceptional circumstances will non-Kaplan machines be accepted on the system.
5. Reserve capability: full details
6. Period of Generation (in months) per year
7. Whether the plant is based on water released from dam/canal for irrigation purposes
8. Rating of all major equipment.
 - a) Turbine (HP):
 - b) Generators (MVA):
 - c) Generator Transformers (MVA):
 - d) Auxiliary Transformers (MVA):
9. Single Line Diagram of Power Station and switchyard.
10. Relaying and metering diagram.
 - a) Neutral grounding of generator.
 - b) Excitation control.
 - c) Earthing arrangements with earth resistance values.
11. SCADA details
12. Communication details

II. Reservoir Data:

Salient features:

1. Type of Reservoir: Multipurpose/Power only
2. Operating Table with:
 - a) Area capacity curves,
 - b) Unit capability at different net heads,

- c) FRL/MDDL.

III. Protection:

1. Full description including settings for all relays and protection systems installed on the Generating units, generator transformer, Auxiliary transformer and electrical motor of major equipment {included}, but not limited to those listed under General.
2. Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, tie breakers, and incoming breakers.
3. Full description of inter-tripping of breakers at the point or points of Connection with the Transmission System.
4. Most probable fault clearance time for electrical faults on the User's system.

IV. Switchyard:

1. Interconnecting Transformers:

- a) Rated MVA
- b) Voltage Ratio
- c) Vector Group
- d) Positive sequence reactance for maximum, minimum, normal Tap (% on MVA)
- e) Positive sequence resistance of maximum, minimum, normal Tap (% on MVA).
- f) Zero sequence reactance (% on MVA)
- g) Tap changer Range (+ % to - %) and steps
- h) Type of Tap changer (off-load/on-load)

2. Switchgear (including circuit breakers, Isolators on all circuits connected to the points of connection):

- a) Rated voltage (KV)
- b) Type of Breaker (MOCB/ABCB/SF6)
- c) Rated short circuit breaking current (KA) 3 Phase.
- d) Rated short circuit breaking current (KA) 1 Phase.
- e) Rated short circuit making current (KA) 3 Phase.
- f) Rated short circuit making current (KA) 1 Phase.
- g) Provisions of auto reclosing with details.
- h) Details of Instrument Transformers.

3. Lightning Arresters, Technical data.

4. Communications: Details of communications equipment installed at points of connections.

5. Basic Insulation level (KV):

- a) Bus bar
- b) Switchgear
- c) Transformer Bushings
- d) Transformer Windings

6. Generating Units:

i. Parameters of Generator:

- a) Rated terminal voltage (KV)
- b) Rated MVA
- c) Rated MW

- d) Inertia constants (MW Sec./MVA) of Generator, Exciter and Turbines
- e) Short circuit ratio
- f) Direct axis synchronous reactance. (% on MVA)
- g) Direct axis transient reactance. (% on MVA)
- h) Direct axis sub-transient reactance (% on MVA)
- i) Quadrature axis synchronous reactance (% on MVA)
- j) Quadrature axis sub-transient reactance (% on MVA)
- k) Direct axis transient open circuit time constant (SEC)
- l) Direct axis sub-transient open circuit time constant (SEC)
- m) Stator Resistance (Ohm)
- n) Stator leakage reactance (Ohm)
- o) Stator time constant (Sec)
- p) Rated Field current (A)
- q) Open Circuit saturation characteristics of the Generator for various terminal voltages giving the compounding current to achieve this.
- r) Generator Capability Chart

ii. Type of Turbine:

- a) Type:
- b) Operating Head (Mtr.)
- c) Discharge with Full Gate Opening (Cumecs)
- d) Speed Rise on total Load throw off (%)

iii. Parameters of Excitation Control system

(AS APPLICABLE TO THERMAL POWER STATIONS)

iv. Parameters of Governor

(AS APPLICABLE TO THERMAL POWER STATIONS)

7. Operational parameters:

- a) Minimum notice required for synchronizing a Generating Unit.
- b) Minimum time between synchronizing different Generating Units in a Power Station.
- c) Minimum block load requirements on Synchronizing.
- d) Maximum and minimum flow rates
- e) Equivalent maximum and minimum generation at various head levels
- f) Any inter Generating Unit constraints.

5I Planning Data Generation

(For submission on request by Transmission Licensee)

5I.1 For Thermal Power Stations:

5I.1.1 General:

1. Detailed Project report.
2. Status Report:
 - a) Land
 - b) Fuel type
 - c) Cooling Method
 - d) Environmental clearance
 - e) Rehabilitation of displaced persons.

3. Approval by Nigeria Electricity Regulatory Commission
4. Financial tie-up in place.
5. Grid Connection Agreement and Use of System Agreement in place

5I.1.2 Connection:

1. Report of studies of parallel operation with Transmission System:
 - a) Load flow studies
 - b) Stability studies
 - c) Short Circuit studies
2. Proposed connection with Transmission System:
 - a) Voltage
 - b) No. of circuits
 - c) Point of connection

5I.2. Hydroelectric Power Stations:

5I.2.1 General:

1. Detailed Project Report
2. Status Report
 - a) Topographical survey
 - b) Geological Survey
 - c) Land
 - d) Environmental clearance
 - e) Rehabilitation of displaced persons
3. Approval by Nigeria Electricity Regulatory Commission
4. Financial Tie-up in place.
5. Grid Connection Agreement and Use of System Agreement in place

5I.2.2 Connection:

1. Reports of studies for parallel operation with TCN System.
 - a) Load flow studies
 - b) Short Circuit studies
 - c) Stability studies
2. Proposed Connection with Transmission System:
 - a) Voltage
 - b) No. of Circuits.
 - c) Point of connection.

ANNEXURE 3:(GC APPENDIX 6)- DISTRIBUTION NETWORK DATA

(To be furnished by the Distributor to the TCN)

6A. Standard Planning Data: Distribution

To enable the TCN to discharge its responsibilities under its Transmission Licence Conditions by conducting System Studies and preparation of perspective plans for Demand, Generation and Transmission Network expansion as detailed under the Grid Code, all Users of the Transmission Network shall furnish all the data to the TCN from time to time detailed below under Data Registration Requirement of Sections 8 and 12.

Configurations of sites will vary hence the data requirements below are broadly phrased.

The interpretation of the requests for data is to be based on what the Distributor owns or has necessary access to.

I. General:

1. Area map
Marking on the map (to scale) of Distribution Licensee franchise area in Nigeria.
2. Consumer Data
Furnish categories of consumers, their numbers and average connected loads

Where there are regional variations in the Distributor area, details must be provided

II. Connection:

1. Points of connection:
Furnish Single Line Diagram showing points of connection to the Transmission Network (Grid Supply Points).
2. Voltage of supply at points of connection:
3. Names of Grid Sub-Station feeding the points of connection.

III. Lines and Sub-stations:

1. Line Data:
Furnish length of line and voltages within the area.
2. Sub-station Data:
Furnish details of 132/33 kV Sub-station, 33/11 KV, Sub-stations, capacitor or reactor installations:

IV. Loads:

1. Loads drawn at points of connection:
2. Details of loads fed at 11kV or above:
Give name of consumer, voltage of supply, contract demand and name of Grid Sub-station from which line is drawn, length of line from Grid Sub-station to consumer's premises.

V. Demand Data (For all Loads 1 MW and above):

1. Type of load: State whether furnace loads, rolling mills, traction loads, other industrial loads, pumping loads etc.
2. Rated voltage:
3. Electrical loading of equipment: State number and size of motors, types of drive and control arrangements.
4. Sensitivity of load to voltage and Frequency of supply:
5. Power Factor of load for night and day
6. Maximum harmonic content of load:
7. Average and maximum phase unbalance of load:
8. Nearest sub-station from which load is to be fed:
9. Location map to scale: Map shall show the location of load with reference to lines and sub-stations in the vicinity.

VI. Load Forecast Data:

1. Peak load and energy forecast for each category of loads for each of the succeeding 5 years.
2. Details of methodology and assumptions on which forecasts are based.
3. If supply is received from more than one sub-station, the sub-station breaks up of peak load and energy projection for each category of loads for each of the succeeding 5 years along with estimated daily load curve.
4. Details of load 1MW and above.
 - a) Name of prospective consumer.
 - b) Location and nature of load/complex.
 - c) Sub-station from which to be fed.
 - d) Voltage of supply.
 - e) Phasing of load.

6B. Detailed Planning Data: Distribution

6B.1 General:

1. Distribution map (To scale). Showing all lines up to 11 kV and sub-stations belonging to the Licensee.
2. Single Line Diagram of distribution system (showing distribution lines from points of connection with transmission system 132/33 kV Sub-station, 33/11 kV sub-station, consumer bus if fed directly from Transmission System)
3. Numbering and nomenclature of lines and sub-stations (Identified with feeding Grid sub-stations of the Transmission System and concerned 33/11 kV sub-station of supplier).
4. Monitoring Distribution Losses (Methods adopted for reduction of losses to be stated).

6B.2 Connection:

1. Points of connection (Furnish details of existing arrangement of Connection)
2. Details of metering at points of connection.

6B.3 Loads:

1. Connected Load (Category-wise) - Furnish consumer details, No. of consumers category-wise details of loads 1 MW and above)
2. Information on diversity of load and coincidence factor.
3. Daily demand profile (current and forecast) on each 33kV/11kV sub-station.
4. Cumulative Demand Profile of Distribution (current and forecast)

6B.4 Detailed Planning Data: Distribution

(For submission on request by the TCN)

I. General:

1. Detailed Project Report (For new and system improvement schemes)
2. Status Report
 - (a) Load Survey
 - (b) Load forecast for next five years
3. Single Line Diagram showing proposed new lines and Sub-stations

II. Connection:

1. Points of connection as applied for
 - (a) New
 - (b) Upgrading existing connection
2. Changes in metering at points of connection
3. SCADA details
4. Communication details.

III. Loads:

1. Details of loads as per the forecast in next 5 years
2. Distribution of loads 33/11 kV Sub-station wise projected for next 5 years
3. Details of major loads of 1 MW and above to be contracted for next 5 years

IV. Improvement Schemes for reduction of Distribution Losses:

1. Statement of estimated Distribution losses for next five years
2. Brief indication of improvement scheme for reduction of losses (excerpts from Detailed Project Report)
 - (a) New lines
 - (b) Upgrading of lines
 - (c) New Sub-station/Upgrading of Sub-stations
 - (d) Rearrangement of loads
 - (e) Installation of capacitors.

ANNEXURE 4: (GC APPENDIX 7) – NETWORK EXPANSION PLANNING DATA

REQUIREMENTS:

To enable the TCN to discharge its responsibilities under its Transmission Licence by conducting System Studies and preparation of plans for Demand, Generation and Transmission Network expansion as detailed under the Grid Code, all Users of the Transmission Network shall furnish all the data to the TCN from time to time detailed below under Data Registration Requirement of Sections 8 and 12

[In pursuance of Sections 8 and 12 of the Grid Code, items in this Appendix must be included in the yearly 5 year planning study report of TCN and provided to Users (e.g. Generating Companies, Discos) on an annual basis.]

7A. Standard Planning Data: Transmission

This is a list of planned circuits

Note: - The compilation of the data is currently the internal matter of the Licensee, and as such the Licensee shall make arrangements for getting the required data from different Departments of the Licensee to up-date its standard planning Data in the format given below:

1. Name of the line: (Indicating Power Stations and Sub-stations to be connected)
2. Voltage of line (kV)
3. No of circuits (single or double) and conductors (single, twin or quad):
4. Route length (Circuit km):
5. Conductor sizes:
6. Line parameters (PU on 100 MVA base or ohmic values):
 - (a) Resistance/KM
 - (b) Series Inductive Reactance /KM
 - (c) Shunt Susceptance/KM
7. Approximate power flow MW & MVAr:
MVAr at both ends
8. Terrain of route:
Give information regarding nature of terrain i.e., forestland, fallow land, agricultural and river basin, hill slope etc.
9. Route Map (to scale):
Furnish topographical map showing the proposed route showing existing power lines and telecommunication lines
10. Purpose of connection:
11. Approximate period of construction:

7B Detailed System Data: Transmission

7B.1 General:

- (a) Single Line Diagram of the User's system from 132 KV bus and above at grid sub-station:
- (b) Name of sub-station
- (c) Power Station connected
- (d) Number and length of Circuits
- (e) Interconnecting transformers
- (f) Sub-station bus layouts
- (g) Power Transformers
- (h) Reactive compensation equipment
 - 1. The details of capacitors installed
 - 2. Additional capacitors to be commissioned along with additional loads.
- (i) Lightning Arresters
- (j) Bus and/or Line Reactors
- (k) Series Capacitors

7B.2 Sub-station layout diagrams showing:

- (a) Bus bar layouts
- (b) Electrical circuitry, lines, cables, transformers, switchgear etc.
- (c) Phasing arrangements
- (d) Earthing arrangements
- (e) Switching facilities and interlocking arrangements
- (f) Operating voltages
- (g) Numbering and nomenclature
 - i. Transformers
 - ii. Circuits
 - iii. Circuit Breakers
 - iv. Isolating switches

7B.3.1 Line parameters: (For all Circuits)

- (a) Designation of line
- (b) Length of line (KM)
- (c) No. of circuits, size, type and number of conductors, thermal rating
- (d) Per Circuit values
 - i. Operating voltage (KV)
 - ii. Positive phase sequence reactance - ohms/KM

- iii. Positive phase sequence resistance - ohms/KM
- iv. Positive phase sequence susceptance - mhos/KM
- v. Zero phase sequence reactance - ohms/KM
- vi. Zero phase sequence resistance - ohms/KM
- vii. Zero Phase sequence susceptance - mhos/KM

7B.3.2 Transformer parameters: (For all transformers)

- (a) Rated MVA and sharing ratio if multiple voltage
- (b) Voltage Ratio(s)
- (c) Vector Group
- (d) Positive sequence reactance on rated MVA base (Max., min. & normal)
- (e) Positive sequence resistance on rated MVA base (max., min. & Normal)
- (f) Zero sequence reactance on rated MVA base
- (g) Tap change range (+% to -%) and steps
- (h) Details of tap changer (off-load/on-load)
- (i) Neutral Grounding Transformer/Resistor Values

7B.3.3 Equipment Details: (For all Sub-stations):

- (a) Circuit Breakers
- (b) Isolating switches
- (c) Current Transformers
- (d) Potential Transformers
- (e) Lightning Arresters

7B.3.4 Relaying and metering:

- (a) Relay protection installed for all transformers and Feeders along with their settings and level of co-ordination with other users.
- (b) Metering Details:
- (c) SCADA details
- (d) Communication details

7B.4.1 Demand Data: (For all sub-stations)

- (a) Demand Profile (Peak and lean load)
 - i. Current
 - ii. Forecast for next 5 years

7B.4.2 Reactive Compensation equipment:

- (a) Type of equipment (fixed or variable)
- (b) Capacities and/or inductive rating (Voltage and MVAR) or its operating range.
- (c) Details of control
- (d) Point of Connection to the system.

7B.5 Detailed Planning Data (Transmission)

(To be submitted by TSP upon request from the SO)

7B.5.1 General:

- 1. Detailed Project Report (For new and System Improvement Schemes)
- 2. Status Report
- 3. Line:
 - a) Route Survey
 - b) Forest Clearance
- 4. Sub-Stations
 - a) Land
 - b) Environmental Clearance
 - c) Financial Tie-up

7B.5.2 Connection:

- 1. Single Line Diagram showing position of connection
- 2. Sub-station layout diagram
 - a) New
 - b) Addition and Alteration
- 3. Changed parameters for revised system studies by SO
- 4. Point of Connection
 - a) Voltage
 - b) Length of circuit
 - c) Circuit parameters
 - d) PLC facilities
 - e) Relaying with inter tripping arrangements to inter trip system breaker at point of connection to isolate on fault
 - f) Metering at point of connection.