

FORMAT-CON-6A

DRAFT

Connection Agreement

between CTU & Generating Company

(already connected to Inter State Transmission System and achieved commercial operation prior to 01.01.2010)

THIS AGREEMENT is made the [] day of [] 201[]

BETWEEN:

[Name and registered address of the CTU](hereinafter called the "CTU"or the First Party) (which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns and for the purposes of this Connection Agreement the CTU)represented by its authorized representative _____[name and full address of the representative]

and

[Name and registered address of the generating Company] (hereinafter called "the Second Party") (which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns) represented by its authorized representative _____[name and full address of the representative]

The First Party and the Second Party shall hereinafter collectively be referred to as "Parties" and individually as "Party" to the said agreement.

WHEREAS:

- (a) The Second Party has agreed with the First Party for signing of Connection Agreement for the **[mention generating station name & address including a captive generating plant as appropriate]** already connected to the CTU's Transmission System and use of the Inter-State Transmission System (ISTS) to transmit electricity.
- (b) The Second Party **[mention generating station including a captive generating plant as appropriate]** is connected to the ISTS Transmission and Communication System at the Connection Point (.....mention details of the connection point, the name of sub-station, name of line which is to be made LILO, communication system details etc... ..) using the

ISTS, as the case may be, to transmit electricity as well as real time data to and/or from the generating station through the ISTS Transmission and Communication System.

- (c) A signed copy of the agreement along with all the Annexures, and amendments when ever made shall be submitted to RLDC/NLDC.

IT IS HEREBY AGREED as follows:

1. General Conditions for Connectivity

1.1. The Parties agree to the following General Conditions

- (a) The parties shall abide by the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009, as amended from time to time and to the extent it is applicable.
- (b) The Parties shall be responsible for safe and reliable operation of their respective equipments in accordance with the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007, Central Electricity Authority (Technical Standards for Construction of electrical plants and electric lines) Regulations, Central Electricity Authority (Grid Standards) Regulations, Indian Electricity Grid Code (IEGC) as amended from time to time and other statutory provisions.
- (c) The Second Party has ensured/shall ensure (strike whichever is not applicable) that necessary facilities for voice & data communication for transfer of real time operational data such as voltage, frequency, real and reactive power flow, energy, status of circuit breaker & isolators positions, transformer taps and other parameters including synchrophasor measurements from their station to Data Collection Point (DCP) of CTU as per IEGC are available. CTU has provided/shall provide (strike whichever is not applicable) access to Second Party for data transfer through communication network. The location of DCP of CTU shall be the nearest station connected electrically where wideband communication capacity of CTU or any other communication medium provided by CTU for data and voice transmission is available. The communication channel & Terminal equipment between Generating Station and DCP shall be provided by the Second Party. The Generating Station, Substation Automation System shall have provision for interfacing with DCP through suitable communication device like gateways with PLCC/modems. The modems/gateways shall be suitable for use with PLCC/OFC (project specific) provided/being provided for EHV lines in the Generating station's Switchyard and to be used for communication between switchyard and respective DCP using communication protocol IEC 60870-5-101/104 as per RLDC's requirement.

(d) Dual and redundant communication system from DCP to the concerned RLDC shall be the responsibility of CTU. The voice & data communication system provided by CTU shall be maintained by CTU to ensure that data transfer to RLDC is in order. The responsibility of data transfer shall be that of the Second Party/ CTU/STU in their respective areas.

1.2. The following documents and their schedules which have been initialed by the parties and annexed herewith shall be deemed to form an integral part of this Agreement in the order of precedence listed below :-

- (a) Detailed Technical Information as per FORMAT CON-4
- (b) Connection Details for connection to ISTS and conditions of Connectivity as per FORMAT CON-5
- (c) This Agreement;

2. Agreement for O & M of Connection Equipment

2.1. For the regular O&M of the connection equipment owned by the Second Party and located in the CTU's premises/switchyard/substation or vice-a-versa, the parties shall separately enter in to the O&M agreement on mutually agreed terms and conditions, if not already entered.

2.2. The Second Party declares that it shall pay/make good damages, if any, caused by the Second Party to the property of the CTU within reasonable time of its occurrence, during the course of construction/Installation of its equipments in the CTU premises, control, operation and maintenance of the equipment.

3. Metering

CTU have provided/shall provide (strike whichever is not applicable) and maintain meters, in accordance with the Central Electricity Authority (Installation and Operation of Meters) Regulations and IEGC as amended from time to time.

The Second Party has provided/shall provide (strike whichever is not applicable) and maintain the necessary inputs to meters, in accordance with the Central Electricity Authority (Installation and Operation of Meters) Regulations and IEGC as amended from time to time.

4. Site Access

Being restricted area, either party shall give permission or allow access to the employees and/or agents and/or subcontractors and/or invitees of the other party in its premises to carry outworks, inspections, etc., based on a written request giving reasonable advance notice. All such actions are to be carried out under the strict supervision of the authorized representative for safety and security of its installations and of its representatives.

5. Conditions of Access

Site access for the First Party/Second Party shall include the right to bring such vehicles, plant, machinery and construction materials as shall be reasonably necessary to carry out the functions in respect of which the permission of access is granted. Being a restricted area, any individual to whom access is given under the Agreement shall comply with all reasonable directions given by either of the parties or the First Party or its duly authorized employees and agents for safety and security of the personnel and equipments. All such access shall be provided without payment of any kind.

6. Transfer, Assignment and Pledge

The Second Party shall not transfer, assign or pledge its rights and obligations under this connection agreement to any other person.

7. Notice

All correspondence/notices required or referred to under this Agreement shall be in writing and signed by the respective authorized signatories of the parties mentioned herein, unless otherwise notified. Such notices shall be deemed to have been duly given if delivered or served by registered mail/speed post of the department of post with an acknowledgment due to other party (ies) as per authorization by parties.

The authorized representative of the parties who shall be responsible for the correspondence, notices, etc. in connection with this agreement shall be informed in advance.

8. Settlement of Disputes and Arbitration

All differences and/or disputes between the parties arising out of or in connection with this agreement shall at first instance be settled amicably through mutual consent.

In the event of unresolved disputes or differences, the aggrieved parties may approach the CERC in accordance with Regulation 32 of the Central Electricity Regulatory Commission (Grant of

Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009 (the Connectivity Regulations)

Notwithstanding the existence of any disputes and differences referred to for arbitration, the parties herein shall continue to perform their respective obligations under this Agreement.

9. Force Majeure

'Force Majeure' shall mean the event or circumstance or combination of events or circumstances including those stated below which partly or fully prevents either party from discharging its obligations under this agreement, only if such events or circumstances are not within the control of the party concerned and would not have been avoided, had the parties taken reasonable care:-

- Natural phenomenon including but not limited to floods, droughts, earthquake and epidemics;
- war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy in each case involving or directly affecting India, revolution, riot, insurrection or other civil commotion, act of terrorism or sabotage in each case within India;
- nuclear explosion, radio active or chemical contamination or ionizing radiation directly affecting the generation station, captive generating plant or the transmission system of the CTU or any facility or system that is integral to and substantial for the performance of this agreement.
- any event or circumstances of a nature analogous to any events set forth above within India.

Either party shall within fifteen (15) days from the occurrence of such a Force Majeure event notify the other in writing of the existence of such cause(s).

Neither of the parties shall be liable for delays in performing obligations on account of any Force Majeure causes as referred to and/or defined above.

10. Confidentiality

The parties shall maintain strict confidence of any information obtained under this Connection Agreement and shall not divulge the same to any third party without the prior written consent of the other party, unless such information is

- (a) in the public domain,
- (b) already in the possession of the receiving party,
- (c) required by the Govt. Ministries/Agencies/Court of competent jurisdiction/Central Commission/CEA.

The information exchanged herein between the parties shall be used only for the purpose of, and in accordance with, this Agreement. This clause shall remain in force even after termination of the Connection Agreement.

11. Governing Laws and Jurisdiction

The agreement shall be governed by Indian Laws and the Rules made thereunder.

12. Amendment to the Connection Agreement

In case of modification to the Point of Connection like re-allocation of bays, up gradation of voltage level etc. by either of the parties, based on mutual consent, the parties shall execute an amendment to the Connection Agreement within 30 days of implementing such modification. Irrespective of whether an amendment is executed in such cases, the Second Party would submit full technical details of the modification to the First Party and the First Party shall intimate such modification to the respective RLDC.

IN WITNESS WHEREOF the First Party and the Second Party have caused this Agreement to be executed by duly authorized representative on date above first herein written.

Signed for and on behalf of:-

[First Party Details]

Signed for and on behalf of:-

[Second Party]

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Information for signing of Connection Agreement

A. DETAILS OF SECOND PARTY

1.	Name of the Second Party	:	
2.	Address for Correspondence	:	
3.	Contact Person 3.1 Prime Contact Person (a) Name (b) Designation (c) Phone No. (d) FAX (e) E-mail 3.2 Alternate Contact Person (a) Name (b) Designation (c) Phone No. (d) FAX (e) E-mail	:	

B. MAPS AND DIAGRAMS

1. Provide necessary survey of India topo sheet clearly marking the location of the site and GPS co-ordinates. **Schedule - I**
2. Provide layout plan (both hard and soft copy in AutoCAD 2000 & above version) in appropriate scale. **Schedule – II**. The layout plan should indicate following details
 - a. The location of the connection point
 - b. Generators
 - c. Transformer
 - d. Site building
3. Provide an electrical Single Line Diagram (SLD) of the facility detailing all significant items of plant. The plan is to be submitted in both hard copy and soft copy in AutoCAD 2000 & above version **Schedule - III**

C. DETAILS OF CONNECTION - GENERATION PLANT

1.	Type of Generation Plant (Hydro, Thermal, Gas etc)	:	
2.	Rating of Generator Units	:	Schedule – IV
3.	Maximum Export Capacity Required	:	
4.	Station house load during normal operating conditions (MW/MVAR)	:	
5.	Expected running regime e.g. base load, peaking etc	:	
6.	Generator Data for Fault (Short Circuit Studies)	:	Schedule – V
7.	Dynamic Simulation Data Generator Excitation Power System Stabilizer	:	Schedule – VI Schedule – VII Schedule – VIII
8.	Details of Connection Point	:	Schedule – IX
9.	Details of Equipment & Protection	:	Schedule – X

D. DETAILS OF CONNECTION – DATA AND VOICE COMMUNICATION

1.	Type of Data Gateway (Remote Terminal Unit/ Substation Automation System Gateway)	:	
2.	Data Communication connectivity Standard followed (As per interface requirement and other guideline made available by the respective RLDC)	:	
3.	The communication media, interface and capacity being targeted for connection for Data and voice Communication	:	
4.	Details of Communication Equipment	:	Schedule – XI (Ann 3b & 5)

This is to certify that the above data pertains to connection existing with the CTU system.

**Authorized Signatory
of Second Party**

Name :

Designation :

Seal :

Place :

Date :

Schedule – I : Survey of India topo sheet clearly marking the location of site and GPS co-ordinates

Schedule – II : Layout plan in appropriate scale.

Schedule – III : Electrical Single Line Diagram (SLD) of the proposed facility detailing all significant items of plant.

Schedule – IV : Rating of Generating Units

(Add additional sheets if number of units are more)

		Unit – 1	Unit - 2	Unit – 3
1.	Unit Rating (MVA)			
2.	Normal Max. Continuous Generation Capacity at Normal operating temperature (MW)			
3	Normal Max. Continuous Export Capacity at Normal operating temperature (MW)			
4	Maximum (Peaking) generating Capacity at min ambient air temperature (MW)			
5	Maximum (Peaking) Export Capacity at min ambient air temperature (MW)			
6	Minimum Continuous Generating Capacity (MW)			
7	Minimum Export Generating Capacity (MW)			
8	Normal Maximum Lagging MVAR at rated MW output			
9.	Normal Maximum leading MVAR at rated MW output			

Please attach capability Curve : _____

Drawing no. of the Capability
Diagram attachment

Schedule – V : Generator Data for Fault (Short Circuit Studies)

All data to be provided on pu machine MVA base

1.	Direct Axis Transient Reactance (Unsaturated)	X_d'	
2.	Sub-transient Reactance (Unsaturated)	X_d''	
3.	Synchronous Reactance	X_s	
4.	Zero Phase Sequence Reactance	X_o	
4.	Negative Phase Sequence Reactance	X_2	

Schedule – VI : Dynamic Simulation Data**Generator Data**

All data to be provided on pu machine MVA base

1.	Direct Axis Positive Phase Sequence Synchronous Reactance	X_d	
2.	Quadrature Axis Positive Phase Sequence Synchronous Reactance	X_q	
3.	Direct Axis Transient Reactance (unsaturated)	X_d''	
4.	Quadrature Axis Transient Reactance (unsaturated)	X_q''	
5.	Sub-Transient Reactance (unsaturated)	X_d''''	
5.	Armature Leakage Reactance	X_l	
6.	Direct Axis Transient open circuit Time Constant (Secs)	T_{d0}''	
7.	Direct Axis Subtransient open circuit Time Constant(Secs)	T_{d0}''''	
8.	Quadrature Axis Transient open circuit Time Constant(Secs)	T_{q0}''	
9.	Quadrature Axis Subtransient open circuit Time Constant(Secs)	T_{q0}''''	
10.	Inertia of complete turbogenerator (MWs/MVA)	H	
11.	Open circuit magnetization curve to be attached		

Excitation Data

Please submit Laplace domain control block diagram that represents the generator excitation system in accordance with the IEEE standard excitation model. This control block diagram should completely specify all the time constants and gains to fully explain the transfer function from the compensator or generator terminal voltage and field current to generator voltage. A list of acceptable IEEE standard excitation model available with PSS/E simulation package is shown in **Annexure-I**.

Schedule – VII: Two Winding Transformer Data

1.	Transformer positive sequence resistance (R1%)	
2.	Transformer positive sequence reactance (X1%)	
3.	Transformer zero sequence resistance (R0%)	
4.	Transformer zero sequence reactance (X0%)	
5.	Transformer Vector group	
5.	Nature of Tap Changer (on load/off load)	
6.	Number of steps and step size	

Schedule – VIII: Three Winding Transformer Data

1.	Transformer Vector group	
2.	Positive sequence resistance (R1HL1%) between HV/LV1	
3.	Positive sequence reactance (X1HL1%) between HV/LV1	
4.	zero sequence resistance (R0HL1%) between HV/LV1	
5.	zero sequence reactance (X0HL1%) between HV/LV1	
6.	Positive sequence resistance (R1HL2%) between HV/LV2	
7.	Positive sequence reactance (X1HL2%) between HV/LV2	
8.	Transformer zero sequence resistance (R0HL2%) between HV/LV2	
9.	zero sequence reactance (X0HL2%) between HV/LV2	
10.	Positive sequence resistance (R1L1L2%) between LV1/LV2	
11.	Positive sequence reactance (X1L1L2%) between LV1/LV2	
12.	zero sequence resistance (R0L1L2%) between LV1/LV2	
13.	zero sequence reactance (X0L1L2%) between LV1/LV2	
14.	Positive sequence resistance (R1HL1//L2%) between HV/(LV1+LV2)	
15.	Positive sequence reactance (X1HL1//L2%) between HV/(LV1+LV2)	
16.	zero sequence resistance (R0HL1//L2%) between HV/(LV1+LV2)	
17.	zero sequence reactance (X0HL1//L2%) between HV/(LV1+LV2)	

Annexure-I

**Acceptable IEEE standard excitation model available with PSS/E simulation package
usedby POWERGRID**

Excitation System Models	
ESAC1A	1992 IEEE type AC1A excitation system model
ESAC2A	1992 IEEE type AC2A excitation system model
ESAC3A	1992 IEEE type AC3A excitation system model
ESAC4A	1992 IEEE type AC4A excitation system model
ESAC5A	1992 IEEE type AC5A excitation system model
ESAC6A	1992 IEEE type AC6A excitation system model
ESAC8B	Basler DECS model
ESDC1A	1992 IEEE type DC1A excitation system model
ESDC2A	1992 IEEE type DC2A excitation system model
ESST1A	1992 IEEE type ST1A excitation system model
ESST2A	1992 IEEE type ST2A excitation system model
ESST3A	1992 IEEE type ST3A excitation system model
EXAC1	1981 IEEE type AC1 excitation system model
EXAC1A	Modified type AC1 excitation system model
EXAC2	1981 IEEE type AC2 excitation system model
EXAC3	1981 IEEE type AC3 excitation system model
EXAC4	1981 IEEE type AC4 excitation system model
EXBAS	Basler static voltage regulator feeding dc or ac rotating exciter model
EXDC2	1981 IEEE type DC2 excitation system model
EXELI	Static PI transformer fed excitation system model
EXPIC1	Proportional/integral excitation system model
EXST1	1981 IEEE type ST1 excitation system model
EXST2	1981 IEEE type ST2 excitation system model
EXST2A	Modified 1981 IEEE type ST2 excitation system model
EXST3	1981 IEEE type ST3 excitation system model
IEEET1	1968 IEEE type 1 excitation system model
IEEET2	1968 IEEE type 2 excitation system model
IEEET3	1968 IEEE type 3 excitation system model
IEEET4	1968 IEEE type 4 excitation system model
IEEET5	Modified 1968 IEEE type 4 excitation system model
IEEEX1	1979 IEEE type 1 excitation system model and 1981 IEEE type DC1 model

IEEEX2	1979 IEEE type 2 excitation system model
IEEEX3	1979 IEEE type 3 excitation system model
IEEEX4	1979 IEEE type 4 excitation system, 1981 IEEE type DC3 and 1992 IEEE type DC3A models
IEET1A	Modified 1968 IEEE type 1 excitation system model
IEET1B	Modified 1968 IEEE type 1 excitation system model
IEET5A	Modified 1968 IEEE type 4 excitation system model
IEEX2A	1979 IEEE type 2A excitation system model
SCRX	Bus or solid fed SCR bridge excitation system model
SEXS	Simplified excitation system model

Schedule – IX: Details of Connection Point : Switchyard Layout

Schedule – X: Details of equipment and protection

Equipment provided in the allocated bay

Sl. No.	Name of Equipments	Nos.	Ratings
1.	Circuit Breaker		
2.	Isolators		
3.	Earth Switches		
4.	CT		
5.	CVT		
6.	Wave Trap		
7.	Any other equipment		
8.			
9.			

Schedule – XI: Details of Communication equipment

System recording & SCADA Equipment to be provided by the Second Party

Sl. No.	Name of Equipments	Nos.	Ratings
1.	Event Logger		
2.	Disturbance recorder		
3.	Fault locator		
4.	Data Acquisition System		

5..	Communication equipment		
6.	RTU		
7.	Etc.		
8.			

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Connection Details for connection to ISTS and conditions of Connectivity

Name and Address of Second Party:

1. Name of the Connection point & Link(s)	:	
2. Voltage level	:	
3. Reactive compensation to be provided	:	
4. Bay allocated in the switchyard of connectivity	:	Bay No. [refer enclosed single line diagram at Annexure-I]
5. Equipment provided in allocated bay	:	[refer Annexure-II]
6. Protection Equipment provided in allocated bay	:	[refer Annexure-II]
7. System Recording & SCADA Equipment provided	:	[refer Annexure-III]
8. Name of Communication Link for Data and Voice Communication	:	from [Name of switchyard/substation] – to [Name of switchyard/substation]
9. Communication equipment details upto POWERGRID Data Collection Point	:	[refer Annexure-IV]
10. Site responsibility schedule	:	[as marked in the attached GA diagram at Annexure-V]

It should be ensured by the Second Party that all the equipments and systems to be provided by Second Party are and shall remain in conformity with the technical standards as specified in the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations and Indian Electricity Grid Code (IEGC).

The Second Party will forward meter data in the format appropriate and at a periodicity as specified by the appropriate regulatory authority from time to time.

Authorized Signatory of CTU

Name:
Designation
Seal:
Place:
Date:

Annexure - II

Equipment provided in the allocated bay

Sl. No.	Name of Equipments	Nos.	Rating(s)
1.	Circuit Breaker		
2.	Isolators		
3.	Earth Switches		
4.	CT		
5.	CVT		
6.	Wave Trap		
7.	Any other equipment		
8.			
9.			

Annexure-III
System recording & SCADA Equipment to be provided by the Second Party

Sl. No.	Name of Equipments	Nos.	Ratings
1.	Event Logger		
2.	Disturbance recorder/ Fault locator		
3.	Data Acquisition System		
4.	Communication equipment		
5.	RTU		
6.	Etc.		
7.			

Annexure-IV

Communication equipment details upto POWERGRID Data Collection Point

Annexure-V**A. Principle & Procedure :**

The responsibility of control, operations, maintenance & all matters pertaining to safety of equipments and apparatus at the connection point shall lie with the First party/Second party (as per ownership of equipment at ISTS connection point).

B. List of equipment and their ownership at the connection point:

Sl. No.	Name of Equipments	Ownership
1.		
2.		
3.		
4.		
5.		
6.		
7.		

C. Site common Drawings :

- a. Site Layout
- b. Electrical Layout (SLD)
- c. General Arrangement Drawings (GA)
- d. Details of protection'
- e. Common service drawing
- f. Any other relevant information/detail