ग्रिड-इंडिया
GRID-INDIA

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(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre

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संदर्भ: NLDC/SO/IEGC/Interconnection/ **दिनांक:** 14th July 2023

सेवा में,

All the Stakeholders

विषय: Draft Procedure for Carrying out Inter-Connection Studies of New Power System Elements – Reg.

संदर्भ: Central Electricity Regulatory Commission, Indian Electricity Grid Code, Regulations, 2023

महोदय/महोदया,

In compliance to the regulations 10 (3) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code), Regulations 2023 published on 29th May 2023, NLDC, in consultation with RLDCs, has prepared a detailed procedure for **"Carrying Out Inter-Connection Studies of New Power System Elements"**. The procedure has been published on Grid-India website and is available at: **https://posoco.in/notices/.**

Stakeholder suggestions/feedback on this draft procedure are invited by **7th August 2023.** The same may kindly be forwarded to **nldcreliability@grid-india.in.**

सधन्यवाद,

भवदीय,

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Grid Controller of India Limited

(formerly Power System Operation Corporation Limited)

National Load Despatch Centre (NLDC)

Procedure

for

Carrying Out Inter-Connection Studies

of New Power System Elements

Prepared in Compliance

to

Clause 10 (3) of Central Electricity Regulatory Commission
Indian Electricity Grid Code
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Procedure for carrying Out Inter-Connection Studies of New Power System Elements

1. Background

1.1 This procedure is in accordance with clause 10(3) of the Indian Electricity Grid Code, 2023 notified by the Central Electricity Regulatory Commission.

"…NLDC shall publish a detailed Procedure covering modalities for carrying out interconnection studies."

1.2 The procedure lays down the guidelines for data submission and performing the interconnection studies for new power system elements to be integrated into the Indian grid.

2. Scope

The procedure shall apply to: all users, State Load Despatch Centres (SLDCs), Regional Load Despatch Centres (RLDCs), National Load Despatch Centre (NLDC), Central Transmission Utility (CTU), State Transmission Utilities (STUs), Licensees, and Settlement Nodal Agencies, to the extent applicable.

3. Definitions

Words and expressions used in this procedure are defined in the Act or any other regulations specified by the Central Commission or Central Electricity Authority shall, unless the context otherwise requires, have the meanings assigned to them under the Act or other regulations specified by the Central Commission, as the case may be.

4. Responsibilities for Conducting Inter-connection Studies

4.1 State Load Despatch Centers (SLDCs), Regional Load Dispatch Centers (RLDCs) or National Load Dispatch Center (NLDC), as the case may be, in consultation with each other and Central Transmission Utility (CTU) or State Transmission Utility (STU), as the case may be, shall carry out a joint system study six (6) months before the expected date of first energization of a new power system element to identify operational constraints, if any.

4.2 Respective SLDC, in consultation with respective RLDC and STU, shall carry out a joint study on the impact of new elements to be energized **in the intra-state system** within its jurisdiction in the **next six (6) months.** The SLDC shall share the results of the studies with the concerned RLDC by **21st day of the "M-6" month** where "M" is the month of expected first time energization of the new elements. The results of the study shall include the study assumptions

and clearly highlight the constraints observed, if any.

4.3 Respective RLDC, in consultation with concerned SLDCs, NLDC and CTU, shall carry out a joint study on the impact of new elements to be energized in the next six (6) months in **(a) the ISTS of the region and (b) the intra-state system on the inter-state system[1].** The RLDC shall share the results of the studies with NLDC by **26th day of the "M-6" month** where "M" is the month of expected first time energization of the new elements. The results of the study shall include the study assumptions and clearly highlight the constraints observed, if any.

4.4 NLDC, in consultation with concerned RLDCs and CTU, shall carry out a joint the study on the impact of new elements to be energized in the next six (6) months in **(a) inter-regional system, (b) cross-border links and (c) intra-regional system on the inter-regional system[2].** NLDC shall complete the inter-connection study by the end of "M-6" month where "M" is the month of expected first time energization of the new elements.

5. Data Submission for Inter-connection Studies

5.1 The timelines and responsibilities for data submission to the SLDCs, RLDCs or NLDC, as the case may be, for carrying out interconnection studies of new elements are provided below:

^ *"M" is the month of expected first time energization of the new element*

Table 1: Data Submission Responsibility and Timelines

S. No.	Power System Element	Data Submission Responsibility	Data to be submitted to	Data/Information Submission Deadline
1.	Transnational links (including HVDC) and associated elements (irrespective of voltage level)	Concerned Transmission Licensee (s) / Settlement Nodal Agency (SNA)	NLDC	15th Day of "M-7" month (NLDC to share the consolidated information of all such elements with the concerned RLDCs by 20th Day of "M-7" month)
2.	Inter-regional transmission system (including HVDC) and associated elements (irrespective of voltage level)	Concerned Transmission Licensee (s)	Concerned RLDCs	15th Day of "M-7" month (RLDCs to share the consolidated information of all such elements with the concerned SLDCs and NLDC by 20th Day of "M-7" month)

[1] Intra-state system directly connected to the inter-state system

[2] Intra-regional system directly connected to the inter-regional system

S. No.	Power System Element	Data Submission Responsibility	Data to be submitted to	Data/Information Submission Deadline
3.	ISTS elements within the region including HVDC, FACTS devices, any other transmission element (irrespective of voltage level)	Concerned ISTS Licensee	Concerned RLDC	15th Day of "M-7" month (RLDC to share consolidated information of all such elements with the concerned SLDCs and NLDC by 20th Day of "M-7" month)
4.	Intra-state transmission system including HVDC, FACTS devices, any other transmission element	Concerned ISTS Licensee / Concerned STU through SLDC	Concerned SLDC	15th Day of "M-7" month (SLDC to share consolidated information of all elements at 132 kV and above voltage level with the concerned RLDC by 20th Day of "M-7" month. RLDC to further share the information with NLDC)
5.	Generating Plants, Bulk Consumers or Load Serving Entities and Combined (Load & Captive) generation complex, Energy Storage Systems, and Synchronous Condensers connected to the ISTS network *(including details of associated dedicated transmission lines)*	Concerned Generation Entity/ Load Serving Entity / Connectivity Grantee	Concerned RLDC	15th Day of "M-7" month (RLDC to share consolidated information of all such elements with the concerned SLDCs and NLDC by 20th Day of "M-7" month)
6.	Generating Plants, Bulk Consumers or Load Serving Entities and Combined (Load & Captive) generation complex, Energy Storage Systems, and Synchronous Condensers connected to the intra-state network *(including details of associated dedicated transmission lines)*	Concerned Generation Entity / Load Serving Entity / Connectivity Grantee	Concerned SLDC	15th Day of "M-7" month (SLDC to share consolidated information of all elements at 132 kV and above voltage level with the concerned RLDC by 20th Day of "M-7" month. RLDC to further share the information with NLDC.)

5.2 As per table-1 above, each entity responsible for providing the necessary data shall furnish the following information **each month on a rolling basis** within the specified timelines (i.e. 15th day of "M-7" month) to the concerned SLDCs/RLDCs/NLDC responsible for carrying out the inter-connection studies:

a) The summary of all the new elements expected to be energized in the "M" month shall be provided in the format specified at **Annexure-I.**

b) The necessary technical and modelling data of all the elements expected to be energized in the "M" month shall be submitted in the formats specified in Grid-India/NLDC's procedure for ***"First Time Charging/Energization (FTC) and Integration of New or Modified Power System Element"***, as amended from time to time, for carrying out the necessary studies.

5.3 In case of non-submission of necessary technical and modelling data by the specified entities, necessary assumptions[3] shall be made by respective entities responsible for conducting interconnection studies.

5.4 If the expected date/month of the first-time energization of the new element is revised due to some reason, the same shall be intimated to the concerned SLDCs/RLDCs/NLDC on immediate basis. The concerned SLDCs/RLDCs/NLDC shall consider the inputs and revise the interconnection studies.

6. Interconnection Studies Methodology and Feedback

6.1 The interconnection studies shall be carried out by SLDCs, RLDCs or NLDC, as the case may be, each month on a rolling basis duly considering all the elements expected to be energized in the next six (06) months.

6.2 The interconnection studies shall be carried out with the help of suitable simulation tools. Further, the studies shall be carried out on a study case[4] (network topology, load-generation balance etc.) duly representative of the real-time conditions.

6.3 The interconnection studies shall be conducted such that the impact of the new element under all anticipated operating conditions of a typical day of the "M" month is covered. For this, the studies may be carried out for at least the following four time periods (i.e. considering the load-generation balance of four cardinal points on the monthly load curve) for the expected month of integration of the element.

a) Solar Peak Period
b) Non-Solar Peak Period
c) Non-Solar Off-peak Period
d) Morning Peak Demand Period

Studies for other scenarios may also be carried out as per requirement.

[3] CEA's manual on Transmission Planning Criteria may be referred in this regard

[4] NLDC's *"Procedure for Assessment of Transfer Capability"* may be referred for base case preparation (input data) guidelines

6.4 The following type of studies may be carried out in the interconnection analysis:

a) Element Charging and Switching Studies
b) Power Flow Studies
c) Short Circuit Studies
d) Reactive Power Management Studies
e) Impact on transfer capability of different control areas/group of control areas
f) Stability Studies as applicable
g) Any other study as per requirement

6.5 The studies shall be carried out in line with the provisions specified in the **extant standards and regulations notified by the Central Electricity Authority (CEA) and Central Electricity Regulatory Commission (CERC).** CEA's extant Manual on Transmission Planning Criteria may also be referred in this regard.

6.6 NLDC, RLDCs and SLDCs shall compare the results of the interconnection studies of the new elements on the system with those of the interconnection and planning studies carried out by CTU and STUs. Any significant variations observed shall be communicated to CEA, RPCs, CTU and STUs for immediate and long-term mitigation measures.

6.7 In case of any constraint observed in the interconnection of new element, CTU, NLDC, RLDC or SLDC, as the case may be, shall explore possible measures for facilitating the integration of the element, subject to grid security.

7. Revision of Procedure

The procedure shall be reviewed and revised by NLDC after stakeholder consultation and with intimation to the Commission.

Under exigencies, the procedure shall be reviewed and revised by NLDC with intimation to the Commission. Stakeholder consultation shall follow subsequently.

Annexure-I: Summary of the elements expected to be first-time energized in next six (06) months

GENERATING UNITS

S.No.	Region	Location	Plant/Unit Name	Unit No	Type/Source	Total Capacity (MW)	Owner/ Agency	Expected Commissioning Date/Month
1	**NR**	Rajasthan	A	Unit-1	Hydro	250	X	-
2	**WR**	Gujarat	B	Unit-2	Coal	300	Y	-
3	**SR**	Tamil Nadu	C	NA	Solar	300	Z	-

Interconnecting/Generator/Station Transformers

S.No.	Region	Location	Sub-Station	ICT No.	Voltage Level (kV)	Capacity (MVA)	Owner/ Agency	Expected Commissioning Date/Month
1	**NR**	Rajasthan	A	3	765/400/33	1500	X	-
2	**WR**	Gujarat	B	1	400/220	500	Y	-
3	**SR**	Tamil Nadu	C	2	220/33	150	Z	-

Substation Bays

S.No.	Region	Location	Sub-Station Name	Bays to be charged	Voltage Level (kV)	Bus Switching scheme	Owner/ Agency	Expected Commissioning Date/Month
1	**NR**	Rajasthan	A	X	765 KV	Breaker & half scheme	X	-
2	**WR**	Gujarat	B	Y	400 KV	Double main & transfer bus scheme	Y	-
3	**SR**	Tamil Nadu	C	Z	220 KV	Double bus scheme	Z	-

TRANSMISSION LINES								
S.No.	**Region(s)**	**Location**	**Line Name**	**Length (KM)**	**Voltage Level (kV)**	**Rating (SIL)**	**Rating (Thermal)**	**Expected Commissioning Date/Month**
1	**Inter-regional (ER-NR)**	Bihar - UP	A-B	M	765 kV	X	X	-
2	**WR**	Gujarat	C-D	N	400 kV	Y	Y	-
3	**SR**	Tamil Nadu	E-F	P	220 kV	Z	Z	-
LILO/Re-Arrangement/Reconductoring of Transmission Lines								
S.No.	**Region(s)**	**Location**	**Line Name/LILO/Re arrangement/ Reconductoring at station**	**Length (KM)**	**Voltage Level (kV)**	**Rating (SIL)**	**Rating (Thermal)**	**Expected Commissioning Date/Month**
1	**Inter-regional (ER-NR)**	Bihar - UP	A-B-C	M	765 kV	X	X	-
2	**WR**	Gujarat	B	N	400 kV	Y	Y	-
3	**SR**	Tamil Nadu	C	P	220 kV	Z	Z	-

BUS/LINE REACTORS								
S.No.	**Region**	**Location**	**Sub-Station/Line**	**Type**	**Voltage Level (kV)**	**Rating (MVAr)**	**Owner/ Agency**	**Expected Commissioning Date/Month**
1	**NER**	A	X	Bus Reactor	400	125	M	-
2	**NR**	B	Y	Line Reactor of … Line at … end	765	125	N	-
2	**NR**	c	Z	Line Reactor of … Line at … end	400	125	N	-
HVDC /AC Filter bank / FACTS DEVICEs/Any other element								
S.No.	**Region(s)**	**Substation (s)**	**Element Name**	**Type**	**Voltage Level (kV)**	**Rating (MW/MVAR) (*Both Forward & Reverse Direction Rating for HVDC)**	**Owner/ Agency**	**Expected Commissioning Date/Month**
1	**NR**	A/B	**X**					-
2	**WR**	C/D	**Y**					-