I/30995/2023

सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

विषय: प्रचालन समन्वय उप-समिति की 212वीं बैठक की कार्यसूची।

Subject: Agenda of the 212th OCC meeting.

प्रचालन समन्वय उप-समिति की **212वीं** बैठक दिनांक 20.10.2023 को 10:30 बजे से एनआरपीसी सचिवालय, कटवारिया सराय, नई दिल्ली में आयोजित की जाएगी। उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है ।

कृपया बैठक में उपस्थित होने की सुविधा प्रदान करें।

The **212th** meeting of Operation Co-ordination Sub-Committee is scheduled to be held on **20.10.2023** from **10:30 Hrs** at **NRPC Secretariat, Katwaria Saarai, New Delhi**. The agenda of this meeting has been uploaded on the NRPC web-site http://164.100.60.165.

Kindly make it convenient to attend the meeting.

Signed by Santosh Kumar
Date: 16-10-2023 10:43:49
Reason: Approved
(संतोष कुमार)
अधीक्षण अभियंता (प्रचालन)

सेवा में : प्रचालन समन्वय उप समिति के सभी सदस्य।
To : All Members of OCC

खण्ड-क: उ.क्षे.वि.स. Part-A: NRPC

1. Confirmation of Minutes

211th OCC meeting was held on 19.09.2023. Minutes of the meeting were issued vide letter dtd. 11.10.2023. No comments have been received till the date.

Decision required from Forum:

Forum may approve the minutes of 211th OCC meeting.

2. Review of Grid operations

2.1 Power Supply Position (Provisional) for September 2023

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of September-2023 is as under:

State / UT	Req. / Avl.	Energy (MU)			Peak (MW)		
		Anticipated	Actual	% Variation	Anticipated	Actual	% Variation
CHANDIGARH	(Avl)	190	194	2.3%	350	388	10.9%
	(Req)	180	194	8.0%	410	388	-5.4%
DELHI	(Avl)	4684	3743	-20.1%	7000	6993	-0.1%
	(Req)	3600	3744	4.0%	7000	6993	-0.1%
HARYANA	(Avl)	6522	6744	3.4%	11463	12753	11.3%
	(Req)	6522	6801	4.3%	12865	12753	-0.9%
HIMACHAL PRADESH	(Avl)	1062	1034	-2.6%	1744	1758	0.8%
	(Req)	1059	1036	-2.2%	1775	1758	-1.0%
J&K and LADAKH	(Avl)	1780	1476	-17.1%	3510	2659	-24.2%
	(Req)	1560	1521	-2.5%	3290	2859	-13.1%
PUNJAB	(Avl)	7960	8148	2.4%	14100	15068	6.9%
	(Req)	8060	8148	1.1%	14900	15068	1.1%
RAJASTHAN	(Avl)	9130	9285	1.7%	18500	17840	-3.6%
	(Req)	9375	9401	0.3%	17000	17956	5.6%
UTTAR PRADESH	(Avl)	14520	14607	0.6%	28000	27389	-2.2%
	(Req)	14250	14619	2.6%	28000	27389	-2.2%
UTTARAKHAND	(Avl)	1320	1387	5.1%	2250	2293	1.9%
	(Req)	1314	1398	6.4%	2300	2368	3.0%
NORTHERN REGION	(Avl)	47168	46619	-1.2%	77300	80500	4.1%
	(Req)	45920	46861	2.1%	80500	80700	0.2%

As per above, negative / significant variation (≥5%) in Actual Power Supply Position(Provisional) vis-à-vis Anticipated figures is observed for the month of

September-2023 in terms of Energy Requirement for Chandigarh, HP, UTs of J&K and Ladakh, and Uttarakhand and in terms of Peak Demand similar variation is noted for Chandigarh, Delhi, Haryana, HP, UTs of J&K and Ladakh, Rajasthan, UP. These states/UTs are requested to submit reason for such variations so that the same can be deliberated in the meeting.

All SLDCs are requested to furnish provisional and revised power supply position in prescribed formats on NRPC website portal by 2nd and 15th day of the month respectively for the compliance of Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007.

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units

The meeting on proposed maintenance programme for Generating Units for the month of November-2023 is scheduled on 18-October-2023 via Video Conferencing

3.2. Outage Programme for Transmission Elements

The meeting on proposed outage programme of Transmission elements for the month of November-2023 is scheduled on 18-October-2023 via Video conferencing.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region for November 2023

The Anticipated Power Supply Position in Northern Region for November 2023 is as under:

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
CHANDIGARH	Availability	110	270	No Revision submitted
	Requirement	110	280	
	Surplus / Shortfall	0	-10	
	% Surplus / Shortfall	0.0%	-3.6%	
DELHI	Availability	1860	5490	No Revision submitted
	Requirement	2190	4260	
	Surplus / Shortfall	-330	1230	
	% Surplus / Shortfall	-15.1%	28.9%	
HARYANA	Availability	4850	10770	No Revision submitted
	Requirement	4130	8340	
	Surplus / Shortfall	720	2430	
	% Surplus / Shortfall	17.4%	29.1%	

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
	Availability	1097	1895	
HIMACHAL PRADESH	Requirement	1010	1938	11-Oct-23
	Surplus / Shortfall	87	-43	
	% Surplus / Shortfall	8.6%	-2.2%	
J&K and LADAKH	Availability	1210	3920	No Revision submitted
	Requirement	1800	3230	
	Surplus / Shortfall	-590	690	
	% Surplus / Shortfall	-32.8%	21.4%	
PUNJAB	Availability	4760	10220	No Revision submitted
	Requirement	4180	7620	
	Surplus / Shortfall	580	2600	
	% Surplus / Shortfall	13.9%	34.1%	
RAJASTHAN	Availability	8080	17340	No Revision submitted
	Requirement	9350	16820	
	Surplus / Shortfall	-1270	520	
	% Surplus / Shortfall	-13.6%	3.1%	
UTTAR PRADESH	Availability	9450	18500	13-Oct-23
	Requirement	9300	18500	
	Surplus / Shortfall	150	0	
	% Surplus / Shortfall	1.6%	0.0%	
UTTARAKHAND	Availability	720	2310	No Revision submitted
	Requirement	1160	2250	
	Surplus / Shortfall	-440	60	
	% Surplus / Shortfall	-37.9%	2.7%	
NORTHERN REGION	Availability	32137	65800	
	Requirement	33230	58900	
	Surplus / Shortfall	-1093	6900	
	% Surplus / Shortfall	-3.3%	11.7%	

SLDCs are requested to update the anticipated power supply position of their respective state / UT for the month of November-2023 and submit the measures proposed to be taken to bridge the gap between demand & availability, as well to dispose-off the surplus, if any, in the prescribed format.

5. Follow-up of issues from previous OCC Meetings- Status update.

The updated status of agenda items is enclosed at ***Annexure-A.I***.

All utilities are requested to update the status.

6. NR Islanding scheme

Latest status of Islanding Scheme of NR is attached as **Annexure-A.II.**

Members may kindly deliberate.

7. Coal Supply Position of Thermal Plants in Northern Region

7.1 In the 186th OCC meeting, it was agreed that coal stock position of generating stations in northern region may be reviewed in the OCC meetings on the monthly basis.

7.2 Accordingly, coal stock position of generating stations in northern region during current month (till 10th October 2023) is as follows:

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
ANPARA C TPS	1200	42.69	12	**3.1**
ANPARA TPS	2630	42.13	12	8.1
BARKHERA TPS	90	25.81	20	7.8
DADRI (NCTPP)	1820	29.03	20	7.6
GH TPS (LEH.MOH.)	920	29.25	20	13.2
GOINDWAL SAHIB TPP	540	27.22	20	**2.2**
HARDUAGANJ TPS	1265	32.77	20	5.0
INDIRA GANDHI STPP	1500	31.27	20	10.5
KAWAI TPS	1320	28.10	20	4.5
KHAMBARKHERA TPS	90	28.77	20	7.7
KOTA TPS	1240	39.50	20	5.7
KUNDARKI TPS	90	26.32	20	7.5
LALITPUR TPS	1980	32.24	20	9.9
MAHATMA GANDHI TPS	1320	37.49	20	16.9
MAQSOODPUR TPS	90	28.96	20	10.1
MEJA STPP	1320	38.77	20	6.9
OBRA TPS	1094	28.34	20	5.7
PANIPAT TPS	710	41.02	20	7.3
PARICHHA TPS	1140	29.40	20	8.3
PRAYAGRAJ TPP	1980	38.73	20	10.1
RAJIV GANDHI TPS	1200	15.99	20	16.9
RAJPURA TPP	1400	41.04	20	12.6
RIHAND STPS	3000	47.49	12	25.8
ROPAR TPS	840	26.46	20	29.0
ROSA TPP Ph-I	1200	38.49	20	8.0
SINGRAULI STPS	2000	46.96	12	9.0

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
SURATGARH TPS	1500	35.85	20	7.6
TALWANDI SABO TPP	1980	30.54	20	4.3
TANDA TPS	1760	32.20	20	7.3
UNCHAHAR TPS	1550	35.12	20	6.9
UTRAULA TPS	90	25.56	20	6.4
YAMUNA NAGAR TPS	600	33.98	20	11.3
CHHABRA-I PH-1 TPP	500	42.54	20	5.7
KALISINDH TPS	1200	25.95	20	3.6
SURATGARH STPS	1320	30.28	20	4.4
CHHABRA-I PH-2 TPP	500	15.38	20	4.7
CHHABRA-II TPP	1320	12.86	20	5.0

8. Status of availability of ERS towers in Northern Region (Agenda by NRPC Sectt.)

8.1 In the 68th meeting of NRPC, issues arising due to non-availability of sufficient ERS were discussed and it was decided that ERS availability monitoring shall be taken as rolling/follow-up agenda in the OCC meetings for regular monitoring of ERS under different utilities in Northern region.

8.2 Subsequently matter was deliberated in the 211th OCC meeting wherein NRLDC representative briefed about the requirement of ERS, recent experience in Northern Region, CEA Regulation on ERS, Govt. Guidelines and present situation on ERS.

8.3 NRPC Sectt. vide letter dated 26.09.2023 requested all transmission utilities of NR to furnish the length of transmission line (ckt-kms) and number of ERS towers available with them at different voltage levels (e.g. 220 kV, 400 KV, 765 KV and + -500 kV HVDC) in the attached format (**Annexure-A.III.)** latest by 6th October 2023 via email at **seo-nrpc@nic.in**.

Members may kindly deliberate.

9. Interim SPS for Anpara Complex (Agenda by UPSLDC)

9.1. UPSLDC vide letter dated 04.10.2023 has intimated that revised SPS scheme for evacuation of power from Anpara and Obra complex was approved in the 209th OCC meeting and it will take 6 to 8 months to implement aforementioned SPS scheme. Due to unavailability of downstream network at Obra C TPS, safe power evacuation from Anpara complex may not be possible in the event of any contingency.

9.2. For safe evacuation of power from Anpara complex, UPSLDC has designed an Interim SPS for Anpara complex with existing hardware/software available at Anpara for already commissioned SPS. To implement interim SPS, no hardware will be

required at Obra C.

9.3. A copy of Interim SPS for Anpara Complex proposed by UPSLDC is attached as **Annexure-A.IV.**

Members may kindly deliberate.

10. Proposed SPS for ICTs at 400 kV GSS Bhilwara (Agenda by RVPN)

10.1 The cited agenda was deliberated in the 209th OCC meeting of NRPC wherein forum asked RVPN to submit the base case for the proposed SPS at RVPN's 400kV GSS Bhilwara to NRLDC for its examination and thereafter the matter can be further deliberated in the next OCC meeting.

10.2 RVPN vide mail dated 10.10.2023 has communicated the observations of NRLDC for proposed SPS for ICTs at 400kV GSS Bhilwara which is as follows:

The logic seems ok and it is seen that some network rearrangement was done in basecase. For instance, in case of outage of 220kV Bhilwara-Bhilwara Interconnector, 220kV Bhilwara S/s would be fed from 220kV Beawar & Anta S/s and not from Kota(PG) via 220kV Kota-Bhilwara. It is requested to confirm that s/s would be operated with this rearrangement during the high demand season.

Further, it may be confirmed from field that tripping of 220kV line will take place before overcurrent protection of ICT is operated. Mock testing of same may be carried out afterwards.

10.3 A copy of proposed SPS for ICTs at 400 kV GSS Bhilwara is attached as **Annexure-A.V.**

Members may kindly deliberate.

11. SPS Scheme for safe evacuation of Power from Alaknanda-Vishnuprayag HEP complex (Agenda by UPSLDC)

11.1 In reference to the discussion held in the 211th OCC meeting, UPSLDC vide letter dated 11.10.2023 has intimated that for safe evacuation of Power from Alaknanda-Vishnuprayag HEP complex, a meeting was held on 09.10.2023 (copy attached as **Annexure-A.VI.**)

11.2 Proposed SPS logic for safe evacuation of Power from Alaknanda-Vishnuprayag HEP complex is attached **Annexure-A.VII**.

Members may kindly deliberate.

12. Scheduling below Minimum Turn Down Level during IEGC-2023 regime (Agenda by APCPL)

12.1. APCPL vide mail dated 12.10.2023 (copy enclosed as **Annexure-A.VIII**) has mentioned that post implementation of IEGC-2023 regulations, RLDCs are not ensuring technical minimum schedule for the generator and the generators are forced to bear DSM penalty for deviating from the schedule, which is less than the Minimum Turn Down Level as mentioned in Form AS- 1 and as stipulated by CERC in IEGC 4th amendment regulations, 2016.

Members may kindly deliberate.

13. Improper Power evacuation from the Switchyard of 6x250MW, STPS, RRVUNL, Suratgarh (Agenda by RVUN)

13.1 RVUN vide mail dated 03.10.2023 has intimated that SSTPS Suratgarh is facing issues related to power evacuation.

13.2 After the commercial power generation from both the 2x660MW units of SSCTPP, Switchyard of STPS-O&M is continuously overstressed because their entire power generation (2x660MW) is being evacuated through the switchyard of STPS(O&M) as SSCTPP is having total four 400KV feeders out of which 2x400KV SSCTPP-Babai feeders are still not commissioned and 2x400KV SSCTPP-Bikaner feeders do not cater loads i.e. lightly loaded/imports solar power from Bikaner during day time. So, entire generation by 2x660MW, SSCTPP is being evacuated through the feeders of STPS only.

13.3 Besides this, considerable solar generation during day time (approx 550MW) at Bikaner is also being evacuated through the Switchyard of STPS via 3x400KV Bikaner feeders (two from SSCTPP and one from STPS-O&M). In nutshell, Switchyard of STPS-O&M is evacuating approx. 1000-1100MW extra power generation continuously in addition to its own 1500MW generation capacity i.e. 60-80% overloading.

13.4 Due to this entire phenomenon, either 2x315MVA, 400KV/220KV ILTs or 2x400KV STPS-Ratangarh lines and sometimes all the four power elements operate near their border line load.

13.5 RUVN has suggested some proposal to tackle the problems of Improper Power evacuation from the Switchyard of 6x250MW, STPS, RRVUNL, Suratgarh. Details are enclosed at **Annexure-A.IX**.

Members may kindly deliberate.

खण्ड-ख: उ.क्षे.भा.प्रे.के. Part-B: NRLDC

14. NR Grid Highlights for September 2023

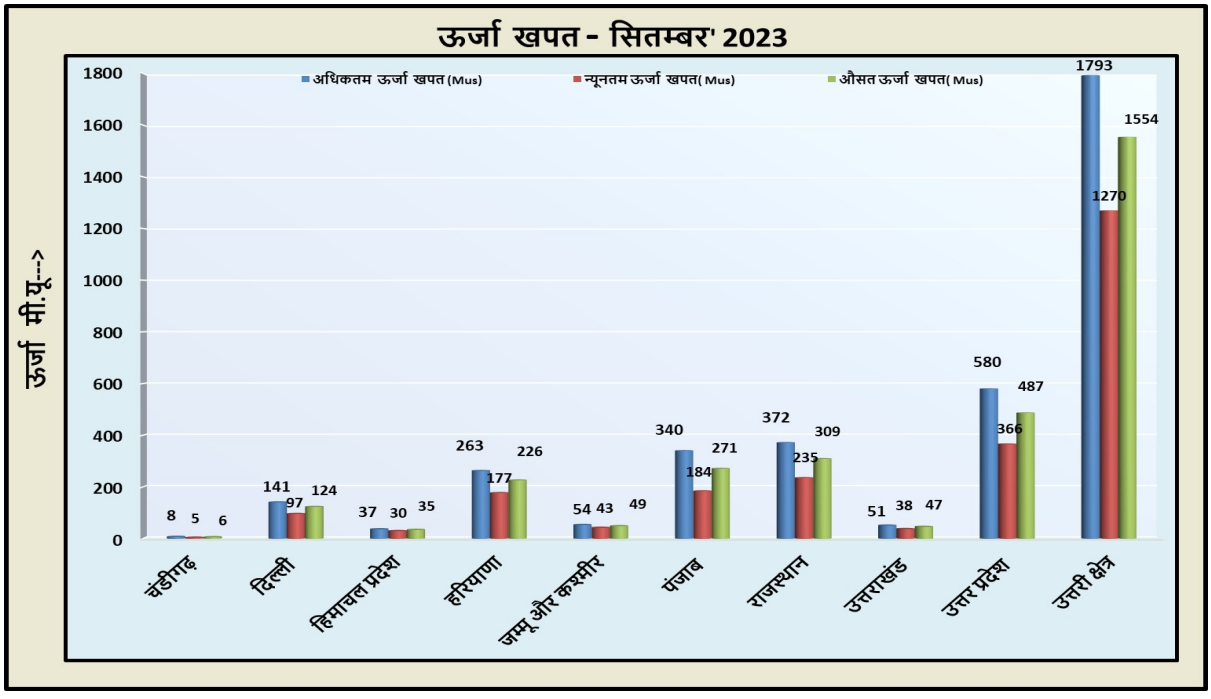
Following are major grid highlights of September 2023:

- Maximum energy consumption of Northern Region was **1793 MUs** on 04th Sep'23 and it was 4.9 % higher than Sep'22 (1710 MUs 09th Sep'22)
- Average energy consumption per day of Northern Region was **1554 MUs** and it was 8.2 % higher than Sep'22 (1436 Mus per day)
- Maximum Demand met of Northern Region was **81048 MW** on 04th Sep'23 @14:50 hours (*based on SCADA data)* as compared to 75673 MW on 30th Sep'22 @13:00 hours.

Northern Region all time high value recorded in Sep'23:

States	Max. Demand Met during the day (MW)		Energy Consumption (MU)	
	As per Format28/hourly data Submitted by States (MW)	As on date	As per PSP (Mus)	As on date
Rajasthan	17772	02-09-2023 14.45 hrs	372	04.09.2023

Energy Consumptions



Comparison of Average Energy Consumption (MUs/Day) of NR States for the Sep'22 vs Sep'23

क्षेत्र/राज्य	सितम्बर- 2022	सितम्बर- 2023	% अंतर
चंडीगढ़	5.9	6.5	10.7%
दिल्ली	114.7	123.7	7.9%
हिमाचल प्रदेश	32.8	34.6	5.4%

हरियाणा	204.8	226.3	10.5%
जम्मू और कश्मीर	49.6	49.2	-0.8%
पंजाब	256.9	271.2	5.6%
राजस्थान	290.3	309.5	6.6%
उत्तराखंड	43.4	46.6	7.3%
उत्तर प्रदेश	437.6	486.8	11.2%
उत्तरी क्षेत्र	**1435.9**	**1554.3**	**8.2%**

Frequency Data

Month	Avg. Freq. (Hz)	Max. Freq. (Hz)	Min. Freq. (Hz)	<49.90 (% time)	49.90 – 50.05 (% time)	>50.05 (% time)
Sep'23	50.00	50.30 on 18.09.23 at 14:02:50 hrs	49.52 on 01.09.23 at 14:50:10 hrs	5.3	**77.9**	16.8
Sep'22	50.00	50.31 on 16.09.22 at 13:02:30 hrs	49.50 on 02.09.22 at 19:19:00 hrs	5.9	**80.8**	13.3

Detailed presentation on grid highlights of Sep'2023 will be shared by NRLDC in OCC meeting.

15. Opening of 400 KV Singrauli(NT)-Anpara(UP) to control fault level

As per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara has to be opened to control the high fault levels in Anpara – Singrauli – Rihand complex.

Extract from the meeting are shown below:

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

In 210 OCC meeting, NRLDC representative informed the forum that a meeting was organized on 10.07.2023 among NLDC, NRLDC & SLDC – UP to discuss on the

constraints faced in the operation of HVDC back-to-Back Vindhyanchal in WR to NR direction due to high loading of 400 kV Anpara – Obra. In the meeting it was discussed & agreed that:

- As per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara will be opened to control the high fault levels in Anpara – Singrauli – Rihand complex. NRLDC & SLDC - UP shall conduct a study to observe the impact of opening 400 kV Singrauli – Anpara on the fault level of the complex.
- Also, the opening of 400 kV Singrauli – Anpara will relieve the loading of 400 kV Anpara – Obra and provide flexibility in the operation of HVDC back-to-Back Vindhyanchal in both directions. The same shall be studied by NRLDC & UP – SLDC to identify operational issues with 400 kV Singrauli – Anpara in open condition. The contingencies/planned outages which may require closing of the line will also be identified.
- For due consultation with all the stakeholders i.e. POWERGRID, NTPC & UP, the matter shall be taken up in the OCC forum before implementation.

NRLDC representative further shared the observations of the study conducted to assess the effects resulting from the opening of the 400 KV Singrauli(NT)-Anpara(UP) (PG) transmission line on the system, and the fault level of the Anpara-Singrauli generation complex, along with the potential contingencies that could occur.

Singrauli	1850 MW
Rihand	1856 MW
Anpara A&B	1546 MW
Anpara C	1100 MW
Anpara D	944 MW
Vindhyanchal BTB	500 MW towards NR
Obra	903 MW
Bara	1760 MW
NR Demand	73200 MW
UP Demand	27000 MW

HVDC Rihand Dadri : 1400 MW towards Dadri
HVDC Balia Bhiwadi : 250 MW towards Bhiwadi

Sl. No	Bus number	Substation	Voltage level	Case: Maximum Generation		After opening 400kV Anpara-Singrauli		Relief
				Fault MVA	Fault current	Fault MVA	Fault current	
1	154056	SINGRL4	400	33.32166	48095.7	22.17586218	32008.1	16087.6
2	154014	ANPARA4	400	37.90139	54705.9	28.11090748	40574.6	14131.3
3	154016	ANPARAC	400	37.11426	53569.8	27.78389629	40102.6	13467.2
4	154015	ANPARA-D	400	33.37294	48169.7	25.77984422	37210	10959.7
5	154057	RIHAND-G	400	22.57143	32579	19.22666463	27751.3	4827.7
6	157000	ANPARAC	765	35.06184	26461.4	32.26407693	24349.9	2111.5
7	157001	ANPARA-D	765	35.23052	26588.7	32.45792719	24496.2	2092.5
8	154018	OBRA4	400	18.54675	26769.9	17.59133154	25390.9	1379
9	157027	OBRA_C_TPS	765	21.62366	16319.5	20.69268716	15616.9	702.6

From the study results, it is clear that the fault level in the Singrauli-Anpara complex has significantly decreased. Maximum relief is observed at Singrauli (16kA), Anpara TPS (14kA), Anpara C (13kA) and Anpara D (11kA).

NRLDC representative stated that as per the study conducted for various contingencies the system was seen to be N-1 Compliant and stable.

Other major findings of the study:

i. The system is compliant w.r.t to N-2 contingency of HVDC Rihand Dadri D/c.

ii. However, Singrauli complex would be N-1 non-compliant w.r.t further tripping of any one ckt of 400kV Singrauli-Allahabad, 400kV Singrauli-Lucknow, 400kV Rihand-Allahabad. By shifting Vindhyachal towards WR (Western Region) with a minimum of 200 MW, the system becomes N-1 compliant.
Action: *Therefore, in case of tripping on any one ckt in Singrauli complex power flow in HVDC Vindhyachal may be shifted towards WR with a minimum of 200 MW*

iii. The system is compliant w.r.t to N-1 contingency of 765 kV Anpara_C – Unnao and 765 kV Anpara D – Obra_C. No major contingency was observed

iv. However, if the generation at Obra is below 400 MW before the tripping incident, it would result in an overload on the 400 kV Anpara-Obra line after the tripping of any one of the 765 kV line.

v. In order to maintain N-1 compliance, the safe limit for HVDC Balia-Bhiwadi power transfer should be **300 MW** from Bhiwadi to Balia which was **400 MW** prior to opening of 400 KV Singrauli(NT)-Anpara(UP) (PG).

The study results and basecase were shared with UP SLDC on 02.08.2023.

In 210 OCC meeting,

- NRLDC representative requested SLDC UP to provide the results of the study carried out on their part and requested CTUIL to provide their comments as the above was approved in NR-PCTP meeting**.**

- SLDC UP representative stated that they received similar results from the study conducted at their end and will share the observations with NRLDC shortly.

- NTPC and POWERGRID were also requested to provide any comments from their side.

- OCC asked all members to submit their comments by first week of September 2023.

- No comments were received at NRLDC end.

Subsequently, the agenda was discussed in 211 OCC meeting. In the meeting,

- NRLDC representative requested UP SLDC, UPPTCL, POWERGRID, NTPC and CTUIL to provide their inputs if any
- Representative from SLDC UP stated that an internal meeting was organized separately in 1st week of September and comments from all the constituents are awaited and will be shared soon.
- No comment was received from NTPC/ POWERGRID.
- CTUIL representative stated that Bhiwadi-Ballia HVDC is expected to be in service with 1000MW from Bhiwadi to Ballia side and in case there is any kind of limitation on Bhiwadi Ballia HVDC due to high line loading of 400kV Ballia-Mau, then reconductoring of line may need to be taken up.
- NRLDC representative stated that for Bhiwadi-Ballia, power is generally flowing from Bhiwadi to Ballia in range of 500-1000MW. In evening/night time, when

demand of UP state is high, high loading of 400kV Ballia-Mau is being observed (even N-1 non-compliant).

- In view of above, in future, there may be requirement of reducing the power order of Bhiwadi-Ballia HVDC during evening time so as to avoid N-1 non-compliance of 400kV Ballia-Mau line.

UP SLDC is requested to provide update. Members may please discuss and accord their approval for opening of 400 KV Singrauli(NT)-Anpara(UP) to control fault level.

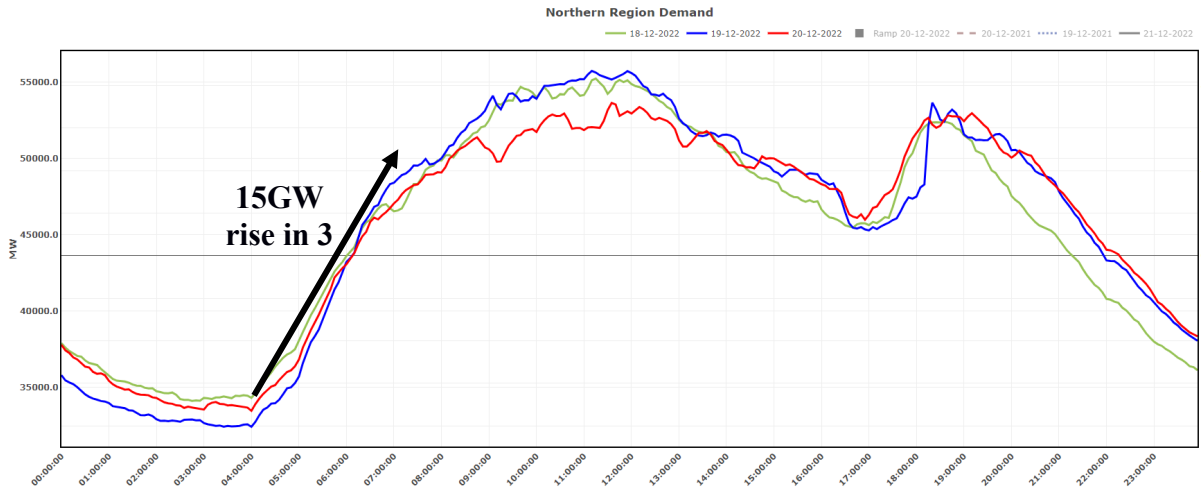
16. Winter preparedness 2023-24

Winter in Northern region is likely to start from mid of October till February end, and the challenges faced during these months are well known to all the utilities. During winter, demand of NR states except Rajasthan and hilly states starts reducing. With decreasing temperatures and festivals, winter also brings some severe challenges to NR grid operators:

(i) **Load-generation balance *(Action by SLDCs/ NRLDC)***

- Hydro generation resource which becomes all the more important due to ramping requirement; it starts depleting due to limited inflow of water (most of the hydro stations of NR are snow fed). With increasing solar generation during the day-time, the ramping requirements during evening hours are rising and posing serious challenge to the system operators to maintain frequency within the band.
- Off-peak to peak demand ratio of NR falls to around 0.5 to 0.6 during winter, morning and evening load ramp is quite steep together with limited hydro resources etc. This increases the importance of Portfolio management as per load forecast especially during high ramp up and ramp down periods.
- Generation planning becomes very important especially with the in-surge of renewable integration with the grid, generation resources should be optimally planned, taking care to maintain adequate reserves.

Typical demand pattern for a winter day is shown below:



Measures to be taken by utilities to manage load generation balance during winter months as discussed during previous many meetings are mentioned below:

- With increasing complexity, users may develop in house or use third party Software tools for precision of load forecasting & generation planning for daily basis, which can further go for hourly basis also.
- Forecast of demand ramp has also become important and so SLDCs are advised to forecast load ramping so that commensurate ramping of generation can also be planned.
- Minimize generation to technical minimum as per IEGC guidelines /CERC directions during low demand.
- Co-ordination of ramping of generation during morning & evening peak ramping.
- Optimum utilization of Hydro resources for meeting peak hour demand.

(ii) High voltages in grid (***Action by all utilities***)

Another big challenge with decrease in demand, is the high voltages observed in the grid. With NR load reducing significantly, the lines become lightly loaded and are generating MVAR most of the time leading to high voltages in grid. Moreover, with heating loads across most of the NR states the power factor also is improved minimizing any reactive power requirement from the grid.

To overcome this challenge number of measures have been discussed earlier and are reiterated for OCC members:

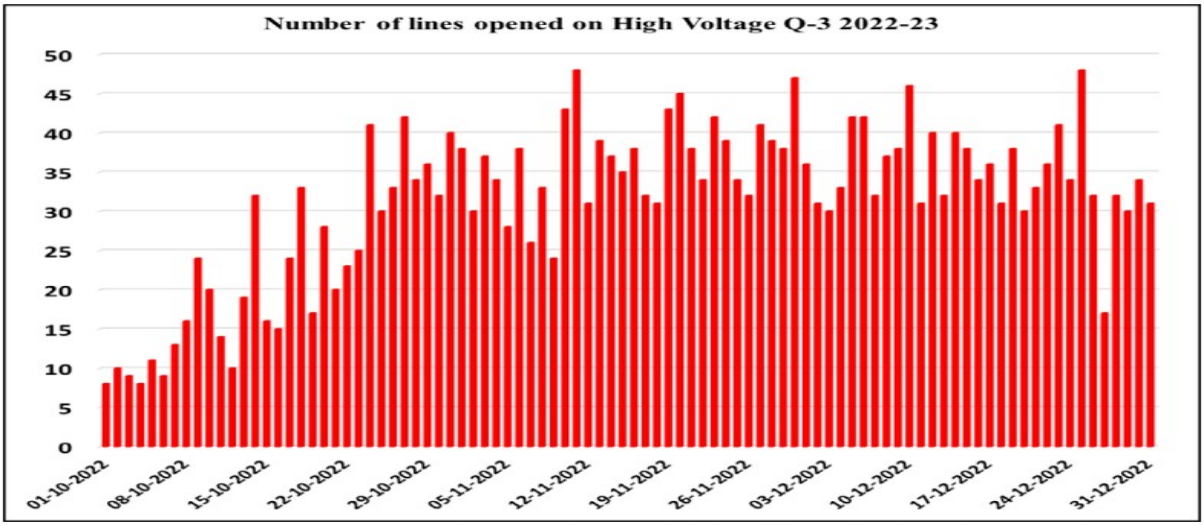
- Ensuring to switch off capacitors & switch on reactors.
- Ensuring healthiness of all commissioned reactors in the system
- Monitoring of reactive power through SCADA displays.
- Reactive power support (absorption) by generating stations as per the capability curve.
- Synchronous condenser operation especially of hydro units during night hours for dynamic voltage support. **Some of the generators have already been tested (Tehri, Chamera, Pong, RSD etc.) and shall be available for condenser mode of operation as and when required. States/SLDCs are also advised to explore synchronous condenser operation of Hydro & Gas units in their state control area. It is requested that all other utilities may explore possibility of running units as synchronous condenser.**
- ICT Tap Optimization at 400kV & above is carried out by NRLDC. Same exercise need to be carried out by SLDCs at 220kV & below levels. ICT tap optimisation will be done by NRLDC based on SCADA data of Oct month.
- Opening of EHV lines based on expected voltage reduction and also considering security & reliability of system
- To ensure that line reactors available after opening of lines are optimally utilized it is necessary that all the stations where the provision of using line reactors as bus reactors is available at all control centres. The Reactive power document being compiled by NRLDC has the details of all such line reactors. Last updated document is available at NRLDC website under documents section: *https://nrldc.in/download/nr-reactive-power-management-2023/?wpdmdl=11903*. It is requested that all utilities go through document and share any anomaly/mis-representation. The document is being utilized in real-time operation by control room operators at NRLDC, thus it is necessary that list of all reactors where such provision is available are updated in the document.

(iii) Plan for winter preparedness *(Action by SLDCs)*

Generally Following actions are being taken at NRLDC end for controlling high voltages in the grid. To avoid frequent opening of lines, following instructions are given to avoid over voltages in the system.

- The bus reactors are switched in.
- The manually switchable capacitor banks are taken out.
- The switchable line/tertiary reactor are taken in.
- Optimized the filter banks at HVDC terminal.
- All the generating units on bar are advised to absorb reactive power within the capability curve.
- Reduced power flow on HVDC terminals so that loading on parallel EHV network goes up resulting in drop in voltage.

After exhausting all the above stated resources, in the last resort, lightly loaded lines were opened and priority was given to the lines which have switchable line reactor, so that their line reactors(L/R) can be converted to bus reactors(B/R) to contain the overvoltage. As can be seen from the plot shown below, number of 400kV & above lines have to be opened on daily basis to control high voltages in the grid.



It has been observed that many transmission lines have switchable Line Reactors (with distinct Circuit Breaker for switching operations) but they are not used as Bus Reactors due to concerns raised by line owners owing to non-availability of NGR bypass scheme. Generally, the bypass scheme is required for Neutral Grounding Reactor (NGR) of the line reactor so as to utilize the line reactor as bus reactor. The NGR bypass scheme requires a bypass isolator or circuit breaker, the provision of which makes the conversion possible. In planning stage, instalment of NGR bypass schemes may also be considered in switchable Line Reactors to avoid multiple opening of parallel circuits on high voltage and to maintain system voltage within limits specified under Central Electricity Authority (Grid Standards) Regulations, 2010.

Severe High voltage in Delhi, Punjab & Haryana area

The issue of high voltage in Delhi, Punjab & Haryana state control area is well known. Since the demand of these states reduces drastically in the winter months compared to high demand months from Jun-Sep, the transmission lines and transformers are under-utilised. This leads to a situation wherein the low power flow through these transmission

lines leads to high MVAR generation. This high MVAR generation along with less reactive load (highly inductive load during summer months due to agricultural and cooling requirement) leads to very high voltages in the grid. Further due to less demand, these states are generally drawing power from the pit-head plants and their internal generation is also less. This lower internal generation / less machines on bar aggravates the high voltage as no reactive power support is available from near by machines.

Delhi has a transmission network and distribution network involving cable which are generating high reactive power. Further, when these cables are lightly loaded during the night hours of winter months, it leaves the operator no choice but to open the transmission lines. Thus, it is important that already planned and approved reactors are commissioned before the winter season so as to minimise the issues of high voltage in Delhi control area.

Similarly, for Punjab & Haryana apart from the above listed measures, it is critical that lightly loaded transmission lines are opened at lower voltage during night time also keeping in mind grid security so that unnecessary MVAR generation is avoided. Ready list of such lines may be furnished to NRLDC/NRPC for information.

Status of reactors under commissioning in Northern region as per 211 OCC MoM is shown below:

State / Utility	Substation	Reactor	Status as per 211 OCC MoM
POWERGRID	Kurukshetra	500 MVAr TCR	Anticipated commissioning: Oct'23
DTL	Mundka	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision.
DTL	Bamnauli	2x25 MVAr at 220 kV	Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision.
DTL	Indraprastha	2x25 MVAr at 220 kV	Bay work completed on 07.11.2023. Reactor part tender is dropped and at present same is under revision.
DTL	Electric Lane	1x50 MVAr at 220 kV	Under Re-tendering due to Single Bid
PUNJAB	Nakodar	1x25 MVAr at 220 kV	1x25 MVAR Reactor at Nakodar has been commissioned on dated 13th February 2023.
PTCUL	Kashipur	1x125 MVAR at 400 kV	Price bid has been opened and is under evaluation. Retendered in Jan'23

Special actions are required by Punjab, Haryana & Delhi to avoid the high voltage issues during winter season. It is also requested to expedite the commissioning of these reactors apart from the measures listed above.

(iv) EHV line trip during fog/Smog *(Action by transmission line owners)*

One more challenge during winter months is tripping of EHV lines due to fog. With low temperature across Northern region and sometimes with high humidity in the air, fog starts to appear across Northern region. This problem is generally most severe from 15Dec- 15Feb period. During this time additional care need to be taken by system operator as many multiple element tripping events have been reported in the past especially in Punjab and Eastern UP. Such tripping are more severe if the lines are tripping from generation complex such as Singrauli-Anpara-Rihand complex. Therefore, utilities are requested to ensure:

- **Priority wise cleaning & replacement is carried out. Priority to be given to the lines that have historical record of tripping during foggy weather.**
- Progress on cleaning replacement of porcelain insulator with polymer insulator to be monitored and latest status may be furnished to NRPC/NRLDC.

(v) Load crash due to inclement weather (***Action by all utilities***)

During winter months, the demand of Northern region is much lower compared to summer months for which the transmission system is designed. When operating at reduced demand, the internal generation of most of the states is low based on merit order. Several EHV lines are also opened to ensure voltages within IEGC limits. In such a scenario, in case of rainfall/snowfall, it is seen that demand of Northern region falls sharply. With several lines out due to high voltage and more tripping due to bad weather, ensuring safe and secure grid operation becomes a big challenge for system operators. To overcome this challenge, it is important that:

- All system operators and transmission utilities regularly monitor weather forecast site (Weather portal for power sector)
- ERS is available in case of emergency.
- Ensure additional trained manpower especially during night hours at all major control centres/ substations

(vi) Ensuring protection settings as approved by NRPC (***Action by all transmission & generating stations***)

Apart from above, it needs to be made sure that defense mechanism is healthy i.e. ensuring all SPS healthy, protection system intact, monitoring of df/dt& UFR etc; and telemetry especially of MVAr of Generator, temperature & humidity etc. is available and reliable.

During winter months, it has been observed that there is **frequent tripping of ICTs on overflux and lines on overvoltage** especially in Punjab and Haryana areas. On number of occasions, it is seen that utilities are correcting their protection settings after tripping events. It is important all the protection settings are as approved by NRPC. Utilities are requested to confirm the same from field and ensure that protection settings are only as approved by NRPC.

Utilities are requested to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. Same may be shared by utilities

via mail with NRPC/NRLDC before next OCC meeting. Members may please discuss.

17. Import Capability of states for Winter 2023-24

As discussed in previous OCC meetings, most of the NR states except J&K, Ladakh and Chandigarh U/Ts are sharing basecase and ATC/TTC assessment with NRLDC. OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

It is again requested that all SLDCs:

- Assess and share ATC/TTC assessment for Winter 2023-24
- Ensure that loading of ICTs and lines are below their N-1 contingency limits.
- While requisitioning power from various sources, states should take care to limit their scheduled drawl as well as actual drawl in real time within the Available Transfer Capability (ATC) limits assessed by SLDC and NRLDC.
- Maximizing internal generation in case of drawl near to the transfer capability limits.

CERC vide their order dated 29.09.2023 has granted approval of "'Detailed Procedure for Allocation of Transmission Corridor for Scheduling of General Network Access and Temporary General Network Access under Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022" which is attached as Annexure-B.I. The procedure mentions that:

"SLDCs in consultation with RLDCs shall declare the import and export TTC, ATC, and TRM of the individual control/bid areas within the region in accordance with Regulation 44 (3) of the Grid Code 2023. RLDCs shall assess the import and export TTC, TRM and ATC for the group of control/bid areas within the region (if required). The computed TTC, TRM and ATC figures shall be published on the website of respective SLDCs and RLDCs, along with the details of the basis of calculations, including assumptions, if any, **at least eleven (11) months in advance**. The specific constraints indicated in the system study shall also be published on the website."

Accordingly, SLDCs are requested to send the PSSE cases for four scenarios for October'24 i.e. Morning Peak, Solar Peak, Evening Peak & Off-Peak hours as given below

S. No.	Scenario	Time of Scenario
1	Off-Peak	04:00 Hrs
2	Morning Peak	10:30 Hrs
3	Evening Peak	19:00 Hrs
4	Solar Peak	12:00 Hrs

Same was also requested vide NRLDC email dated 04.10.2023. It is requested that the basecases as well as ATC/TTC assessments may be shared with NRLDC as per CERC approved procedure. Further, above exercise needs to be carried out regularly on monthly basis.

As discussed in last several OCC meetings, all SLDCs need to furnish ATC/TTC details of their control area at respective SLDC websites. Now, it is being observed that most of the SLDCs except J&K are uploading ATC/TTC limits on their websites.

SLDC	Link for ATC on website
UP	https://www.upsldc.org/documents/20182/0/ttc_atc_24-11-16/4c79978e-35f2-4aef-8c0f-7f30d878dbde
Punjab	https://www.punjabsldc.org/downloads/ATC-TTC0321.pdf
Haryana	https://hvpn.org.in/#/atcttc
Delhi	https://www.delhisldc.org/resources/atcttcreport.pdf
Rajasthan	https://sldc.rajasthan.gov.in/rrvpnl/scheduling/downloads
HP	https://hpsldc.com/mrm_category/ttc-atc-report/
Uttarakhand	https://uksldc.in/ttc-atc
J&K and Ladakh U/T	**NA**

Members may please discuss.

18. Timely revival of transmission system in Rajasthan taken under shutdown for NHAI road diversion work/Bharatmala project

Shutdown of EHV transmission lines in Rajasthan power network are being availed for carrying out diversion works by NHAI for construction of 8 lanes, Bharatmala project etc. Rajasthan being a RE rich state, the shutdowns of continuous nature are being facilitated after much deliberation in OCC forum at NRPC level and in some cases WRPC level also for inter-regional corridors. As such the shutdowns of such continuous nature are planned well in advance and during low state/regional demand period and lean wind season. The shutdowns of continuous nature are being facilitated due to low demand of NR in October-November and lean wind season. Consequently, several such outages have been planned and facilitated in sequential mode in close association with the state, NHAI, RLDC, POWERGRID & other stake holders. Thus it is obvious that any slippage from the plan has impact on all subsequent outage planning & work progress in concerned infrastructure sector.

It has been observed that several state transmission lines taken under shutdown for facilitating the above infrastructure projects are not being restored as per the planned outage. The list of transmission lines where there was delay in revival as committed is being attached at Annexure-B.II.

The delay in revival of transmission lines under outage has cascading effect on the planned outage of other transmission lines which are as important. On the other hand, multiple outages simultaneously may lead to network constraint and curtailment of cheap RE generation may have to be carried out as a last resort to maintain grid security.

Recently, the shutdown of 400 KV Bikaner-Merta was approved for 15 days for Height Raising of transmission towers for Bharatmala project of NHAI but the same was restored in 25 days, a delay of 10 days. Also, presently 400 KV Akal-Kankani and 400 KV Jaisalmer –Kankani are under outage for shifting / height raising work of transmission line (Bharatmala project) from 21.09.2023. The shutdown was approved upto 30.09.2023 after detailed deliberation in 211th OCC meeting held on 18.09.2023 but further extension of 15 days has been communicated through SLDC Rajasthan.

In view of above, it is requested to adhere to the timeline of shutdowns so that other planned outages in the network could also be timely facilitated.

Members may please discuss.

19. Details of current rating of terminal equipment for EHVAC lines

For conducting studies for assessment of inter control-area transfer capability or any other related simulation studies, thermal ratings of lines as specified in CEA's Manual on Transmission Planning Criteria 2023 are being considered as safe capacity limit of lines based on anticipated ambient temperature.

However, it is being observed in number of cases, especially in RVPN control area that the rating of terminal equipment is lower than thermal capacity of transmission line. This is leading to under-utilisation of line capacity due to limited switchgear rating and even leading to constraints in RE evacuation from Western Rajasthan RE complex.

Some of the lines in RVPN control area wherein this issue was observed are listed below:

- 400kV Bikaner(PG)-Bikaner(RJ) D/C : Issue in ISTS-RE evacuation in Dec 2022 and SPS logic had to be implemented to avoid RE curtailment.
- 400kV Bhadla(PG)-Bhadla(RJ) D/C: N-1 non-compliance observed. SPS proposal under discussion, difficult to provide shutdown in the RE complex.

For these lines, thermal capacity is 1700MVA for design @ 75deg & 2180MVA for design @85deg. However, equipment rating is only 2kA which translates to 1.732*400*2= 1385MVA only, thus limiting line power transfer capacity to 1385MVA only.

Issues were earlier observed at 400kV Mahendragarh, Dhanonda and Nawada substation in HVPN control area. Similar issues have also been reported from Vishnuprayag end for 400kV Vishnuprayag-Muzaffarnagar line and SPS is being designed to take care of contingencies in such case.

The issue of lower line equipment rating has also been discussed in the past in 2018 in NRPC-OCC level wherein NPC had asked RPCs to furnish such details. It was requested that the terminal equipment ratings of STUs' and other transmission licensees' transmission lines in region, may be compiled and furnished to Grid-India with a copy to NPC Division, CEA on priority basis.

Subsequently, the agenda was discussed in number of OCC meetings and transmission utilities were asked to submit the data. The agenda was recently discussed in 69th NRPC meeting wherein it was decided that:

- All utilities to furnish the details to Grid-India /CTUIL/NRPC for consideration in future studies and planning of actions well in advance for lines part of important grid document as published by Grid-India. Format for sharing information and information available with NRLDC as on date are attached as Annexure-B.III and Annexure-B.IV respectively.
- Special attention by transmission utilities & CTUIL in this regard so as to avoid such issues in future, including for the cases of conductor upgradation.
- Discussion for requirement of uprating switchgear ratings in 400kV Bhadla(PG)-Bhadla(RVPN) D/C line to avoid issues in RE evacuation/ facilitating shutdowns during high solar generation period.

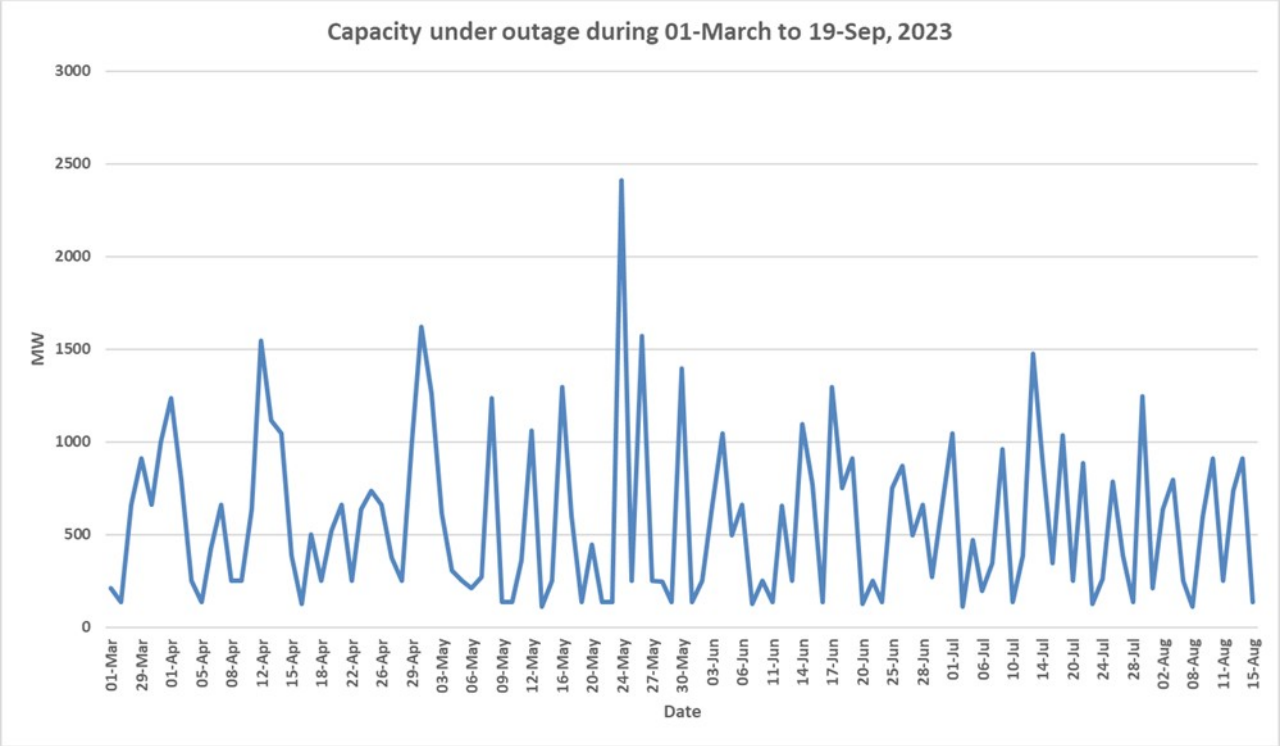
Members may please discuss.

20. Forced outage of thermal generating units in Northern region

Based on the outage available data at NRLDC outage portal, the forced outage rate of thermal generating units since Jan 2021 have been studied. The detailed list is attached as Annexure-B.V. From the analysis, it is seen that the number of outages of intrastate thermal units is very high. It is clear that the number of outages of Suratgarh, Rajwest, Kalisindh, Chhabra, Talwandi Saboo and Ropar generating units is very high. List of units based on highest rate of failure probability is mentioned below:

250 MW Chhabra TPS - UNIT 4
660 MW Suratgarh SCTPS - UNIT 7
200 MW Obra TPS - UNIT 13
135 MW Rajwest (IPP) LTPS - UNIT 3
210 MW Kota TPS - UNIT 3
200 MW RAPS-A - UNIT 2
250 MW Chhabra TPS - UNIT 3
250 MW Suratgarh TPS - UNIT 1
660 MW Talwandi Sabo TPS - UNIT 3
660 MW Meja TPS - UNIT 2
135 MW Rajwest (IPP) LTPS - UNIT 2
250 MW Suratgarh TPS - UNIT 2
660 MW Suratgarh SCTPS - UNIT 8
135 MW Rajwest (IPP) LTPS - UNIT 1
135 MW Rajwest (IPP) LTPS - UNIT 4
135 MW Rajwest (IPP) LTPS - UNIT 5
135 MW Rajwest (IPP) LTPS - UNIT 8
135 MW VSLPP (IPP) - UNIT 1
135 MW Rajwest (IPP) LTPS - UNIT 6

Further, on analyzing the data from Mar-Sep 2023 it is inferred that there is very high forced outage rate of thermal units in RVPN control area. The daily forced outages of Intra-state thermal units of Rajasthan during 01-March to 19-Sep, 2023 is shown below:



Analysis of outages of Talwandi Sabo Thermal Power Station during March-Sep, 2023.

Analysis of the availability and outage hours for the three units of 600 MW each (Unit 1, Unit 2, and Unit 3) at the Talwandi Sabo Thermal Power Station, Punjab during the period from May 1 to September 18, 2023.

Unit	Start date	End date
660 MW Talwandi Sabo TPS Unit- 2	21-05-2023	25-05-2023
660 MW Talwandi Sabo TPS Unit- 2	02-06-2023	06-06-2023
660 MW Talwandi Sabo TPS Unit- 2	27-06-2023	30-06-2023
660 MW Talwandi Sabo TPS Unit- 3	30-06-2023	04-07-2023
660 MW Talwandi Sabo TPS Unit- 2	30-06-2023	05-07-2023
660 MW Talwandi Sabo TPS Unit- 1	03-07-2023	07-07-2023
660 MW Talwandi Sabo TPS Unit- 1	09-07-2023	11-07-2023
660 MW Talwandi Sabo TPS Unit- 1	04-08-2023	05-08-2023
660 MW Talwandi Sabo TPS Unit- 2	18-08-2023	20-08-2023
660 MW Talwandi Sabo TPS Unit- 2	01-09-2023	04-09-2023
660 MW Talwandi Sabo TPS Unit- 3	08-09-2023	12-09-2023
660 MW Talwandi Sabo TPS Unit- 3	14-09-2023	17-09-2023

Availability:

Unit	Availability %	Total Outage Hours
1	95.61	149.6
2	85.3	496.5
3	91.85	270.2

Overall, the Talwandi Sabo Thermal Power Station had an availability percentage of only 72.68% during this period, indicating that there was outage of atleast one unit in every 3 days.

In view of above, it is suggested that Rajasthan and Punjab take measures to minimize outages of generating units under their control area.

Members may please discuss.

21. Operating Procedure Document of Northern region

Regulation 5.1(f) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010, stipulated that a set of detailed internal operating procedure for each regional grid shall be developed and maintained by respective Regional Load Despatch Centres, in consultation with the regional constituents. In compliance with the above regulations, document viz. "Operating Procedures for Northern Region" was prepared by the Northern Regional Load Despatch Centre in July 2023 in consultation with the regional constituents of the Northern Region after discussion in 207 & 208 OCC meetings.

As discussed in 67th NRPC meeting, Central Electricity Regulatory Commission (CERC) has notified the Indian Electricity Grid Code (IEGC) Regulations, 2023. Regulation 28(4) of these regulation mention that:

"*Detailed Operating Procedures for each regional grid shall be developed, maintained and updated by respective RLDCs in consultation with NLDC, concerned RPC and regional entities and shall be kept posted on the respective RLDC's website*"

Accordingly, NRLDC has prepared the draft operating procedure considering various changes mentioned in the new Indian Electricity Grid Code which has been notified to be effective from 01.10.2023. The procedure was also shared with NR constituents vide email dated 21.09.2023 and is also available @ NRLDC website on following link:
https://nrldc.in/download/draft-operating-procedure-for-northern-region-2022-23-iegc-2023/?wpdmdl=12902

NRLDC had already presented in brief major changes done in the document w.r.t. the IEGC 2023 in 69th NRPC meeting. As requested vide email dated 21.09.2023, it is

again requested to go through the procedure and provide comments to NRLDC/NRPC at the earliest.

Members may please discuss.

22. Detailed Procedure for Assessment of Quantum of SRAS & TRAS

The Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 (hereinafter called 'Grid Code') was published on 11.07.2023, in the Gazette of India Extraordinary (Part-III, Section-4, No. 488).

Regulation 30 (11)(k) of the Grid Code requires NLDC to prepare a detailed methodology for the assessment of secondary reserve capacity and submit the same for approval of the Commission.

Further Regulation 30(11)(a) requires NLDC to assess tertiary reserve requirements for the regional control area and the State control area.

Regulation 30(11)(q) and Regulation 30(12)(d) require that modalities for information exchange and timelines in respect of secondary reserve and tertiary reserve, respectively, shall be as per the detailed procedure by NLDC.

The approved procedure is attached as Annexure-B.VI.

The detailed procedure defines the roles of NLDC, RLDCs and SLDCs w.r.t assessment of quantum of Secondary & Tertiary Reserve Capacity along with Information Exchange and Timelines.

All SLDCs are requested to go through the detailed procedure and provide inputs as per the timelines mentioned in the procedure.

For kind information of members. Members may please discuss.

23. Status of non-compliance of RE plants that were issued conditional First Time Charging

In line with the directions issued by CEA as per the meeting held on 01.03.2023, the one-time conditional FTC was issued by NRLDC to 3 numbers of RE developers with the timeline to comply all the pending compliances by 30.06.23.

Extract from CEA MoM dated 05.03.23:
"Regarding point no. 3(e) (Inadequate reactive power support capability at Point of Interconnection), conditional FTC approval could be granted for FTC application received before 31st March'23".

Conditional FTC was given subject to plant shall meet all the compliances by 30th June'23, else FTC approval shall stand withdrawn w.e.f. 00:00 hrs. of 1st July'23 as per MoM.

Further, in reference to the CEA letter (Ref no. CEA-GO-12-22/4/2023-GM Division) dated 12.05.23, deadline for compliance was extended till 30.09.23, extract from letter as follows:

"RE developers who have applied for connectivity till 30th April'23, shall comply with above provisions by 30th Sept'23 else, these RE plants would be disconnected".

Vide meeting held by Chairperson, CEA on 18.5.23, some more RE generators were granted extension up to 30.9.23 and the following was advised as per point 10(b) of the MoM dated. 22.5.23 for processing FTC by RLDCs:

"Provisional FTC/ CON-4 is to be granted to the cases discussed in the meeting based on the undertaking by the RE developers that all the compliance shall be completed by them latest by 30th September, 2023 else the provisional FTC/CON-4 granted shall stand cancelled and the capacity would be disconnected w.e.f. 1st October, 2023. It will be reconnected only after the compliance is reported by the developer and request for re-connection made to the concerned agencies".

As per above, NRLDC issued provisional approval to 2 numbers of RE developers with an undertaking to resolve all pending compliances by 30.09.23.

Brief details and status of RE generators to whom conditional/provisional FTC was issued in reference of CEA MoM dated 05.03.23 & 22.05.23 is given below:

SL. No.	CEA registration no.	RE Developer Name	Installed capacity	Present status
1	1400004024	Renew Surya Ravi Pvt. Ltd.	300	Complied
2	1400003110	Azure Power Maple Private Limited_	300	Yet to Comply
3	1400004616	Nokhra Solar Plant, NTPC Ltd	300	Yet to Comply
4	1400005171	TP Surya Pvt. Ltd. (Tata Solar)	110	Complied
5	1400002378	SBSR Cleantech Pvt. Ltd.	300	Complied

On 19.09.23, NRLDC issued the intimation letter (reg. deadline of 30.09.23 to meet the compliances) to 3 RE developers (as mentioned above in sl. no. 2, 3 & 5). Subsequently, RE plant mentioned in s. no. 5 complied by 30.09.23 and 2 RE plants are yet to comply with CEA direction in Northern Region as on date.

Based on the aforementioned CEA direction dated 05.03.23 and 22.05.23, total **5 RE plants** were given conditional/provisional FTC approval in Northern Region. Out of 5 RE plants, **3 RE plants have complied** and **2 RE plants are yet to comply**.

For kind information of members.

24. Nomination of Nodal officer by UP SLDC for meter data collection

In Northern region around 2700 meters are installed at 380 locations. Every week these SEM data which comes through various state utilities/AMR(Kalkitech) by

Tuesday. In case of non-availability of any meter data it becomes very difficult for NRLDC to co-ordinate with persons at individual stations, as the number locations are more than 300.

After deliberations, it was agreed to designate one/two nodal officer from each state for overall meter data co-ordination. However, as of now, nomination of nodal officers has been received from all the states but nodal officer from UP is yet to be received.

This issue regarding the **Nomination of Nodal officer by UP SLDC for meter data collection** has been raised in 47th NRPC sub commercial meeting. As there was no representative from UP in the meeting, MS NRPC suggested to raise this issue in 211th OCC meeting. In latest 211th OCC meeting this issue was discussed again however till date the nomination is yet to be received from UP.

Hence UP SLDC is requested to nominate two Nodal executives(max 3 nos.) at nodal/SLDC level not at zone/subzone level, for ensuring complete meter data delivery at NRLDC and also to co-ordinate regarding any issue in sending meter data. NRLDC will communicate the non-received meter list with them by Tuesday evening. In case of non-receive of meter data at NRLDC by Thursday morning, NRLDC may consider other end data for those elements if available or SCADA data in case both end data is not received .**The information related to nominated Nodal executives (their contact number and their mail id) from UP SLDC may kindly be send to nrldcos@yahoo.com and nrldcmetering@gmail.com.**

Members may please discuss.

25. Regular Monitoring of Time drift in IEMs

It has been noticed regularly that time drift in meter is not reported to NRLDC and time drift issue increases from multiple hours to multiple days. NRLDC is regularly uploading the discrepancy report on weekly basis indicating the time drift in meters. Besides uploading weekly report, NRLDC metering group is also taking up the matter with concerned over telephonically/e-mail also. Further in line with clause 49(12(e (iii))) of IEGC 2023,

"Entities in whose premises the IEMs are installed shall be responsible for (iii) monitoring and ensuring that the time drift of IEM is within the limits as specified in CEA Metering Regulations 2006."

All members in whose premises the meters are installed, are requested to periodically check (on weekly basis) the time drift in meters and send the time drift/ compliance report as per following format to nrldcos@yahoo.com and nrldcmetering@gmail.com:

"Station Name " SEM Time drift Report Date :								
Sr. No.	**Name of Sub Station**	**Meter No.**	**Element Name**	**Time in GPS**	**Time in SEM**	**Advance/ Retard**	**Time drift Period(hh:mm:ss)**	**Action taken (Advanced / Retarded)**

This issue has been raised in latest 211th OCC meeting and still entities are not sending the time drift data to NRLDC, all stakeholders are requested to send the time drift data timely in desired format. Also account revision of any constituents pertaining to time drift in meters shall not be entertained if the same is not reported to NRLDC timely.

A list of meters having time drift more than one minute has been attached in Annexure-B.VII nodal officers from state/utilities are requested to go through the discrepancy report and rectify the issue. If replacements of meter is required, respective agencies are requested to coordinate with CTU/PGCIL and informed NRLDC about the same via mail at nrldcos@yahoo.com along with contact details of the concerned person to whom CTUIL/PGCIL can contact directly for meter replacement.

26. Timeline and procedure for Meter replacement by CTU/Power grid

Issues related to rectification/replacement of faulty meters is being communicated to Power grid/CTU by NRLDC.

However it is observed that sometimes replacement of faulty meters takes too much time which creates multiple issues in data validation, substitution etc. Few of the cases are mentioned here:

Meter detail	Mailed date	Issue in meter	Action
NP1849A at Bhakra left (BBMB)	25.05.2023,30.05.2023, 24.07.2023,03.08.2023	Time drift	Not replaced yet
NP1724A at Dhalipur(UK)	24.07.2023,04.08.2023, 14.08.2023	Time drift	Not replaced yet
NS1045A, NP7196A, NR3642A at Hissar(BBMB)	21.07.2023,27.07.2023	Zero reading	Not replaced yet

Hence a timeline shall be decided for the period required for replacement/rectification of faulty meters from the date of intimation by NRLDC to CTU/Power grid.

As pointed out by BBMB In 47th NRPC sub commercial meeting, that there is some confusion related to payment of replacement of fault meter by constituents. It was informed that CTU is billing directly to constituents for installation of meters.

Also as mentioned in IEGC 2023 *"The CTU shall be responsible for procurement and installation of Interface Energy Meters (IEMs), at the cost of respective entity. CTU*

shall be responsible for replacement of faulty meters." One of the reason we have observed that there is a confusion related to payment of meter installation and replacement by utilities to CTUIL. Since it is mentioned in IEGC 2023, utilities are requested to adhere to the regulation and expedite the process of meter replacement from their end."

As discussed in 47th NRPC sub commercial meeting it was suggested that the standard price of IEM meters shall be finalized on any common forum or CTU/PGCIL may share the related document if the price is already finalized since as per the new grid code IEGC 2023, entities have to pay meters cost directly to CTU/PGCIL.

This issue was raised by NRLDC in latest 211th OCC meeting. As no representative from CTUIL/PGCIL were present in the meeting, this agenda is again being put up.

CTU/PGCIL may update the status on progress and the issues/reasons for delay in replacement/rectification of faulty meters and actions required to resolve it. Also CTU/PGCIL are requested to provide timeline and procedure for meter replacement.

Members may please discuss.

27. Delay in submission of weekly Special (Interface) Energy meter data in Northern Region.

Delay or non-availability of meter data results in discrepancy in Deviation settlement Account and huge financial implications. Therefore, it is requested that all concerned may be advised to transmit SEM weekly meter reading data to NRLDC by Monday itself and in no case, it should be delayed by Tuesday noon, as per IEGC provision.

As per Sub-proviso (21) of proviso 4 of Regulation 6 of CERC (Indian Electricity Grid Code) Regulations, 2010

"All concerned entities (in whose premises the Special Energy Meters are installed) shall take weekly meter readings and transmit them to the respective RLDC by Tuesday afternoon. It must be ensured that the meter data from all installations within their control area are transmitted to the RLDC within the above schedule"

However, it is observed that Special Energy Meter data (SEM) from the following locations has not been received in time in accordance with IEGC provisions.

Further, It is to be ensured that checking of the healthiness of DCD/Cables, Special Energy Meter and functioning of data dumping software etc for meter data transmission shall be monitored periodically.

Communication to all stakeholders vide NRLDC letter is being forwarded on every Tuesday regarding delay in receipt of SEM data along with the list of sites/location who have not send the data by Tuesday. It has been observed that some of the sites are not sending the SEM data to NRLDC in every week. Hence, all coordinators are requested to take up with these sites and provide the data timely to NRLDC.

This agenda was raised in 211th OCC and it has been observed that still many locations are not sending SEM data timely to NRLDC. Stakeholders are requested to take necessary action.

A list of the sites have been attached for your reference in Annexure-B.VIII.

28. Status update on installation of standby meter and replacement of Vincom/Elster meters.

As per clause 7 "(Location of meters) of CEA metering regulation 2006 , IEM meters shall be installed on HV and LV side for an ICT ,and IEM meters shall be installed on both end for a transmission line."

Multiple elements in Northern region were sorted where meters were installed only on one side of the element and standby meters are not available which poses a problem in validation of data.

As per the discussion in 67th NRPC meeting and as finalized in the special meeting held on 04.07.2023 between CTU, NRLDC and PGCIL at NRLDC, it was finalized that CTU/Power grid shall install 38 nos. standby meters and provide replacement of 118 nos. ELSTER meters and 31 nos. VINCOM meters.

CTU/Power grid are requested to update the current status of installation and replacement of meters and estimated time for the completion of installation and replacement of meters.

Members may please discuss.

29. Agenda on Reactive Energy Accounting as per IEGC 2023

This is agenda was discussed in 69th NRPC meeting and It is for kind information to all the members that as per Annexure-B.IX of IEGC, 2023:

REACTIVE POWER COMPENSATION

"*Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible.* ***The regional entities*** *are therefore expected to provide local VAr compensation or generation such that they do not draw VARs from the EHV grid, particularly under low-voltage condition. To discourage VAr drawals by regional entities, VAr exchanges with ISTS shall be priced as follows:*

The regional entity pays for VAr drawal when voltage is below 97%

The regional entity gets paid for VAr return when voltage is below 97%.

The regional entity gets paid for VAr drawal when voltage is above103%.

The regional entity pays for VAr return when voltage is above 103%."

In view of above regulations wherein regional entities generator are also payable/receivables as per IEGC-2023.

To implement the above, a methodology was prepared and discussed in 69th NRPC meeting for calculation of reactive energy of regional entities including generators and the same is attached as Annexure-B.X. MS, NRPC suggested that to give a week to stakeholder to provide the feedback on it. Members are again requested to go through it and provide their feedback to NRPC/NRLDC or regarding any query.

Members may please discuss.

30. Data regarding demand estimation:

Letter from GM (SO), NRLDC was sent on 06.10.2023 regarding Submission of Demand estimation (forecasting) data in accordance with IEGC 2023 and Operating Procedure. In line with above, each SLDC has to furnish the demand estimation for day ahead, week ahead, month ahead (with time block wise granularity) and demand estimation for year ahead (with hour granularity). The sub-clause 31(2) (h) of IEGC-2023 states the following timeline for the submission of demand estimate data to RLDC:

Type of Demand Estimation	Timeline
Daily	10:00 hours of previous day
Weekly	First working day of previous week
Monthly	Fifth day of previous month
Yearly	30th September of previous year

Members are requested to ensure timely submission of data in the standard formats of NRLDC operating procedure.

31. Frequent forced outages of transmission elements in the month of September'23:

The following transmission elements were frequently under forced outages during the month of **September'23**:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	7	Rajasthan/ RAPS
2	220 KV Nara(UP)-Roorkee(UK) (UP) Ckt-1	7	UP/Utt
3	220 KV New Tanda (UP)-Sohawal(PG) (UP) Ckt-1	4	UP
4	220 KV Khara(UP)-Saharanpur(PG) (UP) Ckt-1	4	PG/UP
5	220 KV Panipat(BB)-Narela(DV) (BBMB) Ckt-1	4	Delhi/BBMB
6	400 KV Orai-Mainpuri (UP) Ckt-1	4	UP

The complete details are attached at **Annexure-B.XI**.

It may be noted that frequent outages of such elements affect the reliability and security of the grid. Hence, utilities are requested to analyze the root cause of the tripping and share the remedial measures taken/being taken in this respect.

Members may like to discuss.

32. Multiple element tripping events in Northern region in the month of September '23:

A total of 32 grid events occurred in the month of Sept'23 of which **18** are of GD-1 category, **08** are of GI-2 Category & **06** is of GI-1 category. The tripping report of all the events have been issued from NRLDC. A list of all these events is attached at **Annexure-B.XII.**

Maximum delayed clearance of fault observed in event of multiple elements tripping at 220kV Amberi(RS) and 400/220kV Chittorgarh(RS) on 04th September, 2023. As per PMU at Kankroli(PG), B-N phase to earth fault is observed with delayed fault clearance time of 1360ms.
Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **09** events out of **32** grid events occurred in the month. The major events with delayed clearance of faults are as follows:

1. Multiple elements tripping at 220kV Amberi(RS & 400/220kV Chittorgarh(RS) at 11:18hrs on 04th September, 2023, fault clearance time: 1360msec.
2. Multiple elements tripping at 220kV Kunihar(RS) at 09:48hrs on 06th September, 2023, fault clearance time: 880msec
3. Multiple elements tripping at 400/220kV Rosa(UP) at 12:37hrs on 07th September, 2023, fault clearance time: 1280msec
4. Multiple elements tripping at 220kV Badarpur(DTL)) at 17:08hrs on 10th September, 2023, fault clearance time: 1240msec
5. Multiple elements tripping at 220kV Khuskhera(RS) at 21:14hrs on 21st September, 2023, fault clearance time: 600msec
6. Multiple elements tripping at 220kV Panipat(HR) at 10:45hrs on 23rd September, 2023, fault clearance time: 760msec

Remedial actions taken by constituents to avoid such multiple elements tripping may be shared.

Members may take necessary preventive measures to avoid such grid incidents / disturbances in future and report actions taken by respective utilities in OCC & PSC forum. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events to RLDC in line with the regulations.

Members may like to discuss.

33. Details of tripping of Inter-Regional lines from Northern Region for September' 23:

A total of 10 inter-regional lines tripping occurred in the month of September'23. The list is attached at **Annexure-B.XIII.** The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event from SLDCs / ISTS licensees / ISGSs is in violation of regulation 37.2(c) of IEGC and regulation 15(3) of CEA Grid Standards. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than that mandated by CEA (Grid Standard) Regulations.

Members may please note and advise the concerned for taking corrective action to avoid such tripping as well as timely submission of the information.

Members may like to discuss.

34. Status of submission of DR/EL and tripping report of utilities for the month of September'23.

The status of receipt of DR/EL and tripping report of utilities for the month of September'2023 is attached at **Annexure-B.XIV**. It is to be noted that as per the IEGC provision under clause 37.2 (c), tripping report along with DR/EL has to be furnished within 24 hrs of the occurrence of the event. However, it is evident from the submitted data that reporting status is not satisfactory and needs improvement. Also, it is observed that reporting status has improved however, reporting status from Punjab, Delhi, Rajasthan & J&K need further improvement.

Members may please note and advise the concerned for timely submission of the information. It is requested that DR/EL of all the trippings shall be **uploaded on Web Based Tripping Monitoring System "http://103.7.128.184/Account/Login.aspx"** within 24 hours of the events as per IEGC clause 37.2(c) and clause 15.3 of CEA grid standard. Apart from prints of DR outputs, the corresponding COMTRADE files may please also be submitted in tripping portal / through email.

35. Status of PSS tuning/ re-tuning and Step Response Test of generator

In last 27 OCC meetings, this point was discussed and Utilities were requested to submit the present status of PSS tuning/re-tuning and Step Response Test of their respective generators as per the below mentioned format.

S. No.	Name of the Generating Station	Date of last PSS tuning / re-tuning performed (in DD/MM/YYYY format)	Date of last Step Response Test performed (in DD/MM/YYYY format)	Report submitted to NRLDC (Yes/ No)	Remarks (if any)

The status of test performed till date is attached at **Annexure-B.XV.**

It is to be noted that as per regulation 29.7 of IEGC, Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner once in five

Members are requested to update about their future plan for PSS tuning and share the reports of PSS tuning/re-tuning and Step Response Test if conducted in their control area.

Members may like to discuss.

36. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 34.3

"*Detailed plans and procedures for restoration after partial/total blackout of each user's/STU/CTU system within a Region, will be finalized by the concerned user's/STU/CTU in coordination with the RLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different subsystems shall be carried out by the users/CTU/STU at least once every six months under intimation to the RLDC*".

Mock Black-start exercise of power stations therefore needs to be carried out in-order to ensure healthiness of black start facility.

The summary of last conducted mock black start exercise of ISGS hydro & gas stations is tabulated below:

Hydro Power Stations:

Name of stations	**Last conducted exercise date**	**Remark**
Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga	20th Dec 2016	
Dhauliganga	28th Dec 2021	Exercise carried out successfully
Bairasiul	30th Nov 2022	
Sewa-2	29th May 2022	
N. Jhakri and Rampur	09th Dec 2022	
Karcham and Baspa	29th Dec 2021	Exercise was partially successful
Budhil	–	
Parbati-3 and Sainj	22nd Dec 2020	Black start of only Parbati-3 was carried out successfully. Sainj to explore blackstart capability.
Salal	02nd Dec 2018	
Chamera-3	04th Dec 2017	
Kishenganga	-	
Koteshwar	07th Dec 2022	Exercise carried out successfully
Chamera-1 and Chamera-2	02nd Dec 2022	
Malana-2, AD Hydro and	27th Jan 2023	

Phozal		
Tehri	14th Dec 2022	
Koldam	11th Nov 2022	Conducted successfully

Gas Power Stations:

Name of stations	**Last conducted exercise date**	**Remark**
Anta GPS	03rd Mar 2023	(unsuccessful, Anta Unit couldn't able to charge the dead bus)
Auraiya GPS	-	
Dadri GPS	28th Jan 2022 (without load)	Exercise carried out successfully

The winter months are off peak hydro period and therefore good time to carry out such exercises. Therefore, the schedule of mock exercise dates for different hydro & Gas power station need to be finalized. The power stations may propose the tentative date for mock black start exercise of their generating units. Power stations may confirm and inform to all the concerned persons of control centre/ substations to facilitate the exercise.

Hydro Power Stations:

Name of stations	**Tentative Date for Mock Black start exercise (proposed by power plants)**
***Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga**	
Dhauliganga	
Bairasiul	
Sewa-2	
N. Jhakri and Rampur	
Karcham and Baspa	
***Budhil**	
***Parbati-3 and Sainj**	
***Salal**	
***Chamera-3**	
***Kishenganga**	
Koteshwar	
Chamera-1 and Chamera-2	
Malana-2, AD Hydro and Phozal	
Tehri	
Koldam	

*Mock Black start exercise not carried out since Year 2021-22

Gas Power Stations:

Name of stations	Tentative Date for Mock Black start exercise (proposed by power plants)
Anta GPS	
*Auraiya GPS	
Dadri GPS	

*Mock Black start exercise not carried out during Year 2021-22

SLDC's may also carryout mock black-start of station in their respective control area & inform the tentative dates to the OCC as well as outcome of these exercises. The proposed Hydro Power Stations to undergo the exercise are as follows:

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)
1	J&K	Baglihar	3x150
2		Baglihar stage-2	3x150
3		Lower Jhelum	3x35
4		Upper Sindh	2x11+3x35
5	HP	Larji	3x42
6		Bhabha	3x40
7		Malana -I	2x43
8		Baspa	3x100
9	Punjab	Ranjit Sagar	4x150
11	Rajasthan	Mahi-I&II	2x25+2x45
12		Rana Pratap Sagar	4x43
13		Jawahar Sagar	3x33
14		Gandhi Sagar	5x23
15		Dholpur GPS	3x110
16		Ramgarh GPS	1x35.5+2x37.5+1x110
17	UP	Rihand	6x50
18		Obra	3x33
19		Vishnuprayag	4x100
20		Srinagar (Alaknanda)	4x82.5

21	Uttarakhand	Gamma Infra	2x76+1x73
22		Shravanti	6x75
23		Ramganga	3x66
24		Chibro	4x60
25		Khodri	4x30
26		Chilla	4x36
27		Maneri Bhali-I&II	3x30+4x76
28	Delhi	IP Extn GTs	6x30+3x30
29		Pragati GPS	2x104.6+1x121.2
30		Rithala	3x36
31	Haryana	Faridabad GPS	2x137.75+1x156.07

Generating stations and states are requested to propose the tentative schedule to conduct the mock black start exercise of hydro/gas generating station w.r.t. their control area.
SLDCs shall submit the reports of black start exercise in their respective control area. SLDCs may also identify further generating stations/unit for black start exercise.

Members may like to discuss.

Follow up issues from previous OCC meetings

Annexure-A.I

<table>
<tr><td>1</td><td>Down Stream network by State utilities from ISTS Station</td><td>Augmentation of transformation capacity in various existing substations, addition of new substations along with line bays as well as requirement of line bays by STUs for downstream network are under implementation at various locations in Northern Region. Further, 220kV bays have already been commissioned at various substations in NR. For its utilization, downstream 220kV system needs to be commissioned.</td><td>List of downstream networks is enclosed in Annexure-A.I.I.</td></tr>
<tr><td>2</td><td>Progress of installing new capacitors and repair of defective capacitors</td><td>Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.</td><td>Data upto following months, received from various states / UTs:
◎ CHANDIGARH — Sep-2019
◎ DELHI — Jun-2023
◎ HARYANA — May-2023
◎ HP — Jul-2023
◎ J&K and LADAKH — Not Available
◎ PUNJAB — Jun-2023
◎ RAJASTHAN — Aug-2023
◎ UP — Sep-2023
◎ UTTARAKHAND — Aug-2023
All States/UTs are requested to update status on monthly basis.</td></tr>
<tr><td>3</td><td>Healthiness of defence mechanism: Self-certification</td><td>Report of mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that “All the UFRs are checked and found functional”.</td><td>Data upto following months, received from various states / UTs:
◎ CHANDIGARH — Not Available
◎ DELHI — Jun-2023
◎ HARYANA — Jun-2023
◎ HP — May-2023
◎ J&K and LADAKH — Not Available
◎ PUNJAB — Jun-2023
◎ RAJASTHAN — Jun-2023
◎ UP — Jun-2023
◎ UTTARAKHAND — Sep-2023
◎ BBMB — Jun-2023
All States/UTs are requested to update status for healthiness of UFRs on monthly basis for islanding schemes and on quartely basis for the rest .</td></tr>
<tr><td></td><td></td><td>In compliance of NPC decision, NR states/constituents agreed to raise the AUFR settings by 0.2 Hz in 47th TCC/49th NRPC meetings.</td><td>Status:
◎ CHANDIGARH — Not Available
◎ DELHI — Increased
◎ HARYANA — Increased
◎ HP — Increased
◎ J&K and LADAKH — Not increased
◎ PUNJAB — Increased
◎ RAJASTHAN — Increased
◎ UP — Increased
◎ UTTARAKHAND — Increased
◎ BBMB — Increased
J&K and LADAKH were requested to update status for increasing settings of UFRs.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Status of FGD installation vis-à-vis installation plan at identified TPS</td><td>List of FGDs to be installed in NR was finalized in the 36th TCC (special) meeting dt. 14.09.2017. All SLDCs were regularly requested since 144th OCC meeting to take up with the concerned generators where FGD was required to be installed.
Further, progress of FGD installation work on monthly
basis is monitored in OCC
meetings.</td><td>Status of the information submission (month) from states / utilities is as under:
<table><tr><td>◎</td><td>HARYANA</td><td>Sep-2022</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Jul-2023</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Jul-2023</td></tr><tr><td>◎</td><td>UP</td><td>Aug-2023</td></tr><tr><td>◎</td><td>NTPC</td><td>Feb-2023</td></tr></table>FGD status details are enclosed as Annexure-A.I.II.
All States/utilities are requested to update status of FGD installation progress on monthly basis.</td></tr>
<tr><td>5</td><td>Submission of breakup of Energy Consumption by the states</td><td>All states/UTs are requested to submit the requisite data as per the billed data information in the format given as under:
<table><tr><td>Category→</td><td>Consumption by Domestic Loads</td><td>Consumption by Commercial Loads</td><td>Consumption by Agricultural Loads</td><td>Consumption by Industrial Loads</td><td>Traction supply load</td><td>Miscellaneous / Others</td></tr><tr><td><Month></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>Status of the information submission (month) from states / utilities is as under:
<table><tr><td></td><td>State / UT</td><td>Upto</td></tr><tr><td>◎</td><td>CHANDIGARH</td><td>Not Submitted</td></tr><tr><td>◎</td><td>DELHI</td><td>May-23</td></tr><tr><td>◎</td><td>HARYANA</td><td>Jul-23</td></tr><tr><td>◎</td><td>HP</td><td>Sep-23</td></tr><tr><td>◎</td><td>J&K and LADAKH</td><td>Not Submitted</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Jul-23</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Jul-23</td></tr><tr><td>◎</td><td>UP</td><td>Apr-23</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Mar-23</td></tr></table>J&K and Ladakh and Chandigarh are requested to submit the requisite data w.e.f. April 2018 as per the billed data information in the given format</td></tr>
<tr><td>6</td><td>Information about variable charges of all generating units
in the Region</td><td>The variable charges detail for different generating units are available on the MERIT Order Portal.</td><td>All states/UTs are requested to submit daily data on MERIT Order Portal timely.</td></tr>
<tr><td>7</td><td>Status of Automatic Demand Management Sysytem in NR states/UT's</td><td>The status of ADMS implementation in NR, which is mandated in clause 5.4.2 (d) of IEGC by SLDC/SEB/DISCOMs is presented in the following table:</td><td>Status:
<table><tr><td>◎</td><td>DELHI</td><td>Fully implemented</td></tr><tr><td>◎</td><td>HARYANA</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>HP</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Under implementation. Likely completion schedule is 31.10.2023.</td></tr><tr><td>◎</td><td>UP</td><td>Scheme implemented by NPCIL only</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Scheme not implemented</td></tr></table></td></tr>
</table>

8	Reactive compensation at 220 kV/ 400 kV level at 15 substations			
	State / Utility	Substation	Reactor	Status
i	POWERGRID	Kurukshetra	500 MVAr TCR	Anticipated commissioning: Oct'23
ii	DTL	Peeragarhi	1x50 MVAr at 220 kV	1x50 MVAr Reactor at Peeragarhi has been commissioned on dated 18.09.2023
iii	DTL	Harsh Vihar	2x50 MVAr at 220 kV	2x50 MVAR Reactor at Harsh Vihar has been commissioned on dated 31th March 2023.
iv	DTL	Mundka	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision.
v	DTL	Bamnauli	2x25 MVAr at 220 kV	Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision.
vi	DTL	Indraprastha	2x25 MVAr at 220 kV	Bay work completed on 07.11.2023. Reactor part tender is dropped and at present same is under revision.
vii	DTL	Electric Lane	1x50 MVAr at 220 kV	Under Re-tendering due to Single Bid
viii	PUNJAB	Dhuri	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	400kV Reactors - 1x125 MVAR Reactor at Dhuri has been commissioned on dated 30th March 2023. 220kV Reactors - 1x25 MVAR Reactor at Dhuri has been commissioned on dated 27th January 2023.
ix	PUNJAB	Nakodar	1x25 MVAr at 220 kV	1x25 MVAR Reactor at Nakodar has been commissioned on dated 13th February 2023.
x	PTCUL	Kashipur	1x125 MVAR at 400 kV	Price bid has been opened and is under evaluation. Retendered in Jan'23
xi	RAJASTHAN	Akal	1x25 MVAr	1x25 MVAR Reactor at Akal has been commissioned on dated 25th July' 2022.

xii	RAJASTHAN	Bikaner	1x25 MVAr	1x25 MVAR Reactor at Bikaner has been commissioned on dated 24th June 2023.
xiii	RAJASTHAN	Suratgarh	1x25 MVAr	1x25 MVAR Reactor at Suratgarh has been commissioned on dated 25th November 2022.
xiv	RAJASTHAN	Barmer & others	13x25 MVAr	Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 & work order placed on dt. 7.04.2022 to M/s Kanohar Electricals Ltd. Schedule time is 18 months.
xv	RAJASTHAN	Jodhpur	1x125 MVAr	Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 & work order placed on dt. 7.04.2022 to M/s Kanohar Electricals Ltd. Schedule time is 18 months.

Annexure-A-I.I

1. Down Stream network by State utilities from ISTS Station:

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
1	400/220kV, 3x315 MVA Samba	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays.	-	02 No. of bays shall be utilized for LILO-II of 220kV Jatwal-Bishnah Transmission Line, the work of which is delayed due to severe ROW problem at Location No. 1 near Grid Substation Jatwal where the Land owner is not allowing erection of Tower. The Deputy Commissioner Samba has been approached for intervention and facilitating the erection of Tower. He is persuading the Land owner to get the work completed. Updated in 210th OCC by JKPTCL.
2	400/220kV, 2x315 MVA New Wanpoh	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV New Wanpoh - Alusteng D/c Line	End of 2023	02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Alusteng D/c Line. The work is in progress and expected to be commission by the end of 2023. Updated in 204th OCC by JKPTCL.
				• 220 kV New Wanpoh - Mattan D/c Line	End of 2024	02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Mattan D/c Line. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL.
3	400/220kV, 2x315 MVA Amargarh	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• 220kV D/C line from 400/220kV Kunzar - 220/33kV Sheeri	End of 2024	02 No. of bays are proposed to be utilized for connecting 220/132 kV GSS Loolipora. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL.
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• 220kV Bhadson (Kurukshetra) – Ramana Ramani D/c line	Jul'24	Updated in 205th OCC by HVPNL
5	400/220 kV, 2x315 MVA Dehradun	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• Network to be planned for 4 bays	-	PTCUL to update the status.
6	Shahjahanpur, 2x315 MVA 400/220 kV	Commissioned: 6 Approved/Under Implementation:1 Total: 7	Utilized: 5 Unutilized: 1 (1 bays to be utilized shortly) Approved/Under Implementation:1	• 220 kV D/C Shahajahanpur (PG) - Gola line	30.09.2023	Updated in 211th OCC by UPPTCL
				• LILO of Sitapur – Shahjahanpur 220 kV SC line at Shahjahanpur (PG)	Commissioned	Energization date: 25.02.2022 updated by UPPTCL in 196th OCC
7	Hamirpur 400/220 kV Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4 (2 bays to be utilized shortly)	• 220 kV Hamirpur-Dehan D/c line	Commissioned	Commisioned date: 09.06.2022. Updated in 198th OCC by HPPTCL
				• Network to be planned for 4 bays	-	HPPTCL to update the status.
8	Sikar 400/220kV, 1x 315 MVA S/s	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• LILO of 220 kV Sikar (220 kV GSS)-Dhod S/c line at Sikar (PG)	Commissioned	LILO of 220 kV S/C Sikar-Dhod line at 400 kV GSS PGCIL, Sikar has been charged on dt. 31.03.2022
				• Network to be planned for 2 bays.	-	Against the 3rd ICT at 400 kV GSS Sikar, only 2 bays were constructed and same has been utilized by RVPN by constructing LILO of 220 kV S/C Sikar – Dhod line as updated by RVPNL in 195th OCC
9	Bhiwani 400/220kV S/s	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV D/C line Bhiwani (PG) – Bhiwani (HVPNL) line	Commissioned	Updated in 202nd OCC by HVPNL
				• 220 kV Bhiwani (PG) - Isherwal (HVPNL) D/c line.	Dec'23	Issue related to ROW as intimated in 208th OCC by HVPNL.
				• 220 kV Bhiwani (PG) - Dadhibana (HVPNL) D/c line.	Apr'24	Issue related to ROW as intimated in 192nd OCC by HVPNL.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
10	Jind 400/220kV S/s	Commissioned: 4 Approved:4 Total: 8	Utilized: 4 Unutilized: 0	• LILO of both circuits of 220 kV Jind HVPNL to PTPS D/C line at 400 kV substation PGCIL Khatkar (Jind) with 0.5 sq inch ACSR conductor	May'24	Tender is under process Updated in 205th OCC by HVPNL.
11	400/220kV Tughlakabad GIS	Commissioned: 6 Under Implementation: 4 Total: 10	Utilized: 6 Unutilized: 0 Under Implementation:4	• RK Puram – Tughlakabad (UG Cable) 220kV D/c line – March 2023.	-	DTL to update the status.
				• Masjid Mor – Tughlakabad 220kV D/c line.	-	DTL to update the status.
12	400/220kV Kala Amb GIS (TBCB)	Commissioned: 6 Total: 6	Utilized: 0 Unutilized: 6	• HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s	Dec'23	Updated in 211th OCC by HPPTCL
				• HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Giri S/s	-	HPPTCL to update the status.
				• Network to be planned for 2 bays	-	HPPTCL to update the status.
13	400/220kV Kadarpur Sub-station	Commissioned: 8 Total: 8	Utilized: 0 Unutilized: 8	• LILO of both circuits of 220 KV Pali - Sector 56 D/C line at Kadarpur along with augmentation of existing conductor from 220 KV Sector-56 to LILO point with 0.4 sq inch AL-59 conductor.	Dec'23	Forest approval is pending for 220 KV Pali - Sector 56 D/C line. Updated in 205th OCC by HVPNL
				• LILO of both circuits of 220KV Sector 65 - Pali D/C line at Kadarpur along with augmentation of balance 0.4 sq. inch ACSR conductor of 220 kV Kadarpur - Sector 65 D/C line with 0.4sq inch AL-59 conductor	Dec'23	Updated in 205th OCC by HVPNL
14	400/220kV Sohna Road Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• LILO of both circuits of 220kV D/c Sohna-Rangla Rajpur at Roj Ka Meo line at 400kV Sohna Road	Jan'24	Updated in 208th OCC by HVPNL
				• LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road	-	The matter is subjudice in Hon'ble Punjab & Haryana High court, Chandigarh Updated in 205th OCC by HVPNL. **Status:-** Earlier 02 nos 220 kV line bays were to be utilized for the 220 kV GIS S/Stn. Sec-77, Gurugram but due to denotification of land of the 220 kV GIS S/Stn. Sec-77 the said substation is now going to be dismantled and a new substation is proposed at Sec-75A, Gurugram. Now, these 02 no. 220 kV line bays may be utilized at 220 kV GIS S/Stn Sec-75A, Gurugram
15	400/220kV Prithla Sub-station	Commissioned: 8 Aprroved: 2 Total: 10	Utilized: 4 Unutilized: 4 Under Implementation:2	• 220kV D/C line from Prithla to Harfali with LILO of one circuit at 220kV Meerpur Kurali	31.03.2024	Updated in 205th OCC by HVPNL
				• LILO of both ckt of 220kV D/c Ranga Rajpur – Palwal line	Commissioned	Commisioned date: 31.12.2021. Updated in 198th OCC by HVPNL
				• 220kV D/C for Sector78, Faridabad	31.03.2024	Issue related to ROW and Pending crossing approval from Northern Railways and DFCCIL. as intimated in 205th OCC by HVPNL.
				• Prithla - Sector 89 Faridabad 220kV D/c line	31.03.2024	Updated in 205th OCC by HVPNL
				• LILO of both circuits of 220kV Samalkha - Mohana line at Sonepat	05.10.2023	Updated in 205th OCC by HVPNL

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
16	400/220kV Sonepat Sub-station	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 2 Unutilized: 4 Under Implementation:2	• Sonepat - HSIISC Rai 220kV D/c line	-	Updated in 205th OCC by HVPNL. **Status:** Due to non-performance of work of 220KV GIS Rai S/Stn, the Contract has been terminated & blacklisted by O/o XEN/WB O/o CE/PD&C, HVPNL, Panchkula vide Ch-100/HDP-2418/REC-254/Xen(WB) Dated 24.02.2023. Now pending work will be caried out by HVPNL/ Departmentely
				• Sonepat - Kharkhoda Pocket A 220kV D/c line	31.07.2024	Updated in 205th OCC by HVPNL. **Status:** The Possession of land for construction of 220KV S/Stn. Pocket-A i.e 6.33 Acres and for Pocket-B is 5.55 Acres has been taken over by HVPNL. Work order yet to be issued by O/o CE/PD&C, Panchkula for construction of 2 no. 220KV GIS S/Stn Pocket-A & Pocket-B.
17	400/220kV Neemrana Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• LILO of Bhiwadi - Neemrana 220kV S/c line at Neemrana (PG)	-	Work order is finalized as updated in 201st OCC by RVPNL. 5 months from layout finalization.
18	400/220kV Kotputli Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Kotputli - Pathreda 220kV D/c line	-	Bid documents under approval as updated in 195th OCC by RVPNL.
19	400/220kV Jallandhar Sub-station	Commissioned: 10 Total: 10	Utilized: 8 Unutilized: 2	• Network to be planned for 2 bays	May'24	LILO of 220 kV BBMB Jalandhar - Butari line at 400 kV PGCIL Jalandhar being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL.
20	400/220kV Roorkee Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Roorkee (PG)-Pirankaliyar 220kV D/c line	Commissioned	Roorkee (PG)-Pirankaliyar 220kV D/c line comiisioned in 2020 as intimated by PTCUL in 197th OCC
21	400/220kV Lucknow Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 2 bays	30.09.2023	• Lucknow -Kanduni, 220 kV D/C line work is completed, safety clearance from Powergrid is awaited updated by UPPTCL in 211th OCC. _____ • No planning for 2 no. of bays upated by UPPTCL in 196th OCC. The same has been communicated to Powergrid.
22	400/220kV Gorakhpur Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	22.08.2023	• Gorakhpur(PG)- Maharajganj, 220 kV D/C line expected energization date is 22.08.2023 updated by UPPTCL in 210th OCC
23	400/220kV Fatehpur Sub-station	Commissioned: 8 Under Implementation:2 Total: 10	Utilized: 6 Unutilized: 2 Under Implementation:2	• Network to be planned for 2 bays	-	• UPPTCL intimated that 02 no. of bays under finalization stage. In 201st OCC, UPPTCL intimated that it is finalized that Khaga s/s will be connected (tentative time 1.5 years). _____ • No planning for 2 no. of bays updated by UPPTCL in 196th OCC. The same has been communicated to Powergrid.
24	400/220kV Abdullapur Sub-station	Commissioned: 10 Under Implementation:2 Total: 12	Utilized: 10 Unutilized: 0 Under Implementation:2	• Abdullapur – Rajokheri 220kV D/c line	Dec'23	SCDA System & PLCC work pending at 220 KV S/stn. Rajokheri Updated in 209th OCC by HVPNL
	400/220kV Panchkula	Commissioned: 8 Under tender:2 Total: 10	Utilized: 2 Unutilized: 4	• Panchkula – Pinjore 220kV D/c line	Dec'23	Updated in 211th OCC by HVPNL
				• Panchkula – Sector-32 220kV D/c line	Feb'24	Updated in 211th OCC by HVPNL
				• Panchkula – Raiwali 220kV D/c line	Commissioned	Updated in 194th OCC by HVPNL

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
25	400/220kV Panchkula Sub-station	Out of these 10 nos. 220kV Line Bays, 2 bays would be used by the lines being constructed by POWERGRID (Chandigarh-2) and balance 8 nos. bays would be used by HVPNL	Unutilized: 4 Under Implementation:2	• Panchkula – Sadhaura 220kV D/c line: Sep'23	Jul'24	Updated in 205th OCC by HVPNL
26	400/220kV Amritsar S/s	Commissioned:7 Approved in 50th NRPC- 1 no. Total: 8	Utilized: 6 Unutilized: 1 Approved in 50th NRPC- 1 no.	• Amritsar – Patti 220kV S/c line	Nov'23	Route survey/tender under process. Updated in 211th OCC by PSTCL.
				• Amritsar – Rashiana 220kV S/c line (2 bays shall be required for above lines. However, 1 unutilized bay shall be used for Patti and requirement of one additional bay approved for Rashiana by NRPC)	Nov'23	Route survey/tender under process.. Updated in 211th OCC by PSTCL.
27	400/220kV Bagpat S/s	Commissioned: 8 Total: 8	Utilized:6 Unutilized: 2	• Bagpat - Modipuram 220kV D/c line	Commissioned	Updated in 201st OCC by UPPTCL
28	400/220kV Bahardurgarh S/s	Commissioned: 4 Approved: 4 Total: 8	Utilized:2 Unutilized: 2	• LILO of 220 kV Nunamajra-Daultabad S/c line at 400 kV Bahadurgarh PGCIL	31.03.2024	Updated in 205th OCC by HVPNL. **Status:** Tentative route stands submitted by TS wing and accordingly BOQ has been submitted by design wing to contracts wing for award of work.
				• Bahadurgarh - METL 220kV D/c line (Deposit work of M/s METL)	31.03.2024	Updated in 205th OCC by HVPNL. **Status:** Tentative route stands submitted by TS wing and accordingly BOQ has been submitted by design wing to contracts wing for award of work.
				• Bahadurgarh - Kharkhoda Pocket B 220kV D/c line	31.07.2024	
29	400/220kV Jaipur (South) S/s	Commissioned: 4 Total: 4	Utilized:2 Unutilized: 2	• Network to be planned for 2 bays.	-	LILO case of 220 kV Dausa – Sawai Madhopur line at 400 kV GSS Jaipur South (PG) is under WTD approval as updated by RVPNL in 195th OCC
30	400/220kV Sohawal S/s	Commissioned: 8 Total: 8	Utilized: 8	• Sohawal - Barabanki 220kV D/c line	Commissioned	Energization date: 14.04.2018 updated by UPPTCL in 196th OCC
				• Sohawal - New Tanda 220kV D/c line	Commissioned	Energization date: 28.05.2019 updated by UPPTCL in 196th OCC
				• Network to be planned for 2 bays	Commissioned	• Sohawal - Gonda 220kV S/c line (Energization date: 27.04.2020) updated by UPPTCL in 196th OCC _____ • Sohawal - Bahraich 220kV S/c line (Energization date: 15.02.2021) updated by UPPTCL in 196th OCC
31	400/220kV, Kankroli	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	-	RVPNL to update the status
32	400/220kV, Manesar	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 2 bays	-	Status:- 2nos bays are being utilised for 220 kV D/C Panchgaon (PGCIL)-Panchgaon Ckt-I & 220 kV D/C Panchagon (PGCIL)-Panchgaon Ckt-II, charged on dated 05.09.2022 & 20.10.2022 respectively. The 2nos bays may be utilised by
33	400/220kV, Saharanpur	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	Commissioned	Saharanpur(PG)-Devband D/c line (Energization date: 20.04.2023) updated by UPPTCL in 207th OCC

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
34	400/220kV, Wagoora	Commissioned: 10 Total: 10	Utilized: 6 Unutilized: 4	• Network to be planned for 4 bays	-	PDD, J&K to update the status.
35	400/220kV, Ludhiana	Commissioned: 9 Total: 9	Utilized: 8 Unutilized: 1	• Network to be planned for 1 bay	Oct'23	Direct circuit from 220 kV Lalton Kalan to Dhandari Kalan to be diverted to 400 kV PGCIL Ludhiana. Work completed but pending for first time charging to be expected by first week of October.Updated in 211th OCC by PSTCL.
36	400/220kV, Chamba (Chamera Pool)	Commissioned: 3 Under tender:1 Total: 4	Utilized:3 Unutilized: 0 Under tender:1	• Stringing of 2nd ckt of Chamera Pool – Karian 220kV D/c line	-	Stringing of 2nd Circuit of Chamera Pool-Karian Tansmission line has been completed & terminal bay at 400/220 kV chamera pooling substation (PGCIL) is not ready.Updated in 198th OCC by HPPTCL
37	400/220kV, Mainpuri	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	-	• 02 no. of bays under finalization stage updated by UPPTCL in 196th OCC. Mainpuri S/s planned. Land is not finalized, therefore timeline not available as intimated by UPPTCL in 201st OCC.
38	400/220kV, Patiala	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays	May'24	2 Nos. bays for 400 kV PGCIL Patiala - 220 kV Bhadson (D/C) line being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL.

FGD Status

Updated status of FGD related data submission

NTPC (27.02.2023)
MEJA Stage-I
RIHAND STPS
SINGRAULI STPS
TANDA Stage-I
TANDA Stage-II
UNCHAHAR TPS
UPRVUNL (18.07.2023)
ANPARA TPS
HARDUAGANJ TPS
OBRA TPS
PARICHHA TPS

PSPCL (18.07.2023)
GGSSTP, Ropar
GH TPS (LEH.MOH.)
RRVUNL (09.07.2023)
CHHABRA SCPP
CHHABRA TPP
KALISINDH TPS
KOTA TPS
SURATGARH SCTPS
SURATGARH TPS

Updated status of FGD related data submission

Lalitpur Power Gen. Co. Ltd. (17.10.2022)
Lalitpur TPS
Lanco Anpara Power Ltd. (18.06.2022)
ANPARA-C TPS

HGPCL (14.09.2022)
PANIPAT TPS
RAJIV GANDHI TPS
YAMUNA NAGAR TPS

Adani Power Ltd. (18.02.2022)
KAWAI TPS

Rosa Power Supply Company (18.06.2022)
Rosa TPP Phase-I
Prayagraj Power Generation Company Ltd. (17.10.2022)
Prayagraj TPP
APCPL (25.02.2022)
INDIRA GANDHI STPP

Pending submissions

GVK Power Ltd.
GOINDWAL SAHIB

NTPC
DADRI (NCTPP)
Talwandi Sabo Power Ltd.
TALWANDI SABO TPP
L&T Power Development Ltd.
Nabha TPP (Rajpura TPP)

Target Dates for FGD Commissioning (Utility-wise)

Adani Power Ltd.	KAWAI TPS U#1 (Target: 31-12-2024), KAWAI TPS U#2 (Target: 31-12-2024)
APCPL	INDIRA GANDHI STPP U#1 (Target: 31-01-2022), INDIRA GANDHI STPP U#2 (Target: 30-09-2023), INDIRA GANDHI STPP U#3 (Target: 30-06-2023)
GVK Power Ltd.	GOINDWAL SAHIB U#1 (Target: 30-04-2020), GOINDWAL SAHIB U#2 (Target: 29-02-2020)
HGPCL	PANIPAT TPS U#6 (Target: 31-12-2022), PANIPAT TPS U#7 (Target: 31-12-2022), PANIPAT TPS U#8 (Target: 31-12-2022), RAJIV GANDHI TPS U#1 (Target: 31-12-2024), RAJIV GANDHI TPS U#2 (Target: 31-12-2024), YAMUNA NAGAR TPS U#1 (Target: 31-12-2024), YAMUNA NAGAR TPS U#2 (Target: 31-12-2024)

NTPC	DADRI (NCTPP) U#1 (Target: 31-12-2020), DADRI (NCTPP) U#2 (Target: 31-10-2020), DADRI (NCTPP) U#3 (Target: 31-08-2020), DADRI (NCTPP) U#4 (Target: 30-06-2020), DADRI (NCTPP) U#5 (Target: 30-06-2022), DADRI (NCTPP) U#6 (Target: 31-03-2023), RIHAND STPS U#1 (Target: 31-10-2025), RIHAND STPS U#2 (Target: 30-06-2026), RIHAND STPS U#3 (Target: 31-12-2024), RIHAND STPS U#4 (Target: 31-03-2025), RIHAND STPS U#5 (Target: 30-06-2025), RIHAND STPS U#6 (Target: 31-10-2025), SINGRAULI STPS U#1 (Target: 31-12-2024), SINGRAULI STPS U#2 (Target: 31-12-2024), SINGRAULI STPS U#3 (Target: 31-12-2024), SINGRAULI STPS U#4 (Target: 31-12-2024), SINGRAULI STPS U#5 (Target: 31-03-2025), SINGRAULI STPS U#6 (Target: 31-06-2024), SINGRAULI STPS U#7 (Target: 31-03-2024), UNCHAHAR TPS U#1 (Target: 31-12-2023), UNCHAHAR TPS U#2 (Target: 31-12-2023), UNCHAHAR TPS U#3 (Target: 30-09-2023), UNCHAHAR TPS U#4 (Target: 30-09-2023), UNCHAHAR TPS U#5 (Target: 30-09-2023), UNCHAHAR TPS U#6 (Target: 31-08-2022), MEJA Stage-I U#1 (Target: 31-10-2023), MEJA Stage-I U#2 (Target: 30-06-2023), TANDA Stage-I U#3 (Target:), TANDA Stage-I U#4 (Target:), TANDA Stage-II U#3 (Target: 31-03-2023), TANDA Stage-II U#4 (Target: 30-09-2023)

L&T Power Development Ltd (Nabha)	Nabha TPP (Rajpura TPP) U#1 (Target: 30-04-2021), Nabha TPP (Rajpura TPP) U#2 (Target: 28-02-2021)
Lalitpur Power Gen. Company Ltd.	LALITPUR TPS U#1 (Target: 31-12-2026), LALITPUR TPS U#2 (Target: 30-09-2026), LALITPUR TPS U#3 (Target: 30-06-2026)
Lanco Anpara Power Ltd.	ANPARA C TPS U#1 (Target: 31-12-2023), ANPARA C TPS U#2 (Target: 31-12-2023)
Prayagraj Power Generation Company Ltd.	PRAYAGRAJ TPP U#1 (Target: 31-12-2024), PRAYAGRAJ TPP U#2 (Target: 31-12-2024), PRAYAGRAJ TPP U#3 (Target: 31-12-2024)
PSPCL	GH TPS (LEH.MOH.) U#1 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#2 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#3 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#4 (Target: 31-12-2026), GGSSTP, Ropar U#3 (Target: 31-12-2026), GGSSTP, Ropar U#4 (Target: 31-12-2026), GGSSTP, Ropar U#5 (Target: 31-12-2026), GGSSTP, Ropar U#6 (Target: 30-12-2026)

Rosa Power Supply Company	ROSA TPP Ph-I U#1 (Target: 31-12-2026), ROSA TPP Ph-I U#2 (Target: 31-12-2026), ROSA TPP Ph-I U#3 (Target: 31-12-2026), ROSA TPP Ph-I U#4 (Target: 31-12-2026)
RRVUNL	KOTA TPS U#5 (Target: 31-08-2024), KOTA TPS U#6 (Target: 31-08-2024), KOTA TPS U#7 (Target: 31-08-2024), SURATGARH TPS U#1 (Target: 31-12-2026), SURATGARH TPS U#2 (Target: 31-12-2026), SURATGARH TPS U#3 (Target: 31-12-2026), SURATGARH TPS U#4 (Target: 31-12-2026), SURATGARH TPS U#5 (Target: 31-12-2026), SURATGARH TPS U#6 (Target: 31-12-2026), SURATGARH SCTPS U#7 (Target: 28-02-2025), SURATGARH SCTPS U#8 (Target: 28-02-2025), CHHABRA TPP U#1 (Target: 31-12-2026), CHHABRA TPP U#2 (Target: 31-12-2026), CHHABRA TPP U#3 (Target: 31-12-2026), CHHABRA TPP U#4 (Target: 31-12-2026), CHHABRA SCPP U#5 (Target: 28-02-2025), CHHABRA SCPP U#6 (Target: 28-02-2025), KALISINDH TPS U#1 (Target: 28-02-2025), KALISINDH TPS U#2 (Target: 28-02-2025)
Talwandi Sabo Power Ltd.	TALWANDI SABO TPP U#1 (Target: 28-02-2021), TALWANDI SABO TPP U#2 (Target: 31-12-2020), TALWANDI SABO TPP U#3 (Target: 31-10-2020)
UPRVUNL	ANPARA TPS U#1 (Target: 31-12-2023), ANPARA TPS U#2 (Target: 31-12-2023), ANPARA TPS U#3 (Target: 31-12-2023), ANPARA TPS U#4 (Target: 31-12-2023), ANPARA TPS U#5 (Target: 31-12-2023), ANPARA TPS U#6 (Target: 31-12-2023), ANPARA TPS U#7 (Target: 31-12-2023), HARDUAGANJ TPS U#8 (Target: 31-12-2024), HARDUAGANJ TPS U#9 (Target: 31-12-2024), OBRA TPS U#9 (Target: 31-12-2024), OBRA TPS U#10 (Target: 31-12-2024), OBRA TPS U#11 (Target: 31-12-2024), OBRA TPS U#12 (Target: 31-12-2024), OBRA TPS U#13 (Target: 31-12-2024), PARICHHA TPS U#3 (Target: 30-04-2022), PARICHHA TPS U#4 (Target: 31-12-2024), PARICHHA TPS U#5 (Target: 31-12-2024), PARICHHA TPS U#6 (Target: 31-12-2024)

Annexure-A.II

MIS Report for Status of Islanding Schemes

Implemented Schemes

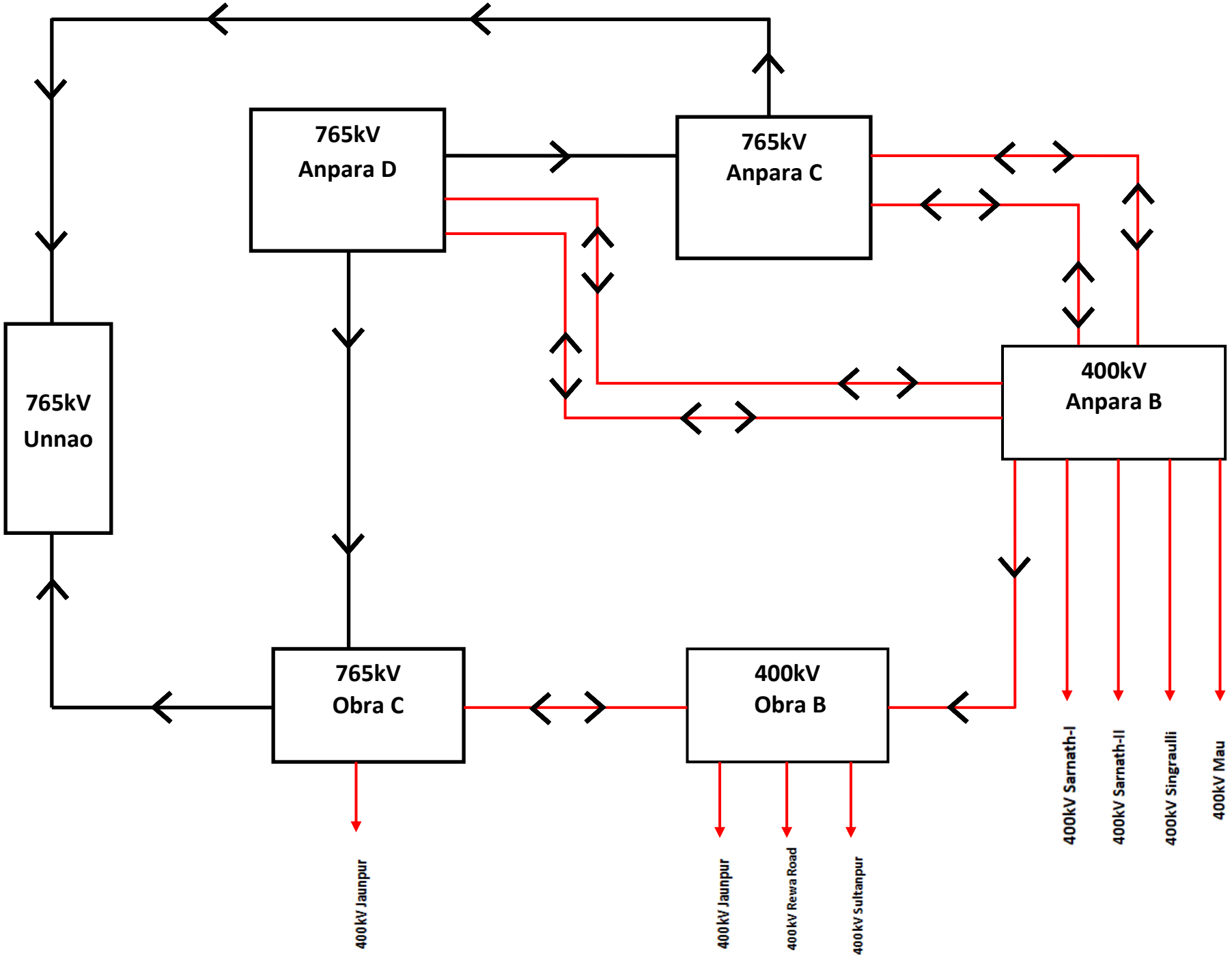
Sl. No.	Islanding Scheme	SLDC	Status	Submission of Self Certification of Healitheness	SOP	SCADA Display Page	Remarks
1	NAPS IS	UP	Implemented	Yes (08-10-2021)	Yes	Yes	-
2	RAPS IS	Rajasthan	Implemented	16-Aug-21	Yes	Yes	List of officials in-charge, format for generation, islanding scheme sld and relays in RAPP IS submitted by RVPN on 04.12.2021.

Under Implementation/ Newly Proposed/Under Discussion

Sl. No.	Islanding Scheme	SLDC	Status	Details of progress	DPR for PSDF funding (Require	Timelines Status - Proposed/Actual									
						Study		Design		Approval		Procurement		Commissioning	
						Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual	Proposed	Actual
1	Lucknow-Unchahar IS	UP	Under Implementation	Scheme has been approved in 59th NRPC meeting held on 31.10.2022. Relay Procurement is under progress. Scheme Implementation timeline : September,2023		-		-	-	-	-	-	-	-	-
2	Agra IS	UP	Under Study	UP has placed offer to CPRI for dynamic study in July, 2022. The estimated time of study is 5 months from date of acceptance.A meeting was taken up with UP on 02.08.2023. Changes are suggested in Study report of CPRI. Final Study report is pending.		-		-	-	-	-	-	-	-	-
3	Jodhpur-Barmer-Rajwest IS	Rajasthan	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022.Preparation of DPR is under finalization. Scheme implementation timeline: October,2023	-	-		-	-	-	-	-	-	-	-
4	Suratgarh IS	Rajasthan	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. SCADA display implementation timeline: Dec, 2022; Scheme implementation timeline: October,2023	-	-		-	-	-	-	-	-	-	-
5	Patiala-Nabha Power Rajpura IS	Punjab	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. Implementation timeline: December,2023		-		-	-	-	-	-	-	-	-
6	Pathankot-RSD IS	Punjab	Implemented	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. Scheme has been implemented in April 2023 as informed by Punjab in 206th OCC. Testing Reports submitted by Punjab.		-		-	-	-	-	-	-	-	-
7	Kullu-Manali-Mandi IS	HP	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. Timeline to be intimated by HPSLDC		-		-	-	-	-	-	-	-	-
8	Shimla-Solan IS	HP	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. Timeline to be intimated by HPSLDC		-		-	-	-	-	-	-	-	-
9	Delhi IS	Delhi	Under Implementation	Scheme has been approved in 68th NRPC meeting held on 18.08.2023. Timeline to be intimated by DTL		-		-	-	-	-	-	-	-	-

Status of availability of ERS towers in NR

Sl. No.	Transmission Utility	Voltage Level (220kV/400kV/765kV/ 500 kV HVDC etc.)	Length of the transmission lines owned by the Utility (Ckt. Kms.)	Number of ERS Towers available (Nos.)	Remarks


765kV
Anpara D
765kV
Anpara C
765kV
Unnao
400kV
Anpara B
765kV
Obra C
400kV
Obra B
400kV Jaunpur
400kV Jaunpur
400kV Rewa Road
400kV Sultanpur
400kV Sarnath-I
400kV Sarnath-II
400kV Singraulli
400kV Mau

Inclusion of Obra – C TPS in Existing SPS Installed at Anpara – D TPS as Interim Measures with Minimum hardware Requirement.

Pre-contingency Condition:

- One unit of Obra C (660 MW) is on bar.
- 765/400kV ICTs at Obra – C not in service.
- 400kV Obra B – Jaunpur open from one end.
- 400kV Obra C – Jaunpur open from one end.
- Both 765kV lines are in service.

- Psum = sum of the pre contingency active power flow on 765kV Anpara C – Unnao line and 765kV Anpara D – Obra C line measured at Anpara C and Anpara D end respectively.

- Tripping of Obra C – Unnao line shall be simulated in logic such a way that whenever flow on 765kV Obra C – Anpara D line is more than +100 MW (flow towards Anpara – D), it shall be treated as tripping of 765kV Obra C – Unnao line.

- $\triangle$P= Difference in the active power flow on 765kV Anpara C – Unnao line and 765kV Anpara D – Obra C line measured at Anpara C and Anpara D end respectively.

Tripping Logic when△P < 200MW (when 1x660MW Unit is not running at Obra C)

S.no	Contingency	Pre contingency condition	Action
1.	Tripping of 765kV Anpara C – Unnao line AND 765kV Anpara D – Obra C OR Obra C – Unnao line, tripping of all three ICTs at 765kV Unnao.	If 1600 <Psum < 1700	One unit to trip at Anpara C or Anpara D in rotation basis. Also, automatic generation at Anpara C and Anpara D as per existing scheme.
		If Psum > 1700	One unit to trip at Anpara C & Anpara D each. Also, automatic generation at Anpara C and Anpara D as per existing scheme.

Tripping Logic when△P > 200MW (when 1x660MW Unit is running at Obra C)

S.no	Contingency	Pre contingency condition	Action
1.	Tripping of 765kV Anpara C – Unnao line AND 765kV Anpara D – Obra C OR Obra C – Unnao line, tripping of all three ICTs at 765kV Unnao.	If 1150 <Psum < 1350	One unit to trip at Anpara C or Anpara D in rotation basis.
		If 1350 <Psum < 1500	One unit to trip at Anpara C AND Anpara D each.
		If Psum > 1500	One unit to trip at Anpara C & Anpara D each. Also, automatic generation backdown at Anpara C and Anpara D as per existing scheme.
2.	Tripping of 765kV Anpara C-Unnao line	Outage of 765kV Anpara D-Obra C OR 765kV Obra C-Unnao line AND 1050<P<1200 (where P is Loading of 765kV Anpara C-Unnao line)	One unit to trip at Anpara C or Anpara D in rotation basis.
		Outage of 765kV Anpara D-Obra C OR 765kV Obra C-Unnao line AND 1200<P<1350 (where P is Loading of 765kV Anpara C-Unnao line)	One unit to trip at Anpara C & Anpara D each.
		Outage of 765kV Anpara D-Obra C OR 765kV Obra C-Unnao line AND P>1350 (where P is Loading of 765kV Anpara C-Unnao line)	One unit to trip at Anpara C & Anpara D each. Also, automatic generation backdown at Anpara C and Anpara D as per existing scheme.

3.	Tripping of one ICT at 765kV Unnao	Loading of 765kV Anpara – Unnao line is more than 1050 MW	One unit to trip at Anpara C or Anpara D in rotation basis.
4.	Tripping of two ICTs at 765kV Unnao	NA	One unit to trip at Anpara C & Anpara D each. Also, automatic generation at Anpara C and Anpara D as per existing scheme.

SOPs related to contingency in Anpara Complex

- In case 765 kV Anpara C-Unnao line is under outage, flow on 765 kV Obra C-Unnao line must be brought down below 1250 MW by backing down generation in Anpara Complex
- In case of tripping of any one of 765kV lines, no automatic action is required. However, generation reduction to be done at Anpara-A, B, C & D till loading of 400kV Anpara – Obra B line comes down below 650 MW.

Proposed SPS for 1x500 MVA+1x315MVA, 400/220 KV ICTs at 400 KV GSS Bhilwara

1. Details of Installed ICTs at 400kV GSS Bhilwara and Transmission Lines

- Percentage impedance of 500 MVA, 400/220 kV ICT-1 is HV-IV: 11.95%, HV-LV:40.30%, IV-LV:26.17% @ Normal Tap:09
- Percentage impedance of 315 MVA, 400/220 kV ICT-2 is HV-IV: 13.04%, HV-LV:40.51%, IV-LV:25.69% @ Normal Tap:09.
- 500 MVA, 400/220 kV ICT-1 will be loaded to full capacity first and then 315 MVA, 400/220 kV ICT-2. There will be difference of loading approximately 10MVA i.e. when ICT-1 is loaded to full capacity then loading on ICT-2 will 97% (approximately).
- Power Map of Transmission System associated with400 KV GSS Bhilwara is shown in Figure 1.

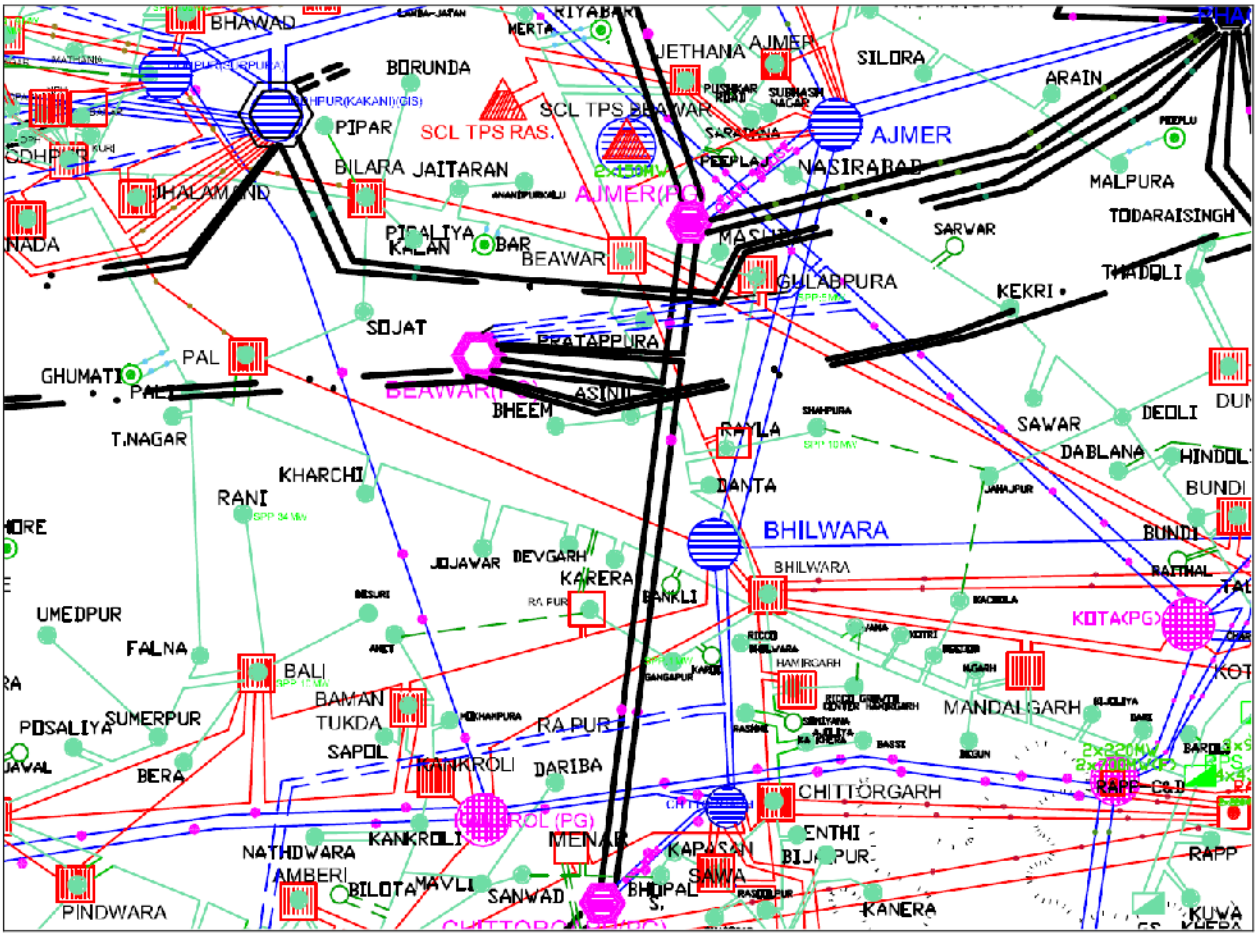


Figure 1: Power map of transmission system associated with 400 kV GSS Bhilwara

2. Load Details of Installed ICTs and Transmission lines Associated with 400kV GSS Bhilwara and Transmission Lines

- Peak load recorded on the 400/220 kV ICTs and 220 kV lines associated with 400 kV GSS Bhilwara are detailed below in Table 1.
- Proposed groups of 220 kV lines to be tripped for SPS are also shown in Table 1.

Table 1: Load Details of ICTs and Transmission Lines Associated with 400 kV GSS Bhilwara

S. No.	Name of Lines/ICTs	Peak Load (MVA)	Average Load (MVA)	Remark
1	500 MVA, 400/220/33 kV ICT-I	368	299	Load sharing of ICT-I is more in respect of ICT-II about 10 MVA due to different percentage impedance
2	315 MVA, 400/220/33 kV ICT-II	278	187	
3	220 KV Bhilwara Interconnector-1	258	190	Proposed for SPSGroup-1
4	220 KV Bhilwara Interconnector-2	203	152	Proposed for SPSGroup-1
5	220 KV S/C Bhilwara-Bamantukda line	187	152	Proposed for SPSGroup-2
6	220 KV S/CBhilwara-Paliline	143	101	Proposed for SPS Group-2
7	220 KV Bhilwara-Jindal Saw line	25	22	Industrial Feeder

3. Proposed SPS for ICTs at 400 kV GSS Bhilwara

- No spare carrier protection channel is available on any of 220 kV feeders emerging from 400 KV GSS Bhilwara to trip the transformers at 220 KV GSS which are being fed from 400 kV GSS Bhilwara.
- After detailed analysis of above loading conditions and grid power flow pattern, two groups of 220 kV lines are identified which are proposed for tripping for SPS. Following 220 kV lines are considered for tripping for SPS of ICTs:-

Proposed for SPS Group-1

- 220 KV Bhilwara Interconnector-1 Line
- 220 KV Bhilwara Interconnector-2Line

Proposed for SPS Group-2

- 220 KV S/C Bhilwara-Bamantukda line
- 220 KV S/C Bhilwara-Pali line

- Tripping command for 220 kV lines are to be taken from overload relay/over current back up relay on 400 kV and/or 220 kV side of ICTs considering 100% loading of

500MVA, 400/220/33 KV ICT-I and 97% loading of 315 MVA, 400/220/33 KV ICT-II with appropriate time delay (3 to 5 second) to avoid tripping during the through faults. Further, time grading of the back-up elements may also be correlated for time delay of overloading.

- Schematic diagram for tripping of 220 kV lines included in SPS for 1x500MVA+1x315MVA, 400/220 KV ICTs at 400 KV GSS Bhilwara is shown below:-

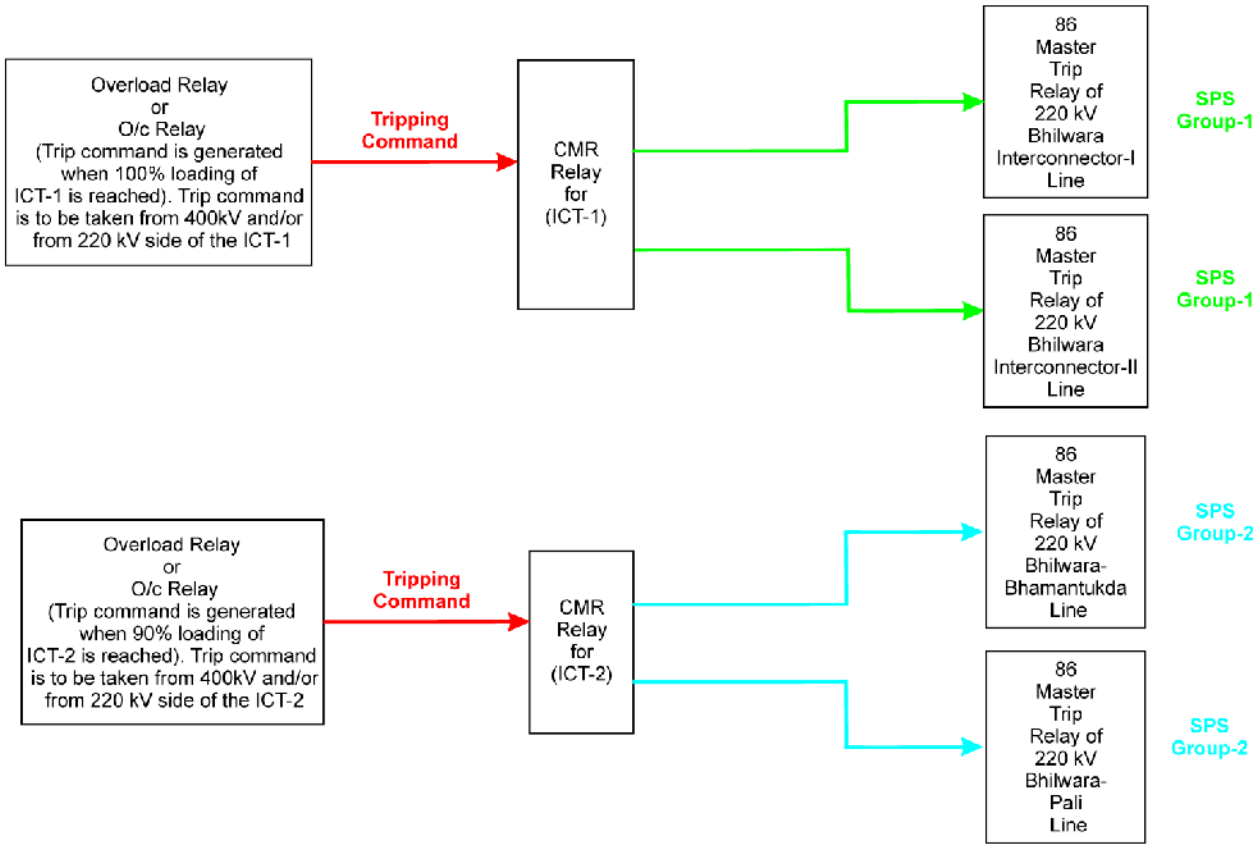


Figure 2: Schematic diagram of proposed logics for SPS of 1x500 MVA+1x315MVA, 400/220 KV ICTs at 400 KV GSS Bhilwara

उत्तर प्रदेश राज्य भार प्रेषण केन्द्र
उ0प्र0पॉवर ट्रांसमिशन कारपोरेशन लि0
(उत्तर प्रदेश सरकार का उपक्रम)
यू0पी0एस0एल0डी0सी0 परिसर, विभूति खण्ड–II
गोमती नगर, लखनऊ–226010
ई–मेल : cepso@upsldc.org
sera@upsldc.org

U.P. State Load Despatch Centre
U.P. Power Transmission Corporation Ltd.
(A U.P. Govt. Undertaking)
UPSLDC Complex, Vibhuti Khand – II
Gomti Nagar, Lucknow- 226010
E-mail: cepso@upsldc.org
sera@upsldc.org

No: -3646 /CE (PSO)/SE(R&A)/EE-II/Meeting Dated: - 11-10- 2023

Chief Engineer (Trans.West), Pareshan Bhawan, 130D, Hydel Colony, Victoria Park, Meerut – 250001.	**Chief Engineer, State Load Dispatch Centre** Uttarakhand Vidyut Bhawan Saharanpur Road Majra, Near ISBT Dehradun-248001, Uttarakhand **(anupam_singh@ptcul.org)**
GM (Operation) Jaypee Vishnuprayag Hydro-Electric Plant, Post - Vishnupuram-246443, District - Chamoli (Uttarakhand).	**General Manager,** NRLDC18-A, SJSS Marg, Katwaria Sarai, New Delhi–110016.
Alaknanda Hydro Power Company Ltd., Srinagar Hydro Electric project, Koteshwar Colony, Srinagar, Garhwal – 246174 (Uttarakhand). **(bishwambar.bag@gvk.com)**	**Sent via e-mail**

Subject:-Minutes of Meeting to discuss the SPS scheme for safe evacuation of power from Alaknanda- Vishnuprayag HEP complex.

A meeting to discuss the SPS scheme for safe evacuation of power from Alaknanda-Vishnuprayag HEP complex was held on 09.10.2023 vide letter no. 3585/CE(PSO)/SE(R&A)/EE-II/SPS dated 06.10.2023. Copy of the Minutes of Meeting is enclosed for further necessary action.

Encl: As above.

(Amarendu)
Chief Engineer (PSO)

No: - /CE (PSO)/SE(R&A)/EE-II/Meeting Dated: - 2023

Copy forwarded for kind information and necessary action via e-mail to the following:-

1. Director, UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.
2. Director (Operation), UPPTCL, 11th Floor, Shakti Bhawan Extn., Lucknow.
3. Director (Project), Power Transmission Corporation of Uttarakhand Limited Vidyut Bhawan, Near ISBT Crossing, Saharanpur Road, Majra, Dehradun-248002. **(director.op@ptcul.org)**
4. Member Secretary, NRPC, 18 – A, SJSS Marg, Katwaria Sarai, New Delhi, 110016.
5. Superintending Engineer (SC), UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.

(Amarendu)
Chief Engineer (PSO)

Minutes of Meeting held on 09.10.2023 to discuss the SPS scheme for safe evacuation of power from Alaknanda-Vishnuprayag HEP complex

A meeting to discuss the SPS scheme for safe evacuation of power from Alaknanda-Vishnuprayag HEP complex was held on 09.10.2023 vide letter no. 3585/CE(PSO)/SE(R&A)/EE-II/ dated 06.10.2023 through video conferencing. List of participants is below:-

UPSLDC

1. Er. Amarendu, Chief Engineer (PSO), UPSDLC, Lucknow.
2. Er. A.J. Siddiqui, Superintending Engineer, (System Control), UPSLDC, Lucknow.
3. Er. Amit Narain, Superintending Engineer, (R&A), UPSLDC.
4. Er. Ram Sharan Singh, Executive Engineer, (R&A), UPSLDC
5. Er. Mohsin Khan, Assistant Engineer – I (R&A), UPSLDC.
6. Er. Anuj Kumar, Assistant Engineer – II (R&A), UPSLDC.

NRLDC

1. Shri Gaurav Malviya, Manager, NRLDC.
2. Shri Deepak Kumar, Assistant Manager , NRLDC

Uttarakhand SLDC

1. Er. Manoj Kumar, Executive Engineer, SLDC Uttarakhand.

Vishnuprayag HEP

1. Shri Amit Jauhari, GM, Corporate office, JPVL (Vishnuprayag).

Alaknanda HEP

1. Shri Bishwambar Bag, Manager (O&M), 400kV Alaknanda HEP.

Singoli Bhatwai HEP

1. Shri Makrand Joshi, Plant Head, Singoli Bhatwari HEP
2. Shri Saurabh Single, Senior Manager, Operation, Singoli Bhatwari HEP.
3. Shri Shailendra Jaiswal, Senior Manager, Maintenance, Singoli Bhatwari HEP.

PTCUL

1. Er. Harsh Verma, Executive Engineer (T&C), 400kV Sri Nagar, PTCUL.

Discussion held in the meeting may be summarized as follows:-

1. Assistant Engineer – I (R&A), UPSLDC gave a brief introduction and background of evacuation constraint in Alaknanda-Vishnuprayag Complex due to tripping of 400kV Alaknanda – Muzaffarnagar line.
2. SPS logic proposed by UPSLDC was deliberated in meeting along with historical data of power flow/generation of Alaknanda, Vishnuprayag HEP complex (copy enclosed as Annexure – I).
3. SPS logic proposed by Alaknanda HEP was also discussed in meeting by all participants (copy enclosed as Annexure – II).
4. Logic – 1 proposed by M/s Alaknanda HEP was agreed by all the stakeholders.

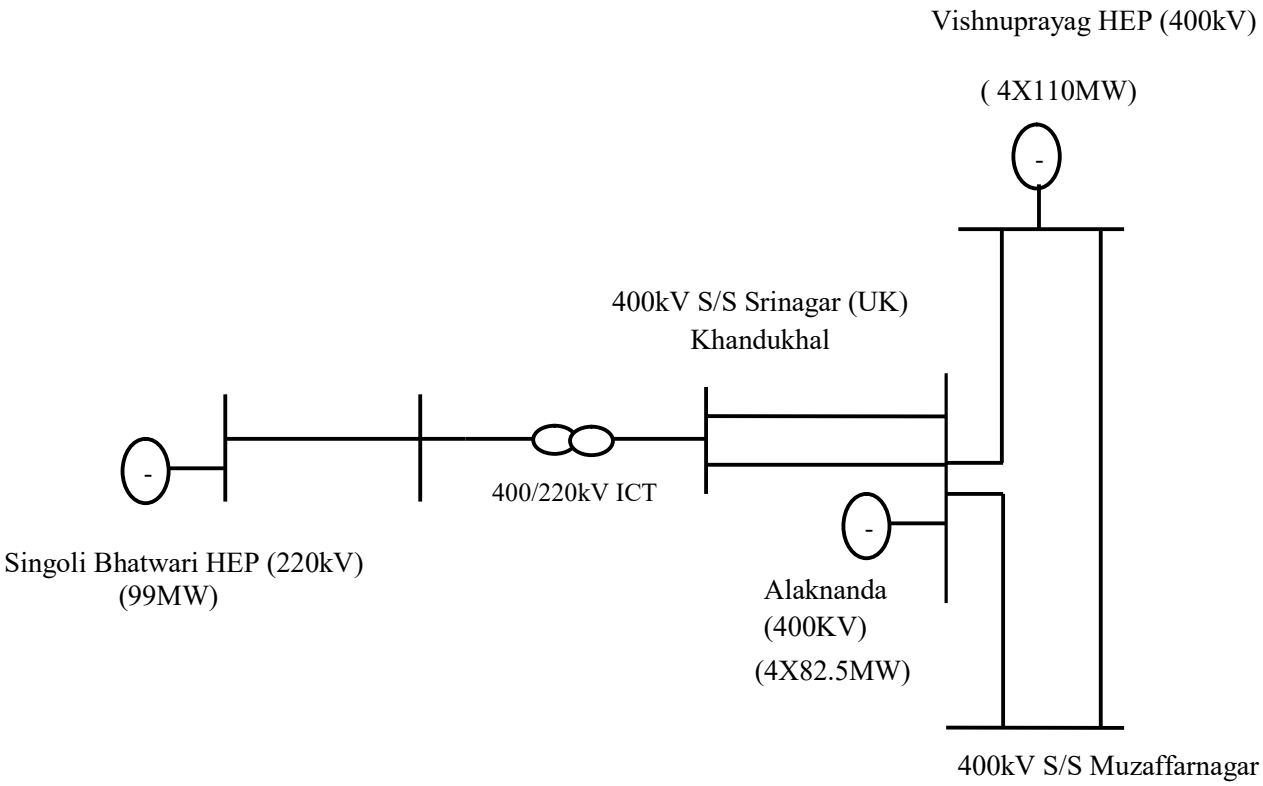
5. In the logic – 2 proposed by M/s Alaknanda HEP, UP SLDC recommended some modification that one unit of Singoli Bhatwari HEP and one unit of Alaknanda HEP will be tripped instantaneously and immediate generation back down will be done at Vishnuprayag HEP on the instruction of UP SLDC upto safe margin. Thereafter efforts will be made to synchronise the tripped unit of Alaknanda HEP as soon as possible.
6. In the logic – 3 proposed by Alaknanda HEP, UP SLDC recommended that one unit of Singoli-Bhatwari will trip and manual generation back down will be done at Alaknanda HEP and Vishnuprayag HEP on pro-rata basis if the flow on Alaknanda-Muzaffarnagar line is more than 760 MW. Alaknanda HEP, Vishnuprayag HEP, Singoli –Bhatwari HEP and representative from NRLDC agreed for the same.
7. With incorporation of above recommendations of UPSLDC, final SPS logic (copy enclosed as Annexure – III) will be put up as an agenda item in the forthcoming OCC meeting scheduled on 20.10.2023 at NRPC, New Delhi, for final discussion and approval. All the stakeholder were requested to present in the next OCC meeting.
8. With respect to communication path, concerned from Alaknanda HEP and Singoli Bhatwari HEP confirmed that PLCC path is available for data communication as per the logic discussed.
9. In SPS logic discussed, generation data from Vishnuprayag is also required at Alaknanda HEP. Representative from Vishnuprayag informed that there is some communication issue at Vishnuprayag end presently. However he informed that the issue will be resolved.

(Amarendu)
Chief Engineer (PSO)

Annexure-III

Final logic of SPS for safe evacuation of Power from Alaknanda-Vishnuprayag HEP complex

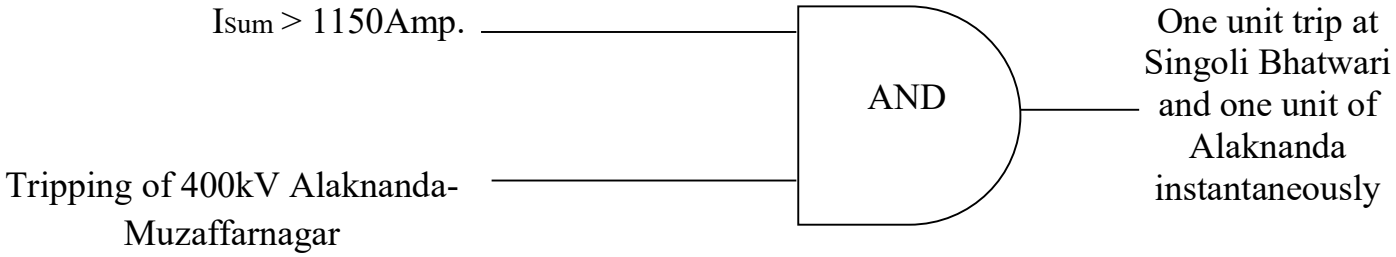
Network Connectivity



Reason for SPS requirement

At Vishnuprayag HEP, overcurrent protection is enabled at 120% on 400kV Vishnuprayag-Muzaffarnagar line. At normal operating condition, current on this line remains well below over current setting. However, in case of tripping of 400kV Alaknanda-Muzaffarnagr line and high injection of power from Uttrakhand through 400kV Srinagar-Alaknanda DC line, overcurrent protection at 400kV Vishnuprayag operates, tripping 400kV Vishnuprayg-Muzaffarnagar line. Therefore, due to loss of evacuation path, generation loss occurs at Alaknanda & Vishnuprayag HEP.

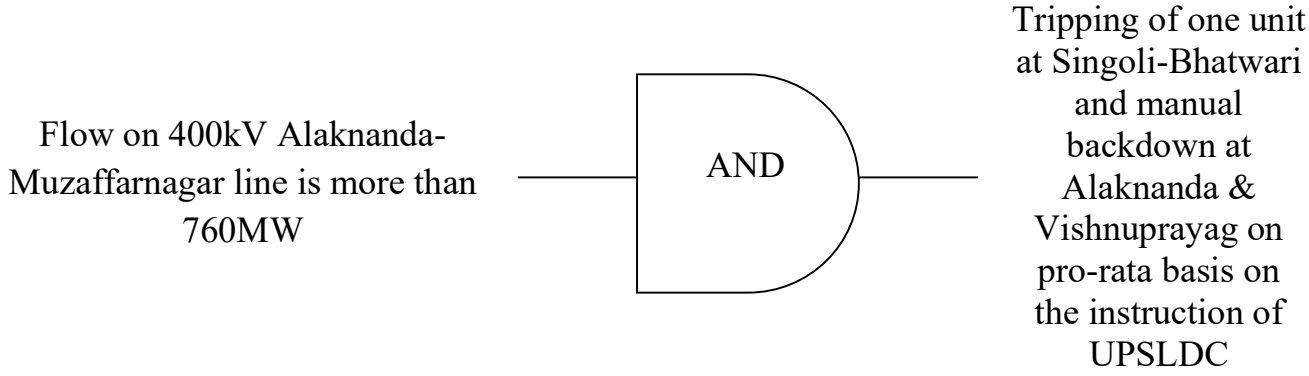
Case-1 Tripping of 400kV Alaknanda-Muzaffarnagar



Where I_{sum} = Total Ex -bus Generation at Alaknanda (in terms of current)+ Total Ex – bus Generation at Vishnuprayag (in terms of current)+ Current Injection at 400kV Alaknanda through 400kV Srinagar-Alaknanda DC line in antecedent condition

Note: - Generating units at Alaknanda and Vishnuprayag HEP to operate with lower generation, so that tripped unit at Alaknanda HEP can be synchronized

Case-2 Tripping of 400kV Vishnuprayag-Muzaffarnagar



Agenda by APCPL-IGSTPS JHAJJAR for 212th OCC meeting

Regarding scheduling below Minimum Turn Down Level during IEGC-2023 regime

IEGC-2023 has been implemented from 01-10-2023 as per Hon'ble CERC order 03-08-2023. Prior to implementation of IEGC-2023 the buyer has to ensure Technical minimum schedule of the generator if they have a requirement of power.

RLDC were also ensuring Technical minimum schedule for the generator prior to bringing machine on bar and during real time operations as well.

Post implementation of IEGC-2023 regulations, RLDCs are not ensuring technical minimum schedule for the generator and the generators are forced to bear DSM penalty for deviating from the schedule, which is less than the Minimum Turn Down Level as mentioned in Form AS-1 and as stipulated by CERC in IEGC 4th amendment regulations, 2016

The relevant clause is reproduced hereunder:

Quote

6.3B – Technical Minimum Schedule for operation of Central Generating Stations and Inter-State Generating Stations

1. *The technical minimum for operation in respect of a unit or units of a Central Generating Station of inter-State Generating Station shall be 55% of MCR loading or installed capacity of the unit of at generating station.*
2. *The CGS or ISGS may be directed by concerned RLDC to operate its unit(s) at or above the technical minimum but below the normative plant availability factor on account of grid security or due to the fewer schedules given by the beneficiaries.*

Unquote

As per IEGC-2023, The **minimum turndown level** is defined as

the minimum output power expressed in percentage of maximum continuous power rating that the generating unit can sustain continuously; to be on bar and includes minimum power level as defined in CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023.

As per General Provisions of IEGC-2023 Regulations refer Regulation 45 (12) pg 129

(12) Minimum turndown level for regional entity thermal generating stations: The minimum turndown level for operation in respect of a unit of a regional entity thermal generating station shall be 55% of the MCR of the said unit or such other minimum power level as specified in the CEA (Flexible Operation of coal based Thermal Generating Units) Regulations, 2023, as amended from time to time, whichever is lower:

As per CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023

> *"**minimum power level**" means the minimum output power expressed in percentage of maximum continuous power rating that the coal based thermal power generating unit can sustain continuously without oil support;*

As per IEGC -2023 regulations pertaining to FGMO

> *(j) All generating stations, including the WS seller mentioned in Table-4 (under subclause (g) of this clause) shall have the capability of reducing output at least by 5% or 10%, as applicable, of their operating level and up to 5% or 10% of their MCR, as applicable, **limited to the minimum turndown level** when the frequency rises above the reference frequency and thus providing primary response, whenever condition arise.*

Further as per IEGC-2023 regulations pertaining to SCUC refer Regulation 46 (4) (d) pg 133

> *(d) If the NLDC in coordination with the RLDCs, after considering the bid results as finalized and available from DAM-AS, anticipates shortfall of reserves in D day due to (i) extreme variation in weather conditions; (ii) high load forecast; (iii) the requirement of maintaining reserves on regional or all India basis for grid security; (iv) network congestion, NLDC may schedule incremental energy from the generating units in the list referred to in sub-clause (c) of this clause **, so as to bring such units to their minimum turndown level in order to maximize availability of onbar units**, by 1500 Hrs. of D-1 day and update the list on the respective RLDC website:*

In view of the above, we hereby request the OCC forum to deliberate on the issue so that technical minimum schedule can be ensured for the generator.

RVUNL AGENDA ITEMS

Improper Power evacuation from the Switchyard of 6x250MW, SSTPS, RRVUNL, Suratgarh

After the commercial power generation from both the 2x660MW units of SSCTPP, Switchyard of STPS-O&M is continuously overstressed because their entire power generation (2x660MW) is being evacuated through the switchyard of STPS(O&M) as SSCTPP is having total four 400KV feeders out of which 2x400KV SSCTPP-Babai feeders are still not commissioned and 2x400KV SSCTPP-Bikaner feeders do not cater loads i.e. lightly loaded/imports solar power from Bikaner during day time. So, entire generation by 2x660MW, SSCTPP is being evacuated through the feeders of STPS only. Besides this, considerable solar generation during day time (approx 550MW) at Bikaner is also being evacuated through the Switchyard of STPS via 3x400KV Bikaner feeders (two from SSCTPP and one from STPS-O&M). In nutshell, Switchyard of STPS-O&M is evacuating approx. 1000-1100MW extra power generation continuously in addition to its own 1500MW generation capacity i.e. 60-80% overloading.

Due to this entire phenomenon, either 2x315MVA, 400KV/220KV ILTs or 2x400KV STPS-Ratangarh lines and sometimes all the four power elements operate near their border line load. The details of impact on our Switchyard are as under:

(a) 2x400KV Ratangarh Feeders:

During the period Dec'21 to May'23 isolator arms/jumpers/joints of these feeders got damaged during peak day hours when all the three Bikaner lines imports power was more than 550MW alongwiith all the generation of the SSCTPP. It has also been observed that for attending these emergency breakdowns, generation of STPS & SSCTPP were back-down and also running units of STPS-O&M were desynchronized sometimes. Moreover, NRLD and LD do not issue written messages for generation back-down/de-synchronization of generating units which had resulted into generation loss both at STPS-O&M & SSCTPP end.

It is also observed that LD & NRLD usually takes 5-6 hours for providing shut-down codes, meanwhile, isolator arms of the healthy lines gets weakened because of passage of double current for 5-6 hours and this plays a vital role for creation of the next emergency break-down.

Besides this, all such emergencies were created during peak day hours but their breakdown maintenance were taken up during the night hours sometimes whole night because LD permits to work during lean load period irrespective of the emergencies.

(b) 2x315MVA, 400KV/220KV ILTs at STPS

In STPS, Unit 1 & 2 are connected at 220KV side and unit# 3 to 6 at 400KV side. Both the ILTs at STPS are loaded up in such way that if either unit#1 or 2 trips then loading on ILTs crosses the overload setting causing critical situation (as the time taken

to control the loading on the ILTs is quite high) and there was every possibility that in case of tripping of any ILT might have resulted in tripping of the other ILT thereby isolation of 220KV and 400KV switchyards. Further, if none of the outgoing 220KV feeder is connected to grid (Generally operates in radial mode) then no supply shall be available at 220KV side and shall lead to tripping of all the station transformers (220KV/6.6KV) resulting in tripping of all the unit auxiliaries and finally tripping of all the units of STPS. The case of cascade tripping of ILTs and all the generating units of STPS has already occurred on 05.06.22.

So, for the stabilization, it becomes necessary to run the unit #1/2/both at STPS always and during their tripping/down period there is extra burden on STPS to maintain the ILT loading through the LD/NRLD .

(c) Proposal of SPS Scheme:

Looking to issues of power evacuation, already a proposal for implementing SPS scheme to save the overloading of ILTs by tripping the 220KV STPS-Bhadra line has been initiated in May'22 but approval from the RVPN is still pending

(d) Drawl of high MVAR:

Since solar power attracts much MVAR, so there is excessive drawl of MVAR from our units causing bad affect on our Generators (Low pf than the design value, low Gen voltage, heating in Exciter etc.).

(e) Violation of N-1 Philosophy:

Presently, seven power sources are connected at 400KV Switchyard of STPS-O&M (4x250MW generating units of STPS-O&M + 2x400KV Inter-connectors from SSCTPP (2x660MW) + 400KV STPS-Bikaner line during day time) but only four power receiving elements are connected for evacuation of these sources of power (2x400KV STPS-Ratangarh lines + 2x315MVA ILTs). This does not meets the CEA guidelines for the basic principle of N-1 security in power network wherein N is the number of power receiving elements and N-1 is the power sources. It is clear that for 400KV switchyard of STPS-O&M, sources are more by 3 numbers than the power receivers. In such cases, if any power receiving element trips then the Grid may collapse.

(g) Difficulty in availing planned shutdowns at STPS:

Due to heavy loading in Switchyard of STPS, planned/preventive shutdowns of power elements like 220KV Buses, 400KV Buses, ILTs are deferred/cancelled/ squeezed by LD even after approved by the OCC. Recently, OCC approved shutdown of ILT-1 was not allowed by LD even after emergency conditions at STPS-site. Also, preventive maintenance and routine tests are carried out during down time of units of both STPS and SSCTPP simultaneously. Only breakdown maintenance are carried out and that is also permitted by LD during lean/night hours.

All such problems were also taken up in agenda of OCC 208 dtd 15.06.23. Please refer page no. 7, 55 &56 for the issues of STPS in this agenda note. Recently, CE(T&C) alongwith their team also visited STPS on 24.09.23 to study & analyse the problems.

Proposals For the Problems of Improper Power evacuation from the Switchyard of 6x250MW, STPS, RRVUNL, Suratgarh

220KV switchyard of STPS was charged in the year 1997 and 400KV switchyard in 2001 i.e. both the switchyards are older by more than 21 years as of now and this continuous overloading of the power elements of the Switchyard in longer run may turn into disaster. So, following remedial measures are hereby proposed for the stable and safe operation of the switchyards of STPS(O&M) :

A) Solar generation at Bikaner is treating us as a load center. So, the import on 3x400KV Bikaner Lines (one from STPS and two from SSCTPP) during day time must be avoided.

B) Approval of the proposed SPS scheme to save the overloading of ILTs.

C)It is requested to arrange in writing the standing direction to STPS to trip the 220KV outgoing lines selectively from our end whenever the loading on ILTs exceeds their rated capacity.

D) Arrange to conduct load flow studies for the existing system and analyze the phenomenon of overloading at STPS Switchyard.

E) Arrange to conduct the study of the higher MVAR demand and low voltage profile in nearby area and accordingly the operation of both Bus and line Reactors installed at SSCTPP plant.

F) LD & NRLD usually takes considerable time for providing shut-down codes during emergencies and that is also without any written messages of generation backdown/desyncronisation of generating units/ management of loads. As such, STPS-O&M is to be allowed to trip the faulty lines after reducing the generation either by backdown or desynchronisation of the generating units without any DSM charges.

G)Early ETC completion of 2x400 KV SSCTPP-Babai Lines.

H) Generation from SSCTPP should be evacuated through their 2x400KV Bikaner lines till the completion of Babai Lines. If possible independent operation of both critical plant and O&M plants.

I) Early ETC of proposed 400KV GSS at village Kenchiya, Hanumangarh. It is also proposed that for this GSS, LILO of 400kV feeders of SSCTPP rather than STPS should be considered otherwise loading on STPS Switchyard through both the SSCTPP-STPS Interconnectors shall remain intact.

J) Planned shutdown of Power elements of 400KV system requires OCC approval which has to be applied at least 30 days in advance but at the time of execution same are

cancelled/deferred/ squeezed by the LD even after approval by the OCC because of highly unpredictive load patterns resulting non- cooperation from the service engineers for the ETC/service work, specialized labours and machines hired etc at our end. So, the planned shutdowns of 400KV elements of STPS should be provided by the LD within 1-2 days of planning after mutual communication till the problem of power evacuation is resolved and the procedure of OCC approval should be taken up by the LD with NRLD at their end.

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CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

No. L-1/261/2021/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 29.09.2023

In the matter of:

Approval of 'Detailed Procedure for Allocation of Transmission Corridor for Scheduling of General Network Access and Temporary General Network Access under Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022

Order

Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022 (hereinafter called 'GNA Regulations') were published on 19.07.2022 in Part III, Section 4 of the Gazette of India (Extraordinary) No 364.

2. In accordance with Regulation 39.2 of the GNA Regulations, NLDC was required to submit a Detailed Procedure in respect of Regulation 36 of the GNA Regulations for approval of the Commission.

3. Accordingly, NLDC vide its letter dated 14.07.2023 submitted the 'Detailed Procedure for Allocation of Transmission Corridor for Scheduling of General Network Access and Temporary General Network Access'.

4. The Commission has examined the Detailed Procedure submitted by NLDC and after incorporating suitable changes hereby approves the "Detailed Procedure for Allocation of Transmission Corridor for Scheduling under General Network Access and Temporary General Network Access" in terms of proviso to Regulation 39.2 of the GNA Regulations. The approved Detailed Procedure is enclosed as Annexure to this order.

Sd/	Sd/	Sd/	Sd/
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

Allocation of Transmission Corridor under General Network Access (GNA) and Temporary General Network Access (T-GNA) to the Inter-State Transmission System

1. Background

1.1. This procedure is in accordance with Regulation 39.2 of the Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022 (hereinafter called 'GNA Regulations').

1.2. The procedure lays down the guidelines for allocation of the transmission corridor for scheduling of GNA and T-GNA transactions as per the provisions stipulated in GNA Regulations and the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 (hereinafter called 'Grid Code, 2023').

The procedure will supplement NLDC's Procedure for granting Temporary General Network Access (T-GNA) to the inter-State Transmission system through the National Open Access Registry (NOAR) prepared in accordance with the aforementioned regulations.

1.3 All the provisions of this Procedure as applicable to GNA Applicants are also applicable to GNA_{RE} and all the provisions of this Procedure as applicable to T-GNA Applicants are also applicable to T-GNA_{RE}. Accordingly, GNA_{RE} and T-GNA_{RE} have not been repeated everywhere in the Procedure as the same provisions are applicable.

2. Definitions

2.1. 'Applicant' means Distribution licensee directly connected to ISTS / Bulk consumer directly connected to ISTS, drawee entity connected to intrastate transmission system or to distribution system, all generating stations, including based on a renewable source of energy with or without Energy Storage System including Renewable Hybrid Generating Station for meeting its auxiliary consumption or start-up power or for meeting its supply obligations in terms of clause (3) of Regulation 6 of the Power Market Regulations, Captive generating

plant, Standalone Energy Storage System, Generating station based on a renewable source of energy with or without Energy Storage System including Renewable Hybrid Generating Station for drawal during non-generation hours as buyers. Trading Licensee on behalf of above buyers or engaged in cross border trade of electricity for injection into or drawal from the Indian grid. Power Exchange for collective or bilateral transactions on behalf of the above buyers or on behalf of trading licensees engaged in cross border trade of electricity for injection into or drawal from the Indian grid., or any other entity as per GNA Regulations

2.2. 'Bid Area' is defined as the largest geographical area within which market participants are able to exchange energy without capacity allocation.

2.3. 'Control Area' means an electrical system bound by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas and contributes to the regulation of frequency as specified in Grid Code, 2023.

2.4. 'Cross Border Transaction' means transactions involving the import or export of electricity between India and any of the neighbouring countries and shall also include transactions across India involving neighbouring countries.

2.5. 'Day' means a day starting at 00:00 hours and ending at 24:00 hours.

2.6. Grid Controller of India Ltd. (hereinafter called 'Grid-India') (erstwhile Power System Operation Corporation Ltd. (POSOCO)) means the wholly Government owned independent Company notified by Central Government under Section 26 and subsection (2) of Section 27 of the Electricity Act vide notification dated 19th December 2016. Grid-India is operating all five RLDCs and the NLDC w.e.f. 1st October, 2010;

3. Words and expressions used in this procedure that are not defined herein but defined in the Act or any other regulations of the Central Commission shall, unless the context otherwise requires, have the meanings assigned to them under the Act or the said regulations specified by the Central Commission.

4. Declaration of Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM)

4.1 Declaration of Transfer Capability

a) The procedure for calculation of TTC, ATC and TRM is attached as Appendix -I of this Procedure.

b) The Central Transmission Utility of India Limited (CTUIL) shall furnish to NLDC on a rolling basis, the import and export ATC of the inter-regional links/corridors as considered by it while granting General Network Access (GNA) to entities.

c) The National Load Despatch Centre (NLDC), Regional Load Despatch Centres (RLDCs) and State Load Despatch Centres (SLDCs) shall consider the quantum declared by CTUIL while assessing the import and export TTC, TRM and ATC for the purpose of grant of Temporary General Network Address (T-GNA), scheduling of GNA and T-GNA transactions.

d) The declaration of the import and export TTC, ATC and TRM shall be carried out by RLDCs and NLDC in accordance with Regulation 44 (1) and Regulation 44(2) of the Grid Code 2023. The TTC, ATC, and TRM figures for the month along with the details of the basis of calculations, including assumptions, if any, shall be published on the website of NLDC and concerned RLDCs at least eleven (11) months in advance. The specific constraints indicated in the system study shall also be published on the website.

e) SLDCs in consultation with RLDCs shall declare the import and export TTC, ATC, and TRM of the individual control/bid areas within the region in accordance with Regulation 44 (3) of the Grid Code 2023. RLDCs shall assess the import and export TTC, TRM and ATC for the group of control/bid areas within the region (if required). The computed TTC, TRM and ATC figures shall be published on the website of respective SLDCs and RLDCs, along with the details of the basis of calculations, including assumptions, if any, at least eleven (11) months in advance. The specific constraints indicated in the system study shall also be published on the website.

f) The consolidated bid area/control area/combination of control areas wise import and export TTC, TRM and ATC shall also be published on the NLDC/Grid-India website.

g) NLDC, RLDCs and SLDCs shall perform the TTC computation studies such that all anticipated operating conditions are covered. In the studies, the worst credible contingency shall be considered to ensure equipment loadings, voltage stability, and transient stability limits.

Provided further that NLDC and/or concerned RLDCs and SLDCs in consultation with each other may revise the TTC, ATC and TRM of respective control areas due to changes in system conditions, which includes changes in network topology or changes in anticipated active or reactive generation or load, on account of outage of one or more generators or transmission lines at any of the nodes in the study. Revised TTC, TRM and, ATC figures along with the reasons for revision shall be published on the websites of NLDC/GRID-INDIA, concerned RLDCs and SLDCs.

a) The TTC, ATC and TRM may also be revised near the operating horizon depending on the anticipated system conditions at that time.

5. Allocation of Transmission Corridor

a) In order to determine whether the drawl schedules as requisitioned by the GNA and T-GNA grantees can be allowed, RLDCs shall check the availability of the margin for each and every time block against the available inter-regional import/export transfer capability as well as intra-regional and bid/control area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area (s) / group of control or bid areas.

b) For the purpose of transmission corridor allocation, all states and Union Territories shall be configured as bid areas. Further, additional bid areas/groups of bid areas may also be configured as and when the need arises.

c) NLDC shall be responsible for the configuration/reconfiguration of these bid area(s) based on the anticipated congestion and prevailing grid conditions. Power Exchanges shall keep the provision in their respective systems for the configuration of bid areas as and when intimated by NLDC with due advance notice.

d) First, the GNA grantees shall be eligible to schedule power within the GNA granted to them subject to the available import and export transfer capability of the concerned bid area (s)/control area (s)/group of control or bid area (s). After the allocation of the corridors to the GNA grantees, the concerned RLDC shall allow the drawl schedules as requisitioned by the T-GNA/ grantees based on the available margin. The detailed procedure for the same is provided in a subsequent section.

e) Responsibilities of CTUIL:

i) The CTUIL shall be responsible for electronically intimating details of any new grant of GNA to all the stakeholders (including NLDC) within 15 days of such grant.

ii) In case of a change in the original quantum or date of effectiveness of GNA, the same shall be intimated by CTUIL to all the stakeholders (including NLDC) at least 15 days in advance from the original date of effectiveness of GNA.

iii) CTUIL shall also provide an interface (Application Programming Interface – API based) for communicating approved GNA quantum to NLDC.

iv) CTUIL shall also inform the details of authorisation of use of GNA by other GNA grantees under Regulation 23 of the GNA Regulations to the RLDCs and NLDC at least 15 days before the effective date of such authorization.

5.1. Allocation of Transmission Corridor and Scheduling of Transactions under GNA and T-GNA

a) Respective SLDCs on behalf of the intra-state entities which are drawee GNA grantees or other drawee GNA grantees which are regional entities, shall furnish the details of the contracts(which may include power purchase agreements (PPAs) or Letters of Award (LOA)or any other type of contract) already entered into by such entities two days before the day when scheduling request is to made ((i.e. for scheduling for ‘S’ day, scheduling request is placed on ‘S-1’ day, copy of the contract may be submitted by 11:00 hrs of ‘S-3’ day) so as to configure these details in the scheduling system. In case contracts have not been entered into by S-3 day, contracts are required to be submitted at least one time block before the time block when the scheduling request is made.

As per Regulation 45(5) of the Grid Code 2023, the copy of contracts once submitted by sellers and buyers need not be submitted again before every scheduling request and the copy of the contract can be linked with a unique ID by RLDC for reference before scheduling request.

b) The requisite information shall be provided in the Web based Energy Scheduling Software (WBES) for scheduling requests under GNA or NOAR for scheduling requests under T-GNA. The said details of the contract shall be provided for Intra Day, Day Ahead Contingency (DAC), Term Ahead, Green Intra Day, Green Day Ahead Contingency (DAC) and Green Term Ahead contracts as per above.

c) SLDCs or drawee GNA grantees shall place a request for schedule in accordance with Regulation 49 of the Grid Code 2023.

d) RLDCs shall check if drawl schedules as requisitioned by the drawee GNA grantees can be allowed based on the available transmission capability.

e) RLDCs shall check the availability of the margin for each and every time block against the available inter-regional import/export transfer capability as well as the intra-regional and bid/control area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area / group of control areas.

f) Once such entity has placed a scheduling request with RLDC and there is a constraint in the transmission system due to which a full schedule as requested by all drawee DICs in the region cannot be accommodated, RLDC shall allocate the transmission corridor as follows:

i. In case of constraint in the transmission system “from outside the region”, the transmission corridor shall be allocated in proportion to the “outside the region” bifurcation of all such drawee DICs.

ii. In case of constraint in the transmission system “within the region”, the transmission corridor shall be allocated in proportion to the total GNA quantum for such drawee DICs (sum of “within the region” and “from outside the region” bifurcation)

g) Drawee GNA grantees shall revise their requisition for drawl schedule based on the availability of transmission corridors for such grantees. In case of no revision is furnished by drawee GNA grantees, within their allotted corridor, RLDC shall consider revised schedules where, the generation from wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) shall be scheduled first followed by scheduling of generation from other sources.

5.2. Allocation of Transmission Corridor and Scheduling of Transactions under Advance T-GNA Application Category

a) After the day-ahead schedule is finalised for the GNA grantees, the schedule for T-GNA grantees under the Advance category shall be finalised over the balance transmission margin, in accordance with clause (j) of Regulation 49(1) of the Grid Code, 2023.

b) Respective SLDC on behalf of intra-State entities which are T-GNA grantees or other drawee T-GNA grantees who are regional entities shall furnish the details of the contracts already entered into by such entities two days before the day when scheduling request is to be made ((i.e. for scheduling for 'S' day, scheduling request is placed on 'S-1' day, copy of contract may be submitted by 11:00 hrs of 'S-3' day) so as to configure these details in the scheduling system. In case contracts have not been entered into by such an entity before S-3 day, and the entity enters into a contract after 'S-3' day, such contracts are required to be submitted at least one time block before a scheduling request is made.

As per Regulation 45(5) of the Grid Code 2023, the copy of contracts once submitted by sellers and buyers need not be submitted again before every scheduling request and the copy of the contract can be linked with a unique ID by RLDC for reference before scheduling request.

The requisite information shall be provided in the Web based Energy Scheduling Software (WBES for scheduling requests under GNA or NOAR for scheduling requests under T-GNA.). The said details of the contract shall be provided for for Intra Day, Day Ahead Contingency (DAC), Term Ahead, Green Intra Day, Green Day Ahead Contingency (DAC) and Green Term Ahead contracts as per above.

c) Standing clearance, as applicable, shall be furnished in accordance with Regulation 28 of the GNA Regulations.

d) The available margin for transactions under the advance bilateral category shall be determined for each bid area /control area /group of control areas as:

Margin for scheduling of advance bilateral category of T-GNA transactions:

- ➢ Import T-GNA margin = import ATC – import schedule (GNA) + 'A'% export schedule (GNA)
- ➢ Export T-GNA margin = export ATC – export schedule (GNA) + 'B'% import schedule (GNA)

Where 'A' and 'B' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

e) RLDCs shall check if the drawl schedules as requisitioned by the drawee T-GNA grantees can be allowed based on the available import/export transfer capability and the standing clearance issued by the NLDC/RLDC/SLDC.

f) For this, the RLDCs shall check the availability of corridor for each and every time block of the next day against the available inter-regional import/export transfer capability as well as the intra-regional and bid area import/export transfer capability and the standing clearance issued by the NLDC/RLDC/SLDC for injecting and drawee entities. This process shall be carried out for all the bid area (s) / control area / group of control areas.

g) In case the day-ahead scheduling request of T-GNA grantees for a full quantum of T-GNA/T-GNA_{RE} cannot be accommodated due to the non-availability of sufficient transmission corridor, then the available transmission corridor shall be allocated for scheduling on a pro-rata basis to the T-GNA grantees in proportion to their granted T-GNA quantum.

Within such proportionate T-GNA allocated, the curtailment of requested schedule shall be done first from generation sources other than wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) in proportion to the requested schedule from such sources .

h) .

i) There shall be no refund in transmission charges in case the advance T-GNA applications were applied more than the standing clearances issued by the SLDC/RLDC for the injecting entity. However, if SLDC/RLDC has revised the standing clearances due to transmission constraints or in view of grid security, transmission charges for the quantum not scheduled shall be refunded to the T-GNA grantee.

j) A T-GNA grantee who has been granted Advance T-GNA, but does not request a schedule for the full quantum of T-GNA by 9.15 AM on 'D-1' day as per Regulation 49(1)(j)(i) of the Grid Code 2023, it may request for scheduling up to T-GNA granted after 2.00 PM on 'D-1' day which shall be processed as per exigency applications. In case, a scheduling request cannot be accommodated due to transmission constraints, no refund of transmission charges for such quantum shall be made.

k) After Scheduling of Advance applications of T-GNA the balance corridor including the unutilised quantum of T-GNA shall be released in the following sequence:

i. Collective transactions under day ahead market.

ii. Bilateral transactions under exigency T-GNA applications received till 13:00 hours of 'D-1' day

iii. Schedule revision by GNA grantees OR Bilateral transactions under exigency T-GNA applications received after 13:00 hours of 'D-1' day OR upward scheduling request by Advance T-GNA grantee on first cum first serve basis.

iv. Collective transactions under real time market

Inter-se, the exigency applications after 13:00 hrs of 'D-1' day and revisions requests under GNA received after 14:00 hrs of 'D-1' day shall be scheduled on first cum first serve basis as per available transmission margin.

5.3. Allocation of Transmission Corridor and Scheduling of Collective Transactions

a) After allocation of the transmission corridor to the GNA grantees and T-GNA grantees under the Advance category, the balance transmission margin shall be released for collective transactions under the Integrated Day Ahead Market (IDAM). The available margin for IDAM transactions shall be determined for each bid area /control area /group of control areas as:

Margin for IDAM category of transactions:

- ➢ Import IDAM margin = import ATC – scheduled import (GNA + advance T-GNA) + 'M'% scheduled export (GNA +T-GNA)
- ➢ Export IDAM margin = export ATC – scheduled export (GNA + advance T-GNA) + 'N'% scheduled import (GNA + T-GNA)

Where 'M' and 'N' are the percentage export/import in the opposite direction which shall be determined by NLDC from time to time based on RE variability and other system exigencies.

b) In case of congestion in any of the bid area/ control area / group of control areas, the allocation of available corridor margin among the power exchanges shall be in the ratio of initial unconstrained market clearing volume in the respective Power Exchange(s) submitted by the respective power exchanges for the particular time block in the congested corridors, as per Grid Code 2023.

Provided that within an integrated day ahead market, high price day ahead market transactions shall be curtailed first, followed by day ahead market transactions and then green day ahead market transactions.

c) For uncongested corridors, the margin shall be the requisition in MW plus residual quantum (in that particular uncongested corridor left over after the total requisition from all power exchanges in that time block) in proportion to the IDAM provisional volume for the respective exchanges.

d) The Power Exchange(s) shall ensure that the scheduling request for IDAM transaction is within the limits for each bid area/ control area / group of control areas and for each time block as intimated by NLDC through NOAR.

5.4. Allocation of Transmission Corridor and Scheduling of Exigency Bilateral Transactions

a) After the finalisation of the collective transactions under IDAM, Exigency applications for the grant of T-GNA shall be processed in accordance with clause (o) of Regulation 49(1) of the Grid Code, 2023 and Regulation 29.4 of the GNA Regulations.

b) The available margin for transactions under the exigency category shall be determined for each bid area /control area /group of control areas as:

Margin for Scheduling of Exigency Bilateral Transactions:

- ➢ Import T-GNA margin = import ATC – net scheduled (GNA + T-GNA)

- ➢ Export T-GNA margin = export ATC – net scheduled (GNA + T-GNA)

c) An application for a grant of exigency T-GNA/T-GNA$_{RE}$ for a bilateral transaction through NOAR may be submitted in accordance with clause (b) of Regulation 28.4 of the GNA Regulations. For each and every time block of a particular day, the requests shall initially be checked against the available inter-regional import/export transfer capability followed by intra-regional and bid area import/export transfer capability. This process shall be carried out for all the bid area (s) / control area / group of control areas.

d) Based on the above, nodal RLDC shall therefore approve / reject / partially approve the transactions as the case may be.

e) In the event T-GNA as applied for, cannot be granted for full quantum and full period as sought in the application, in view of constraints in the transmission system, the entire application shall be rejected.

Provided that, in case the applicant has given consent in its application through NOAR that T-GNA for part quantum or part period or both may be granted to it, T-GNA for such part quantum and part period or both shall be granted as per available transmission margin.

f) T-GNA granted under the exigency application category shall be considered as schedule, which cannot be revised, except in case of forced outage of a unit of a generating station or ESS, transmission constraint and in view of grid security.

g) RLDC shall update the availability of balance transmission corridors, if any, for utilization by GNA grantees by way of revision of schedule, under any contract within its GNA or for exigency applications or in real time market on first cum first serve basis, in accordance with clause (p) of Regulation 49(1) of the Grid Code, 2023.

5.5. Allocation of Transmission Corridor and Scheduling of Real Time Collective Transaction

a) All the entities participating in the real-time market (RTM) may place their bids and offers on the Power Exchange(s) in accordance with clause (q) of Regulation 49.1 of the Grid Code 2023.

b) NLDC shall finalize schedules under RTM in accordance with clause (r) of Regulation 49.1 of the Grid Code 2023.

c) The available margin for real time market collective category of transactions shall be determined for each bid area /control area /group of control areas as:

For real time market collective category of transactions:

- Import RTM margin = import ATC – net scheduled import (GNA + T-GNA)
- Export RTM margin = export ATC – net scheduled export (GNA + T-GNA)

d) In case the combined trade volume submitted by the power exchange(s) exceeds the available transmission margin limit for any of the bid area/ control area / group of control areas, the allocation of available corridor margin for a particular time block among the power exchanges shall be in the ratio of initial unconstrained market clearing volume in

the respective Power Exchange(s) submitted by the respective power exchanges for the particular time block in the congested corridors, as per Grid Code 2023

5.6. Scheduling of Cross Border transactions

Scheduling of cross border GNA and T-GNA transactions shall be done in accordance with the Procedure for approval and facilitating Import/Export (Cross Border) of Electricity) by the Designated Authority (DA), Cross Border Trade of Electricity Regulations, 2019 and amendments thereof and Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State transmission System) Regulations, 2022 and amendments thereof.

5.7 Revision of Schedules under GNA and T-GNA in Case of Real time congestion

a) When to maintain the grid security in the opinion of NLDC/RLDC/SLDC because of interstate/intrastate transmission constraints other than outage of dedicated transmission lines owned and operated by the generating station itself, it becomes necessary to curtail the power flow on a transmission corridor, the transactions already scheduled shall be curtailed in accordance with provisions of Grid Code 2023 and in the manner which in the opinion of NLDC/RLDC/SLDC as the case may be, would relieve transmission constraints and/ or enhance grid security.

b) NLDC/RLDC/SLDC shall initiate the process of curtailment of transactions for all such bid area/ control area/ group of control areas and the same shall become effective from the 7th or 8th time block for any revision in schedule made in odd or even time blocks respectively, counting the time block in which the schedule revision made by the RLDC as the first-time block.

c) The actual generation of sellers shall be treated as scheduled generation from the 1st till the 6th or 7th time block as the case may be. The schedule of buyers will be revised, in proportion, based on the actual generation of the seller.

Provided that the transmission charges for the quantum not scheduled or curtailed shall be refunded to the T-GNA grantee.

d) When because of transmission constraints in the neighbouring countries, it becomes necessary to curtail power flow on a bid area/ control area/ block of control areas/ transmission corridor, the concerned NLDC of the country shall intimate the transactions to be curtailed to NLDC, India. Subsequently, curtailment shall become effective from the 7th or 8th time block for any revision in the schedule made in odd or even time blocks respectively, counting the time block in which the schedule revision made by the NLDC/RLDC as the first-time block.

e) The transactions already scheduled may be curtailed by the Regional Load Despatch Centre as per Regulation 49 (3) of Grid Code 2023.

i. Provided that within an integrated day ahead market, high price day ahead market transactions shall be curtailed first followed by day ahead market transactions and then green day ahead market transactions.

f) The priority of restoration of transactions shall be in the reverse order of that of curtailment as specified in points (e) above.

6. Revision of Procedure

As and when required, the procedure shall be reviewed and revised by NLDC with the approval of the Commission.

Appendix-I

Procedure for Assessment of Transfer Capability

1. Background

1.1. Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations 2022(hereinafter 'GNA Regulations'), provides at Regulation 28.1 that T-GNA may be applied for any period from 1 (one) time block and up to 11 (eleven) months. Regulation 29.1 provides that T-GNA shall be granted within the Available Transfer Capability (ATC) on the ISTS after accounting for the GNA of the GNA grantees.

1.2. As per Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 (hereinafter 'Grid Code 2023) provides at Regulation 33 (5) that RLDC shall assess intra-regional and inter-state level TTC and ATC and submit them to NLDC. Further NLDC shall declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, and cross border interconnections 11 (Eleven) months in advance for each month on a rolling basis. The study inputs from SLDCs would serve as the foundation for the assessment of transfer capabilities at the interstate, intra-regional levels, interregional and cross-border levels.

1.1. Regulation 33 (3)(a) of the Grid Code 2023 provides that SLDCs shall assess and declare the Total import/export Transfer Capability (TTC) and Available Transfer Capability (ATC) of the state. Further Grid Code 2023 at Regulation 44(1)(e)(iii), 44(2)(e), 44(3)(f) provides that SLDCs, RLDCs and NLDC shall assess TTC/ATC at least three months in advance for their respective control areas.

1.2. A harmonious reading of all the provisions in GNA regulations and Grid Code 2023 indicates that transfer capability by SLDCs, RLDCs and NLDC shall be assessed and declared 11 (Eleven) months in advance for each month on a rolling basis.

1.3. The procedure lays down the guidelines for the assessment of TTC and ATC for the import or export of different states/union territories, intra-regional/inter-state level, inter-regional system & cross- border interconnections.

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:

3.1. ‘Available Transfer Capability (ATC)’ means available power transfer capability across control areas or across regions or between ISTS and state network or between cross-border interconnections declared by the concerned load despatch centre for scheduling transactions in a specific direction with due consideration for the network security. Mathematically, ATC is the Total Transfer Capability Less Transmission Reliability Margin. [Grid Code 2023, Regulation 3(1) (10)]

3.2. ‘Bid Area’ is defined as the largest geographical area within which market participants are able to
exchange energy without capacity allocation.

3.3. ‘Congestion’ means a situation where the demand for transmission capacity or power flow on any transmission corridor exceeds its Available Transfer Capability [Grid Code 2023, Regulation 3(1) (32)]

3.4. ‘Control Area’ means an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas and contributes to the regulation of frequency. [Grid Code 2023, Regulation 3(1) (32)]

3.5. ‘Credible contingency’ means the likely to happen contingency, which would affect the Total Transfer Capability of the inter-control area transmission system [CERC Measures to relieve congestion in real time operation Regulations, 2009 – Definition: 2(1)(f)]

3.6. ‘Interconnection Study’ means a joint system study to be carried out by LDCs for assessment of the impact of energization of new elements in the grid six months in advance as per Regulation 10
(3) of Grid Code 2023 .

3.7. ‘Limiting Constraint’ is the limitation on one or more transmission elements that may be reached during normal operation or contingency beyond which the security criteria would be violated.

3.8. ‘Prolonged outage’ means planned or forced shutdown of a transmission element or generator for
more than 7 days.

3.9. ‘System constraint’ is a situation in which there is a need to prepare and activate a remedial action in order to respect operational security limits. [Grid Code 2023, Regulation 3(1) (121)]

3.10. 'Swing bus' means the bus designated in the load-flow study to balance the active power (P) and reactive power (Q) of the system by absorbing/supplying the same.

3.11. "Total Transfer Capability (TTC)" means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of the occurrence of the worst credible contingency. [Grid Code 2023, Regulation 3(1) (128)]. The characteristics of Total Transfer Capability are as follows:

a) TTC is dependent upon the network topology, point and quantum of injection /drawl and power flows in other paths of the interconnected network as well as the prevailing voltage profile in the network during the assessment period.
b) TTC is directional in nature and the transfer capability for the import of power in a region or control area from another region or control area may be different from the transfer capability for the export of power from that region or control area to the other region or control area.
c) Total Transfer Capability is time variant and there could be different figures for different times of the day/month/season/year.
d) Transfer Capability is mentioned in MW.

3.12. "Transmission Reliability Margin (TRM)" means the amount of margin earmarked in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions. [Grid Code 2023, Regulation 3(1) (130)]

3.13. 'Unit commitment' means committing generating units while respecting unit operating characteristics as specified in Grid Code 2023 or standards issued by CEA

Any words mentioned in this procedure and not explicitly defined shall have the meaning assigned to them under the Act or other regulations specified by the Central Commission, or Central Electricity Authority as the case may be.

4. Roles and responsibility and Timeline for Data sharing & TTC/ATC calculation:

4.1. For calculation of the T-GNA margin eleven months in advance, declaration of TTC needs to be done keeping a clear gap of eleven months. Hence TTC assessment and declaration for month 'M' month shall be done before the end of month 'M-12'.

4.2. NLDC shall declare the time of the day corresponding to cardinal points of the

anticipated aggregate All India demand for any particular month, “M” (for which the transfer capability is to be assessed). The time of the day shall be declared by NLDC by the 3rd day of month “M-12”. These time instants shall be used for simulation base case preparation and subsequent transfer capability assessment & inter-connection studies.

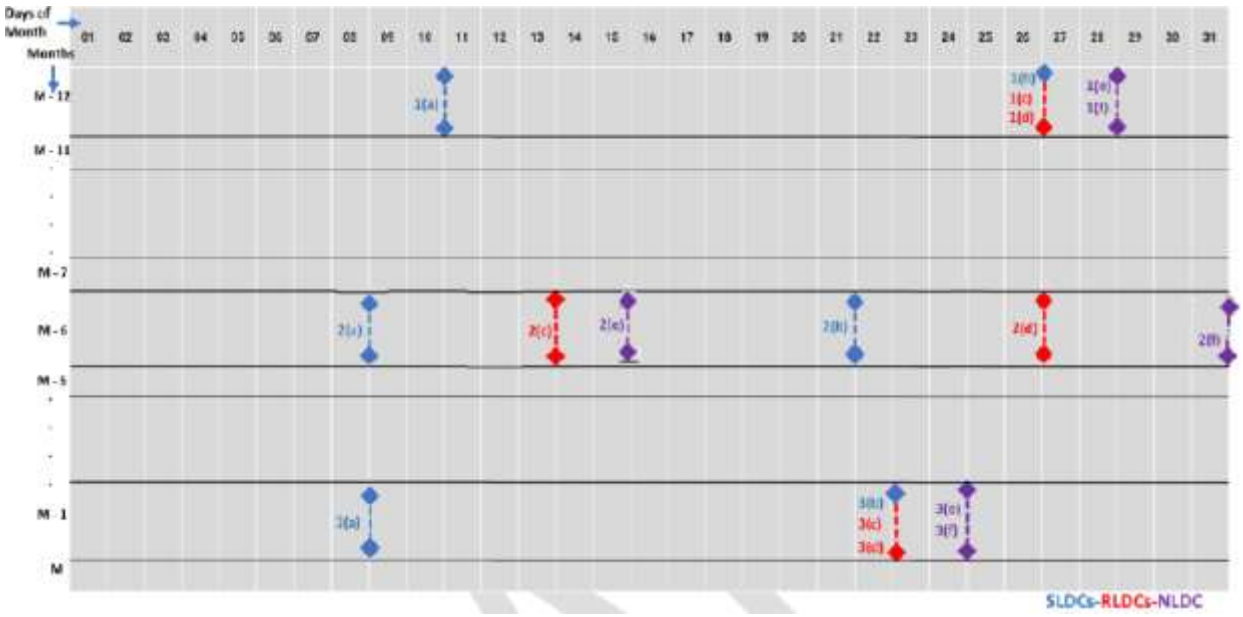
4.3. Detailed roles and responsibilities for Load Dispatch Centers in various timelines are provided in the table below.

Purpose	Sl No	Action of Stakeholder	Responsibility	Submission to	Data/Information Submission Time line
1. Revision 0 TTC/ATC Declaration for Month ‘M’	1(a)	Submission of node wise Load and generation data along with envisaged scenarios for assessment of transfer capability	SLDC	RLDC	10th Day of ‘M-12’ month
		Assessment of TTC/ATC of the import/export capability of the state and intra-state system andsharing of updated network simulation models			
	1(b)	Declaration of TTC/ATC of the intra-state system by SLDC in consultation with RLDC			26th Day of ‘M-12’ month
	1 (c)	Updating state and regional load & generation & modelling of inter-state & intra-state elements in the regional system base case	RLDCs	NLDC	26th Day of ‘M-12’ month
	1 (d)	Assessment and declaration of TTC/ATC by RLDC for the intra-regional and interstate system & sharing of network simulation models			
	1 (e)	Update the All-India network model with inputs from RLDCs/SNA	NLDC	RLDCs	28th Day of ‘M-12’ month
	1(f)	Assessment and declaration ofinter-regional, bid area and cross-border TTC/ATC on the website			

Purpose	Sl No	Action of Stakeholder	Responsibility	Submission to	Data/Information Submission Time line
2. Interconnection Studies for elements to be integrated in the month 'M'	2(a)	Submission of node-wise load and generation data & sharing of network simulation models for intra-state elements coming in the next six months	SLDC	RLDC	8th Day of 'M-6' month
	2(b)	Sharing of inter-connection study results			21st Day of 'M-6' month
	2(c)	Updating state and regional load & generation & modelling of inter-state & intra-state elements coming in the next six months in the regional system base case	RLDCs	NLDC	13th Day of 'M-6' month
	2(d)	Sharing of inter-connection study results			26th Day of 'M-6' month
	2(e)	Update the All-India network model for interconnection studies	NLDC	RLDCs	15th Day of 'M-6' month
	2(f)	Completion of inter-connection study for elements coming in the next six months			Last Day of 'M-6' month
3. Month Ahead TTC/ATC Declaration & Base case for Operational Studies for Month 'M'	3(a)	Submission of node wise Load and generation data along with envisaged scenarios for assessment of transfer capability Assessment of TTC/ATC of the intra-state system and sharing of updated network simulation models	SLDC	RLDC	8th Day of 'M-1' month
	3(b)	Declaration of TTC/ATC of the intra-state system in consultation with RLDC	SLDC	RLDC	22nd Day of 'M-1' month
	3(c)	Updating state and regional load & generation and modelling of inter-state & intra-state elements in the regional system base case	RLDCs	NLDC	22nd Day of 'M-1' month
	3(d)	Assessment and declaration of TTC/ATC for the intra-regional and interstate system & sharing of network simulation models			

	3(e)	Update the All-India network model with inputs from RLDCs/SNA	NLDC	RLDCs	24th Day of 'M-1' month
	3(f)	Assessment and declaration ofinter-regional and cross-border TTC/ATC on the website			

4.4. Timelines for data collection, Base Case Preparation, declaration of TTC/ATC and its review for a typical month 'M' is depicted below. The serial numbers marked for each month in the figure below correspond to the those given against responsibilities of Table in clause 4.2 of this procedure.



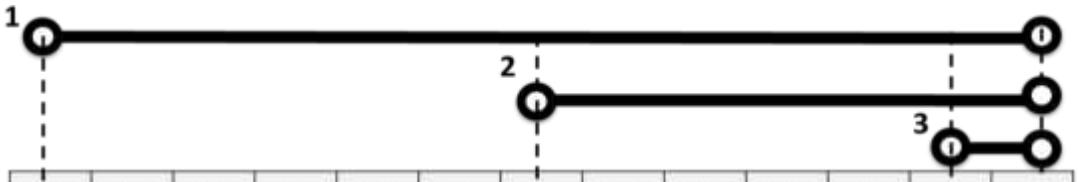
4.5. Every month, three sets of different base cases shall be prepared by all the concerned LDCs.

a) Base cases for Revision - 0 TTC/ATC Declaration

b) Base cases for Interconnection Studies for new elements to be integrated.

c) Base cases for Month Ahead TTC/ATC Declaration & Operational Studies

The limiting cases used for the assessment of Transfer Capability shall also be shared along with the base cases. The yearly timeline for base case sharing for TTC/Inter-connection study is given below:



Preparation of 3 Sets of Simulation Base-Cases

1. Base cases to be prepared in **Jan 2024** for Revision – 0 TTC/ATC Declaration for **Jan 2025**
(For TTC Declaration)
2. Base cases to be prepared in **July 2024** for 6 Month Ahead Interconnection Studies for elements to be integrated in **January 2025**
(For Interconnection Studies)
3. Base cases to be prepared in **December 2024** for 1 Month Ahead TTC/ATC Declaration & Operational Studies for **January 2025**
(For TTC Declaration and Operational Planning Studies)

5. Methodology for assessment of TTC, TRM and ATC

5.1. The Total Transfer Capability (TTC), Available Transfer Capability (ATC) and Transmission Reliability Margin (TRM) for both import & export shall be computed for all the States/Union Territories (UT), Intra-regional/Inter-state level, Inter-regional system, Cross-border interconnections and bid areas. The bid area can also be a part of the Region/State/UT or any combination of the same. The bid area shall be separately defined from time to time as per operational/commercial requirements**.**

5.2. The TTC, ATC and TRM shall be assessed with the help of simulation studies such that all anticipated operating conditions in a particular month are covered. For this, the TTC computation studies may be carried out for at least following four time periods (i.e. considering the load-generation balance of four cardinal points on the monthly load curve or the sum of the absolute value of interregional/regional flow or both depending on the bid area in consideration for TTC assessment) of a typical day of the month.

a) Solar Peak

b) Non-Solar Peak

c) Non-Solar Off-peak

d) Morning Peak Demand

If required, further granular resolution i.e. hourly, sub-hourly (15 min.) may also be considered for TTC

assessment and declaration. This shall be in line with Grid Code 2023, Regulation 31(2)(d) under Operational planning.

5.3. Separate limiting cases for computing the export and import capability corresponding to preferably four load-generation scenarios (as specified in point 5.2 above) for the time frame for which transfer capability is to be assessed shall be used in the simulation studies. If additional study cases, apart from the ones prepared for 04 time periods are prepared, then the same shall also be shared by the concerned SLDC with concerned RLDCs and vice-versa.

5.4. **Modelling of Power System:** The TTC assessment simulation studies will require setting up of a power system model and obtaining a power flow solution. The construction of an accurate base case simulation model is of utmost importance for the accurate assessment of TTC. The modelling and input data guidelines to be followed for TTC assessment are as under:

5.4.1 EHV transmission network shall be normally modelled down to at least 110 kV level with exceptions for generating units connected at lower voltage levels.

5.4.2 Normally, all the conventional generating units greater than 50 MW and connected at 110 kV and above shall be modelled. Smaller generating units (particularly hydro) may be lumped for study purposes.

5.4.3 For Renewable Energy (solar, wind, solar-wind hybrid) and Battery Energy Storage plants, equivalent modelling shall be done at 33 kV or higher voltage level. Attempts shall be made to model individual plants in the simulation cases to the extent possible. However, in the case of very small plants, the capacity can be lumped together at the nearest 33 kV or higher voltage level bus.

5.4.4 Modelling data shall be shared by CTU, ISTS licensees, ISGS/IPPs, STUs/SLDCs and all other Users for carrying out interconnection studies. The models need to be submitted as per the formats prescribed in GRID-INDIA/NLDC's procedure for "*First Time Charging/Energization (FTC) and Integration of New or Modified Power System Element*".

5.4.5 New transmission elements shall be considered only after the date of commissioning of that asset and duly considering their reliability during the initial operation period.

5.4.6 Whenever a new element is commissioned, depending on the jurisdiction of SLDC/RLDC/NLDC, the concerned LDC may add it to the network and a file for the same may be created and maintained. The automation file (such as Python scripts) will be shared with all other concerned LDCs.

5.4.7 The equipment ratings and models submitted by the users at the time of first-time charging/inter-connection study (or revised models submitted later) shall be considered in the assessment of transfer capability. In case any clarification is required regarding the model/rating of any equipment during transfer capability studies, the same shall be sought from the asset owner/user. The ratings of equipment will also be reviewed based on operational permissible loading and dynamic rating of the equipment from time to time.

5.4.8 Load shall be generally lumped at 110/132 kV, as the case may be. Actual system data wherever available shall be used for power system modelling. In cases, where data is not available, standard data as given in the CEA Manual on Transmission Planning Criteria shall be considered. The different components of load as constant power, constant current and constant impedance should be modelled as per the information available from users. In the absence of the above information load should be modelled as constant power load.

5.5 Load Set – Point

5.5.1 For the 1st time to build the All-India Base case in this format SLDC/RLDC may submit node-wise data as per *format-2* given at the end of this procedure. For the subsequent base-case preparation and simulation studies, the data shall be provided in the base-case itself or as per requirement.

5.5.2 Nodal MW demand shall be considered as per the node-wise load forecast provided by SLDCs. Independent load forecasts by RLDCs/NLDC shall be considered in case of the absence of SLDC data. For all four scenarios as mentioned above, node-wise demand must be updated. For overall demandestimation, LGBR finalized by RPC and the latest EPS data may be taken into consideration.

5.5.3 Nodal MVAR demand shall be as per the anticipated power factor provided by SLDCs or power factors as observed from the historical data for each node. This, however, shall be verified, post facto, with actual data, and if different, shall be revised for accurate assessment in the future. For all the four scenarios mentioned above node-wise reactive power demand must be updated.

5.5.4 Bulk consumer connected to ISTS/ having dual connectivity shall explicitly submit their net active and reactive power consumption/injection for all four scenarios to the respective RLDC.

5.6 Network Topology to be Considered for Base Case Preparation:

5.6.1 Outage plan for grid elements as finalized by RPC shall be considered during base case preparation for assessment of Transfer Capability. In case the same is not available, information available from respective utilities shall be considered.

5.6.2 Updated network topology shall be prepared by SLDCs/RLDCs/NLDC as per prevailing network configuration. If the updated network topology is not received from respective agencies, network details as available previously shall be used for TTC computation studies.

5.6.3 The transmission elements/generators under prolonged outage shall be considered in the simulation cases for assessment of Transfer Capability based on their expected date of revival in consultation with the concerned asset owner/utility.

5.7 Unit Commitment and Active Power Generation Dispatch:

5.7.1 The unit commitment (on-bar units) and source-wise dispatch in the base case shall be considered as per the output of Short-Term Resource Adequacy/Production Cost Modelling Studies carried out by states/ RLDCs/NLDC. In the absence of such information, LGBR and the annual generation outage plan published by RPCs in line with Grid Code 2023, Regulation 32(3)(b) may be considered along with the following source-wise dispatch methodology.

a) **Nuclear dispatch** shall be considered as per the past trend of Plant Load Factor available with Central Electricity Authority (CEA) or SLDCs/RLDCs/NLDC while suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs).

b) **Solar and wind dispatch** shall be considered based on the historical dispatch factors available with SLDCs/RLDCs/NLDC corresponding to each study scenario. For newer plants, either the profile data available as specified in CEA's Manual on Transmission Planning Criteria or the historical dispatch of nearby existing plants may be considered.

c) **Hydro dispatch** shall be considered as per the past trend available at SLDCs/ RLDCs/NLDC. The current inflow pattern shall also be suitably considered in the studies.

d) **Gas Dispatch** shall be considered as per the past trend of Plant Load Factor available with Central Electricity Authority (CEA) or SLDCs/RLDCs/NLDC while suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs).

e) **Coal-fired thermal dispatch for** the state/regional/control area/bid area may be arrived at after deducting the anticipated generation of other sources from the total anticipated generation requirement. While deciding the distribution of thermal generation, the merit order dispatch of thermal generators shall be considered.

Further, the generation shall be considered as per the anticipated ex-bus generation of the thermal generating units arrived after deducting a normative auxiliary consumption as per the norms specified by the Central Commission and suitably factoring in the maintenance schedule finalized by Regional Power Committees (RPCs). Distribution of thermal dispatch between state sector generators and ISGS shall be decided in consultation with states/past trends over and above merit order dispatch.

f) Injection/Drawl value of cross-border connection will be set as per historical pattern. Apart from the historic pattern, data received from SNA/DA for additional contracts for all four scenarios shall also be considered.

g) In case, the data from any of the sources mentioned above is unavailable or in case of additional data requirement, reasonable assumptions shall be made.

5.8 **Reactive power dispatch**:

5.8.1 For generating units, reactive power dispatch shall be considered as per the declared generator capability curve or demonstrated generator capability curve from the historical data. In the absence of such data, assumptions recommended in the extant CEA's Manual on Transmission Planning Criteria may be taken. The MVAR absorption of the Generator transformer (GT) shall be considered for implicitly modelled GTs.

5.8.2 The reactive power reserves of FACTS devices in the base case under steady-state shall be preserved to the extent possible so as to provide maximum dynamic support.

5.8.3 In the case of LCC HVDC links, the switching of HVDC Filter banks shall be done in the base case as per the filter switching sequence of the converter station depending on the HVDC power order.

5.9 For arriving at the Total Transfer Capability value of a control area/bid area, load and generation shall be changed for both importing and exporting areas in the base cases (incremental dispatch) as per the following methodology.

5.9.1 **Import Transfer Capability**: While calculating the import transfer capability of a control/bid area, the load of the control/bid-area shall be kept considering the peak demand scenario. Then the load of the importing area(s) may be increased and/or generation of the importing area(s) may be backed down as per reverse merit order for conventional generators & commensurate generation outside the area shall be increased. This process shall be continued till a credible N-1 contingency causes some limiting constraint in the importing/exporting area or joining both areas.

5.9.2 **Export Transfer Capability:** While calculating the export transfer capability of a control/bid area, the load of the control/bid-area shall be kept considering the off-peak demand scenario. Then the load of the exporting area may be decreased or generation of the exporting area(s) may be increased as per merit order and a commensurate decrease in generation will be done outside the area. This process shall be continued till a credible N-1 contingency causes some limiting constraint in the importing/exporting area or joining both areas.

5.10 Following points shall be considered while assessing the import & export transfer capability

5.10.1 Reserve requirements/technical minimum should be honored during scaling up/down of generation

5.10.2 The dispatch of swing bus generators in the load flow solution results shall be within their technical maximum/minimum limits.

5.10.3 The swing bus in the load flow studies shall be located outside the importing/exporting area in the transfer capability assessment.

5.11 The credible N-1 contingencies considered in the TTC/ATC studies shall be as specified in the latest CEA Manual on Transmission Planning Criteria.

5.12 In the studies, the worst credible contingency shall be considered to ensure the following limits:

a) Equipment Loading (Thermal or any other operational Limit)

b) Voltage Stability

c) Transient Stability

5.13 During the assessment of Total Transfer Capability, it shall be ensured that the Reliability Criteria specified for N-1 and N-1-1 contingencies in the latest CEA Manual on Transmission Planning Criteria are satisfied.

5.14 Power Order and direction of the HVDC links shall be based on the envisaged scenarios and capability of the HVDC link. The same may also be modulated in the base-case for the particular scenario based on the power flow in AC lines/ICTs & bus voltages.

5.15 The Transmission Reliability Margin (TRM) shall be kept within the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in the system conditions. Computation of TRM for a region, control area or group of control areas may be based on the consideration of the following:

5.15.1 Size of largest generating unit in the importing control or bid area/group of control or bid areas

5.15.2 Two per cent (2%) of the total anticipated peak demand met in MW of the control/bid area/group of control or bid areas (to account for forecasting uncertainties).

Provided that either of the above TRM values may be decided by the concerned LDC to ensure the reliability of the system under prevailing system conditions.

5.16 For base case preparation and simulation studies for transfer capability assessment of intra-state system, the realistic set points for HVDC and any other ISTS points may be varied by respective NLDC/RLDCs/SLDC after mutual consultation.

6. Declaration of TTC, TRM, ATC and Anticipated Constraints

6.1. The State Load Despatch Centres (SLDCs), in consultation with Regional Load Despatch Centres (RLDCs) shall assess & declare the Transfer Capability for the import or export of electricity by the State.

6.2. The Regional Load Despatch Centres (RLDCs), in consultation with State Load Despatch Centres

(SLDCs) & National Load Despatch Centre (NLDC) shall assess & declare the Transfer Capability for intra-regional and inter-state level.

6.3. The National Load Despatch Centre (NLDC) shall assess & declare the Transfer Capability for inter-regional systems and cross-border interconnections.

6.4. SLDCs/RLDCs/NLDC shall declare the assessed Transfer Capability for both export and import scenarios on their website with the following information

a) Total Transfer Capability (TTC)
b) Available Transfer Capability (ATC),
c) Transmission Reliability Margin (TRM),
d) Limiting constraints and limiting elements
e) Assumptions in the base case for assessment of Transfer Capability,
f) Details of the reason for the revision of the Transfer Capability

6.5. The National Load Despatch Centre (NLDC), Regional Load Despatch Centres (RLDCs) and State Load Despatch Centre (SLDCs) shall refer to the quantum declared by CTUIL while assessing the TTC, TRMand ATC for the purpose of grant of GNA.

Sample format for declaration of TTC/TRM/ATC is enclosed as **Format-I**.

6.6. NLDC and/or concerned RLDCs/SLDCs in consultation with each other may revise the TTC, ATC and TRM of respective areas due to changes in system conditions, which includes changes in network topology or changes in anticipated active or reactive generation or load, on account of outage or otherwise, of one or more generators or transmission elements, at any of the nodes in the study. Revised TTC, TRM and, ATC shall be published on the website of NLDC, concerned RLDCs and SLDCs and shall clearly state the reasons for revision thereof.

6.7. The TTC, ATC and TRM may also be revised near the operating horizon depending on the anticipated system conditions at that time.

6.8. SLDCs / RLDCs / and NLDC shall designate Main and Alternate officers as *"Reliability co-coordinator(s)for TTC Computation and Declaration".*

7. Study of the impact of new elements on TTC Transfer Capability

7.1. Each LDC shall study the impact of new elements on the Transfer Capability as per the relevant regulations of Grid Code 2023, (Operating Code: Regulation 33(9) to 33(13)) for interconnection study for new power system elements.

7.1.1. Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.

7.1.2. Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intrastate system on the inter-state system and share the results of the studies with NLDC.

7.1.3. NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intraregional system on the inter-regional system.

7.2. Timelines and methodology of the interconnection studies are to be followed as per “Procedure for Carrying Out Interconnection Studies of New Power System Elements” notified by NLDC.

7.3. Any major impact on TTC figure by the commissioning of a new element needs to be notified to the concerned utilities

Format-I

National /_____Regional/ State Load Dispatch CentreTOTAL TRANSFER CAPABILITY FOR MMM, YYYY_____

Issue Date: Issue Time: Revision No.

Corridor/ Control Area	Date	Time Period	Time Blocks	Total Transfer Capability (TTC) (MW)	Reliability Margin (RM) (MW)	Available Transfer Capability (ATC) (MW)	Approved GNA (MW)	Margin for T- GNA (MW)	Changes in TTC w.r.t last revision	Remarks
		Period-1								
		Period-2								
		Period-3								
		Period-4								

Assumptions:

A. Aggregate Load and Generation (MW)

Region/State/Bid-Area		Scenarios			
		Period 1	Period 2	Period 3	Period 4
	Load				
	Generation				

B. HVDC Settings

Name of the HVDC Link	Direction of Operation	Power Order (MW)

C. Constraints

Corridor / Control Area	Limiting Constraints for TTC

D. Revision History

Revision Number	Date of Revision	Reason for Revision	Corridors Involved

E. Miscellaneous

Format-II (Node Wise Load Details)

Bus Number	Bus Name	S/s name	In Service	Morning Peak		Solar Peak		Evening Peak		Off-Peak	
				Pload (MW)	Qload (Mvar)	Pload (MW)	Qload (Mvar)	Pload (MW)	Qload (Mvar)	Pload (MW)	Qload (Mvar)

Note: The formats are not exhaustive and may be changed suitably based on the requirement.

Transmission Element Outage Report from 01-07-2022 to 03-10-2023

Annexure-I

S.No	Element Name	Type	Voltage Level	Owner	Daily / Continuous	Outage		Revival		Expected Date of Revival	Delay in Revival	Reason / Remarks
2	220 KV BADARPUR(NT)-ALWAR MIA(RS) (RS) CKT-1	Line	220KV	RRVPNL	C	05-07-2022	13:54	15-07-2022	19:05	14-07-2022	1	Tower erection & stringing work of 220 KV S/C MIA-BTPS line for NHAI line Shifting/Height raising work.
5	400 KV SURATGARH(RVUN)-BIKANER(RS) (RS) CKT-1	Line	400KV	RRVPNL	C	01-08-2022	10:32	24-08-2022	18:20	16-08-2022	8	Shutdown for Shifting and repairing of work of 400 kV S/C Bikaner-STPS Line. (Under deposit work of NHAI Supervison by RVPNL) by Kay CEE Energy & Infra Private Limited. (Request Letter enclosed with the mail)
11	765 KV ANTA-PHAGI (RS) CKT-1	Line	765KV	RRVPNL	C	30-10-2022	11:50	30-11-2022	18:06	11/20/2022	10	To complete shifing,erection and stringing work of new towers of 765 KV S/C Anta-phagi line CKT 1 of deposit work of NHAI for construction of Eight lane access controlled expressway
20	220 KV RANPUR(RS)-BHANPURA(MP) (RS) CKT-1	Line	220KV	RRVPNL	C	29-03-2023	15:18	25-04-2023	17:49	05-04-2023	20	Shutdown by WR. For line modification, tower erection and tower shifting work at loc no 505 to 509 due to construction of 8 lane road under bharatmala project.
21	400 KV BIKANER(RS)-DEEDWANA(MTS) (RS) CKT-1	Line	400KV	RRVPNL	C	06-07-2023	16:28	09-07-2023	22:58	08-07-2023	1	For Shifting of tower no. 31 & 32 to facilitate construction of National Highway Amritsar-Jamnagar T/L under Bharatmala project of PIU - Hanumangarh
23	400 KV BIKANER-MERTA (RS) CKT-1	Line	400KV	RRVPNL	C	24-08-2023	17:15	18-09-2023	19:07	9/7/2023	11	For Height Raising of Tower between Loc. No 36 to 40 For Bharatmala project for NHAI
26	400 KV AKAL-KANKANI	Line	400KV	RRVPNL	C	9/21/2023	16:25	-		9/30/2023	Yet to revive	For Shifting / raising work of Line (BHARAT MALA PROJECT).Not yet revivved and delaying the shutdown of other planned shutdowns.
27	400 KV JAISALMER-KANKANI	Line	400KV	RRVPNL	C	9/21/2023	16:28	-		9/30/2023	Yet to revive	For Shifting / raising work of Line (BHARAT MALA PROJECT).Not yet revivved and delaying the shutdown of other planned shutdowns.

TERMINAL EQUIPMENT DETAILS FOR LINES PART OF IMPORTANT GRID ELEMENTS

S. No.	Owner	Name of the Transmission Line	Length in Ckt KM	Voltage Level in kV	Type of Conductor	Configuration	Temp Deg C	One End (Current Rating)	One and half Breaker scheme			Remote End (Current Rating)	One and half Breaker scheme		
									Line Bay Equipments	Main bay equipments	Tie bay equipments		Line Bay Equipments	Main bay equipments	Tie bay equipments
1	NR-I/ NR-3	Sikar-Agra-1	386	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150	Isolators	3150	3150	3150
								CT		3000	3000	CT		3000	3000
								Breakers		3150	3150	Breakers		3150	3150
								Wave Traps	3150	-	-	Wave Traps	3150	-	-
2	NR-I/ NR-3	Sikar-Agra-2	386	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150	Isolators	3150	3150	3150
								CT		3000	3000	CT		3000	3000
								Breakers		3150	3150	Breakers		3150	3150
								Wave Traps	3150	-	-	Wave Traps	3150	-	-

Annexure-B.IV

TERMINAL EQUIPMENT DETAILS FOR HIGH CAPACITY 400kV LINES

S. No.		Name of the Transmission Line	Length in Ckt KM	Voltage Level in kV	Type of Conductor	Configuration	Temp Deg C	One End (Current Rating)	One and half Breaker scheme			DMT Scheme	Double main Scheme	Remote End (Current Rating)	One and half Breaker scheme			DMT Scheme	Double main Scheme
									Line Bay Equipments	Main bay equipments	Tie bay equipments	All equipments	All equipments		Line Bay Equipments	Main bay equipments	Tie bay equipments	All equipments	All equipments
1	NR-I	B'Garh-Navada (Upto LILO point)	12.55	400	Bersimis	Quad	75	Isolators	3150	3150	2000			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
2	NR-I	Dadri-M. Bagh	54.36	400	Bersimis	Quad	75	Isolators						Isolators					4000
								CT						CT					3000
								Breakers						Breakers					4000
								Wave Traps						Wave Traps					3150
3	NR-I	Ballabhgarh-M. Bagh	60.68	400	Bersimis	Quad	75	Isolators	2000	2000	2000			Isolators					4000
								CT		2000	2000			CT					3000
								Breakers		3150	3150			Breakers					4000
								Wave Traps	3150	-	-			Wave Traps					3150
4	NR-I	Mandola-Dadri-1	46.3	400	Bersimis	Quad	75	Isolators	3150	2000	2000			Isolators					
								CT		2000	2000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	2000					Wave Traps					
5	NR-I	Mandola-Dadri-2	46.3	400	Bersimis	Quad	75	Isolators	3150	2000	2000			Isolators					
								CT		2000	2000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	2000					Wave Traps					
6	NR-III	Lucknow(Old)-Lucknow(New)-I	2.862	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150A	3150A	3150A		
								Current Transformers	NA	3000	3000			Current Transformers	NA	3000A	3000A		
								Breakers		3150	3150			Breakers	NA	3150A	3150A		
								Wave Traps	3150	NA	NA			Wave Traps	3150A	NA	NA		
7	NR-III	Lucknow(Old)-Lucknow(New)-II	2.862	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150A	3150A	3150A		
								Current Transformers	NA	3000	3000			Current Transformers	NA	3000A	3000A		
								Breakers		3150	3150			Breakers	NA	3150A	3150A		
								Wave Traps	3150	NA	NA			Wave Traps	3150A	NA	NA		
8	NR-I	Gurgaon-Manesar-1	16.9	400	ACSR Moose	Quad	85	Isolators					3150	Isolators					3150
								CT					3000	CT					3000
								Breakers					3150	Breakers					3150
								Wave Traps					3150	Wave Traps					3150
9	NR-I	Gurgaon-Manesar-2	16.9	400	ACSR Moose	Quad	85	Isolators					3150	Isolators					3150
								CT					3000	CT					3000
								Breakers					3150	Breakers					3150
								Wave Traps					3150	Wave Traps					3150
10	NR-I	Jhatikara-Bamnauli-1	6.106	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
11	NR-I	Jhatikara-Bamnauli-2	6.106	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
12	NR-I	Jhatikara-Mundka-1	6.782	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
13	NR-I	Jhatikara-Mundka-2	6.782	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
14	NR-I/ NR-3	Sikar-Agra-1	386	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150	-	-			Wave Traps	3150	-	-		
15	NR-I/ NR-3	Sikar-Agra-2	386	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150	-	-			Wave Traps	3150	-	-		
16	NR-I	Bassi-Jaipur(RVPNL) I	47.3	400	ACSR Moose	Quad	85	Isolators	3150	3000	3150			Isolators					
								CT		3150	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150					Wave Traps					
17	NR-I	Bassi-Jaipur(RVPNL) I	47.3	400	ACSR Moose	Quad	85	Isolators	3150	3000	3150			Isolators					
								CT		3150	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150					Wave Traps					

18	NR-3	Bareilly (New) - Bareilly (Old) I	1.7	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	NA	3000A	3000A			CT	NA	3000A	3000A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3150A	NA	NA			Wave Traps	3150A	NA	NA		
19	NR-3	Bareilly (New) - Bareilly (Old) I	1.7	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	NA	3000A	3000A			CT	NA	3000A	3000A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3150A	NA	NA			Wave Traps	3150A	NA	NA		
20	NR-3/NR-I	Bareily Kashipur-I	101.23	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators					
								CT		3000 A	3000 A			CT					
								Breakers		3150 A	3150 A			Breakers					
								Wave Traps	3150 A					Wave Traps					
21	NR-3/NR-I	Bareily Kashipur-II	101.23	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators					
								CT		3000 A	3000 A			CT					
								Breakers		3150 A	3150 A			Breakers					
								Wave Traps	3150 A					Wave Traps					
22	NR-3/WR-II	Rihand III - Vindhyachal PS I	30.702	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT	NA	3000A	3000A		
								Breakers						Breakers	NA	3150A	3150A		
								Wave Traps						Wave Traps	3150A	NA	NA		
23	NR-3/WR-II	Rihand III - Vindhyachal PS II	31.159	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT	NA	3000A	3000A		
								Breakers						Breakers	NA	3150A	3150A		
								Wave Traps						Wave Traps	3150A	NA	NA		
24	NR-I	Roorkee-Kashipur-1	150.832	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
25	NR-I	Roorkee-Kashipur-2	150.832	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150	-	-			Wave Traps					
26	NR-I	Roorkee-Saharanpur-I	36.535	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150	-	-			Wave Traps	3150	-	-		
27	NR-I	Roorkee-Saharanpur-II	36.535	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150	-	-			Wave Traps	3150	-	-		
28	NR-3/ER-I	Varanasi-Sarnath I	107.577	400	ACSR Moose	Quad	85	Isolators	NA	3150A	3150A			Isolators	NA	3150A	3150A		
								CT	NA	3150A	3150A			CT	NA	3150A	3150A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3150A	NA	NA			Wave Traps	3150A	NA	NA		
29	NR-3/ER-I	Varanasi-Sarnath II	107.577	400	ACSR Moose	Quad	85	Isolators	NA	3150A	3150A			Isolators	NA	3150A	3150A		
								CT	NA	3150A	3150A			CT	NA	3150A	3150A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3150A	NA	NA			Wave Traps	3150A	NA	NA		
30	NR-3	Kanpur-Kanpur GIS I	21.233	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					3150
								CT	NA	3000A	3000A			CT					3000
								Breakers	NA	3150A	3150A			Breakers					3150
								Wave Traps	3150A	NA	NA			Wave Traps					3150
31	NR-3	Kanpur-Kanpur GIS II	21.233	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					3150
								CT	NA	3000A	3000A			CT					3000
								Breakers	NA	3150A	3150A			Breakers					3150
								Wave Traps	3150A	NA	NA			Wave Traps					3150
32	NR-1/NR-II	Abdullapur-Bawana-I	166.64	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	3150			Breakers					
								Wave Traps	2000	--	--			Wave Traps					
33	NR-II	Abdullapur - Depalpur (upto LILO point)	140.547	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	2000			Breakers					
								Wave Traps	2000	--	--			Wave Traps					
34	NR-1	Depalpur - Bawana (upto LILO point)	26.095	400	ACSR Snowbird	Tripple	75	Isolators	3000	3000	3000			Isolators					
								CT	N.A	3000	3000			CT					
								Breakers	N.A	3150	3150			Breakers					
								Wave Traps	0	--	--			Wave Traps					
35	NR-1	Hissar-Kaithal I	113.12	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		2000	3150			Breakers		2000	2000		
								Wave Traps	2000					Wave Traps	2000				
36	NR-1	Hissar-Kaithal I	113.12	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		2000	3150			Breakers		2000	2000		
								Wave Traps	2000					Wave Traps	2000				

37	NR-1/NR-II	Kaithal- Patiala I	126	400	ACSR Snowbird	Tripple	75	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	N.A	3000A	3000A			CT	N.A	3000A	3000A		
								Breakers	N.A	3150A	3150A			Breakers	N.A	3150A	3150A		
								Wave Traps	2000A	N.A	N.A			Wave Traps	2000A	N.A	N.A		
38	NR-1/NR-II	Kaithal- Patiala II	126	400	ACSR Snowbird	Tripple	75	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	N.A	3000A	3000A			CT	N.A	3000A	3000A		
								Breakers	N.A	3150A	3150A			Breakers	N.A	3150A	3150A		
								Wave Traps	2000A	N.A	N.A			Wave Traps	2000A	N.A	N.A		
39	NR-II	Nalagarh- Patiala I	93.78	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT	N.A	2000	2000			CT	N.A	2000	2000		
								Breakers	N.A	2000	2000			Breakers	3150A	3150A	3150A		
								Wave Traps	2000					Wave Traps	2000				
40	NR-II	Nalagarh- Patiala II	93.78	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT	N.A	2000	2000			CT	N.A	2000	2000		
								Breakers	N.A	2000	2000			Breakers	3150A	3150A	3150A		
								Wave Traps	2000	N.A	N.A			Wave Traps	2000	N.A	N.A		
41	NR-II	Nalagarh- Rampur I	126.481	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	2000			Breakers					
								Wave Traps	2000					Wave Traps					
42	NR-II	Nalagarh- Rampur II	126.481	400	ACSR Snowbird	Tripple	75	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	2000			Breakers					
								Wave Traps	2000					Wave Traps					
43	NR-I/NR-II	Bahadurgah- Sonepat I	53.4	400	ACSR Snowbird	Tripple	75	Isolators	3150A	3150A	3150A			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		3150A	3150A			Breakers		2000	2000		
								Wave Traps						Wave Traps	2000				
44	NR-I/NR-II	Bahadurgah- Sonepat II	53.4	400	ACSR Snowbird	Tripple	75	Isolators	3150A	3150A	3150A			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		3150A	3150A			Breakers		2000	2000		
								Wave Traps						Wave Traps	2000				
45	NR-I	Baghpat-Kaithal-2	153.672	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	N.A	3000A	3000A			CT	N.A	3000A	3000A		
								Breakers	N.A	3150A	3150A			Breakers	N.A	3150A	3150A		
								Wave Traps	3150A	N.A	N.A			Wave Traps	3150A	N.A	N.A		
46	NR-I	Baghpat-Kaithal-2	153.672	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	N.A	3000A	3000A			CT	N.A	3000A	3000A		
								Breakers	N.A	3150A	3150A			Breakers	N.A	3150A	3150A		
								Wave Traps	3150A	N.A	N.A			Wave Traps	3150A	N.A	N.A		
47	NR-I	Merrut-Baghpat-1	70.976	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150
								CT		3000	3000			CT					3000
								Breakers		3150	3150			Breakers					3150
								Wave Traps	3150	-	-			Wave Traps					3150
48	NR-I	Merrut-Baghpat-2	70.976	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150
								CT		3000	3000			CT					3000
								Breakers		3150	3150			Breakers					3150
								Wave Traps	3150	-	-			Wave Traps					3150
49	NR-II	Abdullapur-Kurukshetra- I	51.65	400	ACSR Snowbird	Tripple	85	Isolators	2000	3150	3150			Isolators	2000	3150	3150		
								CT	N.A	3000	3000			CT	N.A	3000	3000		
								Breakers	N.A	3150	3150			Breakers	N.A	3150	3150		
								Wave Traps	2000	N.A	N.A			Wave Traps	3150	N.A	N.A		
50	NR-II	Kurukshetra- Sonepat I	124.66	400	ACSR Snowbird	Tripple		Isolators	3150A	3150A	3150A			Isolators	2000	2000	2000		
								CT	NA	3000A	3000A			CT		2000	2000		
								Breakers	NA	3150A	3150A			Breakers		2000	2000		
								Wave Traps	3150A	NA	NA			Wave Traps	2000				
51	NR-II	Abdullapur-Kurukshetra- II	51.65	400	ACSR Snowbird	Tripple	85	Isolators	2000	3150	3150			Isolators	2000	3150	3150		
								CT	N.A	3000	3000			CT	N.A	3000	3000		
								Breakers	N.A	3150	3150			Breakers	N.A	3150	3150		
								Wave Traps	2000	N.A	N.A			Wave Traps	3150	N.A	N.A		
52	NR-II	Kurukshetra- Sonepat I	124.66	400	ACSR Snowbird	Tripple		Isolators	3150A	3150A	3150A			Isolators	2000	2000	2000		
								CT	NA	3000A	3000A			CT		2000	2000		
								Breakers	NA	3150A	3150A			Breakers		2000	2000		
								Wave Traps	3150A	NA	NA			Wave Traps	2000				
53	NR-II	Abdullapur-Panchkula- I	63	400	ACSR Snowbird	Tripple	85	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT	N.A	2000	2000			CT	N.A	2000	2000		
								Breakers	N.A	2000	2000			Breakers	N.A	2000	2000		
								Wave Traps	2000	N.A	N.A			Wave Traps	2000	N.A	N.A		
54	NR-II	Abdullapur-Panchkula- II	63	400	ACSR Snowbird	Tripple	85	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT	N.A	2000	2000			CT	N.A	2000	2000		
								Breakers	N.A	2000	2000			Breakers	N.A	2000	2000		
								Wave Traps	2000	N.A	N.A			Wave Traps	2000	N.A	N.A		
55	NR-II	Panchkula-Naptha Jhakri I	165	400	ACSR Snowbird	Tripple	85	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	2000			Breakers					
								Wave Traps	2000	N.A	N.A			Wave Traps					

56	NR-II	Panchkula-Naptha Jhakri II	165	400	ACSR Snowbird	Tripple	85	Isolators	2000	2000	2000			Isolators					
								CT	N.A	2000	2000			CT					
								Breakers	N.A	2000	2000			Breakers					
								Wave Traps	2000	2000	2000			Wave Traps					
57	NR-II	Nalagarh-Parbati PS	47.264	400	ACSR Moose	Quad	85	Isolators	3150	3150	2000			Isolators					3150
								CT	N.A	3000	2000			CT					3150
								Breakers		3150	2000			Breakers					3150
								Wave Traps	3150					Wave Traps					3150
58	NR-II	Nalagarh-Koldam II	46.381	400	ACSR Moose	Quad	85	Isolators	3150	3150	2000			Isolators					
								CT	N.A	3000	2000			CT					
								Breakers		3150	2000			Breakers					
								Wave Traps	3150					Wave Traps					
59	NR-II	Parbati III-Parbati PS(LILO portion)	3.184	400	ACSR Moose	Quad	85	Isolators						Isolators					3000 A
								CT						CT					420kV, 3000A
								Breakers						Breakers					420kV, 3150A
								Wave Traps						Wave Traps					400kV, 3150A
60	NR-II	Nalagarh-Parbati PS(LILO portion)	0.845	400	ACSR Moose	Quad	85	Isolators						Isolators					3000 A
								CT						CT					420kV, 3000A
								Breakers						Breakers					420kV, 3150A
								Wave Traps						Wave Traps					400kV, 3150A
61	NR-II	Parbati III-Parbati PS(LILO portion)	3.114	400	ACSR Moose	Quad	85	Isolators						Isolators					3000 A
								CT						CT					420kV, 3000A
								Breakers						Breakers					420kV, 3150A
								Wave Traps						Wave Traps					400kV, 3150A
62	NR-II	Parbati PS-Koldam I(LILO portion)	0.884	400	ACSR Moose	Quad	85	Isolators					3000 A	Isolators					
								CT					420kV, 3000A	CT					
								Breakers					420kV, 3150A	Breakers					
								Wave Traps					400kV, 3150A	Wave Traps					
63	NR-II	Parbati II-Parbati PS(LILO portion)	0.886	400	ACSR Moose	Quad	85	Isolators						Isolators					3000 A
								CT						CT					420kV, 3000A
								Breakers						Breakers					420kV, 3150A
								Wave Traps						Wave Traps					400kV, 3150A
64	NR-II	Parbati PS-Koldam II(LILO portion)	0.886	400	ACSR Moose	Quad	85	Isolators					3000 A	Isolators					
								CT					420kV, 3000A	CT					
								Breakers					420kV, 3150A	Breakers					
								Wave Traps					400kV, 3150A	Wave Traps					
65	NR-II	400kV Kurukshetra- Jalandhar	267	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	NA	3000A	3000A			CT	NA	3000A	3000A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3150A	NA	NA			Wave Traps	3150A	NA	NA		
66	NR-II	400kV Kurukshetra- Nakodar	234	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					
								CT	NA	3000A	3000A			CT					
								Breakers	NA	3150A	3150A			Breakers					
								Wave Traps	3150A	NA	NA			Wave Traps					
67	NR-II	400kV Jalandhar- Nakodar	42	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					
								CT	NA	3000A	3000A			CT					
								Breakers	NA	3150A	3150A			Breakers					
								Wave Traps	3150A	NA	NA			Wave Traps					
68	SR-I	Gooty - Raichur-I (PG)	128.7	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
69	SR-I	Raichur (PG) - Raichur-I	22.219	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		

70	SR-I	Gooty - Raichur-II (PG)	128.7	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
71	SR-I	Raichur (PG) - Raichur-II	22.219	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
72	SR-I	Nellore - Nellore PS I	3.65	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
73	SR-I	Nellore - Nellore PS II	3.65	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
74	SR-I	Nellore PS - SEPL	3.83	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
75	SR-I	Nellore PS - MEPL	3.85	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
76	SR-I	Neylore PS - Gooty I	289.004	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
77	SR-I	Neylore PS - Gooty Ii	289.004	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
78	SR-I	Neylore PS - TPCIL I	32.488	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
79	SR-I	Neylore PS - TPCIL II	32.73	400	ACSR Moose	Quad	85	Isolators	3000A	3000	3000			Isolators	3000A	3000	3000		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
80	SR-I	Kurnool - Nannoor (Kurnool) I	9.881	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
81	SR-I	Kurnool - Nannoor (Kurnool) II	9.881	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
82	SR-I	Nellore - Tiruvellum-I	172.964	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
83	SR-I	Nellore - Tiruvellum-II	172.964	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
84	SR-I	Nellore PS - NCC I	33.58	400	ACSR Moose	Quad		Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
85	SR-I	Nellore PS - NCC II	33.58	400	ACSR Moose	Quad		Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3000	3000			CT	NA	3000	3000		
								Breakers	NA	3150	3150			Breakers	NA	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
86	SR-II	Thirunelveli - Kudankulam I	72.489	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3150	3150			CT					
								Breakers	NA	3150	3150			Breakers					
								Wave Traps	3150	NA	NA			Wave Traps					
87	SR-II	Thirunelveli - Kudankulam II	72.489	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	NA	3150	3150			CT					
								Breakers	NA	3150	3150			Breakers					
								Wave Traps	3150	NA	NA			Wave Traps					
88	SR-II	Thirunelveli - Kudankulam III	79.534	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	NA	3150	3150			CT					
								Breakers	NA	3150	3150			Breakers					
								Wave Traps	3150	NA	NA			Wave Traps					

89	SR-II	Thirunelveli - Kudankulam IV	79.534	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators						
								CT	NA	3150	3150			CT						
								Breakers	NA	3150	3150			Breakers						
								Wave Traps	3150	NA	NA			Wave Traps						
90	SR-II	Tuticorin PS - Madurai I	94.924	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150			
								CT	NA	3150	3150			CT	NA	3150	3150			
								Breakers	NA	3150	3150			Breakers	NA	3150	3150			
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA			
91	SR-II	Coastal Energen - Tuticorin PS	36.003	400	ACSR Moose	Quad	85	Isolators						Isolators	3150	3150	3150			
								CT						CT	NA	3150	3150			
								Breakers						Breakers	NA	3150	3150			
								Wave Traps						Wave Traps	3150	NA	NA			
92	SR-II	Tuticorin TPS - Tuticorin PS	61.586	400	ACSR Moose	Quad	85	Isolators						Isolators	3150	3150	3150			
								CT						CT	NA	3150	3150			
								Breakers						Breakers	NA	3150	3150			
								Wave Traps						Wave Traps	3150	NA	NA			
93	SR-II	Tuticorin PS - Madurai II	94.924	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150			
								CT	NA	3150	3150			CT	NA	3150	3150			
								Breakers	NA	3150	3150			Breakers	NA	3150	3150			
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA			
94	SR-II	Kochi - Trichur I	78.197	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150			
								CT	NA	3150	3150			CT	NA	3150	3150			
								Breakers	NA	3150	3150			Breakers	NA	3150	3150			
								Wave Traps	4000	NA	NA			Wave Traps	3150	NA	NA			
95	SR-II	Kochi - Trichur II	78.197	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150			
								CT	NA	3150	3150			CT	NA	3150	3150			
								Breakers	NA	3150	3150			Breakers	NA	3150	3150			
								Wave Traps	4000	NA	NA			Wave Traps	3150	NA	NA			
96	SR-II	Tiruvelam - Chitoor I	21.022	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators						
								CT	NA	3150	3150			CT						
								Breakers	NA	3150	3150			Breakers						
								Wave Traps	3150	NA	NA			Wave Traps						
97	SR-II	Tiruvelam - Chitoor II	21.022	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators						
								CT	NA	3150	3150			CT						
								Breakers	NA	3150	3150			Breakers						
								Wave Traps	3150	NA	NA			Wave Traps	2000	NA	NA			
98	SR-I	Ramagundam - Malakaram (upto LILO point)	166.212	400	AAAC	Twin	75	Isolators						Isolators						
								CT						CT						
								Breakers						Breakers						
								Wave Traps						Wave Traps						
99	SR-I	Malakaram - Hyderabad-II (upto LILO point)	27.87	400	AAAC	Twin	75	Isolators						Isolators	2000	2000	2000			
								CT						CT		2000	2000			
								Breakers						Breakers		2000	2000			
								Wave Traps						Wave Traps	2000	2000	2000			
100	Odisha/SR-I	Jeypore - Gazuwaka-I	220	400	AAAC	Twin	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000			
								CT		2000	2000			CT		2000	2000			
								Breakers		2000	3150			Breakers		2000	2000			
								Wave Traps	2000					Wave Traps	2000					
101	Odisha/SR-I	Jeypore - Gazuwaka-II	220	400	AAAC	Twin	75	Isolators	2000	2000	2000			Isolators	2000	2000	2000			
								CT		2000	2000			CT		2000	2000			
								Breakers		2000	2000			Breakers		2000	2000			
								Wave Traps	2000					Wave Traps	2000					
102	SR-II	Kolar - Hoody-I	51.067	400	Bersimis	Quad	75	Isolators						Isolators				3150		
								CT						CT				3150		
								Breakers						Breakers				3150		
								Wave Traps						Wave Traps				3150		
103	SR-II	Kolar - Hoody-II	51.067	400	Bersimis	Quad	75	Isolators						Isolators				3150		
								CT						CT				3150		
								Breakers						Breakers				3150		
								Wave Traps						Wave Traps				3150		
104	SR-II	Kaiga - Narendra-I	107.662	400	AAAC	Twin	75	Isolators						Isolators	2000	2000	2000			
								CT						CT	NA	2000	2000			
								Breakers						Breakers	NA	2000	2000			
								Wave Traps						Wave Traps	2000	NA	NA			
105	SR-II	Kaiga - Narendra-II	107.662	400	AAAC	Twin	75	Isolators						Isolators	2000	2000	2000			
								CT						CT	NA	2000	2000			
								Breakers						Breakers	NA	2000	2000			
								Wave Traps						Wave Traps	2000	NA	NA			
106	SR-II	Narendra - Kudgi I	176.13	400	Zebra	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150	3150	3150			
								CT	NA	3000A	3000A			CT	NA	3150	3150			
								Breakers	NA	3000A	3000A			Breakers	NA	3150	3150			
								Wave Traps	3150A	NA	NA			Wave Traps	3150	NA	NA			
107	SR-II	Narendra - Kudgi II	176.13	400	Zebra	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150	3150	3150			
								CT	NA	3000A	3000A			CT	NA	3150	3150			
								Breakers	NA	3000A	3000A			Breakers	NA	3150	3150			
								Wave Traps	3150A	NA	NA			Wave Traps	3150	NA	NA			

108	WR-I	Aurangabad(PG) - Aurangabad I	52.563	400	ACSR Moose	Quad	85	Isolators	3000	3000	3000			Isolators				3000	
								CT	NA	3000	3000			CT				3000	
								Breakers	NA	3150	3150			Breakers				3150	
								Wave Traps	3150	NA	NA			Wave Traps				3150	
109	WR-I	Aurangabad(PG) - Aurangabad II	52.563	400	ACSR Moose	Quad	85	Isolators	3000	3000	3000			Isolators				3000	
								CT	NA	3000	3000			CT				3000	
								Breakers	NA	3150	3150			Breakers				3150	
								Wave Traps	3150	NA	NA			Wave Traps				3150	
110	WR-I	Wardha - Parli I	336.939	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators	3150 A	3150 A	3150 A		
								CT	NA	3000 A	3000 A			CT	NA	3000 A	3000 A		
								Breakers	NA	3150 A	3150 A			Breakers	NA	3150 A	3150 A		
								Wave Traps	3000 A	NA	NA			Wave Traps	3000 A	NA	NA		
111	WR-I	Wardha - Parli II	336.939	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators	3150 A	3150 A	3150 A		
								CT	NA	3000 A	3000 A			CT	NA	3000 A	3000 A		
								Breakers	NA	3150 A	3150 A			Breakers	NA	3150 A	3150 A		
								Wave Traps	3000 A	NA	NA			Wave Traps	3000 A	NA	NA		
112	WR-I	Mauda - Wardha I	123.841	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators					
								CT	NA	3000 A	3000 A			CT					
								Breakers	NA	3150 A	3150 A			Breakers					
								Wave Traps	3000 A	NA	NA			Wave Traps					
113	WR-I	Mauda - Wardha II	123.841	400	ACSR Moose	Quad	85	Isolators	3150 A	3150 A	3150 A			Isolators					
								CT	NA	3000 A	3000 A			CT					
								Breakers	NA	3150 A	3150 A			Breakers					
								Wave Traps	3000 A	NA	NA			Wave Traps					
114	WR-I	Wardha - Raipur I	370.565	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	3000	3000	3000			CT					
								Breakers	-	3150	3150 (2000 not as indicated by AM)			Breakers					
								Wave Traps	3000	-	-			Wave Traps					
115	WR-I	Wardha - Raipur II	370.565	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	3000	3000	3000			CT					
								Breakers	-	3150	3150			Breakers					
								Wave Traps	3000	-	-			Wave Traps					
116	WR-I	Solapur - Solapur I	11.2	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	NA	3150	3150			CT					
								Breakers	3150	3150	3150			Breakers					
								Wave Traps	3150	NA	NA			Wave Traps					
117	WR-I	Solapur - Solapur II	11.2	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT	NA	3150	3150			CT					
								Breakers	3150	3150	3150			Breakers					
								Wave Traps	3150	NA	NA			Wave Traps					
118	WR-II	Vindhyachal - Jabalpur-I	360	400	ACKC	Twin	75	Isolators						Isolators	2000A	2000A	2000A		
								CT						CT	-	2000A	2000A		
								Breakers						Breakers	-	2000A	2000A		
								Wave Traps						Wave Traps	2000A	-	-		
119	WR-II	Vindhyachal - Jabalpur-II	360	400	ACKC	Twin	75	Isolators						Isolators	2000A	2000A	2000A		
								CT						CT	-	2000A	2000A		
								Breakers						Breakers	-	2000A	2000A		
								Wave Traps						Wave Traps	2000A	-	-		
120	WR-II	Jabalpur - Itarsi-I	232	400	ACKC	Twin	75	Isolators	2000A	2000A	2000A			Isolators	2000A	2000A	2000A		
								CT	-	2000A	2000A			CT	-	2000A	2000A		
								Breakers	-	2000A	2000A			Breakers	-	2000A	2000A		
								Wave Traps	2000A	-	-			Wave Traps	2000A	-	-		
121	WR-II	Jabalpur - Itarsi-II	232	400	ACKC	Twin	75	Isolators	2000A	2000A	2000A			Isolators	2000A	2000A	2000A		
								CT	-	2000A	2000A			CT	-	2000A	2000A		
								Breakers	-	2000A	2000A			Breakers	-	2000A	2000A		
								Wave Traps	2000A	-	-			Wave Traps	2000A	-	-		
122	WR-I / WR-II	Seoni - Khandwa-I	351.729	400	AAAC	Quad	75	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	3150	3150	3150			Breakers	3150	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
123	WR-I / WR-II	Seoni - Khandwa-II	351.729	400	AAAC	Quad	75	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT	NA	3150	3150			CT	NA	3150	3150		
								Breakers	3150	3150	3150			Breakers	3150	3150	3150		
								Wave Traps	3150	NA	NA			Wave Traps	3150	NA	NA		
124	WR-II	Mundra - Bhachau I	99.468	400	ACSR Snowbird	Tripple	85	Isolators						Isolators	3150	3150	3150		
								CT						CT	NA	3000	3000		
								Breakers						Breakers	3150	3150	3150		
								Wave Traps						Wave Traps	3150	NA	NA		
125	WR-II	Mundra - Bhachau II	99.468	400	ACSR Snowbird	Tripple	85	Isolators						Isolators	3150	3150	3150		
								CT						CT	NA	3000	3000		
								Breakers						Breakers	3150	3150	3150		
								Wave Traps						Wave Traps	3150	NA	NA		

126	WR-II	Bachau - Ranchodpura I	282.856	400	ACSR Snowbird	Quad	85	Isolators	3150	3150	3150			Isolators								
								CT	NA	3000	3000			CT								
								Breakers	3150	3150	3150			Breakers								
								Wave Traps	3150	NA	NA			Wave Traps								
127	WR-II	Bachau - Ranchodpura II	282.856	400	ACSR Snowbird	Triplle	85	Isolators	3150	3150	3150			Isolators								
								CT	NA	3000	3000			CT								
								Breakers	3150	3150	3150			Breakers								
								Wave Traps	3150	NA	NA			Wave Traps								
128	WR-II	Indore - Indore II (MP)	49.73	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150			
								CT	NA	3600	3600			CT					3600			
								Breakers	NA	3150	3150			Breakers					3150			
								Wave Traps	3150	NA	NA			Wave Traps					3150			
129	WR-II	Indore - Indore I (MP)	49.73	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150			
								CT	NA	3600	3600			CT					3600			
								Breakers	NA	3150	3150			Breakers					3150			
								Wave Traps	3150	NA	NA			Wave Traps					3150			
130	WR-II	Vindhyachal IV - Vindhyachal PS I	28.55	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators								
								CT	NA	3000A	3000A			CT								
								Breakers	NA	3150A	3150A			Breakers								
								Wave Traps	3150A	NA	NA			Wave Traps								
131	WR-II	Vindhyachal IV - Vindhyachal PS II	28.55	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators								
								CT	NA	3000A	3000A			CT								
								Breakers	NA	3150A	3150A			Breakers								
								Wave Traps	3150A	NA	NA			Wave Traps								
132	WR-II	Jabalpur PS - Jabalpur I	15.456	400	ACSR Moose	Quad	85	Isolators	3150 Amp	3150 Amp	3150 Amp			Isolators	3150 Amp	3150 Amp	3150 Amp					
								CT		3150 Amp	3150 Amp			CT		3150 Amp	3150 Amp					
								Breakers		3150 Amp	3150 Amp			Breakers		3150 Amp	3150 Amp					
								Wave Traps	3150 Amp					Wave Traps	3150 Amp							
133	WR-II	Jabalpur PS - Jabalpur II	15.456	400	ACSR Moose	Quad	85	Isolators	3150 Amp	3150 Amp	3150 Amp			Isolators	3150 Amp	3150 Amp	3150 Amp					
								CT		3150 Amp	3150 Amp			CT		3150 Amp	3150 Amp					
								Breakers		3150 Amp	3150 Amp			Breakers		3150 Amp	3150 Amp					
								Wave Traps	3150 Amp					Wave Traps	3150 Amp							
134	WR-II	Pirana - Vadodara I	131.549	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators								3150
								CT	NA	3000A	3000A			CT								3000
								Breakers	NA	3150A	3150A			Breakers								4000
135	WR-II	Asoj - Vadodara I	11.99	400	ACSR Moose	Quad	85	Isolators						Isolators								3150
								CT						CT								3000
								Breakers						Breakers								4000
136	WR-II	Pirana - Vadodara II	131.549	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators								3150
								CT	NA	3000A	3000A			CT								3000
								Breakers	NA	3150A	3150A			Breakers								4000
								Wave Traps	3150A	NA	NA			Wave Traps								3150
137	WR-II	Asoj - Vadodara II	11.99	400	ACSR Moose	Quad	85	Isolators						Isolators								3150
								CT						CT								3000
								Breakers						Breakers								4000
								Wave Traps						Wave Traps								3150
138	WR-II	Jabalpur PS - Annupur I	246.409	400	ACSR Snowbird	Tripple	85	Isolators	3150 Amp	3150 Amp	3150 Amp			Isolators								
								CT		3150 Amp	3150 Amp			CT								
								Breakers		3150 Amp	3150 Amp			Breakers								
								Wave Traps	3150 Amp					Wave Traps								
139	WR-II	Jabalpur PS - Annupur II	246.409	400	ACSR Snowbird	Tripple	85	Isolators	3150 Amp	3150 Amp	3150 Amp			Isolators								
								CT		3150 Amp	3150 Amp			CT								
								Breakers		3150 Amp	3150 Amp			Breakers								
								Wave Traps	3150 Amp					Wave Traps								
140	ER-I	Barh - Patna-I	93.113	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A					
								CT						CT		3000A	3000A					
								Breakers						Breakers		3150A	3150A					
								Wave Traps						Wave Traps	3150A							
141	ER-I	Barh - Patna-II	93.113	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A					
								CT						CT		3000A	3000A					
								Breakers						Breakers		3150A	3150A					
								Wave Traps						Wave Traps	3150A							
142	ER-I/NR-III	Ballia-Biharshariff I	241.79	400	ACSR	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150	3150	3150					
								CT		3000A	3000A			CT	3000	3000	3000					
								Breakers		3150A	3150A			Breakers		3150	3150					
								Wave Traps	3150A					Wave Traps	3150							
143	ER-I/NR-III	Ballia-Biharshariff II	241.79	400	ACSR	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150	3150	2000					
								CT		3000A	3000A			CT	3000	3000	3000					
								Breakers		3150A	3150A			Breakers		3150	2000					
								Wave Traps	3150A					Wave Traps	3150							
144	ER-I/NR-III	Patna-Ballia I	195.323	400	ACSR	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A					
								CT		3000A	3000A			CT		3000A	3000A					
								Breakers		3150A	3150A			Breakers		3150A	3150A					
								Wave Traps	3150A					Wave Traps	3150A							

145	ER-I/NR-III	Patna-Ballia II	195.323	400	ACSR	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT		3000A	3000A			CT		3000A	3000A		
								Breakers		3150A	3150A			Breakers		3150A	3150A		
								Wave Traps	3150A					Wave Traps	3150A				
146	ER-I	Barh-Patna-III	68.651	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT		3000A	3000A		
								Breakers						Breakers		3150A	3150A		
								Wave Traps						Wave Traps	3150A				
147	ER-I	Barh-Patna-IV	68.651	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT		3000A	3000A		
								Breakers						Breakers		3150A	3150A		
								Wave Traps						Wave Traps	3150A				
148	ER-I/NR-III	Patna-Ballia III	185	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT		3000A	3000A			CT		3000A	3000A		
								Breakers		3150A	3150A			Breakers		3150A	3150A		
								Wave Traps	3150A					Wave Traps	3150A				
149	ER-I/NR-III	Patna-Ballia IV	185	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT		3000A	3000A			CT		3000A	3000A		
								Breakers		3150A	3150A			Breakers		3150A	3150A		
								Wave Traps	3150A					Wave Traps	3150A				
150	ER-I	Biharshariff - Sasaram III (now purnea-I)	324.185	400	ACSR Moose	Quad	85	Isolators	3150	2000	2000			Isolators	3150	3150	3150		
								CT	3000	3000	3000			CT		3000	3000		
								Breakers		2000	2000			Breakers		3150	3150		
								Wave Traps	3000					Wave Traps	2000				
151	ER-I	Biharshariff - Sasaram IV(now purnea-II)	324.185	400	ACSR Moose	Quad	85	Isolators	3000	2000	3000			Isolators	3150	3150	3150		
								CT	3000	3000	3000			CT		3000	3000		
								Breakers		3000	3000			Breakers		3150	3150		
								Wave Traps	3000					Wave Traps	2000				
152	ER-I	Nabinagar - Sasaram I	81.65	400	ACSR Lapwing	Twin	85	Isolators						Isolators	3150	3150	3150		
								CT						CT		3000	3000		
								Breakers						Breakers		3150	3150		
								Wave Traps						Wave Traps	2000				
153	ER-I	Nabinagar - Sasaram II	81.65	400	ACSR Lapwing	Twin	85	Isolators						Isolators	3150	3150	3150		
								CT						CT		3000	3000		
								Breakers						Breakers		3150	3150		
								Wave Traps						Wave Traps	2000				
154	ER-I/ER-II	Koderma-Gaya I	125.512	400	ACSR Moose	Quad	85	Isolators						Isolators	3150	3150	3150		
								CT						CT		3000	3000		
								Breakers						Breakers		3150	3150		
								Wave Traps						Wave Traps	3150				
155	ER-I/ER-II	Koderma-Gaya II	125.512	400	ACSR Moose	Quad	85	Isolators						Isolators	3150	3150	3150		
								CT						CT		3000	3000		
								Breakers						Breakers		3150	3150		
								Wave Traps						Wave Traps	3150				
156	ER-I/ER-II	Gaya - Maithon I	274.943	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150					Wave Traps					
157	ER-I/ER-II	Gaya - Maithon II	274.943	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					
								CT		3000	3000			CT					
								Breakers		3150	3150			Breakers					
								Wave Traps	3150					Wave Traps					
158	ER-I	Ranchi (New) - Ranchi I	78.617	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150					Wave Traps	3150				
159	ER-I	Ranchi (New) - Ranchi II	78.617	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150					Wave Traps	3150				
160	ER-I	Ranchi (New) - Ranchi III	78.542	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150					Wave Traps	3150				
161	ER-I	Ranchi (New) - Ranchi IV	78.542	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators	3150	3150	3150		
								CT		3000	3000			CT		3000	3000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	3150					Wave Traps	3150				
162	ER-I	Patna-Kishanganj I	346.72	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					4000 A
								CT		3000A	3000A			CT					3000 A
								Breakers		3150A	3150A			Breakers					4000 A
								Wave Traps	3150A					Wave Traps					3150 A

163	ER-I	Patna-Kishanganj II	346.72	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators					4000 A
								CT		3000A	3000A			CT					3000 A
								Breakers		3150A	3150A			Breakers					4000 A
								Wave Traps	3150A					Wave Traps					3150 A
164	ER-I/NR-III	Barh II - Gorakhpur I	349.177	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT		3000A	3000A		
								Breakers						Breakers		3150A	3150A		
								Wave Traps						Wave Traps	3150A				
165	ER-I/NR-III	Barh II - Gorakhpur II	349.177	400	ACSR Moose	Quad	85	Isolators						Isolators	3150A	3150A	3150A		
								CT						CT		3000A	3000A		
								Breakers						Breakers		3150A	3150A		
								Wave Traps						Wave Traps	3150A				
166	ER-I	New Ranchi - Chandwa I	68	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150
								CT		3000	3000			CT					3000
								Breakers		3150	3150			Breakers					3150
								Wave Traps	3150					Wave Traps					3150
167	ER-I	Chandwa- Gaya I	117	400	ACSR Moose	Quad	85	Isolators					3150	Isolators	3150	3150	3150		
								CT					3000	CT		3000	3000		
								Breakers					3150	Breakers		3150	3150		
								Wave Traps					3150	Wave Traps	3150				
168	ER-I	New Ranchi - Chandwa II	68	400	ACSR Moose	Quad	85	Isolators	3150	3150	3150			Isolators					3150
								CT		3000	3000			CT					3000
								Breakers		3150	3150			Breakers					3150
								Wave Traps	3150					Wave Traps					3150
169	ER-I	Chandwa- Gaya II	117	400	ACSR Moose	Quad	85	Isolators					3150	Isolators	3150	3150	3150		
								CT					3000	CT		3000	3000		
								Breakers					3150	Breakers		3150	3150		
								Wave Traps					3150	Wave Traps	3150				
170	ER-I/ER-II	Farakka-Malda-I	40	400	HTLS	Twin	75	Isolators						Isolators		3000	3000		
								CT						CT		3000	3000		
								Breakers						Breakers		3000	3000		
								Wave Traps						Wave Traps		3000	3000		
171	ER-I/ER-II	Farakka-Malda-II	40	400	HTLS	Twin	75	Isolators						Isolators		3000	3000		
								CT						CT		3000	3000		
								Breakers						Breakers		3000	3000		
								Wave Traps						Wave Traps		3000	3000		
172	ER-I/ER-II	New Purnea - New Siliguri I	168	400	HTLS	Twin	75	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT		3000A	3000A			CT		3000A	3000A		
								Breakers		3150A	3150A			Breakers		3150A	3150A		
								Wave Traps	3150A					Wave Traps	3150A				
173	ER-I/ER-II	New Purnea - New Siliguri II	168	400	HTLS	Twin	75	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT		3000A	3000A			CT		3000A	3000A		
								Breakers		3150A	3150A			Breakers		3150A	3150A		
								Wave Traps	3150A					Wave Traps	3150A				
174	ER-I	Newpurnea - Kishanganj-I (LILO portion)		400	ACSR Moose	Quad		Isolators	3150 A	3150 A	3150 A			Isolators					4000 A
								CT		2000 A	2000A			CT					3000 A
								Breakers		3150 A	3150 A			Breakers					4000 A
								Wave Traps	3150 A					Wave Traps					3150 A
175	ER-I	Kishanganj-New Siliguri (LILO portion)		400	ACSR Moose	Quad		Isolators					4000 A	Isolators	3150A	3150A	3150A		
								CT					3000 A	CT		3000A	3000A		
								Breakers					4000 A	Breakers		3150A	3150A		
								Wave Traps					3150 A	Wave Traps	3150A				
176	ER-I	Newpurnea - Kishanganj-II (LILO portion)		400	ACSR Moose	Quad		Isolators	3150 A	3150 A	3150 A			Isolators					4000 A
								CT		2000A	2000 A			CT					3000 A
								Breakers		3150 A	3150 A			Breakers					4000 A
								Wave Traps	3150 A					Wave Traps					3150 A
177	ER-I/ER-II	Kishanganj-New Siliguri II (LILO portion)		400	ACSR Moose	Quad		Isolators					4000 A	Isolators	3150A	3150A	3150A		
								CT					3000 A	CT		3000A	3000A		
								Breakers					4000 A	Breakers		3150A	3150A		
								Wave Traps					3150 A	Wave Traps	3150A				
178	ER-II	Durgapur-Maithon I	70.77	400	ACSR Lapwing	Twin	85	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	2000	2000	2000			Wave Traps	2000	2000	2000		
179	ER-II	Durgapur-Maithon II	70.77	400	ACSR Lapwing	Twin	85	Isolators	2000	2000	2000			Isolators	2000	2000	2000		
								CT		2000	2000			CT		2000	2000		
								Breakers		3150	3150			Breakers		3150	3150		
								Wave Traps	2000	2000	2000			Wave Traps	2000	2000	2000		
180	ER-II	Baharampur-Sagardighi I	26.297	400	HTLS	Twin	85	Isolators	3150A	3150A	3150A			Isolators					
								CT	NA	3000A	3000A			CT					
								Breakers	NA	3150A	3150A			Breakers					
								Wave Traps	3150A	NA	NA			Wave Traps					
181	ER-II	Baharampur-Sagardighi II	26.297	400	HTLS	Twin	85	Isolators	3150A	3150A	3150A			Isolators					
								CT	NA	3000A	3000A			CT					
								Breakers	NA	3150A	3150A			Breakers					
								Wave Traps	3150A	NA	NA			Wave Traps					

182	NER	Balipara- Bongaingaon III	309	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	NA	3000A	3000A			CT	NA	3000A	3000A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3000A	NA	NA			Wave Traps	3000A	NA	NA		
183	NER	Balipara- Bongaingaon IV	309	400	ACSR Moose	Quad	85	Isolators	3150A	3150A	3150A			Isolators	3150A	3150A	3150A		
								CT	NA	3000A	3000A			CT	NA	3000A	3000A		
								Breakers	NA	3150A	3150A			Breakers	NA	3150A	3150A		
								Wave Traps	3000A	NA	NA			Wave Traps	3000A	NA	NA		

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Thermal Capability of Breaker and Isolators	Thermal Capability of Other SwitchGears such as CT,PT, etc.	Thermal Capability of Line
							End-I	End-II			
4. 400kV HVAC Transmission Line											
G. HVPNL											
1	CLP Jhajjar -Dhanonda	1	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	2000A @ 50 DEG C	2500A@50 DEG C	728A @ 40 DEG AMBIENT TEMPERATURE
2	CLP Jhajjar -Dhanonda	2	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	2000A @ 50 DEG C	2500A@50 DEG C	728A @ 40 DEG AMBIENT TEMPERATURE
3	CLP Jhajjar- Kabulpur	1	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
4	CLP Jhajjar- Kabulpur	2	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
5	Deepalpur-Kabulpur	1	D/C	64	Quad Moose	KT Jhajjar	KT Jhajjar	KT Jhajjar	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
6	Deepalpur-Kabulpur	2	D/C	64	Quad Moose	KT Jhajjar	KT Jhajjar	KT Jhajjar	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
7	Dhanoda-Daultabad	1	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	2000A @ 50 DEG C	2500A@50 DEG C	728A @ 40 DEG C AMBIENT TEMP
8	Dhanoda-Daultabad	2	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	2000A @ 50 DEG C	2500A@50 DEG C	728 A @ 40 Deg C AMB. TEMP.
9	Gurgaon-Daultabad	1	D/C	24	Quad Moose	HVPNL	POWERGRID	HVPNL	3150 A @ 50 deg C	2000 A @ 50 deg C	714A each conductor@ 50 deg C ambient temp
10	Gurgaon-Daultabad	2	D/C	24	Quad Moose	HVPNL	POWERGRID	HVPNL	3150 A @ 50 deg C	2000 A @ 50 deg C	714A each conductor@ 50 deg C ambient temp
11	Jhajjar-Daulatabad	1	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	3150 A @ 50 deg C	2000 A @ 50 deg C	714A each conductor@ 50 deg C ambient temp
12	Jhajjar-Daulatabad	2	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	3150 A @ 50 deg C	2000 A @ 50 deg C	714A each conductor@ 50 deg C ambient temp
13	Khedar-Fathehabad	1	D/C	40	Twin Moose	HVPNL	HPGCL	POWERGRID	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
14	Khedar-Kirori	1	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
15	Khedar-Kirori	2	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
16	Jind Kirori 1	1	D/C	50	Twin Moose	HVPNL	PGCIL	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
17	Jind Kirori 2	2	D/C	50	Twin Moose	HVPNL	PGCIL	HVPNL	3150 A @ 50 deg C	3000 A @ 50 deg C	714 A @ 50 deg C ambient temp
18	Khedar-Nuhiawali	1	D/C	114	Twin Moose	HVPNL	HPGCL	HVPNL	2000 A @ 45 deg C	2000A @ 45 deg C	1670A @ 45deg C Ambiant temp.
19	Nuhiawali-Fathehabad	1	D/C	78	Twin Moose	HVPNL	HVPNL	POWERGRID	2000 A @ 45 deg C	2000A @ 45 deg C	1670A @ 45deg C Ambiant temp.

The information regarding terminal equipment ratings of 400 KV Lines

Sr. No	Name of Line	Voltage (KV)	Tower Configuration (S/C or D/C)	Line Length (Km)	Type of Conductor	Conductor Configuration	End 1 and End 2 Rating
1	Talwandi Sabo-Dhuri	400 KV	Double Circuit	88	Moose	Twin	CB - 2000A,40 KA CT - 2000A, 40 KA CVT- 4400 pF Isolator-2000A,40KA Line Trap-2000A, 0.5 mH, 40 KA
2	Talwandi Sabo- Muktsar			100.3			
3	Talwandi Sabo- Nakodar			155			
4	LILO of Talwandi Sabo-Nakodar at Moga			11.347			
5	Muktsar- Makhu			95			
6	Makhu- Balachak			64			
7	Rajpura TPS- Nakodar			137			
8	Rajpura TPS- Rajpura			9			
9	Rajpura-Dhuri			84			
10	Nakodar-Makhu			52.72			

CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No. L-1/265/2022/CERC

CORAM:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 28th September, 2023

In the matter of:

Approval of "Detailed Procedure for Assessment of Quantum of Secondary & Tertiary Reserve Capacity, along with Information Exchange and Timelines" under Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023.

Order

The Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 (hereinafter called 'Grid Code') was published on 11.07.2023, in the Gazette of India Extraordinary (Part-III, Section-4, No. 488).

2. Regulation 30 (11)(k) of the Grid Code requires NLDC to prepare a detailed methodology for the assessment of secondary reserve capacity and submit the same for approval of the Commission. Further Regulation 30(11)(a) requires NLDC to assess tertiary reserve requirements for the regional control area and the State control area. Regulation 30(11)(q) and Regulation 30(12)(d) require that modalities

for information exchange and timelines in respect of secondary reserve and tertiary reserve, respectively, shall be as per the detailed procedure by NLDC.

3. Accordingly, NLDC vide its letter dated 20.09.2023 has submitted the “Detailed Procedure for Assessment of Quantum of Secondary & Tertiary Reserve Capacity, along with Information Exchange and Timelines”, after stakeholder consultation, for approval of the Commission.

4. The Commission has examined the Detailed Procedure along with formats submitted by NLDC and after incorporating suitable changes, the Commission hereby approves the “Detailed Procedure for Assessment of quantum of Secondary & Tertiary Reserve Capacity, along with Information Exchange and Timelines”. The approved Detailed Procedure is enclosed as Annexure to this order.

5. NLDC is directed to provide detailed feedback within one month after 6 months of the effective date of this procedure is completed, or earlier if required, to evaluate the operation of this procedure in practice.

Sd/	**Sd/**	**Sd/**	**Sd/**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**

Annexure

Detailed Procedure for Assessment of quantum of Secondary & Tertiary Reserve Capacity, along with Information Exchange and Timelines

1.0 Preamble

1.1 Every entity shall undertake all appropriate measures to maintain its drawal/injection as per schedule. Each control area has to follow certain Frequency Response Performance (FRP) criteria, as specified in Central Electricity Regulatory Commission (CERC) (Indian Electricity Grid Code) Regulations, 2023 hereinafter referred to as the Grid Code, in order to maintain frequency within the Grid Code stipulated band under normal operating conditions.

1.2 The objective of Ancillary Services in Indian power system is to maintain the grid frequency close to 50 Hz, restoration of the grid frequency within the allowable band as specified in the Grid Code and for relieving congestion in the transmission network, to ensure smooth operation of the power system, and safety and security of the grid.

1.3 Adequate reserves are required to be maintained in a distributed manner with both the regional entities at the regional level and at the State level for each state control area as per the Grid Code or the State Grid Code as the case may be.

1.4 As per Grid Code, assessment of reserves shall be carried out on year ahead basis, three day-ahead basis, day ahead basis and intra-day basis.

1.5 This procedure is prepared in accordance with Regulations 30(11) and 30(12) of the Grid Code [Covering Regulations 30(11)(k), 30(11)(q), 30(12)(d), 30(12)(l)]. This procedure supersedes the interim methodology for estimation of reserves prepared in accordance with Regulation 6(1) of the CERC (Ancillary Services) Regulations, 2022.

1.6 All the words and expressions used in the Procedure shall have the same meaning as assigned to them in various CERC Regulations.

2.0 Objective

2.1 The objective of this procedure is to lay down the roles of various entities and methodology for estimation of quantum of reserves for SRAS and TRAS to be followed by the Nodal Agency i.e. NLDC in coordination with RLDCs and SLDCs.

3.0 Scope

3.1 The procedure shall be applicable to all entities as provided in the Grid Code.

4.0 Definitions

4.1 **'Reference contingency'** means the maximum positive power deviation occurring instantaneously between generation and demand and considered for estimation of reserves.

5.0 Roles of NLDC (Nodal Agency), RLDCs and SLDCs

5.1 Nodal Agency i.e. NLDC shall, in coordination with RLDCs and SLDCs, estimate the quantum of requirement of SRAS & TRAS on year ahead basis, three day ahead basis, day ahead basis and real-time basis as per the methodology specified in subsequent sections.

5.2 SLDCs shall furnish data in the stipulated formats and timelines to the Nodal Agency for estimation of the quantum of requirement of SRAS & TRAS.

5.3 SLDC shall maintain reserves as allocated by Nodal Agency (after considering diversity benefit and reference contingency), in accordance with the Grid Code.

6.0 Reserves in Indian Power System

6.1 There shall be different types of reserves, as specified in the Grid Code and AS regulations, such as primary, secondary and tertiary for the purpose of frequency control and regulating Area Control Error. The reserves shall be deployed by each control area as per the Grid Code and the applicable AS regulations:

6.1.1 Provision for primary response shall be mandatory.

6.1.2 Secondary reserves shall be deployed through a regulated mechanism.

6.1.3 Tertiary reserves shall be procured through the market and deployed

6.2 The deployment of reserves is broadly distinguished on the basis of the time of initiation and duration of response as tabulated in Table-1 below:

Reserve	Start of activation	Full Availability/ deployment	Ability to sustain the full deployment
Primary Response	Immediately as soon as frequency crosses the dead band	Within 45 seconds	Up to 5 min
Secondary control Reserve	Within 30 seconds after the receipt of Automatic Generation Control (AGC) signal	within 15 Minutes	Up to 30 min or till replaced by Tertiary Reserves
Tertiary control Reserve	Within 15 minutes of dispatch instruction from NLDC/RLDC		Upto 60 minutes

Table 1: Reserves and their activation

7.0 Area Control Error (ACE)

7.1 "Area Control Error" or "ACE" means the instantaneous difference between a control area's net actual interchange and net scheduled interchange, taking into account the effects of frequency bias and correction of measurement errors.

7.2 The Area Control Error (ACE) for each control area would be calculated at all the load despatch centres based on telemetered values and external inputs as per the below formula:

ACE = (Ia - Is) - 10 * Bf * (Fa - Fs) + Offset

Ia = Actual net interchange in MW (positive value for export)

Is = Scheduled net interchange in MW (positive value for export)

Bf = Frequency Bias Coefficient in MW/0.1 Hz (negative value)

Fa = Actual system frequency in Hz

Fs = Schedule system frequency in Hz (default 50 Hz)

Offset = Provision for compensating errors such as measurement error

7.3 The detailed methodology to be followed by Nodal Agency for calculation and monitoring of Area Control Error (ACE) is attached at **Annexure I**. The ACE shall be worked out for each state and region. Post calculation of the ACE, the outliers would be removed using appropriate statistical techniques.

7.4 ACE is 'positive' means that the control area has surplus generation and the control area's internal generation has to be backed down. ACE is 'negative' means the control area is in deficit and the control area's internal generation has to be increased. All the frequency control interventions shall be in the direction to drive ACE towards zero.

8.0 Estimation of quantum of procurement of Reserves for SRAS and TRAS on an Year ahead and Three day ahead basis

8.1 For maintaining primary reserve, Grid Code provides that reference contingency shall consider quantum of generation outage based on outage of largest power plant, group of power plants, a generation complex, or a generation pooling station, or the actual generation outage occurred in an event during last two years, or a credible outage scenario. Similarly, reference contingency shall also consider outage of single largest load centre or actual outage of load occurred in an event during last two years . The reference contingency for maintaining primary reserve, presently considered in the Indian power system, is the outage of the largest power plant or a sudden load throw-off of 4500 MW, which shall be declared by the Nodal Agency from time to time on the NLDC website.

8.2 The data for assessment of the reserves capacity requirement for SRAS and TRAS shall be furnished to the Nodal Agency by respective SLDCs pertaining to their state control areas as per following timelines.

8.2.1 Year Ahead Basis – For reserve estimation for the next financial year (FY+1), the data for the previous calendar year shall be furnished by 15th January of the current financial year (FY) **(Format – RAS1).**

(Illustration: If the assessment is being carried out for FY 2024-25, the data for the period 1st Jan 2023 to 31st December 2023 has to be provided by 15th January, 2024)

8.2.2 The reserve capacity requirement as per the methodology in this document shall also be estimated by each RLDC and SLDC respectively

by 15th January every year for the next financial year and submitted to NLDC.

8.3 In case of non-availability of data from SLDCs as mentioned above, the data available at RLDCs/Nodal Agency shall be used to estimate the quantum of reserves requirement.

8.4 For estimation of reserve requirement on a three day ahead basis for D day on D-3 day, data for the last available 7 days (i.e., D-4 to D-10) shall be used.

Secondary Reserves

8.5 The estimation of secondary reserve capacity requirement, on regional basis and state basis (considering diversity benefit), shall be carried out by Nodal Agency as per the following methodology:

8.5.1 The positive (Up Reserve) and negative (Down Reserve) secondary reserve capacity requirement on regional basis would be computed as 99 percentile of negative and positive ACE respectively of that region for year ahead, quarter ahead and week ahead.

8.52 The 99 percentile of the positive and negative ACE of each state control shall be computed and aggregated at regional level. This shall be scaled using 99 percentiles of the regional ACE to factor diversity at regional level. The scaled values of 99 percentile of the state ACE shall be used to arrive at the reserve requirement at Inter-state and Intra-state levels.

8.5.3 The drawl by the respective state and its internal-generation at the time of peak demand during the period under consideration shall be used for apportionment of the reserve requirement. The intra state reserves shall be in proportion to the contribution of internal generation at the time peak demand. The Inter-state reserves shall be in proportion to the drawl from the grid at the time of peak demand.

8.5.4 The state level requirement shall be aggregated to arrive at the regional and all India reserve requirement.

8.5.5 If any state control area has net injection in the concerned period, then, entire reserve calculated for such State, is to be allocated within the state control area.

8.5.6 If any state control area has zero internal generation in the concerned period, then, the required reserve is to be allocated at the regional level.

8.6 The all-India total of positive (and negative) secondary reserves capacity requirement on regional basis shall be equal to the reference contingency or secondary reserve capacity requirement as computed above, whichever is higher. If the all-India reserve requirement, computed using 99 percentile of ACE, is less than the reference contingency such additional reserves shall be considered in the regional requirement.

Tertiary Reserves

8.7 The estimated quantum of tertiary reserve requirement at regional level would be considered equal to the secondary reserve requirement at regional level as computed above.

8.8 The estimated quantum of tertiary reserve requirement at state level would be considered equal to the sum of secondary reserve requirement at state level and 50 % of the largest unit size in the respective state control area.

9.0 Estimation of quantum of procurement of Reserves for SRAS and TRAS on Day ahead and Real time basis

9.1 AS Regulations provides that the reserves are to be procured from the market, considering the reserves likely to be available in real-time basis. Further the AS Regulations provides that all generating stations, whose tariff is determined by the Commission under Section 62 of the Act including those having URS power after declaration of the RTM results, shall be deemed to be available for use by the Nodal Agency for SRAS or TRAS or both, subject to technical constraints of such generating stations.

9.2 The all-India reserve requirement on day-ahead basis would be calculated by using the positive (Up Reserve) and negative (Down Reserve) reserve capacity requirement on regional basis, as 99 percentile of negative and positive ACE (10 second data), during the last 7 days respectively of that region for each time block. The up and down reserve requirement shall be aggregated on an all-India basis.

9.3 In any time block, the minimum up reserve requirement shall be equal to the reference contingency. The all-India credible contingency shall be continuously monitored using the SCADA MW data and the likely availability of the generating units. The quantum of reference contingency may vary across time blocks.

9.4 SLDCs shall intimate the quantum and location of the reserves for SRAS and TRAS to the Nodal Agency two days before the day of scheduling by 1100 hrs. The modalities for information exchange and timelines in this respect shall be as per **Format-RAS2**. ***(Illustration: The reserves booked in advance for Friday may be intimated in the NLDC web portal on Wednesday by 1100 hrs.)***

9.5 In case of non-submission of data by the SLDCs before 1100 hrs on 'D-2' basis, advance reserves with SLDC would be assumed as zero MW, for all the associated calculations.

9.6 As per the CERC (Ancillary Services) Regulations, 2022, only tertiary reserve procurement through TRAS day-ahead and real-time markets has been mandated. Hence the procedure covers reserve procurement in day-ahead and real-time segments of TRAS.

9.7 Similar procedure may be adopted in the future for secondary reserve procurement as and when such market segments are made operational by CERC.

9.8 In line with Grid Code Regulation 30(11)(t), 30(11)(u), 30(12)(h), shortfall of secondary and tertiary reserves would be flagged when availability of reserves is less than the requirement. Shortfall would be calculated using data from Format-RAS2 and Format-RAS5. NLDC, RLDC, and SLDC shall indicate the shortfall in secondary reserves, if any, and announce emergency alerts for such periods.

Day-Ahead Procurement of Reserves for TRAS and SRAS

9.9 Day-Ahead procurement of Reserves for TRAS and SRAS would be as per the methodology below:

(a) The total reserves likely to be available in section 62 power plants (including due to SCUC) would be estimated as the minimum of the total reserves available in last 7 days, for each time block.

(b) Reserves declared by SLDCs before 'D-2' shall be considered

(c) Reserves procured by RLDCs/NLDC in advance shall be considered

(d) The up and down reserves to be procured from the TRAS market (day-ahead plus real-time) shall be obtained as:

Total reserve requirement minus [Reserves available as per sub-clause (a) +(b)+(c) of this Clause].

(e) The up and down reserves to be procured, as calculated above, shall be apportioned between day-ahead and real-time AS market in a ratio as decided by the system operator. The ratio may be reviewed from time to time considering the quantum of sell bids received in DAM AS and RTM AS across all the power exchanges.

(f) The up and down quantum so obtained shall become the requirement for TRAS in the day-ahead market.

Real Time Procurement of Reserves for TRAS and SRAS

9.10 Real-Time procurement of Reserves for TRAS and SRAS would be as per the methodology below:

(a) the available up and down reserves in the section 62 thermal and gas generating stations scheduled by RLDCs shall be re-calculated using the latest available schedules.

(b) Reserves available with SLDCs, as declared before 'D-2'

(c) Reserves available with RLDCs/NLDC

(d) TRAS quantum procured in Day-ahead AS market

(e) The incremental up and down reserves to be procured from the real-time AS market shall be obtained as below:

Total reserve requirement minus [Reserves available as per sub-clause (a) +(b)+(c)+(d) of this Clause]

(g) The system operator may also choose to modify the reserve requirement considering factors such as real time system conditions, load/RE forecast, load generation balance, weather, contingencies, congestion etc, in line with the CERC approved procedure.

10.0 Information Dissemination

10.1 The reference contingency shall be declared by Nodal Agency by 25th January before the start of each financial year **(Format – RAS3)**. The review of reference contingency may be done by the Nodal Agency any time after the declaration. Accordingly, the figures of reference contingency would be revised and updated on the Nodal Agency website.

(Illustration: The reference contingency for financial year 2024-25 would be declared by 25th January, 2024)

10.2 The assessment of the reserve requirement for SRAS and TRAS on Year Ahead Basis would be declared by Nodal Agency by 25th January of the current year **(Format – RAS4)**

(Illustration: The reserve requirement for SRAS and TRAS in financial year 2024-25 would be declared by 25th January, 2024)

10.3 The assessment of the reserve capacity requirement for SRAS and TRAS on a three day-ahead basis would be declared by the Nodal Agency daily by 1100 hrs **(Format – RAS5)**

(Illustration: The reserve requirement for SRAS and TRAS for Friday would be declared by 1100 hrs on Tuesday)

10.4 The range of up and down quantum requirement for TRAS in the day-ahead market would be published on NLDC website. **(Format – RAS6).**

10.5 Before the commencement of bidding at Power Exchanges, NLDC shall communicate the range of Up and Down Reserves to be procured from DAM AS to the power exchanges.

10.6 The status of data received by the nodal agency from various sources and static data such as peak demand of the state, internal generation, frequency bias etc. shall also be published on the nodal agency website.

11.0 Revision of the procedures

The Procedure shall be amended from time to time, as necessary, with the approval of the CERC.

Format – RAS1: Data for Estimation of Year Ahead Reserves

Following Data is to be provided by each state control area

1. Assessment of reserves for the FY: 01.04.yyyy to 31.03.yyyy
2. Name of the state:
3. Data for the calendar: 01.01.yyyy to 31.12.yyyy
4. Data furnished (please tick the data submitted):
    a. Actual interchange of the State (10 seconds resolution), (Number of samples = 365*24*60*6 = 3153600 nos.) in excel format
    b. Frequency Response Characteristics of the State for the events posted on NLDC website (https://grid-india.in/frc/)
    c. Peak Demand met
    d. Intra-State Generation (other than ISGS) at the time of peak demand (*sample data filled up in Italics in the tables for understanding*)

Actual interchange of the State (10 seconds resolution) for calendar: 01.01.yyyy to 31.12.yyyy	
Date & Time (DD-MMM-YY HH:MM:SS)	Actual interchange of the State (MW)
01-jan-2021 00:00:10	*452*
01-jan-2021 00:00:20	*456*
01-jan-2021 00:00:30	*461*
…..	
…….	
31-Dec-2021 23:59:50	*498*

Frequency Response Characteristics of the State for calendar: 01.01.yyyy to 31.12.yyyy (In case State has difficulty in computation of FRC, it may seek assistance from respective RLDC)	
Event Details	Frequency Response Characteristics (MW/Hz)
Events 1:	*800*
Event 2:	*815*
Event 3:	*756*

Peak Demand and Intra-State Generation of the State for calendar: 01.01.yyyy to 31.12.yyyy		
State/UT	Peak Demand met (MW)	Intra-State Generation (other than ISGS) at the time of peak demand (MW)
……		

Format – RAS2: Information Exchange Format for intimation of Advance Procured Reserves before 1100 hrs on D-2 by SLDCs to NLDC

Note: Format in line with Regulations 30(11)(q), 30(12)(d) and 30(12)(l) of Grid Code

For date: DD/MM/YYYY

Submitted by: <Name of the State/RLDC>

S.no.	Region	State	Plant Name	From time block to time block	Method of dispatch (Secondary/Tertiary)	Earmarked Spinning Reserve as on D-2 (MW)
1	*WR*	*State-1*	*Station-A*	*1-96*	*Tertiary*	*30*
2	*WR*	*State-1*	*Station-B*	*1-96*	*Secondary*	*20*
3						
4						
5						
	Total					*50*

(*sample data filled up in Italics in the table for understanding*)

- The quantum and location of Reserves declared by SLDCs before D-2 and procured in advance by RLDCs would be intimated to the Nodal Agency two days before the day of scheduling.
- The information shall be submitted daily at 1100 hrs on a D-2 basis. For example, the reserves booked in advance for Friday may be intimated in the NLDC web portal on Wednesday by 1100 hrs.
- The information shall be submitted by the respective SLDCs/RLDCs on the web portal hosted by NLDC. URL and password for the secure web portal may be collected by SLDC from the respective RLDCs.

Summary of Intra-State Advance Reserves

Note: Format in line with Regulations 30(11)(t), 30(11)(u) and 30(12)(h) of Grid Code

S.no.	Region	State /Control Area	Tertiary Reserves Requirement Share intimated by NLDC on D-3	Tertiary Reserves Earmarked by SLDC/RLDC on D-2	Secondary Reserves Requirement Share intimated by NLDC on D-3	Secondary Reserves Earmarked by SLDC/RLDC on D-2	Shortfall in Tertiary Reserve Capacity (computed by NLDC on D-2)	Shortfall in Secondary Reserve Capacity (computed by NLDC on D-2)
1	NR	*State-1*	*100*	*85*	*50*	*30*	*20*	*15*
		State-2						

2	ER	*State-10*	*100*	*85*	*50*	*30*	*20*	*15*
		State-11						

3	WR	*State-16*	*100*	*75*	*50*	*35*	*25*	*25*
		State-17						

4	SR	*State-24*						
		State-25						

5	NER	*State-31*						

		State-37						
		Total	*200*	*160*	*100*	*65*	*40*	*45*

(*sample data filled up in Italics in the tables for understanding*)

Format – RAS3: Reference contingency for Indian Power System

Date: 25 January 2023	**Revision No.**	
Applicable for FY 2023-24		
Reference Contingency for generation loss (MW)	**4500**	
Reference Contingency for load loss (MW)	**4500**	

Format RAS4: SRAS and TRAS Reserve Requirement on an Annual Basis

Requirement of Reserve Quantum for Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) for Year 2023-24																
State/ Union Territory (UT)	**Actual 99 Percentile Negative ACE (MW)**	**Actual 99 Percentile Positive ACE (MW)**	**Scaled 99 Percentile Negative ACE (MW) {a}**	**Scaled 99 Percentile Positive ACE (MW) {b}**	**Max. Demand met {c}**	**Internal Gen. at the time of max demand {d}**	**Drawl from ISTS {e=c-d}**	**State Internal Generation/ State Maximum Demand {f=d/c}**	**State drawl from ISTS/ State Maximum Demand {g=e/c}**	**Secondary Reserves in ISGS {h=a*g}**	**Secondary Reserves at Regional Level {sum of reserves in all states of the region as given in "h"}**	**Secondary Reserves within state {i=a*f}**	**Tertiary Reserves in ISGS (j = h)**	**Tertiary Reserves within state (k = i)**	**Largest Unit Size of internal generation (l)**	**Total Tertiary Reserves within state {m=k + 0.5*l}**
UT of Chandigarh																
Delhi																
Haryana																
Himachal Pradesh																
UT of Jammu and Kashmir and UT of Ladakh*																
Punjab																
Rajasthan																
Uttar Pradesh																
Uttarakhand																
NR state Sum																
Northern Region (NR)																
Chhattisgarh																
UT Daman and Diu#																
UT Dadra and Nagar Haveli#																
Gujarat																
Goa																
Madhya Pradesh																
Maharashtra																
WR States Sum																
Western Region (WR)																
Andhra Pradesh																
Karnataka																
Kerala																
UT of Puducherry																
Tamil Nadu																
Telangana																
SR State Sum																
Southern Region (SR)																
Bihar																
Damodar Valley Corporation																
Jharkhand																
Odisha																
Sikkim																
West Bengal																
ER state Sum																
Eastern Region (ER)																
Arunanchal Pradesh																
Assam																
Manipur																
Meghalaya																
Mizoram																
Nagaland																
Tripura																
NER State Sum																
North-Eastern Region (NER)																
All India																
											Total Tertiary Reserves Requirement in India					
	Note: * UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC. # UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as separate entities inline with data shared with NLDC.															

Sample illustration for Format RAS4

Year-Ahead SRAS and TRAS Reserve requirement for Year 2023-24 (Scaled for reference contigency of 4500 MW)																
State/UT	**Actual 99 Percentile Negative ACE (MW)**	**Actual 99 Percentile Positive ACE (MW)**	**Scaled 99 Percentile Negative ACE (MW) {a}**	**Scaled 99 Percentile Positive ACE (MW) {b}**	**Max. Demand met {c}**	**Internal Gen. at the time of max demand {d}**	**Drawl from ISTS {e=c-d}**	**State Internal Generation/ State Maximum Demand {f=d/c}**	**State drawl from ISTS/ State Maximum Demand {g=e/c}**	**Secondary Reserves in ISGS {h=a*g}**	**Secondary Reserves at Regional Level {sum of reserves in all states of the region as given in "h"}**	**Secondary Reserves within state {i=a*f}**	**Tertiary Reserves in ISGS (j = h)**	**Tertiary Reserves within state (k = i)**	**Largest Unit Size of internal generation (l)**	**Total Tertiary Reserves within state {m=k + 0.5*l}**
UT Chandigarh	52	74	15	23	409	0	409	0.00	1.00	15		0	15	0	0	0
Delhi	266	343	77	108	7800	952	6848	0.12	0.88	67		9	67	9	216	117
Haryana	483	491	139	154	12642	3178	9464	0.25	0.75	104		35	104	35	660	365
Himachal Pradesh	206	173	59	54	2135	555	1580	0.26	0.74	44		15	44	15	100	65
UT Jammu & Kashmir	405	490	117	154	4495	1856	2639	0.41	0.59	69	615	48	69	48	150	123
Punjab	372	509	107	160	14286	5424	8862	0.38	0.62	67		41	67	41	700	391
Rajasthan	699	813	202	255	16918	10498	6420	0.62	0.38	77		125	77	125	660	455
Uttar Pradesh	770	873	222	274	26462	12390	14072	0.47	0.53	118		104	118	104	660	434
Uttarakhand	243	271	70	85	2606	584	2022	0.22	0.78	54		16	54	16	76	54
NR state Sum	3495	4037	1009	1266												2005
Northern Region	2247	2981	1009	1266												
Chhattisgarh	249	267	111	93	5403	2203	3200	0.41	0.59	66		45	66	45	500	295
UT Daman Diu	57	38	26	13	378	0	378	0.00	1.00	26		0	26	0	0	0
UT Dadra Nagar Haveli	100	98	45	34	1043	0	1043	0.00	1.00	45		0	45	0	0	0
Gujarat	851	909	380	316	21558	12835	8723	0.60	0.40	154	589	226	154	226	800	626
Goa	63	54	28	19	607	0	607	0.00	1.00	28		0	28	0	0	0
Madhya Pradesh	586	758	262	264	17091	7006	10085	0.41	0.59	154		107	154	107	660	437
Maharashtra	999	852	446	297	31929	23586	8343	0.74	0.26	117		329	117	329	660	659
WR States Sum	2906	2976	1297	1036												2018
Western Region	2891	2438	1297	1036												
Andhra Pradesh	729	632	296	276	12294	6549	5745	0.53	0.47	138		158	138	158	800	558
Karnataka	660	639	268	279	14859	9137	5722	0.61	0.39	103		165	103	165	800	565
Kerala	170	191	69	83	4522	1630	2892	0.36	0.64	44	639	25	44	25	130	90
UT Puducherry	58	81	24	35	492	0	492	0.00	1.00	24		0	24	0	0	0
Tamil Nadu	753	858	306	374	17636	5676	11960	0.32	0.68	207		98	207	98	600	398
Telangana	587	523	238	228	14128	6828	7300	0.48	0.52	123		115	123	115	800	515
SR State Sum	2956	2924	1200	1276												2126
Southern Region	2673	3004	1200	1276												
Bihar	340	387	157	160	6778	475	6303	0.07	0.93	146		11	146	11	250	136
DVC	426	359	197	149	4052	5111	-1059	1.26	-0.26	0		197	0	197	600	497
Jharkhand	207	236	95	98	1812	332	1480	0.18	0.82	78		17	78	17	210	122
Orissa	419	412	194	171	6652	3584	3068	0.54	0.46	89	411	104	89	104	600	404
Sikkim	42	38	19	16	128	0	128	0.00	1.00	19		0	19	0	0	0
West Bengal	369	371	170	154	9735	5270	4465	0.54	0.46	78		92	78	92	500	342
ER state Sum	1802	1805	833	747												1502
Eastern Region	1856	1759	833	747												
Arunanchal Pradesh	40	57	17	22	213	0	213	0.00	1.00	17		0	17	0	0	0
Assam	135	189	59	74	2375	323	2052	0.14	0.86	51		8	51	8	50	33
Manipur	29	32	13	12	258	0	258	0.00	1.00	13		0	13	0	0	0
Meghalaya	53	47	23	18	425	0	425	0.00	1.00	23	141	0	23	0	42	21
Mizoram	19	30	8	12	166	0	166	0.00	1.00	8		0	8	0	6	3
Nagaland	28	32	12	13	172	0	172	0.00	1.00	12		0	12	0	8	4
Tripura	66	63	29	24	387	155	232	0.40	0.60	17		12	17	12	21	22
NER State Sum	371	450	161	175												83
North-Eastern Region	358	412	161	175												
All India	10026	10594	4500	4500							2396	2104	2396	2104		7734
										Total Tertiary Reserves Requirement in India				10130		
4500 is the largest contigency considered																

Sample Illustration for Summary of Format RAS4

	Year-Ahead (2023-24)								
	Secondary Reserves			Tertiary Reserves			Total Reserves (Secondary + Tertiary)		
State/ Union Territory UT	Within in ISGS	Within state	Total	Within in ISGS	Within state	Total	Within in ISGS	Within state	Total
UT of Chandigarh	15	0	15	15	0	15	30	0	30
Delhi	67	9	77	67	117	185	135	127	262
Haryana	104	35	139	104	365	469	208	400	608
Himachal Pradesh	44	15	59	44	65	109	88	81	169
UT of Jammu and Kashmir and UT of Ladakh*	69	48	117	69	123	192	137	171	309
Punjab	67	41	107	67	391	457	133	431	565
Rajasthan	77	125	202	77	455	532	153	580	733
Uttar Pradesh	118	104	222	118	434	552	236	538	775
Uttarakhand	54	16	70	54	54	108	109	69	178
Chhattisgarh	66	45	111	66	295	361	132	341	472
UT Daman and Diu ,	26	0	26	26	0	26	51	0	51
UT Dadra and Nagar Haveli#	45	0	45	45	0	45	89	0	89
Gujarat	154	226	380	154	626	780	308	853	1160
Goa	28	0	28	28	0	28	57	0	57
Madhya Pradesh	154	107	262	154	437	592	309	545	853
Maharashtra	117	329	446	117	659	776	233	989	1222
Andhra Pradesh	138	158	296	138	558	696	276	715	991
Karnataka	103	165	268	103	565	668	206	729	935
Kerala	44	25	69	44	90	134	88	115	203
UT of Puducherry	24	0	24	24	0	24	47	0	47
Tamil Nadu	207	98	306	207	398	606	414	497	911
Telangana	123	115	238	123	515	638	246	630	876
Bihar	146	11	157	146	136	282	292	147	439
Damodar Valley Corporation	0	197	197	0	497	497	0	694	694
Jharkhand	78	17	95	78	122	200	156	140	296
Odisha	89	104	194	89	404	494	179	509	688
Sikkim	19	0	19	19	0	19	38	0	38
West Bengal	78	92	170	78	342	420	156	435	591
Arunanchal Pradesh	17	0	17	17	0	17	35	0	35
Assam	51	8	59	51	33	84	101	41	142
Manipur	13	0	13	13	0	13	25	0	25
Meghalaya	23	0	23	23	21	44	46	21	67
Mizoram	8	0	8	8	3	11	17	3	20
Nagaland	12	0	12	12	4	16	24	4	28
Tripura	17	12	29	17	22	39	34	34	68
Region-wise and All-India									
Northern Region	615	394	1009	615	2005	2620	1230	2399	3628
Western Region	589	708	1297	589	2018	2607	1178	2727	3905
Southern Region	639	561	1200	639	2126	2765	1279	2686	3965
Eastern Region	411	422	833	411	1502	1913	822	1925	2746
North-Eastern Region	141	19	161	141	83	224	283	102	385
All India	2396	2104	4500	2396	7734	10130	4791	9838	14630

Note:
* UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC.
# UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as single entity inline with data availability with NLDC.

Format RAS5: Assessment of the reserve capacity requirement for SRAS and TRAS on a three day-ahead basis

State/ Union Territory (UT)	Actual 99 Percentile Negative ACE (MW)	Actual 99 Percentile Positive ACE (MW)	Scaled 99 Percentile Negative ACE (MW) {a}	Scaled 99 Percentile Positive ACE (MW) {b}	Max. Demand met {c}	Internal Gen. at the time of max demand {d}	Drawl from ISTS {e=c-d}	State Internal Generation/ State Maximum Demand {f=d/c}	State drawl from ISTS/ State Maximum Demand {g=e/c}	Secondary Reserves in ISGS {h=a*g}	Secondary Reserves at Regional Level {sum of reserves in all states of the region as given in "h"}	Secondary Reserves within state {i=a*f}	Tertiary Reserves in ISGS (j = h)	Tertiary Reserves within state (k = i)	Largest Unit Size of internal generation (l)	Total Tertiary Reserves within state {m=k + 0.5*l}
UT of Chandigarh																
Delhi																
Haryana																
Himachal Pradesh																
UT of Jammu and Kashmir and UT of Ladakh*																
Punjab																
Rajasthan																
Uttar Pradesh																
Uttarakhand																
NR state Sum																
Northern Region (NR)																
Chhattisgarh																
UT Daman and Diu#																
UT Dadra and Nagar Haveli#																
Gujarat																
Goa																
Madhya Pradesh																
Maharashtra																
WR States Sum																
Western Region (WR)																
Andhra Pradesh																
Karnataka																
Kerala																
UT of Puducherry																
Tamil Nadu																
Telangana																
SR State Sum																
Southern Region (SR)																
Bihar																
Damodar Valley Corporation																
Jharkhand																
Odisha																
Sikkim																
West Bengal																
ER state Sum																
Eastern Region (ER)																
Arunanchal Pradesh																
Assam																
Manipur																
Meghalaya																
Mizoram																
Nagaland																
Tripura																
NER State Sum																
North-Eastern Region (NER)																
All India																
											Total Tertiary Reserves Requirement in India					
	Note: * UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC. # UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as separate entities inline with data shared with NLDC.															

Note: To be published every day by 1100 hrs

Sample Illustration for Format RAS5

State/UT	Actual 99 Percentile Negative ACE (MW)	Actual 99 Percentile Positive ACE (MW)	Scaled 99 Percentile Negative ACE (MW) {a}	Scaled 99 Percentile Positive ACE (MW) {b}	Max. Demand met {c}	Internal Gen. at the time of max demand {d}	Drawl from ISTS {e=c-d}	State Internal Generation/ State Maximum Demand {f=d/c}	State drawl from ISTS/ State Maximum Demand {g=e/c}	Secondary Reserves in ISGS {h=a*g}	Secondary Reserves at Regional Level {sum of reserves in all states of the region as given in "h"}	Secondary Reserves within state {i=a*f}	Tertiary Reserves in ISGS (j = h)	Tertiary Reserves within state (k = i)	Largest Unit Size of internal generation (l)	Total Tertiary Reserves within state {m=k + 0.5*l}
UT of Chandigarh	44	46	16	17	283	0	283	0.00	1.00	16		0	16	0	0	0
Delhi	236	266	83	95	4965	366	4600	0.07	0.93	77		6	77	6	216	114
Haryana	378	418	134	149	8698	2238	6460	0.26	0.74	99		34	99	34	660	364
Himachal Pradesh	138	131	49	47	2033	426	1606	0.21	0.79	38		10	38	10	100	60
UT of Jammu and Kashmir and UT of Ladakh*	359	309	127	110	2971	202	2769	0.07	0.93	118	688	9	118	9	150	84
Punjab	332	423	117	151	11466	3751	7715	0.33	0.67	79		38	79	38	700	388
Rajasthan	606	618	214	221	16918	10498	6420	0.62	0.38	81		133	81	133	660	463
Uttar Pradesh	718	836	253	299	22510	11431	11078	0.51	0.49	125		129	125	129	660	459
Uttarakhand	219	206	77	74	2326	670	1656	0.29	0.71	55		22	55	22	76	60
NR state Sum	3030	3254	1069	1163												1992
Northern Region (NR)	1960	2472	1069	1163												
Chhattisgarh	205	236	107	99	4917	2373	2544	0.48	0.52	56		52	56	52	500	302
UT Daman and Diu , UT Dadra and Nagar Haveli#	74	55	39	23	1409	0	1409	0	1	39		0	39	0	0	0
Gujarat	727	778	382	327	20350	8611	11740	0.42	0.58	220	623	162	220	162	800	562
Goa	50	49	26	20	594	0	594	0.00	1.00	26		0	26	0	0	0
Madhya Pradesh	507	700	267	294	17091	7006	10085	0.41	0.59	157		109	157	109	660	439
Maharashtra	783	754	411	317	27002	18840	8162	0.70	0.30	124		287	124	287	660	617
WR States Sum	2346	2572	1232	1080												1920
Western Region (WR)	2259	2295	1232	1080												
Andhra Pradesh	522	498	273	250	10278	5834	4444	0.57	0.43	118		155	118	155	800	555
Karnataka	573	569	300	285	13093	7916	5177	0.60	0.40	118		181	118	181	800	581
Kerala	156	156	82	78	4006	1426	2580	0.36	0.64	53	612	29	53	29	130	94
UT of Puducherry	67	92	35	46	430	0	430	0.00	1.00	35		0	35	0	0	0
Tamil Nadu	615	690	322	346	15645	9364	6280	0.60	0.40	129		192	129	192	600	492
Telangana	564	506	295	254	14013	6456	7557	0.46	0.54	159		136	159	136	800	536
SR State Sum	2498	2512	1306	1258												2259
Southern Region (SR)	2394	2674	1306	1258												
Bihar	237	348	115	169	6600	425	6175	0.06	0.94	108		7	108	7	250	132
Damodar Valley Corporation	377	379	184	184	3486	5000	-1514	1.43	-0.43	0		184	0	184	600	484
Jharkhand	229	226	112	110	1779	482	1297	0.27	0.73	81	307	30	81	30	210	135
Odisha	371	417	180	203	6119	3959	2160	0.65	0.35	64		117	64	117	600	417
Sikkim	43	27	21	13	128	0	128	0.00	1.00	21		0	21	0	0	0
West Bengal	255	341	124	166	9086	6656	2430	0.73	0.27	33		91	33	91	500	341
ER state Sum	1513	1739	736	846												1509
Eastern Region (ER)	1350	1797	736	846												
Arunanchal Pradesh	32	55	16	23	155	0	155	0.00	1.00	16		0	16	0	0	0
Assam	114	138	57	58	2274	296	1978	0.13	0.87	50		7	50	7	50	32
Manipur	27	28	14	12	247	0	247	0.00	1.00	14		0	14	0	0	0
Meghalaya	40	37	20	16	425	0	425	0.00	1.00	20	135	0	20	0	42	21
Mizoram	18	28	9	12	146	0	146	0.00	1.00	9		0	9	0	6	3
Nagaland	27	24	14	10	166	0	166	0.00	1.00	14		0	14	0	8	4
Tripura	54	52	27	22	320	165	155	0.52	0.48	13		14	13	14	21	24
NER State Sum	311	362	156	153												85
North-Eastern Region (NER)	286	325	156	153												
All India	8250	9563	4500	4500							2365	2135	2365	2135		7765
											Total Tertiary Reserves Requirement in India		10130			

Note: * UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC.
UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as single entity inline with data availability with NLDC.

4500 is the largest contigency considered

Note: To be published every day by 1100 hrs

Sample Illustration for Summary of Format RAS5

State/ Union Territory UT	Secondary Reserves			Tertiary Reserves			Total Reserves (Secondary + Tertiary)		
	Within in ISGS	Within state	Total	Within in ISGS	Within state	Total	Within in ISGS	Within state	Total
UT of Chandigarh	16	0	16	16	0	16	31	0	31
Delhi	77	6	83	77	114	191	154	120	274
Haryana	99	34	134	99	364	464	198	399	597
Himachal Pradesh	38	10	49	38	60	99	77	70	147
UT of Jammu and Kashmir and UT of Ladakh*	118	9	127	118	84	202	236	92	328
Punjab	79	38	117	79	388	467	158	427	584
Rajasthan	81	133	214	81	463	544	162	595	758
Uttar Pradesh	125	129	253	125	459	583	249	587	837
Uttarakhand	55	22	77	55	60	115	110	82	193
Chhattisgarh	56	52	107	56	302	357	111	354	465
UT Daman and Diu , UT Dadra and Nagar Haveli#	39	0	39	39	0	39	78	0	78
Gujarat	220	162	382	220	562	782	441	723	1164
Goa	26	0	26	26	0	26	52	0	52
Madhya Pradesh	157	109	267	157	439	597	315	549	863
Maharashtra	124	287	411	124	617	741	249	904	1152
Andhra Pradesh	118	155	273	118	555	673	236	710	946
Karnataka	118	181	300	118	581	700	237	762	999
Kerala	53	29	82	53	94	147	105	123	228
UT of Puducherry	35	0	35	35	0	35	70	0	70
Tamil Nadu	129	192	322	129	492	622	258	685	943
Telangana	159	136	295	159	536	695	318	672	990
Bihar	108	7	115	108	132	240	216	140	355
Damodar Valley Corporation	0	184	184	0	484	484	0	668	668
Jharkhand	81	30	112	81	135	217	163	166	328
Odisha	64	117	180	64	417	480	127	534	661
Sikkim	21	0	21	21	0	21	42	0	42
West Bengal	33	91	124	33	341	374	66	432	498
Arunanchal Pradesh	16	0	16	16	0	16	32	0	32
Assam	50	7	57	50	32	82	99	40	139
Manipur	14	0	14	14	0	14	28	0	28
Meghalaya	20	0	20	20	21	41	40	21	61
Mizoram	9	0	9	9	3	12	18	3	21
Nagaland	14	0	14	14	4	18	27	4	31
Tripura	13	14	27	13	24	37	26	38	64
Region-wise and All-India									
Northern Region	688	381	1069	688	1992	2680	1376	2373	3749
Western Region	623	610	1232	623	1920	2542	1245	2529	3775
Southern Region	612	694	1306	612	2259	2871	1224	2952	4177
Eastern Region	307	429	736	307	1509	1816	614	1938	2553
North-Eastern Region	135	21	156	135	85	220	270	106	376
All India	2365	2135	4500	2365	7765	10130	4730	9900	14630

Note:
* UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC.
# UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as single entity inline with data availability with NLDC.

Format RAS6: Range of Reserve Requirement from the Day-ahead AS Market

Note: Format to be published on NLDC website everyday by 1100 hrs

Date	TRAS Regulation Up	TRAS Regulation Down
02-June-2023	0 to 3800 MW	0 MW
03-June-2023	0 to 4000 MW	0 to 2500 MW
04-June-2023	0 to 4500 MW	0 to 2500 MW
05-June-2023	0 to 4500 MW	0 MW

(*sample data filled up in in the table for understanding*)

Annexure I: Guideline for Calculation and Monitoring of Area Control Error

This document provides the detailed guidelines to be uniformly adopted by the NLDC, RLDCs, SLDCs, and REMCs for measurement, calculation, monitoring, and archival of Frequency, Tie-Line Flows, Frequency Bias, Metering Errors, and Area Control Error (ACE). ACE is an important parameter which depicts the health of the power system. This document enables uniform notation for ACE, thereby allowing all the load despatch control rooms pan India to pass on information about this grid security aspect with one another.

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1. Formula of Area Control Error (ACE)

The Area Control Error (ACE) for each control area[1] would be calculated at all the load despatch centres based on telemetered values and external inputs as per the below formula.

ACE = (Ia - Is) - 10 * Bf * (Fa - Fs) + Offset

Ia = Actual net interchange in MW (positive value for export)

Is = Scheduled net interchange in MW (positive value for export)

Bf = Frequency Bias Coefficient in MW/0.1 Hz (negative value)

Fa = Actual system frequency in Hz

Fs = Schedule system frequency in Hz

Offset = Provision for compensating errors such as measurement error

In the above formula, ACE has three components as below.

1. Interchange deviation component **(Ia-Is)**
2. Frequency deviation component -**10*Bf*(Fa-Fs)**
3. Offset or Metering Error

Sign convention adopted for interchange MW values is, positive value for export and negative value for import. Bf is a negative value. System Frequency (Fa) is a positive value, close to the National Reference Frequency of 50 Hz.

ACE is positive means that the control area has surplus generation and the control area's internal generation has to be backed down. ACE is negative means the control area is in deficit and the control area's internal generation has to be increased. ACE has to be driven towards zero for better frequency control and grid security.

2. Measurement of Frequency

System frequency is an important input for calculating ACE. Typically, ACE is used for taking generation increase/decrease actions using the below applications

[1] *Control Area means an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas and contributes to regulation of frequency as specified;*

a. Secondary frequency control through AGC
b. Tertiary frequency control through TRAS
c. Monitoring and manual generation rescheduling

All the above three applications operate in the time frame of a few seconds to several minutes. Hence it should suffice that the system frequency signal is captured using a sampling time of a few seconds for calculation of ACE.

Suggested sampling time for frequency: 4 seconds, i.e., take a fresh frequency data point every four seconds.

2.1. Choosing the master list of redundant frequency sources

The frequency signal taken should be free from noise. To ensure the same, the signals from such stations shall be selected as the frequency sources, whose historical data is proven to be at least 99.9% noise-free in the past three months. To identify noise, the frequency data of different stations shall be plotted in a time series graph. The graph should be free from spikes. Choose 10 such stations to act as redundant frequency sources in ACE calculation. This list may be reviewed quarterly.

2.2. Location of redundant frequency sources and host server

For the applications a, b, and c, mentioned above, frequency source from any geographic location should serve the purpose as the time range of interest is in seconds. Typically, in time frame of a few seconds, all the electromagnetic transients and most of the electromechanical transients usually get damped and settled[2]. Hence, stations from different geographic locations can be chosen as redundant frequency sources. Having a mix of at least 10 redundant frequency sources from SCADA and URTDSM (PMU) is advised. Frequency data from URTDSM server are generally imported into SCADA3 for the purpose of ACE calculation.

2.3. Algorithm for selecting the Primary Frequency Source

The ACE calculation program can look at the quality tags of all the redundant signals and choose one of the signals as the primary source. The update of the quality tags happens along with the sampling of the data in the EMS system, as a general practice. In case the quality of the primary frequency source becomes 'suspect', then the next signal with 'good quality tag' shall be selected as the primary frequency source automatically. This logic may be developed into the calculation program gradually, if not immediately.

Algorithm outline:
Initialize Primary Freq= 50 Hz

Initialize K=1

Initialize J=1

Initialize Flag = Good

Call Subroutine-A

Subroutine-A ()

Select the Kth frequency signal in the list as 'primary' and read its quality tag.

If the quality tag is good, set J=1, exit Subroutine-A and GOTO Subroutine-B.

If, J=11, Primary Freq = 50 Hz, exit Subroutine-A and GOTO Subroutine-B.

Else, K=K+1, J=J+1 and Call Subroutine-A.

End Subroutine-A ()

Subroutine-B ()

While Flag = Good

Read the quality tag of the Kth signal at time t

If the quality tag is good, t=t0+4s, Flag=Good

Else Flag = Bad

End While

GOTO Subroutine-A

End Subroutine-B

3. Measurement of Tie-Line Flows

3.1. Actual Tie-Line Flows

Actual tie-line flows shall be sampled every 4 seconds similar to frequency and shall be used in the ACE calculation. The update of the quality tags happens along with the sampling of the data in the EMS system, as a general practice. Say, the data is acquired only every 12s by the SCADA because of delays, the ACE calculation program shall repeat the data thrice in those 12s. Some Tie-Line flows have the problem of becoming suspect often. Such data should be identified and rectified immediately by following up with site/substation. Efforts shall be made by respective utilities that the clock synchronization across all the stations taken into consideration by the respective LDC and its calibration shall be done once every

year in order to ensure the synchronicity of time stamping of the collected data. Every tie-line flow can be obtained from 3 different sources viz.,

i. Primary Side (choose the Metering End as per Grid Code)
ii. Secondary Side (side other than the Metering End as per Grid Code)
iii. State Estimator output

Primary side data shall be normally used for ACE calculation. In case the quality of the primary side becomes 'suspect', then let the ACE calculation program automatically choose the secondary side. If flow at both the ends goes suspect, use the state estimator output. If the state estimator is not running, replace the suspect data manually with 'last good value', rather than retaining garbage value. Information of manual interventions shall be monitored, carried forward and updated frequently in every shift. Sign convention adopted for interchange MW values is, positive value for export and negative value for import.

Note that all the tie-lines should be accounted for, while calculating the Net Actual Tie-Line Flow (Ia), i.e., algebraic sum of the flows. If any of the tie-lines is non-observable, the data of the same can be replaced with a fixed value as informed by site/substation telephonically to the control room.

3.2. Scheduled Tie-Line Flows

The Net Scheduled Tie-Line Flow (*Is*) of a control area should generally be the output of a scheduling software program, from which the data is imported into SCADA for all the 96-time blocks. ACE is calculated using the net tie-line flow, and path-wise scheduled flows are algebraically added based on direction.

Net Scheduled Tie-Line Flow of the control area can be calculated every time block by adding the algebraic sum of scheduled MW export contracts (from the control area to all the other control areas; positive values) and the scheduled MW import contracts (to the control area from all the other control areas; negative values) and the MW sum of resultant of such entities. In line with the tie-line flow convention, sign convention for TRAS Up regulation is positive, TRAS Down is negative. For ACE calculation, net control area values are important and not the path-wise values.

For example, if a particular control area imports 2000 MW from the other control areas through tie-lines, exports 500 MW to the other control areas through tie-lines, TRAS Up of 200 MW is dispatched and SCED Down of 100 MW is dispatched. Then Is = -2000+500+200-100 = -1400 MW for that time block.

The Net Scheduled Tie-Line Flow value should be less than the Export Available Transfer Capability (ATC) and greater than the Import ATC value. While calculating ACE, this 15-minute data has to be updated/refreshed every 4 seconds.

4. Assessment of Frequency Bias

The 2017 IEEE Task Force Report on "Measurement, Monitoring, and Reliability Issues Related to Primary Governing Frequency Response," recommends using Frequency Response Characteristic (FRC) calculated after the power and frequency transients have settled, for the Frequency Bias Coefficient (Bf) used in the ACE equation. A sample size of twenty (20) FRC events may be adequate for estimating the frequency response characteristic to minimise error.

FRC computation procedure is provided in Grid Code. A sample template for FRC assessment is enclosed as Annexure-I.I. FRC shall be computed for every control area for all events involving a sudden 1000 MW or more load/generation loss or a step change in frequency by 0.10 Hz. All these FRC values shall be archived along with date, time and reasons of the event.

4.1. Bf value assessment

In the calculation of ACE, the value of Frequency Bias Coefficient in MW/0.1 Hz (negative value) shall be based on median Frequency Response Characteristic. Median value of the past 20 events shall be used for updating the FRC. The occurrence of these 20 events is actually expected to cover the entire previous year, thereby subsuming the seasonality aspect of load and generation. The all-India, region-wise and state-wise Bf value, used in the reserve estimation computation, shall be provided on the Nodal Agency website as per ***Format RAS7***. Bf value shall be reviewed by the Nodal Agency.

4.2. Bf update timing

The Bias (Bf) value may be reviewed in the ACE calculations at the LDCs, once in every quarter on the 24th day of the month after the completion of the previous quarter. For example, Bias (Bf) value shall be updated on 24th July, after the completion of the quarter April – June. The updated Bf value in SCADA shall also be shared continuously through ICCP bottoms up, from SLDCs to RLDCs, and from RLDCs to NLDC for all the relevant control areas. An offline all India compilation in Excel/DB may be maintained by NLDC for all the control areas. While calculating ACE, this quarterly data has to be updated/refreshed every 4 seconds.

5. Measurement of Metering Errors – OFFSET

Typically, the accuracy level of the SCADA Remote Terminal Unit (RTU) is 0.5%. Also, there is a chance of error in the instrumentation and communication. Inherent latency and non-simultaneous reporting of SCADA might also cause metering error. Hence, while calculating ACE using the RTU metered tie-line flows, there is a probability of metering errors corrupting the actual value. OFFSET shall be used if such a metering error has been established using long-term data/statistical analysis.

In case of un-observable tie-line flows, where it is not feasible to replace the actual tie line flow data manually, OFFSET can be used to substitute the tie-line flow with correct sign convention. Information of manual interventions shall be monitored, carried forward and updated frequently in every shift. Sign convention adopted for interchange MW values is, positive value for export and negative value for import. While calculating ACE, OFFSET data has to be updated/refreshed every 4 seconds.

6. Calculation of ACE

Scheduled Interchange (Is), Actual Interchange (Ia), Actual Frequency (Fa), Scheduled Frequency (Fs), Frequency Bias (Bf) and Offset shall be updated/refreshed every 4 seconds in the calculation.

7. Archival of different parameters

It is important to archive the individual parts of the ACE into a database every 4 seconds. That means, apart from the calculated ACE, Interchange deviation (Ia-Is), Frequency deviation (Fa-Fs), Frequency Bias (Bf) and Offset shall also be separately archived in the database every 4 seconds. This is necessary to build and calculate what-if scenarios for reserve estimation, forecasting, etc.

8. Monitoring of ACE and Suggested Corrective Actions

All the control rooms of the control areas shall prominently monitor ACE, apart from the tie-line deviation and frequency deviation.

ACE is positive means that the control area has surplus generation and the control area's internal generation has to be backed down. ACE is negative means the control area is in deficit and the control area's internal generation has to be increased. All the frequency control interventions shall be in the direction to drive ACE towards zero. ACE remaining in the same direction for several minutes without crossing zero is a strong indicator that the frequency control interventions have to be kicked in.

9. Calculating ACE for Regional Entity Control Area

Each Regional entity generating station is a control area by itself. ACE for such entity shall be worked out separately for the purpose of monitoring. The bias would depend on the number of units on bar (40% of capacity on bar per Hz assuming 5% droop plus a small load response from the unit auxiliaries).

Annexure-I.I: Sample Template for Frequency Response Characteristic Calculation

Frequency Response Characteristic Calculation for All India based on NLDC SCADA Data

EVENT: As reported at 16:02 Hrs on 11th June 2021, 220 kV Akal-Bhu -1&2 tripped due to snapping of B-phase jumper which resulted into 1200MW wind generation loss and 300MW solar generation loss in Northern region. At the same time, 400kV Barmer-Jaisalmer-1&2 also tripped due to over voltage after tripping of wind and solar generation.It appears that two events happen in quick succesSsion, total generation loss of around 1500 MW as per reported region has been considered for FRC calculation.

S No	Particulars	Dimension	NR	ER	WR	NER	SR	Nepal	Bhutan	#Bangladesh	Combined cross border	All India
1	Actual Net Interchange before the Event (16:02:30)	MW	11313	-5678	-8306	21.2	1850	109	1241	1039	2390	164388
2	Actual Net Interchange after the Event (16:03:50)	MW	12241	-6128	-9200	-21.5	1469	105	1241	1038	2384	164088
3	Change in Net Interchange (2 - 1)	MW	928	-451	-895	-42.7	-381	-4	-1	-1	-6	-300
4	Generation Loss (+) / Load Throw off (-) during the Event	MW	1500	0	0	0	0	0	0	0	0	1500
5	Control Area Response (3 - 4)	MW	-572	-451	-895	-43	-381	-4	-1	-1	-6	-1800
6	Frequency before the Event	HZ	50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09
7	Frequency after the Event	HZ	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
8	Change in Frequency (7 - 6)	HZ	-0.090	-0.090	-0.090	-0.090	-0.090	-0.090	-0.090	-0.090	-0.090	-0.090
9	Frequency Response Characteristic (5 / 8)	MW/Hz	6353	5007	9939	475	4233	47	6	11	64	20000
10	Net System Demand met before the Event	MW	57737	18219	47210	2249	38974	--	--	--	--	--
11	Internal Generation before the Event (10 - 1)	MW	46424	23897	55516	2228	37124	--	--	--	--	--
12	Ideal load response assuming 4% per Hz (0.04*Row 10)	MW/Hz	2309	729	1888	90	1559	--	--	--	--	--
13	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 11)	MW/Hz	18570	9559	22206	891	14849	--	--	--	--	--
14	Composite ideal response (12 + 13)	MW/Hz	20879	10287	24095	981	16408	--	--	--	--	--
15	Percentage ideal response	%	30.4%	48.7%	41.2%	48.4%	25.8%	--	--	--	--	--

(*) - Data may be constant/suspected during the event
Note: +ve exchange=> import ; (-)ve exchange => export

Flow of 132kv Surjamani-comilla D/c is included in Bangladesh interchange,

Total Generation All India

Total Change in (MW)	1500
FRC for NEWS GRID (dp/df) MW/Hz	**16667**
Power Number (net change in MW/maximum change in frequency)	**8824**

Source Wise Generation (MW)	GAS	HYDRO	NUCLEAR	Thermal	WIND	SOLAR
	4834	22342	5088	98676	20669	12686

Percentage of non responsive generation(nuclear+ wind+ solar as a percentage of total generation)	23.40%

Format RAS7

All-India, Region-wise and State-wise Frequency Bias Coefficient

State/Region/All India	Frequency Bias Coefficient (value in MW/0.1 Hz)
Punjab	
Haryana	
Rajasthan	
Delhi	
Uttar Pradesh	
Uttarakhand	
UT Chandigarh	
Himachal Pradesh	
UT Jammu & Kashmir	
West Bengal	
Bihar	
Odisha	
Jharkhand	
DVC	
Sikkim	
Maharashtra	
Gujarat	
Madhya Pradesh	
Chhattisgarh	
UT Dadra Nagar Haveli	
UT Daman Diu	
Goa	
Andhra Pradesh	
Tamil Nadu	
Karnataka	
Kerala	
UT Puducherry	
Telangana	
Assam	
Meghalaya	
Tripura	
Manipur	
Mizoram	
Nagaland	
Arunachal Pradesh	
ER	
NR	
NER	
SR	
WR	
All-India	

Updated as on: dd/mmm/yyyy

Unique	Number of outages	Total Outage hours	Avg Outage Hours	Repair probablity	Total duration	Total available duration	Failure probablity
660 MW Suratgarh SCTPS - UNIT 7	61	337.2388889	5.5285064	0.0075367	985	647.761111	0.0000643
135 MW Rajwest (IPP) LTPS - UNIT 3	57	272.2729167	4.7767178	0.0087229	985	712.727083	0.0000585
660 MW Suratgarh SCTPS - UNIT 8	54	198.8451389	3.6823174	0.0113153	985	786.154861	0.0000530
250 MW Suratgarh TPS - UNIT 4	52	81.4375	1.5661058	0.0266053	985	903.5625	0.0000461
135 MW Rajwest (IPP) LTPS - UNIT 1	51	195.4569444	3.8324891	0.010872	985	789.543056	0.0000528
250 MW Suratgarh TPS - UNIT 3	51	107.7055556	2.1118736	0.0197297	985	877.294444	0.0000475
250 MW Suratgarh TPS - UNIT 2	49	211.9305556	4.3251134	0.0096337	985	773.069444	0.0000539
250 MW Suratgarh TPS - UNIT 6	48	107.2152778	2.2336516	0.0186541	985	877.784722	0.0000475
250 MW Suratgarh TPS - UNIT 5	45	143.0451389	3.1787809	0.0131078	985	841.954861	0.0000495
135 MW Rajwest (IPP) LTPS - UNIT 4	44	193.2569444	4.3922033	0.0094865	985	791.743056	0.0000526
135 MW Rajwest (IPP) LTPS - UNIT 2	38	221.6208333	5.8321272	0.0071443	985	763.379167	0.0000546
135 MW Rajwest (IPP) LTPS - UNIT 5	38	191.5090278	5.0397113	0.0082677	985	793.490972	0.0000525
125 MW Barsingsar (NLC) - UNIT 1	38	130.2659722	3.4280519	0.0121546	985	854.734028	0.0000487
600 MW Kalisindh TPS - UNIT 1	38	133.3972222	3.5104532	0.0118693	985	851.602778	0.0000489
660 MW Harduaganj_Ext - UNIT 1	38	82.26180556	2.1647844	0.0192475	985	902.738194	0.0000462
600 MW Kalisindh TPS - UNIT 2	36	131.7097222	3.6586034	0.0113887	985	853.290278	0.0000488
135 MW Rajwest (IPP) LTPS - UNIT 8	34	184.0972222	5.4146242	0.0076952	985	800.902778	0.0000520
135 MW Rajwest (IPP) LTPS - UNIT 6	34	166.8909722	4.908558	0.0084886	985	818.109028	0.0000509
660 MW Talwandi Sabo TPS - UNIT 2	34	83.64236111	2.4600694	0.0169372	985	901.357639	0.0000462
210 MW Guru Gobind Singh TPS (Ropar) - UNIT 5	34	49.84722222	1.4660948	0.0284202	985	935.152778	0.0000446
660 MW Chhabra SCTPS - UNIT 5	31	84.95555556	2.7405018	0.015204	985	900.044444	0.0000463
500 MW Singrauli STPS - UNIT 6	31	46.85277778	1.5113799	0.0275686	985	938.147222	0.0000444
250 MW Suratgarh TPS - UNIT 1	31	230.13125	7.4235887	0.0056127	985	754.86875	0.0000552
210 MW Guru Gobind Singh TPS (Ropar) - UNIT 6	31	79.61736111	2.568302	0.0162234	985	905.382639	0.0000460
200 MW Obra TPS - UNIT 9	30	42.97083333	1.4323611	0.0290895	985	942.029167	0.0000442
210 MW Anpara TPS - UNIT 3	30	70.525	2.3508333	0.0177242	985	914.475	0.0000456
210 MW Kota TPS - UNIT 5	30	112.8881944	3.7629398	0.0110729	985	872.111806	0.0000478
200 MW Obra TPS - UNIT 12	30	75.23194444	2.5077315	0.0166153	985	909.768056	0.0000458
210 MW Guru Gobind Singh TPS (Ropar) - UNIT 4	30	49.04097222	1.6346991	0.0254889	985	935.959028	0.0000445
600 MW RGTPP(Khedar) - UNIT 1	30	96.98541667	3.2328472	0.0128885	985	888.014583	0.0000469
135 MW Rajwest (IPP) LTPS - UNIT 7	29	147.1652778	5.0746648	0.0082107	985	837.834722	0.0000497
210 MW Guru Gobind Singh TPS (Ropar) - UNIT 3	28	39.69444444	1.4176587	0.0293912	985	945.305556	0.0000441
250 MW Chhabra TPS - UNIT 2	27	96.69305556	3.5812243	0.0116348	985	888.306944	0.0000469

210 MW Kota TPS - UNIT 4	27	47.19791667	1.748071	0.0238358	985	937.802083	0.0000444
660 MW Jhajjar(CLP) - UNIT 2	27	55.81597222	2.0672582	0.0201555	985	929.184028	0.0000448
125 MW Barsingsar (NLC) - UNIT 2	26	161.6680556	6.2180021	0.006701	985	823.331944	0.0000506
500 MW Singrauli STPS - UNIT 7	26	78.15833333	3.0060897	0.0138608	985	906.841667	0.0000459
110 MW Kota TPS - UNIT 2	26	99.53611111	3.828312	0.0108838	985	885.463889	0.0000471
195 MW Kota TPS - UNIT 6	26	73.19166667	2.8150641	0.0148013	985	911.808333	0.0000457
660 MW Meja TPS - UNIT 1	26	73.74097222	2.8361912	0.0146911	985	911.259028	0.0000457
250 MW Panipat TPS - UNIT 7	26	17.09930556	0.6576656	0.0633554	985	967.900694	0.0000430
660 MW Chhabra SCTPS - UNIT 6	25	25.63680556	1.0254722	0.0406317	985	959.363194	0.0000434
195 MW Kota TPS - UNIT 7	25	38.10138889	1.5240556	0.0273393	985	946.898611	0.0000440
600 MW RGTPP(Khedar) - UNIT 2	25	50.02708333	2.0010833	0.0208221	985	934.972917	0.0000446
660 MW Talwandi Sabo TPS - UNIT 1	25	158.4298611	6.3371944	0.0065749	985	826.570139	0.0000504
210 MW Anpara TPS - UNIT 1	24	119.1472222	4.9644676	0.008393	985	865.852778	0.0000481
660 MW Bara PPGCL TPS - UNIT 2	24	85.56388889	3.565162	0.0116872	985	899.436111	0.0000463
660 MW Meja TPS - UNIT 2	23	222.25625	9.6633152	0.0043118	985	762.74375	0.0000546
500 MW Anpara-D TPS - UNIT 1	22	50.27916667	2.2854167	0.0182315	985	934.720833	0.0000446
270 MW Goindwal(GVK) - UNIT 2	22	156.8541667	7.1297348	0.0058441	985	828.145833	0.0000503
660 MW Jhajjar(CLP) - UNIT 1	22	72.49652778	3.2952967	0.0126443	985	912.503472	0.0000457
500 MW Anpara-D TPS - UNIT 2	22	65.72152778	2.9873422	0.0139477	985	919.278472	0.0000453
660 MW Lalitpur TPS - UNIT 2	21	82.28541667	3.9183532	0.0106337	985	902.714583	0.0000462
660 MW Tanda TPS - UNIT 5	21	13.06597222	0.6221892	0.0669678	985	971.934028	0.0000429
500 MW Rihand-I STPS - UNIT 2	21	47.66666667	2.2698413	0.0183566	985	937.333333	0.0000445
270 MW Goindwal(GVK) - UNIT 1	21	68.65138889	3.2691138	0.0127456	985	916.348611	0.0000455
110 MW Kota TPS - UNIT 1	20	98.87847222	4.9439236	0.0084279	985	886.121528	0.0000470
200 MW Obra TPS - UNIT 11	20	30.52291667	1.5261458	0.0273019	985	954.477083	0.0000437
110 MW Harduaganj-C TPS - UNIT 7	20	74.39027778	3.7195139	0.0112022	985	910.609722	0.0000458
660 MW Bara PPGCL TPS - UNIT 1	19	60.11180556	3.1637792	0.0131699	985	924.888194	0.0000451
200 MW Obra TPS - UNIT 10	19	52.42361111	2.7591374	0.0151013	985	932.576389	0.0000447
210 MW Kota TPS - UNIT 3	19	270.5631944	14.240168	0.002926	985	714.436806	0.0000583
210 MW Panipat TPS - UNIT 6	19	38.81944444	2.0431287	0.0203936	985	946.180556	0.0000440
300 MW DCRTPP (Yamuna Nagar) - UNIT 2	18	32.59375	1.8107639	0.0230105	985	952.40625	0.0000437
660 MW Tanda TPS - UNIT 6	18	13.89652778	0.7720293	0.0539703	985	971.103472	0.0000429
660 MW Bara PPGCL TPS - UNIT 3	17	71.03194444	4.1783497	0.009972	985	913.968056	0.0000456
250 MW Harduaganj-D TPS - UNIT 9	17	26.40069444	1.552982	0.0268301	985	958.599306	0.0000435
660 MW Lalitpur TPS - UNIT 1	17	44.85277778	2.6383987	0.0157924	985	940.147222	0.0000443
500 MW Anpara TPS - UNIT 5	17	43.36944444	2.5511438	0.0163325	985	941.630556	0.0000442

250 MW Chhabra TPS - UNIT 1	17	48.31805556	2.8422386	0.0146598	985	936.681944	0.0000445
250 MW Chhabra TPS - UNIT 3	17	240.7131944	14.1596	0.0029426	985	744.286806	0.0000560
200 MW Obra TPS - UNIT 13	17	336.275	19.780882	0.0021064	985	648.725	0.0000642
135 MW VSLPP (IPP) - UNIT 1	17	180.9993056	10.647018	0.0039135	985	804.000694	0.0000518
200 MW Singrauli STPS - UNIT 3	16	161.9611111	10.122569	0.0041162	985	823.038889	0.0000506
250 MW Guru Hargobind Singh TPS (Lehra Mohabbat) - UNIT 3	16	45.69236111	2.8557726	0.0145903	985	939.307639	0.0000444
500 MW Anpara TPS - UNIT 4	15	51.96527778	3.4643519	0.0120273	985	933.034722	0.0000447
250 MW Panipat TPS - UNIT 8	15	63.44791667	4.2298611	0.0098506	985	921.552083	0.0000452
200 MW Singrauli STPS - UNIT 4	14	15.85138889	1.1322421	0.0368001	985	969.148611	0.0000430
660 MW Lalitpur TPS - UNIT 3	14	32.39791667	2.3141369	0.0180053	985	952.602083	0.0000437
500 MW ISTPP (Jhajjar) - UNIT 1	14	21.37430556	1.5267361	0.0272913	985	963.625694	0.0000432
600 MW Anpara-C TPS - UNIT 2	14	41.61111111	2.9722222	0.0140187	985	943.388889	0.0000442
490 MW Dadri-II TPS - UNIT 2	14	16.44652778	1.174752	0.0354685	985	968.553472	0.0000430
210 MW Anpara TPS - UNIT 2	14	65.56736111	4.6833829	0.0088967	985	919.432639	0.0000453
210 MW Paricha TPS - UNIT 3	13	29.01875	2.2322115	0.0186661	985	955.98125	0.0000436
660 MW Kawai TPS - UNIT 2	13	37.35972222	2.8738248	0.0144987	985	947.640278	0.0000440
210 MW Unchahar TPS - UNIT 2	13	13.67986111	1.052297	0.0395959	985	971.320139	0.0000429
500 MW Unchahar IV TPS - UNIT 1	13	24.14166667	1.8570513	0.022437	985	960.858333	0.0000434
500 MW Rihand-II STPS - UNIT 1	12	25.51736111	2.1264468	0.0195945	985	959.482639	0.0000434
210 MW Paricha TPS - UNIT 4	12	44.58611111	3.7155093	0.0112143	985	940.413889	0.0000443
500 MW Rihand-I STPS - UNIT 1	12	17.80694444	1.483912	0.0280789	985	967.193056	0.0000431
660 MW Talwandi Sabo TPS - UNIT 3	12	225.3472222	18.778935	0.0022188	985	759.652778	0.0000548
250 MW Chhabra TPS - UNIT 4	12	430.1541667	35.846181	0.0011624	985	554.845833	0.0000751
110 MW Tanda TPS - UNIT 4	12	12.125	1.0104167	0.0412371	985	972.875	0.0000428
600 MW Anpara-C TPS - UNIT 1	12	31.87847222	2.6565394	0.0156846	985	953.121528	0.0000437
210 MW Dadri-I TPS - UNIT 4	12	24.50416667	2.0420139	0.0204047	985	960.495833	0.0000434
250 MW Paricha TPS - UNIT 5	12	26.70763889	2.2256366	0.0187212	985	958.292361	0.0000435
300 MW Rosa TPS - UNIT 1	11	83.53333333	7.5939394	0.0054868	985	901.466667	0.0000462
660 MW Kawai TPS - UNIT 1	11	42.55277778	3.8684343	0.0107709	985	942.447222	0.0000442
210 MW Unchahar II TPS - UNIT 1	11	19.9375	1.8125	0.0229885	985	965.0625	0.0000432
210 MW Unchahar TPS - UNIT 1	11	64.46736111	5.8606692	0.0071095	985	920.532639	0.0000453
300 MW DCRTPP (Yamuna Nagar) - UNIT 1	11	140.7118056	12.791982	0.0032572	985	844.288194	0.0000494
700 MW Rajpura(NPL) TPS - UNIT 2	10	17.33263889	1.7332639	0.0240394	985	967.667361	0.0000431
250 MW Paricha TPS - UNIT 6	10	16.79166667	1.6791667	0.0248139	985	968.208333	0.0000430
700 MW Rajpura(NPL) TPS - UNIT 1	10	18.67013889	1.8670139	0.0223173	985	966.329861	0.0000431
110 MW Tanda TPS - UNIT 2	10	26.67361111	2.6673611	0.0156209	985	958.326389	0.0000435

200 MW Singrauli STPS - UNIT 2	10	11.80763889	1.1807639	0.0352879	985	973.192361	0.0000428
200 MW Singrauli STPS - UNIT 5	9	9.477083333	1.0530093	0.0395691	985	975.522917	0.0000427
210 MW Unchahar II TPS - UNIT 2	9	15.10972222	1.678858	0.0248185	985	969.890278	0.0000430
200 MW RAPS-A - UNIT 2	9	248.15625	27.572917	0.0015111	985	736.84375	0.0000565
210 MW Dadri-I TPS - UNIT 2	9	17.02083333	1.8912037	0.0220318	985	967.979167	0.0000430
300 MW Rosa TPS - UNIT 2	8	55.32777778	6.9159722	0.0060247	985	929.672222	0.0000448
500 MW Rihand-III STPS - UNIT 1	8	16.89583333	2.1119792	0.0197287	985	968.104167	0.0000430
210 MW Unchahar III TPS - UNIT 1	8	7.208333333	0.9010417	0.0462428	985	977.791667	0.0000426
250 MW Guru Hargobind Singh TPS (Lehra Mohabbat) - UNIT 4	8	23.41527778	2.9269097	0.0142357	985	961.584722	0.0000433
210 MW Guru Hargobind Singh TPS (Lehra Mohabbat) - UNIT 1	8	8.100694444	1.0125868	0.0411487	985	976.899306	0.0000427
300 MW Rosa TPS - UNIT 3	7	71.08472222	10.15496	0.0041031	985	913.915278	0.0000456
490 MW Dadri-II TPS - UNIT 1	7	8.911111111	1.2730159	0.0327307	985	976.088889	0.0000427
500 MW Rihand-II STPS - UNIT 2	7	14.06875	2.0098214	0.0207315	985	970.93125	0.0000429
110 MW Tanda TPS - UNIT 1	7	8.857638889	1.265377	0.0329283	985	976.142361	0.0000427
111.19 MW Auraiya GPS - UNIT 2	7	10.98819444	1.5697421	0.0265436	985	974.011806	0.0000428
210 MW Dadri-I TPS - UNIT 1	7	38.14166667	5.4488095	0.0076469	985	946.858333	0.0000440
200 MW Singrauli STPS - UNIT 1	6	11.77777778	1.962963	0.0212264	985	973.222222	0.0000428
10 MW Unchahar Solar - UNIT 1	6	2.133333333	0.3555556	0.1171875	985	982.866667	0.0000424
300 MW Rosa TPS - UNIT 4	6	20.40347222	3.4005787	0.0122528	985	964.596528	0.0000432
500 MW Rihand-III STPS - UNIT 2	6	13.9375	2.3229167	0.0179372	985	971.0625	0.0000429
110 MW Tanda TPS - UNIT 3	6	10.41805556	1.7363426	0.0239968	985	974.581944	0.0000428
250 MW Harduaganj-D TPS - UNIT 8	6	5.316666667	0.8861111	0.0470219	985	979.683333	0.0000425
500 MW ISTPP (Jhajjar) - UNIT 3	6	16.19513889	2.6991898	0.0154367	985	968.804861	0.0000430
220 MW NAPS - UNIT 1	5	16.78263889	3.3565278	0.0124136	985	968.217361	0.0000430
156.07 MW Faridabad GPS - UNIT 3	5	5.136111111	1.0272222	0.0405625	985	979.863889	0.0000425
130.19 MW Dadri GPS - UNIT 1	5	16.70694444	3.3413889	0.0124699	985	968.293056	0.0000430
150 MW Shree Cement (IPP) TPS - UNIT 2	5	12.68472222	2.5369444	0.016424	985	972.315278	0.0000429
220 MW RAPS-C - UNIT 1	5	25.12083333	5.0241667	0.0082932	985	959.879167	0.0000434
500 MW ISTPP (Jhajjar) - UNIT 2	4	2.257638889	0.5644097	0.0738234	985	982.742361	0.0000424
137.75 MW Faridabad GPS - UNIT 1	4	4.328472222	1.0821181	0.0385047	985	980.671528	0.0000425
130.19 MW Dadri GPS - UNIT 2	4	1.184027778	0.2960069	0.1407625	985	983.815972	0.0000424
109.3 MW Auraiya GPS - UNIT 5	4	12.66319444	3.1657986	0.0131615	985	972.336806	0.0000429
220 MW RAPS-C - UNIT 2	4	17.21944444	4.3048611	0.009679	985	967.780556	0.0000431
220 MW NAPS - UNIT 2	4	32.91111111	8.2277778	0.0050641	985	952.088889	0.0000438
111.19 MW Auraiya GPS - UNIT 4	4	8.816666667	2.2041667	0.0189036	985	976.183333	0.0000427
210 MW Guru Hargobind Singh TPS (Lehra Mohabbat) - UNIT 2	4	8.644444444	2.1611111	0.0192802	985	976.355556	0.0000427

111.19 MW Auraiya GPS - UNIT 3	4	28.71319444	7.1782986	0.0058045	985	956.286806	0.0000436
111.19 MW Auraiya GPS - UNIT 1	4	1.930555556	0.4826389	0.0863309	985	983.069444	0.0000424
220 MW RAPS-B - UNIT 2	4	36.71180556	9.1779514	0.0045399	985	948.288194	0.0000439
150 MW Shree Cement (IPP) TPS - UNIT 1	4	6.809027778	1.7022569	0.0244773	985	978.190972	0.0000426
Ramgarh GPS - UNIT 1	4	5.875694444	1.4689236	0.0283654	985	979.124306	0.0000426
Ramgarh GPS - UNIT 5	4	8.229166667	2.0572917	0.0202532	985	976.770833	0.0000427
130.19 MW Dadri GPS - UNIT 4	3	0.590972222	0.1969907	0.2115159	985	984.409028	0.0000423
130.19 MW Dadri GPS - UNIT 3	3	14.3875	4.7958333	0.0086881	985	970.6125	0.0000429
210 MW Dadri-I TPS - UNIT 3	3	4.775694444	1.5918981	0.0261742	985	980.224306	0.0000425
154.51 MW Dadri GPS - UNIT 6	3	38.23888889	12.746296	0.0032689	985	946.761111	0.0000440
Ramgarh GPS - UNIT 3	3	8.242361111	2.7474537	0.0151656	985	976.757639	0.0000427
Ramgarh GPS - UNIT 4	3	3.809722222	1.2699074	0.0328108	985	981.190278	0.0000425
216 MW Bawana GPS - UNIT 1	2	40.14305556	20.071528	0.0020759	985	944.856944	0.0000441
154.51 MW Dadri GPS - UNIT 5	2	0.204166667	0.1020833	0.4081633	985	984.795833	0.0000423
88.71 MW Anta GPS - UNIT 2	2	18.95555556	9.4777778	0.0043962	985	966.044444	0.0000431
153.2 MW Anta GPS - UNIT 4	2	38.79375	19.396875	0.0021481	985	946.20625	0.0000440
88.71 MW Anta GPS - UNIT 1	2	2.897916667	1.4489583	0.0287563	985	982.102083	0.0000424
137.75 MW Faridabad GPS - UNIT 2	2	1.25	0.625	0.0666667	985	983.75	0.0000424
220 MW RAPS-B - UNIT 1	1	6.749305556	6.7493056	0.0061735	985	978.250694	0.0000426
216 MW Bawana GPS - UNIT 3	1	27.80416667	27.804167	0.0014986	985	957.195833	0.0000435
216 MW Bawana GPS - UNIT 4	1	31.16875	31.16875	0.0013368	985	953.83125	0.0000437
104.6 MW Pragati Gas Turbines - UNIT 2	1	80.17847222	80.178472	0.0005197	985	904.821528	0.0000460
30 MW Delhi Gas Turbines - UNIT 1	1	1.243055556	1.2430556	0.0335196	985	983.756944	0.0000424

Annexure 1:

List of Time Drift report received				
S. No.	**Station**	**Meter No.**	**Time Drift Report Received**	**Time drift (Sec)**
1	NTPC ANTA		Yes	
2	Dhulkote BBMB		Yes	
3	Rampur		Yes	
4	Kotputli SS		Yes	
5	Singrauli - 1		Yes	
6	Rihand STPS		Yes	
7	Allahabad - 1		Yes	
8	Vindhyachal Pooling 1		Yes	
9	BHAKRA	NR-3366-A	Yes	130
		NR-3384-A	Yes	154
10	Singrauli	NP-1549-A	Yes	8715
11	Salal	WR-2159-A	Yes	62
12	RAPS-B	NP-3022-A	Yes	120
13	Anta	NP-1303-A	Yes	64
14	Dhulkote	NP-3107-A	Yes	60
15	Bhakra Left Bank	NP-3097-A	Yes	222
16	Kotla	WR-2156-A	Yes	62
18	Dasuya	NP-1871-A	Yes	85
19	Ropar	NP-8556-A	Yes	96
20	Majri	NP-1563-A	Yes	64
21	Lehra Mohabat	NP-1838-A	Yes	141
22	Mohali	NP-8822-A	Yes	69
23	Nakodar	NR-3469-A	Yes	105
24	NAPS		Yes	
25	AD Hydro		Yes	
26	Bhinmal		Yes	
27	Khurja ckt-1		Yes	
28	Chirawa GSS		Yes	
29	Fatehabad	NP-5427-A	Yes	101
30	BAWANA III		Yes	
31	JHAJJAR		Yes	
32	Mohali-PSEB		Yes	
33	Dsauya		Yes	
34	chohal		Yes	
35	Mahilpur		Yes	
36	Alawalpur		Yes	
37	Kangra		Yes	
38	Sarha		Yes	
39	Pathankot		Yes	
40	shanan		Yes	
41	UBDC-3		Yes	
42	Ranjit Sagar HPS		Yes	
43	Ropar		Yes	

Annexure 2:

WEEKLY SEM DATA DISCREPANCY REPORT FOR THE WEEK (11/09/23-17/09/23)				
Delay in uploaded meter data				
S. No	**Station_Name**	**Feeder Name**	**Owner**	**Data uploading time**
1	ALIGARH	Aligarh-PG	PGCIL_NR3	9/20/2023 12:21
2	KANPURGIS	Kanpur GIS-PG	PGCIL_NR3	9/20/2023 13:42
3	BAREILY	Bareily-PG	PGCIL_NR3	9/21/2023 11:26
4	MAINPURI	Mainpuri-PG	PGCIL_NR3	9/19/2023 16:54
5	JAIPURS	Jaipur South -PG	PGCIL_NR1	9/20/2023 12:49
6	SONEPAT	Sonepat-PG(AMR)	PGCIL_NR1	9/20/2023 13:18
7	KISHENPUR	Kishenpur-PG	PGCIL_NR2	9/20/2023 10:00
8	NALLAGARH	Nallaragh-PG	PGCIL_NR2	9/19/2023 18:41
9	PATIALA	Patiala-PG	PGCIL_NR2	9/20/2023 11:13
10	ABDULLAPUR	Abdullapur_PG(AMR)	PGCIL_NR2	9/19/2023 11:42
11	SINGRAULI	Singrauli STPS	NTPC	9/19/2023 15:57
12	DADRI1	Dadri-NTPC	NTPC	9/19/2023 15:09
13	DHAULIGANGA	Dhauliganga HPS	NHPC	9/20/2023 17:17
14	NAKODAR	Nakodar-PSEB	PUNJAB	9/19/2023 11:57
15	SULTANPUR	400kV Sultanpur-UPPCL	UP_CENTRAL	9/20/2023 12:09
16	PILIBHIT	Pilibhit-UPPCL	UP_CENTRAL	9/19/2023 11:55
17	LALITPUR01	Lalitpur-UPPCL (AMR)	UP_SOUTH CENTRAL	9/19/2023 11:39
18	JHAJJAR	JHAJJAR	IPP	9/19/2023 12:23
19	BAREILY7	Bareily 765 -PG		9/20/2023 15:24

WEEKLY SEM DATA DISCREPANCY REPORT FOR THE WEEK (18/09/23-24/09/23)				
Delay in uploaded meter data				
S. No	**Station_Name**	**Feeder Name**	**Owner**	**Data uploading time**
1	SINGRAULI	Singrauli STPS	NTPC	9/26/2023 11:12
2	KANGRA02	Kangra-PSEB (AMR)	PUNJAB	9/26/2023 11:13
3	NAINIRALIWAYS	NAINI RALIWAYS	UP_SOUTH EAST	9/26/2023 11:29
4	DEHRADUN	Dehradun-PG	PGCIL_NR1	9/26/2023 11:32
5	BTPS01	BTPS (AMR)	DELHI	9/26/2023 11:39
6	CBCITY	CG City-UPPCL	UP_CENTRAL	9/26/2023 11:42
7	KOTA01	Kota-RVPNL (AMR)	RAJASTHAN	9/26/2023 12:24
8	NAKODAR	Nakodar-PSEB	PUNJAB	9/26/2023 12:34
9	BHADLA2	Bhadla2-PG	PGCIL_NR1	9/26/2023 13:20
10	PINJORE	Pinjore-HVPN	HARYANA	9/26/2023 14:42
11	ACMEHRGRH	ACME HEERAGARH	RE	9/26/2023 15:54
12	NALLAGARH	Nallaragh-PG	PGCIL_NR2	9/26/2023 16:21
13	PANCHKULA	Panchkula-PG	PGCIL_NR2	9/26/2023 17:40
14	VINDHYACHAL	Vindyachal HVDC-PG	PGCIL_NR3	9/26/2023 17:49
15	MOHINDERGARH	MOHINDERGARH	ADANI	9/26/2023 17:51
16	RAPPC	RAPPC	NPC	9/26/2023 20:36
17	GRNOIDA2	GRNOIDA2	UP_WEST	9/26/2023 21:59
18	ABDULLAPUR	Abdullapur_PG(AMR)	PGCIL_NR2	9/27/2023 9:55
19	RENEW	ReNew Power_Bhadla	RE	9/27/2023 12:01

20	URI1	Uri HPS	NHPC	9/27/2023 12:06
21	BANALA	Banala-PG	PGCIL_NR2	9/27/2023 12:52
22	APTFPL	APTFPL_Jodhpur Azure-34(130MW)	RE	9/27/2023 15:24
23	SONEPAT	Sonepat-PG(AMR)	PGCIL_NR1	9/27/2023 17:11

WEEKLY SEM DATA DISCREPANCY REPORT FOR THE WEEK (25/09/23-01/10/23)

Delay in uploaded meter data

S. No	Station_Name	Feeder Name	Owner	Data uploading time
1	ALLAHABAD	Allahabad-PG	PGCIL_NR3	10/3/2023 12:09
2	VARANASI	Varanasi PG	PGCIL_NR3	10/3/2023 13:16
3	ALIGARH	Aligarh-PG	PGCIL_NR3	10/3/2023 15:44
4	KANPURGIS	Kanpur GIS-PG	PGCIL_NR3	10/5/2023 13:31
5	LUCKNOW	Lucknow-PG	PGCIL_NR3	10/3/2023 16:22
6	SOHAWAL	Sohawal-PG	PGCIL_NR3	10/3/2023 12:29
7	AGRAHVDC	Agra-HVDC	PGCIL_NR3	10/3/2023 12:31
8	AGRAPG	Agra-PG	PGCIL_NR3	10/3/2023 17:51
9	MAINPURI	Mainpuri-PG	PGCIL_NR3	10/3/2023 16:40
10	SHAHJAHANPUR	Shahjahanpur PG(AMR)	PGCIL_NR3	10/4/2023 14:55
11	VINDHYACHAL	Vindyachal HVDC-PG	PGCIL_NR3	10/3/2023 16:57
12	BAHADURGARH	Bahadurgarh-PG	PGCIL_NR1	10/3/2023 12:12
13	BHADLA1	Bhadla1-PG	PGCIL_NR1	10/4/2023 13:07
14	BHIWANI	Bhiwani-PG	PGCIL_NR1	10/3/2023 13:44
15	JIND	Jind(PG)	PGCIL_NR1	10/3/2023 13:01
16	MANDOLA	Mandola-PG	PGCIL_NR1	10/3/2023 16:18
17	SONEPAT	Sonepat-PG(AMR)	PGCIL_NR1	10/4/2023 9:31
18	KISHENPUR	Kishenpur-PG	PGCIL_NR2	10/4/2023 12:14
19	NALLAGARH	Nallaragh-PG	PGCIL_NR2	10/3/2023 17:41
20	WAGOORA	Wagoora-PG	PGCIL_NR2	10/3/2023 17:09
21	MOGA	Moga-PG	PGCIL_NR2	10/4/2023 19:19
22	PATIALA	Patiala-PG	PGCIL_NR2	10/3/2023 18:21
23	BANALA	Banala-PG	PGCIL_NR2	10/3/2023 14:48
24	CHAMBA	Chamba -PG	PGCIL_NR2	10/3/2023 12:23
25	LUDHIANA	Ludhiana-PG(AMR)	PGCIL_NR2	10/4/2023 16:35
26	SAMBA	Samba-PG	PGCIL_NR2	10/3/2023 12:16
27	RIHAND1	Rihand-1 STPS	NTPC	10/3/2023 16:24
28	AURAYA1	Auraiya CCPP	NTPC	10/3/2023 13:04
29	DADRI1	Dadri-NTPC	NTPC	10/3/2023 15:51
30	DADRI2	Dadri GPS	NTPC	10/3/2023 16:13
31	UNCHAHAR1	Unchahar1	NTPC	10/3/2023 15:28
32	KOLDAM	Koldam HPP	NTPC	10/5/2023 10:58
33	CHAMERA3	Chamera-3 HPS	NHPC	10/4/2023 16:03
34	KOTA01	Kota-RVPNL (AMR)	RAJASTHAN	10/4/2023 9:43
35	PINJORE	Pinjore-HVPN	HARYANA	10/3/2023 18:51
36	HISSARIA2	Hissar IA-2-HVPN	HARYANA	10/3/2023 14:00
37	NAKODAR	Nakodar-PSEB	PUNJAB	10/4/2023 11:23
38	NEHRIAN	Nehrian-HPSEB	HP	10/3/2023 15:36
39	MALANA	Malana HEP-2	HP	10/3/2023 15:28
40	BAWANA	Bawana-DTL	DELHI	10/3/2023 12:12
41	KOTESHWAR1	KOTESHWAR HEP-THDC	THDC	10/3/2023 12:23
42	RAPSB	RAPS-B	NPC	10/3/2023 19:36
43	SULTANPUR	400kV Sultanpur-UPPCL	UP_CENTRAL	10/3/2023 12:40

44	CBCITY	CG City-UPPCL	UP_CENTRAL	10/3/2023 12:09
45	NAUBASTHA	Naubastha-UPPCL	UP_SOUTH CENTRAL	10/4/2023 12:34
46	NAINIRALIWAYS	NAINI RALIWAYS	UP_SOUTH EAST	10/3/2023 12:23
47	RAJPURA	RAJPURA	PUNJAB	10/3/2023 14:26
48	KHETRIPG	KHETRI-PG	PGCIL_NR1	10/3/2023 12:14
49	ADANI SOLAR PARK	ADANI SOLAR PARK SOUTH BLOCK 250 MW	RE	10/3/2023 14:28
50	BAREILY7	Bareily 765 -PG		10/3/2023 15:06
51	KHURJA02	KHURJA-THDC	THDC	10/3/2023 17:20

Annexure 3:

Agenda on Reactive Energy Accounting as per IEGC 2023

1. Reactive Energy Accounting Requirements as per IEGC, 2023

1.1 Regulatory Provisions for Reactive Energy Accounting as per IEGC, 2023

Annexure-4 of IEGC, 2023 states as follows:

1. REACTIVE POWER COMPENSATION

(a) Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The regional entities are therefore expected to provide local VAr compensation or generation such that they do not draw VARs from the EHV grid, particularly under low-voltage condition. To discourage VAr drawals by regional entities, VAr exchanges with ISTS shall be priced as follows:

- *The regional entity pays for VAr drawal when voltage is below 97%*
- *The regional entity gets paid for VAr return when voltage is below 97%.*
- *The regional entity gets paid for VAr drawal when voltage is above103%.*
- *The regional entity pays for VAr return when voltage is above 103%.*

Where all voltage measurements are at the interface point with ISTS.

(b) The charge for VArh shall be at the rate of 5 paise/kVArh w.e.f. the date of effect of these regulations. This rate shall be escalated at 0.5paise/kVArh per year thereafter, unless otherwise revised.

(c) All the Inverter Based Resources (IBRs) covering wind, solar, and energy storage shall ensure that they have the necessary capability, as per CEA Connectivity Standards, all the time including non-operating hours and night hours for solar. The active power consumed by these devices for purpose of providing reactive power support, when operating under synchronous condenser/night-mode, shall not be charged under deviations and shall be treated as transmission losses in the ISTS.

(d) For IBRs of capacity 50 MW and below not coming directly to the point of interconnection but through the pooling at the Power Park Developer end, the Power Park Developer shall act as aggregator for the Reactive Energy Charges for payments to and from the Pool Account at RLDC level. The de-pooling of Reactive Energy charges amongst the individual wind and solar shall be done by the Power Park Developer.

(e) For any interconnecting line between two states, owned by the States, the interface points shall be treated in terms of this Regulation for the purpose of reactive power charges.

2. ACCOUNTING AND PAYMENT FOR REACTIVE ENERGY EXCHANGES

(a) RPC Secretariat shall also issue the weekly statement for VAR charges, to all regional entities.

(b) The concerned regional entities shall pay the amounts into regional Pool Account operated by the RLDC within 10 (ten) days of issue of statement.

(c) The regional entities who have to receive the money on account of VAR charges would then be paid out from the regional Pool Account, within two (2) working days from the receipt of payment in the Pool Account.

(d) If payments against the above VAr charges are delayed by more than two days, i.e., beyond twelve (12) days from issue of the statement by RPC Secretariat, the defaulting regional entity shall pay simple interest @ 0.04% for each day of delay. The interest so collected shall be paid to the regional entities who had to receive the amount, payment of which got delayed.

(e) Persistent payment defaults, if any, shall be reported by the RLDC to the Member Secretary, RPC, for initiating remedial action.

3. Methodology & Procedure for carrying out Reactive Energy Accounting as per IEGC, 2023

In line with the stated requirements of IEGC, 2023, Reactive Energy Accounting is proposed to be carried as follows:

3.1 Regional Entities except Generating Stations (Regional Drawee Entities)

Methodology:

- Reactive Energy accounting shall be done for Regional Entity except Generating Stations for their reactive power interchange with ISTS, **Natural ISTS(state owned), on its own line emanating directly from an ISGS** etc.
- All the interface points which are used for calculation of active drawal calculation shall be used for reactive power interchange calculation as well.
- Reactive energy account shall also be issued for PGCIL HVDC drawal points.

3.2 Regional Entity Generating Stations (ISGS including Nuclear Stations)

Methodology:

- VAr drawal/return of all the regional entity generating stations including Nuclear stations shall be accounted considering all the outgoing feeders with that generating station.
- RE/ Floating Solar located in the premises of a Generating Station, and feeding through the Common ICT in the Generation Switchyard, VAr drawal/return of the same shall not be accounted as the same will be considered in the Var interchange of the principal generating station.
- De-pooling for Stages within Generating Station (if applicable) shall not be required as owner of generating stations will be same. Else it can be carried out on the basis of installed capacity of various stages.

3.3 RE Generating Station (s) directly connected to ISTS Pooling Station

Methodology:

- VAr drawal/return at ISTS Metering Point end of line connecting RE Generating Station and ISTS PS shall be accounted.

3.4 RE Generating Station (of Installed Capacity > 50 MW) connected to ISTS Pooling Station through Intermediate Pooling Station(PS)

Methodology:

- Reactive Accounting shall be done at ISTS Metering Point end of the line connecting Intermediate PS to ISTS PS.
- De-pooling of Reactive Charges shall be done as given below:
  - For each Connecting line between Intermediate PS and ISTS PS, Reactive Energy De-pooling shall be carried out as follows:

Incomer-X			
Name of Generator	**Connected Capacity**	**MVAR_H**	**MVAR_L**
Reactive Energy measuredat ISTS Metering Point end of the connecting linebetween Intermediate PS and ISTS PS		X	Y
Reactive Energy measured at Incomers of RPPD			
REG-1	CCREG1	REG1X	REG1Y
REG-2	CCREG2	REG2X	REG2Y
REG-3	CCREG3	REG3X	REG3Y
REG-4	CCREG4	REG4X	REG4Y
SUM	CCTotal	REGX	REGY

Name of the Generator	**Connected Capacity**	**MVAR_H**	**MVAR_L**
REG-1	CC-REG1	REG1X+ (X-REGX)*CCREG1/CCTotal	REG1Y+ (Y-REGY)*CCREG1/CCTotal
REG-2	CC-REG2	REG2X+ (X-REGX)*CCREG2/CCTotal	REG2Y+ (Y-REGY)*CCREG2/CCTotal
REG-3	CC-REG3	REG3X+ (X-REGX)*CCREG3/CCTotal	REG3Y+ (Y-REGY)*CCREG3/CCTotal
REG-4	CC-REG4	REG4X+ (X-REGX)*CCREG4/CCTotal	REG4Y+ (Y-REGY)*CCREG4/CCTotal

Procedure for Reactive energy charge calculation:

- NRLDC will furnish the verified processed SEM data and the calculation formula of each Regional Entity as per mutually agreed format to NRPC.

- NRPC Secretariat would issue the weekly Reactive Energy Account based on the data furnished by NRLDC.

- Note:

- For IBRs of capacity 50 MW and below not coming directly to the point of interconnection but connected through the Intermediate Pooling Station of the Power Park Developer, the Power Park Developer/Lead generator shall act as aggregator for the Reactive Energy Charges for payments to and from the Pool Account at RLDC level. The de-pooling of Reactive Energy charges amongst the individual RE Generators shall be carried out by the Power Park Developer/Lead generator using above methodology or any other suitable

methodology.

- Active energy accounting of nuclear stations/other generating stations shall be shifted from GT and STs combination to outgoing feeder in line with CEA Metering regulation 2006 and amendments thereof.

4. Treatment of Active Power Consumption for providing Reactive Power Support (Night mode operation/Condenser mode)

4.1 Regulatory Provisions as per IEGC, 2023

Clause 1(c) of Annexure-4 of IEGC, 2023 states as follows:

All the Inverter Based Resources (IBRs) covering wind, solar and energy storage shall ensure that they have the necessary capability, as per CEA Connectivity Standards, all the time including non-operating hours and night hours for solar. The active power consumed by these devices for purpose of providing reactive power support, when operating under synchronous condenser/night-mode, shall not be charged under deviations and shall be treated as transmission losses in the ISTS.

4.2 Methodology Proposed

- A suitable methodology for determining Active PowerConsumption for providing Reactive Power Support during synchronous condenser/ night mode taking into account the following shall be formulated:
  - During the Time-blocks corresponding to *synchronous condenser/ night-mode of operation, the concerned machine/ unit will be drawing active power to support (i) own auxiliary consumption, and (ii) providing reactive power support*
  - *Active status (in-service) of the machine (s)/ unit(s)*
  - *Learnings from the Pilot project or otherwise of the relation between reactive power support vs active power consumption*
- Once determined, the active power consumption by an SPD/ QCA for providing reactive power support in a time-block shall be deducted from the Actuals recorded by corresponding SEMs.
- NRLDC will provide the block-wise data of standard active power consumption by an SPD/QCA to NRPC.
- Also NRLDC will share the time duration of reactive power support/night mode operation to NRPC on weekly basis.
- NRPC Secretariat would issue the Weekly DSM Account based on data furnished and reactive power support duration details provided by NRLDC.

- **Note: The reactive charge account in line with IEGC 2023 shall be issued from 02.10.2023.**

Sr No	Element Name	Outage Date	Outage Time	Reason
1	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	01-Sep-23	12:39	Phase to earth fault B-N
		03-Sep-23	11:33	Phase to earth fault B-N
		03-Sep-23	13:12	Phase to earth fault B-N
		17-Sep-23	06:31	Phase to earth fault Y-N
		26-Sep-23	12:01	Phase to earth fault B-N
		26-Sep-23	13:59	Phase to earth fault B-N
		27-Sep-23	12:50	Transient fault
2	220 KV Khara(UP)-Saharanpur(PG) (UP) Ckt-1	10-Sep-23	04:05	Phase to earth fault Y-N
		13-Sep-23	00:45	Phase to earth fault Y-N
		19-Sep-23	12:40	Phase to Ground Fault R-N
		25-Sep-23	23:20	Phase to earth fault Y-N
3	220 KV Nara(UP)-Roorkee(UK) (UP) Ckt-1	05-Sep-23	11:07	Phase to Ground Fault B-N
		05-Sep-23	15:39	Phase to earth fault Y-N
		08-Sep-23	01:51	Phase to earth fault R-N
		16-Sep-23	15:48	Phase to earth fault R-N
		18-Sep-23	03:35	Earth fault
		22-Sep-23	18:09	Phase to earth fault R-N
		28-Sep-23	13:23	Phase to earth fault B-N
4	220 KV New Tanda (UP)-Sohawal(PG) (UP) Ckt-1	01-Sep-23	12:59	Phase to earth fault B-N
		06-Sep-23	11:10	Phase to earth fault B-N
		17-Sep-23	21:32	Phase to earth fault R-N
		30-Sep-23	10:19	Phase to earth fault B-N
5	220 KV Panipat(BB)-Narela(DV) (BBMB) Ckt-1	05-Sep-23	13:45	Phase to earth fault Y-N
		10-Sep-23	05:11	Phase to earth fault B-N
		22-Sep-23	13:12	R Phase Jumper Broken
		29-Sep-23	07:22	Phase to earth fault B-N
7	400 KV Orai-Mainpuri (UP) Ckt-1	16-Sep-23	17:02	Over Voltage
		23-Sep-23	07:51	Over Voltage
		23-Sep-23	07:51	Over Voltage
		30-Sep-23	06:00	Over Voltage

Grid Event summary for September 2023

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	
1	GD-1	1) 400/220kV 500MVA ICT-1 at Rasra(UP) 2) 132kV Gorakhpur-new(UP)-Maharajganj(FCI) Ckt 3) 132kV Gorakhpur-new(UP)-Kasaya Ckt 4) 220kV Gorakhpur-1(UP)-Deoria(UP) Ckt 5) 132kV Gorakhpur-new(UP)-Mohaddipur(UP) Ckt 6) 220kV Gorakhpur-1(UP)-Gorakhpur-2(UP) Ckt-2 7) 220kV Rasra(UP)-Deoria(UP) Ckt	Uttar Pradesh	UPPTCL	3-Sep-23	00:05	3-Sep-23	00:25	00:20	i) During antecedent condition, 220kV Sarnath(UP)-Gazipur(UP) Ckt was opened from Sarnath(UP) end due to overloading of ICTs at Sarnath(UP). ii) As reported, at 00:05 hrs, 400/220kV 500MVA ICT-1 at Rasra(UP) tripped due to overloading. iii) Since 220kV Sarnath(UP)-Gazipur(UP) Ckt was already open, with the tripping of 400/220kV 500MVA ICT-1 at Rasra(UP), major load of Rasra and Gazipur complex was fed by Gorakhpur(UP). iv) Due to this, SPS operated due to overloading of 400/220kV ICTs (1*500MA, 1*315MVA and 1*240MVA) at 400/220kV Gorakhpur-1(UP) and 132kV Gorakhpur-new(UP)-Maharajganj(FCI) Ckt, 132kV Gorakhpur-new(UP)-Kasaya Ckt, 220kV Gorakhpur-1(UP)-Deoria(UP) Ckt, 132kV Gorakhpur-new(UP)-Mohaddipur(UP) Ckt and 220kV Gorakhpur-1(UP)-Gorakhpur-2(UP) Ckt-2 tripped. (220kV Gorakhpur-1(UP)-Gorakhpur-2(UP) Ckt-1 should also have tripped due to SPS operation at Gorakhpur-1(UP), but it didn't trip. Exact reason need to be analysed) v) As per SCADA SOE, 220kV Hata2(UP)-Deoria(UP) Ckt-1 also tripped during the same time. (Exact reason yet to be shared) vi) As per PMU at Lucknow(PG), no fault is observed in the system. vii) As per SCADA, change in demand of approx. 735MW is observed in UP control area. But, as reported by SLDC-UP, load loss of approx. 750MW occurred in UP control area. viii) As reported, at 00:07 hrs, 220kV Rasra_220(UP)-Deoria(UP) Ckt tripped due to broken jumper. ix) As per SCADA SOE, 220kV Rasra(UP)-Rasra_220(UP) Ckt also tripped during the same time. x) Complete blackout occurred at 220/132kV Rasra_220(UP) S/s.	0	0.25	0	750	0.000	1.021	56899	73429	NA
2	GI-2	1) 400/220kV 315MVA ICT-4 at Sarnath(UP) 2) 132 kV Sarnath(UP)-Saidpur(UP) Ckt 3) 220KV Sarnath(UP)-Azamgarh(UP) Ckt 4) 220KV Sarnath(UP)-Harhua(UP) Ckt 5) 220KV Sarnath(UP)-Ghazipur(UP) Ckt	Uttar Pradesh	UPPTCL	3-Sep-23	00:12	3-Sep-23	00:32	00:20	xi) At 00:07 hrs, 220kV Sarnath(UP)-Gazipur(UP) Ckt was again charged from Sarnath(UP) end due to tripping of 400/220kV 500MVA ICT-1 at Rasra(UP). (Previously 220kV Sarnath(UP)-Gazipur(UP) Ckt was opened from Sarnath(UP) end due to overloading of ICTs at Sarnath(UP) at 00:05 hrs) xii) Since 220kV Rasra(UP)-Deoria(UP) Ckt and 400/220kV 500MVA ICT-1 at Rasra(UP) already tripped, load of Rasra & Gazipur complex was fed by Sarnath(UP). xiii) Due to this, at 00:12 hrs, 400/220kV 315MVA ICT-4 at Sarnath(UP) tripped due to over-loading. (ICT-4 tripped on O/C protection operation before SPS operation. O/C setting of ICT and settings of SPS need to be reviewed). xiv) At the same time, SPS also operated due to overloading of 400/220kV ICTs (3*315MVA and 1*500MVA; among these ICT-4 tripped already) at 400/220/132kV Sarnath(UP) and 132 kV Sarnath(UP)-Saidpur(UP) Ckt, 220KV Sarnath(UP)-Azamgarh(UP) Ckt, 220KV Sarnath(UP)-Harhua(UP) Ckt and 220KV Sarnath(UP)-Ghazipur(UP) Ckt tripped. xv) As per PMU at Lucknow(PG), no fault is observed in the system. xvi) As per SCADA, change in demand of approx. 470MW is observed in UP control area. But, as reported by SLDC-UP, load loss of approx. 380MW occurred in UP control area.	0	0.127	0	380	0.000	0.527	56588	72118	NA
3	GD-1	1) 220 KV Amberi(RS)-Kankroli(PG) (RS) Ckt 2) 400/220 kV 315 MVA ICT 1 at Chittorgarh(RS) 3) 400/220 kV 315 MVA ICT 2 at Chittorgarh(RS)	Rajasthan	RVVPNL	4-Sep-23	12:37	4-Sep-23	13:13	00:36	i) 220/132kV Debari(RS) has connectivity from 220kV Amberi and 400/220kV Chittorgarh(RS). ii) During antecedent condition, 187MW was coming to 220/132kV Amberi(RS) through 220kV Amberi(RS)-Kankroli(PG) ckt and 121MW was going out from 220/132kV Amberi(RS) through 220kV Amberi(RS)-Debari(RS) ckt and rest of the power was flowing through 220/132kV 160MVA ICT 1 & 2 at Amber(RS) feeding 132kV feeders. At 400/220kV Chittorgarh(RS) 400/220kV 315MVA ICT-1&2 were carrying approx. 266MW each. iii) As reported, at 12:37hrs, 220 KV Amberi(RS)-Kankroli(PG) (RS) Ckt tripped due to O/C E/F relay operation at Amberi(RS) end. (Exact reason and location of fault yet to be shared) iv) As per PMU at Kankroli(PG), B-N phase to earth fault is observed with delayed fault clearance time of 1360ms. v) Due to loss of supply, complete blackout occurred at 220/132kV Amberi(RS). vi) With this, only source left for Debari was 400/220kV Chittorgarh. Loading of 400/220 kV 315 MVA ICT 1 & 2 at Chittorgarh(RS) increased further and then both the ICTs tripped due to overloading. (Exact value of increase in loading is yet to be received from Rajasthan). vii) As per SCADA, change in demand of approx. 585MW is observed in Rajasthan control area.	0	0.351	0	585	0.000	0.732	67572	79890	1360
4	GI-1	1) 220 KV Kanpur(PG)-Unchahar(NT) (PG) Ckt-1 2) 220 KV Kanpur(PG)-Unchahar(NT) (PG) Ckt-3 3) 210 MW Unchahar III TPS - UNIT 1 4) 210 MW Unchahar II TPS - UNIT 1	Uttar Pradesh	UPPTCL	5-Sep-23	09:56	7-Sep-23	10:51	00:55	i) During antecedent condition, 210 MW Unchahar III TPS - UNIT 1 (carrying ~187MW), 210 MW Unchahar II TPS - UNIT 1 (was going under shutdown) and 220kV feeders to Kanpur (ckt-I & III) were connected to 220kV Bus-3. Rest of the elements were connected to other 220kV buses. ii) As reported, at 09:56hrs, while taking shutdown of 210 MW Unchahar II TPS - UNIT 1 on boiler tube leakage, when generator CB was opened, Y-ph pole of the breaker didn't open. iii) Due to this, pole discrepancy relay operated but breaker didn't not open and remained stuck in closed position. iv) Further, manual tripping command was initiated to trip the breaker but as Y-ph pole of the breaker was in stuck condition, LBB of the generator breaker operated. v) Due to LBB operation, all the elements connected at 220kV Bus-3 i.e., 210 MW Unchahar III TPS - UNIT 1 and 220kV feeders to Kanpur (ckt-I & III) tripped. vi) As per PMU at Kanpur(PG), no fault in system is observed. vii) As per SCADA, generation loss of approx. 187MW at Unchahar TPS occurred.	0	0	187	0	0.293	0.000	63839	76167	NA
5	GI-2	1) 765 KV Anpara_C(LAN)-Unnao(UP) (UP) Ckt-1 2) 765 KV Obra_C_TPS-Unnao (UP) ckt	Uttar Pradesh	UPPTCL	5-Sep-23	12:50	5-Sep-23	14:30	01:40	i) During antecedent condition, 765 KV Obra_C_TPS-Unnao (UP) ckt and 765 KV Anpara_C(LAN)-Unnao(UP) (UP) Ckt were carrying approx. 846MW & 913MW respectively. ii) As reported, at 12:50 hrs, 765 KV Obra_C_TPS-Unnao (UP) ckt tripped on B-N phase to earth fault, fault was in Z-1(148km) from Unnoa end. At the same time, 765 KV Anpara_C(LAN)-Unnao(UP) (UP) Ckt also tripped on Tee differential protection operation at Unnao end. iii) As per PMU at Unnao(PG), B-N phase to earth fault with no A/R operation is observed. iv) As per DR of 765 KV Obra_C_TPS-Unnao (UP) ckt at Unnao end, B-N fault in Z-1 with no A/R operation at Unnao end and unsuccessful A/R operation at Obra_C end is observed. v) With the tripping of aforementioned 765kV lines, MW loading of 765kV Anpara_C-Obra_B ckt increased to ~947MW. vi) As a remedial actions, units of Anpara-A,B,C&D thermal plants were back down to technical minimum. Line loading in the complex came witin safe limit by 13:20hrs. vii) As reported and as per SCADA data, generation backdown of approx. 1240MW at Anapara generation complex occurred in UP control area within 45minutes.	0	0	0	0	0.000	0.000	67091	78696	80
6	GD-1	1) 220 kV Wangtoo –Bhabha-Kunihar(HP) ckt (Tconnection) 2) 220 kV Jeori-Kunihar(HP) Ckt 3) 220 kV Baddi-Kunihar(HP) Ckt-1 4) 220 kV Baddi-Kunihar(HP) Ckt-2 5) 220/132kV ICT-1 at Kunihar(HP) 6) 220/132kV ICT-2 at Kunihar(HP) 7) 220/132kV ICT-3 at Kunihar(HP)	HP	HPPTCL	6-Sep-23	06:44	6-Sep-23	06:59	00:15	i) As reported, at 06:44 hrs, 220 KV Kunihar-Baddi ckt-1&2 tripped on over current earth fault protection operation. (Exact reason and location of fault yet to be shared) ii) At the same time, 220 kV Jeori-Kunihar(HP) Ckt, 220 kV Kunihar-Pinjore(HP) Ckt also tripped on overvoltage. iii) With the tripping of aforementioned elements load of 220/132kV Kunihar(HP) got affected. iv) As per PMU, Y-B fault converted into three phase fault with delayed clearance in 880msec is observed. v) As per SCADA, change in demand of approx. 150MW in HP control area and and HP hydro generation loss of approx. 40MW (Bhabha HEP) is observed. vi) Further at 07:22 hrs, while restoration again multiple elements tripping occurred at Kunihar S/s and 220/132kV Kunihar S/s became dead. vii) As per PMU & DR, no fault was in system at 07:22hrs. viii) As per SCADA, change in demand of approx. 250MW in HP control area and is observed at 07:22hrs.	0	0.037	40	150	0.079	0.219	50371	68491	880
7	GD-1	1) 220 KV Nanauta-Badhaikalan (UP) Ckt 2) 220 KV Nanauta(UP)-Saharanpur(PG) (UP) Ckt 3) 220 KV Nanauta-Shamli (UP) Ckt 4) 220/132kV 200MVA ICT-1 at Nanauta(UP) 5) 220/132kV 200MVA ICT-1 at Nanauta(UP)	Uttar Pradesh	UPPTCL	6-Sep-23	01:48	6-Sep-23	02:43	00:55	i) 220/132kV Nanauta(UP) S/s has double main bus scheme at both 220 & 132 kV level. There are three (03) 220kV lines connected at 220kV Nanauta(UP) i.e. 220kV lines to Shaharanpur(PG), Badhaikalan(UP) & Shamli(UP). ii) During antecedent condition, 220kV lines to Shaharanpur(PG), Badhaikalan(UP) & Shamli(UP) were carrying 100MW (towards Nanauta), 43MW (towards Nanauta) and 20MW (towards Shamli) respectively. iii) As reported, at 01:48 hrs, Y-N phase to earth fault occurred on 220 KV Nanauta-Badhaikalan (UP) Ckt, fault was at ~22.4km from Badhaikalan end. On this fault, distance protection at Nanauta end operated however, line CB of Badhaikalan line at Nanauta end didn't open and remained stuck. iv) Due to this, LBB protection of line CB at Nanauta end of Badhaikalan ckt operated. All three (03) 220kV lines connected at 220kV Nanauta(UP) tripped and 220/132kV Nanauta(UP) became dead. v) As per PMU at Saharanpur(PG), Y-N phase to earth fault with fault with delayed clearance in 320ms is observed. vi) As per SCADA, change in demand of approx. 115MW is observed in UP control area. As reported by SLDC-UP, load loss of approx. 130MW occurred in UP control area.	0	0.12	0	130	0.000	0.174	52124	74681	320
8	GI-2	1) 400/220kV 200MVA ICT-1 at Rosa(UP) 2) 400/220kV 200MVA ICT-2 at Rosa(UP) 3) 300 MW Rosa TPS - UNIT 2 4) 220kV Shahjahanpur(UP)-Rosa TPS(UP) Ckt-1 5) 220kV Shahjahanpur(UP)-Rosa TPS(UP) Ckt-2 6) 220kV Rosa-Badaun(UP) Ckt-1 7) 220kV Rosa-Badaun(UP) Ckt-2 8) 220kV Rosa-Dohna(UP) Ckt-1 9) 220kV Shahjahanpur(PG)-Shahjhanpur(UP) Ckt	Uttar Pradesh	UPPTCL	7-Sep-23	12:37	7-Sep-23	13:35	00:58	i) 400/220kV Rosa(UP) S/s has double main transfer bus scheme as 400 & 220kV level. ii) During antecedent condition, 300 MW Rosa TPS – UNIT-2 (connected at 220kV side) was carrying approx. 282MW and 400/220kV 200MVA ICT-1&2 were carrying approx. 65MW each. iii) As reported, at 12:37 hrs, R-Y fault occurred on 220kV Rosa-Badaun(UP) Ckt-2. Rosa end distance protection sensed fault in Z-2 (93km). Line CB at Rosa end didn't open and LBB also failed to operate. iv) Further, adjacent 220kV feedres at Rosa and tripped from remote end and 400/220kV 200MVA ICTs at Rosa tripped on O/C E/F protection operation. v) At the same time, 300 MW Rosa TPS - UNIT 2 tripped on standby earth fault protection operation and 220kV Shahjahanpur(PG)-Shahjhanpur(UP) Ckt also tripped from Shajhanpur(PG) end only. (as per SOE). vi) As per PMU at Bareilly(PG), R-Y phase to phase fault with delayed clearance in 1280msec is observed. vii) Generation loss of approx. 282MW occurred due to tripping of 300 MW Rosa TPS - UNIT 2.	0	0	282	0	0.453	0.000	62257	79493	1280
9	GI-1	1) 210 MW Guru Gobind Singh TPS (Ropar) - UNIT 4 2) 210 MW Guru Gobind Singh TPS (Ropar) - UNIT 5 3) 220kV GGSSTP-Kharar ckt 4) 220kV GGSSTP-Mohali ckt	Punjab	PSTCL	8-Sep-23	10:21	7-Sep-23	11:09	00:48	i) During antecedent condition, 210 MW Guru Gobind Singh TPS (Ropar) - UNIT 4 (carrying ~162MW) & UNIT 5 (carrying ~112MW) and 220kV feeders to Kharar & Mohali were connected to 220kV Bus-1 section-III. Rest of the elements were connected to Bus-1 section-I&II and Bus-2. ii) On 08th sept, 2023, Unit-6 at GGSSTP was in light up condition after attending boiler tube leakage. At 10:21hrs, generator breaker was closed to synchronize the unit however, R-ph pole of the breaker didn't close. iii) Due to this, pole discrepancy relay operated but this time B-ph pole of the breaker didn't not open and remained stuck in closed position. iv) Further, manual tripping command was initiated to trip the breaker but as B-ph pole of the breaker was in stuck condition, LBB of the generator breaker operated. v) Due to LBB operation, all the elements connected at 220kV Bus-1 section-III i.e., 210 MW Guru Gobind Singh TPS (Ropar) - UNIT 4 & 5 and 220kV feeders to Kharar & Mohali tripped. vi) As per PMU at Jalandhar(PG), no fault in system is observed. vii) As per SCADA, generation loss of approx. 280MW at Ropar GGSSTP and load loss of approx. 70MW in Punjab control area.	0	0.056	280	70	0.484	0.096	57809	72607	NA
10	GI-2	1) 490 MW Dadri Thermal stage-2 - UNIT 1 2) 490 MW Dadri Thermal stage-2 - UNIT 2	Uttar Pradesh	UPPTCL/NTPC	9-Sep-23	15:24	9-Sep-23	19:30	04:06	i) During antecedent condition, 490MW Unit-1&2 at Dadri Thermal Stage-2(NTPC) were generating approx. 256MW & 254MW respectively. Supply to FGD (Flue gas desulphurization) and PA fan was coming from common 11kV bus. ii) As reported at 15:24hrs, fault occurred in 11kV feeder to FGD (Flue gas desulphurization). This feeder tripped with the delay of approx. 350msec on O/C E/F protection operation. iii) As per communication with Dadri TPS, during the fault, voltage of 11kV bus dropped to ~2kV and as soon fault cleared, motor of PA fan drew current in the range of ~6.5kA. Further, PA fan motor tripped on O/C which further led to the tripping of mil and then units tripped on flame failure. iv) As per PMU at Maharanibagh(PG), no fault in system in observed. v) As per SCADA, change in generation of approx. 500MW at Dadri Thermal Stage-2(NTPC) is observed.	0	0	500	0	0.938	0.000	53328	66254	NA
11	GD-1	1) 220 kV Tuglakabad-Badarpur (DTL) Ckt-1 2) 220 kV Tuglakabad-Badarpur (DTL) Ckt-2 3) 220 kV Ballabhgarh(BB)-Badarpur (DTL) Ckt-1 4) 220 kV Ballabhgarh(BB)-Badarpur (DTL) Ckt-2 5) 220kV Badarpur-Okhla ckt-1 6) 220kV Badarpur-Okhla ckt-2	Delhi	DTL/BBMB	10-Sep-23	17:08	10-Sep-23	17:13	00:05	i) 220kV Badarpur(DTL) has double main single breaker bus scheme. It has source from 220 kV Tuglakabad-Badarpur (DTL) Ckt-1&2 and 220 kV Ballabhgarh(BB)-Badarpur (DTL) Ckt-1&2. ii) During antecedent condition, part load of 220kV Okhla and 220kV Sarita Vihar was fed from 220kV Badarpur(DTL) via 220kV Badarpur-Okhla ckt-1&2 and 220kV Badarpur-Sarita Vihar ckt-1&2 respectively. iii) As reported, at 17:08hrs, R-ph conductor near wavetrap of 220 kV Ballabhgarh(BB)-Badarpur (DTL) Ckt-2 at Badarpur end damaged and created R-N fault. iv) As per DR of Ballabhgarh(BB) end, R-N fault followed by Y-N & B-N fault with total fault clearance time of ~800msec is observed. Fault distance recorded at Ballabhgarh end was ~24.7km. v) As reported, on this fault, 220 kV Ballabhgarh(BB)-Badarpur (DTL) Ckt-1&2 tripped from Ballabhgarh(BB) end only, 220 kV Tuglakabad-Badarpur (DTL) Ckt-1&2 tripped from Badarpur end in Z-4 and 220kV Badarpur-Okhla ckt-1&2 tripped on O/C E/F protection operation. vi) As per PMU at Ballabhgarh(PG), R-N fault which later converted into three phase fault with fault clearance time of ~1240msec is observed. vii) With the tripping of aforementioned lines, 220kV Badarpur S/s became dead and load feeding from Badarpur to 220kV Okhla and 220kV Sarita Vihar affected. viii) As reported by SLDC-Delhi, load loss of approx. 125MW is occurred in Delhi control area. ix) At 17:13 hrs, 220kV bus coupler breaker at Sarita Vihar S/s and Okhla S/s was closed and load was normalized.	0	0.01	0	125	0.000	0.221	46035	56475	1240
12	GD-1	1) 220 KV Seora_SL_BHD2_PG (Mega_SuryaUrja)-Bhadla_2 (PG) (Mega_SuryaUrja) Ckt-1	Rajasthan	MSUPL	10-Sep-23	14:28	10-Sep-23	17:45	03:17	i) During antecedent condition, total MW generation of MSUPL RE station was approx. 220MW and it was evacuated through 220 KV Bhadla2(PG)-MSUPL (MSUPPL) Ckt. ii) As reported, at 14:28hrs, 220 KV Bhadla2(PG)-MSUPL (MSUPPL) Ckt tripped on B-N phase to earth fault. iii) As per PMU at Bhadla2(PG), B-N fault with unsuccessful A/R operation is observed. iv) As per SCADA, generation loss of approx. 220MW at MSUPL RE station is observed.	0	0	220	0	0.419	0.000	52504	62000	80
13	GD-1	1) 400/220 kV 500 MVA ICT 1 at Azamgarh1(UP) 2) 400/220 kV 500 MVA ICT 2 at Azamgarh1(UP) 3) 220/132 kV 160 MVA ICT 1 at Azamgarh2(UP) 4) 220/132 kV 200 MVA ICT 2 at Azamgarh2(UP) 5) 220/132 kV 160 MVA ICT 3 at Azamgarh2(UP) 6) 220kV Azamgarh2-Haraua(UP) Ckt 7) 220kV Azamgarh2-Jaunpur(UP) Ckt	Uttar Pradesh	UPPTCL	11-Sep-23	05:36	11-Sep-23	06:36	01:00	i) 220/132kV Azamgarh2(UP) S/s has double main transfer bus scheme at both 220 & 132 kV level. ii) As reported, at 05:36 hrs, 220kV Bus-bar protection operated at Azamgarh2(UP) which resulted into tripping of all the elements connected to 220kV Bus-1 & 2 at Azamgarh2(UP). (Exact reason of busbar protection operation yet to be shared) iii) Due to loss of supply at 132kV level of Azamgarh2(UP), both 132kV Bus-1 & 2 at Azamgarh2(UP) also became dead which resulted into total blackout of 220/132kV Azamgarh2(UP) S/s. iv) As per PMU at Varanasi(PG), Y-N phase to earth fault with fault clearance time of 80ms is observed. v) As per SCADA, change in demand of approx. 465MW is observed in UP control area.	0	0.465	0	465	0.000	0.817	41261	56925	80

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	
14	GD-1	1) 220 KV Auraiya(NT)-Agra2(UP) (PG) Ckt-1 2) 220 KV Auraiya(NT)-Agra2(UP) (PG) Ckt-2 3) 220kV Agra1(UP)-Agra2(UP) Ckt-1 4) 220kV Agra1(UP)-Agra2(UP) Ckt-2 5) 220kV Agra2(UP)-Kirawali Ckt 6) 220/132kV 160MVA ICT-1 at Agra2(UP) 7) 220/132kV 160MVA ICT-2 at Agra2(UP) 8) 220/132kV 100MVA ICT-3 at Agra2(UP)	Uttar Pradesh	UPPTCL, PGCIL, NTPC	12-Sep-23	06:43	12-Sep-23	07:15	00:32	i) 220/132kV Sikandra (Agra2) (UP) S/s has double main transfer bus scheme at both 220 & 132 kV level. However, during antecedent condition, all the elements were connected to 220kV Bus-1 only. 220kV Bus-2 and transfer were not in service consition. ii) As reported, at 06:43 hrs, 220kV Agra1(UP)-Agra2(UP) Ckt-2 tripped due to Y-ph and B-ph CT blast. Fault distance was 0.7 km from Sikandra (Agra2) (UP). iii) At the same time, 220kV bus-bar protection operated at Sikandra (Agra2) (UP) which resulted into tripping of all the elements connected to 220kV Bus-1 at Sikandra (Agra2) (UP). iv) As per DR of 220kV Busbar at Sikandra (Agra2) (UP), B-N phase to earth fault with fault current of ~13.87kA followed by Y-N phase to earth fault with fault current of ~13.96kA is observed. v) As per PMU at Agra(PG), B-N phase to earth fault followed by Y-N phase to earth fault with fault clearance time of 80ms is observed. vi) Due to tripping of 220kV Bus-1, supply to 132kV side of Sikandra (Agra2) (UP) also lost and 132kV Bus-1 & 2 at Sikandra (Agra2) (UP) also became dead which resulted into total blackout of 220/132kV Sikandra (Agra2) (UP) S/s. (all 132kV feeders at Agra2(UP) opened manually) vii) As per SCADA, change in demand of approx. 125MW is observed in UP control area.	0	0.067	0	125	0.000	0.207	47396	60478	80
15	GI-2	1) 400/220 KV 315 MVA ICT-1 at Obra-B(UP) 2) 400/220 KV 315 MVA ICT-2 at Obra-B(UP) 3) 400/220 KV 240 MVA ICT-3 at Obra-B(UP) 4) 200 MW Obra TPS - UNIT 12 5) 220kV Obra-A(UP)-Rewa Road(UP) Ckt-1 6) 220kV Obra-A(UP)-Rewa Road(UP) Ckt-2 7) 220kV Obra-A(UP)-Mirzapur(UP) Ckt	Uttar Pradesh	UPPTCL	13-Sep-23	07:50	13-Sep-23	08:48	00:58	i) During antecedent condition, 200 MW Obra TPS - UNIT 12 was running through station transformer and generating approx. 124MW. ii) As reported, at 07:50 hrs, 400/220 KV 315 MVA ICT-1 at Obra-B(UP) tripped on R-ph differential protection operation due to blast of 220kV R phase bushing of transformer. Firefighting system installed to protect ICT from fire, operated automatically and protected the complete transformer from the spreading of fire and further damage to other equipment and ICT itself. iii) At the same time, 400/220 KV 315 MVA ICT-2 and 240 MVA ICT-3 at Obra-B(UP) also tripped on over-current earth-fault protection operation. iv) During the same time, "SPS related to overloading of remaining ICT after tripping of any ICT at Obra TPS" operated and 220kV Obra-A(UP)-Rewa Road(UP) Ckt-1 & 2 and 220kV Obra-A(UP)-Mirzapur(UP) Ckt tripped. v) As per PMU at Allahabad(PG), R-N phase to earth fault with fault clearance time of 80ms is observed. vi) As per SCADA, change in demand of approx. 345MW is observed in UP control area. vii) As reported by SLDC-UP, load loss of approx. 308MW is observed in UP control area and generation loss of approx. 124MW is observed at Obra-B(UP) .	0	0.298	308	124	0.625	0.204	49310	60833	80
16	GD-1	1) 220 KV Singoli Bhatwari (Singoli(LTUHP))-Srinagar(UK) (PTCUL) Ckt-1 2) 220 KV Singoli Bhatwari(Singoli(LTUHP))-Srinagar(UK) (PTCUL) Ckt-2 3) 33MW Unit-1 at Singoli Bhatwari HEP 4) 33MW Unit-2 at Singoli Bhatwari HEP 5) 33MW Unit-3 at Singoli Bhatwari HEP	Uttarakhand	Singoli Bhatwari HEP, PTCUL	14-Sep-23	17:19	14-Sep-23	18:08	00:49	i) During antecedent condition, 33MW Unit-1, 2 and 3 at Singoli Bhatwari HEP were generating approx. 36MW each respectively. ii) As reported, at 12:24 hrs, 220 KV Singoli Bhatwari(Singoli(LTUHP))-Srinagar(UK) (PTCUL) Ckt-1 & 2 tripped on Y-B-N double phase to ground fault with fault distance of 70.81km and 71.31km from Srinagar(UK) end respectively. As per DR, fault sensed in zone-1 at both the ends for both the lines; DT received at Singoli Bhatwari end. iii) The power generated by 33MW Unit-1, 2 and 3 at Singoli Bhatwari HEP were evacuating through 220 KV Singoli Bhatwari(Singoli(LTUHP))-Srinagar(UK) (PTCUL) Ckt-1 & 2. Hence, due to tripping of both 220 KV Singoli Bhatwari(Singoli(LTUHP))-Srinagar(UK) (PTCUL) Ckt-1 & 2, 33MW Unit-1, 2 and 3 at Singoli Bhatwari HEP tripped due to loss of evacuation path and blackout occurred at 220kV Singoli Bhatwari HEP. iv) As per PMU at Muzaffarnagar(UP), Y-B-N double phase to ground fault is observed with fault clearing time of 80 ms. v) As per SCADA, generation loss of approx. 108MW at Singoli Bhatwari HEP is observed.	0	0	108	0	0.200	0.000	53939	67824	80
17	GI-1	1) 220 KV Amargarh (INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2	Jammu & Kashmir	PDD JK, INDIGRID	14-Sep-23	14:58	14-Sep-23	16:27	01:29	i) 220/132kV Ziankote S/s have two bus at 220kV side i.e., main bus & reserve bus. ii) During antecedent condition, 220kV Ziankote was operating in bus split mode viz. 220kV Amargarh(INDIGRID) –Ziankote(JK) D/C (carrying 126MW each) was feeding Ziankote load. 220kV Wagoora-Ziankote(JK) Ckt-2 (carrying 84MW) was connected at other bus and feeding Alusteng. 220kV Wagoora-Ziankote(JK) Ckt-1 was not in service. iii) As reported, at 14:58 hrs, 220 KV Amargarh(INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2 tripped from Ziankote(JK) end only on B-N phase to earth fault with fault current of 1.043kA from Ziankote(JK) end. (Exact reason of fault yet to be shared) iv) As per PMU at Amargarh(PG), B-N phase to earth fault is observed with delayed fault clearing time of 1200ms. v) As per SCADA, change in demand of approx. 145MW is observed in J&K control area.	0	0.215	0	145	0.000	0.198	60432	73270	1200
18	GD-1	1) 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 2) 70 MW Unit-2 at Dhauliganga(NH) 3) 70 MW Unit-4 at Dhauliganga(NH)	Uttarakhand	PGCIL, NHPC	16-Sep-23	18:45	16-Sep-23	19:52	01:07	i) During antecedent condition, 70 MW Unit-2 & 4 at Dhauliganga(NH) and 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 were connected to 220kV Bus-2 at Dhauliganga (NH) and only 70 MW Unit-2 & 4 at Dhauliganga(NH) was running and generating approx. 70MW each and total MW generation of 140MW was evacuating through 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 only. 220kV Bus-1 at Dhauliganga (NH) was not in service. ii) As reported, at 18:45hrs, bus bar protection operated at 220kV Bus-2 at Dhauliganga(NH) during synchronization of 70 MW Unit-3 at Dhauliganga(NH) as there was fault in Y-ph of CB (SO2 found in CB chamber) and 70 MW Unit-2 & 4 at Dhauliganga(NH) and 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 tripped. iii) As per PMU at 400kV Jauljivi(PG), Y-N phase to ground fault is observed in the system with fault clearance time of 80ms. iv) As per SCADA, generation loss of approx. 140MW is observed at Dhauliganga(NH). v) 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 and 70 MW Unit-4 at Dhauliganga(NH) revived at 19:52 hrs and 20:03 hrs respectively.	0	0	140	0	0.289	0.000	48425	61120	80
19	GD-1	1) 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 2) 70 MW Unit-4 at Dhauliganga(NH)	Uttarakhand	PGCIL, NHPC	16-Sep-23	21:00	20-Sep-23	23:06	98:06	i) During antecedent condition, 70 MW Unit- 2 & 4 at Dhauliganga(NH) and 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 were connected to 220kV Bus-2 at Dhauliganga (NH) and only 70 MW Unit- 4 at Dhauliganga(NH) was running and generating approx. 68MW and total MW generation of 68MW was evacuating through 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 only. 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-1 was not in service. ii) As reported, at 21:00 hrs, bus bar protection operated at 220kV Bus-2 at Dhauliganga(NH) (Exact reason of busbar protection operation yet to be shared) and 70 MW Unit- 4 at Dhauliganga(NH) and 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-2 tripped. iii) As per PMU at 400kV Jauljivi(PG), Y-N phase to ground fault is observed in the system with fault clearance time of 120ms. iv) As per SCADA, generation loss of approx. 68MW is observed at Dhauliganga(NH). v) 220 KV Jauljivi (PG)-Dhauliganga(NH) (PG) Ckt-1 revived at 23:06 hrs on 20th September, 2023.	0	0	68	0	0.140	0.000	48641	64129	120
20	GI-1	1) 220 KV Amargarh(INDIGRID)-Ziankote(JK) (PDD JK) Ckt-1 2) 220 KV Amargarh(INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2	Jammu & Kashmir	PDD JK, INDIGRID	16-Sep-23	17:36	16-Sep-23	22:16	04:40	i) 220/132kV Ziankote S/s have two bus at 220kV side i.e., main bus & reserve bus. ii) During antecedent condition, 220kV Ziankote was operating in bus split mode viz. 220kV Amargarh(INDIGRID) –Ziankote(JK) D/C (carrying 117MW each) was feeding Ziankote load. 220kV Wagoora-Ziankote(JK) Ckt-2 (carrying 133MW) was connected at other bus and feeding Alusteng. 220kV Wagoora-Ziankote(JK) Ckt-1 was not in service. iii) As reported, at 17:36 hrs, 220 KV Amargarh(INDIGRID)-Ziankote(JK) (PDD JK) Ckt-1 tripped on Y-B phase to phase fault with fault current of Iy=~3.714kA and Ib=~3.402kA and fault distance of 17.89km from Amargarh end. (Exact reason of fault yet to be shared) iv) At the same time, 220 KV Amargarh(INDIGRID)-Ziankote(JK) (PDD JK) Ckt-2 also tripped on Y-B phase to phase fault with fault current of Iy=~3.733kA and Ib=~3.401kA and fault distance of 17.91km from Amargarh end. (Exact reason of fault yet to be shared) v) As per PMU at Amargarh(PG), Y-B phase to phase fault is observed with delayed fault clearing time of 120ms. vi) As per SCADA, change in demand of approx. 250MW is observed in J&K control area.	0	1.167	0	250	0.000	0.437	47735	57150	120
21	GD-1	1) 400/33 kV 330 MVA ICT 1 at AYANA1 SL_BKN_PG (ARP1PL)	Rajasthan	Ayana Renewable Oe	17-Sep-23	10:34	17-Sep-23	13:32	02:58	i) During antecedent condition, 400/33 kV 330 MVA ICT 1 at AYANA1 SL_BKN_PG (ARP1PL) was carrying total MW generation of Ayana Solar which was approx. 205MW. ii) As reported, at 10:34hrs, 400/33 kV 330 MVA ICT 1 at AYANA1 SL_BKN_PG (ARP1PL) tripped on over current protection operation due to flashover on LV-02 isolator clamps and IPS tube connector. iii) As per PMU at Ayana(IP), R-Y phase to phase fault converted to 3-phase fault is observed with delayed fault clearance time of 600ms. iv) As per SCADA, generation loss of approx. 205MW is observed at Ayana Solar.	0	0	205	0	0.448	0.000	45770	49801	600
22	GD-1	1) 220 KV Lalsot(RS)-Dausa(RS) (PG) Ckt 2) 220 KV Bassi(PG)-Dausa(RS) (PG) Ckt-1 3) 220 KV Bassi(PG)-Dausa(RS) (PG) Ckt-2 4) 220 KV Sawaimadhopur(RS)-Dausa(RS) (PG) Ckt	Rajasthan	RVPNL, PGCIL	17-Sep-23	00:51	17-Sep-23	02:01	01:10	i) 220/132kV Dausa(RS) has double main and transfer bus scheme at both 220kV and 132kV level. ii) As reported, at 00:51hrs, R and Y phase CT blast occured at Lalsot end of 220 KV Lalsot(RS)-Dausa(RS) (PG) Ckt. iii) At the same time, bus bar protection operated at Dausa(RS) and all the elements connected to both 220kV Bus-1 and 2 at Dausa(RS) tripped. (Exact reason of bus bar protection operation at Dausa(RS) yet to be shared) iv) Due to loss of supply to 132kV level also 220/132kV Dausa(RS) S/s became dead. v) As per PMU at Bassi(PG), R-N phase to earth fault with delayed fault clearance time of 200ms followed by Y-N phase to earth fault with fault clearance time of 120ms are observed. vi) As per SCADA, change in demand of approx. 110MW is observed in Rajasthan control area.	0	0	110	0	0.251	0.000	43865	60246	200
23	GD-1	1) 400/220 KV 315 MVA ICT-2 at Obra-B(UP) 2) 400/220 KV 240 MVA ICT-3 at Obra-B(UP) 3) 200 MW Obra TPS - UNIT 12	Uttar Pradesh	UPPTCL	18-Sep-23	13:53	18-Sep-23	14:23	00:30	i) During antecedent condition, 400/220 KV 315 MVA ICT-1 at Obra-B(UP), 220kV Obra-A(UP)-Rewa Road(UP) Ckt-1 & 2 and 220kV Obra-A(UP)-Mirzapur(UP) Ckt were not in service. 220kV Obra-A(UP)-Robertganj(UP) Ckt and 220kV Obra-A(UP)-Sahupuri(UP) Ckt were fed radially through 400/220 KV 315 MVA ICT-2 and 240 MVA ICT-3 at Obra-B(UP). Active power loading of 400/220 KV 315 MVA ICT-2 and 240 MVA ICT-3 at Obra-B(UP) were approx. 202 MW and 157MW respectively. 200 MW Obra TPS - UNIT 12 was running through station transformer and generating approx. 120MW. ii) As reported, at 13:53 hrs, 400/220 KV 240 MVA ICT-3 at Obra-B(UP) tripped on over-current earth-fault protection operation. (Exact reason yet to be shared.) iii) Due to tripping of 400/220 KV 240 MVA ICT-3 at Obra-B(UP), 400/220 KV 315 MVA ICT-2 at Obra-B(UP) got overloaded and tripped on directional over-current protection operation. iv) As 220kV Obra-A(UP)-Robertganj(UP) Ckt and 220kV Obra-A(UP)-Sahupuri(UP) Ckt were fed radially through 400/220 KV 315 MVA ICT-2 and 240 MVA ICT-3 at Obra-B(UP), 220/132kV Obra-A(UP) S/s became dead due to tripping of both the ICTs and loss of supply. v) During the same time, 200 MW Obra TPS - UNIT 12 also tripped as station supply failed due to tripping of both the ICTs. vi) As per PMU at Allahabad(PG), B-N phase to earth fault with fault clearance time of 80ms is observed. vii) As per SCADA, change in demand of approx. 325MW is observed in UP control area. viii) As per SCADA, change in generation of approx. 120MW is observed at Obra-B(UP). As reported by SLDC-UP, generation loss of approx. 110MW is observed at Obra-B(UP) .	0	0.163	0	325	0.000	0.572	49556	56847	80
24	GD-1	1) 220 KV Khushkhera(RS)-Neemrana(PG) Ckt 2) 220 KV Khushkhera(RS)-Bhiwadi(PG) Ckt 3) 220 KV Khushkhera(RS)-Alwar(RS) Ckt 4) 220 KV Khushkhera(RS)-Kishangarh-Bas(RS) Ckt 5) 220/132kV 160 MVA ICT-1 at Khushkhera(RS) 6) 220/132kV 160 MVA ICT-2 at Khushkhera(RS)	Rajasthan	RVPNL, PGCIL	21-Sep-23	21:14	21-Sep-23	23:32	02:18	i) 220/132kV Khushkhera(RS) has double main bus scheme at both 220kV and 132kV level. ii) As reported, at 00:51hrs, Y phase CT blast occured at Khushkhera(RS) end of 220 KV Khushkhera(RS)-Neemrana(PG) Ckt. iii) As per DR at Khushkhera(RS) end of 220 KV Khushkhera(RS)-Neemrana(PG) Ckt, line tripped on Y-N phase to earth fault with fault current of ~11.94kA from Khushkhera(RS) end and fault clearing time of ~310ms; fault sensed in zone-4 at Khushkhera(RS) end. iv) At the same time, bus bar protection operated at Khushkhera(RS) and all the elements connected to both 220kV Bus-1 and 2 at Khushkhera(RS) tripped. v) Due to loss of supply to 132kV level also 220/132kV Khuskhera(RS) S/s became dead. vi) As per PMU at Bhiwadi(PG), Y-N phase to earth fault converted to R-Y-N double phase to earth fault is observed with delayed fault clearance time of 600ms. vii) As per SCADA, change in demand of approx. 190MW is observed in Rajasthan control area.	0	0.437	0	190	0.000	0.315	43865	60246	600
25	GI-1	1) 220 KV Mandaula(PG)-Narela(DV) (DTL) Ckt-1	Delhi	DTL, PGCIL	22-Sep-23	13:38	22-Sep-23	13:44	00:06	i) 220kV side of 400/220kV Mandaula(PG) has double main & transfer bus scheme and 220/66kV Narela has double main bus scheme. ii) During antecedent condition, 220 KV Mandaula(PG)-Narela(DV) (DTL) Ckt-2 was already under planned shutdown. and load of 220kV Narela S/s was connected through 220 KV Mandaula(PG)-Narela(DV) (DTL) Ckt-1. i) As reported, at 13:38 hrs, 220 KV Mandaula(PG)-Narela(DV) (DTL) Ckt-1 tripped on R-N phase to ground fault with fault current of 8.89kA and fault distance of 13.21km from Mandaula(PG) end. (Exact reason of fault yet to be shared) iii) As per PMU at Mandaula(PG), R-N phase to earth fault is observed with delayed fault clearing time of 160ms. iv) As per SCADA, change in demand of approx. 125 MW is observed in Delhi control area. v) As reported, load of 220kV Narela S/s was restored at 13:44 hrs through 220kV DSIDC Bawana-Narela ckt-1&2.	0	0.013	0	125	0.000	0.188	57561	66602	160
26	GI-1	1) 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-1 2) 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-2 3) 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-3 4) 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-4	Haryana	Haryana, BBMB	23-Sep-23	10:45	23-Sep-23	12:11	01:26	i) During antecedent condition, 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-1, 2, 3 & 4 were carrying approx. 28MW each. ii) As reported by BBMB, at 10:45hrs, 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-4 tripped on B-N phase to earth fault with fault distance of 7.38 km from PanipatTH(HV) end. As per DR at Panipat(BB) end, fault sensed in zone-1 at Panipat(BB) end; fault current was ~3.92kA from Panipat(BB) and fault clearing time was ~55ms. (Exact reason of fault yet to be shared) iii) Due to delay in fault clearance from PanipatTH(HV) end, 220 KV PanipatTH(HV)-Panipat(BB) (HVPNL) Ckt-1, 2 & 3 also tripped from Panipat(BB) end only on Z-2/Z-3 distance protection operation with fault distance of 56.66km, 38.41 km and 15.31km respectively from PanipatTH(HV) end. iv) As per DR at Panipat(BB) end, fault sensed in zone-3 for Ckt-1 & 2 and in zone-2 for Ckt-3 at Panipat(BB) end; fault current was ~3.92kA, ~3.80kA and ~3.64kA from Panipat(BB) respectively and fault clearing time was ~780ms, ~780ms and ~380ms respectively. No relay operated at PanipatTH(HV) end. v) As per PMU at Panipat(BB), Y-N phase to earth fault with delayed clearance of 760msec is observed. (There is phase sequence issue at BBMB stations that's why Y-N fault is recorded as B-N fault at Panipat(BB)) vi) As per SCADA, no change in demand is observed in Haryana control area.	0	0	0	0	0.000	0.000	55363	58056	760
27	GI-2	1) 800 KV HVDC Kurukshetra(PG) Pole-01 2) 800 KV HVDC Kurukshetra(PG) Pole-03	Haryana	PGCIL	24-Sep-23	00:21	24-Sep-23	02:44	02:23	i) During antecedent condition, 800 KV HVDC Kurukshetra(PG) Pole-1, 2, 3 & 4 were carrying 725 MW, 721 MW, 470 MW and 477 MW respectively from Champa to Kurukshetra. Total power order was approx. 2500MW. ii) As reported, at 00:21hrs, 800 KV HVDC Kurukshetra(PG) Pole-01 blocked due to false latching of External Block in Lane-1 Main-1 & Main-2. iii) At the same time, 800 KV HVDC Kurukshetra(PG) Pole-03 also blocked due to protective pole isolation failure in Pole-1 and CAT-B initiation at Champa end. iv) As reported, Pole 1 Lane 1 was put into maintenance to avoid further tripping due to external block until identification of root cause for latching of protection. v) As per PMU at Kurukshetra(PG), no fault is observed in the system, but fluctuation in voltage is observed. vi) As per SCADA, no load loss is observed in Haryana control area.	0	0	0	0	0.000	0.000	46977	58783	NA

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	
28	GD-1	1) 220 kV Preet Vihar-Harsh Vihar (DTL) Ckt-1 2) 220 kV Preet Vihar-Harsh Vihar (DTL) Ckt-2 3) 220 kV Preet Vihar-Patparganj (DTL) Ckt-1 4) 220 kV Preet Vihar-Patparganj (DTL) Ckt-2 5) 220/33kV 100MVA ICT-1 at Preet Vihar(DTL) 6) 220/33kV 100MVA ICT-2 at Preet Vihar(DTL) 7) STG at Pragati(DTL)	Delhi	DTL	25-Sep-23	13:27	25-Sep-23	13:30	00:03	i) During antecedent condition, 220 kV Preet Vihar-Harsh Vihar (DTL) Ckt-1 & 2 were feeding the load of 220kV Dev nagar, Park Street(part load), I.P. Stn & Rajghat S/s through 220kV Harsh Vihar-Preet Vihar-Patparganj-I.P. Stn-Pragati link. STG at Pragati(DTL) was also connected to this link and was generating approx. 52MW. ii) As reported, at 13:27 hrs, bus bar protection operated at 220kV Bus-1 & 2 at Preet Vihar(DTL) which resulted into tripping of all the elements connected to both the buses and 220/33kV Preet Vihar(DTL) S/s became dead. (Exact reason of bus bar protection operation yet to be shared) iii) Due to tripping of Harsh Vihar-Preet Vihar-Patparganj link the load of 220kV 220kV Dev nagar, Park Street(part load), I.P. Stn & Rajghat got interrupted. iv) As reported by SLDC-Delhi, generation loss of approx. 52MW occurred due to tripping of STG at Pragati(DTL) during the same time. v) As per PMU at Maharanibagh(PG), no fault is observed in the system. vi) As per SCADA, change in demand of approx. 420MW is observed in Delhi control area. vii) As reported by SLDC-Delhi, load loss of approx. 275MW is occurred in Delhi control area. viii) At 13:30 hrs, 220kV Patparganj-Gazipur Ckt was charged and supply was extended to I.P. Stn, rajghat, Pragati & Park Street S/s and load normalized.	0	0.014	52	275	0.099	0.464	52696	59229	NA
29	GD-1	1) 220kV Allahabad Rewaroad (UP)-Obra-A(UP) Ckt-1 2) 220kV Allahabad Rewaroad (UP)-Allahabad400(UP) Ckt-1 3) 220kV Allahabad Rewaroad (UP)-Allahabad400(UP) Ckt-2 4) 220kV Allahabad Rewaroad (UP)-Allahabad(PG) Ckt-1 5) 220kV Allahabad Rewaroad (UP)-Allahabad(PG) Ckt-2 6) 220kV Allahabad Rewaroad (UP)-Sirathu Ckt 7) 220kV Allahabad Rewaroad (UP)- Allahabad Cantt Ckt 8) 220kV Allahabad Rewaroad (UP)-Mirzapur Ckt 9) 220/132kV 160MVA ICT-1 at Allahabad Rewaroad(UP) 10) 220/132kV 200MVA ICT-2 at Allahabad Rewaroad(UP) 11) 220/132kV 200MVA ICT-3 at Allahabad Rewaroad(UP)	Uttar Pradesh	UPPTCL, PGCIL	27-Sep-23	20:09	27-Sep-23	20:51	00:42	i) 220kV Allahabad Rewaroad(UP) has double main bus scheme and both the buses are connected through bus coupler. ii) During antecedent condition, 220kV Obra-A(UP)-Mirzapur Ckt was under shutdown to avoid overloading of 400/220kV ICTs at Obra-B(UP) and 220kV Mirapur S/s was radially fed from 220kV Allahabad Rewaroad (UP). As a standby arrangement, 220kV Allahabad Rewaroad (UP)-Obra-A(UP) Ckt-1 was connected with 220kV Obra-A(UP)-Mirzapur Ckt through jumpering. iii) As reported, at 19:14 hrs, 220kV Allahabad Rewaroad (UP)-Obra-A(UP) Ckt-1 (now 220kV Allahabad Rewaroad (UP)-Mirzapur Ckt as a standby arrangement) tripped on R-N phase to earth fault with fault distance of 21.47km from Allahabad Rewaroad(UP); fault sensed in zone-1. iv) After clearance line was tried to be energised at 20:09 hrs. During charging, again R-N phase to earth fault occurred on the line. As reported by SLDC-UP, R-phase jumper was found broken at location no. 457. v) But due to delay in opening of CB at Allahabad Rewaroad(UP) end of 220kV Allahabad Rewaroad (UP)-Obra-A(UP) Ckt-1, LBB protection operated at 220kV Allahabad Rewaroad(UP). vi) Due to isolator contact issue bus tied condition was reflecting and elements connected to both the buses tripped resulting in complete blackout of 220/132/33kV Allahabad Rewaroad(UP) S/s. vii) Load of areas fed from 132kV Minto Park, 132kV Kareli, 132kV Sarai Aqil and 132kV Meja road was affected. 220kV Sirathu and 220kV Allahabad Cantt were getting supply from 220kV Fatehpur(UP). viii) As per PMU at Allahabad(PG), R-N phase to earth fault with delayed fault clearance time of 160ms is observed. ix) As per SCADA, change in demand of approx. 390MW is observed in UP control area. x) As reported by SLDC-UP, load loss of approx. 300MW is observed in UP control area.	0	0.21	0	300	0.000	0.439	52451	68272	160
30	GD-1	1) 220 KV Fatehpur(PG)-Fatehpur(UP) (PG) Ckt-1 2) 220/132kV 200MVA ICT-1 at Fatehpur(UP) 3) 220/132kV 200MVA ICT-2 at Fatehpur(UP) 4) 220kV Fatehpur(UP)- Sirathu(UP) Ckt 5) 220kV Fatehpur(UP)- Allahabad Cantt(UP) Ckt	Uttar Pradesh	UPPTCL, PGCIL	27-Sep-23	20:25	27-Sep-23	21:05	00:40	i) During antecedent condition, 220/132kV Allahabad Cantt(UP) & 220/132kV Sirathu(UP) S/s were getting supplies from 220/132kV Fatehpur(UP) in radial mode. ii) As reported, at 20:25 hrs, 220 KV Fatehpur(PG)-Fatehpur(UP) (PG) Ckt-1 tripped on B-N phase to earth fault from Fatehpur(UP) end and auto-reclosed successfully from Fatehpur(PG) end. iii) Again B-N phase to earth fault occurred in 220 KV Fatehpur(PG)-Fatehpur(UP) (PG) Ckt-1 within reclaim time and line finally tripped from Fatehpur(PG) end also. iv) With the tripping of 220 KV Fatehpur(PG)-Fatehpur(UP) (PG) Ckt-1, 220kV Fatehpur(UP)- Sirathu(UP) Ckt and 220kV Fatehpur(UP)- Allahabad Cantt(UP) Ckt started taking power from 220kV Bus-1 at Fatehpur(UP) through back feeding from 220/132kV 200MVA ICT-2 at Fatehpur(UP). v) Due to this, 220/132kV 200MVA ICT-1 at Fatehpur(UP) got overloaded and finally tripped on over-current protection operation causing supply failure of 220kV Fatehpur(UP)- Sirathu(UP) Ckt and 220kV Fatehpur(UP)- Allahabad Cantt(UP) Ckt which resulted into complete blackout of 220/132kV Allahabad Cantt(UP) & 220/132kV Sirathu(UP). vi) Load of areas fed from 132kV Khaga, Malwan, Hussainganj, OPH, Kareilly, Manori, Manjanpur, Barwari and Sirathu were affected. vii) As per PMU at Fatehpur(PG), two consecutive B-N phase to earth faults with fault clearance time of 80ms are observed. viii) As per SCADA, change in demand of approx. 540MW is observed in UP control area. ix) As reported by SLDC-UP, load loss of 570MW occurred in UP control area.	0	0.38	0	570	0.000	0.840	52341	67842	80
31	GI-2	1) 220kV Obra-A(UP)-Robertganj(UP) Ckt 2) 400/220 KV 240 MVA ICT-3 at Obra-B(UP) 3) 400kV Obra-B(UP)-Sultanpur(UP) Ckt 4) 200 MW Obra TPS - UNIT 11 5) 200 MW Obra TPS - UNIT 13	Uttar Pradesh	UPPTCL	27-Sep-23	12:53	27-Sep-23	14:02	01:09	i) During antecedent condition, 400/220 KV 315 MVA ICT-1 at Obra-B(UP) was not in service. 400kV Obra-B(UP)-Sultanpur(UP) Ckt, 400/220 KV 240 MVA ICT-3 at Obra-B(UP), 200 MW Obra TPS - UNIT 11 and 13 were connected to 400kV Bus-1 at Obra-B(UP) and rest of the elements were connected to 400kV Bus-2 at Obra-B(UP). 200 MW Obra TPS - UNIT 11 and 13 were generating approx. 285MW in total. ii) As reported, at 12:53 hrs, 220kV Obra-A(UP)-Robertganj(UP) Ckt tripped on Y-B phase to phase fault with fault distance of 1.4km from Obra-A(UP) end; fault sensed in zone-1. (Exact reason yet to be shared) iii) At the same, 400/220 KV 240 MVA ICT-3 at Obra-B(UP) tripped on over-current earth-fault protection operation and bus bar protection of 400kV Bus-1 also operated. (Reason of ICT tripping and bus bar protection operation yet to be shared by UP) iv) As per PMU at Allahabad(PG), Y-B phase to phase fault with fault clearance time of 80ms is observed. v) As reported by SLDC-UP, no change in demand is observed in UP control area. vi) As per SCADA and as reported by SLDC -UP, generation loss of approx. 285MW is observed at Obra-B(UP).	0	0	285	0	0.512	0.000	55632	65423	80
32	GI-2	1) 400kV Bus-2 at Koteshwar (PG) 2) 765/400kV 800MVA ICT-2 at Koteshwar(PG) 3) 400kV Koteshwar(PG)-Tehri(TH) (PG) Ckt-1 4) 400kV Koteshwar(PG)-Tehri(TH) (PG) Ckt-3 5) 400kV Koteshwar(PG)- Koteshwar (TH) (PG) Ckt-2	Uttarakhand	THDC, PGCIL	28-Sep-23	15:45	28-Sep-23	16:26	00:41	i) 765/400kV Koteshwar(PG) has double main bus scheme at 400kV level. During antecedent condition, 765/400kV 800MVA ICT-2 at Koteshwar(PG), 400kV Koteshwar(PG)-Tehri(TH) (PG) Ckt-1 & 3 and 400kV Koteshwar(PG)- Koteshwar (TH) (PG) Ckt-2 were connected to 400kV Bus-2 at Koteshwar(PG) and rest of the elements were connected to 400kV Bus-1 at Koteshwar(PG). 765/400kV 800MVA ICT-4 at Koteshwar(PG) was under shutdown. Only 100MW Unit-4 at Koteshwar HEP was running during antecedent condition. ii) As reported, at 15:45hrs, 400kV side bay (410) of 765/400kV 800MVA ICT-4 at Koteshwar(PG) was closed for CSD adjustment. However, at the same time bus bar protection of 400kV Bus-2 operated. This resulted into tripping of all the elements connected to Bus -2 and Bus-2 became dead. (Exact reason of bus bar protection operation yet to be shared) iii) As per PMU at 400kV Koteshwar(PG), B-N phase to ground fault is observed in the system with fault clearance time of 80ms. iv) As per SCADA, no load loss or generation loss is observed in Uttarakhand control area.	0	0	0	0	0.000	0.000	56005	64265	80

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time									
1	132 KV Rihand(UP)-Garwa(JS) (UP) Ckt-1	UPPTCL	13-Sep-23	23:59		Phase to earth fault R-N	NA	NA	YES	YES			
2	132 KV Rihand(UP)-Garwa(JS) (UP) Ckt-1	UPPTCL	20-Sep-23	18:27		Phase to earth fault R-N	NA	NA	YES	YES			
3	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	20-Sep-23	15:48		Phase to earth fault R-N	NA	NA	NO	NO			
4	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	20-Sep-23	04:48		Phase to earth fault R-N	NA	NA	NO	NO			
5	220 KV Ranpur(RS)-Bhanpura(MP) (RS) Ckt-1	RRVPNL	14-Sep-23	14:29		Phase to earth fault B-N	NA	NA	NO	NO			
6	500 KV HVDC Mahindergarh(APL)-Adani Mundra(APL) (ATIL) Ckt-2	APL	15-Sep-23	15:49		Earth fault	NA	NA	YES	YES (after 24hrs)			
7	765 KV Varanasi-Gaya (PG) Ckt-1	POWERGRID	24-Sep-23	08:56		Over Voltage	NA	NA	YES	YES			
8	765 KV Varanasi-Gaya (PG) Ckt-2	POWERGRID	15-Sep-23	20:00		Phase to earth fault Y-N	NA	NA	YES	YES			
9	800 KV HVDC Kurukshetra(PG) Pole-03	POWERGRID	24-Sep-23	00:21		Relay maloperation	NA	NA	NO	NO			
10	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	24-Sep-23	00:21		Relay maloperation	NA	NA	YES	YES (after 24hrs)			

 # Fault Clearance time has been computed using PMU Data from nearest node available and/or DR provided by respective utilities (*Annexure-* ***II)***

****Yes, if written Preliminary report furnished by constituent(s)***

R-Y-B phase sequencing (Red, Yellow, Blue) is used in the list content.All information is as per Northern Region unless specified.

^^ tripping seems to be in order as per PMU data, reported information. However, further details may be awaited.

Reporting of Violation of Regulation for various issues for above tripping

1	Fault Clearance time(>100ms for 400kV and >160ms for 220kV)	1. CEA Grid Standard-3.e 2. CEA Transmission Planning Criteria
2	DR/EL Not provided in 24hrs	1. IEGC 5.2(r) 2. CEA Grid Standard 15.3
3	FIR Not Furnished	1. IEGC 5.9.6.a 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)

4	Protection System Mal/Non Operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.A 2. CEA (Technical Standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)
5	A/R non operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.C 2. CEA Technical Planning Criteria

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st September 2023 - 30th September 2023

S. No.	Utility	Total No. of tripping	First Information Report (Not Received)		Disturbance Recorder (Not Received)	Disturbance Recorder (NA) as informed by utility	Disturbance Recorder (Not Received)	Event Logger (Not Received)	Event Logger (NA) as informed by utility	Event Logger (Not Received)	Tripping Report (Not Received)	Tripping Report (NA) as informed by utility	Tripping Report (Not Received)	Remark
			Value	%	Value		%	Value		%	Value		%	
1	ACME_HEERGARH	1	1	100	1	0	100	1	0	100	1	0	100	DR, EL & Tripping report need to be submitted
2	ADANI	1	1	100	1	0	100	1	0	100	1	0	100	
3	ANTA-NT	3	3	100	3	0	100	3	0	100	3	0	100	
4	APL	4	3	75	3	0	75	3	0	75	3	0	75	
5	ARP1PL	2	2	100	2	0	100	2	0	100	2	0	100	
6	AURAIYA-NT	5	5	100	5	0	100	5	0	100	5	0	100	
7	AVAADA_SUNRAYS	3	3	100	3	0	100	3	0	100	3	0	100	
8	BBMB	49	11	22	12	9	30	11	19	37	13	0	27	
9	CPCC1	61	0	0	17	2	29	16	1	27	1	0	2	
10	CPCC2	24	0	0	0	6	0	0	4	0	0	0	0	
11	CPCC3	59	3	5	6	6	11	9	5	17	4	0	7	
12	DADRI-NT	2	2	100	2	0	100	2	0	100	2	0	100	
13	DHAULIGANGA-NH	10	0	0	0	0	0	0	0	0	0	0	0	
14	DULHASTI-NH	2	0	0	0	2	0	0	2	0	1	0	50	DR, EL & Tripping report need to be submitted
15	FARIDABAD-NT	3	3	100	3	0	100	3	0	100	3	0	100	
16	FBTL	1	0	0	0	0	0	0	0	0	0	0	0	Details received
17	KARCHAM	1	1	100	1	0	100	1	0	100	1	0	100	DR, EL & Tripping report need to be submitted
18	KHURJA STPP	1	1	100	1	0	100	1	0	100	1	0	100	
19	KISHENGANGA-NH	1	0	0	0	1	0	0	0	0	0	0	0	Details received
20	KOTESHWAR	1	0	0	0	1	0	0	0	0	0	0	0	
21	Mega_SuryaUrja	2	2	100	0	0	0	0	0	0	2	0	100	DR, EL & Tripping report need to be submitted
22	NAPP	4	0	0	0	0	0	0	0	0	0	0	0	Details received
23	RAPPA	7	3	43	7	0	100	7	0	100	7	0	100	DR, EL & Tripping report need to be submitted
24	RAPPB	1	1	100	1	0	100	1	0	100	1	0	100	
25	RENEW SURYARAVI (RSRPL)	1	0	0	0	0	0	1	0	100	1	0	100	
26	SALAL-NH	4	4	100	4	0	100	4	0	100	4	0	100	
27	SEWA-2-NH	1	0	0	0	0	0	0	0	0	0	0	0	Details received
28	SINGOLI	5	0	0	0	0	0	0	0	0	0	0	0	
29	SINGRAULI-NT	3	0	0	3	0	100	3	0	100	3	0	100	
30	SLDC-DV	20	4	20	8	3	47	10	0	50	10	0	50	

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st September 2023 - 30th September 2023

S. No.	Utility	Total No. of tripping	First Information Report (Not Received)		Disturbance Recorder (Not Received)	Disturbance Recorder (NA) as informed by utility	Disturbance Recorder (Not Received)	Event Logger (Not Received)	Event Logger (NA) as informed by utility	Event Logger (Not Received)	Tripping Report (Not Received)	Tripping Report (NA) as informed by utility	Tripping Report (Not Received)	Remark
			Value	%	Value		%	Value		%	Value		%	
31	SLDC-HP	12	0	**0**	1	8	**25**	1	7	**20**	1	2	**10**	
32	SLDC-HR	14	1	**7**	3	3	**27**	3	1	**23**	1	0	**7**	DR, EL & Tripping report need to be submitted
33	SLDC-JK	11	0	**0**	11	0	**100**	11	0	**100**	1	5	**17**	
34	SLDC-PS	26	1	**4**	16	3	**70**	16	3	**70**	18	0	**69**	
35	SLDC-RS	79	35	**44**	17	9	**24**	17	10	**25**	27	0	**34**	
36	SLDC-UK	23	0	**0**	5	6	**29**	6	1	**27**	0	0	**0**	
37	SLDC-UP	177	17	**10**	18	40	**13**	16	57	**13**	18	12	**11**	
38	STERLITE	5	0	**0**	0	0	**0**	0	0	**0**	4	1	**100**	
39	TANAKPUR-NH	2	1	**50**	1	0	**50**	1	0	**50**	1	0	**50**	DR, EL & Tripping report need to be submitted
40	TEHRI	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	
41	UNCHAHAR-NT	5	2	**40**	2	0	**40**	2	0	**40**	2	0	**40**	
42	URI-I-NH	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
Total in NR Region		**639**	**113**	**18**	**160**	**99**	**30**	**163**	**110**	**31**	**148**	**20**	**24**	

As per the IEGC provision under clause 5.2 (r), detailed tripping report along with DR & EL has to be furnished within 24 hrs of the occurrence of the event

S. No.	Name of the Generatng Station (Capacity in MW)	Date of last PSS tuning / re-tuning performed (in DD/MM/YYYY format)	Date of last Step Response Test performed (in DD/MM/YYYY format)	Report submitted to NRLDC/NRPC (Yes/ No)	Remarks (if any)	Tentative schedule for PSS tuning / re-tuning
1	**THDC**					
	TEHRI HPS(4 * 250)	15.12.2021 to 20.12.2021	15.12.2021 to 20.12.2021	Yes	(Report shared vide email dt.19.01.2019)	
	KOTESHWAR HPS(4 * 100)	17/03/2019 to 19/03/2019	17/03/2019 to 19/03/2019	Yes	(Report shared vide email dt.11.02.2021)	
2	**SJVNL**					
	NATHPA-JHAKRI HPS(Unit1 #250)	10.03.2020	-	No	Excitation system upgraded in 2020	
	NATHPA-JHAKRI HPS(Unit2 #250)	14.03.2013	-	No	The upgradation of old excitation system of Unit No.#2&4 will be carried out during Annual Plant Maintenance of FY 20222-23, therefore PSS tuning shall be carried out at the time of upgradation of unit. It is also submitted that step response test of other Units shall also be carried out during upgradation work of Unit # 2 &4 by the OEM, being a system and software specific job.	
	NATHPA-JHAKRI HPS(Unit3 #250)	03.03.2020	-	No	Excitation system upgraded in 2020	
	NATHPA-JHAKRI HPS(Unit4 #250)	14.03.2013	-	NO	The upgradation of old excitation system of Unit No.#2&4 will be carried out during Annual Plant Maintenance of FY 20222-23, therefore PSS tuning shall be carried out at the time of upgradation of unit. It is also submitted that step response test of other Units shall also be carried out during upgradation work of Unit # 2 &4 by the OEM, being a system and software specific job.	
	NATHPA-JHAKRI HPS(Unit5 #250)	14.05.2016	14.05.2016	NO	Excitation system upgraded in 2013	
	NATHPA-JHAKRI HPS(Unit6 #250)	14.05.2017	14.05.2017	NO	Excitation system upgraded in 2013	
	RAMPUR HEP(6 * 68.67)	29.11.2014	27.10.2020,10.02.2021	YES	PSS Response and Step Test response was checked in February, 2021 by Rampur HPS and report of the same was submitted to NRLDC. Now the work of PSS tuning and step response testing has been awarded to BHEL, Bengaluru. Testing shall be carried out in November, 2022.	
3	**HVPNL**					
	PANIPAT TPS(unit1# 250)	29.03.2016	29.03.2016	YES	--	
	PANIPAT TPS(unit2# 250)	15.01.2018	15.01.2018	YES	--	
	DCRTPP (YAMUNA NAGAR)(unit1#300)	19-12-2018	19-12-2018	YES	(Report attached)	
	DCRTPP (YAMUNA NAGAR)(unit1#300)	Will be carried out shortly				
	RGTPP(KHEDAR) (2*600)	5th to 6th July 2013	5th to 6th July 2013	Report attached. Previous record being looked into	No MW capacity addition after 2013 at RGTPP Khedar. No new line addition in vicinity of station	
	JHAJJAR(CLP) (2*660)	20-05-2017	20-05-2017	YES	--	
4	**NTPC**					
	Rihand (Unit1#500)	03-03-2017	03-03-2017	YES	Next test will be done during re-commissioning of unit after O/H	
	Rihand (Unit2#500)	02-07-2016	02-07-2016	YES	Next test will be done during re-commissioning of unit after O/H	
	Rihand (Unit3#500)	15-08-2015	15-08-2015	YES	Next test will be done during re-commissioning of unit after O/H	
	Rihand (Unit4#500)	25-05-2017	25-05-2017	YES	Next test will be done during re-commissioning of unit after O/H	
	Rihand (Unit4#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	
	Rihand (Unit5#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	
	SINGRAULI STPS(Unit1#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit2#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit3#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit4#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit5#200)	-	-	-	Not done in last three years	
	SINGRAULI STPS(Unit6#500)	02.05.2018	02.05.2018	NO	--	
	SINGRAULI STPS(Unit7#500)	15.07.2018	15.07.2018	NO	--	

	UNCHAHAR I(2 * 210)	29-03-2016	29-03-2016	YES	--	
	UNCHAHAR II TPS(unit1# 210)	13-07-2019	13-07-2019	YES	--	
	UNCHAHAR II TPS(unit2# 210)	10-08-2018	10-08-2018	YES	--	
	UNCHAHAR UNIT6#500	-	31.03.2017	YES	--	
	KOLDAM HPS(4 * 200)	01-07-2015	01-07-2015	YES	--	
	DADRI GPS(2 * 154.51) (ST-Steam Turbine)	-	18-11-2015	YES	Next test will be done during re-commissioning of unit after O/H	
	DADRI GPS(2 * 154.51) (GT-Steam Turbine)	2017-18	2017 & 2018	YES	Next test will be done during re-commissioning of unit after O/H	
	ANTA GPS GT-1 (88.71)(GT- Gas Turbine)	10-10-2021	10-10-2021	YES		
	ANTA GPS GT-2 (88.71)(GT- Gas Turbine)	10-10-2021	10-10-2021	YES		
	ANTA GPS GT-3 (88.71)(GT- Gas Turbine)	08-08-2014	08-08-2014	YES	Next test will be done when Station will get opprtunity to have shcedule to run on full load.	
	ANTA GPS(1 * 153.2)(ST- Steam Turbine)	08-08-2014	08-08-2014	YES	Next test will be done when Station will get opprtunity to have shcedule to run on full load.	
5	**Aravali Power Company Private Ltd**					
	ISTPP (JHAJJAR)(3 * 500)	-	25-08-2015	YES	--	
6	**NHPC**					
	CHAMERA HPS (3*180)	06-08-2020	27-12-2019	YES	--	
	CHAMERA II HPS(3 * 100)	11-10-2015	11-10-2015	NO	Replacement of Excitation system in two units	
	CHAMERA III HPS(Unit1#77)	29-10-2015	07-01-2012	YES	--	
	CHAMERA III HPS(Unit2,3#77)	29-10-2015	19-06-2012	YES	--	
	PARBATI III HEP (Unit1# 130)	21-01-2016	21-01-2016	YES	Have been done recetly. The report on PSS turning shall be submitted seperately.	
	DULHASTI HPS(Unit2#130)	21-01-2020	21-01-2020	YES	--	
	DULHASTI HPS(Unit1#130)	29-12-2019	29-12-2019	YES	--	
	URI HPS(Unit3# 120)	10-01-2021	10-01-2021	YES	--	
	URI HPS(Unit4# 120)	15-02-2021	15-02-2021	YES	--	
	URI HPS(Unit2# 120)	07-03-2016	07-03-2016	YES	--	
	URI-II HPS(4 * 60)	Mar-14	Mar-14		2021-22	
	SALAL HPS (Unit-3,4,5,6 # 115)	16-12-2014	16-12-2014	YES	--	
	KISHANGANGA(3 * 110)	18-05-20 18	18-05-20 18	YES	--	
	BAIRASIUL HPS(3 * 60)	30-07-2015	30-07-2016	YES	--	
	SEWA-II HPS(3 * 40)	09-07-2016	09-07-2016	YES	--	
	PARBATI III HEP(4 * 130)	16-12-2016	16-12-2016	YES	--	
	TANAKPUR HPS(Unit1# 31.42)	09-01-2015	09-01-2015	YES	--	
	TANAKPUR HPS(Unit2,3#31.4)	24-05-2014	24-05-2014	YES	--	
	DHAULIGANGA HPS(Unit1 ,2# 70)	04-05-2014	17-04-2018	YES	--	
	DHAULIGANGA HPS(Unit3,4# 70)	26-06-2014	17-04-2018	YES	--	
7	**PUNJAB**					
	RAJPURA(NPL) TPS(2 * 700)	22-04-2014	22-04-2014	YES	--	
8	**Rajasthan**					
	KAWAI TPS(Unt1# 660)	03-02-2023	03-02-2023	YES	--	
	KAWAI TPS(Unt2# 660)	03-02-2023	03-02-2023	YES	--	
	CHHABRA TPS(Unit 1#250)	28-02-2023	28-02-2023	NO	--	
	CHHABRA TPS(Unit 2,3,4#250)	28-02-2023	28-02-2023	NO	--	
	CHHABRA TPS(Unit5# 660)	10-02-2016	10-02-2016	YES	--	
	CHHABRA TPS(Unit6# 660)	7/28/2018	7/28/2018	YES	--	
	KALISINDH TPS(Unit1# 600)	03-02-2023	03-02-2023	YES	--	
	KALISINDH TPS(Unit2# 600)	03-02-2023	03-02-2023	YES	--	
	KOTA TPS(Unit1#110)	PSS tuning and step response test of Unit#1,2,3,4,6&7 conducted sucessfully during 02.03.22 to 04.03.22		YES		
	KOTA TPS(Unit2#110)				--	
	KOTA TPS(Unit3#195)				--	
	KOTA TPS(Unit4#195)				--	
	KOTA TPS(Unit6#110)				--	
	KOTA TPS(Unit7#110)				--	
	SURATGARH TPS (Unit5#250)	14-03-2022	14-03-2022	Yes	--	
	SURATGARH TPS (Unit2,4#250)	06-06-2022		Yes	--	
	SURATGARH TPS (Unit1,3,,6#250)	05.02.22 & 06.02.22		Yes	--	
	SURATGARH SSCTPS (Unit 7&8)	PSS tuning and step response test of Unit#7&8 were carried out on 28.11.20 & 30.03.21.				
	RAJWEST (IPP) LTPS(Unit1# 135)	26-04-2016	26-04-2016	No	--	
	RAJWEST (IPP) LTPS(Unit2# 135)	14-07-2016	14-07-2016	No	--	
	RAJWEST (IPP) LTPS(Unit3# 135)	03-01-2014	03-01-2014	No	--	
	RAJWEST (IPP) LTPS(Unit4# 135)	03-11-2015	03-11-2015	No	--	
	RAJWEST (IPP) LTPS(Unit5# 135)	21-09-2014	21-09-2014	No	--	
	RAJWEST (IPP) LTPS(Unit6# 135)	14-08-2014	14-08-2014	No	--	
	RAJWEST (IPP) LTPS(Unit7# 135)	20-02-2016	20-02-2016	No	--	
	RAJWEST (IPP) LTPS(Unit8# 135)	11-06-2014	11-06-2014	No		
9	**UTTAR PRADESH**					
	ANPARA-C TPS(Unit1# 600)	22-08-2015	22-08-2015	Yes	--	

	ANPARA-C TPS(Unit2# 600)	08-03-2016	08-03-2016	Yes	--	
	ROSA TPS(Unit1 #300)	05-10-2021	05-10-2021	Yes	--	
	ROSA TPS(Unit2# 300)	15-01-2022	15-01-2022	Yes	--	
	ROSA TPS(Unit3 # 300)	03-02-2017	03-02-2017	Yes	--	
	ROSA TPS(Unit4# 300)	05-10-2021	05-10-2021	Yes	--	
	Anpara-A (Unit1#210)	27.09.2021	27.09.2021	Yes	--	
	Anpara-A(Unit2#210)	27.09.2021	27.09.2021	Yes	--	
	Anpara-A(Unit3#210)	25.09.2020	25.09.2020	Yes	--	
	Anpara-B(Unit4#500)	07.12.2014	07.12.2014	Yes		
	Anpara-B (Unit5#500)	17.08.2014	Dec., 2019	Yes	--	
	Anpara-D(Unit6#500)	15.11.2016	15.11.2016	No	--	
	Anpara-D (Unit7#500)	15.04.2017	15.04.2017	No	--	
	Obra-B(Unit9#200)	22.03.2016	22.03.2016	Yes	Report enclosed.	
	Obra-B(Unit10#200)	28.06.2016	20.06.2016	Yes	Report enclosed.	
	Obra-B (Unit11#200)	21.01.2017	21.01.2017	Yes	Report enclosed.	
	Obra-B (Unit12#200)	Unit taken on load after R&M on 22		-	PSS tuning and SRT scheduled in April, 2021.	
	Obra-B(Unit13#200)	Unit closed under R&M.		-	PSS tuning and SRT scheduled in April, 2021.	
	Parichha-B(Unit3#210)	08.01.2016	08.01.2016	Yes	--	
	Parichha-B (Unit4#210)	08.01.2016	08.01.2016	Yes	--	
	Parichha-C (Unit5#250)	08.02.2020	08.02.2020	No	--	
	Parichha-C(Unit3#250)	09.01.2016	09.01.2016	No	--	
	Harduaganj (Unit8#250)	20.08.2015	20.08.2015	No	--	
	Harduaganj (Unit3#250)	13.04.2016	13.04.2016	No	--	
	Harduaganj(Unit7#105)	16.07.2021	16.07.2021	yes	--	
	Harduaganj(Unit9#250)	16.07.2021	16.07.2021	yes	--	
	LALITPUR TPS(Unit1# 660)	23.02.2022	23.02.2022	yes	--	
	LALITPUR TPS(Unit2# 660)	30.03.2021	30.03.2021	yes	--	
	LALITPUR TPS(Unit3# 660)	15.01.2022	15.01.2022	yes	--	
	ALAKNANDA HEP(Unit1# 82.5)	12.072017	12.072017	No	--	
	ALAKNANDA HEP(Unit2# 82.5)	12.072017	12.072017	No	--	
	ALAKNANDA HEP(Unit3# 82.5)	12.072017	12.072017	No	--	
	ALAKNANDA HEP(Unit4# 82.5)	12.072017	12.072017	No	--	
	MEJA TPS(Unit1#660)	16.10.2018	05.09.2017	yes	--	
	MEJA TPS(Unit2#660)	16.01.2021	18.05.2020	yes	--	
	Bara Unit#1				Step test for PSS checking was not performed since commissioning by erstwhile owner as per information available. PSS tuning along with step test will be performed in next AOH (May 2022 or planned shutdown)	
	Bara Unit#2	01.02.2022	01.02.2022	Yes		
	Bara Unit#3				Step test for PSS checking was not performed since commissioning by erstwhile owner as per information available. PSS tuning along with step test will be performed in next AOH (May 2022 or planned shutdown)	
	Vishnuprayag Unit#1	06/02/2021	06/02/2021	Submitted in the prescribed format provided by NRLDC to SE (R&A)		
	Vishnuprayag Unit#2	06/04/2021	06/04/2021			
	Vishnuprayag Unit#3	06/04/2021	06/04/2021			
	Vishnuprayag Unit#4	05/02/2021	05/02/2021			
10	**BBMB**					
	BHAKRA HPS(Unit1#108)	--	--	No	PSS is not provided ,shall be provided in ongoing RM&U	
	BHAKRA HPS(Unit1#108)	24.07.2015	24.07.2015	No	--	
	BHAKRA HPS(Unit3#126)	--	--	No	PSS is not provided ,shall be provided in ongoing RM&U	
	BHAKRA HPS(Unit4#126)	--	--	No	--	
	BHAKRA HPS(Unit5#126)	--	--	No	--	
	BHAKRA HPS(Unit6#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	--	--	No	The original Rusian excitation system is under replacement PO issued Hence,PSS not got tuned.	
	BHAKRA HPS(Unit7#157)	18.02.2016	18.02.2016	No	--	
	BHAKRA HPS(Unit7#157)	18.02.2017	18.02.2017	No	--	
	DEHAR HPS(Unit#1 165)	08.08.2017	08.08.2017	No	--	
	DEHAR HPS(Unit#2 165)	08.08.2018	08.08.2018	No	--	
	DEHAR HPS(Unit#3 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#4 165)	02.07.2017	02.07.2017	No	--	
	DEHAR HPS(Unit#5 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#6 165)	02.07.2017	02.07.2017	No	--	
	PONG HPS(6 * 66)	--	--	--	PSS not provided.RM&U agenda under considration.	