सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सं: उ.क्षे.वि.स./प्रचालन/106/01/2023/ 3038-3079 दिनांक: 17.03.2023

विषय: प्रचालन समन्वय उप-समिति की 205वीं बैठक की कार्यसूची।

Subject: Agenda of 205th OCC meeting.

प्रचालन समन्वय उप-समिति की **205वीं** बैठक का आयोजन वीडियो कॉन्फ्रेंसिंग के माध्यम से दिनांक **21.03.2023** को **10:30** बजे से किया जायेगा। उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है।

बैठक में सम्मिलित होने के लिए लिंक व पासवर्ड सभी सदस्यों को ई-मेल द्वारा प्रदान किया जाएगा।

कृपया बैठक में उपस्थित होने की सुविधा प्रदान करें।

205th meeting of the Operation Co-ordination sub-committee will be conducted through Video Conferencing on **21.03.2023** from **10:30 Hrs**. The agenda of this meeting has been uploaded on the NRPC web-site http://164.100.60.165.

The link and password for joining the meeting will be e-mailed to respective e-mail IDs in due course.

Kindly make it convenient to attend the meeting.

17/03/23

(संतोष कुमार)
अधीक्षण अभियंता (प्रचालन)

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

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1. Confirmation of Minutes

The minutes of the 204th OCC meeting were issued vide letter of even number dated 14.03.2023.

Sub-committee may deliberate and kindly confirm the Minutes.

2. Review of Grid operations

2.1 Power Supply Position (Provisional) for February 2023

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

State / UT	Req. / Avl.	Energy (MU)			Peak (MW)		
		Anticipated	Actual	% Variation	Anticipated	Actual	% Variation
CHANDIGARH	(Avl)	110	97	-11.5%	290	295	1.7%
	(Req)	120	97	-18.9%	240	295	22.9%
DELHI	(Avl)	2678	1919	-28.3%	5000	4667	-6.7%
	(Req)	1990	1921	-3.5%	5000	4667	-6.7%
HARYANA	(Avl)	4270	3894	-8.8%	11270	8570	-24.0%
	(Req)	3960	3911	-1.2%	8470	8570	1.2%
HIMACHAL PRADESH	(Avl)	979	911	-7.0%	2050	1977	-3.6%
	(Req)	998	916	-8.2%	2047	1977	-3.4%
J&K and LADAKH	(Avl)	1250	1665	33.2%	1750	3044	73.9%
	(Req)	1750	1669	-4.6%	2900	3044	5.0%
PUNJAB	(Avl)	4860	4181	-14.0%	11380	8864	-22.1%
	(Req)	3780	4224	11.7%	8200	8864	8.1%
RAJASTHAN	(Avl)	7510	8324	10.8%	18770	16754	-10.7%
	(Req)	8190	8587	4.9%	16100	16754	4.1%
UTTAR PRADESH	(Avl)	8960	9023	0.7%	19500	18602	-4.6%
	(Req)	8820	9044	2.5%	19800	18602	-6.1%
UTTARAKHAND	(Avl)	1109	1103	-0.5%	2310	2218	-4.0%
	(Req)	1134	1124	-0.9%	2350	2368	0.8%
NORTHERN REGION	(Avl)	31725	31116	-1.9%	77100	59100	-23.3%
	(Req)	30742	31492	2.4%	59500	59200	-0.5%

As per above, negative / significant variation (≥5%) in Actual Power Supply Position(Provisional) vis-à-vis Anticipated figures is observed for the month of February-2023 in terms of Energy Requirement for Chandigarh, Delhi, Haryana, HP, UTs of J&K and Ladakh, Punjab, and Uttarakhand and in terms of Peak Demand similar variation is noted for Chandigarh, Delhi, HP, Punjab, 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 April-2023 is scheduled on 20-March-2023 via Video Conferencing

3.2. Outage Programme for Transmission Elements

The meeting on proposed outage programme of Transmission elements for the month of April-2023 is scheduled on 20-March-2023 via Video conferencing.

4. Planning of Grid Operation

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

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

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
CHANDIGARH	Availability	160	340	No Revision submitted
	Requirement	150	330	
	Surplus / Shortfall	10	10	
	% Surplus / Shortfall	6.7%	3.0%	
DELHI	Availability	2860	6170	No Revision submitted
	Requirement	3440	6510	
	Surplus / Shortfall	-580	-340	
	% Surplus / Shortfall	-16.9%	-5.2%	
HARYANA	Availability	5780	11710	No Revision submitted
	Requirement	5210	9790	
	Surplus / Shortfall	570	1920	
	% Surplus / Shortfall	10.9%	19.6%	
HIMACHAL PRADESH	Availability	900	3170	No Revision submitted
	Requirement	1050	1850	
	Surplus / Shortfall	-150	1320	
	% Surplus / Shortfall	-14.3%	71.4%	

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
J&K and LADAKH	Availability	1430	3530	No Revision submitted
	Requirement	1580	2710	
	Surplus / Shortfall	-150	820	
	% Surplus / Shortfall	-9.5%	30.3%	
PUNJAB	Availability	6130	12320	No Revision submitted
	Requirement	5310	10280	
	Surplus / Shortfall	820	2040	
	% Surplus / Shortfall	15.4%	19.8%	
RAJASTHAN	Availability	9810	19140	No Revision submitted
	Requirement	8980	14710	
	Surplus / Shortfall	830	4430	
	% Surplus / Shortfall	9.2%	30.1%	
UTTAR PRADESH	Availability	13950	23000	16-Mar-23
	Requirement	13800	25000	
	Surplus / Shortfall	150	-2000	
	% Surplus / Shortfall	1.1%	-8.0%	
UTTARAKHAND	Availability	1302	2270	10-Mar-23
	Requirement	1320	2330	
	Surplus / Shortfall	-18	-60	
	% Surplus / Shortfall	-1.4%	-2.6%	
NORTHERN REGION	Availability	42322	75200	
	Requirement	40840	67700	
	Surplus / Shortfall	1482	7500	
	% Surplus / Shortfall	3.6%	11.1%	

SLDCs are requested to update the anticipated power supply position of their respective state / UT for the month of April-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. Submission of breakup of Energy Consumption by the states

5.1 The updated status on the submission of energy consumption breakup is presented below:

State / UT	From	To
DELHI	Apr-2018	Nov-2022
HARYANA	Apr-2018	Dec-2022
HIMACHAL PRADESH	Apr-2018	Dec-2022
PUNJAB	Apr-2018	Dec-2022
RAJASTHAN	Apr-2018	Jan-2023
UTTAR PRADESH	Apr-2018	Jan-2023
UTTARAKHAND	Apr-2018	Nov-2022

All the remaining UTs viz., 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 format given as under:

Category→	Consumption by Domestic Loads	Consumption by Commercial Loads	Consumption by Agricultural Loads	Consumption by Industrial Loads	Traction supply load	Miscellaneous / Others
<Month>						

6. 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.

7. NR Islanding scheme

7.1 In the meeting (204th OCC), AEE(SS) apprised the forum that a meeting was held on 11th January 2023 with Himachal Pradesh and Delhi, regarding implementation of islanding schemes in these states, wherein, frequency protection setting received from generators involved in Kullu-Manali islanding scheme was deliberated and it was found that their setting can be set below 47.9 Hz.

7.2 However, with regard to Shimla-Solan islanding scheme some HEPs were requested to intimate there under frequency protection setting within one week.

7.3 Representative from HP apprised the forum that they had consulted with the concerned OEM Department and the latter had informed that the generator is designed for +-3% and it will be difficult to take frequency setting below the design limits. He also asked NRPC Secretariat to plan a meeting in the coming months to further deliberate on this issue.

7.4 No comments were received from Delhi Representative regarding the cited subject.

7.5 AEE (P), NRPC enquired about the status of Pathankot-RSD IS as implementation date was 31.12.2022. Punjab informed that RSD IS is expected to be commissioned by 25.02.2023.

7.6 Further, UP was also enquired about status of study by CPRI in Agra islanding scheme. UPSLDC informed that interim report has been submitted by CPRI,

however issues were observed in few cases which is communicated to CPRI. He stated that final report is expected at the earliest.

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

Members may kindly deliberate.

8. Coal Supply Position of Thermal Plants in Northern Region

8.1 In 186th OCC meeting (held on 18.08.2021), it was agreed that coal stock position of generating stations in northern region may be reviewed in the OCC meetings on the monthly basis.

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

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
ANPARA C TPS	1200	88.70	17	2.9
ANPARA TPS	2630	62.74	17	27.1
BARKHERA TPS	90	36.14	26	28.6
DADRI (NCTPP)	1820	75.55	26	6.3
GH TPS (LEH.MOH.)	920	66.40	26	7.6
GOINDWAL SAHIB TPP	540	73.66	26	5.6
HARDUAGANJ TPS	1265	27.69	26	23.3
INDIRA GANDHI STPP	1500	51.87	26	9.1
KAWAI TPS	1320	83.40	26	13.7
KHAMBARKHERA TPS	90	35.76	26	29.8
KOTA TPS	1240	94.93	26	2.9
KUNDARKI TPS	90	74.24	26	27.1
LALITPUR TPS	1980	51.97	26	25.6
MAHATMA GANDHI TPS	1320	85.71	26	14.1
MAQSOODPUR TPS	90	36.44	26	33.4
MEJA STPP	1320	94.83	26	4.9
OBRA TPS	1094	65.09	26	7.5
PANIPAT TPS	710	56.39	26	28.3
PARICHHA TPS	1140	40.81	26	9.2
PRAYAGRAJ TPP	1980	61.69	26	15.4
RAJIV GANDHI TPS	1200	75.76	26	19.7
RAJPURA TPP	1400	55.40	26	30.5
RIHAND STPS	3000	80.52	17	29.9
ROPAR TPS	840	53.13	26	14.1
ROSA TPP Ph-I	1200	62.43	26	13.6
SINGRAULI STPS	2000	82.72	17	17.6

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
SURATGARH TPS	1500	42.46	26	2.6
TALWANDI SABO TPP	1980	58.11	26	8.3
TANDA TPS	1760	70.01	26	4.3
UNCHAHAR TPS	1550	79.29	26	8.6
UTRAULA TPS	90	36.52	26	38.6
YAMUNA NAGAR TPS	600	87.26	26	11.8
CHHABRA-I PH-1 TPP	500	76.57	26	2.5
KALISINDH TPS	1200	64.98	26	5.2
SURATGARH STPS	1320	59.81	26	6.5
CHHABRA-I PH-2 TPP	500	70.35	26	4.8
CHHABRA-II TPP	1320	54.66	26	5.0

9. Procedure for Shifting of Transmission Lines involving in work by other Infrastructure Developers (Agenda by NRPC Sectt.)

9.1 PSE&TD, Division CEA vide its letter dated 10.03.2023 intimated about SoP regarding Procedure for Shifting of Transmission Lines involving work by other Infrastructure Developers (Copy is attached as **Annexure-A.III.)**

Members may kindly note for strict compliance.

10. Energization check of +/- 600MVAR STATCOM (Make-SIEMENS) at 765/400/220 kV Bhadla_II & Fatehgarh-II S/S) (Agenda by Powergrid/NR-1)

10.1 Powergrid, NR-1 vide its mail dated 14.03.2023 mentioned that ccommissioning activities of +/- 600MVAR STATCOM (Make-SIEMENS) at 765/400/220 kV Bhadla_II & Fatehgarh-II S/S is in full swing and energisation test is expected to commence as per following schedule:-

1. Bhadla-II (+/- 600MVAR STATCOM) – From 26.03.2023 to 16.04.2023
2. Fatehgarh-II (+/- 600MVAR STATCOM) - From 15.04.2023 to 17.05.2023

10.2 Powergrid NR-1 has requested OCC forum for approval of the testing schedule of STATCOM at Fatehgarh_2 & Bhadla_2 as per the schedule mentioned in **Annexure-A.IV**.

Members may kindly deliberate.

11. Calibration and Testing of Interface Energy Meters installed at Generating Stations (Agenda by NHPC)

11.1. The above said agenda was also deliberated in 197th OCC meeting (held on 22.07.2022) (Agenda No. 15) wherein following was recorded in the Minutes of Meeting:

"POWERGRID representative informed that it would take four to five months to finalize the agency for carrying out the testing of Interface Energy Meters

installed at Generating stations in Northern region and thereafter the work would be carried out."

11.2. In this regard, NHPC vide its letter dated 13.03.2023 (copy attached as **Annexure-A.V**) has intimated that Powergrid has not provided any information regarding calibration/testing of Interface Energy Meters as decided in 197th OCC meeting.

Members may kindly deliberate.

12. Flexible/Zero Scheduling of Tehri HPP to facilitates river dredging/cleaning works of Tehri PSP and Planned Outages of Tehri HPP (Agenda byTHDC)

12.1. THDC vide mail dated 16.03.2023 has submitted draft "Operation Philosophy to facilitate river dredging work of Tehri PSP and Planned Outages for Tehri HPP".

12.2. The Draft Operation Philosophy is attached as **Annexure-A.VI** along with a schedule of river dredging work and flowchart for perusal and consideration of the forum.

Members may kindly deliberate.

13. Replacement/Installation of Interface Energy Meters at PGCIL Sub-Stations (Agenda by PSTCL)

13.1 PSTCL vide its mail dated 16.03.2023 has mentioned that they had installed EDMI (Wallaby) make meters at PGCIL Sub-Stations while executing boundary metering project in 2012-13. Now, PSTCL is replacing all existing boundary meters with latest interface energy meters and is also installing AMR equipment as a part of SAMAST project.

13.2 List of existing boundary meters to be replaced/New meters to be installed at PGCIL Sub-Stations is enclosed as **Annexure-A.VII**. They are requesting PGCIL to allow the same and inform substation managers regarding the same.

Members may kindly deliberate.

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

14. NR Grid Highlights for February 2023

Following are major grid highlights of February2023:

- Maximum energy consumption of Northern Region was **1140 Mus** on 17th February'23 and it was 6.1 % higher than February' 2022 (1075 Mus 02nd February'22)

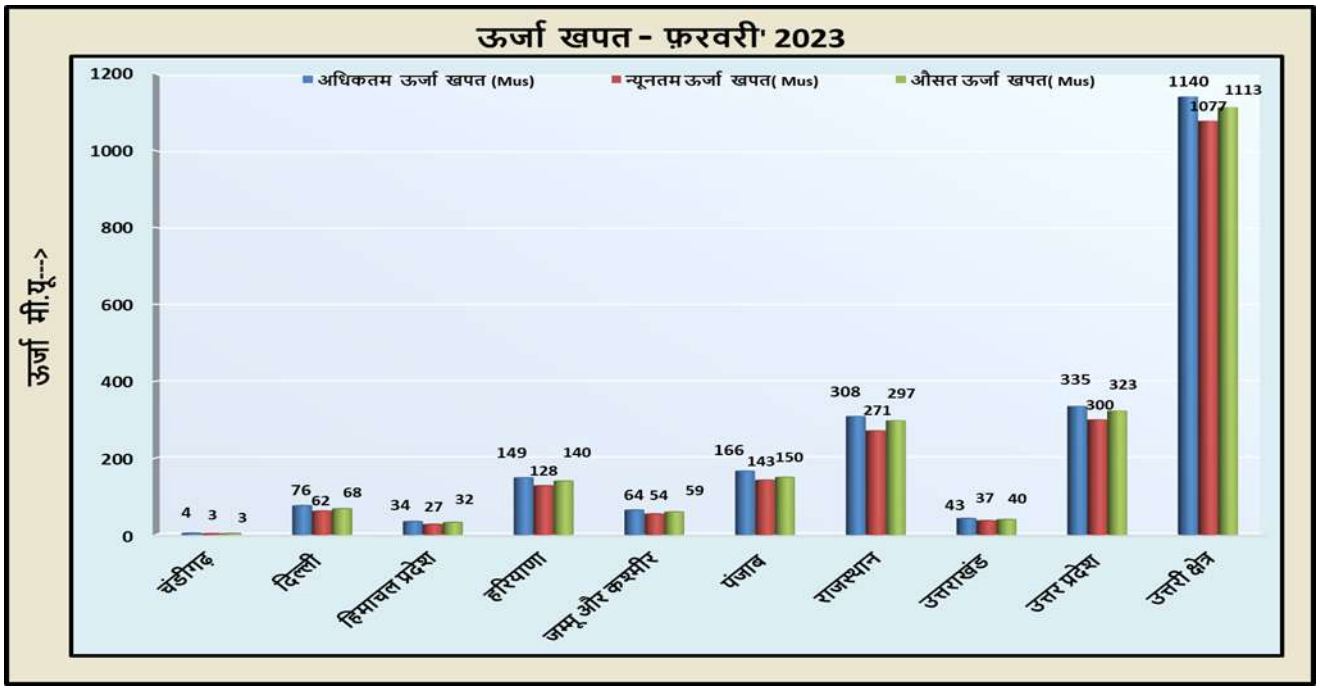
- Average energy consumption per day of Northern Region was **1113 Mus** and it was 7.8 % higher than February'22 (1033 Mus per day)

- Maximum Demand met of Northern Region was **59,101MW** on 09th February'23 @11:00 hours (*based on data submitted by Constituents)* as compared to 54,996 MW on 04th February'22 @11:00 hours.

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

States	Max. Demand Met during the day (MW)		As per SCADA instantaneous data
	As per hourly data Submitted by States (MW)/Format28	As on date	
J&K(UT) and Ladakh (UT	3044	02-02-2023	3091
		20:00 hrs	01-02-2023

Energy Consumption:



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

क्षेत्र/राज्य	फ़रवरी - 2022	फ़रवरी - 2023	% अंतर
चंडीगढ़	3.5	3.5	0.5
दिल्ली	66.5	68.0	2.2

हिमाचल प्रदेश	33.4	32.2	-3.6
हरियाणा	124.3	140.3	12.9
जम्मू और कश्मीर	54.9	59.4	8.4
पंजाब	125.1	149.9	19.9
राजस्थान	277.3	297.3	7.2
उत्तराखंड	40.0	39.7	-0.9
उत्तर प्रदेश	307.9	322.6	4.8
उत्तरी क्षेत्र	**1032.8**	**1112.9**	**7.8**

Frequency Data

Month	**Avg. Freq. (Hz)**	**Max. Freq. (Hz)**	**Min. Freq. (Hz)**	**<49.90 (% time)**	**49.90 – 50.05 (% time)**	**>50.05 (% time)**
Feb'23	50.00	50.40	49.51	10.8	64.7	24.6
Feb'22	50.00	50.26	49.54	6.0	76.8	17.2

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

15. Summer Preparedness 2023: Actions for improvement in grid operation (Statewise):

Most of the NR states recorded their maximum demand met and maximum energy consumption during the year 2022-23. Statewise maximum demand and energy consumption as per data available with NRLDC is shown below:

State	Maximum demand (in MW)	Date/ Time	Maximum energy consumption (MU)	Date

Punjab	14295	22.08.22 at 14:45	334.45	29.06.22
Haryana	12768	28.06.22 at 11:56	266.15	07.07.21
Rajasthan	17206	18.01.23 at 14:30	328.86	09.09.22
Delhi	7695	29.06.22 at 15:10	153.52	28.06.22
Uttar Pradesh	26589	09.09.22 at 21:39	547.360	19.08.22
Uttarakhand	2594	14.06.22 at 21:00	54.27	15.06.22
Himachal Pradesh	2071	06.01.23 at 09:45	37.0	06.01.23
J&K and Ladakh (UT)	3044	02.02.23 at 20:00	64.6	20.01.23
Chandigarh	426	08.07.21 at 15:00	8.41	08.07.21
Northern region	77006	28.06.22 at 11:50	1737.09	28.06.22

With the increase in temperature, demand of Northern Region starts increasing from March onwards every year. IMD (India Meteorological Department) has forecasted above normal heat during Apr-Jun months in upcoming summer months. The IMD has predicted **normal to above normal minimum temperatures** in most parts of the country, except for South Peninsular India, where normal to below normal minimum temperatures are on the cards. Summer of Northern region are typically hot and demand is also high during this time, therefore advance actions help in better grid operation.

There has been continuous growth over the years. This year already Northern region energy consumption has been higher by 15% & 8% in January & February respectively compared to previous year. With this growth, this year maximum demand met and energy consumption of Northern region is expected to break previous records.

During the upcoming high demand season, SLDCs may 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. SLDCs need to ensure this during real-time operation.

SLDCs need to make sure that loading of 220kV and below voltage level intrastate lines remain within safe limits during the high demand season.

State-wise actions that are required to avoid transmission related issues that were encountered during last high demand season and would help in meeting higher demand this year are listed below:

Punjab:

- ICT Capacity augmentation at Nakodar from 2*315MVA to 2*500MVA ICTs
- Expediting commissioning of 400kV Dhanansu Substation with connectivity both at 400kV and 220kV.
- ICT Capacity augmentation at 400/220kV Ludhiana(PG)
- Minimising outages of Talwandi Saboo thermal generating units
- Avoiding/ Minimising outages of generating units on coal shortage.
- Expediting ADMS implementation

Haryana:

- Plan to mitigate severe N-1 non-compliance issue at 400/220kV Deepalpur and Panipat(BBMB) during summer/monsoon 2023
- Expediting commissioning of new 500MVA ICT at 400/220kV Kurukshetra (PG)
- Expediting revival of 400/220kV Bhiwani(BBMB) ICT under long outage.
- Reconductoring of 220kV Hisar (PG) - Hisar (IA) to be taken up for approval.
- Ensuring availability of Faridabad Gas generating station during high demand season.
- Avoiding too much dependence on exchange for power procurement and plan to meet the deficit as discussed in meeting held with NRPC, NRLDC on 10.03.2023.
- Expediting ADMS implementation

Rajasthan:

- Improving the power factor and reducing the MVAr drawls in State substations at transmission as well as distribution level especially Western Rajasthan. After capacitor installation at low voltage level for improving voltage profile, as per the present load pattern and voltage profile of Rajasthan, it may be

required that there has to be daily operation of capacitor banks for voltage control. It also needs to be duly considered.

- Expediting ICT augmentation at non-compliant 400/220kV RVPN substations such as Ajmer, Merta, Chittorgarh, Jodhpur, Bikaner, Hindaun, Bhilwara etc.

- Measures for severe low voltages in Hindaun & Alwar area and RE rich Western Rajasthan substations

- For 01-Dec-2022 to 10-Mar-2023, every two days 3 Machine outages were reported in Rajasthan. Measures need to be taken to avoid such frequent machine outages and ensuring sufficient coal stock.

- Identifying sufficient number of radial feeders so as to control overdrawl in case of message from NRLDC (presently identified feeders have two sources)

- Expediting implementation of ADMS scheme

Uttar Pradesh:

- Although SPS implemented at number of 400/220kV substations such as Azamgarh, Obra, Sarnath, Nehtaur, Gorakhpur etc. Plan to enhance capacity may also be taken up as per forecasted load growth

- Commissioning of 400/220kV Jaunpur S/S & 400/220kV Sahupuri S/S along with underlying network to be expedited.

- Expediting revival of 765kV AnparaD – Obra – Unnao line out for more than one year now.

- Avoiding/ Minimising outages of generating units on coal shortage.

- Expediting revival of generating unit such as Anpara TPS Unit 3 & Unit 4 which are out since 05-01-2023 & 01-11-2022 for overhauling works.

- Expediting ADMS implementation

Delhi:

- After bus -split due to high fault level at Bawana, 2*315 MVA ICTs N-1 non-compliant. Additional ICT/ load shifting to other station to be planned. Delhi SLDC to make sure that essential loads such as hospitals, DMRC, other important loads have alternate supply available so as to avoid load loss in case of N-1 contingency. As requested in earlier OCC meetings, DTL to explore SPS implementation at Bawana (2 ICTs section)

- New ICT/ Capacity augmentation at 400/220kV Mundka to be planned by DTL. One ICT under prolonged outage may be revived. One ICT already being diverted from Ludhiana(PG).

- Implementation of ADMS scheme to be taken up with DISCOMS (manual actions required as per last intimation from Delhi side)

Uttarakhand:

- Although, SPS implemented at 400/220kV Kashipur, additional ICT to be commissioned as per anticipated load growth and to improve reliability.

- To manage high loading of 220kV CBGanj-Pantnagar and 220kV Roorkee-Roorkee lines, additional connectivity/ conductor upgradation to be planned by PTCUL

- Status of 400kV Landhora S/S to be furnished

Himachal Pradesh:

- New ICT/ Capacity augmentation to be proposed by HPPTCL/ PSTCL at 400/220kV Nallagarh. New lines or additional supply may be provided. CT ratio at Nallagarh end to be uprated for utilising full line capacity. POWERGRID informed work to be done under next shutdown of line. Update to be provided.

J&K and Ladakh U/T:

- Revival of 220kV Kishenpur-Mirbazar line out under tower collapse for more than one year now.

- Capacity augmentation at 400/220kV Amargarh to be expedited. As per latest discussion held in 16 CMETS held on 28.02.2023, new ICT to be implemented in next 21 months.

- Additional planned 220kV and low voltage lines to be expedited to manage drawl from Amargarh.

- Actions to manage severe low voltages in J&K control area. SVC at New Wanpoh being fully utilised (no margin for dynamic support) and outage of SVC leads to low voltage.

- Sharing of ATC/TTC assessment with NRLDC to be done. Training imparted to J&K SLDC officials by NRLDC in online mode on 20th & 21st Feb 2023 & 10th Mar 2023.

J&K has also procured PSSe software & NRLDC has imparted them training sessions in Feb-Mar 2023 in online mode. It is expected that shortly J&K would also

be performing load flow studies and sharing their import capability assessments with NRLDC/ NRPC. It is appreciable that now all the NR states except J&K and Ladakh and Chandigarh U/Ts have started assessing import transfer capability of their control area and sharing with NRLDC/ NRPC.

Apart from above, following are some of the key actions that were agreed in last NRPC meeting for ensuring safe and secure grid operation during summer 2023:

- Apart from LTA/MTOA/STOA/Market arrangements based on forecast, other short term arrangements should also be planned for real time imbalances. For example, ensuring adequate margin while scheduling own thermal generation, units on bar, maintenance of reserves, technical minimum operation of thermal units in case of load crash, tie up with neighbour states or hydro rich states and utilization of real-time market etc. to bridge the load-generation gap in real time.

- Regular monitoring of weather websites for weather forecast information and plan load generation balance accordingly. In case of forecasted thunderstorm or wind storm, generation may be timely backed down so as to avoid any under drawl, high frequency operation of the grid and wastage of precious fuel.

- In view of high/increasing demand & transmission constraints (if any) in importing the power or in case of any contingency in the system, states to maximize their internal generation to avoid low frequency/low voltage operation or other related issues.

- SLDCs to arrange for display window at their control centers so that system operators readily know quantum of reserve available and hence better real-time actions can be taken.

- Some states continue to connect/ disconnect large quantum of load at hourly boundaries resulting in frequency spikes and instantaneous over voltages. Such actions to be avoided especially during high demand season.

- States to take actions to ensure backing down of thermal generation as per latest regulations issued by CEA regarding thermal plants flexible operation.

- Utilities to update & share coal stock position of thermal plants at least a week in advance as agreed earlier in TCC/NRPC meeting, especially in case of anticipation of low coal stock.

- Each utility shall work on plan for tower repairing work before April. Extra precautions need to be taken care for important lines which have history of tripping during thunderstorm/ windstorm.

- Latest status regarding availability of ERS to be submitted by all transmission utilities to NRPC/ NRLDC.

- Take all necessary precautions to avoid any issues arising due to low voltages during summer months.

- All state control area/Users shall ensure before start of summer that their protection and defence system are in working conditions and settings are as per the recommendations of NRPC. It is also suggested to carry out mock testing exercise of important SPS in Northern region including under state control area.

- All utilities to ensure the telemetry of all analog & digital points of all stations at respective control centers.

Regarding feeders for physical regulation attached as Annexure of MoM of 203 OCC meeting, SLDCs to verify that

- list of feeders are actually radial in nature and are likely to provide the expected relief

- Such feeders are not part of any other scheme such as any SPS, UFR or df/dt actuated shedding

- Telemetry is to be ensured for all such feeders for monitoring in real time by SLDC/ NRLDC

Members may like to discuss.

16. RE related Issues in Northern region

Presently around 11900MW of renewable generation has been connected in the ISTS network in Western Rajasthan. As deliberated in previous NRPC meetings, number of issues have been observed with increasing RE integration in Western Rajasthan. On many occasions, multiple element tripping including outage of renewable generation has also taken place.

All the past major generation loss events of Northern Region can be broadly classified in two category as follows;

(i) Due to transient over voltage during switching operation, Non-desirable reduction in RE generation in Renewable Energy Zone (REZ) of NR. (5 nos. of events since Jan'22). (Past events, last occurred on 11th Feb'22).

(ii) In case of fault in the vicinity of RE complex, (10 nos. of events since Jan'22, last occurred on 15th Oct'22).

a) Reduction in RE generation due to dip in voltage. RE plants failed to recover 90% of pre-fault MW within 1sec of clearance of fault as specified in CEA Connectivity Standards.

b) After clearance of fault, as RE plants are not recovering its full MW in due time (slow active power ramp rate/ recovering only partial pre-fault MW), leading to over voltage.

c) Due to inadequate absorption of MVAR during high voltage and further reduction in generation due to probable inverters tripping leading to further high voltage and aggravating the situation.

Other major RE issues observed include observance of oscillations and low voltage in RE complex:

(i) Low frequency voltage oscillations in RE complex of NR.

(ii) Low voltage issues in RE pooling stations due to MVAr drawl/inadequate MVAr support by RE plants (During peak RE generation period).

Majority of the issues with regard to LVRT/ HVRT non-compliance of RE plants observed are listed below:

(i) Tests of sample inverter/WTG are carried out in a factory/lab environment to demonstrate the compliance of the equipment against specified CEA standards. Based on the results of these type characteristics tests, single unit simulation model is prepared which is then used to develop complete plant model. In the pre-commissioning phase, type test and simulation response are the only proof for LVRT & HVRT compliance.

(ii) Both unit level and plant simulation models submitted by the RE developers suggest LVRT/HVRT compliance of plants. However, the compliance is not being observed in real-time operation.

(iii) There is a major challenge to obtain the compliance study report of each inverter (owing to high population) and the inverters within a plant are susceptible to witness different voltages. This is main issue in deviation of plant behavior from simulation results. Performance during grid event is presently the only way to check LVRT/HVRT compliance at Point of Interconnection (PoI).

(iv) Inverters have been tested in lab for LVRT/HVRT compliances but, there is no provision for recording and archiving of data at inverter level in millisecond time interval, in the commissioned plants.

(v) Inverter logs can only show the inverter mode of operation in case of tripping but not in case of fault-ride through.

(vi) CEA Regulations define the LVRT/HVRT setting philosophy at PoI. However, inverter terminal voltage decides the LVRT/HVRT mode of inverters. The Inverter terminal voltage remains slightly different than PoI voltage due to drop in internal collector system and cables.

(vii) Once inverter senses VT (Inverter terminal voltage) < 0.9 pu, it goes into LVRT mode and PPC gets bypassed. After the fault gets cleared and inverter senses normal voltage at terminal, it will respond as per its previous set point (Set point is the command given by PPC) till the inverters do not get the next command from PPC.

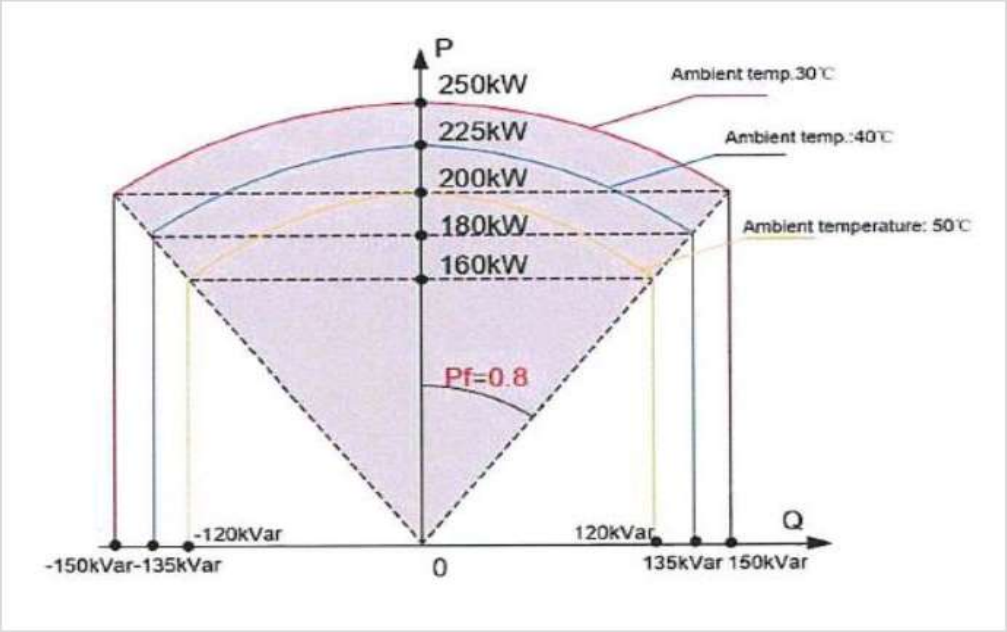
(viii) Communication time of PPC with inverters is usually 200~250 milliseconds, so inverter continues to respond as per previous command and if inverters were injecting MVAR at prefault condition it would continue to inject MVAR till it does not get the next command from PPC. However, in case inverters continue to inject MVAR, it might be possible that before going under the control of PPC, inverters would go in HVRT mode and the inverter gets tripped out on HVRT Stage-2 if voltage at inverter terminal exceeds the settings.

(ix) As overall execution time for PPC is around 1 second, so after 1 second of fault clearance the plant should get controlled by PPC. However, from PMU plots it has been observed that despite sustained high voltage for 2 to 4 seconds, RE plants are not absorbing MVAR. This voltage rise in RE complex leads to tripping of EHV lines on overvoltage, which further reduces evacuation path and more tripping of solar generators has been seen in past events.

Apart from above issues related to MVAr capability of RE plant especially at high ambient temperature are also being observed. As per CEA connectivity standards, RE plant shall have the capability to inject/absorb MVAR (reactive power) up to 33% of MW (active power generation)

In order to inject/absorb 33% reactive power (MVAR) along with delivering rated active power (MW), the MVA capacity of the RE plant shall be higher than the rated MW capacity of the plant i.e. MVA Capacity > MW Capacity

With rise in ambient temperature beyond a certain point, there is degradation in Inverter/WTG's rated MVA Capacity



RE Developers are designing their plants for low ambient temperature operation i.e. the plants have the margin to deliver/absorb reactive power at low ambient temperatures (<40°C) but become non-compliant at higher ambient temperatures (>50°C) as no margin is left. Temperatures dependent ratings are limiting active power and in such scenario obtaining reactive support may be difficult.

Moreover, as per discussions taken by NRLDC with RE developers, it emerged that there is lack of Coordination between multiple agencies involved i.e. RE Developer and Inverter /WTG /PPC OEMs at most of the RE plants. Further, lack of awareness observed among RE Developers about implemented protection and control settings at respective RE plants. Over-dependency on OEMs in this aspect has also been observed. Restricted access provided to RE Developers to download/modify the implemented inverter/WTG level settings (activity usually carried out by inverter/WTG OEM at present).

Northern regional Grid has been experiencing voltage oscillations during peak solar hours. Oscillations that are coming are of varied frequencies and magnitude. Oscillatory modes of frequency around 2.7 Hz (3-4 kV P-P at 765 kV Fateh2), 0.1 Hz (30-40 kV P-P at 765 kV Fateh2), 0.6 Hz (40-50 kV P-P at 765 kV Fateh2), Notch of 60-70 kV without any defined periodicity are being seen commonly.

Based on Short circuit ratio (grid strength) and remoteness of RE plants, control modes of few of the plants were changed and performance of RE plants and oscillations in the RE complex were observed. Changing control mode to Fixed reactive power injection has effectively damped oscillations in the solar complex to a great extent. This solution was resorted to at selected plants at various Pooling stations to mitigate the problem of oscillations. However, it brings other challenges such as that plant goes on injecting VARS irrespective of voltage and MW and once evening comes, the plant has to be resorted back to voltage control to prevent overvoltage. Moreover, the performance of plant in case of nearby fault may not be

as desired. Operating different plants in optimal control modes is being investigated at NRLDC end. However, other planned devices such as STATCOMs at Bhadla-II and Fatehgarh-II need to be commissioned at the earliest along with POD functionality.

Inverter Based Resources have operation very much different from conventional generation resources. To assess the possible reasons for such non-compliance by RE plants and issues being observed at RE plants, team of representatives from Grid India, CTUIL and CEA visited different RE plants in Western Rajasthan in first week of March 2023. The major findings of the committee are being compiled and would be shared with NRPC forum.

Members may like to discuss.

17. TTC/ATC of state control areas for summer 2023

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.

Based on feedbacks received till date, SLDCs are requested to go through the tentative ATC/TTC limits for April 2023 as shown below and provide comments. If no comments are received, these limits will be assumed confirmed and uploaded on NLDC website. SLDCs are also requested to upload these limits in their respective websites. States are also requested to regularly provide update regarding the upcoming transmission elements which would improve import capability of respective state control area.

STATE	**PRESENT IMPORT TRANSFER CAPABILITY**	**CONSTRAINTS**	**REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS**
Haryana	TTC: 9100MW RM: 600MW	N-1 Contingency of 2*315 MVA ICT at Deepalpur	New 500MVA ICT approved in 4 NRPCTP held on 05.10.2021. SPS commissioned as immediate measure. ICT commissioning delayed to PPP substation model issues as informed by HVPN. In 204 OCC meeting, it was informed by Indigrid representative that talks are underway between Indigrid and HVPN to resolve issues for commissioning of new ICT at Deepalpur.

	ATC: 8500MW	N-1 Contingency of 3*150+500 MVA ICT at Panipat BBMB	Proposal for new ICT to be given by HVPN/DTL. Drawl to be planned from other nearby stations. Lack of space at Panipat as informed by BBMB in OCC meeting. Other options to be explored by HVPN.
		N-1 Contingency of 2*500 MVA ICT at Kurukshetra (PG)	New 500MVA ICT approved in 4 NRPCTP held on 05.10.2021. Expected before paddy 2023.
		High loading of 220kV Hissar (PG)-Hissar (IA)	Reconductoring of 220kV Hisar (PG)-Hisar (IA) to be taken up for approval. As informed by CTUIL in 62 NRPC (31.01.2023), HVPN has written letter to CEA in this regard, however, proposal from HVPN side to be discussed at CEA level.
Punjab	TTC: 9000MW RM: 500MW	N-1 Contingency of 2*500 MVA ICT at Patran	New 500MVA ICT approved in 11 CMETS held on 30.09.2022. (Expected May'2024)
		N-1 Contingency of 2*315 MVA ICT at Nakodar	ICT capacity at Nakodar would be augmented from 315MVA to 500MVA by July 2023 (1st ICT) and Sep 2023 (2nd ICT). One 315MVA ICT damaged, to be borrowed from POWERGRID.
		N-1 Contingency of 2*500+1*250+1*315 MVA ICT at Moga	One 250MVA ICT to be replaced by 500MVA ICT. Bay equipment of higher ratings to be used. Approved in 11 CMETS held on 30.09.2022

	ATC: 8500MW	N-1 Contingency of 2*315+2*500 MVA ICT at Ludhiana	One 315MVA ICT to be replaced by 500MVA ICT (expected May 2023). Approved in 11 CMETS held on 30.09.2022.
Rajasthan	TTC: 7600MW RM: 600MW ATC: 7000MW	N-1 Contingency of 2*315 MVA ICT at Chittorgarh	Rajasthan STU has planned and implemented SPS at these locations. (except Bhilwara & Hindaun)
		N-1 Contingency of 2*315 MVA ICT at Jodhpur	
		N-1 Contingency of 2*315 MVA ICT at Ajmer	
		N-1 Contingency of 2*315 MVA ICT at Bikaner	
		N-1 Contingency of 2*315 MVA ICT at Merta	New 1*500MVA ICT under bidding/ implementation at these S/s by RVPNL.
		N-1 Contingency of 2*315 MVA ICT at Hindaun	

	(Issues observed with load >14500MW)	N-1 Contingency of 1*315+1*500 MVA ICT at Bhilwara	Capacity augmentation at Chittorgarh expected by July 2023, for all other substations after next winter season.
		Low voltage issues at Hindaun, Alwar.	New 400/220kV Dholpur S/s likely to provide some relief, however approved by CEA on 27Jan 2023, so issue likely to persist for next 1-2 winter seasons. Other immediate measures required by RVPN.
			Severe issues observed during Dec 2022-Jan 2023 months.
		Low voltage issues in RE generation pockets	Additional reactive power support devices for maintaining grid voltages within IEGC prescribed limits to be planned. Intrastate RE generators to support the grid by operating in voltage control mode.
		N-1 contingency of 400kV Barmer-Bhinmal D/C (under high wind gen.)	Commissioning of 765kV Jodhpur (Kankani) to be expedited. Additional transmission system requirement to be assessed by RVPN
		Huge MVAR drawl at RVPN during winter months (even below 0.8 at	As intimated by RVPN, Capacitor banks to be installed after PSDF funding. Capacitor planning & implementation to be done in expeditious manner at transmission & distribution level.

		number of 400/220kV ICTs)	
Uttar Pradesh	TTC: 15100MW RM: 600MW ATC: 14500MW	N-1 Contingency of 2*500 MVA ICT at Azamgarh	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented. Commissioning of 400/220kV Jaunpur S/S likely to provide relief (expected before summer 2023).
		N-1 Contingency of 3*315+1*500 MVA ICT at Sarnath	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented. Commissioning of 400/220kV Sahupuri S/S likely to provide relief (Oct'2023)
		N-1 Contingency of 2*315+1*240 MVA ICT at Obra	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS under implementation by UPPTCL.
		N-1 Contingency of 3*315 MVA ICT at Allahabad	New ICT/ Capacity augmentation may be proposed by UPPTCL. Commissioning of 400/220kV Jaunpur S/S likely to provide relief (expected before summer 2023).
		N-1 Contingency of 2*315 MVA ICT at Sohawal(PG)	New 500MVA ICT approved in 3 NRPCTP held on 19.02.2021. New ICT expected before summer 2023.
		N-1 Contingency of 2*200 MVA ICT at Nehtaur	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented.

		N-1 Contingency of 1*240+1*315+1*500 MVA ICT at Gorakhpur (UP)	Capacity augmentation at Gorakhpur (UP) from 1055MVA to 1315MVA to be expedited. SPS implemented.
Delhi	TTC: 7100MW RM: 300MW ATC: 6800MW	N-1 contingency of 2*315 MVA ICT at Bawana	After bus -split due to high fault level at Bawana, ICTs N-1 non-compliant. Additional ICT/ load shifting to other station to be planned. Delhi SLDC to make sure that essential loads such as hospitals, DMRC, other important loads have alternate supply available so as to avoid load loss in case of N-1 contingency. As requested in earlier OCC meetings, DTL to explore SPS implementation at Bawana (2 ICTs section)
		N-1 Contingency of 3*315 MVA ICT at Mundka	New ICT/ Capacity augmentation to be planned by DTL. One ICT under prolonged outage to be revived (to be borrowed from Ludhiana(PG)). SPS implemented
Himachal Pradesh	TTC: 1400MW RM: 100MW ATC: 1300MW	N-1 Contingency of 3*315 MVA ICT at Nallagarh	New ICT/ Capacity augmentation to be proposed by HPPTCL/ PSTCL, based on future load growth. Drawl by Punjab, Chandigarh & HP from 400/220kV Nallagarh

	(lean hydro) No major transmission issues during summer/ monsoon		
Uttarakhand	T TC: 1700MW RM: 100MW ATC: 1600MW	N-1 Contingency of 2*315 MVA ICT at Kashipur	New ICT/ Capacity augmentation to be planned by PTCUL. SPS implemented at Kashipur. Bid opening shortly for new 315MVA ICT at Kashipur
		High loading of 220kV CB Ganj-Pantnagar	Additional connectivity/ conductor upgradation to be planned by PTCUL
		High loading of 220kV lines from Roorkee (PG)	Additional connectivity/ conductor upgradation to be planned by PTCUL (400kV Landhora S/S under discussion). Under discussion with CTUIL and CEA.
J&K	TTC: 2200MW RM: 100MW	N-1 Contingency of 2*315 MVA ICT at Amargarh	New ICT/ Capacity augmentation may be expedited by NRSSXXIX (planned for Mar'2026). Additional planned 220kV and low voltage lines to be expedited to manage drawl from Amargarh. As per latest discussion held in 16 CMETS held

	ATC: 2100MW (lean hydro) No major transmission issues during summer/ monsoon		on 28.02.2023, new ICT to be implemented in next 21 months .
		High loading of 220kV lines from Wagoora(PG)	Additional connectivity to be planned and already approved schemes to be expedited by JKPTCL
		Low voltage issues during winter season	Large dependency on SVC at New Wanpoh for MVAR support. Capacitor installation at low voltage level to be expedited.

J&K

Loading of 400/220kV Amagarh ICTs was above N-1 contingency limits for last 30 days. 220kV Amargarh-Ziankote D/C lines are also N-1 non-compliant for most of the time during winter months.

Apart from above, there are issues related to huge MVAR drawl by J&K control area during winter season.

Not assessing its ATC. J&K representatives had intimated during 47th TCC and 49th NRPC meeting that they would be sharing ATC/TTC assessment with NRLDC from October 2021, however the same is still awaited.

J&K and Ladakh U/Ts are once again requested to advise the concerned officers to evaluate their ATC/TTC limits in coordination with NRLDC and share latest assessment with NRLDC and NRPC. ***NRLDC had taken online training sessions for J&K representative on 20th & 21st Feb 2023 and 9th March 2023.***

As discussed in 62 NRPC meeting, all states are requested to assess ATC/TTC limits of their respective state control area for summer 2023 and share with NRLDC/ NRPC at the earliest.

It is again requested that SLDCs may 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. NRLDC is continuously sending emails in real-time for ensuring N-1 compliances as well as restricting schedule till ATC limit and maximizing internal generation. SLDCs need to ensure this during real-time operation.

Members may like to discuss.

18. Grid Operation related issues

a) Issues related to Rajasthan state control area

In 59, 60 and 62 NRPC meetings and 202 and 203 OCC meeting, NRLDC representative had highlighted various issues related to Rajasthan state control area. As per latest discussion held in 62 NRPC meeting, following actions were requested from RVPN side:

- In the reply submitted by RVPN, actions being taken at their end have been included, but timeline for implementation of these works is not clear. It was requested that timelines for these proposals are also submitted at the earliest. It was also requested to confirm whether these issues would be attended before winter 2023-24.

- Issues regarding N-1 violation of 400/220kV ICTs is being discussed in every OCC meeting every year, so RVPN should have timely planned and executed ICT capacity augmentation so that such situation could have been avoided.

- Loading of 400/220kV ICTs is very high and it is likely that SPS relief will not be able to bring ICT loading within safe limits under N-1 contingency of one ICT. This issue was also highlighted by NRLDC in 202nd and 203rd OCC meetings.

- RVPN to submit action plan on managing higher demand during winter 2023-24 with same ICT capacity.

- RVPN to submit actions being taken at their end to make sure that such poor factor and low voltages are not observed during next winter season. It was also requested to take actions to minimize this high MVAR drawl and low voltage for remaining high demand season.

- Since the commissioning of 400/220 kV Dholpur substation would take time, short term actions also need to be taken by RVPN to make sure that low voltage issues at 400kV Hindaun/Alwar is minimized

- PMUs are under commissioning at 400kV Akal, Ramgarh, Bhadla, Bikaner, Kankani and are expected to be reporting to SLDC shortly. Apart from above 25 PMUs would also be implemented at 220kV feeders at number of different RVPN substations. Reporting of PMUs at SLDC and status of reporting to NRLDC to be updated.

- DISCOMs has started disconnecting 1-phase agricultural feeders drawing load beyond certain limit. Matter has been taken up with DISCOMs and the sudden demand disconnection is likely to reduce further. SLDC to provide update.

In 204 OCC meeting, Rajasthan SLDC informed the following:

- Issues would be discussed with RVPN (planning) representative and consolidated reply would be submitted.

- Capacity augmentation at 400/220kV Chittorgarh would be completed by Jun/July 2023.

- Cybersecurity related issues due to which PMU reporting at SLDC not completed. Once PMUs report at SLDC, then same would be shared with NRLDC.

- Matter is being taken up with DISCOMs to minimise sudden load disconnection.

- Some of the RE generators connected at Bhadla (RVPN) are changing mode of operation around 10:00hrs and drawing high MVAr from HV network.

OCC forum asked RVPN to submit their reply on the issues highlighted at the earliest especially their plan to meet higher demand during 2023 summer and 2023-24 winter. NRLDC representative asked Rajasthan SLDC to take up the matter with RE generators on immediate basis.

Rajasthan SLDC to provide update.

b) Long outage of transmission elements

List of elements under long outage in Northern region is attached as **Annexure-B.I.**

It is requested to expedite restoration of the above-mentioned Grid elements at the earliest and also provide an update regarding their expected restoration date/time.

Some of the key elements need to be revived at the earliest:

- 400/220 kV 240 MVA ICT 2 at Orai(UP)

- 400/220 kV 315 MVA ICT 2 at Mundka(DV)
- 400/220 kV 500 MVA ICT 1 at Bhiwani(BB)
- 400KV Bus 1 at Vishnuprayag(JP)
- 400KV Bus 2 at Parbati_2(NH)
- 400KV Bus 2 at Parbati_3(NH)
- 765 KV ANPARA_D-UNNAO (UP) CKT-1

Member may like to discuss.

19. Frequent forced outages of transmission elements in the month of February'23:

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

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	220 KV Hissar(BB)-Chirawa(RS) (BB) Ckt-1	3	BBMB/Rajasthan
2	220 KV RAPS_A(NP)-Sakatpura(RS) (RS) Ckt-2	7	NPCIL/Rajasthan
3	400 KV Bareilly-Unnao (UP) Ckt-1	4	UP
4	400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1	3	Rajasthan

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

20. Multiple element tripping events in Northern region in the month of February '23:

A total of 21 grid events occurred in the month of February'23 of which **5** are of GD-1 category, **12** are of GI-2 Category & 04 is of GI-1 category. The preliminary report of

all the events have been issued from NRLDC. A list of all these events is attached at **Annexure-B.III.**

Further, despite persistent discussions/follow-up in various OCC/PCC meetings, it is observed that provisions 5.2(r) and 5.9.4(d) of the IEGC, pertaining to reporting of events / tripping to RLDC, is not being complied with by many utilities.

Maximum Fault duration observed is 1560 msec in the event of multiple element tripping at 400/220kV Rajpura(PS) & 400kV Rajpura Thermal at 11:25hrs on 03rd Feb, 2023. During the event, bus bar protection at 220kV side operated and both 220kV Bus-1&2 tripped. Hence, 220kV side of 400/220kV Rajpura(PS) became dead.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total 5 events out of **21** grid events occurred in the month. The other events with delayed clearance of faults are as follows:

1. Multiple elements tripping at 220kV Hissar_IA(Har), 220kV Hissar(BB) & Hissar(PG) at 15:11hrs on 12th February, 2023, fault clearance time: 1320ms

2. Multiple elements tripping at 220kV Hissar_IA(Har), 220kV Hissar(BB) & Hissar(PG) at 11:19hrs on 14th February, 2023, fault clearance time: 840ms

3. Multiple elements tripping at 220kV Bhinmal(PG) & 220 kV Bhinmal(RS) at 14:37hrs on 17th February, 2023, fault clearance time: 880ms

4. Multiple elements tripping at 220/132kV Modipuram(UP) at 05:29hrs on 19th February, 2023, fault clearance time: 320ms

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.

21. Details of tripping of Inter-Regional lines from Northern Region for February' 23:

A total of 5 inter-regional lines tripping occurred in the month of February'23. The list is attached at **Annexure-B.IV.** 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 5.2(r) 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.

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

The status of receipt of DR/EL and tripping report of utilities for the month of February'2023 is attached at **Annexure-B.V**. It is to be noted that 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. 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 been improved from POWERGRID (NR-2, NR-3), UP, HP, Haryana, Rajasthan & Uttarakhand in February'2023 compared to the previous month. However, reporting status from POWERGRID (NR-1), Punjab, Delhi, J&K & RE stations need 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 5.2.r 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.

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

In last 22 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.VI.**

It is to be noted that as per regulation 5.2(k) of IEGC, Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner as per a plan prepared for the purpose by the CTU/RPC from time to time.

Members were requested to update about their future plan for PSS tuning as there is no significant progress despite including this agenda in every OCC meeting and a separate meeting may be called for detail discussion on this matter.

Members may like to discuss.

24. Frequency response characteristic:

Three FRC based event occurred in the month of **February-2023**. Description of the event is as given below:

Table:

S. No.	**Event Date**	**Time (In hrs.)**	**Event Description**	**Starting Frequency (in Hz)**	**End Frequency (in Hz)**	***Δf***
1	09-Feb-23	11:45hrs	On 9th February, 2023 at 11:45hrs, line reactor at Bhadla end of 765kV Bhadla-Bikaner ckt-1 opened. As per PMU at Fatehgarh2 (PG), voltage increased from 745kV to 775kV with the opening of line reactor. At the same time, reduction in RE generation connected at ISTS RE pooling stations occurred which led to further increase in voltage followed by further reduction in RE generation. As per SCADA, total reduction in RE generation of approx. 4590MW is observed. Hence, generation loss of	50.00	49.54	0.46

			4590MW has been considered for FRC calculation.			
2	09-Feb-23	12:30hrs	On 9th February, 2023, at 12:30 hrs, Reduction in RE generation connected at ISTS RE pooling stations occurred. As per SCADA, total reduction in RE generation of approx. 3510MW is observed. At the same time, 400kV Fatehgarh2-Fatehgarh1 Pooling ckt-1&2 tripped on over voltage. Hence, generation loss of 3510MW has been considered for FRC calculation.	50.06	49.71	0.35

Status of data received till date:

Status of Field Data received of FRC of Grid event occurred at RE complex in Rajasthan at 11:45 Hrs & at 12:30 Hrs on 09.02.2023			
Data Received from		Data Not Received from	
Koteshwar HEP	UP	Uttarakhand	APCPL Jhajjar
HP	Dadri NTPC	Haryana	Singrauli NTPC
		Punjab	Unchhahar NTPC
		Delhi	NHPC
		BBMB	Rihand NTPC
		Rajasthan	

FRC of ISGS generators:

Generator	09-Feb-23 event	Generator	09-Feb-23 event
Singrauli TPS	6%	Salal HEP	1%
Rihand-1 TPS	3%	Tanakpur HEP	-6%
Rihand-2 TPS	2%	Uri-1 HEP	36%
Rihand-3 TPS	9%	Uri-2 HEP	0%
Dadri-1 TPS	10%	Dhauliganga HEP	No generation
Dadri -2 TPS	15%	Dulhasti HEP	No generation
Unchahar TPS	-4%	Sewa-II HEP	No generation
Unchahar stg-4 TPS	11%	Parbati-3 HEP	No generation
Jhajjar TPS	-4%	Jhakri HEP	No generation
Dadri GPS	No generation	Rampur HEP	No generation
Anta GPS	No generation	Tehri HEP	No generation
Auraiya GPS	No generation	Koteswar HEP	No generation
Narora APS	7%	Karcham HEP	No generation
RAPS-B	11%	Malana-2 HEP	No generation
RAPS-C	9%	Budhil HEP	No generation
Chamera-1 HEP	No generation	Bhakra HEP	-1%
Chamera-2 HEP	No generation	Dehar HEP	1%
Chamera-3 HEP	No generation	Pong HEP	1%
Bairasiul HEP	No generation	Koldam HEP	No generation
		AD Hydro HEP	No generation

FRC of State generators:

Generator	09-Feb-23 event	Generator	09-Feb-23 event
PUNJAB		UP	
Ropar TPS	-2%	Obra TPS	1%
L.Mohabbat TPS	13%	Harduaganj TPS	-1%
Rajpura TPS	0%	Paricha TPS	0%
T.Sabo TPS	2%	Rosa TPS	1%
Goindwal Sahib TPS	12%	Anpara TPS	0%
Ranjit Sagar HEP	20%	Anpara C TPS	3%
Anandpur Sahib HEP	-1%	Anpara D TPS	-1%
HARYANA		Bara TPS	14%
Panipat TPS	7%	Lalitpur TPS	0%
Khedar TPS	2%	Meja TPS	6%
Yamuna Nagar TPS	No generation	Vishnuprayag HEP	-3%
CLP Jhajjar TPS	7%	Alaknanda HEP	-1%
Faridabad GPS	No generation	Rihand HEP	2%
RAJASTHAN		Obra HEP	-1%
Kota TPS	1%	UTTARAKHAND	
Suratgarh TPS	0%	Gamma Infra GPS	No generation
Kalisindh TPS	-1%	Shravanti GPS	No generation
Chhabra TPS	No generation	Ramganga HEP	2%
Chhabra stg-2 TPS	10%	Chibra HEP	No generation
Kawai TPS	0%	Khodri HEP	No generation
Dholpur GPS	No generation	Chilla HEP	-3%
Mahi-1 HEP	1%	HP	
Mahi-2 HEP	No generation	Baspa HEP	1%
RPS HEP	0%	Malana HEP	No generation
JS HEP	6%	Sainj HEP	No generation
DELHI		Larji HEP	0%
Bawana GPS	29%	Bhabha HEP	0%
Pragati GPS	No generation	Giri HEP	0%
		J&K	
		Baglihar-1&2 HEP	No generation
		Lower Jhelum HEP	No generation

Memebers who haven't shared the data yet are requested to share the data and analysis of FRC of their control area.

Members may like to discuss.

25. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 5.8(b)

"*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 during 2020-21 & 2021-22 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	_	
Dhauliganga	28th Dec 2021	Exercise carried out successfully
Bairasiul	04th Dec 2020	
Sewa-2	29th May 2022	
N. Jhakri and Rampur	17th Dec 2019	
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	-	
Chamera-3	-	
Kishenganga	-	
Koteshwar	19th Jan 2022	Exercise carried out successfully
Chamera-1 and Chamera-2	08th Dec 2020	
Malana-2, AD Hydro and Phozal	08th Jan 2021	
Tehri	12th Jan 2022	
Koldam	22nd Jan 2021	Partially successful.

Gas Power Stations:

Name of stations	**Last conducted exercise date**	**Remark**
Anta GPS	09th Feb 2021 (with load) 01st Feb 2022 (without load)	Exercise carried out successfully
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**	**31st Jan 2023**
Dhauliganga	**28th Feb 2023**
***Bairasiul**	**Conducted successfully on 30th Nov 2022**
Sewa-2	**12th Jan 2023**
***N. Jhakri and Rampur**	**Conducted successfully on 09th Dec 2022**
Karcham and Baspa	
***Budhil**	
***Parbati-3 and Sainj**	**09th Nov 2022(to be rescheduled)**
***Salal**	**15th Dec 2022**
***Chamera-3**	**27th Jan 2023**
***Kishenganga**	
Koteshwar	**Conducted successfully on 07th Dec 2022**

***Chamera-1 and Chamera-2**	**Conducted successfully on 02nd Dec 2022**
***Malana-2, AD Hydro and Phozal**	**Conducted on 27th Jan 2022 (island synchronization was unsuccessful)**
Tehri	**Conducted successfully on 14th Dec 2022**
***Koldam**	**Conducted successfully on 11th Nov 2022**

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

Gas Power Stations:

Name of stations	**Tentative Date for Mock Black start exercise** **(proposed by power plants)**
Anta GPS	**Conducted on 03rd Mar 2023 (unsuccessful, Anta Unit couldn't able to charge the dead bus)**
*Auraiya GPS	Mar 2023
Dadri GPS	Jan 2023

*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		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

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.

As per the discussion in last OCC, current status w.r.t. following points:

a) *Mock black start exercise of RSD HEP (Punjab)*

b) *Mock black start exercise of Hydro/Gas power stations in Rajasthan control area.*

Members may like to discuss.

26. Frequent event of blackout of 400kV Noida Sec 148 GIS (UP)

Frequent events of blackout of 400kV Noida Sec 148 GIS (UP) has been observed in recent past i.e., 06th Mar23, 08th Mar23 & 09th Mar23. In all the three events bus bar protection had operated and both the 400kV bus tripped which led to the complete outage of S/s. Out of three events, in only one event there was fault at 400kV Bus. (Details of the events are attached as **Annexure-B.VII**)

As per the analysis of the event and details received as of now, there is an issue related to arrangements of contacts of DC source that whenever DC source is not available then it raises flag as gas detector stage-3 (GD-3) which further initiates bus bar tripping which shows that there is an issue with bus bar protection logic which need to be reviewed and corrected.

It is also to be mentioned that similar event was reported in Apr22.The issues related to battery charger and logic of initiation of Bus bar tripping during DC source changeover had already been discussed in 45PSC meeting (held in Jun22). Remedial actions were recommended and agreed to complete it within 30days. However, observing recent frequent tripping triggered due to similar issue, it is suspected that corrective actions haven't been taken yet. It is requested to share the status of corrective actions taken as of now and to expedite the corrective/remedial actions to avoid such further trippings.

Members may like to discuss.

27. Status of Bus bar protection:

Clause - 4 in schedule - V of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 reads as

"Bus bar protection and local breaker backup protection shall be provided in 220kV and higher voltage interconnecting sub- stations as well as in all generating station switchyards".

During analysis of many grid incidents/disturbances, it has been found that the Busbar protection at the affected substation was **not present or non-operational** which resulted in considerably increasing both the number of affected elements and fault clearance time. Accordingly, it becomes critical to monitor and keep Busbar protection at all the 220 kV and above voltage level substations healthy and operational.

Constituents were requested vide NRLDC letter dated 28th Dec 2022 to furnish status of Busbar protection in the following format in your control area positively by **15 January 2023.**

As of now details are received from POWERGRID(NR-1 & NR-2), Haryana, NTPC, BBMB, HP and UP

Constituents are requested to share the details.

*****

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:
<table><tr><td>◎</td><td>CHANDIGARH</td><td>Sep-2019</td></tr><tr><td>◎</td><td>DELHI</td><td>Jan-2023</td></tr><tr><td>◎</td><td>HARYANA</td><td>Dec-2022</td></tr><tr><td>◎</td><td>HP</td><td>Jan-2023</td></tr><tr><td>◎</td><td>J&K and LADAKH</td><td>Not Available</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Jul-2022</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Feb-2023</td></tr><tr><td>◎</td><td>UP</td><td>Jan-2023</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Feb-2023</td></tr></table>All States/UTs are requested to update status on monthly basis.</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">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:
<table><tr><td>◎</td><td>CHANDIGARH</td><td>Not Available</td></tr><tr><td>◎</td><td>DELHI</td><td>Dec-2022</td></tr><tr><td>◎</td><td>HARYANA</td><td>Dec-2022</td></tr><tr><td>◎</td><td>HP</td><td>Jan-2023</td></tr><tr><td>◎</td><td>J&K and LADAKH</td><td>Not Available</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Jun-2022</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Sep-2022</td></tr><tr><td>◎</td><td>UP</td><td>Dec-2022</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Dec-2022</td></tr><tr><td>◎</td><td>BBMB</td><td>Dec-2022</td></tr></table>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>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:
<table><tr><td>◎</td><td>CHANDIGARH</td><td>Not Available</td></tr><tr><td>◎</td><td>DELHI</td><td>Increased</td></tr><tr><td>◎</td><td>HARYANA</td><td>Increased</td></tr><tr><td>◎</td><td>HP</td><td>Increased</td></tr><tr><td>◎</td><td>J&K and LADAKH</td><td>Not increased</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Increased</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Increased</td></tr><tr><td>◎</td><td>UP</td><td>Increased</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Increased</td></tr><tr><td>◎</td><td>BBMB</td><td>Increased</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td colspan="3">BBMB was requested to submit the updated self certification report indicating increase of 0.2 Hz in AUFR settings, within one week. J&K and LADAKH were requested to update status for increasing settings of UFRs.</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 colspan="3">Status of the information submission (month) from states / utilities is as under:
◎ HARYANA — Sep-2022
◎ PUNJAB — Feb-2023
◎ RAJASTHAN — Feb-2023
◎ UP — Feb-2023
◎ NTPC — Feb-2023
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>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 colspan="3">All states/UTs are requested to submit daily data on MERIT Order Portal timely.</td></tr>
<tr><td>6</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 colspan="3">Status:
◎ DELHI — Fully implemented
◎ HARYANA — Scheme not implemented
◎ HP — Scheme not implemented
◎ PUNJAB — Scheme not implemented
◎ RAJASTHAN — Under implementation. Likely completion schedule is 31.03.2023.
◎ UP — Scheme implemented by NPCIL only</td></tr>
</table>

7	Reactive compensation at 220 kV/ 400 kV level at 15 substations			
	State / Utility	Substation	Reactor	Status
i	POWERGRID	Kurukshetra	500 MVAr TCR	Anticipated commissioning: First week of March'23
ii	DTL	Peeragarhi	1x50 MVAr at 220 kV	PO awarded to M/s Kanohar Electricals Ltd. Drawings approved and under final stage inspection. GIS Bay is already available.
iii	DTL	Harsh Vihar	2x50 MVAr at 220 kV	PO awarded to M/s Kanohar Electricals Ltd. Drawings approved and under final stage inspection. GIS Bay is already available.
iv	DTL	Mundka	1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. Reactor part tender is dropped and at present same is under revision.
v	DTL	Bamnauli	2x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. Reactor part tender is dropped and at present same is under revision.
vi	DTL	Indraprastha	2x25 MVAr at 220 kV	Bay work awarded to M/s. Ethos. Bay work is expected to be completed by Dec.21. 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 - LOA issued on dated. 17.08.2021 and date of completion of project is 18 months from the date of LOA. 220kV Reactors - LOA issued on dated 19.07.2021 and date of completion of project is 18 months from the date of LOA. Commsioned 27th Jan'23
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	Main bus shutdown is required for commissioning of 1x25 MVAR reactor at Bikaner, same is expected upto March’ 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.	Mar'23	02 No. of bays shall be utilized for LILO-II of 220kV Hiranagar Bishnah Transmission Line, the work of which is under progress and shall be completed by March'2023. Updated in 204th 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	-	HVPNL to update the status.
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	Feb'23	Updated in 201st 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: 0 Unutilized: 6	• 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.	Jun'23	Issue related to ROW as intimated in 202nd OCC by HVPNL.
				• 220 kV Bhiwani (PG) - Dadhibana (HVPNL) D/c line.	Apr'24	Issue related to ROW as intimated in 192nd OCC.HVPNL to update the status.
10	Jind 400/220kV S/s	Commissioned: 4 Approved:4 Total: 8	Utilized: 4 Unutilized: 0 Approved:4	• 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	Updated in 197th OCC by HVPNL

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
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	Mar'23	Updated in 198th OCC by HPPTCL
				• Network to be planned for 4 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.	Mar'23	Updated in 197th 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	May'23	Updated in 197th OCC by HVPNL
14	400/220kV Sohna Road Sub-station	Commissioned: 8 Total: 8	Utilized: 2 Unutilized: 4	• LILO of both circuits of 220kV D/c Sector-69 - Roj Ka Meo line at 400kV Sohna Road	Jun'23	Updated in 197th OCC by HVPNL
				• LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road	Jun'23	Updated in 197th OCC by HVPNL
15	400/220kV Prithla Sub-station	Commissioned: 8 Total: 8	Utilized: 2 Unutilized: 4 Under Implementation:2	• Prithla - Harfali 220kV D/c line with LILO of one ckt at Meerpur Kurali	Commissioned	Commisioned date: 31.12.2021. Updated in 198th OCC by HVPNL
				• LILO of both ckt of 220kV D/c Ranga Rajpur – Palwal line	-	HVPNL to update the status
				• 220kV D/C for Sector78, Faridabad	02.03.2023	Updated in 198th OCC by HVPNL
				• Prithla - Sector 89 Faridabad 220kV D/c line	31.03.2024	Under Implementation (Mar'24). Updated in 198th OCC by HVPNL
16	400/220kV Sonepat Sub-station	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 2 Unutilized: 2 Under Implementation:2	• LILO of both circuits of 220kV Samalkha - Mohana line at Sonepat	-	HVPNL to update the status.
				• Sonepat - HSIISC Rai 220kV D/c line	Mar'23	Line work is complete howere substation work is under progress. Updated in 201st OCC by HVPNL
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	Mar'23	• Lucknow -Kanduni, 220 kV D/C line expected energization date Mar'23 updated by UPPTCL in 203rd OCC _____ • No planning for 2 no. of bays upated by UPPTCL in 196th OCC. The same has been communicated to Powergrid.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
22	400/220kV Gorakhpur Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	Mar'23	• Gorakhpur(PG)- Maharajganj, 220 kV D/C line expected energization date Mar'23 updated by UPPCL in 204th 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	Oct'22	Updated in 198th OCC by HVPNL
25	400/220kV Pachkula Sub-station	Commissioned: 8 Under tender:2 Total: 10 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	Utilized: 2 Unutilized: 4 Under Implementation:2	• Panchkula – Pinjore 220kV D/c line	Jun'23	Updated in 203rd OCC by HVPNL
				• Panchkula – Sector-32 220kV D/c line	Jun'23	Updated in 203rd OCC by HVPNL
				• Panchkula – Raiwali 220kV D/c line	Commissioned	Updated in 194th OCC by HVPNL
				• Panchkula – Sadhaura 220kV D/c line: Sep'23	Sept'23	Updated in 194th 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	May'23	Route survey/tender under process. Work expected to be completed by May 2023. Updated in 198th 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)	May'23	Route survey/tender under process. Work expected to be completed by May 2023. Updated in 198th 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 Total: 4	Utilized:2 Unutilized: 2	• Network to be planned for 2 bays.	Mar'24 and July'24	Updated in 198th OCC by HVPNL
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

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
32	400/220kV, Manesar	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 4 bays	-	One bay 220 kV Manesar (PG)-Panchgaon ckt commissioned on 05.09.2022
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	Mar'23	Saharanpur(PG)-Devband D/c line expected energization date first week of March'23 updated by UPPTCL in 204th OCC
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	Mar'23	Direct circuit from 220 kV Lalton Kalan to Dhandari Kalan to be diverted to 400 kV PGCIL Ludhiana. Work expected to be completed by March 2023.Updated in 198th 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.

2. Establishment of new 400/220kV substations in Northern Region:

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule		Downstream connectivity by States
1	400/220kV Dwarka-I GIS (8 nos. of 220kV bays)	4x 500	Mar'22		DTL to update the status
2	220/66kV Chandigarh GIS (8 nos. of 66kV bays)	2x 160	Apr'22		Chandigarh to update the status.
3	400/220kV Jauljivi GIS Out of these 8 nos. 220kV Line Bays, 4 nos. (Pithoragath-2, & Dhauliganga-2) would be used by the lines being constructed by POWERGRID and balance 4 nos. bays would be used by the lines being constructed by PTCUL.	2x315	Feb'22		• 220kV Almora-Jauljibi line • 220kV Brammah-Jauljibi line PTCUL to update the status of lines.

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 (15.02.2023)
ANPARA TPS
HARDUAGANJ TPS
OBRA TPS
PARICHHA TPS

PSPCL (16.02.2023)
GGSSTP, Ropar
GH TPS (LEH.MOH.)
RRVUNL (16.03.2023)
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)

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	Delhi IS	Delhi	Implemented	Yes (Sept - 2021)	No	Yes	List of officials in-charge and relays in Delhi IS submitted by DTL on 16.08.2021. Revision of island is under discussion.
2	NAPS IS	UP	Implemented	Yes (08-10-2021)	Yes	Yes	-
3	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 (Required /	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.		-		-	-	-	-	-	-	-	-
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.		-		-	-	-	-	-	-	-	-
3	Jodhpur-Barmer-Rajwest IS	Rajasthan	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. Scheme implementation timeline: July,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: July,2023	-	-		-	-	-	-	-	-	-	-
5	Patiala-Nabha Power Rajpura IS	Punjab	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022. SCADA display implementation timeline: Dec, 2022; Scheme implementation timeline: July,2023		-		-	-	-	-	-	-	-	-
6	Pathankot-RSD IS	Punjab	Under Implementation	Scheme has been approved in 60th NRPC meeting held on 30.11.2022.. SCADA display as well as scheme implementation timeline: Dec, 2022		-		-	-	-	-	-	-	-	-
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											

सत्यमेव जयते

भारत सरकार / Government of India

विद्युत मंत्रालय / Ministry of Power

केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority

विद्युत प्रणाली अभियांत्रिकी एवं प्रौद्योगिकी विकास प्रभाग

Power System Engineering & Technology Development Division

दिनांक /Date:10.03.2023

To,

As per the Attached List

विषय: Procedure for shifting of Transmission Lines involving works by other Infrastructure Developers-regarding

महोदय/महोदया,

Several infrastructure projects of National Highways Authority of India (NHAI), Indian Railways, Airports Authorities, Border Roads Organization (BRO), Irrigation Departments, etc. are going on in various parts of the Country and many times, construction/development projects like roads, railways, airports, mines, flood banks/dam etc. come across existing/under construction transmission lines in their route alignment, leading to the need for shifting of such lines for construction of these projects. However, due to lack of coordination between the Infrastructure Developers and the transmission line Owner, the safety of the transmission lines was sometime compromised during the construction and also construction of these infrastructure projects were delayed substantially.

To ensure smooth coordination between the infrastructure developing agencies and transmission licensees while developing infrastructure projects Ministry of Power vide its letter No. 34-3/18/2022-TRANS(MoP) dated 18th May, 2022 requested Central Electricity Authority (CEA) to prepare a consolidated Standard Operating Procedure for shifting of Transmission lines while developing infrastructure projects. Accordingly, CEA prepared a consolidated Standard Operating Procedure for shifting of Transmission lines after deliberations/discussion with

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I/26656/2023

various stakeholders, in various meetings and submitted to Ministry vide CEA's letter no. CEA-PS-1477/4/2022-PSETD Division dated 11.11.2022. Ministry of Power Vide its letter no. 34-3/18/2022-TRANS(MoP) dated 03.03.2023 conveyed approval of the Hon'ble Minister of Power and NRE for **"Procedure for Shifting of Transmission Lines involving in work by other Infrastructure Developers"**.

A copy of the approved document is attached herewith for compliance of all the stakeholders in addition to the existing regulatory provisions of Central Electricity Authority (CEA) and other Authorities such as Environment & Forest, Defence, Airport, NHAI, BRO, etc., to ensure smooth coordination between the infrastructure developing agencies and transmission licensees while developing infrastructure projects.

भवदीय,

10/03/2023

(भंवर सिंह मीना/ **Bhanwar Singh Meena)**

निदेशक/ **Director**

Copy to:

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F. No. 34-3/18/2022-TRANS (MoP)
भारत सरकार / Government of India
विद्युत मंत्रालय / Ministry of Power
(पारेषण प्रभाग / Transmission Division)
*****

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Shram Shakti Bhawan, Rafi Marg, New Delhi-110001

दिनांक: 03.03.2023

To,

Chairperson
Central Electricity Authority
Sewa Bhawan, R.K. Puram
New Delhi – 110 066

Subject: Procedure for Shifting of Transmission Lines involve in work by other Infrastructure Developers – regarding

Sir,

I am directed to refer to CEA's letter No. CEA-PS-14-77/4/2022-PSETD Division dated 11.11.2022, therein, sharing the Standard Operating Procedure (SOP) for shifting of Transmission lines by various infrastructure developers, and to say that SOP as approved by the Hon'ble Minister of Power and NRE is enclosed..

2. It is, therefore, requested to circulate the said SOP to all the States/UTs Government and all the concerned Ministries / Department.

3. This issues with approval of the Competent Authority.

Yours Sincerely,

Enclosure: As stated.

3/3/23.

(बिहारी लाल)
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Standard Operating Procedure for shifting of Transmission line for other infrastructure projects

Several infrastructure projects of National Highways Authority of India (NHAI), Indian Railways, Airports Authorities, Border Roads Organization (BRO), Irrigation Departments, etc. are going on in various parts of the Country and many times, construction/development projects like roads, railways, airports, mines, flood banks/dam etc. come across existing/under construction transmission lines in their route alignment, leading to the need for shifting of such lines for construction of these projects. However, due to lack of coordination between the Infrastructure Developers and the transmission line Owner, the safety of the transmission lines was being often compromised during the construction and also construction of these infrastructure projects were delayed substantially. Therefore, in addition to the existing regulatory provisions of Central Electricity Authority (CEA) and other Authorities such as Environment & Forest, Defence, Airport, NHAI, BRO, etc.,the following Standard Operating Procedure (SOP) for shifting of Transmission lines needs to be observed while developing infrastructure projects.

STANDARD OPERATING PROCEDURE:

1. Subsequent to the erection of a transmission line (overhead line or underground cable),if any entity, including but not limited to BRO, NHAI, Indian Railways, Airports Authority, Irrigation Departments, etc.(hereinafter called Infrastructure Developer), proposes to carry out construction of road, railway track, airport, dam, flood bank, etc. or addition/alteration of existing infrastructure or similar type of work, whether permanent or temporary, which may affect the safety, reliability, availability, and clearances of the existing transmission lines or which may require shifting of whole or part of the transmission lines, such Infrastructure Developer or it's contractor employed to carry out such construction/addition/alteration, shall give intimation in writing to the Owner of the affected transmission line and to the Member (Power System), CEA and shall furnish therewith a detailed proposal including coordinates, scale drawing of the proposed work, finished level of Road/Rail, KMZ/KML file of the route etc.

2. Except for Projects of National Importance, all other requests for the diversion of transmission lines for other infrastructure projects shall be considered by the Owner of the transmission line, only if such diversion proposal for infrastructure projects serves wider public interest and is

recommended by the concerned State Government or the concerned Central Ministries. After getting the recommendations of the State Government or the concerned Central Ministry, such diversion proposal for ISTS lines, excluding Projects of National Importance, shall be taken up after approval by the Ministry of Power. For the Projects of National Importance, no such approval is required. Individual request for diversion shall not be considered.

3. On receipt of an intimation for the shifting of transmission line, the Owner of the transmission line shall examine the proposal for compliance of existing regulations and any other law for the time being in force, technical feasibility of the proposal, Right of Way (RoW) compliance and requirement of shifting or alteration of the transmission line and compensation required as per regulation, if any. The Owner shall carry out a joint survey with Infrastructure Developer to assess the ground conditions and collect relevant information. The Owner shall intimate its views/queries to the Infrastructure Developer, if any or its concurrence on the proposal within 30 days from the date of receipt of the proposal.

4. The Infrastructure Developer shall furnish clarificationsto the queries, if any,to the Owner of the affected transmission line within 15 days of receipt of queries/views.Any further communication, if any, among the parties in this regard shall be replied within 07 days from the receipt of the correspondence.

5. Both the parties will mutually decide whether the Owner of the transmission linewill carry out shifting/alteration of the transmission line or this responsibility will be taken up by the Infrastructure Developer.

6. If shifting or alteration work is executed by theInfrastructure Developer:

   (a) He shall submit the design documents and drawings relevant for the construction of transmission line to the Owner of the transmission line. The Owner shall examine/raise queries, if any, and provide its final approval of drawings within 3 Weeks from the date of receipt of documents.If required, the existing design documents and drawings available with the Owner may be provided to the Infrastructure Developer. No work of shifting of transmission line shall be executed before getting the final approval of drawings/documents by the Owner.

(b) All relevant cost incurred for shifting/alteration shall be borne by the Infrastructure Developer.

(c) The Infrastructure Developer shall be responsible for RoW compensation, forest clearances, wild life clearance etc.

(d) Both the parties may sign a Memorandum of Understanding (MoU) which will include mutually agreed terms and conditions.

(e) The Infrastructure Developer shallpay supervision charges, as specified in this SOP, to the Owner before commencement of work of shifting/altering the line.

(f) The Infrastructure Developer shall intimate the requirement of shutdown of existing transmission line for work of shifting or altering to the Owner of the transmission line for further necessary action in this regard. The shifting or alteration work shall be initiated only after the approval of RPC/SLDC.

7. If shifting or alteration work is executed by the Owner of the transmission line, the following provisions shall be followed:

(a) The Owner shall work out the cost implication of the shifting/alteration of the transmission line on the basis of the cost of material used after crediting the depreciated cost of the existing material which is being replaced and the wages of labour employed in effecting the shifting/alteration and intimate the same along with the time required for shifting/altering the transmission line to the Infrastructure Developer, within 30 days. The estimate may also include all statutory charges, supervision charges, amount for compensation of RoW/Forest Clearance/Wild life Clearance etc., as applicable.

(b) The Infrastructure Developer, shall deposit the amount of the estimated cost to the Owner, within30 days of the receipt of the cost estimate.

(c) If there is any dispute regarding the cost of alteration of the transmission line estimated by the Owner or the responsibility to pay such cost, the dispute may be referred to the Member (Power System), CEA which shall after hearing both parties decide upon the issue.

(d) Both the parties may sign an MoU which will include mutually agreed terms and conditions.

(e) The work of shifting/alteration shall be awarded through a tender, by the Owner and the price discovered through the tender and other charges as mentioned above shall be reimbursed by the Infrastructure Developer. In case the shifting project is of small size and/or the project is of urgent nature, and the Owner awards the

work on Rate Contract or cost plus basis, the reimbursement of cost of works, in such case, shall be as per actuals.

8. The Infrastructure Developer shall make a payment of supervision charges at the following rates to the Owner of the transmission line:

Infrastructure Project	**Shifting works by Infrastructure developers**	**Shifting works by the Owner**
Projects Under BharatmalaPariyojana	2.5%	Not Applicable
Other Infrastructure Projects	2.5%	15%

[Note:Supervision charges may be calculated as the percentage of estimated cost of material (after crediting the depreciated cost of the existing material) & wages (exclusive of GST) and then GST may be separately applied on the supervision charges.]

9. The shifting/alteration work shall normally be completed within 10 months from the date of first request of the infrastructure developer. In case the shifting project is of small size or the project is of urgent nature, a shorter time frame may be mutually decided between the Owner & the infrastructure developer.

10. The design, testing, construction and erection/laying of transmission line shall be in accordance with Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, Central Electricity Authority (Measures Relating to Safety and ElectricSupply) Regulations and relevant Standards. In addition, the applicable Regulations/Guidelines/Procedures of other Authorities such as NHAI, BRO, Airport, Defense, Forest, etc., shall be followed.

11. It shall be ensured that the reliability and safety of the transmission line is not compromised during or after the diversion work.

12. No cutting of soil within ten meters from the tower structure of 110 kV and above voltagelevel shall be permitted without the written permission of the Owner of tower structure.For towers located on hill slope, extra precautions shall be taken to ensure that any cutting/excavation on that hill does not compromise the safety and integrity of the tower structure and if it is expected that the stability of hill may be compromised due to cutting/excavation work, even for distance beyond 10 m, the written

permission of the Owner of tower structure shall be taken before commencing any such activity.

13. Before commencement of work upon road, rail, airport, flood bank, dam etc.,Infrastaructure Developer shall ensure that the provisions of Regulations 58, 60, 61 and 76 of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010(as amended up to date)are not contravened either during or after the aforesaid construction.

14. The request for requirement of shutdown of existing transmission line for work of shifting or altering shall be submitted to the respective Regional Power Committee (RPC) or State Load Dispatch Center (SLDC), as applicable, well in advance by the Owner of the transmission line.

15. As per Ministry of Power's OM No. 34-311812022-Trans dated 03.08.2022, the RPC Secretariat shall provide deemed availability certificate for the shutdown period availed by transmission licensee (both RTM and TBCB) for shifting of their ISTS lines for all National Infrastructure Projects of NHAI, Railways, BRO etc., provided transmission customers are not affected by the shutdown of the line.All such applications for deemed availability shall be considered irrespective of date of application. However, deemed availability for past shifting of lines, where the diversion work has already been completed, shall not be considered

16. For the cases where deemed availability certificate for the shutdown period is not issued to transmission licensee for the shutdown period or part thereof, then in such cases, charges towards loss of availability due to such shutdowns shall be borne by Infrastructure Developer.

17. **Requirement for Overhead Transmission Lines Crossing of Road/highways :**

(a) At all road crossings, except National Highways, the towers/ poles shall be fitted with normal suspension or tension insulator strings depending on the type of towers. However, for all National Highways crossings, tension type towers/ poles with tension insulator stringsshall be used.
(b) A minimum of two sets of long rod insulators or two sets of disc insulator strings per phase per circuit shall be used.
(c) The crossing span shall not be more than 250 meters, unless higher span is permitted by NHAI.

(d) No joints in conductors or earth wire(s) shall be permitted, in crossing span.

(e) Theoverhead line crossing shall normally be at right angle as far as possible.

पतों की सूची:

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STATCOM Station - 1 Activities post charging of Converter Transformer at 765/400/220kV Bhadla-2 Substation				
Day	**Item**	**Work**	**Reactive power injecion in 400 kV HV Bus**	**Testing Time**
26/03/23 to 29/03/23	Energisation of coupling transformer , no load operation, air release and other energisation checks		None	None
3/30/2023	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ±360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ± 360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
4/1/2023	Station 1 MSR	Initial current mode of MSR	Q = 125 MVAr (Reactive)	4 hours
	Station 1 MSC 1	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
	Station 1 MSC 2	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
4/3/2023	SVC fixed Q ramp	fixed reactive power mode (FQM) for SVC	Qsvc = ± 300 MVAr	2 hours
	SVC on sequence Station 1 VSC-1	Initial VSC-1 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC off sequence Station 1 VSC-1	VSC-1 off sequence starting at capacitive or inductive operating point	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC Closed Loop Control	Verify response time of SVC controller	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	4 hours
4/5/2023	SVC Closed Loop Control voltage reference ramp	Ramp in voltage control mode (SVC in service and voltage control mode is enabled.)	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	2 hours
	Heat run and auxiliary load determination	Heat run test for primary components Check of internal AC/DC meters of auxiliary supply	Maximum capacitive power injection: +nominal Q (+550MVAr) Maximum inductive power injection: - nominal Q (- 425 MVAr)	8 Hours
	Reactive device switching	Check of controller behaviour in case of MSC/MSR switching at HV bus	Depending on system conditions up to ±300MVAr	2 hours

Remarks :- Code & time duration of day for carrying out energisation test may be provided by RLDC on D-3 basis

STATCOM Station - 2 Activities post charging of Converter Transformer at 765/400/220kV Bhadla-2 Substation

Day	Item	Work	Reactive power injecion in 400 kV HV Bus	Testing Time
06/04/23 to 09/04/23	Energisation of coupling transformer , no load operation, air release and other energisation checks		None	None
4/10/2023	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ±360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ± 360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
4/12/2023	Station 1 MSR	Initial current mode of MSR	Q = 125 MVAr (Reactive)	4 hours
	Station 1 MSC 1	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
	Station 1 MSC 2	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
4/14/2023	SVC fixed Q ramp	fixed reactive power mode (FQM) for SVC	Qsvc = ± 300 MVAr	2 hours
	SVC on sequence Station 1 VSC-1	Initial VSC-1 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC off sequence Station 1 VSC-1	VSC-1 off sequence starting at capacitive or inductive operating point	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC Closed Loop Control	Verify response time of SVC controller	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	4 hours
4/16/2023	SVC Closed Loop Control voltage reference ramp	Ramp in voltage control mode (SVC in service and voltage control mode is enabled.)	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	2 hours
	Heat run and auxiliary load determination	Heat run test for primary components Check of internal AC/DC meters of auxiliary supply	Maximum capacitive power injection: +nominal Q (+550MVAr) Maximum inductive power injection: - nominal Q (- 425 MVAr)	8 Hours
	Reactive device switching	Check of controller behaviour in case of MSC/MSR switching at HV bus	Depending on system conditions up to ±300MVAr	2 hours

Remarks :- Code & time duration of day for carrying out energisation test may be provided by RLDC on D-3 basis

STATCOM Station - 1 Activities post charging of Converter Transformer at 765/400/220kV Fatehgarh-2 Substation

Day	Item	Work	Reactive power injecion in 400 kV HV Bus	Testing Time
15/04/23 to 18/04/23	Energisation of coupling transformer , no load operation, air release and other energisation checks		None	None
4/19/2023	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ±360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ± 360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
4/21/2023	Station 1 MSR	Initial current mode of MSR	Q = 125 MVAr (Reactive)	4 hours
	Station 1 MSC 1	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
	Station 1 MSC 2	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
4/23/2023	SVC fixed Q ramp	fixed reactive power mode (FQM) for SVC	Qsvc = ± 300 MVAr	2 hours
	SVC on sequence Station 1 VSC-1	Initial VSC-1 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC off sequence Station 1 VSC-1	VSC-1 off sequence starting at capacitive or inductive operating point	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC Closed Loop Control	Verify response time of SVC controller	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	4 hours
4/25/2023	SVC Closed Loop Control voltage reference ramp	Ramp in voltage control mode (SVC in service and voltage control mode is enabled.)	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	2 hours
	Heat run and auxiliary load determination	Heat run test for primary components Check of internal AC/DC meters of auxiliary supply	Maximum capacitive power injection: +nominal Q (+550MVAr) Maximum inductive power injection: - nominal Q (- 425 MVAr)	8 Hours
	Reactive device switching	Check of controller behaviour in case of MSC/MSR switching at HV bus	Depending on system conditions up to ±300MVAr	2 hours

Remarks :- Code & time duration of day for carrying out energisation test may be provided by RLDC on D-3 basis

STATCOM Station - 2 Activities post charging of Converter Transformer at 765/400/220kV Fatehgarh-2 Substation

Day	Item	Work	Reactive power injecion in 400 kV HV Bus	Testing Time
26/04/23 to 30/04/23	Energisation of coupling transformer , no load operation, air release and other energisation checks		None	None
5/1/2023	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ±360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 1 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc = ± 360A (1h each))	Qsvc = ± 36 MVAr	1 hour each
	Station 1 VSC 2 current mode	Initial current mode (The VSC current is ramped up and down to Ivsc= ± 1450A (20min each))	Qsvc = ± 150MVAr	20 Min each
5/3/2023	Station 1 MSR	Initial current mode of MSR	Q = 125 MVAr (Reactive)	4 hours
	Station 1 MSC 1	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
	Station 1 MSC 2	Initial current mode of MSC	Q = -125 MVAr (Capacitive)	4 hours
5/5/2023	SVC fixed Q ramp	fixed reactive power mode (FQM) for SVC	Qsvc = ± 300 MVAr	2 hours
	SVC on sequence Station 1 VSC-1	Initial VSC-1 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC off sequence Station 1 VSC-1	VSC-1 off sequence starting at capacitive or inductive operating point	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC on sequence Station 1 VSC-2	Initial VSC-2 on sequence in fixed reactive power mode (FQM)	FQM up to ± 150MVAr Ramp Rate 5 MVAr /sec	1 hour
	SVC Closed Loop Control	Verify response time of SVC controller	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	4 hours
5/7/2023	SVC Closed Loop Control voltage reference ramp	Ramp in voltage control mode (SVC in service and voltage control mode is enabled.)	Maximum capacitive power injection: + 300MVAr Maximum inductive power injection: - 300MVAr	2 hours
	Heat run and auxiliary load determination	Heat run test for primary components Check of internal AC/DC meters of auxiliary supply	Maximum capacitive power injection: +nominal Q (+550MVAr) Maximum inductive power injection: - nominal Q (- 425 MVAr)	8 Hours
	Reactive device switching	Check of controller behaviour in case of MSC/MSR switching at HV bus	Depending on system conditions up to ±300MVAr	2 hours

Remarks :- Code & time duration of day for carrying out energisation test may be provided by RLDC on D-3 basis

एनएचपीसी लिमिटेड
(भारत सरकार का उद्यम)
NHPC Limited
(A Government of India Enterprise)

संदर्भ सं./Ref. No. : एनएच/ओ&एम/जीएमसी/SEM/23/49-50.

फोन/Phone :

दिनांक/Date : 13/03/2023

The Member Secretary,
NRPC, Northern Regional Power Committee,
18A, Shahid Jit Singh Marg,
Katwaria Sarai, New Delhi-110016.

Sub.: Calibration and testing of Interface Energy Meters installed at Generating stations (NHPC) regarding.

Ref.: 1. MoM of 197th OCC Meeting held on 22th July 2022.

महोदय,

This has reference to the Agenda no. 15 (**Calibration and testing of Interface Energy Meters installed at Generating stations) of** 197th OCC Meeting wherein, the following was recorded in the Minutes of Meeting:

"POWERGRID representative informed that it would take four to five months to finalize the agency for carrying out the testing of Interface Energy Meters installed at generating stations in Northern region and thereafter the work would be carried out".

In this regard, it is intimated that Powergrid has not provided any information regarding calibration/testing of Interface Energy Meters as decided during above OCC meeting.

This is for your kind information please.

धन्यवाद,

भवदीय,

सूरज

(सूरज धीमान)
महाप्रबंधक (ओ&एम)

Copy to:

1. Sr. General Manager, NRLDC, Katwaria Sarai, New Delhi

Operation Philosophy for Flexible/Zero Scheduling of Tehri HPP

Background:

The river dredging work of Tehri PSP is being undertaken by THDCIL , the work commenced from 15-Feb -2023 and scheduled to be completed by 15-Jun 2023. As the work is being undertaken in TRC area of Tehri HPP, which is common for both Tehri HPP and PSP and water level is required to be kept below EL 606.00, hence, to provide requisite and safe working condition zero scheduling of Tehri HPP is primary requirement.

In this context, a brief presentation was given by THDCIL Official during 204th OCC meeting. Considering the timely commissioning of project and providing safe and desired working conditions to facilitate the river dredging work, zero-scheduling of Tehri HPP was approved during night period (Non-peaking hours) till 31-Mar-2021, and it was agreed that existing methodology shall be reviewed in monthly OCC meeting and based on system conditions flexible/zero scheduling of next month shall be approved in OCC meeting.

Key Points pertaining to Flexible/Zero Scheduling and Planned Outages of Tehri HPP

THDCIL requested to extend the zero/flexible scheduling of Tehri HPP to facilitate river dredging works of Tehri PSP and allow planned outage of one unit in each month of April, May and first week of June'23, in this context, THDCIL deliberated following points to be considered:

- River Dredging/Cleaning is pre-requisite for commissioning of PSP project, as during pumped mode operation water will be pumped from TRC area, hence this area require to be cleaned before commissioning activities. Further, baffle walls are to be constructed in TRC area to obstruct debris in future.
- During the monsoon, risk of cloud burst, flash flood, heavy rains and landslides are very high in Himalayan region, which is not safe for execution of work in river bed area, hence this work is to be completed before onset of monsoon.
- In respect to Planned Outage of One Unit in Month of April, May and First Week of June followings are submitted:
    - Mar-Jun is lean period for Tehri HPP , during this period reservoir level falls steeply and reached its minimum (MDDL) on 20th Jun, also, downstream water requirements are also at its minimum, hence, Mar-Jun is an opportune time to undertake all planned outage related activities as during this period plant capacity is in downturn and at its minimum.

- Tehri Reservoir filling cycle commences from 21st Jun onwards, and from 21st Jun to 31st Sep approx. 75% of annual inflow received in catchment area of Tehri Reservoir, also plant capacity reaches its rated value within 50days of commencement of monsoon. Therefore, all planned outages are completed before onset of monsoon.
- During monsoon, there is high risk of Cloud Brusting, Flash Flood and Heavy Rains , hence in order to mitigate any unforeseen situation all maintenance related activities are completed before monsoon so that high reliability and better preparedness of plant and its equipment may be ensured.
- 31st Oct – 31st Jan Reservoir head available more than rated head of machine, hence plant capacity during this period is at its maximum and any outage during this period is undesirable. Further from Dec onwards downstream requirement for drinking, irrigation , 'Magh Mela', 'Snan' are commenced.
- Also, visit of OEM (Russia) have been already planned and they will visit during proposed annual maintenance of unit from Mar-Jun for comprehensive inspection and Repair & Maintenance of Units.
- Considering the High demand in grid, the best efforts are being taken by Tehri plant to complete its annual maintenance in 15-20 days, earlier it was taken 25-30 days. Also, in general panned outage of Tehri HPP are being taken in Mar-Jun, hence, all resource planning and deployment have been done in advance for timely completion of maintenance activities.

In view of above, considering all aspects of O&M of multipurpose project viz preparedness of plant before onset of monsoon, downstream requirement of drinking, irrigation and Magh & Kumbh Mela, and Reservoir filling Cycle, **Mar-Jun is only available opportune time for Tehri HPP to carry out planned outage,** hence **it is requested that planned outage of one unit in month of April, May and Jun (before onset of monsoon) may be accorded.**

Further, In context to river dredging work, considering anticipated high demand in the Grid in month of April'23 and May'23, and taking cognizance of timely commissioning of Tehri PSP project, following Operating Philosophy are advised:

Operation Philosophy of Tehri HPP to facilitate River Dredging works of Tehri PSP:

Considering anticipated unprecedented high demand in Grid during April and May following operational methodology are suggested:

1. Existing operating philosophy i.e. Zero Scheduling during night hours shall be extended for month of April, however, in case of any contingency and high demand in Grid the scheduling of Tehri HPP shall be restored to normal(i.e. Zero Scheduling shall be avoided) with proper intimation to plant so that due care of safety of man-machine may be ensured.

2. Tehri PSP shall submit schedule of river dredging work, highlighting the construction and concerting activities of baffle walls. This schedule will help Grid Operator to manage and mitigate contingency situation during high demand period and facilitate to Co-ordinate River dredging work and scheduling of Tehri HPP effectively.

3. **Scenario-I River Dredging Work**
   During River Dredging work heavy man-machine are deployed in river bed area and mobilization/evacuation of resources requires approx 02:00 hrs. Hence, during this period, in case of high demand/contingency, if Grid operator requires to schedule the Tehri HPP then instruction shall be communicated 02:00 hrs prior to scheduling of machine.

4. **Scenario-II River Dredging Work along with Construction/ Concreting of Baffel Wall**
   Construction of baffle walls require concreting and its settling time approx 24:00 hrs, hence during this period, prior instruction for scheduling of plant may be given atleast 4 Days in advance so that construction activities may be align with Grid requirements or vice -versa concreting activities may be reshedule as per Grid Requirements.

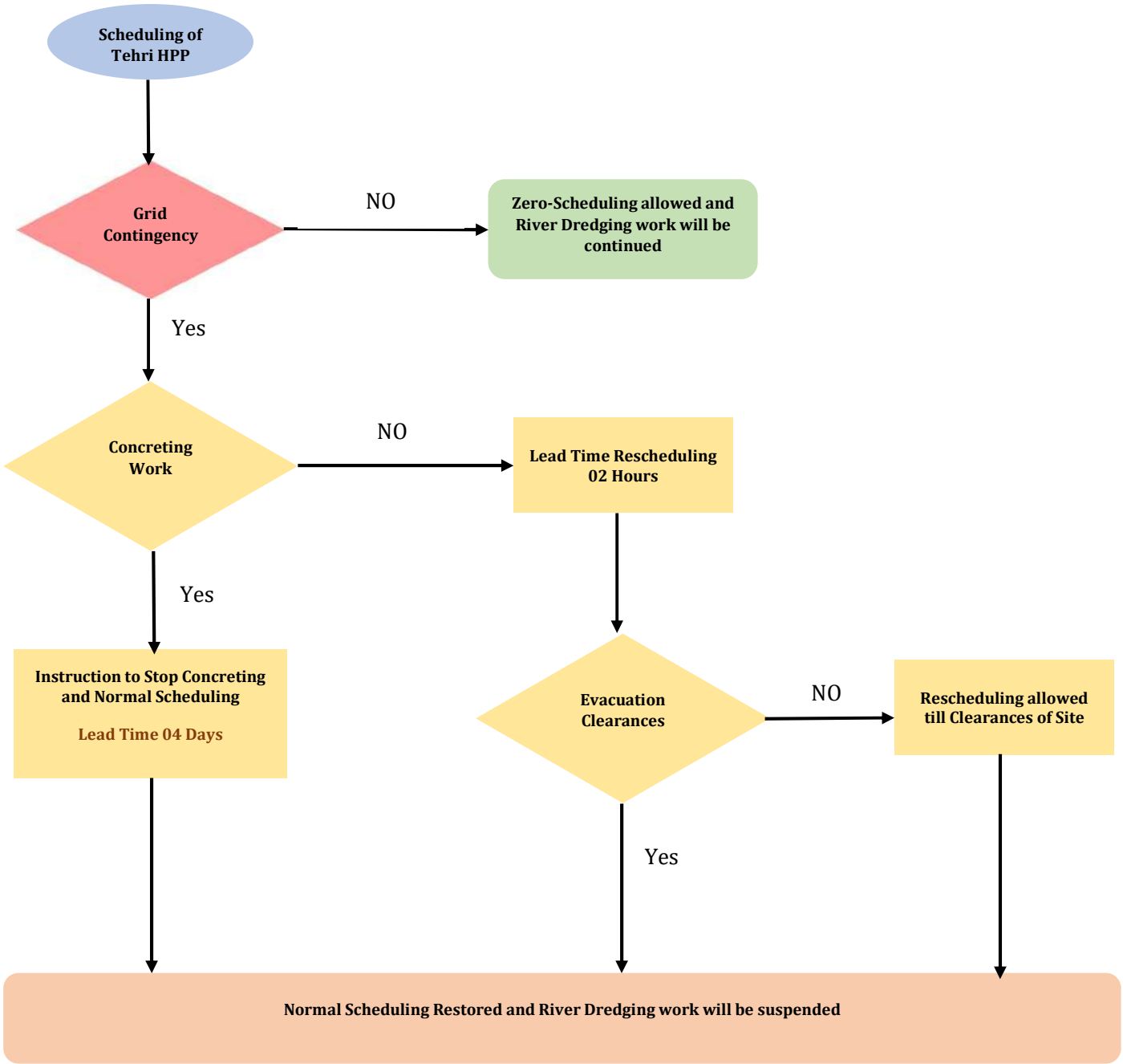
The work-flow and schedule of river dredging work is attached at Annexure -I and Annexure-II respectively.

Further, it is requested that in order to ensure safe working condition and to avoid any exigency situation in TRC area of Tehri HPP, in case of scheduling during proposed period of river dredging works, a stringent protocol/safety standard shall be opted between NRLDC Control Room and Plant Control Room for scheduling/revision in scheduling of Tehri HPP, so that **it may be ensured that Unit will be operated after fully evacuation of construction site.**

SCHEDULE FOR RIVER DREDGING WORK

SL NO.	DATE		ACTIVITY	STATUS
	FROM	TO		
1	05.02.2023	20.02.2023	DUMPING OF HCC RMC WASTE MATERIAL AT LEFT BANK APPROACH ROAD/SURFACE GRADING AND STABLISATION OF APPROACH ROAD AND STRENGTHNING OF ROAD WHEREVER REQUIRED	
2	05.02.2023	20.03.2023	GRADING OF EXISTING APPROACH ROAD AND PREARATION OF SITE FOR PUTTING UP PORTABLE RMC PLANT. LABOUR CAMP PREPARATION ESTABLISHMENT /ALLOTMENT FROM HCC@RIGHT BANK . MOBILISATION AND INSTALLATION OF RMC PLANT@RIGHT BANK	
3	15.02.2023	28.02.2023	CONSTRUCTION OF DYKE-1 AND APPROACH ROAD WITH DREDGED MATERIAL UPTO DYKE 2	
4	15.02.2023	20.03.2023	CONSTRUCTION OF DYKE 2 WITH DREDGED MATERIAL	
5	15.03.2023	30.03.2023	DREDGING OF RIVER BED FROM DYKE-1 TO BAFFLE WALL /EXCAVATION FOR BAFFLE WALL FOUNDATION	
6	28.02.2023	31.03.2023	APPROACH ROAD FROM DYKE-2 TO STILLING BASIN	
9	22-02-2023	20.03.2023	**DREDGING OF RIVER BED FROM DYKE TO HPP-TRT-OUTLET:** APPROX 100 MTR TO BE SHIFTED TO AREA ON THE UPSTREAM OF DYKE FOR REHANDLING OF MATERIAL	
10	20.03.2023	31.03.2023	**CONSTRUCTION OF RB APPROACH ROAD:** FROM D/S OF HPP TRT OUTLET TO PSP OUTLET FOR RIVER DREDGING.	
8	25.03.2023	31.03.2023	**MS SHEETING AS PROTECTION WALL IN FRONT OF HPP -TRT - OUTLET:** ANCHORING OF MS SHEETING WITH APPROACH ROAD AREA APPROX 60MTR *8 MTR APPROX . FIXING /ANCHORING /GROUTING OF MS SHEET WITH APPROACH ROAD AND ON RIVER BED	
7	25.03.2023	20.04.2023	**CONSTRUCTION OF BAFFLE WALL-1 :** A) MUDMAT B) MICROPILING C) CONCRETING	**CONCRETE WORKS**
11	31.03.2023	14.04.2023	DREDGING BETWEEN HPP TRT OUTLET TO U/S OF PSP TRT OUTLET i/c CONSTRUCTION OF APPROACH ROAD AT LEFT BANK AND CONSTRUCTION OF DYKE FOR BAFFLE WALL-2	
	15.04.2023	30.04.2023	**CONSTRUCTION OF BAFFLE WALL-2 :** A) MUDMAT B) MICROPILING C) CONCRETING	**CONCRETE WORKS**
12	01.05.2023	15.05.2023	CONSTRUCTION OF ACCESS ROAD AND DREDGING OF RIVER BED MATERIAL FROM PSP-TRT-OUTLET AND D/S AREA	
13	16.05.2023	31.05.2023	REMOVAL OF ACCESS ROAD FROM DOWN STREAM OF PSP-TRT-OUTLET TO DYKE /UPSTREAM OF HPP TRT OUTLET	
14	01.06.2023	10.06.2023	REMOVAL/DREDGING OF RIVER BED MATERIAL FROM U/S OF BAFFLE WALL-1 TO SPILLWAY	
20	11.06.2023	15.06.2023	CLEANING AND REMOVAL WASTE MATERIAL, SHUTTERING MATERIAL SCAFFOLDING MATERIAL FROM SITE AND HANDING OVER	

WORK FLOW FOR SCHEDULING OF TEHRI HPP TO FACILITATES RIVER DREDGING WORKS OF TEHRI PSP DURING GRID CONTEGENCY



Sr. No.	Utiltiy Name	Station Name	Device Type	Feeder Name	Boundary Type	Voltage Level	Main meter required	Wallaby/EDMI meter no. already installed
1	PGCIL	400 kV Amritsar	Transmission Line	400 kV Makhu I	I-T	400kV	1	HT01140011
2	PGCIL	400 kV Amritsar	Transmission Line	400 kV Makhu II	I-T	400kV	1	HT01140016
3	PGCIL	400 kV Amritsar	Power Transformer	ICT 3 400/220 kV (HV & LV)	I-T	400kV	2	HT01130240
4	PGCIL	400 kV Amritsar	Power Transformer	ICT 2 400/220 kV (HV & LV)	I-T	400kV	2	HT01130040
5	PGCIL	400 kV Amritsar	Power Transformer	ICT 1 400/220 kV (HV & LV)	I-T	400kV	2	HT01130039
6	PGCIL	400 kV Amritsar	Power Transformer	ICT 4 400/220 kV (HV & LV)	I-T	400kV	2	HT01130923
7	PGCIL	400 kV Moga	Transmission Line	400 kV Nakodar	I-T	400kV	1	HT01140007
8	PGCIL	400 kV Moga	Transmission Line	400 kV Behman Jassa	I-T	400kV	1	HT01140008
9	PGCIL	400 kV Moga	Power Transformer	ICT 1 400/220 kV (HV & LV)	I-T	400kV	2	HT01130042
10	PGCIL	400 kV Moga	Power Transformer	ICT 2 400/220 kV (HV & LV)	I-T	400kV	2	HT01130041
11	PGCIL	400 kV Moga	Power Transformer	ICT 3 400/220 kV (HV & LV)	I-T	400kV	2	HT01130043
12	PGCIL	400 kV Moga	Power Transformer	ICT 4 400/220 kV (HV & LV)	I-T	400kV	2	HT01130044
13	PGCIL	400 kV Jalandhar	Transmission Line	220 kV Kapurthala-1 (Kanjli)	I-T	220kV	1	HT01130034
14	PGCIL	400 kV Jalandhar	Transmission Line	220 kV Kapurthala-2 (Kanjli)	I-T	220kV	1	HT01130035
15	PGCIL	400 kV Jalandhar	Transmission Line	220 kV Kartarpur 1	I-T	220kV	1	HT01130036
16	PGCIL	400 kV Jalandhar	Transmission Line	220 kV Kartarpur 2	I-T	220kV	1	HT01130037
17	PGCIL	400 kV Ludhiana	Power Transformer	ICT 1 400/220 kV (HV & LV)	I-T	400kV	2	HT01130021
18	PGCIL	400 kV Ludhiana	Power Transformer	ICT 2 400/220 kV (HV & LV)	I-T	400kV	2	HT01130022
19	PGCIL	400 kV Ludhiana	Power Transformer	ICT 3 400/220 kV (HV & LV)	I-T	400kV	2	HT01130023
20	PGCIL	400 kV Ludhiana	Power Transformer	ICT 4 400/220 kV (HV & LV)	I-T	400kV	2	HT01140053
21	PGCIL	400 kV Malerkotla	Power Transformer	ICT 1 400/220 kV (HV & LV)	I-T	400kV	2	HT01130007
22	PGCIL	400 kV Malerkotla	Power Transformer	ICT 2 400/220 kV (HV & LV)	I-T	400kV	2	HT01130008
23	PGCIL	400 kV Malerkotla	Power Transformer	ICT 3 400/220 kV (HV & LV)	I-T	400kV	2	HT01130009
24	PGCIL	400 kV Nalagarh	Transmission Line	220 kV Mohali Ckt-1	I-T	220kV	1	HT01130045
25	PGCIL	400 kV Nalagarh	Transmission Line	220 kV Mohali Ckt-2	I-T	220kV	1	HT01130046
26	PGCIL	400 kV Patiala	Power Transformer	ICT 1 400/220 kV (HV & LV)	I-T	400kV	2	HT01130010
27	PGCIL	400 kV Patiala	Power Transformer	ICT 2 400/220 kV (HV & LV)	I-T	400kV	2	HT01130011
28	PGCIL	400 kV Patiala	Power Transformer	ICT 3 400/220 kV (HV & LV)	I-T	400kV	2	HT01130012
29	PGCIL	400KV Jalandhar	Transmission Line	400KV PSTCL Dhanansu	I-T	400KV	1	Line not commissioned yet.
Total							**47**	

Transmission Element Outage Report 17-03-2023

A. Details of Transmission Elements under Planned Outage:-

S.No	Element Name	Type	Voltage Level	Owner	Outage		Revival		Expected Date of Revival	Reason / Remarks
					Date	Time	Date	Time		
1	220 KV Gazipur(DTL)-Noida Sec62(UP) (UP) Ckt-1	Line	220KV	UPPTCL	30-04-2022	22:55	*	*	-	Tower tilted on one side at tower no 10 from Gazipur (DTL) end.
2	FSC(40%) of 400 KV Kala Amb(PKTL)-Sorang(Greenko) (Greenko) Ckt-1 at Kala Amb(PKTL)	FSC	400KV	POWERGRID	26-09-2022	09:47	*	*	-	To attend Unbalance current that is rapidly increasing in B phase. Charging code was issued as NR2209-4483, but cancelled due to Unbalance alarm is still not rectified.
3	40352T TIE BAY - 400KV SURATGARH(RVUN)-RATANGARH(RS) (RS) CKT-2 AND 400/220KV 315 MVA ICT 1 AT RATANGARH(RS)	BAY	400KV	RRVPNL	06-10-2022	22:07	*	*	07-10-2022	For attending the closing problem of Y-phase Pole Of Tie CB(40352T).
4	225 MVAR Bus Series Reactor No 1 at 400 KV Ballabhgarh(PG)	BR	400KV	POWERGRID	17-12-2022	17:50	*	*	20-02-2023	For attending the abnormal sound observed in Bus Series Reactor at Ballabgarh in Y & B-phase.
5	220 KV Budhil(LB)-Lahal(HP) (HPSEB) Ckt-1	Line	220KV	HPSEB	11-01-2023	18:08	*	*	-	for smooth power flow ,open the remote end breaker(Budhil end) of 220kV Lahal-Budhil Line for smooth power flow and 220kV Lahal-Budhil Line will be kept in charged condition from 400/220/33kV GIS S/stn lahal end only.
6	400KV Bus 1 at Parbati_3(NH)	BUS	400KV	NHPC	27-02-2023	15:25	*	*	30-04-2023	One pole of Bus Coupler CB has got stuck at Parbati-3.
7	400 KV Suratgarh SCTPS(RVUN)-Bikaner(RS) (RS) Ckt-2	Line	400KV	RRVPNL	12-03-2023	18:11	*	*	-	To attend oil leakage from R-phase CVT at Bikaner(RS).
8	400/220 kV 315 MVA ICT 2 at Mundka(DV)	ICT	400/220KV	DTL	20-09-2019	00:19	*	*	-	Due to fire in ICT
9	400/220 kV 315 MVA ICT 1 at Muradnagar_1(UP)	ICT	400/220KV	UPPTCL	13-03-2020	02:46	*	*	-	Buccholz relay alarm and Local Breaker Backup protection operated. Tripped along with Hapur-Muradnagar line. Flags are not reset because of cable flashover.
10	400/220 kV 500 MVA ICT 2 at Noida Sec 148(UP)	ICT	400/220KV	UPPTCL	19-08-2020	08:12	*	*	-	ICT tripped on REF protection. Transformer caught fire and got damaged.
11	SVC No 1(-140/+140MVAR) at 400 KV Kanpur(PG)	SVC	400KV	POWERGRID	24-08-2020	17:33	*	*	-	Hand tripped at 17:33hrs on 24.08.2020 after observation of heavy sparking in TSC Capacitor bank. Due to non support from OEM, the element has been decapitalized by Powergrid.
12	402 TIE BAY - 400KV AKAL-JODHPUR (RS) CKT-1 AND 400KV AKAL(RS)-KANKANI(RS) (UNDEF) CKT-2 AT Akal(RS)	BAY	400KV	RRVPNL	17-08-2021	23:27	*	*	-	Y-Phase pole of Tie Breaker got stuck up when Line reactor was manually tripped.Due to Y-Phase pole stuck up of Tie Breaker of 400 kV Akal-Jodhpur Line (Dia-2), Y-Phase supply continued to 400 kV Line Reactor of 400 kV Akal-Jodhpur Line. As a reason of this 400 kV NGR (connected to 400 kV Jodhpur Line Reactor) got tripped on NGR Bucholtz Trip & NGR PRV Trip. Due to single phase supply at NGR it got too hot and smoke continued to coming out of NGR
13	50 MVAR LR on Akal-Jodhpur (RS) Ckt-1 @Akal(RS)	LR	400KV	RRVPNL	17-08-2021	23:47	*	*	-	Akal: DT Receive Jodhpur: DT Send, 400 kV Reactor Manually Trip at 400 kV GSS, Jodhpur due to low voltage(before tripping reactor was charged as a bus reactor)
14	FSC(40%) of 400 KV Fatehpur-Mainpuri (PG) Ckt-1 at Mainpuri(PG)	FSC	400KV	POWERGRID	24-10-2021	21:07	*	*	-	VME protection system was blocking the FSC back to in service
15	50 MVAR Non-Switchable LR on Agra-Unnao (UP) Ckt-1 @Agra(UP)	LR	400KV	UPPTCL	28-10-2021	22:27	*	*	31-05-2022	R and Y phase bushing damaged at Agra(UP).
16	400KV Bus 1 at Vishnuprayag(JP)	BUS	400KV	JPVL	02-12-2021	14:42	*	*	30-11-2022	Bus bar protection operated at Vishnuprayag. Sparking in Bus Coupler CB.
17	50 MVAR Bus Reactor No 1 at 400KV Moradabad(UP)	BR	400KV	UPPTCL	03-12-2021	22:22	*	*	31-01-2023	R-phase bushing damaged.
18	FSC(40%) of 400 KV Fatehpur-Mainpuri (PG) Ckt-2 at Mainpuri(PG)	FSC	400KV	POWERGRID	29-01-2022	08:25	*	*	-	As per NRLDC instrcution while attempting charging of FSC-2 (Fathepur Mainpuri line-2) at Mainpuri, VME protection system was blocking the FSC back to in service. Due to that FSC-2 could not be taken in service.
19	220 KV Kishenpur(PG)-Mir Bazar(PDD) (PDD) Ckt-1	Line	220KV	PDD JK	19-02-2022	21:45	*	*	31-12-2022	Tower no. 170 collapsed.
20	400KV Bus 3 at Gorakhpur(UP)	BUS	400KV	UPPTCL	21-02-2022	10:46	*	*	-	disc insulator of B phase 400 kv transfer Bus coupler damaged
21	220 KV Gazipur(DTL)-Shahibabad(UP) (UP) Ckt-2	Line	220KV	UPPTCL	30-04-2022	19:30	*	*	-	Line remains charge at No load from UP end. Manually open at 19:30 on 30/04/22 due bending of tower no. 4
22	407 MAIN BAY - 80 MVAR BUS REACTOR NO 1 AT 400KV AGRA SOUTH(UP) AND SELECT	BAY	400KV	UPPTCL	21-07-2022	00:00	*	*	-	Due To Problem In Reactor Side Isolator While Shut Down Return Of 80 MVAR Bus Reactor. Opened At 15:58 Of 07/04/22
23	400/220 kV 500 MVA ICT 1 at Bhiwani(BB)	ICT	400/220KV	BBMB	31-07-2022	04:42	*	*	15-09-2022	Tripped due to tripping of 220 KV Bhiwani-Hissar ckt-2.ICT under inspection.

24	132 KV Sheopur(MP)-Khandar(RS) (MPSEB) Ckt-1	Line	132KV	RRVPNL,MPSEB	05-08-2022	21:28	*	*	-	B-N fault, Zone-1 from Khandar(RS) & Zone-2, Dist. 100.2km from Sheopur(MP).
25	400/220 kV 315 MVA ICT 3 at Mundka(DV)	ICT	400/220KV	DTL	05-09-2022	19:18	*	*	-	Fire observed on both sides bushing of 315 MVA ICT-3.
26	132 KV Rihand(UP)-Nagar Untari(JS) (UP) Ckt-1	Line	132KV	UPPTCL	15-09-2022	00:10	*	*	-	Phase to earth fault R-N , Zone-1, Fault current 1.73kA, Dist. 45.48km from Rihand(UP).
27	400/220 kV 240 MVA ICT 2 at Orai(UP)	ICT	400/220KV	UPPTCL	24-09-2022	00:03	*	*	-	Differential protection Trip, REF protection Trip.
28	40452A MAIN BAY - 400 KV JODHPUR-KANKANI (RS) CKT-2 AT JODHPUR	BAY	400KV	RRVPNL	10-11-2022	07:10	*	*	-	400kV Jodhpur-Kankani Ckt-2 was opened due to high voltage on 09.11.2022 at 18:10 Hrs. While charging the line on 10.11.2022 at 07:10 Hrs, the main CB could be not be charged due to SF6 gas pressure low alarm.
29	408 BUS COUPLER BAY - 400KV BUS 1 AT DASNA(UP) AND 400KV BUS 2 AT DASNA(UP)	BAY	400KV	UPPTCL	10-11-2022	17:21	*	*	-	Bus Coupler CB tripped due to PD relay mal-operation.
30	403 MAIN BAY - 400 KV BAWANA-MUNDKA (DV) CKT-2 (DTL) AT BAWANA(DV)	BAY	400KV	DTL	09-12-2022	18:36	*	*	-	CB tripped due to PD relay mal-operation.
31	400/220 kV 315 MVA ICT 2 at Gonda(UP)	ICT	400/220KV	UPPTCL	16-12-2022	08:38	*	*	-	Tripped on PRV-1 Protection due to Maloperation by Monkeys
32	411 TIE BAY - 400KV KOLDAM(NT)-LUDHIANA(PG) (PS) CKT-1 AND 80.01 MVAR BUS REACTOR NO 1 AT 400KV KOLDAM(NT)	BAY	400KV	NTPC	24-12-2022	00:47	*	*	20-04-2023	Hand-tripped due to flashover observed in Tie bay 411 CB.
33	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	Line	220KV	POWERGRID	27-12-2022	00:04	*	*	-	Phase to earth fault R-N , Zone-1 from Auraiya.
34	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	Line	220KV	RRVPNL	07-01-2023	15:35	*	*	-	B-N fault, Dist. 185.6km from Debari(RS).
35	400 KV Muktsar-Makhu (PS) Ckt-2	Line	400KV	PSTCL	08-01-2023	03:21	*	*	-	Phase to earth fault Y-N , Fault current 5.30kA, Dist. 50.6km from Makhu & Fault current 5.13kA, Dist. 35.5km from Muktsar.
36	220 KV Samaypur(BB)-Palli(HV) (HVPNL) Ckt-2	Line	220KV	HVPNL	12-01-2023	16:56	*	*	-	Tripped with multi elements tripping at Samyapur
37	400 KV Tanda(NT)-Basti(UP) (UP) Ckt-1	Line	400KV	UPPTCL	15-01-2023	12:25	*	*	-	R-Y Fault , Zone-1, Fault current -Ir- 8.615kA, Iy- 9.264kA. Fault Dist- 25.46km from Basti end
38	409-52T TIE BAY - 400 KV ANTA(RS)-KAWAI SCTPS(APR) (RS) CKT-2 (RRVPNL) AND 765/400 KV 1500 MVA ICT 2 AT ANTA(RS) AT 400 KV ANTA(RS) (RRVPNL)	BAY	400KV	RRVPNL	25-01-2023	07:46	*	*	-	CB could not be charged due to PD relay.
39	406 MAIN BAY - 400/220KV 315 MVA ICT 2 AT MURADNAGAR_2(UP)	BAY	400KV	UPPTCL	28-01-2023	13:45	*	*	-	LBB protection maloperated during testing work for upcoming 400 KV Muradanagar-Simbhawali line as informed by UP. LBB optd at Muradnagar end (Further details awaited)
40	400/220 kV 315 MVA ICT 1 at Nakodar(PSG)	ICT	400/220KV	PSTCL	06-02-2023	22:55	*	*	-	Differential protection trip.
41	400 KV Bhadla-Fatehgarh_II (PG) Ckt-2	Line	400KV	POWERGRID	09-02-2023	12:29	*	*	-	Over voltage Tripped on Over Voltage operated.
42	220 KV Fatehgarh_II(PG)-EDEN SL_FGRAH_PG (ERCPL) (EDEN (ERCPL)) Ckt-1	Line	220KV	EDEN (ERCPL)	10-02-2023	11:38	*	*	-	Over voltage trip.
43	494 MAIN BAY - 400KV MUZAFFARNAGAR(UP)-VISHNUPRAYAG(JP) (UP) CKT-1 AT Muzaffarnagar(UP)	BAY	400KV	UPPTCL	20-02-2023	18:05	*	*	-	B-N fault, Zone-2, Dist. 333.7km, Fault current 1.475kA from Muzaffarnagar(UP).
44	50 MVAR Bus Reactor No 1 at 400KV Akal(RS)	BR	400KV	RRVPNL	26-02-2023	16:31	*	*	31-03-2023	Buchholz Relay Trip
45	431 MAIN BAY - 400 KV BHIWADI-HISSAR (PG) CKT-3 (POWERGRID) AT 400 KV BHIWADI(PG)	BAY	400KV	POWERGRID	01-03-2023	22:57	*	*	-	M/Bay of 400KV Bhiwadi-Hisar Ckt-3 at Bhiwadi could not be taken into service along with line .
46	404 BUS COUPLER BAY - 400KV BUS 1 AT NOIDA SEC 148(UP) AND 400KV BUS 2 AT NOIDA SEC 148(UP)	BAY	400KV	UPPTCL	08-03-2023	17:28	*	*	-	LBB operated
47	400KV Bus 2 at Noida Sec 148(UP)	BUS	400KV	UPPTCL	08-03-2023	17:28	*	*	-	Bus bar protection operated
48	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-2	Line	400KV	UPPTCL	08-03-2023	17:28	*	*	-	LBB operated
49	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1	Line	400KV	UPPTCL	09-03-2023	14:59	*	*	-	Bus bar protection operated at Noida sec 148 .LINE ANTI THEFT CHARGE AT 15:54 HRS OF 09.03.23 FROM Noida end

Generating Unit Outage Report 17-03-2023

S.No	Station	Location	Owner	Unit No	Capacity MW	Reason(s)	Outage		Expected Revival Date
							Date	Time	
1	RAPS-A	RAJASTHAN	NPCIL	1	100	Subject to regulatory clearance. Unit is to be decommissioned.	09-10-2004	22:58	-
2	Faridabad GPS	HARYANA	NTPC,HVPNL	1	138	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Haryana in RLNG/Liquid and Spot Gas).	11-10-2021	14:03	-
3	Faridabad GPS	HARYANA	NTPC,HVPNL	3	156	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Haryana in RLNG/Liquid and Spot Gas).	13-10-2021	20:16	-
4	Faridabad GPS	HARYANA	NTPC,HVPNL	2	138	Reserve Shutdown (Non availability of domestic gas & NIL requisition by Haryana in RLNG/Liquid and Spot Gas).	13-10-2021	20:37	-
5	Bhakra HPS	PUNJAB	BBMB	1	108	Renovation Modernization and upgradation of capacity to 126MW	15-12-2021	12:05	22-05-2023
6	RAPS-B	RAJASTHAN	NPCIL	1	220	For Mandatory Replacement of Reactor Components	27-10-2022	22:30	28-05-2024
7	Dulhasti HPS	J&K	NHPC	3	130	Replacement of MIV seal of 2 Units	09-02-2023	05:30	17-03-2023
8	Dadri-I TPS	DELHI	NTPC	4	210	Over hauling	09-02-2023	23:38	17-03-2023
9	Dulhasti HPS	J&K	NHPC	1	130	Replacement of MIV seal of 2 Units	10-02-2023	05:30	20-03-2023
10	Dulhasti HPS	J&K	NHPC	2	130	Replacement of MIV seal of 2 Units	10-02-2023	05:30	20-03-2023
11	Bhakra HPS	PUNJAB	BBMB	3	126	Annual Maintenance	17-02-2023	09:00	20-03-2023
12	Dadri GPS	UP	NTPC	6	155	Reserve Shutdown	17-02-2023	10:50	-
13	RAPS-C	RAJASTHAN	NPCIL	1	220	Annual Over hauling	17-02-2023	23:44	30-03-2023
14	Tanakpur HPS	HP	NHPC	3	31	Annual Maintenance	23-02-2023	09:00	23-03-2023
15	Singrauli STPS	UP	NTPC	6	500	Over hauling	24-02-2023	23:29	31-03-2023
16	Salal HPS	J&K	NHPC	1	115	Annual Maintenance	26-02-2023	06:18	19-03-2023
17	Budhil HPS (IPP)	HP	Greenko Budhil	2	35	Annual Maintainence	27-02-2023	09:30	25-03-2023
18	Dadri GPS	UP	NTPC	3	130	Reserve Shutdown	28-02-2023	12:32	-
19	TEHRI HPS	UTTARAKHAND	THDC	1	250	Annual Maintenance	01-03-2023	09:15	28-03-2023
20	Singoli Bhatwari HEP	UTTARAKHAND	Singoli(LTUHP)	3	33	Annual Maintenance	01-03-2023	09:45	22-03-2023
21	Pong HPS	PUNJAB	BBMB	3	66	Annual Maintanace	06-03-2023	15:00	22-03-2023
22	Parbati III HEP	HP	NHPC	1	130	Annual Maintenance	10-03-2023	00:00	05-04-2023
23	Chamera I HPS	HP	NHPC	2	180	Annual Maintainence	10-03-2023	20:00	08-04-2023
24	Rampur HEP	HP	SJVNL	6	69	Annual Maintainence	11-03-2023	00:00	01-04-2023
25	Nathpa-Jhakri HPS	HP	SJVNL	6	250	Annual Maintainence	11-03-2023	00:00	01-04-2023
26	Dehar HPS	HP	BBMB	6	165	Annual maintenance.	11-03-2023	20:00	17-06-2023
27	Rampur HEP	HP	SJVNL	5	69	for Annual Planned Maintenance of the Butter Fly Valve (BFV) # 03	16-03-2023	00:00	-
28	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSPCL	2	210	ESP breakdown. Rectification works under progress as confirmed by SLDC-PS.	13-05-2022	21:36	01-01-2024
29	Anpara TPS	UP	UPPTCL	4	500	Over hauling	01-11-2022	01:14	05-04-2023
30	Anpara TPS	UP	UPPTCL	3	210	Over hauling	05-01-2023	00:02	15-04-2023
31	Panipat TPS	HARYANA	HPGCL	8	250	Annual Maintenance	10-02-2023	00:11	26-03-2023
32	Rosa TPS	UP	UPPTCL	4	300	Over hauling	17-02-2023	02:36	27-03-2023
33	Jhajjar(CLP)	HARYANA	HVPNL	1	660	Over hauling	25-02-2023	09:39	01-04-2023
34	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSPCL	3	250	Reserve Shutdown	08-03-2023	01:33	27-03-2023
	Sub Total (SS)				3875				
Total Planned Outage (CS+SS)					9486				

B. Forced Outages

S.No	Station	Location	Owner	Unit No	Capacity MW	Reason(s)	Outage		Expected Revival Date
							Date	Time	
	Central Sector (CS)								
1	Kishenganga	J&K	NHPC	1	110	Stator core damaged	23-11-2022	20:18	31-03-2023
2	Sainj HEP	HP	HPSEB	2	50	Problem in Y-Phase Circuit Breaker	24-11-2022	19:31	05-04-2023

3	Bairasiul HPS	HP	NHPC	2	60	Unit #2 is under shutdown condition due to Generator Shaft current very high	22-02-2023	18:44	18-03-2023
4	Chamera I HPS	HP	NHPC	1	180	Due to problem in protection panel	14-03-2023	18:20	17-03-2023
5	Nathpa-Jhakri HPS	HP	SJVNL	5	250	Maintenance work on Butterfly Valve no. 3 which is common for Unit no. 5 & 6.	16-03-2023	00:00	-
6	Shree Cement (IPP) TPS	RAJASTHAN	RRVPNL,Sh. Cement	2	150	Vibration in ID Fan other	16-03-2023	22:31	18-03-2023
	Sub Total (CS)				800				
	State Sector (SS)								
1	Giral (IPP) LTPS	RAJASTHAN	RRVPNL	1	125	Unit was out on bed material leakage and it is likely to be scrapped.	11-07-2014	08:20	-
2	Giral (IPP) LTPS	RAJASTHAN	RRVPNL	2	125	Unit was out on bed material leakage and it is likely to be scrapped.	27-01-2016	15:27	-
3	Delhi Gas Turbines	DELHI	DTL	9	34	STG Governor oil leakage	12-02-2022	20:00	-
4	Delhi Gas Turbines	DELHI	DTL	5	30	due to tripping of associated STG at 20:00 hrs	12-02-2022	21:04	-
5	Bawana GPS	DELHI	DTL/Pragati CCGT	5	253	C&I problem	03-06-2022	22:04	-
6	Ramgarh GPS	RAJASTHAN	RRVPNL	2	38	due to fire accident in GT - 2	04-06-2022	01:17	31-03-2023
7	Obra TPS	UP	UPPTCL	10	200	Tripped DUE TO TURBINE PROBLEM . Turbine is under hauling	29-01-2023	21:00	04-05-2023
8	Suratgarh TPS	RAJASTHAN	RRVPNL	2	250	Due to ESP hopper choking.	31-01-2023	19:12	20-03-2023
9	Rosa TPS	UP	UPPTCL	3	300	ELECTRICAL FAULT	27-02-2023	00:27	18-03-2023
10	Kota TPS	RAJASTHAN	RRVPNL	5	210	DUE TO PROBLEM IN EHTC GOVERNING SYSTEM OF TURBINE	01-03-2023	15:05	20-03-2023
11	Bawana GPS	DELHI	DTL/Pragati CCGT	4	216	INTERNAL FAULT	08-03-2023	16:57	31-03-2023
12	DCRTPP (Yamuna Nagar)	HARYANA	HVPNL	1	300	Due to steam leakage at various points of boiler and turbine	10-03-2023	08:03	20-03-2023
13	Goindwal(GVK)	PUNJAB	PSPCL	2	270	BOILER ABNORMAL SOUND	12-03-2023	22:31	18-03-2023
14	Lalitpur TPS	UP	UPPTCL,LP GCL	2	660	boiler tube leakage	13-03-2023	21:20	17-03-2023
15	Chhabra TPS	RAJASTHAN	RRVPNL	2	250	TO ATTEND LOW CONDENSER VACUUM	14-03-2023	00:10	26-03-2023
16	Suratgarh SCTPS	RAJASTHAN	RRVPNL	8	660	DUE TO SUSPECTED BOILER TUBE LEAKAGE	14-03-2023	03:11	18-03-2023
17	Paricha TPS	UP	UPPTCL	4	210	Tripped due to furnace pressure high	14-03-2023	22:55	17-03-2023
18	Suratgarh TPS	RAJASTHAN	RRVPNL	6	250	due to furnace pressure high	15-03-2023	22:40	18-03-2023
	Sub Total (SS)				4381				
Total Forced Outage (CS+SS)					5181				

G. Outages of Nuclear based Generating Units

S.No	Station	Location	Owner	Unit No	Capacity MW	Reason(s)	Outage		Expected Revival Date
							Date	Time	
	Central Sector (CS)								
1	RAPS-A	RAJASTHAN	NPCIL	1	100	Subject to regulatory clearance. Unit is to be decommissioned.	09-10-2004	22:58	-
2	RAPS-B	RAJASTHAN	NPCIL	1	220	For Mandatory Replacement of Reactor Components	27-10-2022	22:30	28-05-2024
3	RAPS-C	RAJASTHAN	NPCIL	1	220	Annual Over hauling	17-02-2023	23:44	30-03-2023
	Sub Total (CS)				540				
	State Sector (SS)								
--No Outages--									
	Sub Total (SS)				0				
Total (CS+SS)					540				

Sr No	Element Name	Outage Date	Outage Time	Reason
1	220 KV Hissar(BB)-Chirawa(RS) (BB) Ckt-1	06-Feb-23	17:10	Tripped due to relay mal-operation at Hisar(BBMB). As per PMU, R-Y fault is observed.
		12-Feb-23	15:11	Y-B fault, Zone-2, Dist. 140.6km from Chirawa(RS). As per PMU, Y-B & R-N fault is observed.
		14-Feb-23	11:19	220 KV Bus Bar protection operated due to bursting of LA at 220 KV Hissar (Hissar_IA end). As per PMU, multiple R-Y fault is observed.
2	220 KV RAPS_A(NP)-Sakatpura(RS) (RS) Ckt-2	02-Feb-23	00:51	Sakatpura end:- MAIN 1 :- A PHASE, DIST=-5.7Km Ia=8.87KA, MAIN 2 :- A PHASE,Z-1,FAULT LOC=0.000m,Ia=5.879KA A. RAPP A end:- MAIN 1=R phase Z2 dist-35.51 KM FAULT CURRENT=5.967KA MAIN II 1=R phase Z1 dist-3571 KM FAULT CURRENT=2.098KA. As per PMU, R-N fault occured, no auto-reclosing observed.
		03-Feb-23	06:20	SAKATPURA:- R-N Fault ,DIST=6.5Km,Ia=8.54KA and RAPP:-R-N Fault ,zone-2,distance=33.5KM,Fault current=3.46KA. As per PMU, R-N fault occured, no auto-reclosing observed.
		06-Feb-23	06:33	R-N fault, Dist. 9.6km, Fault current 4.83kA from Sakatpura(RS) & Dist. 25.52km, Fault current 3.445kA from RAPS_A. As per PMU, R-N fault occured, no auto-reclosing observed.
		06-Feb-23	20:12	R-N fault, Dist. 11.6km, Fault current 4.91kA from Sakatpura(RS). As per PMU, R-N fault occured, no auto-reclosing observed.
		23-Feb-23	23:27	SAKATPURA MAIN 1 :- A PHASE, DIST=-10.1Km Ia=7.96KA. As per PMU, R-N fault occured, no auto-reclosing observed.
		25-Feb-23	06:06	R-N fault, Zone-1, Dist. 24.51km, Fault current 3.44kA from Sakatpura(RS) & Zone-1, Dist. 30.4km, Fault current 5.0kA from RAPS_A. As per PMU, R-N fault occured, no auto-reclosing observed.
		26-Feb-23	05:18	R-N Fault, Zone-1, Dist. 24.71km, Fault current 3.55kA from Sakatpura(RS) & Zone-1, Dist. 13.51km, Fault current 5.816kA from RAPS_A. As per PMU, R-N fault occured, no auto-reclosing observed.
3	400 KV Bareilly-Unnao (UP) Ckt-1	04-Feb-23	09:43	Group-B trip relay mal-operated, line tripped from Unnao end only. As per PMU, no fault is observed.
		06-Feb-23	20:27	Y-N fault, Dist. 18.75km, Fault current 10.760kA from Bareilly(UP). As per PMU, Y-N fault occured, no auto-reclosing observed.
		13-Feb-23	15:40	Y-N Fault, Dist. 28.34km, Fault current 8.649kA from Bareilly. As per PMU, Y-N fault occured, no auto-reclosing observed.
		16-Feb-23	12:42	DT Received at Bareilly end, Group A & B trip relay operated. As per PMU, no fault is observed.
4	400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1	17-Feb-23	14:09	Y-N fault, Zone-1, Fault current 3.876kA, Dist. 57.73km from Jodhpur & Zone-1, Fault current 2.1kA, Dist. 153km from Rajwest. As per PMU, Y-N fault occured, no auto-reclosing observed.
		18-Feb-23	13:02	Y-N fault, Dist. 61.34km, Fault current 3.692kA from Jodhpur. Earthwire snapped at Loc. no. 238. As per PMU, Y-B fault is observed.
		23-Feb-23	07:55	B-N fault, Zone-1, Dist. 159km, Fault current 1.09kA from Jodhpur & Dist. 8.32km, Fault current 8.214kA from Rajwest. As per PMU, B-N fault occured, no auto-reclosing observed.

Annexure-B.III

Grid Event summary for February 2023

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage Date	Outage Time	Revival Date	Revival Time	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: Generation Loss(MW)	Loss of generation / loss of load during the Grid Disturbance: Load Loss (MW)	% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance: % Generation Loss(MW)	% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance: % Load Loss (MW)	Antecedent Generation/Load in the Regional Grid: Antecedent Generation (MW)	Antecedent Generation/Load in the Regional Grid: Antecedent Load (MW)	Preliminary Report receipt status: within 24hrs	Preliminary Report receipt status: after 24hrs	Preliminary Report receipt status: Not Received	DR/EL receipt status: within 24hrs	DR/EL receipt status: after 24hrs	DR/EL receipt status: Not Received	Detailed Report receipt status: Received	Detailed Report receipt status: Not Received	Fault Clearance time (in ms)	Remarks
1	GI-2	1) 400/220 kV 500 MVA ICT 2 at Rajpura(PS) 2) 400/220 kV 500 MVA ICT 3 at Rajpura(PS) 3) 400/220 kV 500 MVA ICT 4 at Rajpura(PS) 4) 220kV Rajpura-Devigarh (PS) ckt-1 5) 220kV Rajpura-Devigarh (PS) ckt-2 6) 220kV Rajpura-Gobindgarh old (PS) ckt-2 7) 220kV Rajpura-Ablowal (PS) ckt-1 8) 400 KV Rajpura TPS(PSG)-Rajpura(PS) (PS) Ckt-1 9) 400 KV Rajpura TPS(PSG)-Rajpura(PS) (PS) Ckt-2 10) 700 MW Rajpura(NPL) TPS - UNIT 2	Punjab	PSTCL	3-Feb-23	11:25	3-Feb-23	15:55	04:30	1. During antecedent condition, 220kV Rajpura-Ablowal (PS) ckt-2 was under shutdown and work was being done on the line with the help of hydraulic crane. 700MW Unit-1&2 at Rajpura TPS were running and generating approx. 666MW & 680MW respectively. 2. As reported, at 11:25hrs, while work was being done on 220kV Rajpura-Ablowal (PS) ckt-2, hydraulic crane came into induction zone of 220kV Rajpura-Ablowal (PS) ckt-1 and an accident happened. Simultaneously, bus bar protection at 220kV side operated and both 220kV Bus-1&2 along tripped. Hence, 220kV side of 400/220kV Rajpura(PS) became dead. 3. At the same time, 400 KV Rajpura TPS(PSG)-Rajpura(PS) (PS) Ckt-1 & Ckt-2 also tripped on distance protection operation in Zone-3 and 700 MW Rajpura(NPL) TPS - UNIT 2 tripped on GT standby earth fault protection operation. 4. As per PMU, R-N phase to earth fault with delayed clearance in 156Omsec is observed. 5. As per SCADA & SOE data, status of circuit breaker of all the tripped elements didn't record in SOE and SCADA data of Rajpura TPS was not healthy. 6. As reported by Punjab, Generation loss of approx. 680 MW at 400kV Rajpura TPS. No load loss in Punjab control area (as reported by SLDC-Punjab)	0	0.00	680	0	1.260	0.000	53980	56712		Y(PS)			Y(PS)		Y(PS)		1560	i) Exact location and nature of fault? How did bus fault occur? ii) Reason of delayed clearance of fault? iii) DR & EL of all the tripped elements and tripping report of the event need to be shared. iv) SCADA data was not healthy during the event. Healthiness of SCADA data need to be ensured. v) Remedial action taken report to be shared.
2	GI-2	1) 765kV Bhadla-Bikaner ckt-1	Rajasthan	POWERGRID	8-Feb-23	12:25	8-Feb-23	15:26	03:01	1. At 12:25:09:404 hrs, 125MVAr Bus reactor at 400kV Fatehgarh1 Pooling S/s was opened. 2. Increase in phase voltage of ~16kV at 765kV Bikaner(PG), ~11kV at 765kV Fatehgarh2(PG) & ~14kV at 765kV Bhadla(PG) is observed as per PMU. 3. At the same time, drop in RE generation connected at ISTS RE pooling station in Rajasthan RE generation complex also observed, which led to further increase in voltage followed by further reduction in RE generation (MW reduction at RE stations on HVRT operation suspected). 4. As per SCADA, total reduction of approx. 1700MW RE generation connected at ISTS RE pooling station in Rajasthan RE generation complex observed. 5. At 12:25:50:255 hrs, 765kV Bhadla-Bikaner ckt-1 tripped on over voltage protection operation at Bhadla(PG) end. 6. No tripping of elements (lines/transformer) dedicated to RE stations recorded (as per SCADA SOE). 7. Within 03 minutes of the triggering of event, approx. 1200MW RE generation recovered.			1700 (drop in RE generation)				52963	57188		Y(PG)			Y(PG)		Y(PG)		NA	
3	GI-2	1) 765kV Bhadla2-Ajmer ckt-1 2) 765kV Bhadla2-Bikaner ckt-1 3) 765kV Bhadla-Fatehgarh2 ckt-1	Rajasthan	POWERGRID	9-Feb-23	11:45	9-Feb-23	14:52	03:07	1. At 11:45hrs, line reactor at Bhadla end of 765kV Bhadla-Bikaner ckt-1 opened. As per PMU at Fatehgarh2(PG), voltage increased from 745kV to 775kV with the opening of line reactor. 2. At the same time, reduction in RE generation connected at ISTS RE pooling stations occurred which led to further increase in voltage followed by further reduction in RE generation. 3. As per SCADA, total reduction in RE generation of approx. 4459MW is observed. 4. Due to significant reduction of RE generation, further over voltage occurred in transmission network at ISTS RE pooling stations. On this over voltage 765kV Bhadla2-Ajmer ckt- 1, 765kV Bhadla2-Bikaner ckt-1 & 765kV Bhadla-Fatehgarh2 ckt-1 tripped on over voltage protection operation.			4459 (drop in RE generation)				52667	58516		Y(PG)			Y(PG)		Y(PG)		NA	
4	GI-2	1) 765kV Bhadla2-Ajmer ckt-2	Rajasthan	POWERGRID	9-Feb-23	11:57	9-Feb-23	16:25	04:28	1. At 11:57hrs, charging attempt of 765kV Bhadla2-Ajmer ckt-1 was taken which further led to over voltage, line didn't hold and trip. 2. At the same time, reduction in RE generation connected at ISTS RE pooling stations occurred. 3. As per SCADA, total reduction in RE generation of approx. 3678MW is observed. 4. At the same time, 765kV Bhadla2-Ajmer ckt-2 tripped on over voltage.			3678 (drop in RE generation)				52472	58424		Y(PG)			Y(PG)		Y(PG)		NA	
5	GI-2	1) 765kV Bhadla2-Fatehgarh2 ckt-1	Rajasthan	POWERGRID	9-Feb-23	12:03	9-Feb-23	13:35	01:32	1. At 12:03hrs, charging attempt of 765kV Bhadla2-Bikaner ckt-1 was taken which further led to over voltage, line didn't hold and trip. 2. At the same time, reduction in RE generation connected at ISTS RE pooling stations occurred. 3. As per SCADA, total reduction in RE generation of approx. 2993MW is observed. 4. At the same time, 765kV Bhadla2-Fatehgarh2 ckt-1 tripped on over voltage.			2993 (drop in RE generation)				51106	58020		Y(PG)			Y(PG)		Y(PG)		NA	
6	GI-2	1) 765kV Bhadla2-Fatehgarh2 ckt-2	Rajasthan	POWERGRID	9-Feb-23	12:17	9-Feb-23	18:32	06:15	1. At 12:17hrs, during fluctuation in voltage, reduction in RE generation connected at ISTS RE pooling stations occurred. 2. As per SCADA SOE, no switching is observed during that time at 220 kV & above level. 3. As per SCADA, total reduction in RE generation of approx. 3379MW is observed. 4. At the same time, 765kV Bhadla2-Fatehgarh2 ckt-2 tripped on over voltage.			3379 (drop in RE generation)				51013	57623		Y(PG)			Y(PG)		Y(PG)		NA	
7	GD-1	1) 765kV Bhadla-Fatehgarh2 ckt-2	Rajasthan	POWERGRID	9-Feb-23	12:29	9-Feb-23	20:09	07:40	1. During antecedent condition, RE generation evacuating from Fatehgarh2 were being back downed to facilitate the charging of 765kV lines at Fatehgarh2, these switching led to the fluctuation in voltage. 2. At 12:29hrs, during fluctuation in voltage, reduction in RE generation connected at ISTS RE pooling stations occurred. 3. At the same time, 765kV Bhadla-Fatehgarh2 ckt-2 tripped on over voltage. 4. With the tripping of 765kV Bhadla-Fatehgarh2 ckt-2, evacuation path from Fatehgarh2 was lost as rest of the three 765kV lines were already in tripping condition. 5. As per SCADA, total reduction in RE generation of approx. 3055MW is observed.			3055 (drop in RE generation)				50568	57227		Y(PG)			Y(PG)		Y(PG)		NA	
8	GI-2	1) 220kV Fatehgarh2-EDEN ckt	Rajasthan	POWERGRID	10-Feb-23	11:31	10-Feb-23	20:16	08:45	1. At 11:31:24:440 hrs, 220kV Fatehgarh2-EDEN ckt tripped on R-Y phase to phase fault, fault occurred due to snapping of conductor. As per PMU, fault cleared within 100msec 2. On this fault, during voltage dip, significant drop in RE generation connected at ISTS RE pooling station in Rajasthan RE generation complex also observed (suspected due to LVRT operation.). 3. As per SCADA, total reduction of approx. 3100MW RE generation connected at ISTS RE pooling station in Rajasthan RE generation complex observed. 4. No tripping of elements (lines/transformer) dedicated to RE stations recorded (as per SCADA SOE). 5. Within 04 minutes of the triggering of event, approx. 2260MW RE generation recovered.			300MW loss & total 3100 drop in RE generation				52520	58441		Y(PG)			Y(PG)		Y(PG)		80	
9	GD-1	1) 220kV Hissar_IA(Har)-Narwana ckt 2) 220kV Hissar_IA(Har)-Masudpur ckt-1 3) 220kV Hissar_IA(Har)-Masudpur ckt-2 4) 220kV Hissar(BB)-Bhiwani(BB) ckt-1 5) 220kV Hissar(BB)-Bhiwani(BB) ckt-2 6) 220kV Hissar(BB)-Hissar_IA(Har) ckt-1 7) 220kV Hissar(BB)-Hissar_IA(Har) ckt-2 8) 220kV Hissar_IA(Har)-Hissar(PG) ckt-1 9) 220kV Hissar_IA(Har)-Hissar(PG) ckt-2 10) 220/132kV ICT-1 at Hissar_IA(Har 11) 220/132kV 100MVA ICT-1 at Hissar(BB) 12) 220/132kV 100MVA ICT-2 at Hissar(BB) 13) 220kV Hissar(BB)-Chirawa(RS) ckt-2 14) 400kV Hissar(PG)-Moga ckt-3	Haryana	HVPNL, BBMB, POWERGRID	12-Feb-23	15:11	12-Feb-23	16:50	01:39	1. As reported, at 15:11hrs, Y & B phase CVT and B-ph CT at Hissar_IA end of 220kV Hissar_IA-Hissar_PG ckt-1 damaged. 2. As per PMU, Y-B fault with delayed clearance of 1320msec and R-N fault which cleared within 100msec is observed. 3. As reported, distance protection of 220kV Hissar_IA-Hissar_PG ckt-1 didn't operate at Hissar_IA end on this fault and then LBB operated which led to the tripping of 220kV feeders to Masudpur-1&2, Hissar(PG)-1&2 & Narwana tripped from Hissar end. 4. At the same time, 220kV Hissar(BB)-Hissar_IA(Har) ckt-1 & 2 tripped from Hissar(BB) end only and 220kV Hissar(BB)-Bhiwani(BB) ckt-1 & 2 tripped from Bhiwani(BB) end only in Z-2 on distance protection operation. 5. Due to tripping of all the 220kV feeders, 220kV Hissar_IA(Har) S/s became dead. 6. As per SCADA, change in demand of approx. 250MW in Haryana control area (as per SCADA data).	0	0.41	0	250	0.000	0.546	46030	45779		Y(PG) Y(BBMB) Y(HR) Y(RS)		Y(HR)	Y(PG) Y(BBMB) Y(RS)		Y(PG) Y(BBMB) Y(HR) Y(RS)		1320	i) Fault clearance time is 1320msec. Reason of such large delayed clearance of fault? ii) Why did distance protection at Hissar-_IA end of 220kV Hissar_IA-Hissar_PG ckt-1 not operate? iii) 220kV Hissar(BB)-Bhiwani(BB) ckt-1 & 2 tripped from Bhiwani(BB) end only in Z-2, protection coordination between 220kV S/s in the Hissar region need to be reviewed. iv) DR of Hissar_IA(Har) are not time synced, time syncing of all the recording devices/software need to be ensured. v) DR/EL of all the tripped elements along with tripping report of the event need to be shared. vi) Frequent event of equipment failure are being reported at Haryana & BBMB S/s. Proper maintenance of equipment and their healthiness need to be ensured. vii) Remedial action taken report to be shared.
10	GD-1	1) 220kV Hissar_IA(Har)-Narwana ckt 2) 220kV Hissar_IA(Har)-Masudpur ckt-1 3) 220kV Hissar_IA(Har)-Masudpur ckt-2 4) 220kV Hissar(BB)-Bhiwani(BB) ckt-1 5) 220kV Hissar(BB)-Bhiwani(BB) ckt-2 6) 220kV Hissar(BB)-Hissar_IA(Har) ckt-1 7) 220kV Hissar(BB)-Hissar_IA(Har) ckt-2 8) 220kV Hissar_IA(Har)-Hissar(PG) ckt-1 9) 220kV Hissar_IA(Har)-Hissar(PG) ckt-2 10) 220/132kV ICT-1 at Hissar(BB) 11) 220/132kV 100MVA ICT-1 at Hissar(BB) 12) 220/132kV 100MVA ICT-2 at Hissar(BB) 13) 220kV Hissar(BB)-Chirawa(RS) ckt-2 14) 220 KV Hissar(BB)-Jindal Steel(HR)(HVPNL) Ckt-1 15) 220 KV Hissar-Sangrur (BB) Ckt-1 16) 220KV Bus 1 at Hissar(BB) 17) 220KV Bus 2 at Hissar(BB)	Haryana	HVPNL, BBMB, POWERGRID	14-Feb-23	11:19	14-Feb-23	12:16	00:57	1. As reported, at 11:19hrs, Y- phase conductor (from terminal tower to gantry) of 220kV Hissar_IA-Hissar_PG ckt-1 snapped from gantry end, due to which 220KV CVT & 220KV LA of Y- phase snapped out, thereby causing damage to D1 no. of 220KV CVT & 3 no. 220KV LA's. 2. LBB protection operated causing tripping of all 220 kV feeders at 220kV Hissar_IA(Har) S/s. 3. As per PMU, Y-B fault with clearance time of 120 msec and B-N fault converted to Y-B fault with delayed clearance time of 840 msec are observed. 4. Due to tripping of all the 220kV feeders, 220kV Hissar_IA(Har) & 220kV Hissar(BB) S/s became dead. 5. As per SCADA, change in demand of approx. 220MW in Haryana control area (as per SCADA data)	0	0.21	0	220	0.000	0.391	51083	56262	Y(HR)	Y(PG) Y(BBMB) Y(RS)		Y(HR)	Y(PG) Y(BBMB) Y(RS)		Y(PG) Y(BBMB) Y(HR)	Y(RS)	840	i) Fault clearance time is 840msec. Reason of delayed clearance of fault need to be checked. ii) Protection coordination between 220kV S/s in the Hissar region need to be reviewed. iii) DR of Hissar_IA(Har) are not time synced, time syncing of all the recording devices/software need to be ensured. iv) DR/EL of all the tripped elements along with tripping report of the event need to be shared. v) Frequent event of equipment failure are being reported at Haryana & BBMB S/s. Proper maintenance of equipment and their healthiness need to be ensured. vi) Remedial action taken report to be shared.
11	GI-1	1) 220 KV Kishenpur(PG)-Ramban(PDD) Ckt-1 2) 220kV Mirbazar– Ramban (PDD) ckt	Jammu & Kashmir	POWERGRID, SLDC-JK	15-Feb-23	13:09	15-Feb-23	20:29	07:20	1. As reported, at 13:09 hrs, conductor of B- phase of 220 KV Kishenpur(PG)-Ramban(PDD) ckt-1 snapped between gantry string and tower location no. kp101 near Kishenpur(PG) end. 2. As per sending end FIR by CPCC2, line tripped on B-N fault, with fault current Ib=21.83kA and fault location= 0.091kM from Kishenpur(PG) end. 3. As per PMU, B-N fault with clearance time of 80 msec is observed. 4. As per SCADA, change in demand of approx. 115MW in J&K control area (as per SCADA data)	0	0.84	0	115	0.000	0.200	51951	57400		Y(PG) Y(JK)		Y(PG)		Y(JK)	Y(PG)	Y(JK)	80	
12	GD-1	1) 220 KV Hissar(PG)-Sagwan(Har) ckt 2 2) 220 KV Sagwan-Isharwal ckt 1 3)220 KV Sagwan-Isharwal ckt 2	Haryana	HVPNL, POWERGRID	17-Feb-23	05:57	17-Feb-23	11:50	05:53	1. 220/132kV Sagwan S/s have double main single breaker bus scheme. It has power source through 220 KV Hissar(PG)-Sagwan(Har) Ckt-1&2. 2. During antecedent condition, 220 KV Hissar(PG)-Sagwan(Har) Ckt-1 was already out as it tripped on R-N phase to earth fault at 03:30hrs on 17th Feb'23 (Zone-1, Distance of 13.3 km from Sagwan(Har) & Zone-1, Distance of 10.09 km from Hissar(PG)). 3. As reported, at 05:57hrs on 17th Feb'23, R-N phase to earth fault occurred on 220 KV Hissar(PG)-Sagwan(Har) Ckt-2 (Zone-1, Distance of 12.32km from Sagwan(Har) & Zone-1, Distance of 9.9km from Hissar(PG)). 4. With the tripping of 220 KV Hissar(PG)-Sagwan(Har) Ckt-2, 220/132kV Sagwan(Har) became dead. 5. As per PMU at 400 kV Hissar(PG), R-N fault with clearance time of 120 msec is observed. 6. As per SCADA, change in demand of approx. 105MW in Haryana control area (as per SCADA data)	0	0.62	0	105	0.000	0.242	38093	43474		Y(PG) Y(HR)			Y(PG) Y(HR)		Y(HR)	Y(PG)	120	
13	GI-1	1) 220 KV Bhinmal(PG)-Bhinmal(RS) Ckt-1 2) 220 KV Bhinmal(PG)-Bhinmal(RS) Ckt-2	Rajasthan	RVPNL, POWERGRID	17-Feb-23	14:37	17-Feb-23	17:35	02:58	1. As reported, at 14:37hrs, 220 KV Bhinmal(PG)-Bhinmal(RS) Ckt-1 & 2 tripped due to B-N phase to earth fault. 2. As per sending end FIR by CPCC1, 220 KV Bhinmal(PG)-Bhinmal(RS) Ckt-1 & 2 tripped due to B-N phase to earth fault with fault location of 10 km and 20.5 km respectively from Bhinmal(PG) end and fault current of 4.12 kA and 7.57 kA respectively. 3. As per PMU at 400 kV Bhinmal(PG), B-N fault with delayed clearance time of 880 msec is observed. 4. As per SCADA, change in demand of approx. 210MW in Rajasthan control area (as per SCADA data)	0	0.62	0	210	0.000	0.387	51685	54235	Y(PG)	Y(RS)		Y(PG)		Y(RS)	Y(PG)	Y(RS)	880	i) Exact reason of fault need to be shared. ii) Fault clearance time is 880msec. Reason of delayed clearance of fault need to be checked. iii) DR/EL of all the tripped elements along with tripping report of the event need to be shared from Rajasthan end. iv) Remedial action taken report to be shared.
14	GI-1	1) 220 KV Meerut(PG)-Modipuram(UP) (PG) Ckt-1 2) 220 KV Meerut(PG)-Modipuram(UP) (PG) Ckt-2 3) 220 KV Modipuram(UP)-Shatabdinagar(UP) ckt 4) 220/132 kV 200 MVA ICT 1 at Modipuram(UP) 5) 220/132 kV 200 MVA ICT 2 at Modipuram(UP)	Uttar Pradesh	UPPCL, POWERGRID	19-Feb-23	05:29	19-Feb-23	08:06	02:37	1. As per information received from SLDC-UP, during antecedent condition, 220 KV Meerut(PG)-Modipuram(UP) (PG) Ckt-1 & 2, 220 KV Modipuram(UP)-Shatabdinagar(UP) and 220/132 kV 200 MVA ICT 1 & 2 at Modipuram(UP) were connected to Bus-1 and 220 KV Modipuram(UP)-Faridnagar ckt and Modipuram(UP)- Muza ckt were connected to Bus-2 and bus coupler was open. 2. As reported, at 05:29hrs, 220 KV Meerut(PG)-Modipuram(UP) (PG) Ckt-1 tripped on Y-N phase to earth fault, zone 2, with fault current of 2657.35 A and fault location of 20.3 km from Modipuram(UP) end. 3. As per FIR received from SLDC UP, due to bus bar protection operation, 220 KV Meerut(PG)-Modipuram(UP) (PG) Ckt-2, 220 KV Modipuram(UP)-Shatabdinagar(UP), 220/132 kV 200 MVA ICT 1 & 2 at Modipuram(UP) also got tripped at the same time. 4. As per PMU at Meerut(PG), Y-N phase to earth fault with delayed clearance time of 320 msec is observed. 5. As per SCADA, no load loss in Uttar Pradesh control area (as per SCADA) is observed.	0	0.00	0	0	0.000	0.000	38066	42580	Y(UP)		Y(PG)	Y(UP)		Y(PG)	Y(UP)	Y(PG)	320	i) Exact reason of fault need to be shared. ii) Why bus bar protection operated in Modipuram (UP)? iii) As per FIR received from SLDC UP, only breakers at Modipuram(UP) end tripped and lines remained charged from other end. Reason need to be clarified. iv) DR of Modipuram(UP) is not time synced, time syncing of all the recording devices/software need to be ensured. v) SCADA data is not available for Modipuram(UP), availability and healthiness of SCADA data need to be ensured. vi) Reason of fault with delayed clearance time need to be checked. vii) DR/EL of all the tripped elements along with tripping report of the event need to be shared from CPCC1 end. viii) Remedial action taken report to be shared.
15	GI-1	1) 220 kV Adani Fatehgarh Solar park-Adani Solar Park PSS2 ckt 2) 220 kV Bhadla(PG)-ESSEL IPSS2 (SBE6PL) ckt	Rajasthan	AHEJ4L, AREPRL, POWERGRID, ESUCRL	19-Feb-23	12:39	19-Feb-23	13:09	00:30	1. During the antecedent condition, voltage at SBE6PL was 243 kV and MVA loading of 400/220 kV 500 MVA ICT 1 & 2 was 503 MVA (each). 2. As reported, at 12:39 hrs, 220 kV Adani Fatehgarh Solar park-Adani Solar Park PSS2 ckt tripped due to SPS Stage-I operation at Adani Fatehgarh Solar park. 3. At the same time, 220 kV Bhadla(RG)-ESSEL IPSS2 (SBE6PL) ckt tripped due to over voltage. 4. As per PMU, a voltage rise of 56 kV and 60 kV are respectively observed at 400 kV Bhadla(PG) and 400 kV Fatehgarh(IP). After the incidence, voltage oscillations at 400 kV Bhadla(PG) and 400 kV Fatehgarh(IP) reduced. 5. As per SCADA, generation loss of approx. 280MW at SBE6PL and approx. 350MW at AHEJ4L occurred. 6. At the same time, approx. 100 MW dip in generation observed at APTFL (connected to Bhadla(PG)), which restored within 3-4 minutes. 7. Change in NR Solar generation of approx. 850 MW and change in Rajasthan Solar generation of approx. 125 MW are observed (as per SCADA).			850 (drop in NR Solar Generation)				51369	52867	Y(ESUCRL)		Y(PG) Y(AHEJ4L) Y(AREPRL)	Y(ESUCRL)		Y(PG) Y(AHEJ4L) Y(AREPRL)	Y(ESUCRL)	Y(PG) Y(AHEJ4L) Y(AREPRL)		NA	
16	GD-1	1) 220 KV Tanakpur(NH)-CB Ganj(UP) Ckt 2) 220 KV Tanakpur(NH)-Sitarganj(PG) Ckt 3) 40MW Unit-2 at Tanakpur HEP 4) 40MW Unit-3 at Tanakpur HEP	Uttarakhand	TANAKPUR NH, SLDC-UP, CPCC3	21-Feb-23	12:16	21-Feb-23	13:57	01:41	1. During antecedent condition, 40 MW Unit-2 & 3 were running and generating approx. 12 MW and 13 MW respectively. All the elements i.e., unit-2 & 3, Sitarganj line(carrying 48MW towards Sitarganj), CB Ganj line (carrying 58MW towards Tanakpur) & 220/132kV ICT (carrying no active power) were connected at 220kV Bus-2, 220kV Bus-1 was under shutdown. 2. As reported, at 12:16hrs, bus bar protection operated due to maloperation during testing of relay. Hence, all the elements connected to 220 kV Bus-2 tripped and S/s became dead. 3. As per PMU at Meerut(PG), no fault in system is observed. 4. As per SCADA, generation loss of approx. 25MW occurred at Tanakpur HEP observed.	0.042	0.00	25	0	0.051	0.000	49111	52414		Y(NH) Y(UP) Y(PG)		Y(NH)		Y(UP) Y(PG)	Y(NH) Y(UP) Y(PG)		NA	
17	GI-2	1) 400 KV Kala Amb(PKTL)-Sorang(Greenko) Ckt 2) 400 KV Kala Amb(PKTL)-Wangtoo_GIS(HP) Ckt	Himachal Pradesh	CPCC2, SLDC-HP, Sorang	21-Feb-23	18:29	21-Feb-23	20:39	02:10	1. As reported, at 18:29hrs, 400 kV Kala Amb(PKTL)-Wangtoo_GIS(HP) Ckt-1 tripped due to Y-N phase to earth fault with fault current of 5.9kA and distance of 43.2km from Kala Amb end. Also, 400 kV Kala Amb(PKTL)-Sorang(Greenko) Ckt-1 tripped due to Y-B-N double phase to ground fault with fault current of Iy=Ib=5.163kA and distance of 85.39km from Sorang end. 2. As per receiving end FIR by Wangtoo_GIS(HP), tripping occurred at bay no. 410 (of 400 kV Kala Amb(PKTL)-Wangtoo_GIS(HP) Ckt-1) as a consequence of Y-N phase to ground fault with fault current of 3.667kA from Wangtoo end. As per receiving end FIR by Sorang(Greenko), 400 kV Kala Amb(PKTL)-Sorang(Greenko) Ckt-1 tripped due to over-current and earth-fault protection operation. 3. As per PMU at 400 kV Abdullapur(PG), Y-B fault with clearance time of 120 msec is observed. 4. Due to tripping of both 400 kV Wangtoo(HP)-Kala Amb ckt and 400 kV Sorang HEP-Kala Amb ckt, case-6 of SPS for reliable evacuation of power from Nathpa Jhakri, Rampur, Karcham hydro generation complex operated. On operation of SPS, 250MW Unit-2 & 4 at Karcham Wangtoo HPS tripped. 5. As per SCADA, reduction in generation of approx. 500MW at Karcham and NR hydro generation reduction of approx. 845MW is observed.	1.083	0.00	500	0	1.015	0.000	49249	52272	Y(HP)	Y(Sorang) Y(PG)		Y(HP)	Y(Sorang) Y(PG)		Y(HP) Y(Sorang) Y(PG)		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		Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)	Remarks
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)	within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received		
18	GI-2	1) 400 KV Rajwest(RW)-Kankani (RS) Ckt 2) 400 KV Barmer(RS)-Rajwest(RW) Ckt 3) 400 KV Rajwest(RW)-Jodhpur (RS) Ckt	Rajasthan	SLDC-RS	23-Feb-23	06:44	23-Feb-23	07:28	00:44	1. As reported, at 06: 44 hrs, 400 KV Rajwest(RW)-Kankani (RS) Ckt and 400 KV Barmer(RS)-Rajwest(RW) Ckt tripped due to fog at Rajwest. 2. 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt tripped on R-Y phase to phase fault with a distance of 8.672 km and fault current of 3.890 kA from Barmer(RS) end. 3. Further, 400 KV Rajwest(RW)-Kankani (RS) Ckt also tripped on R-N phase to earth fault with a distance of 212.8 km and fault current of 1.845 kA from Kankani(RS) end. 4. As reported, at 07:55 hrs, 400 KV Rajwest(RW)-Jodhpur(RS) Ckt also tripped on B-N phase to earth fault, with a distance of 159 km, and fault current of 1.09 kA from Jodhpur(RS) end and with a distance of 8.32 km and fault current of 8.214 kA from Rajwest end (zone-1). As per TR received from Jodhpur(RS) end, during patrolling of line, snapped jumper at location 13 was found and same was attended by other end (400KV GSS BARMER) by taking Emergency shutdown. 5. As 400 KV Rajwest(RW)-Kankani (RS) Ckt revived before 400 KV Rajwest(RW)-Jodhpur (RS) Ckt tripped, hence units connected at 400/220 kV Rajwest(raj) did not trip. 6. As per SCADA, no load loss/generation loss occurred in Rajasthan. 7. As per PMU at Bhinmal(PG), R-N phase to earth fault with fault clearing time of 80msec is observed.	0	0.00	0	0	0.000	0.000	48866	52039		Y(RS)			Y(RS)		Y(RS)		80	
Other Events																												
1		Event of RE generation drop of approx. 1444MW in RE complex in Rajasthan.	Rajasthan		9-Feb-23	12:08				1. At 12:08hrs, during fluctuation in voltage, reduction in RE generation connected at ISTS RE pooling stations occurred. 2. As per SCADA SOE, no switching is observed during that time at 220 kV & above level. 3. As per SCADA, total reduction in RE generation of approx. 1444MW is observed.			1444 (drop in RE generation)				51063	57977									NA	
2		Event of RE generation drop of approx. 1288MW in RE complex in Rajasthan.	Rajasthan		9-Feb-23	12:12				1. At 12:12hrs, during fluctuation in voltage, reduction in RE generation connected at ISTS RE pooling stations occurred. 2. As per SCADA SOE, no switching is observed during that time at 220 kV & above level. 3. As per SCADA, total reduction in RE generation of approx. 1288MW is observed.			1288 (drop in RE generation)				51099	58013									NA	
3		Event of RE generation drop of approx. 2273MW in RE complex in Rajasthan.	Rajasthan		9-Feb-23	12:23				1. At 12:23hrs, during fluctuation in voltage, reduction in RE generation connected at ISTS RE pooling stations occurred. 2. As per SCADA SOE, no switching is observed during that time at 220 kV & above level. 3. As per SCADA, total reduction in RE generation of approx. 2273MW is observed.			2273 (drop in RE generation)				51119	57729									NA	

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	3-Feb-23	10:18	Nil	Heavy jerk on ICT 3 feeder of Rihand(UP) - Obra ckt.	NA	NA	yes (After 24 hrs)	No			DR, EL not received
2	132 KV Rihand(UP)-Nagar Untari(JS) (UP) Ckt-1	UPPTCL	3-Feb-23	10:18	Nil	Heavy jerk on ICT 3 feeder of Rihand(UP) - Obra ckt.	NA	NA	yes (After 24 hrs)	No			DR, EL not received
3	70 KV Vindhyachal(PG) Pole-2	POWERGRID	3-Feb-23	10:13	Nil	Tripped due to CWC AC power supply fault. Tripped due to voltage dip in only available Auxiliary feeder B2LB, as the redundant feeder B2LA is already under shut down by NTPC.	NA	NA	yes (After 24 hrs)	yes			
4	132 KV Rihand(UP)-Nagar Untari(JS) (UP) Ckt-1	UPPTCL	7-Feb-23	13:06	Nil	B-N fault, Zone-1, Dist. 39km, Fault current 2.016kA from Rihand(UP).	NA	NA	yes (After 24 hrs)	yes			As per DR, B-N fault, Z-1 from Rihand end.
5	400 KV Singrauli(NT)-Vindhyachal(PG) (PG) Ckt-2	POWERGRID	9-Feb-23	17:10	Nil	Tripped only from Vindhyachal end due to D/T received at HVDC Vindhyachal from NTPC Singrauli end.	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			DT sent by PLCC carrier channel-2 due to malfunctioning of PLCC card. Card has been replaced.

 # 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

Annexure-B.V

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st February 2023 - 28th February 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	1	1	100	1	0	100	1	0	100	1	0	100	
2	ADANI	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
3	AHEJ4L	3	1	33	1	1	50	1	1	50	1	1	50	
4	APFOL	1	1	100	1	0	100	1	0	100	1	0	100	
5	APL	2	0	0	0	1	0	0	0	0	0	0	0	Details Received
6	APMPL	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
7	AREPRL	4	0	0	0	3	0	0	3	0	0	2	0	Details Received
8	ASEJOL	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
9	AVAADA RJHN	1	0	0	0	1	0	0	1	0	0	1	0	Details Received
10	BBMB	29	3	10	3	3	12	3	5	13	5	5	21	
11	CPCC1	61	23	38	30	0	49	36	0	59	41	0	67	DR/EL & Tripping report needs to be submitted
12	CPCC2	19	2	11	2	0	11	3	0	16	3	0	16	
13	CPCC3	17	0	0	0	3	0	0	3	0	4	0	24	
14	DADRI-NT	1	0	0	0	0	0	0	0	0	0	0	0	
15	EDEN (ERCPL)	3	0	0	0	0	0	0	0	0	0	0	0	Details Received
16	ESUCRL	2	2	100	2	0	100	2	0	100	2	0	100	DR/EL & Tripping report needs to be submitted
17	FBTL	1	0	0	0	0	0	0	0	0	0	0	0	Details Received
18	JHAJJAR	1	0	0	0	0	0	0	0	0	1	0	100	
19	KOLDAM-NT	1	0	0	0	0	0	0	0	0	1	0	100	DR/EL & Tripping report needs to be submitted
20	PKTSL	1	1	100	1	0	100	1	0	100	1	0	100	
21	RAPPA	10	2	20	10	0	100	10	0	100	7	0	70	
22	RENEW SUN WAVES(RSWPL)	1	0	0	0	0	0	0	0	0	0	0	0	Details Received
23	RSEJ3PL	1	1	100	1	0	100	1	0	100	1	0	100	
24	SAURYA	1	1	100	1	0	100	1	0	100	1	0	100	DR/EL & Tripping report needs to be submitted
25	SBSRPC-11	1	1	100	1	0	100	1	0	100	1	0	100	
26	SEWA-2-NH	1	0	0	0	0	0	0	0	0	0	0	0	Details Received

Status of submission of FIR/DR/EL/Tripping Report on NR Tripping Portal

Time Period: 1st February 2023 - 28th February 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		%	
27	SINGRAULI-NT	1	0	**0**	1	0	**100**	1	0	**100**	1	0	**100**	**DR/EL & Tripping report needs to be submitted**
28	SLDC-CHD	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
29	SLDC-DV	4	0	**0**	3	1	**100**	3	1	**100**	3	0	**75**	
30	SLDC-HP	2	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
31	SLDC-HR	21	4	**19**	7	1	**35**	7	1	**35**	6	0	**29**	**DR/EL & Tripping report needs to be submitted**
32	SLDC-JK	7	0	**0**	7	0	**100**	7	0	**100**	5	0	**71**	
33	SLDC-PS	25	3	**12**	10	4	**48**	9	2	**39**	16	0	**64**	
34	SLDC-RS	48	0	**0**	7	0	**15**	7	0	**15**	18	0	**38**	
35	SLDC-UK	3	0	**0**	0	1	**0**	0	1	**0**	0	0	**0**	Details Received
36	SLDC-UP	49	8	**16**	7	13	**19**	9	15	**26**	8	0	**16**	**DR/EL & Tripping report needs to be submitted**
37	SORANG	1	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
38	STERLITE	3	0	**0**	0	0	**0**	0	1	**0**	0	1	**0**	
39	TANAKPUR-NH	4	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
40	TANDA-NT	1	0	**0**	0	1	**0**	0	0	**0**	0	0	**0**	
41	UNCHAHAR-NT	2	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
Total in NR Region		**338**	**58**	**17**	**100**	**33**	**33**	**108**	**34**	**36**	**132**	**10**	**40**	

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	3rd Quarter
	NATHPA-JHAKRI HPS(Unit6 #250)	14.05.2017	14.05.2017	NO	Excitation system upgraded in 2013	3rd Quarter
	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	--	3rd Quarter
	PANIPAT TPS(unit2# 250)	15.01.2018	15.01.2018	YES	--	3rd Quarter
	DCRTPP (YAMUNA NAGAR)(unit1#300)	19-12-2018	19-12-2018	YES	(Report attached)	3rd Quarter
	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	--	3rd Quarter
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	3rd Quarter
	Rihand (Unit2#500)	02-07-2016	02-07-2016	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit3#500)	15-08-2015	15-08-2015	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter

	Rihand (Unit4#500)	25-05-2017	25-05-2017	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit4#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	Rihand (Unit5#500)	11-12-2014	11-12-2014	YES	Next test will be done during re-commissioning of unit after O/H	3rd Quarter
	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	--	3rd Quarter
	SINGRAULI STPS(Unit7#500)	15.07.2018	15.07.2018	NO	--	3rd Quarter
	UNCHAHAR I(2 * 210)	29-03-2016	29-03-2016	YES	--	3rd Quarter
	UNCHAHAR II TPS(unit1# 210)	13-07-2019	13-07-2019	YES	--	
	UNCHAHAR II TPS(unit2# 210)	10-08-2018	10-08-2018	YES	--	3rd Quarter
	UNCHAHAR UNIT6#500	-	31.03.2017	YES	--	3rd Quarter
	KOLDAM HPS(4 * 200)	01-07-2015	01-07-2015	YES	--	3rd Quarter
	DADRI GPS(2 * 154.51) (ST-Steam Turbine)	-	18-11-2015	YES	--	3rd Quarter
	ANTA GPS(3 * 88.71)(GT- Gas Turbine)	08-08-2014	08-08-2014	YES	--	3rd Quarter
	ANTA GPS(1 * 153.2)(ST- Steam Turbine)	08-08-2014	08-08-2014	YES	--	3rd Quarter
5	**Aravali Power Company Private Ltd**					
	ISTPP (JHAJJAR)(3 * 500)	-	25-08-2015	YES	--	3rd Quarter
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 uni	3rd Quarter
	CHAMERA III HPS(Unit1#77)	29-10-2015	07-01-2012	YES	--	3rd Quarter
	CHAMERA III HPS(Unit2,3#77)	29-10-2015	19-06-2012	YES	--	3rd Quarter
	PARBATI III HEP (Unit1# 130)	21-01-2016	21-01-2016	YES	Have been done recetly. The report on PSS t	3rd Quarter
	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	--	3rd Quarter
	URI-II HPS(4 * 60)	Mar-14	Mar-14		carriedout in 2021-22	
	SALAL HPS (Unit-3,4,5,6 # 115)	16-12-2014	16-12-2014	YES	--	3rd Quarter
	KISHANGANGA(3 * 110)	18-05-20 18	18-05-20 18	YES	--	3rd Quarter
	BAIRASIUL HPS(3 * 60)	30-07-2015	30-07-2016	YES	--	3rd Quarter
	SEWA-II HPS(3 * 40)	09-07-2016	09-07-2016	YES	--	3rd Quarter
	PARBATI III HEP(4 * 130)	16-12-2016	16-12-2016	YES	--	3rd Quarter
	TANAKPUR HPS(Unit1# 31.42)	09-01-2015	09-01-2015	YES	--	3rd Quarter
	TANAKPUR HPS(Unit2,3#31.4)	24-05-2014	24-05-2014	YES	--	3rd Quarter
	DHAULIGANGA HPS(Unit1 ,2# 70)	04-05-2014	17-04-2018	YES	--	3rd Quarter
	DHAULIGANGA HPS(Unit3,4# 70)	26-06-2014	17-04-2018	YES	--	3rd Quarter
7	**PUNJAB**					
	RAJPURA(NPL) TPS(2 * 700)	22-04-2014	22-04-2014	YES	--	3rd Quarter
8	**Rajasthan**					
	KAWAI TPS(Unt1# 660)	08-08-2014	08-08-2014	YES	--	3rd Quarter
	KAWAI TPS(Unt2# 660)	09-10-2014	09-10-2014	YES	--	3rd Quarter
	CHHABRA TPS(Unit 1#250)	22-05-2018	22-05-2018	NO	--	3rd Quarter
	CHHABRA TPS(Unit 2,3,4#250)	04-10-2015	04-10-2015	NO	--	3rd Quarter
	CHHABRA TPS(Unit5# 660)	10-02-2016	10-02-2016	YES	--	3rd Quarter
	CHHABRA TPS(Unit6# 660)	7/28/2018	7/28/2018	YES	--	3rd Quarter
	KALISINDH TPS(Unit1# 600)	10-02-2016	10-02-2016	YES	--	3rd Quarter
	KALISINDH TPS(Unit2# 600)	08-02-2016	08-02-2016	YES	--	3rd Quarter
	KOTA TPS(Unit1#110)	PSS tuning and step response test of Unit#1,2,3,4,6&7 were sucessfully done on 02.03.22 to 04.03.22		YES		3rd Quarter
	KOTA TPS(Unit2#110)				--	3rd Quarter
	KOTA TPS(Unit3#195)				--	
	KOTA TPS(Unit4#195)				--	
	KOTA TPS(Unit6#110)				--	3rd Quarter
	KOTA TPS(Unit7#110)				--	3rd Quarter
	SURATGARH TPS (Unit5#250)	14-03-2022	14-03-2022	Yes	--	3rd Quarter
	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	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit2# 135)	14-07-2016	14-07-2016	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit3# 135)	03-01-2014	03-01-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit4# 135)	03-11-2015	03-11-2015	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit5# 135)	21-09-2014	21-09-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit6# 135)	14-08-2014	14-08-2014	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit7# 135)	20-02-2016	20-02-2016	No	--	3rd Quarter
	RAJWEST (IPP) LTPS(Unit8# 135)	11-06-2014	11-06-2014	No		3rd Quarter
9	**UTTAR PRADESH**					
	ANPARA-C TPS(Unit1# 600)	22-08-2015	22-08-2015	Yes	--	Nov-22
	ANPARA-C TPS(Unit2# 600)	08-03-2016	08-03-2016	Yes	--	During next overhauling
	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	--	Nov-22
	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		3rd Quarter
	Anpara-B (Unit5#500)	17.08.2014	Dec., 2019	Yes	--	
	Anpara-D(Unit6#500)	15.11.2016	15.11.2016	No	--	3rd Quarter
	Anpara-D (Unit7#500)	15.04.2017	15.04.2017	No	--	3rd Quarter
	Obra-B(Unit9#200)	22.03.2016	22.03.2016	Yes	Report enclosed.	3rd Quarter
	Obra-B(Unit10#200)	28.06.2016	20.06.2016	Yes	Report enclosed.	3rd Quarter
	Obra-B (Unit11#200)	21.01.2017	21.01.2017	Yes	Report enclosed.	3rd Quarter
	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	--	3rd Quarter
	Parichha-B (Unit4#210)	08.01.2016	08.01.2016	Yes	--	3rd Quarter
	Parichha-C (Unit5#250)	08.02.2020	08.02.2020	No	--	
	Parichha-C(Unit3#250)	09.01.2016	09.01.2016	No	--	3rd Quarter
	Harduaganj (Unit8#250)	20.08.2015	20.08.2015	No	--	3rd Quarter
	Harduaganj (Unit3#250)	13.04.2016	13.04.2016	No	--	3rd Quarter
	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	--	Apr-23
	ALAKNANDA HEP(Unit2# 82.5)	12.072017	12.072017	No	--	Apr-23
	ALAKNANDA HEP(Unit3# 82.5)	12.072017	12.072017	No	--	Apr-23
	ALAKNANDA HEP(Unit4# 82.5)	12.072017	12.072017	No	--	Apr-23
	MEJA TPS(Unit1#660)	16.10.2018	05.09.2017	yes	--	3rd Quarter
	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)	During next overhauling
	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)	During next overhauling
	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	--	3rd Quarter
	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	--	3rd Quarter
	BHAKRA HPS(Unit7#157)	18.02.2017	18.02.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#1 165)	08.08.2017	08.08.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#2 165)	08.08.2018	08.08.2018	No	--	3rd Quarter
	DEHAR HPS(Unit#3 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#4 165)	02.07.2017	02.07.2017	No	--	3rd Quarter
	DEHAR HPS(Unit#5 165)	08.08.2019	08.08.2019	No	--	
	DEHAR HPS(Unit#6 165)	02.07.2017	02.07.2017	No	--	3rd Quarter
	PONG HPS(6 * 66)	--	--	--	PSS not provided.RM&U agenda under considration.	

Tripping report

NRLDC

(Multiple elements tripping at 400kV Noida Sec 148 S/s (UP))

1. **Date & Time of event:** 20:47 hrs on 06.03.2023

2. **Location/Control Area:** Uttar Pradesh

3. **Plant/Substation Name:** 400kV Noida Sec 148 (UP) GIS

4. **GD/GI Category:** GD-1 (complete outage of 400kV Noida Sec 148 (UP))

5. **Antecedent Condition:**
   - NR Load : 55682 MW
   - Affected state load(UP) : 16634 MW
   - Frequency : 49.93 Hz
   - weather condition : Normal
   - IR exchange : 4472 MW

6. **Generation loss/Load loss:** Load loss of approx. 96MW (as per SCADA).

7. **Duration of interruption:** ~1:25(hh:mm) (Restoration time : 22:12 hrs), energy unserved: 0.136MUs

8. **Tripped elements:**

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1		22:10 hrs	
2.	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-2		22:16 hrs	
3.	400KV Bus 1 at Noida Sec 148(UP)		22:12 hrs	
4.	400KV Bus 2 at Noida Sec 148(UP)		22:17 hrs	

5.	400/220 kV 500 MVA ICT 1 at Noida Sec 148(UP)	20:47 hrs	22:14 hrs	Bus bar protection operated during DC supply changeover at 400kV Noida sec148 operated due to issue in logic of bus bar protection operation related to gas detector.
7.	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-1		22:12 hrs	
8.	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-2		17:17 hrs	

9. Details of fault (if any) :

i) Nature of fault: No fault at 400/220kV level. Voltage dip of approx. 2kV observed in all the three phases (as reported RYB fault at 33kV level.)

ii) Fault clearing time: NA

10. Brief description of event:

i) 400/220/33kV Noida Sec148 GIS has double main single breaker bus scheme. Power comes from 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) D/C and feeds Noida Sec 123 via 400 KV Noida Sec 148-Noida Sec 123 (UP) D/C and feeders connected at 220kV level at Noida Sec 148. There are 2*500MVA ICT at Noida Sec148, during antecedent condition, only ICT-1 was in service. There is 1*160MVA 220/132kV ICT and 1*60MVA 220/33kV transformer.

ii) As reported, brief detail of the event are as follows:

- ✓ There are two (no.) DC source i.e., I & II with automatic changeover mechanism via mechanical changeover relay which takes approx. minimum 100msec to changeover the DC source.
- ✓ There is a logic for initiation of bus bar protection with the delay of 100msec in the case of gas detector stage-3 (GD-3).
- ✓ In addition, there is an issue related to arrangements of contacts of DC source that whenever DC source is not available then it raises flag as gas detector stage-3 (GD-3) which further initiates bus bar tripping as DC source changeover takes more than 100msec.
- ✓ There is also a preexisting issue related to cards of battery charger which lead to DC source failure during any fluctuation in AC supply.
- ✓ So, at 20:47hrs on 06th Mar23, a RYB three phase fault occurred in one of the 33kV feeder (feeder no 14), differential current was approx. 20kA.
- ✓ During this fault, DC supply from DC source-I lost due to issue arose in

its battery charger.

- ✓ And before DC source changeover could have occurred, bus bar tripping initiated with the flag of GD-3.
- ✓ Due to bus bar protection operation, all the feeders and elements connected at both the 400kV bus tripped.
- ✓ Similar logic/arrangement w.r.t. DC source & GD-3 and bus bar tripping initiation is implemented at 220kV level. However, as bus bar relay at 220kV side is defective that's why tripping didn't initiate to elements connected at 220kV bus although, 1*160MVA 220/132kV ICT tripped, reason of the same is yet to be identified.

iii) As per PMU at 765kV Agra(PG), voltage dip of approx. 02kV is observed in all the three phases which suspects RYB fault in downward network.

iv) As per SCADA, change in demand of approx. 96MW is observed in UP control area.

11. Preliminary Observations:

i) The issues related to battery charger and logic of initiation of Bus bar tripping during DC source changeover had been discussed in 45PSC meeting. Remedial actions were recommended and agreed to complete it within 30days. However, observing recent frequent tripping triggered due to similar issue, it is suspected that corrective actions haven't been taken yet. It is requested to expedite the corrective/remedial actions to avoid such further trippings.

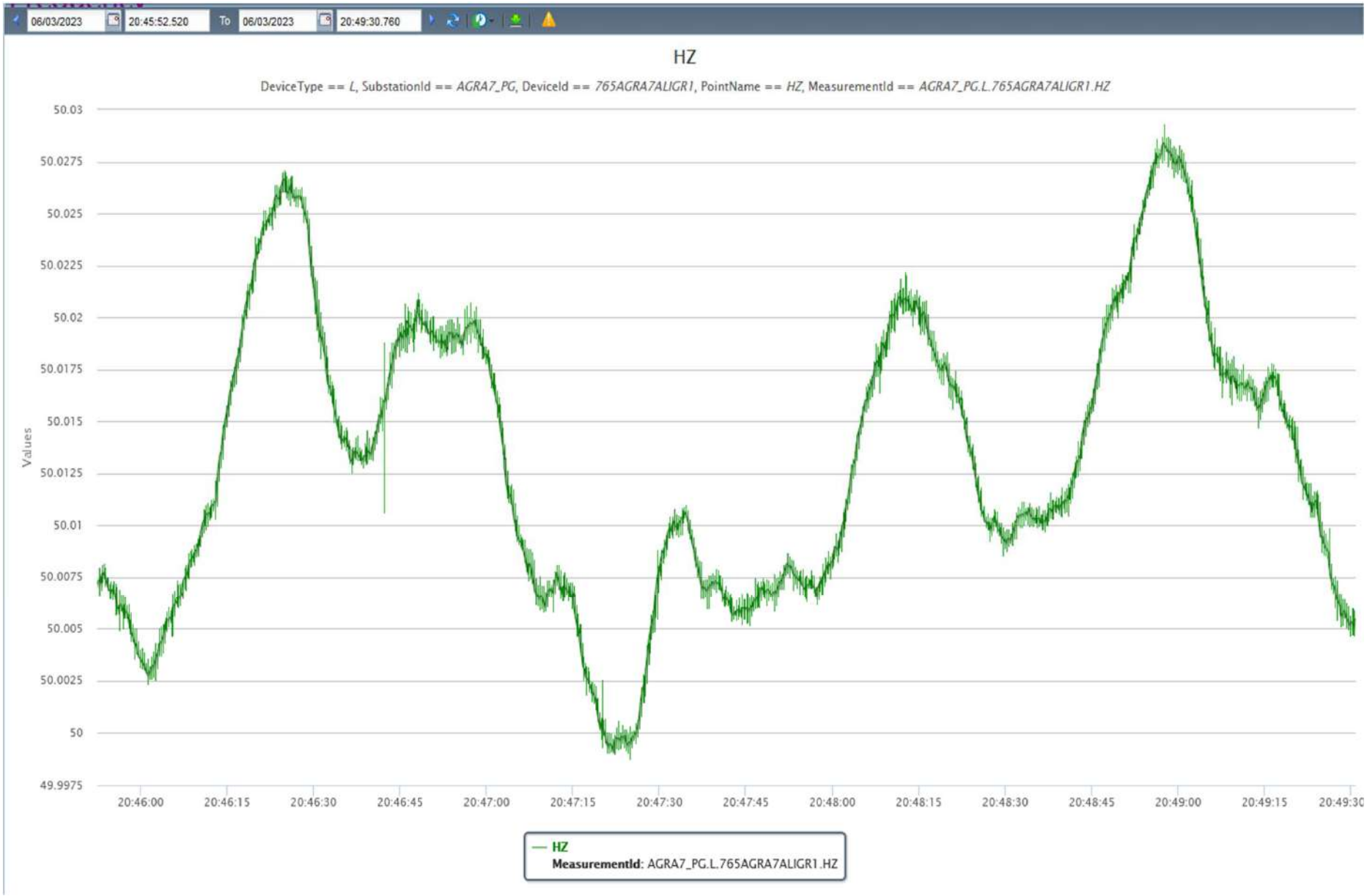
ii) It is observed that DR of 33kV feeder is not time synced. Time syncing of the same need to be ensured.

iii) SCADA data of 400kV Noida Sec 148 S/s was not healthy during the event timing, healthiness of the same need to be ensured.

iv) Remedial action taken report to be shared.

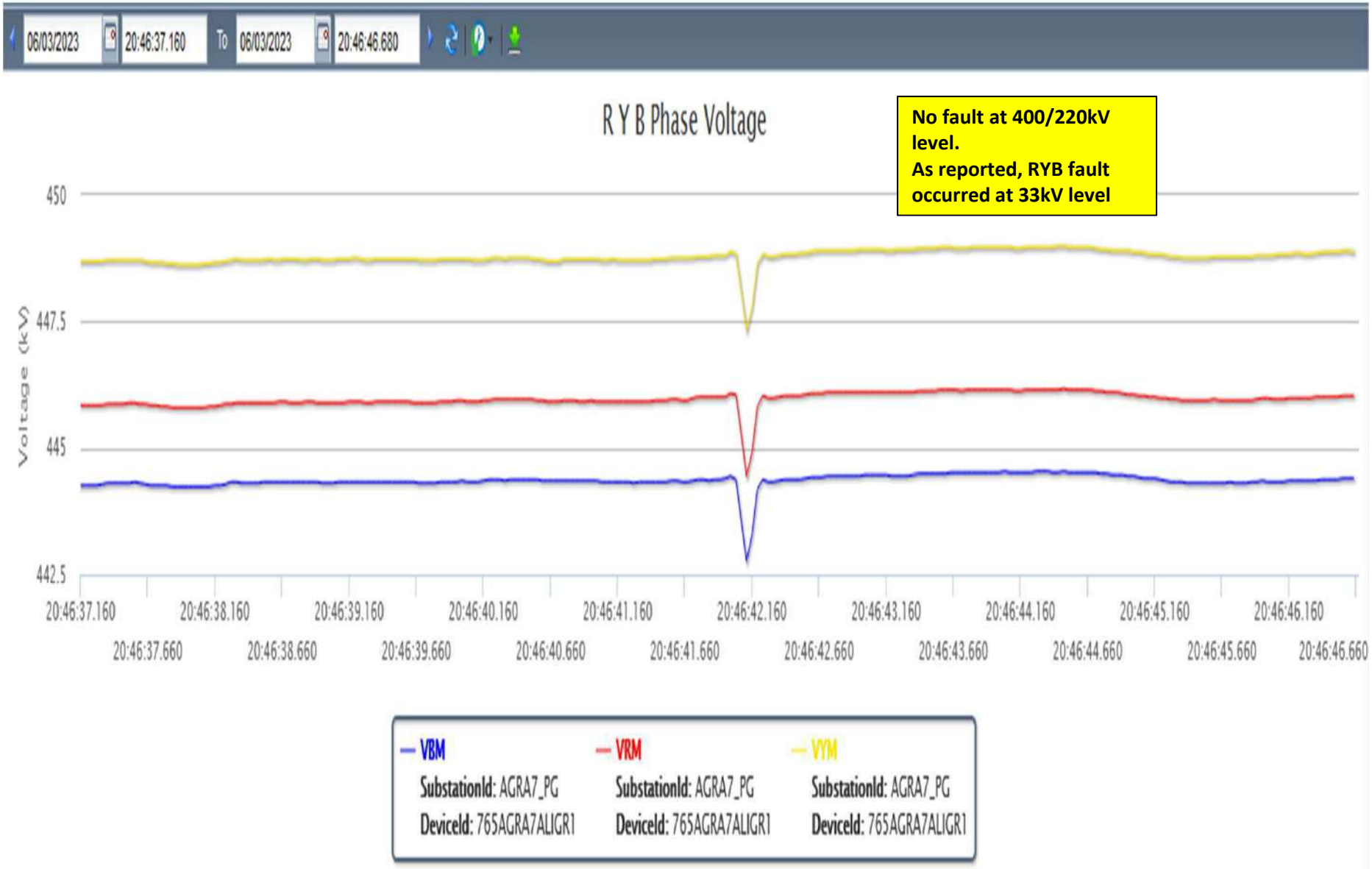
PMU Plot of frequency at Agra765(PG)

20:47hrs/06-Mar-23

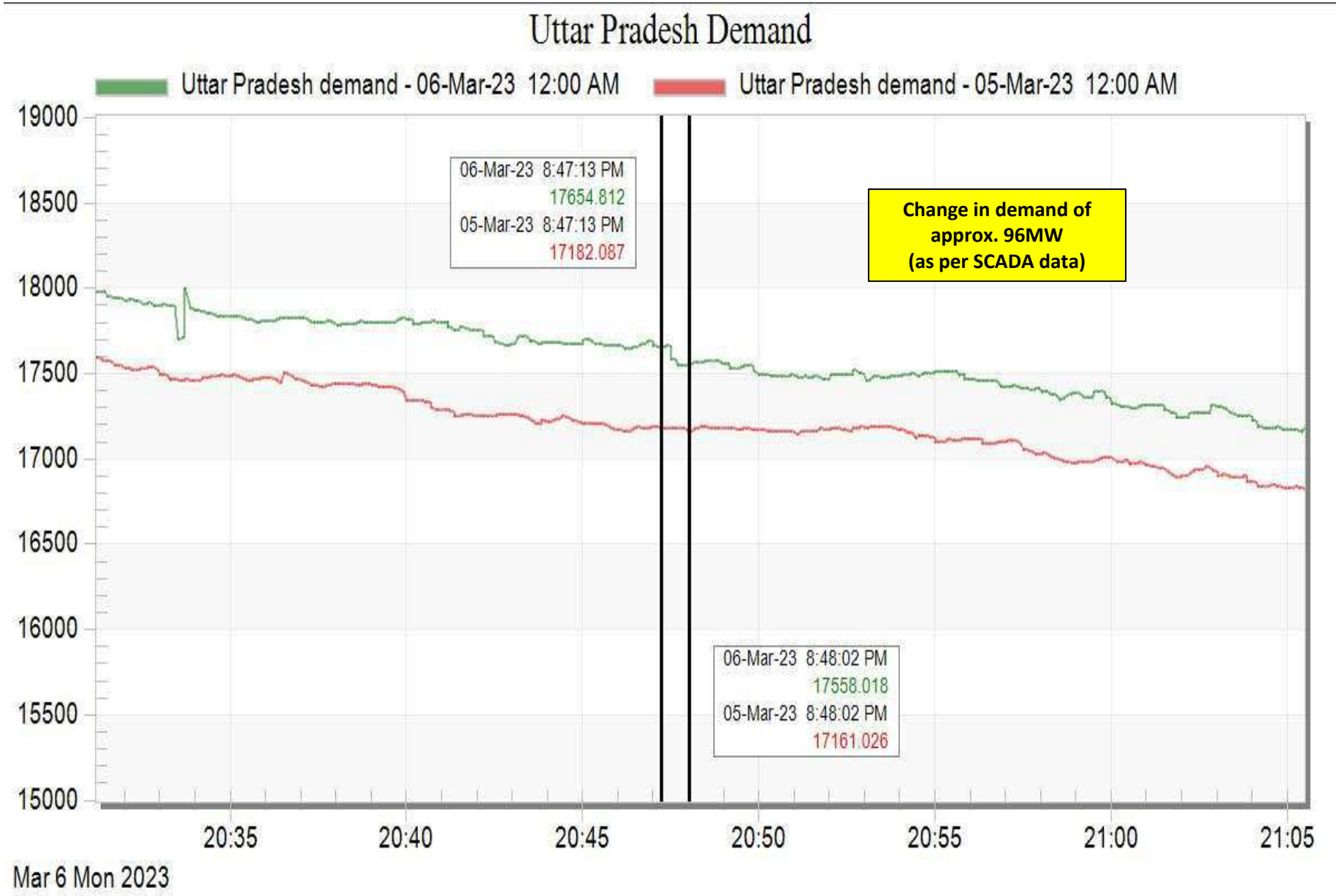


PMU Plot of phase voltage magnitude at Agra765(PG)

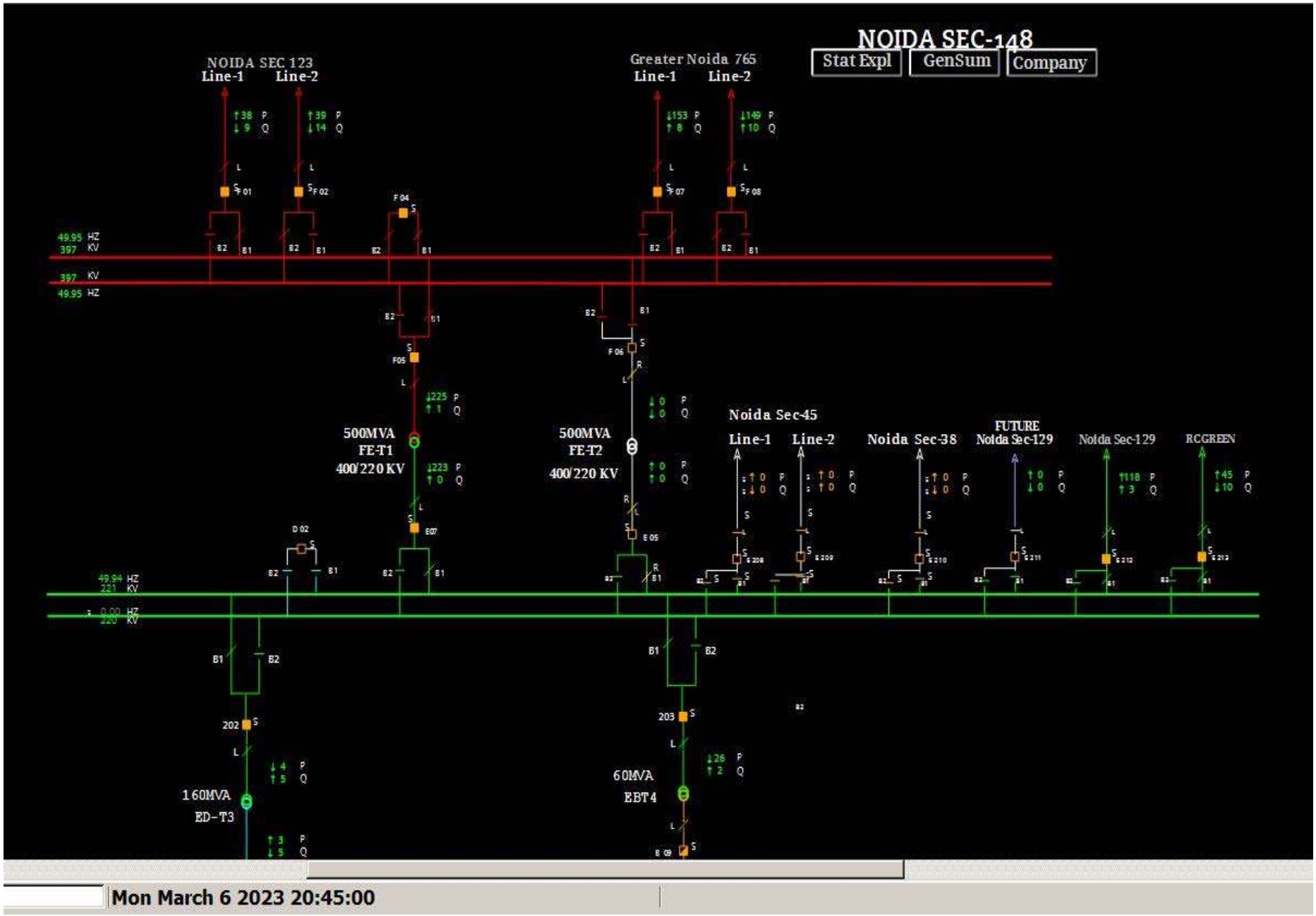
20:47hrs/06-Mar-23



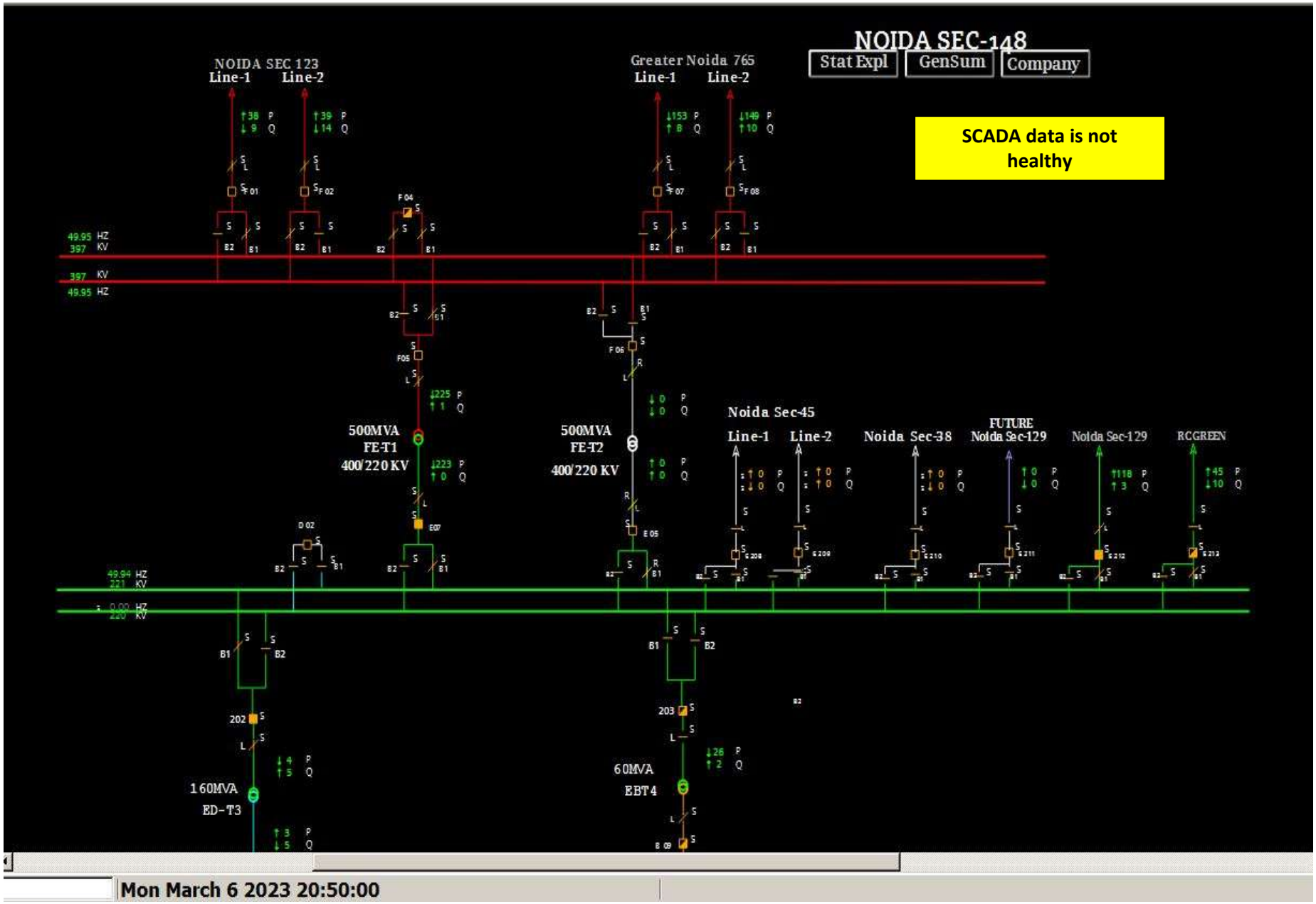
Uttar Pradesh demand during the event



SLD of 400/220kV Noida Sec 148(UP) before the event



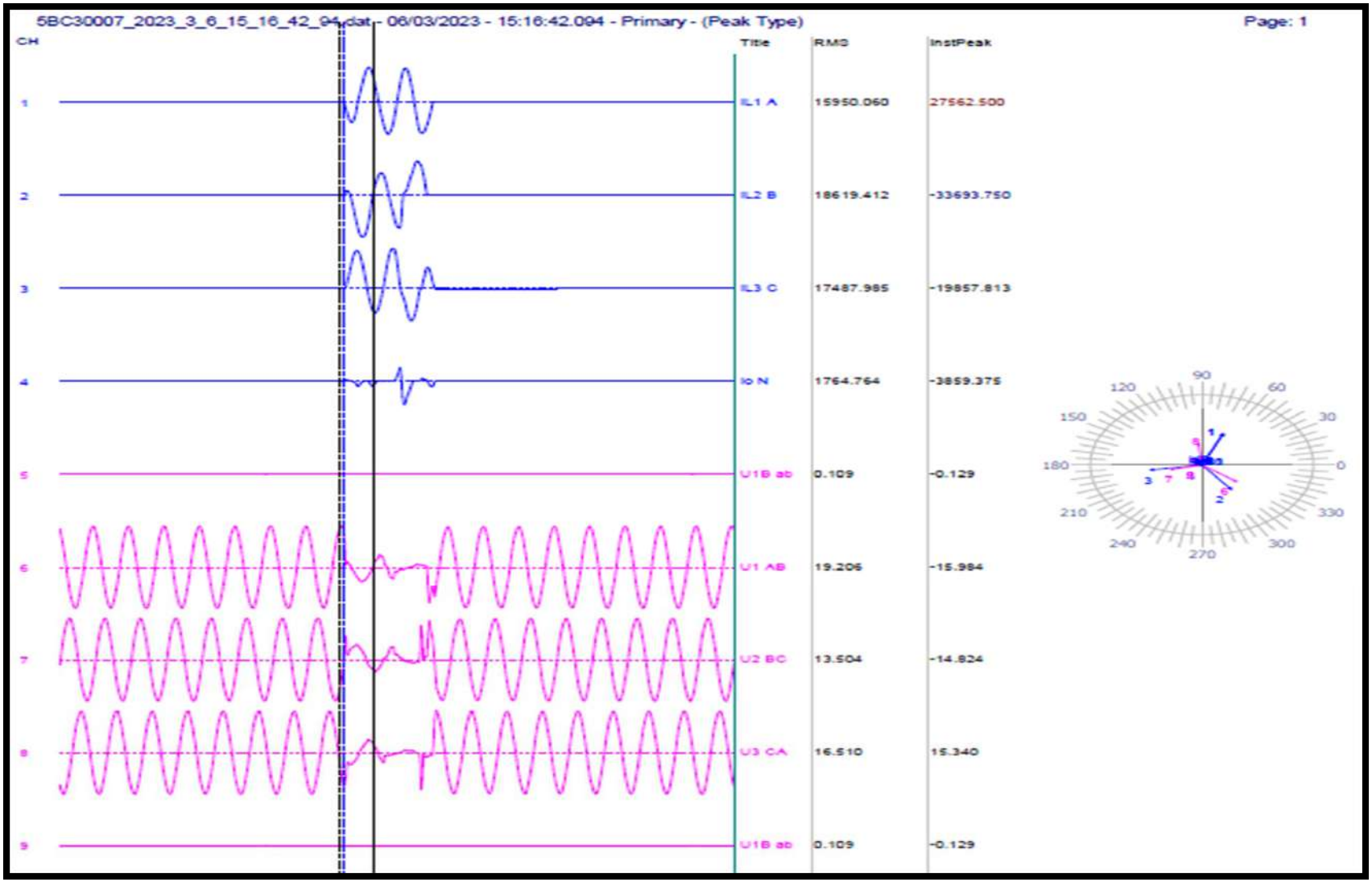
SLD of 400/220kV Noida Sec 148(UP) after the event



SCADA SOE

Time	Station Name	Voltage(kV)	Element Name	Element Type	Element Status	Remark
20:46:42,138	SC148_U	33	22FDR14	Circuit Breaker	Open	Feeder no 14 at 33kV level at Noida Sec 148
20:47:13,268	SC148_U	132	04NMRC1	Circuit Breaker	disturbe	
20:47:13,299	SC148_U	220	03T4	Circuit Breaker	disturbe	
20:47:19,970	SC148_U	400	02SC123B	Circuit Breaker	Open	Line CB at Noida Sec148 end of 400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-2 opened
20:47:20,016	SC148_U	400	01SC123A	Circuit Breaker	Open	Line CB at Noida Sec148 end of 400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-1 opened
20:47:20,017	SC148_U	400	07GNOD71	Circuit Breaker	Open	Line CB at Noida Sec148 end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened
20:47:20,066	SC148_U	400	08GNOD72	Circuit Breaker	Open	Line CB at Noida Sec148 end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-2 opened
20:47:20,078	SC148_U	400	05T1	Circuit Breaker	Open	CB at 400kV side of 400/220 kV 500 MVA ICT 1 at Noida Sec 148(UP) opened
20:48:04,050	GNOD7_U	400	408SKD2S	Circuit Breaker	Open	Tie CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-2 opened
20:48:04,093	GNOD7_U	400	412S148A	Circuit Breaker	Open	Main CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened
20:48:04,094	GNOD7_U	400	411SKD1S	Circuit Breaker	Open	Tie CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened

DR of feeder no 14 connected at 33kV level at Noida Sec 148 S/s



- ✓ Differential current in all three phase of approx. 16-19kA
- ✓ Time sync issue.

DR of 400kV bus bar relay

File: 0603bb2.DAT - 06/03/2023 - 20:47:19.925 - Primary - (Peak Type) Page: 1

```
* File Information::
* ------------------
            Station: MiCOM
             Device: 1
          File Name: C:\USERS\VIPIN\ONEDRIVE\DESKTOP\SEC 148 BUS BAR\0603bb2.DAT
          File Size: 148895 Bytes
     Prefault Time: 06/03/2023 20:47:19.436000
        Fault Time: 06/03/2023 20:47:19.925000
         Save Time: 03/09/2023 11:21:32
      Process Time: 03/09/2023 11:22:51
 Start Date && Time: 06/03/2023 20:47:19.436000
   End Date && Time: 06/03/2023 20:47:20.954804
      File Duration: 1  Sec(s) - 518 Mils(s) - 804 Mics(s)
 Sampling Frequency: 1200.480192, 833.000  Microsecond Rate
     Line Frequency: 50.000000

* Maximum/Minimum Analog Summary:
* -------------------------------
>  Max-Inst     Min-Inst      Max-RMS      Min-RMS     One-Bit    Inst-Diff     RMS-Diff   pUnits     Description
     31.710      -31.710       25.069        0.000     31.7100        0.000       25.069        V           1-VAN
     31.710      -31.710       22.422        0.000     31.7100        0.000       22.422        V           2-VBN
     31.710      -31.710       25.891        0.000     31.7100        0.000       25.891        V           3-VCN
    165.720     -182.292      119.049        3.566      5.5240       16.572      115.483        A           4-IA-T1/IX-T1
     93.908      -88.384       77.730        3.383      5.5240        5.524       74.347        A           5-IB-T1/IX-T2
     16.572      -16.572       11.048        3.566      5.5240        0.000        7.482        A           6-IC-T1/IX-T3
    193.340     -198.864      176.854        4.066      5.5240        5.524      172.788        A           7-IA-T2/IX-T4
    193.340     -193.340      176.826        3.740      5.5240        0.000      173.085        A           8-IB-T2/IX-T5
    370.108     -364.584      346.533        3.910      5.5240        5.524      342.623        A           9-IC-T2/IX-T6
     22.096      -22.096        9.091        3.566      5.5240        0.000        5.525        A          10-IA-T3/IX-T7
    480.588     -497.160      340.238        3.379      5.5240       16.572      336.859        A          11-IB-T3/IX-T8
    270.676     -270.676      250.597        4.215      5.5240        0.000      246.383        A          12-IC-T3/IX-T9
     22.096      -22.096       11.048        3.740      5.5240        0.000        7.308        A          13-IA-T4/IX-T10
     27.620      -22.096        9.230        3.616      5.5240        5.524        5.613        A          14-IB-T4/IX-T11
     27.620      -27.620        9.894        0.000      5.5240        0.000        9.894        A          15-IC-T4/IX-T12
     27.620      -22.096       10.517        3.906      5.5240        5.524        6.611        A          16-IA-T5/IX-T13
     22.096      -33.144       11.162        4.066      5.5240       11.048        7.097        A          17-IB-T5/IX-T14
     33.144      -27.620       11.609        4.066      5.5240        5.524        7.544        A          18-IC-T5/IX-T15
     27.620      -27.620       16.572        4.784      5.5240        0.000       11.788        A          19-IA-T6/IX-T16
     38.668      -38.668       16.725        0.000      5.5240        0.000       16.725        A          20-IB-T6/IX-T17
     33.144      -22.096       10.815        4.510      5.5240       11.048        6.305        A          21-IC-T6/IX-T18

* Events/Sensors Activity Summary:
* ---------------------------------
>Fst  Lst  Fst-Change        Lst-Change        Changes    Description
  N    N    20:47:19.973463  20:47:20.149293   003         1-R1 401 LBB/BB OP
  N    N    20:47:19.925149  20:47:20.864007   003         2-R2 402 LBB/BB OP
  N    N    20:47:19.925149  20:47:19.968465   002         3-R4 404 LBB/BB OP
  N    N    20:47:19.973463  20:47:20.149293   003         4-R5 405 LBB/BB OP
  N    N    20:47:19.973463  20:47:20.149293   003         5-R7 407 LBB/BB OP
  N    N    20:47:19.925149  20:47:20.864007   003         6-R8 408 LBB/BB OP
  N    N    20:47:19.925149  20:47:20.149293   003         7-Any Trip
  A    A    xx:xx:xx.xxxxxx  xx:xx:xx.xxxxxx   000         8-Diff Z1 Blked
  A    A    xx:xx:xx.xxxxxx  xx:xx:xx.xxxxxx   000         9-Diff Z2 Blked
```

- ✓ Bus bar protection operated

Tripping report

NRLDC

(Multiple elements tripping at 400kV Noida Sec 148 S/s (UP))

1. **Date & Time of event:** 17:26 hrs on 08.03.2023

2. **Location/Control Area:** Uttar Pradesh

3. **Plant/Substation Name:** 400kV Noida Sec 148 (UP) GIS

4. **GD/GI Category:** GD-1 (complete outage of 400kV Noida Sec 148 (UP))

5. **Antecedent Condition:**
   - NR Load : 38477 MW
   - Affected state load(UP) : 12206 MW
   - Frequency : 49.96 Hz
   - weather condition : Normal
   - IR exchange : 2858 MW

6. **Generation loss/Load loss:** Load loss of approx. 80MW (as reported).

7. **Duration of interruption:** ~00:47(hh:mm) (Restoration time : 18:13 hrs), energy unserved: 0.062MUs

8. **Tripped elements:**

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1		18:11 hrs	
2.	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-2			
3.	400KV Bus 1 at Noida Sec 148(UP)		18:10 hrs	
4.	400KV Bus 2 at Noida Sec 148(UP)			

5.	400/220 kV 500 MVA ICT 1 at Noida Sec 148(UP)	17:26 hrs	18:16 hrs	Bus bar protection operated. Flashover occurred at Y-phase of earth switch of 402 Bay (400kV Noida Sec148-Noida sec 123 ckt-2) at Noida sec 148 end.
7.	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-1		18:13 hrs	
8.	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-2			

9. Details of fault (if any) :

i) Nature of fault: Y-N phase to earth fault (Bus fault)

ii) Fault clearing time: 80msec

10. Brief description of event:

i) 400/220/33kV Noida Sec148 GIS has double main single breaker bus scheme. Power comes from 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) D/C and feeds Noida Sec 123 via 400 KV Noida Sec 148-Noida Sec 123 (UP) D/C and feeders connected at 220kV level at Noida Sec 148. There are 2*500MVA ICT at Noida Sec148, during antecedent condition, only ICT-1 was in service (ICT-2 is under breakdown since 19.08.2020). There is 1*160MVA 220/132kV ICT and 2*100MVA 220/33kV transformer.

ii) As reported, brief detail of the event are as follows:

- ✓ At 17:26hrs, flashover occurred at Y-phase of earth switch of 402 Bay (400kV Noida Sec148- Noida sec 123 ckt-2) at Noida sec 148 end. Noida Sec123 ckt-2 was connected at 400kV Bus-2 at Noida Sec148.
- ✓ On this fault, Bus bar protection operated. However, due to delayed opening of bus coupler bay, elements connected to 400kV bus-1 also tripped.
- ✓ Operation of bus bar protection has been tested and it is found okay.
- ✓ Reason of delayed opening of bus coupler breaker not identified yet.

iii) As per PMU at 765kV Agra(PG), Y-N phase to earth fault which cleared within 100msec is observed.

iv) As reported by SLDC-UP, load loss of approx. 80MW occurred in UP control area.

11. Preliminary Observations:

i) Reason of delayed opening of bus coupler breaker need to be investigated and corrective actions need to be taken to avoid such event of station blackout in future.

ii) SCADA data of 400kV Noida Sec 148 S/s was not healthy during the

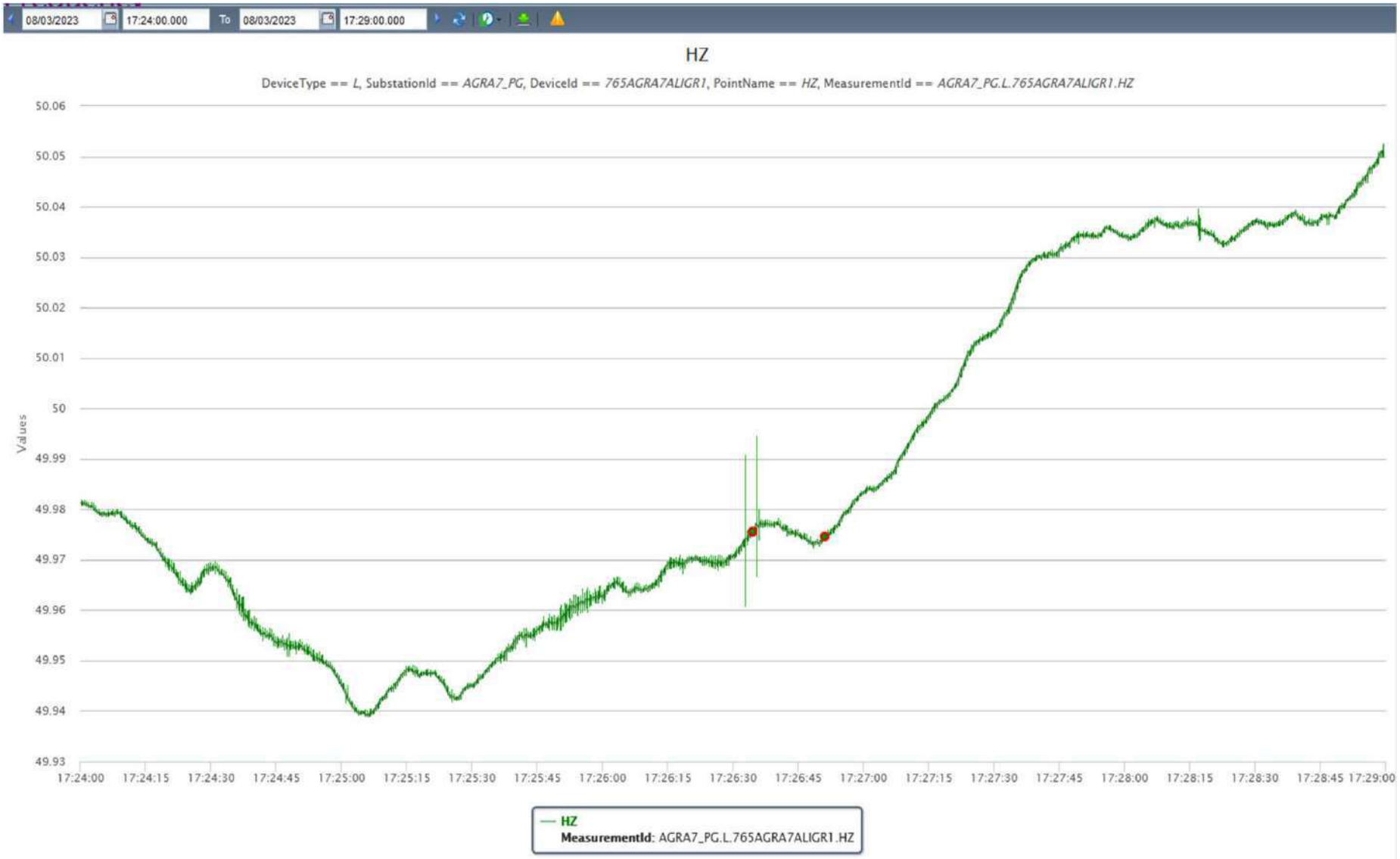
event timing, healthiness of the same need to be ensured.

iii) SCADA SOE data of 400kV Noida Sec148 (UP) S/s are also not available. Availability of the same need to be ensured.

iv) Remedial action taken report to be shared.

PMU Plot of frequency at Agra765(PG)

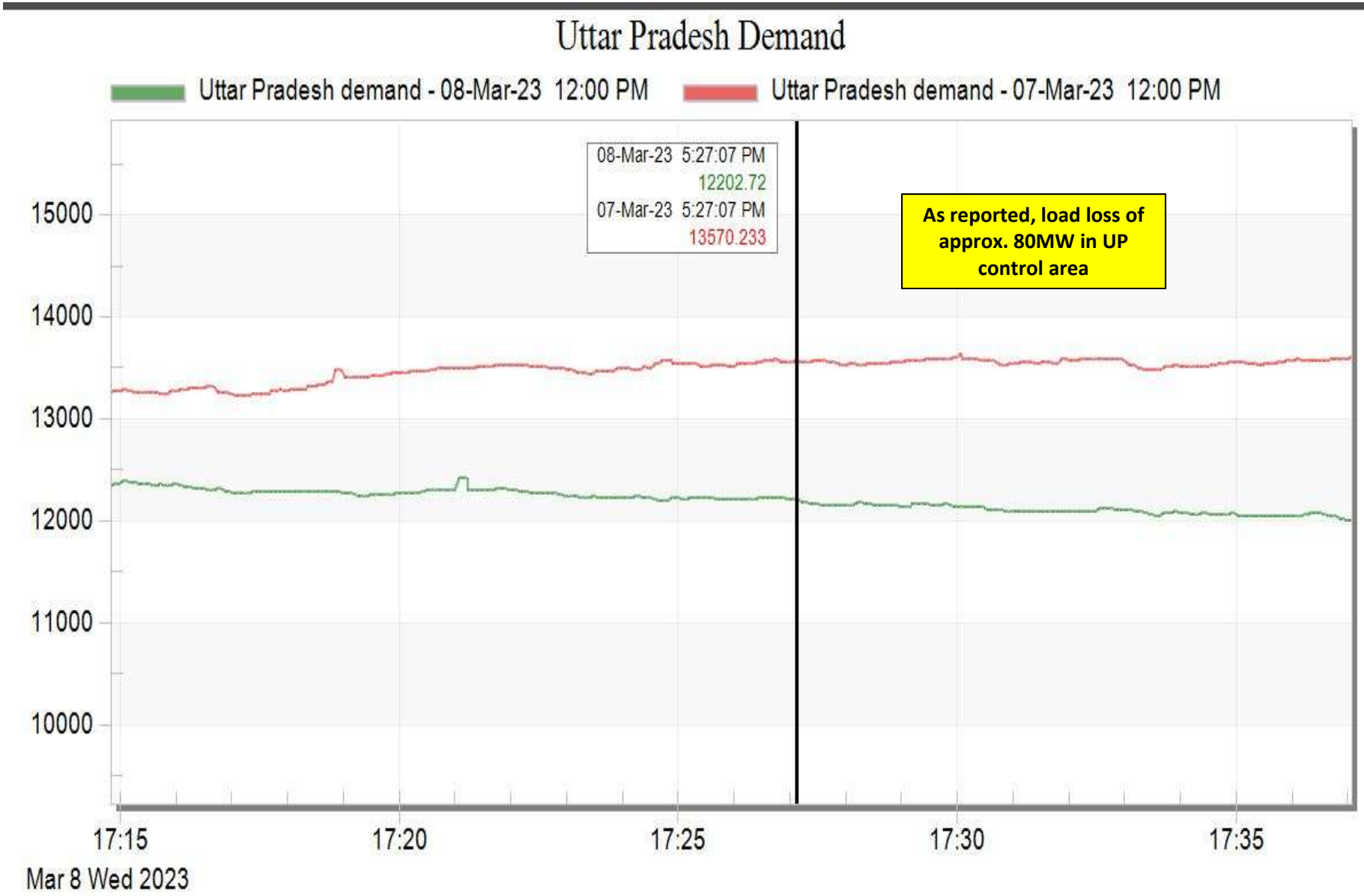
17:26hrs/08-Mar-23



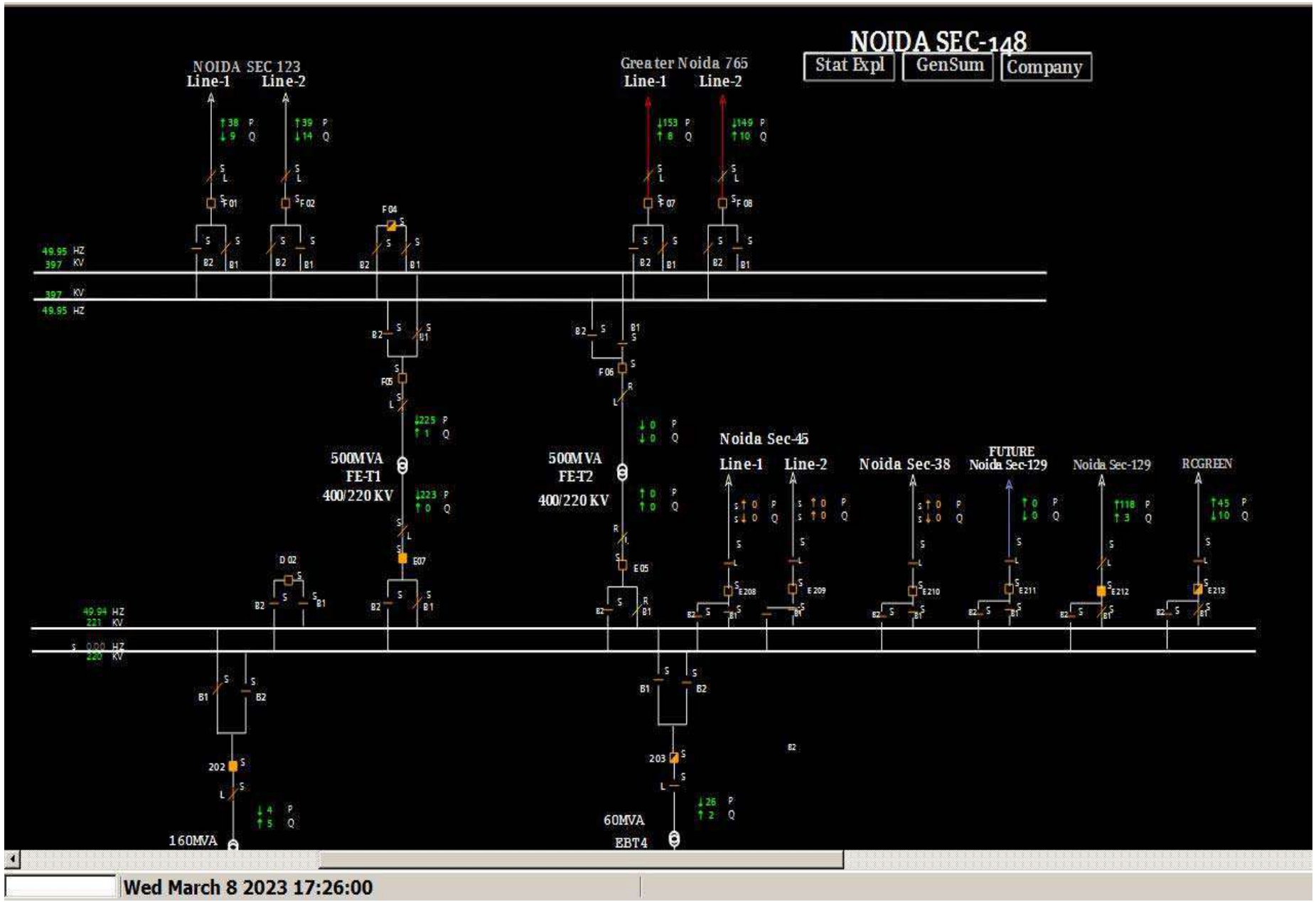
PMU Plot of phase voltage magnitude at Agra765(PG)

17:26hrs/08-Mar-23

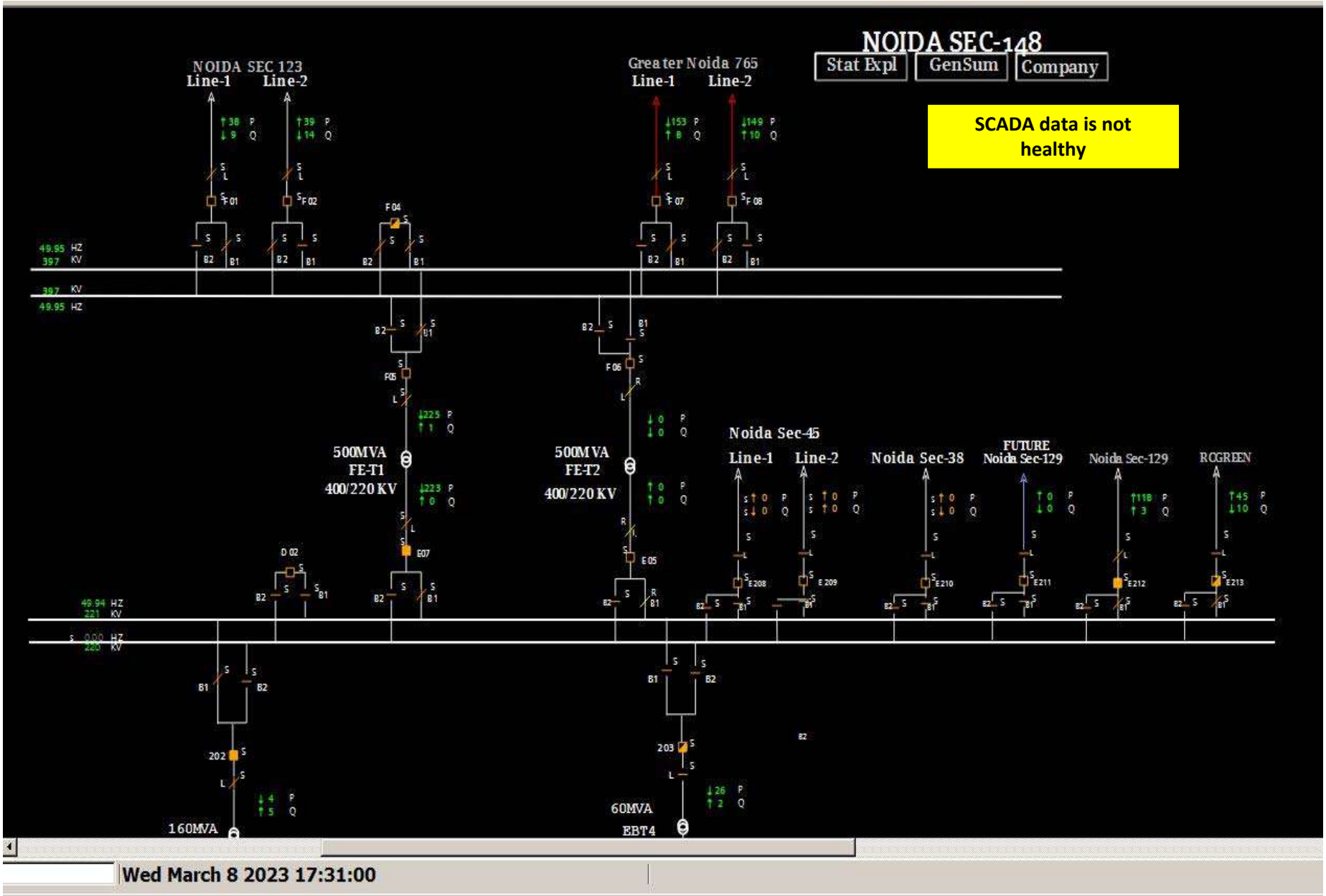
Uttar Pradesh demand during the event



SLD of 400/220kV Noida Sec 148(UP) before the event



SLD of 400/220kV Noida Sec 148(UP) after the event



SCADA SOE

Time	Station Name	Voltage(kV)	Element Name	Element Type	Element Status	Remark
17:27:19,334	GNOD7_U	400	408SKD2S	Circuit Breaker	Open	Tie CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-2 opened
17:27:19,453	GNOD7_U	400	411SKD1S	Circuit Breaker	Open	Tie CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened
17:27:19,454	GNOD7_U	400	412S148A	Circuit Breaker	Open	Main CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened

- ✓ SCADA SOE data of 400kV Noida Sec148(UP) S/s are not available.

DR of 400kV Bus Bar protection at Noida Sec148(UP)

File: bb1.DAT - 08/03/2023 - 17:26:35.221 - Primary - (Peak Type) Page: 1

```
* File Information::
* ------------------
            Station: MiCOM
             Device: 1
          File Name: C:\USERS\VIPIN\ONEDRIVE\DESKTOP\SEC 148 BUS BAR\bb1.DAT
          File Size: 160562 Bytes
     Prefault Time: 08/03/2023 17:26:34.723000
        Fault Time: 08/03/2023 17:26:35.221000
         Save Time: 03/09/2023 09:51:30
      Process Time: 03/09/2023 09:57:35
 Start Date && Time: 08/03/2023 17:26:34.723000
   End Date && Time: 08/03/2023 17:26:36.234042
      File Duration: 1  Sec(s) - 511 Mils(s) - 42 Mics(s)
Sampling Frequency: 1197.604790, 835.000  Microsecond Rate
    Line Frequency: 50.000000

* Maximum/Minimum Analog Summary:
* -------------------------------
>  Max-Inst      Min-Inst      Max-RMS      Min-RMS     One-Bit    Inst-Diff     RMS-Diff   pUnits     Description
   1141.560     -1014.720      762.030        0.000     31.7100      126.840      762.030        V           1-VAN
   1109.850      -983.010      733.540        0.000     31.7100      126.840      733.540        V           2-VBN
   1204.980     -1078.140      814.027        0.001     31.7100      126.840      814.026        V           3-VCN
    116.004      -110.480       67.674        3.906      5.5240        5.524       63.768        A           4-IA-T1/IX-T1
     60.764       -60.764       35.496        4.066      5.5240        0.000       31.431        A           5-IB-T1/IX-T2
     27.620       -38.668       18.597        3.740      5.5240       11.048       14.857        A           6-IC-T1/IX-T3
    143.624      -138.100       87.872        4.066      5.5240        5.524       83.806        A           7-IA-T2/IX-T4
    127.052      -132.576       85.369        3.189      5.5240        5.524       82.180        A           8-IB-T2/IX-T5
    254.104      -248.580      175.343        4.080      5.5240        5.524      171.263        A           9-IC-T2/IX-T6
     27.620       -38.668       16.649        0.000      5.5240       11.048       16.649        A          10-IA-T3/IX-T7
  19737.252    -11440.204    11679.807        7.973      5.5240     8297.048    11671.833        A          11-IB-T3/IX-T8
    176.768      -176.768      121.890        4.066      5.5240        0.000      117.825        A          12-IC-T3/IX-T9
     27.620       -27.620       11.554        4.066      5.5240        0.000        7.489        A          13-IA-T4/IX-T10
     22.096       -27.620       13.294        3.189      5.5240        5.524       10.105        A          14-IB-T4/IX-T11
     22.096       -33.144       18.321        3.906      5.5240       11.048       14.415        A          15-IC-T4/IX-T12
     33.144       -27.620       11.880        4.561      5.5240        5.524        7.319        A          16-IA-T5/IX-T13
     38.668       -33.144       14.352        5.289      5.5240        5.524        9.063        A          17-IB-T5/IX-T14
     22.096       -22.096       14.263        3.331      5.5240        0.000       10.932        A          18-IC-T5/IX-T15
     33.144       -30.660       20.359        0.000      5.5240        5.524       20.359        A          19-IA-T6/IX-T16
     27.620       -38.668       21.125        4.407      5.5240       11.048       16.719        A          20-IB-T6/IX-T17
     22.096       -38.668       19.301        0.000      5.5240       16.572       19.301        A          21-IC-T6/IX-T18

* Events/Sensors Activity Summary:
* ---------------------------------
>Fst  Lst  Fst-Change        Lst-Change        Changes    Description
  N    N    17:26:35.385228  17:26:35.676592   002         1-R1 401 LBB/BB OP
  N    N    17:26:35.220979  17:26:35.676592   004         2-R2 402 LBB/BB OP
  N    N    17:26:35.220979  17:26:35.261796   002         3-R4 404 LBB/BB OP
  N    N    17:26:35.385228  17:26:35.676592   002         4-R5 405 LBB/BB OP
  N    N    17:26:35.385228  17:26:35.676592   002         5-R7 407 LBB/BB OP
  N    N    17:26:35.220979  17:26:35.676592   004         6-R8 408 LBB/BB OP
  N    N    17:26:35.220979  17:26:35.676592   004         7-Any Trip
  N    N    17:26:35.385228  17:26:35.474296   002         8-Diff Fault Z1
  N    N    17:26:35.385228  17:26:35.474296   002         9-Diff Fault CZ
  N    N    17:26:35.385228  17:26:35.474296   002        10-Idiff Start Z1
  N    N    17:26:35.385228  17:26:35.474296   002        11-Idiff CZ Start
  N    N    17:26:35.385228  17:26:35.486821   002        12-Idiff Trip Z1
  N    N    17:26:35.385228  17:26:35.474296   002        13-Fault B
```

✓ Bus bar protection operated, fault in Y-phase.

Tripping report

NRLDC

(Multiple elements tripping at 400kV Noida Sec 148 S/s (UP))

1. **Date & Time of event:** 14:59 hrs on 09.03.2023

2. **Location/Control Area:** Uttar Pradesh

3. **Plant/Substation Name:** 400kV Noida Sec 148 (UP) GIS

4. **GD/GI Category:** GD-1 (complete outage of 400kV Noida Sec 148 (UP))

5. **Antecedent Condition:**
   - NR Load : 48706 MW
   - Affected state load(UP) : 13759 MW
   - Frequency : 50.07 Hz
   - weather condition : Normal
   - IR exchange : 1785 MW

6. **Generation loss/Load loss:** Load loss of approx. 100MW (as per SCADA).

7. **Duration of interruption:** ~00:20(hh:mm) (Restoration time : 15:19 hrs), energy unserved: 0.033MUs

8. **Tripped elements:**

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1	14:59 hrs		Bus bar protection operated during DC supply changeover at 400kV Noida sec148. It operated due to issue in logic of bus bar protection operation related to gas detector.
3.	400KV Bus 1 at Noida Sec 148(UP)			
5.	400/220 kV 500 MVA ICT 1 at Noida Sec 148(UP)		15:37 hrs	
7.	400 KV Noida Sec 148-Noida Sec 123 (UP) Ckt-1		15:19 hrs	

9. Details of fault (if any) :

i) Nature of fault: No fault at 400/220kV level. Voltage dip of approx. 1kV observed in all the three phases (as reported RYB fault at 33kV level.)

ii) Fault clearing time: NA

10. Brief description of event:

i) 400/220/33kV Noida Sec148 GIS has double main single breaker bus scheme. Power comes from 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) D/C and feeds Noida Sec 123 via 400 KV Noida Sec 148-Noida Sec 123 (UP) D/C and feeders connected at 220kV level at Noida Sec 148. There are 2*500MVA ICT at Noida Sec148, during antecedent condition, only ICT-1 was in service. There is 1*160MVA 220/132kV ICT and 2*100MVA 220/33kV transformer.

ii) As reported, brief detail of the event are as follows:

- ✓ There are two (no.) DC source i.e., I & II with automatic changeover mechanism via mechanical changeover relay which takes more than 100msec to changeover the DC source.
- ✓ There is a logic for initiation of bus bar protection with the delay of 100msec in the case of gas detector stage-3 (GD-3).
- ✓ In addition, there is an issue related to arrangements of contacts of DC source that whenever DC source is not available then it raises flag as gas detector stage-3 (GD-3) which further initiates bus bar tripping as DC source changeover takes more than 100msec.
- ✓ There is also a preexisting issue related to cards of battery charger which lead to DC source failure during any fluctuation in AC supply.
- ✓ So, at 20:47hrs on 06th Mar23, a RYB three phase fault occurred in one of the 33kV feeder (feeder no 12), differential current was approx. 20kA.
- ✓ During this fault, DC supply from DC source-I lost due to issue arose in its battery charger.
- ✓ And before DC source changeover could have occurred, bus bar tripping initiated with the flag of GD-3.
- ✓ Due to bus bar protection operation, all the feeders and elements connected at both the 400kV bus tripped.
- ✓ Similar logic/arrangement w.r.t. DC source & GD-3 and bus bar

tripping initiation is implemented at 220kV level. However, as bus bar relay at 220kV side is defective that's why tripping didn't initiate to elements connected at 220kV bus although, 1*160MVA 220/132kV ICT tripped, reason of the same is yet to be identified.

- ✓ It is informed that, defective cards in battery charger has been replaced. Both the DC source are healthy now, same has been tested and confirmed.
- ✓ Issue related to logic of bus bar protection is yet to be resolved, follow up has been taken to resolve the same.

iii) As per PMU at 400kV Agra(PG), voltage dip of approx. 01kV is observed in all the three phases which suspects RYB fault in downward network.

iv) As reported by SLDC-UP, load loss of approx. 100MW occurred in UP control area.

11. Preliminary Observations:

i) The issues related to battery charger and logic of initiation of Bus bar tripping during DC source changeover had been discussed in 45PSC meeting. Remedial actions were recommended and agreed to complete it within 30days. However, observing recent frequent tripping triggered due to similar issue, it is suspected that corrective actions haven't been taken yet. It is requested to expedite the corrective/remedial actions to avoid such further trippings.

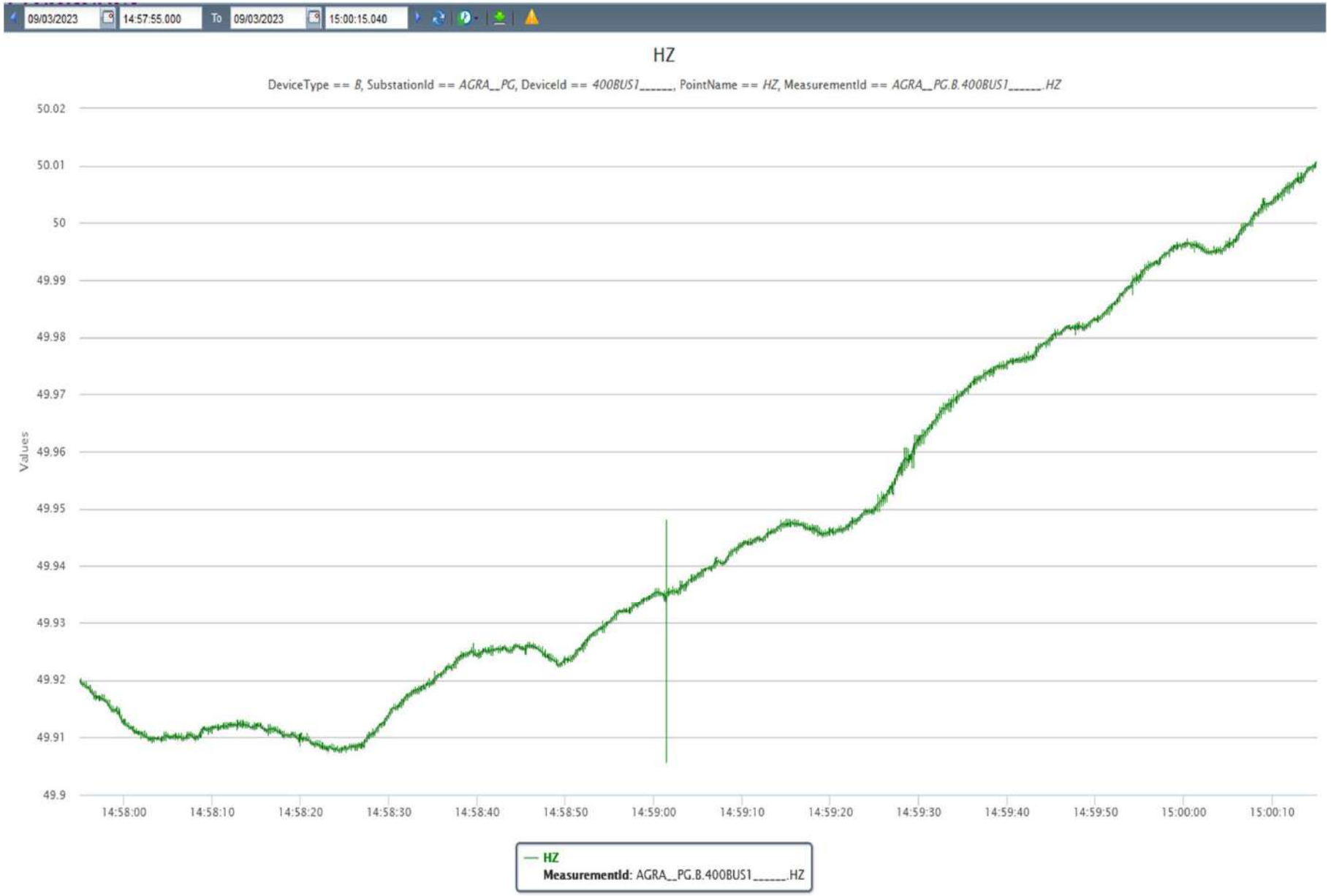
ii) It is observed that DR of 33kV feeder is not time synced. Time syncing of the same need to be ensured.

iii) SCADA data of 400kV Noida Sec 148 S/s was not healthy during the event timing, healthiness of the same need to be ensured.

iv) Remedial action taken report to be shared.

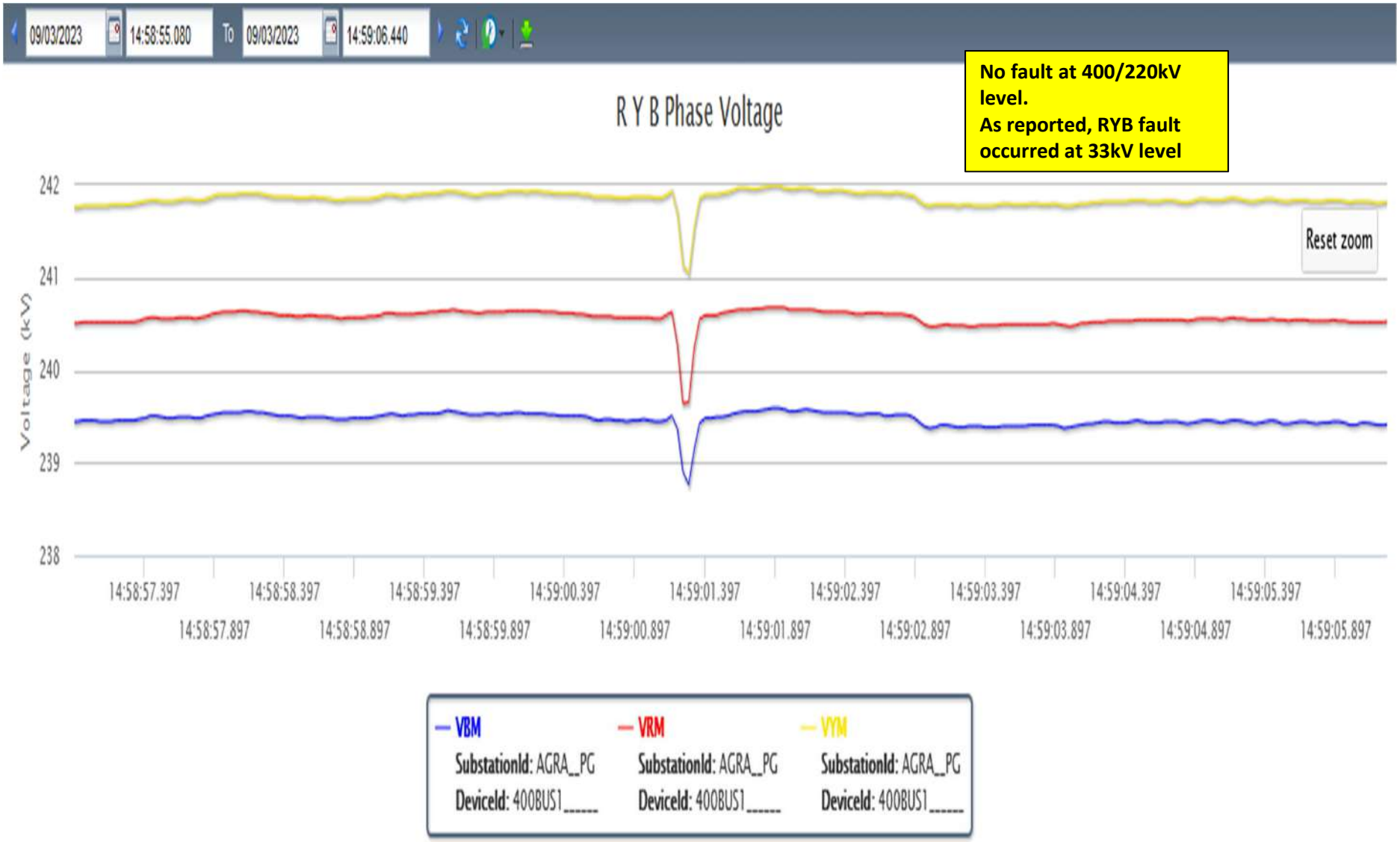
PMU Plot of frequency at Agra400(PG)

14:59hrs/09-Mar-23

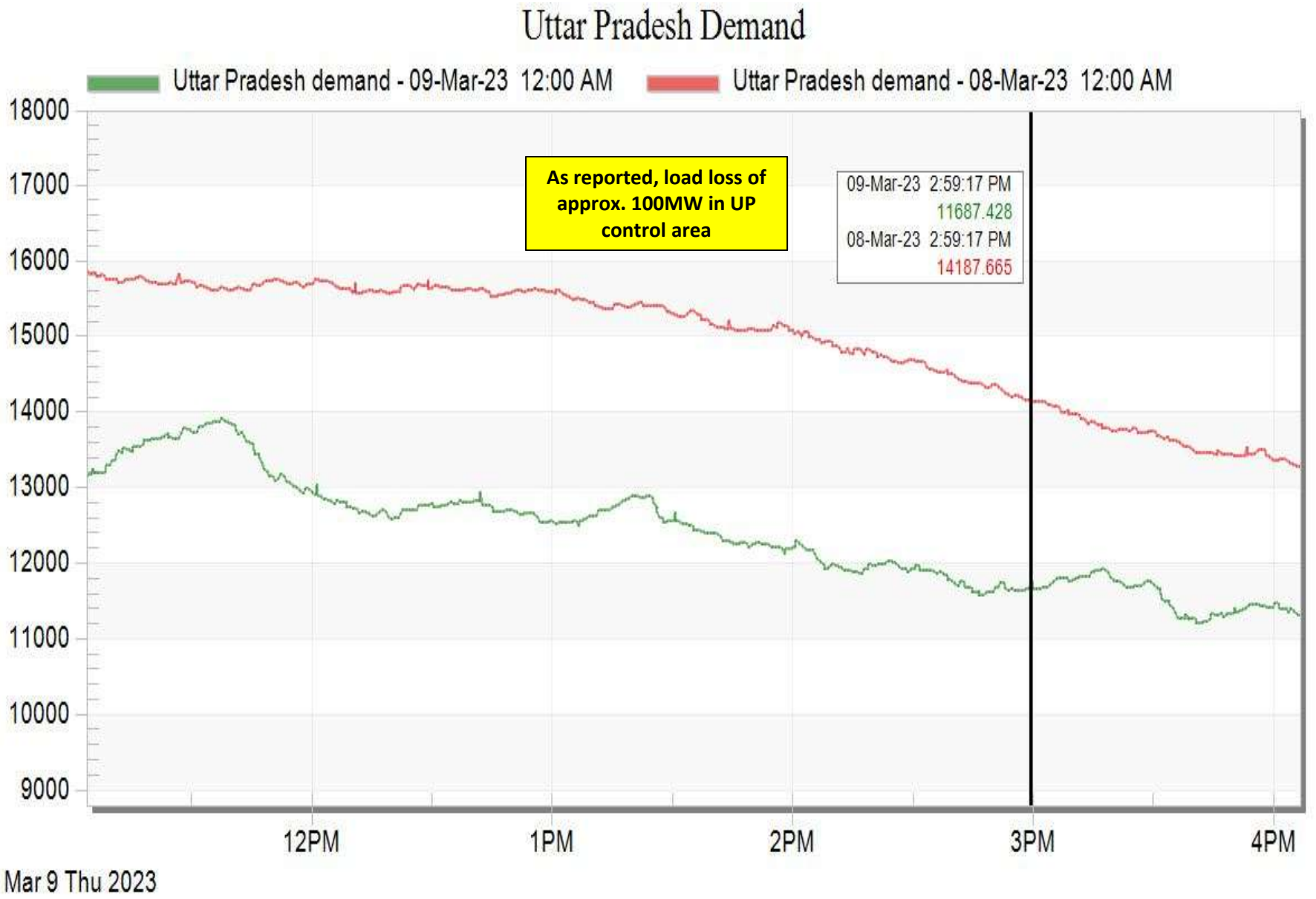


PMU Plot of phase voltage magnitude at Agra400(PG)

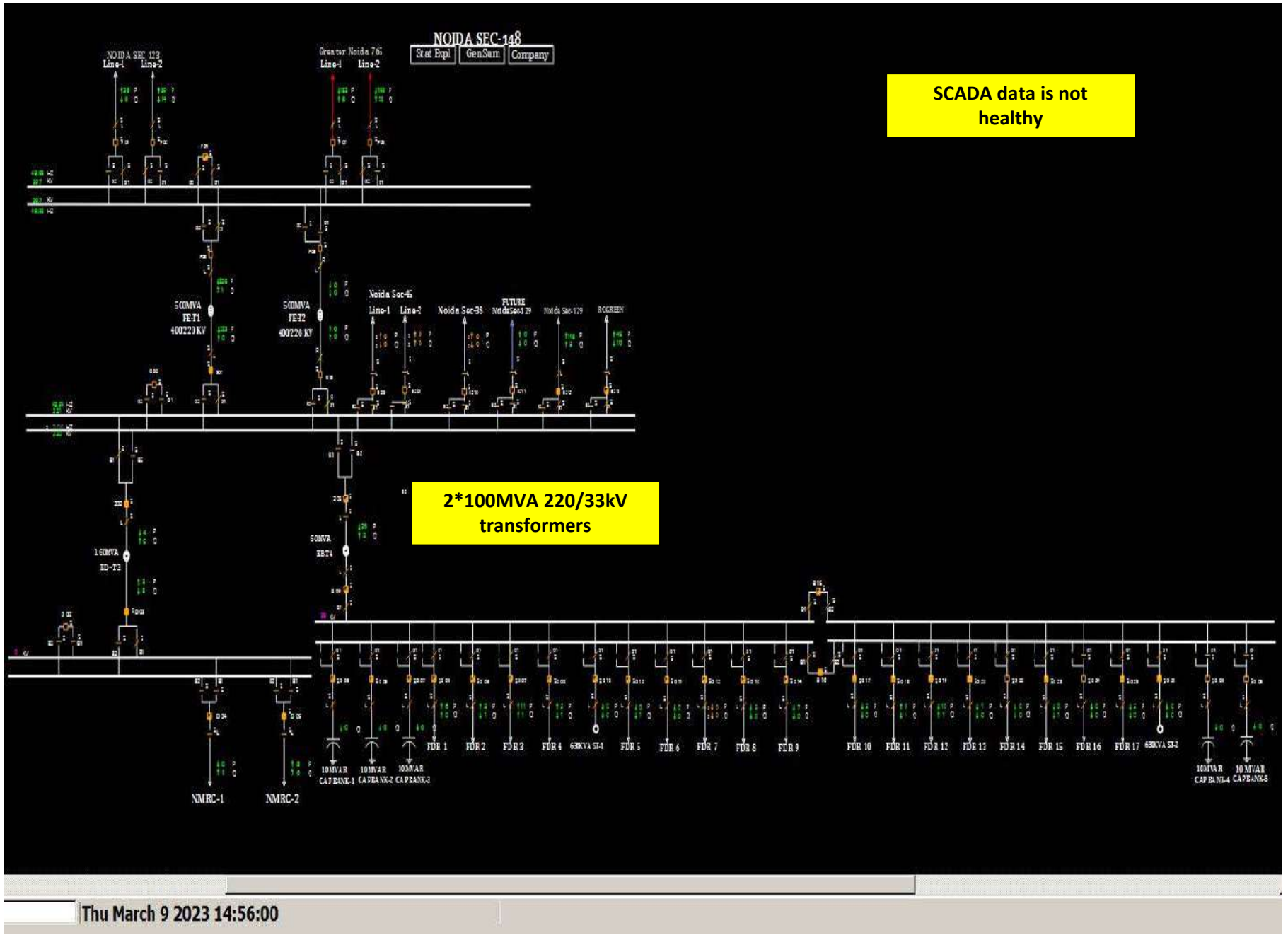
14:59hrs/09-Mar-23



Uttar Pradesh demand during the event



SLD of 400/220kV Noida Sec 148(UP) before the event

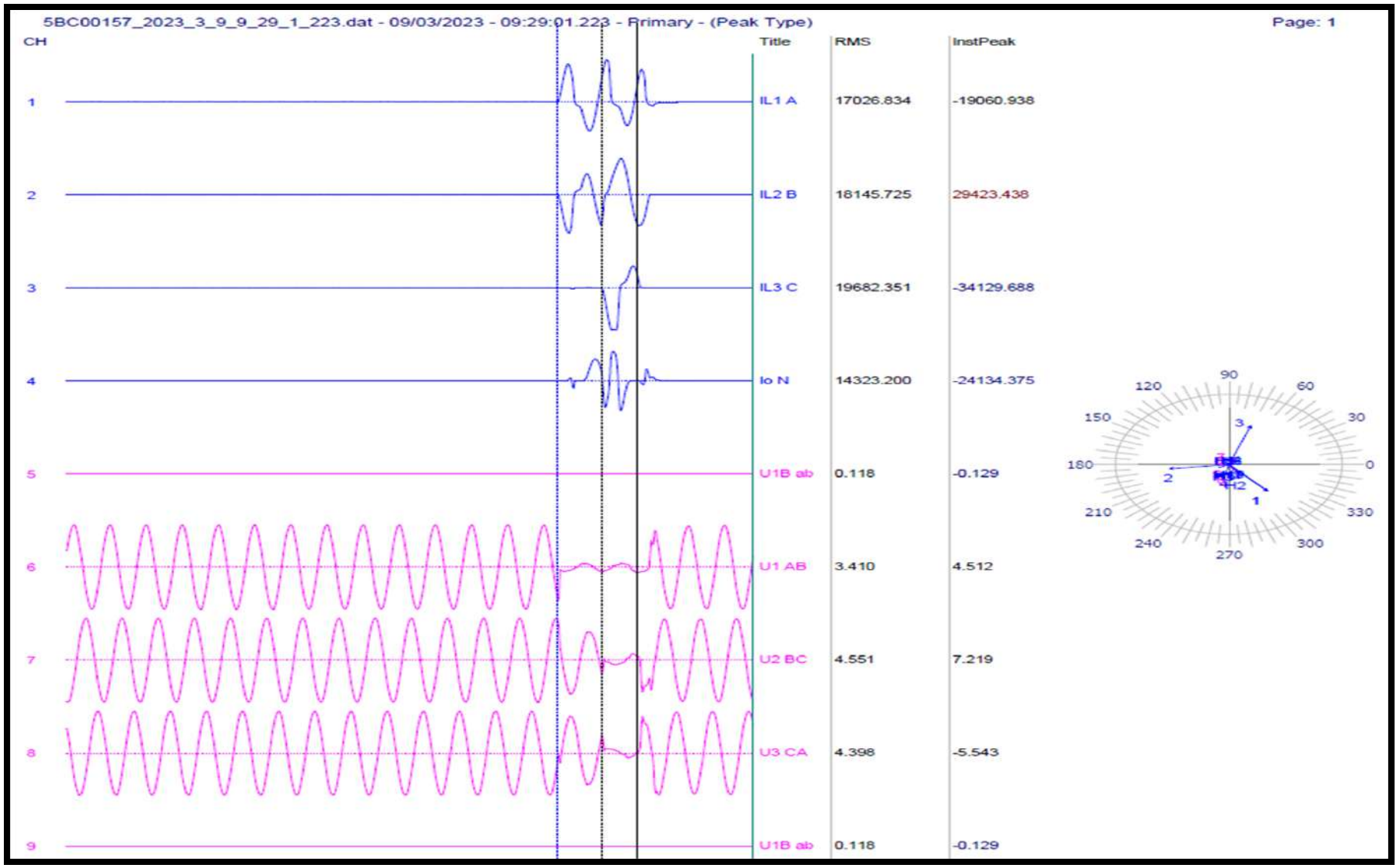


SCADA SOE

Time	Station Name	Voltage(kV)	Element Name	Element Type	Element Status	Remark
14:59:46,913	GNOD7_U	400	412S148A	Circuit Breaker	Open	Main CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened
14:59:46,914	GNOD7_U	400	411SKD1S	Circuit Breaker	Open	Tie CB at Gr.Noida_ end of 400 KV Gr.Noida_2(UPC)-Noida Sec 148 (UP) Ckt-1 opened

- ✓ SCADA SOE data of 400kV Noida Sec148(UP) S/s are not available.

DR of feeder no 12 connected at 33kV level at Noida Sec 148 S/s



- ✓ Differential current in all three phase of approx. 17-19kA
- ✓ Time sync issue.

DR of 400kV bus bar relay

```
* File Information::
* ------------------
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             Device: 1
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          File Size: 414049 Bytes
     Prefault Time: 09/03/2023 15:01:33.091000
       Fault Time: 09/03/2023 15:01:33.576000
        Save Time: 03-10-2023 14:25:06
     Process Time: 03-10-2023 18:12:42
 Start Date && Time: 09/03/2023 15:01:33.091000
   End Date && Time: 09/03/2023 15:01:34.609559
      File Duration: 1  Sec(s) - 518 Mils(s) - 559 Mics(s)
 Sampling Frequency: 1200.480192, 833.000  Microsecond Rate
    Line Frequency: 50.000000

* Maximum/Minimum Analog Summary:
* -------------------------------
>  Max-Inst      Min-Inst       Max-RMS      Min-RMS     One-Bit    Inst-Diff     RMS-Diff   pUnits     Description
     31.710       -31.710        31.710        0.003     31.7100        0.000       31.707        V           1-VAN
     31.710       -31.710        21.468        0.000     31.7100        0.000       21.468        V           2-VBN
     31.710       -31.710        19.418        0.000     31.7100        0.000       19.418        V           3-VCN
     22.096       -27.620        10.211        3.906      5.5240        5.524        6.305        A           4-IA-T1/IX-T1
     27.620       -27.620        11.826        0.000      5.5240        0.000       11.826        A           5-IB-T1/IX-T2
     22.096       -22.096         9.959        4.066      5.5240        0.000        5.893        A           6-IC-T1/IX-T3
     22.096       -22.096        12.607        3.740      5.5240        0.000        8.867        A           7-IA-T2/IX-T4
     22.096       -27.620         9.959        3.740      5.5240        5.524        6.219        A           8-IB-T2/IX-T5
     22.096       -16.572        10.638        3.740      5.5240        5.524        6.898        A           9-IC-T2/IX-T6
     27.620       -27.620        12.856        4.510      5.5240        0.000        8.346        A          10-IA-T3/IX-T7
     27.620       -22.096        10.756        3.906      5.5240        5.524        6.850        A          11-IB-T3/IX-T8
     22.096       -27.620        16.572        3.383      5.5240        5.524       13.189        A          12-IC-T3/IX-T9
     22.096       -22.096        10.085        0.000      5.5240        0.000       10.085        A          13-IA-T4/IX-T10
     27.620       -22.096        10.517        0.000      5.5240        5.524       10.517        A          14-IB-T4/IX-T11
     22.096       -22.096        14.263        3.906      5.5240        0.000       10.357        A          15-IC-T4/IX-T12
     27.620       -27.620        11.554        3.906      5.5240        0.000        7.648        A          16-IA-T5/IX-T13
     33.144       -33.144        14.874        4.784      5.5240        0.000       10.090        A          17-IB-T5/IX-T14
     22.096       -27.620        10.022        4.066      5.5240        5.524        5.957        A          18-IC-T5/IX-T15
     27.620       -33.144        12.707        0.000      5.5240        5.524       12.707        A          19-IA-T6/IX-T16
     33.144       -27.620        11.880        4.219      5.5240        5.524        7.661        A          20-IB-T6/IX-T17
     22.096       -33.144         9.894        0.000      5.5240       11.048        9.894        A          21-IC-T6/IX-T18

* Events/Sensors Activity Summary:
* ---------------------------------
>Fst  Lst  Fst-Change         Lst-Change         Changes    Description
  N    N    15:01:33.575806  15:01:33.810712  004          1-R1 401 LBB/BB OP
  N    N    15:01:33.575806  15:01:33.810712  004          5-R5 405 LBB/BB OP
  N    N    15:01:33.575806  15:01:33.810712  004          7-R7 407 LBB/BB OP
  N    N    15:01:33.575806  15:01:33.810712  004          9-Any Trip

* Events/Sensors Activity Log:
* -----------------------------
> State    Trigger-Time                Description
    A      09/03/2023 15:01:33.575806   1-R1 401 LBB/BB OP
    A      09/03/2023 15:01:33.575806   5-R5 405 LBB/BB OP
    A      09/03/2023 15:01:33.575806   7-R7 407 LBB/BB OP
    A      09/03/2023 15:01:33.575806   9-Any Trip
N          09/03/2023 15:01:33.651609   1-R1 401 LBB/BB OP
N          09/03/2023 15:01:33.651609   5-R5 405 LBB/BB OP
N          09/03/2023 15:01:33.651609   7-R7 407 LBB/BB OP
N          09/03/2023 15:01:33.651609   9-Any Trip
    A      09/03/2023 15:01:33.707420   1-R1 401 LBB/BB OP
    A      09/03/2023 15:01:33.707420   5-R5 405 LBB/BB OP
    A      09/03/2023 15:01:33.707420   7-R7 407 LBB/BB OP
    A      09/03/2023 15:01:33.707420   9-Any Trip
N          09/03/2023 15:01:33.810712   1-R1 401 LBB/BB OP
N          09/03/2023 15:01:33.810712   5-R5 405 LBB/BB OP
N          09/03/2023 15:01:33.810712   7-R7 407 LBB/BB OP
N          09/03/2023 15:01:33.810712   9-Any Trip
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- ✓ Bus bar protection operated