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/106/01/2023/1504-1545 दिनांक: 14.02.2023

विषय: प्रचालन समन्वय उप-समिति की 204वीं बैठक की कार्यसूची।

Subject: Agenda of 204th OCC meeting.

प्रचालन समन्वय उप-समिति की **204वीं** बैठक का आयोजन वीडियो कॉन्फ्रेंसिंग के माध्यम से दिनांक **17.02.2023** 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।

204th meeting of the Operation Co-ordination sub-committee will be conducted through Video Conferencing on **17.02.2023** 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.

Santosh 14/02/23

(संतोष कुमार)
अधीक्षण अभियंता (प्रचालन)

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

Special Invitee: SE(Operation), WRPC (For agenda no. 11)

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1. Confirmation of Minutes

The minutes of the 203rd OCC meeting were issued vide letter of even number dated 07.02.2023.

- With regard to Agenda No. 7 (Part-A) (NR Islanding Scheme), UPSLDC vide letter dated 10.02.2023 has requested OCC forum that following statement may kindly be added:

  "In the meeting, it was decided that UPPTCL will arrange and commission UFRs to be installed at substations of PGCIL. It was also decided that UPPTCL shall request PGCIL to give consent for testing and maintaining UFRs and related system at their substations."

- With regard to Agenda No. 21 (Part-B) (TTC/ATC of state control areas for winter 2022), JKTTPL (IndiGrid) vide mail dated 10.02.2023 has submitted that JKTTPL has never denied the installation of new ICT and this matter is still under discussions with HVPNL. There are certain key aspects which need further deliberations and discussions amongst both JKTTPL and HVPNL before arriving at a final conclusion.

Sub-committee may deliberate and kindly confirm the Minutes.

2. Review of Grid operations

2.1 Power Supply Position (Provisional) for January 2023

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

State / UT	Req. / Avl.	Energy (MU)			Peak (MW)		
		Anticipated	Actual	% Variation	Anticipated	Actual	% Variation
CHANDIGARH	(Avl)	120	143	18.8%	270	323	19.6%
	(Req)	130	143	9.7%	280	323	15.4%
DELHI	(Avl)	3183	2476	-22.2%	5500	5526	0.5%
	(Req)	2400	2479	3.3%	5500	5623	2.2%
HARYANA	(Avl)	4630	4352	-6.0%	11110	8259	-25.7%
	(Req)	4190	4386	4.7%	7930	8259	4.1%
HIMACHAL PRADESH	(Avl)	1113	1079	-3.0%	2060	2071	0.5%
	(Req)	1116	1081	-3.1%	2080	2071	-0.4%
J&K and LADAKH	(Avl)	920	1949	111.8%	3240	3015	-6.9%
	(Req)	1930	1957	1.4%	3000	3015	0.5%
PUNJAB	(Avl)	5160	4614	-10.6%	11390	9089	-20.2%
	(Req)	3970	4650	17.1%	7450	9089	22.0%
RAJASTHAN	(Avl)	8520	9193	7.9%	19200	17206	-10.4%
	(Req)	9130	9609	5.2%	16200	17399	7.4%
UTTAR	(Avl)	9920	10613	7.0%	20500	21342	4.1%

PRADESH	(Req)	10075	10674	5.9%	20500	21342	4.1%
UTTARAKHAND	(Avl)	1302	1313	0.9%	2450	2492	1.7%
	(Req)	1333	1348	1.1%	2550	2492	-2.3%
NORTHERN REGION	(Avl)	34867	35731	2.5%	77300	63200	-18.2%
	(Req)	34274	36326	6.0%	59800	63600	6.4%

As per above, negative / significant variation (≥5%) in Actual Power Supply Position(Provisional) vis-à-vis Anticipated figures is observed for the month of January-2023 in terms of Energy Requirement for Chandigarh, HP, Punjab, Rajasthan, UP, and in terms of Peak Demand similar variation is noted for Chandigarh, HP, Punjab, Rajasthan, and Uttarakhand. 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 March-2023 is scheduled on 16-February-2023 via Video Conferencing

3.2. Outage Programme for Transmission Elements

The meeting on proposed outage programme of Transmission elements for the month of March-2023 is scheduled on 16-February-2023 via Video conferencing.

4. Planning of Grid Operation

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

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

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
CHANDIGARH	Availability	130	290	No Revision submitted
	Requirement	110	250	
	Surplus / Shortfall	20	40	
	% Surplus / Shortfall	18.2%	16.0%	
DELHI	Availability	2430	6080	No Revision submitted
	Requirement	2130	4300	
	Surplus / Shortfall	300	1780	
	% Surplus / Shortfall	14.1%	41.4%	
HARYANA	Availability	4590	10560	No Revision submitted
	Requirement	4270	7590	

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
	Surplus / Shortfall	320	2970	
	% Surplus / Shortfall	7.5%	39.1%	
HIMACHAL PRADESH	Availability	1023	1970	13-Feb-23
	Requirement	1029	1954	
	Surplus / Shortfall	-6	16	
	% Surplus / Shortfall	-0.5%	0.8%	
J&K and LADAKH	Availability	1140	3510	No Revision submitted
	Requirement	1790	3670	
	Surplus / Shortfall	-650	-160	
	% Surplus / Shortfall	-36.3%	-4.4%	
PUNJAB	Availability	5890	11720	No Revision submitted
	Requirement	4410	7670	
	Surplus / Shortfall	1480	4050	
	% Surplus / Shortfall	33.6%	52.8%	
RAJASTHAN	Availability	8960	19000	No Revision submitted
	Requirement	8990	16140	
	Surplus / Shortfall	-30	2860	
	% Surplus / Shortfall	-0.3%	17.7%	
UTTAR PRADESH	Availability	12630	25050	No Revision submitted
	Requirement	11770	20190	
	Surplus / Shortfall	860	4860	
	% Surplus / Shortfall	7.3%	24.1%	
UTTARAKHAND	Availability	1228	2110	07-Feb-23
	Requirement	1240	2190	
	Surplus / Shortfall	-12	-80	
	% Surplus / Shortfall	-0.9%	-3.7%	
NORTHERN REGION	Availability	38022	75600	
	Requirement	35739	60200	
	Surplus / Shortfall	2283	15400	
	% Surplus / Shortfall	6.4%	25.6%	

SLDCs are requested to update the anticipated power supply position of their respective state / UT for the month of March-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	Nov-2022
HIMACHAL PRADESH	Apr-2018	Dec-2022

State / UT	From	To
PUNJAB	Apr-2018	Nov-2022
RAJASTHAN	Apr-2018	Nov-2022
UTTAR PRADESH	Apr-2018	Oct-2022
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 (203rd OCC), NRPC representative apprised that a meeting was held on 11th January 2023, and concern of Himachal Pradesh regarding the under frequency setting of generators was discussed.

7.2 In the meeting held on 11.01.2023, setting received from generators involved in Kullu-Manali islanding scheme was deliberated and it was found that their under frequency protection setting can be set below 47.9 Hz.

7.3 In the meeting held on 11.01.2023, however, with regard to Shimla-Solan islanding scheme some HEPs were requested to intimate there under frequency protection setting within one week.

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, 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 February 2023) is as follows:

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
ANPARA C TPS	1200	80.94	17	6.4
ANPARA TPS	2630	65.44	17	26.2
BARKHERA TPS	90	60.74	26	26.7

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd (Days)	Actual Stock (Days)
DADRI (NCTPP)	1820	72.72	26	5.6
GH TPS (LEH.MOH.)	920	64.10	26	**2.6**
GOINDWAL SAHIB TPP	540	55.94	26	9.0
HARDUAGANJ TPS	1265	41.40	26	23.3
INDIRA GANDHI STPP	1500	66.79	26	9.3
KAWAI TPS	1320	84.01	26	13.5
KHAMBARKHERA TPS	90	47.89	26	23.8
KOTA TPS	1240	69.49	26	**3.2**
KUNDARKI TPS	90	72.83	26	26.3
LALITPUR TPS	1980	54.29	26	25.1
MAHATMA GANDHI TPS	1320	80.49	26	15.2
MAQSOODPUR TPS	90	67.50	26	30.0
MEJA STPP	1320	64.19	26	6.5
OBRA TPS	1094	67.44	26	7.5
PANIPAT TPS	710	86.06	26	7.7
PARICHHA TPS	1140	47.54	26	7.8
PRAYAGRAJ TPP	1980	74.66	26	7.6
RAJIV GANDHI TPS	1200	63.89	26	14.9
RAJPURA TPP	1400	92.55	26	23.7
RIHAND STPS	3000	95.29	17	25.9
ROPAR TPS	840	58.73	26	4.8
ROSA TPP Ph-I	1200	81.75	26	8.8
SINGRAULI STPS	2000	88.97	17	16.1
SURATGARH TPS	1500	51.70	26	**2.3**
TALWANDI SABO TPP	1980	71.24	26	4.3
TANDA TPS	1760	76.96	26	8.9
UNCHAHAR TPS	1550	78.90	26	11.2
UTRAULA TPS	90	47.86	26	33.3
YAMUNA NAGAR TPS	600	85.34	26	16.7
CHHABRA-I PH-1 TPP	500	78.82	26	**0.9**
KALISINDH TPS	1200	80.57	26	**2.3**
SURATGARH STPS	1320	0.00	26	**1.4**
CHHABRA-I PH-2 TPP	500	68.97	26	**2.2**
CHHABRA-II TPP	1320	57.28	26	**1.4**

9. Draft guidelines on manpower adequacy for SLDCs,(Agenda by NRPC Sectt.)

9.1 GM, Division CEA in its letter dated 14.12.2022 informed that the meeting was taken by Secretary (P) with CEA and GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. Draft guidelines for strengthening of SLDCs in India is attached as **Annexure-A.III.**

9.2 The cited matter was deliberated in the 61st NRPC meeting held on 26th December 2022(Copy of MoM of meeting is attached as **Annexure-A.IV**) wherein It was decided that this agenda may be discussed in upcoming OCC meeting.

Members may kindly deliberate.

10. Expeditious revival of thermal (coal) units by Mar-23 (i.e. 31.03.2023) and ensure maximum capacity on bar during anticipated crunch period (from 01st April to 15th May-23) (Agenda by NRPC Sectt.)

10.1 NLDC vide its mail dated 10.02.2023 highlighted that all constituents shall be apprised the need for expeditious revival of thermal (coal) units by Mar-23 (i.e. 31.03.2023) and ensure maximum capacity on bar during anticipated crunch period (from 01st April to 15th May-23)

Members may kindly note and for strict compliance.

11. Guidelines/ Procedure for Certification of Open Cycle Operation of Combined Cycle Gas Based Generating Stations(Agenda by NRPC Sectt.)

11.1. As per CERC (T&C of Tariff) Regulations, 2014, Energy Charge Rate for a gas/liquid fuel based station is to be adjusted for open cycle operation based on certification of Member Secretary of respective Regional Power Committee for the open cycle operation during the month.

11.2. Guidelines/ Procedure for Certification of Open Cycle Operation of Combined Cycle Gas Based Generating Stations were discussed and finalised in 35th CSC meeting of NRPC held on 19.02.2018 **(Annexure-A.V)** where Guidelines/ Procedure for Certification of Open Cycle Operation for schedule is given by beneficiaries. A copy of relevant portion of MoM is enclosed herewith for reference.

11.3. It has been noted that, for past 2 years, NTPC Gas Power plants in NR are occasionally given sufficient schedule by their ISGS beneficiaries. Majority of generation under these plants are due to the schedule given under RRAS. Under such circumstances, modalities of certification of generation under open cycle finalised in 35th CSC meeting does not hold true.

11.4. In view of this, there is a need for deliberation on Guidelines/ Procedure for certification of generation under open cycle for the schedule given under RRAS.

Members may kindly deliberate.

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

12. NR Grid Highlights for January 2023

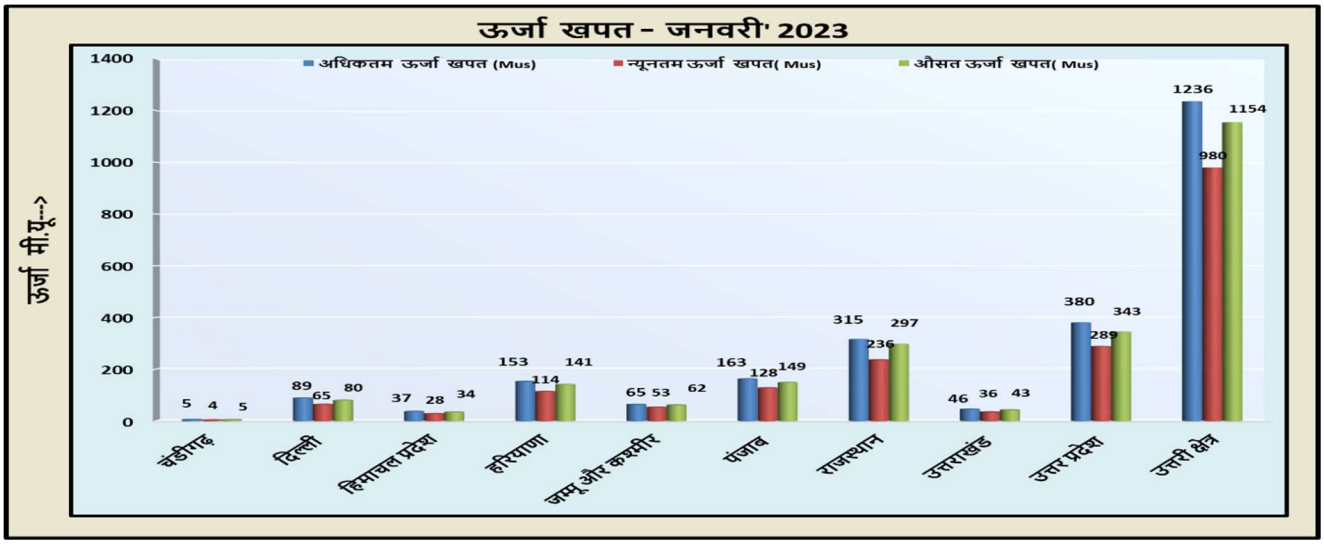
Following are major grid highlights of January 2023:

- Maximum energy consumption of Northern Region was **1236 Mus** on 11th January'23 and it was 14.8 % higher than January' 2022 (1077 Mus 19th January'22)
- In January'23, the Average energy consumption per day of Northern Region was **1154 Mus** and it was 14.6 % higher than January'22 (1007 Mus per day)
- In January'23, the Maximum Demand met of Northern Region was **63236MW** on 11th January'23 @13:00 hours (*based on data submitted by Constituents)* as compared to 56213 MW on 28th January'22 @11:00 hours.

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

States	Max.DemandMet duringtheday(MW)		As per SCADAinstantaneousdata	EnergyConsumption (MU)	
	As per hourly dataSubmittedbyStates (MW)/Format28	Asondate		As per PSP (Mus)	Asondate
Rajasthan	17206	18-01-2023 14:30hrs	17097 23-01-23	-	-
J&K(UT)andLadakh(UT	3019	18-01-2023 21:00 hrs	3019 18-01-2023	65.39	20.01.23
Himachal Pradesh	2071	06-01-2023 09:45hrs	2071 06-01-2023		

Energy Consumption:



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

State/ U/T	January - 2022	January - 2023	% Diff
Chandigarh	4.0	4.6	13.8
Delhi	72.5	80.0	10.4
HP	34.2	34.5	0.8

Haryana	118.3	141.5	19.6
Jammu & Kashmir	55.9	61.9	10.7
Punjab	120.2	148.8	23.8
Rajasthan	248.5	296.7	19.4
Uttarakhand	41.8	42.7	2.1
Uttar Pradesh	311.9	343.4	10.1
Northern Region	**1007.3**	**1154.1**	**14.6**

Frequency Data

Month	Avg.Freq. (Hz)	Max.Freq.(Hz)	Min. Freq.(Hz)	<49.90(%time)	49.90–50.05(%time)	>50.05(%time)
Jan'23	50.00	50.49	49.42	13.30	58.70	28.00
Jan'22	50.00	50.28	49.65	5.84	75.66	18.50

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

13. Grid Operation related issues

a) Central Electricity Authority (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023

On 25.01.2023, Central Electricity Authority has recently notified regulations on Flexible operation of coal fired generating units. It is available @*https://cea.nic.in/wp-content/uploads/notification/2023/01/Gazette_Flexible_operation-4.pdf*

Extract from notified regulations are mentioned below:

Applicability*- These regulations shall apply to all coal based thermal power generating units owned or under control of the Central Government, State Governments or owned by any private company, connected with the grid and to the load despatch centers*

General requirements*.- (1) The coal based thermal power generating units shall be designed or suitably retrofitted, if required, to comply with these regulations for full range of ambient and environmental conditions prevailing at the site.*

(2) All equipment and systems installed shall comply with the provisions of statutes, regulations and safety codes, as applicable.

Flexible operation of coal based thermal power generating units*- (1) The coal based thermal power generating units shall be capable of providing the flexible operation as per these regulations.*

(2) The implementation of flexible operation of the coal based thermal power generating units shall be as per the phasing plan specified by the Authority from time to time.

(3) All load despatch centers shall schedule the coal based thermal power generating units, under their jurisdiction, considering the flexible operation capabilities as specified in these regulations.

Minimum power level capabilities of coal based thermal power generating units for flexible operation*- The coal based thermal power generating units shall have flexible operation capability with minimum power level of forty percent.*

Provided that the generating units which are not capable of achieving minimum power level of fifty-five percent, shall achieve the same within one year of the notification of these regulations.

Provided further that the generating units which are not capable of achieving minimum power level of forty percent, shall achieve the same as per phasing plan mentioned in the sub-regulation (2) of regulation 5 of these regulations.

Ramp rates capabilities of coal based thermal power generating units for flexible operation*- (1) The coal based thermal power generating units shall have ramp rate capability of minimum three percent per minute for their operation between seventy percent to hundred percent of maximum continuous power rating and shall have ramp rate capability of minimum two percent per minute for their operation between fifty-five percent to seventy percent of maximum continuous power rating.*

Provided that the generating units which are not capable to comply with this regulation, shall comply with the same within one year of the notification of these regulations.

(2) The coal based thermal power generating units shall achieve ramp rate capability of minimum one percent per minute for their operation between forty percent to fifty-five percent of maximum continuous power rating as per phasing plan mentioned in the sub-regulation (2) of regulation 5 of these regulations.

Relaxation of regulations*. - The Authority may, by an order and for the reasons to be recorded in writing, relax any provision of these regulations in respect of the matter referred to the Authority, on case to case basis.*

CERC vide their order dated 06.02.2023 has amended DSM regulations. Details available @https://cercind.gov.in/2023/orders/1-SM-2023.pdf

Members may kindly discuss.

b) Non-availability of Tehri and Koteshwar generation due to proposed river dredging work of Tehri Pump Storage Plant

THDC vide letter No. THDC/RKSH/OMS/F-120 dtd. 24.01.2023 and E-mail dtd. 03.02.2023 (**Annexure-B.I**) have informed regarding non-availability of Tehri and Koteshwar generation from 15th Feb to 15th June 2023 due to proposed river dredging work of Tehri Pump Storage Plant.

The generation pattern of Tehri HEP vis-à-vis frequency for the period Feb-2022 to June-2022 is attached at **Annexure-B.II**. From the generation pattern ofTehri HEP, it is observed that:

(1) During the month of Feb-2022, max. generation was 820MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 75.2 percent of the time (sample day-27th Feb-2022).

(2) During the month of March-2022, max. generation was 200MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 52.5 percent of the time (sample day-25th March-2022). Moreover, low frequency operation was observed in March-2022 with abnormal high temperatures reaching 40°C reaching in March itself, which was highest recorded temperature in last 122 years in the country.

(3) During the month of April-2022, max. generation was 500MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 50.8 percent of the time (sample day-21st April-2022). Again, low frequency operation was observed in April month also. Delhi witnessed temperature of 45°C, which was also the highest for past 72 years.

(4) During the month of May-2022, max. generation was 400MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 68.3 percent of the time (sample day-25th May-2022). Moreover, there was continuous generation (round the clock) at Tehri HEP from 18th to 22nd May and 25th to 27th May (Max. Gen. 400 MW and Min. Gen. 120 MW).

(5) During the month of June-2022, max. generation was 375MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 54.7 percent of the time (sample day-13th June-2022). Moreover, there was continuous generation (round the clock) at Tehri from 11th to 13th June (Max. Gen. 375 MW and Min. Gen. 250 MW).

From the above data, it is observed that generating units at Tehri HEP were running for extended hours due to high demand period in summer season, as well as due to low head at Tehri.

Also, due high RE integration, variability in the grid has increased. So, availability of hydro generating units could be required during contingency. From the profile of Tehri generation vis-à-vis frequency for the period Feb-2022 to June-2022 (for sample days, attached at **Annexure-B.II**), it can be seen that non-availability of Tehri generation could have adverse impact on frequency profile particularly during the months of March and April.

Further, as per Office Memorandum, MoPdtd. 25.11.2022 enclosing Minutes of the meeting taken by Secretary (Power), as per point no. 4 it was requested to minimise outages in the month of April'23 and other peak demand months.(also discussed in 203 OCC meeting)

Members may kindly discuss.

c) 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.

Rajasthan SLDC to provide update.

d) Low CUF and large deviations by ISTS connected RE generators

As per clause (1)(r) of Regulation 2 of the Central Electricity Regulatory Commission regulation (Deviation Settlement Mechanism and related matters) (Second Amendment) Regulations, 2015 as quoted below:

Quote:

“(ii) After sub-clause (q) under clause (1) of Regulation 2, new sub-clause (r) shall be added as under:- (r) 'Available Capacity (AvC)' for wind or solar generators which are regional entities is the cumulative capacity rating of the wind turbines or solar inverters that are capable of generating power in a given time-block.”

Un Quote.

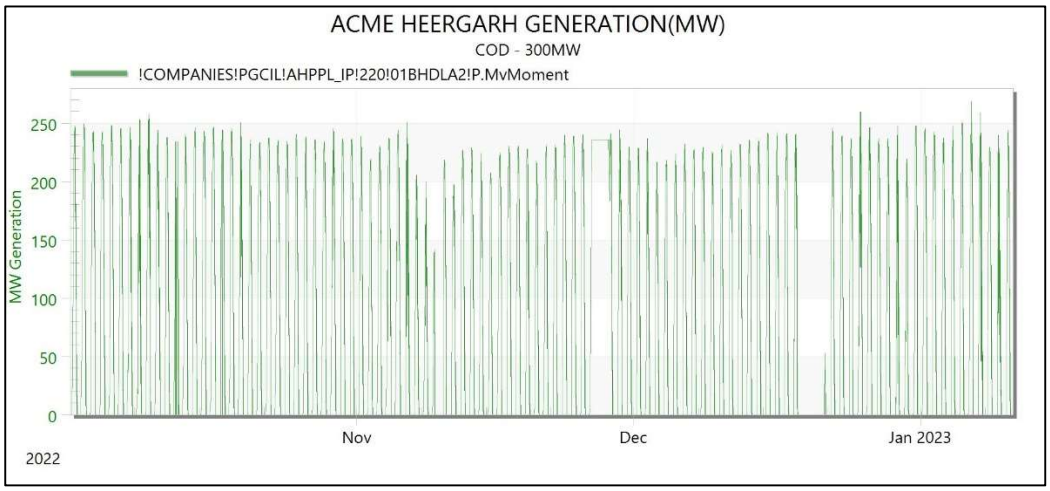
The Plant (ACME Heergarh) has already declared full COD for 300MW on 25.05.2022. Similarly, Azure Mapple also has declared full COD for 257MW on 31.03.2022.

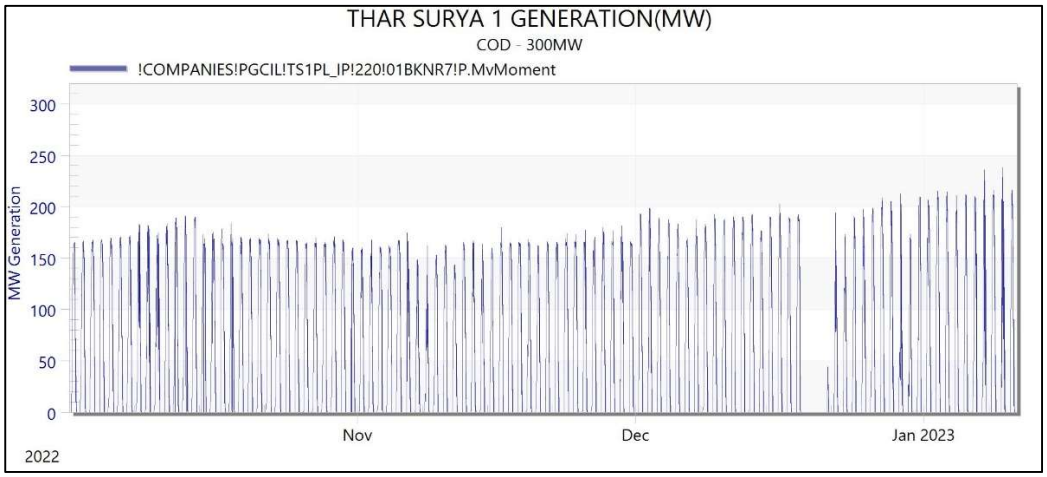
Since last few month it has been observed that max generation of ACME Heergarh plant is ~250MW and plant is not able to schedule/generate up to full COD for 300MW. Low CUF are observed in ACME Heergarh/AzureMapple and these plants are not generating up to Declared capacity/Available Capacity value on continuous basis. Communication regarding this have been sent by NRLDC but response is yet to be received.

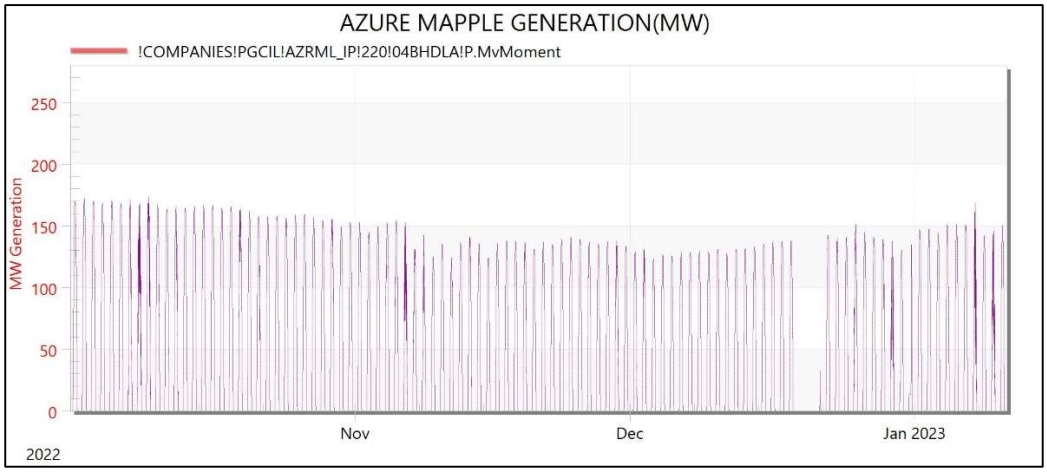
Recently same issue is observed in TharSuyra1.

Trend Graph for these plants is shown below for reference.

Plant Name	CoD quantum (MW)	Actual generation (MW)
ACME Heergarh	300	230-250
TharSuyra1	300	170-200
AzureMapple	257	140-170







ACME Heergarh vide their letter dated 20.01.2023 has submitted their response. Response is attached as Annexure-B.III. Reply from other solar developers such as Azure Mapple and Thar Surya1 is still awaited. It is to be noted that AvC quantum is considered for DSM charge calculation.

Members may kindly discuss.

e) Long outage of transmission elements

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

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.

14. Summer Preparedness 2023

With the increase in temperature, demand of Northern Region starts increasing from March onwards every year. Summer of Northern region are typically hot and demand is also high during this time, therefore advance actions help in better grid operation.

Due to extreme weather conditions, high demand is observed during summer/monsoon months in Northern region. Along with high demand, high loadings of lines and transformers and low voltages especially at distribution level are big challenge to safe and secure grid operation. To overcome the commonly encountered challenges during summer months and ensuring smooth grid operation, following are few points which have been discussed on many occasions in previous OCC and TCC/ NRPC meetings and are required to be followed by all:

S. No.	Issues	Action plan	Action by
1	**Maintenance of reserves** During summer, in anticipation of increasing demand, adequate reserves shall be maintained. During summer, sudden outage of hydro units on silt or other major generation outage affects frequency/voltage, line loading, reliability and security of the corridor/control area/Generation complex etc. In events of sudden load crash, ISGS generators are being instructed to back down to 55% of their installed capacity. However, amongst states only UP state controlled generators are seen to be backing down upto 55%, which	In such cases, apart from portfolio management based on proper forecast as discussed above, re-starting of units under reserve shutdown at state as well as Inter-state level through appropriate transactions is required. Moreover, display window showing reserve available in ISGS generators has been developed at NRLDC. SLDCs are also requested to arrange for such 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. Other states are also requested to take actions to ensure backing down	NRLDC, SLDCs, Generators

	ensures that sufficient reserves are available to cater any variation in demand.	of generators to 55% of their capacity in case of critical situations. This would ensure reserves in the system and also make us prepared for extreme situations.	
2	**Furnishing of coal stock position** Advance information of coal stock of thermal plants ensures generating units availability and it is very important during high demand season.	It has been observed in past years that sudden information of outage of thermal units on coal unavailability poses challenges to meet high demand. It is therefore requested to update & share coal stock position of thermal plants at least a week in advance as agreed earlier in TCC/NRPC meeting.	Generators, SLDCs
3	**Portfolio Management, load staggering** As discussed in previous OCC meetings states such as UP, Rajasthan and Haryana continue to connect/ disconnect large quantum of load at hourly boundaries resulting in frequency spikes and instantaneous over voltages. This has also resulted in tripping of lines on overvoltage in recent past. In view of high/increasing demand & transmission constraints (if any) in importing the power or in case of any contingency in the system, states are requested to maximize their internal generation to avoid low frequency/low voltage operation or other related issues.	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 neighbor states or hydro rich states and utilization of real-time market etc. to bridge the load-generation gap in real time.	SLDCs
4	**Tower Strengthening and availability of ERS** There have been number of instances of tower collapse & damage in the past during thunder storms which resulted in constraints in supply power for extended duration of time. Number of tower collapse incidents occurred during last summer also in May/Jun 2021 & 2022 in which many EHV lines including 765kV lines were out on tower collapse.	All utilities are requested to ensure availability of Emergency Restoration System (ERS) for early restoration of supply. 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 may be shared by all transmission utilities***	***STUs and POWERGRID***
5	**Reactive power management**	To maintain the voltage profile of	

	Over the years during summer months, it has been observed that voltage profile during summer has improved. However, it is always essential to remain alert and take all necessary precautions to avoid any issues arising due to low voltages during summer months.	Grid within IEGC band during summer, following known actions are suggested: i. Switching ON Capacitor/Switching OFF reactor as per system requirement ii. Tap Optimization at 400/220kV by NRLDC and 220/132kV by respective state control area based on scatter plots of ICTs, offline studies, NRPC RE account etc. iii. Dynamic reactive support from Generator as per their capability curve. iv. SCADA Displays for better visualization during real-time	NRLDC, SLDCs
6	**Defense Mechanism** Several defense mechanism schemes have been recommended by various committees and advantages of such defense schemes have been discussed in many fora too. Majority of defense mechanism are to cover protection for under voltage, under frequency, rate of change of frequency, SPS for line/ICTs loading/generator complex evacuation etc. It is pertinent to mention here that SPS is only for operational defense and should not be considered as long term solution.	Till date it has been observed that performance of SPS is considerably low. Accurate operation of SPS is very essential and hence, mapping of SPS in SCADA is also being done. It is suggested that all state control area/Users shall ensure before start of summer that their protection and defense system are in working conditions and settings are as per the recommendations of NRPC. In addition, all states/user need to provide update for changes or modifications carried out if any.	Transmission utilities (STU/ISTS) and SLDCs
7	**Telemetry** It has been observed number of times, that telemetry of large nos of stations is affected during contingency, inclement weather, or in day to day switching operations etc.	All are requested to ensure the telemetry of all analog & digital points of all stations at respective control centers. Large number of telemetry issues are also encountered with newly commissioned elements.	J&K/ POWERGRID shall share the current status of data telemetry of J&K. Other SLDCs STUs

Due to unfavorable weather conditions during summer months, All India demand is on the higher side. On several days, it is observed that frequency is below the band

for most of the time. In order to maintain the Grid security all SLDCs are requested to take proactive steps as follows:

- Ensure that ADMS is in service and expedite its implementation if not commissioned.
- Ensure healthiness and availability of AUFLS and df/dt load shedding.
- Ensure revival of intra-state generators under economic shutdown/RSD
- Ensure portfolio balancing through STOA/RTM market segments
- Ensure no under injection by the generators from schedule
- In case of inadequate margins in intrastate generators measures for emergency load regulation measures may be taken in interest of grid security.
- Pursue generators to expedite revival of thermal units under forced outage wherever feasible.

In this case, the list of radial feeders become very important. Utilities have been requested number of times to update list of radial feeders which can be opened on the directions of NRLDC to regulate the demand. List of such radial feeders has been provided by respective utilities and is part of 'Operating Procedure of Northern Region'. Latest list of radial feeders is also attached as **Annexure-B.V**. Following are the attributes for such feeders:

- Feeders shall be radial in nature
- They should usually have substantial load flow so that reduction of drawal can be prominently noticed on opening of such lines.

The opening of feeders is generally an extreme step which shall be required in case of threat to grid security and non-adherence to RLDC instructions to manage overdrawl by SLDCs/ DISCOMs. In such a case, every utility needs to take actions to support RLDC by following their instructions including opening of feeders.

SLDCs are once again requested 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

Utilities may also intimate in case no radial feeders are available to disconnect. In such a case, NRLDC along with constituent will study the grid connected feeders /ICTs for disconnection which has low impact in the NR Grid. For such states, it is requested to nominate one nodal officer from SLDC which shall coordinate with NRLDC and study about such feeders.

Telemetry is to be ensured for all such feeders for monitoring in real time by SLDC/ NRLDC. States are also advised to take remedial measures for minimizing sustained over drawal at low frequencies as per the IEGC.

Members may like to discuss.

15. 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 March 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.

Feedback regarding issues observed during Q1 and Q2 2022-23 was submitted by Grid-India to CTUIL and CEA. It is requested that all utilities go through the issues encountered in Q1 and Q2 2022-23 and take necessary actions to avoid such issues in 2023-24. Feedbacks submitted by Grid-India to CTUIL and CEA are available:

Q1 2022-23:
https://posoco.in/download/nldc-operational-feedback_july_2022/?wpdmdl=46648

Q2 2022-23:
https://posoco.in/download/nldc-operational-feedback_oct_2022/?wpdmdl=48526

STATE	PREENT IMPORT TRANSFER CAPABILITY	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
Haryana	TTC: 9100MW RM: 600MW ATC: 8500MW	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.
		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
		N-1 Contingency of 2*500 MVA ICT at Kurukshetra (PG)	New 500MVA ICT approved in 4 NRPCTP held on 05.10.2021.
		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 is awaited.
Punjab	TTC: 9000MW RM: 500MW	N-1 Contingency of 2*500 MVA ICT	New 500MVA ICT approved in 11 CMETS held on 30.09.2022. (Expected May'2024)

STATE	PREENT IMPORT TRANSFER CAPABILITY	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
	ATC: 8500MW	at Patran	
		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)
		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
		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.
		N-1 contingency of 400kV Rajpura (Th)-Rajpura D/C	Additional evacuation path from Rajpura TPS may be planned. Line length is small.
Rajasthan	TTC: 7600MW RM: 600MW ATC: 7000MW (Issues observed with load >14500MW)	N-1 Contingency of 2*315 MVA ICT at Chittorgarh	New 1*500MVA ICT under bidding/ implementation at these S/s by RVPNL. Rajasthan STU has planned and implemented SPS at these locations. (except Bhilwara&Hindaun) Capacity augmentation at Chittorgarh expected by July 2023, for all other substations after next winter season.
		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	
		N-1 Contingency of 2*315 MVA ICT at Hindaun	
		N-1 Contingency of 1*315+1*500	

STATE	PREENT IMPORT TRANSFER CAPABILITY	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
		MVA ICT at Bhilwara	
		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 1-2 more winter seasons. Other measures required by RVPN.
		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 number of 400/220kV ICTs)	As intimated by RVPN, Capacitor banks to be installed after PSDF funding. Action plan for next winter to be submitted.
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.
		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
		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
		N-1 Contingency of	New 500MVA ICT approved in 3 NRPCTP held on 19.02.2021.

STATE	PREENT IMPORT TRANSFER CAPABILITY	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
		2*315 MVA ICT at Sohawal(PG)	
		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 (expected by Mar 2023). 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.
		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. One ICT already shifted from 400/220kV Bamnauli to Mundka.
Himachal Pradesh	TTC: 1400MW RM: 100MW ATC: 1300MW (lean hydro)	N-1 Contingency of 3*315 MVA ICT at Nallagarh	New ICT/ Capacity augmentation to be proposed by HPPTCL/ PSTCL
Uttarakhand	TTC: 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 is planned in Feb 2023 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)
J&K	TTC: 2200MW RM: 100MW ATC: 2100MW (lean hydro)	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.
		High loading of 220kV lines from	Additional connectivity to be planned and already approved schemes to be expedited by JKPTCL

STATE	PREENT IMPORT TRANSFER CAPABILITY	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
		Wagoora(PG)	
		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.

Loading of 400/220kV ICTs and important 220kV lines observed above or close to N-1 contingency limits in last month is also attached as **Annexure-B.VI**.

UP

In 203 OCC meeting, UP representative stated that Sohawal SPS has been implemented and Obra SPS is likely to be commissioned by end of Feb2023.

UP SLDC to provide update on:

- Status of Obra SPS

Haryana

In 203 OCC meeting, Haryana SLDC informed the following:

- ATC/TTC limits for low demand period i.e. winter months based on anticipated state generation scenario has been shared with NRLDC
- Regarding N-1 non-compliance at 400/220kV Dipalpur: As intimated by XEN/TS, Panipat, feasibility regarding installation of additional 400/220kV ICTs already submitted, but M/s JKTPL (Now Indigrid) authorities (400kV Dipalpur) deny for installation of additional ICTs due to commercial reasons.
- Panipat BBMB: As intimated by XEN/TS, Panipat, the matter has been taken up with 400kV S/Stn. BBMB, Panipat regarding installation of additional ICT or augmentation of ICTs but BBMB Panipat replied that “Installation of additional ICT or augmentation of ICTs is not possible due to space constraints”.As intimated by PD&C wing, the creation of 400kV TikriKhurd by DTL will provide relief to the ICTs at Panipat BBMB (Dec-24)

NRLDC representative stated that the above issues may not be attended before paddy 2023, for ATC/TTC enhancement. Accordingly, it was requested to take up the matter on priorty with STU.

Haryana SLDC to provide update

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.

In 202 & 203 OCC meeting, it was discussed that proposal for capacity augmentation was discussed in OCC/ NRPC meeting but could not be finalised. Therefore, till capacity is augmented at 400/220kV Amargarh, any N-1 contingency is likely to lead to tripping of

both ICTs as they are loaded beyond their N-1 contingency limit and there would be load loss in valley area.

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. ***J&K officers have requested for online assistance from NRLDC officers. NRLDC would be providing training to J&K officers in last week of Feb 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.

16. MVAR support from generators

During winter season, demand of Northern region is low and high voltages are a common phenomenon predominantly in Punjab, Haryana and Delhi area. Even after several actions being taken by control centers, it is seen that there is persistent high voltage in Northern region. The reactive power absorption by generators becomes an important resource that helps in managing high voltages in the grid. However, even after continuous follow up in OCC meetings, it is seen that MVAR data telemetry is poor/ inaccurate from most of the generating stations. For some of the generators it is seen that there is inadequate reactive power absorption based on their capability curve especially during night hours. The performance of generators in absorption of reactive power for last 30 days (11 Jan 2023 – 10 Feb 2023) is shown below:

S.No.	Station	Unit No.	Capacity	Geographical location	MVAR capacity as per capability curve (on LV side)	MVAR performance (-) Absorption (+) Generation (HV side data)	Voltage absorption above (in KV)
1	Dadri NTPC	1	490	Delhi-NCR	-147 to 294	-170 to 100	415

		2	490		-147 to 294	-160 to 110	410
2	Singrauli NTPC	1	200	UP	-60 to 120	-20 to 10	405
		2	200		-60 to 120	-20 to 10	405
		3	200		-60 to 120	-20 to 5	403
		4	200		-60 to 120	-	-
		5	200		-60 to 120	-50 to 10	404
		6	500		-150 to 300	-50 to 20	405
		7	500		-150 to 300	-60 to 15	404
3	Rihand NTPC	1	500	UP	-150 to 300	-40 to 35	403
		2	500		-150 to 300	-50 to 20	402
		3	500		-150 to 300	-100 to 0	398
		4	500		-150 to 300	-40 to 40	403
4	Kalisindh RS	1	600	Rajasthan	-180 to 360	-120 to 100	Not clear
		2	600		-180 to 360	-150 to 30	Not clear
5	Anpara C UP	1	600	UP	-180 to 360	-40 to 80	770
		2	600		-180 to 360	-40 to 80	770
6	TalwandiSaboo PB	1	660	Punjab	-198 to 396	-220 to 0	410
		2	660		-198 to 396	-220 to 0	410
		3	660		-198 to 396	-	-
7	Kawai RS	1	660	Rajasthan	-198 to 396	-50 to 80	407
		2	660		-198 to 396	-60 to 60	406
8	IGSTPP Jhajjar	1	500	Haryana	-150 to 300	-70 to 110	418
		2	500		-150 to 300	-100 to 120	417
		3	500		-150 to 300	-	-
9	Rajpura (NPL)	1	700	Punjab	-210 to 420	-220 to 0	405
		2	700		-210 to 420	-220 to 0	405
10	MGTPS	1	660	Haryana	-198 to 396	-150 to 50	412
		2	660		-198 to 396	-150 to 100	412

11	Bawana	1	216	Delhi-NCR	-65 to 130	-70 to 20	412
		2	216		-65 to 130	-	-
		3	216		-65 to 130	-	-
		4	216		-65 to 130	-50 to 40	415
		5	253		-65 to 130	-50 to 50	418
		6	253		-65 to 130	-30 to 40	418
12	Bara PPGCL	1	660	UP	-198 to 396	-60 to 80	765, 780
		2	660		-198 to 396	-70 to 70	765, 775
		3	660		-198 to 396	-60 to 60	765, 770
13	Lalitpur TPS	1	660	UP	-198 to 396	-50 to 80	765
		2	660		-198 to 396	-60 to 40	765
		3	660		-198 to 396	-80 to 90	760
14	Anpara D UP	1	500	UP	-150 to 300	-70 to 30	760
		2	500		-150 to 300	-50 to 50	765
15	Chhabra TPS	1	250	Rajasthan	-75 to 150	-50 to 20	405
		2	250		-75 to 150	-50 to 20	405
		3	250		-75 to 150	-	-
		4	250		-75 to 150	-	-
		5	660		-198 to 396	-70 to 100	408
		6	660		-198 to 396	-60 to 100	408

All generating stations are requested to resolve any issues related to telemetry and make sure that MVAr absorption is as per grid requirement and capability curve of machine.

Some of the generating units such as Dadri, Bawana, IGSTPP Jhajjar and Bara need to explore possibility of further MVAR absorption. Generators may also set their Vsch (voltage set point) such that units are absorbing MVAR as per their capability and grid requirement. Plots for concerned units are attached as Annexure-B.VII. Actions from above generators was also requested in 203 OCC meeting.

In 203 OCC meeting,

NTPC representative agreed to check the matter with Dadri generating station.

IGSTPP Jhajjar representative stated that there is requirement of tap change of Generator transformer and they are exploring the possibility of Generator transformer tap change for better reactive power response with their Operational Services team.

Members may like to discuss.

17. Frequent forced outages of transmission elements in the month of January'23:

The following transmission elements were frequently under forced outages during the month of

January 23:

S. No.	Element Name	No. of forced outages	Utility/SLDC
1	220 KV Kotputli(PG)-Bansur(RS) (RS) Ckt-1	3	Rajasthan
2	400 KV Agra-Unnao (UP) Ckt-1	3	UP
3	400 KV Aligarh-Sikandrabad (UP) Ckt-1	4	UP
4	400 KV Amargarh(NRSS XXIX)-Samba(PG) (NRSS XXIX) Ckt-2	3	INDIGRID/J&K
5	400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1	4	UP
6	400 KV Bareilly-Unnao (UP) Ckt-1	7	UP
7	400 KV Suratgarh(RVUN)-Ratangarh(RS) (RS) Ckt-2	3	Rajasthan
8	765 KV Anta-Phagi (RS) Ckt-2	3	Rajasthan

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

18. Multiple element tripping events in Northern region in the month of January '23:

A total of 24 grid events occurred in the month of January'23 of which **15** are of GD-1 category, **07** are of GI-2 Category & 02 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.IX.**

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 560 msec in the event of multiple element tripping at 400kV Bara &Meja S/s in UP at 04:33hrs on 01st Jan 23 & at 06:23hrs on 05th Jan23. During both the 400 KV Bara(UP)-Meja TPS(MUN) (UP) D/C tripped on single phase to earth fault.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total 8events out of **24** grid events occurred in the month. The other events with delayed clearance of faults are as follows:

1. Multiple elements tripping at 220kV Samaypur(BB) at 16:56hrs on 12th Jan23, fault clearance time: 520ms

2. Multiple elements tripping at 400kV Rajwest(RS) at 05:32hrs on 13th Jan23 and at 05:02hrs on 30th Jan23, fault clearance time: 200ms & 320ms during 13th Jan & 30thJan tripping event respectively.
3. Multiple elements tripping at 132kV Sewa-2(NHPC) & 220/132kV Hiranagar(J&K) at 20:05hrs on 25th Jan23, fault clearance time: 280ms
4. Multiple elements tripping at 400kV Anpara(UP) at 17:04hrs on 28th Jan23, fault clearance time: 440ms

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

As per the discussion in last OCC, tripping report along with status of corrective actions are yet to be received from BBMB w.r.t. event at Dehar&Panipat in Dec22 and from Haryana & Delhi w.r.t. event at Jhajjar on 20th Dec22.

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.

19. Details of tripping of Inter-Regional lines from Northern Region for January' 23:

A total of 17 inter-regional lines tripping occurred in the month of January'23. The list is attached at **Annexure-B.X.** 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.

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

The status of receipt of DR/EL and tripping report of utilities for the month of January'2023 is attached at **Annexure-B.XI**. 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, Haryana 7 Uttarakhand in January'2023 compared to the previous month. However, reporting status from POWERGRID (NR-1), Punjab, Delhi, HP, J&K, and Rajasthan & 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.

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

In last 21 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.XII.**

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 please discuss.

22. Frequency response characteristic:

Three FRC based event occurred in the month of **January-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	12-Jan-23	05:52hrs	On 12th Jan at 03:03hrs, 400kV Bara-Meja ckt-1 tripped on Y-N fault. Further at 03:48hrs 400kV Bara-Meja ckt-2 tripped on phase to earth fault, as per PMU, Y-N followed by R-N fault observed. With the tripping of 400kV Bara-Meja ckt-1&2 generation of all three 660MW Units at Bara TPS (carrying ~1250MW during antecedent condition) was evacuating from 765kV Bara-Mainpuri ckt-2. Further at 05:52hrs, 765kV Bara-Mainpuri ckt-2 tripped on R-N phase to earth fault. Due to loss of evacuation path, all three(03) running units at Bara TPS tripped and loss of ~1250MW generation occurred. Hence, generation loss of 1250MW has been considered for FRC calculation.	49.91	49.88	0.03
2	14-Jan-23	12:06hrs	On 14th Jan 2023, As reported At 12:06 hrs drop in RE generation of approx.1100MW observed in Rajasthan RE complex. As per PMU at 12:06hrs R-N phase to earth fault is observed and multiple elements tipping at 220kV Heerapura(Raj) observed from SCADA data. Accordingly 1100MW has been considered in FRC Calculation.	50.04	50.00	0.04
3	14-Jan-23	13:03hrs	On 14th Jan 2023, As reported At 13:03 hrs Due to Multiple tripping at Rajasthan RE complex, generation loss of around 2340 MW resulted in Rajasthan RE generation loss complex of Northern	50.13	50.02	0.11

			Region and same has been considered in FRC Calculation.			
4	14-Jan-23	14:55hrs	On 14th Jan 2023, As reported At 14:55 hrs Due to multiple tripping in solar park lead to tripping of evacuating lines at 765kV, 400kV , 220kV and resulted in generation loss of around 3210 MW resulted in Rajasthan RE generation loss complex of Northern Region and same figure has been considered in FRC Calculation.	50.01	49.83	0.18
5	14-Jan-23	15:18hrs	On 14th Jan 2023, As reported At 15:18 hrs Due to multiple tripping in solar park lead to tripping of evacuating lines at 765kV, 400kV , 220kV and resulted in generation loss of around 4780 MW resulted in Rajasthan RE generation loss complex of Northern Region and same figure has been considered in FRC Calculation.	50.04	49.70	0.34
6	17-Jan-23	09:55hrs	On 17th Jan 2023, As reported at 09:56 hrs, Due to Auxiliary bus fault at Sterlite of Easterner Region led to tripping of all lines and resulted in 1900 MW load loss. After tripping all Generation of 1550 MW started exporting to Grid, subsequently due SPS action two generators tripped which lead to 752 MW generation loss. Accordingly for FRC Calculation figure of 1148 MW has been considered. For FRC calculation an offset value of 0.053 Hz has been considered in the settling frequency 50.03Hz based	50.04	50.08	0.04

			on approximate calculation and final settling frequency 50.08 Hz has been considered for calculation in the event.			

Status of Data received till date:

For 12th Jan23 event:
Data/update has been received from NTPC(Singrauli, Koldam, Dadri), TSPL, NHPC, Delhi, AD Hydro HEP, Rosa Reliance, & Koteshwar HEP.

For 14th Jan23 event:
Data/update has been received from NTPC(Singrauli, Koldam), TSPL, NHPC, UP, Delhi, Tehri HEP, AD Hydro HEP, CSCTPP Chhabra, Karcham HEP & Koteshwar HEP.

For 17th Jan23 event:
Data/update has been received from NTPC(Singrauli, Tanda, Koldam), TSPL, Kawai TPS, NHPC, UP, Delhi, Tehri HEP, AD Hydro HEP, CSCTPP Chhabra & Karcham HEP.

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

Members may please discuss.

23. 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**	**Remark**

	exercise date	
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**
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	23rd Jan 2023
*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	RanjitSagar	4x150
11		Mahi-I&II	2x25+2x45
12		Rana PratapSagar	4x43
13		JawaharSagar	3x33
14		Gandhi Sagar	5x23
15	Rajasthan	Dholpur GPS	3x110
16		Ramgarh GPS	1x35.5+2x37.5+1x110
17		Rihand	6x50
18		Obra	3x33
19	UP	Vishnuprayag	4x100
20		Srinagar (Alaknanda)	4x82.5
21			
		Gamma Infra	2x76+1x73
22		Shravanti	6x75
23		Ramganga	3x66
24		Chibro	4x60
25	Uttarakhand	Khodri	4x30
26		Chilla	4x36
27		ManeriBhali-I&II	3x30+4x76
28		IP Extn GTs	6x30+3x30
29	Delhi	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 Obra&Rihand HEP (UP)

24. Revision of document for System Restoration Procedure (SRP) and System Protection Scheme for Northern Region:

System Restoration Procedure document of Northern Region and System Protection Scheme for Northern region have been revised and shared with all the constituents on 31st Dec 2022. Documents are available at NRLDC website with following link:

System Restoration Procedure:

https://nrldc.in/download/nr-system-restoration-document/?wpdmdl=11999

System Protection Scheme:

https://nrldc.in/download/nr-sps-2023/?wpdmdl=12006

Documents are password protected and password has already been shared with all the NR constituents through letter dated 31st Jan 2023.

25. Drop/loss of RE generation and Non-compliance of LVRT/HVRT

In recent past, multiple events of loss of RE generation connected at ISTS pooling stations in RE generation complex in Rajasthan occurred due to non-compliance of LVRT/HVRT. Brief details of events occurred during recent past are as follows:

a) On 14thJan 2023:

i) Reduction of approx. 2430MW RE generation at 13:03hrs, triggering incident was R-N (L-G) fault in 765kV Ajmer-Bhadla2 ckt-2.

ii) Reduction of approx. 3210MW RE generation at 14:55hrs, triggering incident was R-Y (L-L) fault in 400kV Bassi-Heerapura ckt-2.

iii) Reduction of approx. 4468MW RE generation at 15:18hrs, triggering incident was R-Y (L-L) fault in 400kV Phagi-Heerapura ckt-1.

b) On 08th Feb 2023:

Reduction of approx. 1700MW RE generation at 12:25hrs during opening of 125MVAr Bus reactor at 400kV Fatehgarh1 Pooling S/s.

c) On 09th Feb 2023:

Eight (no.) incidents of significant reduction in RE generation along with tripping of multiple 765kV ISTS lines at RE pooling stations occurred.

Significant reduction in RE generation also occurred during these incidents i.e, ~4459MW at 11:45hrs, ~3678MW at 11:57hrs, ~2993MW at 12:03hrs, ~1444MW at 12:08hrs, ~1288MW at 12:12hrs, ~3379MW at 12:17hrs, ~2273MW at 12:23hrs and ~3055MW at 12:30hrs.

d) On 10th Feb 2023:

iv) Reduction of approx. 3000MW RE generation at 11:31hrs, triggering incident was R-Y (L-L) fault 220kV fatehgarh2-Eden ckt.

LVRT/HVRT compliance status of RE stations connected at ISTS pooling stations in RE generation complex in Rajasthan based on analysis of 14th Jan 2023 event from PMU data is attached at **Annexure-B.XIII**

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>Nov-2022</td></tr><tr><td>◎</td><td>HP</td><td>Jan-2022</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>Jan-2023</td></tr><tr><td>◎</td><td>UP</td><td>Jan-2023</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Jan-2023</td></tr></table>All States/UTs are requested to update status on monthly basis.</td></tr>
<tr><td>3</td><td>Healthiness of defence mechanism: Self-certification</td><td>Report of mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that “All the UFRs are checked and found functional”.</td><td>Data upto following months, received from various states / UTs:
<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>Nov-2022</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></td><td></td><td>In compliance of NPC decision, NR states/constituents agreed to raise the AUFR settings by 0.2 Hz in 47th TCC/49th NRPC meetings.</td><td>Status:
<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>

			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.
4	Status of FGD installation vis-à-vis installation plan at identified TPS	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.	Status of the information submission (month) from states / utilities is as under: ◎ HARYANA — Sep-2022 ◎ PUNJAB — Sep-2022 ◎ RAJASTHAN — Nov-2022 ◎ UP — Sep-2022 ◎ NTPC — Feb-2022 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.
5	Information about variable charges of all generating units in the Region	The variable charges detail for different generating units are available on the MERIT Order Portal.	All states/UTs are requested to submit daily data on MERIT Order Portal timely.
6	Status of Automatic Demand Management Sysytem in NR states/UT's	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:	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

7	Reactive compensation at 220 kV/ 400 kV level at 15 substations			
	State / Utility	Substation	Reactor	Status
i	POWERGRID	Kurukshetra	500 MVAr TCR	Testintg is under progress and Anticipated commissioning: Dec'22
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.
ix	PUNJAB	Nakodar	1x25 MVAr at 220 kV	220kV Reactors - LOA issued on dated 19.07.2021 and date of completion of project is 18 months from the date of LOA.
x	PTCUL	Kashipur	1x125 MVAR at 400 kV	Price bid has been opened and is under evaluation
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.	-	PDD, J&K to update the status.
2	400/220kV, 2x315 MVA New Wanpoh	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV New Wanpoh - Alusteng D/c Line	-	PDD, J&K to update the status.
				• 220 kV New Wanpoh - Mattan D/c Line	-	PDD, J&K to update the status.
3	400/220kV, 2x315 MVA Amargarh	Commissioned: 6 Total: 6	Utilized: 6 Unutilized: 2	• 220kV D/C line from 400/220kV Kunzar - 220/33kV Sheeri	-	PDD, J&K to update the status.
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
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	Commissioned: 8	Utilized: 0	• 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

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
13	Sub-station	Total: 8	Unutilized: 8	• 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.
22	400/220kV Gorakhpur Sub-station	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	Feb'23	• Gorakhpur(PG)- Maharajganj, 220 kV D/C line expected energization date Feb'23 updated by UPPCL in 202nd 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

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
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
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	Jan'23	Saharanpur(PG)-Devband D/c line expected energization date Jan'23 updated by UPPTCL in 202nd 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.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
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 (25.02.2022)
MEJA Stage-I (Updated by UP on 18.06.2022)
RIHAND STPS
SINGRAULI STPS
TANDA Stage-I
TANDA Stage-II
UNCHAHAR TPS
UPRVUNL (14.11.2022)
ANPARA TPS
HARDUAGANJ TPS
OBRA TPS
PARICHHA TPS

PSPCL (14.11.2022)
GGSSTP, Ropar
GH TPS (LEH.MOH.)
RRVUNL (10.02.2023)
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: 30-09-2022), INDIRA GANDHI STPP U#2 (Target: 30-09-2022), INDIRA GANDHI STPP U#3 (Target: 30-09-2022)
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: 30-04-2021), PANIPAT TPS U#7 (Target: 28-02-2021), PANIPAT TPS U#8 (Target: 31-12-2020), RAJIV GANDHI TPS U#1 (Target: 30-04-2022), RAJIV GANDHI TPS U#2 (Target: 28-02-2022), YAMUNA NAGAR TPS U#1 (Target: 31-12-2021), YAMUNA NAGAR TPS U#2 (Target: 31-10-2021)

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: 30-06-2022), RIHAND STPS U#1 (Target: 30-06-2024), RIHAND STPS U#2 (Target: 30-06-2024), RIHAND STPS U#3 (Target: 31-12-2023), RIHAND STPS U#4 (Target: 31-12-2023), RIHAND STPS U#5 (Target: 30-06-2023), RIHAND STPS U#6 (Target: 30-06-2023), SINGRAULI STPS U#1 (Target: 30-06-2024), SINGRAULI STPS U#2 (Target: 30-06-2024), SINGRAULI STPS U#3 (Target: 30-06-2024), SINGRAULI STPS U#4 (Target: 30-06-2024), SINGRAULI STPS U#5 (Target: 30-06-2024), SINGRAULI STPS U#6 (Target: 31-03-2023), SINGRAULI STPS U#7 (Target: 31-03-2023), UNCHAHAR TPS U#1 (Target: 31-12-2023), UNCHAHAR TPS U#2 (Target: 31-12-2023), UNCHAHAR TPS U#3 (Target: 30-06-2024), UNCHAHAR TPS U#4 (Target: 30-06-2024), UNCHAHAR TPS U#5 (Target: 30-06-2024), UNCHAHAR TPS U#6 (Target: 30-06-2022), MEJA Stage-I U#1 (Target: 31-12-2022), MEJA Stage-I U#2 (Target: 31-03-2023), TANDA Stage-I U#3 (Target:), TANDA Stage-I U#4 (Target:), TANDA Stage-II U#3 (Target: 31-12-2022), TANDA Stage-II U#4 (Target: 31-12-2022)

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: 31-12-2024), GH TPS (LEH.MOH.) U#2 (Target: 31-12-2024), GH TPS (LEH.MOH.) U#3 (Target: 31-12-2024), GH TPS (LEH.MOH.) U#4 (Target: 31-12-2024), GGSSTP, Ropar U#3 (Target: 31-03-2022), GGSSTP, Ropar U#4 (Target: 31-05-2022), GGSSTP, Ropar U#5 (Target: 31-07-2022), GGSSTP, Ropar U#6 (Target: 30-09-2022)

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: 31-08-2022), KOTA TPS U#6 (Target: 31-08-2022), KOTA TPS U#7 (Target: 31-08-2022), 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											

Issue No : I/25047/2022

Annexure II

File No.CEA-GO-12-29/2/2022-GM Division

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
ग्रिड प्रबंधन प्रभाग
Grid Management Division
****

Sub : Guidelines on manpower adequacy for SLDCs

It is to inform that the meeting was taken by Secretary(P) with CEA & GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. The draft circulated by MoP on 29.11.2022 was discussed (copy enclosed).

It was decided for restructuring of the draft report including organogram of typical SLDC & capturing new areas like cyber security, resource adequacy, disturbances etc.

For the above activity the list of documents to be referred are as below:

(1) Pradhan Committee Report 2008-GoI (Report of the Combined Committee on Manpower Certification, Incentives for System Operators and Ring Fencing Load Despatch Centres)
(2) Detailed organogram
(3) Model distribution structure
(4) GCI (erstwhile POSOCO) report filed to CERC
(5) Other documents as mentioned under references of the draft circulated by MoP on 29.11.2022.

It is requested to submit views/inputs of all stakeholders of the RPCs for preparation/ restructuring of above cited draft report. It is also requested that the views/inputs may be discussed in some forum of RPCs and compiled views may be submitted to this Division.

This issues with the approval of Member(GO&D~~)/Chairperson~~, CEA

(M M Dhakate)
Chief Engineer

Member Secretary (NRPC/WRPC/SRPC/ERPC/NERPC)

No: CEA-GO-12-29/2/2022-GM Division दिनांक:14.12.2022

Draft

Guidelines for Strengthening of State Load Despatch Centres in India

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Guidelines For Strengthening of State Load Despatch Centres in India

1. Background

The Electricity Act 2003 designates the Load Despatch Centres (LDCs) as apex bodies to ensure integrated, secure, reliable, economic, and efficient operation of power system under their jurisdiction. The LDCs would play an important rote in facilitating the energy transition towards a sustainable and decarbonised electricity grid. The availability of human resources in the State Load Despatch Centres was reviewed by, Secretary (Power), Ministry of Power, Government of India on 16th September 2022. These guidelines have been formulated to provide a benchmark to the State governments / utilities for strengthening -the State Load Despatch Centres by ensuring adequacy of trained and certified human resources.

2. Categorization of State Load Despatch Centres

Considering the diversity of power system profile of different states in terms of their peak demand met, energy consumption and installed capacity of Renewable Energy Sources, the thirty-five SLDCs could be grouped into three categories —Large SLDCs{Medium SLDCs, Emerging SLDCs.

No.	Large SLDCs	Medium SLDCs	Emerging SLDCs
1	Andhra Pradesh	Assam	Arunachal Pradesh
2	Gujarat	Bihar	Chandigarh
3	Haryana	Chhattisgarh	*Dadra and Nagar Haveli
4	Karnataka	Damodar Valley Corporation	Daman & Diu
5	Maharashtra	Delhi	Goa
6	Madhya Pradesh	Himachat Pradesh	Manipúr
7	Punjab	'Jammu & Kashmir and Ladakh	Meghataya
8	Rajasthan	Jharkhand	Mizoram
9	Tamil Nadu	Kerala	Nagaland
10	Telangana	Odisha	Puducherry
11	Uttar Ptadesh	Uttarakhand	Sikkim
12	West Bengal		Tripura

3. Functional areas within State Load Despatch Centre

The functions discharged by SLDCs could be broadly classified into following categories System Operation (SO), Market Operation (MO), System Logistics, and Support services. The System Operation function covers operational planning, real-time operation and post despatch analysis. The market operation function covers open access administration, day ahead market, real-time market, energy accounting and settlement activities. System logistics covers decision support, Information technology and cyber security related activities. The regulatory and legal affairs; human resource management contract services, finance and account, establishment, administration are support services. Further details regarding these functions are enclosed as Annexure-I.

There are Thirteen Renewable Energy Management Centre (REMC) in India which includes the REMCs in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra Telangana Tamil Nadu: Karnataka and Uttar Pradesh which are collocated with SLDCs. The REMCs are also envisaged for UT Ladakh and UT Andaman Nicobar. takes care of forecasting, scheduling and real-time monitoring renewable energy resources

4. Recommended deployment of human resources

The recommended number-of human resources in a SLDC would vary depending upon whether the SLDC is large, medium', or emerging. The SLDCs where REMC is co-located would require additionaL18-24 nos. of executives. SLDCs should staff 2- 4 nos of experts for ensuring compliance to cyber security protocols and guidelines. Typically, the number of personnel in any SLDC, REMC and Cyber Security functions should be in the range as indicated in the table below. These numbers include only the executive staff including Supervisors but- excluding- staff for physical infrastructure security and sub-LDCs. It may further be noted that the SLDCs where a dedicated Cyber Security operation Centre is established would require additional human resources

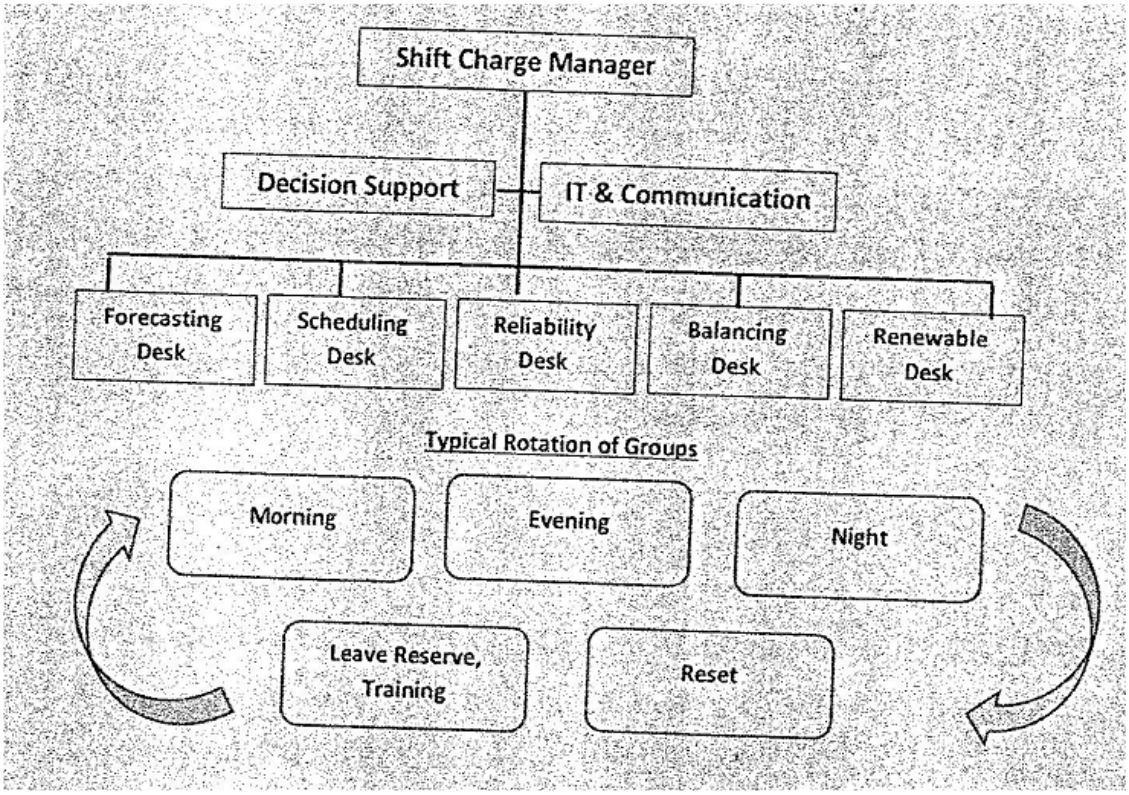
Table 1:- HR Requirement in Diff. Categories of SLDCs

Category of SLDCs	Total personnel required for SO, MO, Sys-Logistics & Support services	Personnel for REMC	Personnel for Cyber Security
Large	100 - 150	18-24	2-4
Medium	70- 100		
Emerging	30 - 50		

In order to maintain an optimum balance of staff in critical functions, it is recommended that the proportion of executive staff in System Operation, Market Operation, System Logistics, Support services is maintained in the range of (35 - 45) % : (20- 30) % : (15 - 20) % : (10 15) % of the total strength. The ratio of (Executive + Supervisors) to Nonexecutive must be endeavored to be maintained at around 95%: 5%. The regular personnel deployed in non-core, non-critical functions may be optimized by out-sourcing and automation of routine activities.

Real-Time operation is at the heart of any SLDC. Thereforet adequate deployment of trained and certified personnel is required. Each control room must operate in five shift groups with 3-8 Nos. per shift.' The fifth group is recommended to factor leave reserves and training needs of real-time operations personnel: Thus the HR budget for real-time operatiðns should take •into account round-the clock operationst entitled leaves, public holidays, festivalst business travely training, special assignments etc. making a total of 15-40 Nos. Overall for control room shift operation.

Figure 1:- Typical Organization of Rea/ Time Team for LDC



5. Training of System Operators

System operators need to be up-to-date with the evolving technology, policies, rules standards, regulations, procedures and best practices. Therefore, capacity building through training and refresher programme has been implemented through National Power Training Institute (NPTI) for Load Despatchers. It is categorized into 3 levels - Basic Level Specialist Level and Management Level. Basic Level System Operation programme is the foundation course required for all System Operators and can also be attended by those

posted in other functional areas in LDCs. Basic Level Course on Cyber Security is required for those posted in IT & OT functions. The specialist courses on topics such as Reliability, Regulatory Framework in Power Sector, and Advanced course on Cyber Security are available for experienced specialist professionals employed in these respective fields in LDCs,, The payment of Tuition fee for these courses is exempt for employees of SLDCs.

Detailed list of Training Courses for LDC personnel is given at Annexure-II.

6. Certification of System Operators

National Power Training Institute has been entrusted as Nodal Agency for certification of System Operators and various certification exams for Basic and Specialist Level are being conducted by NPTI. List of training/certification programs is given at Annexure-ll. Basic Level Certifications are mandatory to work in critical area of System Operation in an LDC. Guidelines regarding mandatory certification are being separately notified vide Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulationsó2022: Specialist level certification is optional. Each certificate has a validity of 03 years and must be renewed thereafter.

7. Short term exposure Programme for System Operators

A Short Term Exposure Programme has been envisaged provide opportunity the system operators to learn from each other and to propagate best-practices Rotation of System Operators would also enhance cohesive working and coordination in operations.The programme Will include 2-10 days' duration rotational assignments to other LDCs.The officials from one LDC will be rotated to other LDCs in System Operation, Market Operation and Logistics functions.' Detailed modalities of the Short-Term Exposure Programme ate given as Annexure- III.

8. Tenure of Posting in SLDCs

Reliable and safe operation of power systems is critical to the country. Tacit knowledge gained through practical experience is essential for handling minute to minute challenges and entrants. Therefore, a minimum posting for a period of three years is recommended for any Official posted in SLDC. Any person posted in an CDC shall be provided training -and must acquire relevant basic level certificate within six months of being posted in the LDC.

Annexure-I : Functional areas in a Load Despatch Centre

1. System Operation functions

System Operation function includes but shall not be limited to the following functions:

a) Operational Planning ;

i) Load Forecasting ii) RE forecasting iii) Fuel security assessment iv) Production cost optimization studies v) Generating outage planning vi) Transmission outage planning vii) Assessment of Transfer Capability víii) Reactive Power studies ix) Short circuit and transient stability studies x) Small Signal stability studies xi) Electromagnetic transient studies xii) Mock black start drills xiii) Operation of back up control centre xiv) Preparations for special events like festivals, natural calamities like cyclone, floods etc. xv) Documentation of procedures (operating, restoration)

b) Scheduling and Despatch on day-ahead and real-time basis

i) Day ahead security studies factoring all outages ii) Unit commitment iii) Day ahead optimization and scheduling 'iv) Shift Crew Resource Management v) Anticipating and mitigating congestion vi) Preparation for speciat events vii) -Handling requests for emergency/urgent outages unforeseen In operational planning horizon

c) Reat Time Operation

i) Frequency Control ii) Voltage control iii) Tie line loading control iv)•Congestion management v) Ensuring security at all times vi) Ancillary -Services vii) Balancing Services, Automatic Generation Control viii) Real Time Contingency Analysis ix) Dynamic Security Assessment x) Monitoring weather updates xi) Handling emergency outage requests xii) Restoration of network after tripping xiii) Rescheduling of generation xiv) Reporting of a grid disturbance (GD)/grid incident(GI) xv) Periodic communication with stakeholders and sensitizing in case of emergency xvi) De-briefing after an extreme event

d) After the Fact or Post Despatch Analysis.

i) Analysis of frequency and voltage ii) Analysis of Grid Code violations and follow up with agencies iii) Analysis of Grid Events (GD/GI) iv) Evaluating primary response viz. computation of Frequency Response Characteristics (FRC) of individual control areas v) Low Frequency Oscillations (IFO) monitoring and analysis vi) Detailed reports of Grid Disturbances/Grid Events vii) Simulation of events and learnings thereof viii) Event replay, lessons learnt and dissemination of same ix) Taking up shortcomings with stakeholders Submission of Operational feedback to policy makers/regulators/planners f) Information dissemination

2. Market Operation functions

Market Operation function includes but shall not be limited to the following functions: (a) facilitating grid access to new entities including but not limited to first time charging of elements (b) feedback in respect of electricity market design, • for complementing reliability and causing economy (c) open access administration, (d) finalization of Interchange schedules for energy accounting (e) Day Ahead Market, (f) Real Time Market, (g) Ancillary Services Market (h) Interface Energy Metering (i) energy accounting and settlement.

3. System Logistics functions

System Logistics functions includes designs operations and maintenance of but shall not be limited to the Engineering of new SCADA/EMS/WAMS/RÉMC upgrades (b) Maintenance of- SCADA/EMS/WAMS/REMC infrastructure (c) Synchro- ' phasor technologies (d) Real time software applications (e) Off-line software applications (f) Big Data •Analytics tools (g) ' k Decision Support Systems Information Technology Networking and Communication systems Including websites; Wi-Fi access security and other related systems (i) conference and meeting related facilities including audio-visual equipment such as video conference equipment etc., (j) Power supp(y system (k) firefighting and alarm systems (l) Ergonomic systems (m) Public Address System.

Annexure II: Training and Certification Program for capacity building

1 . System Operator Training Programmes

SN	Name of the Training Program	Level	Duration of the Training Pro rams	Remarks
1	Basic Level Programme on power System Operation	Basic	03 weeks (Full Length) 3 Days (Refresher)	Mandatory
2	Power Market	Specialist	02 weeks	Desirable
3	Regulatory Framework in Power Sector	Specialist	02 weeks	Desirable
4	Power System Logistics	Specialist	02 weeks	Desirable
5	Power System Reliability	Specialist	02 weeks (Full Length) 03 Days Refresher	Desirable
6	RE source and Grid Integration	Specialist	02 weeks	Desirable
7	Familiarization on Despatcher Training Simulator		02 weeks	Desirable
Cyber Security (Training cum Certification)				
8	Training and Certification Program on Cyber Security	Basic	02 weeks	Mandatory
9	'Training and Certification Program on Cyber Security	Intermediate	02 weeks	Desirable
10	Training and Certification Program on Cyber Security	Advance	02 weeks	Desirable

2. System Operator Certification

SN	Name of the Certification	Level	Validity of Certification	Remarks
1	Basic Level Power System Operation Certification	Basic	03 Years	Mandatory

2	Specialist Level Power System Reliability Certification	Specialist	03 Years	Desirable
3	Specialist Level Regulatory Framework in Power Sector Certification	Specialist	03 Years	Desirable
4	Specialist Level Power System Logistics Certification	Specialist	03 Years	Desirable

Annexure-III: Short Term Exposure Program

A Short-Term Exposure Programme to facilitate rotation of System Operators, to enhance cohesion and exposure among System Operators in LDCs is being implemented for all State Load Despatch Centres, Regional Load Despatch Centres and National Load Depatch Centre. The objective of this programme is to propagate best-practices, facilitate peer-to-peer learning from each other and propagate best-practices through hands on exposure of real time working of other LDCs This will be beneficial for new and emerging SLDCs, where resource adequacy concerns for multi-tasking executive's have been expressed. The planned programme comprises of rotation of LDC officials to other LDCs for a duration of Two to Ten Days.

1. Modalities

a. Rotational assignments will be done on reciprocity basis. Generally the ratio of requirement and number of persons to be rotated will endeavored to be kept as 1 : 1; however, .in certain cases especially for emerging LDCs this can be relaxed

b. All LDCs will analyse their own requirement, work out number of officers they wish to post' to other LDCs for exposure, clearly specifying periods of assignments in both cases. Each LDC can prepare an Annual Rotation Plan for— (i) officials they wish to rotate to other LDCs and (ii) officials they can host in their LDC keeping in mind their Human Resource Adequacy.

c. The host organization may design specific programme Including a few-class-room Sessions to facilitate the learning delivery in share with the visiting organization beforehand

d. In order to leverage familiarity and already established sense of comfort, initially the rotation will be within the same

e: The Rotation will be in the areas of System Operation; Market Operation, Logistics and REMC Functions.

f. Any short-term assignment will be for a minimum period of 2 working days but not exceeding 10 working days in total.

2. Eligibility:-

a. All LDC officials working in System Operation, Market Operation, Logistics and REMC functions will be eligible to be rotated to other LDCs-

b. LDC officials should have minimum 1 year or regular service in an LDC before they can be considered for the exposure programme.

3. Execution

a. LDCs can send their Annual Rotation Plan to the Forum of Load Despatchers (FOLD) Secretariat at the beginning of the financial year.

b. FOLD secretariat will compile requirements and assist in devising a Region-wise rotational plan on round-robin basis so that Human Resource adequacy is maintained at all Load Despatch Centres.

c. This programme is focused on increasing capacity building of SLDCs, therefore, the focus must be on giving exposure to SLDC officials. However, to kickstart the

programme, RLDCs and NL-DC will start by posting their officers out to SLDCs and host officers from other LDCs in their region. FOLD Secretariat will coordinate the liasoning with LDCs, if require. Travel arrangement including accommodation & logistics will be done by respective LDCs.

4. TADA including accommodation expenses will be borne by the parent organization as per their rules. Host organization wilt not be obligated to provide ,any facility to the visiting officer.*

Annexure to Short Term Exposure Programme:- Requirement Detail Format

Name of the LDC
-Total number of Job Roles identified for officers from other LDCs
Details of the rotes identified for officers from other LDCs

st. No.	Department	Area of the task/ project	Proposed Assignment Details (To which the officer from LDCs will be deputed)	Proposed Period of the Assignment (Start Date & End Date)

References

1 Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2022 -- Draft regulation,

2. MOP 0M No. 13/3/2019-OM-Part(1) dated 23rd March, 2022- Mandatory certification for personnel posted in Load Despatch Centres (NLDC/ RLDCs / SLDCs).

3. NPTI Letter - NPTI/PSTI/PSO/2022-23 dated 26th April, 2022 & 1 st September, 2022 Training & Certification of System Operators.

Capacity Building of Indian Load Despatch Centres (CABIL) Report 2018 - Report of the Forum of Regulators Technical Committee sub-group.

5. Dhiman Committee Report, 2010 (Report of the Combined Committee for Training and Certification of System Operators, March 2010).

6 Reports of task Force headed by Chairperson, CEA on Manpower Selection and Recruitment Procedure and Tenures for Personnel in SLDCs, June 2009 (Rakesh Nath Committee Report 2009).

7. Pradhan Committee Report 2008 - GoI (Report of the Committee on Manpower Certification; Incentives for System Operators and Ring Fencing Load Despatch Centres).

सत्यमेव जयते

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

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (61वीं)/2022/ **568-615** दिनाँक: 19, जनवरी, 2023

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक का कार्यवृत ।
Subject: 61st meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक दिनांक **26th दिसंबर , 2022** को **1100** बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 61st meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **26th December, 2022** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

(नरेश भंडारी)
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

A.2.6 He added that the issue was already deliberated in ERPC, NERPC and WRPC meetings apart from SRPC. In NERPC meeting, all the NERPC constituents opined that this particular encashed CBG amount may be retained with the CTU for the time being, until the outcome of appeal filed by various generators in APTEL come wherein ERPC and WRPC in their meetings opined that the matter may be discussed in respective CCM (Commercial Sub-Committee).

A.2.7 In the meeting, views were asked from states, however, no comment received.

A.2.8 MS, NRPC stated that since the matter is subjudice to APTEL, any decision on the instant matter may not be tenable. He added that since the matter pertains to all pan India level, the same may be taken up by CTU as an agenda in NPC Forum.

A.2.9 SE, NRPC endorsed the views of MS, NRPC and suggested that status quo may be maintained.

A.2.10 CTU accepted the views of MS, NRPC and stated that in case the BG amount is disbursed to the DICs in the pool and disputes are settled in favour of the relinquishing IPPs later, then return of amount with interest may be difficult.

A.2.11 Accordingly, it was decided to maintain status quo. CTU was requested to take up the agenda in next NPC meeting.

A.3 Draft guidelines on manpower adequacy for SLDCs (agenda by GM Division, CEA)

A.3.1 EE (P&SS), NRPC apprised the forum that GM Division, CEA in its letter dated 14.12.2022 informed that the meeting was taken by Secretary (P) with CEA and GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. Draft guidelines for strengthening of SLDCs in India is attached as **Annexure-II.**

A.3.2 MS, NRPC stated that since the matter pertains to all RPCs, the same could be taken up as an agenda and to be discussed on NPC Forum.

A.3.3 Representative from Punjab deliberated that provision regarding performance based incentive as well as Certification Retainer-ship Amount to the employees of SLDCs is missing in the draft guidelines and need to be included. He also added that cyber security is a crucial issue of the hour, however, the manpower strength (2-4 personnel) mentioned in guideline is quite less. He also suggested that certification exam should be conducted twice a year.

A.3.4 In response to this, MS NRPC stated that the incentive to system operators will surely boost their morale. He highlighted that NRLDC gets performance based incentive. As the work of SLDCs are similar to NRLDC, SLDCs may also have performance based incentive. He further added that manpower requirement for cyber security could be increased.

A.3.5 In charge, NRLDC stated that earlier a letter was sent to states for short term posting in different SLDCs/RLDCs. However, states have not shown much interest in this regard. He emphasized that the constituent SLDCs may comment on the recommended number-of human resources in a SLDC and deployment of system operators from one SLDC to other for short term exposure. Regarding performance linked incentives, he suggested that states may approach their respective SERCs. He mentioned that certificate link incentive is not provided in NRLDC. However, NRLDC employees get performance based incentive.

A.3.6 MS, NRPC suggested to change the categories of SLDCs (Large, Medium and Small) to Established SLDCs (Large+Medium) and Emerging SLDCs.

A.3.7 UPSLDC representative apprised the forum that due to lack of ring-fencing in SLDCs, the system operators are usually transferred /promoted to other sub-companies despite possessing certification of Basic/Specialist/Intermediate/Advance level which leads to shortage of experienced manpower in SLDCs. He further added that due to the large transmission network under big states, a large manpower is required to coordinate with RLDC, related litigations, SCADA mapping, energy and accounting of injecting entities, tripping analysis and facilitating shutdowns in real-time. He requested that minimum posting for a tenure of three years should be made mandatory for any official posted in SLDC.

A.3.8 MS, NRPC endorsed the opinion of UPSLDC. He further added that certification is must within 6 months and retention of 3 years should be mandatory.

A.3.9 After deliberation, GM Division, CEA was requested to take up the agenda in next NPC meeting.

A.3.10 It was also decided that this agenda may be discussed in upcoming OCC meeting also. If any other additional view comes there, same shall be communicated to GM Division, CEA.

A.4 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/Barmer Complex) (agenda by CTU)

A.4.1 EE (P&SS), NRPC apprised the forum that CTU vide mail dtd. 19.12.2022 has proposed scheme for transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/ Barmer Complex).The scheme is attached as **Annexure-III.**

A.4.2 CTU representative apprised that the above scheme has been discussed in NR Joint study meeting held on 05.12.2022, and 13th CMETS-WR meeting held on 07.12.2022.

A.4.3 The scheme is also discussed & agreed in the 14th CMETS-NR meeting held on 23.12.2022.

Annexure-III

Guidelines/Procedure for Certification of Open Cycle Operation of Combined Cycle Gas Based Generating Stations

1. When operating under full module, if the schedule of generation given by NRLDC is less than 55% of the MCR loading of the module, one GT may go under Reserve shutdown and the unit may operate under part-module condition. Subsequently, when the injection schedule for the station is more than the on bar declared capacity of the part-module, GT under RSD may be brought on bar. Open Cycle Generation for the 2nd GT may be certified up to a maximum of 1.0 hrs in case of hot start up, 2.0 hrs in case of warm start up and 2.5 hrs in case of cold start up.
2. When operating under half module, if the injection schedule given by NRLDC is less than 55% of the MCR loading of the part-module, the entire module may go under Reserve shutdown. Subsequently, when schedule received is more than 55% of the MCR loading, then one or more GT may be brought back in operation. Open Cycle Generation for the 1st GT may be certified up to a maximum of 1.0 hrs in case of hot start up, 2.5 hrs in case of warm start up and 4.0 hrs in case of cold start up. For 2nd GT, the time certified for Open Cycle Generation would be same as in case of (1) above.
3. When operating under full module, if the schedule of generation given by NRLDC is less than 55% of the MCR loading of the part module, all GTs may go under Reserve shutdown. The procedure for open cycle certification shall be as in case (2) above.
4. No maintenance activities on unit under RSD shall be undertaken by the Generating station, otherwise Open Cycle Generation shall not be certified.
5. When a GT is started within 3 hours of shutdown, it would be considered as a hot start-up, 3 to 24 hours warm start-up, and beyond 24 hours cold start-up.
6. Open Cycle Generation shall also be certified when:
    a. If STG is under outage and instruction for running GT(s) on Open Cycle is given by NRLDC.
    b. If the unit is re-started after tripping due to grid contingencies.

c. If the unit is re-started after scheduled OEM inspection and/or statutory boiler inspection duly approved in the OCC meetings and schedule is given for running these units.

7. The generating station shall submit the requisite data to NRPC Secretariat for the period for which it seeks certification of open cycle generation.

टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED
(भारत सरकार एवं उ.प्र.सरकार का संयुक्त उपक्रम)
(A Joint venture of Govt.of India of UP)

सूचना का अधिकार
Right To Information

No: THDC/RKSH/OMS/F- 120 **Date: 24 Jan 2023**

To,

Chief General Manager
GRID CONTROLLER OF INDIA,
NORTHERN REGIONAL LOAD DESPATCH CENTRE
18-A, SHAHEED JEET SINGH SANSANWAL MARG, KATWARIA SARAI,
NEW DELHI -110016
Email: somara.lakra@grid-india.in

Sub: Dredging work of Tehri PSP and its impact on operation of Tehri HPP and Koteshwar HEP - regarding.

Dear Sir,

Tehri Power Complex which comprises under operation projects Tehri HPP (4x250MW), Koteshwar HEP(4x100MW), and under construction project Tehri PSP(4x250MW). The construction work of Tehri PSP is on very advance stage. In this context, civil works (river dredging) is scheduled to be taken for water conductor system of Tehri PSP, the work is scheduled to be commenced from 15th Feb'23, this is an opportune time to under river dredging work as it is a lean period for Tehri HPP and Koteshwar HEP.

The Tail Race Channel (TRC) is common for Tehri HPP and Tehri PSP. During the operation of Tehri HPP, TRC level is in range of 606-609.5mtr, however, the proposed river dredging work will be undertaken below EL 606mtr,therefore, Tehri HPP shall not be available for generation and minimum availability shall be ensured from KHEP to meet the downstream requirements during river dredging works. Considering the daily downstream irrigation requirement and average plant operation, it is estimated that the daily period for river dredging work will be is in range of 8-9 hrs during non-peaking hrs.

In view of above, it is requested that flexibility in scheduling of Tehri HPP may be allowed i.e. zero scheduling during day other than peaking hour. River Dredging is one of the major critical activity for timely commissioning of Tehri PSP and during the above activities the operation of Tehri HPP and Koteshwar HEP shall be impacted, however, best effort shall be made by both project to meet the irrigation requirements and Grid Demand.

Yours Sincerely

(Virendra Singh)
General Manager(OMS) 24/01/23

CC: ED, NRLDC

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली-110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel: 011 26519406, 26523869, Fax: 011 26852747

संदर्भ सं॰ : उ0क्षे0भा0प्रे0कें0/प्र0सं0/151/ दिनांक : 07 फरवरी, 2023

सेवा मे,

General Manager(OMS),
TEHRI Hydro Development Corporation Limited
Pragatipuram, Rishikesh, Uttrakhand- 249201

विषय : Regarding non-availability of Tehri and Koteshwar generation due to proposed river dredging work of Tehri Pump Storage Plant.

महोदय,

This is with reference to your letter No. THDC/RKSH/OMS/F-120 dtd. 24.01.2023 and your E-mail dtd. 03.02.2023 regarding non-availability of Tehri and Koteshwar generation from 15th Feb to 15th June 2023 due to proposed river dredging work of Tehri Pump Storage Plant.

The generation pattern of Tehri HEP vis-à-vis frequency for the period Feb-2022 to June-2022 is attached at Annexure-I. From the generation pattern of Tehri HEP, it is observed that :

(1) During the month of Feb-2022, max. generation was 820MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 75.2 percent of the time (sample day-27th Feb-2022).

(2) During the month of March-2022, max. generation was 200MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 52.5 percent of the time (sample day-25th March-2022). Moreover, low frequency operation was observed in March-2022 with abnormal high temperatures reaching 40°C reaching in March itself, which was highest recorded temperature in last 122 years in the country.

(3) During the month of April-2022, max. generation was 500MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 50.8 percent of the time (sample day-21st April-2022). Again, low frequency operation was observed in April month also. Delhi witnessed temperature of 45°C, which was also the highest for past 72 years.

(4) During the month of May-2022, max. generation was 400MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 68.3 percent of the time (sample day-25th May-2022). Moreover, there was continuous generation (round the clock) at Tehri HEP from 18th to 22nd May and 25th to 27th May (Max. Gen. 400 MW and Min. Gen. 120 MW).

(5) During the month of June-2022, max. generation was 375MW during the period 09:00Hrs to 16:30Hrs. Also, Frequency was within band for 54.7 percent of the time (sample day-13th June-2022). Moreover, there was continuous generation (round the clock) at Tehri from 11th to 13th June (Max. Gen. 375 MW and Min. Gen. 250 MW).

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
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Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel.: 011 26519406, 26523869, Fax: 011 26852747

From the above data, it is observed that generating units at Tehri HEP were running for extended hours due to high demand period in summer season, as well as due to low head at Tehri. Load and frequency of sample days is attached at Annexure-II.

Also, due high RE integration, variability in the grid has increased. So, availability of hydro generating units could be required during contingency. From the profile of Tehri generation vis-à-vis frequency for the period Feb-2022 to June-2022 (for sample days, attached at Annexure-I), it can be seen that non-availability of Tehri generation could have adverse impact on frequency profile particularly during the months of March and April.

Further, as per Office Memorandum, MoP dtd. 25.11.2022 enclosing Minutes of the meeting taken by Secretary (Power), as per point no. 4 he requested minimum outages in the month of April'23 and other peak demand months.(Copy of the same attached as Annexure-III)

As, the share holding state would get impacted due to outage of Tehri plant during certain hours, it would be desirable that issue is discussed in the upcoming OCC meeting or any special meeting for this purpose.

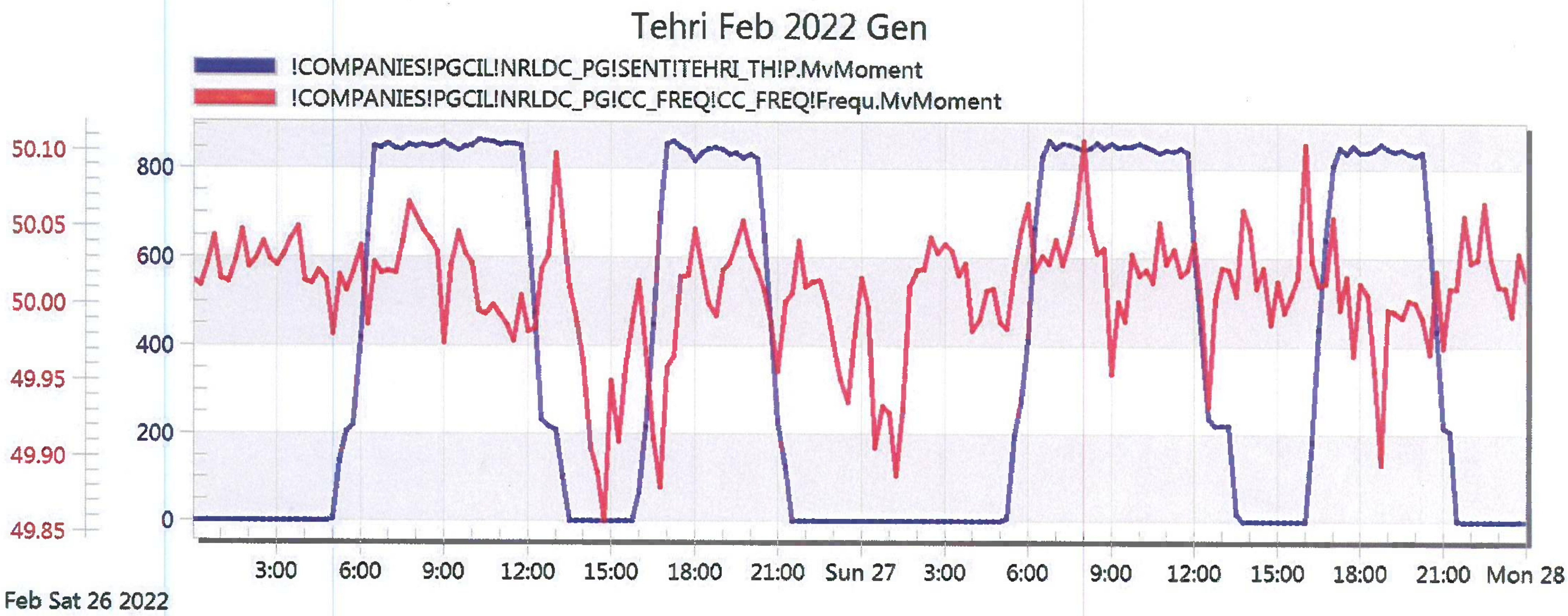
सादर धन्यवाद

07/02/2022

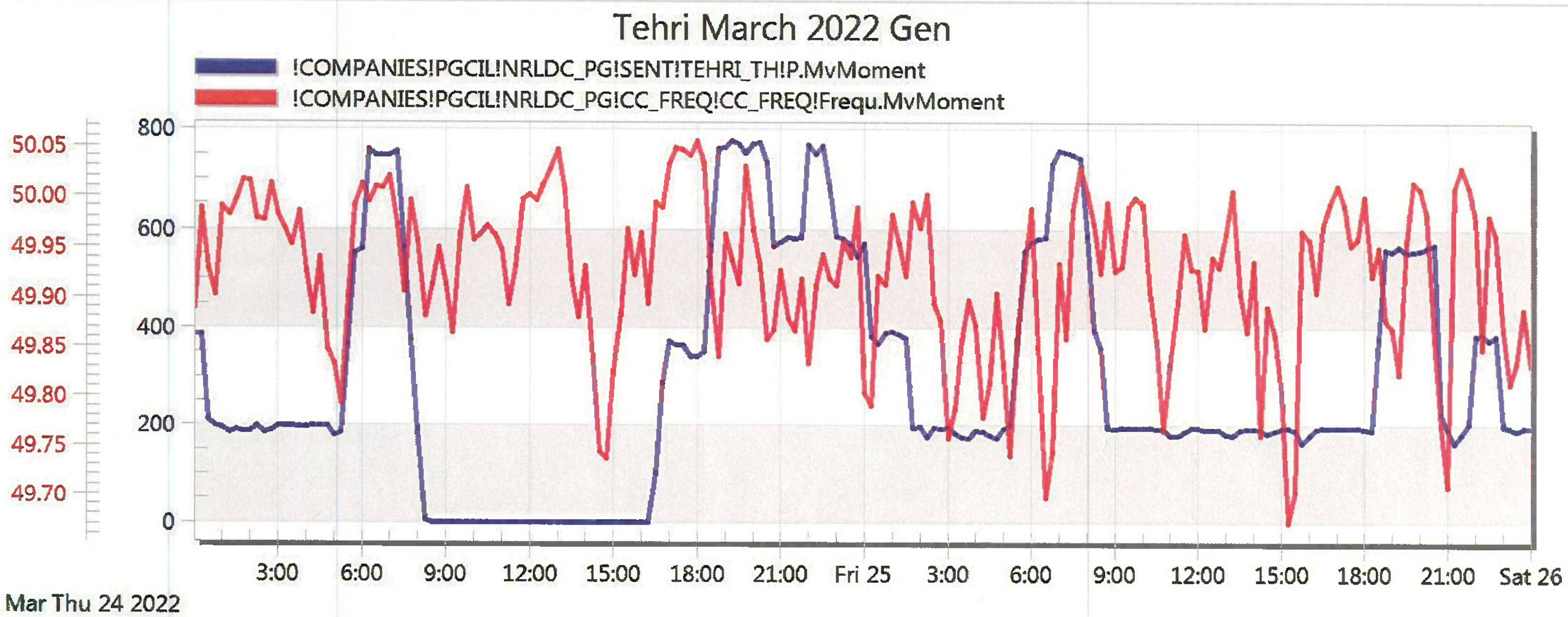
सोमारा लाकरा
मुख्य महाप्रबंधक (प्रणाली संचालन)
उत्तरी क्षेत्र भार प्रेषण केंद्र, नई दिल्ली

विनम्र सूचनार्थ :
1. सदस्य सचिव, उत्तरी क्षेत्र विद्युत् समिति
2. कार्यपालक निदेशक, राष्ट्रीय भार प्रेषण केंद्र
3. कार्यपालक निदेशक, उत्तरी क्षेत्र भार प्रेषण केंद्र

ANNEXURE - I



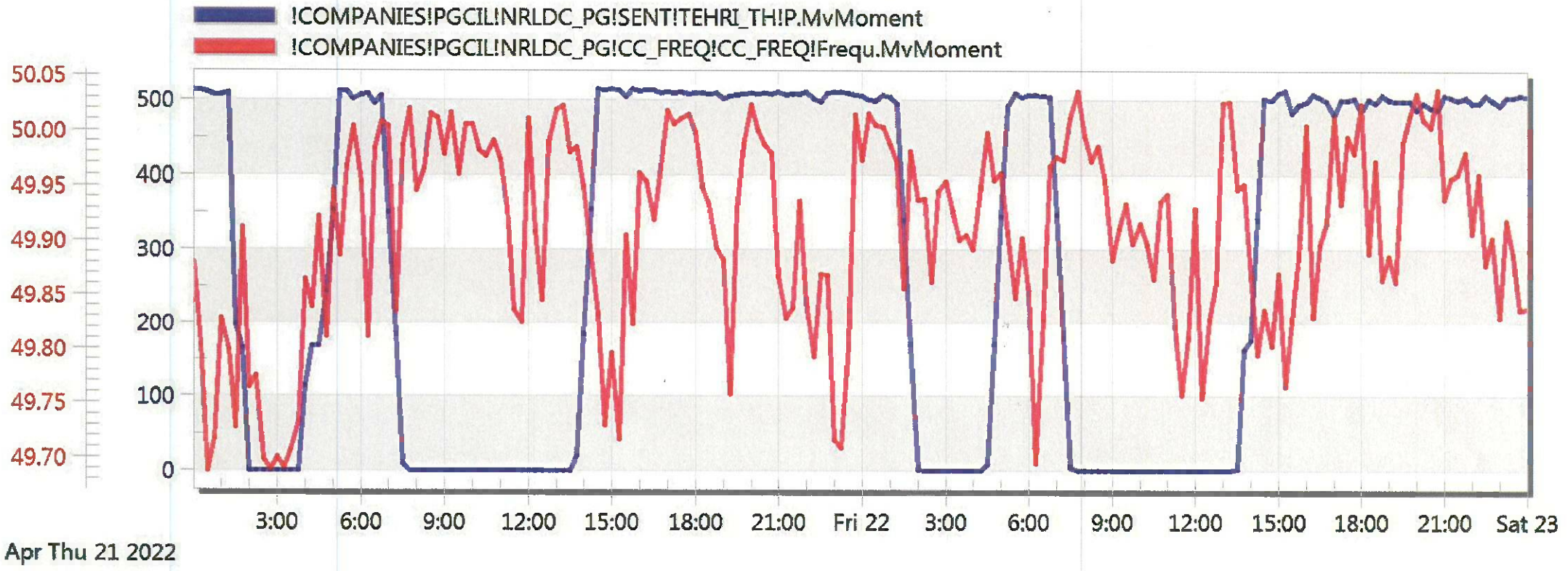
किशन कुमार झा



Tehri March 2022 Gen
!COMPANIES!PGCIL!NRLDC_PG!SENT!TEHRI_TH!P.MvMoment
!COMPANIES!PGCIL!NRLDC_PG!CC_FREQ!CC_FREQ!Frequ.MvMoment
50.05
50.00
49.95
49.90
49.85
49.80
49.75
49.70
800
600
400
200
0
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Fri 25
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Sat 26
Mar Thu 24 2022

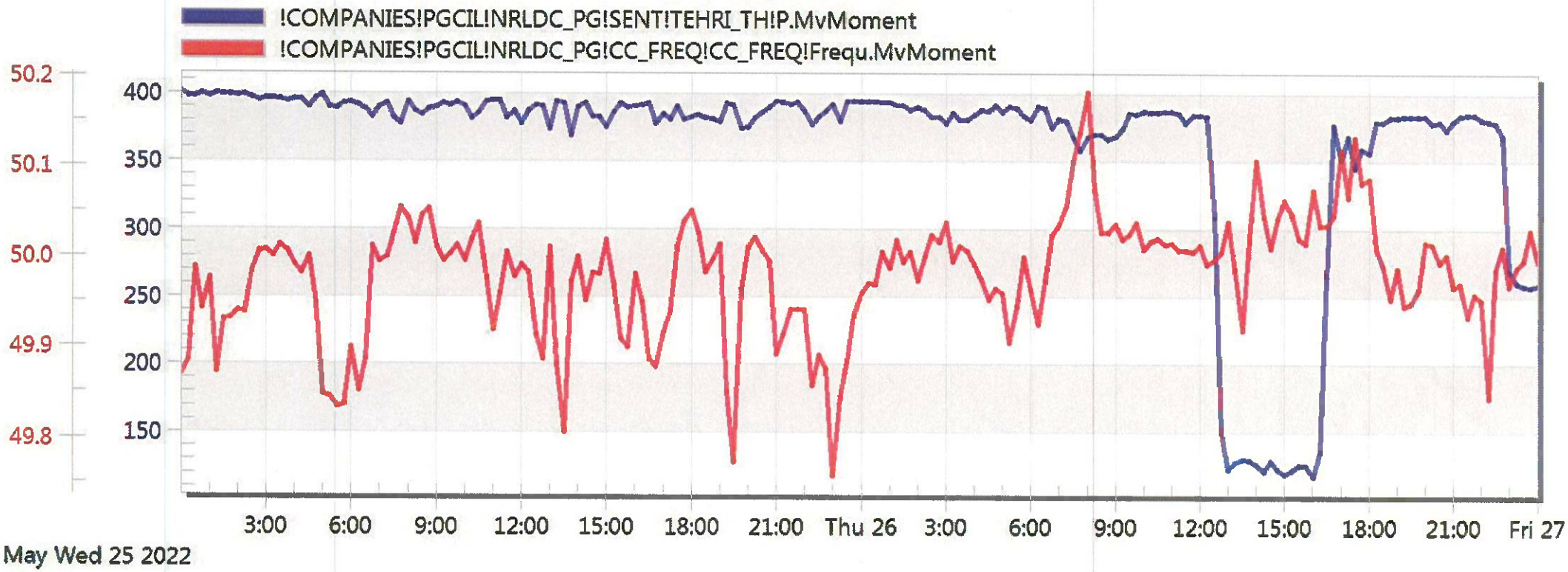
विकास कुमार झा

Tehri April 2022 Gen

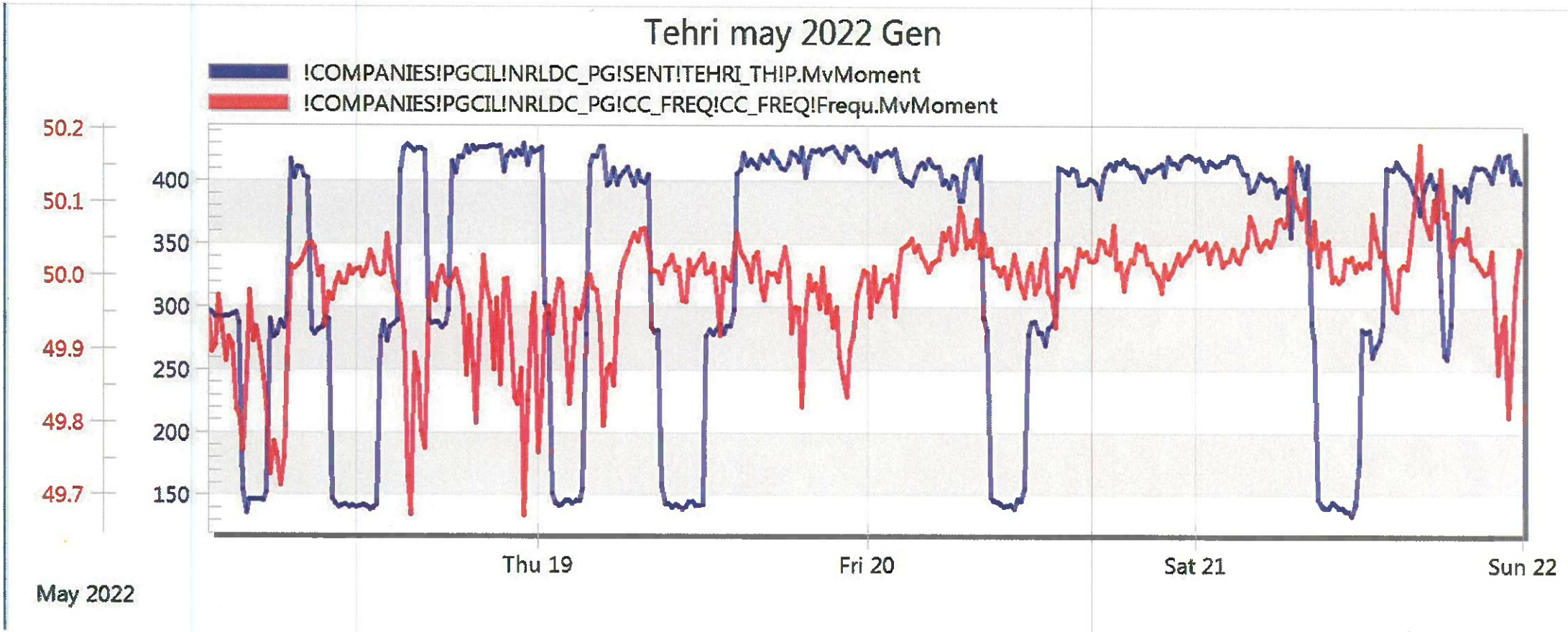


विकास कुमार झा

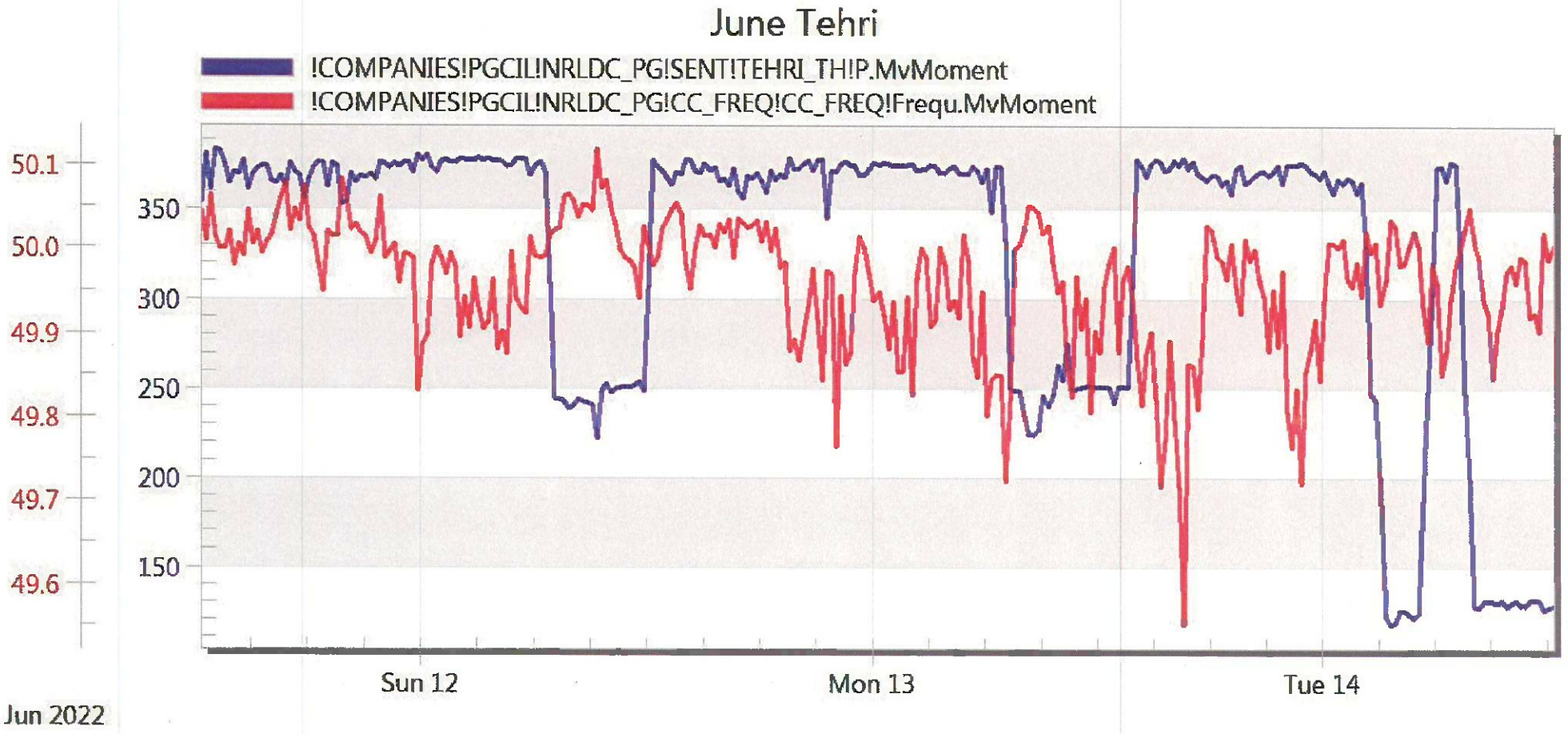
Tehri may 2022 Gen



विकास कुमार झा

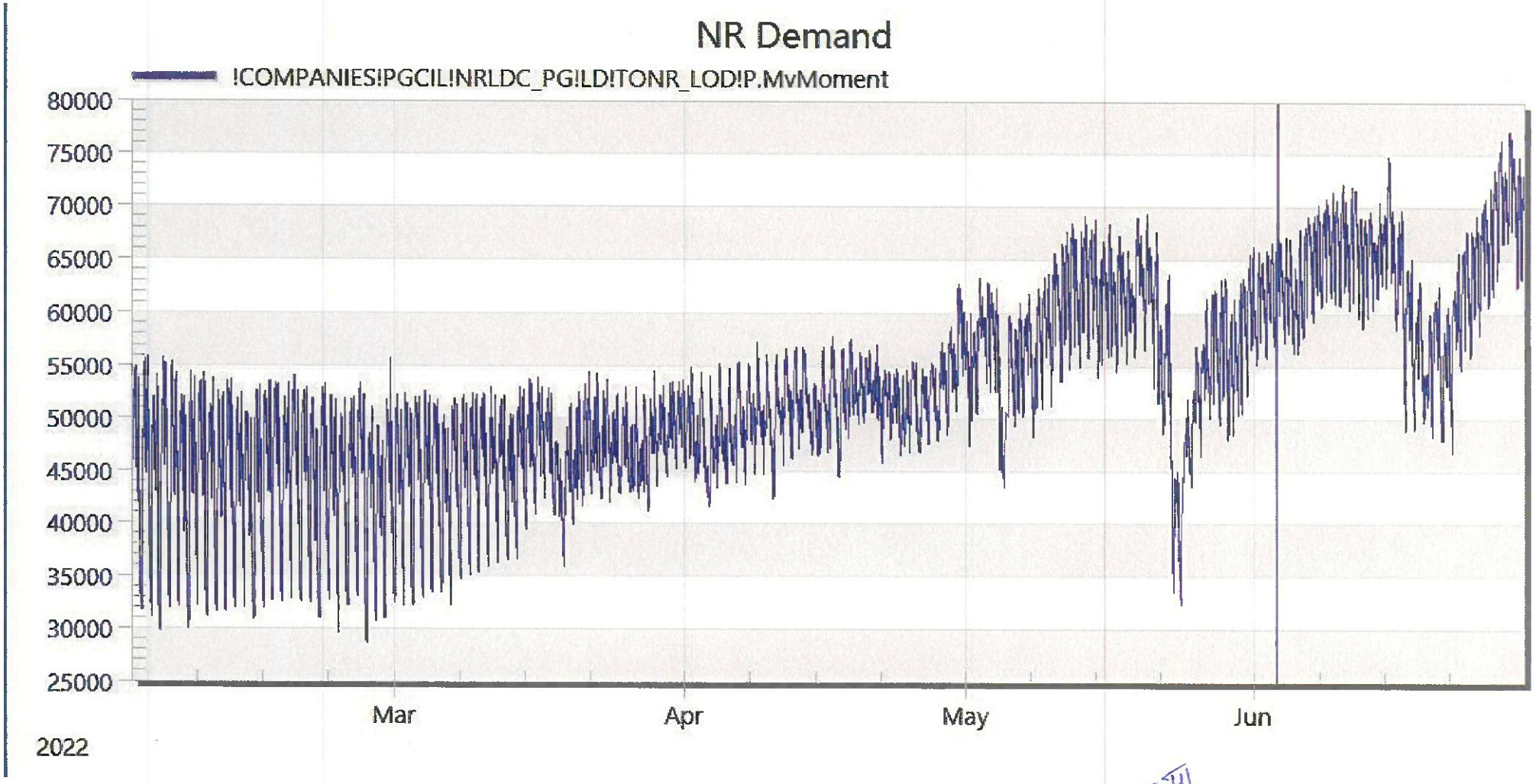

Tehri may 2022 Gen
!COMPANIES!PGCIL!NRLDC_PG!SENT!TEHRI_TH!P.MvMoment
!COMPANIES!PGCIL!NRLDC_PG!CC_FREQ!CC_FREQ!Frequ.MvMoment
50.2
50.1
50.0
49.9
49.8
49.7
400
350
300
250
200
150
Thu 19
Fri 20
Sat 21
Sun 22
May 2022

विकास कुमार शा

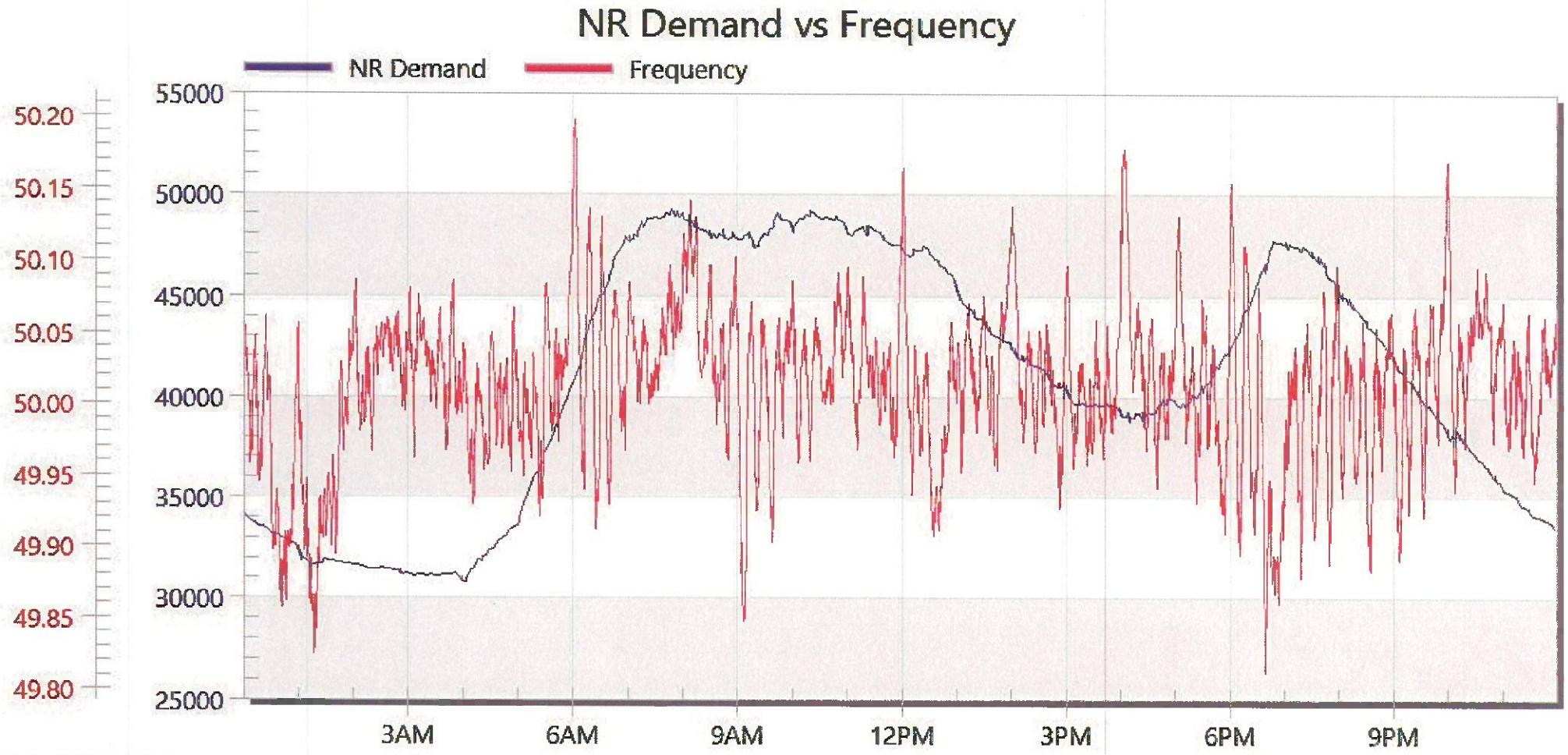

June Tehri
!COMPANIES!PGCIL!NRLDC_PG!SENT!TEHRI_TH!P.MvMoment
!COMPANIES!PGCIL!NRLDC_PG!CC_FREQ!CC_FREQ!Frequ.MvMoment
50.1
50.0
49.9
49.8
49.7
49.6
350
300
250
200
150
Sun 12
Mon 13
Tue 14
Jun 2022

विकास कुमार सी

ANNEXURE-II

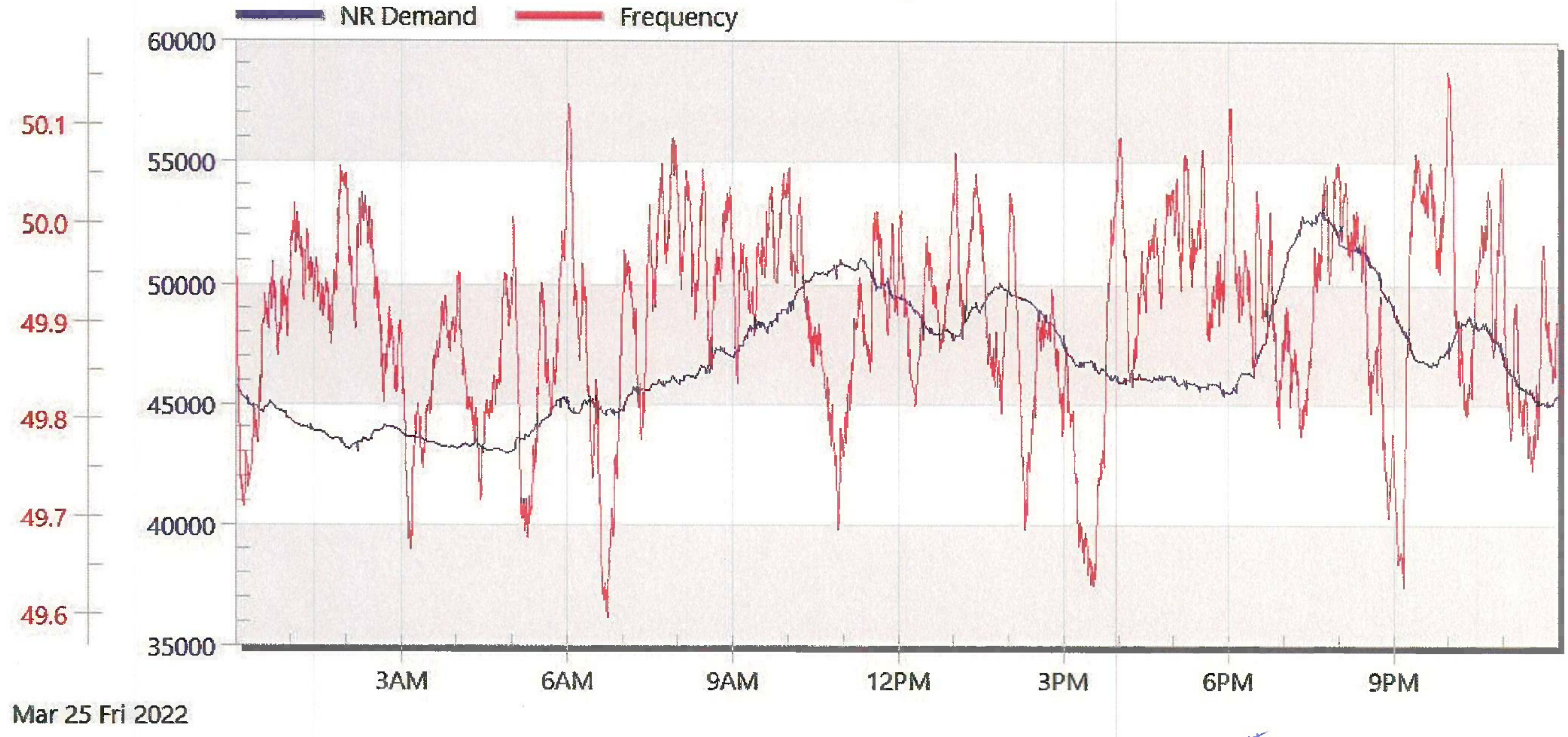


विशाल शर्मा

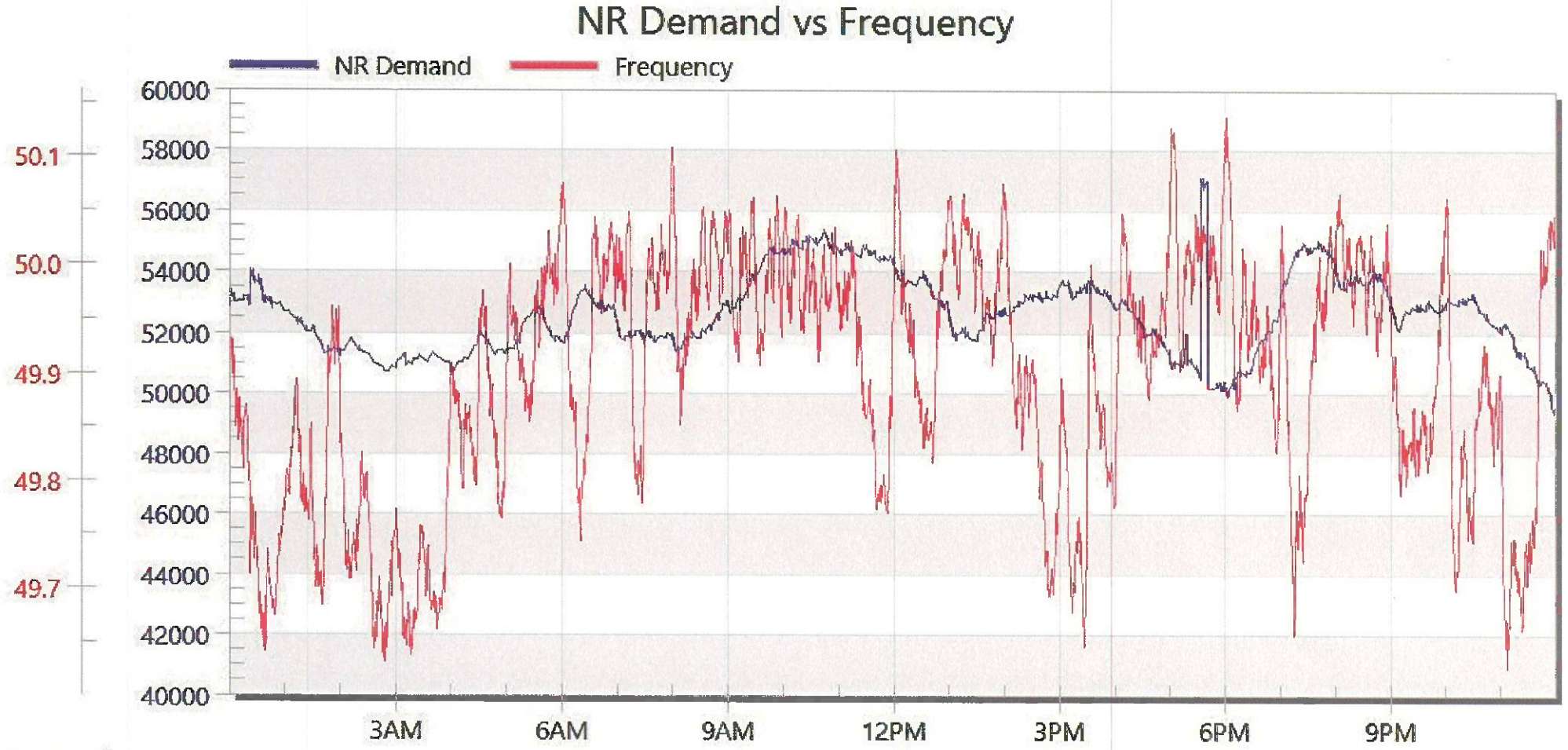

NR Demand vs Frequency
NR Demand
Frequency
55000
50000
45000
40000
35000
30000
25000
50.20
50.15
50.10
50.05
50.00
49.95
49.90
49.85
49.80
3AM
6AM
9AM
12PM
3PM
6PM
9PM
Feb 27 Sun 2022

विवेक कुमार झा

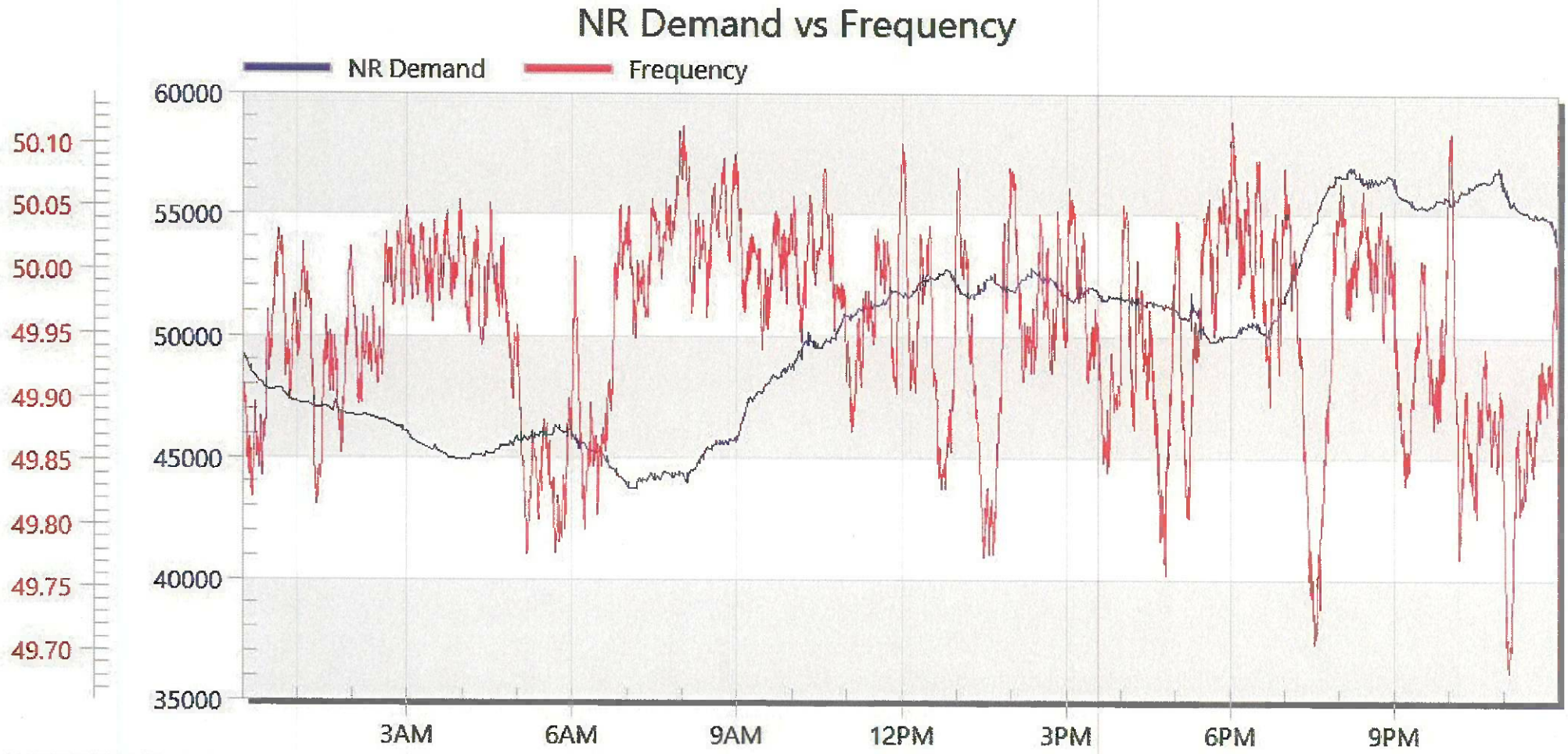
NR Demand vs Frequency



विकास कुमार झा

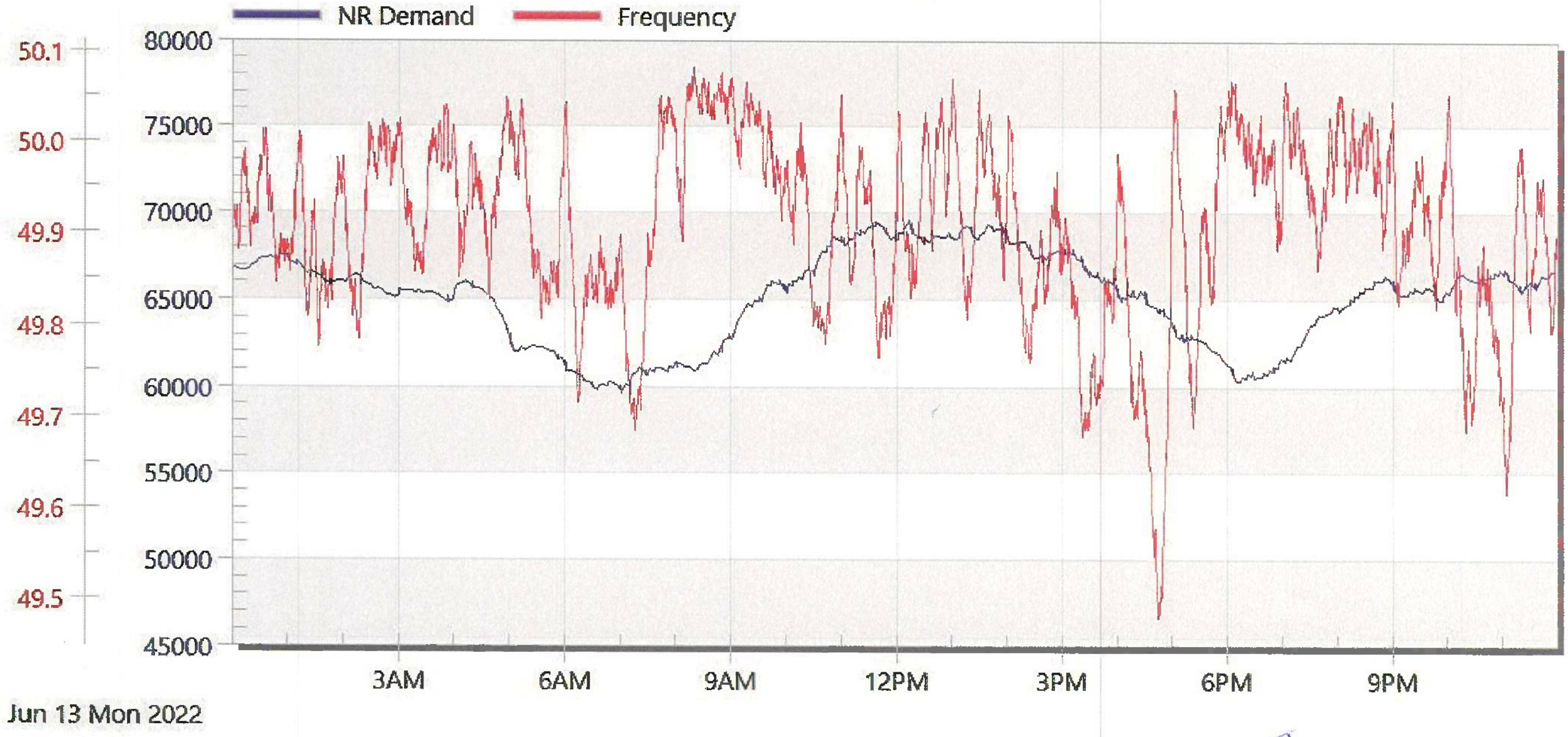

NR Demand vs Frequency
NR Demand
Frequency
60000
58000
56000
54000
52000
50000
48000
46000
44000
42000
40000
50.1
50.0
49.9
49.8
49.7
3AM
6AM
9AM
12PM
3PM
6PM
9PM
Apr 21 Thu 2022

विशाल कुमार डंगाल


NR Demand vs Frequency
NR Demand
Frequency
60000
55000
50000
45000
40000
35000
50.10
50.05
50.00
49.95
49.90
49.85
49.80
49.75
49.70
3AM
6AM
9AM
12PM
3PM
6PM
9PM
May 25 Wed 2022

विकास श्रीवास्तव

NR Demand vs Frequency



विकास कुमार झा

ANNEXURE-III

सं. 22-1301/3/2022-ओएम [265482]
भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
Shram Shakti Bhawan, Rafi Marg,
New Delhi, the 25th November, 2022

OFFICE MEMORANDUM

Subject: Minutes of the meeting taken by Secretary (Power) at 9:45 AM on 22th November, 2022 regarding 'Outage planning for next one year' –reg.

The undersigned is directed to forward a copy of the minutes of the meeting on the above mentioned subject held at 9:45 AM on 22.11.2022 under the Chairmanship of Secretary (Power) for necessary action.

Encl: As above.

(Anoop Singh Bisht)
Deputy Secretary to the Government of India
Tel: 23062439
Email: anoopsingh.bisht@nic.in

Distribution: As per list annexed

Copy to:

PS to Secretary (P) / PPS to Chief Engineer (EC, ET, EV & OM)/ PPS to DS (OM)

Minutes of the Meeting taken by Secretary (Power) at 9:45 AM on 22th November, 2022 regarding 'Outage planning for next one year'

1. The meeting was held at Shram Shakti Bhawan and List of participants is attached as **Annexure-1.**

2. GRID-INDIA gave a presentation on the proposed unit outage plan based on the inputs received from RPCs for 2023-24. The copy of the presentation is attached as **Annexure–II.**

3. GRID-INDIA shared the monthly All India forecasted peak demand for 2023-24 and requirement of thermal generation capacity considering other spinning reserve, sources availability, forced outage rate and capacity augmentation of thermal capacity etc.

4. Secretary (Power) enquired about the forced outage rate considered at all India level for the above exercise. GRID-INDIA informed that on average the forced outage rate is around 8%. It was noted that requirement of thermal capacity is highly critical for meeting non-solar peak demand in the month of April'23 and mentioned that efforts should be made to minimize the thermal planned outages in peak demand months. He requested to review the proposed outage plan and plan minimum outages in the month of April'23 and other peak demand months.

5. CMD NTPC suggested that the annual planned outage should be finalized within IEGC timelines to bring the certainty for TPPs.

6. During presentation, the timeline for annual outage planning as mentioned in IEGC was explained. In line with the IEGC provision, RPC's shall finalize the annual outages by 31st December in consultation with all stake holders. In this regard, Secretary (Power) directed CEA to coordinate with regions and finalize the outage plan considering All India perspective.

7. Presently, declaration of peak months of regions are being carried out based on peak demand as per CERC tariff regulations and GRID-INDIA suggested to review this requirement and declaration may be considering net peak demand (excluding solar and wind generation) on All India basis to maximize thermal generation as per all India requirement. R&R wing, MoP shall examine it and put up a proposal to issue suitable direction to CERC.

ACME
Leading Through Innovation

Ref: ACME/BUS/200123/4680

Dated: 20.01.2023

To,
Mr. Alok Kumar
General Manager (SO)
Northern Regional Load Despatch Centre
18-A, Shaheed Jeet Singh Sansanwal Marg,
Katwaria Sarai, New Delhi -110016

Sub: Reply to your Letter No.- NRLDC/REMC/ACME Heergarh/Dec22/18

Dear Sir,

We are in receipt of your letter and are writing in response to the same. In this regard, we would like to submit as follows:

1) We had synchronized and commissioned 50 MW AC / 50.46 MWp DC on 30th March 2022. The COD of this part capacity of the project up to 50 MW AC / 50.46 MWp DC was achieved on 3rd April 2022.

2) We have subsequently synchronized and commissioned an additional 50 MW AC / 50.52 MWp DC on 14th April 2022. The COD of this part capacity of the project up to 50 MW AC / 50.52 MWp DC was achieved on 15th April 2022 making the total commissioned capacity as 100 MW AC / 100.98 MWp DC as of 15th April 2022.

3) Further, an additional 100 MW AC / 100.92 MWp DC was synchronized and commissioned on 2nd May 2022. The COD of this part capacity of the project up to 100 MW AC / 100.92 MWp DC was achieved on 3rd May 2022 making the total commissioned capacity 200 MW AC / 201.9 MWp DC as of 3rd May 2022.

4) Finally, the last part of 100 MW AC / 131.29 MWp DC was synchronized and commissioned on 23rd May 2022. The COD of this part capacity of the project up to 100 MW AC / 131.29 MWp DC would be the date of injection based upon NRLDC standing clearance. Hence the total commissioned capacity of the project stands at 300 MW AC / 333.19 MWp DC.

5) We would like to inform you that the project got impacted by Force Majeure events viz. disruption in supply chain in Solar PV sector, which is acknowledged by Ministry of New and Renewable Energy also, due to which we could not install the full planned DC capacity of 445 MW DC against the 300 MW AC project capacity. We are making all efforts to install the balance DC capacity of 112 MW and the same would be completed in few months going forward. It is also submitted that there are fixed losses like temperature (8-12%), DC cable, conversion, soiling, mismatch, degradation, IAM, irradiance losses etc. total of around 20 to 25% which are impacting the overall generation from our solar plant.

As you are aware that solar power is infirm in nature and its generation is dependent upon various factors like solar insolation, ambient conditions etc. We request your support in this regard and we will keep you updated on further developments.

Yours Sincerely,
For and on behalf of **ACME Heergarh Powertech Private Limited**

Yogesh Kumar Sankhecha
Authorize signatory

ACME Heergarh Powertech Private Limited

20/1/23 Sh. P. Pchaul
→ Sh. Kamaldeep / Sh. Ravi Khandelwal.

S. No.	Element Name	Owner	Outage Date	Reason	Update as received in 203 OCC meeting
1	125 MVAR Bus Reactor No 1 at 400 KV Akal(RS)	RRVPNL	30-11-2022	Buchholz relay trip as conservator tank is empty.	_
2	125 MVAR Bus Reactor No 1 at 400 KV Jaisalmer(RS)	RRVPNL	01-11-2022	To replace the burnt TB in the M.K Box and wiring to be done in M.K box.	_
3	132 KV HIRANAGAR(PDD)-KATHUA(JK) (PDD JK) CKT-1	PDD JK	29-05-2022	for rectification of hotspots / shortcomings	
4	132 KV Rihand(UP)-Nagar Untari(JS) (UP) Ckt-1	UPPTCL	15-09-2022	Phase to earth fault R-N , Zone-1, Fault current 1.73kA,	
5	220 KV AGRA(PG)-FEROZABAD(UP) (UP) CKT-1	UPPTCL	27-11-2021	Jumpering work for making Lilo point of 220 kv Firozabad(400)-Agra(765) PG line at 220 kv Tundla	
6	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	27-12-2022	Phase to earth fault R-N , Zone-1 from Auraiya.	
7	220 KV Dadrigas(NT) - Bus 3	NTPC	08-12-2022	Over hauling . Replacement of ICT-3 Bushing.	
8	220 KV Gazipur(DTL)-Noida Sec62(UP) (UP) Ckt-1	UPPTCL	30-04-2022	Tower tilted on one side at tower no 10 from Gazipur (DTL) end.	Line under break down , no further status till now . Fund not provided by MCD, Delhi.
9	220 KV Gazipur(DTL)-Shahibabad(UP) (UP) Ckt-2	UPPTCL	30-04-2022	Line remains charge at No load from UP end. Manually open at 19:30 on 30/04/22 due bending of tower no. 4	Line under break down , no further status till now . Fund not provided by MCD, Delhi.
10	220 KV Kishenpur(PG)-Mir Bazar(PDD) (PDD) Ckt-1	PDD JK	19-02-2022	Tower no. 170 collapsed.	_
11	225 MVAR Bus Series Reactor No 1 at 400 KV Ballabhgarh(PG)	POWERGRID	17-12-2022	For attending the abnormal sound observed in Bus Series Reactor at Ballabgarh in Y & B-phase.	
12	400/220 kV 240 MVA ICT 2 at Orai(UP)	UPPTCL	24-09-2022	Differential protection Trip, REF protection Trip.	Testing from outside agency was done. Result sent to higher authority. New ICT will be planned.
13	400/220 kV 240 MVA ICT 3 at Moradabad(UP)	UPPTCL	13-12-2021	Due to high DGA values, Hydrogen gas is above permissible limit.	
14	400/220 kV 315 MVA ICT 1 at Muradnagar_1(UP)	UPPTCL	13-03-2020	Buccholz relay alarm and Local Breaker Backup protection operated.	TWC approved on 09.12.2021 for replacement with 500MVA new ICT .
15	400/220 kV 315 MVA ICT 2 at Gonda(UP)	UPPTCL	16-12-2022	Tripped on PRV-1 Protection due to Maloperation by Monkeys	
16	400/220 kV 315 MVA ICT 2 at Mundka(DV)	DTL	20-09-2019	Due to fire in ICT	
17	400/220 kV 315 MVA ICT 3 at Mundka(DV)	DTL	05-09-2022	Fire observed on both sides bushing of 315 MVA ICT-3.	Works on borrowing Transformer from POWERGRID. Would be charged before summer season.
18	400/220 kV 500 MVA ICT 1 at Bhiwani(BB)	BBMB	31-07-2022	Tripped due to tripping of 220 KV Bhiwani-Hissar ckt-2. ICT under inspection.	Transformer being diverted from Panipat(BBMB). Timeline to be intimated separately.
19	400/220 kV 500 MVA ICT 2 at Noida Sec 148(UP)	UPPTCL	19-08-2020	ICT tripped on REF protection. Transformer caught fire and got damaged.	ICT received from BHEL , December 2022
20	400KV Bus 1 at Vishnuprayag(JP)	JPVL	02-12-2021	Bus bar protection operated at Vishnuprayag. Sparking in Bus Coupler CB.	_
21	400KV Bus 2 at Parbati_2(NH)	NHPC	29-07-2020	Fire incident took place in Generating unit, control cables of Bus coupler CB damaged.	_
22	400KV Bus 2 at Parbati_3(NH)	NHPC	14-09-2022	Rectification work in Generator GIS Bay CB.	_
23	400KV Bus 3 at Gorakhpur(UP)	UPPTCL	21-02-2022	Disc insulator of B phase 400 kV transfer Bus coupler damaged	Bus healthy
24	50 MVAR Bus Reactor No 1 at 400KV Moradabad(UP)	UPPTCL	03-12-2021	R-phase bushing damaged.	Alloted from 400 kV design , Jan 2023
25	50 MVAR BUS REACTOR NO 1 AT 400KV PANKI(UP)	UPPTCL	29-01-2022	Replacement of 50 MVAR Bus reactor by new 125 MVAR Bus Reactor.	Erection work completed except one bus Isolator of Bay, 30 Jan 2023

26	50 MVAR LR ON 400 KV AKAL-RAMGARH (RS) CKT-1 @RAMGARH(RS)	RRVPNL	23-04-2018	Reactor is out as line is yet to be commissioned. Shifted to Bhadla line.	_
27	50 MVAR LR on Akal-Jodhpur (RS) Ckt-1 @Akal(RS)	RRVPNL	17-08-2021	NA	_
28	50 MVAR Non-Switchable LR on 400 KV Amargarh(NRSS XXIX)-Samba(PG) (NRSS XXIX) Ckt-2 @Amargarh(NRSS XXIX)	NRSS XXIX	22-12-2022	to open LR at Amargarh end only for voltage control	
29	50 MVAR Non-Switchable LR on Agra-Unnao (UP) Ckt-1 @Agra(UP)	UPPTCL	28-10-2021	R and Y phase bushing damaged at Agra(UP).	Testing done by OEM, Report awaited. BHEL submitted report that it is irreparable. Now further Design unit UPPTCL will decide. Design Unit advised to propose 63 MVAR line reactor, Dec 2023
30	50 MVAR Non-Switchable LR on Akal-Jodhpur (RS) Ckt-1 @Jodhpur(RS)	RRVPNL	07-07-2022	To take-out Line Reactor out of service due to high DGA violation; for internal inspection by OEM.	_
31	50 MVAR Non-Switchable LR on Allahabad-Fatehpur (PG) Ckt-1 @Allahabad(PG)	POWERGRID	27-11-2021	Requirement of reactor being studied by CTUIL. Update to be provided by POWERGRID	_
32	50 MVAR Non-Switchable LR on Allahabad-Fatehpur (PG) Ckt-2 @Allahabad(PG)	POWERGRID	27-11-2021	Requirement of reactor being studied by CTUIL. Update to be provided by POWERGRID	_
33	765 KV ANPARA_D-UNNAO (UP) CKT-1	UPPCL	08-02-2022	Shifting of Line Reactor from Anpara-D to Obra-C S/S (OCC 190)	
34	FSC(40%) of 400 KV Fatehpur-Mainpuri (PG) Ckt-1 at Mainpuri(PG)	POWERGRID	24-10-2021	VME protection system was blocking the FSC back to in service	_
35	FSC(40%) of 400 KV Fatehpur-Mainpuri (PG) Ckt-2 at Mainpuri(PG)	POWERGRID	29-01-2022	VME protection system was blocking the FSC back to in service	_
36	FSC(40%) of 400 KV Kala Amb(PKTL)-Sorang(Greenko) (Greenko) Ckt-1 at Kala Amb(PKTL)	POWERGRID	26-09-2022	To attend Unbalance current that is rapidly increasing in B phase.	Not in service due to low current

Annex-VII

List of feeders for physical regulation in Supply				
UP				
S No	Name of Feeder	Affected area	Approx Load relief (MW)	Remarks
1	220kV Meerut-Gajraula	Gajraula	100	Radial
2	220kV Baghpat(PG)-Baghpat D/C	Baghpat	60	Radial
3	220kV Allahabad(PG)-Jhusi	Jhusi	200	Radial
4	220kV Sohawal(PG)-Barabanki D/C	Barabanki	120	Not Radial
5	220kV Mainpuri(PG)-Neemkarori D/C	Farukkhabad	120	Radial
6	220kV Gorakhpur(PG)-Gola D/C	Gorakhpur	80	Radial
7	132kV Ballia(PG)-Bansdeeh	Ballia	15	Radial
8	132kV Ballia(PG)-Sikandarpur	Ballia	30	Radial
50 no.s 132kV feeders can also be opened from SLDC and testing was also carried out few days back at SLDC level				
Punjab				
S No	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	132kV Jamalpur-Ghulal D/C	Ghulal	91	High loading during paddy
2	66kV Jamalpur-Chandigarh Road	Chandigarh Road	37	To be preferred
3	66kV Jamalpur-Sherpur	Ludhiana	13	-
4	220/132kV Sangrur ICT 1,2, 3	Shamsabad	166	High loading during paddy
5	220kV Amritsar-Naraingarh D/C	Amritsar adjoining area	100	To be preferred
6	220kV Patiala-Nabha D/C	Nabha	190	To be opened after discussion with SLDC
7	220kV Jalandhar-Kanjli D/C	Kapurthala	64	To be preferred
120 no.s 66kV feeders may be tripped from SLDC control room to control overdrawl (usuallywhen freq below 49.8Hz)				
Haryana				

Annex-VII

S No	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	Feeders in schedule A	Panipat, Hisar, Jagadhari, Ballabgarh, Kurukshetra	300	High loading during paddy
2	Feeders in schedule B		225	High loading during paddy
3	132kV Narela-Kundli	Rai-Sonepat	55	Radial
4	66kV Dhulkote-Babyal,66kV Dhulkote-Ambala City 1 & 2	Ambala City	40	
5	66kV Samaypur-Globe Steel 1 & 2	Ballabgarh	40	Fed from 220kV A-5 Faridabad also
6	66kV Samaypur-A-5 Faridabad 1 & 2	Faridabad	55	Fed from 220kV A-5 Faridabad also
7	66kV Samaypur-Sohna 1 & 2	Sohna	25	Fed from Badshahpur and Tandu also
220/132kV, 220/66 kV ICTs at BBMB stations such Hissar, Ch. Dadri, Kurukshetra, Jagadri. Dhulkote, can be opened. However, many 132kV, 66 kV and below feeder are covered under Schedule A & B				
As informed by SLDC on 06.05.2022, not many 132kV radial feeders are available for opening of physical regulation. SLDC Haryana representative stated that they shall study and share revised list for physical feeder opening. Moreover, details of some of the feeders tested remotely from				

Rajasthan

S. No.	Transmission line / Transformers to be opened	Power supply interruption	Approx load relief (MW)	Remark
1	220kV Anta-Lalsot	Lalsot	130	The load of 220 kV GSS Lalsot is normally fed from Anta radially. However If ring of 220kV Anta-Lalsot-Dausa is closed then SLDC will open 220 kV Dausa – Lalsot line immediately after physical regulation message received from NRLDC.
2	220 kV Bhinmal (PG) –Sayla Ckt-I & II	Sayla	40	However 220 kV GSS Sayla is also fed from 220 kV GSS Jalore. SLDC will open 220 kV Sayla – Jalore line immediately after physical regulation message received from NRLDC.
3	220 kV Bassi(PG) - Bagru line	Bagru	80	However 220 kV GSS Bagru is also fed from 220 kV GSS Phulera. SLDC will open 220 kV Bagru – Phulera line immediately after physical

				regulation message received from NRLDC.
4	220kV Bhiwadi(PG) -Khushkera 220kV Neemrana(PG)-Khushkera	Khushkhera & Kishangarh Bas	170	Limited alternate supply may be available. 220kV Alwar-K.G.Bas - Khushkhera line may get overloaded.
5	220/132 kV, 160 MVA Transformer at 220kV GSS Behror	Behror	80	SLDC will open 220/132kV transformer of 220kV GSS Behror immediately after physical regulation message received from NRLDC.

J&K

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	220kV Kishenpur-Baran D/C	Baran	200	Radial feeder
2	220kV New Wampoh-Mirbazar	Mirbazar	200	Radial feeder
3	132kV Gladni-Kalakote S/C	Jammu	80	Priority 1
4	Kashmir Bemina	Kashmir	50	
5	132kV Barn-KalakoteD/C	Jammu	80	Priority 2
6	132kV Zainakote - Pattan D/C	Kashmir	70	
220kV Samba-Hiranagar may not be opened as it also supplies to Railways				

Uttarakhand

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	132kV Pithoragarh(PG)-Pithoragarh	Pithoragarh	50	Radial feeder
2	220kV Sitarganj-Eldeco	Eldeco	40-60	Industrial load (only in case of extreme situations)

No control available from SLDC control room for physical regulation.
It was discussed that such feeders may be identified which are fed from two resources and will provide relief. Compiled list of such feeders after discussion at state level needs to be shared with NRLDC at the earliest. In case it is difficult to identify such feeders, contingency plan needsto be developed at SLDC level and shared with NRLDC.

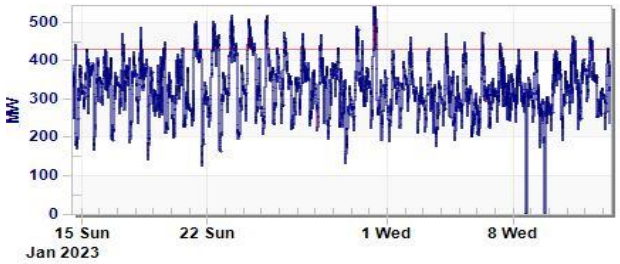
Himachal Pradesh

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks

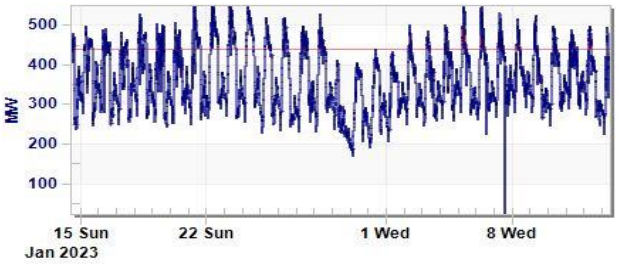
Annex-VII

1	66kV Bhakra-Rakkar	Rakkar/ Una	10-18	Area being fed from 66kV Rakkar (Una)
2	66kV Pong-Sansarpur	Sansarpur	2-5	Radial feeder
3	132kV Dehar-Kangoo	Kunihar/Shimla	80-140	Priority 1. 400/220kV DeharICT may overload
4	220kV Dehar-Kangoo			
5	220kV Nallagarh-Upernangal D/C	Baddi/ Nallagarh	180-315	Industrial load (only in case of extreme situations)
6	220kV Khodri-Majri D/C	Kala Amb/ Paonta Sahib/ Nahan	80-190	Limited supply may be available from Kunihar.Many essential loads, Oxygen plants, administrative buildings
7	132kV Kulhal-Giri			
8	66kV Parwanoo-Pinjore	Parwanoo	-	Generally kept open
9	33kV Ganguwal-Bilaspur	Bilaspur	6-8	-
Delhi				
SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	220kV Mundka-Peeragarhi D/C	Peeragarhi	100-150	Radial feeder
2	220kV BTPS-Okhla D/C	Okhla	200-350	Radial feeder
3	33kV Delhi ckts 1,2,3,4feeders from Rohtak road (BBMB)	Rohtak Road	20-30	Radial feeder
4	220kV MaharaniBagh-Lodhi Road D/C	Lodi Road	200-300	May not be opened as VIP area
5	220kV Maharanibagh-Masjid Moth D/C	Masjid Moth		Radial feeder

Jodhpur ICT loading



Merta ICT loading



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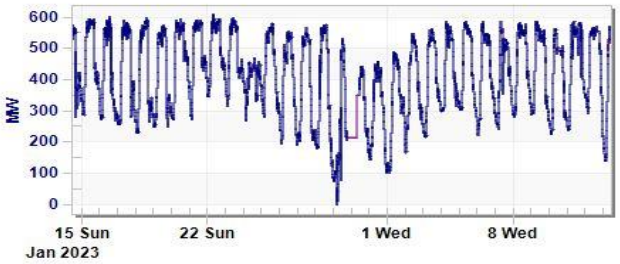

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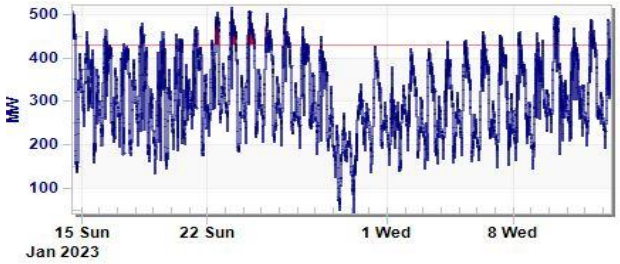

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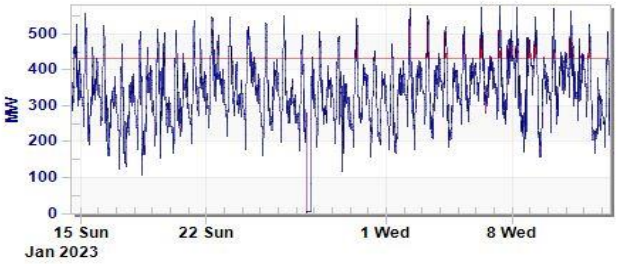
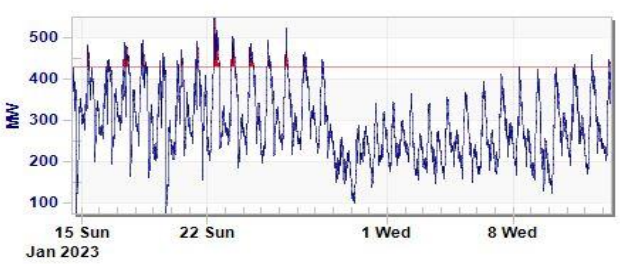
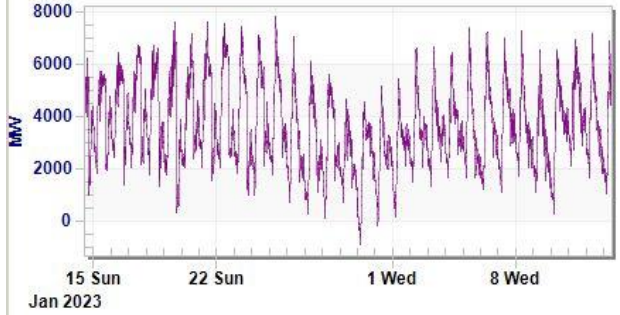


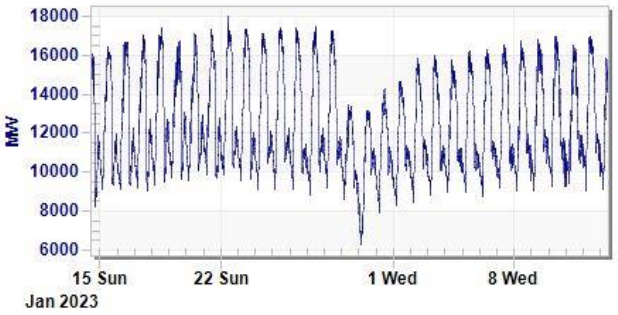
Bhilwara ICT loading



Rajasthan import



Rajasthan Load



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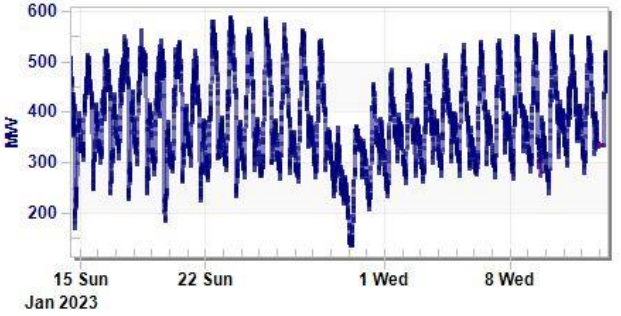
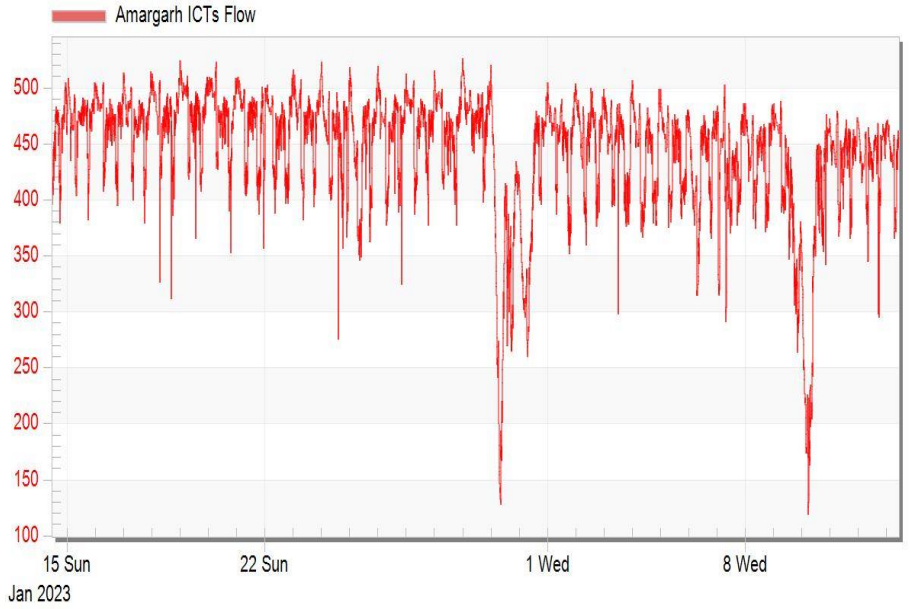
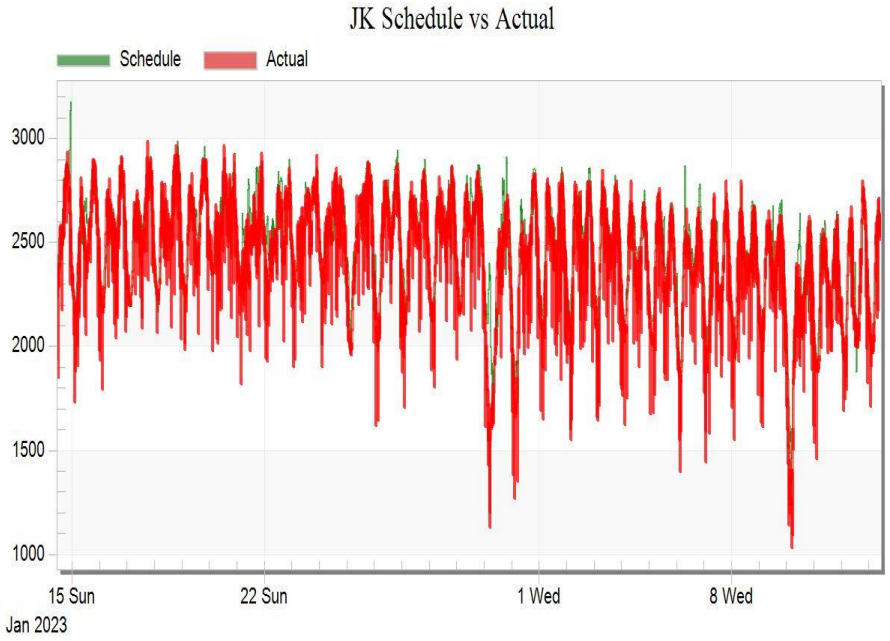
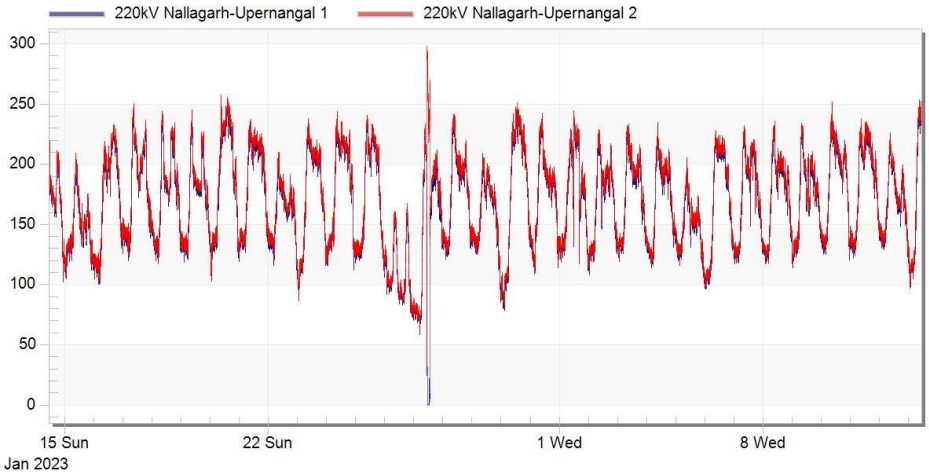
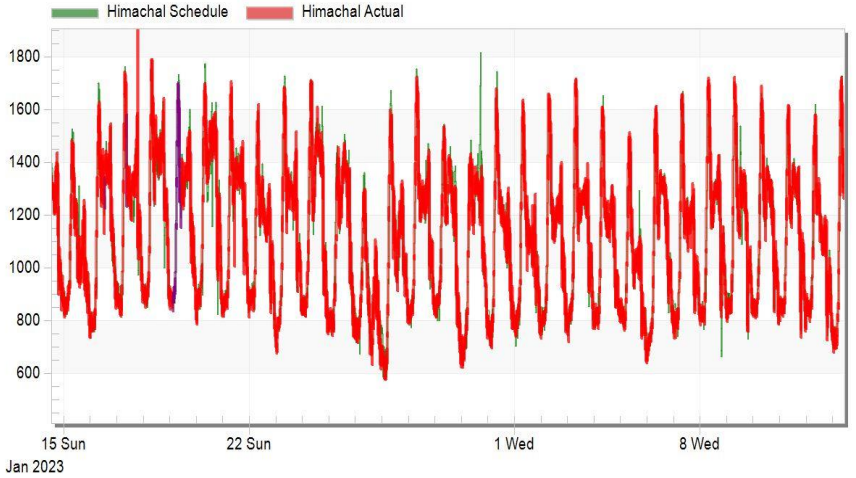
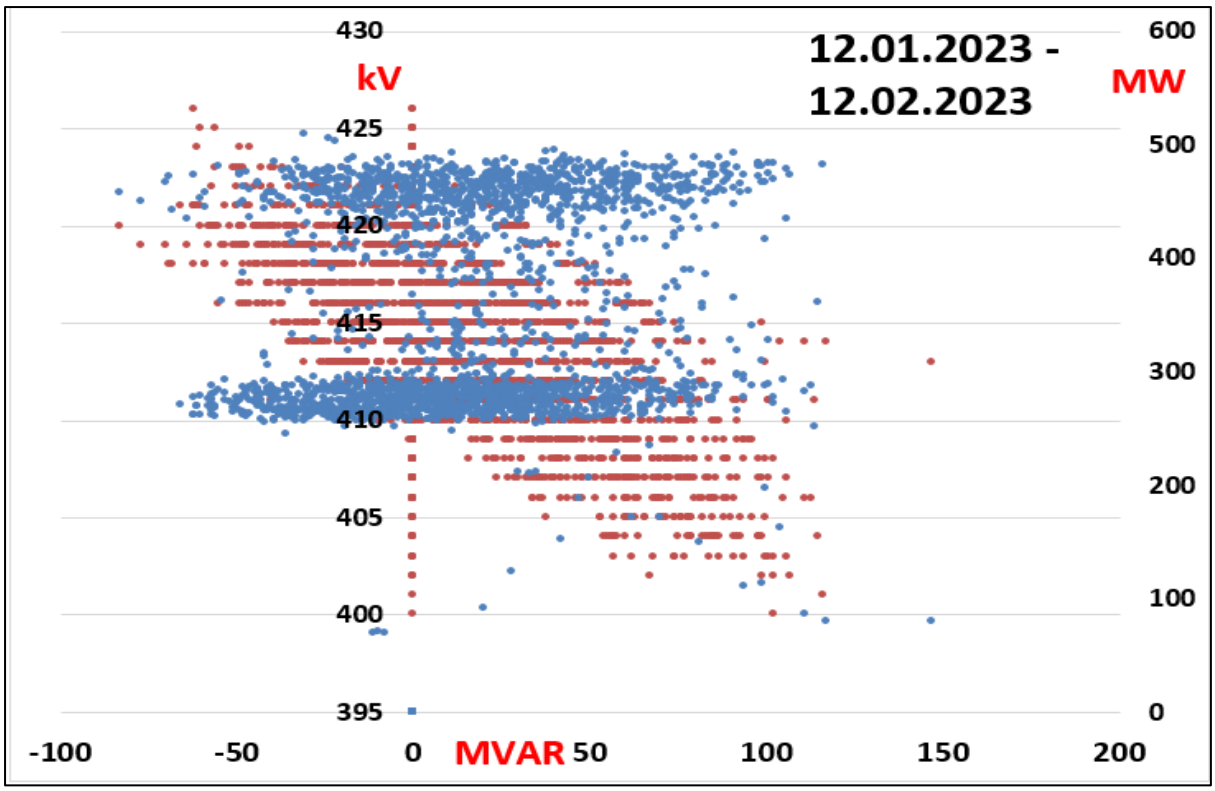



Amargarh ICTs Flow
500
450
400
350
300
250
200
150
100
15 Sun
22 Sun
1 Wed
8 Wed
Jan 2023

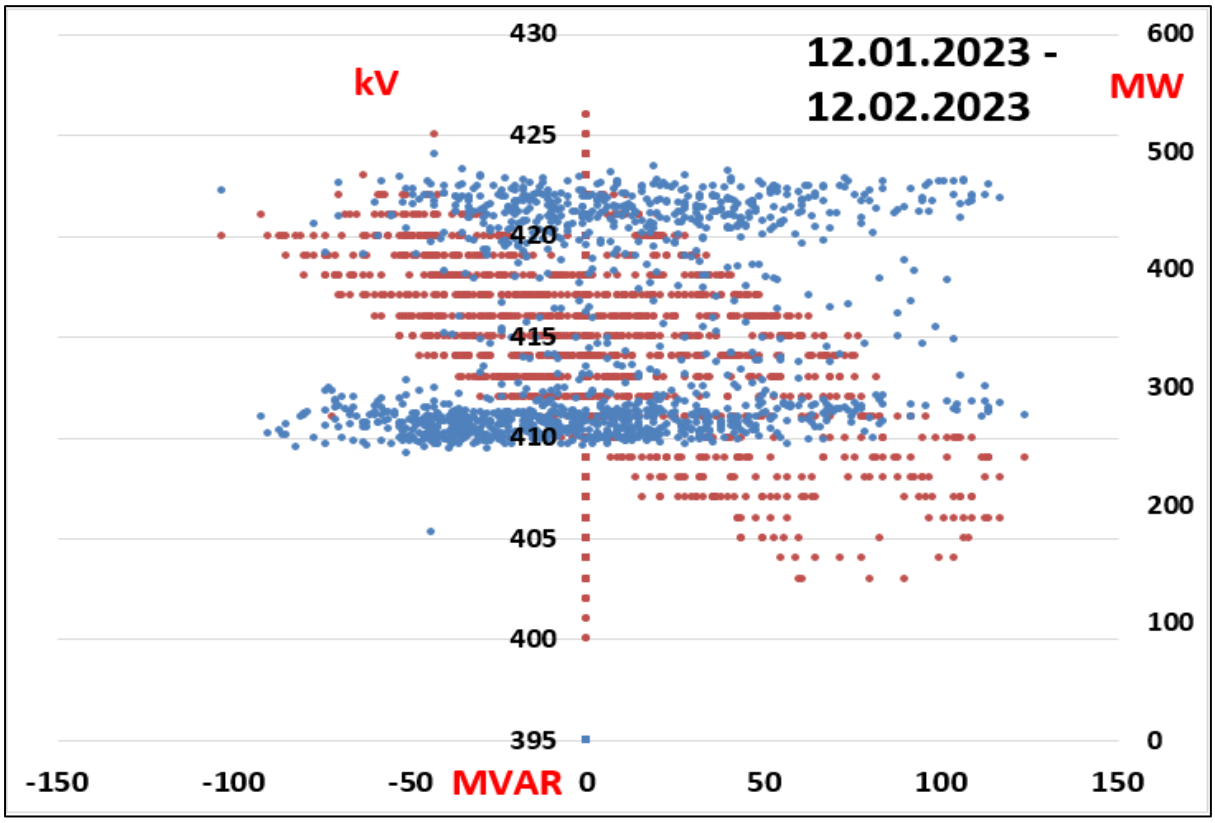

JK Schedule vs Actual
Schedule
Actual
3000
2500
2000
1500
1000
15 Sun
22 Sun
1 Wed
8 Wed
Jan 2023


220kV Nallagarh-Upernangal 1
220kV Nallagarh-Upernangal 2
300
250
200
150
100
50
0
15 Sun
22 Sun
1 Wed
8 Wed
Jan 2023

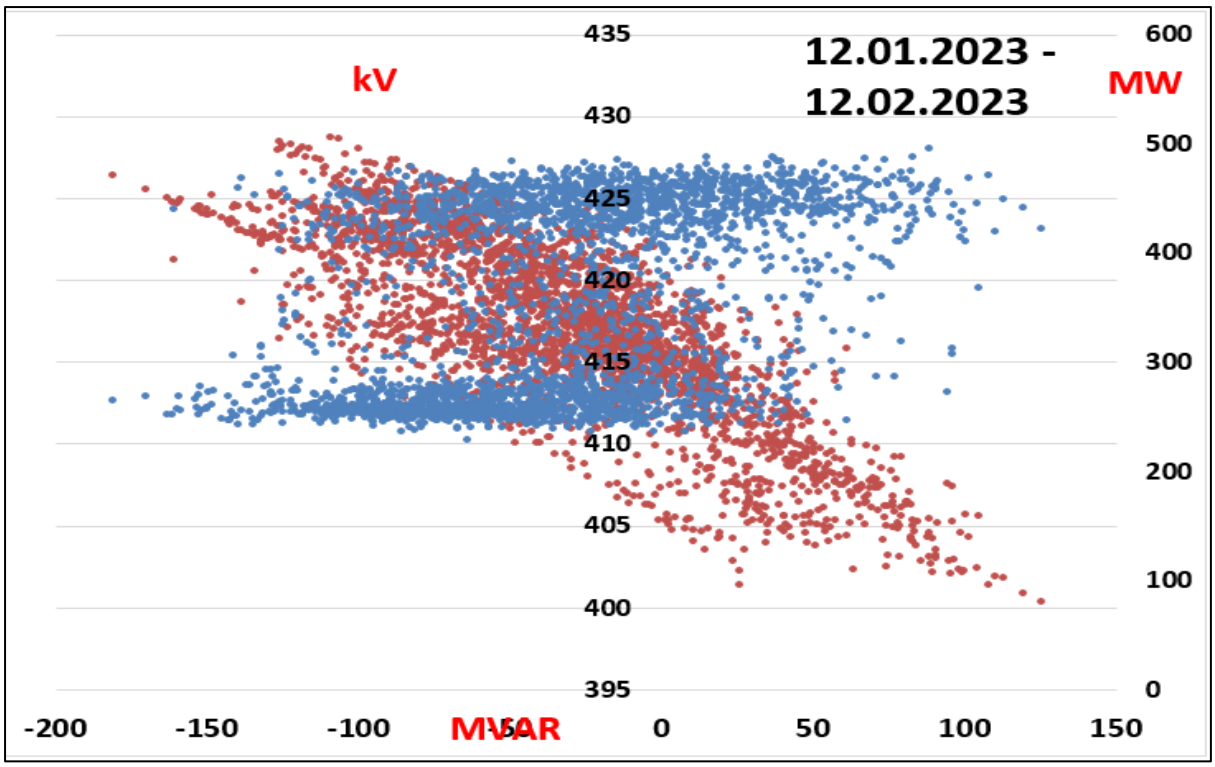

Himachal Schedule
Himachal Actual
1800
1600
1400
1200
1000
800
600
15 Sun
22 Sun
1 Wed
8 Wed
Jan 2023



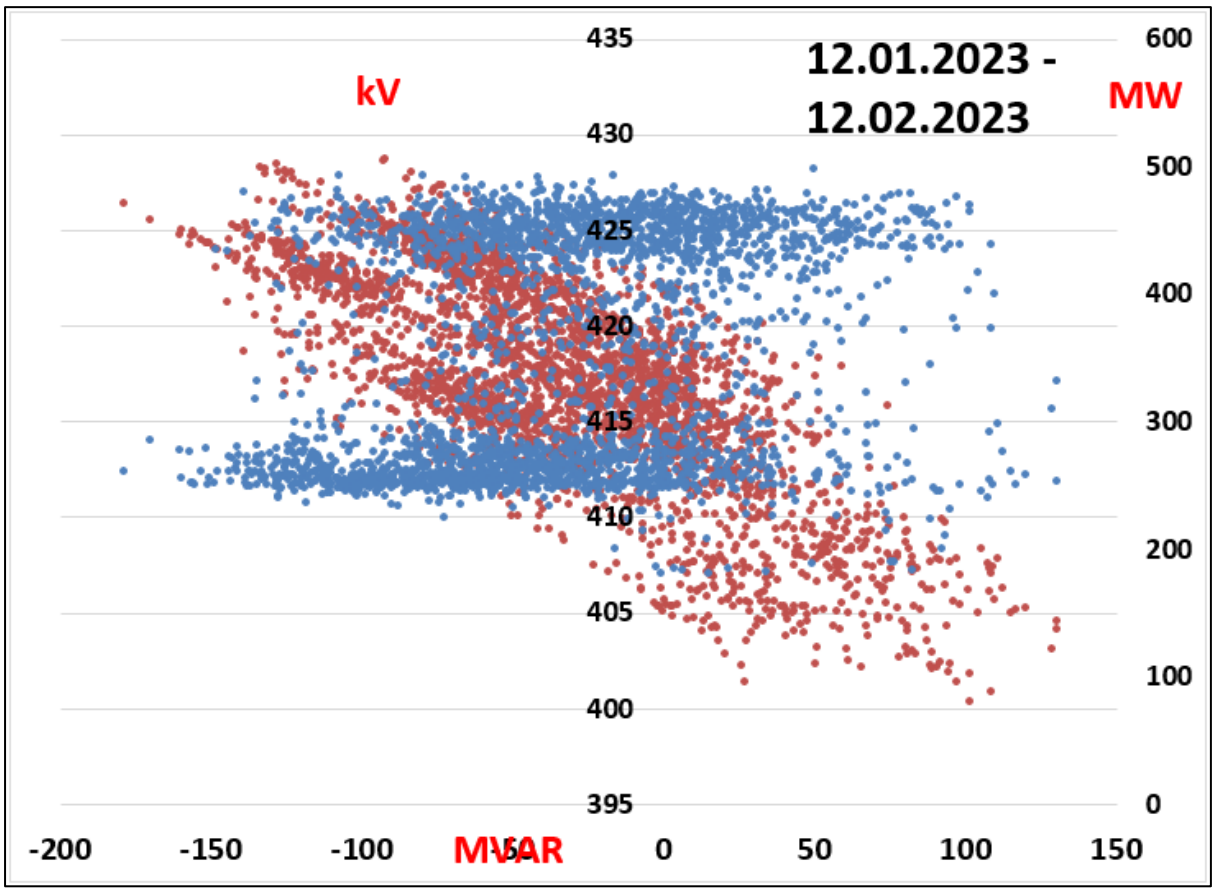
IGSTPP Jhajjar Unit-I



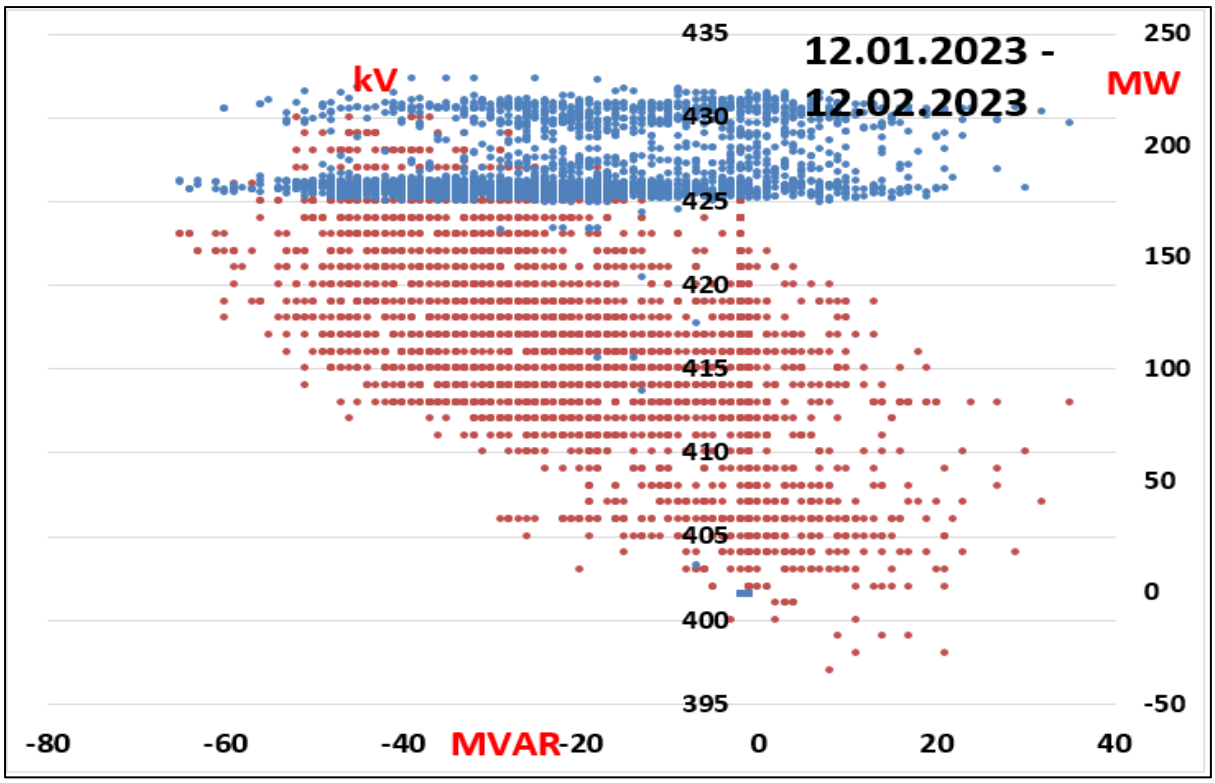
IGSTPP Jhajjar Unit-II



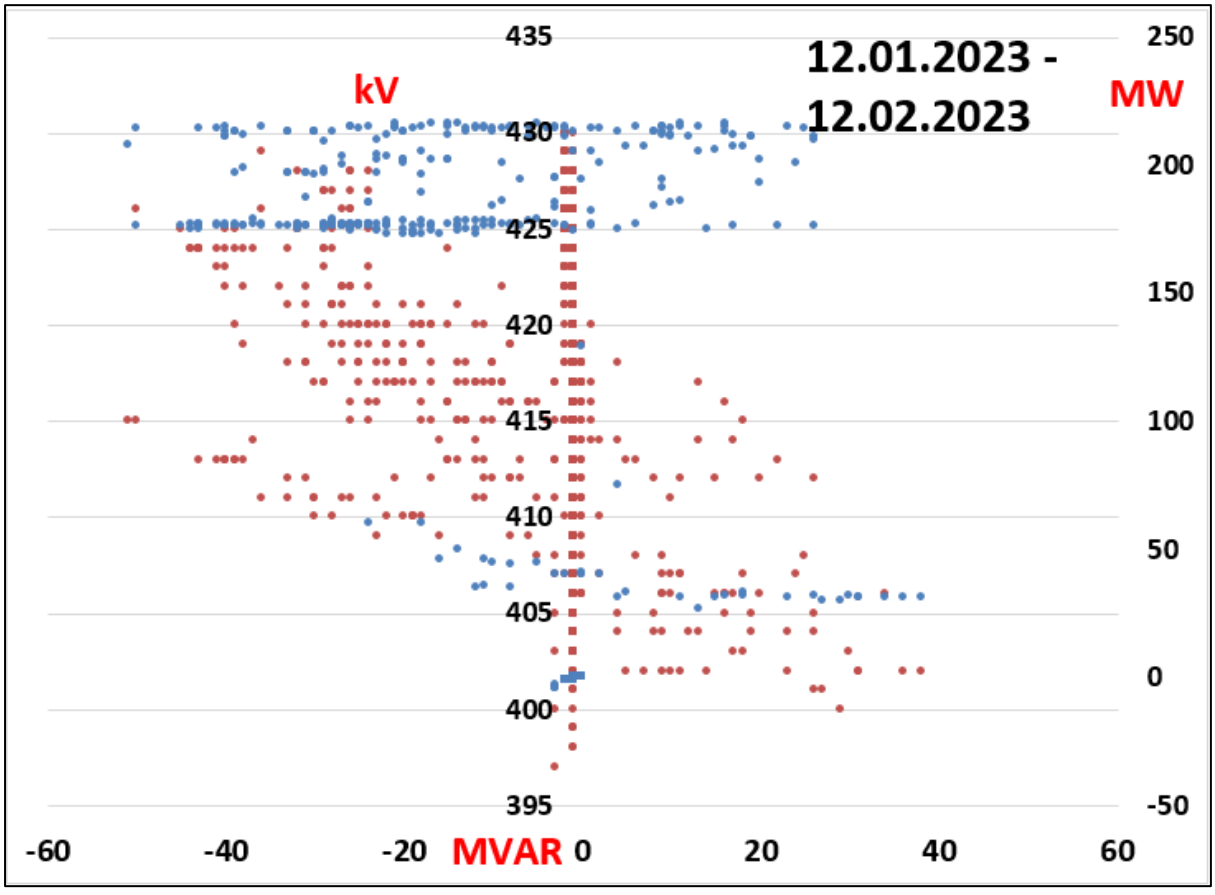
Dadri Thermal Unit-V



Dadri Thermal Unit-VI



Bawana GT-I



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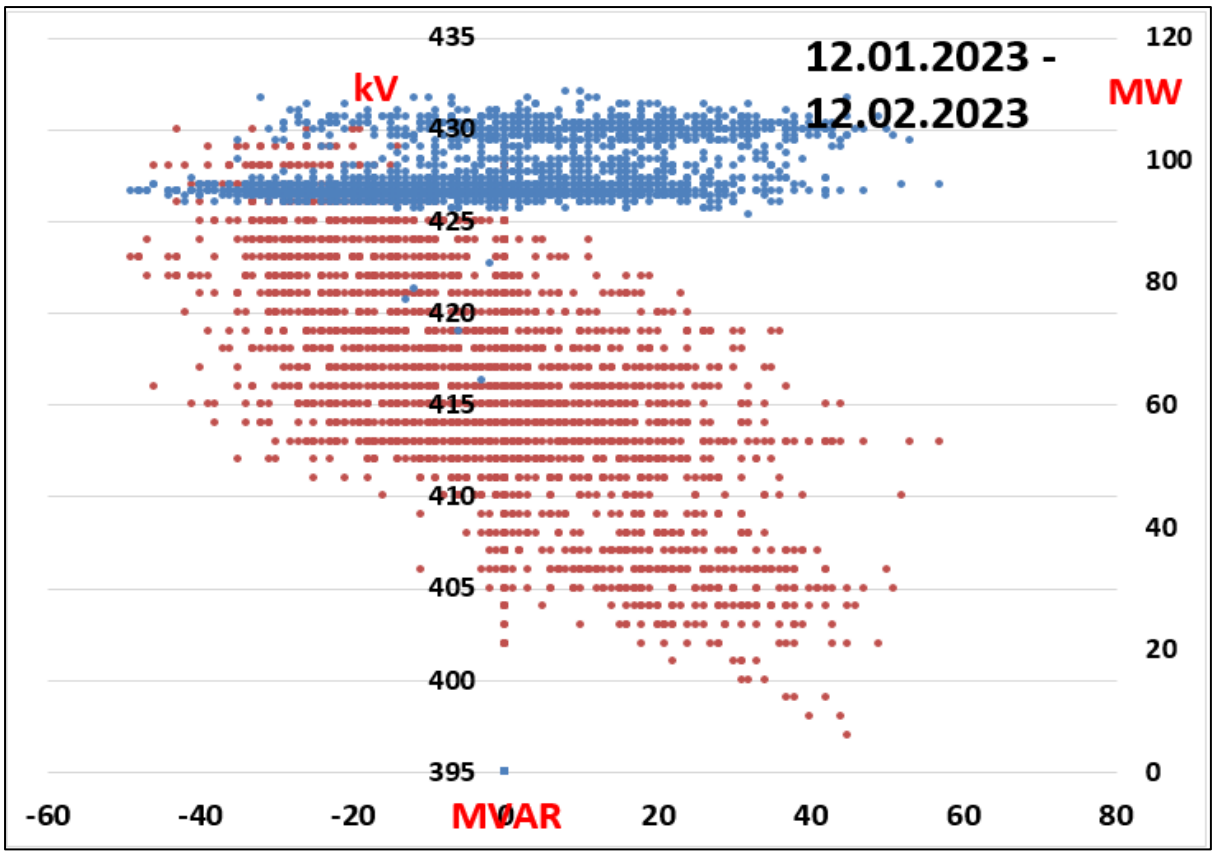
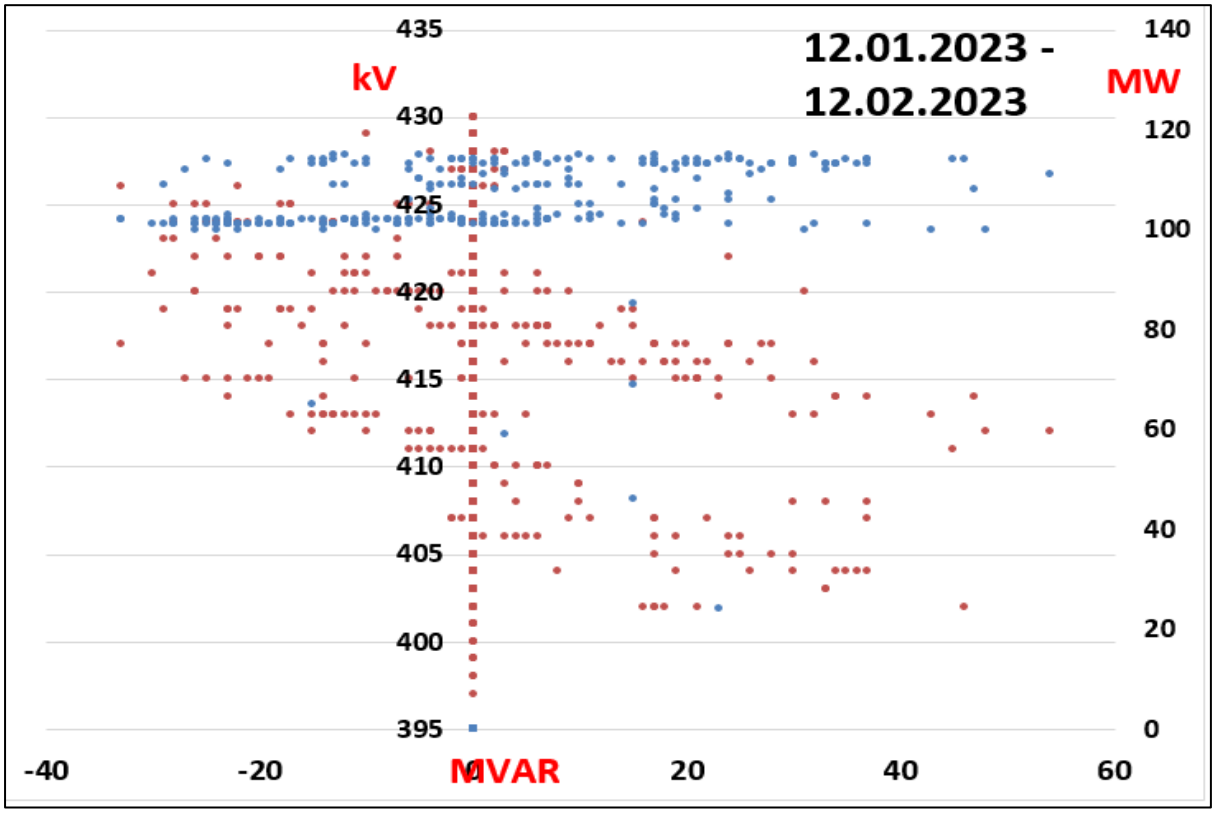


Bawana ST-I



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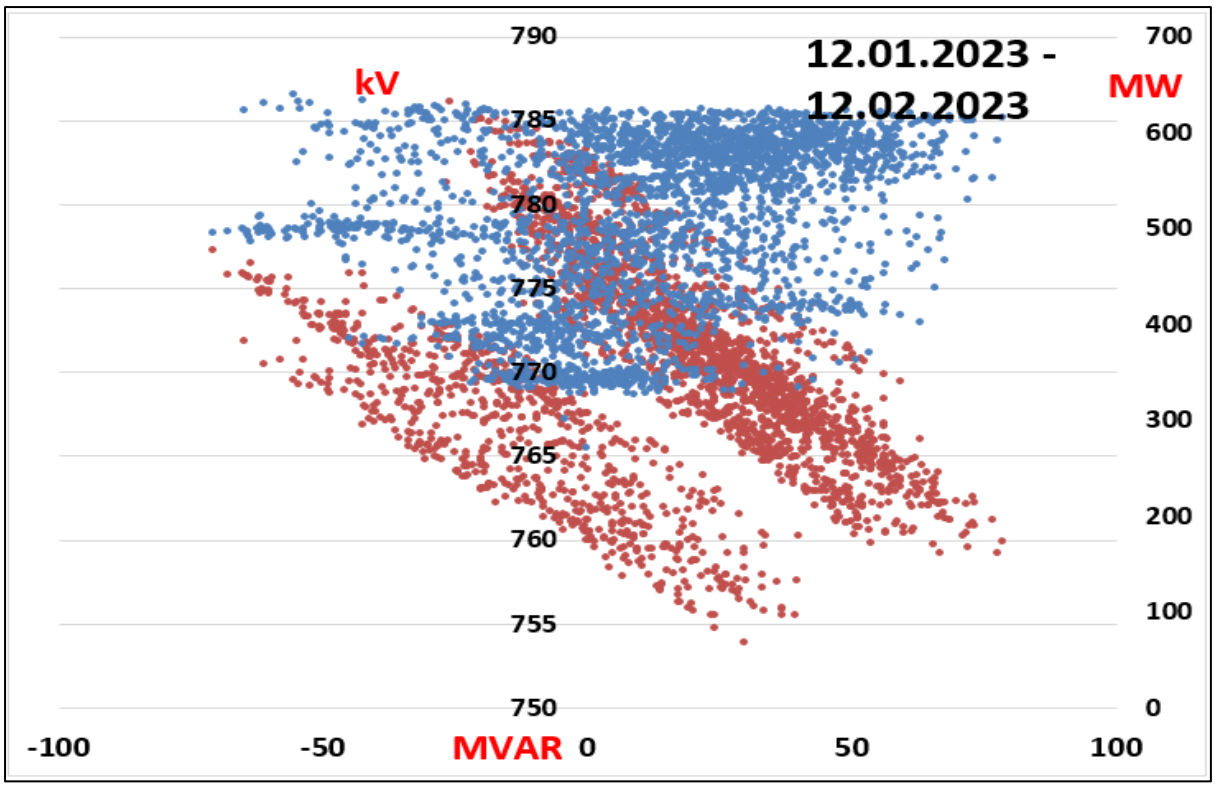
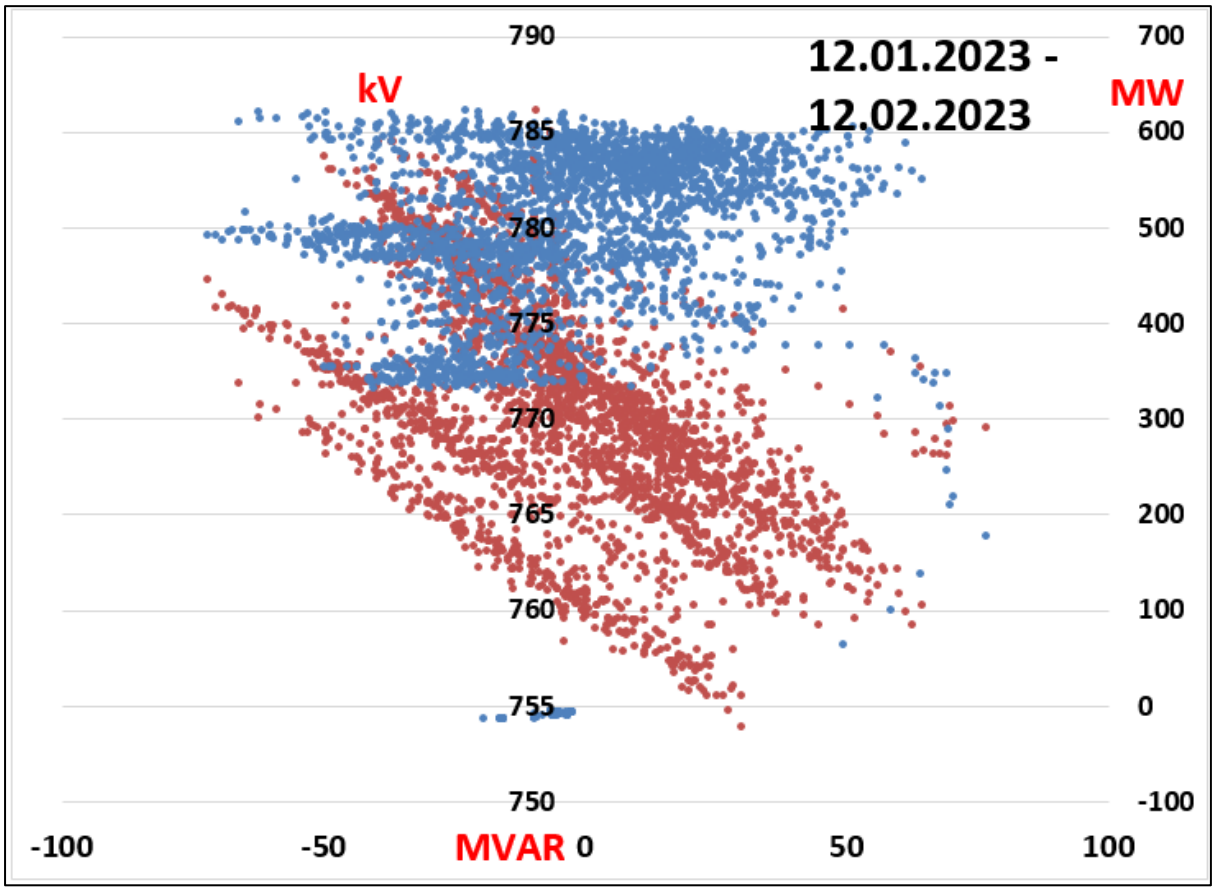
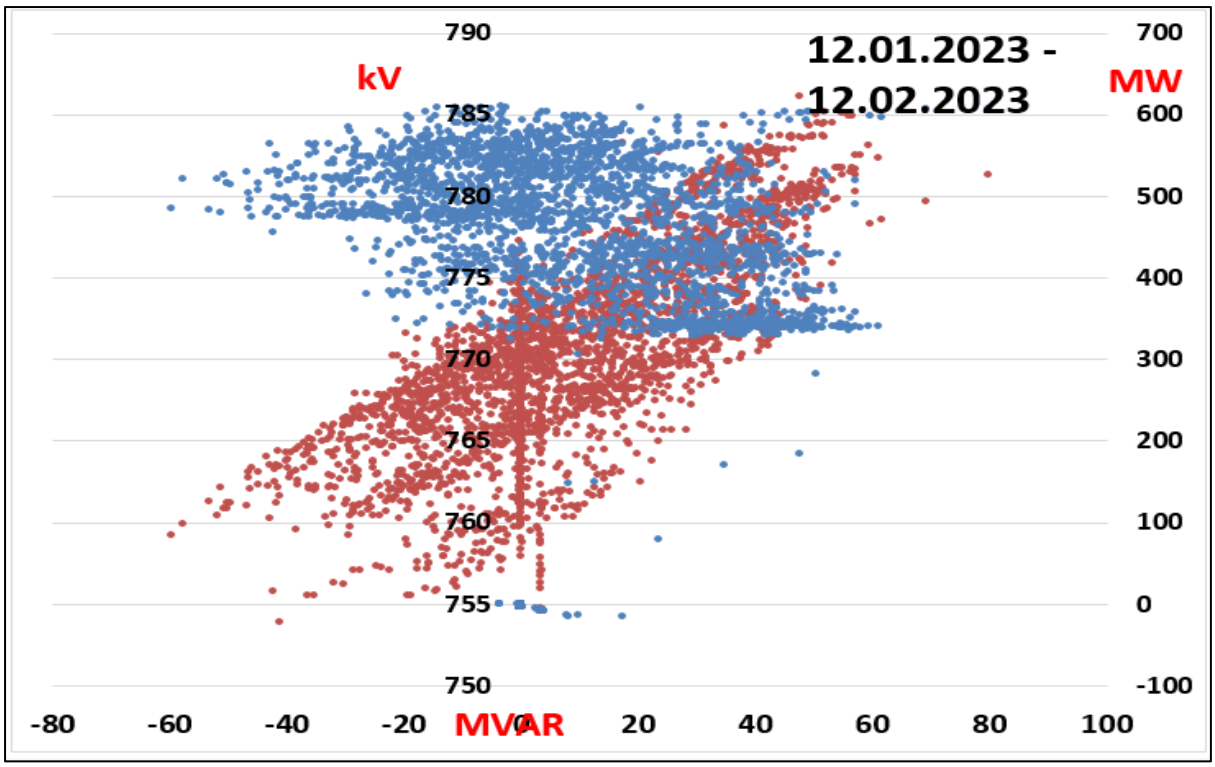


Bara Unit-I



Bara Unit-II



Bara Unit-III

Sr No	Element Name	Outage Date	Outage Time	Reason
1	220 KV Kotputli(PG)-Bansur(RS) (RS) Ckt-1	05-Jan-23	21:54	R-N fault, Zone-1, Dist. 20.10km from Bansur(RS).
		22-Jan-23	07:46	r-N fault, Dist. 22.76km from Bansur & Dist. 18.72km, Fault current 7.2kA from Kotputli(PG).
		23-Jan-23	03:03	R-N fault, Bansur end: Ar-3.15kA & 26.62km distance, Kotputli end: 18.94km & Ir=6.7kA.
2	400 KV Agra-Unnao (UP) Ckt-1	22-Jan-23	04:48	Y-phase, Zone-1, Dist. 79.1km, Fault current 4.931kA from Unnao end.
		22-Jan-23	19:01	R-N fault, Zone-1, Dist. 233km, Fault current 1.03kA from Unnao & Zone-1, Dist. 33.53km, Fault current 7.7078kA from Agra(PG).
		24-Jan-23	01:54	LBB protection operated on 400 kV Unnao Bareilly 2nd line. Due to this the bus connected (BUS A) through this line dead and 400 kV Bus coupler opened and the lines and ICTs connected through Bus A opened.
3	400 KV Aligarh-Sikandrabad (UP) Ckt-1	04-Jan-23	18:46	Phase to earth fault R-N
		09-Jan-23	03:09	R-N Fault, Zone-1, Dist. 50.82km, Fault current 5.828kA from Aligarh end.
		10-Jan-23	07:12	Phase to earth fault R-N
		26-Jan-23	23:41	R-N fault, Zone-1, Dist. 27.149km, Fault current 7.6125kA from Aligarh.
4	400 KV Amargarh(NRSS XXIX)-Samba(PG) (NRSS XXIX) Ckt-2	13-Jan-23	00:32	Phase to earth fault R-N
		13-Jan-23	02:01	Phase to earth fault R-N
		13-Jan-23	17:38	R-N Fault, Dist. 90.52km, Fault current 2.73kA from Amargarh and Dist. 161.95km, Fault current 2.23kA from Samba.
5	400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1	05-Jan-23	03:20	Y-B fault, Fault current Iy 4.30kA Ib 4.41kA from Mau(UP).
		15-Jan-23	15:27	Phase to phase fault Y-B
		17-Jan-23	06:34	Y-N Fault, Dist. 163.32km, Fault current 2.35kA from Anpara.
		26-Jan-23	23:19	Y-N fault, Zone-1, Fault current Iy 20kA, Dist. 2.8km from Mau(UP).
		13-Jan-23	10:57	Phase to earth fault Y-N
		17-Jan-23	04:18	R-N Fault, Dist. 141.07km, Fault current 2.53kA from Unnao.

6	400 KV Bareilly-Unnao (UP) Ckt-1	23-Jan-23	21:37	Unnao end-B phase, Zone 1, 58.5 km, 21.6 %, 6.03 kA Bareilly end- B phase, 202.68 km, 74.79 %, 1.805 kA
		25-Jan-23	13:46	Phase to earth fault R-N
		26-Jan-23	00:59	Y-N fault, Zone-1, Dist. 214.1km, Fault current 2.1kA from Unnao & Dist. 16.4km, Fault current 13.44kA from Bareilly. Charging attempt failed at 01:40 hrs from Unnao end. Earth-wire found broken between Tower no. 702-705.
		29-Jan-23	05:12	Over voltage
		30-Jan-23	11:42	line tripped at Unnao end only . flags are: B-N Fault , trip relay operated, CB trip 1/2 faulty
7	400 KV Suratgarh(RVUN)-Ratangarh(RS) (RS) Ckt-2	11-Jan-23	00:12	RYB fault, Distance=22.6Km, 7.14kA from Suratgarh end. The line is tripped from STPS end only.
		17-Jan-23	02:20	R-N Fault, Dist. 50.9km, Fault current 4.80kA from Ratangarh & Dist. 82.36km from Suratgarh.
		30-Jan-23	17:11	RATANGARH END - Distance=116.50Km Zone=Z1 Phase=Y Fault Current=2.57 KA STPS END - Distance=17.33 Km Zone=Z1 Phase=R & B Fault Current=11.323 KA
8	765 KV Anta-Phagi (RS) Ckt-2	01-Jan-23	05:39	R-N fault, Zone-1, Dist. 70.4km from Phagi & Zone-1, Dist. 123.2km from Anta.
		29-Jan-23	09:24	Y-N fault, Z-1 (84.8km) Iy-4.35kA from Anta end and 112km & 5.2kA from Phagi end.
		29-Jan-23	21:30	Y-N fault, Z-1 (30.7km) Iy-10.16kA from Phagi end and 167km & 2.5kA from Anta end.

ary for January 2023

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)	Remarks (Points of discussion)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)		
1	GI-2	1) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-1 2) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-2 3) 660 MW Meja TPS - UNIT 1	Uttar Pradesh	UPPTCL	1-Jan-23	04:33	1-Jan-23	17:18	12:45	1. As reported, at 04:33 hrs, 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-1 & 2 tripped on Y-N phase to earth fault, fault was in Z-1 from Bara end and in Z-2 from Meja end. 2. As per PMU at Mainpuri(PG), Y-N phase to earth fault with fault clearing time of 560 ms followed by B-N phase to earth fault with fault clearing time of 320 ms is observed. 3. Further, as reported, 660 MW Unit-1 at Meja TPS tripped on generator differential protection operation at 04:50hrs.	0	0	0	0	0.000	0.000	31602	36851	560	1. Reason of frequent faults? 2. Reason of delayed clearance of fault? 3. Status of A/R operation at both end? 4. Remedial/corrective actions taken?
2	GD-1	1) 220/132kV 100MVA ICT-1 at Hamirpur_2(HP) 2) 220/132kV 100MVA ICT-2 at Hamirpur_2(HP) 3) 220/132kV 100MVA ICT-3 at Hamirpur_2(HP) 4) 132 KV Hamirpur(HP)-Chohal (PS) (PSTCL) Ckt-1	Himachal Pradesh	HPPTCL	4-Jan-23	07:27	4-Jan-23	14:50	07:23	1. As reported at 07:27hrs, Due to overloading of all 3 220/132kV 100MVA ICTs at hamirpur2(HP) (carrying ~107MVA each during antecedent condition) tripped. 2. Due to tripping of ICTs at Hamirpur2(HP), Hamirpur2(HP) S/s got dead and due to cascade tripping at Kangoo, Nehrain & Hamirpur_1(HP), these S/s also became dead. 3. As mper PMU, no fault in system is observed. 4. As per SCADA, load loss of approx. 600MW in Uttarakhand control area is observed.	0	4.43	0	600	0.000	1.195	46411	50202	NA	
3	GI-2	1) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-1 2) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-2	Uttar Pradesh	UPPTCL	5-Jan-23	06:23	5-Jan-23	12:28	06:05	1. During antecedent condition, 660MW Unit-2 at Meja was generating approx. 500 MW. 2. As reported, at 06:23 hrs, 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-1 & 2 tripped on B-N phase to earth fault, fault was in Z-1 from Bara end. 3. As per PMU at Mainpuri(PG), B-N phase to earth fault with fault clearing time of 560 ms is observed.	0	0	0	0	0.000	0.000	39367	46426	560	1. Reason of frequent faults? 2. Reason of delayed clearance of fault? 3. Status of A/R operation at both end? 4. Remedial/corrective actions taken?
4	GD-1	1) 400/220 kV 315 MVA ICT -1 at Hindaun(Raj) 2) 400/220 kV 315 MVA ICT -2 at Hindaun(Raj)	Rajasthan	RVPNL	5-Jan-23	13:21	5-Jan-23	13:56	00:35	1. During antecedent condition, 220kV Hindaun220-Sikrai(Dausa)(Raj) ckt was not in service and MVA loading of 400/220 kV 315 MVA ICT-1 & 2 at Hindaun(Raj) was 265 and 282 MVA respectively. 2. At 13:21 hrs, 400/220kV 315MVA ICT-1&2 both tripped on O/C protection operation. 3. As per PMU, no fault is observed in system. 4. As per SCADA, load loss of approx. 550MW is observed in Rajasthan control area.	0	0.32	0	550	0.000	0.937	53705	58708	NA	
5	GD-1	1) 66MW Ramganga HEP UNIT-1 2) 66MW Ramganga HEP UNIT-2 3) 66MW Ramganga HEP UNIT-3 4) 132 KV Sherkot(UP)-Kalagarh(UK) (UP) Ckt-1 5) 132 KV Afzalgarh(UP)-Kalagarh(UK) (UP) Ckt-1	Uttarakhand	PTCUL	8-Jan-23	12:17	8-Jan-23	13:29	01:12	1. As reported at 12:17hrs, 132 KV Sherkot(UP)-Kalagarh(UK) (UP) Ckt & 132 KV Afzalgarh(UP)-Kalagarh(UK) (UP) Ckt was manually opened from UP end due to overloading of line. However, it was not done in coordination with SLDC-UK. 2. Due to outage of two (02) 220kV lines, all running three (03) 66MW units at Ramganga HEP tripped due to loss of evacuation path. 3. As per PMU, no fault in system is observed. 4. As per SCADA, loss of generation of approx. 120MW at Ramganag HEP occurred.	0	0.14	120	0	0.224	0.000	53454	60466	NA	
6	GI-1	1) 220/33 kV 150 MVA ICT 2 at AHEJ4L PSS 2 HB_FGRAH_FBTL (AHEJ4L)	Rajasthan	AHEJ4L	9-Jan-23	15:21	10-Jan-23	06:02	14:41	1. PSS-2 AHEJ4L, 220/33 kV 150 MVA ICT 2 at AHEJ4L PSS 2 Fatehgarh tripped due to Differential protection operated at 15:21. 2. As per AHEJ4L PSS-2, it was observed that outgoing feeder No-307 Cable end termination kit failure caused this tripping. 3. As per SCADA data of ICT loading, generation loss of approx. 38 MW occurred at AHEJ4L-PSS2 at Fatehgarh. 4. Generation connected to ICT-2 was resumed through Bus coupler at 16:04.	0.027	0.00	38	0	0.081	0.000	46892	56519	NA	
7	GD-1	1) 400/220 kV 315 MVA ICT -1 at Hindaun(Raj) 2) 400/220 kV 315 MVA ICT -2 at Hindaun(Raj)	Rajasthan	RVPNL	11-Jan-23	11:13	11-Jan-23	12:52	01:39	1. During antecedent condition, 220kV Hindaun220-Sikrai(Dausa)(Raj) ckt was not in service and MVA loading of 400/220 kV 315 MVA ICT-1 & 2 at Hindaun(Raj) was 258 and 281 MVA respectively. 2. At 11:13 hrs, 400/220kV 315MVA ICT-1&2 both tripped on O/C protection operation. 3. As per PMU, no fault is observed in system. 4. As per SCADA, load loss of approx. 420MW is observed in Rajasthan control area.	0	0.69	0	420	0.000	0.697	53252	60250	NA	
8	GD-1	1) 220 KV Ballabhgarh(BB)-Badarpur(NT) (BB) Ckt-1 2) 220 KV Samaypur(BB)-Palli(HV) (HVPNL) Ckt-1&2 3) 220KV Bus 3&4 at Samaypur(BB) 4) 220 KV Ballabhgarh-Samaypur (BB) Ckt-2 5) 400/220 kV 500 MVA ICT 1,2,3&4 at Ballabhgarh(PG) 6) 220 KV Palwal(HV)-Samaypur(BB) (HVPNL) Ckt-2 7) 220 KV Samaypur(BB)-Badshahpur(HV) (HVPNL) Ckt-1 &2 8) 220 KV Ballabhgarh-Charkhi Dadri (BB) Ckt-1 9) 220 KV Faridabad Sec-58 (HV)-Faridabad(NT) (HVPNL) Ckt-1	Haryana	BBMB	12-Jan-23	16:56	12-Jan-23	23:47	06:51	1. Multiple elements tripping occurred at Samaypur(BB) while charging of Bus-4 at 220 kV Samaypur S/S which was under planned outage. 2. As per SCADA, approx. 400 MW Load Loss occurred in Haryana. 3. As per PMU at Ballabhgarh(PG), B-N phase to earth fault with fault clearing time of 520 ms is observed.	0	2.74	0	400	0.000	0.779	44192	51323	520	1. Exact location and nature of fault? 2. Reason of delayed clearance of fault? 3. Sequence of event & details of protection operation? 4. Remedial action taken?
9	GD-1	1) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-1 2) 400 KV Bara(UP)-Meja TPS(MUN) (UP) Ckt-2 3) 765 KV Bara-Mainpuri (UP) Ckt-2 4) 660 MW Bara PPGCL TPS - UNIT 1,2&3	Uttar Pradesh	UPPTCL	12-Jan-23	05:53	13-Jan-23	11:13	05:20	1. During antecedent condition, 660MW Unit-1, 2 & 3 at Bara were generating approx. 430 MW, 405 MW and 415 MW respectively. 2. As reported, 400kV Bara – Meja ckt 1 & 2 tripped at 03:03 hrs & 03:48 hrs respectively on phase to earth fault. After tripping of 400kV Bara-Meja D/C generation of Bara TPS was evacuating only through 765kV Bara – Mainpuri ckt 2 (ckt 1 was already out). 3 At 05:53hrs, 765 KV Bara-Mainpuri (UP) Ckt-2 also tripped on R-N phase to earth fault. 4. After tripping of 765 KV Bara-Mainpuri (UP) Ckt-2 at 05:53 hrs, 660 MW Bara PPGCL TPS - UNIT 1,2&3 tripped due to loss of evacuation path. 5. As per SCADA, approx. 1200 MW generation loss occurred in Uttar Pradesh. 6. As per PMU at Mainpuri(PG), Y-N phase to earth fault with fault clearing time of 80 ms is observed at 03:04 hrs, Y-N followed by R-N phase to earth fault with fault clearing time of 760 ms is observed at 03:48 hrs and B-N phase to earth fault with fault clearing time of 80 ms is observed at 05:53 hrs.	0	0.00	1200	0	3.212	0.000	37358	46439	80	
10	GD-1	1) 220 KV Ratangarh(RS)-Sikar(PG) (PG) Ckt-1&2 2) 400/220 kV 315 MVA ICT 1,2&3 at Ratangarh(RS)	Rajasthan	RVPNL	12-Jan-23	07:11	12-Jan-23	09:16	02:05	1. During antecedent condition, 400/220 kV 315 MVA ICT 1,2&3 at Ratangarh(RS) were carrying approx. 133 MW each respectively. 2. As reported at 07:10hrs, Y-Ph CT at 220kV side of 400/220KV ICT-I at Ratangarh(RS) burst. 3. At the same time, all the elements connected at 220kV Bus-1&2 tripped. 4. As per PMU at Sikar(PG), R-N phase to earth fault with fault clearing time of 80msec at 07:10:35hrs followed by R-B phase to phase fault with fault clearing time of 80msec at 07:10:36hrs is observed. 5. As per SCADA, change in load of approx. 220 MW observed in Rajasthan control area.	0	0.46	0	220	0.000	0.462	44003	47635	80	
11	GD-1	1) 400 KV Rajwest(RW)-Kankani (RS) Ckt-1 2) 400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1 3) 135 MW Rajwest (IPP) LTPS - UNIT 1,2,3,4,5,6,7&8 4) 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1	Rajasthan	RVPNL	13-Jan-23	05:32	13-Jan-23	15:33	10:01	1. During antecedent condition, 135 MW Rajwest (IPP) LTPS - UNIT 1,2,3,4,5,6,7&8 were carrying approx. 65 MW each respectively. 2. As reported, 400 KV Rajwest(RW)-Kankani (RS) Ckt-1 and 400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1 tripped due to heavy fog at 04:24 hrs and 04:51 hrs respectively. 3. Further at 05:32hrs, 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1 also tripped on phase to earth fault due to fog. With the tripping of 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1 135 MW Rajwest (IPP) LTPS - UNIT 1,2,3,4,5,6,7&8 tripped due to loss of evacuation path. 4. As per SCADA, approx. 450 MW generation loss occured in Rajasthan. 5. As per PMU at Bhinmal(PG), B-N phase to earth fault with fault clearing time of 200 ms is observed.	0	0.00	450	0	1.316	0.000	34182	41812	200	1. Reason of frequent faults? 2. Reason of delayed clearance of fault? 3. DR/EL of the tripped elements? 4. Satus of A/R operation? 5. Remedial action taken?
12	GI-2	1) 220 KV Fatehgarh_II(PG)-ASEJOL_HB FTGH2 (ASEJOL) (ASEJOL) Ckt-1 2) 220 KV Fatehgarh_II(PG)-ASEJOL_HB FTGH2 (ASEJOL) (ASEJOL) Ckt-2	Rajasthan	ASEJOL	14-Jan-23	13:03	14-Jan-23	14:01	00:58	1. At 13:03:hrs, 765kV Ajmer-Bhadla2 ckt-2 tripped after unsuccessful A/R operation on R-N phase to earth fault as fault was of permanent in nature. 2. As per PMU, R-N phase to earth fault with unsuccessful A/R operation is observed and fault cleared within 100msec. 3. At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT. 4. As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 762kV (before fault) to 855kV (after fault). However, over voltage didn't sustain and no further tripping of ISTS element on over voltage observed. 5. 220kV Fatehagrh2-ASEJOL ckt-1&2 tripped on transient over voltage instantaneously. 6. As per SCADA, total reduction in RE generation of approx. 2340MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).			2340	0	4.481	0.000	52224	57073	80	

S.No.	Category of Grid Disturbance (GD-1 to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)	Remarks (Points of discussion)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)		
13	GD-1	1) 765 KV Fatehgarh_II(PG)-Bhadla(PG) (FBTL) Ckt-1 2) 765 KV Bhadla_2 (PG)-Fatehgarh_II(PG) (PFTL) Ckt-1 3) 220 KV Fatehgarh_II(PG)-Devikot SL_FTGH2 (NTPC_DEVIKOT) (NTPC_DEVIKOT) Ckt-1 4) 765 KV Bikaner(PG)-Khetri (PKTSL) (BKTL) Ckt-1 5) 400 KV Fatehgarh_II(PG)-Fatehgarh Pooling(FBTL) (FBTL) Ckt-1 6) 400 KV Bhadla(PG)-Fatehgarh Pooling(FBTL) (FBTL) Ckt-1 7) 400kV Bassi-Heerapura ckt-2	Rajasthan	POWERGRID, NTPC DEVIKOT, FBTL, BKTL	14-Jan-23	14:55	14-Jan-23	16:51	01:56	1. At 14:55hrs, 400kV Bassi-Heerapura ckt-2 tripped on R-Y phase to phase fault. 2. As per PMU, R-Y phase to phase fault is observed. 3. At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT which led to the over voltage in system. 4. As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 769kV (before fault) to 841kV (after fault). 5. On this over voltage multiple 765kV ISTS lines at 765kV RE pooling stations tripped. 6. As per SCADA, total reduction in RE generation of approx. 3210MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).			3210	0	6.766	0.000	47441	52382	80	
14	GD-1	1) 400 KV Bhadla-Sohnpur (RS) Ckt-1 2) 400 KV Bhadla(PG)-Bhadla_2 (PG) (FBTL) Ckt-2 5) 400 KV Fatehgarh_II(PG)-Fatehgarh Pooling(FBTL) (FBTL) Ckt-2 6) 400 KV Fatehgarh Pooling(FBTL)-Adani RenewPark_SL_FGARH_FBTL (AREPRL) (AREPRL) Ckt-1 &2 7) 400 KV Bhadla(PG)-Bhadla_2 (PG) (FBTL) Ckt-1 8) 765 KV Bikaner-Moga (PG) Ckt-1 9) 765 KV Bikaner-Bhadla_2 (PG) Ckt-1 10) 400 KV Phagi-Heerapura (RS) Ckt-1 11) 765 KV Fatehgarh_II(PG)-Bhadla(PG) (FBTL) Ckt-2 12) 765 KV Bhadla-Bikaner (PG) Ckt-1 13) 400 KV Bhadla-Merta (RS) Ckt-1 14) 400 KV Bhadla-Ramgarh (RS) Ckt-1&2 15) 400 KV Bhadla(RS)-Bhadla(PG) (PG) Ckt-2	Rajasthan	POWERGRID, NTPC DEVIKOT, FBTL, BKTL, RENEW, ADANI, RVPNL	14-Jan-23	15:18	14-Jan-23	17:49	02:31	1. At 15:18hrs, 400kV Phagi-Heerapura ckt-1 tripped on R-Y phase to phase fault. 2. As per PMU, R-Y phase to phase fault which cleared within 100msec is observed. 3. At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT which led to the over voltage in system. 4. As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 760kV (before fault) to 848kV (after fault). 5. On this over voltage multiple 765kV ISTS lines at 765kV RE pooling stations tripped. 6. During same time, 400kV Fatehgarh1-Fatehgarh2-I also tripped on over voltage which was only emanating path left for RE generation at Adani Solar Park. Prior to this, at 14:54 hrs on 14th Jan 2023, 400kV Fatehgarh1-Fatehgarh2-II tripped subsequent to multiple tripping at 765kV ISTS pooling station of RE on R-Y (L-L) fault at 400kV Bassi-Heerapura-II. Thus, evacuation path for 400kV Adani solar park loss at 15:18 hrs. 7. At the same time, SPS to relive transmission congestions in Bikaner complex operated due to tripping of multiple 765kV lines at Bikaner(PG). On action of SPS, Thar Surya, SBSR, Tata Green Power and RENEW Power RE stations tripped. 8. As per SCADA, total reduction in RE generation of approx. 4468MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).			4468	0	9.602	0.000	46534	51684	80	
15	GI-2	1) 400 KV Lucknow_1(PG)-Basti(UP) (PG) Ckt-1 2) 400 KV Tanda(NT)-Basti(UP) (UP) Ckt-1&2	Uttar Pradesh	UPPTCL	15-Jan-23	12:25	15-Jan-23	16:14	03:49	1. As reported at 12:25hrs, 400 KV Tanda(NT)-Basti(UP) (UP) Ckt-1 tripped on R-Y phase to phase fault, fault distance was 25.46km (Z-1) from Basti end. 2. At the same time, 400 KV Tanda(NT)-Basti(UP) (UP) Ckt-2 & 400 KV Lucknow_1(PG)-Basti(UP) (PG) Ckt-1 also tripped. 3. As per PMU at Lucknow(PG), R-Y phase to phase fault with fault clearing time of 80 ms is observed. 4. As per SCADA, no load loss occurred in Uttar Pradesh control area.	0	0.00	0	0	0.000	0.000	52228	57226	80	
16	GD-1	1) 400/220 kV 315 MVA ICT -1 at Hindaun(Raj) 2) 400/220 kV 315 MVA ICT -2 at Hindaun(Raj)	Rajasthan	RVPNL	17-Jan-23	08:56	17-Jan-23	09:26	00:30	1. During antecedent condition, MVA loadings of 400/220 kV 315 MVA ICT-1 & 2 at Hindaun(Raj) were 284 and 307 MVA respectively. 2. At 08:56 hrs, 220kV Hindaun220-Sikrai(Dausa)(Raj) ckt (carrying ~87MW) tripped which further resulted into overloading of 220kV Hindaun400-Hindaun220(Raj) ckt and 400/220kV 315MVA ICTs at Hindaun. Subsequently, 400/220kV 315MVA ICT-1&2 at Hindaun tripped on overcurrent protection operation. 3. As per PMU, no fault is observed in system. 4. As per SCADA, load loss of approx. 500 MW is observed in Rajasthan control area.	0	0.25	0	500	0.000	0.875	51397	57155	NA	
17	GD-1	1) 220 KV Jalandhar-Pong (BB) Ckt-2 2) 220 KV Pong(BB)-Dasuya(PS) (BB) Ckt-2 3) 66 MW Pong HPS - UNIT 2 4) 66 MW Pong HPS - UNIT 4 5) 220 KV Jessore(HP)-Pong(BB) (PG) Ckt-1 6) 220KV Bus 2 at Pong(BB)	Himachal Pradesh	BBMB	24-Jan-23	11:40	24-Jan-23	13:35	01:55	1. During antecedent condition, 66MW Unit-2,3,4&5 were running and generating approx. 66MW, 66MW, 50MW & 60MW respectively. Unit-2,4&6 & 220kV feeders to Jalandhar ckt-2, Jessore ckt-1 and Dasuya ckt-2 were connected at 220kV Bus-2 and Unit-1,3&5, 220/66kV 40MVA Transformer and 220kV feeders to Bairasul, Jalandhar ckt-1 and Dasuya ckt-1 were connected at 220kV Bus-1. 2. As reported, busbar protection operated at 220 kV Bus-2 at Pong(BB) at 11:40 hrs. Hence all the elements connected to Bus-2 got tripped. As bus coupler between bus 1 and bus 2 got opened (as per SCADA SOE), all elements at Bus-1 remained connected. 3. As per PMU at Jalandhar (PG), no fault is observed. As reported, flashover in CB of Unit-4 at Pong HEP observed. 4. As per SCADA, total generation loss of approx. 114MW is observed at Pong HEP(BBMB).	0	0.00	114	0	0.229	0.000	49781	55570	NA	
18	GI-2	1) 765/400 kV 1000 MVA ICT 2 at Unnao(UP) 2) 400 KV Unnao(UP)-Jehta_Hardoi Road (UP) (PG) Ckt-2 3) 400 KV Agra-Unnao (UP) Ckt-1 4) 400/220 kV 315 MVA ICT 1 at Unnao(UP) 5) 400 KV Bareilly-Unnao (UP) Ckt-2 6) 765/400 kV 1000 MVA ICT 1 at Unnao(UP) 7) 400 KV Unnao-Panki (UP) Ckt-1 8) 400 KV Unnao-Lucknow (UP) Ckt-1	Uttar Pradesh	UPPTCL	24-Jan-23	01:54	24-Jan-23	03:35	01:41	1. During antecedent condition, 765/400 kV 1000 MVA ICT 2, 400/220 kV 315 MVA ICT 1 and 400 kV feeders to Jehta_Hardoi Road ckt-2, Agra ckt-1, Bareilly ckt-2, Panki ckt-1, Lucknow ckt-1 were connected to 400 kV Bus 1 at Unnao(UP). 400kV Unnao-Bareilly ckt-1 was not in service. 2. As reported, R-N phase to earth fault occurred on 400kV Unnao-Bareilly ckt-2, fault was in Z-1 from Unnao end. Line CB at Unnao end failed to open which led to LBB protection operation. Due to this, elements connected at 400kV Bus-1 at Unnao(UP) tripped. 3. As per PMU, R-N phase to earth fault with delayed clearance of 240msec is observed. 4. As per SCADA, no load loss is observed in Uttar Pradesh control area.	0	0.00	0	0	0.000	0.000	30774	34797	240	i) Why did line CB of 400 kV Unnao-Bareilly ckt 2 fail to clear R-N fault due to which LBB protection operated? ii) DR/EL & tripping report of all the tripped elements need to be shared. iii) Remedial action taken report to be shared.
19	GI-1	1) 132 KV Hiranagar(PDD)-Sewa_2(NH) (PG) Ckt-1 2) 132 KV Hiranagar(PDD)-Sewa_2(NH) (PG) Ckt-2	J&K	JKPTCL, NHPC	25-Jan-23	20:05	25-Jan-23	22:05	02:00	1. As reported, 132 KV Hiranagar(PDD)-Sewa_2(NH) (PG) Ckt-1&2 tripped on Y-N phase to earth fault (zone-1 protection operated). Fault current was 0.92 kA and distance was 1.5 km from Sewa_2(NH) end. 2. As per PMU at Sambha(PG), R-Y fault is observed with delayed clearance of 280 ms. 3. As per SCADA, change in load of approx. 50MW observed in J&K(UT) & Ladakh(UT) control area.	0	0.10	0	50	0.000	0.099	38835	50512	280	i) Exact location and nature of fault? ii) Reason of delayed clearance of fault? iii) DR, EL of tripped elements & tripping report of the event need to be shared. iv) Remedial action taken report to be shared.
20	GI-2	1) 400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1 2) 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2	Uttar Pradesh	UPPTCL	26-Jan-23	23:19	27-Jan-23	00:13	00:54	1. During antecedent condition, 400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1 & 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2 were carrying 242MW & 339MW respectively. 2. As reported at 23:19hrs, 400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1 tripped on Y-N phase to earth fault. Fault was in Z-1 (2.5km, 1%) from Mau end and in Z-2(238km) from Anpara end. Line tripped after unsuccessful A/R operation from both the ends. 3. At the same time, 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2 also tripped from Anpara end only. Fault was in Z-2(154km) from Anpara end. 4. As per PMU, Y-N phase to earth fault with unsuccessful A/R operation is observed. 5. As per SCADA, no load loss is observed in Uttar Pradesh control area.	0	0.00	0	0	0.000	0.000	32704	38123	80	
21	GI-2	1) 400kV Muradnagar_1-Mathura (UP) ckt 2) 400/220kV 315MVA ICT-2 at Muradnagar_1(UP) 3) 63MVAr Bus reactor at Muradnagar_1(UP)	Uttar Pradesh	UPPTCL	28-Jan-23	13:45	28-Jan-23	16:58	03:13	1. As reported, testing and commissioning work of 400kV Bus bar protection at Muradnagar_1(UP) was being done by ZIV Firm engineer on behalf of M/S JSP Project Pvt Ltd. to incorporate 2 (no.) of upcoming 400kV line bays i.e., Muradnagar-II to Simbhawali. During this work, LBB protection maloperated multiple times i.e., 13:45hrs, 17:06hrs & 17:24hrs. 2. At 13:45hrs, on maloperation of LBB protection, 400kV Muradnagar_1-Mathura (UP) ckt, 400/220kV 315MVA ICT-2 at Muradnagar_1(UP) & 63MVAr Bus reactor at Muradnagar_1(UP) tripped. 3. As per PMU at Anpara(UP), no fault in system is observed. 4. As per SCADA SOE, no change in demand of UP is observed. 5. As reported by SLDC-UP, 400kV bus bar protection is kept out of service due to multiple maloperation and issue has been taken up with M/S JSP Project Pvt Ltd. to resolve the same at the earliest.	0	0.00	0	0	0.000	0.000	50790	51943	NA	

S.No.	Category of Grid Disturbance (GD-I to GD-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Revival		Duration (hh:mm)	Event (As reported)	Energy Unserved due to Generation loss (MU)	Energy Unserved due to Load loss (MU)	Loss of generation / loss of load during the Grid Disturbance		% Loss of generation / loss of load w.r.t Antecedent Generation/Load in the Regional Grid during the Grid Disturbance		Antecedent Generation/Load in the Regional Grid		Fault Clearance time (in ms)	Remarks (Points of discussion)
					Date	Time	Date	Time					Generation Loss(MW)	Load Loss (MW)	% Generation Loss(MW)	% Load Loss (MW)	Antecedent Generation (MW)	Antecedent Load (MW)		
22	GD-1	1) 400 KV Bus-1 at Anpara(UP) 2) 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2 3) 210 MW Anpara TPS - UNIT 1 4) 400/132 kV 100 MVA ICT 1 at Anpara(UP)	Uttar Pradesh	UPPTCL	28-Jan-23	17:04	28-Jan-23	19:15	02:11	1. During antecedent condition, 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2, 210MW Unit-1 at Anpara TPS & 400/132 kV 100 MVA ICT 1 at Anpara(UP) were connected at 400kV Bus-1 at Anpara (UP) and rest of the elements were connected at 400kV Bus-2. 2. As reported at 17:04hrs, 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2, 210MW Unit-1 at Anpara TPS & 400/132 kV 100 MVA ICT 1 at Anpara(UP) all tripped on bus bar-1 differential protection operation. 3. As per PMU at Anpara(UP), R-Y phase to phase fault with delayed clearance in 440msec is observed. 4. As per SCADA SOE, 400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2 tripped from Sarnath end followed by tripping of all the elements connected at Bus-1 at Anpara(UP). 5. As per SCADA, generation loss of approx. 190MW in UP control area is observed (210MW Unit-1 at Anpara TPS tripped).	0	0.00	190	0	0.424	0.000	44789	45727	440	i) Exact location and nature of fault? ii) Reason of delayed clearance of fault? iii) DR & EL of all the tripped elements along with tripping report of the event need to be shared. iv) Remedial action taken report to be shared.
23	GD-1	1) 220 KV Maharanibagh-Masjid Moth ckt-1 2) 220 KV Maharanibagh-Masjid Moth ckt-2 3) 220 KV Maharanibagh-Trauma Centre ckt-1 4) 220 KV Maharanibagh-Trauma Centre ckt-2	Delhi	DTL	29-Jan-23	15:50	29-Jan-23	16:00	00:10	1. During antecedent condition, 220kV Masjid Moth S/s was fed from 220kV Maharanibagh-masjid Moth ckt-1&2 and 220kV Trauma Centre, 220kV R.K. Puram & 220kV Vasant Kunj were fed from 220kV Maharanibagh-Trauma Centre ckt-1&2. 2. As reported at 15:50hrs, a fire incident occurred near Sarai Kale Khan drain in the vicinity of 220kV cables. On this fire incident, 220kV Maharanibagh-masjid Moth ckt-1&2 and 220kV Maharanibagh-Trauma Centre ckt-1&2 were manually tripped due to safety reasons. 3. By 16:00hrs, load of Trauma centre, RK puram & Vasant Kunj were restored by 220kV Tuglakabad-Trauma Centre ckt-1&2. 4. As per SCADA, change in load of approx. 250MW observed in Delhi control area for around 5-10min.	0	0.04	0	250	0.000	0.575	41000	43514	NA	
24	GD-1	1) 400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1 2) 135 MW Rajwest (IPP) LTPS - UNIT 4 3) 400 KV Rajwest(RW)-Kankani (RS) Ckt-1 4) 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1 5) 135 MW Rajwest (IPP) LTPS - UNIT 1 6) 135 MW Rajwest (IPP) LTPS - UNIT 2 7) 135 MW Rajwest (IPP) LTPS - UNIT 3 8) 135 MW Rajwest (IPP) LTPS - UNIT 5 9) 135 MW Rajwest (IPP) LTPS - UNIT 6 10) 135 MW Rajwest (IPP) LTPS - UNIT 7 11) 135 MW Rajwest (IPP) LTPS - UNIT 8	Rajasthan	RVPNL	30-Jan-23	05:02	30-Jan-23	12:24	07:22	1. As reported, 400 KV Rajwest(RW)-Jodhpur (RS) Ckt-1 tripped on Y-N phase to ground fault at 03:15 hrs, fault was in Z-1 from Rajwest end followed by 135 MW Rajwest (IPP) LTPS - UNIT 4 tripping at 03:17 hrs. Further at 03:48hrs, 400 KV Rajwest(RW)-Kankani (RS) Ckt-1 tripped on Y-N phase to ground fault, fault was in Z-1 (7.28km) from Rajwest end. 2. Further at 05:02hrs, 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1 also tripped on B-N phase to earth fault during fog, fault was in Z-1 from Rajwest end. With the tripping of 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt-1 135 MW Rajwest (IPP) LTPS - UNIT 1,2,3,5,6,7&8 tripped due to loss of evacuation path. 3. As per SCADA, approx. 730 MW generation loss occurred at 400kV Rajwest(RS) at 05:02hrs, prior to this 135MW Unit-4 at Rajwest tripped at 03:17hrs. 4. As per PMU at Jodhpur(RS), Y-N phase to earth fault with fault clearing time of 80 ms is observed at 03:14 hrs and 03:17 hrs, Y-N fault converted to R-Y fault with fault clearing time of 400 ms, B-N phase to earth fault with fault clearing time of 320 ms .	0	0.00	730	0	2.465	0.000	29620	31593	320	1. Reason of frequent faults? 2. Reason of delayed clearance of fault? 3. DR/EL of the tripped elements? 4. Satus of A/R operation? 5. Remedial action taken?
Other Events																				
1		Event of RE generation drop of approx. 1100MW in Rajasthan RE generation complex	Rajasthan		14-Jan-23	12:06				1. At 12:06hrs, 220kV Heerapura-Niwana (RS) ckt tripped. 2. As per PMU, R-N phase to earth fault in system is observed. 3. On this fault, few of the RE stations connected at ISTS pooling stations in Rajasthan RE generation complex dropped their generation due to non compliance of LVRT. As per SCADA, transient drop in total RE generation of approx. 1100MW is observed.							53086	58851	80	

Annex-X

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	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	19-Jan-23	01:01	Nil	Phase to earth fault R-N	NA	NA	yes	yes			
2	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	25-Jan-23	06:39	Nil	Line tripped from Auriya end only	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
3	400 KV Allahabad-Sasaram (PG) Ckt-1	POWERGRID	2-Jan-23	00:40	Nil	Phase to earth fault Y-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
4	400 KV Allahabad-Sasaram (PG) Ckt-1	POWERGRID	21-Jan-23	00:15	Nil	Phase to phase fault R-B	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
5	400 KV Balia-Biharshariff (PG) Ckt-2	POWERGRID	2-Jan-23	01:18	Nil	Phase to earth fault R-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
6	400 KV Gorakhpur(PG)-Muzaffarpur(PG) (POWERLINK) Ckt-1	POWERLINK	2-Jan-23	00:43	Nil	Phase to earth fault Y-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
7	400 KV Varanasi-Biharshariff (PG) Ckt-1	POWERGRID	2-Jan-23	00:46	Nil	Phase to earth fault R-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
8	400 KV Varanasi-Biharshariff (PG) Ckt-1	POWERGRID	7-Jan-23	04:21		tripped on Y-N fault at F.D 147.457Km and FC-2.932 KA	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
9	400 KV Varanasi-Biharshariff (PG) Ckt-1	POWERGRID	9-Jan-23	06:13		Phase to earth fault Y-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
10	400 KV Varanasi-Biharshariff (PG) Ckt-1	POWERGRID	10-Jan-23	01:56		Y-N fault, Dist. 148.515km, Fault current 3.017kA from Varanasi.	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
11	400 KV Varanasi-Biharshariff (PG) Ckt-2	POWERGRID	1-Jan-23	06:26		Phase to earth fault B-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			

12	400 KV Varanasi-Bihartariff (PG) Ckt-2	POWERGRID	1-Jan-23	23:25	Nil	Phase to earth fault B-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
13	400 KV Varanasi-Bihartariff (PG) Ckt-2	POWERGRID	10-Jan-23	00:24	Nil	Phase to earth fault R-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
14	765 KV Phagi(RS)-Gwalior(PG) (PG) Ckt-1	POWERGRID	29-Jan-23	13:11	Nil	At phagi end M1:- Zone-I , R- phase location= 160.3 KM ,IA =3.9 KA , M2 :-Z-1,R-ph, IA=3.98KA,In=4.2KA Ka , Location= 151.5 KM and At Gawalior End :- Z-1, R-Ph , 135 KM & fc= 5.06KA.Charging attempt failed at 16:34 hrs from Gwailor end (R-N fault , 132.82KM & 5.5KA)	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
15	765 KV Phagi(RS)-Gwalior(PG) (PG) Ckt-2	POWERGRID	14-Jan-23	17:01		At Phagi end M1- 86A, 86B , DT Send, Ia= 193A ,Ib=193A,Ic=194A, In- 0A , Va-410KV, Vb-416KV, Vc-416KV M2:- location-6.871Milimeter , Va-475, Vb-475, Vc-470 , In- 6.85A , At Gwalior- DT Recieve	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
16	765 KV Phagi(RS)-Gwalior(PG) (PG) Ckt-2	POWERGRID	30-Jan-23	00:34		The 765 kV Main Bus-A got tripped during charging attempt of 765 kV Phagi-Gwalior-1, and the Phagi-Gwalior-2 situated in same dia with Phagi-Anta-2(RVPN Line) and the Phagi-Anta was already tripped, due to that DT was sent to Gwalior end. Now the 765 kV Bus-A energised, hence Phagi-Gwalior ckt-2 may be taken into service.	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			
17	765 KV Varanasi-Gaya (PG) Ckt-2	POWERGRID	11-Jan-23	04:31		Phase to earth fault R-N	NA	NA	yes (After 24 hrs)	yes (After 24 hrs)			

 # Fault Clearance time has been computed using PMU Data from nearest node available and/or DR provided by respective utilities (*Annexure-* ***II)***

****Yes, if written Preliminary report furnished by constituent(s)***

R-Y-B phase sequencing (Red, Yellow, Blue) is used in the list content.All information is as per Northern Region unless specified.

^^ tripping seems to be in order as per PMU data, reported information. However, further details may be awaited.

Reporting of Violation of Regulation for various issues for above tripping

1	Fault Clearance time(>100ms for 400kV and >160ms for 220kV)	1. CEA Grid Standard-3.e 2. CEA Transmission Planning Criteria
2	DR/EL Not provided in 24hrs	1. IEGC 5.2(r) 2. CEA Grid Standard 15.3
3	FIR Not Furnished	1. IEGC 5.9.6.a 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)
4	Protection System Mal/Non Operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.A 2. CEA (Technical Standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)
5	A/R non operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.C 2. CEA Technical Planning Criteria

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

Time Period: 1st January 2023 - 31st January 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	ADANI	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	**DR/EL & Tripping report needs to be submitted**
2	AHEJ4L	3	2	**67**	2	1	**100**	2	1	**100**	2	1	**100**	
3	APFOL	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
4	APMPL	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
5	AREPRL	3	1	**33**	1	2	**100**	1	2	**100**	1	2	**100**	
6	ASEJOL	4	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
7	AURAIYA-NT	2	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
8	AVAADA RJHN	1	0	**0**	0	1	**0**	0	1	**0**	1	0	**100**	**DR/EL & Tripping report needs to be submitted**
9	BBMB	41	7	**17**	5	22	**26**	5	25	**31**	9	15	**35**	
10	CPCC1	97	56	**58**	55	2	**58**	67	3	**71**	62	1	**65**	
11	CPCC2	14	2	**14**	2	3	**18**	2	3	**18**	4	0	**29**	
12	CPCC3	37	0	**0**	0	2	**0**	0	2	**0**	10	0	**27**	
13	DADRI-NT	3	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
14	EDEN (ERCPL)	1	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
15	ESUCRL	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	**DR/EL & Tripping report needs to be submitted**
16	FARIDABAD-NT	1	1	**100**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
17	FBTL	4	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
18	KISHENGANGA-NH	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	**DR/EL & Tripping report needs to be submitted**
19	NTPC_KOLAYAT SL	3	3	**100**	3	0	**100**	3	0	**100**	3	0	**100**	
20	NTPC_SL_DEVIKOT	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
21	PKTSL	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	
22	RAPPA	15	0	**0**	14	0	**93**	13	0	**87**	11	0	**73**	
23	RAPPB	3	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
24	RAPPC	1	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	
25	RENEW	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	**DR/EL & Tripping report needs to be submitted**
26	RENEW SUN BRIGHT (RSBPL)	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
27	SALAL-NH	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
28	SAURYA	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	
29	SBSRPC-11	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	
30	SEWA-2-NH	2	2	**100**	2	0	**100**	2	0	**100**	2	0	**100**	

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

Time Period: 1st January 2023 - 31st January 2023

S. No.	Utility	Total No. of tripping	First Information Report (Not Received)		Disturbance Recorder (Not Received)	Disturbance Recorder (NA) as informed by utility	Disturbance Recorder (Not Received)	Event Logger (Not Received)	Event Logger (NA) as informed by utility	Event Logger (Not Received)	Tripping Report (Not Received)	Tripping Report (NA) as informed by utility	Tripping Report (Not Received)	Remark
			Value	%	Value		%	Value		%	Value		%	
31	SINGRAULI-NT	1	1	**100**	0	0	**0**	0	0	**0**	0	0	**0**	Details Received
32	SLDC-DV	9	0	**0**	5	1	**63**	6	1	**75**	6	0	**67**	**DR/EL & Tripping report needs to be submitted**
33	SLDC-HP	8	0	**0**	7	1	**100**	7	1	**100**	4	1	**57**	
34	SLDC-HR	9	3	**33**	3	0	**33**	3	0	**33**	3	0	**33**	
35	SLDC-JK	6	0	**0**	6	0	**100**	6	0	**0**	6	0	**100**	
36	SLDC-PS	19	2	**11**	11	1	**61**	12	1	**67**	14	0	**74**	
37	SLDC-RS	172	0	**0**	65	0	**38**	62	0	**36**	98	0	**57**	
38	SLDC-UK	12	0	**0**	0	10	**0**	0	9	**0**	0	0	**0**	Details Received
39	SLDC-UP	139	18	**13**	20	24	**17**	20	31	**19**	24	7	**18**	**DR/EL & Tripping report needs to be submitted**
40	STERLITE	5	0	**0**	0	2	**0**	0	1	**0**	1	1	**25**	
41	TANAKPUR-NH	2	2	**100**	1	0	**50**	1	0	**50**	2	0	**100**	
42	TANDA-NT	3	1	**33**	2	0	**67**	2	0	**67**	2	0	**67**	
43	TATAPOWER	1	0	**0**	0	1	**0**	0	0	**0**	0	0	**0**	Details Received
44	THAR SURYA 1 PRIVATE LIMITED	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	**DR/EL & Tripping report needs to be submitted**
45	TPGEL_SL	1	1	**100**	1	0	**100**	1	0	**100**	1	0	**100**	
46	UNCHAHAR-NT	4	0	**0**	0	0	**0**	0	1	**0**	0	0	**0**	Details Received
Total in NR Region		**644**	**120**	**19**	**223**	**73**	**39**	**233**	**82**	**41**	**284**	**28**	**46**	

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.	

Annexure-XIII

List of RE plants which were not compliant with CEA (Technical Standards for Connectivity to the Grid) Regulations clause B2(3) (LVRT) and clause B2(7) (HVRT)

Event Descriptions

Event description_15:18hrs event

On this fault (R-Y-N fault), significant generation drop at RE stations connected at ISTS pooling station occurred along with tripping of multiple 765kV & 400kV ISTS & Rajasthan state transmission lines. Elements at 400, 220 & 33 kV level at few of the RE stations also tripped on over voltage during same time.

a) At 15:18hrs, 400kV Phagi-Heerapura ckt-1 tripped on R-Y-N double phase to ground fault.

b) As per PMU, R-Y-N double phase to earth fault is observed.

c) At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT which led to the over voltage in system.

d) As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 760kV (before fault) to 848kV (after fault).

e) On this over voltage multiple 765kV ISTS lines at 765kV RE pooling stations tripped.

f) During same time, 400kV Fatehgarh1-Fatehgarh2-I also tripped on over voltage which was only emanating path left for RE generation at Adani Solar Park. Prior to this, at 14:54 hrs on 14th Jan 2023, 400kV Fatehgarh1-Fatehgarh2-II tripped subsequent to multiple tripping at 765kV ISTS pooling station of RE on R-Y-N (L-L-G) fault at 400kV Bassi-Heerapura-II. Thus, evacuation path for 400kV Adani solar park loss at 15:18 hrs.

g) At the same time, SPS to relive transmission congestions in Bikaner complex operated due to tripping of multiple 765kV lines at Bikaner(PG). On action of SPS, Thar Surya, SBSR, Tata Green Power and RENEW Power RE stations tripped.

h) As per SCAD, total reduction in RE generation of approx. 4468MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

Event description_14:55hrs event

On this fault (R-Y-N fault), significant generation drop at RE stations connected at ISTS pooling station occurred along with tripping of multiple 765kV & 400kV ISTS & Rajasthan state transmission lines. Elements at 400, 220 & 33 kV level at few of the RE stations also tripped on over voltage during same time.

a) At 14:55:hrs, 400kV Bassi-Heerapura ckt-2 tripped on R-Y-N double phase to ground fault.

b) As per PMU, R-Y-N double phase to earth fault is observed.

c) At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT which led to the over voltage in system.

d) As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 769kV (before fault) to 841kV (after fault).

e) On this over voltage multiple 765kV ISTS lines at 765kV RE pooling stations tripped.

f) As per SCADA, total reduction in RE generation of approx. 4468MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

Event description_13:03hrs event

On this fault (R-N fault), significant generation drop at RE stations connected at ISTS pooling station occurred. No tripping of elements is observed except at ASEJOL RE station.

a) At 13:03:hrs, 765kV Ajmer-Bhadla2 ckt-2 tripped after unsuccessful A/R operation on R-N phase to earth fault as fault was of permanent in nature.

b) As per PMU, R-N phase to earth fault is observed.

c) At the same time, significant reduction in RE generation also observed with delayed recovery due to non-compliance of LVRT.

d) As per PMU at Fatehgarh2(PG), voltage at 765kV level varied from 762kV (before fault) to 855kV (after fault). However, over voltage didn't sustain and no further tripping of ISTS element on over voltage observed.

e) 220kV Fatehagrh2-ASEJOL ckt-1&2 tripped on transient over voltage instantaneously.

f) As per SCADA, total reduction in RE generation of approx. 2340MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

Performance of RE plants connected at 220kV and 400kV Bikaner(PG) at 13:03:33 hrs, 14:55:38hrs and 15:18:30hrs fault event on 14th Jan'23

Performance of RE plants connected at 220kV and 400kV Bikaner (PG) @13:03:33hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 13:03:33:200 (Pre-fault)	Generation at 13:03:33:360 (during fault)	Generation at 13:03:34:200 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 13:03:42:200	%% of pre-fault generation at 13:03:42:200	HVRT Compliant/Non-compliant w.r.t reduction of generation (unwanted tripping/generation loss)
1	Azure Power Forty Three Pvt. Ltd._PSS	Bikaner(PG)	300	1.02	0.93	1.04	629	446	513	82	LVRT Non-compliant	477	76	HVRT Non-compliant
2	Azure Power Forty Three Pvt. Ltd._RSS		300											
3	RENEW SOLAR POWER Pvt. Ltd. Bikaner		250	1.00	0.89	1.03	410	375	393	96	LVRT compliant	400	98	
4	Renew Surya Ravi Pvt. Ltd.		150											
5	Avaada Sunce energy Pvt limited		350	1.00	0.89	1.03	916	845	924	101	LVRT compliant	693	76	HVRT Non-compliant
6	Avaada Sustainable RJ Pvt. Ltd.		300											
7	Avaada RJHN_240MW		240											
8	Ayaana Renewable Power One Pvt. Ltd.		300	1.00	0.89	1.03	288	249	291	101	LVRT compliant	290	101	
9	Thar Surya Pvt. Ltd.		300	1.00	0.89	1.02	213	-8	0	0	LVRT Non-compliant	205	96	
10	Tata Power Green Energy Ltd. (TPGEL)		225	1.00	0.89	1.03	224	222	224	100	LVRT compliant	224	100	
11	SBSR Power Cleantech Eleven Private Ltd.		213	1.01	0.93	1.04	210	167	167	80	LVRT Non-compliant	200	95	
	Total capacity_Bikaner(PG)		**2928**				**2890**	**2295**	**2513**	**87**		**2489**	**86**	

Performance of RE plants connected at 220kV and 400kV Bikaner (PG) @14:55:38hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 14:55:38:720 (Pre-fault)	Generation at 14:55:38:920 (during fault)	Generation at 14:55:39:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 14:55:45:000	% of pre-fault generation at 14:55:45:000	HVRT Compliant/Non-compliant w.r.t reduction of generation (unwanted tripping/generation loss)
1	Azure Power Forty Three Pvt. Ltd._PSS	Bikaner(PG)	300	1.022	0.894	1.075	550	373	473	86	LVRT Non-compliant	470	85	
2	Azure Power Forty Three Pvt. Ltd._RSS		300											
3	RENEW SOLAR POWER Pvt. Ltd. Bikaner		250	1.009	0.853	1.064	341	301	341	100	LVRT Compliant	335	98	
4	Renew Surya Ravi Pvt. Ltd.		150											
5	Avaada Sunce energy Pvt Ltd.		350	1.022	0.895	1.078	745	690	746	100	LVRT Compliant	246	33	HVRT Non-compliant
6	Avaada Sustainable RJ Pvt. Ltd.		300											
7	Avaada RJHN_240MW		240											
8	Ayaana Renewable Power One Pvt. Ltd.		300	1.009	0.853	1.066	259	229	260	100	LVRT Compliant	91	35	HVRT Non-compliant
9	Thar Surya Pvt. Ltd.		300	1.010	0.848	1.064	167	106	82	49	LVRT Non-compliant	100	60	
10	Tata Power Green Energy Ltd. (TPGEL)		225	1.010	0.848	1.064	178	168	178	100	LVRT Compliant	177	99	
11	SBSR Power Cleantech Eleven Private Ltd.		213	1.014	0.885	1.071	186	138	185	99	LVRT Compliant	186	100	
	Total capacity_Bikaner(PG)		**2928**				**2427**	**2005**	**2265**	**93**		**1605**	**71**	

Performance of RE plants connected at 220kV and 400kV Bikaner (PG) @15:18:30hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 15:18:29:720 (Pre-fault)	Generation at 15:18:30:000 (during fault)	Generation at 15:18:30:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 15:18:58:000	%age Change	HVRT Compliant/Non-compliant w.r.t reduction of generation (unwanted tripping/generation loss)
1	Azure Power Forty Three Pvt. Ltd._PSS	Bikaner(PG)	300	1.018	0.927	1.083	500	354	484	97	LVRT Compliant	485	97	
2	Azure Power Forty Three Pvt. Ltd._RSS		300											
3	RENEW SOLAR POWER Pvt. Ltd. Bikaner		250	1.006	0.889	1.074	308	287	304	99	LVRT Compliant	295	96	
4	Renew Surya Ravi Pvt. Ltd.		150											
5	Avaada Sunce energy Pvt limited		350	1.021	0.928	1.078	674	662	640	95	LVRT Compliant	350	52	HVRT Non-compliant
6	Avaada Sustainable RJ Pvt. Ltd.		300											
7	Avaada RJHN_240MW		240											
8	Ayaana Renewable Power One Pvt. Ltd.		300	1.012	0.890	1.078	235	210	235	100	LVRT Compliant	12	5	HVRT Non-compliant
9	Thar Surya Pvt. Ltd.		300	1.003	0.886	1.067	147	23	29	20	LVRT Non-compliant	31	21	
10	Tata Power Green Energy Ltd. (TPGEL)		225	1.009	0.886	1.078	160	153	160	100	LVRT Compliant	160	100	
11	SBSR Power Cleantech Eleven Private Ltd.		213	1.013	0.921	1.078	171	131	138	81	LVRT Non-compliant	167	98	
	Total capacity_Bikaner(PG)		**2928**				**2194**	**1820**	**1990**	**91**		**1500**	**68**	

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV and 400kV Bikaner(PG)

1. Thar Surya Pvt. Ltd._300MW is having the major issue at Bikaner (PG), in all the three events Thar Surya Pvt. Ltd. reduced its MW sharply and failed to recover even 50% of pre-fault generation.
2. Except Thar Surya Pvt. Ltd. rest all the RE Plants recovered at least 80% of pre-fault generation in all the three events.
3. In all the three events Avaada_Bikaner_890MW (Avaada Sunce energy Pvt Ltd._350MW, Avaada Sustainable RJ Pvt. Ltd._300MW, Avaada RJHN_240MW) recovered more than 90% of pre-fault generation within 1sec but reduced its generation to 76%, 33% and 52% respectively in three events despite Voltage<1.1pu.
4. Avaada Sustainable RJ Pvt. Ltd._300MW is having major problem, Avaada Sustainable RJ Pvt. Ltd._300MW reduced its generation by 169MW, 182MW and 190MW respectively in three events after recovery probably due to Inverters went into HVRT despite Voltage<1.1pu.
5. In all the three events Ayaana Renewable Power One Pvt. Ltd._300MW recovered more than 90% of pre-fault generation within 1sec but reduced its active power to 33% and 5% respectively in 2nd and 3rd event probably due to inverters went in HVRT despite Voltage<1.1pu.
6. Majority of the RE plants failed to support adequate reactive power during fault.

Performance of RE plants connected at 220kV Bhadla(PG) at 13:03:33 hrs, 14:55:38hrs and 15:18:30hrs fault event on 14th Jan’23

Performance of RE plants connected at 220kV Bhadla(PG) @13:03:33hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to AREPRL (PU)	Lowest Voltage of line from plant to AREPRL (during fault) (PU)	Post-fault Voltage of line from plant to AREPRL (PU)	Generation at 13:03:33:200 (Pre-fault)	Generation at 13:03:33:360 (during fault)	Generation at 13:03:34:200 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 13:03:42:200	% of pre-fault generation at 13:03:42:200	HVRT Compliant/Non-compliant w.r.t reduction of generation (unwanted tripping/generation loss)
1	RENEW SOLAR POWER Pvt. Ltd. Bhadla	Bhadla(PG)	50	PMU Data down, SCADA data taken for 13:04hrs for MW			52					0	0	LVRT or HVRT Non-compliant
2	AZURE POWER INDIA Pvt. Ltd., Bhadla		200	PMU Data down, SCADA data taken for 13:04hrs for MW			149					145	97	
3	Azure Power Thirty Four Pvt. Ltd.		130	0.995	0.873	1.045	130	124	127	98	LVRT Compliant	122	94	
4	SB ENERGY FOUR PRIVATE LIMTED, Bhadla		200	0.996	0.877	1.043	506	365	444	88	LVRT Non-Compliant	505	100	
5	Clean Solar Power (Bhadla) Pvt. Ltd		300											
6	SB Energy Six Private Limited, Bhadla		300	0.995	0.873	1.038	299	299	294	98	LVRT Compliant	280	94	
7	Azure Power Forty One Pvt limited		300	0.984	0.831	1.033	297	248	295	99	LVRT Compliant	297	100	
8	ACME Chittorgarh Solar Energy Pvt Ltd		250	0.995	0.828	1.043	238	176	201	84	LVRT Non-Compliant	210	88	
9	Mahindra Renewable Private Limited		250	PMU Data down, SCADA data taken for 13:04hrs for MW			246					247	100	
10	Adani Solar Enegry Four Private Limited		50	0.989	0.875	1.035	316	206	253	**80**	LVRT Non-Compliant	315	100	
11	Adani Renewable Energy (RJ) limited Rawara		200											
12	Adani Solar Enegry Jodhpur Two Limited, Rawara		50											
13	Azure Maple Pvt. Ltd.		250	PMU Data down, SCADA data taken for 13:04hrs for MW			162					163	101	
14	Tata Power Renewable Energy Ltd. (TPREL)		300	PMU Data down			309					268	87	LVRT or HVRT Non-compliant
15	Clean Solar Power (Jodhpur) Pvt. Ltd.		250	0.987	0.862	1.033	249	91	115	46	LVRT Non-Compliant	120	48	
	Total capacity_Bhadla(PG)		**3080**				**2953**					**2672**		

Performance of RE plants connected at 220kV Bhadla(PG) @14:55:38hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 14:55:38:720 (Pre-fault)	Generation at 14:55:38:920 (during fault)	Generation at 14:55:39:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 14:55:45:000	% of pre-fault generation at 14:55:45:000	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	RENEW SOLAR POWER Pvt. Ltd. Bhadla	Bhadla(PG)	50	PMU Data down, SCADA data taken for 14:56:30hrs for MW			51					51	100	
2	AZURE POWER INDIA Pvt. Ltd., Bhadla		200	PMU Data down, SCADA data taken for 14:56:30hrs for MW			124					123	99	
3	Azure Power Thirty Four Pvt. Ltd.		130	1.004	0.862	1.097	120	52	116	97	LVRT Compliant	0	0	HVRT Non-compliant
4	SB ENERGY FOUR PRIVATE LIMTED, Bhadla		200	0.999	0.866	1.091	486	335	360	74	LVRT Non-compliant	371	76	
5	Clean Solar Power (Bhadla) Pvt. Ltd		300											
6	SB Energy Six Private Limited, Bhadla		300	1.005	0.862	1.097	296	167	253	85	LVRT Non-compliant	57	19	HVRT Non-compliant
7	Azure Power Forty One Pvt limited		300	0.996	0.831	1.086	273	67	87	32	LVRT Non-compliant	0	0	
8	ACME Chittorgarh Solar Energy Pvt Ltd		250	1.003	0.824	1.094	177	140	170	96	LVRT Compliant	132	75	HVRT Non-compliant
9	Mahindra Renewable Private Limited		250	PMU Data down, SCADA data taken for 13:04hrs for MW			242					82	34	LVRT or HVRT Non-compliant
10	Adani Solar Enegry Four Private Limited		50	0.996	0.860	1.088	283	171	192	68	LVRT Non-compliant	282	100	
11	Adani Renewable Energy (RJ) limited Rawara		200											
12	Adani Solar Enegry Jodhpur Two Limited, Rawara		50											
13	Azure Maple Pvt. Ltd.		250	PMU Data down, SCADA data taken for 14:56:30hrs for MW			135					0	0	LVRT or HVRT Non-compliant
14	Tata Power Renewable Energy Ltd. (TPREL)		300	PMU Data down, SCADA data taken for 14:56:30hrs for MW			281					138	49	LVRT or HVRT Non-compliant
15	Clean Solar Power (Jodhpur) Pvt. Ltd.		250	0.991	0.848	1.083	219	83	137	63	LVRT Non-compliant	103	47	HVRT Non-compliant
	Total capacity_Bhadla(PG)		**3080**				**2686**					**1339**	50	

Performance of RE plants connected at 220kV Bhadla(PG) @15:18:30hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 15:18:29:720 (Pre-fault)	Generation at 15:18:30:000 (during fault)	Generation at 15:18:30:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 15:18:58:000	%age Change	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	RENEW SOLAR POWER Pvt. Ltd. Bhadla	Bhadla(PG)	50	PMU Data down, SCADA data taken for 15:19:30hrs for MW			47					24		LVRT or HVRT Non-compliant
2	AZURE POWER INDIA Pvt. Ltd., Bhadla		200				39					0		LVRT or HVRT Non-compliant
3	Azure Power Thirty Four Pvt. Ltd.		130	1.000	0.908	1.098	2	1	0	0		0	0	HVRT Non-compliant (Reduced generation to 2 MW before the event despite of V<1pu
4	SB ENERGY FOUR PRIVATE LIMTED, Bhadla		200	1.004	0.904	1.098	479	403	429	90	LVRT Compliant	170	35	HVRT Non-compliant
5	Clean Solar Power (Bhadla) Pvt. Ltd		300											
6	SB Energy Six Private Limited, Bhadla		300	1.001	0.879	1.098	280	172	218	78	LVRT Non-compliant	0	0	HVRT Non-compliant, tripped despite V<1pu
7	Azure Power Forty One Pvt limited		300	1.001	0.879	1.098	0	0	0	Line was tripped earlier				HVRT Non-compliant
8	ACME Chittorgarh Solar Energy Pvt Ltd		250	1.004	0.870	1.102	175	138	158	90	LVRT Compliant	110	63	HVRT Non-compliant
9	Mahindra Renewable Private Limited		250	PMU Data down, SCADA data taken for 15:19:30hrs for MW			224					5		LVRT or HVRT Non-compliant
10	Adani Solar Enegry Four Private Limited		50	1.005	0.907	1.102	260	201	239	92	LVRT Compliant	245	94	
11	Adani Renewable Energy (RJ) limited Rawara		200	1.005	0.907	1.102								
12	Adani Solar Enegry Jodhpur Two Limited, Rawara		50	1.005	0.907	1.102								
13	Azure Maple Pvt. Ltd.		250	PMU data down, Line was tripped in 14:55:40hrs before this event as per SCADA data, DR need to be checked at what voltage it tripped.								0		
14	Tata Power Renewable Energy Ltd. (TPREL)		300	PMU Data down, SCADA data taken for 15:19:30hrs for MW			202					0		HVRT Non-compliant
15	Clean Solar Power (Jodhpur) Pvt. Ltd.		250	1.001	0.881	1.102	184	-4	24	13	LVRT Non-compliant	33	18	
	Total capacity_Bhadla(PG)		**3080**				**1892**					**587**		

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV Bhadla(PG)

1. Clean Solar Power (Jodhpur) Pvt. Ltd._300MW is having the major issue at Bhadla (PG), in all the three events CSP(J)PL reduced its MW sharply and failed to recover even 50% of pre-fault generation in 1st and 3rd event, in 2nd event it recovered only upto 63% of pre-fault generation.
2. In 2nd events followings are the important observations:
   - Azure Power Forty One Pvt Ltd. recovered only 32% of pre-fault active power, which further reduced to zero without any line tripping suggest tripping at internal plant.
   - Mahoba Solar and Saurya Urja Pvt. Ltd. recovered only 68% and 74% respectively.
   - Azure Power 34 Pvt. Ltd. successfully recovered 97% of pre-fault active power but active power reduced to zero without tripping of line within 3sec after recovery. Therefore it can be inferred that plant internal elements tripped (ICTs or 33kV feeders or Inverters) despite voltage <1.1pu at 220kV plant end.
   - As per SCADA (PMU NA), Azure Maple Pvt. Ltd. reduced its generation to 0MW. (tripping may be identified with SOE).
   - As per SCADA (PMU NA), MRPL reduced its generation to 34MW. (Inverters might went into HVRT and tripped).
   - As per SCADA (PMU NA), TPREL reduced its generation to 49MW. (Inverters might went into HVRT and tripped).
   - SBE6PL, reduced its generation to 19% of pre-fault MW after successful recovery to 85% (Inverters might went into HVRT and tripped despite voltage<1.1pu at 220kV plant end.

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV Bhadla(PG) cont…

In 3rd events followings are the important observations:

- ACME Chittorgarh recovered 90% of pre-fault active power but reduced its generation to 63% of pre-fault active power (inverters might have tripped in HVRT despite voltage<1.1pu at 220kV plant end.
- Saurya Urja Pvt. Ltd. successfully recovered 90% of pre-fault active power but active power reduced to 35% (Inverters might have tripped in HVRT despite voltage<1.1pu at 220kV plant end
- As per SCADA (PMU NA), MRPL reduced its generation 224MW to 5MW. (Inverters might went into HVRT and tripped).
- As per SCADA (PMU NA), TPREL reduced its generation from 202MW to 0MW. (tripping may be identified with SOE).
- SBE6PL, recovered 78% of pre-fault MW which further reduced to zero 0MW due to tripping of 220kV line despite voltage<1.1pu at 220kV plant end.

Performance of RE plants connected at 220kV and 400kV Bhadla-II(PG) at 13:03:33 hrs, 14:55:38hrs and 15:18:30hrs fault event on 14th Jan'23

Performance of RE plants connected at 220kV and 400kV Bhadla-II(PG) @13:03:33hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 13:03:33:200 (Pre-fault)	Generation at 13:03:33:360 (during fault)	Generation at 13:03:34:200 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 13:03:42:200	% of pre-fault generation at 13:03:42:200	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	ACME Heeragarh powertech Pvt. Ltd	Bhadla-II(PG)	300	0.995	0.774	1.047	261	215	263	101	LVRT compliant	261	100	
2	ABC Renewable Pvt. Ltd		300	1.006	0.847	1.054	314		256	82	LVRT Non-compliant	PMU MW data Not available, SCADA data taken		
3	Mega Surya Urja Pvt. Ltd. (MSUPL)		250	1.006	0.847	1.055	249	223	249	100	LVRT compliant	249	100	
4	NTPC Kolayat_400kV		400	0.998	0.779	1.058	414	292	135	33	LVRT Non-compliant	280	68	
5	Avaada Sunrays Pvt. Ltd.		320	1.005	0.858	1.058	316	144	162	51	LVRT Non-compliant	167	53	
6	NTPC Nokhra_300MW		150	PMU data Not available, SCADA data taken for MW only			124		125	101	LVRT compliant	125		
	Total capacity_Bhadla-II(PG)		**1720**				**1678**		**1190**	71				

Performance of RE plants connected at 220kV and 400kV Bhadla-II(PG) @14:55:38hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 14:55:38:720 (Pre-fault)	Generation at 14:55:38:920 (during fault)	Generation at 14:55:39:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 14:55:45:000	% of pre-fault generation at 14:55:45:000	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	ACME Heeragarh powertech Pvt. Ltd	Bhadla-II(PG)	300	1.005	0.824	1.099	215	173	216	100	LVRT Compliant	211	98	
2	ABC Renewable Pvt. Ltd		300	1.007	0.843	1.100	258	215	258	100	LVRT Compliant	258	100	
3	Mega Surya Urja Pvt. Ltd. (MSUPL)		250	1.007	0.849	1.102	214	193	213	100	LVRT Compliant	90	42	HVRT Non-compliant
4	NTPC Kolayat_400kV		400	1.015	0.847	1.095	346	237	122	35	LVRT Non-Compliant	0	0	HVRT Non-compliant
5	Avaada Sunrays Pvt. Ltd.		320	1.013	0.876	1.102	268	211	263	98	LVRT Compliant	247	92	
6	NTPC Nokhra_300MW		150	PMU data Not available, SCADA data taken for MW only for 14:56:30hrs			105					104	99	Seems Compliant as per SCADA
	Total capacity_Bhadla-II(PG)		**1720**				**1406**					**910**	**65**	

Performance of RE plants connected at 220kV and 400kV Bhadla-II(PG) @15:18:30hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 15:18:29:720 (Pre-fault)	Generation at 15:18:30:000 (during fault)	Generation at 15:18:30:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 15:18:58:000	% of pre-fault generation at 15:20:52:800	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	ACME Heeragarh powertech Pvt. Ltd	Bhadla-II(PG)	300	1.023	0.884	1.118	196	156	196	100	LVRT Compliant	123	63	Reduced generation before 2sec (Non-compliant to HVRT stage-I
2	ABC Renewable Pvt. Ltd		300	1.029	0.920	1.118	267	PMU data Not available, SCADA data taken for MW only for 15:19:30hrs				23	9	LVRT or HVRT Non Compliant
3	Mega Surya Urja Pvt. Ltd. (MSUPL)		250	PMU Voltage data NA			195		0	0			0	Line Tripped on OV, PMU voltage data suspected, need to check through DR
4	NTPC Kolayat_400kV		400	Plant was tripped before this event at 14:55:40hrs due to tripping of 400kV line on OV (but voltage was <1.1pu										
5	Avaada Sunrays Pvt. Ltd.		320	1.018	0.924	1.113	227	178	223	98	LVRT Compliant	0	0	Line Tripped on OV, line voltage was 1.11pu for 5sec (Line OV setting need to be reviewed)
6	NTPC Nokhra_300MW		150	Plant was tripped before this event, not tripped till 14:56:30hrs (details need to be checked through DR)										
	Total capacity_Bhadla-II(PG)		**1720**				**885**					**146**		

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV and 400kV Bikaner(PG)

1. NTPC Kolayat_400kV_400MW is having the major issue at Bhadla-II (PG), in both 1st and 2nd event, it recovered only up to 33% and 35% respectively.
2. In 2nd event plant tripped due to tripping of 400kV NTPC Kolayat-Bhadla-II(PG) line despite voltage<1.1pu at 400kV NTPC Kolayat end.
3. In 2nd event after recovering 90% of pre-fault active power MSUPL reduced it generation to 42% of pre-fault active power despite voltage<1.1pu at 220kV MSUPL end.
4. ACME Heeragarh Pvt. Ltd. reduced its active power generation to 63% of pre-fault MW within 2sec despite voltage<1.2pu at 220kV ACME Heeragarh end.
5. As per SCADA (PMU NA), ABC renewable reduced its active power generation to 9% of pre-fault active power (Inverters might have tripped on OV).
6. Observations on 3rd event:
   220kV Avaada Sunrays Pvt. Ltd.-Bhadla-II(PG) line, 220kV MSUPL-Bhadla-II(PG) tripped on overvoltage.
   220kV NTPC Nokhra-Bhadla-II(PG) line tripped on overvoltage even before this event.

Performance of RE plants connected at 220kV Fatehgarh-II(PG) at 13:03:33 hrs, 14:55:38hrs and 15:18:30hrs fault event on 14th Jan'23

Performance of RE plants connected at 220kV Fatehgarh-II(PG) @13:03:33hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 13:03:33:200 (Pre-fault)	Generation at 13:03:33:360 (during fault)	Generation at 13:03:34:200 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 13:03:42:200	% of pre-fault generation at 13:03:42:200	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	Adani Hybrid Energy Jaisalmer One Ltd._390MW	Fatehgarh-II(PG)	390	1.002	0.835	1.067	403	-30	383	95	LVRT compliant	341	85	HVRT Non-compliant
2	Adani Hybrid Energy Jaisalmer Two Ltd._300MW		300	PMU Data not available, SCADA data used for MW			290					130	45	LVRT or HVRT Non-compliant
3	Adani Hybrid Energy Jaisalmer Three Ltd._300MW		300	1.029	0.825	1.077	281	-24	226	80	LVRT Non-compliant	250	89	
4	ReNew Solar Urja Private Limited		300	1.017	0.844	1.086	304	127	209	69	LVRT Non-compliant	178	59	HVRT Non-compliant
5	Eden Renewable Cite Private Limited		300	0.992	0.801	1.077	310	200	326	105	LVRT compliant	310	100	HVRT compliant
6	Renew Sun Waves Private Limited		300	PMU Data not available, SCADA data used for MW			300					65	22	LVRT or HVRT Non-compliant
7	Renew Sun Bright Pvt. Ltd.		300	1.006	0.848	1.069	309	261	300	97	LVRT compliant	305	99	
8	ReNew Solar Energy (Jharkhand Three) Private Limited		300	1.026	0.825	1.087	307	209	308	101	LVRT compliant	290	95	
9	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW		450	1.000	0.000	0.000	448	0	0	0	LVRT Non-compliant	0	0	
10	NTPC Devikot Solar plant_240MW		240	0.995	0.853	1.061	213	154	207	97	LVRT compliant	43	20	HVRT Non-compliant
	Total capacity_Fatehgarh-II(PG)		**3180**				**3165**					**1912**	**60**	

Performance of RE plants connected at 220kV Fatehgarh-II(PG) @14:55:38hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 14:55:38:720 (Pre-fault)	Generation at 14:55:38:920 (during fault)	Generation at 14:55:39:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 14:55:45:000	% of pre-fault generation at 14:55:45:000	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	Adani Hybrid Energy Jaisalmer One Ltd._390MW	Fatehgarh-II(PG)	390	1.010	0.822	1.101	372	217	364	98	LVRT Compliant	365	98	
2	Adani Hybrid Energy Jaisalmer Two Ltd._300MW		300	PMU Data down, SCADA data taken for 14:56:30hrs for MW			289					139	48	LVRT or HVRT Non-compliant
3	Adani Hybrid Energy Jaisalmer Three Ltd._300MW		300	1.019	0.829	1.102	268	-17	197	74	LVRT Non-compliant	210	78	
4	ReNew Solar Urja Private Limited		300	1.017	0.844	1.099	177	23	24	14	LVRT Non-compliant	25	14	
5	Eden Renewable Cite Private Limited		300	1.007	0.828	1.104	295	193	296	100	LVRT Compliant	296	100	
6	Renew Sun Waves Private Limited		300	PMU Data down, SCADA data taken for 14:56:30hrs for MW			273					34	12	LVRT or HVRT Non-compliant
7	Renew Sun Bright Pvt. Ltd.		300	1.013	0.842	1.099	273	141	151	55	LVRT Non-compliant	261	96	
8	ReNew Solar Energy (Jharkhand Three) Private Limited		300	1.004	0.909	1.098	275	95	259	94	LVRT Compliant	257	93	
9	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW		450	1.005	0.833	1.101	356	-60	336	94	LVRT Compliant	355	100	
10	NTPC Devikot Solar plant_240MW		240	1.003	0.862	1.098	170	150	162	95	LVRT Compliant	0	0	HVRT Non-compliant
	Total capacity_Fatehgarh-II(PG)		**3180**				**2748**					**1941**	71	

Performance of RE plants connected at 220kV Fatehgarh-II(PG) @15:18:30hrs

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 15:18:29:720 (Pre-fault)	Generation at 15:18:30:000 (during fault)	Generation at 15:18:30:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 15:18:58:000	%age Change	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	Adani Hybrid Energy Jaisalmer One Ltd._390MW	Fatehgarh-II(PG)	390	1.011	0.859	1.118	325	46	99	30	LVRT Non-compliant	315	97	HVRT Non-Compliant
2	Adani Hybrid Energy Jaisalmer Two Ltd._300MW		300	PMU Data not available, SCADA data is taken for MW only at 15:19:30hrs			200					35		LVRT or HVRT Non-Compliant
3	Adani Hybrid Energy Jaisalmer Three Ltd._300MW		300	1.038	0.860	1.134	262	-10	103	39	LVRT Non-compliant	200	76	
4	ReNew Solar Urja Private Limited		300	1.015	0.861	1.118	220	69	143	65	LVRT Non-compliant	20	9	HVRT Non-Compliant
5	Eden Renewable Cite Private Limited		300	1.010	0.849	1.126	270	172	270	100	LVRT Compliant	0	0	Line tripped on OV, from PMU plot voltage was 112% for 5sec and then tripped
6	Renew Sun Waves Private Limited		300	PMU Data not available, SCADA data is taken for MW only at 15:19:30hrs			164					0	0	line might have tripped on OV, need to check the DR
7	Renew Sun Bright Pvt. Ltd.		300	1.015	0.860	1.124	251	164	178	71	LVRT Non-compliant	0	0	Line tripped on OV, from PMU plot voltage was 112% for 5sec and then tripped
8	ReNew Solar Energy (Jharkhand Three) Private Limited		300	1.016	0.861	1.123	253	136	228	90	LVRT Compliant	245	97	HVRT Complaint
9	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW		450	1.014	0.855	1.121	340	186	325	96	LVRT compliant	330	97	HVRT Compliant
10	NTPC Devikot Solar plant_240MW		240	Already tripped before this event										
	Total capacity_Fatehgarh-II(PG)		**3180**				**2285**					**1145**		

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV and 400kV Bikaner(PG)

1. Renew Sun Waves Private Ltd., Adani Hybrid Energy Jaisalmer Two Ltd., ReNew Solar Urja Pvt. Ltd. and Renew Sunbright Pvt. Ltd. at Fatehgarh-II(PG) is having major issue in recovering pre-fault active power within 1sec.
2. NTPC Devikot recovered pre-fault active power within 1sec in both cases, but reduced the generation within 4-5sec despite of voltage<1.1 pu at NTPC Devikot end (Inverters might went into HVRT).
3. Pre-fault voltage of 220kV ASEJIPL_450MW-Fatehgarh-II (PG) line at 220kV ASEJIPL end was 1 pu, during fault when voltage dip below 0.9pu, line tripped instantaneously, 0 pu voltage can be seen in PMU. ASEJ1PL reported that in 220kV line, 0.9pu voltage was set for DR triggering recording and wrongly for tripping of line also. Immediately after tripping of line, 0.9pu voltage was set for DR triggering kept enabled only for recording and disabled for tripping of line. For 2nd and 3rd event ASEJIPL performance was good, it recovered 90% of pre-fault active power and kept the generation sustained. (Newly commissioned plant, Inverters setting were kept as recommended by NRLDC).
4. Eden performance was good in all the three events, not any inverters tripping occurred in these 3 events, Line tripped on OV, from PMU plot it can be observed that voltage at 220kV Plant end was 112% for 5sec and then line tripped, Line OV setting may be increased to 120% for 2-3sec. Recently Eden changed the inverters settings as recommended by NRLDC
5. Performance of RSEJ3L is good in all 3 events, Plant recovered 90% of pre-fault active power successfully and retained the generation.

Performance of RE plants connected at 220kV AREPRL (Adani Solar park being pooled in Fatehgarh-I) at 13:03:33 hrs, 14:55:38hrs and 15:18:30hrs fault event on 14th Jan'23

Performance of RE plants connected at 220kV AREPRL

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to AREPRL (PU)	Lowest Voltage of line from plant to AREPRL (during fault) (PU)	Post-fault Voltage of line from plant to AREPRL (PU)	Generation at 13:03:33:200 (Pre-fault)	Generation at 13:03:33:360 (during fault)	Generation at 13:03:34:200 (after 1sec of fault event)	% of generation recovered	LVRT Compliant /Non-compliant w.r.t recovery of Active power only	Generation at 13:03:42:200	% of pre-fault generation at 13:03:42:200	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	Adani Hybrid Energy Jaisalmer Four Ltd.	Fatehgarh-I(Adani Pooling)	700	1.016	0.823	1.090	622	578	620	100	LVRT Compliant	570	92	HVRT Non-Compliant
2	Nidan Solar NTPC		296	1.008	0.842	1.086	302	38	124	41	LVRT Non-Compliant	210	70	
	Total capacity_Fatehgarh-I (Adani pooling)		**996**				**924**	616	**744**	81		**780**	84	

Performance of RE plants connected at 220kV AREPRL

Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 14:55:38:720 (Pre-fault)	Generation at 14:55:38:920 (during fault)	Generation at 14:55:39:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 14:55:45:000	% of pre-fault generation at 14:55:45:000	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
Adani Hybrid Energy Jaisalmer Four Ltd.	**Fatehgarh-I(Adani Pooling)**	700	1.019	0.847	1.098	551	523	550	100	LVRT Compliant	400	73	HVRT Non-compliant
Nidan Solar NTPC		296	1.019	0.847	1.098	279	13	212	76	LVRT Non-Compliant	275	99	
Total capacity_Fatehgarh-I (Adani pooling)		**996**				**830**		**762**	92		**675**	81	

Performance of RE plants connected at 220kV AREPRL

Sl No.	Plant Name	Pooling Station	Plant Capacity commissioned and being scheduled as on 14.01.23	Pre-fault voltage of line from plant to POI (PU)	Lowest Voltage of line from plant to POI (during fault) (PU)	Post-fault Voltage of line from plant to POI (PU)	Generation at 15:18:29:720 (Pre-fault)	Generation at 15:18:30:000 (during fault)	Generation at 15:18:30:720 (after 1sec of fault event)	% of generation recovered	LVRT Compliant/Non-compliant w.r.t recovery of Active power only	Generation at 15:18:58:000	%age Change	HVRT Compliant/Non-compliant w.r.t reduction of generation despite V<1.1pu (unwanted tripping/generation loss)
1	Adani Hybrid Energy Jaisalmer Four Ltd.	**Fatehgarh-I(Adani Pooling)**	700	1.018	0.853	1.112	563	535	561	100	**LVRT Compliant**	0	0	HVRT Non-compliant (at 1.11pu voltage plant reduced its generation to 281MW within 2sec), then with voltage of 1.12 pu lines were tripped in next 8-10sec
2	Nidan Solar NTPC		296	1.017	0.866	1.120	258	13	58	22	**LVRT Non-compliant**	0	0	**Line tripped on OV, from PMU plot voltage was 112% for 5sec and then tripped**
	Total capacity_Fatehgarh-I (Adani pooling)		**996**				**821**		**619**			0	0	

Inference from analysis of 14th Jan'23 event at (13:03:33hrs, 14:55:38hrs and 15:18:30hrs) for RE plants connected at 220kV and 400kV Bikaner(PG)

1. In all the three events NTPC Nidan was not able to recover 90% of pre-fault active power.
2. In all the three events AHEJ4L was able to recover 90% of pre-fault active power successfully within 1sec.
3. After successfully recovering the 90% of pre-fault active power, AHEJ4L reduced its MW in all the 3 events, inverters might went in HVRT and tripped.
4. In 3rd event due to reduction in active power by AHEJ4L after successful recovery, voltage further rises and with 112% voltage at 220kV line, lines tripped on OV.

14th Jan'23 RE generation loss events

- During the fault in RE vicinity, several events of RE generation loss observed on 14th Jan'23, major generation loss occurred at 13:03hrs (2156MW), 14:55hrs (3387MW) and 15:18hrs (4521MW) in NR ISTS connected RE plants.
- Details of generation loss in each event plant wise, pooling station wise are given in below link:

https://docs.google.com/spreadsheets/d/1jT3hbdh0GPifsBQAHJs6J-y0IjcJiX4B/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true

- LVRT/HVRT Non-compliance of several plants have been observed in these events.
- Major loss of RE generation plant wise is shown in next slides.

Summary for 13:03 event (As per SCADA)

Sl No.	Plant Name	Pooling Station	Before Event (13:03:00)	After Event (13:04:00)	Generation loss in 13:03 event
1	Azure Power Forty Three Pvt. Ltd._PSS	Bikaner(PG)	625	479	146
2	Azure Power Forty Three Pvt. Ltd._RSS				
3	Avaada Sustainable RJ Pvt. Ltd.		314	145	169
	Total capacity_Bikaner(PG)		**939**	**624**	**315**
1	RENEW SOLAR POWER Pvt. Ltd. Bhadla	Bhadla(PG)	52	0	52
2	Tata Power Renewable Energy Ltd. (TPREL)		309	268	41
3	Clean Solar Power (Jodhpur) Pvt. Ltd.		248	121	127
	Total capacity_Bhadla(PG)		**609**	**389**	**220**
1	Adani Hybrid Energy Jaisalmer One Ltd._390MW	Fatehgarh-II(PG)	406	362	44
2	Adani Hybrid Energy Jaisalmer Two Ltd._300MW		290	130	160
3	Adani Hybrid Energy Jaisalmer Three Ltd._300MW		279	225	54
4	ReNew Solar Urja Private Limited		302	181	121
5	Renew Sun Waves Private Limited		300	65	235
6	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW		445	0	445
7	NTPC Devikot Solar plant_240MW		215	79	136
	Total capacity_Fatehgarh-II(PG)		**2237**	**1042**	**1195**
1	Adani Hybrid Energy Jaisalmer Four Ltd.	Fatehgarh-I(Adani Pooling)	647	596	51
2	Nedan Solar NTPC		301	216	85
	Total capacity_Fatehgarh-I (Adani pooling)		**948**	**812**	**136**
1	ABC Renewable Pvt. Ltd	Bhadla-II(PG)	314	256	58
2	Avaada Sunrays Pvt. Ltd.		316	148	168
	Total capacity_Bhadla-II(PG)		**630**	**404**	**226**
	Total NR ISTS		**5363**	**3271**	**2092**

Summary for 14:55 event (As per SCADA)

Sl No.	Plant Name	Pooling Station	Before Event (14:55:00)	After Event (14:57:00)	Generation loss in 14:55 event
1	Azure Power Forty Three Pvt. Ltd._PSS	Bikaner(PG)	557	468	89
2	Azure Power Forty Three Pvt. Ltd._RSS				
3	Avaada sunce energy Pvt limited		290	75	215
4	Avaada Sustainable RJ Pvt. Ltd.		261	79	182
5	Avaada RJHN_240MW		205	88	117
6	Ayaana Renewable Power One Pvt. Ltd.		263	91	172
7	Thar Surya Pvt. Ltd.		170	121	49
	Total capacity_Bikaner(PG)		**1746**	**922**	**824**
1	SB Energy Six Private Limited, Bhadla	Bhadla(PG)	297	65	232
2	Azure Power Forty One Pvt limited		276	0	276
3	Mahindra Renewable Private Limited		242	82	160
4	Azure Maple Pvt. Ltd.		135	0	135
5	Tata Power Renewable Energy Ltd. (TPREL)		281	138	143
6	Clean Solar Power (Jodhpur) Pvt. Ltd.		235	118	117
	Total capacity_Bhadla(PG)		**1466**	**403**	**1063**
1	Adani Hybrid Energy Jaisalmer Two Ltd._300MW	Fatehgarh-II(PG)	289	139	150
2	Adani Hybrid Energy Jaisalmer Three Ltd._300MW		279	213	66
3	ReNew Solar Urja Private Limited		275	34	241
4	Renew Sun Waves Private Limited		273	34	239
5	NTPC Devikot Solar plant_240MW		164	0	164
	Total capacity_Fatehgarh-II(PG)		**1280**	**420**	**860**
1`	Adani Hybrid Energy Jaisalmer Four Ltd.	Fatehgarh-I(Adani Pooling)	617	548	69
	Total capacity_Fatehgarh-I (Adani pooling)		**617**	**548**	**69**
1	ABC Renewable Pvt. Ltd	Bhadla-II(PG)	298	257	41
2	NTPC Kolayat_400kV		358	0	358
	Total capacity_Bhadla-II(PG)		**656**	**257**	**399**
	Total NR ISTS		**5765**	**2550**	**3215**

Summary for 15:18 event (As per SCADA)

Plant Name	Pooling Station	Before Event (15:16:00)	After Event (15:19:00)	Generation loss in 15:16 event
Avaada sunce energy Pvt limited	Bikaner(PG)	264	208	56
Avaada Sustainable RJ Pvt. Ltd.		236	46	190
Ayaana Renewable Power One Pvt. Ltd.		237	12	225
Thar Surya Pvt. Ltd.		141	31	110
Tata Power Green Energy Ltd. (TPGEL)		163	160	3 (later tripped due to SPS operation)
SBSR Power Cleantech Eleven Private Ltd.		174	170	4(later tripped due to SPS operation)
Total capacity_Bikaner(PG)		**1215**	**627**	**588**
AZURE POWER INDIA Pvt. Ltd., Bhadla	Bhadla(PG)	39	0	39
SB ENERGY FOUR PRIVATE LIMTED, Bhadla		160	62	98
Clean Solar Power (Bhadla) Pvt. Ltd		288	192	96
SB Energy Six Private Limited, Bhadla		282	0	282
Mahindra Renewable Private Limited		224	5	219
Tata Power Renewable Energy Ltd. (TPREL)		202	0	202
Clean Solar Power (Jodhpur) Pvt. Ltd.		185	35	150
Total capacity_Bhadla(PG)		**1380**	**294**	**1086**
Adani Hybrid Energy Jaisalmer One Ltd._390MW	Fatehgarh-II(PG)	330	275	55
Adani Hybrid Energy Jaisalmer Two Ltd._300MW		200	35	165
Adani Hybrid Energy Jaisalmer Three Ltd._300MW		272	206	66
ReNew Solar Urja Private Limited		198	23	175
Eden Renewable Cite Private Limited		273	0	273
Renew Sun Waves Private Limited		164	0	164
Renew Sun Bright (RSEJ4L)		253	0	253
Total capacity_Fatehgarh-II(PG)		**1690**	**539**	**1151**
Adani Hybrid Energy Jaisalmer Four Ltd.	Fatehgarh-I(Adani Pooling)	581	0	581
Nedan Solar NTPC		258	0	258
Total capacity_Fatehgarh-I (Adani pooling)		**839**	**0**	**839**
ACME Heeragarh powertech Pvt. Ltd	Bhadla-II(PG)	199	124	75
ABC Renewable Pvt. Ltd		267	23	244
Mega Surya Urja Pvt. Ltd. (MSUPL)		197	0	197
Avaada Sunrays Pvt. Ltd.		230	0	230
Total capacity_Bhadla-II(PG)		**893**	**147**	**746**

Preliminary inference

1. ASEJ1PL_450MW_Fatehgarh-II(PG) tripped on instantaneous undervoltage during fault at 13:03hrs (Plant kept Under voltage DR triggering and tripping also at 0.9pu voltage on 220kV line), after tripping Plant rectified it and disable tripping at 0.9pu. Later at 14:55hrs and 15:18hrs, plant was able to recover MW.
2. ASEJ1PL is recently commissioned plant whose Inverters setting were kept as came from the studies and HVRT settings for different stages were increased.
3. It has also been observed those plants which have increased the HVRT settings for different stages are having better performance in recovering and retaining the generation.
4. Eden also changed the HVRT settings, no inverters tripping (failure of generation recovery) occurred in Eden solar plant, at 15:18hrs 220kV line tripped due to OV (setting were 112%, 5sec).
5. Those plants whose settings are mentioned wrong (shown in the next slide) and communicated to plants earlier after on Oct'22 are found to be failed to recover the generation in all the event like Clean Solar Power (Jodhpur) Pvt. Ltd., Mahindra Renewable Pvt. Ltd. etc.
6. Several plants are yet to submit the present implemented settings and in different event some wrong undesirable settings have been found in different RE plants.
7. ***Protection audit of RE plants and uniform protection philosophy is the need of time.***

List of 220kV lines from RE plants to POI tripped in 14th Jan'23 RE generation loss event (as per PMU)

Sl. No.	Line name (Connecting the RE plant to pooling station)	Trpping time (hh:mm:ss:ms:ms:ms)	PMU Voltage (pu) at plant end	Time (after which line tripped after fault clearance)	Remarks
1	220kV ASEJ1PL-Fatehgarh-II(PG) Ckt-1 and Ckt-2	13:33:33:800	0.9	0	ASEJ1PL reported that in 220kV line, 0.9pu voltage was set for DR triggering recording and wrongly for tripping of line also. (Wrong setting, rectified after this event)
2	400kV NTPC Kolayat-Bhadla-II(PG)	14:55:40:040	1.094	1	400kV NTPC Kolayat line voltage at 400kV NTPC Kolayat end was 1.094pu for 1sec after fault clearance (at 14:55:39:040) (Wrong setting)
3	220kV NTPC Devikot-Fatehgarh-II(PG)	14:55:44:120	1.098	5	220kV NTPC Devikot line voltage at 220kV NTPC Devikot end was 1.098pu for 5sec after fault clearance (at 14:55:39:040) (Wrong setting)
4	220kV Azure Power 34 Pvt. Ltd.-Bhadla(PG)	15:18:31:320	1.098	1.3	220kV Azure Power 34 Pvt. Ltd line voltage at 220kV Azure Power 34 Pvt. Ltd. end was 1.098pu for 1.3sec after fault clearance (at 15:18:30:040) (Wrong setting)
5	220kV SB Energy Six Pvt. Ltd.-Bhadla(PG)	15:18:33:040	1.102	3	220kV SBE6PL line voltage at 220kV SBE6PL end was 1.102pu for 3sec after fault clearance (at 15:18:30:040) (Wrong setting)
6	220kV Azure Power 41 Pvt. Ltd.-Bhadla(PG)	15:18:32:440	1.098	2.4	220kV Azure Power 41 Pvt. Ltd. line voltage at 220kV Azure power 41 end was 1.098pu for 2.4sec after fault clearance (at 15:18:30:040) (Wrong setting)
7	220kV Avaada Sunrays Pvt. Ltd.-Bhadla-II(PG)	15:18:35:400	1.113	5.36	220kV Avaada Sunrays Pvt. Ltd. line voltage at 220kV Avaada Sunrays end was 1.113pu for 5.36 after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
8	220kV Eden Renewable-Fatehgarh-II(PG)	15:18:35:160	1.126	5	220kV Eden Renewable cite Pvt. Ltd. line voltage at 220kV Eden end was 1.126pu for 5sec after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
9	220kV RSBPL-Fatehgarh-II(PG)	15:18:36:640	1.124	6.5	220kV RSBPL line voltage at 220kV RSBPL end was 1.124pu for 6.5sec after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
10	220kV NTPC Nidan-Adani Solar Park(AREPRL)	15:18:35:280	1.12	5.2	220kV NTPC Nidan line voltage at 220kV NTPC Nidan end was 1.12pu for 5.2sec after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
11	220kV PSS1(350MW_Solar)-Adani Solar Park(AREPRL)	15:18:36:640	1.116	6.5	220kV PSS1 line voltage at 220kV PSS1 end was 1.116pu for 6.5sec after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
12	220kV PSS2(250MW_Solar)-Adani Solar Park(AREPRL)	15:18:42:440	1.11	12	220kV PSS2 line voltage at 220kV PSS2 end was 1.11pu for 12sec after fault clearance (at 15:18:30:040) (setting need to be reviewed and rectified accordingly)
13	220kV SBSR Pvt. Lrd.-Bikaner (PG)	15:20:18:620	1	108	220kV SBSR Pvt. Ltd.-Bikaner (PG) tripped due to SPS operation at Bikaner(PG)-Bikaner(RS) line (**SPS operated at 15:20:18:320)**
14	220kV TPGEL-Bikaner(PG)	15:20:18:320	1	108	220kV TPGEL.-Bikaner (PG) tripped due to SPS operation at Bikaner(PG)-Bikaner(RS) line **(SPS operated at 15:18:30:000)**
15	220kV Thar Surya Pvt Ltd.-Bikaner(PG)	15:20:18:320	1	108	220kV Thar Surya Pvt Ltd.-Bikaner (PG) tripped due to SPS operation at Bikaner(PG)-Bikaner(RS) line (**SPS operated at 15:18:30:000)**
16	220kV TPREL-Bhadla(PG)	Details need to be checked through DR/EL			Line might tripped at 14:55:40hrs (As per SCADA)
17	220kV Azure Maple Pvt. Ltd.-Bhadla(PG)				Line might tripped at 15:19:30hrs (As per SCADA)
18	220kV MSUPL-Bhadla-II(PG)				Line might tripped at 15:19:30hrs (As per SCADA)
19	220kV NTPC Nokhra-Bhadla-II(PG)				Plant might tripped before the event of 15:18:30hrs, not tripped till 14:56:30hrs (details need to be checked through DR)
20	220kV RSWPL-Fatehgarh-II(PG)				Line might tripped at 15:19:30hrs (As per SCADA)