I/32223/2023

सत्यमेव जयते

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

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 213वीं बैठक का कार्यवृत
|

Subject: Minutes of the 213th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 213वीं बैठक दिनांक 22.11.2023 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है। यदि कार्यवृत पर कोई टिप्पणी हो तो कार्यवृत जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें |

The 213th meeting of the Operation Co-ordination Sub-Committee (OCC) of NRPC was held on 22.11.2023. The Minutes of this meeting has been uploaded on the NRPC website http://164.100.60.165. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक:यथोपरि।

28/12/23
(डी. के. मीना)
अधीक्षण अभियंता (प्रचालन)

सेवा में,

उ.क्षे.वि.स. के प्रचालन समन्वय उप-समिति के सभी सदस्य

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 213 वीं बैठक का कार्यवृत्त

The 213th OCC meeting of NRPC was held on 22.11.2023 through video conferencing.

खण्ड-क:उ.क्षे.वि.स. PART-A:NRPC

1. Confirmation of Minutes

Minutes of the 212th OCC meeting was issued on 10.11.2023. OCC confirmed the minutes.

2. Review of Grid operations of October 2023

Anticipated vis-à-vis Actual Power Supply Position (Provisional) for October 2023

Reasons submitted by States for significant deviation of actual demand from anticipated figures during the month of October 2023 are as under:

- **Delhi**

Delhi experienced unusual hot days due to absence of western disturbance compared to October month of previous year. So, peak demand and energy consumption was on higher side than expected.

- **Rajasthan**

The Actual Energy requirement w.r.t. Anticipated Energy requirement for the month October' 2023 increased by 7.7% and the Actual peak demand w.r.t. Anticipated peak demand for the month October' 2023 increased by 5.8% due to increase in demand due to the upcoming election in the Rajasthan state.

- **Uttar Pradesh**

Due to high irrigation demand and low rain in October 2023 in comparison to October 2022, energy requirement and energy consumption was higher than anticipated.

3. Maintenance Programme of Generating units and Transmission Lines

The maintenance programme of generating units and transmission lines for the month of December 2023 was deliberated in the meeting on 21.11.2023.

4. Anticipated Power Supply Position in Northern Region for December 2023

The updated anticipated Power Supply Position for December 2023 is as below:

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
CHANDIGARH	Availability	110	260	No Revision submitted
	Requirement	120	290	
	Surplus / Shortfall	-10	-30	
	% Surplus / Shortfall	-8.3%	-10.3%	
DELHI	Availability	3319	5300	21-Nov-23
	Requirement	2150	5300	
	Surplus / Shortfall	1169	0	
	% Surplus / Shortfall	54.4%	0.0%	
HARYANA	Availability	5200	11510	No Revision submitted
	Requirement	4386	8410	
	Surplus / Shortfall	814	3100	
	% Surplus / Shortfall	18.6%	36.9%	
HIMACHAL PRADESH	Availability	1128	2052	08-Nov-23
	Requirement	1127	2067	
	Surplus / Shortfall	1	-15	
	% Surplus / Shortfall	0.1%	-0.7%	
J&K and LADAKH	Availability	1250	1700	22-Nov-23
	Requirement	2050	3100	
	Surplus / Shortfall	-800	-1400	
	% Surplus / Shortfall	-39.0%	-45.2%	
PUNJAB	Availability	5240	10850	21-Nov-23
	Requirement	4550	8500	
	Surplus / Shortfall	690	2350	
	% Surplus / Shortfall	15.2%	27.6%	
RAJASTHAN	Availability	8850	18700	No Revision submitted
	Requirement	9826	17616	
	Surplus / Shortfall	-976	1084	
	% Surplus /	-9.9%	6.2%	

State / UT	Availability / Requirement	Revised Energy (MU)	Revised Peak (MW)	Date of revision
	Shortfall			
UTTAR PRADESH	Availability	10540	21000	16-Nov-23
	Requirement	10385	21000	
	Surplus / Shortfall	155	0	
	% Surplus / Shortfall	1.5%	0.0%	
UTTARAKHAND	Availability	1246	2350	07-Nov-23
	Requirement	1280	2395	
	Surplus / Shortfall	-34	-45	
	% Surplus / Shortfall	-2.7%	-1.9%	
NORTHERN REGION	Availability	36884	67200	
	Requirement	35875	62600	
	Surplus / Shortfall	1009	4600	
	% Surplus / Shortfall	2.8%	7.3%	

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

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

5.2. In 213th OCC, SLDCs were requested again to coordinate with respective Transmission Utilities of states/UTs and submit details about the updated status of Down Stream network by State Utilities from ISTS Station (enclosed as ***Annexure-A-I.I***) before every OCC meeting.

6. NR Islanding scheme

6.1. In the meeting (213th OCC), UPSLDC representative apprised forum that UFR have been installed at PGCIL and UPPCL S/s, however, work is pending from NTPC Unchahar end for Lucknow- Unchahar islanding scheme.

6.2. With regard to Agra islanding scheme, UPSLDC representative apprised forum Lalitpur plant has some observations on CPRI report. So, they demanded some time to figure out. Further, GM NRLDC mentioned that in the 70th NRPC meeting held on 18.11.2023 it was decided that UPSLDC and Lalitpur will have bilateral meeting to solve their outstanding issues and thereafter both have been asked to expedite the implementation of the Agra islanding scheme.

6.3. Representative from RRVPNL intimated forum that draft DPR for Jodhpur-Barmer Rajwest and Suratgarh Islanding scheme has been prepared and the

same will be shared with NRPC Secretariat and NRLDC in the next week and it is expected to be finalized by the month of Decemeber'23.

6.4. With regard to Patiala-Nabha Power Rajpura islanding scheme representative from Punjab SLDC informed that management has decided to go for PSDF funding for its implementation. The implementation may be expected in March 2025. MS, NRPC asked Punjab to submit the DPR for Nabha IS at the earliest.

6.5. With regard to Kullu-Manali Islanding scheme, representative from HPSLDC apprised forum that in the 70th NRPC meeting held on 18.11.2023 it was intimated that the scheme has been listed for hearing in HPERC on 22nd November and after clearance from there, execution will be started.

6.6. With regard to Shimla-Solan Islanding scheme representative from HPSLDC has intimated that GE has confirmed capability capability of the generator working in the Power & opening mode and response of GE is awaited on the switching of the generator to automatic mode. Further, HPSEB has been asked to take up the matter with GE.

7. Coal Supply Position of Thermal Plants in Northern Region

7.1. In the meeting, NRPC representative apprised forum about the coal stock position of generating stations in northern region during current month (till 10th November 2023).

7.2. Average coal stock position of generating stations in northern region, having critical stock, during first ten days of November 2023 is as follows:

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd. (Days)	Actual Stock (Days)
KHAMBARKHERA TPS	90	0.62	22	1.9
KOTA TPS	1240	0.76	22	3.8
LALITPUR TPS	1980	0.83	22	3.4
MAHATMA GANDHI TPS	1320	0.83	22	2.0
MEJA STPP	1320	0.47	22	2.8
OBRA TPS	1094	0.62	22	2.2
RAJIV GANDHI TPS	1200	0.50	22	0.8
ROSA TPP Ph-I	1200	0.75	22	0.5
SURATGARH TPS	1500	0.52	22	2.5
TANDA TPS	1760	0.75	22	3.0
UNCHAHAR TPS	1550	0.68	22	2.0
UTRAULA TPS	90	0.61	22	1.7
CHHABRA-I PH-1 TPP	500	0.87	22	1.4
KALISINDH TPS	1200	0.68	22	3.9

Station	Capacity (MW)	PLF % (prev. months)	Normative Stock Reqd. (Days)	Actual Stock (Days)
CHHABRA-I PH-2 TPP	500	0.74	22	0.8
CHHABRA-II TPP	1320	0.75	22	1.7

7.3. In the meeting, above mentioned generating station was requested to take adequate measures.

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

8.1. In the meeting, In the meeting, EE(O) NRPC apprised forum updated inputs received from utilities are attached as **Annexure-A.II.**

8.2. MS, NRPC asked transmission utilities of NR that have not submitted the status of ERS set/towers available with them to submit the requisite information before next OCC meeting.

Decision of the OCC forum

- *Forum asked the transmission utilities of NR that have not submitted the status of ERS set/towers available with them to submit the requisite information before next OCC meeting.*

9. Planned Annual Maintenance Program of Transmission Elements for the financial year 2024-25-reg. (Agenda by NRPC Sectt.)

9.1. In the meeting, EE(O) NRPC apprised forum that Clause (b) of Section 32(3) of Indian Electricity Grid Code (IEGC) 2023, stipulates for advance preparation of annual outage plan for the transmission elements by the concerned RPC.

9.2. In accordance with above provision, NRPC Sectt. vide letter dated 26.11.2023 requested all State/Central Transmission utilities/ licensees related to Northern Region to submit their annual outage plan of transmission elements in the enclosed format (**Annexure-A.III**) for the FY 2024-25 via email at **seo-nrpc@nic.in**

9.3. MS, NRPC asked all the concerned utilities/stakeholders of NR to submit the requisite information at the earliest.

Decision of the OCC forum

- *Forum asked all the concerned utilities/stakeholders of NR to submit the proposed Planned Annual Maintenance Program of Transmission Elements for the financial year 2024-25 at the earliest.*

10. Tapping Tertiary of 765/400/33 kV ICT-2 (by connecting the same at the point of connection of the UPPCL supply) for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia SubStation. (Agenda by Powergrid NR-3)

10.1. In the meeting, Powergrid NR-3 representative apprised that currently two Auxiliary supplies have been provisioned at Ballia Substation for HVDC, 400kV and 765kV System. One is from Tertiary of 200MVA 400/132kV ICT, and another is UPPCL feeder at 33kV Levels.

10.2. Further, he mentioned that the auxiliary supply from UPPCL feeder is not reliable and sometimes it fails 2-3 times in a day and outage duration in most of the cases is generally more than 12 Hrs. Due to frequent breakdowns of UPPCL supply, the Auxiliary Power supply changeover occurs multiple times which is undesirable in view of frequent MV/LT CB operation, Valve Cooling Pump changeovers & UPS bypass operation.

10.3. Moreover, he stated that regarding auxiliary supply from tertiary of 400/132 KV 200 MVA ICT, there are 02 nos 132 KV transmission lines of UPPCL connected to UPPCL SubStation. There are frequent faults in these lines which are being fed by this ICT, hence the reliability of this ICT is also not good.

10.4. Powergrid NR-3 also mentioned that generally their HVDC stations have provision for auxiliary supply from tertiary of the two independent ICTs and dedicated feeders from generating plants. However, in case of Ballia same is not available.

10.5. In view of above facts, Powergrid have proposed that –

Tapping Tertiary of 765/400/33 kV ICT-2 (by connecting the same at the point of connection of the UPPCL supply) in addition to the UPPCL Supply & 200MVA 400/132kV ICT Tertiary for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Substation with approx. cost estimate of Rs 1.25 Cr may be considered under ADD-CAP.

10.6. GM, NRLDC asked Powergrid to confirm whether Ballia HVDC has ever been out of service due to auxiliary failure, Powergrid replied that has not been the case till now. Further, Powergrid mentioned that at the time of through fault relay have picked up but has never operated.

10.7. NRLDC representative apprised forum that as per CEA Technical Standard for Construction of Electrical Plants Lines Regulation 2022, Auxiliary Power Supply System shall be from Highly reliable duplicated supply from two separate sources with automatic change over facility.

10.8. GM, NRLDC asked Powergrid to submit the details of auxiliary power supply at their HVDC stations on pan India basis.

10.9. Further, he also asked Powergrid to co-ordinate with UPPTCL and get the protection setting of the said relay checked.

10.10. MS, NRPC asked UPPTCL to get the through faults detected by the relay examined internally and thereafter a separate meeting may be held with NRPC, NRLDC, UPPTCL and Powergrid NR-3.

Decision of the OCC forum

- *Forum asked UPPTCL to get the through faults detected by the relay examined internally and thereafter a separate meeting may be held with NRPC, NRLDC, UPPTCL and Powergrid NR-3.*

11. Feasibility of Varanasi Islanding Scheme (Agenda by UPSLDC)

11.1. EE(O), NRPC informed forum that UPSLDC has planned a tentative Varanasi islanding Scheme using generation of Anpara BTPS.

11.2. UPSLDC representative informed that for Varanasi Islanding scheme generation of Anpara B (2X500 MW) is considered as these machines have automatic governor control system and load at 400/220/132 kV Sarnath end is taken which is fed by double circuit line from 400kV Anpara B S/s. Further, he mentioned that there are three major load center at 400/220/132 kV Sarnath end namely 220/132 kV Sahupuri, 220/132kV Gajokhar and 220/33kV Bhalupur. (Block Diagram of Proposed Varanasi islanding scheme is attached as **Annexure-A.IV**)

11.3. Further, UPSLDC representative presented the load-generation scenario which is as follows:

Summer Peak (MW)	Summer Off Peak (2022-23) MW	Summer Average (MW)	Winter Peak (2022-23) MW	Winter Off Peak (MW)	Winter Average (MW)
879.2	419.53	643.62	688.5	384.12	490.455

11.4. Further, he also presented Generation Pattern of Anpara BTPS (2X500 MW) (**Annexure-A.IV**) in which it can be inferred that load and generation considered for the said islanding is matching, henceforth is appears that islanding scheme is feasible.

11.5. GM, NRLDC asked UPSLDC to submit the steady state study results with them for further analysis. He also suggested that load of cantonment area may also be considered in the scheme.

12. Review of Outages of thermal units planned in the month of March'24 (Agenda by NRPC Sectt.)

12.1. In the meeting, EE(O) NRPC apprised forum that Chairperson, CEA in the recent review meeting stated that in view of upcoming general election, outages of generating units may be avoided in the months of March'24 to May'24. Therefore, he asked all RPC's to review the outages of thermal units planned in the month of March'24 in the current financial year.

12.2. In compliance to the directions of Ministry MS, NRPC asked all the thermal generating stations of NR to avoid planned maintenance of their units in the months of March'24 to June'24.

12.3. NTPC informed that they would be reviewing their outage plan of thermal units for the month of March'24 to June'24 and would plan accordingly so as to avoid planned outage of their generating stations in this aforesaid period.

Decision of the OCC forum

- *Forum asked all the thermal generating stations of NR to avoid planned maintenance of their units in the months of March'24 to June'24.*

13. Additional Agenda: Construction of 220/132 kV, 2X100 MVA Substation nearby Una and 220 kV (Twin Zebra) D/C line from 220/132 kV Nehrian Substation to proposed 220/132 kV, 2X100 MVA Substation near Una (Agenda by HPPTCL)

13.1. In the meeting HPPTCL representative informed that Currently Una & Tahliwal area has peak load requirement of around 100 MVA and Amb and Gagret substation are also feeding around 90 MVA load. However, considering the upcoming Bulk Drug Pharma Park in Distt Una and load growth of present consumers, there is additional load requirement of around 120 MVA which needs to be met.

13.2. He mentioned that as an interim measure HPPTCL is constructing 220/132 kV, 80/100 MVA Substation at Tahliwal (Distt. Una in Himachal Pradesh) by S/C LILO of 220 kV D/C Bhakra Jamalpur D/C line of BBMB with Provision of SPS to restrict drawl at 50 MVA and to ensure no drawl of Power from Jamalpur side in case of outage of Bhakhra - Tahliwal circuit in line with approval of Power Subcommittee of BBMB 69th NRPC.

13.3. He stated that considering above and lack of any other source of power nearby, HPPTCL has planned construction of 220 kV (Twin Zebra) D/C line from 220/132kV Nehrian Substation to proposed 220/132 kV Substation near Una & 220/132kV, 2X100 MVA Substation nearby Una. (Proposed Connectivity Diagram is attached at **Annexure-A.V**).

13.4. He further informed that the proposed system was discussed in meeting held under chairmanship of Chief Engineer PSPA CEA on meeting dated-02.11.2023 alongwith CTUIL & GRID INDIA. The proposal has been approved

by CEA and it was decided that any strengthening /augmentation of associated ISTS shall be done if the need arises (MoM attached as **Annexure-VI**).

13.5. Keeping in view of above HPPTCL requested approval of constituents for HPPTCL Proposal of construction of 220/132 kV, 2X100 MVA Substation nearby Una and 220 kV (Twin Zebra) D/C line from 220/132 kV Nehrian Substation to proposed 220/132 kV, 2X100 MVA Substation near Una.

13.6. Representative of NRLDC stated that with the proposed 200 MVA substation, there would be requirement for additional ICT at Jalandhar or augmentation of existing 315 MVA ICT to 500 MVA for 'N-1' compliance. Further, reconductoring of 220 kV Nehrian- Hamirpur D/c line may also be required in future.

13.7. MS, NRPC stated that considering the additional load requirement, proposal of HPPTCL may be approved and it may be taken for approval in the upcoming NRPC board meeting.

Decision of the OCC forum

- *Forum approved HPPTCL Proposal of construction of 220/132 kV, 2X100 MVA Substation nearby Una and 220 kV (Twin Zebra) D/C line from 220/132 kV Nehrian Substation to proposed 220/132 kV, 2X100 MVA Substation near Una. Further, forum decided to take up the matter in the upcoming NRPC meeting for view of all constituents and approval.*

14. Table Agenda No.1: Operational safety of 400 kV D/C Dadri-Ballabgarh (Quad) line LILO at Maharanibagh Substation (Delhi): (Agenda by Powergrid NR-1)

14.1 In the meeting, Powergrid NR-1 representative informed forum that most of the towers of the 400 KV Dadri Maharanibagh transmission line are passing through Noida/Greater Noida. There have been several instances of dumping of garbage, filling of excess soil, cutting of soil, rise in road height etc. at tower location reported. Due to this Powergrid is facing operation safety issues. The matter is being reported to concerned authorities, District administration etc. from time to time. The major affected locations are:

- LOC: 62-63 (Dadri – Maharanibagh - Ballabhgarh Line) Road crossing at Sector 150 Noida
- LOC: 25 Dadri Maharanibagh Line: Road constructed near to TOWER at Sector 94 Noida
- Plantation of tree in the line corridor of Dadri Maharanibagh Line at Sector 150

14.2 MS, NRPC asked Powergrid NR-1 to take up the matter with the higher level of concerned authorities, District administration etc. Further, he also asked Powergrid NR-1 to apprise this issue to Member (Power System), CEA considering the operational safety of towers of the 400 KV Dadri Maharanibagh transmission passing through the affected locations.

15. Table Agenda No.2: Review of N-1 Contingency loading criteria in some critical Grid Substations of NR-1: (Agenda by Powergrid NR-1)

15.1. In the meeting, Powergrid NR-1 representative informed forum that N-1 Contingency loading criteria is not met in following critical grid substations in NR-1:-

- 400//220 kV Jaipur South S/S :- 02 nos 400/220 kV 500 MVA ICT banks is in service at Jaipur South S/S. The loading at ICTs at Jaipur South is > 700MW resulting in non-compliant of N-1 Contingency.
- 400/220kV Bassi SS – 02 nos ICTs of 315MVA and 01 no ICT of 500MVA banks is in service at Bassi S/S. The loading at ICTs at Bassi is > 900MW resulting in non-compliant of N-1 Contingency.
- 400/220 kV Neemrana S/S :- 02 nos 400/220 kV (01 no 315 MVA & 01 no 500 MVA) ICT banks is in service at Neemrana S/S. The loading at ICTs at Neemrana is > 500MW resulting in non-compliant of N-1 Contingency.
- 400/220 kV Bhiwadi S/S: - 03 nos 400/220 kV 315 MVA ICT banks is in service at Bhiwadi S/S. The loading at ICTs at Bhiwadi is > 800MW resulting in non-compliant of N-1 Contingency.
- 765/400/220 kV Bhiwani S/S:- 03 nos 765/400 kV 1000 MVA ICTs are installed at Bhiwani S/S. After 400 kV Bus split with series reactor 765/400 kV ICT-1 is installed in 400 kV Bus-1 & 2 section and 765/400 kV ICT-2 & 3 is installed in 400kV Bus-3&4 portion. Due to pooling of RE power, combined loading of ICTs > 2200 MW resulting in non-compliant of N-1 Contingency. *Further, it is to mentioned that N-1 non-compliance of 765/400 kV Bhiwani(PG) ICTs issue was also discussed in OCC 209 MOM refer page 114. It was replied by CTU representative that Augmentation of 1x1500 MVA (4th) transformer of Bhiwani S/s is linked with Transmission system for evacuation of RE power from renewable energy parks in Leh and with delay in implementation of Leh scheme will also impact the implementation of 765/400kV, 1x1500MVA (4th) ICT at Bhiwani S/s. In view of urgent requirement of 765/400kV, 1x1500MVA ICT, Proposal for delinking of 765/400kV, 1x1500MVA (4th) ICT at Bhiwani S/s from agreed transmission scheme, i.e. Transmission system (EHVAC+HVDC) for evacuation of RE power from renewable energy parks in Leh (5GW Leh-Kaithal transmission corridor) will be taken up in Consultation Meeting for Evolving Transmission Schemes in Northern Region"*

15.2. NRLDC presented the loading pattern of ICT's of these aforementioned Grid Stations of NR-1. Subsequently, it was inferred that loading at ICT's at Bassi S/s is on higher side resulting in non-compliant of N-1 Contingency while for

Bhiwadi S/s also loading pattern is marginally higher. Whereas in case of Jaipur South S/s and Neemrana S/s loading is within limits.

15.3. Rajasthan SLDC representative mentioned that they have planned a LILO of Dausa-Sawai Madhopur line at Jaipur South S/s and thereafter there will be requirement of additional ICT at Jaipur S/s not at Bassi S/s.

15.4. MS, NRPC asked Powergrid NR-1 to formally submit their request to CTU for review of N-1 Contingency loading criteria in aforementioned critical Grid Substations of NR and subsequently matter may be taken up in the CMETS meeting of CTU.

16. Table Agenda No.3: Augmentation of existing 400 KV 50 MVAR Bus Reactor at UPPTCL Muradnagar SS (Agenda by Powergrid NR-1)

16.1. In the meeting, Powergrid NR-1 informed that 01 Nos of 50 MVAR (3X 16.67 MVAR) Bus reactor of CGL make is owned By POWERGRID at 400/220 KV UPPTCL Muradnagar SS. The year of Manufacturing of above-mentioned Bus Reactor is 1984. These Bus reactors have completed more than 35 years of useful service. The bus reactor is not having dedicated 400 kV bay & there is provision for taking it in service through TBC bay. The bus reactor is not utilized at Muradnagar due to non-availability of dedicated bay & very less impact of bus voltage due to 50 MVAR capacity. Additionally, the reactor is very old and very high noise & vibrations are generated during operation.

16.2. Further, he mentioned that there is 400 kV POWERGRID Dadri Bay 94 which has been out of service for a long time because the Dadri Line is shifted from this bay to another new Substation UPPTCL Muradnagar-2.

16.3. Powergrid requested that provision of augmentation of existing 50 MVAR bus reactor at UPPCL Muradnagar SS with new 125 MVAR Bus Reactor in spare Dadri bay may please be considered by forum for better voltage regulation of Muradnagar Bus.

16.4. MS, NRPC asked Powergrid NR-1 to formally submit their request to CTU for discussion of cited matter in the CMETS meeting of CTU.

17. Table Agenda No.4: Providing Bay shutdowns / AR non-auto mode from 08:00Hrs and Line / ICTs shutdowns from 13:00Hrs in Renewable Energy (RE) connected stations: (Agenda by Powergrid NR-1.)

17.1 In the meeting EE(C), Powergrid NR-1 mentioned that Outages for maintenance of Transmission lines, equipment in RE connected stations are being provided from 17:00Hours due to RE Grid constraints.

*Powergrid NR-1 requested in winter months **for providing of bay shutdowns / AR non-auto mode from 08:00Hrs and Line / ICTs***

shutdowns from 13:00Hrs, which will improve planned maintenance activities.

17.2 GM, NRLDC mentioned that there is heavy generation in RE pocket during day period, and is would not be feasible to give outages before 15:00 hrs in winter months. However, he suggested that code may be issued to the utilities well in advance so that there is no delay in availing the shutdown.

17.3 GM, NRLDC mentioned to internally discuss the matter with NLDC for 765kV grid elements and he further suggested Powergrid that a separate bi-lateral meeting may be held for optimum solution in this matter.

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

18. NR Grid Highlights for October 2023

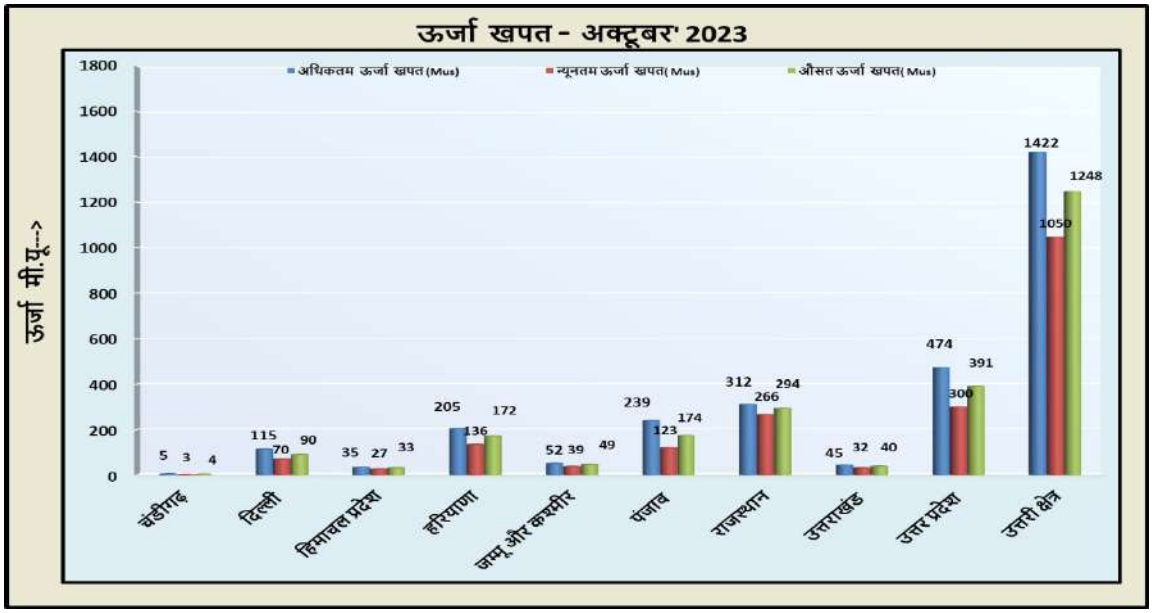
NRLDC representative presented the major grid highlights for Oct'23:

- Maximum energy consumption of Northern Region was **1422 MUs** on 10th Oct'23 and it was 6.8 % higher than Oct'22 (1332 MUs 04th Oct'22)
- Average energy consumption per day of Northern Region was **1248 MUs** and it was 15.5 % higher than Oct'22 (1081 Mus per day)
- Maximum Demand met of Northern Region was **67829 MW** on 10th Oct'23 @12:47 hours (*based on SCADA data)* as compared to 60710 MW on 01st Oct'22 @20:00 hours.

Northern Region all-time high value recorded in Oct'23:

No new record

Energy Consumptions



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

क्षेत्र/राज्य	अक्टूबर- 2022	अक्टूबर- 2023	% अंतर
चंडीगढ़	3.9	4.1	5.0%
दिल्ली	78.5	90.5	15.2%
हिमाचल प्रदेश	30.2	32.6	7.7%
हरियाणा	140.1	172.4	23.1%
जम्मू और कश्मीर	50.2	48.5	-3.4%
पंजाब	163.0	173.9	6.7%
राजस्थान	254.4	294.5	15.8%
उत्तराखंड	36.0	40.0	11.1%
उत्तर प्रदेश	324.2	391.1	20.6%
उत्तरी क्षेत्र	**1080.6**	**1247.6**	**15.5%**

Frequency Data

Month	Avg. Freq. (Hz)	Max. Freq. (Hz)	Min. Freq. (Hz)	<49.90 (% time)	49.90 – 50.05 (% time)	>50.05 (% time)
Oct'23	49.99	50.30 27.10.23 at 16:03:50 hrs	49.47 16.10.23 at 14:56:40 hrs	8.9	74.4	16.7
Oct'22	50.01	50.41	49.53	4.9	78.3	16.9

Detailed presentation on grid highlights of Oct'2023 as shared by NRLDC in OCC meeting is attached as Annexure-B.I.

19. Winter preparedness 2023-24

The agenda for winter preparedness by all states and utilities was discussed in detail in 212 OCC meeting. In the meeting, NRLDC representative had mentioned about the common issues observed during winter months and actions required from utilities. One of the important issue related to high voltages in the grid during winter months was also discussed. Number of actions/ measures required from utility side were discussed in the meeting. Some of these agreed actions are listed below:

- Generation resources along with ramp requirement should be optimally planned, taking care to maintain adequate reserves
- All the generating units on bar to absorb reactive power as per grid requirement and their capability curve

- Some of the generators have already been tested (Tehri, Chamera, Pong, RSD etc.) and shall be available for condenser mode of operation as and when required. States/SLDCs are also advised to explore synchronous condenser operation of Hydro & Gas units in their state control area. It is requested that all other utilities may explore possibility of running units as synchronous condenser.
- ICT Tap Optimization at 400kV & above is carried out by NRLDC. Same exercise need to be carried out by SLDCs at 220kV & below levels.
- Punjab, Haryana & Delhi were also asked to prepare & share with NRPC/NRLDC plan to manage high voltages during the upcoming winter season
- Priority wise cleaning & insulator replacement to be carried out. Priority to be given to the lines that have historical record of tripping during foggy weather.
- Utilities to ensure that all the protection settings are as approved by NRPC so as to avoid any undesirable tripping on overvoltage / overflux specially during winter season.

In 213 OCC meeting,

Punjab SLDC representative informed the following:

- *New reactors have been commissioned at Dhuri (2 no.s) & Nakodar (1 no.s)*
- *Around 65 lines have been opened since 25th Oct 2023 and wil generally be kept opened till Apr next year.*
- *6-8 400kV lines are being opened on daily basis in coordination with NRLDC during night time and then charged during morning hours.*
- *TSPL and NPL, Rajpura have been advised to absorb reactive power support to minimise the high voltages in the grid.*
- *RSD is expected to provide synchronous condenser mode of operation during winter months.*

NRLDC representative asked Punjab SLDC to share list of lines which have been kept opened since 25 Oct'23 and also ask RSD to provide support as synchronous condenser as per requirement.

Haryana SLDC representative informed the following:

- *All the concerned utilities i.e. HPPC, DISCOMs, HPGCL & MGTPS Jhajjar are advised to maintain load generation balance during the winter months by carrying out proper load forecasting & generation planning.*
- *All the generators are advised to minimize the generation to technical minimum as per IEGC/CERC guidelines during the low demand.*
- *The capacitor bank switch off message given to all TS Circle.*
- *All generators are advised to maximize the MVAR absorption as per capability curve to avoid high voltage in grid.*
- *TS wing advised to inform continuous high voltage conditions at substations so as to optimise transformer tap position at substations.*
- *132kV /66kV lines running on no load in the field are being opened during the night hours to curb high voltage. The detail of idle lines will be submitted soon.*

- *TS wing is requested to carry out cleaning & replacement of porcelain insulators to avoid tripping during foggy weather. Priority may be given to the lines that have historical record of tripping during foggy weather. The report of cleaning & replacement of insulators will be submitted as & when received from TS wing.*
- *The DISCOMs are requested to monitor the weather forecast site regularly.*
- *The TS wing is requested to carry out pre-winter maintenance activities at substations to avoid tripping during winters.*
- *The TS wing & M&P wing are requested to ensure healthiness of protection system to avoid unnecessary tripping of ICTs on over flux during the winter season.*
- *A list of 400kV & 220kV lines have already been prepared by SLDC Haryana for opening of lines during the high voltage conditions in Grid*

No comment could be received from Delhi SLDC.

CGM, NRLDC asked all states to regularly monitor the reactive power performance of all generating stations and stated that this performance would be discussed in next OCC meeting

OCC appreciated the efforts of Punjab and Haryana and asked them to take proactive measures to avoid issues related to high voltage during winter months.

Proposed ICT changes at 400/220kV level

NRLDC has identified few 400/220kV nodes where it seems that there is need for tap change exercise. The analysis has been done based on the SCADA data of October month available at NRLDC. Following 400/220kV nodes have been identified for tap change exercise:

1. 400/220kV Neemrana (increase by 2)
2. 400/220kV Daultabad (increase by 2)
3. 400/220kV Kabulpur (increase by 1)
4. 400/220kV Mainpuri (decrease by 1)
5. 400/220kV Patiala (decrease by 2)
6. 400/220kV Roorkee (decrease by 2)
7. 400/220kV Sarnath-UP (decrease by 1)

Scatter Plots are attached as Annexure-B.I of agenda. Same exercise needs to be carried out by SLDCs at 220kV & below levels.

OCC forum approved the tap changes as suggested by NRLDC.

Status of washing of insulators & replacement of porcelain insulators with polymer insulators

One more challenge during winter months is tripping of EHV lines due to fog. With low temperature across Northern region and sometimes with high humidity in the air, fog starts to appear across Northern region. This problem is generally most severe from 15Dec- 15Feb period. During this time additional care need to be taken by system operator as many multiple element tripping events have been reported in the past

especially in Punjab and Eastern UP. Such tripping are more severe if the lines are tripping from generation complex such as the Singrauli-Anpara-Rihand complex.

For lines such as 400kV Bara-Meja 1 & 400kV Bara-Meja 2 for which pre-winter maintenance was not carried out last year, tripping on number of occasions was reported during Jan month in 2023 at the time of fog.

NRLDC representative also presented the list of lines tripped frequently during last winter months.

Latest status regarding insulator replacement as available with NRLDC is attached as Annexure-B.II of agenda.

It was mentioned that details regarding insulator cleaning progress have been received from POWERGRID NR-1 & NR-3. Details regarding replacement of porcelain insulators with polymer insulators have also been received from NR-1, NR-2, DTL, & NRSS XXXI.

Bara representative that insulator cleaning has been carried out this year for 400kV Bara-Meja 1 & 2.

OCC once again requested to furnish the utility-wise latest status of washing of insulators & replacement of porcelain insulators with polymer insulators.

20. Import Capability of states for Winter 2023-24

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

It was again requested that all SLDCs:

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

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

"SLDCs in consultation with RLDCs shall declare the import and export TTC, ATC, and TRM of the individual control/bid areas within the region in accordance with Regulation 44 (3) of the Grid Code 2023. RLDCs shall assess the import and export TTC, TRM and ATC for the group of control/bid areas within the region (if required). The

computed TTC, TRM and ATC figures shall be published on the website of respective SLDCs and RLDCs, along with the details of the basis of calculations, including assumptions, if any, **at least eleven (11) months in advance**. The specific constraints indicated in the system study shall also be published on the website."

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

S. No.	Scenario	Time of Scenario
1	Off-Peak	03:00 Hrs
2	Morning Peak	10:30 Hrs
3	Evening Peak	18:30 Hrs
4	Solar Peak	12:00 Hrs

Same was also requested vide NRLDC email dated 01.11.2023. It was requested that the basecases as well as ATC/TTC assessments may be shared with NRLDC as per CERC approved procedure. Further, above exercise needs to be carried out regularly on monthly basis.

Data for interconnection studies

As per **Regulation 33 of IEGC 2023,**

(9) Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.
(10) Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intra-state system on the inter-state system and share the results of the studies with NLDC.
(11) NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intra-regional system on the inter-regional system.

Further as per the CERC Approved procedure for Assessment of Transfer Capability,

Purpose	Sl No	Action of Stakeholder	Responsibility	Submission to	Data/Information Submission Time line
2. Interconnection Studies for elements to be integrated in the month 'M'	2(a)	Submission of node-wise load and generation data & sharing of network simulation models for intra-state elements coming in the next six months	SLDC	RLDC	8th Day of 'M-6' month
	2(b)	Sharing of inter-connection study results			21st Day of 'M-6' month
	2(c)	Updating state and regional load & generation & modelling of inter-state & intra-state elements coming in the next six months in the regional system base case	RLDCs	NLDC	13th Day of 'M-6' month
	2(d)	Sharing of inter-connection study results			26th Day of 'M-6' month
	2(e)	Update the All-India network model for interconnection studies	NLDC	RLDCs	15th Day of 'M-6' month
	2(f)	Completion of inter-connection study for elements coming in the next six months			Last Day of 'M-6' month

In line with above, utilities are requested to share the list of **elements/LGB data/interconnection study results** etc as per the approved procedure which are expected to be commissioned up to **May 2024, before 8.11.2023. Above was also requested vide mails dated 1.11.2023 & 3.11.2023 by NRLDC. This needs to be practised as monthly exercise on regular basis.**

Latest ATC/TTC figures as available with NRLDC for the month of December 2023 is attached as Annexure-B.III of agenda. States are requested to go through these figures and provide any comments.

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

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

Uttarakhand	https://uksldc.in/ttc-atc
J&K and Ladakh U/T	**NA**

It was mentioned that basecase & ATC/TTC assessments for eleven months in advance have been received from Haryana & J&K.

OCC forum agreed that in case no assessments for eleven months in advance are shared by SLDC, the existing ATC/TTC assessment would be published on website and considered for the said month.

It was requested that all SLDCs (especially Rajasthan, HP and Uttarakhand) assess and share ATC/TTC assessment for Winter 2023-24 at the earliest.

Forum asked all states to share data and basecase for M-6 & M-11 timelines as discussed in the agenda.

21. Action plan by RVPN for winter season

Concerns on the transmission related issues in RVPN control area have been discussed in various forums including NRPC (last discussed in detail in the 65th NRPC meeting held on 21.04.2023) and OCC forum (last discussed in detail in the 211th OCC meeting held on 19.09.2023).

Based on the discussions and inputs shared by RVPN in these meetings, it was concluded that the works being carried out by RVPN will take some time and the persisting issues are likely to be observed during this winter season also.

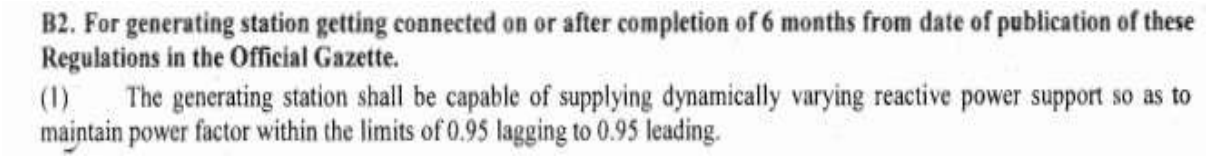
Following are the major issues that are likely to be observed during this winter season:

- Continuous N-1 non-compliance issues at ICT level in most of the RVPN substations
- Sustained low voltage operations in several Rajasthan system pockets, like voltage dropping to 340 & 330 kV level at the 400kV Hindaun & Alwar substations respectively
- Huge MVAr drawl by RVPN network leading to very poor power factor at number of substations
- Reactive power performance of intra-state RE generators at point-of connection level.
- Minimizing forced outage of intrastate thermal generating units during high demand season to avoid possibility of power shortages/ excessive drawl from the grid

As requested in 211th OCC meeting held on 19.09.2023, it was once again requested that Rajasthan SLDC may conduct meeting with all intrastate thermal & RE generators, DISCOMs, STU etc. and plan for safe and secure grid management during the upcoming winter months. It is very important given the expected situation in upcoming few months.

NRLDC representative asked RVPN/ Rajasthan SLDC for following actions at the earliest:

- *Action plan to meet > 17000MW peak demand during winter with meeting of all intrastate stakeholders*
- *Load MVAR drawl management including identification of nodes at 220kV and 132kV level which are drawing huge MVAR from the grid and suitable actions thereof*
- *Gas generation at Dholpur till new connectivity of 400 kV Alwar established*
- *Operating intrastate RE generators in voltage control mode for required reactive power support as per CEA regulations, 2013 & 2019*



B2. For generating station getting connected on or after completion of 6 months from date of publication of these Regulations in the Official Gazette.

(1) The generating station shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading.

- *Minimising planned/ forced outage of intrastate thermal generating units*
- *Assess ATC/TTC for solar as well as evening peak scenarios for upcoming winter season.*

Rajasthan SLDC representative stated that:

- *Meeting has been planned with all intrastate stakeholders & CEA representatives in the month of December this year. Representative from NRLDC/NRPC were also requested to join for the workshop on reactive power management.*
- *However, all other actions would take time and critical situation is expected to be present during this winter season.*
- *The matter regarding supplying agricultural supply in only two blocks is being taken up with higher authorities.*

OCC asked Rajasthan SLDC to take actions to ensure safe and secure grid operation. It was also suggested that Rajasthan SLDC may also share their communication with higher management highlighting the critical situation of Rajasthan grid.

22. Upgradation of terminal equipment for 400kV Bhadla(PG)-Bhadla(RVPN) D/C lines

It is being observed in number of cases, especially in RVPN control area that the rating of terminal equipment is lower than thermal capacity of transmission line. This is leading to under-utilisation of line capacity due to limited switchgear rating and even leading to constraints in RE evacuation from Western Rajasthan RE complex. This issue was also discussed in 212 OCC meeting.

In 212 OCC meeting, it was agreed that:

- All utilities to furnish the details to Grid-India /CTUIL/NRPC for consideration in future studies and planning of actions well in advance for lines part of important grid document as published by Grid-India. Format for sharing

information and information available with NRLDC as on date are attached as Annexure of 212 agenda
- NRLDC/ CTUIL to carry out studies for loading management/ SPS requirement for 400kV Bhadla(PG)-Bhadla(RVPN) D/C lines.
- OCC asked POWERGRID to expedite their proposal for switchgear replacement at 400kV Bhadla(RVPN) end.

With regard to submission of details to Grid-India/CTUIL/NRPC regarding details of terminal equipments as per format submitted in last OCC meeting, it may be noted that information is still awaited from utilities.

In 213 OCC meeting, OCC forum asked utilities to submit the details at the earliest as per the decision of 69NRPC & 212 OCC meeting.

Accordingly, NRLDC has carried out simulation studies to manage loading of 400kV Bhadla(PG)-Bhadla(RVPN) D/C line in case of outage of any one ckt. According to the studies, generation backing down will be required at Bhadla(PG) in such case.

From the studies carried out at NRLDC end, it is observed that 400kV Bhadla(PG)-Bhadla (RS) D/C has **80 %** sensitivity on each other.

As per telephonic communication with Rajasthan, the switchgear rating at Bhadla(RS) is of **2000 A** and therefore the permissible line loading of 400kV Bhadla(PG)-Bhadla(RS) is **~ 1385 MVA per circuit.**

As per present scenario of peak solar generation, in case of tripping of 400kV Bhadla(PG)-Bhadla(RS)-1, the loading of other parallel circuit would increase upto **2000 MW.**

Generation backing down at Bhadla(PG) provides highest relief on loading of 400kV Bhadla(PG)-Bhadla(RS) lines. Accordingly, it is suggested that in case loading of 400kV Bhadla(PG)-Bhadla(RS) exceeds 1400MW, commensurate generation has to be tripped at Bhadla(PG) to bring the loading of 400kV Bhadla(PG)-Bhadla(RS) to safe limits.

To limit the above line loading below 1385 MVA, **a graded generation tripping/ backing down of 1000-1500 MW at Bhadla(PG) would be required during peak solar hours (as per loading of 400kV Bhadla(PG)-Bhadla(RVPN) D/C).**

Accordingly, it is suggested that:

Case	**Possible Actions**	**Remarks**
Load on any circuit of 400kV Bhadla (PG)-Bhadla(RVPN) D/c line exceeds 1350 MW	• Tripping of RE Generations connected at 400kV Bhadla(PG)	• Except 50MW, nearly 3100MW generation is being evacuated through Bhadla(PG) under GNA. • Huge GNA curtailment (1200-1500MW) would be required in this case & it would be difficult to configure as it has to be done on

		pro-rata/ rotational basis.
	• Tripping of 400kV Bhadla(PG)-Bhadla II D/C lines	• This would avoid any injection from 400kV Bhadla-II, but generally there is little power flow or power flows from 400kV Bhadla to 400kV Bhadla-II (PG), therefore this may further degrade the situation.
	• Tripping of generation connected at 765/400kV Fatehgarh-II/ Fatehgarh-I & Bhadla-II which are not being evacuated under GNA.	• Tripping of nearly 1650MW generation is likely to bring relief of 300MW on 400kV Bhadla(PG)-Bhadla(RVPN) line. Bhadla-II generation has slightly higher sensitivity than Fatehgarh-II/ Fatehgarh generation on 400kV Bhadla(PG)-Bhadla(RVPN). • Tripping of 1650MW generation would have significant impact on grid frequency as well as drawl schedule of various states.

Considering above, deployment of SPS for 400kV Bhadla(PG)-Bhadla(RVPN) line does not seem to be the correct option.

In case of high loading of 400kV Bhadla(PG)-Bhadla(RVPN) beyond 1400MW, the line may be opened. On opening of both ckts of 400kV Bhadla(PG)-Bhadla(RVPN) D/C in simulation studies, it seems that rest of the network is able to evacuate the power, however, voltage & line loadings need to be carefully monitored in this case.

Moreover, as per studies carried out by NRLDC considering charging of Fatehgarh-III and 400kV Fatehgarh II – Fatehgarh III lines & 400kV Fatehgarh III – Bhensara (Jaisalmer) lines, it seems that the issue of high loading of 400kV Bhadla(PG)-Bhadla(RVPN) would be resolved.

In 213 OCC meeting,

- *POWERGRID was requested to provide update on the switchgear replacement at 400kV Bhadla(RVPN) end. POWERGRID was also requested to provide update on the already approved SPS of 765kV Bhadla2-Ajmer D/C.*

- *POWERGRID representative informed that the proposal for switchgear replacement at 400kV Bhadla(RVPN) end is under preparation and would be shared shortly with OCC/ NRPC forum.*

- *POWERGRID representative stated that SPS of 765kV Bhadla2-Ajmer D/C has been tested and implemented logic would be shared shortly.*

- *POWERGRID representative highlighted that in case of high loading of single 765kV ckt beyond 2500MW, SPS may be wired as it may lead to development of hotspot and issues at clamp connectors etc.*

- *NRLDC & CTUIL representative highlighted that the capacity of 765kV line is considered much higher and to control loading of 765kV line in such case, tripping of RE generation would have to be done which is not desirable. OCC forum agreed that the matter may be deliberated in future, if the issues related to hotspots or damage to clamp/ connectors are seen.*

OCC forum agreed that the requirement of SPS would be reviewed with commissioning of 400kV Fatehgarh-II – Fatehgarh III lines & 400kV Fatehgarh III – Bhensara (Jaisalmer) lines. POWERGRID was asked to expedite the charging of Fatehgarh-III and 400kV Fatehgarh II – Fatehgarh III lines & 400kV Fatehgarh III – Bhensara (Jaisalmer) lines.

23. Presentation on primary frequency response tests carried out by M/S Solvina in NR

Regulation 2017, 5.2 (g) of IEGC (Fifth Amendment), with regard to generator governor response, stipulates that 'provided that periodic checkups by third party should be conducted at regular intervals once in two year through independent agencies selected by RLDC or SLDC as the case may be…….'.

In compliance to above, NLDC on behalf of RLDCs formulated a procedure for testing primary frequency response test of regional entity generators and shared the details with generators. The modus-operandi in this regard was also intimated to Hon'ble commission on 12th Oct 2018. A meeting with all generators at NLDC, POSOCO was organized to discuss the important clauses of Request for proposal (RFP). RfP was reviewed and shared with all the five agencies selected during EoI stage. Based on that third parties M/S SOLVINA and SIEMENS were awarded the work of testing generator PFR. Based on experience of testing carried out across NR & All India, representative from Solvina will share a presentation in the OCC meeting covering:

- Primary Frequency Response Test Experience from 200 Units
- PFR Testing as per new IEGC
- Way Ahead

Solvina representative delivered a presentation on the PFR test experience of more than 200 units from across the country along with learnings through the exercise. The requirements of testing as per IEGC 2023 were also discussed.

Presentation as shared by Solvina team is attached as Annexure-B.II.

OCC forum noted the same.

24. Multiple elements tripping at 400kV Dadri TPS & Dadri HVDC on 4th November, 2023:

As reported, on 4th November, at 04:03 hrs, B-N phase to earth fault occurred on 400kV Dadri-Mandola ckt-1. Fault distance was approx. 100meter from Dadri TPS end. As per PMU & DR of 400kV Dadri-Mandola ckt-1, B-N phase to earth fault with successful A/R operation is observed. Steady state fault current was ~35kA, during transient fault current magnitude was ~52kA. Distance protection relay at Harshvihar end of 400kV Dadri-Harshvihar ckt-2 sensed the fault on 400kV Dadri-Mandola ckt in Z-1 and successful autoreclosed from Harshvihar end. Dadri end relay sensed fault in Z-4 as fault was in reverse direction however as informed by Dadri, instant three phase tripping occurred on DT received from Harshvihar end. During fault time, over voltage of the magnitude of approx. 723kV in 400kV Dadri-Mandola ckt-2 and Dadri end and approx. 560kV in 400kV Bus-2 at Dadri TPS is observed (as per PMU at Dadri TPS). Over voltage sustained for approx. 100msec. On this over voltage, 400kV Dadri-Mandola ckt-2 tripped on over voltage stage-2 protection operation at Dadri end. At the same time, all three filter banks connected at Dadri HVDC tripped on over voltage protection operation. Due to tripping of filter banks, HVDC Rihand-Dadri Bipole got blocked. During the same time, 490 MW Dadri-II TPS - UNIT 2 also tripped due to turbine vibration protection operation.

Discussion on below mentioned preliminary observations of the said event was done during the meeting:

i) Reason of over voltage in 400kV Bus need to be identified.
ii) Reason of Z-1 over reach at Harshvihar end and DT received at Dadri end from Harshvihar end also need be reviewed.
iii) Mismatch is suspected in nomenclature of 400kV Bus at Dadri TPS in SCADA & PMU, it need to be checked.
iv) DR at Dadri TPS end are not time synced. Time sync of DR with GPS need to be ensured.
v) Remedial action taken report to be shared.

Dadri NTPC representative informed that Z-1 time delay setting of 400kV Dadri-Mandola ckt-1 at Dadri end was found 100msec by default, same has been corrected and set as 0 sec. Regarding tripping of 400kV Dadri-Mandola ckt-2 due to over voltage, Dadri NTPC representative informed that there was actual overvoltage didn't occur in primary circuit. During inspection issue related to neutral earthing of CVT secondary was found which would have led to the overvoltage in secondary circuit. Reason of tripping of 400kV Dadri-Harshvihar ckt-2 from Dadri end and reason of over voltage in 400kV Bus at Dadri couldn't be identified yet. NRLDC also raised concern on time sync issue at Dadri NTPC. Dadri NTPC was requested to analyse the event in detail and share the same

with NRLDC. POWERGRID was also requested to review the suspected phase sequence and bus name nomenclature issue in PMU installed at Dadri NTPC.

25. Frequent forced outages of transmission elements in the month of October'23:

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

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	220 KV Ballabhgarh-Charkhi Dadri (BB) Ckt-1	3	BBMB
2	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	3	Rajasthan/ RAPS
3	220 KV Deoband(UP)-Saharanpur(PG) (UP) Ckt-2	3	PG/UP
4	400 KV Bareilly-Unnao (UP) Ckt-1	4	UP

The complete details are attached at Annexure-B.IV of Agenda.

Discussion during the meeting:

- **220 KV Ballabhgarh-Charkhi Dadri (BB) Ckt-1:** *NRLDC representative raised concerned on frequent tripping of the line and non-operation of A/R during single phase to earth fault. BBMB representative informed that during patrolling bird nest was found at fault location and same was removed. Regarding A/R operation, it was informed that some part of the line is cable and due to which A/R operation is disabled in the line.*

- **220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1:** *NRLDC representative raised concerned on frequent faults of the line. Rajasthan representative stated that line passes though forest and is around ~50 years old. Major cause of faults are vegetation and issues related to insulator discs. Disc insulators have been replaced in around 100km length of the line and in rest of the line it would be done during shutdown in March-April 2024 that A/R operation issue has been taken up with site engineer. Necessary follow-up action will be taken to resolve the issue related to frequent fault and A/R operation.*

- **220 KV Deoband(UP)-Saharanpur(PG) (UP) Ckt-2:** *UP representative informed that during patrolling issue of disc puncture was found. Regarding issue of A/R operation, it was informed that testing was done but no issue was identified. Further review of A/R operation would be done during shutdown.*

- **400 KV Bareilly-Unnao (UP) Ckt-1:** *UP representative informed that issue in Main-2 relay is suspected. After dead time, A/R operation is not completing and thereafter tripping of line on pole discrepancy was observed.*

NRLDC representative requested UP to take up the issue with transmission wing for expeditious remedial actions. Up agreed for the same.

NRLDC representative emphasized that A/R (auto re-closer) issue was found in many of these tripping. He sensitized all the utilities to ensure healthiness/in service of A/R in 220 kV and above transmission lines in compliance to CEA Grid Standards. He further informed that most of the tripping are transient in nature but due to non-operation of A/R, it resulted into tripping of the transmission element thus reducing the reliability of the grid. All the utilities shall endeavor to keep auto re-closer in service and healthy condition of 220 kV and above voltage level transmission line. Issue of time syncing of DR/EL at many of the stations was highlighted, constituents were requested to ensure the time syncing of DR/EL. In addition, necessary actions also need to be taken to ensure the Right of Way to minimize the frequent faults in the line. All utilities agreed for the same.

OCC forum reiterated that frequent outages of such elements affect the reliability and security of the grid. Members were requested to look into such frequent outages and share the remedial measures taken/being taken in this respect.

26. Multiple element tripping events in Northern region in the month of October'23:

A total of 15 grid events occurred in the month of Oct'23 of which **09** are of GD-1 category, **05** are of GI-2 Category & **01** is of GI-1 category. The tripping report of all the events have been issued from NRLDC. A list of all these events is attached at **Annexure-B.V** of agenda**.**

Maximum delayed clearance of fault observed was 720msec during event of multiple elements tripping at 400/220kV Akal(RS) on 10th October, 2023 and at 400kV Uri2(NHPC) on 14th October, 2023.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **05** events out of **15** grid events occurred in the month. The major events with delayed clearance of faults are as follows:

i. Multiple elements tripping at 220kV Laltokalan(PS) at 08:37hrs on 07th October, 2023, fault clearance time: 360msec.
Punjab representative informed that detailed report of the tripping is yet to be received from the transmission wing. NRLDC representative requested Punjab to take necessary followup actions to ensure the timely submission of tripping reports as mentioned in IEGC 2023.

ii. Multiple elements tripping at 220kV Nehtaur(UP) at 20:16hrs on 09th October, 2023, fault clearance time: 640msec
UP representative informed that 400/220kV ICT-2 & 3 tripped on differential protection operation. Fire incident also occurred during the same time. ICT-1

was hand tripped for safety precautions. Details of the tripping have also been uploaded on NR Tripping Monitoring System.

iii. Multiple elements tripping at 400/220kV Akal(RS) at 10:21hrs on 10th October, 2023, 2023, fault clearance time: 720msec.
Rajasthan representative informed that fault occurred on 220kV Akal-Bhainsera ckt due to snapping of jumper which later fell on 220kV bus and led to the tripping of other feeders on bus bar protection operation. NRLDC representative raised concern over delayed clearance of fault and non-submission of DR of the tripped elements. Rajasthan representative agreed to further analyse the event and to share the DR.

iv. Multiple elements tripping at 400kV Uri2(NHPC) at 04:23hrs on 14th October, 2023, fault clearance time: 720msec
NHPC representative agreed to share the analysis of the event.

NRLDC representative requested concerned utilities to analyse the tripping incidents at their end and taken necessary actions to avoid the similar events in future. Also share the detailed report of the tripping incidents along with remedial action taken. Utilities agreed for the same.

OCC forum suggested all the NR constituents to update the information on tripping portal developed by NRLDC. All the constituents agreed to take proactive remedial actions in this regard to minimize the tripping.

Members were asked to take expeditious actions to avoid such tripping in future, Moreover, utilities may impress upon all concerned for providing the preliminary report, DR/EL & detailed Report of the events in line with the regulations. Members were further requested to ensure the time syncing of recording devices (DR, EL etc.) with GPS/NAVIK at substation of their respective control area. Members agreed to take action in this regard.

27. Details of tripping of Inter-Regional lines from Northern Region for October' 23:

A total of 04 inter-regional lines tripping occurred in the month of October'23. The list is attached at **Annexure-B.VI** of agenda**.** The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event from SLDCs / ISTS licensees / ISGSs is in violation of regulation 37.2(c) of IEGC and regulation 15(3) of CEA Grid Standards. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than that mandated by CEA (Grid Standard) Regulations.

NRLDC representative requested Rajasthan to analyse and review the tripping of 765kV Phagi-Gwalior ckt-1 on relay mal-operation. Rajasthan agreed for the same.

NRLDC representative requested members to advise the concerned for taking corrective action to avoid such tripping as well as timely submission of the information. Members agreed for the same.

OCC forum emphasized the importance of inter- regional links and requested all the concerned utilities to take necessary corrective to minimise such tripping in future.

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

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

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

NRLDC representative stated that reporting status of POWERGRID, UP, Delhi, HP & Uttarakhand is improved and status is satisfactory, reporting status from Punjab, Haryana, Rajasthan, NHPC & J&K need further improvement.

Punjab representative informed that they are working on setting up the communication system with relays so that protection data would be available remotely and timely submission of the tripping details would be ensured. Tentative timeline for competition of this work is 02 months.

OCC forum emphasized the importance of DR/EL & tripping report data for analysis of the trippings. In addition, these data are also base for the availability verification. Unavailability of these details delays the availability verification process also. Hence, timely submission of DR/EL & tripping report is very much necessary. Members were requested to comply the IEGC 37.2(c) and submit the details in time. Members agreed to take necessary follow-up actions to improve the reporting status

Members may please note and advise the concerned for timely submission of the information. It is requested that DR/EL of all the trippings shall be uploaded on Web Based Tripping Monitoring System "http://103.7.128.184/Account/Login.aspx" within 24 hours of the events as per IEGC clause 37.2.c and clause 15.3 of CEA grid standard. Apart from

prints of DR outputs, the corresponding COMTRADE files may please also be submitted in tripping portal / through email.

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

Since 182nd OCC meeting, 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.VIII** of Agenda**.**

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

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

NRLDC representative informed that all the units who have done Step response test before 2018 were requested to plan the exciter step-response test and submit the tentative schedule of step-response test on the units with NRPC/ NRLDC. Members can share the details via mail.

OCC forum deliberated that members may kindly accord due priority in this regard and update about their future plan for PSS tuning as there is little progress despite including this agenda in every OCC meeting. Members agreed for the same.

30. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 34.3

"*Detailed plans and procedures for restoration after partial/total blackout of each user's/STU/CTU system within a Region, will be*

finalized by the concerned user's/STU/CTU in coordination with the RLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different subsystems shall be carried out by the users/CTU/STU at least once in every year under intimation to the RLDC".

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

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

Hydro Power Stations:

Name of stations	Last conducted exercise date	Remark
Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga	20th Dec 2016	
Dhauliganga	28th Dec 2021	Exercise carried out successfully
Bairasiul	30th Nov 2022	
Sewa-2	29th May 2022	
N. Jhakri and Rampur	09th Dec 2022	
Karcham and Baspa	29th Dec 2021	Exercise was partially successful
Budhil	–	
Parbati-3 and Sainj	22nd Dec 2020	Black start of only Parbati-3 was carried out successfully. Sainj to explore blackstart capability.
Salal	02nd Dec 2018	
Chamera-3	04th Dec 2017	
Kishenganga	-	
Koteshwar	07th Dec 2022	Exercise carried out successfully
Chamera-1 and Chamera-2	02nd Dec 2022	
Malana-2, AD Hydro and Phozal	27th Jan 2023	
Tehri	14th Dec 2022	
Koldam	11th Nov 2022	Conducted successfully

Gas Power Stations:

Name of stations	Last conducted exercise date	Remark

Anta GPS	03rd Mar 2023	(unsuccessful, Anta Unit couldn't able to charge the dead bus)
Auraiya GPS	-	
Dadri GPS	28th Jan 2022 (without load)	Exercise carried out successfully

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

Hydro Power Stations:

Name of stations	**Tentative Date for Mock Black start exercise (proposed by power plants)**
Uri-I, II HEP, Lower Jhelum HEP, Upper Sindh and Kishenganga	
Dhauliganga	
Bairasiul	
Sewa-2	
N. Jhakri and Rampur	
Karcham and Baspa	
Budhil	
Parbati-3 and Sainj	
Salal	
Chamera-3	
Kishenganga	
Koteshwar	
Chamera-1 and Chamera-2	
Malana-2, AD Hydro and Phozal	
Tehri	**Conducted successfully on 07th November 2023**
Koldam	

Gas Power Stations:

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

Anta GPS	
Auraiya GPS	
Dadri GPS	

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

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)
1	J&K	Baglihar	3x150
2		Baglihar stage-2	3x150
3		Lower Jhelum	3x35
4		Upper Sindh	2x11+3x35
5	HP	Larji	3x42
6		Bhabha	3x40
7		Malana -I	2x43
8		Baspa	3x100
9	Punjab	Ranjit Sagar	4x150
11	Rajasthan	Mahi-I&II	2x25+2x45
12		Rana Pratap Sagar	4x43
13		Jawahar Sagar	3x33
14		Gandhi Sagar	5x23
15		Dholpur GPS	3x110
16		Ramgarh GPS	1x35.5+2x37.5+1x110
17	UP	Rihand	6x50
18		Obra	3x33
19		Vishnuprayag	4x100
20		Srinagar (Alaknanda)	4x82.5
21	Uttarakhand	Gamma Infra	2x76+1x73
22		Shravanti	6x75
23		Ramganga	3x66

24		Chibro	4x60
25		Khodri	4x30
26		Chilla	4x36
27		Maneri Bhali-I&II	3x30+4x76
28	Delhi	IP Extn GTs	6x30+3x30
29		Pragati GPS	2x104.6+1x121.2
30		Rithala	3x36
31	Haryana	Faridabad GPS	2x137.75+1x156.07

Central sector Hydro/Gas generating stations were requested to share the tentative schedule for mock black start exercise of units of their respective control area.
SLDCs shall also conduct the mock black start of hydro/gas generating stations in their control area and submit the reports of black start exercise. SLDCs may also identify further generating stations/unit for black start exercise.

Punjab representative informed that they are taking follow-up for conducting mock black start exercise of Ranjit Sagar HEP.

Rajasthan representative informed that procedure of Jawahar Sagar HEP is ready and mock black start exercise of Jawahar Sagar HEP may be conducted during February 2024. NRLDC representative requested Rajasthan to take follow-up with Ramgarh GPS for its black start exercise.

OCC forum requested members to share tentative schedule for mock black start exercise of generating stations of their control area. Also share the report/observation of the mock exercise.

31. Revision of document for Reactive Power Management of Northern Region:

NRLDC has been issuing 'Reactive Power document of Northern Region' on annual basis. Reactive Power Management document for Northern region was last revised on 31st Dec 2022 & updated document link is as below:

https://nrldc.in/download/nr-reactive-power-management-2023/?wpdmdl=11903

Document is password protected and password was already informed to all the NR constituents through letter dated 30th Dec 2022.

In view of new addition/modification of transmission & generation element in NR grid since Dec'22, the document is being review for update.

Constituents were requested to provide the feedback, suggestion and updated information by 10th Dec 2023.

Follow up issues from previous OCC meetings

Annexure-A.I

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

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Status of FGD installation vis-à-vis installation plan at identified TPS</td><td>List of FGDs to be installed in NR was finalized in the 36th TCC (special) meeting dt. 14.09.2017. All SLDCs were regularly requested since 144th OCC meeting to take up with the concerned generators where FGD was required to be installed.
Further, progress of FGD installation work on monthly
basis is monitored in OCC
meetings.</td><td>Status of the information submission (month) from states / utilities is as under:
<table><tr><td>◎</td><td>HARYANA</td><td>Sep-2023</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Oct-2023</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Jul-2023</td></tr><tr><td>◎</td><td>UP</td><td>Oct-2023</td></tr><tr><td>◎</td><td>NTPC</td><td>Feb-2023</td></tr></table>FGD status details are enclosed as Annexure-A.I.II.
All States/utilities are requested to update status of FGD installation progress on monthly basis.</td></tr>
<tr><td>5</td><td>Submission of breakup of Energy Consumption by the states</td><td>All states/UTs are requested to submit the requisite data as per the billed data information in the format given as under:
<table><tr><td>Category→</td><td>Consumption by Domestic Loads</td><td>Consumption by Commercial Loads</td><td>Consumption by Agricultural Loads</td><td>Consumption by Industrial Loads</td><td>Traction supply load</td><td>Miscellaneous / Others</td></tr><tr><td><Month></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>Status of the information submission (month) from states / utilities is as under:
<table><tr><td></td><td>State / UT</td><td>Upto</td></tr><tr><td>◎</td><td>CHANDIGARH</td><td>Not Submitted</td></tr><tr><td>◎</td><td>DELHI</td><td>Sep-23</td></tr><tr><td>◎</td><td>HARYANA</td><td>Sep-23</td></tr><tr><td>◎</td><td>HP</td><td>Sep-23</td></tr><tr><td>◎</td><td>J&K and LADAKH</td><td>Not Submitted</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Sep-23</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Oct-23</td></tr><tr><td>◎</td><td>UP</td><td>Jul-23</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Jul-23</td></tr></table>J&K and Ladakh and Chandigarh are requested to submit the requisite data w.e.f. April 2018 as per the billed data information in the given format</td></tr>
<tr><td>6</td><td>Information about variable charges of all generating units in the Region</td><td>The variable charges detail for different generating units are available on the MERIT Order Portal.</td><td>All states/UTs are requested to submit daily data on MERIT Order Portal timely.</td></tr>
<tr><td>7</td><td>Status of Automatic Demand Management Sysytem in NR states/UT's</td><td>The status of ADMS implementation in NR, which is mandated in clause 5.4.2 (d) of IEGC by SLDC/SEB/DISCOMs is presented in the following table:</td><td>Status:
<table><tr><td>◎</td><td>DELHI</td><td>Scheme Implemented but operated in manual mode.</td></tr><tr><td>◎</td><td>HARYANA</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>HP</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>PUNJAB</td><td>Scheme not implemented</td></tr><tr><td>◎</td><td>RAJASTHAN</td><td>Under implementation. Likely completion schedule is 31.12.2023.</td></tr><tr><td>◎</td><td>UP</td><td>Scheme implemented by NPCIL only</td></tr><tr><td>◎</td><td>UTTARAKHAND</td><td>Scheme not implemented</td></tr></table></td></tr>
</table>

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

xii	RAJASTHAN	Bikaner	1x25 MVAr	1x25 MVAR Reactor at Bikaner has been commissioned on dated 24th June 2023.
xiii	RAJASTHAN	Suratgarh	1x25 MVAr	1x25 MVAR Reactor at Suratgarh has been commissioned on dated 25th November 2022.
xiv	RAJASTHAN	Barmer & others	13x25 MVAr	Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 & work order placed on dt. 7.04.2022 to M/s Kanohar Electricals Ltd. Schedule time is 18 months. Likely to be commissioned by 31.01.2024.
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. Likely to be commissioned by 31.01.2024.

Annexure-A-I.I

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

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
1	400/220kV, 3x315 MVA Samba	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays.	-	02 No. of bays shall be utilized for LILO-II of 220kV Jatwal-Bishnah Transmission Line, the work of which is delayed due to severe ROW problem at Location No. 1 near Grid Substation Jatwal where the Land owner is not allowing erection of Tower. The Deputy Commissioner Samba has been approached for intervention and facilitating the erection of Tower. He is persuading the Land owner to get the work completed. Updated in 210th OCC by JKPTCL.
2	400/220kV, 2x315 MVA New Wanpoh	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV New Wanpoh - Alusteng D/c Line	End of 2023	02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Alusteng D/c Line. The work is in progress and expected to be commission by the end of 2023. Updated in 204th OCC by JKPTCL.
				• 220 kV New Wanpoh - Mattan D/c Line	End of 2024	02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Mattan D/c Line. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL.
3	400/220kV, 2x315 MVA Amargarh	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• 220kV D/C line from 400/220kV Kunzar - 220/33kV Sheeri	End of 2024	02 No. of bays are proposed to be utilized for connecting 220/132 kV GSS Loolipora. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL.
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• 220kV Bhadson (Kurukshetra) – Ramana Ramani D/c line	Jul'24	Updated in 205th OCC by HVPNL
5	400/220 kV, 2x315 MVA Dehradun	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• Network to be planned for 4 bays	-	PTCUL to update the status.
6	Shahjahanpur, 2x315 MVA 400/220 kV	Commissioned: 6 Approved/Under Implementation:1 Total: 7	Utilized: 5 Unutilized: 1 (1 bays to be utilized shortly) Approved/Under Implementation:1	• 220 kV D/C Shahajahanpur (PG) - Gola line	31.10.2023	Updated in 212th OCC by UPPTCL. Work completed but pending for first time charging to be expected in the month October.
				• LILO of Sitapur – Shahjahanpur 220 kV SC line at Shahjahanpur (PG)	Commissioned	Energization date: 25.02.2022 updated by UPPTCL in 196th OCC
7	Hamirpur 400/220 kV Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4 (2 bays to be utilized shortly)	• 220 kV Hamirpur-Dehan D/c line	Commissioned	Commisioned date: 09.06.2022. Updated in 198th OCC by HPPTCL
				• Network to be planned for 4 bays	-	HPPTCL to update the status.
8	Sikar 400/220kV, 1x 315 MVA S/s	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• LILO of 220 kV Sikar (220 kV GSS)-Dhod S/c line at Sikar (PG)	Commissioned	LILO of 220 kV S/C Sikar-Dhod line at 400 kV GSS PGCIL, Sikar has been charged on dt. 31.03.2022
				• Network to be planned for 2 bays.	-	Against the 3rd ICT at 400 kV GSS Sikar, only 2 bays were constructed and same has been utilized by RVPN by constructing LILO of 220 kV S/C Sikar – Dhod line as updated by RVPNL in 195th OCC
9	Bhiwani 400/220kV S/s	Commissioned: 6 Total: 6	Utilized: 2 Unutilized: 4	• 220 kV D/C line Bhiwani (PG) – Bhiwani (HVPNL) line	Commissioned	Updated in 202nd OCC by HVPNL
				• 220 kV Bhiwani (PG) - Isherwal (HVPNL) D/c line.	Dec'23	Issue related to ROW as intimated in 208th OCC by HVPNL.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
				• 220 kV Bhiwani (PG) - Dadhibana (HVPNL) D/c line.	Apr'24	Issue related to ROW as intimated in 192nd OCC by HVPNL.
10	Jind 400/220kV S/s	Commissioned: 4 Approved:4 Total: 8	Utilized: 4 Unutilized: 0	• LILO of both circuits of 220 kV Jind HVPNL to PTPS D/C line at 400 kV substation PGCIL Khatkar (Jind) with 0.5 sq inch ACSR conductor	May'24	Tender is under process Updated in 205th OCC by HVPNL.
11	400/220kV Tughlakabad GIS	Commissioned: 6 Under Implementation: 4 Total: 10	Utilized: 6 Unutilized: 0 Under Implementation:4	• RK Puram – Tughlakabad (UG Cable) 220kV D/c line – March 2023.	-	DTL to update the status.
				• Masjid Mor – Tughlakabad 220kV D/c line.	-	DTL to update the status.
12	400/220kV Kala Amb GIS (TBCB)	Commissioned: 6 Total: 6	Utilized: 0 Unutilized: 6	• HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s	Dec'23	Updated in 211th OCC by HPPTCL
				• HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Giri S/s	-	HPPTCL to update the status.
				• Network to be planned for 2 bays	-	HPPTCL to update the status.
13	400/220kV Kadarpur Sub-station	Commissioned: 8 Total: 8	Utilized: 0 Unutilized: 8	• LILO of both circuits of 220 KV Pali - Sector 56 D/C line at Kadarpur along with augmentation of existing conductor from 220 KV Sector-56 to LILO point with 0.4 sq inch AL-59 conductor.	Dec'23	Forest approval is pending for 220 KV Pali - Sector 56 D/C line. Updated in 205th OCC by HVPNL
				• LILO of both circuits of 220KV Sector 65 - Pali D/C line at Kadarpur along with augmentation of balance 0.4 sq. inch ACSR conductor of 220 kV Kadarpur - Sector 65 D/C line with 0.4sq inch AL-59 conductor	Dec'23	Updated in 205th OCC by HVPNL
14	400/220kV Sohna Road Sub-station	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• LILO of both circuits of 220kV D/c Sohna-Rangla Rajpur at Roj Ka Meo line at 400kV Sohna Road	Jan'24	Updated in 208th OCC by HVPNL
				• LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road	-	The matter is subjudice in Hon'ble Punjab & Haryana High court, Chandigarh Updated in 205th OCC by HVPNL. **Status:-** Earlier 02 nos 220 kV line bays were to be utilized for the 220 kV GIS S/Stn. Sec-77, Gurugram but due to denotification of land of the 220 kV GIS S/Stn. Sec-77 the said substation is now going to be dismantled and a new substation is proposed at Sec-75A, Gurugram. Now, these 02 no. 220 kV line bays may be utilized at 220 kV GIS S/Stn Sec-75A, Gurugram.
15	400/220kV Prithla Sub-station	Commissioned: 8 Aprroved: 2 Total: 10	Utilized: 4 Unutilized: 4 Under Implementation:2	• 220kV D/C line from Prithla to Harfali with LILO of one circuit at 220kV Meerpur Kurali	31.03.2024	Updated in 205th OCC by HVPNL
				• LILO of both ckt of 220kV D/c Ranga Rajpur – Palwal line	Commissioned	Commisioned date: 31.12.2021. Updated in 198th OCC by HVPNL
				• 220kV D/C for Sector78, Faridabad	31.03.2024	Issue related to ROW and Pending crossing approval from Northern Railways and DFCCIL. as intimated in 205th OCC by HVPNL.
				• Prithla - Sector 89 Faridabad 220kV D/c line	31.03.2024	Updated in 205th OCC by HVPNL

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
16	400/220kV Sonepat Sub-station	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 2 Unutilized: 4 Under Implementation:2	• LILO of both circuits of 220kV Samalkha - Mohana line at Sonepat	31.12.2023	Updated in 205th OCC by HVPNL. **Status:** Work was held up due to ROW at T.L. No. 7,8,11,12 & 13 by the farmers of Jajji villagers during July'23 and now the matter has been resolve and work under progress from 01.08.2023. The erection work of T.no. 1 is pending due to non availability of shut down at 220KV Mohana-Smk line and 220KV Jajji-Mohana line. • PLCC protection coupler and Forest approval is also pending.
				• Sonepat - HSIISC Rai 220kV D/c line	Mar'24	Updated in 212th OCC by HVPNL. **Status:** Due to non-performance of work of 220KV GIS Rai S/Stn, the Contract has been terminated & blacklisted by O/o XEN/WB O/o CE/PD&C, HVPNL, Panchkula vide Ch-100/HDP-2418/REC-254/Xen(WB) Dated 24.02.2023. Now pending work will be caried out by HVPNL/ Departmentely. Now, the matter is under approval from competent authority of Nigam.,
				• Sonepat - Kharkhoda Pocket A 220kV D/c line	31.07.2024	Updated in 212th OCC by HVPNL. **Status:** Work order has been issued to M/s R.S Infra on dated 09.08.2023 by O/o CE/PD&C, Panchkula for construction of line. The Survey work has been completed.
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 commissioned 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	Commissioned	• Lucknow -Kanduni, 220 kV D/C line work energized on 05.10.2023. Updated in 212th OCC by UPPTCL. _____ • 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	Commissioned	• Gorakhpur(PG)- Maharajganj, 220 kV D/C line energized on 27.09.2023 updated by UPPTCL in 212th 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.

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
24	400/220kV Abdullapur Sub-station	Commissioned: 10 Under Implementation:2 Total: 12	Utilized: 10 Unutilized: 0 Under Implementation:2	• Abdullapur – Rajokheri 220kV D/c line	Dec'23	SCDA System & PLCC work pending at 220 KV S/stn. Rajokheri Updated in 209th OCC by HVPNL
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	Dec'23	Updated in 211th OCC by HVPNL
				• Panchkula – Sector-32 220kV D/c line	Feb'24	Updated in 211th OCC by HVPNL
				• Panchkula – Raiwali 220kV D/c line	Commissioned	Updated in 194th OCC by HVPNL
				• Panchkula – Sadhaura 220kV D/c line: Sep'23	Jul'24	Updated in 205th OCC by HVPNL
26	400/220kV Amritsar S/s	Commissioned:7 Approved in 50th NRPC- 1 no. Total: 8	Utilized: 6 Unutilized: 1 Approved in 50th NRPC- 1 no.	• Amritsar – Patti 220kV S/c line	Nov'23	Route survey/tender under process. Updated in 211th OCC by PSTCL.
				• Amritsar – Rashiana 220kV S/c line (2 bays shall be required for above lines. However, 1 unutilized bay shall be used for Patti and requirement of one additional bay approved for Rashiana by NRPC)	Nov'23	Route survey/tender under process.. Updated in 211th OCC by PSTCL.
27	400/220kV Bagpat S/s	Commissioned: 8 Total: 8	Utilized:6 Unutilized: 2	• Bagpat - Modipuram 220kV D/c line	Commissioned	Updated in 201st OCC by UPPTCL
28	400/220kV Bahardurgarh S/s	Commissioned: 4 Approved: 4 Total: 8	Utilized:2 Unutilized: 2	• LILO of 220 kV Nunamajra-Daultabad S/c line at 400 kV Bahadurgarh PGCIL	31.03.2024	Updated in 205th OCC by HVPNL. **Status:** Tentative route stands submitted by TS wing and accordingly BOQ has been submitted by design wing to contracts wing for award of work.
				• Bahadurgarh - METL 220kV D/c line (Deposit work of M/s METL)	31.03.2024	Updated in 205th OCC by HVPNL. **Status:** Tentative route stands submitted by TS wing and accordingly BOQ has been submitted by design wing to contracts wing for award of work.
				• Bahadurgarh - Kharkhoda Pocket B 220kV D/c line	31.07.2024	Updated in 212th OCC by HVPNL. **Status:** Work order has been issued to M/s R.S Infra on dated 09.08.2023 by O/o CE/PD&C, Panchkula for construction of line. The Survey work has been completed.
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

Sl. No.	Substation	Downstream network bays	Status of bays	Planned 220 kV system and Implementation status	Revised Target	Remarks
31	400/220kV, Kankroli	Commissioned: 6 Total: 6	Utilized: 4 Unutilized: 2	• Network to be planned for 2 bays	-	RVPNL to update the status
32	400/220kV, Manesar	Commissioned: 8 Total: 8	Utilized: 4 Unutilized: 4	• Network to be planned for 2 bays	-	Status:- 2nos bays are being utilised for 220 kV D/C Panchgaon (PGCIL)-Panchgaon Ckt-I & 220 kV D/C Panchagon (PGCIL)-Panchgaon Ckt-II, charged on dated 05.09.2022 & 20.10.2022 respectively. The 2nos bays may be utilised by HVPNL in future.
33	400/220kV, Saharanpur	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	Commissioned	Saharanpur(PG)-Devband D/c line (Energization date: 20.04.2023) updated by UPPTCL in 207th OCC
34	400/220kV, Wagoora	Commissioned: 10 Total: 10	Utilized: 6 Unutilized: 4	• Network to be planned for 4 bays	-	PDD, J&K to update the status.
35	400/220kV, Ludhiana	Commissioned: 9 Total: 9	Utilized: 8 Unutilized: 1	• Network to be planned for 1 bay	Oct'23	Direct circuit from 220 kV Lalton Kalan to Dhandari Kalan to be diverted to 400 kV PGCIL Ludhiana. Work completed but DR/EL not submitted by PSTCL.Updated in 212th OCC by PSTCL.
36	400/220kV, Chamba (Chamera Pool)	Commissioned: 3 Under tender:1 Total: 4	Utilized:3 Unutilized: 0 Under tender:1	• Stringing of 2nd ckt of Chamera Pool – Karian 220kV D/c line	-	Stringing of 2nd Circuit of Chamera Pool-Karian Tansmission line has been completed & terminal bay at 400/220 kV chamera pooling substation (PGCIL) is not ready.Updated in 198th OCC by HPPTCL
37	400/220kV, Mainpuri	Commissioned: 6 Under Implementation:2 Total: 8	Utilized: 6 Unutilized: 0 Under Implementation:2	• Network to be planned for 2 bays	-	• 02 no. of bays under finalization stage updated by UPPTCL in 196th OCC. Mainpuri S/s planned. Land is not finalized, therefore timeline not available as intimated by UPPTCL in 201st OCC.
38	400/220kV, Patiala	Commissioned: 8 Total: 8	Utilized: 6 Unutilized: 2	• Network to be planned for 2 bays	May'24	2 Nos. bays for 400 kV PGCIL Patiala - 220 kV Bhadson (D/C) line being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL.

FGD Status

Updated status of FGD related data submission

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

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

Updated status of FGD related data submission

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

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

Adani Power Ltd. (18.02.2022)
KAWAI TPS

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

Pending submissions

GVK Power Ltd.
GOINDWAL SAHIB

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

Target Dates for FGD Commissioning (Utility-wise)

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

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

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

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

Status of availability of ERS towers in NR

Sl. No.	Transmission Utility	Voltage Level (220kV/400kV/765kV/ 500 kV HVDC etc.)	Length of the transmission lines owned by the Utility (Ckt. Kms.)	Number of ERS Sets (towers) available (Nos.)	ERS Set (towers) required as per the Govt. norms.	Location	Remarks
1	PTCUL	400kV	418.394	NIL	1		
		220kV	1045.135	NIL	1		
2	Powergrid NR-1	220 KV	1842.88	NIL	1		
		400 KV	11074.26	12 Towers	3	All 400kV ERS at Ballabhgarh	make-Lindsey
		765 KV	4721.85	15 Towers	1	All 765kV ERS at Meerut	Make-SBB
		500 KV HVDC	653.88	NIL	1		
		800 KV HVDC	416.58	NIL	1		
3	Powergrid NR-2	66 KV	37.56	Nil	1		ERS tower available for 400KV rating can be used in place of lower as well as higher voltage Towers. In case used for 765KV Line, No of towers can be erected will reduce due to increase in Tower Hight.
		132 KV	262.7	Nil	1		
		220 KV	2152	Nil	1		
		400 KV	8097.3	02 Set (32 Towers)	2	Kishenpur & Jalandhar	
		765 KV	337.5	Nil	1		
4	Powergrid NR-3	800KV HVDC	2205	NIL	1		400KV ERS will be also be used in other voltage level lines
		500KV HVDC	2566	NIL	1		
		765KV	4396	NIL	1		
		400KV	12254	26 Towers	3	Kanpur	
		220KV	1541	NIL	1		
		132KV	207	NIL	1		
5	PARBATI KOLDAM TRANSMISSION COMPANY LIMITED	400kV	457	NIL	1		Procurement under process.
6	PATRAN TRANSMISSION COMPANY LTD	400kV	0.4	NIL	1	It is kept in Bhopal and on need basis is moved across region	Not available, will tie up based on the requirements in future. However the parent company IndiGrid owns one set of ERS for all five regions.
7	NRSS-XXIX TRANSMISSION LTD	400kV	853	NIL	1		
8	GURGAON PALWAL TRANSMISSION LTD	400kV	272	NIL	1		
9	RAPP Transmission Company Limited.	400kV	402	NIL	1		
10	NRSS XXXVI Transmission Limited	400kV	301.924	NIL	1		Element I - Operational comprising of 3 kms. Element II - Work Under Progress comprising of 221.924 kms. Element III - Work Under Progress comprising of 77 kms.
11	HPPTCL	220 kV	659	NIL	1		
		400 kV	75.7	NIL	1		
12	RVPN	132 kV	18969.958	1 Set	4	01 No. ERS available at 220 kV GSS Heerapura, Jaipur	ERS proposed : 01 Set at 400 kV GSS, Jodhpur. 01 set at 400 kV GSS Bikaner
		220 kV	16227.979		3		
		400 kV	6899.386		2		
		765 kV	425.498		1		
13	DTL						
14	JKPTCL						

Status of availability of ERS towers in NR

Sl. No.	Transmission Utility	Voltage Level (220kV/400kV/765kV/ 500 kV HVDC etc.)	Length of the transmission lines owned by the Utility (Ckt. Kms.)	Number of ERS Sets (towers) available (Nos.)	ERS Set (towers) required as per the Govt. norms.	Location	Remarks
15	HVPN						HVPN does not have ERS Set. Technical Specifications are being finalized
16	PSTCL						
17	UPPTPCL						
18	POWERLINK						
19	POWERGRID HIMACHAL TRANSMISSION LTD						
20	Powergrid Ajmer Phagi Transmission Limited						
21	Powergrid Fatehgarh Transmission Limited						
22	POWERGRID KALA AMB TRANSMISSION LTD						
23	Powergrid Unchahar Transmission Ltd						
24	Powergrid Khetri Transmission Limited						
25	POWERGRID VARANASI TRANSMISSION SYSTEM LTD						
26	ADANI TRANSMISSION INDIA LIMITED						
27	BIKANER KHETRI TRANSMISSION LIMITED						
28	FATEHGARH BHADLA TRANSMISSION LIMITED						
29	NRSS-XXXI(B) TRANSMISSION LTD						
30	ARAVALI POWER COMPANY PVT LTD						

*The transmission Utility with line length less than 500 ckt kms (of 400 KV lines) may be given option either to procure ERS or have agreement with other transmission utilities for providing ERS on mutually agreed terms, when need arises. (As per MoP directions)

Planned Annual Maintenance Programme of Tramsmission Elements for the year 2024-25

Annexure-A.III

Note: Category A: AC Transmission elements at 400 kV & above and HVDC elements (excluding lines emanating ISGS)
Category B: Transmission elements at 132 kV & above and below 400kV level emanating from ISGS
Category C: Transmission elements at 132 kV & above and below 400kV which are inter-regional in nature
Category D: Transmission elements at 220 kV level with one end in a state while other end is in another state

Sl. No.	Name of Element (line/ Transformer/ Reactor/ Bay/ Bus)	Type of Element (line/ Transformer/ Reactor/ Bay/ Bus)	Owner (RVPN/ Adani/ PGCIL)	Category (A/ B/ C/D) as mentioned below	Daily / Continuous basis	Corridor (Inter/Intra)	Outage From (mm/dd/yy)	Outage To (mm/dd/yy)	Reason	Remarks, if any
1										
2										
3										
4										
5										
6										
7										
8										

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

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

Annexure-A.IV

No 3823 SE(R&A) /EE-II /Varanasi islanding Date: - 30.10. 2023

Member Secretary, NRPC,
18 – A, SJSS Marg, Katwaria Sarai,
New Delhi, 110016.
(ms-nrpc@nic.in)

Subject: Regarding agenda on the feasibility of Varanasi Islanding Scheme in the 213th OCC meeting of NRPC.

As per the decision taken at higher management level, UPSLDC has prepared a tentative Varanasi Islanding Scheme using generation of Anpara BTPS. To discuss it further UPSLDC proposes to put up Varanasi Islanding Scheme (VIS) at OCC forum.

It is therefore, requested to include subject issue as an agenda point in 213th OCC meeting of NRPC for further discussion on proposed Islanding Scheme.

Encl: Map of Varanasi Islanding Scheme
Load details of Varanasi Region
Generation pattern of Anpara 'B'TPS

Amit Narain

(Amit Narain)
Superintending Engineer (R&A)

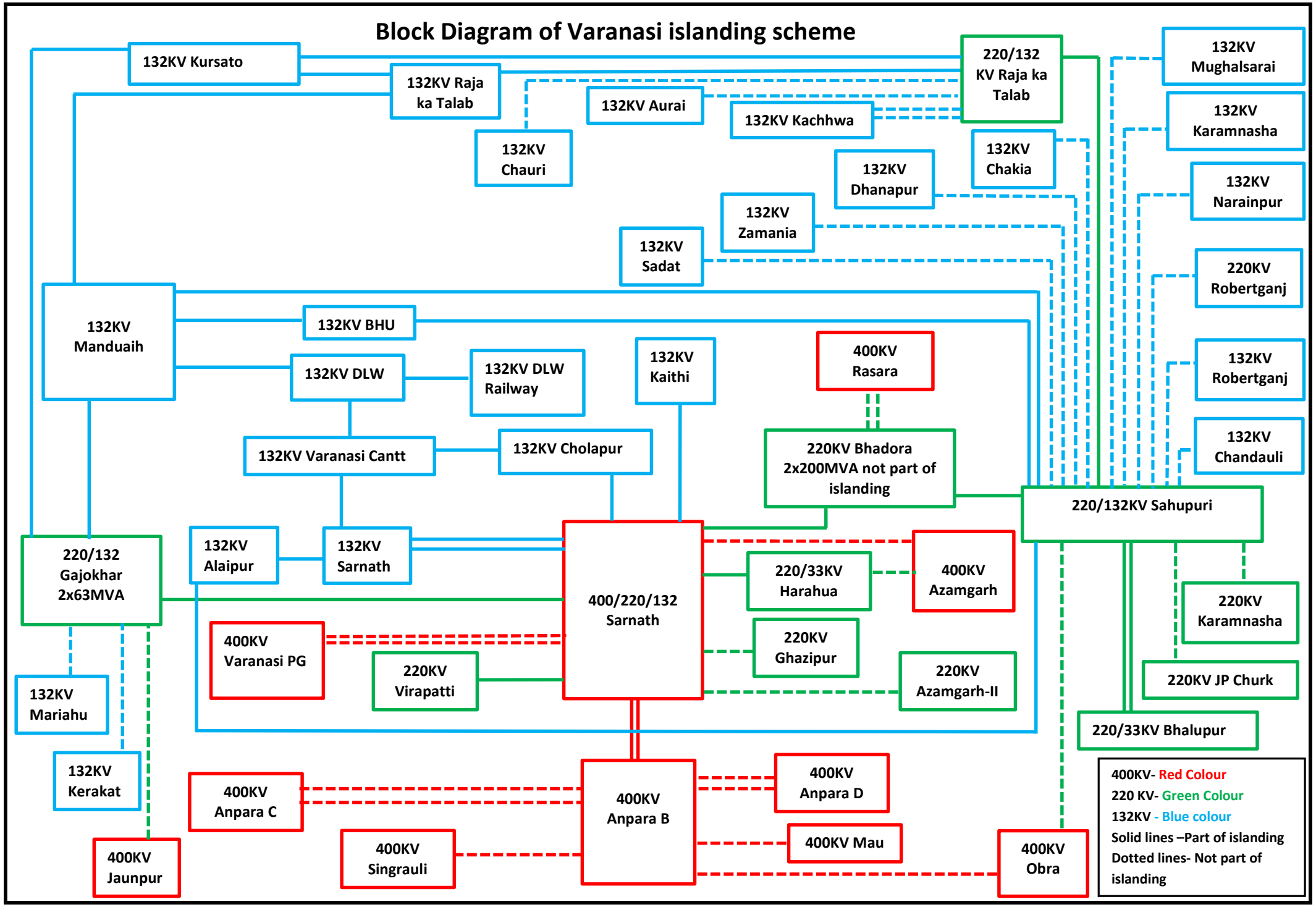
No SE(R&A) /EE-II /Varanasi islanding Date: - 2023

Copy forwarded to following for information and necessary action:-

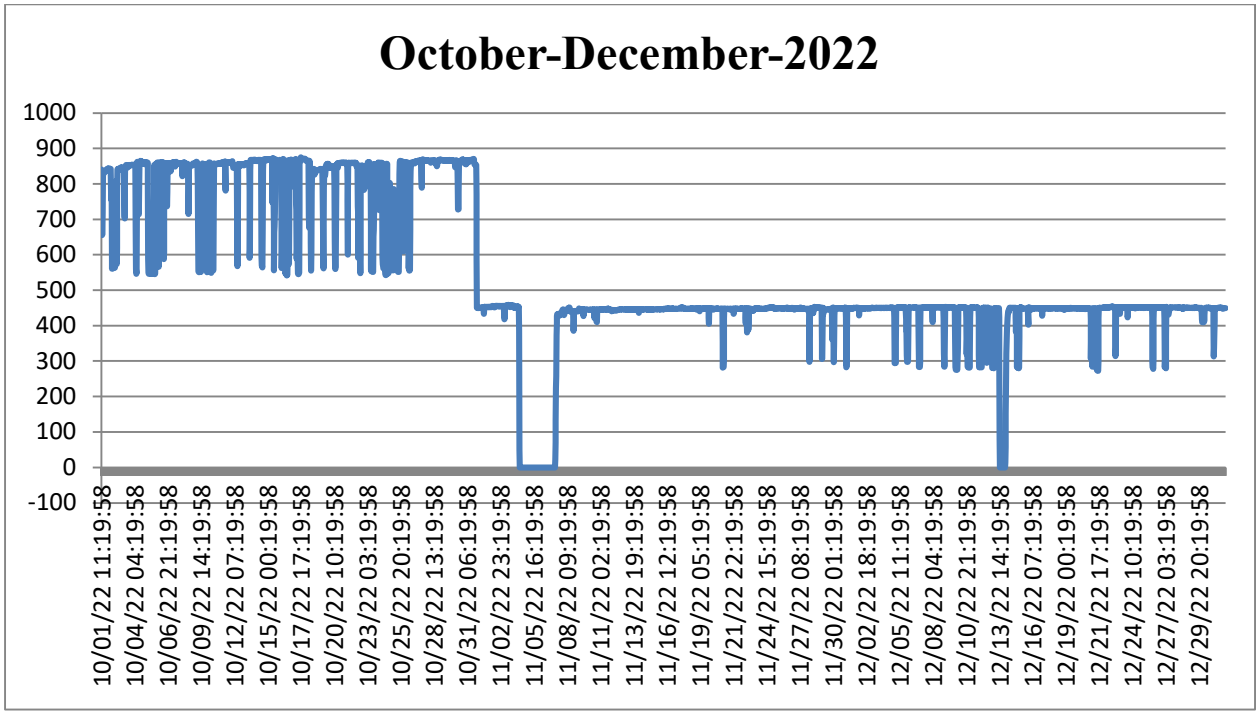
1. Director, UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.
2. Director (Operation), UPPTCL, 11th Floor, Shakti Bhawan Extn., Lucknow.
3. Director (Technical), UPRVUNL, 8th Floor, Shakti Bhawan Extension, Lucknow.
4. Chief Engineer (PSO), UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.
5. General Manager, NRLDC 18-A, SJSS Marg, Katwaria Sarai, New Delhi–110016.
6. Superintending Engineer (System Control), UPSLDC, Vibhuti Khand – II, Gomti Nagar, Lucknow.
7. SE (Operations), NRPC, 18 – A SJSS Marg, Katwaria Sarai, New Delhi, 110016. (seo-nrpc@nic.in).

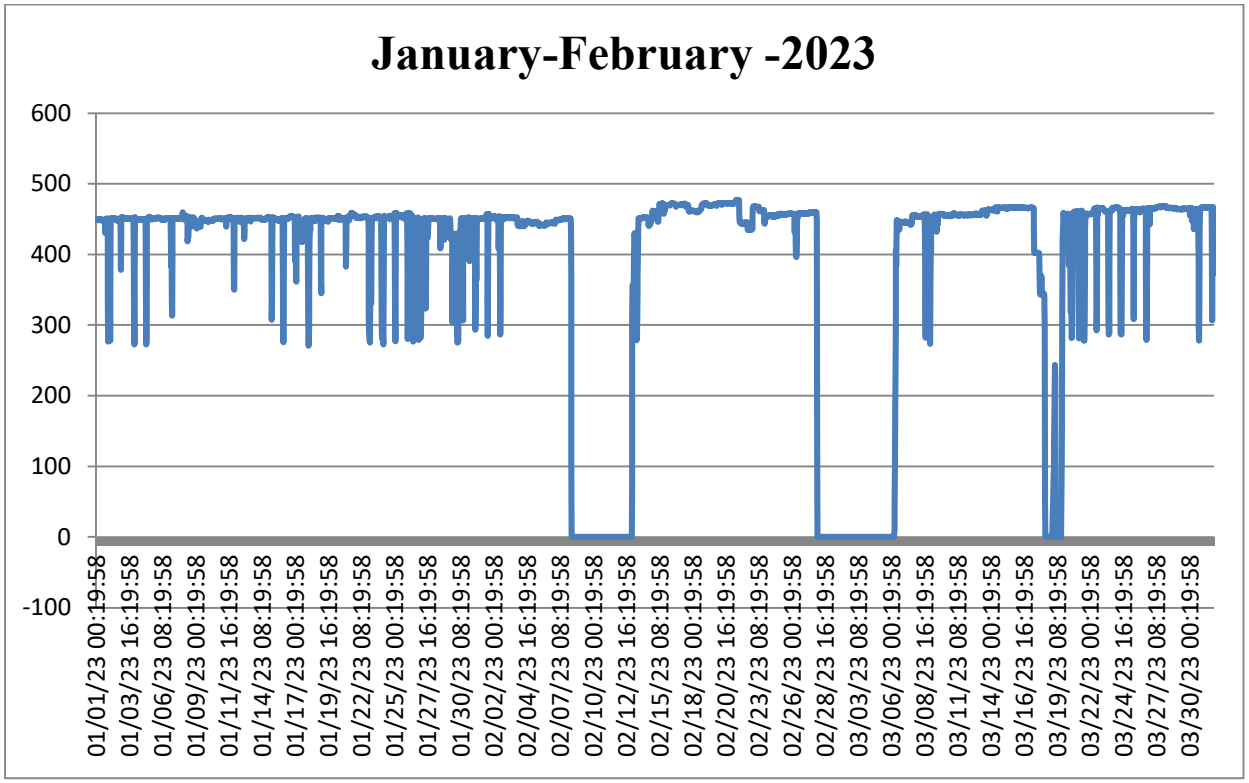
(Amit Narain)
Superintending Engineer (R&A)

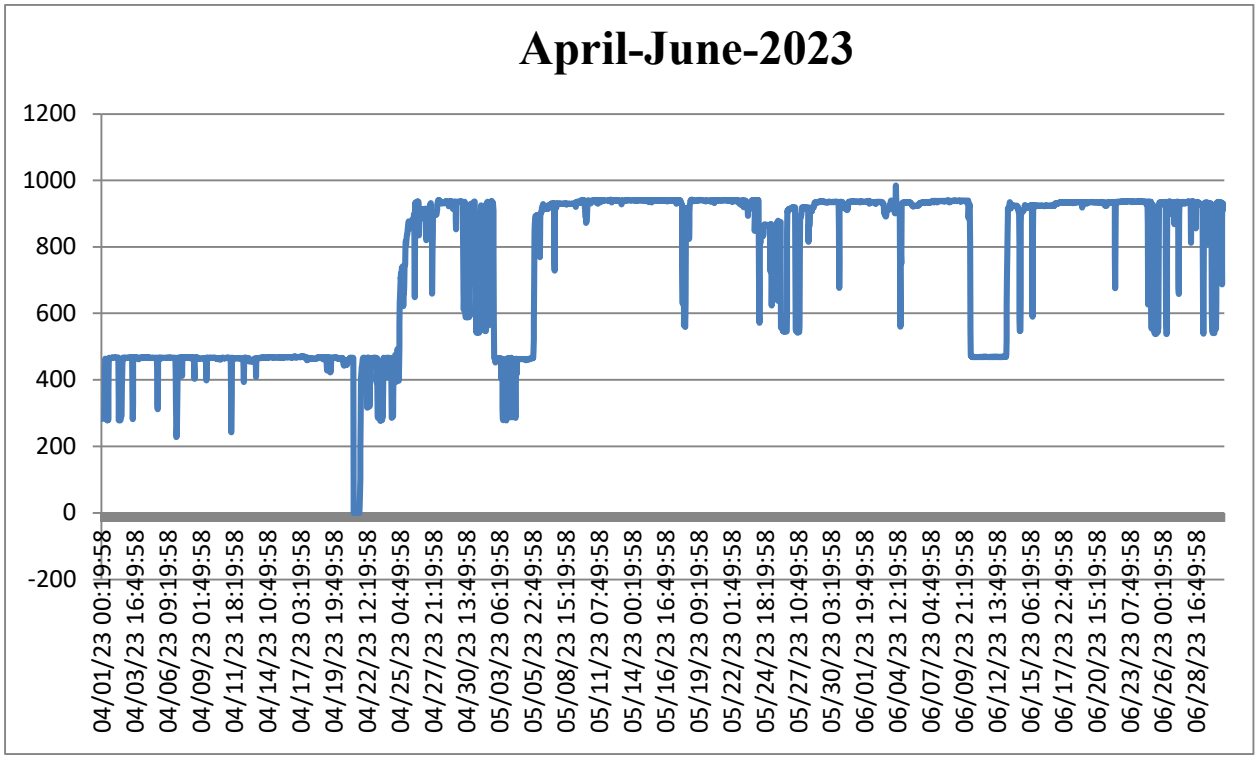
Block Diagram of Varanasi islanding scheme



Generation Pattern of Anpara BTPS (2x500MW)



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400
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-200
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04/03/23 16:49:58
04/06/23 09:19:58
04/09/23 01:49:58
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04/14/23 10:49:58
04/17/23 03:19:58
04/19/23 19:49:58
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05/22/23 01:49:58
05/24/23 18:19:58
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05/30/23 03:19:58
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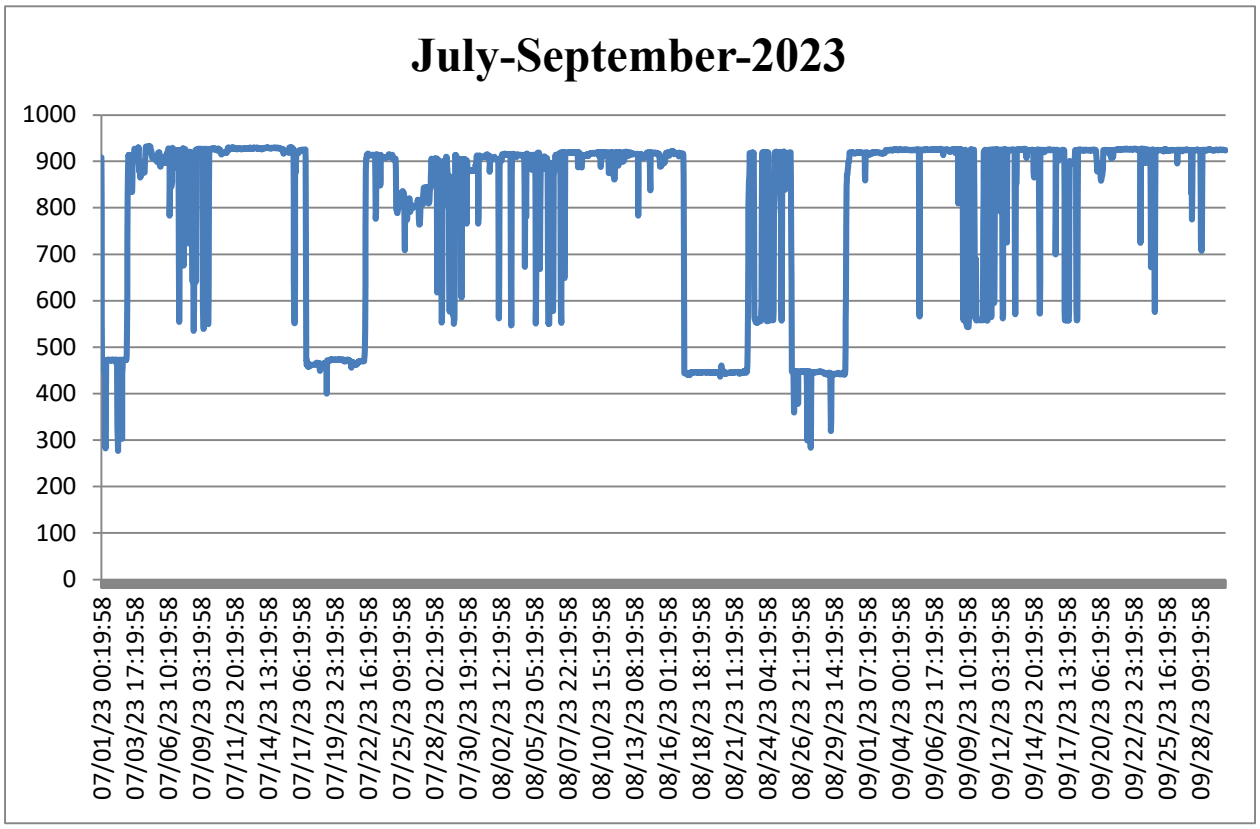
06/26/23 00:19:58
06/28/23 16:49:58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1000
900
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500
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100
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07/03/23 17:19:58
07/06/23 10:19:58
07/09/23 03:19:58
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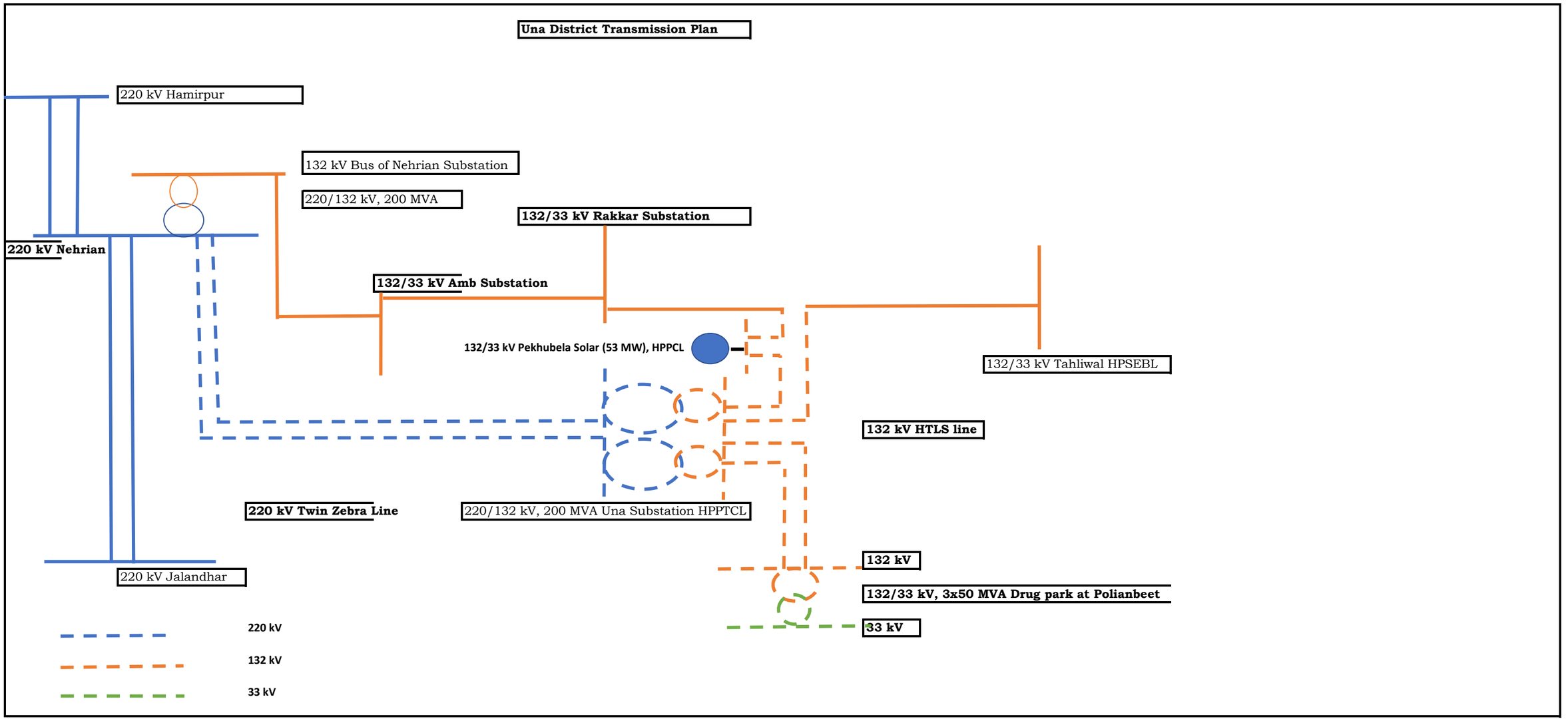
09/17/23 13:19:58
09/20/23 06:19:58
09/22/23 23:19:58
09/25/23 16:19:58
09/28/23 09:19:58

Load for Varanasi Region

S.No.	Name of substation	Name of the ICT/ Feeder	Rating of ICT		Summer Peak (2022-23) MW	date and time	Summer Off Peak (2022-23) MW	date and time	Summer Average (2022-23)	Winter Peak (2022-23) MW	date and time	Winter Off Peak (2022-23)MW	date and time	Winter Average (2022-23)	Details of Essential load If any
			Installed Capacity (MVA)	Installed Capacity (MW)											
1	220kV Substation Gajokhar under ETD-I Varanasi	132kV/33kV Transformer	63 MVA T/F-I		32	01.08.23/06:00	11.5	27.04.23/10:00	21.75	23.5	01.10.23/07:00	8.5	17.12.22/02:00	16	Feeding Airport supply 1.5 MW on 33 KV Voltage level
		132kV/33kV Transformer	63 MVA T/F-II		30	01.08.23/06:00	11.5	27.04.23/10:00	20.75	23.5	01.10.23/07:00	8.5	17.12.22/02:00	16	
2	220/33kV Substation Harahua	220kV/33kV Xmer at 220kV Substation Harahua	60 MVA T/F I		41.1	19.07.2022/21:00	29.15	06.04.2022/22:00	35	33.4	13.01.2023/08:00	15	26.12.2022/02:00	25	Standby supply for Goithahan S.T.P
			60 MVA T/F II		22.16	19.07.2022/21:00	10.85	06.04.2022/22:00	17	21.71	13.01.2023/08:00	13	26.12.2022/02:00	17	
3	132kV Substation Cholapur	132kV/33kV Xmer at 132kV Substation Cholapur	40 MVA T/F-I		13.67	03.09.2023/09:00	8.36	18.04.2023/19:00	12.04	10.81	08.01.2023/10:00	6.93	18.12.2022/11:00	7.75	
			40 MVA T/F-II		13.87	03.09.2023/09:00	8.57	18.04.2023/19:00	12.24	11.02	08.01.2023/10:00	7.12	18.12.2022/11:00	7.8	
4	132kV Substation Sarnath	132kV/33kV Xmer at 132kV Substation Sarnath	100 MVA T/F		61.5	15.06.2022/20:00	53.8	30.07.2022/20:00	55.8	32	08.01.2023/10:00	32.6	08.11.2022/19:00	26.4	Sarnath W.T.P, Tibbatian institute, Kashi Vishwanath temple
			63 MVA T/F(40 MVA since 03.03.2023)		40.5	15.06.2022/20:00	31.4	30.07.2022/22:00	36	15	08.01.2023/10:00	23.6	08.11.2022/19:00	13.8	Deendyal Upadhya(DDU) Hospital
			40 MVA T/F(100 MVA T/F II since 20.12.2022)		21.5	15.06.2022/20:00	18.8	03.05.2021/20:00	19.6	49	08.01.2023/10:00	11.4	08.11.2022/19:00	36	Kaal bhairav temple, Kabir chura hospital, Maridian hospital, Konia S.T.P, Urban area of Varanasi city
5	132 KV Substation Kaithi	132kV/33kV Xmer at 132kV Substation Kaithi	40 MVA T/F-I		7.7	15.07.2022/20:00	6.4	25.04.2022/20:00	7	6.2	08.01.2023/10:00	4.8	20.11.2022/08:00	5.6	Markandey Mahadev temple
			40 MVA T/F-II		7.7	15.07.2022/20:00	6.4	25.04.2022/20:00	7	6.2	08.01.2023/10:00	4.8	20.11.2022/08:00	5.6	Goithahan & Deenapur S.T.P
6	220/33kV Substation Bhelupur under ETD-I Varanasi	220kV/33kV Transformer	60 MVA T/F-I		43.32	25.08.2022/13:00	16.24	30.06.2022/06:00	29.78	33.57	16.01.2023/15:00	16.19	25.10.2022/11:00	24.88	Feeding Baba Viswanath Temple,Dasaswamedh Ghat,Mayre-Mr.Ashok Tiwari,Minister-Dayashankar Mishra(33 KV Godauliya),Rudraksh Convention Center(33 KV Nagar Nigam),Durga Temple(33 KV Kbir Nagar),Harischandra Ghat to Assi Ghat(33 KV Bhadaini), VIP-Mahendra Pandey, Minister-Ravindra Jaiswal(33 KV Shankuldhara)
		220kV/33kV Transformer	60 MVA T/F-II		44.04	12.09.2022/13:00	15.52	30.06.2022/06:00	29.78	33.57	27.01.2023/19:00	11.19	30.10.2022/02:00	22.38	

7	132/33 KV Substation Cantt under ETD-I Varanasi	132kV/33kV Transformer	63 MVA T/F-I		42.26	15.07.23/22:00	16.29	01.05.23/20:00	29.275	39.1	02.10.23/19:00	25.19	09.10.23/18:00	32.145	Feeding Cantoment Board,DM,Commissioner office and Aawas,Kachhari,Circuit House Supply
		132kV/33kV Transformer	63 MVA T/F-II		39.96	03.06.23/15:00	12.16	01.05.23/04:00	26.06	35.62	05.01.23/10:00	14.33	01.10.23/05:00	24.975	
		132kV/33kV Transformer	40 MVA T/F-III		25.63	25.06.23/10:00	8.04	01.05.23/04:00	16.835	19.76	09.10.23/12:00	9.12	01.10.23/05:00	14.44	
8	132/33 KV Substation DLW under ETD-I Varanasi	132kV/33kV Transformer	40 MVA T/F-I		17.4	12.09.23/15:00	. 4	15.06.23/13:00	8.9	11.6	10.01.23/09:00	. 6	25.10.22/10:00	6.1	DLW (RLY)= 2 MW
		132kV/33kV Transformer	20 MVA T/F-II		10.6	11/07.23/07:00	. 4	24.06.23/21:00	5.5	5.4	07.01.23/09:00	. 4	19.02.23/13:00	2.9	
9	132/33 KV Substation BHU under ETD-I Varanasi	132kV/33kV Transformer	12.5 MVA T/F-I		5.6	22.06.2023/12:00	1.6	22.06.2023/12:00	3.6	3.5	13.12.2022/15:00	0.6	13.12.2022/15:00	2.05	1. Cancer Hospital = 2MW 2. BHU and Hospital = 12 MW
		132kV/33kV Transformer	12.5 MVA T/F-II		5.6	22.06.2023/12:00	1.6	22.06.2023/12:00	3.6	3.5	13.12.2022/15:01	0.6	13.12.2022/15:01	2.05	
		132kV/33kV Transformer	40 MVA T/F-III		25.6	22.06.2023/15:00	8	22.06.2023/15:00	16.8	15	13.12.2022/15:02	2.4	13.12.2022/15:02	8.7	
10	132kV Substation Kursato	132/33kv Transformer-I	40MVA		11.2	18-06-22/06.00	8	13-04-22/19:00	8.8	14.2	20-01-2023/18:00	11.6	20-11-23/08:00	8.14	
		132/33kv Transformer-II	40MVA		11.2	18-06-22/06.00	8	13-04-22/19:00	8.8	14.2	20-01-2023/18:00	11.6	20-11-23/08:00	8.14	
11	132kV Substation Rajatalab	132/33kv Transformer-I	63MVA		34.4	17-08-22/20.00	13	20-04-22/20:00	29	28.8	21-01-2023/4:00	25.4	25-03-23/02:00	22	
		132/33kv Transformer-II	63MVA		34.4	17-08-22/20.00	12.8	20-04-22/20:00	29	28.8	21-01-2023/4:00	25.4	25-03-23/02:00	22	
	220kV Substation Raja Ka Talab	220/132/33kv Substation Raia Ka Talab	40mva trf-1		14.3	08-08-2022/14:00	2.2	12-04-2023/19:00	8.91	7.8	01-10-2022/06:00	1.5	12-02-2023/14:00	7	
			40mva trf-2		9.7	19-07-22/14.00	2.2	12-04-2023/19:00	6.48	7.6	01-10-2022/06:00	1.4	12-02-2023/14:00	6.83	
13	132kV Substation Manduadih	132kV/33kV Manduadih at 132kV Substation Varanasi	40MVA-1		28.83	18-07-22/16.00	16.47	29-09-22/20:00	16.4	18.76	04-03-23/10.00	18.7	04-03-23/10:00	9.1	Feeding Hospital and Railways = 4 MW
			40MVA-2		27.68	15-05-22/23.00	23.34	05-09-22/22:00	23.3	17.16	18-01-23/08.00	16	18-02-23/08:00	14.2	
			40MVA-3		27.23	18-07-22/15.00	15.3	29-09-22/20:00	16.4	17.84	04-03-23/10.00	17.8	04-03-23/10:00	8.7	
			40MVA-4		33.4	07-08-22/11.00	25.6	05-09-22/21:00	26	18.99	18-01-23/08.00	16.7	17-02-23/07:00	15.3	
			20MVA-1		8	08-07-22/24.00	5.7	05-09-22/23:00	7.3	5.49	08-01-23/10.00	4.1	20-03-23/07:00	4.5	
	220kV Substation Sahupuri	132/33kV Trnasformers at 220kV Substation Sahupuri	40 MVA T/F -I		32.92	15.06.2023/22:00	4.57	24.06.2023/21:00	18.745	31.09	15.11.2022/10:00	9.14	27.11.2022/14:00	20.12	33kV Ramnagar and 33kV LBS Hospital
			40 MVA T/F -II		36.58	16.06.2023/22:00	4.57	24.06.2023/21:00	20.575	29.26	01.02.2023/15:00	4.57	19.02.2023/13:00	16.92	
			20 MVA T/F -III		17.6	13.06.2023/24:00	1.6	24.06.2023/21:00	9.6	15.55	30.01.2023/11:00	4.34	27.11.202/14:00	9.95	
					879.2		419.5		643.6	688.5		384.1		490.5	


Una District Transmission Plan
220 kV Hamirpur
132 kV Bus of Nehrian Substation
220/132 kV, 200 MVA
132/33 kV Rakkar Substation
220 kV Nehrian
132/33 kV Amb Substation
132/33 kV Pekhubela Solar (53 MW), HPPCL
132/33 kV Tahliwal HPSEBL
132 kV HTLS line
220 kV Twin Zebra Line
220/132 kV, 200 MVA Una Substation HPPTCL
132 kV
220 kV Jalandhar
132/33 kV, 3x50 MVA Drug park at Polianbeet
33 kV
220 kV
132 kV
33 kV

Annexure-A.VI

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन-I प्रभाग
Power System Planning & Appraisal-I Division

सेवा में / To

1. COO (CTUIL), Saudamini, Plot No. 2, Sector - 29, Gurugram-122001
2. CEO, POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110010
3. Director, HPPTCL, Himfed Bhawan, Panjari, Shimla-171005

विषय/Subject: Meeting to discuss HPPTCL proposal for Construction of a 220/132 kV, 200 MVA substation nearby Una, Himachal Pradesh - regd

महोदय/Sir,

A meeting through VC was held on 02.11.2023 to discuss HPPTCL's proposal for Construction of a 220/132 kV, 200 MVA substation nearby Una, Himachal Pradesh under intrastate transmission system.

The Minutes of the meeting are attached herewith.

Encl: As above

भवदीय / Yours faithfully,

(नितिन देसवाल / Nitin Deswal)
उप निदेशक/Deputy Director

प्रतिलिपि/ Copy to -

1. SA to Member (PS), CEA

Minutes of the meeting to discuss HPPTCL's proposal for Construction of a 220/132 kV, 200 MVA substation nearby Una, Himachal Pradesh

List of participants is attached at **Annexure-I.**

Background

HPPTCL vide letter dated 15.07.2023 submitted a proposal for establishment of a 200/132 kV substation near Una, Himachal Pradesh. The following intra-state transmission system has been proposed by HPPTCL:

(i) Establishment of 220/132 kV, 200 MVA sub-station near Una, Himachal Pradesh
(ii) Nehrian (220/132 kV) – Una (220/132 kV) 220 kV D/c line

Presently, both circuits of Hamirpur – Jalandhar (PG) 220 kV D/c line are LILOed at Nehrian (220/132 kV, 200 MVA) S/s. As the elements in the proposal are intra-state elements incidental to ISTS; therefore, HPPTCL has sought approval of CEA.

The proposal along with studies submitted by HPPTCL was forwarded to CTUIL and Grid India seeking their observations and comments on the same. CTUIL and Grid India have furnished their observations. The meeting has been proposed for further deliberations on the proposal.

Deliberations in the meeting

- HPPTCL elucidated the intra-state proposal and stated that the existing EHV network supplying power to Una and surrounding area is saturated and needs to be supplemented immediately keeping in view the establishment of proposed Bulk Drug Park (Project of National Importance) having projected demand of 120 MVA by 2026-27 and to provide reliable power to existing and future consumers in Una area. Presently, 132/33 kV Rakkar Substation & 132/33 kV Tahliwal Substation together are serving commercial load of Una City and industrial & Domestic load of Tahliwal industrial area respectively. The load being catered is around 100 MVA and entire load is being served by 132 kV S/c link from Amb substation of HPSEBL. Presently the 132 kV link has reached its maximum loading and in the event of its outage, the entire area has to face power disruptions. Therefore, additional source of supply is required to serve the increased load envisaged in Una district.

- HPPTCL added that that as an immediate measure, HPPTCL would be constructing 220/132 kV, 80/100 MVA Sub-station at Tahliwal (Distt. Una in Himachal Pradesh) by S/c LILO of 220 kV D/C Bhakra - Jamalpur D/C line of BBMB (with provision of SPS to restrict drawl at 50 MVA and to ensure no drawl of power from Jamalpur side in case of outage of Bhakhra - Tahliwal circuit). Further, for the long-term plan of providing 120 MVA power to the proposed Bulk Drug Park and to ensure reliable power supply in the area, establishment of 220/132 kV, 2x100 MVA Substation nearby Una by 220 kV D/C (Twin Zebra) line from 220/132 Nehrian Substation to Una has been proposed. HPPTCL stated that the above proposal shall be part of intrastate transmission network and HPPTCL agreed to any required system strengthening identified by POSOCO and CTUIL.

- Grid India stated that ICT loadings (2 x 315 MVA + 500 MVA, 400/220 kV) at Jalandhar (PG) has regularly crossed 800 MW and as per load flow studies, 17% of load is getting transferred

to 315 MVA ICTs during tripping of 500 MVA ICT. Therefore, with the proposed 200 MVA substation, there would be requirement for additional ICT at Jalandhar or augmentation of existing 315 MVA ICT to 500 MVA for 'N-1' compliance. Alternatively, if further incremental load is to be fed by 220 kV Hamirpur - Nehrian ckts, reconductoring of these circuits would be needed to cater to increased load at 220 kV Nehrian substation.

- CTUIL stated that proposal seems fine; however, in evening peak scenario (Monsoon season), loading of 220 kV Nehrian- Hamirpur D/c line is marginally higher (~200 MW) in 'N-1' contingency condition with the proposed load at new 220/132 kV Una S/s. Therefore, loading of 220 kV Nehrian - Hamirpur D/c line need to be observed in real time with implementation of proposed intra state system (being implemented by HPPTCL), considering actual load growth in Una area, so that measures may be taken for reconfiguration/diverting the load by HPPTCL or strengthening scheme may be planned to meet proposed demand of Una area.

- Regarding query about the issue of critical loading of ICTs at Jalandhar (PG) and operational constraints thereof, Grid India informed that the loadings of the ICTs have not yet reached the critical mark; therefore, the issue has not been highlighted in the operational feedback. However, with the proposed drawl from new sub-station in Una and availability of very less margin in 400/220 kV ICTs at Jalandhar (PG), there might be requirement of augmentation of ICTs at 400/220 kV Jalandhar (PG) S/s.

- Regarding availability of space for augmentation at Jalandhar (PG), CTUIL informed that space is not available for additional ICT; however, the existing 315 MVA, 400/220 kV ICTs could be upgraded to 500 MVA, if required.

- Regarding the tentative progression of demand/drawl form proposed Una sub-station, HPPTCL informed that there would be requirement for additional load of 120 MVA progressively by the year 2026-27.

- After further deliberations, the proposal of HPPTCL for establishment of 220/132 kV, 200 MVA substation nearby Una, Himachal Pradesh, through Una (New) – Nehrian 220 kV D/c line under intrastate transmission system was agreed. Further, with the implementation of above intra-state system, the loadings of 400/220 kV ICTs at Jalandhar (PG), and 220 kV Nehrian - Hamirpur D/c line need to be observed with the progressive increase in demand in Una area so that suitable augmentation measures in ISTS may be planned accordingly, if required.

Meeting ended with thanks to the chair.

* * *

Annexure-I

List of Participants

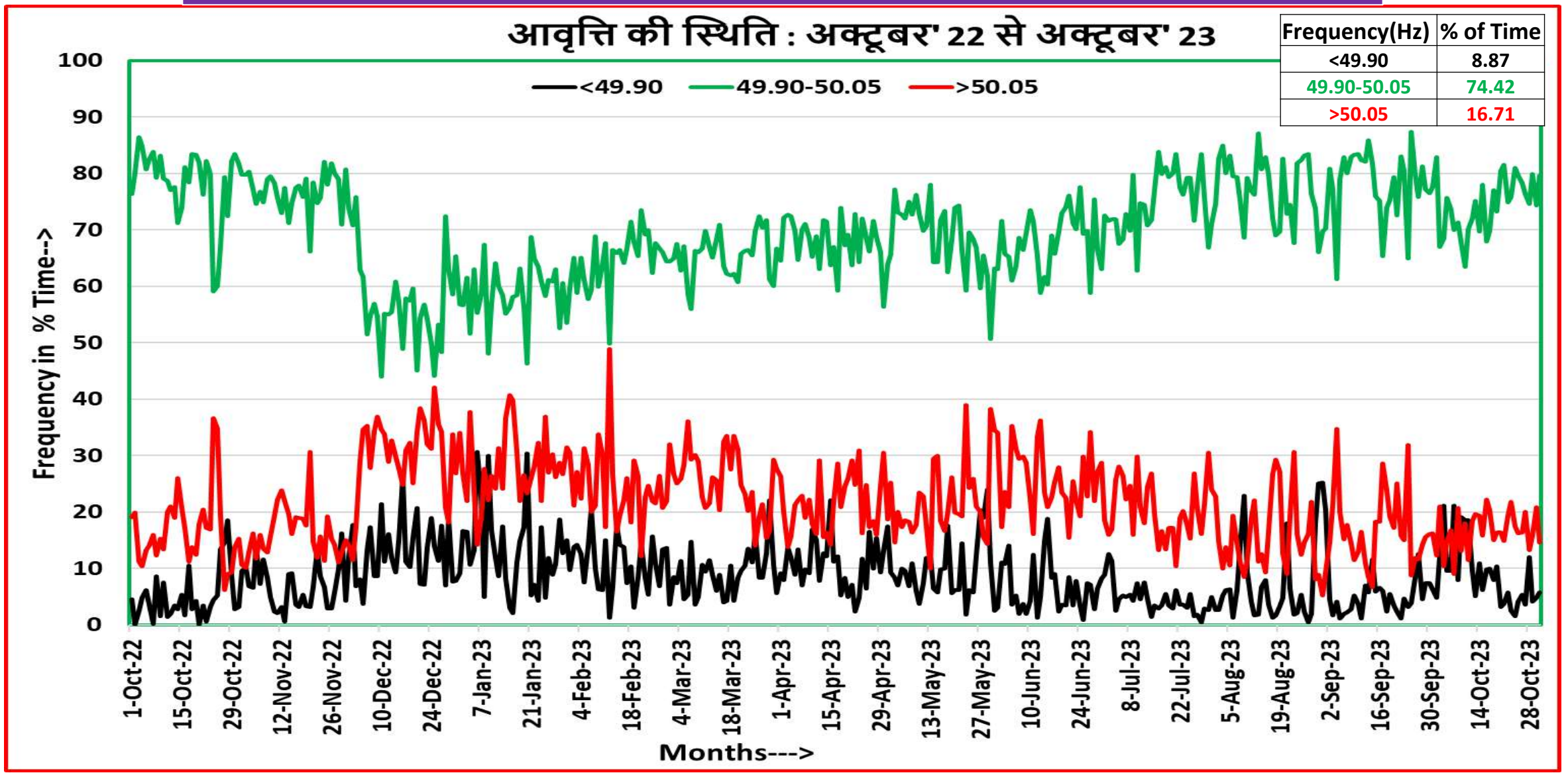
	Name (Sh/Smt/Ms)	Designation
	CEA	
1	Ishan Sharan	Chief Engineer
2	Manjari Chaturvedi	Director
3	Nitin Deswal	Deputy Director
	CTUIL	
4	Sandeep Kumawat	Ch. Manager
	Grid India	
5	Gaurav Singh	Manager
	HPPTCL	
6	Rajiv Sood	Director
7	Harmanjeet Singh	Dy. Manager

प्रचालन समन्वय उपसमिति की बैठक
अक्टूबर- 2023

पिछले एक साल मे आवृत्ति की स्थिति

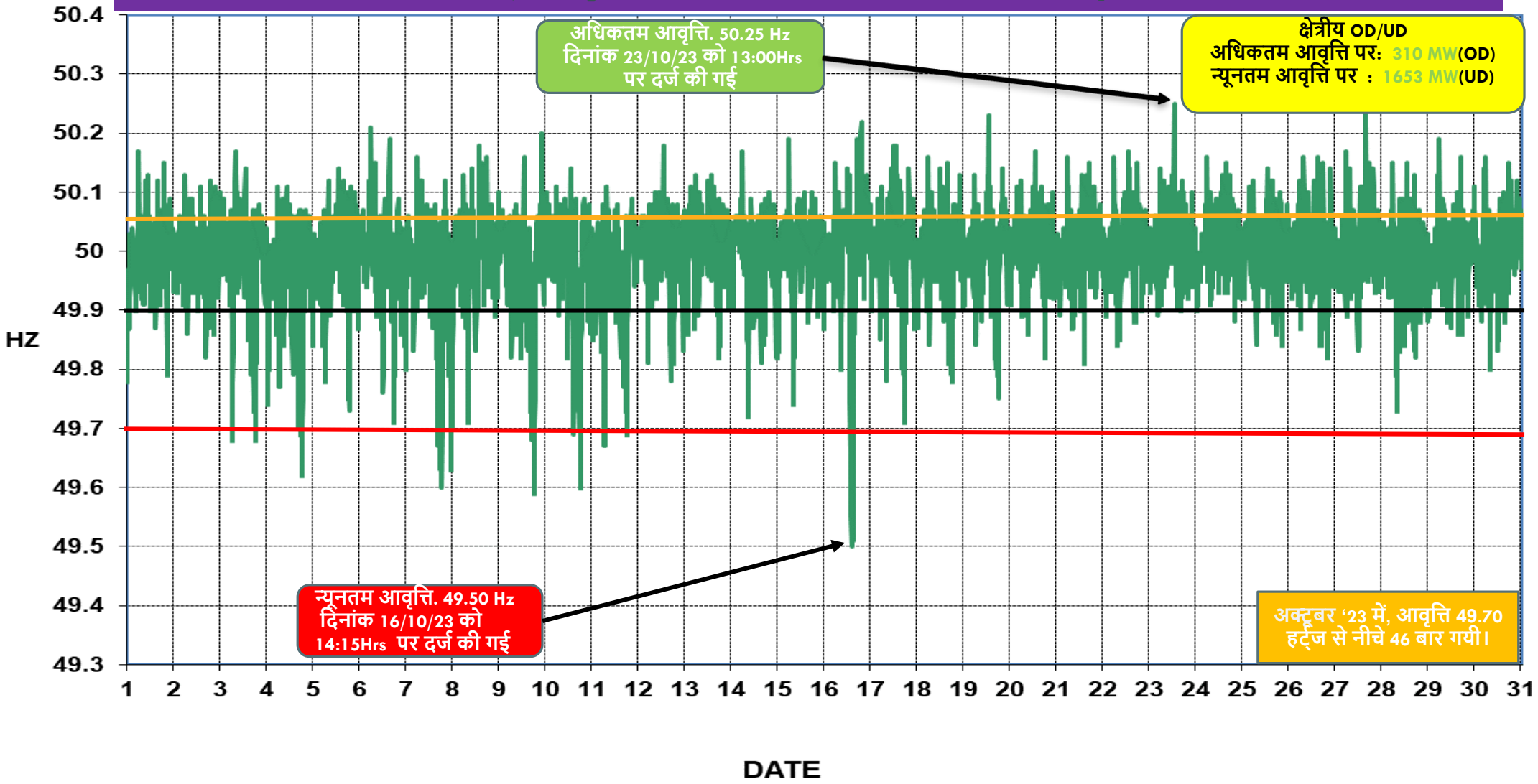
आवृत्ति बैंड	अक्टूबर 2022	नवम्बर 2022	दिसंबर 2022	जनवरी 2023	फ़रवरी 2023	मार्च 2023	अप्रैल 2023	मई 2023	जून 2023	जुलाई 2023	अगस्त 2022	सितम्बर 2023	अक्टूबर 2023
< 49.7 Hz(%)	0.04	0.13	1.11	1.25	0.32	0.16	0.24	0.24	0.22	0.09	0.47	0.11	0.53
<49.8 Hz(%)	0.46	0.76	3.96	3.60	1.95	1.26	1.68	1.48	0.86	0.66	1.63	0.57	1.99
<49.9 Hz(%)	4.88	6.70	12.78	13.30	10.75	9.03	10.54	9.83	8.42	4.60	7.11	5.21	8.87
49.90-50.05 Hz(%)	**78.27**	**77.00**	**57.39**	**58.70**	**64.68**	**63.84**	**67.90**	**68.48**	**67.83**	**74.96**	**77.25**	**77.86**	**74.42**
50.05-50.10 Hz(%)	14.04	13.88	11.99	15.26	14.59	17.86	12.54	13.25	15.59	15.64	13.28	13.32	13.53
>50.10 Hz(%)	2.63	2.30	17.84	12.34	8.49	7.99	6.46	8.44	8.15	4.79	2.35	3.61	3.18
>50.20 Hz(%)	0.18	0.12	4.07	1.83	1.49	1.28	0.88	0.77	1.09	0.80	0.23	0.32	0.14
औसत आवृत्ति	50.00	50.00	50.00	50.00	50.00	50.00	49.99	49.99	50.01	50.01	50.00	50.00	49.99

आवृत्ति की स्थिति: अक्टूबर -2022 से 2023



अक्टूबर -2023 के दौरान आवृत्ति की स्थिति

(As per 5 Minute SCADA data)



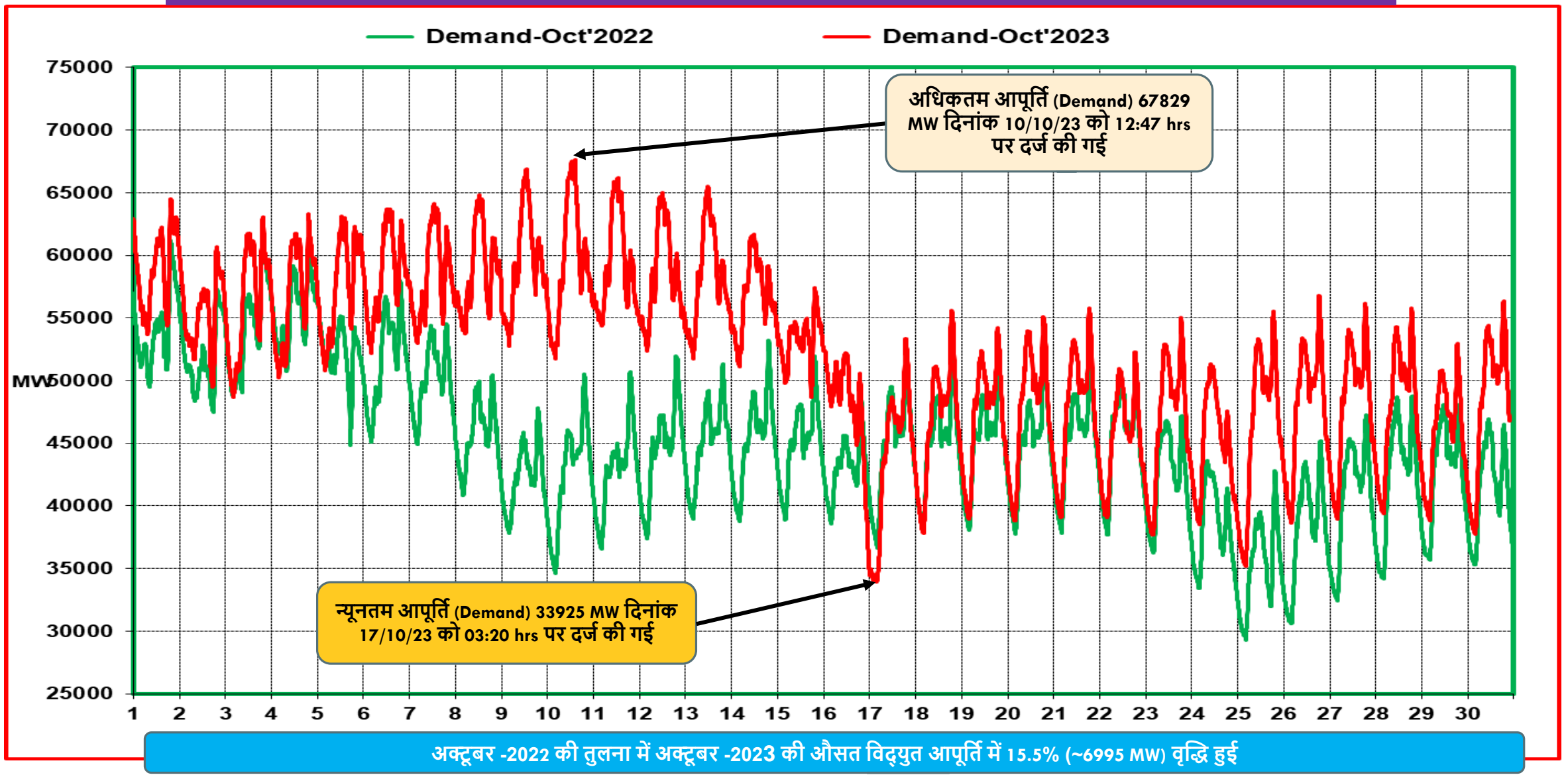
अक्टूबर-2023 के दौरान अधिकतम मांग (Demand Met), अधिकतम ऊर्जा खपत (Energy consumption) और अब तक का कीर्तिमान (राज्यों द्वारा जमा आंकड़ों के अनुसार)

ग्रिड-इंडिया GRID-INDIA

राज्य	अधिकतम मांग (MW) (in Oct'23)	दिनांक / समय	रिकॉर्ड अधिकतम मांग (in MW) (upto Sep'23)	दिनांक / समय	अधिकतम ऊर्जा खपत (MU) (in Oct'23)	दिनांक	रिकॉर्ड अधिकतम ऊर्जा खपत (MU) (Upto Sep'23)	दिनांक
पंजाब	12491	08.10.23 at 11:30	15293	24.06.23 को 11:45 बजे	239.0	01.10.2023	344.1	24.06.2023
हरियाणा	9947	07.10.23 at 15:00	12768	28.06.22 को 11:56 बजे	205.2	10.10.2023	273.1	18.08.2023
राजस्थान	15641	31.10.23 at 12:45	17840	02.09.23 को 14:45 बजे	312.5	31.10.2023	371.6	04.09.2023
दिल्ली	5583	09.10.23 at 15.26	7695	29.06.22 को 15:10 बजे	115.2	10.10.2023	153.5	28.06.2022
उत्तर प्रदेश	24096	01.10.23 at 20:42	28284	24.07.23 को 21:43 बजे	474.0	10.10.2023	580	03.09.2023
उत्तराखंड	2259	09.10.23 at 19:00	2594	14.06.22 को 21:00 बजे	44.5	04.10.2023	56.2	17.06.2023
हिमाचल प्रदेश	1871	31.10.23 at 07:45	2071	06.01.23 को 09:45 बजे	35.0	07.10.2023	37.1	14.09.2023
जम्मू और कश्मीर (UT) तथा लद्दाख़ (UT)	2735	22.10.23 at 19.00	3044	02.02.23 को 20:00 बजे	52.0	27.10.2023	64.6	20.01.2023
चंडीगढ़	265	09.10.23 at 18:00	426	08.07.21 को 15:00 बजे	5.2	09.10.2023	8.4	08.07.2021
उत्तरी क्षेत्र #	67829	10.10.23 at 12:47	81048	04.09.23 को 14:50 बजे	1421.8	10.10.2023	1792.7	04.09.2023

उत्तरी क्षेत्र अधिकतम मांग (Demand Met) as per SCADA Data

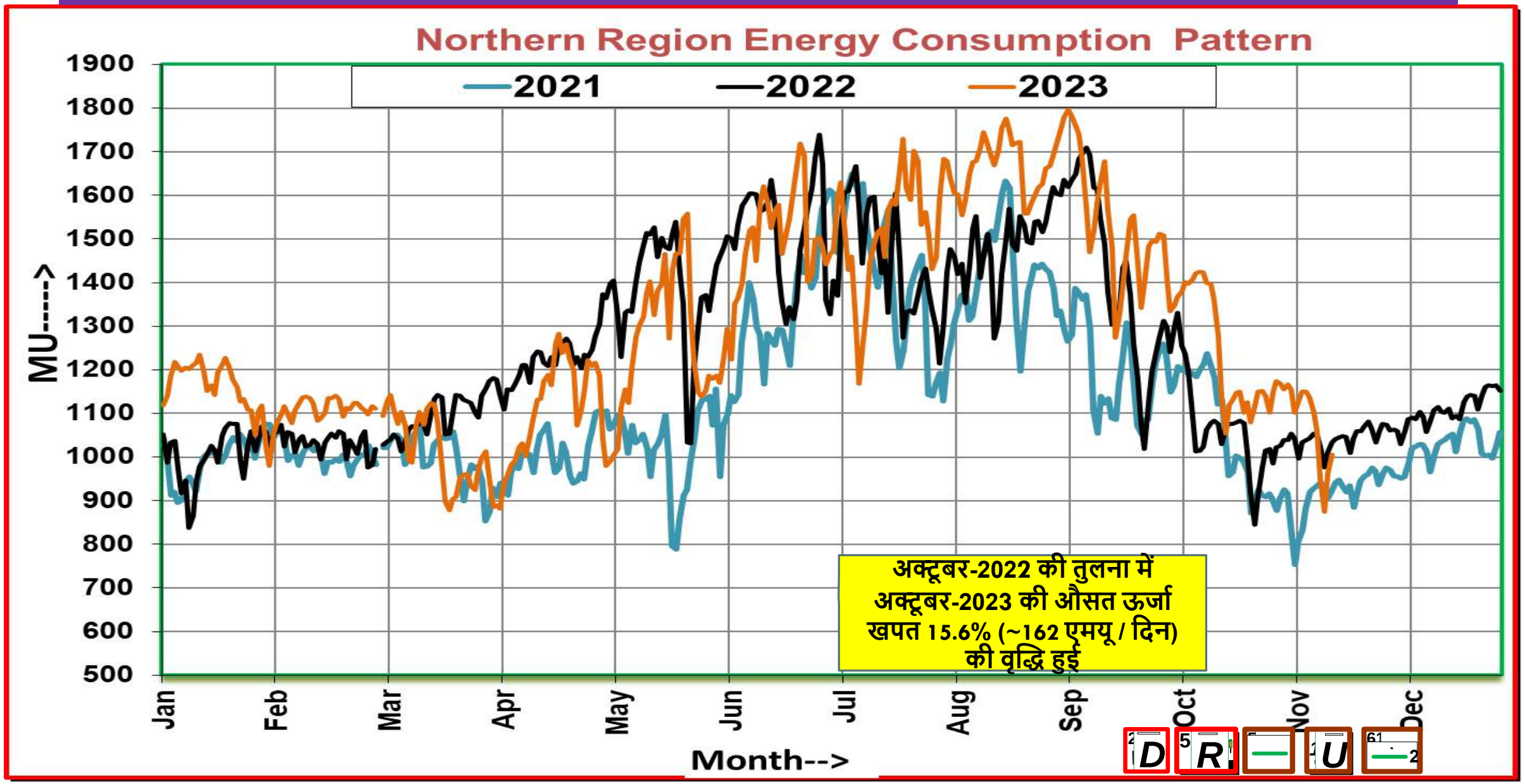
क्षेत्रीय विद्युत आपूर्ति (Demand) अक्टूबर 2022 बनाम अक्टूबर 2023 (As per 5 Minute SCADA data)



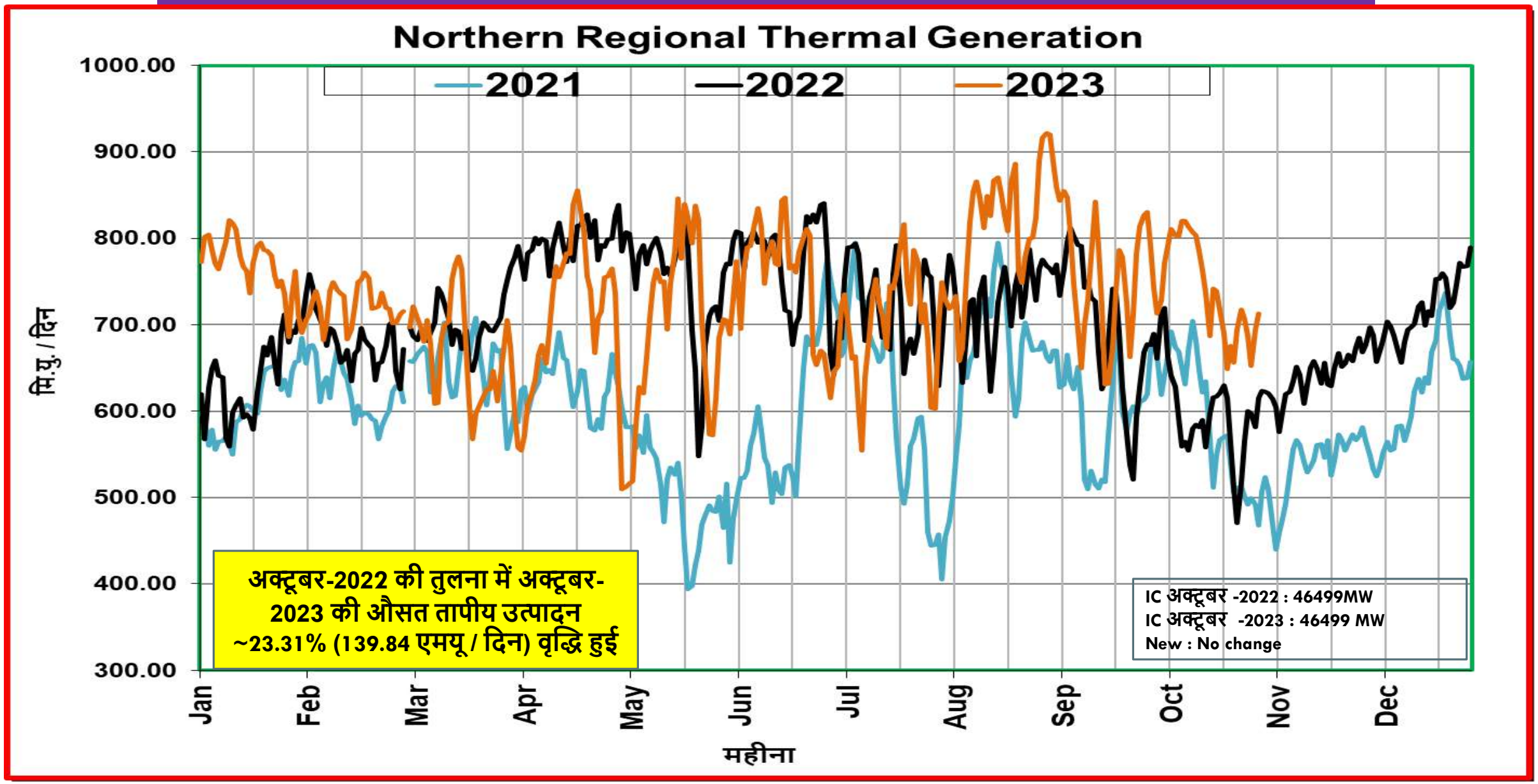
उत्तरी क्षेत्र की औसत ऊर्जा खपत में वृद्धि(% में) अक्टूबर-2023/ अक्टूबर-2022 / अक्टूबर-2021

राज्य	अक्टूबर - 2021	अक्टूबर - 2022	अक्टूबर - 2023	% वृद्धि (अक्टूबर - 2022 vs अक्टूबर - 2021)	% वृद्धि (अक्टूबर - 2023 vs अक्टूबर - 2022)
पंजाब	157.3	163.9	173.9	3.6%	6.7%
हरियाणा	149.5	141.0	173.6	-6.3%	23.1%
राजस्थान	226.6	255.2	294.5	12.3%	15.8%
दिल्ली	85.4	79.4	90.5	-8.0%	15.2%
उत्तर प्रदेश	334.8	327.6	391.1	-3.1%	20.6%
उत्तराखंड	36.9	36.2	40.0	-2.3%	11.1%
चंडीगढ़	4.1	3.9	4.1	-4.4%	5.0%
हिमाचल प्रदेश	31.3	30.3	32.6	-3.4%	7.7%
जम्मू और कश्मीर (UT) तथा लद्दाख़ (UT)	44.1	50.4	48.5	14.0%	-3.4%
उत्तरी क्षेत्र	1069.8	1087.9	1251.0	1.0%	15.8%

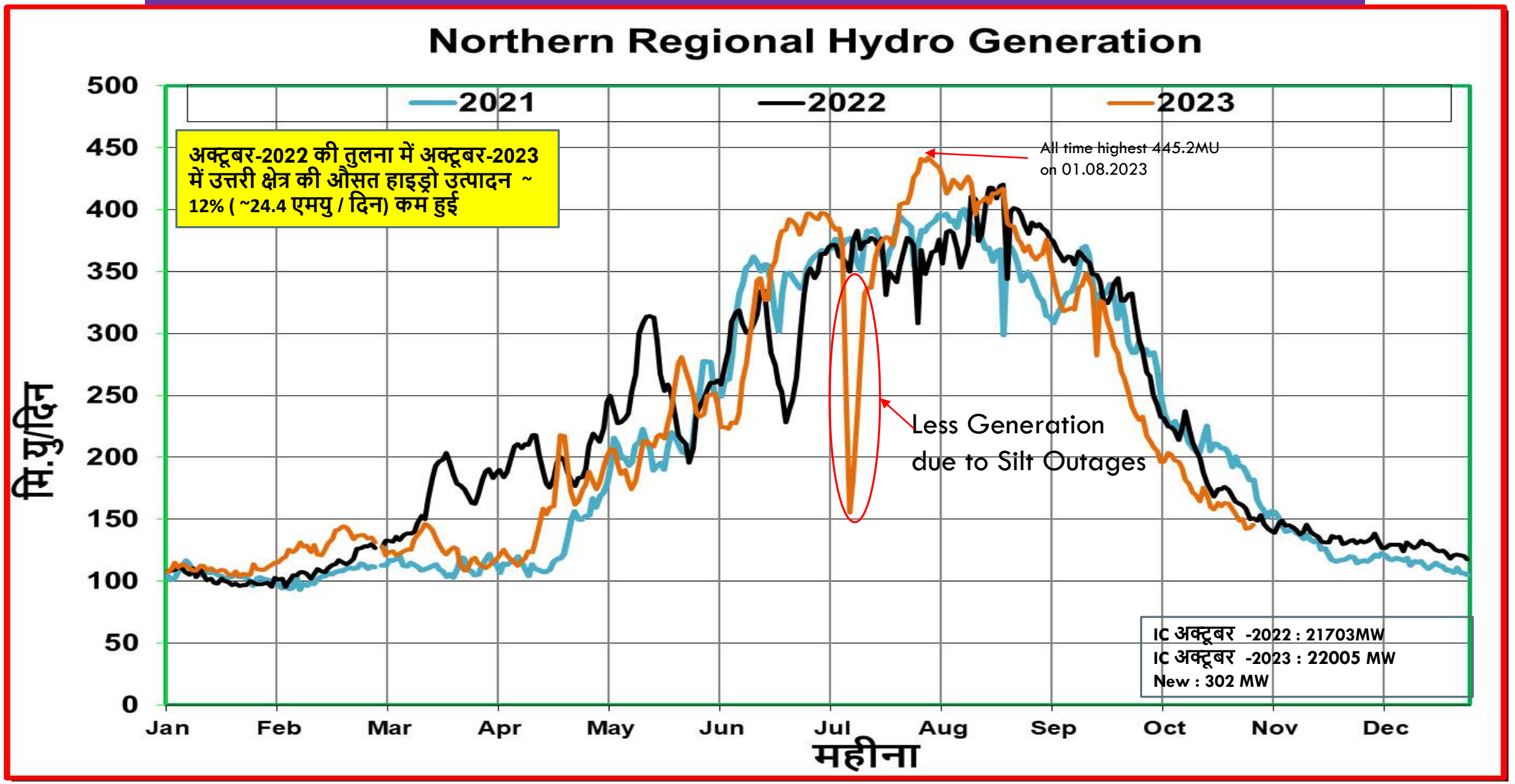
उत्तरी क्षेत्र की ऊर्जा खपत(MUs)



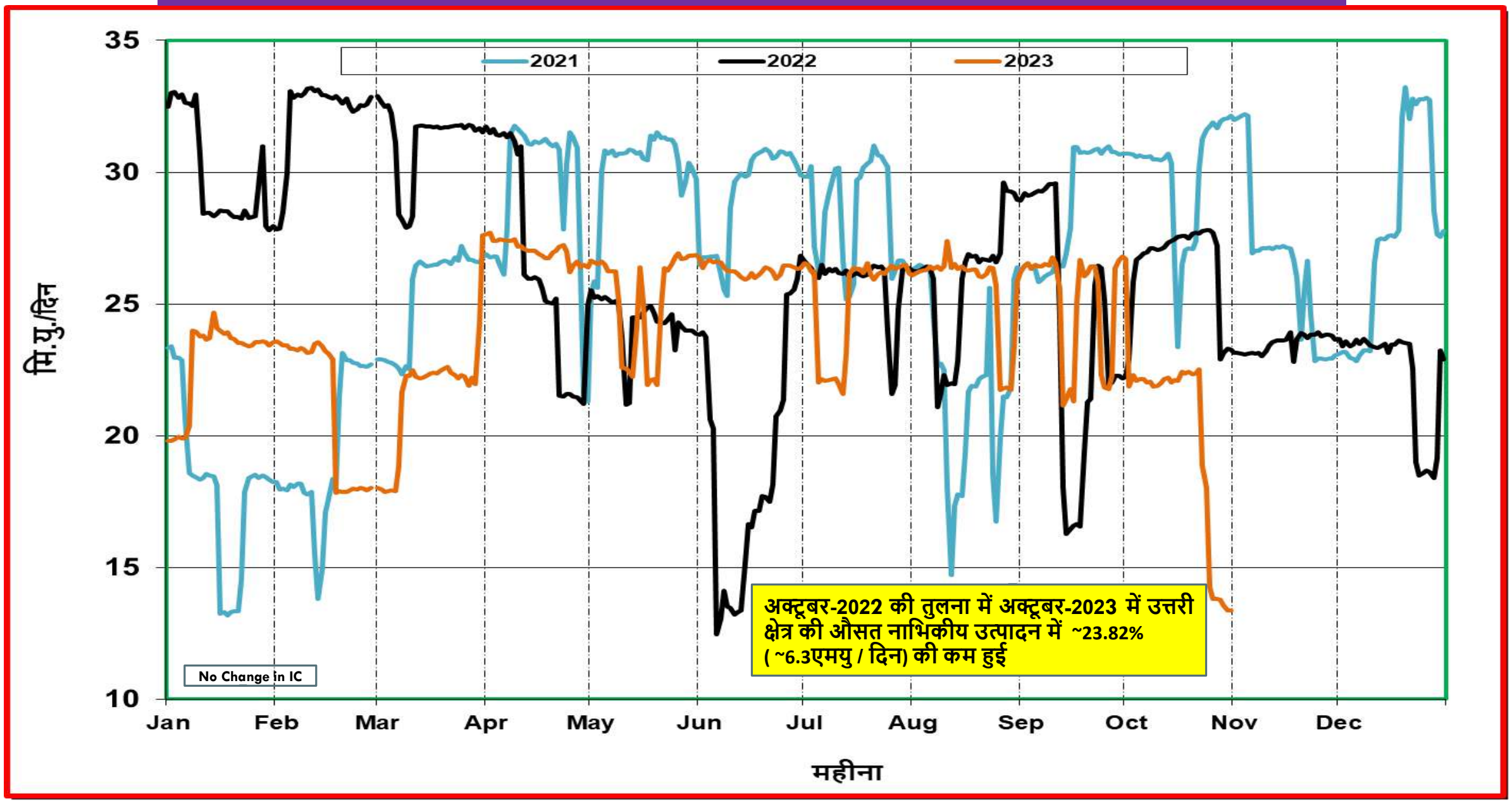
उत्तरी क्षेत्र की तापीय (Thermal) उत्पादन की स्थिति(Mus/Day)



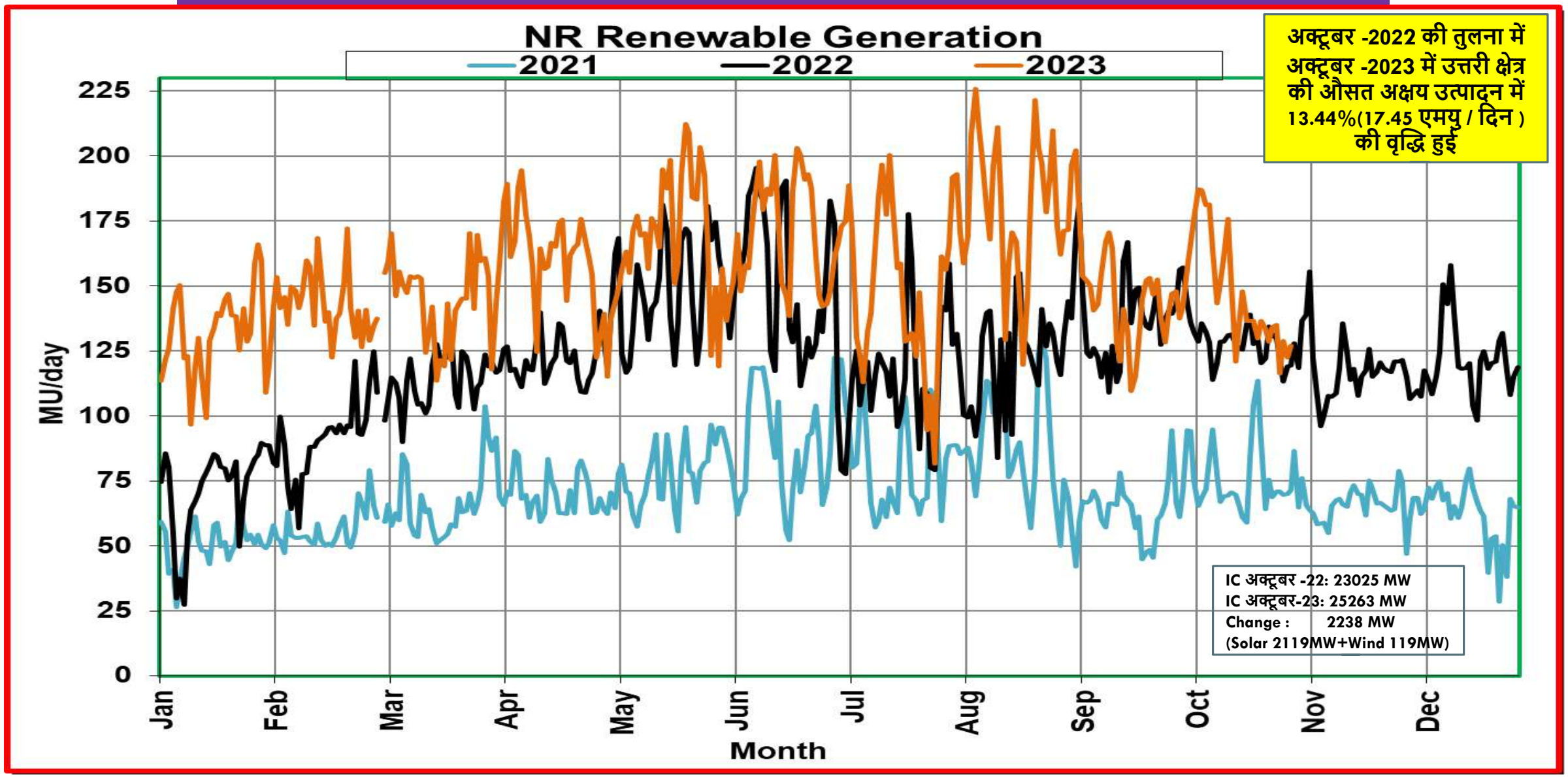
उत्तरी क्षेत्र की जलीय (हाइड्रो) उत्पादन की स्थिति(Mus/Day)



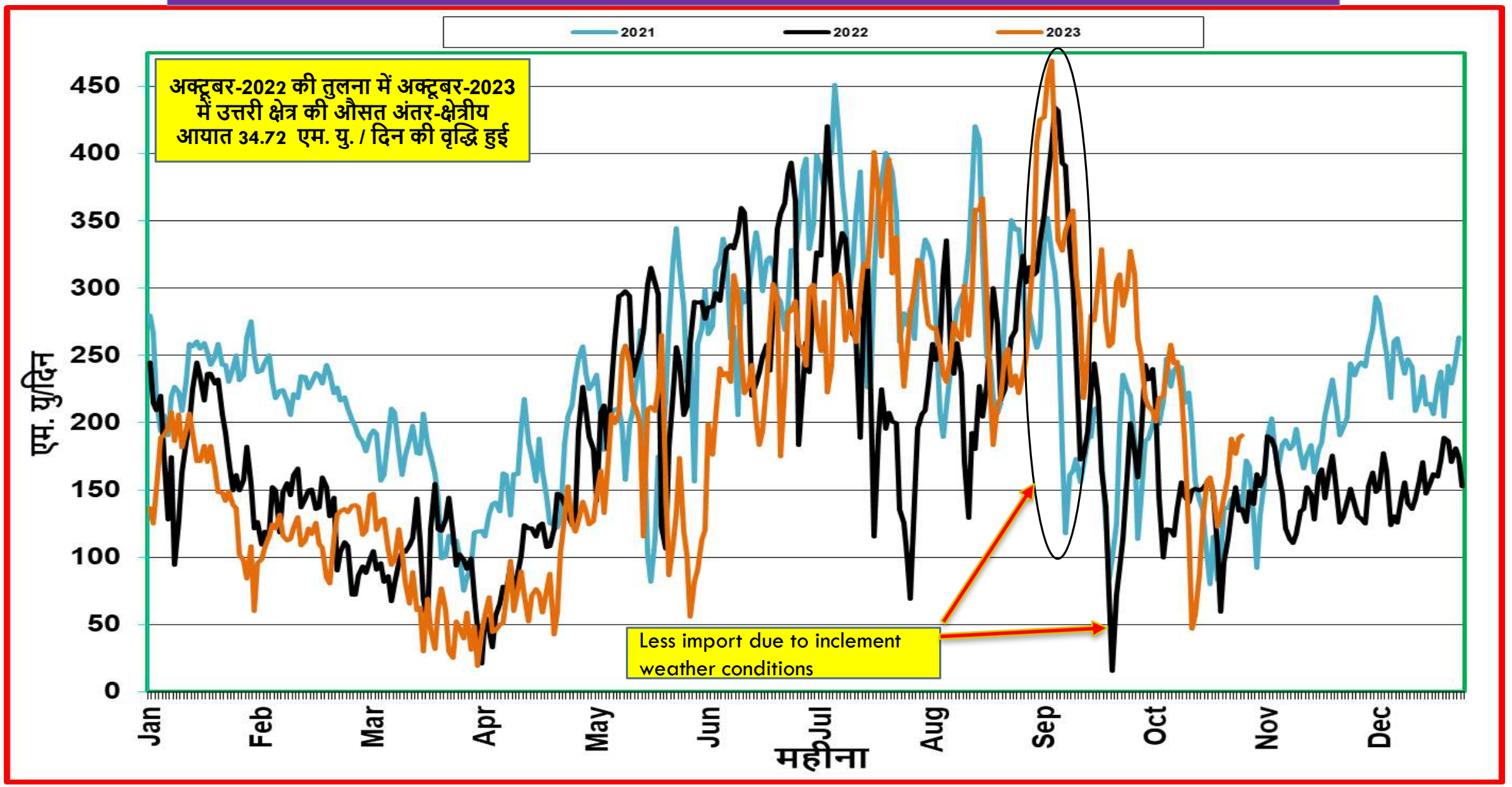
उत्तरी क्षेत्र की नाभिकीय उत्पादन की स्थिति (Mus/Day)



उत्तरी क्षेत्र की अक्षय (Renewable) उत्पादन की स्थिति (Mus/Day)



अंतर-क्षेत्रीय आयात(Mus/Day) की स्थिति



वास्तविक सारांश - अक्टूबर-2022 बनाम अक्टूबर-2023

	अक्टूबर-2022 (मि.यु. /दिन)	अक्टूबर-2023 (मि.यु. /दिन)	अक्टूबर माह में वृद्धि (मि.यु./दिन)
तापीय (Thermal) उत्पादन	599.87	739.71	139.84
जलीय (Hydro) उत्पादन	199.94	175.8	-24.14
नाभिकीय (Nuclear) उत्पादन	26.45	20.14	-6.3
अंतर-क्षेत्रीय (Inter-Regional) कुल आयात	149.19	183.91	34.72
अक्षय (Renewable) उत्पादन	129.845	147.292	17.45
कुल	**1105.3**	**1266.9**	**161.6**

RE Penetration

	Maximum Daily MU Penetration			
	Oct '2023		Record upto Sep '2023	
	Max % Penetration	Date	Max % Penetration	Date
Punjab	4.90	24-10-2023	12.28	01-04-2020
Rajasthan	20.85	06-10-2023	36.47	22-10-2021
UP	3.48	18-10-2023	4.72	22-03-2023
NR	13.36	06-10-2023	20.69	02-04-2023

	Maximum Instantaneous Penetration in MW			
	Oct '2023		Record upto Sep '2023	
	Max % Penetration	Date	Max % Penetration	Date
Punjab	8.67	16-10-2023	26.87	22-04-2020
Rajasthan	40.23	14-10-2023	68.38	31-03-2020
UP	11.56	19-10-2023	17.78	13-02-2023
NR	37.87	18-10-2023	53.72	02-04-2023

OUTAGE SUMMARY OF LAST THREE MONTHS

MONTH	PLANNED	FORCED OUTAGES	EMERGENCY SHUTDOWNS	TRIPPING	% PLANNED as of TOTAL S/D	% EMERGENCY SHUTDOWNS	TOTAL OUTAGES (A+B)
	(A)	(B=C+D)	(C)	(D)	(A/(A+C))	(C/(A+C))	
July-23	497	834	379	455	56.7%	43.3%	1331
Aug-23	561	848	385	463	59.3%	40.7%	1409
Sep-23	701	797	349	448	66.8%	33.2%	1498
Oct-23	**966**	**707**	**331**	376	**74.5%**	**25.5%**	**1673**

New Elements First Time Charged During Oct 2023

S. No.	Type of transmission element	Total No
1	Transmission Lines	08
2	RE Generating Units	02
3	ICTs/GTs/Transformers	07
4	STATCOM DEVICES	01
5	BUS	04
6	LILO Line Charging	02
7	BUS REACTOR	02
8	CAPACITOR BANK	02
9	Bays	35
Total New Elements charged		63

Transmission Lines

S.No	Name of element	Owner	Voltage Level (in kV)	Circuit No	Line Length	Conductor Type	State	Actual date of charging
1	220kV Lucknow_1(PG)-Kanduni-1	UPPTCL	220kV	1	45.50 KM	Moose	UTTAR PRADESH to UTTAR PRADESH	04-Oct-2023
2	220kV Lucknow_1(PG)-Kanduni-2	UPPTCL	220kV	2	45.50 KM	Moose	UTTAR PRADESH to UTTAR PRADESH	04-Oct-2023
3	220kV Wagoora(PG)-Budgam-1	PDD JK	220kV	1	20.44	HTLS	JAMMU & KASHMIR to JAMMU & KASHMIR	10-Oct-2023
4	220kV Abdullapur(PG)-New Jagadhari TSS(DFCCIL)-1	RAILWAYS	220kV	1	10.2	ZEBRA	HARYANA to HARYANA	13-Oct-2023
5	220kV Abdullapur(PG)-New Jagadhari TSS(DFCCIL)-2	RAILWAYS	220kV	2	10.2	ZEBRA	HARYANA to HARYANA	13-Oct-2023
6	220kV Bhadla_2 (PG)-RSDCL(PSS4)_SL_BHD2_PG-1	RSDCL	220kV	1	29.387	AL59 Moose	RAJASTHAN to RAJASTHAN	18-Oct-2023
7	220kV Shahjahanpur(PG)-Lakhimpur(Gola)-1	UPPTCL	220kV	1	57.57 KM	MOOSE	UTTAR PRADESH to UTTAR PRADESH	26-Oct-2023
8	220kV Shahjahanpur(PG)-Lakhimpur(Gola)-2	UPPTCL	220kV	2	57.57 KM	MOOSE	UTTAR PRADESH to UTTAR PRADESH	26-Oct-2023

RE Generating Units

S.No	Plant Name	Capacity to be charged	Voltage LeveL	Total Installed Capacity of Plant	Type of RE	Actual date of charging
1	SBSR Power Cleantech Eleven Private Limited (SBSRPC-11)	25 MW	33kV	300 MW	Solar	04-Oct-2023
2	Rising Sun Energy (K) Private Limited (RSEKPL)	164 MW	33kV	190 MW	SOLAR	21-Oct-2023

LILO Line Charging

S.No	Name of element	Voltage Level (in kV)	Name of Line to be LILOed	Line Length of New Line after LILO (In Km)	LILO Portion Line Length (In Km)	Conductor Type	Agency/Owner	Location	Actual date of charging
1	400kV Ataur(UP)-Noida Sec 123(UP)-1(After LILO of 400 KV ATAUR- INDIRAPURAM CKT-II at 400 KV NOIDA SECTOR 123)	400kV	400 KV ATAUR-INDIRAPURAM CKT-II	19.127 KM	10.177 KM	Twin HTLS	WUPPTCL,PGYTL	UTTAR PRADESH to UTTAR PRADESH	20-Oct-2023
2	400kV Indirapuram(UP)-Noida Sec 123(UP)-1(After LILO of 400 KV ATAUR- INDIRAPURAM CKT-II at 400 KV NOIDA SECTOR 123)	400kV	400 KV ATAUR-INDIRAPURAM CKT-II	16.547 KM	10.177 KM	Twin HTLS	WUPPTCL,PGYTL	UTTAR PRADESH to UTTAR PRADESH	20-Oct-2023

ICTs/GTs/Transformers

S.No	Name of element	Owner	Voltage Level (HV/LV/Tertiary)	MVA Capacity	Configuration	State	Transformer Details	Actual date of charging
1	400/220/33kV, 500 MVA MVA, 3-Phase, T & R, ICT - 2 at Fatehgarh_III(PG)	PRTL	400/220/33kV	500 MVA	3-Phase	RAJASTHAN	New	02-Oct-2023
2	400/220/33kV, 500 MVA MVA, 3-Phase, BHEL, ICT - 2 at Rasra (UP)	UPPTCL	400/220/33kV	500 MVA	3-Phase	UTTAR PRADESH	New	04-Oct-2023
3	400/220/33kV, 500 MVA MVA, 3-Phase, T&R, ICT - 1 at Fatehgarh_III(PG)	PRTL	400/220/33kV	500 MVA	3-Phase	RAJASTHAN	New	05-Oct-2023
4	220/33kV, 100 MVA, 3-Phase, TAL, ICT - 2 at RSDCL(PSS4)_SL_BHD2_PG	RSDCL	220/33/na	100	3-Phase	RAJASTHAN	New	19-Oct-2023
5	220/33kV, 100 MVA, 3-Phase, TAL, ICT - 1 at RSDCL(PSS4)_SL_BHD2_PG	RSDCL	220/33/na	100	3-Phase	RAJASTHAN	New	19-Oct-2023
6	220/33kV, 100 MVA, 3-Phase, TAL, ICT - 3 at RSDCL(PSS4)_SL_BHD2_PG	RSDCL	220/33/na	100	3-Phase	RAJASTHAN	New	19-Oct-2023
7	400/220/33kV, 315 MVA, 3-Phase, CGL, ICT - 3 at Muzaffarnagar(UP)	POWERGRID	400/220/33kV	315	3-Phase	UTTAR PRADESH	Replacement	22-Oct-2023

STATCOM DEVICES

S.No	Name of element	Owner	Voltage Level (in kV)	STATCOM No	STATCOM Make	MVAR Rating	Auxilliary Transformer Rating	Substation	State	Actual date of charging
1	**STATCOM : 1**, 34.5kV, 2*+/-150 MVAR each | Coupling Transformer : 400KV/34.5KV, 550 MVA | MSR : 1, 34.5kV, -125 MVAr each | MSC : 2, 34.5kV, +125 MVAr each | Auxillary Transformer : 630 kVA at **Fatehgarh_II(PG)**	POWERGRID	34.5kV	1	SIEMENS	(+550/-425) MVAR	630 kVA	Fatehgarh_II(PG)	RAJASTHAN	26-Oct-2023

BUS REACTOR

S.No	Name of element	Owner	Voltage LeveL	MVAR Capacity	Actual date of charging
1	400kV, 125 MVAR Bus Reactor 2 at Fatehgarh_III(PG)	PRTL	400kV	125 MVAR	02-Oct-2023
2	220kV, 25 Bus Reactor 1 at RSDCL(PSS4)_SL_BHD2_PG	RSDCL	220kV	25	20-Oct-2023

CAPACITOR BANK

S.No	Name of element	Owner	Voltage Level (in kV)	Capacitor Bank No	Capacitor MVAR Rating	Actual date of charging
1	33kV, Static, 44 MVAR(11) Capacitor bank no-4 Nos (HBP2K23- 126,127,128,129) at Renew SuryaRavi SL_BKN_PG (RSRPL)	RENEW SURYARAVI (RSRPL)	33kV	4 Nos (HBP2K23-126,127,128,129)	44	11-Oct-2023
2	33kV, Static, 44 MVAR(11) Capacitor bank no-4 Nos (HBP2K23- 130,131,132,133) at Renew SuryaRavi SL_BKN_PG (RSRPL)	RENEW SURYARAVI (RSRPL)	33kV	4 Nos (HBP2K23-130,131,132,133)	44	12-Oct-2023


धन्यवाद

Testing of Primary Frequency Response (PFR) of Generators as per IEGC Clause 5.2

Knowledge Dissemination Workshop

Team – Solvina, NRLDC

Solvina

Agenda

1. **Project Background**
2. **Understanding PFR & its importance**
3. **PFR test experience from 200 units**
   a) Summary of PFR from thermal, hydro and gas based units
   b) Key observations
   c) Benefits of PFR test
4. **Grid code compliance testing**
   a) IEGC 2023
   b) way ahead
5. **Q&A Session**

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PFR Test – Status

Region	Units Allotted	PFR Test Completed
WR	65	62
SR	27	27
NR	62	56
ER	27	27
NER	19	19
Total	**200**	**193**

Note: We have been able to fulfil the criteria to complete 100 PFR tests in one year.

PFR Test – Journey so far

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Region	Sum of Capacity (MW)
WR	29283
SR	13270
NR	12493.77
ER	9896
NER	1969.3
Grand Total	**66912.07 MW**

S.No.	OEM	Units
1	BHEL	100
2	ANDRITZ HYDRO	22
3	LMZ	14
4	DONGFANG ELECTRIC	13
5	TOSHIBA	10
6	HARBIN ELECTRIC	9
7	GE	6
8	SIEMENS	6
9	ABB	5
10	ANSALDO	3
11	Beijing BEIZHONG	3
12	ALSTOM -NEYRPIC T.SLG	2
13	DOOSAN	2
14	HARBIN TURBINE COMPANY (HTC)	2

PFR activity in SLDCs NR

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Generating companies under SLDCs in NR, started to issue orders based on POSOCO's TOR.

Orders received:

- Uttar Pradesh: UPRVUNL, PPGCL, LANCO, Reliance ADA, Alakhnanda Hydro
- Punjab: GHTP, GVK
- Haryana: NTPC Faridabad, Aparava Power Jhajjar
- Himachal Pradesh: Malana Hydro

15 Units tested UP SLDC
1 Unit of Punjab SLDC
2 Unit of Himachal SLDC

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Why PFR?

Primary frequency response importance

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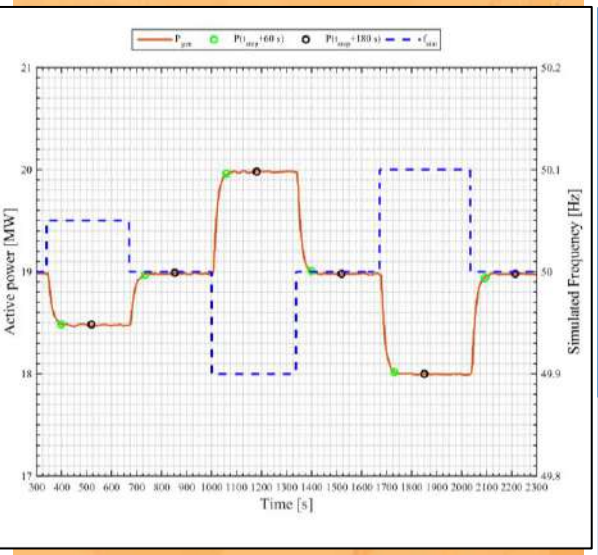


The **Primary Frequency Control** (PFC), an important way to maintain **frequency** stability, balances the power generation and load consumption in the grid. - PFC immediately activates when the Grid **frequency** deviates from 50 Hz.

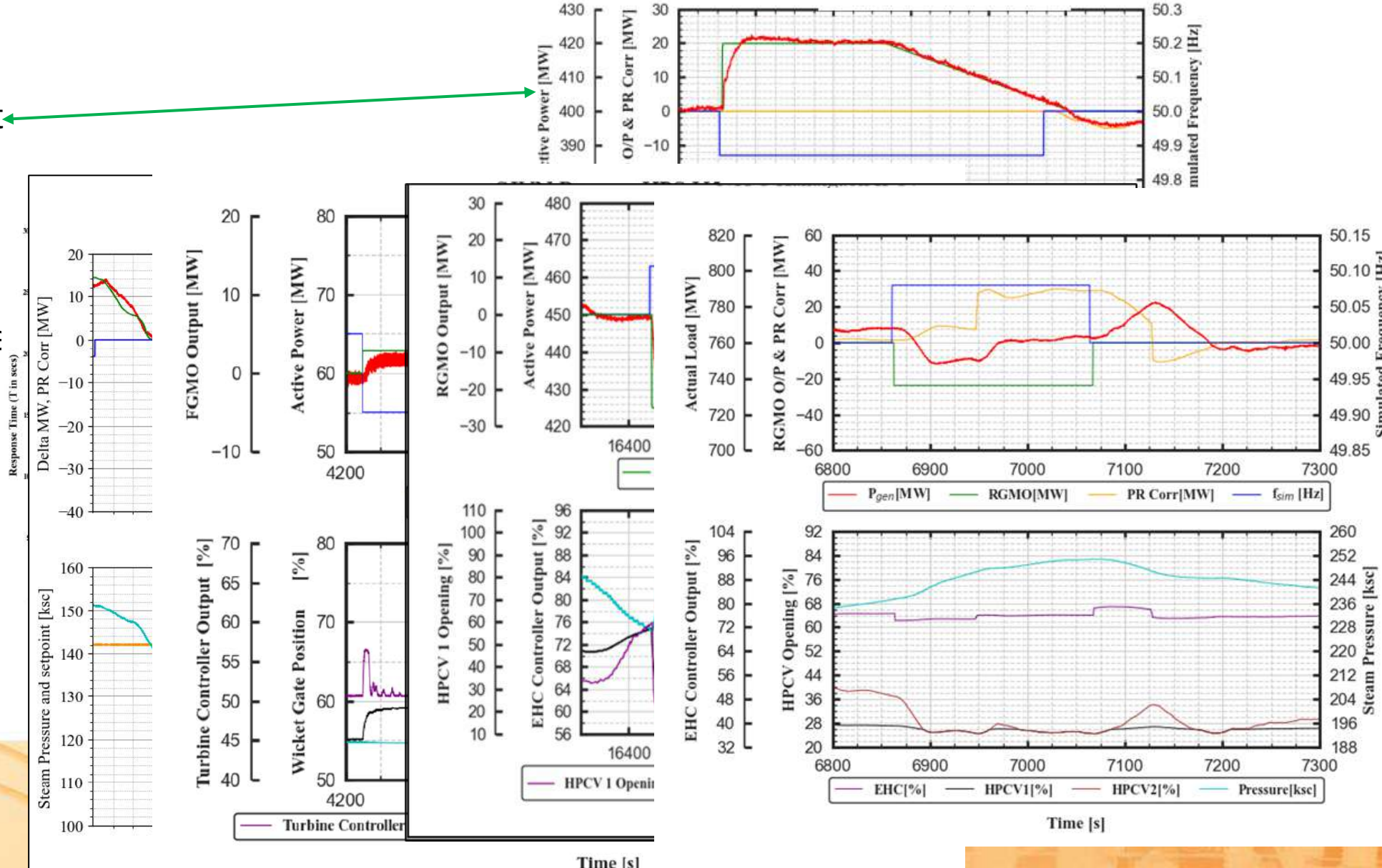
- Critical for the **smooth operation, stability, and resilience of power grids**
- It helps in balancing electricity supply and demand, preventing large frequency deviations

Testing of primary response helps in:

Verifying the compliance of the unit with respect to IEGC

In determining and ascertaining the present response time of the TG system. i.e., rise time, time constant, etc.

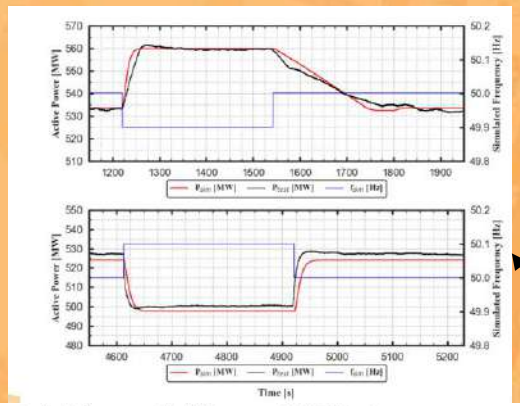
Helps in identifying the system bottlenecks & suggest suitable recommendations



Why PFR testing?

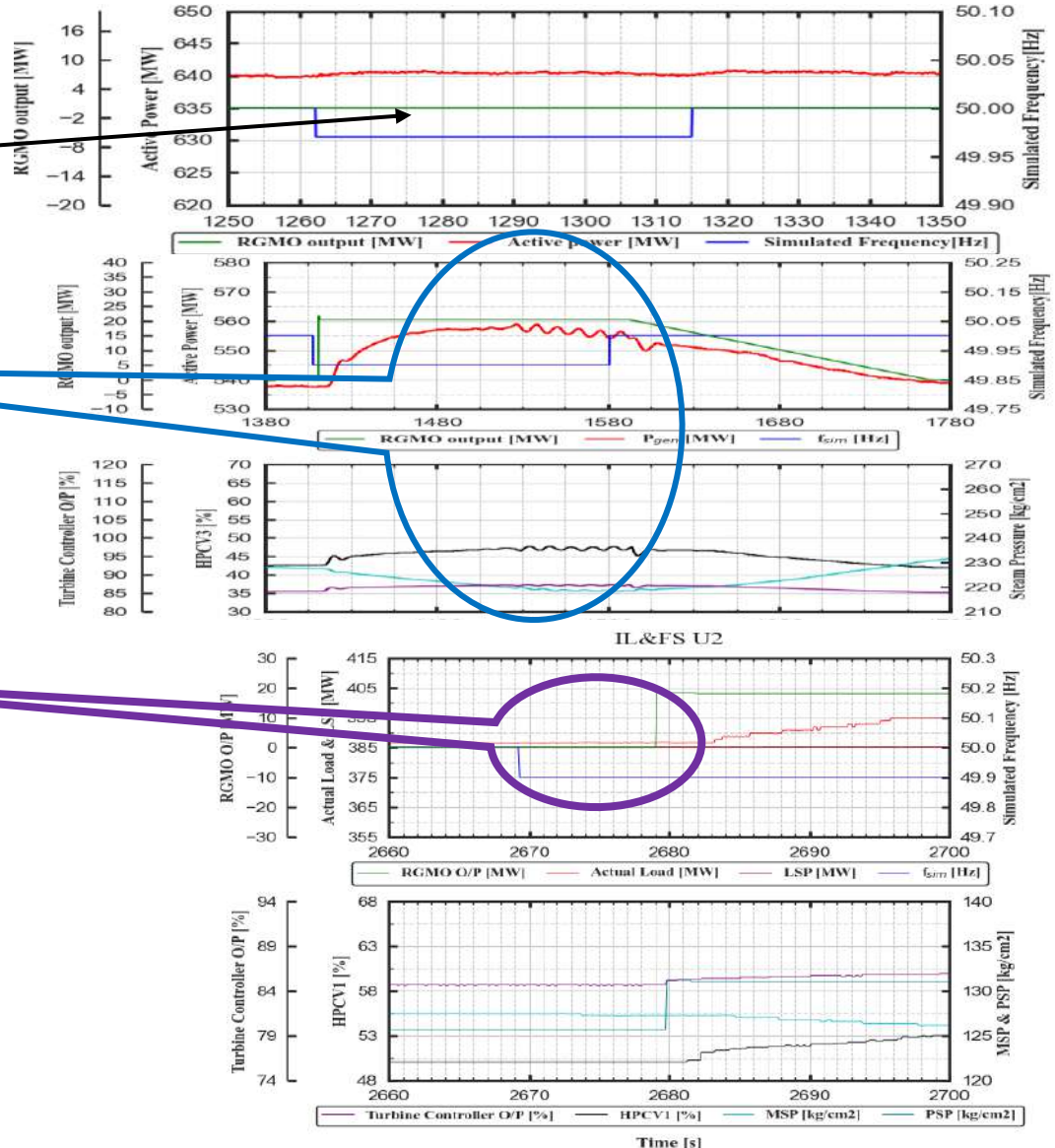
Primary frequency response testing and Importance

- To ensure that ripple filter follows the norms pertaining to grid code of RGMO/FGMO.
- To find out the unusual behaviors of control valves, if present.
- To find out delays in control loop and non-linearities at different load levels.
- To create a database and set references for model validation and future studies.



Parameters for turbine-governor block diagram as per IEEE G1 format

Parameters	Description	Value
K	Controller gain	20
T1	Governor time constant [Sec.]	0.2
T2		0
T3	Servo time constant [Sec.]	1
U0	Valve opening rate [p.u/s]	0.294
Uc	Valve closing rate [pu/s]	-0.294
P_{max}	Maximum gate limit [pu]	1.2
P_{min}	Minimum gate limit [pu]	0.1
T4	High pressure turbine time constant [Sec.]	0.186
K1	High Pressure Turbine Factor [p.u]	0.309
K2	High pressure turbine factor [p.u]	0.391
T5	Intermediate pressure turbine time constant	6
K3	Intermediate pressure turbine factor	0.391
K4	Intermediate pressure turbine factor	0
T6	Medium pressure turbine factor	0.40
K5	Medium pressure turbine factor	0.30
K6	Medium pressure turbine factor	0
T7	low pressure turbine time constant [Sec.]	0.40
K7	Low pressure turbine factor	0
K8	Low pressure turbine factor	0



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Overview

- 193 out of 200 units tested for PFR
- Dynamic turbine governor model validation performed for all the tested units
- Reports of all the tested units are submitted to respective RLDCs

Major areas of concern related to PFR

- Logics related
- Unit operation related
- Controller tunning related

Logics related to PFR

- Droop implementation in controller logic with limiters
- Diversity in Ripple filter logic implementation
- Response in consecutive changes in frequency
- RGMO implementation for both below and above 50Hz
- Fixed % change in MW for any change in frequency
- Restriction in response hold time
- Scan time of governor frequency controller & intentional delay

Unit operation related

- System bottlenecks w.r.t Super-critical units.
- Pressure correction affecting the sustainability of response.
- Coal quality
- Manual interventions to achieve desired response during test - Higher Pressure setpoint maintained for steps below 50Hz & Lower Pressure setpoints maintained during steps above 50Hz.
- Base load Vs MCR understanding for Gas based units.
- Overshoot, mechanical backlash and oscillations in MW when operating near forbidden zone w.r.t. hydro units.

Controller tunning related

- Governor frequency controller tuning.
- CMC controller tuning.
- Boiler tuning.

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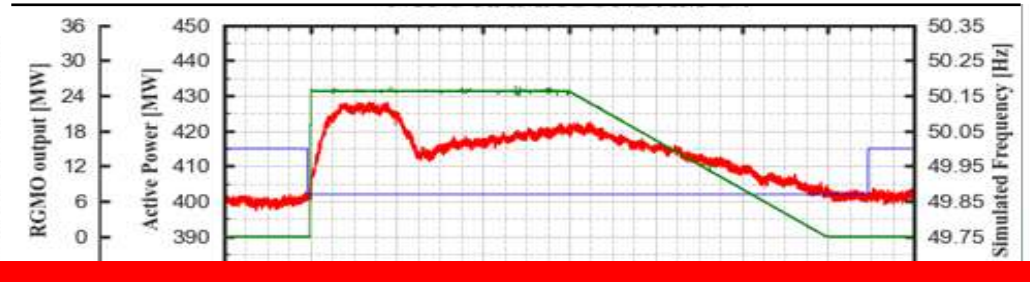
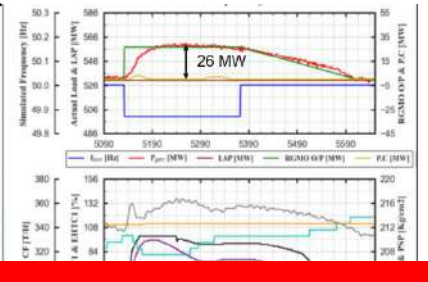
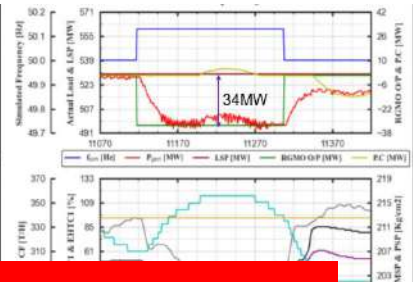
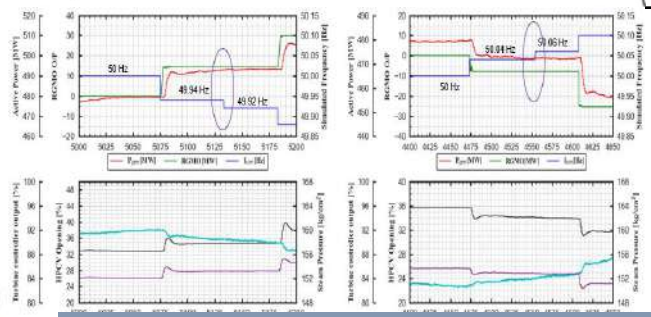
Logic related

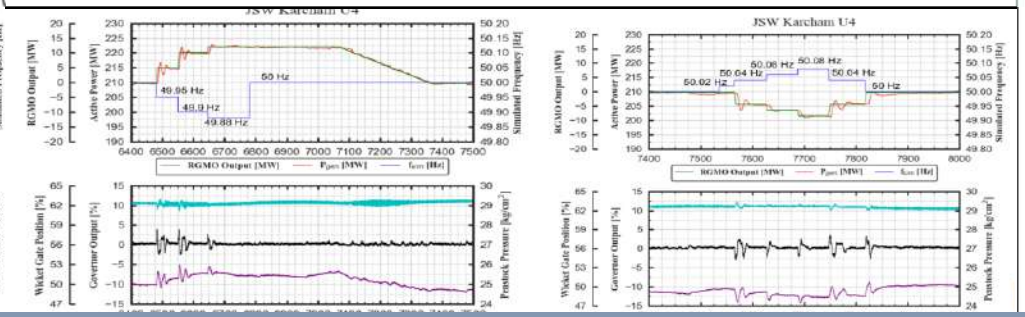


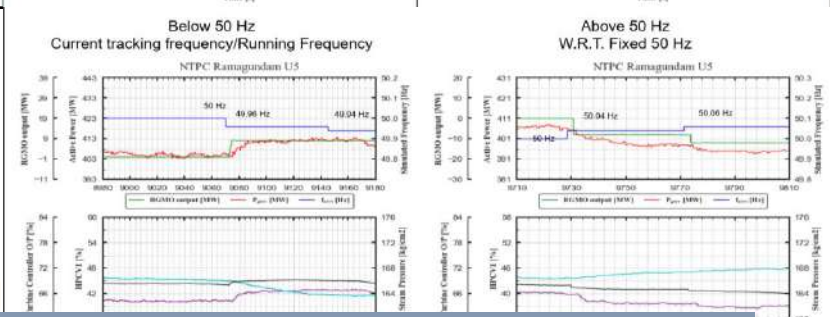




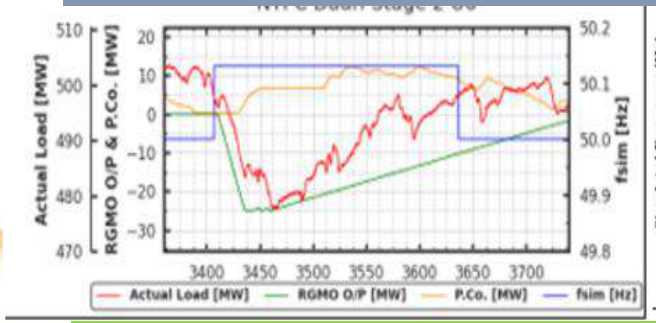
Different MW contributions due to different ways of droop implementation with limiters

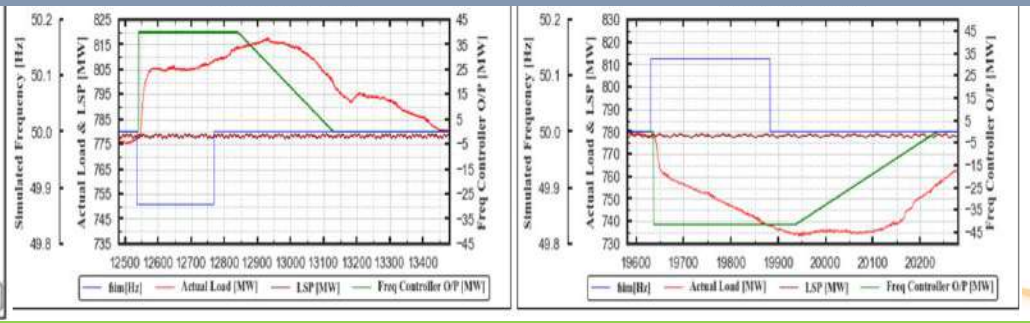


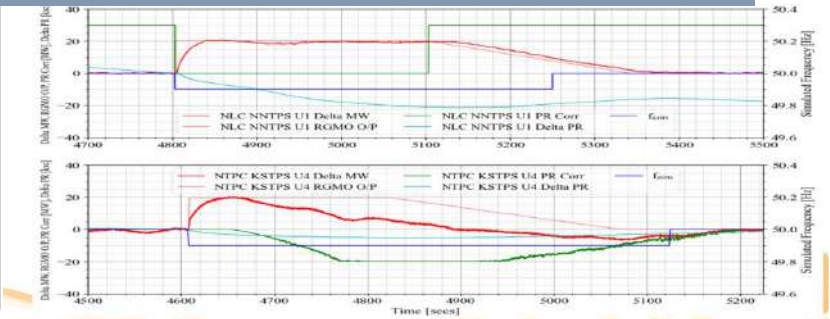




Different MW contributions due to different ways of ripple filter logic implementations







Different responses due to different logic implementations of PFR

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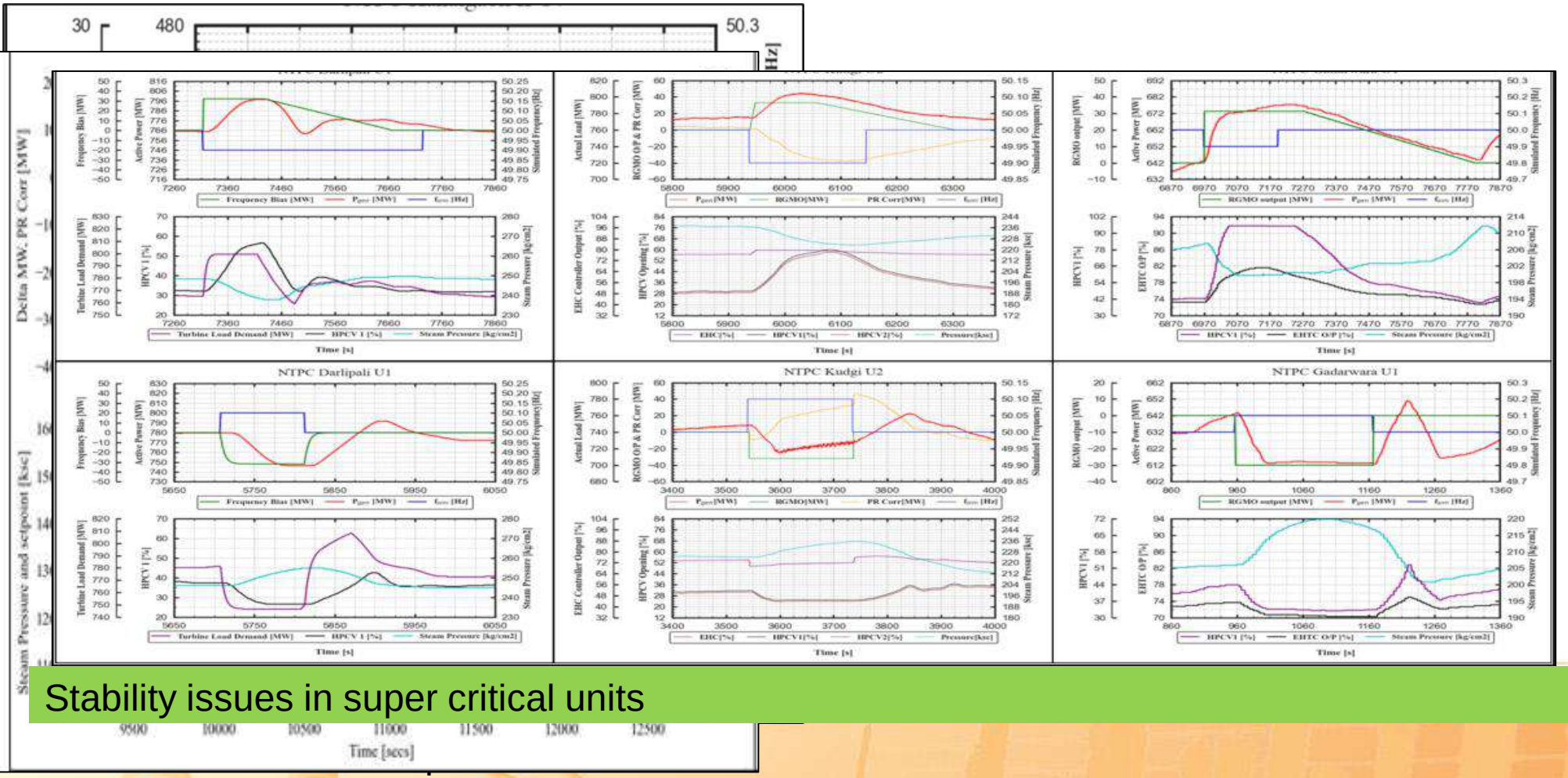
Unit operation related



Stability issues in super critical units

Tuning of boilers

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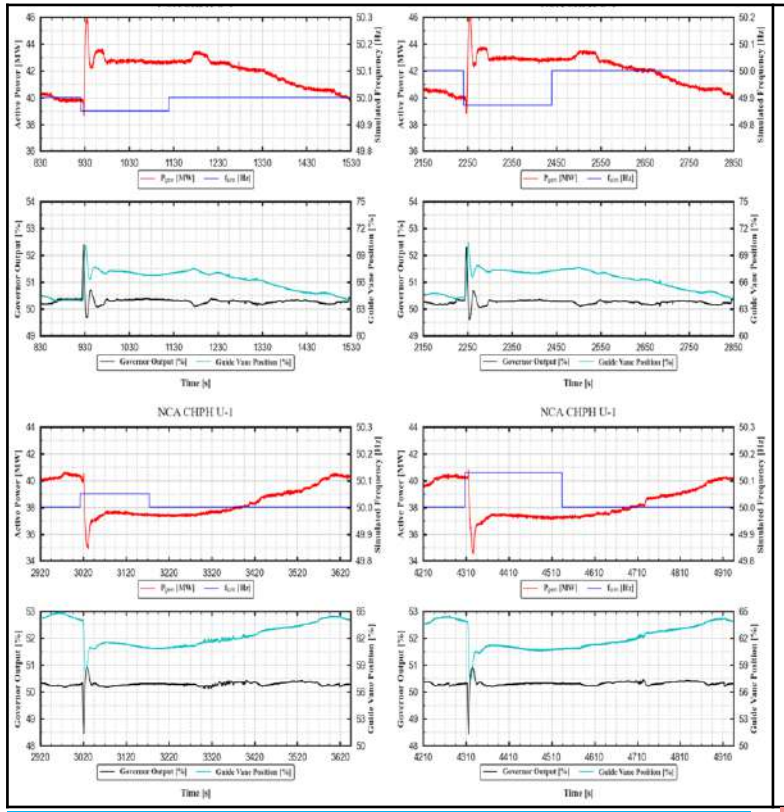
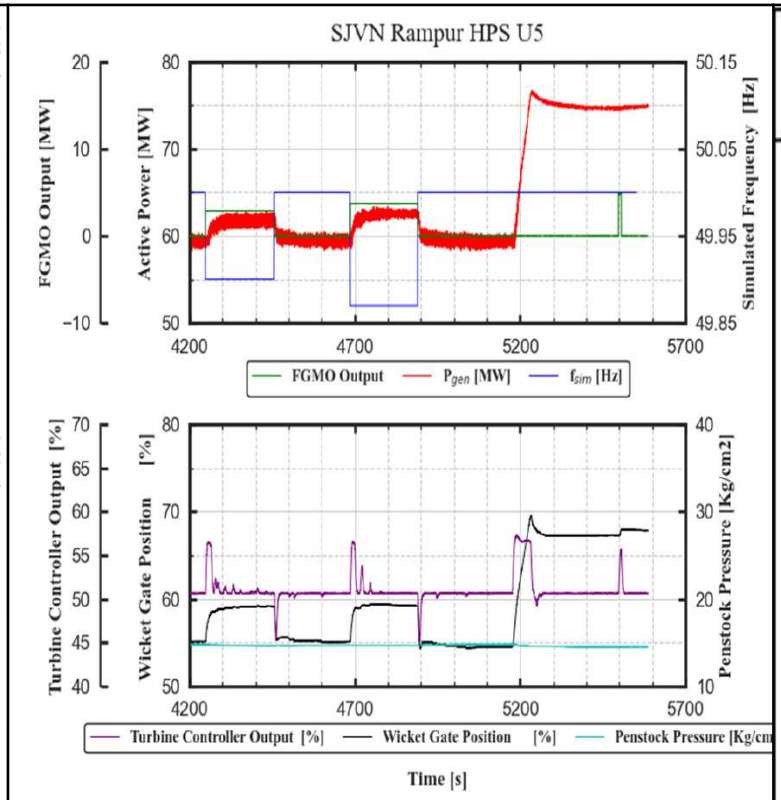
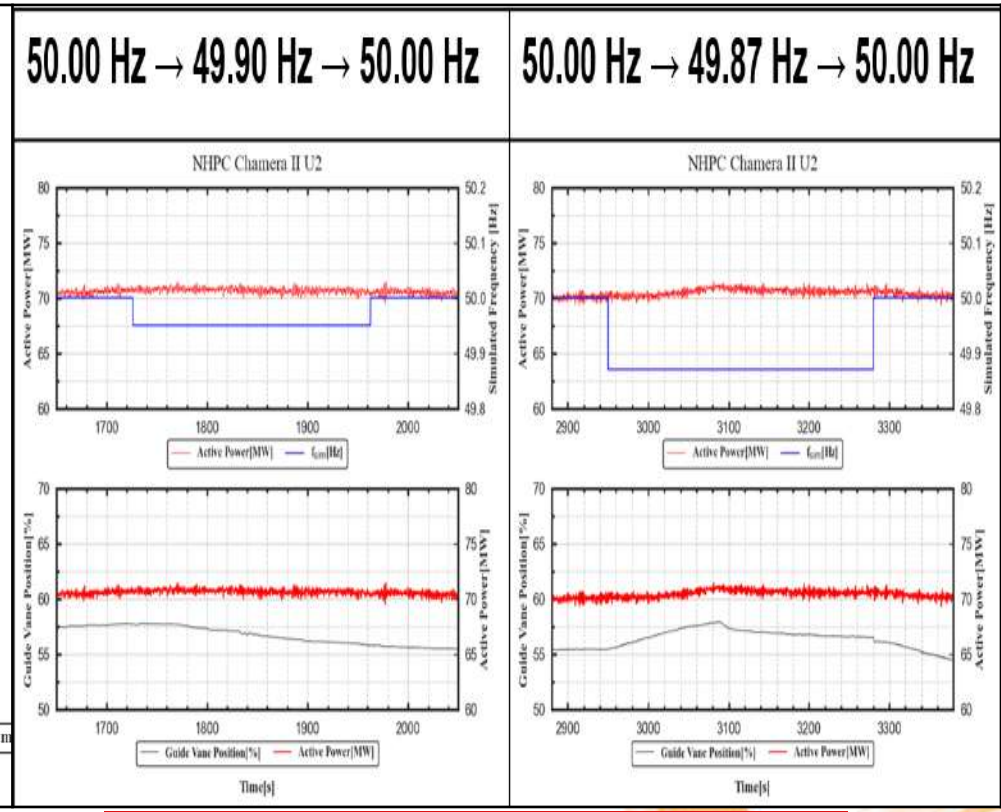
Controller tunning and unit operation related



Fixed % change in MW for any frequency change

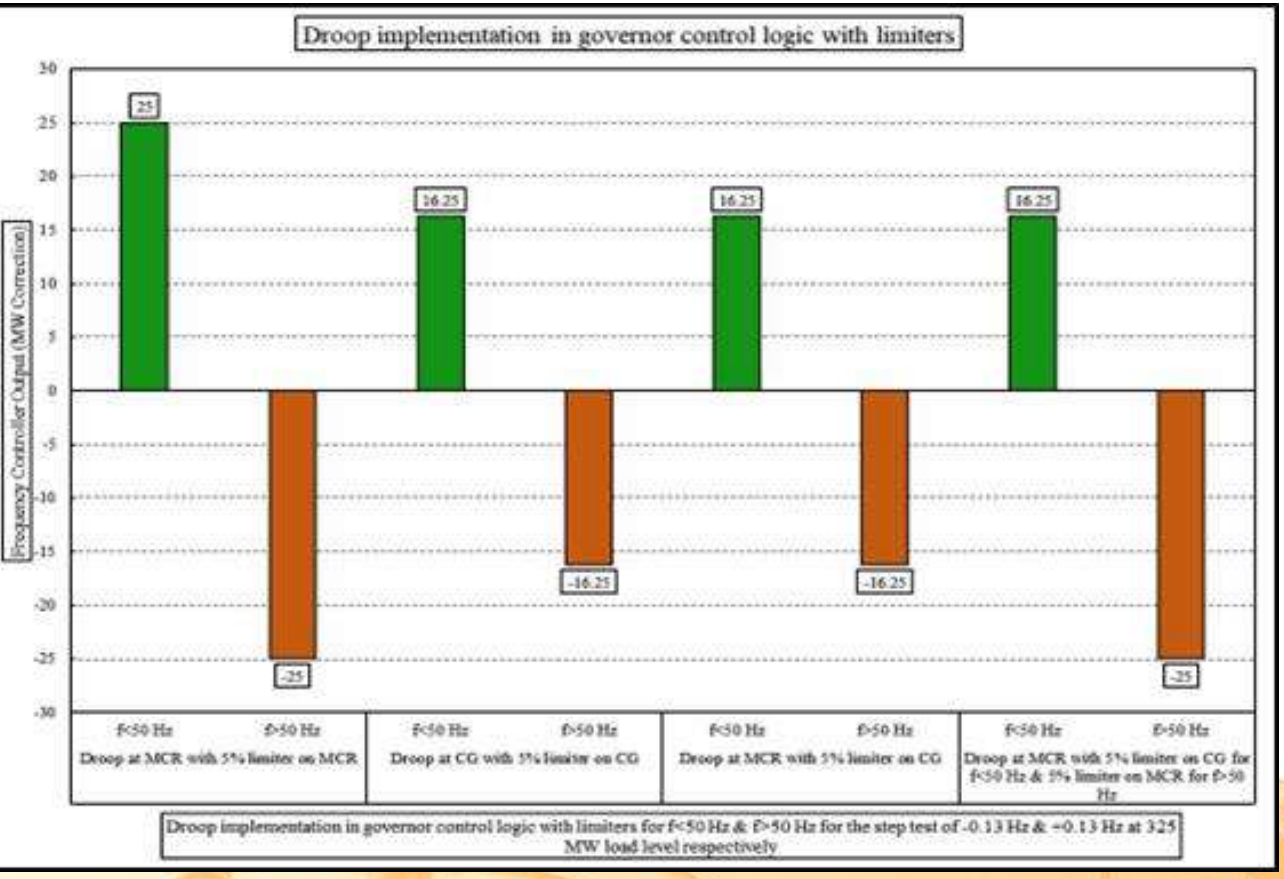


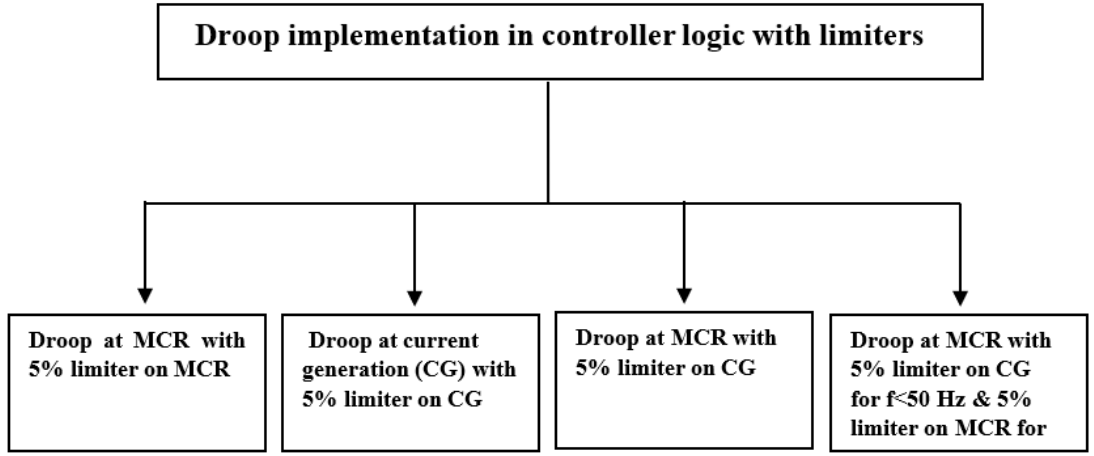
Unstable operation near forbidden zone



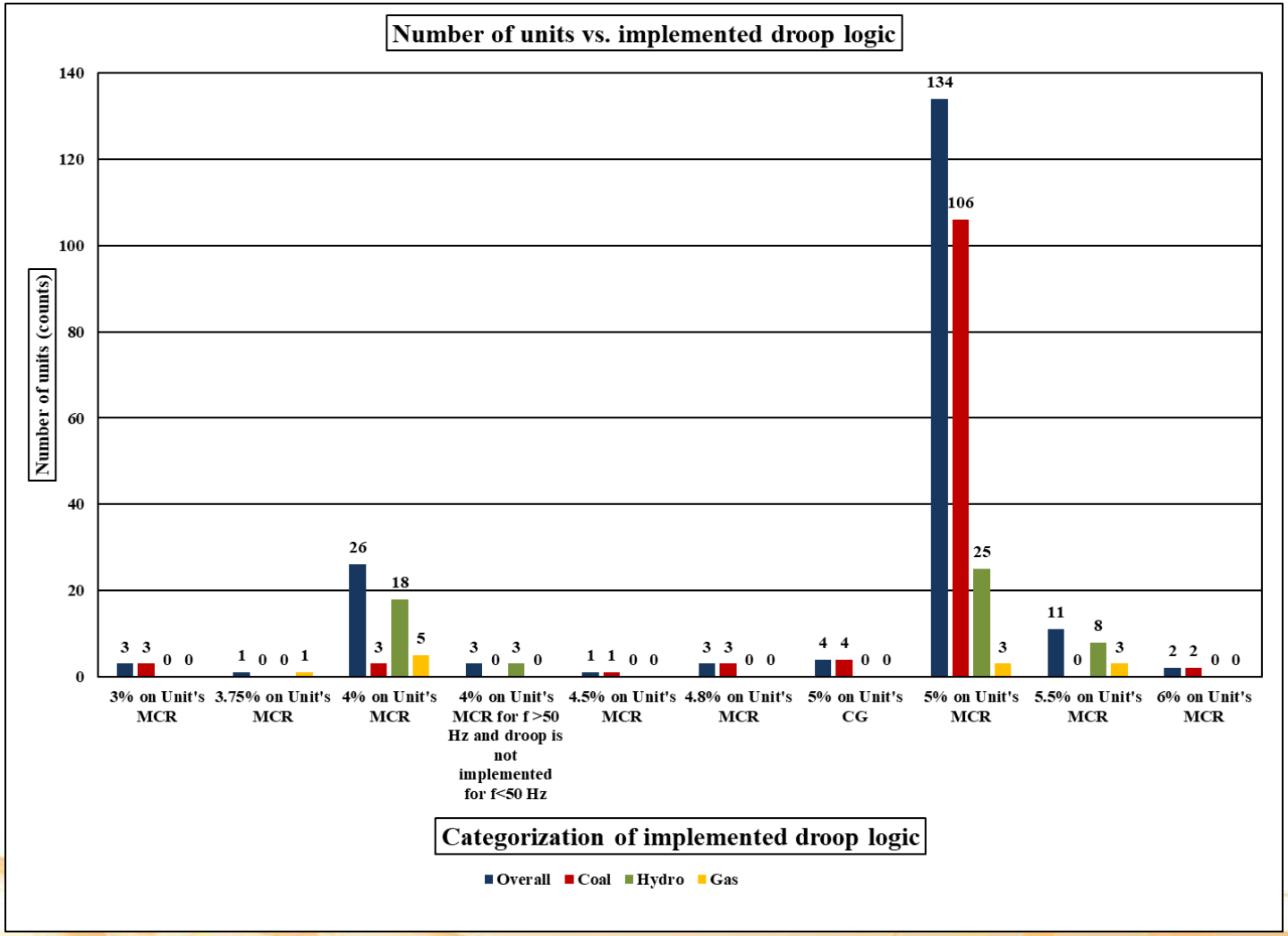
Insignificant PFR due to dead band implemntation

Droop implementation in controller logic with limiters





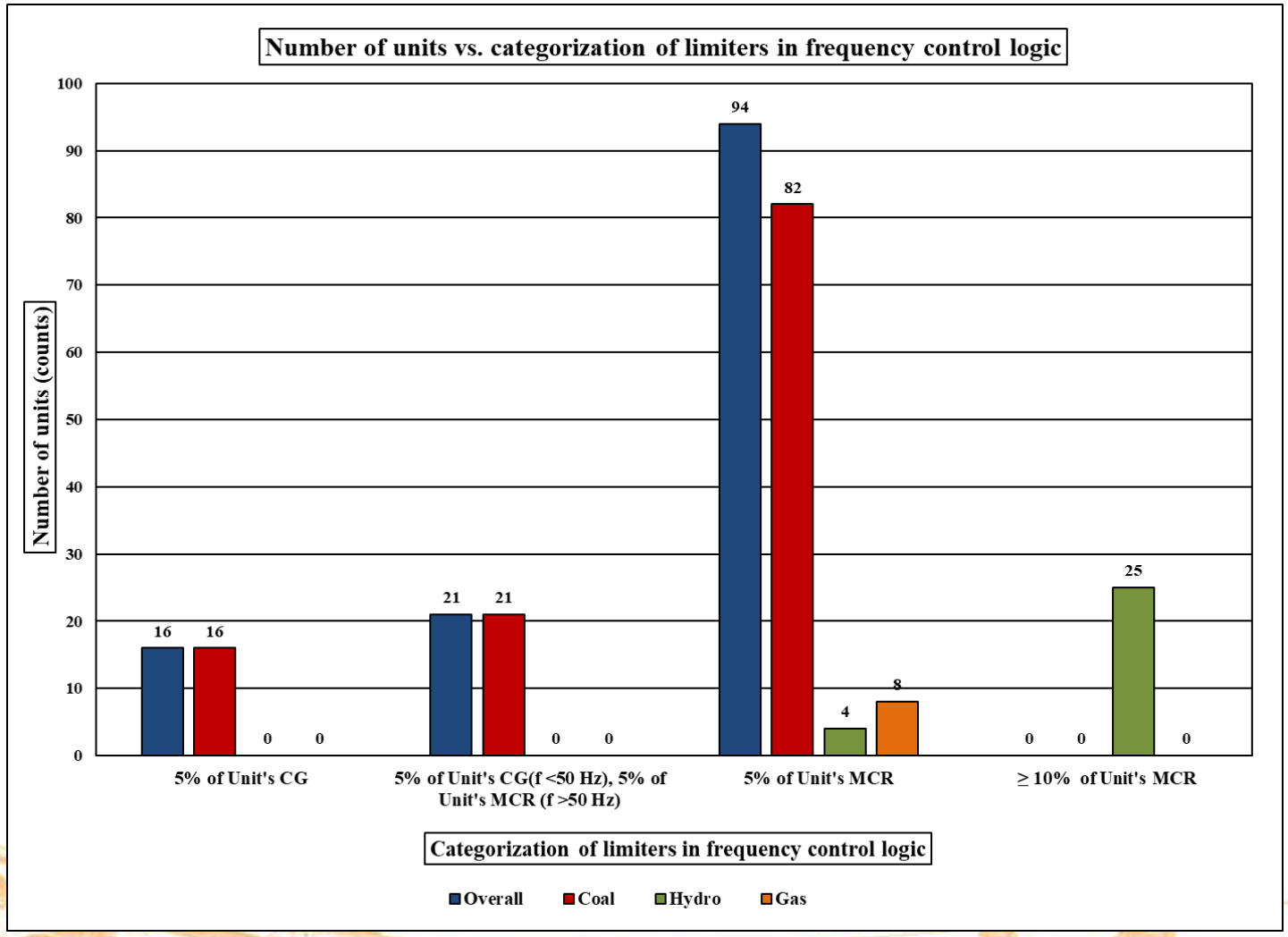
Droop implementation in controller logic



Variations in frequency control logic for implemented droop has been observed among the tested generating units resulting in different frequency controller output (**RGMO output/MW correction**), affecting the MW contribution from the unit simultaneously.

Figure: Bar graph representing number of units vs. implemented droop logic.

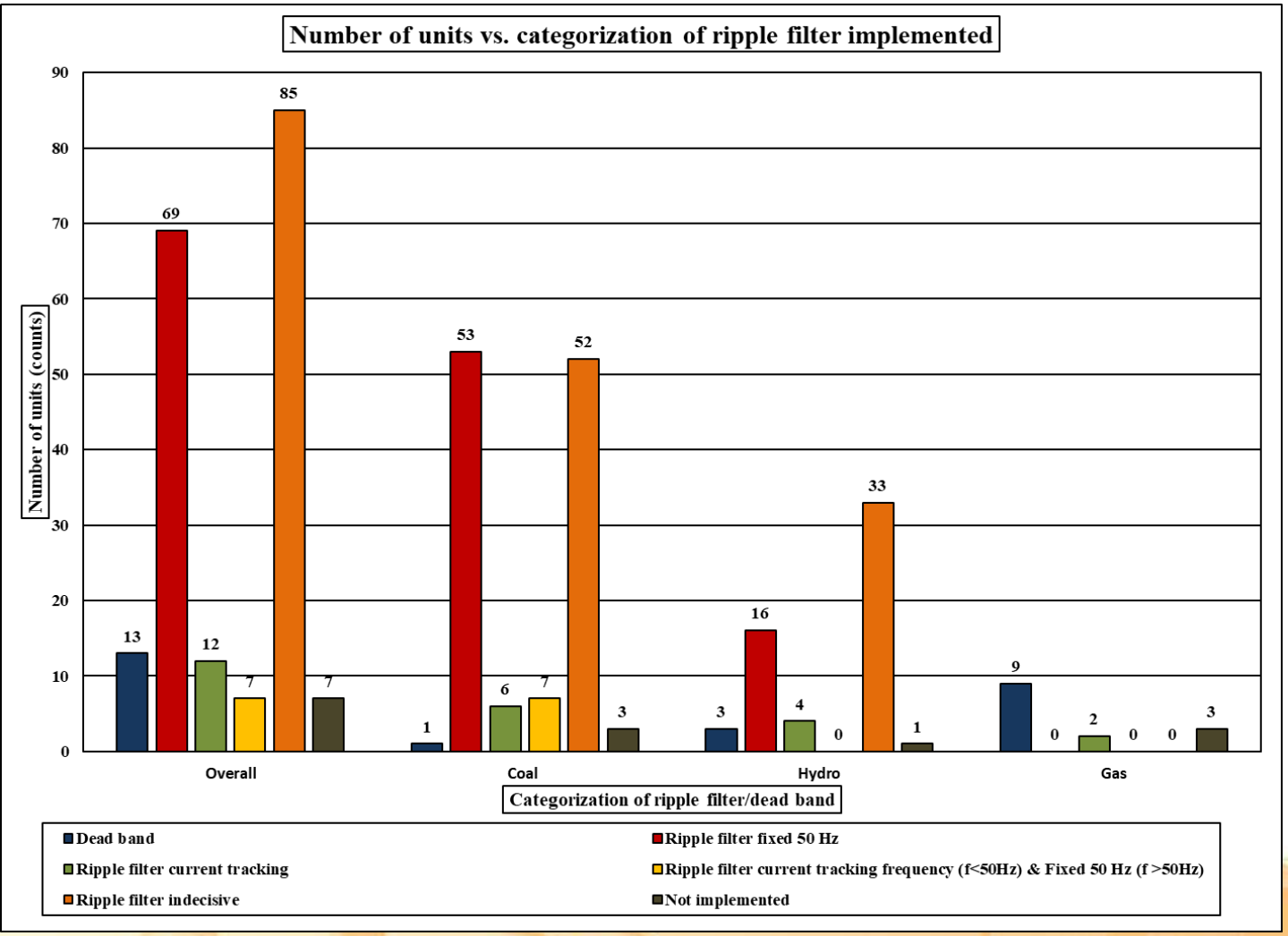
Limiters implemented

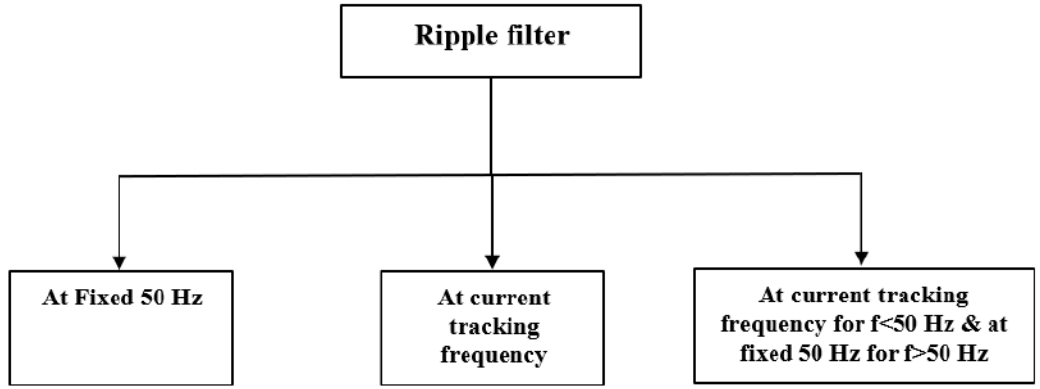


From the analysis of PFR test results, it has been observed that different implemented limiters in frequency control logic restricts the maximum MW contribution from the units leading to lesser contribution than the desired.

Figure: Bar graph representing number of units vs. categorization of different limiters in frequency control logic.

Ripple Filter implementation





Note: Category of ripple filter indecisive includes those units, **where ripple filter is implemented** in frequency control logic but status of ripple filter being implemented whether at fixed 50 Hz or current tracking frequency is unknown.

Figure: Bar graph representing number of units vs. categorisation of ripple filter/dead band.

Scan Time and Intentional delay

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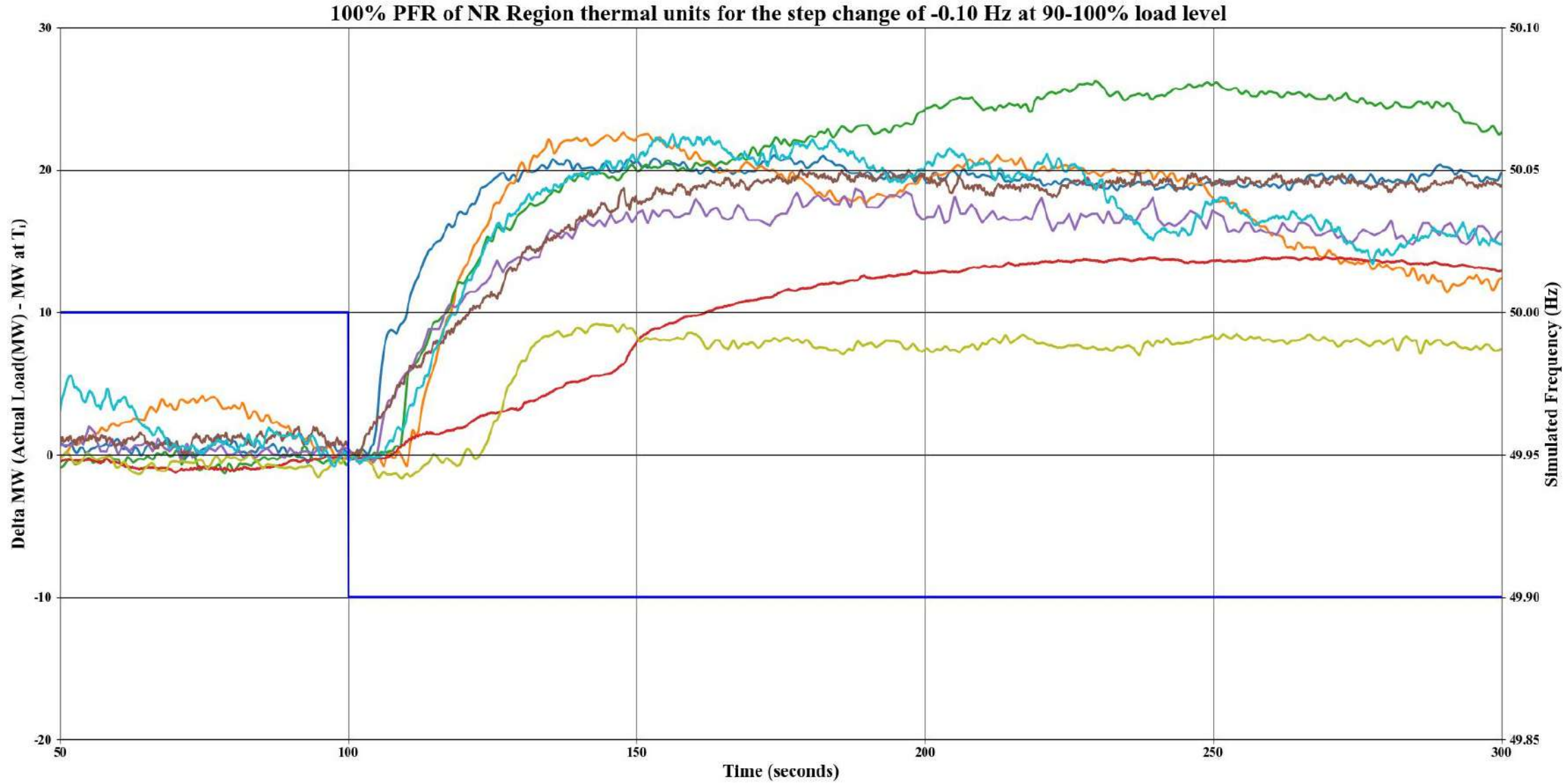
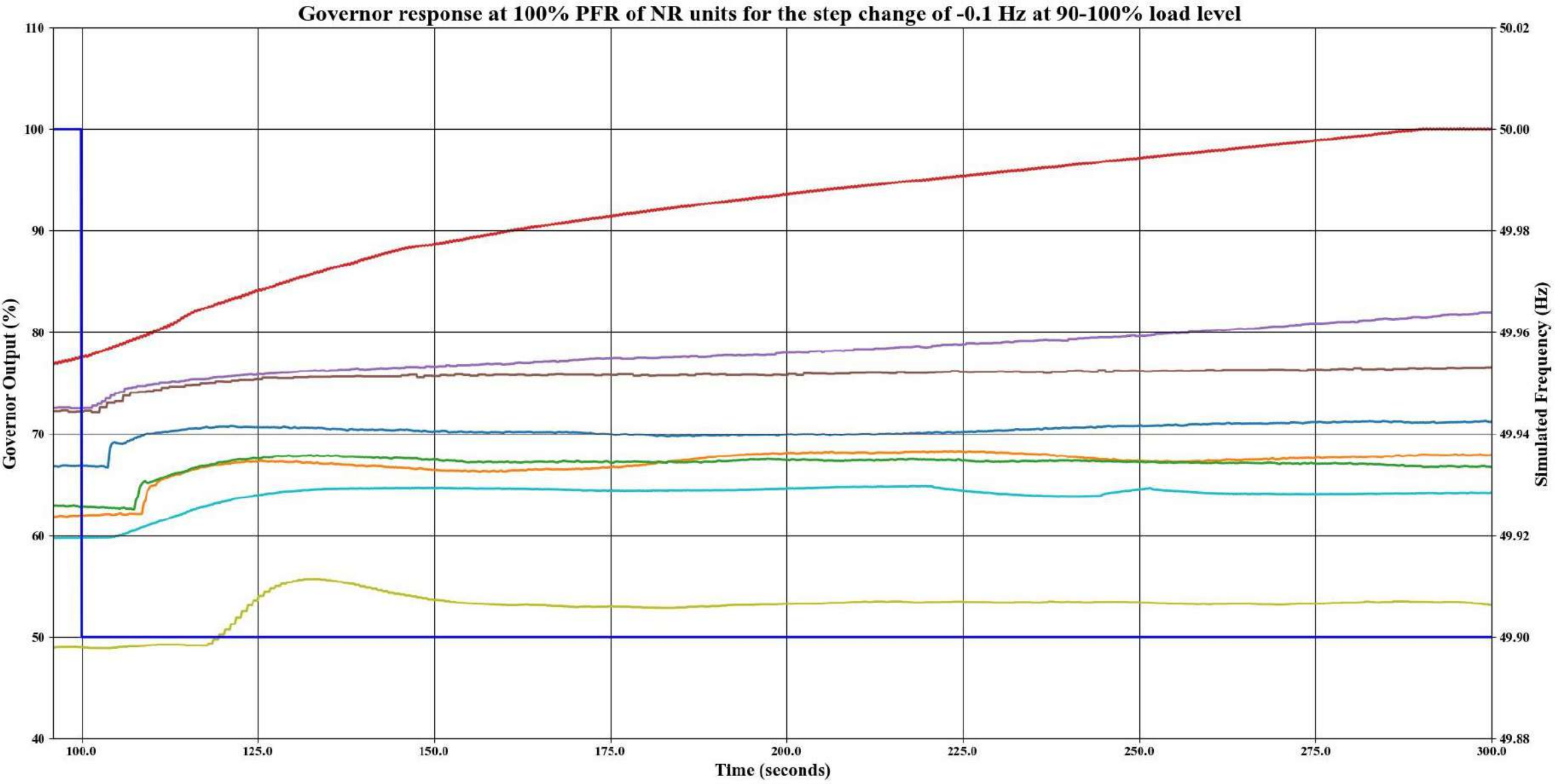
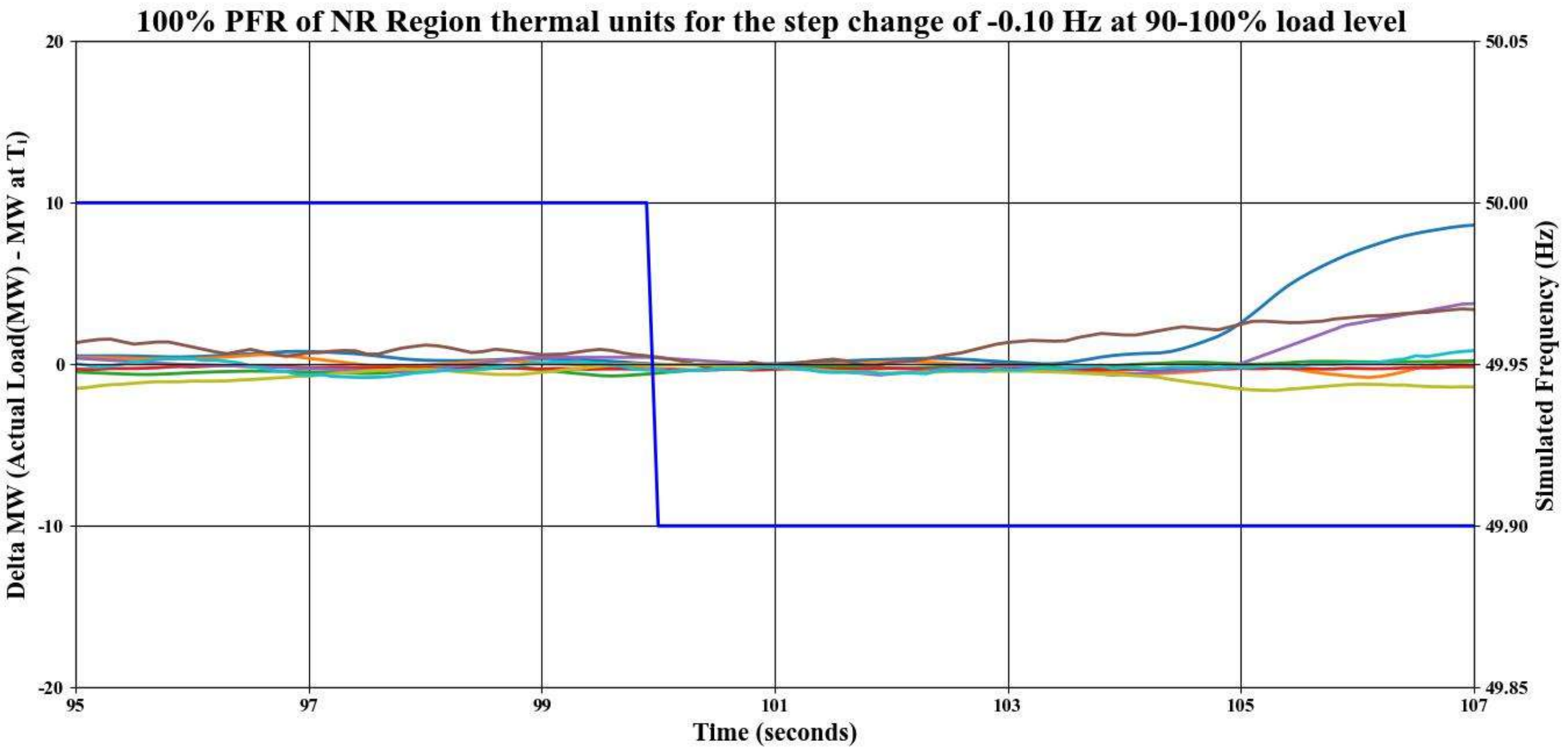


Scan time and intentional delay



Scan time and intentional delay

Solvina



Scan time and the intentional delay

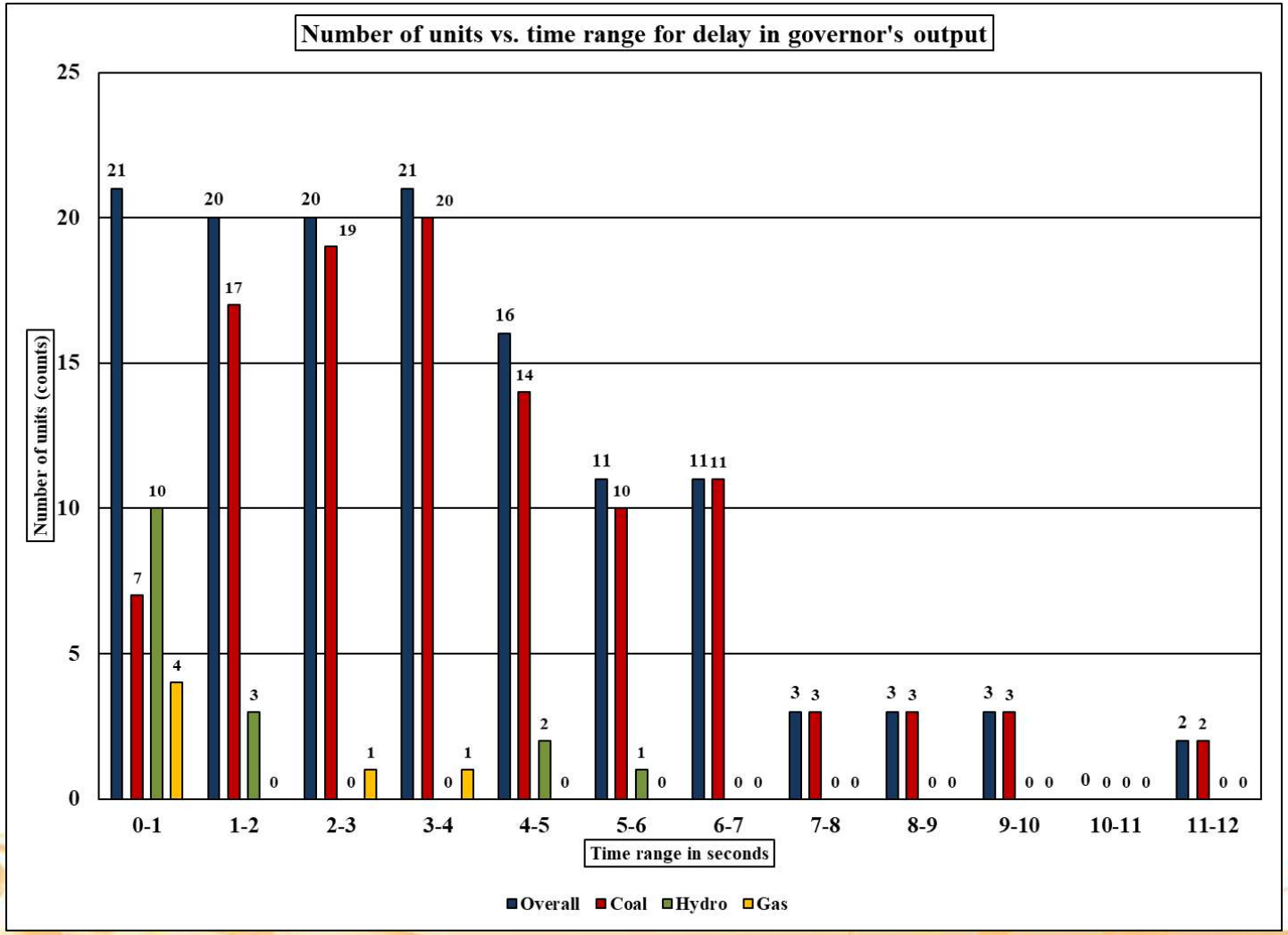
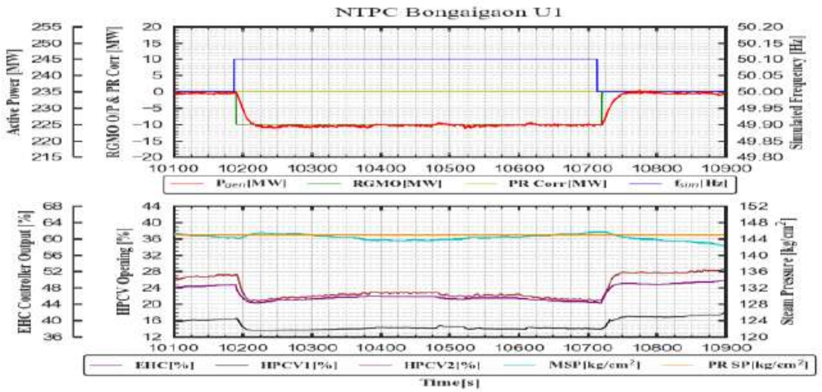
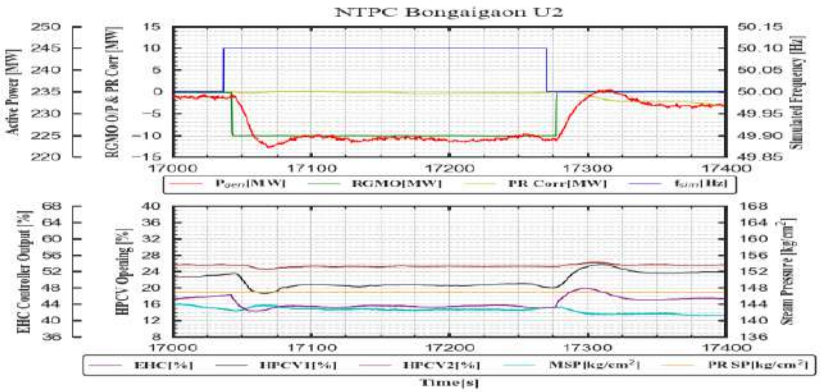


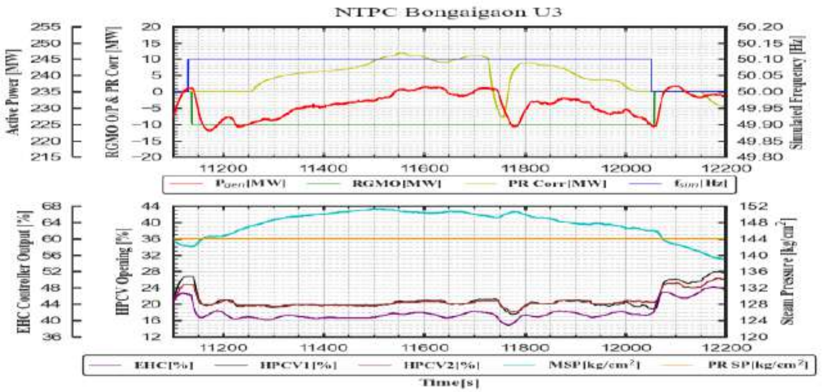
Figure: Bar graph representation of number of units with different time delays.

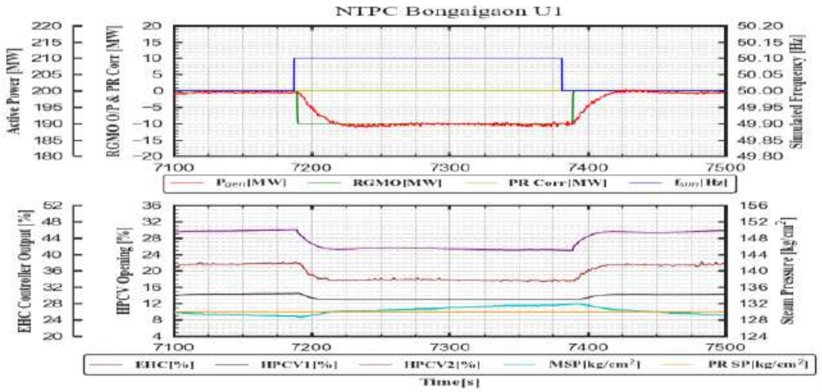
Key observations: PFR of the units at the same station

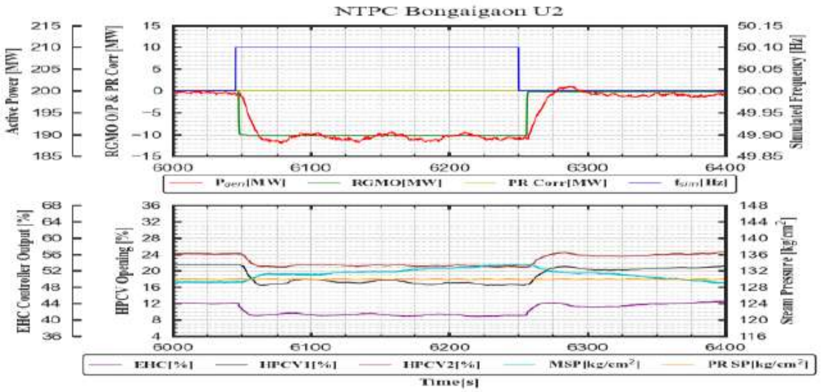
Unit 1	Unit 2	Unit 3

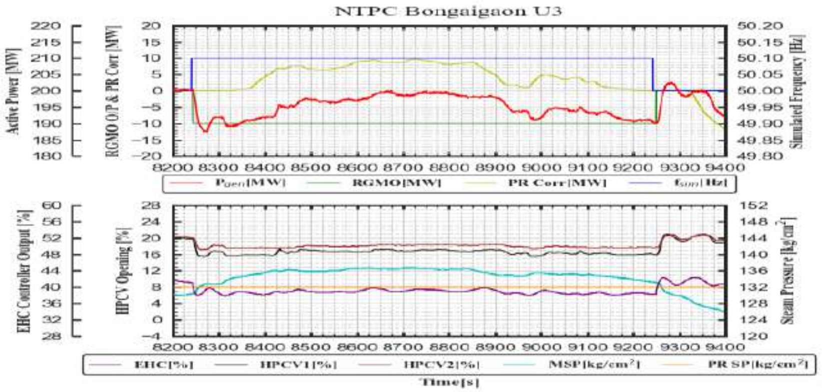


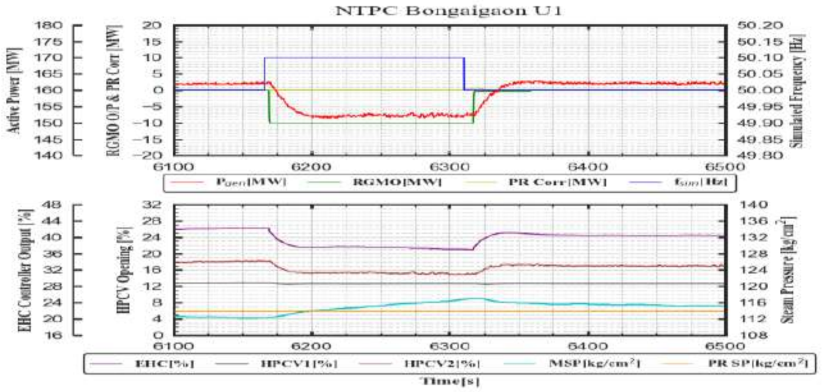


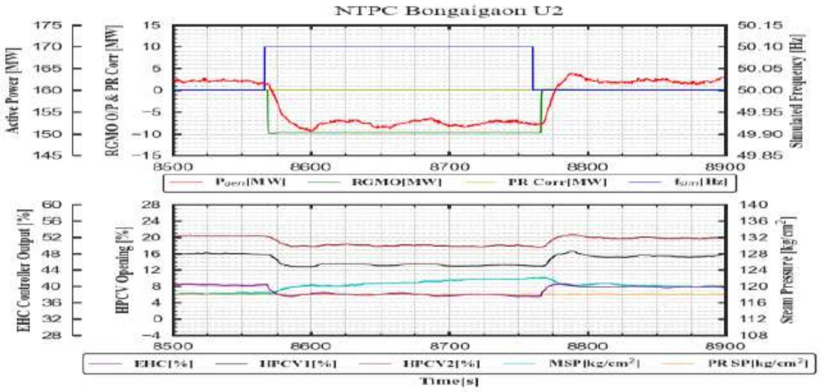


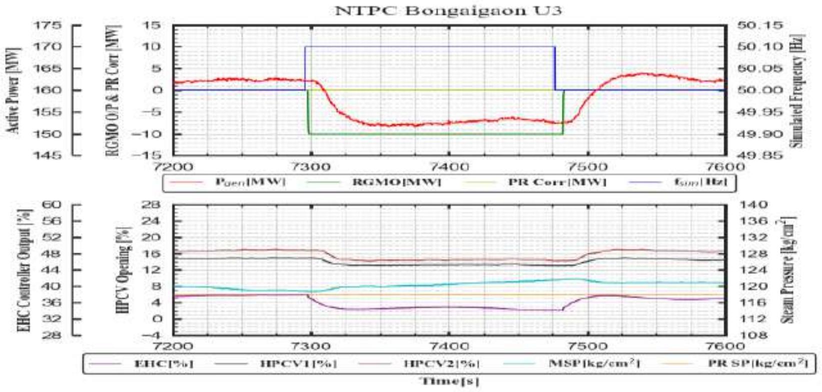












Key observations: PFR of the units at different stations having same rating and vintage

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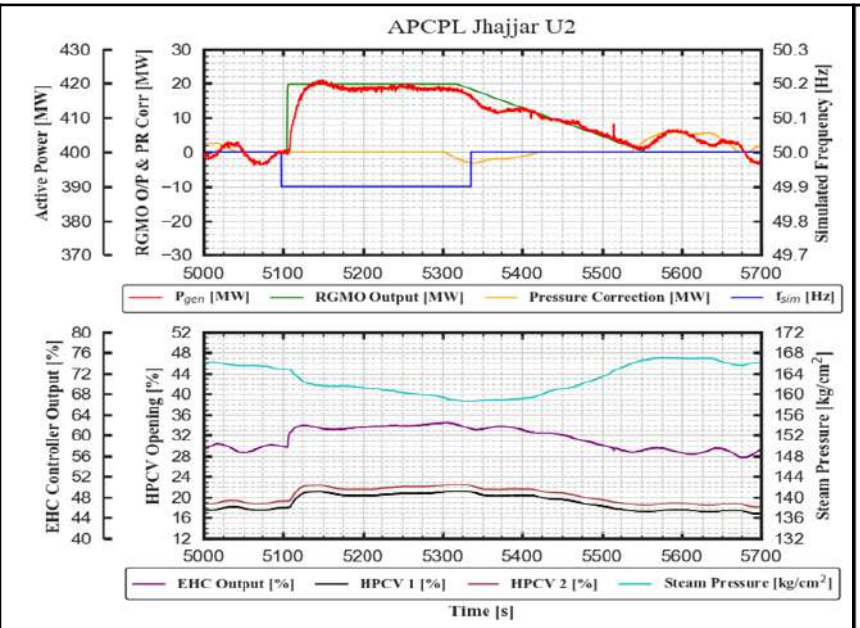

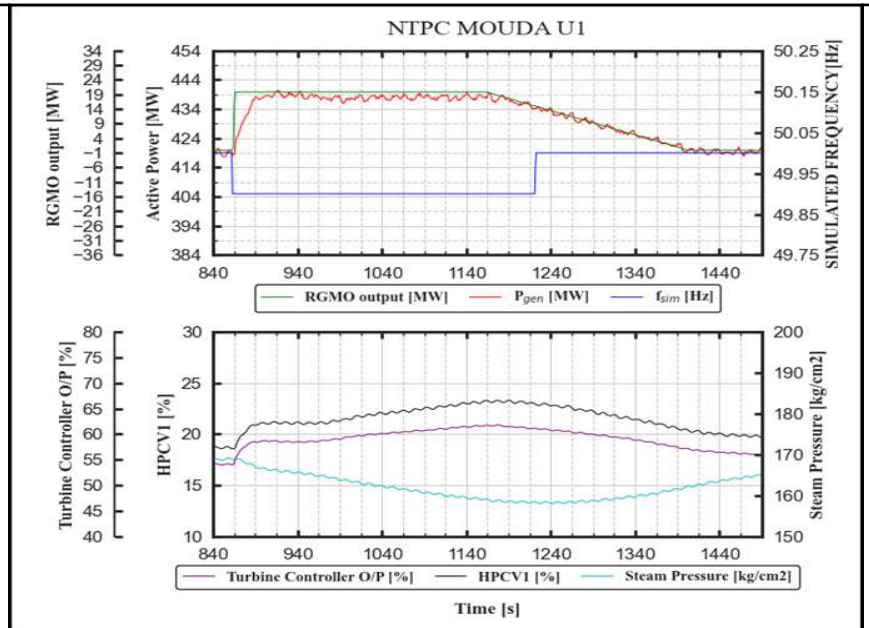

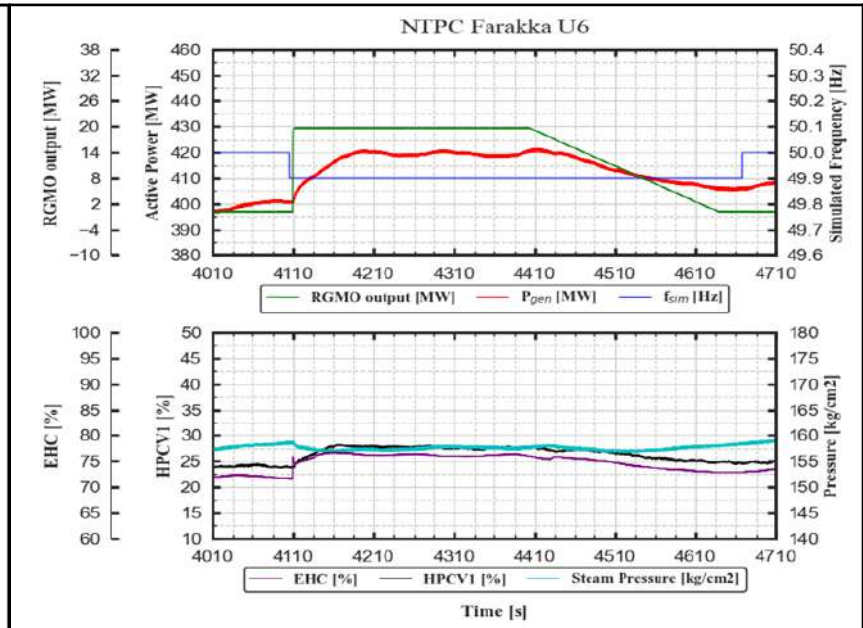

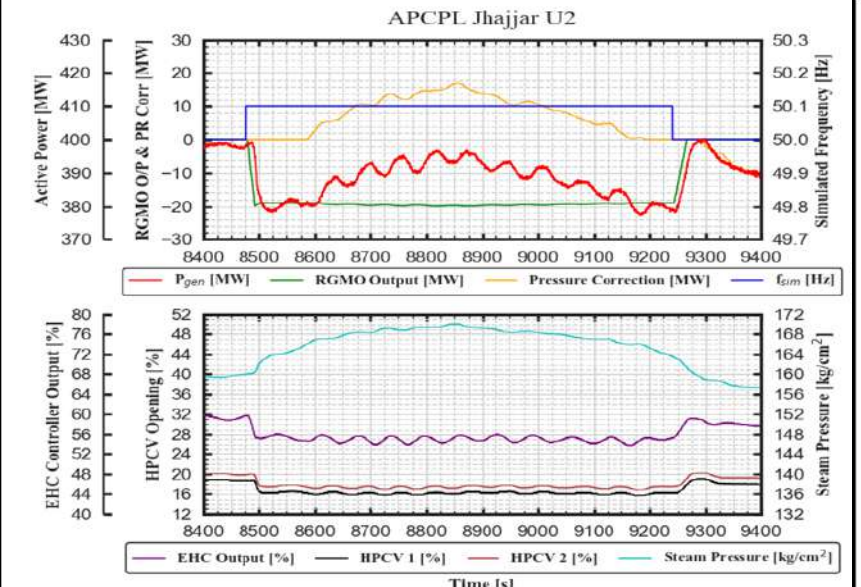

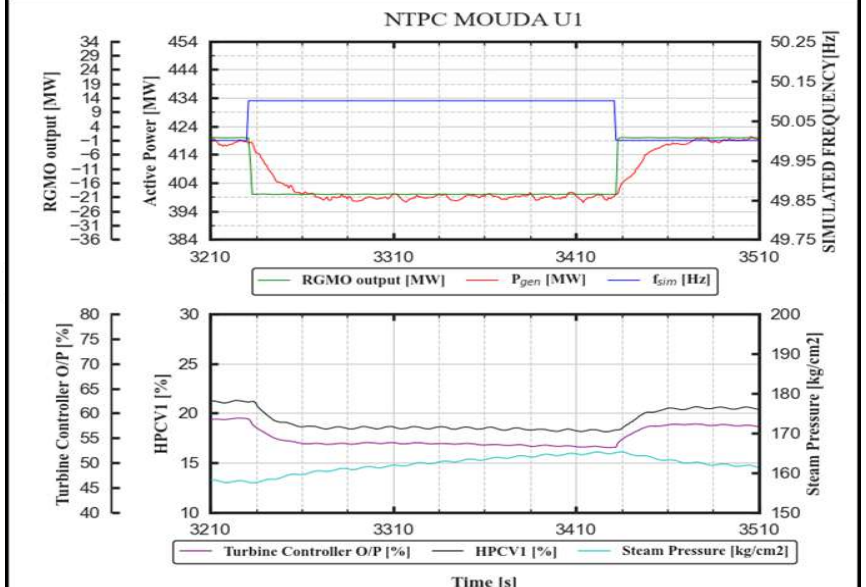

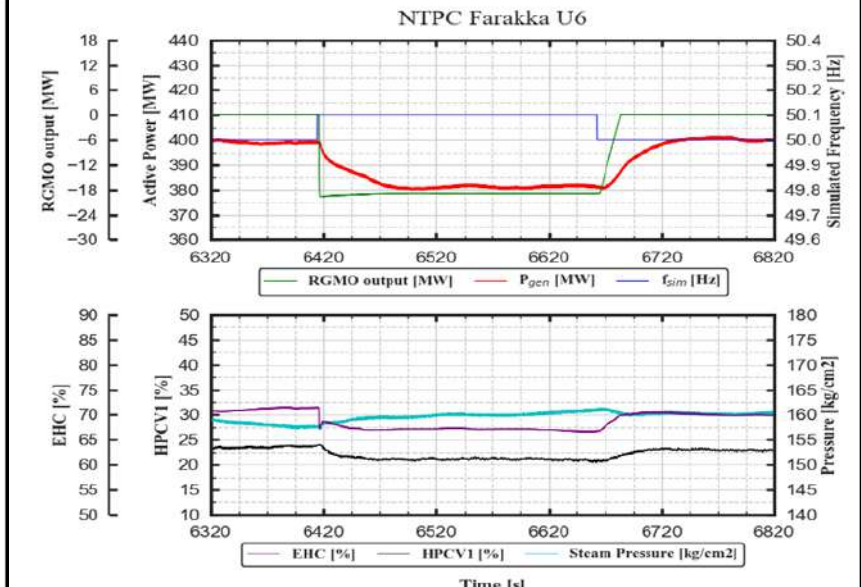

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   b) way ahead
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Key Observation: Initial response of controller during frequency changes

A. Immediate response
B. Gradient response

A. Immediate response

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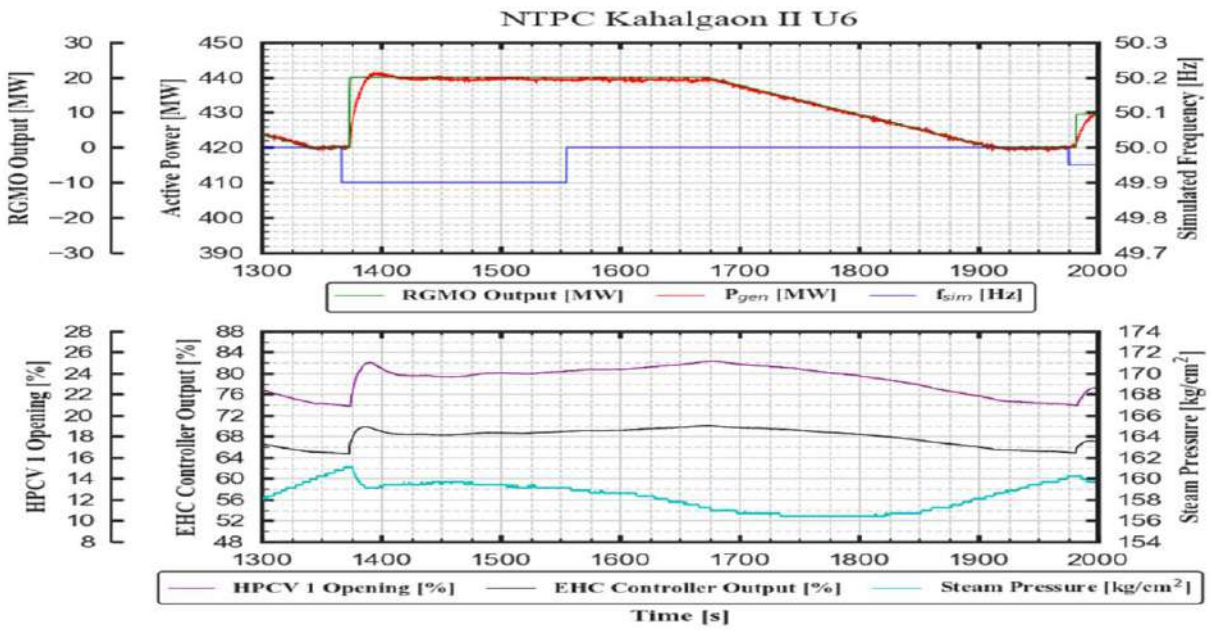
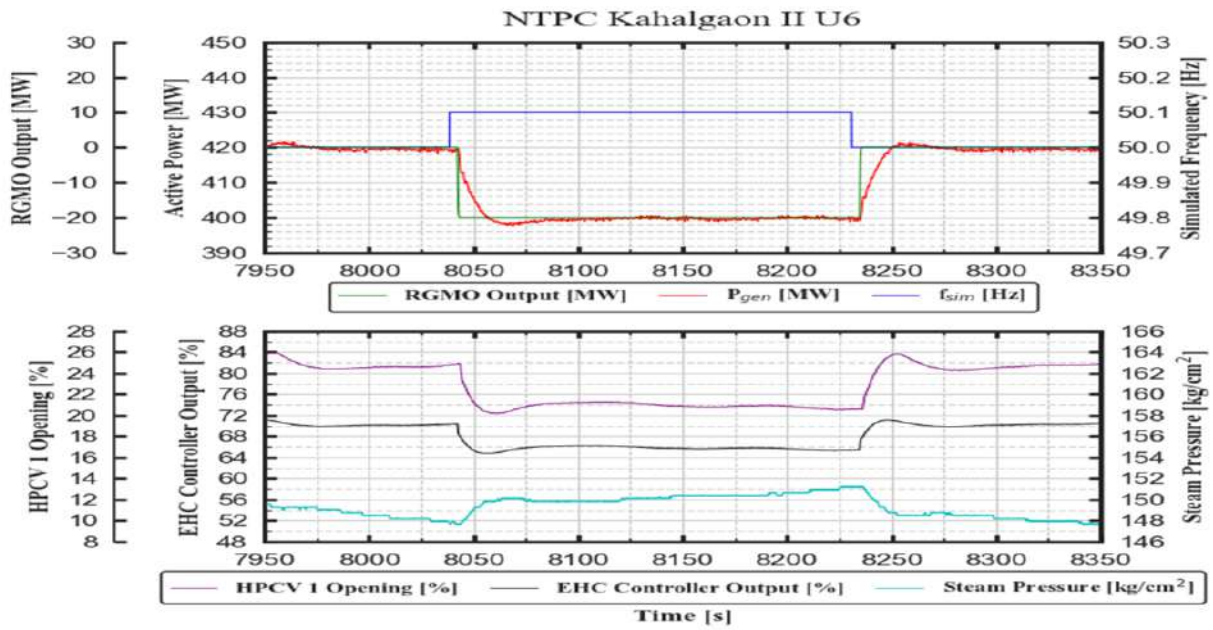
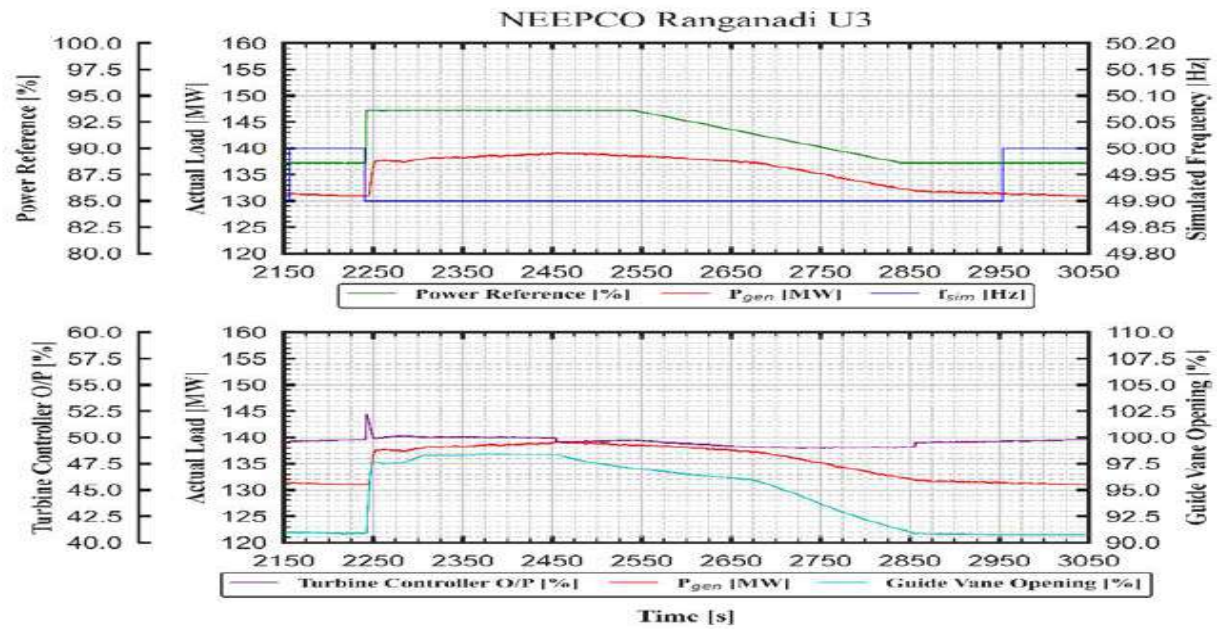
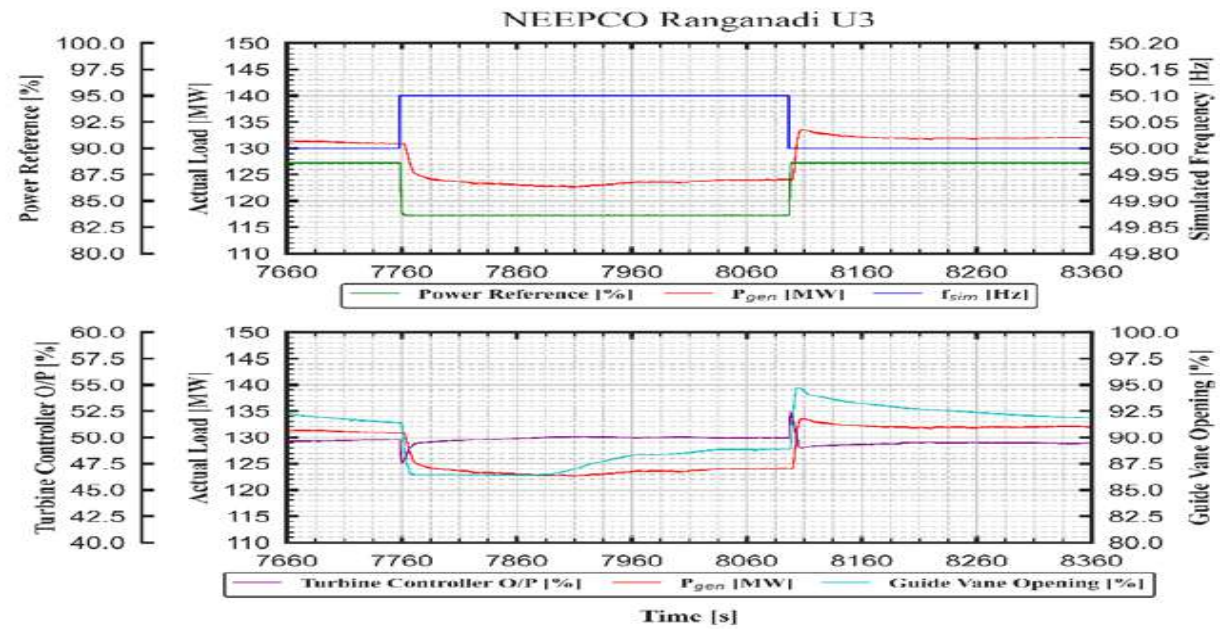


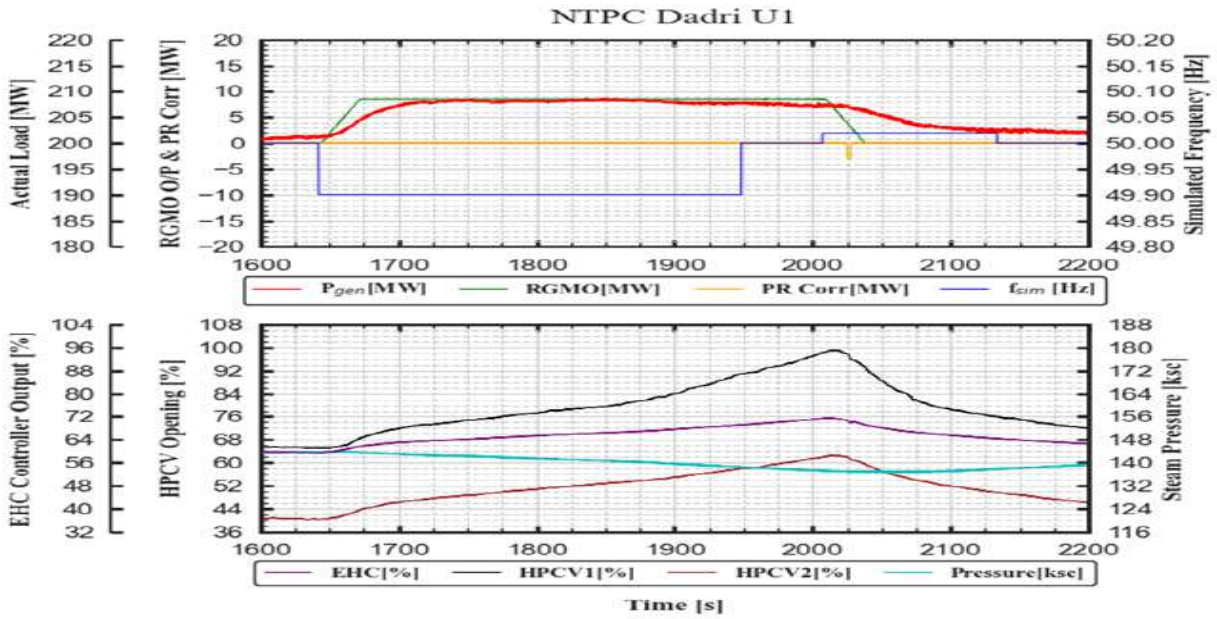


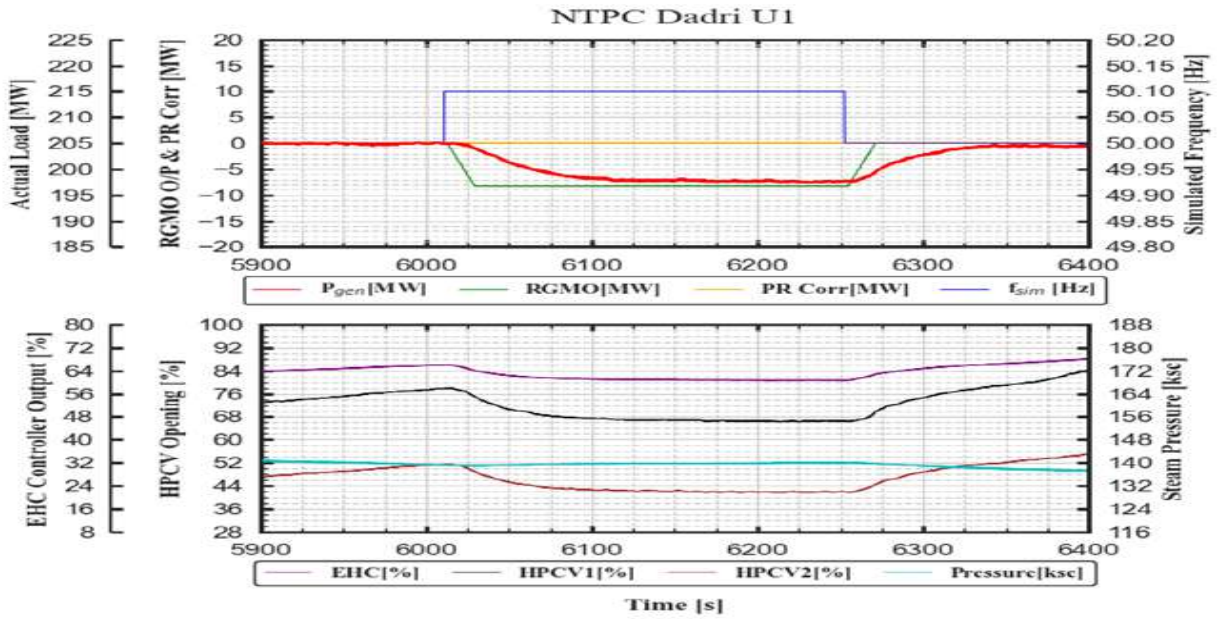


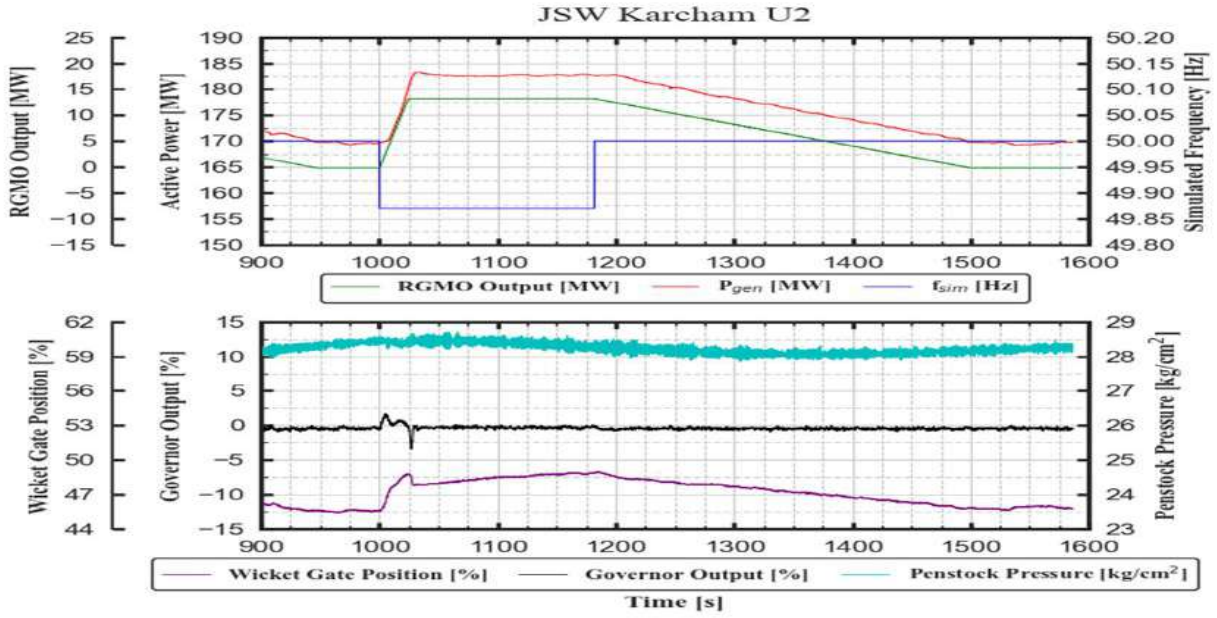


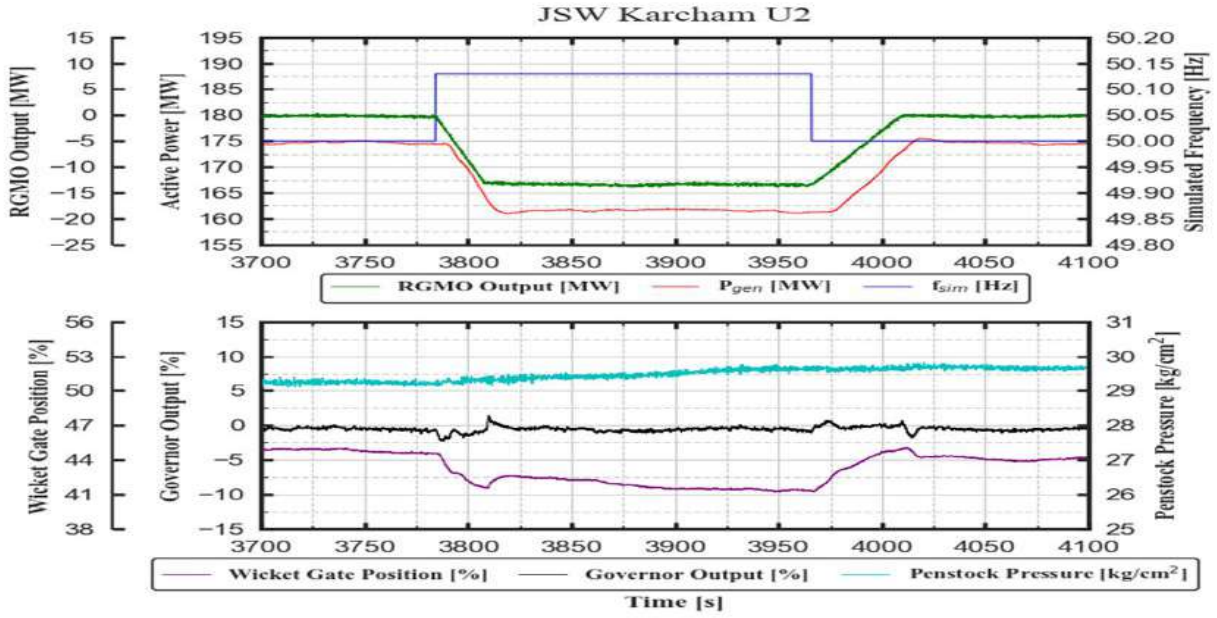
B. Gradient response

Solvina

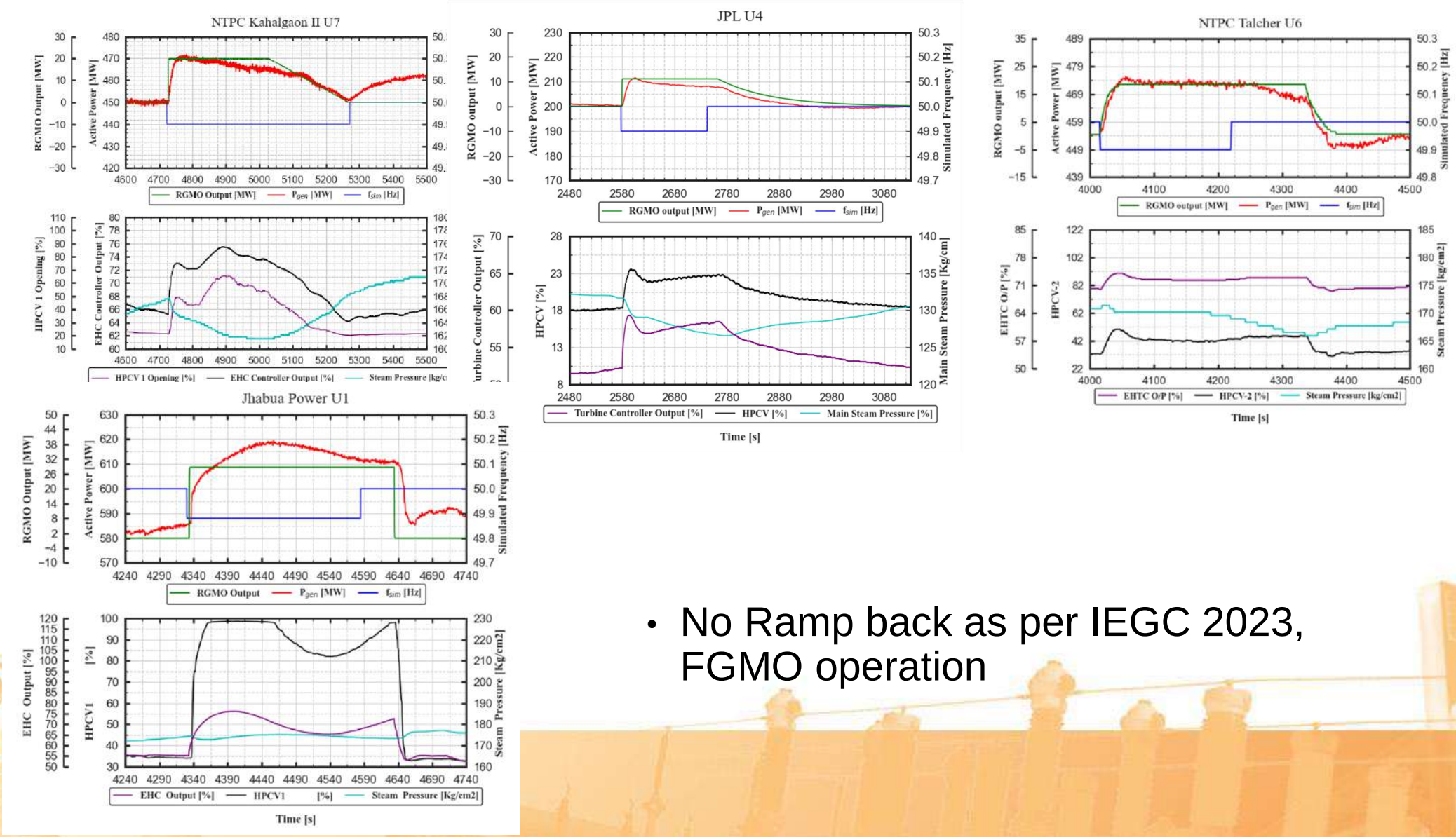








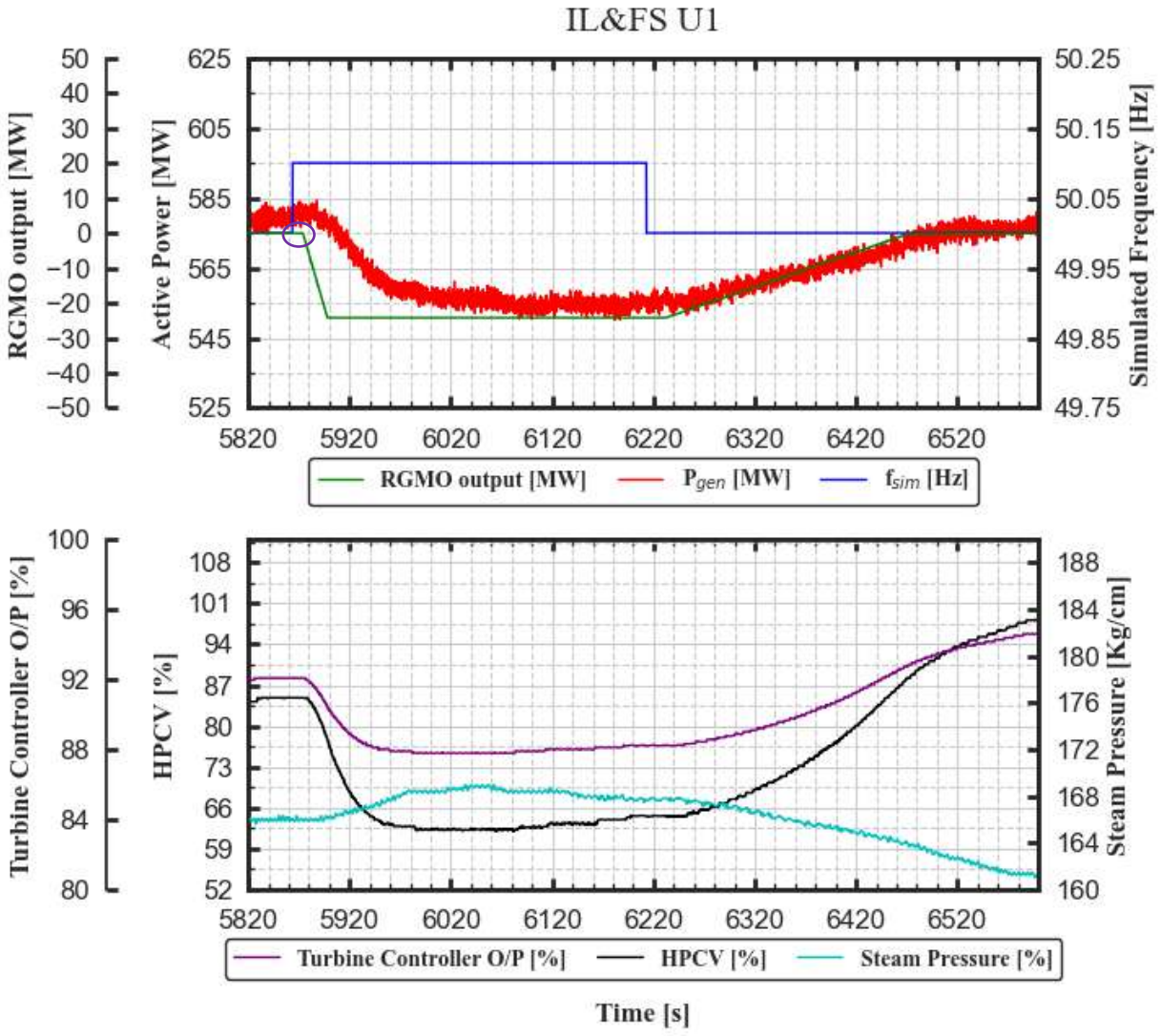
Ramp-back rate at 1% per minute



- No Ramp back as per IEGC 2023, FGMO operation

Solvina

Key Observation:
Delay in initiation of response



Key Observations:

- For steps above 50 Hz at all load levels, **sluggish response from the unit to achieve desired MW correction.**
- **No response** from the unit when normalizing the frequency back to 50 Hz.
- **After 25 seconds** from normalization**, the unit withdraws its correction** at the rate of 1% per minute.

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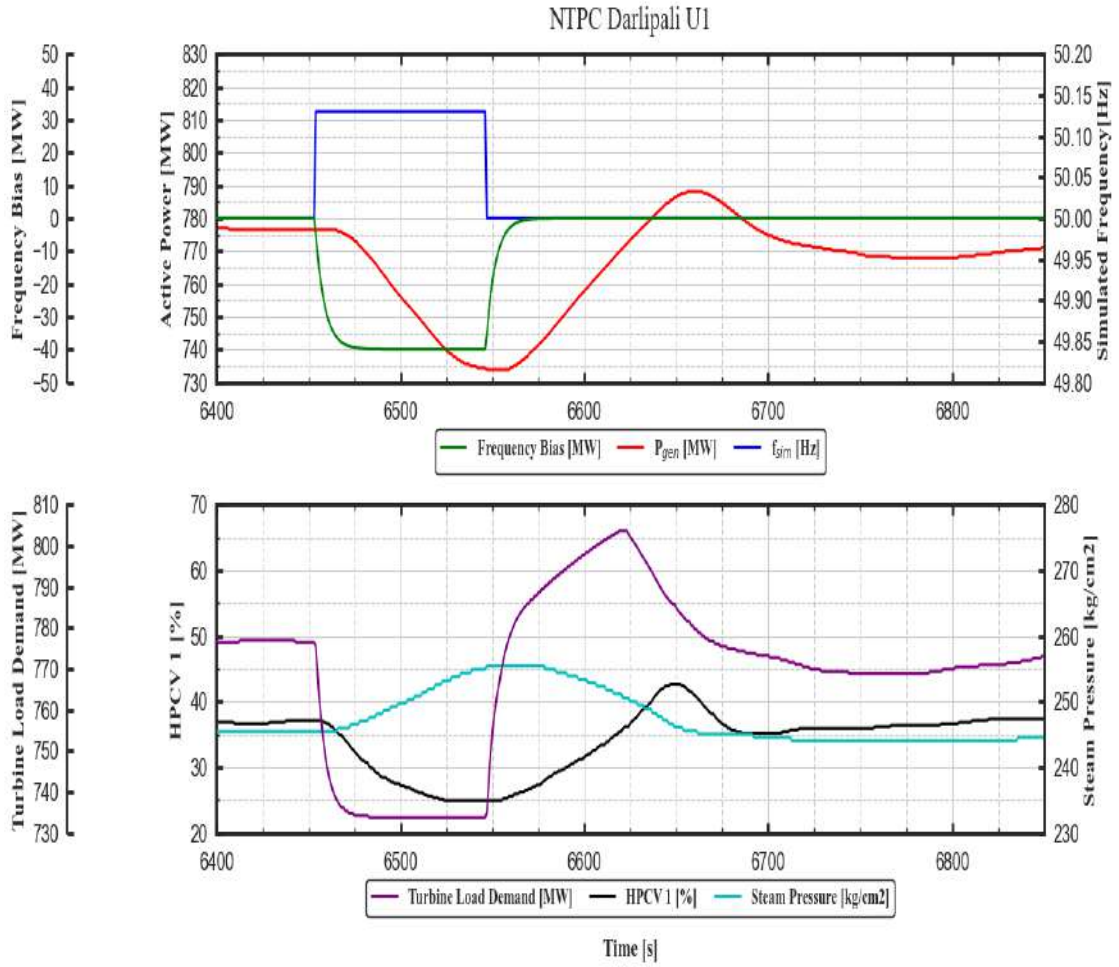
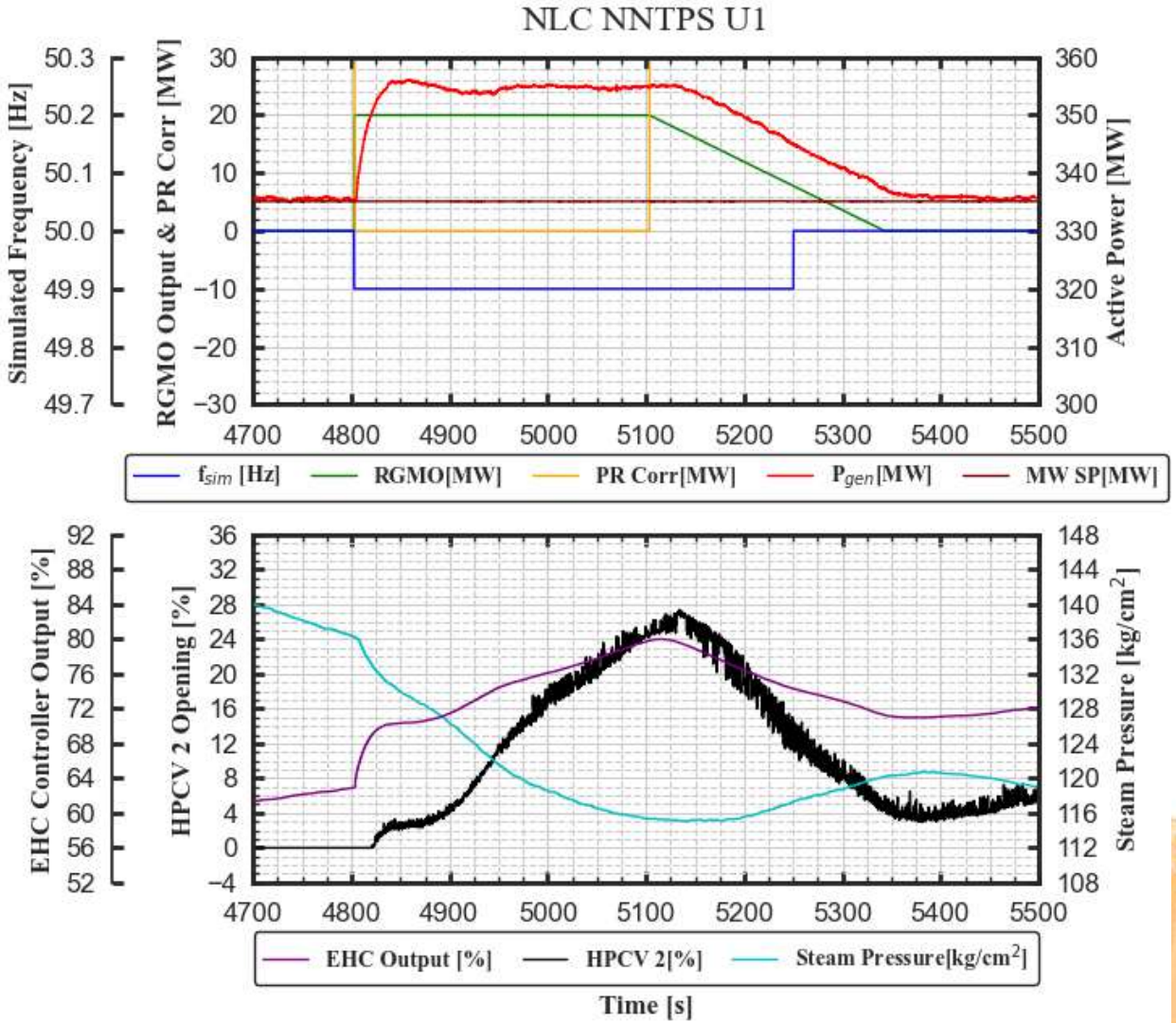
Key Observation:
Delay in initiation of response



Key Observations:

- At all load levels, **sluggish response from the unit to achieve desired MW correction.**
- **After 20 seconds** from normalization**, the unit withdraws its correction**.

Key Observation:
Deactivated pressure correction (MW) logic



Key Observations:

- It was observed that the unit response was stable, and quantum of MW change was as per droop.

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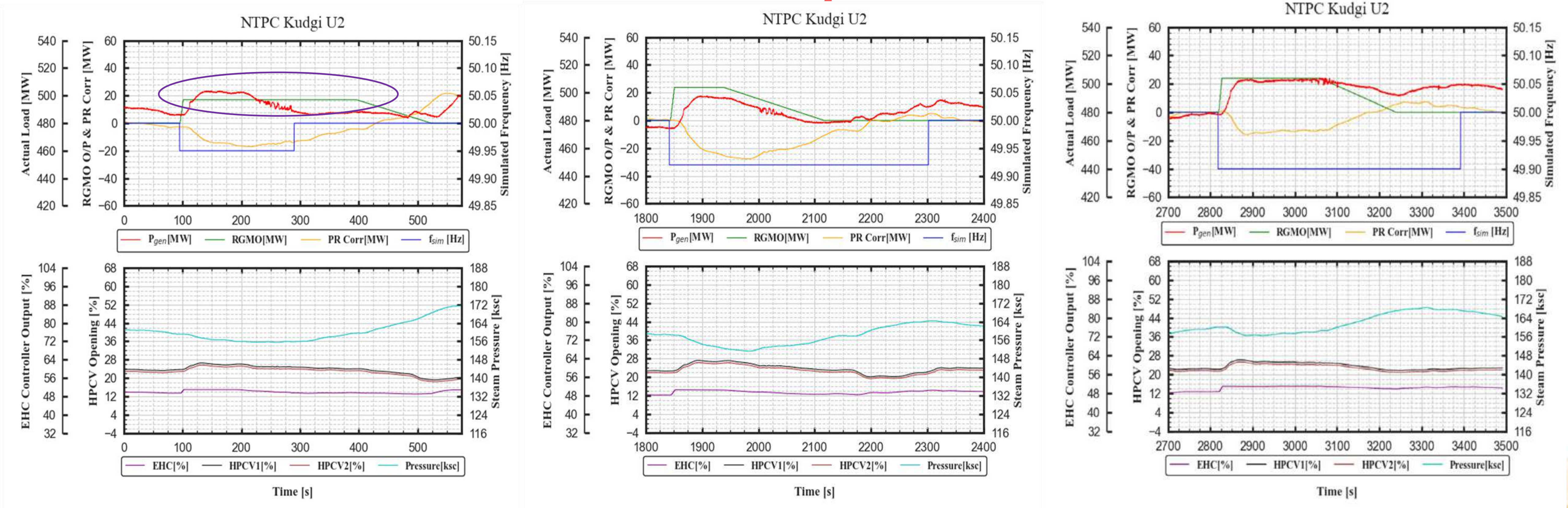
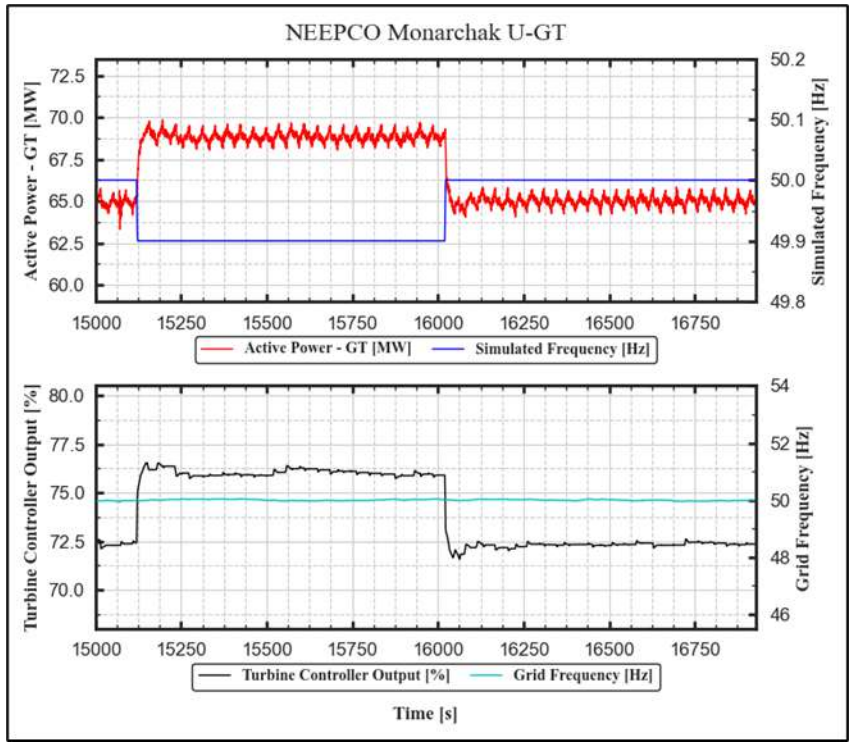
Key Observation:
Variable hold time of the response

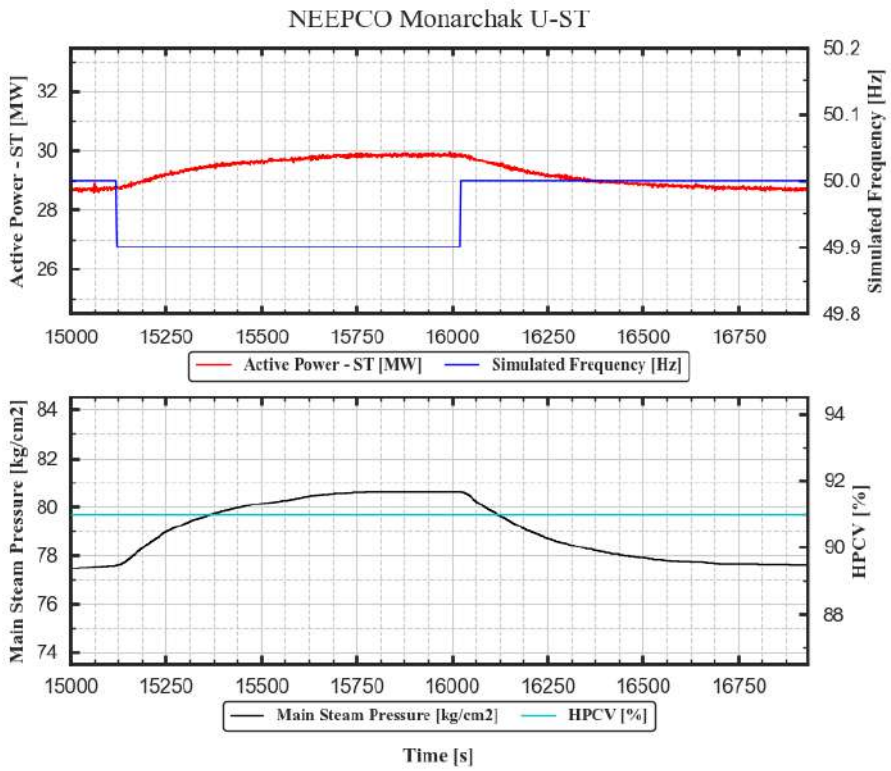


Key Observations:

- Variable hold time was observed for all tested units
- Pressure is not stable → RGMO output withdraws at a rate of 1% per minute

Key observations GT ST combined cycle test NEEPCO Monarchak





PFR test of GT and ST in combined cycle (first of its kind)

Simulated frequency change applied to governor of GT, response from GT and ST observed

When unit operates in base load mode no PFR contribution

Provides primary frequency response only when operated in pre select mode.

Response from ST is delayed (10-15 min.), which is non supportive in PFR

Time constant (τ), Rise time (Tr) & Full response time (T).

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Time constant (τ)

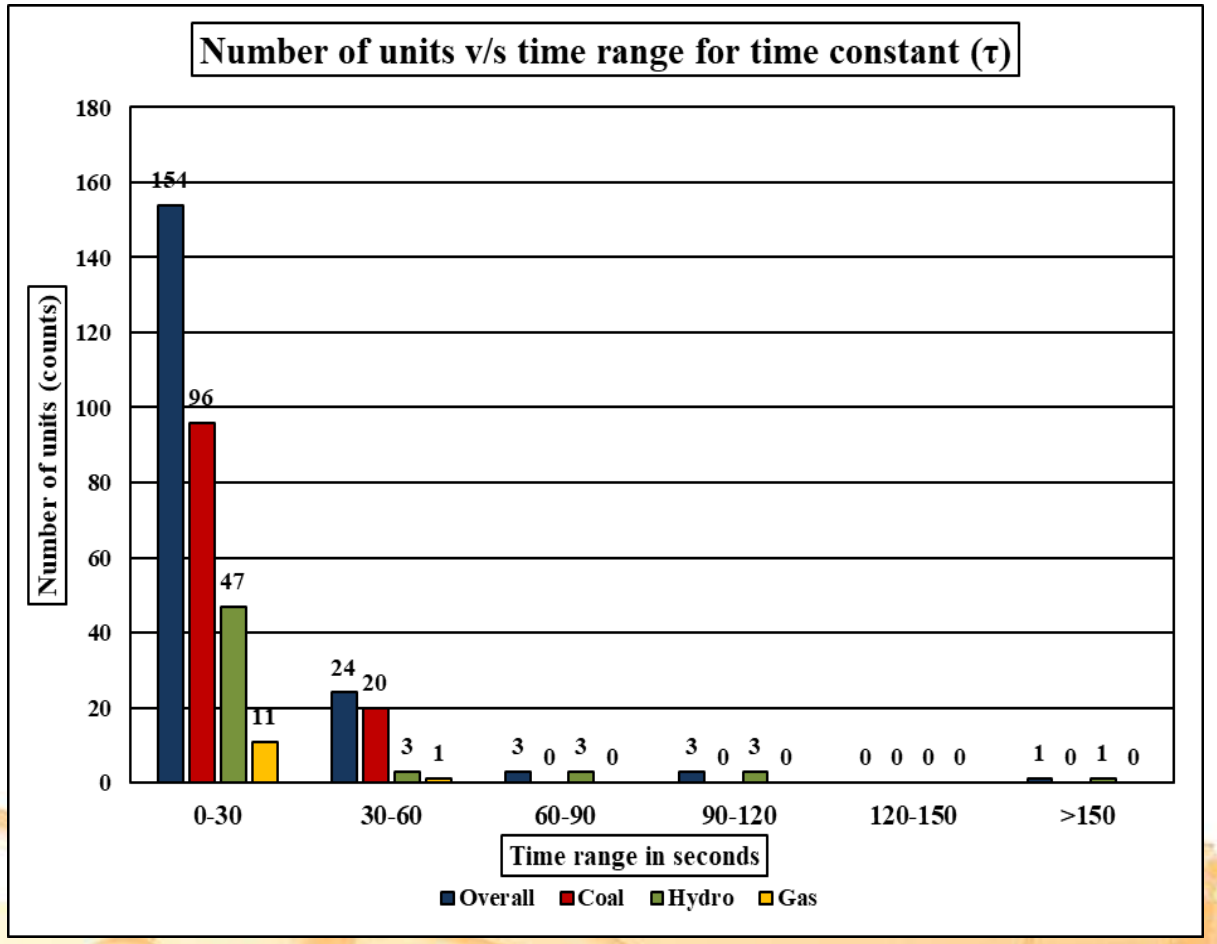


Figure: Bar graph representation of number of units vs. time range for time constant.

- **Time constant for all the units for the frequency step of -/+0.10 Hz lies within the range of 150 seconds.**

From the represented bar graph for time constant, it can be concluded that:

1. 154 units (96-coal, 47-hydro & 11-gas units) out of 193 units i.e., **80% units are contributing 63.2% of full response* within 30 seconds.**
2. Even 178 units (116-coal, 50-hydro & 12-gas units) out of 193 units i.e., **92 % units are contributing 63.2% of full response* within 60 seconds.**
3. **Signifies that the majority of units are responding fast up to 63.2 % of the full response.**

***Full response:** It is defined as the MW contribution (RGMO output in MW) by the unit for the applied frequency step when MW change in actual load is greater than or equals to RGMO output.

Rise time (Tr)

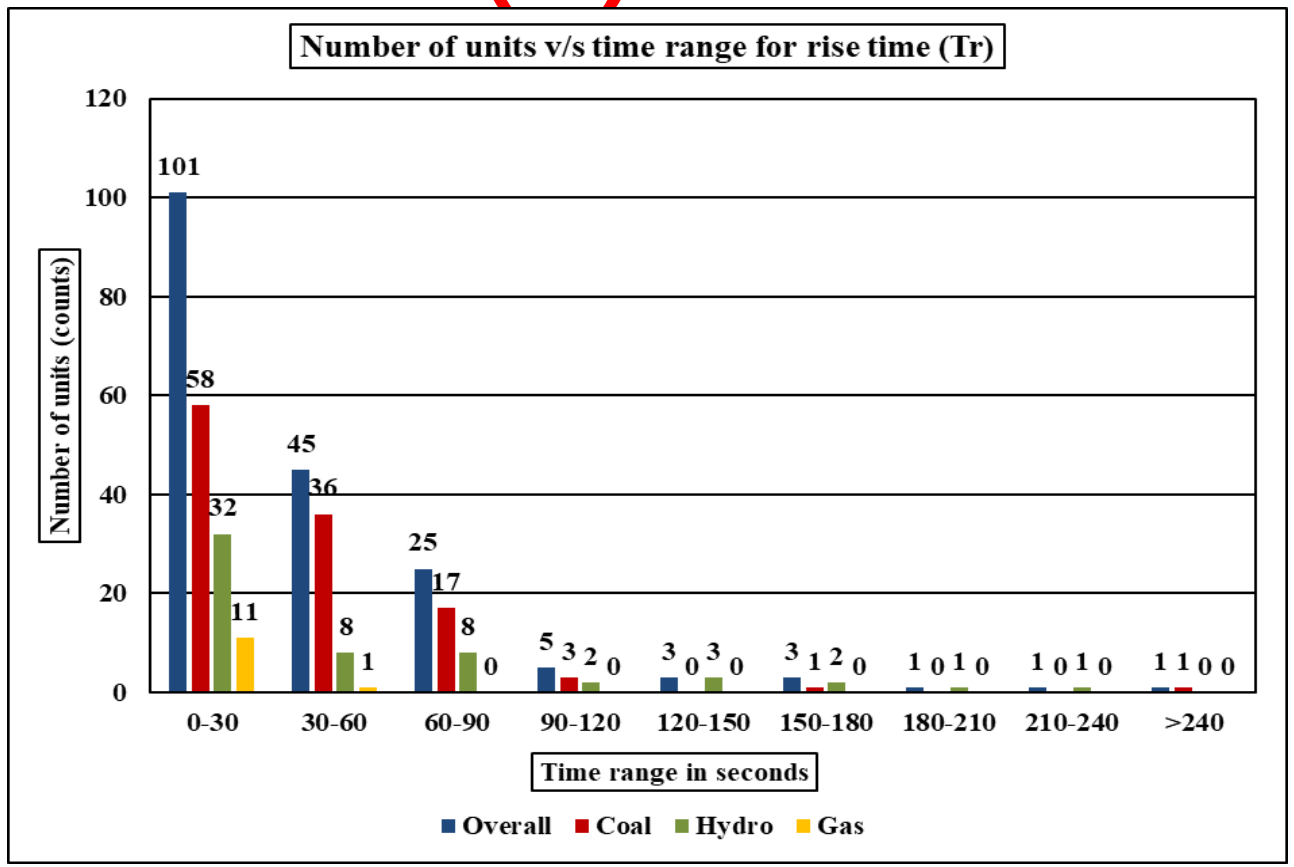
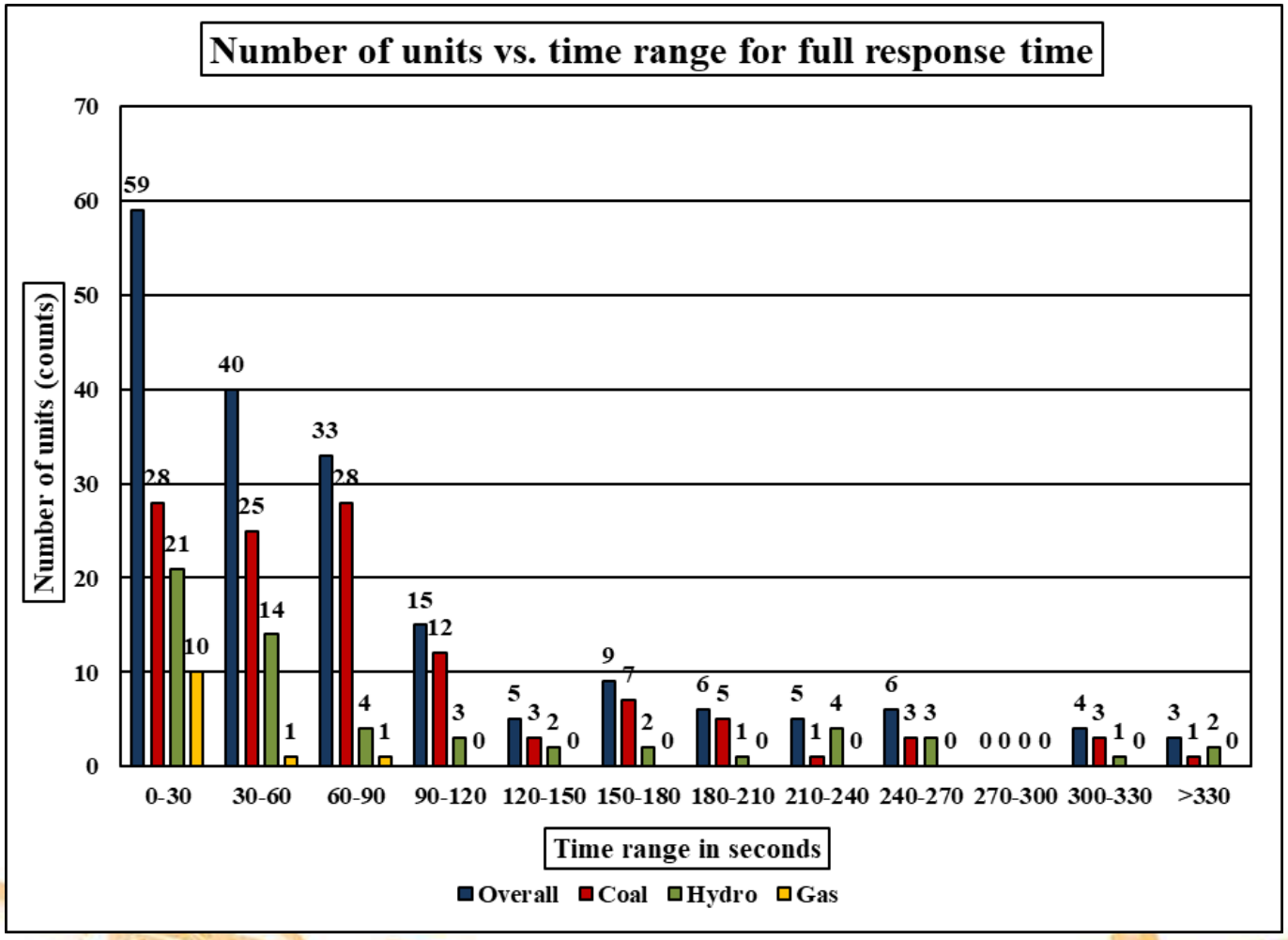


Figure: Bar graph representation of number of units vs. time range for rise time.

From the represented bar graph for rise time, it can be observed that:

1. 101 units (58-coal, 32-hydro & 11-gas units) out of 193 units i.e., **52% units are contributing 10% to 90% of full response* within 30 seconds.**
2. 146 units (94-coal, 40-hydro & 12-gas units) out of 193 units i.e., **76 % units are contributing 10% to 90 % of full response* within 60 seconds.**
3. Even 171 units (111-coal, 48-hydro & 12-gas units) out of 193 units i.e., **89 % units are contributing 10% to 90 % of full response* within 90 seconds.**
4. Signifies that the majority of units are responding from 10% to 90% of the full response within 90 seconds.
5. Unlike time constant, **rise time values are slightly higher indicating units are responding fast with the change in frequency but taking time to reach up to 90% of the full response* value.**

Full response time (T)



From the represented bar graph for rise time, it can be observed that:

1. 59 units (28-coal, 21-hydro & 10-gas units) out of 193 units i.e., **31% units are contributing full response* within 30 seconds.**
2. 99 units (53-coal, 35-hydro & 11-gas units) out of 193 units i.e., **51% units are contributing full response* within 60 seconds.**
3. 132 units (81-coal, 39-hydro & 12-gas units) out of 193 units i.e., **68% units are contributing full response* within 90 seconds.**
4. 147 units (93-coal, 42-hydro & 12-gas units) out of 193 units i.e., **76% units are contributing full response* within 120 seconds**

Figure: Bar graph representation of number of units vs. time range for rise time.

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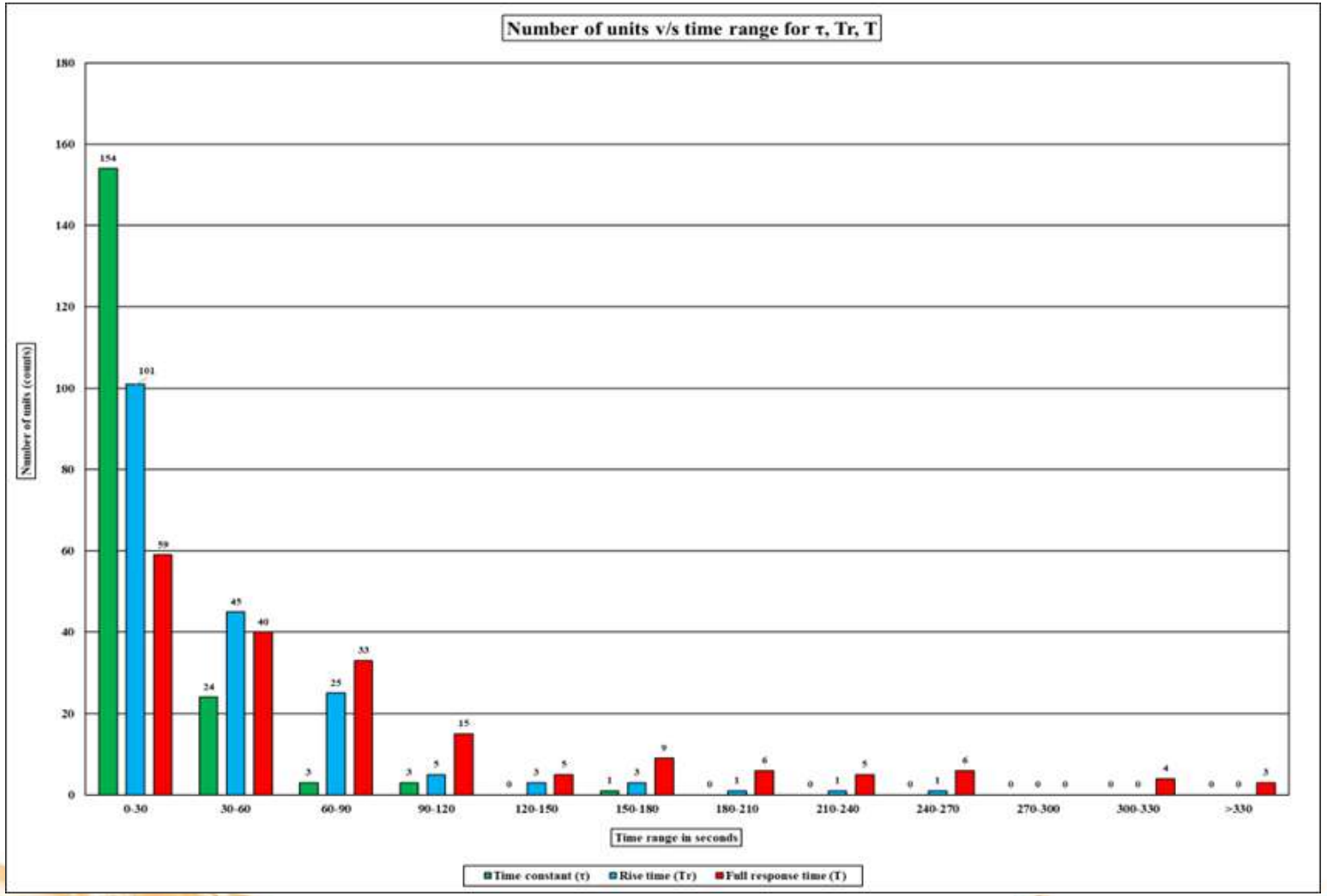

Figure: Bar graph representation for number of units vs. time range for τ, Tr, T.

number of units for time constant, rise time and full
response time within first 30 seconds are in decreasing trend
(i.e., 154 units-time constant, 101 units- rise time & 59 units- full response time within first 30 seconds)

although the units are responding **fast initially but slow down considerably after achieving 63.2% of response**, resulting in longer time to reach 90% of full response*.

Furthermore, units after reaching 90% of full response become even slower, which adds to more time to reach the full response*.

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Test Benefits

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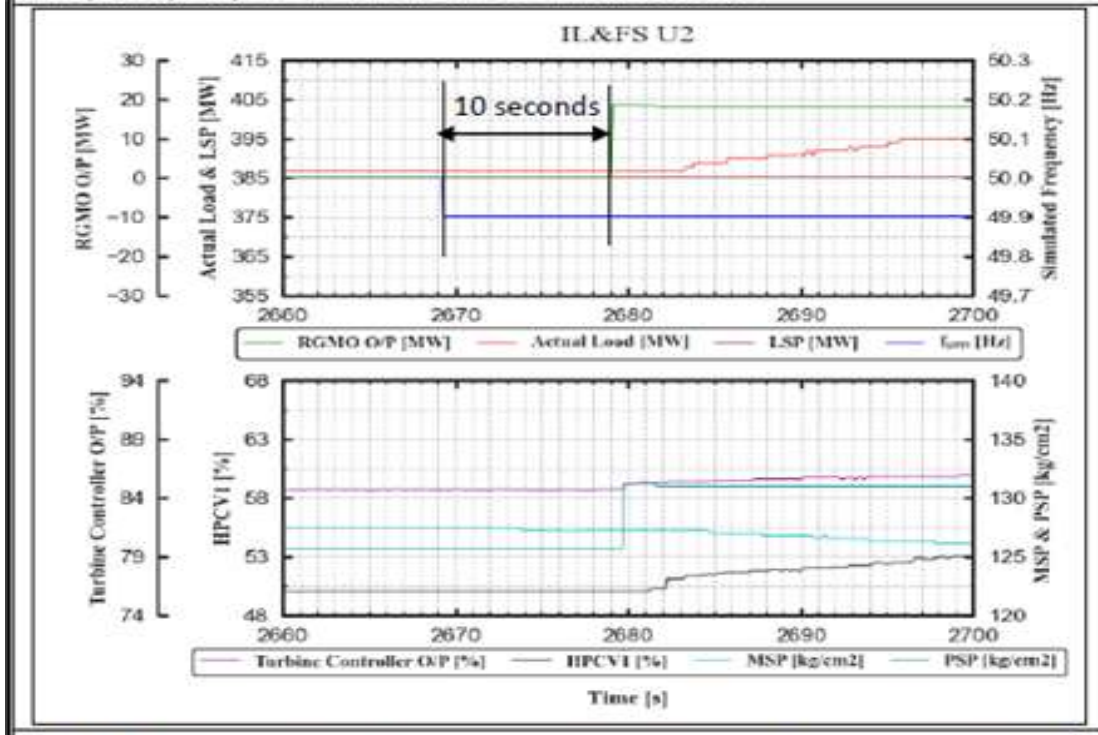
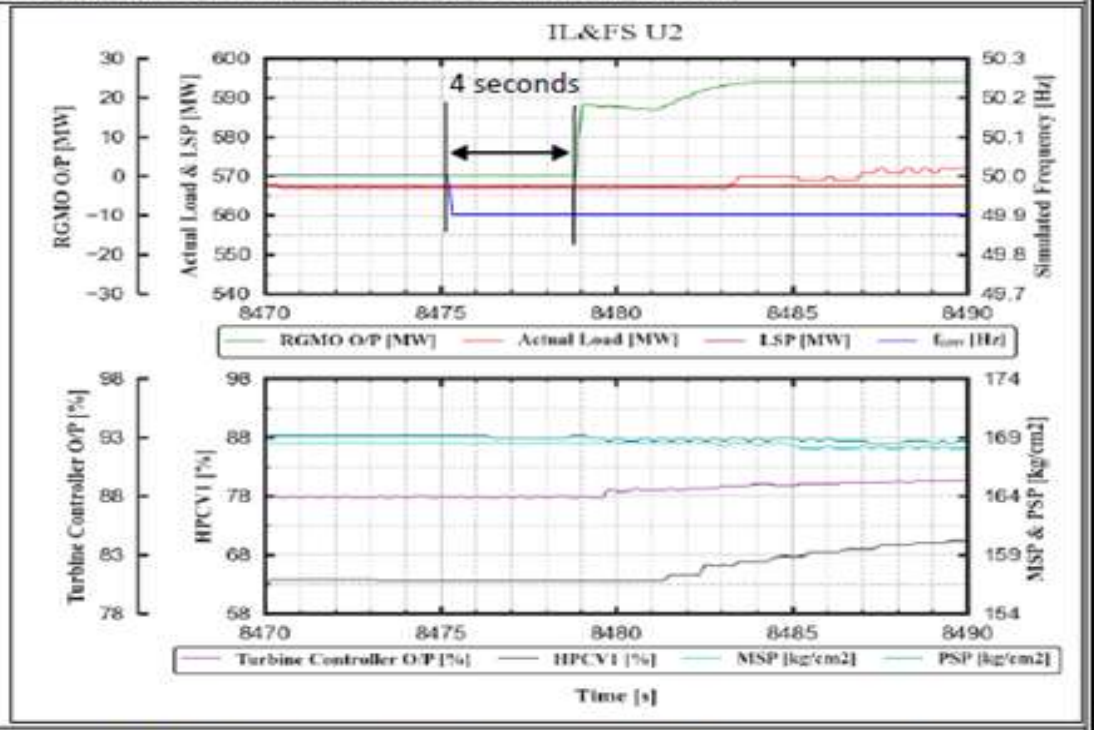
Unit 2: Generator make: Dongfang electric machinery co. ltd; **Governor make:** ABB; **Unit's MCR**: 600 MW.
Droop implemented: 5% on unit's MCR

Response before logic modification Frequency step of -/+0.10Hz at 385 MW load level	**Response after logic modification** Frequency step of -/+0.10 Hz at 568 MW load level
	
Initial logic implemented: When the frequency was decreased from 50Hz to 49.90Hz, frequency controller output (RGMO Output) responded as per the droop with the delay of around 10 seconds.	**Logic modified:** After modification, when the frequency was decreased from 50Hz to 49.90Hz, frequency controller output (RGMO Output) responded as per the droop with the delay of around 4-5 seconds

Reduced delay in delivery of PFR

Test Benefits -know system bottlenecks

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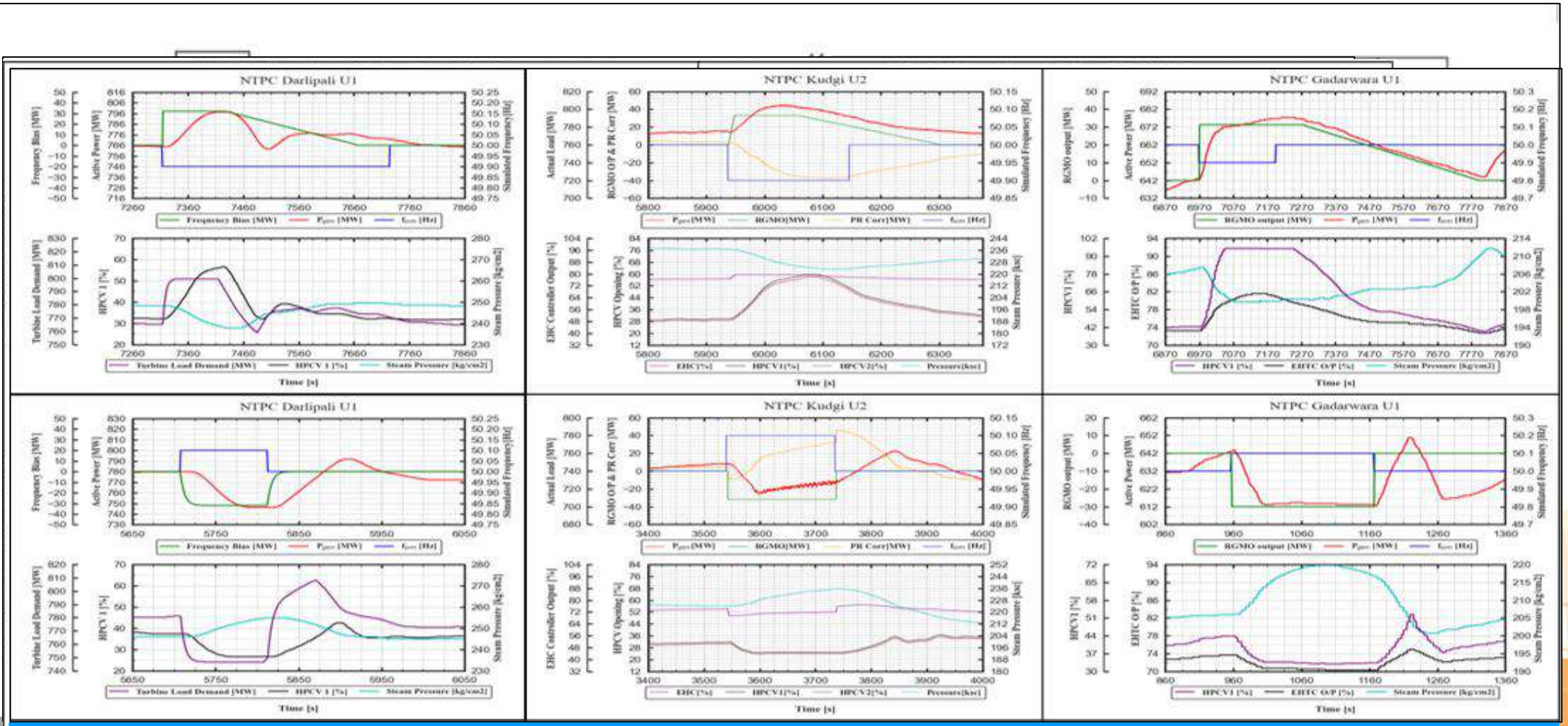

Knowing the stability issues of super critical units

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IEGC 2023
Relevant extracts related to PFR

- Reference frequency 50 Hz
- FGMO mode for below and above 50 Hz
- PFR response:
  - Below 50Hz: Instant rise by min. 105% of operating level and upto 105% or 110% of MCR
  - Above 50 Hz: Reduce o/p by min. 5% or 10% of operating level and upto 5% or 10% of MCR
- Inherent dead band within +/- 0.03 Hz
- Full PFR within 45 sec
- PFR to sustain at least for 5 min
- Droop settings:
  - Thermal & WS: 3% to 6%
  - Hydro: 0% to 10%
- Mandatory PRAS for WS above 10 MW capacity

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   b) **way ahead**
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Grid code compliance testing – the way ahead

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- New Indian Electricity Grid Code (IEGC) 2023 is notified by CERC and directed to be in effect from 01st October 2023. There are several changes made in clause 30. FREQUENCY CONTROL AND RESERVES.
- RGMO provision is discarded, and free governing mode of operation is amended in IEGC clause 30(10) Primary Control ***"The generating stations and units thereof shall have electronically controlled governing systems or frequency controllers in accordance with the CEA Technical Standards for Connectivity and are mandated to provide PRAS. The generating stations and units thereof with governors shall be under Free Governor Mode of Operation".***
- Some major changes are **removal of ripple filter**, **FGMO logic for frequency changes below and above 50 Hz, response with respect to reference frequency of 50Hz.**
- All these changes may potentially improve the overall PFR, however, to ensure that units are complying with new IEGC 2023 retesting is the way.

Cont….

Testing units PFR capability as per IEGC 2023

- IEGC 2023 brings several changes such as RGMO logic has been removed, now the units will be operating under free governing mode of operation.
- Ripple filter implementation is discarded, and the inherent dead band shall not exceed 0.03 Hz, it is clearly stated that governor response shall be with respect to fixed frequency of 50 Hz.
- The MW contribution restricted by limiters such as maximum 5% of current generation and 5% of MCR are also removed.
- In order to ensure all these changes are implemented by the generators in its original form without any disparity, it is important to **test the units for primary frequency response.**

Inclusion of test with sinusoidal change in frequency

Cont….

- Manual interventions were noted in certain instances to achieve an ideal response by increasing the main steam pressure from its setpoint while increasing the MW and vice versa in case of MW reduction.
- Furthermore, restriction in response was noticed in several generating units during the frequency transition from below 50Hz to above 50 Hz and vice versa, due to the diverse implementation of ripple filter logic. Hence to capture the more realistic response and to verify proper function of free governing operation a test of sinusoidal change in frequency (e.g. from 49.92 Hz to 50.08 Hz with time period of 300 seconds) has been included in the test procedure.

Need for turbine governor model validation

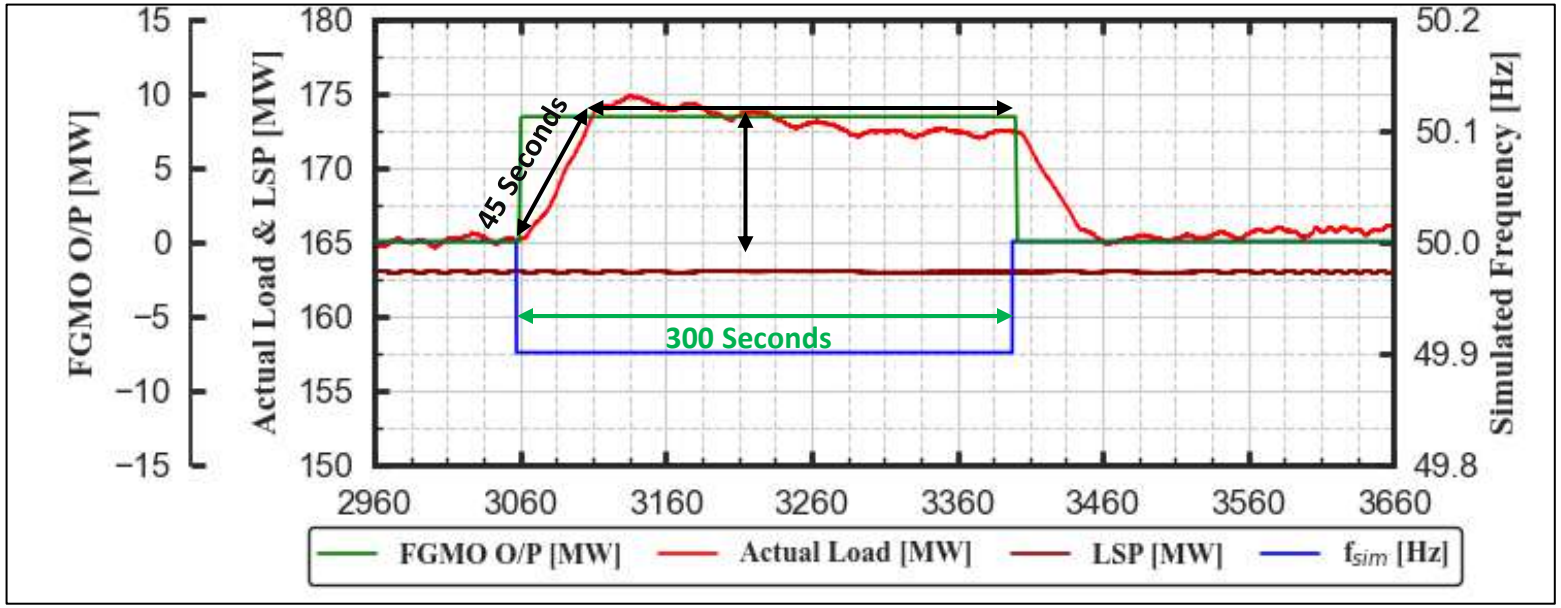
Cont….

- From the PFR tests carried out for 193 generating units, dynamic turbine and governor models were developed and validated with the tests results. These governor models include provision of ripple filter and restricted governing mode of operation.
- Now since the units will be operating in free governing mode of operation and ripple filter is discarded, the existing models needs to be revalidated with new test results to replicate the similar response from the unit.

Test of inherent dead band

The inherent dead band of a generating unit or frequency controller shall not exceed +/- 0.03 Hz. In the test procedures for test of primary frequency response available on Grid-India website mentions the dead band test for 0.01Hz, 0.02Hz and 0.03Hz frequency steps.

PFR – Key Performance Indicator



SPEED OF RESPONSE

MAGNITUDE (MW/HZ)

STABILITY

Test to be conducted

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Technical minimum

- Inherent dead band
- Sinusoidal signal
- Step test

60% to 80% load level

- Step test

100% load level

- Inherent dead band
- Sinusoidal signal
- Step test

Final procedure of periodic testing of power system elements by Grid India can be downloaded from below link.

Link:

https://posoco.in/wp-content/uploads/2023/09/Final-Procedure-of-Periodic-Testing-for-Power-System-Elements-submitted-to-CERC.pdf

Test 1 : Inherent Dead Band test

Load Level	Test Signal
Full Load & Technical Minimum (Inherent dead band test)	-/+0.01Hz from 50 Hz
	+/-0.01Hz from 50 Hz
	-/+0.02Hz from 50 Hz
	+/-0.02Hz from 50 Hz
	-/+0.03Hz from 50 Hz
	+/-0.03Hz from 50 Hz

- 50 to 49.99 Hz → Response w.r.t Inherent Dead band
- 49.99 to 50 Hz → Response w.r.t Inherent Dead band
- 50 to 49.98 Hz → Response w.r.t Inherent Dead band
- 49.98 to 50 Hz → Response w.r.t Inherent Dead band
- 50 to 49.97 Hz → Response w.r.t Inherent Dead band
- 49.97 to 50 Hz → Response w.r.t Inherent Dead band

- 50 to 50.01 Hz → Response w.r.t Inherent Dead band
- 50.01 to 50 Hz → Response w.r.t Inherent Dead band
- 50 to 50.02 Hz → Response w.r.t Inherent Dead band
- 50.02 to 50 Hz → Response w.r.t Inherent Dead band
- 50 to 50.03 Hz → Response w.r.t Inherent Dead band
- 50.03 to 50 Hz → Response w.r.t Inherent Dead band

Test 2 : Governor response with respect to fixed reference frequency of 50 Hz

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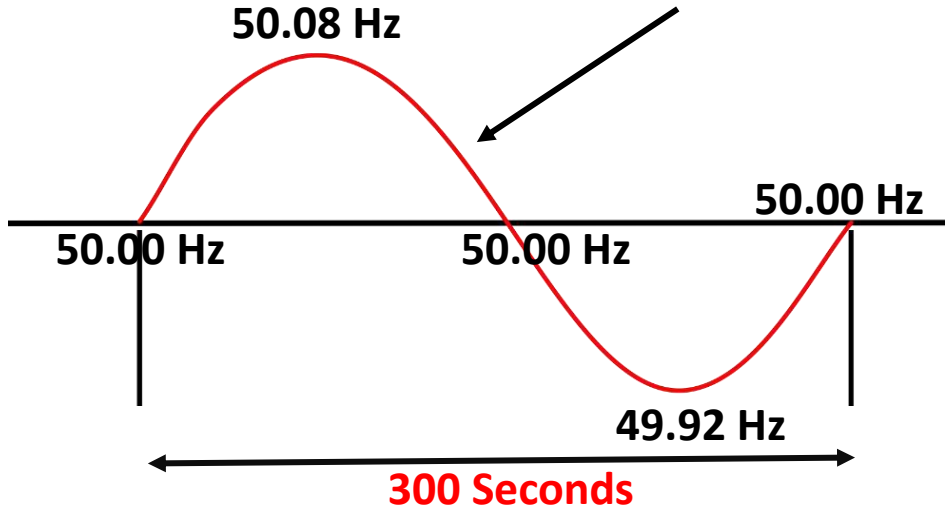
S.No	Load Level	Test Signal
1	**Technical Minimum**	Signal from 49.92 Hz to 50.08 Hz
		Signal from 50.08 Hz to 49.92 Hz

S.No	Load Level	Test Signal
2	**100 % of MCR**	Signal from 49.92 Hz to 50.08 Hz
		Signal from 50.08 Hz to 49.92 Hz

Test Signal will be given in the form of Sinusoidal



Note: **Free governing mode of operation for below and above 50 Hz, a test including transition of frequency from a value less than 50 Hz to above 50 Hz and vice versa is to be done as with period of 300 seconds**

Test 3: Step test

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Below 50 Hz

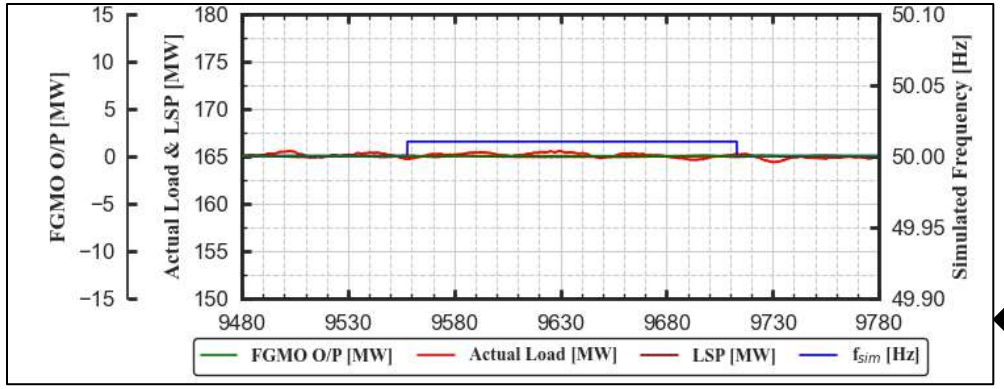
S. No.	Simulated frequency (Hz)	Initial generated load (MW)	Load change (MW) (after 45 seconds)	Droop (%) Actual implemented droop	Calculated Droop (%) at 45 seconds
1	50.00→49.95	25.11	0.23	5%	10.87
	49.95→50.00	25.34	-0.2	5%	12.50
2	50.00→49.90	25.09	0.75	5%	6.67
	49.90→50.00	25.62	-0.45	5%	11.11
3	50.00→49.875	25.16	1.01	5%	6.44
	49.875→50.00	25.57	-0.41	5%	15.85

Above 50 Hz

S. No.	Simulated frequency (Hz)	Initial generated load (MW)	Load change (MW) (after 45 seconds)	Droop (%) Actual implemented droop	Calculated Droop (%) at 45 seconds
1	50.00→50.05	25.06	-0.19	5%	13.16
	50.05→50.00	24.79	0.2	5%	12.50
2	50.00→50.10	25.07	-0.68	5%	7.35
	50.10→50.00	24.11	0.71	5%	7.04
3	50.00→50.125	25.09	-1.13	5%	5.75
	50.125→50.00	23.65	1.07	5%	6.07

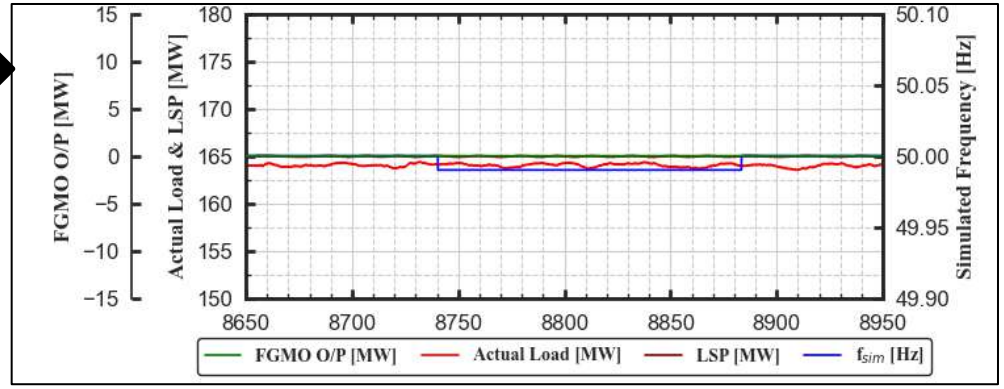
Expected response

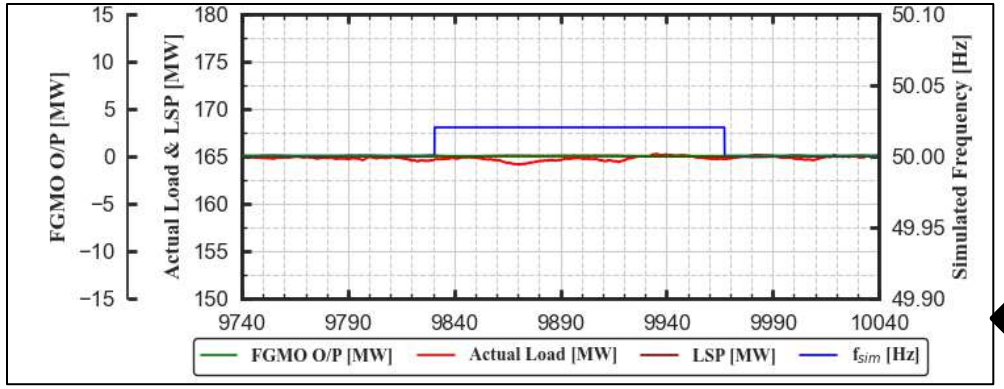
1. Inherent dead band



-/+0.01HZ from 50 Hz

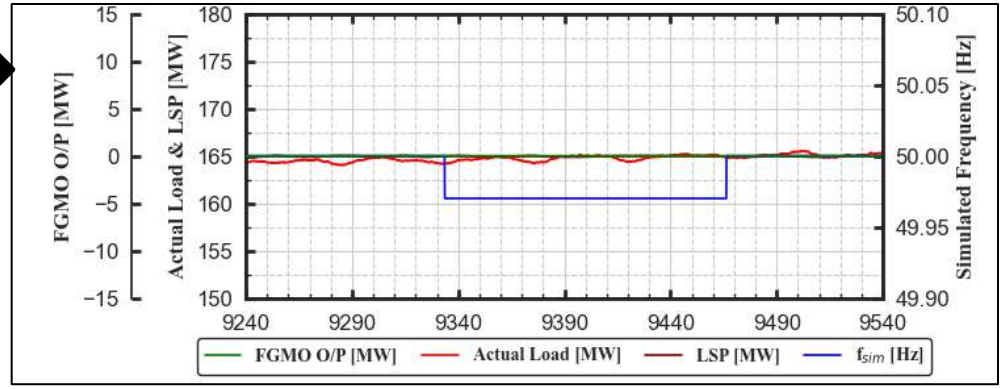
+/-0.01HZ from 50 Hz

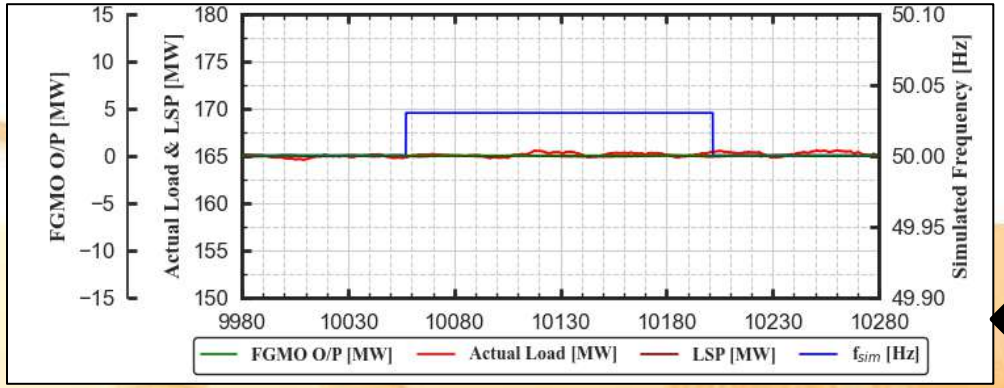




-/+0.02HZ from 50 Hz

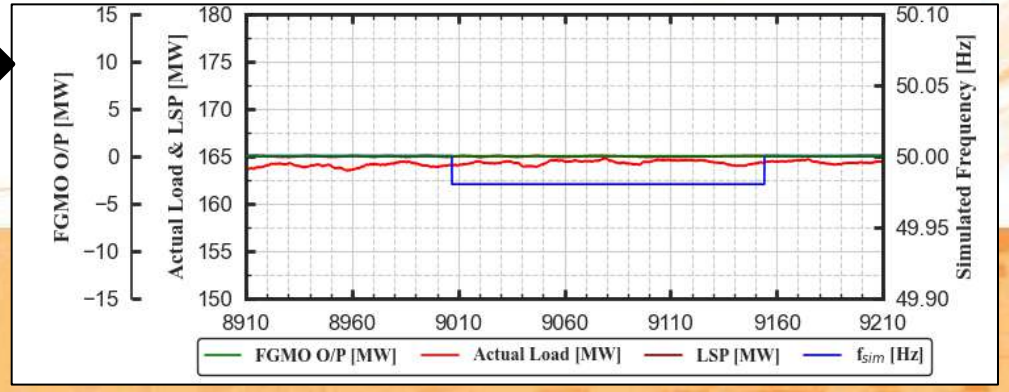
+/-0.02HZ from 50 Hz



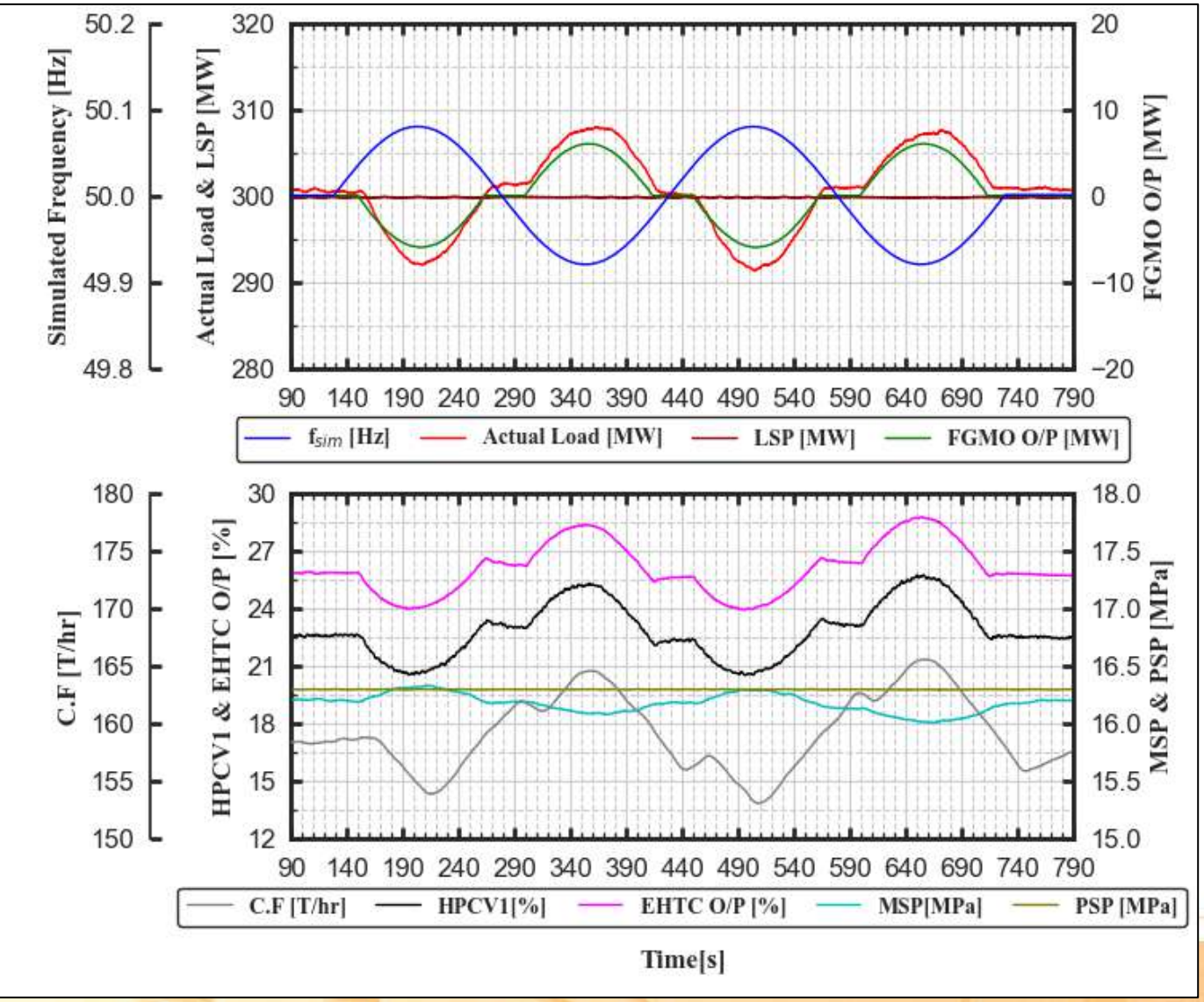


-/+0.03HZ from 50 Hz

+/-0.03HZ from 50 Hz

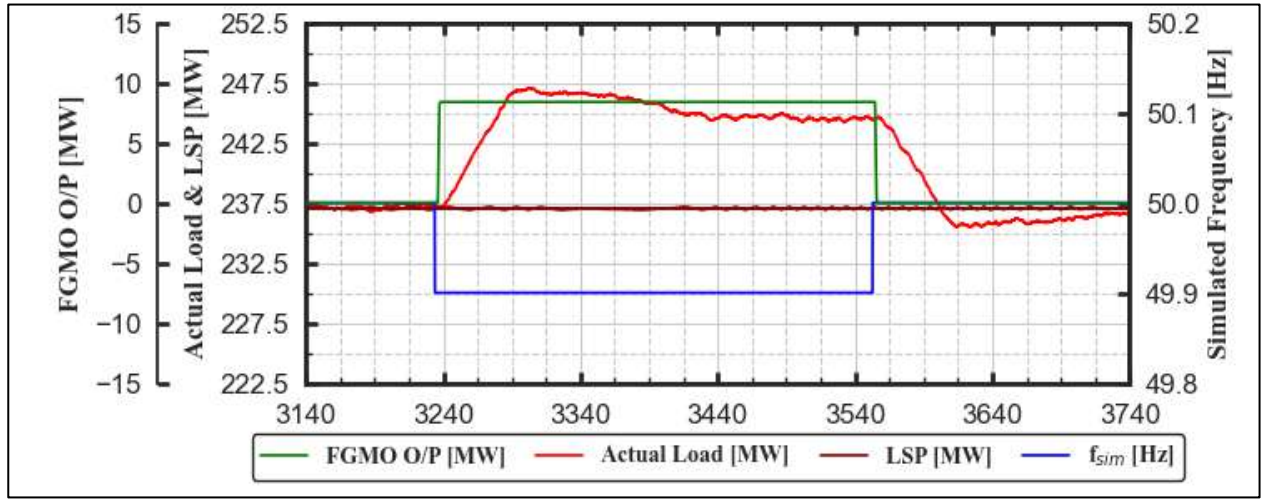


2. Sinusoidal test

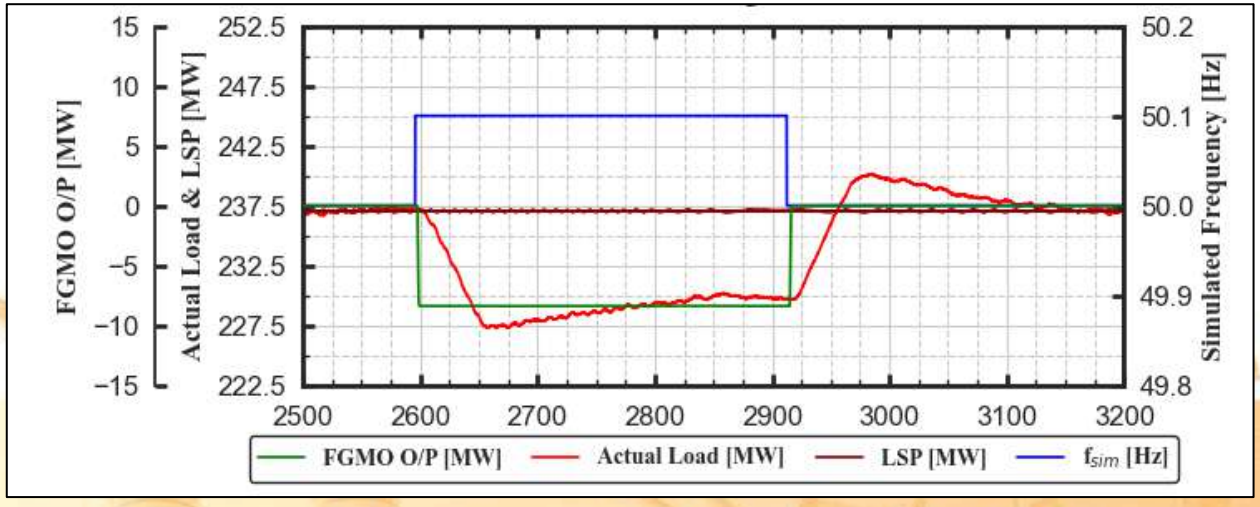


- Response as per droop w.r.t frequency change

3. Step test expected response



- 50 to 49.90 Hz → Response as per droop
- 49.90 to 50 Hz → Response as per droop



- 50 to 50.10 Hz →Response as per droop
- 50.10 to 50 Hz →Response as per droop

Note: Droop should lie within a band of 3% - 6%

Thank you!

Contact us:

Deepesh Yadav

M: +91 98733 02435

E: deepesh.yadav@solvina.com

Ashish Mishra

M: +91 9731 742 848

E: ashish.mishra@solvina.com

Mohammad Shahzad Alam

M: +91 99106 11184

E: shahzad.alma@solvina.com

Saurabh Tripathi

M: +91 95407 28444

E: saurabh.tripathi@solvina.com

For more info, please visit: www.solvina.com

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