



सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

संख्या: NRPC/OPR/106/01/2020/219-260

दिनांक: 07.01.2020

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 166^{वीं} बैठक का कार्यवृत्त |

Subject: Minutes of 166th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 166^{वीं} बैठक 17.12.2019 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट <http://www.nrpc.gov.in> पर उपलब्ध है। यदि कार्यवृत्त पर कोई टिप्पणी हो तो कार्यवृत्त जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें |

166th meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 17.12.2019. The Minutes of this meeting has been uploaded on the NRPC website <http://www.nrpc.gov.in>. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक: यथोपरि

(सौमित्र मजूमदार)

अधीक्षण अभियंता (प्रचालन)

सेवा में,

प्रचालन समन्वय उप-समिति के सभी सदस्य

Minutes of the 166th meeting of the Operation Coordination Sub-Committee (OCC) of NRPC

166th meeting of OCC of NRPC was held on 17.12.2019 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at **Annexure-A.I.**

PART-A: NRPC

1. Confirmation of Minutes

Comments from HP:

Representative of HP stated that in the agenda of 165th OCC meeting, the figures for Power Supply Position (Provisional) for October 2019 is to be read as given below which was updated in the 163rd OCC meeting:

State	Req./Avl.	MUs	MW
		Anticipated	Anticipated
Himachal Pradesh	Avl.	980	1600
	Req.	840	1630

OCC confirmed the minutes by including the aforementioned information under the point 2.1 of the minutes.

2. Review of Grid operations of October 2019

2.1. Anticipated vis-à-vis Actual Power Supply Position (Provisional) November 2019

Sub Committee was informed that there were variations (i.e. > 5.0%) in the Anticipated Vis-à-vis Actual Power Supply Position (Provisional) for the month of November, 2019 in terms of Energy Requirement for all states and UTs of Northern Region except Delhi and in terms of Peak Demand similar variation is noted in Delhi, Haryana, Himachal Pradesh, Punjab, Uttar Pradesh and Uttarakhand.

Reasons for variation and comments submitted by the states are as under:

Delhi - There is no load shedding in Delhi due to shortage of power; however, because of pleasant weather condition, there is negative growth w.r.t. 2018 in the month of November'19 in term of peak demand.

Punjab - Late Sowing of wheat crop due to inclement weather conditions during end of October and November caused reduced consumption and reduced maximum demand in agriculture sector in the State of Punjab during the month of November'19.

Also due to proactive approach of Punjab State in checking the cases of stubble burning, the period of sowing of wheat crop was staggered leading to reduction in maximum demand.

Rajasthan - Agriculture load of Rabi season did not pick up in the month of November'2019 due to delay in end of monsoon.

Haryana - Due to seasonal crop shift and pleasant weather conditions there was a decline in the energy consumption and peak demand.

Himachal Pradesh – Weather conditions caused reduction of state's power demand

2.2. Power Supply Position for NCR:

2.2.1. The Sub-Committee was informed that the NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of November 2019 is placed on NRPC website (<http://nrpc.gov.in/operation-category/power-supply-position>).

2.3. The highlights of grid operation during November 2019 are as follows:

2.3.1. Frequency remained within the IEGC band for **73.62%** of the time during November 2019, which is lower than that of last year during same month (November 2018) when frequency (within IEGC band) remained 79.88% of the time.

2.3.2. Utilities were requested to take necessary action to improve the frequency regime viz. by not changing abruptly the loads at block boundaries and assuring primary response from the generators.

2.3.3. Maximum and minimum load for the region during November 2019 were 44,381 MW (04.11.2019 at 18:40 hrs) and 26,406 MW (28.11.2019 at 03:30 hrs).

2.3.4. The average Thermal generation in November 2019 decreased by 17.60 % (99.74 MU/ Day) with respect to the corresponding month in the previous year. The details are enclosed at **Annexure-A.II (A)**.

2.3.5. The average Hydro generation in November 2019 decreased by 4.74 % (6.69 MU/ Day) with respect to the corresponding month in previous year. The details are enclosed at **Annexure-A.II (B)**.

2.3.6. The average Nuclear generation in November 2019 increased by 3.9 MU/ Day as compared to corresponding month in previous year. The details are enclosed at **Annexure-A.II (C)**.

2.3.7. The average Renewable generation in November 2019 increased by 8.00 MU/ Day with respect to the corresponding month in previous year. All utilities were requested to send the data for renewable generation regularly. The details are enclosed at **Annexure-A.II (D)**.

2.3.8. Long outages of generating Units were discussed in detail and the same is placed at **Annexure-A.II (E)**.

2.3.9. Long outages of transmission lines were discussed in detail and the same is placed at **Annexure-A.II (F)** and all constituents were requested to revive the elements under long outages at the earliest.

2.3.10. The new elements charged were discussed and the list is attached at

Annexure-A.II (G).

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units.

The maintenance programme for Generating Units for the month of January 2020 was discussed on 16.12.2019 at NRPC Secretariat, New Delhi.

3.2. Outage Programme for Transmission Elements.

The maintenance programme for Generating Units for the month of January 2020 was discussed on 16.12.2019 at NRPC Secretariat, New Delhi.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region during January 2020

4.1.1. **Delhi SLDC** informed that anticipated peak demand will be 4575 MW in place of 4510 MW and anticipated peak availability will be 4884 MW in place of 5790 MW. Further, anticipated energy requirement will be 2180 MU in place of 2200 MU.

4.1.2. **HP SLDC** informed that anticipated energy requirement will be 928 MU in place of 920 MU. Further, anticipated peak demand will be 1702 MW in place of 1640 MW and anticipated peak availability will be 1678 MW in place of 1600 MW.

4.1.3. **Punjab SLDC** informed that anticipated energy requirement will be 3520 MU in place of 3810 MU and anticipated peak demand will be 6470 MW in place of 7480 MW.

4.1.4. **Uttarakhand SLDC** informed that anticipated energy availability will be 1132 MU in place of 1230 MU and the anticipated energy requirement will be 1163 MU in place of 1270 MU. Further, anticipated peak availability will be 2100 MW in place of 2270 MW and anticipated peak demand will be 2180 MW in place of 2280 MW.

4.1.5. **UP SLDC** has informed that anticipated energy requirement will be 8525 MU in place of 9000 MU and anticipated peak demand will be 15000 MW in place of 16400 MW.

5. Submission of breakup of Energy Consumption by the states

5.1. All the SLDCs were requested to provide the required information by segregating the same from the billed data from DISCOMs. It was also decided to add two more categories namely Traction supply and Miscellaneous/ Others on the request of multiple SLDCs.

5.2. The SLDCs were advised to submit the data for the duration April 2018 to November 2019 initially and thereafter make it a monthly exercise. SLDCs informed that the monthly information could only be made available with a delay of around 02 months as the billed data information needs to be collected from DISCOMs and submitted to NRPC. Revised format for data submission as agreed in the meeting is as under:

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

6. System Study for Capacitor Requirement in NR for the year 2019-20

- 6.1. Members were informed that the date for submission of report for the state of Haryana which was 15.12.2019 was delayed as there were certain clarifications sought from Haryana by CPRI. Haryana representative was requested to submit the information as sought by CPRI at the earliest so as to complete the study timely.
- 6.2. Members were also informed that CPRI required prescribed limits for voltage variation at 11 kV level to be considered at the time of study. It was brought out that the prescribed limits for voltage variations are learned to be specified as **+6% and -9%**, for voltage level of **11 kV**. The same is based on the "*Report on Power Quality of Electricity Supply to Consumers*" of Forum of Regulators (FoR).
- 6.3. As per the decision of 44th TCC and 47th NRPC, NRLDC representative was requested to provide the PSSE data file with respect to the date and time of states other than Haryana so that CPRI could take up the work simultaneously for all the states. The date and time as informed by the states are as given below:
- Delhi: - 10.07.2018 (15:26 Hrs)
 - Rajasthan: - 13.01.2018 (08:15 Hrs)
 - Uttar Pradesh: - 12.08.2019 (**22:00 hrs.**)
 - Haryana: - 11.07.2018 (00:45 Hrs)
 - Punjab:- 10.07.2018 (**15:45 hrs**)
 - Himachal Pradesh: - 28.12.2018 (10:00 Hrs)
- 6.4. Further, all states except UP, Punjab, HP and Rajasthan were asked to submit the details of nodal officer by 1st week of January 2020, so that CPRI can directly co-ordinate with nodal officer and resolve the issues, if any, while modelling their respective networks.
- 6.5. NRLDC representative also advised all states to submit the PSSE nodal officers' details accordingly.

7. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 7.1. All the states were once again requested to submit the information as per format enclosed in Annexure-III of Minutes of 162nd OCC meeting, duly signed by the head of SLDC, latest by 15th January 2020.
- 7.2. Thereafter, consolidated proposal for tackling the phase nomenclature mismatch issue of NR may be submitted in the forthcoming TCC/NRPC meeting.

8. Follow up of issues from previous OCC Meetings – Status update

The detail of the updated status as discussed in the 166th OCC meeting is placed at **Annexure-A.III**.

9. SPS for ICTs at 765 kV Unnao sub-station

- 9.1. UP informed that the mock testing of revised logic has been done and the report for the same would be submitted to NRPC/NRLDC. UP was also advised to get the live testing of SPS scheme conducted.

10. Automatic Demand Management System

- 10.1. Punjab SLDC informed that a meeting with M/s Siemens and SLDC along with PSPCL was held on 29.11.2019. M/s Siemens representative intimated that separate Hardware/software/applications will be required for implementing ADMS on 66 kV feeders where remote control (through SCADA) facility is available. M/s Siemens was requested to submit detailed project report/tentative cost and the same is awaited.
- 10.2. Punjab representative was requested to share the details with UP so that necessary steps may be taken by UP SLDC.

11. Cyber Security Preparedness Monitoring

- 11.1. Members were informed about the decision taken in the 44th TCC / 47th NRPC meetings, wherein it was decided that cyber security related agenda will be taken up in TeST meetings due to the presence of SCADA and communication related personnel in the same.

12. Mapping of UFR, df/dt relay details in SCADA

- 12.1. SE, Operation, NRPC briefed the members about the outcome of the video conferencing held with each SLDCs and the recommendations sent out to them in this regard. Representative of NRLDC was requested to brief about the status of implementation of the recommendations by the SLDCs.
- 12.2. NRLDC representative informed that based on the recommendations, most of the SLDCs (Haryana, UP, Punjab) has updated their SCADA displays. It was also informed that Punjab has submitted a detailed reply updating on the action taken based on the recommendations.
- 12.3. Further, UP also informed that SCADA mapping has been revised with actual feeder name along with the average load relief.
- 12.4. NRLDC representative stated that the submissions made by Punjab and UP would be looked into and shortcomings, if any would be brought forward in the next OCC meeting.
- 12.5. Other SLDCs were requested to update on the progress made and submit a detailed reply citing the action taken on the recommendations made during the video conferencing.

13. Implementation Plan for compliance to new environment norms for left out plants

- 13.1. Members were informed that Ministry of Power vide letter no. 10/1/2019-S.Th

dated 19.11.2019 has directed CEA to finalise the Phasing Plan for FGD implementation of Thermal Power Projects for left out plants (List enclosed at Annexure-A6 of the agenda note).

- 13.2. NTPC, RRVUNL and UPRVUNL were requested to submit the updated phase out plan for Meja STPP(U-1,2), Tanda TPP(U-5,6), Chhabra TPP Extn(U-6), Suratgarh SCTPP(U-7,8), Harduaganj TPS Exp-II, Jawaharpur STPP(U-1,2), Obra C STPP(U-1,2) and Panki(1x660MW) at the earliest.
- 14. Removal/ amendment of structure installed at 220kV BBMB Grid (Agenda by Tata Power DDL)**
 - 14.1. BBMB representative informed that the said six-pole structure is installed outside BBMB property and does not belong to their ownership. It was stated that the same belongs to DHBVNL and Haryana SLDC was advised to get it rectified at the earliest considering the criticality of the issue.
- 15. Voltage reduction at 400 kV Panipat, 400 kV Mandola & 400 kV Bawana (agenda by TPDDL)**
 - 15.1. TPDDL representative stated that they are consistently receiving high voltage at grids being fed from 220 kV Narela. 220kV Narela is being fed by 400kV Mandola (PGCIL) & 400kV Bawana (DTL). Also, High voltage is being received from 220 kV BBMB Rohtak Road grid which is being fed from 400kV BBMB Panipat via 220 kV Narela itself.
 - 15.2. In view of the above voltage regulation is required from 400 kV Panipat, 400kV Mandola & 400kV Bawana.
 - 15.3. It was decided that a separate meeting with the representatives of Delhi SLDC / DTL and Delhi DISCOMs would be called by NRLDC on 23.12.2019 at NRPC Sectt. to discuss the issue.
- 16. Approval for Energy accounting Methodology to be done by UPSLDC as proposed by MUNPL for drawl of Start-Up Power for Unit-2 of MUNPL granted by UPPCL (Agenda by Meja Urja Nigam (P) Ltd.)**
 - 16.1. It was informed that the matter may first be deliberated bilaterally by Meja Urja Nigam (P) Ltd. and UP-SLDC. In case of any difference of opinion, the same may be recorded and sent to NRPC Sectt, based on which a separate meeting may be called, if required.
- 17. Failure of fibre link between Parichha plant and Agra Fatehabad substation (agenda by LPGCL)**
 - 17.1. UP representative informed that the said line has been constructed by POWERGRID as a turnkey project and complete handover hasn't been done yet. POWERGRID was requested to take necessary action.
- 18. Black start of Alaknanda and Vishnuprayag HEP (agenda by UP-SLDC)**
 - 18.1. PTCUL representative advised UP to consider the load of Muzaffarnagar for black-start as the load available near Alaknanda and Vishnuprayag HEP is not a

huge quantum and may pose problem in managing the same during the exercise.

18.2. UP-SLDC was advised to formulate the procedure along with identification of quantum of load and formally take up the matter with PTCUL.

19. Frequent Bus Reactor operation at APRL, Kawai (agenda by Adani Power Ltd.)

19.1. OCC forum was of the view that the voltage band for switching out of Bus Reactor was not being reached as per that available in the NR operating procedures.

19.2. Rajasthan SLDC was advised to follow the same and avoid any unwarranted switching in and out of bus reactors.

20. Problem of excessive vibrations in GTs of Rihand Stage – III and Vindhyachal StageIV during monopole operation of HVDC Rihand - Dadri (agenda by NTPC)

20.1. POWERGRID was advised to take up the issue with the concerned personnel and submit the information at the earliest as per the minutes of the meeting held on 31.05.2019.

20.2. Further, NTPC was also advised to formally communicate with POWERGRID in this regard.

21. Sub Synchronous Resonance (SSR) study for Stage#2 2x490 MW Turbo generators at Dadri (Table agenda by NTPC)

21.1. NTPC representative intimated that turbo generators of Dadri are having problem of high vibration during the fault in power system network which in turn causing tripping of units.

21.2. In this regard, NTPC Dadri has planned to conduct SSR study for Stage # 2 2x490 MW Turbo generators and require data of Rihand-Dadri HVDC line.

21.3. OCC forum was of the opinion that data may be shared with NTPC for the study, subject to signing of Non-Disclosure Agreement with the consultant.

22. Low availability of bus reactor at Koteshwar HEP (Table agenda by NRLDC)

22.1. In the 44th TCC / 47th NRPC meeting, NRLDC highlighted the low availability of 125 MVAr bus reactor at Koteshwar, as same is charged through transfer bus coupler.

22.2. It was also mentioned that bus reactor is opened in case transfer bus coupler is needed and the reactor cannot remain in service till transfer bus coupler is engaged.

22.3. In this matter, OCC forum decided that a team comprising of officers of NRPC Sectt, NRLDC and POWERGRID visit the site to explore the possibility of extra bay.

Part-B: NRLDC

1. Tap optimization in Northern region

NRLDC representative stated that tap position changes as approved in last OCC meeting were carried out by NRLDC in consultation with SLDCs and POWERGRID. Scatter plots suggesting improvements in voltage profile were also presented in 166th OCC meeting. It was discussed that similar exercise may be done by the states for the reactive power management at lower voltage level and the changes may be analyzed with the help of scatter plots.

Delhi representative stated that they have already optimized tap positions of 220kV and below voltage level ICTs still high voltages are being observed in the grid. As already discussed in earlier agenda, separate meeting to discuss high voltages issue in the grid would be convened. Other utilities also informed that they have already made all capacitors out of service based on requirement, but still issue of high voltage is persisting.

It was deliberated that even after utilizing support from available reactive power resources (including opening of lines), voltages continued to remain above 420kV for more than 60-70% of time especially in Punjab, Haryana and Delhi.

Utilities were once again asked to make sure that all reactive power resources are utilized to minimize high voltages in the grid. Also, it was once again agreed that utilities shall share details of tap changes carried out at 220kV and below voltage level at least on monthly basis.

2. Reactive power performance of generators

NRLDC representative presented reactive power response of generating stations in respect of Voltage vs MVAR and MW vs MVAR for 27.11.19 - 11.12.19 as per NRLDC SCADA data. Based on available data, it was observed that there are margins available as per capability curves for most of the generating stations. In addition, telemetry (sign and magnitude of MVAR) of various state generating station is yet to be corrected. The matter has been discussed in many of the previous OCC/TCC meetings. Based on available data, MVAR performance of state generators is tabulated below:

Anpara-C:	Generating up to 150 MVAR most of the time (MVAR response needs improvement)
Bara TPS:	Generating MVAR most of the time (data needs correction)
Anpara-D:	Absorption and generation -100 to 100 MVAR (MVAR response needs improvement)

Anpara TPS:	Absorption and generation -50 to 100 MVAR (MVAR response needs improvement)
Lalitpur TPS	Absorption and generation -100 to 200 MVAR
Khedar:	Absorption and generation -150 to 50 MVAR
MGTPS:	Absorption upto 150 MVAR
Kawai:	Absorption upto -250 MVAR
Chhabra:	Absorption and generation -100 to 100 MVAR (May provide more support for Hindaun and Alwar voltage profile)
Rajpura:	Generating MVAR most of the time (data needs check)
Talwandi Saboo:	Absorption up to 300 MVAR

In 165th OCC meeting, it was discussed that in view of persistent high voltages in Northern region and inadequate response from most generators, reactive power capability testing shall be carried out after discussion in OCC meeting. This shall also boost confidence of generators to absorb/generate MVAR as per capability curve. SLDCs may also consider carrying out reactive power capability testing of generators under their jurisdiction. This is likely to improve voltage profile in the grid.

Same was also deliberated in 44th TCC and 47th NRPC meeting, TCC and NRPC concurred with discussions of OCC and it was decided that:

- All generators (including intrastate) shall absorb MVAR as per capability curve
- Reactive power support performance and MVAR telemetry issues will be reviewed in monthly OCC meetings.
- Reactive power capability testing will be carried out after discussion in OCC meeting.

It was once again agreed that states shall also develop MVAR vs voltage plots for generators under their jurisdiction.

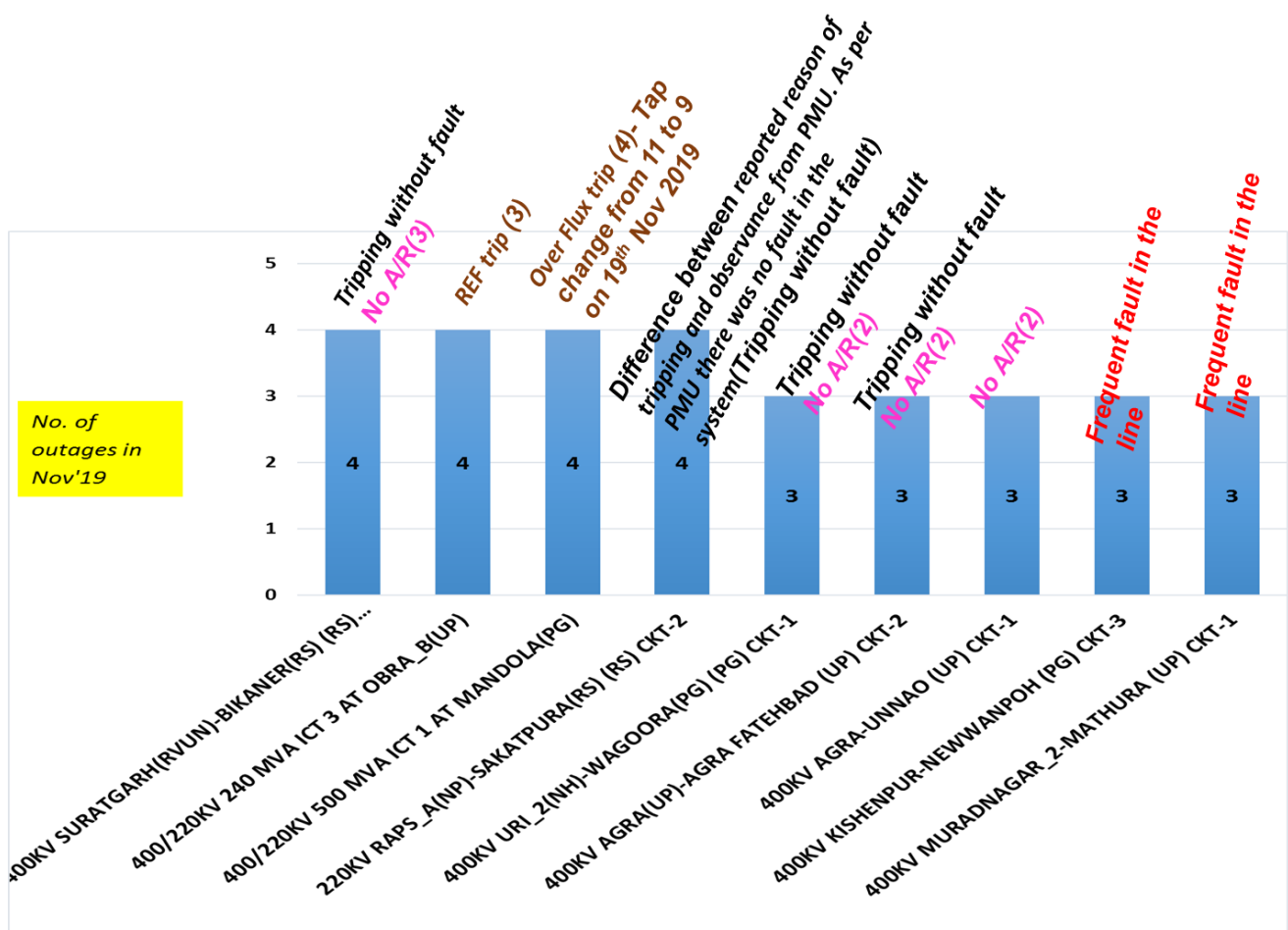
UP SLDC representative stated that they are regularly taking up issue of MVAR absorption by generators on regular basis and communicating the same with generating stations.

OCC noted the same. It was also agreed that as discussed in TCC/ NRPC meeting, based on reactive power performance of generators, reactive power capability testing will be carried out after discussion in next OCC meeting.

3. Frequent forced outages of transmission elements in the month of Nov'19:

The following transmission elements were frequently under forced outages during the month of **Nov'19**:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	400KV SURATGARH(RVUN)-BIKANER(RS) (RS) CKT-1	4	Rajasthan
2	400/220KV 240 MVA ICT 3 AT OBRA_B(UP)	4	UP
3	400/220KV 500 MVA ICT 1 AT MANDOLA(PG)	4	POWERGRID
4	220KV RAPS_A(NP)-SAKATPURA(RS) (RS) CKT-2	4	Rajasthan/NPCIL
5	400KV URI_2(NH)-WAGOORA(PG) (PG) CKT-1	3	NHPC/POWERGRID
6	400KV AGRA(UP)-AGRA FATEHBAD (UP) CKT-2	3	UP
7	400KV AGRA-UNNAO (UP) CKT-1	3	UP
8	400KV KISHENPUR-NEWWANPOH (PG) CKT-3	3	POWERGRID
9	400KV MURADNAGAR_2-MATHURA (UP) CKT-1	3	UP



The complete details are attached at **Annexure-B.3** of the Agenda. The following was discussed during the meeting:

- **400kV Suratgarh (RVUN)-Bikaner (RS) ckt-1:** Rajasthan representative informed that frequent tripping of the line was occurred due to migrating bird in this season. Birds are found dead nearby transmission line. NRLDC representative informed that this line was also tripped without A/R four times also in the month of Oct-2019. Remedial action yet to be taken. OCC once again advised Rajasthan to check the non-operation of A/R in the line, correct it and submit the remedial measures report within 7days.
- **400/220 kV 240 MVA ICT-3 at Obra B (UP):** UP representative informed that ICT was frequently tripped due to earthing issue. DC earth fault issue yet to be rectified. OCC advised UPPTCL to rectify the DC earth problem at 400.220 kV Obra B TPS immediately to prevent the further tripping.
- **400/220 kV 500 MVA ICT-1 at Mandola (PG):** NRLDC representative informed that remedial action has already been taken. NRLDC team analysed the tap position and suggested the tap changes for ICTs at Mandola (PG).
- **220 kV RAPP A-Sakatpura ckt-2:** NRLDC representative informed that there was difference between reported reason of tripping and observance from PMU. As per PMU there was no fault in the system (Tripping without fault). Rajasthan representative informed that they will check and share the remedial measures report within 7days.

- *400kV Uri2-Wagoora ckt-1:* POWERGRID representative informed that A/R was not operated at 400 kV Wagoora (PG) end due to PLCC (BPL make) communication issue and it has been rectified in last shutdown of the line.
- *400kV Agra (UP)-Fatehabad (UP) ckt-2 & Agra-Unnao ckt:* UP representative informed that they will check the reason of nonoperation of A/R in both the line and share the report within 7days.
- *400kV Kishenpur-New Wanpoh ckt-3:* POWERGRID representative informed that this line was tripped due to heavy snowfall in some span. Issue of heavy actual snow loading compare to design snow loading of the line has been taken up with POWERGRID corporate design wing. Information will be shared later on after reply from design wing.
- *400kV Muradnagar2-Mathura ckt-1:* UP representative informed that committee report yet to be come. OCC advised UPPTCL to check the reason of frequent tripping it and submit the remedial measures report within 7days.
- *NRLDC representative informed that despite of regular OCC agenda, remedial measures report and supporting details are still awaited for most of the tripped elements.*
- *As discussed in 38th PSC meeting & 164th OCC meeting, compiled information of monthly transmission elements outage list starting from Oct 2018 to Jun 2019 is attached at **Annexure-B.6.1 of 164th OCC MoM (Minutes of Meeting)**. Action taken and identified during the OCC meeting is also part of the details.*

Frequent outages of such elements affect the reliability and security of the grid. Hence, utilities are requested to look into such frequent outages and share the remedial measures taken/being taken in this respect.

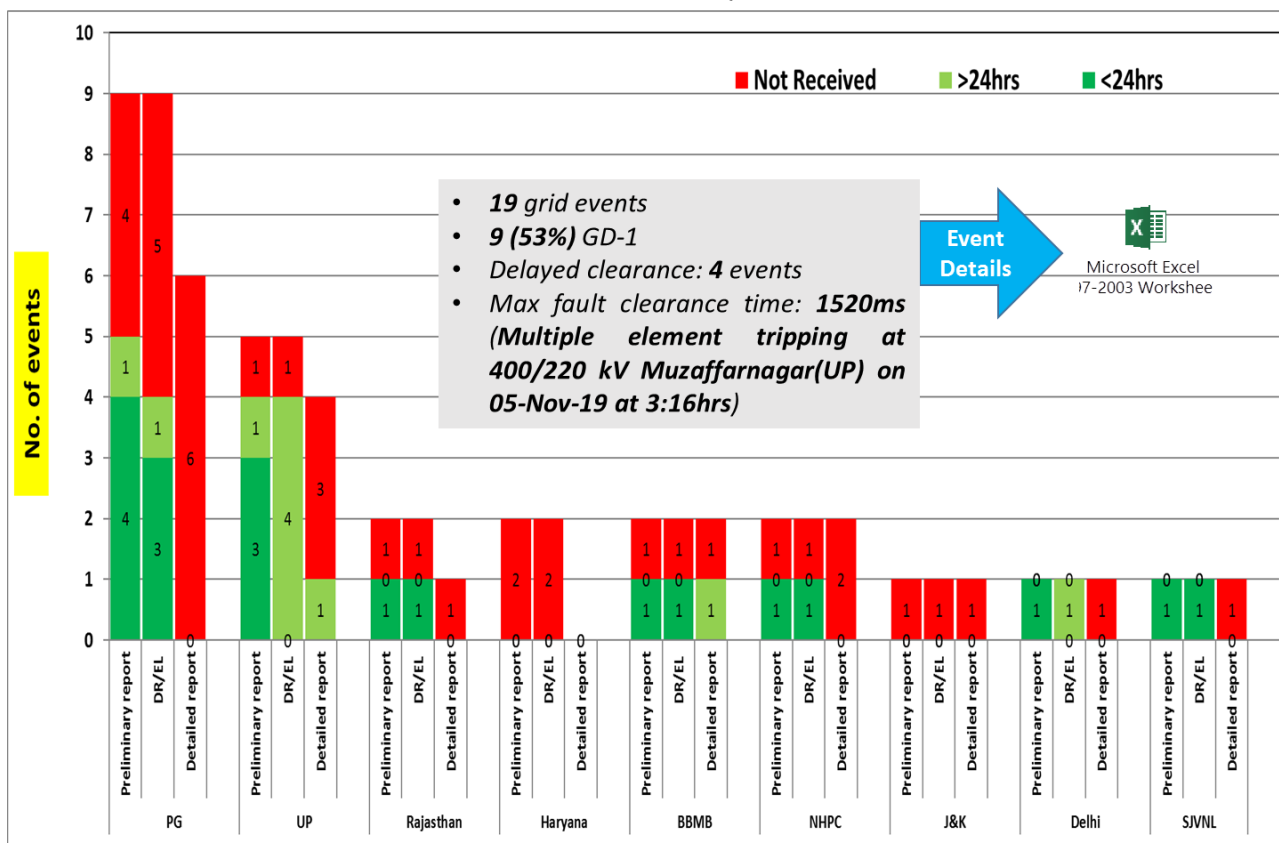
OCC raised concern on non-submission of details to NRPC/ NRLDC and suggested to all the SLDCs to compile the information and share the remedial measures report for last ten months tripping presented in various OCC meeting.

All the concerned utility shall prepare the presentation on remedial measures taken from Oct-2018 onward and present it during next (167th) OCC meeting.

4. Multiple element tripping events in Northern region in the month of Nov'19:

A total of **17** grid events occurred in the month of Nov'19 of which **9** are of GD-1 category. The preliminary report of all the events have been issued from NRLDC. A list of all these events along with the status of details received by 05-Dec-19 is attached at **Annexure-B.4** of the Agenda.

Note: Details received by 02-Dec-19 are considered



He emphasized that though despite persistent discussions/follow-up in various OCC/PCC meetings, the compliance of the regulations is still much below the desired level.

Maximum Fault Duration is **1520ms** in the event of multiple element tripping at 400/220 kV Muzaffarnagar(UP) on 05-Nov-19 at 3:16hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **4** events out of 17 grid events occurred in the month.

NRLDC representative informed that online web based portal for reporting of tripped element has been kept online from 01st Nov 2019 and all the members can now upload their tripping details on web portal. This information was already shared with all the constituents through mail. Despite of web based portal tripping details are still awaited from many of the utilities. He further raised concern for non-submission of details from Haryana after regular follow-up in OCC/ PSC meeting

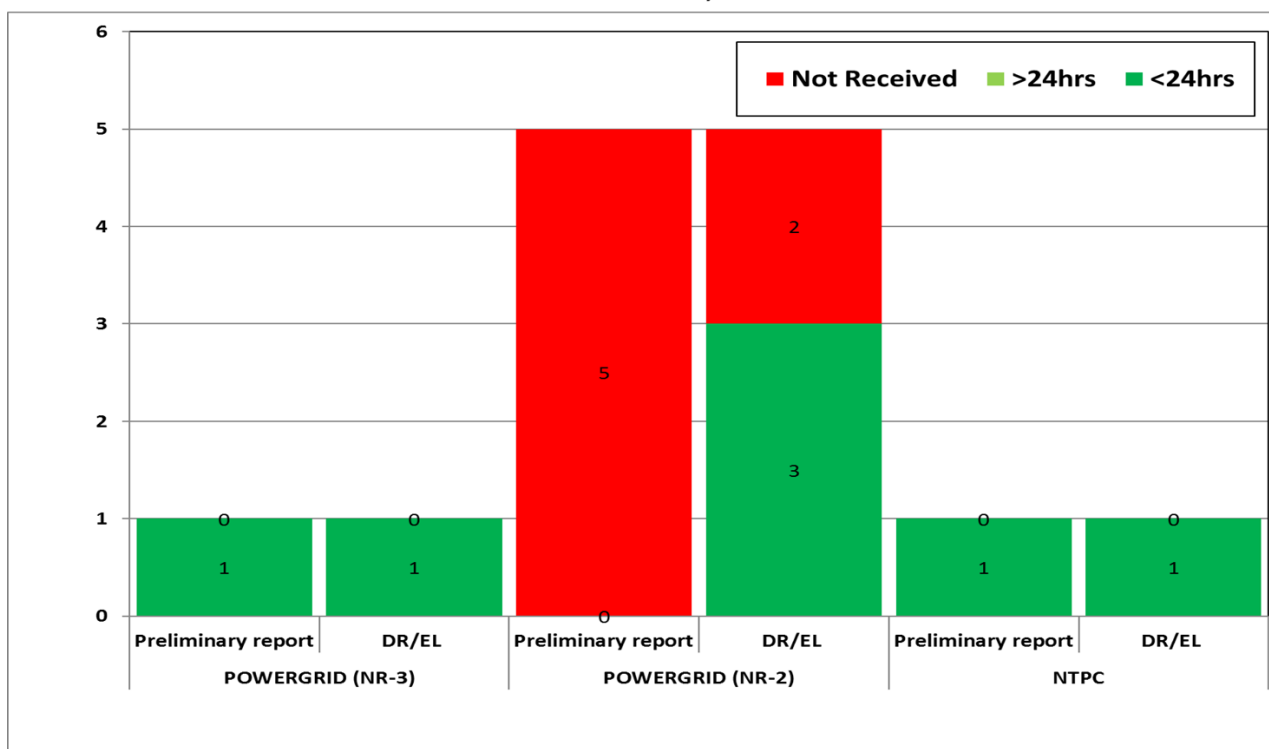
OCC, NRPC raised concern for non-submission of details from the NR utilities and suggested to all for further improvement.

Members were requested to provide timely details of the grid events, detailed report in desired format along with remedial measure report. Members agreed for the same.

5. Details of tripping of Inter-Regional lines from Northern Region for Nov'19:

A total of **07** inter-regional lines tripping occurred in the month of Nov'19. The list is attached at **Annexure-B.5** of the Agenda. Out of 07 number of trippings, 5 tripping incidents are related to HVDC system. The status of receipt of preliminary reports, DR/EL within 24hrs of the event was shown as below:

Note: Details received by 05-Dec-19 are considered



The non-receipt of DR/EL & preliminary report within 24hrs of the event is in violation of various regulations. 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 mandated by CEA (Grid Standard) Regulations.

NRLDC representative requested for timely submission of details and analysis of event for better real time system operation. Members agreed for the same.

6. Frequency response characteristic:

One FRC based event has occurred in the month of **Nov-2019**. Description of the events is as given below:

Table:

S. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf

1	01-Nov-19	11:16hrs	On 01st November 2019 , at 11:16hrs R-phase jumper of 220kv Giral line at Akal station snapped & dropped at 220kv structure leading to tripping of all 220 kV lines emanating from Akal S/S. Due to this tripping, approx.1644 MW generation loss was observed as per SCADA data. This value is calculated by summing the net delta P on all the lines emanating from Akal-Ramgarh generation complex. In this complex only Akal station have reported a Wind outage of 1200MW. Mada Suz and Ramgarh SCADA data was suspected in the entire incident. 400KV Akal-Ramgarh ckt-2 has also got tripped in the incident. The fault clearing time as per Jodhpur PMU was almost 1 second.	49.90	49.83	- 0.067
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The Hon'ble CERC approved procedure has already been shared with all concerned during previous OCC meetings. FRC observed for each state control area for the events is tabulated below:

States	01-Nov-19 event	Remarks
PUNJAB	56%	
HARYANA	121%	
RAJASTHAN	232%	Event in Rajasthan
DELHI	178%	Decrease in schedule
UTTAR PRADESH	45%	
UTTARAKHAND	49%	
CHANDIGARH	-5%	
HIMACHAL PRADESH	2%	
JAMMU & KASHMIR	137%	
NR	44%	

FRC calculation of ISGS stations based on NRLDC SCADA data is tabulated below:

Generator	01-Nov-19 event	Generator	01-Nov-19 event
Singrauli TPS	51%	Salal HEP	9%
Rihand-1 TPS	10%	Tanakpur HEP	6%
Rihand-2 TPS	-13%	Uri-1 HEP	88%
Rihand-3 TPS	16%	Uri-2 HEP	44%
Dadri-1 TPS	86%	Dhauliganga HEP	No generation
Dadri -2 TPS	138%	Dulhasti HEP	161%
Unchahar TPS	Suspected SCADA data	Sewa-II HEP	No generation
Unchahar stg-4 TPS	2%	Parbati-3 HEP	No generation
Jhajjar TPS	127%	Jhakri HEP	71%
Dadri GPS	0%	Rampur HEP	0%
Anta GPS	No generation	Tehri HEP	No generation
Auraiya GPS	No generation	Koteswar HEP	0%
Narora APS	21%	Karcham HEP	Suspected SCADA data
RAPS-B	-7%	Malana-2 HEP	Suspected SCADA data
RAPS-C	1%	Budhil HEP	No generation
Chamera-1 HEP	No generation	Bhakra HEP	-1%
Chamera-2 HEP	0%	Dehar HEP	23%
Chamera-3 HEP	No generation	Pong HEP	-19%
Bairasiul HEP	No generation	Koldam HEP	No generation
		AD Hydro HEP	No generation

FRC calculation of major state generators based on NRLDC SCADA data is tabulated below:

Generator	01-Nov-19 event	Generator	01-Nov-19 event
PUNJAB		UP	
Ropar TPS	No generation	Obra TPS	-4%
L.Mohabbat TPS	No generation	Harduaganj TPS	155%
Rajpura TPS	19%	Paricha TPS	-5%
T.Sabo TPS	105%	Rosa TPS	No generation
Goindwal Sahib TPS	No generation	Anpara TPS	-2%
Ranjit Sagar HEP	-28%	Anpara C TPS	60%
Anandpur Sahib HEP	-12%	Anpara D TPS	1%
HARYANA		Bara TPS	-2%
Panipat TPS	No generation	Lalitpur TPS	-22%
Khedar TPS	-13%	Meja TPS	No generation
Yamuna Nagar TPS	No generation	Vishnuprayag HEP	Suspected SCADA data
CLP Jhajjar TPS	No generation	Alaknanda HEP	30%
Faridabad GPS	No generation	Rihand HEP	No generation
RAJASTHAN		Obra HEP	No generation
Kota TPS	64%	UTTARAKHAND	
Suratgarh TPS	63%	Gamma Infra GPS	No generation
Kalisindh TPS	-19%	Shravanti GPS	No generation
Chhabra TPS	No generation	Ramganga HEP	Suspect SCADA data
Chhabra stg-2 TPS	71%	Chibra HEP	-37%
Kawai TPS	186%	Khodri HEP	No generation
Dholpur GPS	No generation	Chilla HEP	28%
Mahi-1 HEP	No generation	HP	
Mahi-2 HEP	No generation	Baspa HEP	-6%
RPS HEP	No generation	Malana HEP	-8%
JS HEP	97%	Sainj HEP	-14%
DELHI		Larji HEP	72%
Badarpur TPS	No generation	Bhabha HEP	4%
Bawana GPS	24%	Giri HEP	-10%
Pragati GPS	-17%	J&K	
		Baglihar-1&2 HEP	0%
		Lower Jhelum HEP	No generation

In line with the decisions taken during various OCC meetings, the time and date of the FRC events were e-mailed to respective utilities. Constituents may submit the FRC of their control areas for both the events and reason of poor response, if observed.

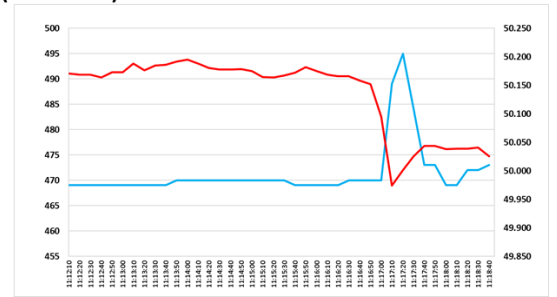
NRLDC representative showed following peculiar case of FRC events observed:

Details by Constituents: Delhi

Delhi Control area response: 169%(SLDC), 178%(NRLDC) Decrease in schedule

CCGT Bawana: -169%(SLDC), 24%(NRLDC)

Pragati: -10%(SLDC), -17%(NRLDC)



Details by Constituents: NHPC

संयुक्त प्रणाली प्रतिक्रिया (Frequency Response Characteristics) के संबंध में।

Ref: 1) On 01st November 2019, at 11:16hrs, due to snapping of R-phase jumper of 220kv Giral line at Akal station approx.1644 MW generation loss was observed as per SCADA data.

महोदय ,

दिनांक-01/11/2019 को हुई 1644 मेगावाट के लोड लॉस के संदर्भ में यह उल्लेख करना उचित है कि NHPC के पावर स्टेशन - चमेरा -1, चमेरा -3, सेवा -2 और धौलीगंगा की कोई भी इकाई उत्पादन शैड्यूल के अनुसार नहीं चल रही थी।

IEGC रेग्युलेशन खंड संख्या 5.2 (f), (g), (h) और (i) के अनुसार, NHPC पावर स्टेशन - उरी, उरी-II, दुलहसती, सलाल, बैरासूल, चमेरा-II, टनकपुर एवं किशनगंगा में RGMO / FGMO mode of operation लागू नहीं है।

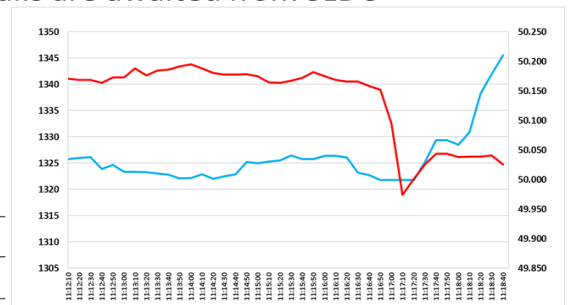
यह आपकी जानकारी के लिए प्रेषित है।

Details by Constituents: Punjab

Punjab Control area response: 56%(NRLDC) Details are awaited from SLDC

Punjab

Rajpura: 72%(NPL details), 19%(NRLDC)



Date	Time	Station Load during RGMO as per data sheet recorded at SLDC end [Ex Bus]	Station Load during RGMO as per data sheet recorded at NPL end [Generation]
		Station load(MW)	Station load(MW)
01-11-2019	11:16:40	1322.71	1373.00
	11:16:50	1321.75	1379.10
	11:17:00	1321.75	1384.10
	11:17:10	1321.75	1389.50
	11:17:20	1321.75	1393.10
	11:17:30	1325.17	1393.60
	11:17:40	1329.32	1396.30
	11:17:50	1329.32	1400.50

- As per data recorded at NPL end, Percentage of ideal response achieved is 71.54 % (as compared to 19 % at SLDC end) with a total load variation of +27.5 MW.
- By above data comparison, there is suspicion about correct data recorded/transferred to SLDC during the event.

We are looking at the data transmission during the event

FRC characteristics of Punjab Control Area during tripping of 400/220 KV Akal station in Rajasthan at 11:16 hrs on 01.11.2019 as follows:-

Sr. No	Particulars	Dimension	GGSSSTP	GHTP	RSD	NPL (IPP)	TSPL (IPP)	GVK (IPP)
1	Actual net interchange of Punjab region before the event (11:16:40 hrs.)	MW	0.00	0.00	117.56	1380.06	1589.00	0.00
2	Actual net interchange of Punjab region after the event (11:17:50 hrs.)	MW	0.00	0.00	117.03	1404.26	1618.00	0.00
3	The net interchange of Punjab Region (2-1)	MW	0.00	0.00	-0.53	24.20	29.00	0.00
4	Generation Loss (+)/Load Throw off (-) during Event	MW	0.00	0.00	0.00	0.00	0.00	0.00
5	Control Area Response (3-4)	MW	0.00	0.00	-0.53	24.20	29.00	0.00
6	The frequency before the event	HZ	49.90	49.90	49.90	49.90	49.90	49.90
7	The frequency after the event	HZ	49.83	49.83	49.83	49.83	49.83	49.83
8	Change in frequency (7-6)	HZ	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
9	Frequency response characteristics (FRC) (5/8)	MW/HZ	0.00	0.00	7.57	-345.71	-414.29	0.00
10	Net system demand met before the event	MW	0.00	0.00	0.00	0.00	0.00	0.00
11	Internal generation of Punjab Region before the event (10-1)	MW	0.00	0.00	117.56	1380.06	1589.00	0.00
12	Ideal Load Response of Punjab Region assuming 4% per Hz (0.04* Row 10)	MW/HZ	0.00	0.00	0.00	0.00	0.00	0.00
13	Assuming 5% droop means 5% Ideal generators response of Punjab Region (0.4* Row 11)	MW/HZ	0.00	0.00	47.02	552.02	635.60	0.00
14	Composite Ideal Response(12+13)	MW/HZ	0.00	0.00	47.02	552.02	635.60	0.00
15	Percentage Ideal Response (9/14)*100	%	*	*	16.10	-62.63	-65.18	*

* No Generation

Note:- 1.) It is observed that the SCADA data taken by NRLDC in respect of NPL & TSPL seems to be different from the SCADA data available at Punjab SLDC. The difference in the SCADA data is shown in the table. Moreover, NPL has also raise the issue of SCADA data difference through e-mail dated 09.11.2019 addressed to your office. 2.) It is intimated that Anandpur Sahib Hydel Power Plant is Run-Off river plant and the same is available in 164th OCC minutes. Accordingly, the calculation of FRC characteristics for this plant is not required.	01.11.2019				
		NPL		TSPL	
	TIME	NRLDC DATA	PSLDC DATA	NRLDC DATA	PSLDC DATA
	11:16:40	1323.00	1380.00	1489.00	1589.00
11:17:50	1329.00	1404.00	1531.00	1618.00	

Details by Constituents: Uttar Pradesh

**UP Control area response: 45%(NRLDC) Details are awaited from SLDC UP
Rajpura: 145%(Harduaganj details), 155%(NRLDC)**

FRC Calculations for 01.11.2019 Uttar Pradesh Control Area from 11:16:40Hrs. R-phase jumper of 220KV Giral line at Akal station snapped & dropped at 220KV Structure leading to tripping of all 220KV lines emanating from Akal S/S.

Sr No	Particulars	VISHNUPRAY AG (4X110MW)	ALAKHNAND A (4X82MW)	ANPARA-C LANCO (2X600MW)	ROSA-I (2X300MW)	ROSA-II (2X300MW)	RIHAND-Hydro (6X50MW)	OBRA-H (3X33MW)	KHARA-H (3X24MW)	Tanda(4X110)	Meja TPS	UP
1	Actual net interchange immediately before the disturbance	144.000	82.529	981.682	-1.586	-0.203	0.000	0.192	48.224	7.372	0.947	4339.546
2	Actual net interchange immediately after the disturbance	144.000	82.459	996.711	-1.586	-0.203	0.000	0.192	48.205	7.372	0.947	4229.248
3	Change in Net Interchange (2 - 1)	0.000	-0.071	15.029	0.000	0.000	0.000	0.000	-0.019	0.000	0.000	-110.298
4	Generation Loss (+) / Load Throw off (-) during the Event	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	Control Area Response (4-3) (ΔP)	0.000	0.071	-15.029	0.000	0.000	0.000	0.000	0.019	0.000	0.000	-110.298
6	Frequency before the Event	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035
7	Frequency after the Event	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897
8	Change in Frequency (7-6)	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138
9	Frequency Response Characteristic (5 / 8)	0.000	-0.513	108.848	0.000	0.000	0.000	0.000	-0.139	0.000	0.000	798.837
10	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 1) (P Ideal.net)	57.600	33.012	392.673	-0.635	-0.081	0.000	0.077	19.290	2.949	0.379	1735.819
11	Percentage ideal response	0.000	-1.554	27.720	0.000	0.000	0.000	0.000	-0.722	0.000	0.000	46.021

Sr No	Particulars	Dimension	ANPARA-A (3X210MW)	ANPARA-B (2X500MW)	ANPARA-D (2X500MW)	OBRA-B (5X200MW)	PARICHHA-B (2X210MW)	PARICHHA-C (2X250MW)	HARDUAGAN (2X250MW)	LALITPUR (3X660MW)	BARA (3X660MW)
1	Actual net interchange immediately before the disturbance	MW	538.370	404.877	953.536	488.927	221.042	139.226	264.374	878.148	1079.959
2	Actual net interchange immediately after the disturbance	MW	537.863	404.878	953.788	488.604	220.604	143.365	275.572	873.709	1078.340
3	Change in Net Interchange (2 - 1)	MW	-0.507	0.001	0.252	-0.323	-0.4377	4.139	11.198	-4.439	-1.619
4	Generation Loss (+) / Load Throw off (-) during the Event	MW	0.000	0.000	0.000	0.000	0.00000	0.000	0.000	0.000	0.000
5	Control Area Response (4-3) (ΔP)	MW	0.507	-0.001	-0.252	0.323	0.43774	-4.139	-11.198	4.439	1.619
6	Frequency before the Event	HZ	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035	50.035
7	Frequency after the Event	HZ	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897	49.897
8	Change in Frequency (7-6)	HZ	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138	-0.138
9	Frequency Response Characteristic (5 / 8)	MW/HZ	-3.673	0.010	1.825	-2.339	-3.170	29.977	81.103	-32.150	-11.723
10	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 1) (P Ideal Gen)	MW/Hz	215.348	161.951	381.414	195.571	88.417	55.690	105.750	351.259	431.984
11	Percentage ideal response	%	-1.706	0.006	0.479	-1.196	-3.586	53.828	76.694	-9.153	-2.714

The following were discussed:

- Momentary positive response from Bawana CCGT to be checked and improved in view of changes in APCPL-Jhajjar. Negative response from Pragati GT also needs to be checked
- Details received from NHPC, no unit was running at the time of FRC event.
- Details also received from UP & Punjab. FRC Calculation sheet of Punjab is not in line with NRLDC calculation sheet. It needs to be checked and corrected.

Constituents were requested to look into the above aspects among others and submit the reason for not providing the response and corrective actions taken / to be taken for improved response. Constituents agreed on the same.

OCC advised all the SLDCs to check the FRC details for intra state generators, improve its FRC response and share the remedial measures report to NRPC/ NRLDC in 10 days.

7. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 5.8(b) "Mock trial runs of the procedure for different sub-systems shall be carried out by the Users/ CTU/ STU at least once every six months under intimation to the RLDC".

Mock Black-start exercise of power stations therefore needs to be carried out in order to ensure healthiness of black start facility. The winter months are off peak hydro period and therefore good time to carry out such exercises.

The following is the status and schedule of mock exercises to be carried out:

Scheduled Date	Revised scheduled Date	Name of stations	Comments/Remarks
09-Oct-19		Anta GPS	To be confirmed by Anta. Internal black start reportedly conducted on 18-Oct-19.
22-Oct-19	15 Nov'19	*Dhauliganga	Revised schedule due to load provision in UP. Conducted Successfully on 15 th Nov 2019
25-Oct-19	17 th Dec 2019	*N. Jhakri and Rampur	Revised schedule due to overhauling activity at Jhakri.
31-Oct-19	31-Oct-19	*Bairasiul	Exercise was partial successful. Island created but could not sustain long and unit tripped. Final synchronization of island with the grid could not be successful at Bairasiul due to problem in synchronization at Bairasiul HEP.
05-Nov-19		Sewa-2	Revised schedule due to load provision in J&K.
8-Nov-19	in Dec'19	*Karcham and Baspa	Exercise deferred by Karcham due to reported internal problem.
15-Nov-19	13, 14-Nov-19	*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's, Upper Sindh and Kishanganga	NHPC revised dates due to 15 th being Friday. Confirmation yet to be received from J&K.
19-Nov-19		Parbati-3 and *Sainj	
21-Nov-19		Salal	
26-Nov-19		*Chamera-3	
28-Nov-19	28-Nov-19	Koteshwar	Conducted Successfully
04-Dec-19		*Auraiya GPS	
10-Dec-19	10-Dec-19	Chamera-1 and 2	Due to outages of Unit#1 & Unit#2, the mock black start exercise at Chamera-2 Power Station may be avoided. Chamera-1 Black Start completed successfully
12-Dec-19		Malana-2, AD Hydro and Phozal	
19-Dec-19		*Dadri GPS	
27-Dec-19		Tehri	
02-Jan-20		Koldam	

* Mock Black start exercise not carried out during Year 2018-19.

SLDC's were also requested to 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 were as follows:

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)
1	J&K	Baglihar	3x150
2		Baglihar stage-2	3x150
3		Lower Jhelum	3x35
4		Upper Sindh	2x11+3x35
5		Larji	3x42
6		Bhabha	3x40
7		Malana -I	2x43
8		Baspa	3x100
9	Punjab	Ranjit Sagar	4x150
10	Rajasthan	Mahi-I&II	2x25+2x45
11		Rana Pratap Sagar	4x43
12		Jawahar Sagar	3x33
13		Gandhi Sagar	5x23
14		Dholpur GPS	3x110
15		Ramgarh GPS	1x35.5+2x37.5+1x110
16	UP	Rihand	6x50
17		Obra	3x33
18		Vishnuprayag	4x100
19		Srinagar (Alaknanda)	4x82.5
20	Uttarakhand	Gamma Infra	2x76+1x73
21		Shravanti	6x75
22		Ramganga	3x66
23		Chibro	4x60
24		Khodri	4x30
25		Chilla	4x36
26		Maneri Bhali-I&II	3x30+4x76
27	Delhi	IP Extn GTs	6x30+3x30
28	Haryana	Faridabad GPS	2x137.75+1x156.07

During last winter, SLDCs had been requested to carry out mock drills and share their experiences. However, the report of such exercises was not received.

During 163rd OCC meeting, members agreed to confirm the schedule by the end of September'19. However, details are still awaited from all the utilities. It is once again requested to all the members to kindly confirm the schedule as it would be difficult to change the schedule once finalized.

In 164th OCC meeting the following were informed by states:

- Punjab representative informed that black start facility is not available at Anandpur Sahib.
- UP representative informed that Rihand Hydro black start will be carried out during second week of Nov-2019.
- Delhi representative informed that Pragati and Rithala stations don't have black start capability.

In 165th OCC meeting the following were discussed:

- Black start of Dhauliganga HEP was rescheduled on 15th Nov 2019 (UPPTCL changed the date to provide the load), it is already running.
- Black start of Bairasiul was partially successful in view of stopping of unit due to problem in island synchronization with the main grid at Bairasiul HEP
- Mock exercise was postponed because of CERC visit. Mock exercise of Karcham/ Baspa can be done in the month of December. NRLDC representative further suggested to Karcham HEP to do the exercise in the month of November itself.
- Tehri & Koteshwar agreed to do mock exercise as per schedule.
- NHPC confirmed all the dates of mock exercises which are to be held before next OCC meeting.
- UP representative informed that black start was successfully occurred at Rihand Hydro on 11th Nov 2019, Obra HEP was also tried to synchronized, obra bus was charged but unit didn't synchronize during this exercise. Black start of Obra HEP will be further expedited after taking input & reason of tripping of Obra unit during recent exercise.
- UP representative further informed that Vishnuprayag & Alaknanda have black start facility but nearby load is available at Srinagar (Uttarakhand). UPPTCL representative will share the procedure in the meantime and will discuss with Uttarakhand for consent in this regard.
- Punjab representative informed that black start facility is not available at Anandpur Sahib.
- Delhi representative informed that they will do the mock exercise for IP-GT in the month of December-2019.
- NRLDC representative requested to Uttarakhand for conducting mock black start exercise of hydro units in Uttarakhand.
- Haryana representative informed that they are taking up the matter with Faridabad GT for mock black start exercise and will be revert soon.
- NTPC Anta agreed to share the black start procedure at the earliest

In 166th OCC meeting the following were discussed:

- *Karcham representative agreed to do the testing on 23rd or 24th Dec 2019. Haryana & POWERGRID representative also agreed for the same.*
- *Black start of Jhakri HEP & Rampur HP was done on 17th Dec 2019.*
- *NRLDC representative suggested Delhi SLDC to do the mock exercise of Pragati GT in the month of Dec 2019.*

- Rajasthan representative informed that they have planned for mock exercise of hydro and gas station. Date will be shared in 10days.
- Haryana representative agreed to take up the matter with NTPC for Faridabad gas and revert back.
- Uttrakhand representative informed that there was no facility available for black start of the units in Uttrakhand control area. NRLDC representative suggested to SLDC-Uttrakhand for further take up the issue in view of non-availability of DG set, setting issue or any other issue and share the exact reason (plant wise) with NRPC/ NRLDC
- NHPC representative requested to explore the possibility to extent the Uri-1 HEP to Delina load.
- Punjab representative informed that they will conduct the mock exercise of RSD in the month of Jan-2020.

SLDCs are once again requested to share the information and program for this year's mock black start exercises and submit the reports of black start exercises carried out last season in their respective control area. SLDCs may also further identify further generating stations/unit for black start exercise.

8. Review of SPS at Bhadla (RVPNL) for evacuation of ISTS connected Solar Power:

A meeting was convened by NRPC on 08.07.19 at NRPC secretariat, New Delhi under the chairmanship of Member Secretary (NRPC) to finalize the logic and implementation of SPS at Bhadla (RVPN) S/s and reliable evacuation of ISTS connected Solar Power. Minutes of meeting attached as **Annexure-B.6** of the Agenda

SPS logic as approved in the meeting is as below:

Cause: line loading of either of 220kV Bhadla-Bap S/c line or 220kV Bhadla-Badisid S/c line increases beyond 225 MW

Action:

- New ISTS Solar generation (beyond 350 MW] is to be curtailed through 220kV injection feeder (ISTS) disconnection at Bhadla (PG) S/s
- Bus sectionaliser to be closed at 220kV Bhadla (RVPN) S/s after above action to relieve loading on 220kV Bhadla- Bap S/c line or 220kV Bhadla-Badisid S/c line.
- Action should be achieved within say 200 ms.

It was also decided that the above arrangement will be in place till availability of 765kV Bhadla (PG)- Bikaner (PG) D/c line by Aug/Sep 2019.

Recently on 12th & 13th Dec 2019, above SPS operated due to over loading of 220 kV Bhadla (Raj)-Bap ckt or 220 kV Bhadla (Raj)-Badisid ckt and further resulted

into tripping of ISTS connected Solar Generation. This SPS has been disabled till further review of the scheme.

Following were discussed during the meeting:

- *NRLDC representative purposed two separate SPS one for ISTS connected solar generators and one is for intra state connected solar generators in Rajasthan.*
 - *For ISTS connected solar generators SPS will take care about tripping of both 765 kV Bhadla-Bikaner ckt and in case of tripping both the lines, SPS will be triggered and tripped all the ISTS connected Solar Generators wired in SPS scheme. For line tripping input for both end of 765 kV lines to be taken for SPS logic like in 765 kV Agra-Gwalior SPS.*
 - *For intra state connected solar generators, Rajasthan may purpose and share the information in OCC meeting.*
 - *Existing SPS scheme needs to be disabled for ISTS connected solar generators.*
- *POWERGRID representative informed that they will discuss internally and revert back for proposed SPS scheme. Tripping for existing SPS scheme will be disabled immediately.*
- *Rajasthan representative agreed to block the tripping communication from Bhadla (Raj) to Bhadla (PG) and also agreed to review and share the SPS scheme in next OCC meeting.*

OCC advised POWERGRID to go through the SPS scheme and share the feedback in 15days. OCC also advised SLDC-Rajasthan to share the SPS scheme details in next OCC meeting.

9. Load Crash in Northern Region on 12th Dec 2019:

Sudden thunder storm/rainfall during winter in NR is probable phenomenon and subsequent load crash in range of 7-15 GW in region as a whole. Such fast reduction of large load causes frequency/voltage excursions, line loading etc.

Recently on 12th December 2019, load crash of **7.4GW** occurred in Northern Grid on account of dust storm/ thunderstorm within **4hrs 30minutes** time span.

Punjab, Haryana, Rajasthan, Uttar Pradesh, J&K and Uttarakhand were the major affected state control area during load crash. Demand crash in Punjab started first at 05:00hrs itself followed by Rajasthan & Haryana at 17:00hrs and 17:30hrs respectively. Uttar Pradesh & Uttarakhand demand started decreasing at 18:30hrs & 20:30hrs respectively. Maximum demand crash of Northern Region was **9424MW** at 04:00hrs of 13th Dec 2019 as compared to previous day. Maximum load crash of affected state control area is tabulated below:

State Control Area	Demand Met (MW) at 04:00hrs	Demand Met (MW) at 04:00hrs	Demand Reduction (in MW)	Minimum Demand Met (in MW)	Load Crash Amount (in MW) and duration

	of 12th Dec'19	of 13th Dec'19			
Punjab	3350	2571	779	2454 (03:00hrs)	500MW in 03:00hrs (Started in 05:00hrs of 12th Dec)
Haryana	4180	2176	2004	2080 (02:51hrs)	2000MW in 03:30hrs (Started in 17:30hrs of 12th Dec)
Rajasthan	5874	4903	971	4903 (04:00hrs)	1000MW in 01:30hrs (Started in 17:00hrs of 12th Dec)
Uttar Pradesh	9010	4440	4570	4304 (04:36hrs)	3300MW in 04:00hrs (Started in 18:30hrs of 12th Dec)
Delhi	1481	1442	39	1427 (03:34hrs)	300 MW in 01:15hrs (Started in 20:30hrs of 12th Dec)
Chandigarh	108	149	-41	144 (02:36hrs)	40 MW in 02:30hrs (Started in 19:26hrs of 12th Dec)
J&K	1885	1283	602	1117 (05:24hrs)	300 MW in 03:00hrs (Started in 18:00hrs of 12th Dec)
Uttarakhand	1532	1122	410	1110 (04:58hrs)	250 MW in 03:00hrs (Started in 20:30hrs of 12th Dec)
Himachal Pradesh	953	890	63	890 (04:00hrs)	

Northern Region	28345	18921	9424	18921 (04:00hrs)	7400MW in 04:30hrs (started at 17:30hrs of 12th Dec)
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Utilities are requested to kindly submit the detailed report and prepare the presentation on experience of load crash considering the following points:

- Load Crash (in MW) in the State
- Analysis of Thermal Generation backing down in the state (till technical minimum or not, if not than reason of the same needs to be discussed)
- Analysis of fast ramping down of state generation during reduction in demand met.
- Reason of large deviation from the schedule
- Line tripping & tower collapse (132 kV and above)
- Line manually opened on high voltage in state Grid
- Future remedial measures (Improvement in action taken for future)
- Weather monitoring and warning/alerts issued or not?

Since no representative from SLDCs presented during the meeting, NRLDC representative requested to all the SLDCs representative to share the report along with action points.

NRLDC representative informed that during this incident almost 100 numbers of line tripped on fault, over voltage or manually opened on high voltage. He further emphasized that in the absence of 100 numbers of line, grid became weak and it may have resulted into larger catastrophe and grid disturbance. Utilities have to analyse the incident in peace time because at the time of actual load crash everyone was in hurry to take action. He requested to all the NR utilities to analyse this load crash in view of improvement area and minimize the opening/ tripping of transmission line.

Haryana representative informed that unit at DC RTP was boxed up during the incident and multiple 220 kV lines were opened during the incident.

Action points:

- OCC suggested to all the state load despatch centre to put separate screen dedicated for weather monitoring and use this information in real time grid operation.
- Utilities shall submit the detailed report on load crash **within 15days** considering the following points:
 - Load Crash (in MW) in the State
 - Analysis of Thermal Generation backing down in the state (till technical minimum or not, if not than reason of the same needs to be discussed)

- Analysis of fast ramping down of state generation during reduction in demand met.
- Reason of large deviation from the schedule
- Line tripping & tower collapse (132 kV and above)
- Line manually opened on high voltage in state Grid
- Future remedial measures (Improvement in action taken for future)
- Weather monitoring and warning/alerts issued or not?

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

Reactive Power Management document for Northern region is due for revision. The last updated document link is as below:

<https://nrlcdc.in/download/nr-reactive-power-management-2019/>

Document is password protected and password was already informed to all the NR constituents through letter dated 28th Dec 2018.

Despite of continuous discussion in various OCC meeting and NRLDC letter dated 29th Nov 2019, details are still awaited from most of the NR utilities. Following are the status of data submission by NR utilities:

Reactive Power Document			
Data Received from	Data Not received from		
Adani	Malana-II	Rosa-Reliance	J&K
Rajasthan	HP	THDC	APCPL
POWERGRID NR-2	UP	Karcham (JSW)	JAYPEE
	Delhi	AD Hydro	POWERLINK
	NTPC	POWERGRID- NR3	PKTCL
	Punjab(Data received from NPL – Rajpura only)	POWERGRID NR-1	Shree Cement
	Railway	Greenko Budhil	SJVNL
	Haryana	NPCIL	Chandigarh

	Uttarakhand	Malana-I	Others...
	BBMB	Haryana	

It is once again requested to all the NR constituents to provide the feedback, suggestion and updated information by 20th December 2019.

11. Revision of document for System Restoration Procedure (SRP) for Northern Region:

System restoration procedure for Northern region is due for revision. The last updated document link has already been shared with the constituents.

https://nrlcdc.in/wp-content/uploads/2019/01/System_Restoration_NR_2019.pdf

Document is password protected and password was already informed to all the NR constituents through letter dated 31st Jan 2019.

Constituents are requested to go through the document and provide any modification/addition in respect of their system. SLDC/Generating utilities are requested to kindly update and share the restoration procedure in respect of their state/generating station.

Despite of continuous discussion in various OCC meeting and NRLDC letter dated 25th Nov 2019, details are still awaited from most of the NR utilities. Following are the status of data submission by NR utilities:

System Restoration Procedure		
Data Received from	Data Not received from	
NHPC	Delhi	SJVN
Rajasthan	THDC (Tehri)	HP
	Rosa (Reliance)	J&K
	Greenko Budhil	Malana-I
	NTPC	JAYPEE
	POWERGRID	POWERLINK
	Railway	PKTCL

	UP	Shree Cement
	BBMB	Karcham (JSW)
	Chandigarh	AD Hydro
	APCPL	Malana-II
	Adani	Uttarakhand
	Haryana	Punjab
	NPCIL	Others...

It is once again requested to all the NR constituents to provide the feedback, suggestion and updated information by 30th December 2019.

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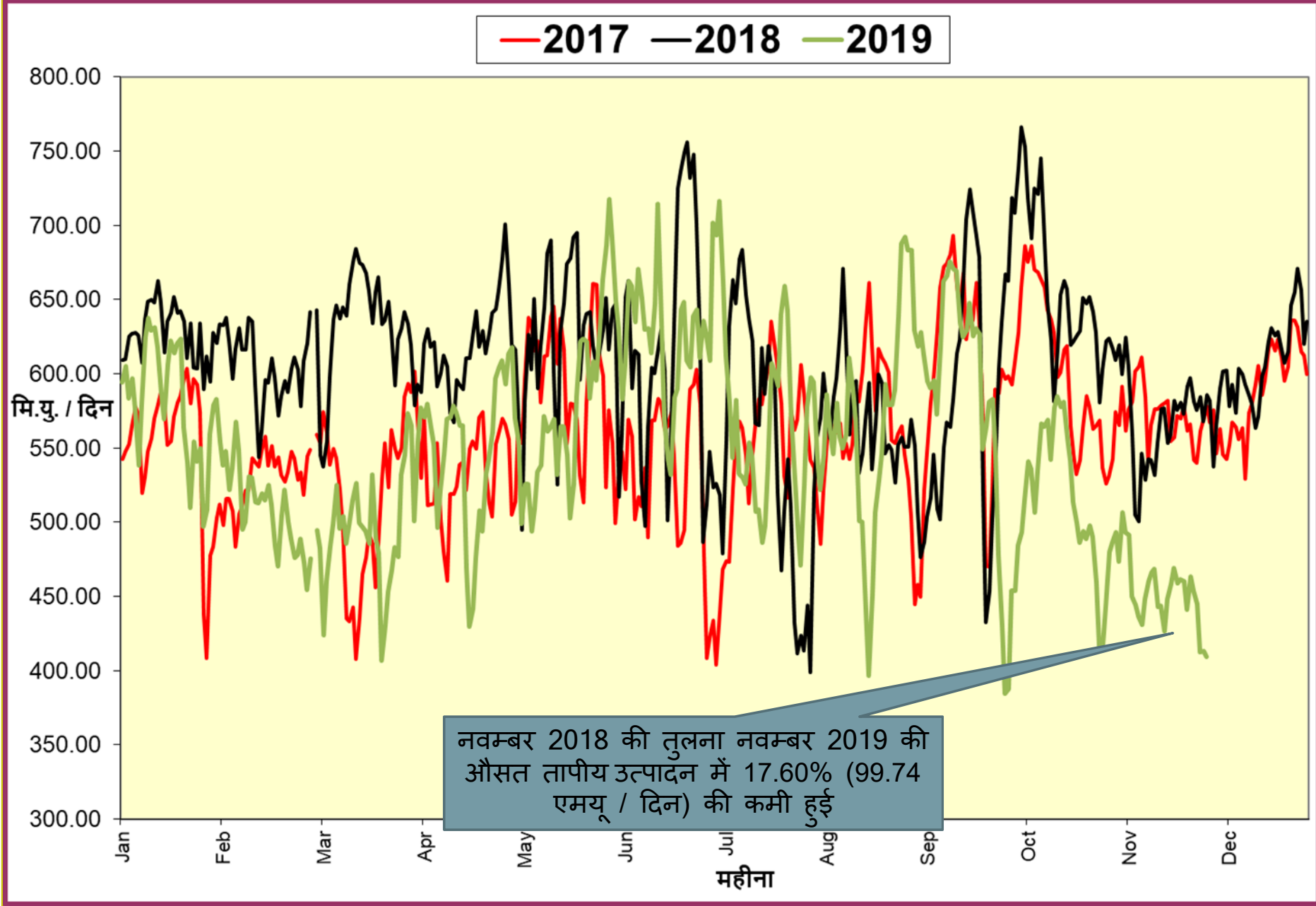
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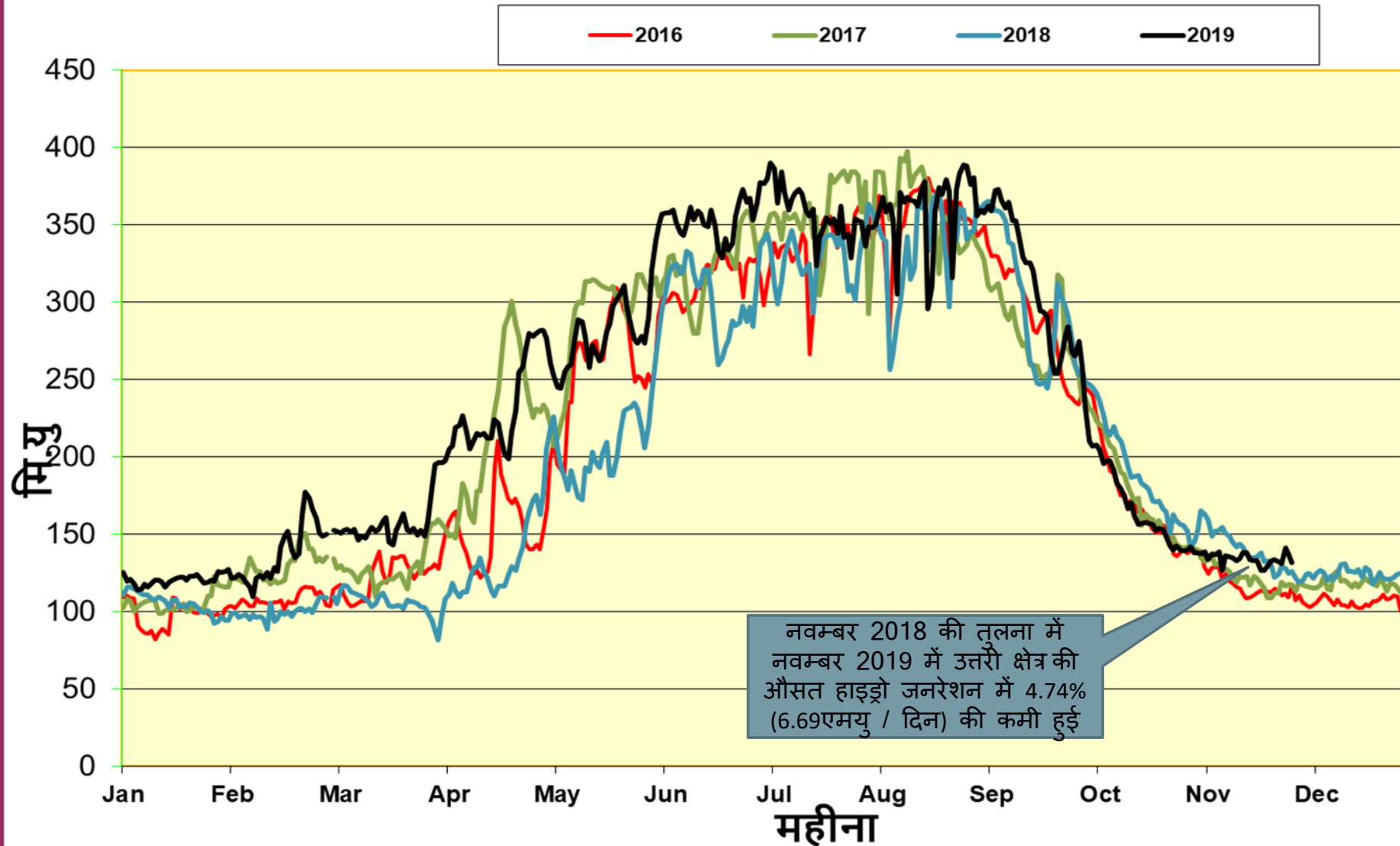
उत्तरी क्षेत्र की तापीय (Thermal) उत्पादन की स्थिति (MUs)



उत्तरी क्षेत्र की जलीय (हाइड्रो) उत्पादन की स्थिति (MUs)



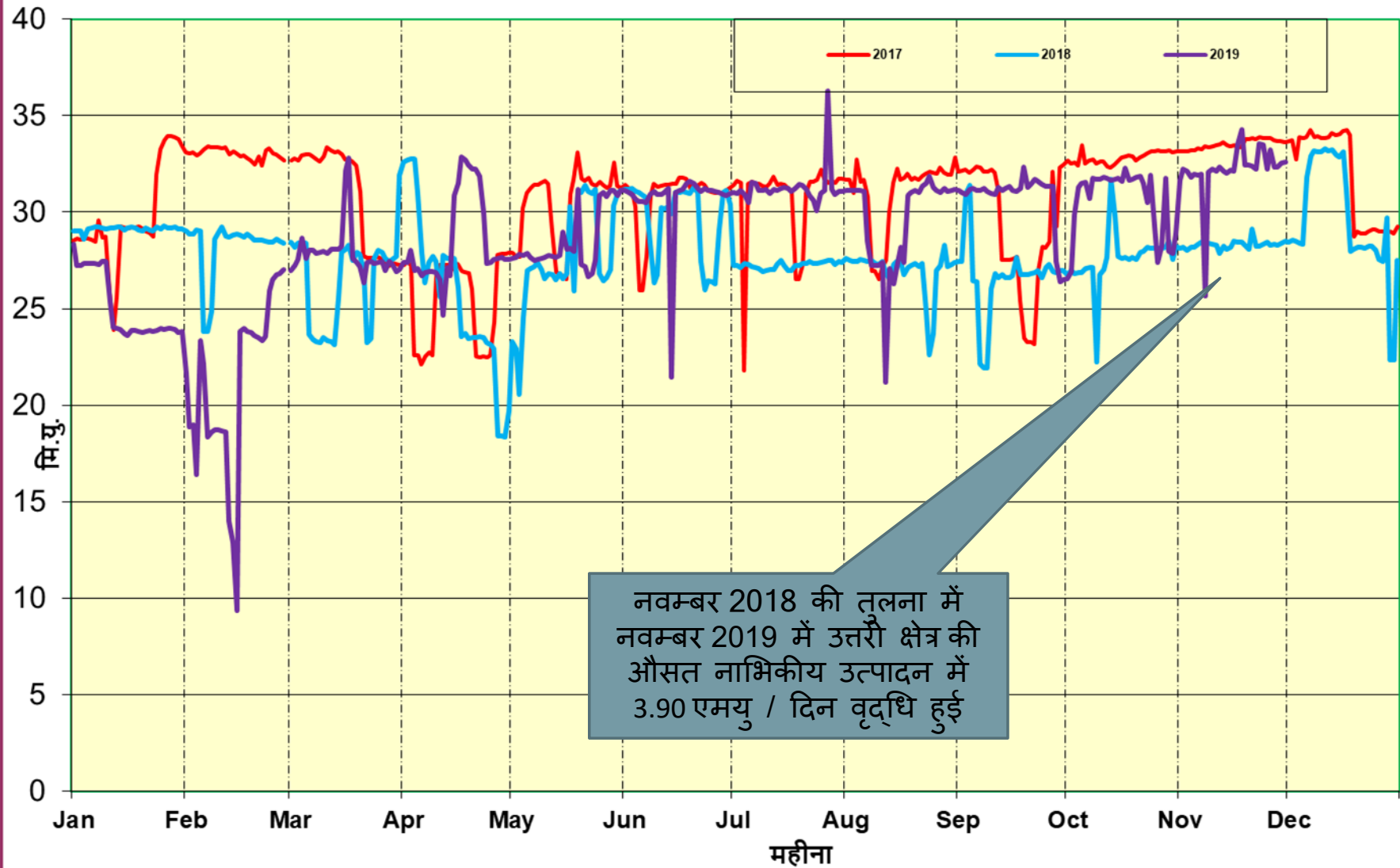
Northern Regional Total Hydro Generation



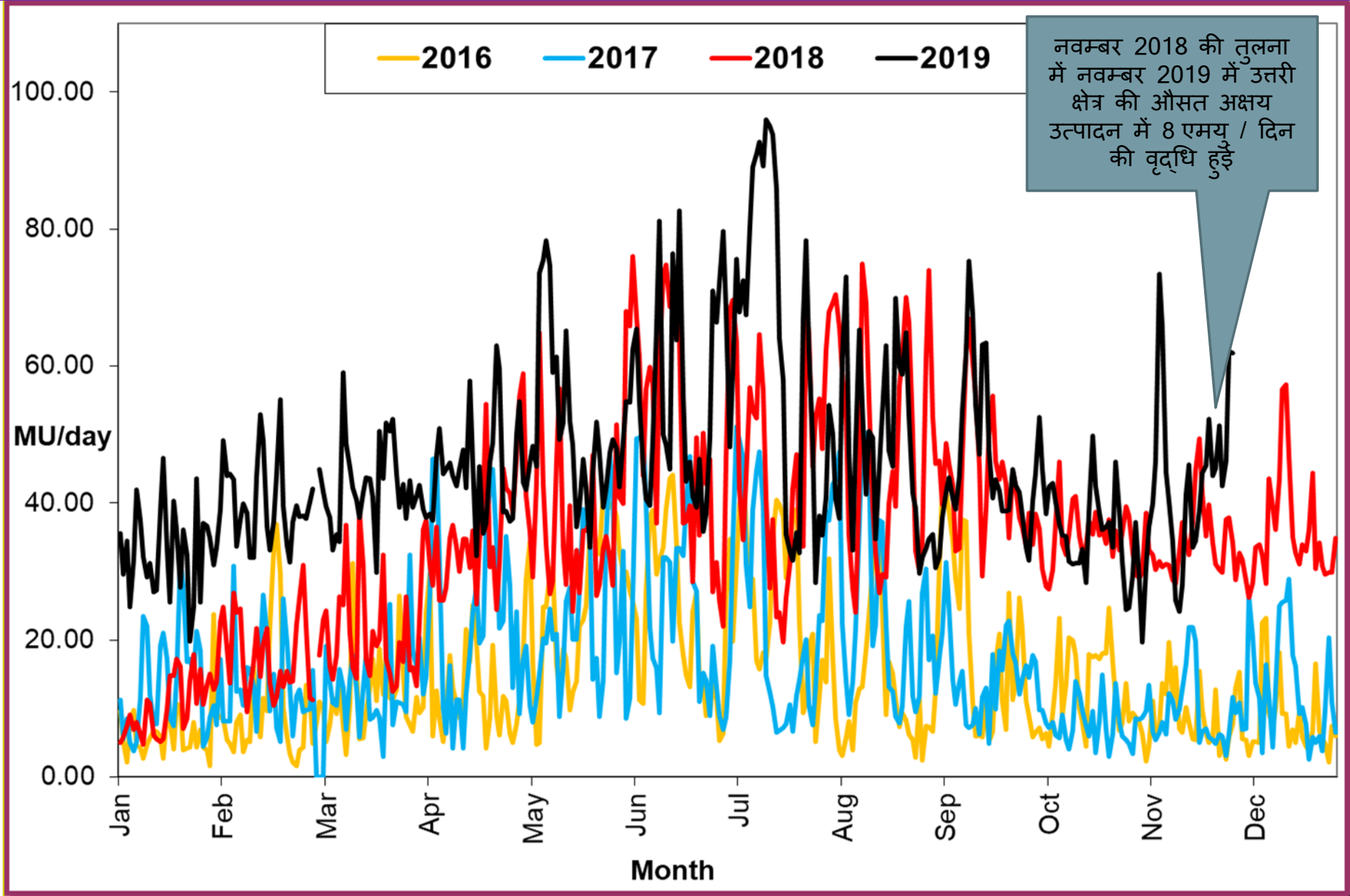
उत्तरी क्षेत्र की नाभिकीय उत्पादन की स्थिति (MUs)



Total Nuclear Generation



उत्तरी क्षेत्र की अक्षय (Renewable) उत्पादन की स्थिति (MUs)



Long Outage of Generating Units

SL. No	Station Name	Location	Owner	Unit No	Capacity	Reason	Outage		Outage duration (in days)
							Date	Time	
1	Giral (IPP) LTPS	RAJASTHAN	RRVNL	1	125	bed material leakage	11-07-14	8:20	1984
2	Giral (IPP) LTPS	RAJASTHAN	RRVNL	2	125	Boiler tube leakage	27-01-16	15:27	1419
3	Bairasiul HPS	HP	NHPC	2	60	renovation and modernization of the plant	15-10-18	10:02	427
4	Bhakra HPS	PUNJAB	BBMB	3	126	Renovation and Maintenance work	01-04-19	9:20	259
5	Chamera II HPS	HP	NHPC	1	100	turbine problem	07-08-19	8:58	131
6	Chamera II HPS	HP	NHPC	2	100	turbine problem	07-08-19	3:54	131
7	Dehar HPS	HP	BBMB	6	165	capital maintenance during poor/reduced inflows.	23-09-19	9:00	84
8	Bara PPGCL TPS	UP	UPPTCL,JPV L	2	660	Coal Shortage	24-09-19	19:39	83
9	Meja TPS	UP	UPPTCL,NTP C	1	660	hp turbine vibration high	06-10-19	23:22	71
10	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSPCL	6	210	annual maintenance	01-11-19	9:00	45
11	Anpara TPS	UP	UPPTCL	5	500	annual overhauling	04-11-19	7:51	42
12	Dehar HPS	HP	BBMB	5	165	annual maintenance during poor/reduced inflows.	05-11-19	9:00	41
13	Rihand-I STPS	UP	NTPC	2	500	unit over hauling	05-11-19	0:40	41
14	Anpara-D TPS	UP	UPPTCL	2	500	generator blast due to hydrogen leakage.	13-11-19	14:14	33

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
					Date	Time		
1	400/220 KV 315 MVA ICT 1 AT BHILWARA(RS)	ICT	400/220KV	RRVPLN	12-05-19	23:42	218	oil leakage in transformer
2	400 KV GORAKHPUR(PG)-MOTIHARI(BS) (PG) CKT-2	Line	400KV	POWERGRID	13-08-19	22:05	125	e/sd due to soil erosion at tower no.132 near gandak river bank
3	400 KV GORAKHPUR(PG)-MOTIHARI(BS) (PG) CKT-1	Line	400KV	POWERGRID	13-08-19	22:04	125	e/sd due to soil erosion at tower no.132 near gandak river bank
4	125 MVAR BUS REACTOR NO 1 AT 400KV REWA ROAD(UP)	BR	400KV	UPPTCL	05-10-19	14:54	72	the 125mva bus reactor tripped due to prv operated at 11:40 hrs today.
5	80 MVAR BUS REACTOR NO 1 AT 400KV NATHPA JHAKRI(SJ)	BR	400KV	SJVNL	17-10-19	12:58	60	failure of reactor . b-phase bushing of the 80 mvar bus reactor blasted at njpc resulting in bus bar protection operation.
6	220 KV KISHENGANGA(NH)-WAGOORA(PG) (PG) CKT-1	Line	220KV	POWERGRID	07-11-19	12:37	39	r-b-n, Z1, Fault Current= 797.4 Amp, 81.42 KM from Kishenganga
7	400 KV BASPA(JP)-KARCHAM WANGTOO(JSW) (HBPL) CKT-2	Line	400KV	JSW	18-11-19	9:04	28	planned
8	400 KV HARDUAGANJ (UP) - BUS 1	BUS	400KV		22-11-19	14:55	24	some abnormal/chattering sound is being observed at main bus-i

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
					Date	Time		
11	400KV BUS 2 AT NATHPA JHAKRI(SJ)	BUS	400KV	NJPC	24-11-19	20:43	22	bus bar protection operated
12	400 KV BANDA-REWA ROAD (UP) CKT-1	Line	400KV	UPPTCL	24-11-19	13:24	22	line tripped due to zone-1 R-phase fault current 3.356KA FD-77.46 KM from banda end.
13	400/220 KV 315 MVA ICT 1 AT WANGTO_GIS(HP)	ICT	400/220KV	HPSEB	26-11-19	23:33	20	osr trip in r phase
14	220 KV SAHUPURI(UP)-PUSAULI(BS) (UP) CKT-1	Line	220KV	UPPTCL	26-11-19	11:14	20	to facilitate shutdown of 500 mva ict at pusauli (pg erts)
15	132 KV SEWA_2(NH)-KATHUA(PDD) (PG) CKT-1	Line	132KV	POWERGRID	27-11-19	16:01	19	phase to earth fault b-n
16	400/220 KV 315 MVA ICT 1 AT KALISINDH(RS)	ICT	400/220KV	RRVPLN	27-11-19	11:37	19	attending internal oil leakage from w-phase diverter switch oil chamber and replacement of y-phase hv bushing
17	220 KV AGRA(PG)-SHAMSHABAD(UP) CKT-1	Line	220KV	UPPTCL	28-11-19	19:43	18	over voltage 220kv agra(pg)-shamshabad road line trip at 19:43 hrs . as per information of 765kv power grid s/s end , 220kv agra(pg)-shamshabad road line tripped due to over voltage, no flags at power grid s/s end
18	220 KV KISHENPUR(PG)-UDHAMPUR(PDD) (PG) CKT-1	Line	220KV	POWERGRID	28-11-19	0:46	18	phase to earth fault b-n
19	765 KV ANPARA_C(LAN)-UNNAO(UP) CKT-1	Line	765KV	UPPTCL	30-11-19	3:10	16	Phase to earth fault B-N due to over due distance 371.19 km from anpara end fault current 2.047ka
20	80 MVAR BUS REACTOR NO 1 AT 400 KV KANKANI(RS)	BR	400KV	RRVPLN	30-11-19	10:50	16	MAINTENANCE WORK

Si. No.	Type of transmission element	Total No
1	400kV lines	02
4	500 MVA ICTs	01
5	315 MVA ICTs	02
6	125 MVAR Bus Reactor	01
Total New Elements charged		06

Transmission Lines (400kV line- 1 ckt. Km)									
S. No.	Name of element	Voltage Level (in kV)	Line Length (In Km) before LILO	Line Length (In Km)	LILO Line Length (In Km)	Conductor Type	Location	Actual date & time of charging (Synchronized)	
								Date	Time
1	400kV Karcham Wangtoo-Wangtoo(HP) line-1 along with associated bays 407(m) & 408(t) at Wangtoo(HP) (LILO of 400kV DC Karcham Wangtoo-Kala Amb at Wangtoo(HP))	400	175	0.92	0.082	ACSR Quad Moose	HP	07.11.2019	5:23
2	400kV Wangtoo(HP)-Kala Amb line-1 along with associated bays 412(m) & 411(t) at Wangtoo(HP) (LILO of 400kV DC Karcham Wangtoo-Kala Amb at Wangtoo(HP))	400	175	174.1	0.104	ACSR Quad Moose	HP	07.11.2019	5:23

ICT (ICT Capacity Addition - 1130 MVA)								
S.No.	Name of element	Voltage Level	Transformation Capacity (in MVA)	New/replacement /augmentation	Agency/ Owner	Remarks	Actual date & time of charging (on load)	
							Remarks	Date
1	500 MVA ICT-2 at Prithala associated bays no (409 & 408) and 207	400/220/33	500	New	GE	At load	01.11.2019	10:32
2	315 MVA ICT-1 along with associated with 413(m),414 & 207 at Wangtoo(HP)	400/220/33	315	New	GE		02.11.2019	11:17
3	315 MVA ICT-2 along with associated with 415(m),414 & 209 at Wangtoo(HP)	400/220/33	315	New	GE		13.11.2019	16:00

Bus Reactor (Capacity Addition –Bus Reactor 125 MVAR)									
S. No.	Name of element	Voltage Level (kV)	Transformation Capacity (in MVAR)	New/ replacement /augmentation	Type	Agency/ Owner	Remarks	Actual date & time of charging	
								Date	Time
1	125 MVAR Bus Reactor along with associated bays 412(M) & 411(T) at Prithala	400	125	New	GE	HARYAN A		01.11.2019	15:20

Details of Solar Plant Commissioned(1510 MW)						
Sr. No.	Plant Name	Installed Capacity (MW)	Capacity commissioned(MW)	Dedicated Tr. Line	Grid Connectivity	Commissioned Date
1	SB Energy Solar Power Plant	200	100	220/33kV Saurya	765/400kV Bhadla(PG)	03.05.2019
			100			09.07.2019
2	Renew Solar Power Plant	50	50	220/33kV Adani	765/400kV Bhadla(PG)	27.04.2019
3	Azure Solar Power Plant	200	150	220/33kV Adani	765/400kV Bhadla(PG)	27.04.2019
			50			27.07.2019
4	Mahoba Solar UP Pvt. Ltd	250	100	220kV Mahoba-(PG) S/c line	765/400kV Bhadla(PG)	06.08.2019
			100			21.08.2019
			50			Yet to be commissioned
5	Tata Power Renewable Energy Ltd	150	150	220kV TPREL-Bhadla(PG) S/C line	765/400kV Bhadla(PG)	30.08.2019
6	Azure Power 34 Pvt Transmision Ltd	130	130	220kV APTFL-Bhadla(PG) S/C line	765/400kV Bhadla(PG)	06.09.2019
7	ACME Chittorgarh Solar Energy Power Pvt Ltd	250	100	220kV ACME-Bhadla(PG) S/C line	765/400kV Bhadla(PG)	06.10.2019
			130			25.10.2019
			20			Yet to be commissioned
8	Renew Solar Power Plant, Bikaner	250	250	400kV Bikaner(Renew)-Bikaner(PG) S/C line	765/400kV Bikaner(PG)	27.10.2019
9	Clean Solar Power Energy Pvt Ltd	300	100	220/33kV Saurya	765/400kV Bhadla(PG)	10.12.2019

Follow up issues from previous OCC meetings

Sl. No.	Agenda point	Details	Status
1.	Monitoring of schemes funded from PSDF (Agenda by NPC)	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in NR. Utilities are requested to expedite implementation of the schemes and submit information of physical as well as financial progress in the prescribed format by first week of every month on regular basis to Member Convener, PSDF Project Monitoring Group (AGM, NLDC and POSOCO) with a copy to NPC Division.	Updated status has been received from Punjab, Delhi, HP, UP and Rajasthan , All other states were requested to update the status of the schemes to be funded from PSDF.
2.	Sub-stations likely to be commissioned in next six months.	All the concerned states were requested to submit the details of the downstream network associated specially with POWERGRID substations along with the action plan of their proposed/approved networks.	The updated details of the substations of POWERGRID and their required downstream network is enclosed in Annexure-A.III.I of the agenda note. All states were requested to update the status of remaining downstream networks on regular basis.
3.	Progress of installing new capacitors and repair of defective capacitors	Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.	Information received from Delhi, UP, Rajasthan, Uttarakhand, HP and UT of Chandigarh (for Q2) . All other states were requested to furnish updated status up to second quarter.

Sl. No.	Agenda point	Details	Status
4.	Healthiness of defence mechanism: Self-certification	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 <i>"All the UFRs are checked and found functional"</i> .	<p>Report for the period ending Sep'2019 received from UP, Delhi, Haryana, HP, BBMB and Punjab.</p> <p>Rajasthan have submitted information up to June'2019.</p> <p>All states were requested to submit details of feeder-wise expected load relief through UFR and df/dt relays in the format enclosed at Annexure-A.2.3 of agenda of 165th OCC.</p> <p>In 166th OCC meeting it was decided that a group comprising of officers from NRPC, NRLDC and POWERGRID will check the healthiness of UFR in one of the sub-stations of Delhi during first week of January 2020.</p> <p>Report of the group would be discussed in the next OCC meeting.</p>
5.	Recommendations of Enquiry Committee on grid disturbances on 30 & 31.7.2012	Based on the recommendations of the Enquiry Committee on grid disturbances on 30 th & 31 st July 2012, utilities of NR were requested to take necessary action and submit compliance/status report to NRPC.	<p>Updated status awaited from HVPNL, Chandigarh and J&K.</p> <p>HVPNL to furnish information by 5th January 2020.</p>
6.	Status of FGD installation vis-à-vis installation plan at identified TPS	List of FGDs to be installed in NR was finalized in the 36 th TCC (special) meeting dt. 14.09.2017. All SLDCs were regularly requested since 144 th 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.	<p>Updated status for the month of October 2019 has been received from Punjab, NTPC and UP.</p> <p>All states/utilities were requested to update status on monthly basis.</p>

7. Reactive compensation at 220 kV/ 400 kV level

Sl. No.	Owner	Substation	Reactor	Updated Status
1.	POWERGRID	Kurukshetra	500 MVAR TCR	Anticipated commissioning: Jan-Mar'2021
2	DTL	Peeragarhi	1x50 MVAR at 220 kV	Tender floated in December 2019. Commissioning expected by March 2021.
		Harsh Vihar	2x50 MVAR at 220 kV	
		Mundka	1x125 MVAR at 400 kV	Under Tendering. Expected commissioning by March 2021.
			1x25 MVAR at 220 kV	
		Electric Lane	1x50 MVAR at 220 kV	Under Financial Concurrence
		Bamnauli	2x25 MVAR at 220 kV	Under Tendering
Indraprastha	2x25 MVAR at 220 kV	Under Tendering		
3.	Punjab	Dhuri	1x125 MVAR at 400 kV	Tendering process to be restarted.
			1x25 MVAR at 220 kV	
		Nakodar	1x25 MVAR at 220 kV	Anticipated commissioning: Mid 2021
4.	PTCUL	Kashipur	1x125 MVAR at 400kV	PTCUL advised to submit the proposal for PSDF funding.
5.	Rajasthan	Akal	1x25 MVAR	PSDF funding sanctioned. Under tendering
		Bikaner	1x25 MVAR	
		Suratgarh	1x25 MVAR	
		Barmer	1x25 MVAR	Response awaited from TESG of PSDF.
		Jodhpur	1x125 MVAR	

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
1	400/220kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS. Balance 4 nos. to be utilized	Commissioned (1 st & 2 nd – Mar'13 3 rd – Oct'16) Bays - Mar'13	<ul style="list-style-type: none"> • LILO of 220 kV Bishnha – Hiranagar D/c line. Target completion - Nov, 2019 • 220 kV D/c Samba (PG) – Samba (JKPDD) approved in 1st NRSCT.
2	400/220kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned in Jul'14 Bays-Jul'14	<ul style="list-style-type: none"> • 220 kV New Wanpoh - Mirbazar D/c line. • 220 kV Alusteng - New Wanpoh Line.
3	400/220 kV, 2x315 MVA Parbati Pooling Station (Banala)	2 Nos. of 220 kV bays to be utilized.	Commissioned in Dec'17	220 kV Charor- Banala D/c line (18 km). Commissioned on 06.12.2019
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	4 nos. of 220 kV bays to be utilized 4 nos. of bays utilised for LILO of one circuit of Kaul-Pehowa 220 kV D/c line at Bhadson (Kurukshetra). Commissioned on 07.03.2019 LILO of one circuit of Kaul-Bastara 220 kV D/c line Bhadson(Kurukshetra). Commissioned on 27.06.2019	Commissioned in Mar'17.	<ul style="list-style-type: none"> • 220kV D/c Bhadson (Kurukshetra) – Salempur with HTLS conductor equivalent to twin moose. P.O. issued on 15.10.18. Contract agreement signed on 30.11.18. Likely date of completion is 30.04.2020.

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
5	400/220 kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned in Jan'17	<ul style="list-style-type: none"> 220 kV Dehradun-Jhajra line. Target completion: Nov 2021 PTCUL representative to clarify as the said line has not been planned
6	Shahjahanpu, 2x315 MVA 400/220 kV	Partially utilized. Balance 4 Nos. of 220 kV bays to be utilized.	Commissioned in Jun/Sep'14	<ul style="list-style-type: none"> Shajahnapur-Azimpur D/C line is planned, expected by Dec, 2020 220 kV D/C Shajahnapur-Gola line expected by Dec, 2020
7	Hamirpur 400/220 kV 2x 315 MVA Sub-station (Augmentation by 3x105 MVA ICT)	2 nos. bays utilized under ISTS. Balance 6 nos to be utilized	1 st -Dec'13, 2 nd – Mar'14 & 3 rd Mar'19. 4 bays-Dec'13, 2 bays-Mar'14 2 bays-Mar'19	<ul style="list-style-type: none"> 220 kV D/C Hamirpur-Dehan line. Target completion – Dec, 2020
8	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of transformer from Ballabgarh)	Commissioned	<ul style="list-style-type: none"> 220 kV Kaithal(PG)-Neemwala D/c line. Target completion - 30.04.2020.
9	Sikar 400/220kV, 1x 315 MVA S/s	2 Nos. of 220 kV bays	Commissioned	Retendering to be done in December.
10	Bhiwani 400/220kV S/s	6 nos. of 220kV bays	Commissioned	<ul style="list-style-type: none"> 220kV Bhiwani (PG) - Isherwal (HVPNL) D/c line. Target completion – Nov, 2020
11	Jind 400/220kV S/s	6 nos. of 220kV bays	Commissioned	<ul style="list-style-type: none"> LILO of both circuits of 220kV D/c Narwana – Mund line at Jind (PG). Target completion – Nov, 2020

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
12	400/220kV Tughlakabad GIS (10 no of 220kV bays)	4x 500	Commissioned	<ul style="list-style-type: none">• RK Puram – Tughlakabad (UG Cable) 220kv D/c line. Scheme will be revised Target completion – March 2023• Okhla – Tughlakabad 220kv D/c line.• Mehrauli – Tughlakabad 220kv D/c line.• BTPS – Tughlakabad 220kv D/c line.• Commissioned.• Masjid Mor – Tughlakabad 220kv D/c line. Target completion – Dec, 2021.
13	400/220kV Kala Amb GIS (TBCB) (6 nos. of 220kV bays)	7x105	Commissioned (Jul'17)	HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s. Details for remaining 4 nos. of line bays may be provided. Target completion – Dec, 2021