



सत्यमेव जयते

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

संख्या: NRPC/OPR/106/01/2019/ 4465-4506

दिनांक: .05.2018

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 158^{वीं} बैठक का कार्यवृत्त ।

Subject: Minutes of 158th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 158^{वीं} बैठक 23.04.2019 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 ।

158th meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 23.04.2019. 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 158th meeting of the Operation Coordination Sub-Committee
(OCC) of NRPC**

158th meeting of OCC of NRPC was held on 23.04.2019 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at **Annexure-I**.

SE(O) introduced Sh. Naresh Bhandari, new Member Secretary, NRPC by stating that he had worked in NRPC for about 18 years in various capacities and his rich experiences would positively guide this sub-committee. MS, NRPC then welcomed all the members of the sub-committee to the 158th OCC meeting and highlighted the importance of OCC where thread bearing issues are discussed amongst the officials having experience of the field. He further added that NLDC and NRLDC have vital role in the OCC being real time Grid Operator. He requested all utilities to work in a team spirit so that System operation can run in a more efficient and coordinated manner. He requested SE(O), NRPC to take up agenda items.

PART-A: NRPC

1. Confirmation of Minutes

The minutes of the 157th OCC meeting held on 07.03.2019 and 11.03.2019 at NRPC Secretariat, New Delhi were issued vide letter of even number dated 25.03.2019.

Sub-Committee confirmed the minutes of the 157th OCC meeting.

2. Review of Grid operations of March 2019:

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

Sub Committee was informed that there are variations (i.e. > 5.0%) in the Anticipated vis-à-vis Actual Power Supply Position (Provisional) for the month of March, 2019 in terms of Energy Requirement for Chandigarh, Delhi, Himachal Pradesh, J&K, Punjab, UP & Uttarakhand and in terms of Peak Demand for Chandigarh, Haryana, J&K, Punjab & Rajasthan. Reasons for variation and comments submitted by the utilities are as under:

Delhi

Decrease in energy demand to the extent of 1855 MU in actual against the anticipation of 2080 MU was mainly due to low temperature in the second half of the March 2019 as compared to last year.

Uttar Pradesh

The figure for anticipated energy requirement was corrected from 11,377 MU to 9,610 MU due to which there is percentage variation of -10.58% in energy requirement. The reason for decline in demand in terms of MU is the weather condition as there were more thunderstorm and rain during the month which led to reduced energy consumption.

Haryana

The figure for actual energy requirement was corrected from 3658 MU to 3678 MU and the figure for anticipated peak demand was corrected from 7536 MW to 6960. It was mentioned that cool weather condition was the reason for decline in peak demand.

Rajasthan

Anticipated V/s Actual power supply position of Rajasthan in terms of MU was within limit but variation of 6.7% in terms of MW was due to unexpected rise in temperature in Rajasthan.

The Sub-Committee requested all SLDCs to furnish the provisional and final power supply position in prescribed formats by 2nd and 15th day of the month respectively in compliance to the provision 5.3 of IEGC.

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 March 2019 is placed on NRPC website (www.nrpc.gov.in/meetings/occ.html).

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

2.3.1. Frequency remained within the IEGC band for 71.07% of the time during March 2019, which is less than that of last year during same month (March 2018) when frequency (within IEGC band) remained 79.17% of the time. The maximum and minimum frequencies recorded were 50.30 Hz (01.03.2019 at 04:35 hrs) and 49.64 Hz (10.03.2019 at 20:35) respectively.

2.3.2. Utilities were requested to take necessary action to further 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 March 2019 were 45,383 MW (29.03.2019 at 20:00 hrs) and 24,811 MW (03.03.2019 at 04:00 hrs).

2.3.4. The average consumption, of the Northern Region, for March 2019, increased by 1.05% (9.4 MU per day) with respect to the corresponding month in previous year.

2.3.5. The average Thermal generation in March 2019 decreased by 11.95% (74 MU/Day) with respect to the corresponding month in previous year. The details are enclosed at **Annexure-III(A)**.

2.3.6. The average Hydro generation in March 2019 increased by 49.15 MU/day with respect to the corresponding month in previous year.

- 2.3.7. The average Renewable generation in March 2019 increased by 19.74 MU/day with respect to the corresponding month in previous year. All utilities were requested to send the data for renewable generation regularly. The reason for the increase was highlighted as capacity addition, better sunshine & wind. Also, it was added that the telemetry of renewable had improved.
- 2.3.8. The average nuclear generation in March 2019 increased by 1.39 MU/day as compared to corresponding month in previous year.
- 2.3.9. The net average Inter-Regional import increased by 22.13 MU/day during the month of March 2019, as compared to the corresponding month in previous year.
- 2.3.10. The net average Import from WR increased by 28.43 MU/day during March 2019 as compared to corresponding month in previous year.
- 2.3.11. The net average Import from ER increased by approximately 5.53 MU/day during March 2019 as compared to corresponding month in previous year.
- 2.3.12. The net average Import from NER was approximately 14.01 MU/day during March 2019.
- 2.3.13. The transmission losses are depicted at **Annexure-III(B)**.
- 2.3.14. Long outages of generating Units were discussed in detail and the same is placed at **Annexure-III(C)**.
- 2.3.15. Long outages of transmission lines were discussed in detail and the same is placed at **Annexure-III(D)** & all constituents were requested to revive the elements under long outages at the earliest.
- 2.3.16. The new elements charged were discussed and the list is placed at **Annexure-III(E)**.
- 2.3.17. Total outages during March 2019 were 865 including Planned S/D (582) and Forced S/D (Trippings-208+Emergency S/D-75).

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 May, 2019 was discussed on 15.04.2019 at NRPC Secretariat, New Delhi.

3.2. Outage Programme for Transmission Elements.

The maintenance programme for transmission elements for the month of May, 2019 was discussed on 15.04.2019 at NRPC Secretariat, New Delhi.

Report of outage approvals given in 158th OCC is enclosed at **Annexure-IV**.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region during May, 2019 as per LGBR for 2019-20:

- 4.1.1. As per the intimation by the representatives of Haryana and UP, it was decided that peak requirement for May'19 would be 8,420 MW and 20,800 MW for respective states.
- 4.1.2. In view of the surplus/shortfall existing in the energy/peak demands, it was decided that proper forecasting needs to be done by state SLDCs. In this regard, it was decided that NLRDC may share 10 days' IMD data with state SLDCs for better forecasting and rationalization of energy/peaking.
- 4.1.3. Modified Anticipated Power Supply Position in Northern Region during May, 2019 is placed at **Annexure-V**.

5. Information about variable charges of all the generating units in the Region.

All SLDCs were requested to confirm if the process of scheduling was being done as per Merit Order Despatch and in case of variations, the reasons may be furnished. No instance of variation was intimated by SLDCs.

6. Reactive compensation at 220 kV/400kV level

- 6.1. In the 38th TCC & 41st NRPC dt. 27th & 28th February 2018, following elements in NR were approved:
 - a) 500 MVAR TCR at 400 kV bus at Kurukshetra S/s of Powergrid.
 - b) 30 no. 220 kV bus reactors at 220 kV sub-stations and 18 no. 400 kV bus reactors at 400 kV sub-stations subject to the availability of space.
- 6.2. Status update of this agenda point is placed at 'Agenda Point 6' of **Annexure-II**.

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

- 7.1. In the 38th TCC & 41st NRPC meeting dt. 27th & 28th February 2018, it was decided to conduct capacitor requirement study of NR at 11/33 kV level from CPRI so as to obtain the true requirement of capacitor for FY 2019-20. In the subsequent NRPC meeting, approval was given to the Techno-Commercial offer of CPRI of Rs. 32 Lakh (excluding taxes) for conducting the capacitor study and the format for data submission was shared amongst the members.
- 7.2. In the 150th OCC meeting dt. 21.08.2018, members expressed concerns on the nature of the format. Accordingly, CPRI made a detailed presentation in the 151st OCC meeting and format was revised based on the received inputs & sent to respective SLDCs on 24.09.2018.
- 7.3. Utilities had been regularly pursued for the submission of data; however, data received from the utilities were mostly not in line with the requirement of CPRI.
- 7.4. In the 158th OCC meeting, the decision of previous OCC meeting regarding data collection through third party was reiterated in case requisite data in proper format is not received from the utilities.

Moreover, as per the deliberation in 41st TCC & 44th NRPC meeting, held on 18th & 19th March 2019, members were requested to again submit clarifications/inputs on all the concerns raised by TESHG (*Techno-Economic Sub-Group*) in respect of Capacitor DPRs, which were deemed returned.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 8.1. The Protection Sub-Committee while discussing multiple elements tripping at 400/220/132kV Dehar HEP of BBMB in its 34th meeting held on 21.04.2017 recommended, inter-alia, that BBMB should modify phase sequencing at Dehar as Y-B-R instead of R-Y-B.
- 8.2. The issue was deliberated in the 138th OCC meeting held on 23.08.2017 and BBMB was requested to rectify the phase nomenclature at their end. However, BBMB requested for the coordination among concerned utilities to carry out this activity and requested NRPC to form a committee comprising of BBMB and its partner states, utilities with which BBMB has interconnection, NRPC Secretariat and POWERGRID for the same. NRPC in its 41st meeting held on 28th February, 2018 approved the proposed formation of the committee and advised BBMB to resolve the issue.
- 8.3. BBMB drew a draft action plan which was duly deliberated by the Committee in its 1st meeting held on 04.06.2018. HPSEB and PSTCL agreed with action plan; however, PSTCL was of the view that 400kV Dehar-Rajpura line is owned by PGCIL and hence the work is to be executed by them. Comments on the action plan were also received from NTPC and POWERGRID.
- 8.4. Reply of BBMB vis-à-vis the comments of POWERGRID were deliberated in the 151st OCC meeting, wherein members were of the view that reply of BBMB was generally in order. However, POWERGRID representative stated that the matter pertains with NR-I and NR-II region of POWERGRID and final decision regarding the same is to be taken up at the level Executive Directors of respective regions. Accordingly, the matter was taken up on 07.10.2018 for POWERGRID consent to the action plan. However, reply of the same is awaited.
- 8.5. In the 40th TCC & 43rd NRPC meeting, referring to issue encountered in Rajasthan wherein problem was mitigated for a Double circuit line, POWERGRID mentioned that it may not be optimal plan to change the Jumper configuration for a single circuit line in view of requirement for long shut down & material.
- 8.6. Although tentative dates for conducting site visits at Bhiwani, Rajpura, Panchkula & Panipat S/s were planned during 154th to 157th OCC meetings; however, committee could not make site visit.

- 8.7. In the 41st TCC & 44th NRPC meeting, held on 18th & 19th March 2019, POWERGRID representative stated that there might be some issues in the work such as design constraint of tower, de-stringing and re-stringing of conductors etc. which would be clarified at the time of site visit and decision of committee would be implemented.
- 8.8. In the 158th OCC meeting, it was decided that representatives of NRPC, NRLDC in coordination with BBMB and PGCIL will conduct site visit during the first week of May 2019 to understand and resolve the issues.

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

The detail of the updated status as discussed in the 158th OCC meeting is placed at 'agenda point 9' of **Annexure-II**.

10. Status of FGD installation vis-à-vis installation plan at identified TPS

- 10.1. The status of FGD installation was enclosed at Annexure-III of the Agenda of 158th OCC meeting and no further updation was made by the members.

11. LVRT compliance by wind generators.

- 11.1. The CEA (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013 stipulates for LVRT capability in the wind generating stations connected at voltage level of 66 kV and above. CERC vide order dt. 05.01.2016 had directed all WTGs of capacity equal to or more than 500kW except Stall Type WTGs to implement LVRT, after the issue of necessary regulation/clarification by CEA.
- 11.2. With regard to monitoring of the installation and performance of LVRT installed on existing WTGs, CERC had directed SLDCs to prepare quarterly reports and submit it to RPCs for validation. Any deficiency and non-compliance to the Commission needs to be reported by RPCs in consultation with RLDCs.
- 11.3. As LVRT are not installed in many of the wind turbines in Rajasthan, the issue has been regularly raised in the various meetings of NRPC and OCC. In the 156th OCC meeting, SLDCs were requested to submit quarterly report on installation & performance of LVRT on existing WTGs to NRPC, as per the order of CERC.
- 11.4. Rajasthan submitted WTG data with respect to LVRT compliance (status of this agenda point is enclosed at **Annexure-VII**). In the 158th OCC meeting, Director (GM), CEA apprised the members about the recent amendment in regulation i.e., Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 in a brief presentation (placed at **Annexure-VIII**). Members were also requested to submit their comments, if any, on the draft CEA (Technical Standard for Communication System in Power System Operation) Regulation 2019, available on CEA website by 10.05.2019.

12. System Protection Scheme (SPS) in NR

12.1. Revised SPS for 765 kV Agra-Gwalior line

In the 154th OCC meeting, POWERGRID representative informed that modifications related to CB ON/OFF status at both Agra & Gwalior end, DTPC installation and end to end testing for 20 links out of 21 had been done. In the 155th OCC meeting, POWERGRID representative requested concerned utilities to do the terminal connections as cable had been laid down to the Protection panel in all substations.

In the 41st TCC & 44th NRPC meeting, held on 18th & 19th March 2019, POWERGRID representative informed that implementation of revised SPS for 765 kV Agra-Gwalior line has been completed.

In the 158th OCC meeting, representative of Haryana informed that load group has been changed from original submission to NRPC in 2016. 220kV Samaypur-Palwal D/C is feeding load to five district of Haryana and tripping of these feeders resulted into power supply failure in these districts. Due to this, Haryana has changed it from load group C&D to E&F. Other feeders also changed in view of providing adequate load relief.

POWERGRID representative informed that there were no changes done in old scheme and additional load shedding feeders has been wired in H, I, J & K load group. They have added some of the feeders in C, D, E & F along with existing feeder to provide adequate load shedding. POWERGRID representative further informed that finalization of load group is the responsibility of NRPC secretariat and state utilities were not submitted load group wise details that's why final sheet was yet to be finalized. He also requested NRPC/ NRLDC to finalize the load group and share the final sheet with POWERGRID.

NRLDC representative informed that Haryana also provided load group details only for C, D, E & F. If all the load shedding feeders wired in E&F load group then these feeders will be tripped in other SPS operation of Balia-Bhiwadi SPS. He also informed that for load group finalization inputs required from all the concerned state constituents so it will discuss in next OCC meeting.

NRPC representative suggested to do mock testing first and suggested that if changes are done in future then again mock testing will be done after revised implementation.

Following action points were decided during 158th OCC meeting:

- Mock testing of existing implemented scheme shall be done on 30.04.2019.
- Haryana shall discuss the revised load group with the management for approval and also share the status in next OCC meeting.
- POWERGRID shall check the feasibility for replacement of feeders in existing load group of C, D, E & F also and inform the NRPC/ NRLDC about time duration to complete the work.

Further, PGCIL was requested to resolve the issue related to DTPC at Nara substation, raise by the representative of UP.

- Issue of load group to be discussed in next OCC meeting.

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

In the 154th OCC meeting, the representative of UPRVUNL intimated that required hardware had been arranged at site. In the 157th OCC meeting, it was intimated that SPS work has been completed in DCS and input has been provided to UPPTCL as per the requirement. Based on the submission of UPSLDC that ICT-3 was not included in the SPS to be implemented, it was advised that UPSLDC, UPRVUNL and other concerned utilities to conduct a meeting to explore the revision of SPS for ICTs at 765kV substation. In the 41st TCC & 44th NRPC meeting, held on 18th & 19th March 2019, representative of UPRVUNL informed that work pertaining to them has been completed and UPPTCL has to do testing of SPS.

In the 158th OCC meeting, it was decided that mock testing for the scheme will be carried out on **02.05.2019** and the revised SPS logic will be shared by UPSLDC.

12.3. SPS for Kawai – Kalisindh - Chhabra generation complex

In the 152nd OCC meeting, RRVPNL representative intimated that the Technical specification for implementation of automatic load shedding scheme under SPS for Kawai Kalisindh generation complex is under approval and the estimated implementation period for the scheme may take further 6-7 months. Further, Rajasthan SLDC representative confirmed that Chhabra STPS units have also been wired to the SPS.

In the 156th OCC meeting, it was intimated that request was made by Rajasthan to review SPS scheme for Kawai-Kalisindh-Chhabra generation complex upon commissioning of 400kV CTPP-Anta feeder.

In the 157th OCC meeting, representative of Rajasthan informed about the scheduling of meeting to review the SPS for Kawai- Kalisindh-Chhabra generation complex and mentioned that studies were being carried out by Planning Division. It was advised that studies might be shared amongst NRLDC and Rajasthan, so that revised scheme might be formulated at the earliest. NRLDC requested to share the dynamic data for AVR, Governor, PSS for the generators so that detailed studies might be carried out.

In the 158th OCC meeting, it was decided that NRLDC will examine the proposed interim arrangement as per the study done by Rajasthan (shared on 15.04.2019) and matter will be reviewed in the next OCC meeting.

13. Automatic Demand Management System

- 13.1. Clause 5.4.2 (d) of IEGC mandates for implementation of the state-of-the-art demand management schemes for automatic demand management to reduce overdrawal from the grid. The responsibility for the implementation of the same has been entrusted on SLDCs/ SEB/ DISCOMs. CERC in its order in petition No. 5/SM/2014 had granted time till 31.06.2016 to the concerned SLDCs/ SEB/ DISCOMs to implement ADMS, failing which action under Section 142 of the Act for non-compliance of the Regulation 5.4.2 (d) of the Grid Code and order of the Commission. RLDCs were also directed to submit the report in this regard to the commission by 31.08.2016. The issue of implementation of ADMS in NR is being deliberated regularly in the OCC meetings. The status of implementation of ADMS in states of NR is placed at 'agenda point 13' of **Annexure-II**.
- 13.2. All the utilities were requested to expedite the implementation of ADMS so as to avoid any action by the commission under Section 142 of the Electricity Act for non-compliance of IEGC.

14. Status of implementation of recommendations of Enquiry Committee on grid disturbances on 30th & 31st July 2012

- 14.1. Based on the recommendations of the Enquiry Committee on grid disturbances on 30th & 31st July 2012, utilities of NR were requested to take necessary action and submit compliance/status report to NRPC. In the 8th NPC meeting held on 30.11.2018, the non-submission of implementation status related information was highlighted and serious concern was shown. In the subsequent OCC meetings, utilities were requested to submit the requisite information regarding implementation of recommendations of Enquiry Committee. The status of information received in this regard is placed at the 'agenda point 14' of **Annexure-II**.
- 14.2. In the 158th OCC meeting, it was decided that requisite information needs to be submitted by UP, HP, SJVNL (in respect of Rampur & Nathpa-Jhakri) and NTPC (NR-HQ) before next OCC meeting.

15. Planning, procurement and the deployment of Emergency Restoration System (ERS)

- 15.1. As per the CEA (Grid Standards) regulations 2010, each transmission licensee shall have an arrangement for restoration of transmission lines of 400 kV & above and strategic 220 kV lines through the use of ERS in order to minimise the outage time of the transmission lines in case of tower failures. Further, the guidelines and the indicative requirement for planning, procurement & deployment of ERS was issued by Ministry of Power vide which transmission utilities/licensees were asked to plan for at least one ERS for each 5000 Ckt. Km of transmission line length and the transmission utilities with line length less than 500 Ckt Km (of 400KV) were given option either to procure ERS or have agreement with other transmission utilities for providing ERS on mutually agreed terms (Annexure 16 of the MoM of the 150th OCC meeting).

15.2. In the 155th OCC meeting, BBMB was advised to procure ERS for their system to which BBMB replied that the decision has already been taken in the full board that partner states shall provide ERS to BBMB, whenever needed. In the 41st TCC & 44th NRPC meeting dt. 18th & 19th March 2019, representative of BBMB mentioned that cost for ERS may be borne by partner states. Rajasthan proposed that if partners agree then additional ERS would be procured by them and cost for which would be borne by all partner states. Haryana agreed for the same; however, representative of Punjab declined to bear any expenditure and stated that they would share the 2 sets of ERS which were already procured by them and spare them in case of emergency.

15.3. Status in respect of ERS is placed at 'agenda point 15' of **Annexure-II**.

16. Cleaning and Replacement of porcelain insulators

16.1. All transmission licensees in the Northern Region were requested since 148th OCC meeting to plan insulator replacement work from September 2018 onwards. The meeting for cleaning and replacement work of conventional insulator was held on 15.10.2018 and all utilities were requested to stick to the timeline to mitigate fog related trippings during winter season and to ensure proper submission of data regarding progress of the cleaning / replacement work in line with the discussions held in the meeting.

16.2. In the 156th OCC meeting, it was intimated that a web based online application (<http://nrpc.gov.in/portal>) has been made functional on NRPC website, wherein transmission licensees can regularly fill up their respective data pertaining to cleaning & replacement of porcelain insulators. This online application can facilitate generation of centralized and consolidated report. Demonstration of the application was given to the participants. The requisite login ID and password was subsequently furnished to the transmission licensees by NRPC.

16.3. In the 158th OCC meeting, members were requested to submit requisite data pertaining to cleaning & replacement of porcelain insulators on the online application of NRPC. Further, it was decided that list of elements along with following details (*not covered under first five approved stages for porcelain insulator replacement*) may be submitted by POWERGRID before next OCC meeting:

Element Name & Type; Maximum ESDD (Equivalent Salt Deposit Density) value; Pollution level (as per recommendation of the inquiry committee on grid incident in Northern Region on 27.01.2007); Number of fog related tripping of the element in last one year.

17. Cyber Security Preparedness Monitoring

17.1. Based on the detailed presentation given by Chief Information Security Officer (CISO), MoP in the 37th TCC and 40th NRPC meeting, all utilities were requested to monitor actions being taken in regard to the following points and report the status:

a. Appointment of organization-wise CISO and its status.

- b. Identification of organization-wise Critical Infrastructure and its status.
- c. Preparation of organization-wise Crisis Management Plan and its status.
- d. Status of Cyber Security Mock Drill activity in coordination with CERT-In.
- e. Status of Training / Workshops on Cyber Security organized / participated by power sector entities.
- f. Status of action taken on CERT-In / NCIIPC advisories.

17.2. In the 156th OCC meeting, it was mentioned that inherent vulnerability in the ICT infrastructure or website or web applications shall be accessed and remedial action thereon shall be taken by all utilities by conducting Vulnerability Assessment & Penetration Test (VAPT) of their respective ICT infrastructure, websites and web applications.

17.3. In the 158th OCC meeting, all utilities were requested to intimate NRPC about the status of VAPT conducted in their respective organization and VAPT plan for the future. Further, POWERGRID was requested to submit draft CMP to CISO, MoP after incorporating the changes suggested by CERT-in.

18. TTC assessment considering temperature dependent rating of lines/terminal equipment

18.1. For conducting studies in PSSE for assessment of inter control area transfer capability, POSOCO considers thermal ratings of lines as specified in CEA's 'Manual on Transmission Planning criteria-2013' considering ambient temperature of 45°C for terminal equipment ratings of both ends of the lines. As there is a scope for considering temperature adjusted thermal ratings for these lines in the PSSE studies, NRCE has decided to finalize the methodology for computation of TTC/ATC/TRM taking into account variation in thermal capability of lines w.r.t. variation of ambient temperature.

18.2. All STUs and transmission licensees were requested to furnish terminal equipment ratings at all lines at 400kV & above for fully implementing the temperature adjusted TTC to ensure that there is no gap in security assessment. The matter is under regular follow up since 152nd OCC meeting and only HVPNL has submitted the data so far.

18.3. In the 158th OCC meeting, all remaining STUs and transmission licensees were requested for expeditious submission of information.

19. Expediting Construction of 132kV supply for railway traction substation for railway electrification projects in states in NR region

19.1. Ministry of Railways has accorded high priority to railway electrification projects for reducing dependence on fuel based on crude oil and enhancing energy security of nation. However, progress of ongoing transmission line and substation works, being executed by SEBs, is not matching with the targets for railway sections planned to be commissioned on electric traction. State-wise detail in respect of NR is placed at 'agenda point 19' of **Annexure-II**.

19.2. In the 158th OCC meeting, members were again requested to take up the matter with concerned utilities to expeditious completion of the identified transmission line & substation works and update the status. Further, it was decided that representative from Railways will be invited in the future OCC meeting as special invitee.

20. Problem of excessive vibrations in GTs of Rihand Stage-III and Vindhyachal Stage-IV during operation of Rihand - Dadri HVDC, on monopole mode with ground return

20.1. In the 142nd OCC meeting, it was reported by NTPC that after shifting of 2x500MW Rihand Stage-III units (Unit# 5&6) from NR Grid to WR Grid through Vindhyachal Pooling Station on 28.11.2017, problem of excessive vibrations in GTs of Rihand stage III (and Vindhyachal Stage-IV also) has been observed whenever Rh-Dadri HVDC is run on single pole in ground return mode.

20.2. In the 38th TCC & 41st NRPC meeting, it was decided to constitute a committee with members from CEA, NRPC, POSOCO, NTPC, POWERGRID and CTU to look into the issue of high vibrations during mono pole ground return operation for corrective actions. First meeting of the Committee was held on 16.10.2018 (*minutes attached in the 155th OCC MoM*).

20.3. In the 158th OCC meeting, it was decided that the constituted committee will hold its second meeting for reviewing the situation. In this regard, NTPC was requested to propose the meeting date.

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

21.1. As per Hon'ble CERC regulation, UFR and df/dt mapping is mandatory. In the 136th OCC meeting dt. 16.06.2017, it was decided that in addition to the SCADA mapping, states should provide the following information regarding the UFR, df/dt relays installed at their respective substations:

- Source of frequency measurement for UFR, df/dt relay viz. positive sequence, phase-to-neutral, phase-to-phase
- Computational time for measurement of frequency, rate of change of frequency in UFR, df/dt relays respectively.

21.2. In the 137th OCC meeting dt. 18.07.2017, NRPC reiterated that mapping of UFR has to be done in the SCADA of SLDC & NRLDC for better visibility of relay status and feeder load relief. In the subsequent OCC meetings, all state utilities were requested to correct the SCADA UFR, df/dt displays as per the comments.

21.3. In the 158th OCC meeting, utilities were again requested to submit the progress on details tabulated in 'agenda point 21' of **Annexure-II** at the earliest and correct/provide the SCADA UFR, df/dt displays as per the comments.

22. Frequent revisions in schedule (Agenda by APCPL-IGSTPS JHAJJAR)

- 22.1. APCPL representative mentioned that coal based thermal generating stations are designed for Base Load operation with minimal intervention in Scheduled Generation for better efficiency and stable operation for life span of 25 years. By quoting the example of 31.03.2019, it was mentioned that schedule of IGSTPS is frequently revised in opposite direction. The change in Schedule Generation is maintained by varying the amount of coal fired i.e. by changing the Heat Flux inside the boiler. Due to continuous variation of Heat Flux undue thermal stress on boiler tubes and other boiler components occur, which may lead to frequent tube/material failure. The electricity demand pattern is generally forecast a day ahead and the scheduling of Generating stations need to be spread out such that there is gradual change in schedule for consecutive blocks and single block revisions need to be avoided. Representative of APCPL requested to review the frequent revision of schedules, consequent schedule revisions in reverse direction and the scheduling pattern in respect of APCPL (IGSTPS)-Jhajjar.
- 22.2. NRLDC representative stated that all ramp up/down limits given by APCPL Jhajjar are being followed while scheduling at NRLDC. Since Jhajjar is having higher variable cost, requisition of power from beneficiaries changes frequently and accordingly schedule is being given to them. OCC suggested that if issues are coming up in machines within these ramp up/down limits, they shall take up matter with OEM and CERC.
- 22.3. It was decided that APCPL and CLP India will share requisite data in respect of schedule revisions for the months of March, April and May (upto 15th) 2019 in the next OCC meeting for deliberation.

23. Additional Agenda-I - Shifting of RLDC's declared peak hours (Agenda by UPSLDC)

- 23.1. UP representative stated that use of hydro generation for peaking is done by NRLDC based on peak hours declaration. The peak timing declared by NRLDC of Northern region as a whole is different from peak hours of UP. NRLDC representative stated that the issue has been previously deliberated in 156th OCC meeting and it was agreed that for better system operation ISGS hydro scheduling is to be done on regional peak hours requirement with consent of all beneficiaries. In every OCC meeting, NRLDC is presenting demand curve of Northern region and states as well. Thus, if forum decides change in peak hours the same would definitely be incorporated.
- 23.2. MS, NRPC stated that NRLDC has to look after Northern region as a whole and decide peak hours accordingly and the same could not be done state-wise. MS, NRPC stated that NRLDC shall make sure that request of states is taken into consideration upto best possible extent and peaking hours are rationalized to maximum extent. Further, It was decided that NRLDC will present the monthly load curves of states and region as a whole and same may be deliberated in the next OCC meeting so that all constituents, in consensus, may take a decision on the matter.

24. Additional Agenda-II - Declaration of DC in consent with Buyer in low stock conditions (Agenda by UPSLDC)

- 24.1. Submission was made by UPSLDC for a provision that if the coal stock is less than the provisions of regulations, then DC of the generator shall be decided mutually with the buyer depending upon the coal stock.
- 24.2. NRLDC representative stated that NRLDC has been continuously advocating that in a single day, there should not be DC revision due to coal shortage. Earlier, the matter was taken up in OCC as well as RPC meetings wherein it was decided that utilities shall keep coal stock for atleast two days and declare their DC accordingly.
- 24.3. After deliberation, it was concluded in the meeting that generator has the prerogative to give DC for the next day by considering the availability of adequate coal stock with it in the next day.

25. Additional Agenda-III (Agenda by Delhi and Haryana)

- 25.1. In the past, unit of Aravali Jhajjar was brought on bar solely on the request of one state (either Delhi/Haryana). However, the second state later started scheduling power from Aravali Jhajjar as per its entitlement and full schedule of the either state could not be met.
- 25.2. It was decided that a meeting will be convened under the chairmanship of Member Secretary, NRPC with NRLDC, Delhi SLDC and Haryana SLDC.

Part-B: NRLDC

1. Actions for Summer preparedness 2019

NRLDC representative stated that with rise in temperatures in last few weeks, demand of Northern region has increased significantly reaching maximum figure of 48,630MW on 22.04.2019 and is likely to increase further in upcoming weeks. In the 158th OCC meeting, challenges faced during summer season and necessary actions required to overcome these were discussed. For some of the challenges discussed in the meeting, actions to be taken by utilities are as under:

- i) **Weather Monitoring:** It was highlighted that utilities were asked to take actions in co-ordination with NRLDC to improve telemetry of temperature & humidity of various nodes at control centers.

Although, telemetry has improved slightly from some POWERGRID stations, there is still need for improvement. NRLDC representative highlighted that telemetry from state owned substations is very poor with no/bad data being reported from most of the stations (**Annexure-IX**). Utilities were requested to

take necessary action required for improving weather data telemetry at substations. Haryana representative stated that temperature and humidity data from some new stations will be available shortly and same will be shared with NRLDC after actions by SCADA department.

- ii) Portfolio management and Load staggering:** NRLDC representative mentioned that all states except Uttarakhand and HP are sharing demand forecast data regularly with NRLDC. Representatives from Uttarakhand and HP stated that they shall inform the issue to concerned official in SLDC and will ensure that forecast data is regularly shared with NRLDC.

NRLDC representative stated that in the last OCC, Rajasthan and Haryana representatives informed they are taking up issue of sudden connection / disconnection of load with respective DISCOMs. However, from latest demand graph of Haryana it seems that they are disconnecting 800-1000MW of load at 06:00hrs and connecting 1000-1500MW of load at 18:00hrs (**Annexure-X**). Haryana SLDC representative mentioned that efforts are being made to take up the issue with DISCOMs and suggested that it would be better if DISCOMs are also invited to OCC meetings or separate meeting for better actions.

- iii) Tower Strengthening and categorization of feeders:** In last OCC meeting, it was discussed that number of tower collapse incidents are reported during summer/monsoon in April-June months in which many EHV lines are out on tower collapse along with important inter-regional lines. This year, even after continuous efforts being made by utilities, many lines in Rajasthan went under outage on 07.04.2019 due to high speed winds although these were revived in short time (details attached in agenda).

Utilities were once again requested to ensure:

- Tower strengthening and repair works are completed as early as possible
- ERS is available for any contingency

Further, it was reiterated that manual opening of feeders shall be restricted to only those having threat to life or materials. Thus, it is important to classify feeders under following two lists:

- one which do not require manual opening (in view of safety requirements)
- other with safety concern

In last OCC meeting, it was agreed that SLDCs shall collect information from DISCOMs, compile and share as early as possible. NRLDC representative again highlighted necessity of such data and stated that such information would be very helpful to identify approximate quantum of load that could be cut by DISCOMs during thunderstorm/windstorm etc. Thus, states could plan their portfolio in better manner in such extreme weather situations. State

utilities were again asked to actively take up this issue with DISCOMs taking reference of minutes of previous OCC/NRPC meetings.

iv) Defense mechanism

In last OCC, it was directed to all utilities to implement and check healthiness of grid defense mechanism as per approved settings.

- a. UVLS/UFR/df/dt
- b. SPS
- c. Islanding Schemes

Utilities were again asked to confirm healthiness of defense mechanisms under their jurisdiction. Moreover, utilities were also asked to share average/normal loading of feeders identified for relief during SPS operation.

2. Computation of TTC/ATC of respective control areas and reliability issues

As per the 'Revised Congestion Management Procedure in Real-Time System Operation' approved by the CERC, State Load Despatch Centre (SLDC) shall assess the Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) on its inter-State transmission corridor considering the meshed intra State corridors for exchange (import/ export) of power with inter-State Transmission System (ISTS). These figures along with the data considered for assessment of TTC should be forwarded to the respective RLDC for assessment of TTC at the regional level. The details of anticipated transmission constraints in the intra State system shall also be indicated separately.

NRLDC representative stated that in last OCC meeting, result of studies carried out for assessing the TTC/ATC of large state control area of Northern region for summer 2019 (as per network information available at NRLDC) was presented. It has also been agreed earlier that each state shall regularly assess and share its ATC/TTC. TTC/ATC of summer 2019, constraints expected and actions to be taken by utilities were also discussed in 157th OCC meeting. TTC/ATC of states and other reliability issues were highlighted in 158th meeting:

- **Punjab:** State own generation = 6000 MW (High hydro), TTC = 6800 MW (on managing the load locally at Rajpura and Amritsar ICTs, without this relaxation TTC comes out as 6000MW), ATC = 6200 MW (considering reliability margin as 600 MW). N-1 non-compliance at Rajpura, Amritsar, Muktsar, Ludhiana and Nakodar ICTs. Many 220kV lines near Amritsar (PG) and Ludhiana (PG) are also critically loaded. Punjab has assessed ATC/TTC limits as 7000/7600MW; however, this does not take care of N-1 compliance at many stations. Increase in internal generation at 220kV level would help in meeting high demand, manage loading of ICTs & also improve voltage profile.
- **Uttar Pradesh:** State own generation = 10,590 MW, TTC = 12,300 MW, ATC = 11,700 MW (considering reliability margin as 600 MW). ATC has increased with commissioning/replacement of ICTs at several stations. N-1 non-compliance issue at Agra (PG), Agra (UP), Obra, Sarnath ICTs.

UP has shared base-case, network changes and ATC/TTC assessment done by them vide email dated 16.04.2019. NRLDC representative stated that all states in general shall share base-case and network changes regularly and not after several months. The TTC/ATC assessment done by UP is approximately similar to computations done by NRLDC. Few other network elements details of which were shared recently would also be considered while assessing TTC/ATC. Further, UP shall expedite commissioning of underlying n/w at recently commissioned 765kV & 400kV stations to reduce loading on other heavily loaded lines and ICTs.

- **Delhi:** State own generation = 584 MW (No generation at BTPS), TTC = 6500 MW, ATC = 6200 MW (considering RM as 300 MW). N-1 non-compliance issue at Mundka and HarshVihar ICTs. TTC/ATC study carried out by Delhi and detailed report shared, results of which are quite similar to NRLDC study. Both circuits of 400kV Bamnauli-Tughlakabd D/C are in service through ERS. Delhi representative mentioned that lines can be revived on normal towers before 15th May 2019.
- **Haryana:** TTC and ATC assessed by NRLDC are 7500MW and 6900MW respectively. N-1 non-compliance at Deepalpur and Panipat. 220kV lines from Hisar, Lula ahir, Abdullapur etc. are heavily loaded. Haryana representative stated that they have assessed TTC/ATC limit of Haryana as 7900MW / 7300MW. Many new elements are also being commissioned in Haryana, details of which and latest base-case would be shared with NRLDC shortly.
- **Rajasthan:** Under internal generation of Rajasthan as 6390 MW, TTC = 5000 MW, ATC = 4400 MW. N-1 non-compliance at Phagi, Jodhpur, Akal and Bhadla ICTs. Constraint for evacuation of power from Rajwest. High loading of ICTs at Akal (one 500MVA ICT is still out) and Bhadla (constraint in evacuation of renewables) and need for reactive power support.

Rajasthan vide email dated 16.04.2019 has shared study for revised SPS conditions carried out by their planning department. However, there are some assumptions in base-case, which need clarification. For example: 765kV Phagi-Bhiwani and 765kV Phagi-Gwalior are considered open, which indicate already degraded network. Status of 400kV Chhabra-Chhabra Supercritical is not known (in service or not).

Probably, due to these assumptions, backing down quantum in studies of Rajasthan Planning division is coming out more than that suggested by NRLDC study. Rajasthan SLDC representative informed that they have already expressed these concerns to their Planning department and are expecting revised SPS study in few weeks. NRLDC representative stated that quantum of generation to be backed down is being studied, but Rajasthan shall also expedite identification of loads, which could be shed under operation of SPS.

3. Requirement of modelling data of solar parks and generators

NRLDC representative stated that four renewable (Solar, PV) generators have submitted data for registration at NRLDC, and many are in pipeline for connection

at NR ISTS system. Requisite data for registration has been uploaded on NRLDC website for quick references. Till date, following data have been submitted by generators in respect of modelling & various CEA/CERC compliance:

- i. Inverter data sheet
- ii. SLD
- iii. LVRT compliance
- iv. Generator & electric control model for dynamic modeling
- v. Dynamically varying reactive power- All generators said that inverter has the capability though the control would be manual (control is by power factor only).

Observations on the submitted data:

- a) Some of the generator provided LVRT compliance by just giving undertaking from the inverter supplier (though there is no mentioning of CEA standards & setting). Moreover, test reports submitted are of foreign-test lab companies. NRLDC representative asked whether registration be allowed under such circumstances. In this regard, MS, NRPC and Director (Grid Management), CEA stated that test-reports of foreign labs for individual generators shall be acceptable.
- b) Non-compliance of para B2, CEA (Technical Standards for Connectivity to the Grid) regulation, 2013 (automatic dynamic reactive power response): Every generator is saying that control is inherently manual, although some of them mentioned they would be using SCADA signals to automatically vary reactive power control. NRLDC representative asked whether registration be allowed under such circumstances. MS, NRPC and Director (Grid Management), CEA stated that since generator is submitting undertaking that they shall be able to control reactive power automatically, NRLDC can proceed with registrations in such cases.
- c) Non-submission of either user defined model or standard model for control of reactive power whether it is automatic or manual for off-line modeling. Generators have submitted undertaking that they shall provide data to NRLDC within given time.

NRLDC representative stated that guidelines for submission of data by renewable generators as per CEA (Technical Standards for Connectivity to the Grid) Regulation, 2013 are available at NRLDC website. CEA Technical Standards for connectivity to the Grid (amendment) regulations 2019, has been notified on 08.02.2019. As per the amended regulation, wind generating stations, wind-solar PV hybrid systems, energy storage systems and stations using inverters, getting commissioned after six months from the commencement of amended regulation, are required to have frequency response capability (generating stations with installed capacity of more than 10 MW connected to 33 kV & above), LVRT facility and HVRT facility.

NRLDC representative stated that registrations of upcoming solar/wind generators/park developers in August 2019 shall be inline with the regulations and SLDCs shall also make sure that these requirements are communicated to solar/wind generators/park developers well before, so that registration process is smooth.

OCC agreed for the same.

NRLDC has been continuously raising need for dynamic data of conventional as well as renewable generators from past many years. Even from 2018, the issue has been discussed in 143rd, 146th, 154th, 155th and 157th OCC meetings and several TCC/NRPC meetings also. Dynamic data of conventional generator are still pending from various agencies.

Total no. of NR generating stations modelled above 25MW = 159			
	Fully submitted	Partially submitted	Not submitted
Generator	34	9	116
Governor	24	5	130
Exciter	12	6	141
Stabilizer	18	2	139

Latest status of dynamic data submission was enclosed in *Annexure-4 of agenda*.

Members agreed to take up issue with generators and provide required dynamic data to NRLDC/ NRPC at the earliest.

4. Updating documents in line with Indian Electricity Grid Code (IEGC):

NRLDC representative stated that in line with IEGC, NRLDC is updating the document, “*Important grid element of Northern region*”, “*Operating procedure of Northern region*” and “*Power Maps of Northern region and related information*”. Important Grid element and operating procedures are available at NRLDC website and power maps were mailed to respective utilities. Members were requested to go through the documents and provide the updated information and feedback to modify the above documents.

It was mentioned that respective information may be sent to nrlcso2@posoco.in / nrlcso2@gmail.com till 20th May 2019.

OCC noted the same.

5. Feeders for physical regulation:

NRLDC representative stated that as per Indian Electricity Grid Code (IEGC), in respect of demand control, all efforts must be made to avoid situation of low frequency. Hon’ble CERC in its order in petition no 125/MP/2012 also directed to have the list of radial feeders, which can be opened on the directions of NRLDC to

regulate the demand. List of such radial feeders has been provided by respective utilities and is part of 'Operating Procedure of Northern Region'.

In view of continuous network change and high demand period during summer, it is desirable to have updated list of feeders. Thus, each state control area is requested to update the information of feeders (*enclosed in Annexure-5 of agenda*) that can be used for demand regulation by NRLDC (in addition to action by SLDC).

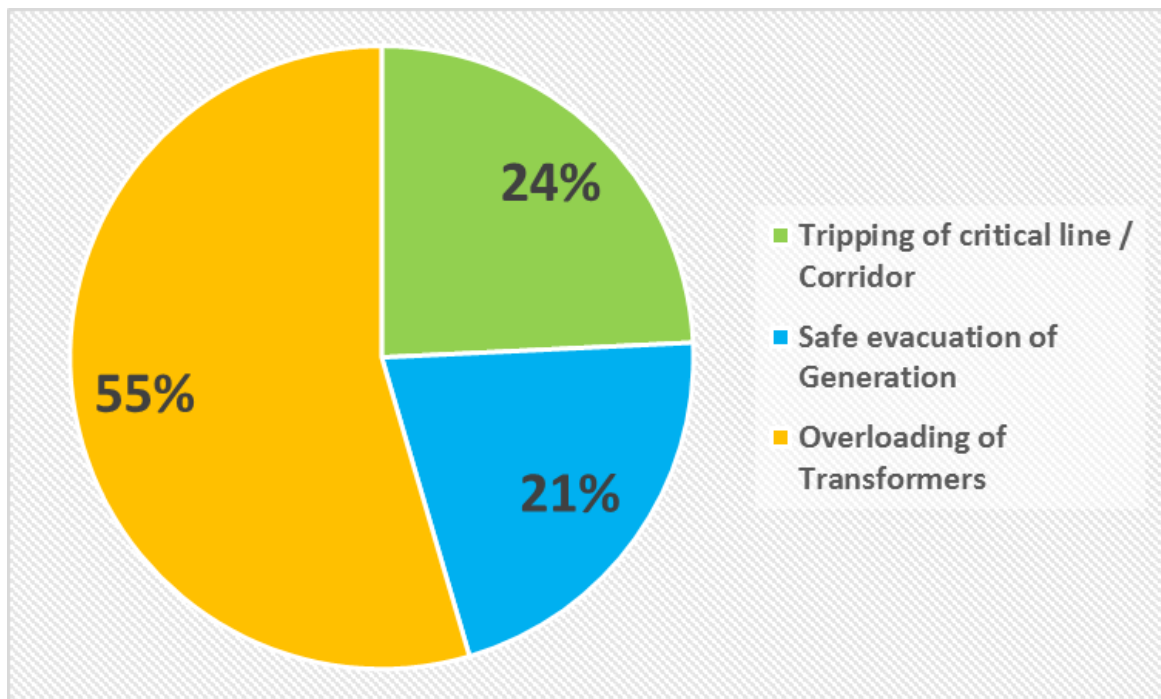
SE(O), NRPC asked utilities to provide update on the list of feeders to NRPC as well as NRLDC.

6. Mapping of analog data and digital status in SCADA data and SoE:

System Protection Scheme (SPS) is very important defensive mechanism for healthy and reliable system operation. Further, SPS is an important tool, which helps in protection during real time, based on some logic. Therefore, monitoring of SPS is also important to assess its reliability. Mal-operation or mis-operations of SPS in the system has been observed many times. In 2018, around 27% of SPS operation occurred were either malfunction or false operation. A list of such incidents are tabulated as under:

Table-1:

SPS	No. of correct operation	No. of Mal-operation/Failed to operate
Agra-Gwalior	0	1
Rihand-Dadri	5	0
G.Noida (UP) ICT	0	1
Chabra TPS	2	0
Mehrauli Bus coupler	1	0
Agra(UP) ICT	2	0
Mundra-Mohindergarh	0	1
Balia-Bhiwadi	1	1
Total	11	4



Mapping of SPS feeders, CB status, analog data in SCADA or Station Event log is discussed in various OCC meetings and TCC meeting; however, it seems that utilities are not considering it during implementation of new SPS scheme like Agra-Gwalior SPS (extension), Tehri-Koteshwar SPS, Dhauliganga SPS and Anpara-Unnao SPS scheme.

NRPC/ TCC has already approved the following:

- Mapping SPS feeders, CB status, analog data in SCADA or Station Event log for new SPS scheme to be taken care at the time of implementation of new scheme
- Utilities shall expedite the Mapping of feeders and digital data, also in existing SPS scheme.

A document “Roles and Responsibility regarding SPS” (attached as *Annex-6 of the Agenda*) was approved in the 121st OCC and TCC meeting, wherein following roles were mentioned among others:

- Mapping of SPS feeders CB status, analog data in SCADA or Station Event log.
- Periodic mock testing of SPS schemes (at least once in half year) and certification of healthiness by utility.
- Timely updating the scheme in case of any network or schematic changes.
- Reporting of SPS operation in approved format within 3days of SPS operation.

It has been observed that the utilities are yet to assume the roles and responsibilities as per the approved procedure.

NRLDC representative informed that issue of poor load shedding response was already discussed in various OCC/ TCC meeting and utilities were already suggested to take action to improve the load shedding but it seems action is still pending at utility end.

Representative of UPPTCL informed that SPS operation at 400/220 kV G. Noida (UP) was actual operation instead of mal-operation. At 400/220 kV, G. Noida station has two 315MVA ICTs and two 500MVA ICTs. At the time of incident, one 315MVA and one 500MVA ICT were on one bus and other pair on other 400 kV bus at G. Noida (UP). One 500MVA ICT was under shutdown, it resulted into power flow through bus coupler and bus coupler connector became red hotwired. Operator at G. Noida (UP) station tripped the bus coupler to prevent further damage. It resulted into over loading of 315MVA ICT and further SPS operation for 400/220 kV ICTs at G. Noida.

Following action points were decided during the meeting:

- Each utility shall share the reason of poor load shedding response in its control area and preventive measures taken. (Action: **All concerned utilities**; Time Frame: **15 days**)
- Mapping of SPS feeders CB status, analog data in SCADA or Station Event log for recently commissioned SPS scheme of Agra-Gwalior (extended), Tehri-Koteshwar, Dhauliganga HEP, Anpara-Unnao SPS. (Action: **POWERGRID, THDC, Punjab, Rajasthan, Uttar Pradesh, Haryana and Delhi**; Time Frame: **30 days**)
- Mapping of SPS feeders CB status, analog data in SCADA or Station Event log needs to be expedited for already commissioned SPS scheme.
- Each utility ensure the regular mock testing of SPS schemes (at least once in half year) and share the report to NRPC/ NRLDC. (Action: **All concerned utilities**; Time Frame: **30 days for first mock testing of all the SPS scheme than regularly after six month**)
- Monthly self-certification of healthiness of SPS by concerned utility (**General Recommendation**)
- Reporting of SPS operation in approved format within 3days of SPS operation to NRPC/ NRLDC. (**General Recommendation**)
- Implemented logic diagram for each SPS scheme needs to be shared for updated SPS document of NR. (Action: **All concerned utilities**; Time Frame: **15 days**)
- Roles and Responsibility of SPS needs to be adhered by all the concerned utilities.

It was requested to all the concerned utilities to take proactive action for the aforesaid points.

7. Mapping of RGMO/ FGMO status in NR SCADA:

Agenda point on Mapping of RGMO/ FGMO status in NR SCADA data has been discussed in various OCC meetings. FGMO/ RGMO status from many plants is still not integrated in SCADA. Present status of mapping is tabulated as under:

Plant	Total No. of Plants	RGMO status available from plant		RGMO status not available from Plant
		Complete	Partial	
ISGS	39	15	4	20
Uttar Pradesh	17	17	0	0
Punjab	7	6	0	1
Haryana	4	2	0	2
HP	5	0	0	5
Rajasthan	16	4	1	12
Uttarakhand	8	0	0	8
J&K	4	0	0	4

NRLDC representative further shared the name of the plant from where signal is yet to be received:

Plant	Total No. of Plants	RGMO status available from plant		RGMO status not available from Plant	List of the plant (RGMO status not available from Plant)	List of the plant (RGMO status partially available from Plant)
		Complete	Partial			
ISGS	39	15	4	20	Unchahar-IV, Bairasuil (RoR), Chamera-II (RoR), Dulhasti (RoR), Narora, Parbati-II, Parbati-III, RAPP-A,B,C, Sainj, Salal, Tanakpur RoR), Uri-1&2 (RoR), AD Hydro, Budhil, Malana-II, Karcham, Sh Cement	Anta, Auraiya, Dadri (Gas), Rihand
Uttar Pradesh	17	17	0	0	Nil	
Punjab	8	6	0	2	Anandpur Sahib and Jogindernagar/ Shanan	
Haryana	4	2	0	2	Panipat TPS and RGTPS-Khedar	
HP	5	0	0	5	Larji, Bhabha, Giri, Baspa & Malana	
Rajasthan	16	4	1	12	Suratgarh TPS, Ramgarh, Dholpur, Giral, Barsinghsar, RAPS-A, Rajwest, VSLP, Mahi, Rana Pratap Sagar, Jawahar Sagar, Gandhi Sagar	Kota TPS
Uttarakhand	8	0	0	8	Ramganga, Chibro, Khodri, Chilla, Maneri Bhali, Tiloth, Gama Infra & Shrivanti	
J&K	4	0	0	4	Baghlihar, Lower Jhelam, Uppar Sindh & Papore GT	

MS, NRPC suggested all the concerned utilities to take corrective action to improve the reporting of the FGMO/ RGMO signal in state/RLDC SCADA system.

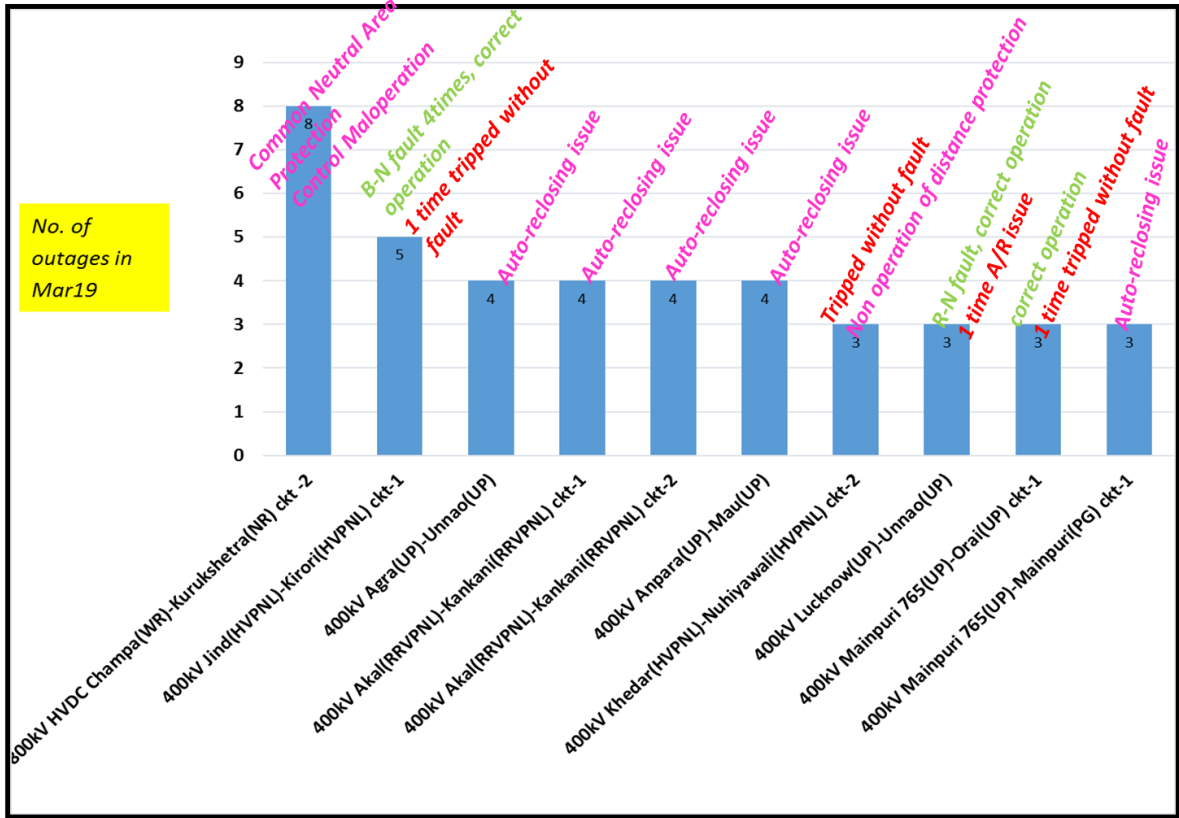
8. Frequent forced outages of transmission elements

Following transmission elements were frequently under forced outages during the month of March 2019:

SI. NO.	Element Name	No. of forced outages	Utility/SLDC
1	800kV HVDC Champa(WR)-Kurukshetra(NR) -2	8	POWERGRID
2	400kV Jind(HVPNL)-Kirori(HVPNL) ckt-1	5	Haryana
3	400kV Agra(UP)-Unnao(UP)	4	UP
4	400kV Akal(RRVPNL)-Kankani(RRVPNL) ckt-1	4	Rajasthan
5	400kV Akal(RRVPNL)-Kankani(RRVPNL) ckt-2	4	Rajasthan
6	400kV Anpara(UP)-Mau(UP)	4	UP
7	400kV Khedar(HVPNL)-Nuhyanwali(HVPNL) ckt-2	3	Haryana
8	400kV Lucknow(UP)-Unnao(UP)	3	UP
9	400kV Mainpuri 765(UP)-Orai(UP) ckt-1	3	UP
10	400kV Mainpuri 765(UP)-Mainpuri(PG) ckt-1	3	UP

The complete details are attached at **Annexure-7** of the Agenda. 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.

Complete status and major cause of tripping is shown as under:



Following were the discussion on trippings:

- Haryana representative informed that there were some trees branches, which were touching the line (400 kV Jind-Kirori ckt-1) during wind and resulted into tripping of the line. Preventive action has been taken by trimming the trees branches. 400 kV Khedar-Nuhiyanwali ckt-2 tripped due to over voltage in the line during lightly loaded condition.
- Rajasthan representative informed that A/R issue in 400 kV Akal-Kankani ckt-1 will be checked.
- UPPTCL representative informed that A/R issue was persisting in Agra-Unnao ckt. Remedial measure is being taken. Auto reclosure issue in 400 kV Anpara-Mau ckt has already been sorted out. Following were the issues in 400 kV Anpara-Mau line which were sorted out
 - REL-670 Main I distance protection was out of service. It has been taken back in service and CVT connection was also restored.
 - A/R function of Main II distance protection was found damage. It has been checked and corrected
 - 33kV line was lowered down to maintain the clearance in 400kV Anpara-Mau line.
- UPPTCL representative further informed that 400 kV Lucknow-Unnao ckt tripped due to touching of bamboo tree and tree cutting has been done.

Details for 400 kV Mainpuri-Orai ckt-1 and Mainpuri-Mainpuri ckt-1 is pending from the site and will be informed later.

- POWERGRID representative informed that these trippings of Champa-Kurukshetra were mainly during testing work.
- NRLDC representative raised concern over non-submission of information for multiple time single element tripping during last six months. Information is still pending from most of the NR utilities.
- UPPTCL representative informed that some of the action has been taken and some are pending, a consolidated report would be submitted within 15 days.
- Rajasthan, Haryana representative also informed that remedial measures report of every tripping would be submitted along with last nine month tripping.

Although remedial measures report was requested to all the NR constituents, but details are still awaited from all the involved utilities.

MS, NRPC raised serious concern for submission of details to NRPC and suggested all the constituents to share the report of last nine month tripping and remedial measures taken by all the utilities for mitigation of such tripping incidents. Members agreed to the same and decided to submit all the remedial measures report within 7 days.

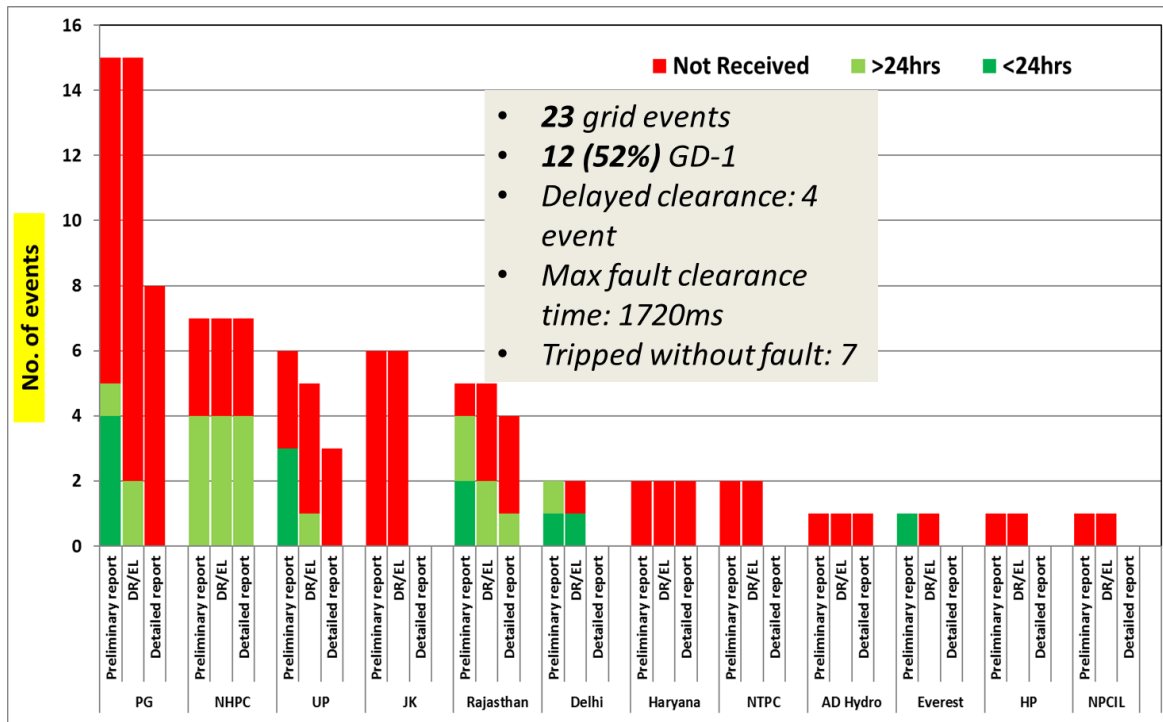
9. Multiple element tripping events in Northern region in the month of Mar'19:

A total of **23** grid events occurred in the month of Mar'19 of which **12** are of GD-1 category. The preliminary report of all the events has been issued from NRLDC. 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 **1720ms** in the event of tripping at Gurgaon Sect-72 (HVPNL) on 30th Mar 2019 at 00:38hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **4** events out of 23 events in the month.

NRLDC representative stated that the compliance of reporting details of events is still below the desired level. He presented the following consolidated status of the reporting:



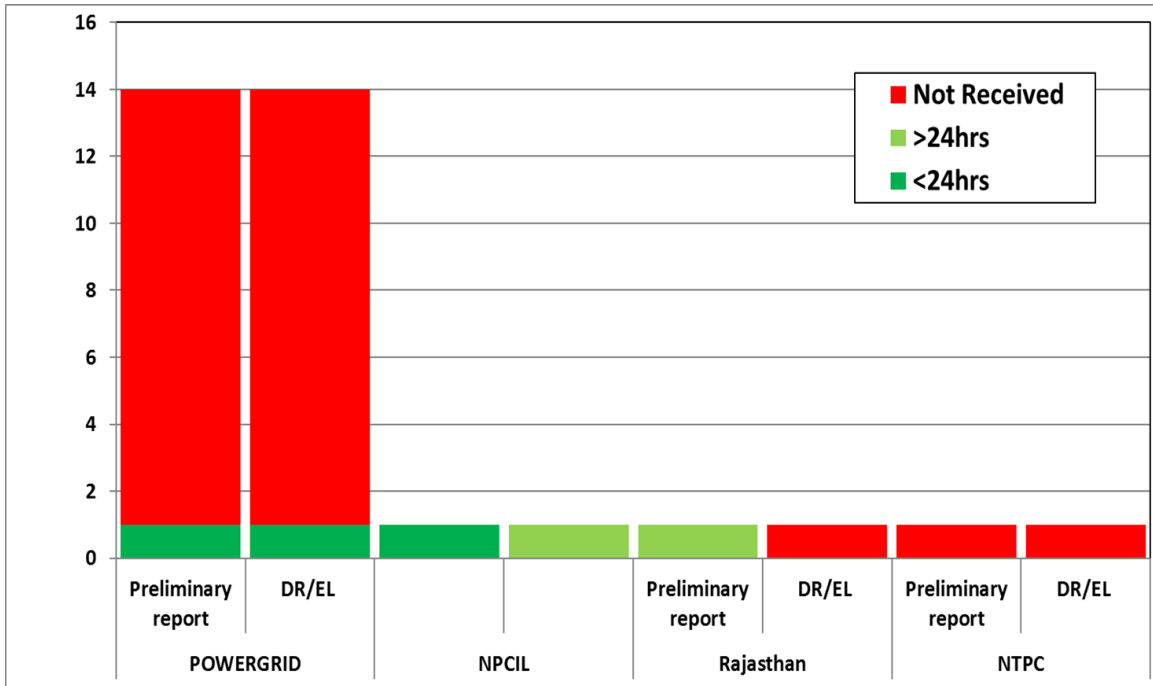
NRLDC representative again requested all the NR utilities to kindly calculate the energy loss in the incident and share the information to NRPC/ NRLDC in its report.

Members were requested to take expeditious actions to avoid such tripping in future and discuss the same. Moreover, utilities were asked to impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events in line with the regulations.

10. Details of tripping of Inter-Regional lines from Northern Region for Mar'19:

A total of 16 inter-regional lines tripping occurred in the month of Mar'19. The list is attached at **Annexure-9** of the 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 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.

Status of details received from the NR constituents is as under:

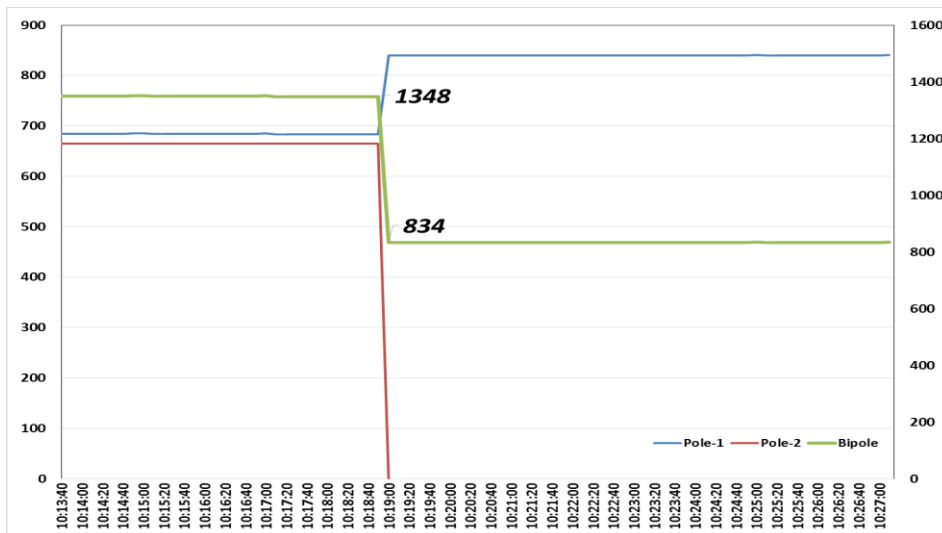


NRLDC representative once again requested all the concerned utilities to kindly submit the Preliminary Report, DR/EL within 24hrs and also share the remedial measures report for tripping in last one year.

Members were requested to note and advise the concerned for taking corrective action to avoid such trippings as well as timely submission of the information.

11. HVDC Rihand-Dadri Pole-2 tripping and subsequent operation of SPS on 25th Mar-2019:

HVDC Rihand-Dadri Pole-1 & 2 were running with HVDC line in service and power flow of the order of 1350MW. At 10:27hrs of 25th Mar 2019, HVDC Rihand-Dadri Pole-2 tripped on VESDA. Tripping of Pole-2 resulted into power order reduction from 1350MW to 840MW. SCADA data of MW power flow of HVDC Pole-1 & 2 is graphically shown as under:



It seems from SCADA data, case-1 operated (bipole reduction by more than 750MW). However, in actual case-2 would have been operated as reduction of only ~515MW occurred as per SCADA data.

State	Actual Load Relief obtained from SCADA	Planned Load Relief	% relief*
Punjab	80	196	41%
Haryana	120	190	63%
Rajasthan	40	170	24%
UP	Nil	200	0%
Delhi	150	350	43%

*: Considering load shedding in group A, B, C & D

Further feeder wise SCADA details is tabulated below:

Load Group A&B -

	Group-A				Group-B			
	Scheduled	SCADA	CB STATUS		Scheduled	SCADA	CB STATUS	
Delhi	220kV Mandola-Narela -I	150	-23	<input checked="" type="checkbox"/>	220kV Mandola-Gopalpur -I	200	88	<input checked="" type="checkbox"/>
	220kV Mandola-Narela -II		-0	<input checked="" type="checkbox"/>	220kV Mandola-Gopalpur -II		64	<input checked="" type="checkbox"/>
UP	Feeders from 220/132 kV Muradnagar Old	100						
Rajasthan	220 kV Alwar-GSS Mandawar	25	22	<input checked="" type="checkbox"/>	220/132 kV Ratangarh-132 KV Sardar Sahar	26	0	<input checked="" type="checkbox"/> S
Haryana					220/33 kV, 100 MVA Paripat (BBMB) ICT	50	38	<input checked="" type="checkbox"/>
Punjab	220 kV Malerkotla-66 kV Malerkotla	35	13	<input checked="" type="checkbox"/> S				
	220 kV Malerkotla-66 kV Naudhrani		0	<input type="checkbox"/>				
Total		310	12			276	189	

(Before the incident)

	Group-A				Group-B			
	Scheduled	SCADA	CB STATUS		Scheduled	SCADA	CB STATUS	
Delhi	220kV Mandola-Narela -I	150	-23	<input type="checkbox"/>	220kV Mandola-Gopalpur -I	200	1	<input checked="" type="checkbox"/> S
	220kV Mandola-Narela -II		1	<input type="checkbox"/>	220kV Mandola-Gopalpur -II		0	<input checked="" type="checkbox"/> S
UP	Feeders from 220/132 kV Muradnagar Old	100						
Rajasthan	220 kV Alwar-GSS Mandawar	25	27	<input checked="" type="checkbox"/>	220/132 kV Ratangarh-132 KV Sardar Sahar	26	0	<input checked="" type="checkbox"/> S
Haryana					220/33 kV, 100 MVA Paripat (BBMB) ICT	50	37	<input checked="" type="checkbox"/>
Punjab	220 kV Malerkotla-66 kV Malerkotla	35	0	<input checked="" type="checkbox"/> S				
	220 kV Malerkotla-66 kV Naudhrani		0	<input type="checkbox"/>				
Total		310	5			276	39	

(After the incident)

Load Group C&D -

Group-C				Group-D			
	Scheduled	SCADA	CB STATUS		Scheduled	SCADA	CB STATUS
220/132 kV, 63 MVA Modipuram ICT-II	100	12	■				
220/132 kV, 40 MVA Modipuram ICT-III		7	■				
132 kV Modipuram-Mawana		0	□				
132 kV Modipuram-Sardhana		6	■				
132 kV Modipuram-Kankerkhara		28	■				
132 kV Kota-Talera	60	11	■ S	132 kV Alwar-Bansoor	59	0	■
132 kV Merta-Roon		7	■	132 kV Alwar-Malakhera		33	■
132 kV Merta-Merta Road		16	□ S				
220kV Samaypur-Palwal -I	140	50	■				
220kV Samaypur-Palwal -II		68	■				
66 kV Gobindgarh-Focal Point	71			66 kV Laltokalan-Gill Road -I	90	30	■ S
66 kV Gobindgarh-Talwara -D/C				66 kV Laltokalan-Gill Road -II		30	■ S
66 kV Gobindgarh-Chourwala D/C				66 kV Laltokalan-Ferozpur Road		10	■ S
	371	203			149	103	

(Before the incident)

Group-C				Group-D			
	Scheduled	SCADA	CB STATUS		Scheduled	SCADA	CB STATUS
220/132 kV, 63 MVA Modipuram ICT-II	100	12	■				
220/132 kV, 40 MVA Modipuram ICT-III		7	■				
132 kV Modipuram-Mawana		-0	□				
132 kV Modipuram-Sardhana		6	■				
132 kV Modipuram-Kankerkhara		27	■				
132 kV Kota-Talera	60	11	■ S	132 kV Alwar-Bansoor	59	0	□
132 kV Merta-Roon		0	■	132 kV Alwar-Malakhera		0	□
132 kV Merta-Merta Road		17	□ S				
220kV Samaypur-Palwal -I	140	0	□				
220kV Samaypur-Palwal -II		-0	■ S				
66 kV Gobindgarh-Focal Point	71			66 kV Laltokalan-Gill Road -I	90	0	□
66 kV Gobindgarh-Talwara -D/C				66 kV Laltokalan-Gill Road -II		0	□
66 kV Gobindgarh-Chourwala D/C				66 kV Laltokalan-Ferozpur Road		0	□
	371	81			149	0	

(After the incident)

Following are the discussion points:

- Reason of operation of Case-2 instead of Case-1 needs to be looked into. (POWERGRID)
- Lower load relief in case of operation of SPS (Respective states)
- Non-tripping of feeders come under SPS operation (Respective states)
 - Non tripping at Modipuram in UP
 - Non tripping at Mandola-Narela ckts in Delhi
 - Non tripping of Gobindgarh in Punjab
- Antecedent power flow became zero or very less in some of the feeders.

- Telemetry of some of the feeders in SCADA.
- Data telemetry of SPS signal wiring in the SCADA to be expedited. (POWERGRID and respective utilities)
- Reporting of the SPS operation from Punjab, Delhi and NTPC is still awaited.

Details received from UP, Rajasthan and Haryana:

Name of substation : 220 KV Substation Muradnagar						
Sl. No.	Date and Time of Tripping	Counter reading of Digital Tele Protection coupler		Name of Feeder/ Transformer which tripped	Total load shed due to tripping of Feeder/ Transformer as per hourly loading (MW)	Date and time of Normalization
		Before receipt of command	After receipt of command			
1	25.03.19 10:20	35	36	Following 132KV Feeders : 132 KV Morta (CB no 77) 132 KV Dasna (CB no 73)	24	Date :- 25.03.19 CB no-77 at 10:45 CB no-73 at 10:50
2	<p>220 KV S/S Modipuram (UPPTCL)- No tripping observed of SPS digital tele protection system installed at 220 KV S/S Modipuram since dt.- 06.10.17 and synchronization fail LED glowing continuously on the card of SPS cabinet, for which same has been intimated to PGCIL vide letter no.- 673/ETCC/MT dt.- 16.11.18 & NRPC in OCC & PSC meetings, you are therefore requested to coordinate with NRPC to get it set right. This matter was also discussed on dt.- 05.03.19 in blackout /protection meeting held at SLDC Lucknow.</p>					

Regarding the trailing mail, as per SCADA the instantaneous loading on various points in Haryana before tripping:

Samaypur-Palwal ckt-1	51MW
Samaypur-Palwal ckt-2	64MW
220/33kV 60MVA t/f at BBMB Panipat	26MW

The same may be confirmed by SCADA data. Kindly update the load relief of Haryana to 141MW.

Northern Regional Grid Operation Monitoring Format- 2

1. Date and time of the triggered control operation: 10.15 Hrs. on dated 25/03/2019
2. SPS initiated control received (Yes / No)

Sr. No.	Location	Control Received (Y/N)
1	Alwar (Rajasthan))	Y
2	Merta (Rajasthan)	Y

2.1. Load Shedding:

Sr. No	Name of GSS	Name of Feeder	Tripped (Y/N)	Load relief (MW)	Total Load Relief (MW)
1.	220 KV GSS Alwar	132 KV Alwar- Malakhera	Y	35	35
2.	220 KV GSS Alwar	132 KV Alwar- Bansur	Y	0	
3.	400 KV GSS Merta	132 KV Merta- Roon	Y	36	45
4.	400 KV GSS Merta	132 KV Merta- Merta Road	Y	9	
TOTAL RELIEF :					90 MW

Apart from above SPS operation, Haryana representative also reported the tripping of 220 kV Samaypur-Palwal ckt-1 & 2 on 19th Mar 2019 at 16:13hrs. At the time of tripping of these feeders, SPS condition was not fulfilled. It needs to be relooked by POWERGRID and Haryana.

POWERGRID representative informed that SPS logic operated at HVDC Rihand end is correct as Rihand end PLC logic sense the 770MW, hence Case-1 operated. SPS

NRLDC representative informed that there may be issue with the SPS logic or measurement equipment. It seems there is difference between SCADA data and site reported data. He further informed that load shedding figures are very poor compare to planned load shedding figures. Total average response of the total load group is around 35-40%. Further details have already been tabulated above. He raised concern about poor response from the utilities and undesired operation case other than planned case. SPS are the safety net for power system and safety net should be ensured each and every time in the grid.

Member Secretary, NRPC raised serious concern about poor load relief and reporting from the constituents and progress on earlier OCC/ TCC recommendations. He further suggested NRPC secretariat to write letter to all Managing Director of STU/SLDC and concerned utilities for poor load shedding response on account of SPS operation. He also suggested to all concerned officer to ensure the proper load shedding in case of SPS operation.

UPPTCL representative informed that there was an issue in DTPC of Modipuram and Nara. Modipuram DTPC has been corrected by POWERGRID, but Nara DTPC issue is still pending. Lower load relief observed at 220 kV Muradnagar (24MW against 100MW planned relief), it was due to shifting of 100MVA Dasna load at 765 kV Hapur station. Now two new feeders with 140MVA load has been connected at 220 kV Muradnagar station.

Haryana representative informed that Panipat TPS also tripped and shed 26MW load. However, SCADA data was showing nil relief. NRLDC representative clarified that this load shedding data in SCADA is also coming from Haryana so it may be checked and corrected by Haryana.

Delhi representative informed that 220 kV Mandola-Narela D/C fed either from Mandola end or DSIDC Bawana end. Some maintenance activity was running at 220 kV Mandola so this load was shifted towards Bawana.

Following action points decided during the meeting:

- HVDC Rihand-Dadri SPS logic needs to be checked and corrected in view of error in SPS logic or measurement equipment. (Action: **POWERGRID**; Time Frame: **15 days**)
- Load needs to be ensured according to planned load in the SPS so that desired relief to be available at the time of actual requirement in the system. (Action: **Punjab, Rajasthan, Uttar Pradesh, Haryana and Delhi**; Time Frame: **15 days**)
- Difference in SLDC reporting and SCADA data of Panipat TPS needs to be looked into. (Action: **Haryana**; Time Frame: **15 days**)
- Difference in SLDC reporting and SCADA data of Alwar and Merta needs to be looked into. (Action: **Rajasthan**; Time Frame: **15 days**)
- Uttar Pradesh please share the details of additional feeders wired at 220 kV Muradnagar (UP) (Action: **Uttar Pradesh**; Time Frame: **7 days**)
- POWERGRID shall check the reason of sending the SPS signal at 220 kV Samaypur-Palwal ckt-1 & 2 on 19th Mar 2019 at 16:13hrs. (Action: **POWERGRID**; Time Frame: **7 days**)

All concerned officer were asked to submit the report on aforesaid points.

12. Repeated observance of low frequency oscillation in the Indian Grid due to controller interaction at HVDC Agra end:

Repeated operations of HVDC controller at Agra end of +/- 800 kV HVDC Agra-Alipurduar-Biswanath Chariali observed in last one and half month. The recent such observance of oscillations in the grid due to HVDC controller interactions at Agra are tabulated below:

Date	Time	Oscillation in the Region	Reason	Remarks
21.02.19	03:46:28 to 03:47:15hrs	NR, NER and ER	Controller operation at HVDC Agra end of HVDC Agra-APD-BNC	Fault in 400 kV Agra-Sikar ckt-1 which cleared within 100ms
23.02.19	00:23:04 to 00:23:11 hrs	NR, NER and ER	Controller operation at HVDC Agra end of HVDC Agra-APD-BNC	Manual opening of 765kV Lalitpur-Fatehabad-1 to avoid over voltage tripping
14.03.19	09:05:15 to 09:05:21hrs	NR, NER and ER	Controller action at Agra end. HVDC Agra-BNC Pole-1 also tripped due to reverse power direction trip.	Blue phase to earth fault in 400 kV Bongaigaon-Balipara ckt-2. At the same time HVDC Agra-BNC pole-1 also tripped
03.04.19	10:49-10:50hrs	NR, NER and ER	Controller operation at HVDC Agra end of HVDC Agra-APD-BNC	Fault signature was not captured in PMU plot of phase voltages of NR stations. It seems mal-operation of any HVDC controller

Some of these controller interactions seems to have been triggered during AC system fault in the vicinity of converter/inverter stations. However, there are incidents wherein the controller interactions have been triggered due to nearby AC transmission line switching operation and sometimes without observance of either any switching operation or any fault in the system. Such as, on 03rd Apr 2019, though oscillations have been captured through PMU phase voltages and frequency but without any fault in the system. It is also pertinent to mention that during one of such incident on 14th March 2019, the HVDC Agra-BNC pole-1 tripped as well.

Most of the oscillation captured having frequency of 2-4 Hz, it comes under the category of local area mode which generally occurs due to malfunction of excitation control and DC circuit control.

NRLDC has already written a letter (dated 05th Apr 2019) to POWERGRID for analyzing the issue, taking corrective action and reporting the entire issue to NRPC/ NRLDC

POWERGRID representative informed that issue has been found during reverse power direction from Agra to BNC. Issue has been referred to ABB from POWERGRID corporate centre and still under discussion. Any finding will be share with NRPC/ NRLDC.

NRLDC representative informed that bidirectional power flow on HVDC Agra-BNC was already approved and it was not a new thing so this issue should be taken care at the time of commissioning itself.

MS, NRPC suggested POWERGRID to kindly expedite the action and share the detailed report on the findings.

13. Frequency response characteristic:

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

Sl. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf
1	12.03.19	13:02hrs	HVDC Talcher-Kolar pole 2 tripped due to DC earth fault. Prior to incident, power flow on bipole was 2000MW and after tripping of pole-II, power flow on pole-I jumped to 1250MW. Then after 1.5 minutes flow on pole-I came down to 150MW. SPS operated and led to load relief of around 1219 MW in SR and generation relief of around 734MW.	50.157	50.202	0.045
2	12.03.19	17:03hrs	Two running units at Singareni generating 1170 MW tripped due to Bus-Bar protection operation at 400kV Ramadugu substation.	50.051	49.980	-0.071

The 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	Talchar-Kolar Event		Singareni Event	
	FRC	Remarks	FRC	Remarks
PUNJAB	40%		24%	
HARYANA	10%		-1%	
RAJASTHAN	18%		24%	
DELHI	-65%	Decrease in schedule	-73%	
UTTAR PRADESH	67%		39%	
UTTARAKHAND	94%		27%	
CHANDIGARH	-277%	Small Control area	88%	Small Control area
HIMACHAL PRADESH	12%		61%	
JAMMU & KASHMIR	136%		9%	
NR	45%		17%	

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

Generator	FRC (Talchar-Kolar Event)	FRC (Singareni Event)	Generator	FRC (Talchar-Kolar Event)	FRC (Singareni Event)
Singrauli TPS	1%	0%	Salal HEP	-145%	0%
Rihand-1 TPS	106%	8%	Tanakpur HEP	Decrease in schedule	3%
Rihand-2 TPS	256%	21%	Uri-1 HEP	-7%	1%
Rihand-3 TPS	24%	-30%	Uri-2 HEP	0%	0%
Dadri-1 TPS	46%	59%	Dhauliganga HEP	No generation	26%
Dadri-2 TPS	2%	48%	Dulhasti HEP	135%	2%
Unchahar TPS	0%	16%	Sewa-II HEP	0%	0%
Unchahar stg-4 TPS	29%	-21%	Parbati-3 HEP	No generation	No generation
Jhajjar TPS	Decrease in schedule	Increase in schedule	Jhakri HEP	No generation	No generation
Dadri GPS	-13%	0%	Rampur HEP	No generation	No generation
Anta GPS	No generation	No generation	Tehri HEP	Decrease in schedule	0%
Auraiya GPS	No generation	No generation	Koteswar HEP	0%	0%
Narora APS	0%	-19%	Karcham HEP	No generation	No generation
RAPS-B	54%	-15%	Malana-2 HEP	No generation	No generation
RAPS-C	13%	4%	Budhil HEP	0%	No generation
Chamera-1 HEP	No generation	Suspect SCADA data	Bhakra HEP	-4%	5%
Chamera-2 HEP	No generation	-48%	Dehar HEP	268%	28%
Chamera-3 HEP	No generation	No generation	Pong HEP	5%	7%
Bairasiul HEP	No generation	No generation	Koldam HEP	No generation	No generation
			AD Hydro HEP	No generation	No generation

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

Generator	FRC (Talchar-Kolar Event)	FRC (Singareni Event)	Generator	FRC (Talchar-Kolar Event)	FRC (Singareni Event)
PUNJAB			UP		
Ropar TPS	No generation	No generation	Obra TPS	-6%	9%
L.Mohabbat TPS	No generation	No generation	Harduaganj TPS	298%	19%
Rajpura TPS	57%	55%	Paricha TPS	No generation	No generation
T.Sabo TPS	87%	18%	Rosa TPS	No generation	No generation
Goindwal Sahib TPS	200%	85%	Anpara TPS	-3%	1%
Ranjit Sagar HEP	91%	17%	Anpara C TPS	1%	29%
Anandpur Sahib HEP	-13%	-17%	Anpara D TPS	27%	10%
HARYANA			BARA		
Panipat TPS	132%	0%	Bara TPS	-3%	1%
Khedar TPS	No generation	No generation	Lalitpur TPS	No generation	No generation
Yamuna Nagar TPS	No generation	No generation	Meja TPS	-1%	3%
CLP Jhajjar TPS	0%	16%	Vishnuprayag HEP	Suspect SCADA data	0%
Faridabad GPS	0%	0%	Alaknanda HEP	No generation	0%
RAJASTHAN			UTTARAKHAND		
Kota TPS	49%	-29%	Obra HEP	-15%	51%
Suratgarh TPS	3%	5%	Gamma Infra GPS	12%	20%
Kalisindh TPS	0%	7%	Shravanti GPS	90%	50%
Chhabra TPS	No generation	No generation	Ramganga HEP	Suspect SCADA data	Suspect SCADA data
Chhabra stg-2 TPS	139%	-18%	Chibra HEP	No generation	10%
Kawai TPS	3%	58%	Khodri HEP	No generation	No generation
Dholpur GPS	No generation	No generation	Chilla HEP	-69%	-6%
MAHARASHTRA			HP		
Mahi-1 HEP	8%	-5%	Baspa HEP	-34%	-7%
Mahi-2 HEP	No generation	No generation	Malana HEP	No generation	No generation
RPS HEP	29%	4%	Sainj HEP	Suspect SCADA data	-12%
JS HEP	-10%	13%	Larji HEP	Suspect SCADA data	Suspect SCADA data
DELHI			J&K		
Badarpur TPS	No generation	No generation	Bhabha HEP	Suspect SCADA data	Suspect SCADA data
Bawana GPS	-21%	15%	Giri HEP	Suspect SCADA data	Suspect SCADA data
Pragati GPS	No generation	No generation	J&K		
			Baglihar-1&2 HEP	-11%	-4%
			Lower Jhelum HEP	No generation	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.

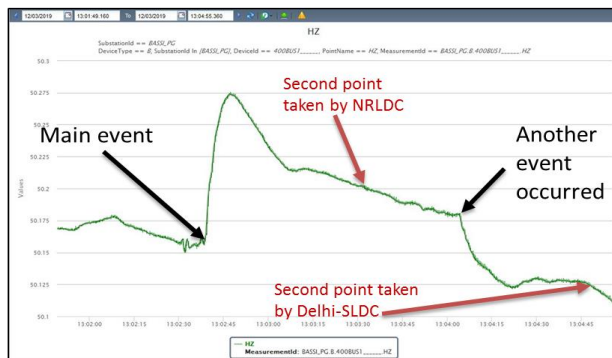
Details received from Delhi:

B 13 FRC: Details by Constituents: Delhi

12-Mar-19 Talcher-Kolar event

	Delhi SLDC	NRLDC	Remarks
Starting from	12 March 2019 at 13:02:45HRS.	12 March 2019 at 13:02:30HRS.	Difference of 2 min taken by SLDC
To	12 March 2019 at 13:04:40 HRS.	12 March 2019 at 13:03:30 HRS.	
FRC	424%	-65% (Dec in schedule)	

In Singareni event as well, difference of ~2 min taken between calculation points



Details received from NHPC:

B 13 FRC: Details by Constituents: NHPC

12-Mar-19 Singareni event

Chamera-1: 8% (NHPC), Suspect SCADA data (NRLDC)
Sewa-II: 197% (NHPC), Suspect SCADA data (NRLDC)
 No response from **Dhauliganga** observed

12Mar2019 17:02:50				<i>Before the incident</i>			
1	BUS FREQ	50.0459	2	U1 GEN. MW	36.9748		
3	U2 GEN. MW	39.1323	4	U3 GEN. MW	38.9142		
12Mar2019 17:03:41				<i>After the incident</i>			
1	BUS FREQ	49.9838	2	U1 GEN. MW	40.3715		
3	U2 GEN. MW	41.7067	4	U3 GEN. MW	39.3763		

12-Mar-19 Talcher-Kolar event

Sewa-II: 203% (NHPC), 0% (NRLDC)

Comparatively lower response from unit #3 of Sewa-II HEP

12Mar2019 13:02:30				<i>Before the incident</i>			
1	BUS FREQ	50.1722	2	U1 GEN. MW	37.5620		
3	U2 GEN. MW	37.0542	4	U3 GEN. MW	40.3140		
12Mar2019 13:03:00				<i>After the incident</i>			
1	BUS FREQ	50.2693	2	U1 GEN. MW	34.7903		
3	U2 GEN. MW	35.1552	4	U3 GEN. MW	40.3230		

Details received from Punjab:

B 13 FRC: Details by Constituents: Punjab

12-Mar-19 Singareni event

Sr No	Particulars	Dimension	PUNJAB STATE CONTROL AREA GENERATION				
			Ropar TPS	L.Mohabbat TPS	Rajpura TPS	T.Sabo TPS	Goindval Sahib TPS
1	Actual Net Interchange before the Event	MW	4	0	653	1388	498
2	Actual Net Interchange after the Event	MW	4	0	664	1395	510
3	Change in Net Interchange (2 - 1)	MW	-0.30	0.00	10.20	7.00	12.00
4	Generation Loss (-)	MW	0	0	0	0	0
5	Generator Response (4-3)	MW	0.30	0.00	-10.20	-7.00	-12.00
6	Frequency before the Event	HZ	50.05	50.05	50.05	50.05	50.05
7	Frequency after the Event	HZ	49.98	49.98	49.98	49.98	49.98
8	Change in Frequency (7-6)	HZ	-0.07	-0.07	-0.07	-0.07	-0.07
9	Frequency Response Characteristic (5 / 8)	MW/HZ	-4	0	144	99	169
10	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 1)	MW/Hz	1.7	-0.1	281.3	555.2	199.2
11	Percentage of Ideal response	%	No generation	No generation	55%	18%	85%

Negative response due to calculation error

Sr. No	Particulars	Dimension	GGSSSTP	GHTP	RSD	NPL (IPP)	TSPL (IPP)	GVK (IPP)
1	Actual net interchange of Punjab region before the event (17:02:50 hrs.)	MW	0.00	0.00	241.81	685.72	1465.00	538.00
2	Actual net interchange of Punjab region after the event (17:03:40 hrs.)	MW	0.00	0.00	241.83	698.73	1474.00	551.00
3	The net interchange of Punjab Region (2-1)	MW	0.00	0.00	0.02	13.01	9.00	13.00
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	0.02	13.01	9.00	13.00
6	The frequency before the event	HZ	50.05	50.05	50.05	50.05	50.05	50.05
7	The frequency after the event	HZ	49.98	49.98	49.98	49.98	49.98	49.98
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	-0.29	-185.86	-128.57	-185.71
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	241.81	685.72	1465.00	538.00
12	Ideal Load Response of Punjab Region assuming 4% per Hz (0.4* 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	96.72	274.29	586.00	215.20
14	Composite Ideal Response(12+13)	MW/Hz	0.00	0.00	96.72	274.29	586.00	215.20
15	Percentage Ideal Response (9/14)*100	%	*	*	-0.30	-67.76	-21.94	-86.30

Details from Rajasthan, Uttar Pradesh and Tehri HEP:

B 13 FRC: Details by Constituents: Rajasthan

12-Mar-19 Singareni event

KTPS	STPS	KALISINDH	CTPP	ADANI	CSCTS
-20.46%	2.64%	0.00%	0.00%	12.67%	0.00%

12-Mar-19 Talcher-Kolar event

KTPS	STPS	KALISINDH	CTPP	ADANI	CSCTS
21.98%	-4.43%	0.00%	-10.09%	5.48%	-16.27%

Details by Constituents: UP

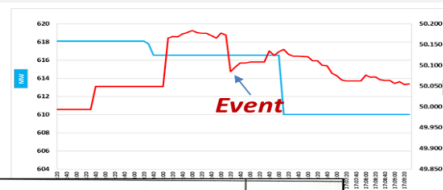
12-Mar-19 Singareni event: Very low response from state control area generators as observed from received details. Rosa under RSD during above incident

Details by Constituents: Tehri HEP

12-Mar-19 Talcher-Kolar event: No generation

12-Mar-19 Singareni event

- No margin for Frequency response



2	12.03.2019	17:03:00 Hrs	On 12th March 2019, at 17:03 Hrs, two running units at Singareni generating 1170 MW tripped due to Bus-Bar protection operation at 400KV Ramadugu substation.	-0.07	During the time of event station was generating maximum load of 610 MW against Injection schedule of 606 MW. The FRC of the event is annexed as Annexure '2'.	Units were running in RGMD.
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Haryana representative informed that FRC of Haryana was ~14% for Singareni event. Information will be shared soon.

Action points decided during the meeting:

- In Delhi FRC calculation time taken was different from NRLDC. Maximum time difference shall be 50-80second for FRC calculation. Delhi shall recalculate the FRC and share the details.
- NHPC shall check the reason of poor response from Chamera-1 plant and Dhauliganga HEP. Comparatively lower response from unit-III of Sewa-2 needs to be looked into.
- Punjab shall correct the calculation for the FRC of the generators. Punjab shall recalculate the FRC and share the details.
- Rajasthan shall check the reason of poor response in both the incident.
- Other utilities shall also check the FRC response in case of these incident and share the details.
- As per Hon'ble commission order, All the ISGS hydro and thermal generators shall maintain the margin for FRC. All the generators shall ensure the proper margin during generation for compliance of the order.

All the NR constituents shall share the remedial measures report to NRPC/ NRLDC.

14. Implementation of Pilot Project on SCED (Security Constrained Economic Dispatch) for ISGS (Inter-State Generating Stations) of PAN India

Hon'ble Commission, vide Order in Petition No. 02/SM/2019 (Suo-Motu) dated 31st January, 2019, directed for Pilot on SCED of Inter-State Generating Stations (ISGS) Pan India <http://cercind.gov.in/2019/orders/02-SM-2019.pdf>.

Information about SCED (Security Constrained Economic Dispatch) has already been presented during 156h OCC meeting. Pilot Project on SCED has been implemented for PAN India ISGS thermal generating station from 1st Apr 2019.

This Agenda is for the information of the members.

Annexure-I

List of participants in the 158th OCC meeting held on 23th April 2019, New Delhi

BBMB

Name	Designation	Contact No.	Email
S. K. SEKHRI	ASE	9463079046	sanjaybbmb72@gmail.com
PARVEEN KUMAR	Dy. Power Controller	9463083459	dy.power.c@bbmb.nic.in

NHPC

Name	Designation	Contact No.	Email
Aditya Gautam	G.M. (D&M)	9816503059	aditya.gautam@gmail.com

NPCIL/NAPS/RAPS

Name	Designation	Contact No.	Email
R. D. YADAV	STE(ERL), NPCIL RAPS-B	9413354527	rdyadav@npcil.co.in
S. K GOYAL	STE(ERL), NPCIL NAPS	9412768103	skgoyal@npcil.co.in

NRLDC

Name	Designation	Contact No.	Email
शशि बरपेडा	जॉय पावर कंट्रोलर	9717296928	ssberpande@posoco.in
शशि बरपेडा	जॉय पावर कंट्रोलर		shshil@posoco.in
राजीव पोरवाल	जॉय पावर कंट्रोलर	9871551133	rk.porwal@posoco.in
M M Hassan	GM SO-1	9910952965	mm.hassan@posoco.in
अलोक कुमार	DGM Sr. DGM	9910953908 999909321	gms@posoco.in alok.kumar@posoco.in
Sanjay Kumar	AGM (OS)	8004950082	Sanjaykumar04@ntpc.co.in
P.K. SAINI	DGM (OS)	9650991759	PKSaini@ntpc.co.in

PGCIL

Name	Designation	Contact No.	Email
N S Thakur	Sr. G.M.	9001890586	ns.thakur@powergrid.in
S. C. Sharma	Sr DGM	9873919526	sc-sharma@powergrid.in
BIMAL KUMAR	Sr DGM	6393572580	bimalkumar@powergrid.in
RKRAMAN	DGM	9971399089	rkraman@powergrid.in

SJVNL

Name	Designation	Contact No.	Email
Avinash Jekhar	Manager	9816625472	gmcsojvn@gmail.com

THDC

Name	Designation	Contact No.	Email

NRLDC → KAMALDEEP Chief Manager 9971700722 Kamaldeep@posoco.in

DTL

Name	Designation	Contact No.	Email
Pradeep Katiyar	DGM(T)/SO-SLDC	9999533676	pradeepkatiyar03@yahoo.co.in
Paritosh Joshi	Msmt) prot-12	9999533933	paritoshjoshi2013@gmail.com

HVPNL-HPGCL-HPPC

Name	Designation-Org.	Contact No.	Email
N.K. MAJUMDAR	PC(S)DC HARYANA	9466219242	slcdchayara@gmail.com
ASHISH K Pandey	APC /SLDC Haryana	9468631004	

HPSEBL

Name	Designation	Contact No.	Email
Balbir Singh	Sr. Ex. Engineer	9418053041	Balbir.koushal16@gmail.com

PSTCL-PSPCL

Name	Designation	Contact No.	Email

RVPNL-RRVUNL-RDPPC

Name	Designation-Org.	Contact No.	Email
A.K. ARYA	SE(SOLD), SLDC, Raj	9414061066	se.edwopnl@gmail.com
Kamal Kataria	XEN (SOLD), SLDC, Raj	9413382632	— do —
Mukesh Kizor	AEN (PAP), RVPN, Raj	9414014863	se.pb@rvpn.co.in
Mehana Kumar. MB	XE (PP), RVPNL	9413349828	pp.sivani@gmail.com

Name	Designation-Org.	Contact No.	Email
KAVINDRA SINGH	Tech. Advisor, UPPTCL	9205363821	SKAVINDRA@YAHOO.CO.IN.
A.J. Siddiqui	SE, UP SLDC	9415609362	SESC@UPSLDC.ORG
Zahid Ahmad	SE, UP SLDC	9415609365	sera@upslde.org
Sanjay Sivastara	SE, PMC, UPPCL	9415099212	cepmpcuppl@gmail.com

PTCUL

Name	Designation-Org.	Contact No.	Email
Vinayak Shaily	Executive Engineer, SLDC (operations)	7088117954	vinayak-shaily@ptcl.org

APCPL

Name	Designation-Org.	Contact No.	Email
P. MEDIRATTA	AGM, APCPL (EEMG)	9416212411	pmediratta@ntpc.co.in
Amit Hooda	Manager (EEMG)	9416212595	amit.hooda01@gmail.com

RRVUNL RAJASTHAN

Rakesh Kumar XEN (PP) RAVUNL 9413349585 pp.evun@gmail.com

Adani Power Ltd.

Name	Designation-Org.	Contact No.	Email

AD Hydro Power Ltd.

Name	Designation-Org.	Contact No.	Email
Anil Kumar Garg	General manager	9910796444	anilgarg@vijbhawan.com

Jaiprakash Power Ventures Ltd.

Name	Designation-Org.	Contact No.	Email

NRPC

Name	Designation	Contact No.	Email

CEA

- VIKRAM SINGH, DIRECTOR 9868893051 VIJAYRAMSINGH-CEA@Govt.IN

JHAJJAR POWER LIMITED (CLPINDIA)

- Karunakar Jha, GM-Commercial, 9992225435 Karunakar.jha@CLPindia.in
- Rajneesh Sethi, Sr. Mgr- Commercial 7087975769, rajneesh.sethi@CLPindia.in

NRDC

- निमित्त भादव मैनेजर - पोसोको 956050257 nityadav@posoco.in
- गौरव मालवीय उप प्रबंधक 9594441301 gauravmalviya@posoco.in
- सुकुचि अंत मुं.प्रो - पोसोको 9971038986 sueneli.jeni@posoco.in

Status updates of agenda points**Agenda Point 6: Reactive compensation at 220 kV/400kV level**

In the 39th meeting Standing Committee on Power System Planning of NR (SCPSPNR) held on 29th & 30th May 2017, following elements in NR were approved:

- a) 500 MVAR TCR at 400 kV bus at Kurukshetra S/s of Powergrid.
- b) 30 no. 220 kV bus reactors at 220 kV sub-stations and 18 no. 400 kV bus reactors at 400 kV sub-stations, subject to the availability of space.

6.i. POWERGRID:

500 MVAR TCR at Kurukshetra S/s: Contract awarded in January 2019 with completion schedule of 22 months, kick off meeting has been held.

In the 41st TCC & 44th NRPC meeting held on 18th & 19th March 2019, POWERGRID informed that as per the order of MoP, few approved reactors are to be done by POWERGRID instead of through TBCB.

6.ii. DTL:

The updated status of the reactors as received from DTL is as under:

S.No.	Bus Name	Voltage level (kV)	Reactor (MVAR)	Status
1	Peeragarhi	220	1x50	Reactors were approved in the Board which would be further processed for PSDF funding.
2	Mundka	400	1x125	Reactors were approved in the Board which would be further processed for PSDF funding.
		220	1x25	
3	Harsh Vihar	220	2x50	Reactors were approved in the Board which would be further processed for PSDF funding.
4	Electric Lane	220	1x50	Proposal have been prepared and it would be placed before the Board for approval.
5	Bamnauli	220	2x25	Proposal have been prepared and it would be placed before the Board for approval.
6	Indraprastha	220	2x25	Proposal have been prepared and it would be placed before the Board for approval.
TOTAL			450	

6.iii. PSTCL:

Bid validity period was not extended by the bidder for the tenders of 400 kV bus reactor at Dhuri substation and 220 kV bus reactors at Dhuri and Nakodar substations due to pendency in PSDF funding approval.

Queries of PSDF have been clarified and delay was due to shortage of Funds in PSDF. Process of retendering would be done within 3 months, once funding from PSDF is received.

6.iv. Uttarakhand:

125 MVAR reactors at Kashipur: Technical Evaluation has been completed. Further, it would be discussed in CPC meeting.

6.v. Rajasthan: Status is as under:

Item	Background	Status
3 Nos. each of 25 MV A (220KV) reactors for Akal, Bikaner & Suratgarh.	DPR submitted for PSDF funding on 27.04.2018. Reply to the observations of NLDC submitted on 28.07.2018	Approved in the Monitoring Committee of PSDF. Minutes of the Monitoring Committee meeting to be issued.
1 No. of 25 MVAR (220KV) reactor for Barmer & 125 MVA (400KV) reactor for Jodhpur, included in 450 MVA (13x25+1x125MVA) proposal	Revised DPR for 450 MVAR Reactor after separating STATCOM was submitted vide letter dt. 12.10.2018 to POSOCO for approval.	Clarifications which were sought have been submitted for PSDF funding.

Agenda Point 9: Follow up of issues from previous OCC Meetings – Status update

S. 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 Northern Region. 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.	The updated status available is attached as Annexure-II/1 of the 158 th OCC Agenda. All states were requested to update.
2	Sub-stations likely to be commissioned in next 6 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 Power Grid and their required downstream network were enclosed as Annexure II/2 of the 158 th OCC Agenda. All other concerned utilities were requested to update regularly

S. No.	Agenda point	Details	Status
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 Uttarakhand (up to March 2019), UP, Rajasthan & Haryana (up to January 2019). All other states were requested to update.
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> ".	The information of period ending March 2019 received from UP, Haryana, Delhi and Rajasthan. All others were requested to submit.
5	Strengthening of Intra-State transmission system	All SLDCs were requested to give information regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning	UPPTCL has submitted the information ending 12/2018. ALL other SLDCs were requested to give half yearly feedback ending 12/2018 in the month of 1/2019 to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning.
6	Mapping of Feeders in SCADA	All the utilities were requested to go through the "Compendium of SPS in NR" (available on NRLDC & NRPC website) and identify feeders concerning their state and map the same in SCADA	All states except Punjab & Rajasthan were requested to update. HVPNL-SCADA wing has made provisions in the database as well as associated displays at control centre. The work at RTU locations is yet to be carried out to complete the SCADA mapping.

Agenda Point 13: Automatic Demand Management System

The status of implementation of ADMS in states of NR is as under:

State/ Utility	Status
Punjab	Not fully implemented. At SLDC level, remote tripping for 26 locations is operational. At 11 kV feeder level, ADMS is to be implemented by Distribution Company.
TPDDL	Fully implemented.
Rajasthan	Under implementation. LoA placed on 12/12/2018 with an execution period of 18 months for ADMS at the level of 33 kV feeders at EHV Substation of RVPN under SCADA / EMS part of project. ADMS functionality at 11 kV feeders from 33/11 kV substation is under the jurisdiction of the Discoms and matter is being perused with discoms authorities
UP	Not fully implemented. Remote operation of 132 kV feeders under ADMS is operational. For the down below network, issue taken up with the DISCOMs.
Haryana	Not implemented.

Agenda Point 14: Status of implementation of recommendations of Enquiry Committee on grid disturbances on 30th & 31st July 2012

Status of information submitted is as under:

Submitted		Not Submitted	
NTPC (NCR)	POSOSCO	Uttar Pradesh	Delhi
BBMB	NHPC	Himachal Pradesh	UT of Chandigarh
Punjab	HPGCL (Panipat TPS)	SJVNL	Jammu and Kashmir
Rajasthan	NPCIL	NTPC (NR-HQ)	
THDC	POWERGRID (NR-1 & NR-2)	POWERGRID (NR-3)	

Agenda Point 15: Planning, procurement and the deployment of Emergency Restoration System

Status of ERS in NR is as under:

Transmission Licensee	Number of ERS available in state	No of ERS to Be Procured	Remark if Any
POWERGRID	2 sets of 400 kV & 2 sets 765 kV	-	-
DTL	2 sets	-	-
PSTCL	2 sets	-	-
UPPTCL	2 sets	-	-
PTCUL		2 sets	DPR under finalization
HVPN		2 sets	Under tendering
RRVPN		2 sets	NIT floated
HPPTCL		2 sets	Matter under consideration regarding fund availability
PDD J&K	2 sets	-	-
BBMB	0	0	Matter discussed in the 41st TCC & 44th NRPC meeting
Sterlite*			

* Sterlite has an arrangement with M/s Supreme, Kolkata to provide the ERS services as and when required and are in the process of procurement of their own.

Agenda Point 19: Expediting Construction of 132kV supply for railway traction substation for railway electrification projects in states in NR region

Summary of transmission line work being executed by various state electricity boards is as under:

Sl. No.	State	Tr. Line to be expedited	Contract to be awarded	Estimate awaited
1	UP	19	5	1
2	Haryana	5	2	-
3	Punjab	1	2	2
4	Rajasthan	5	5	7
5	J&K	1	-	-

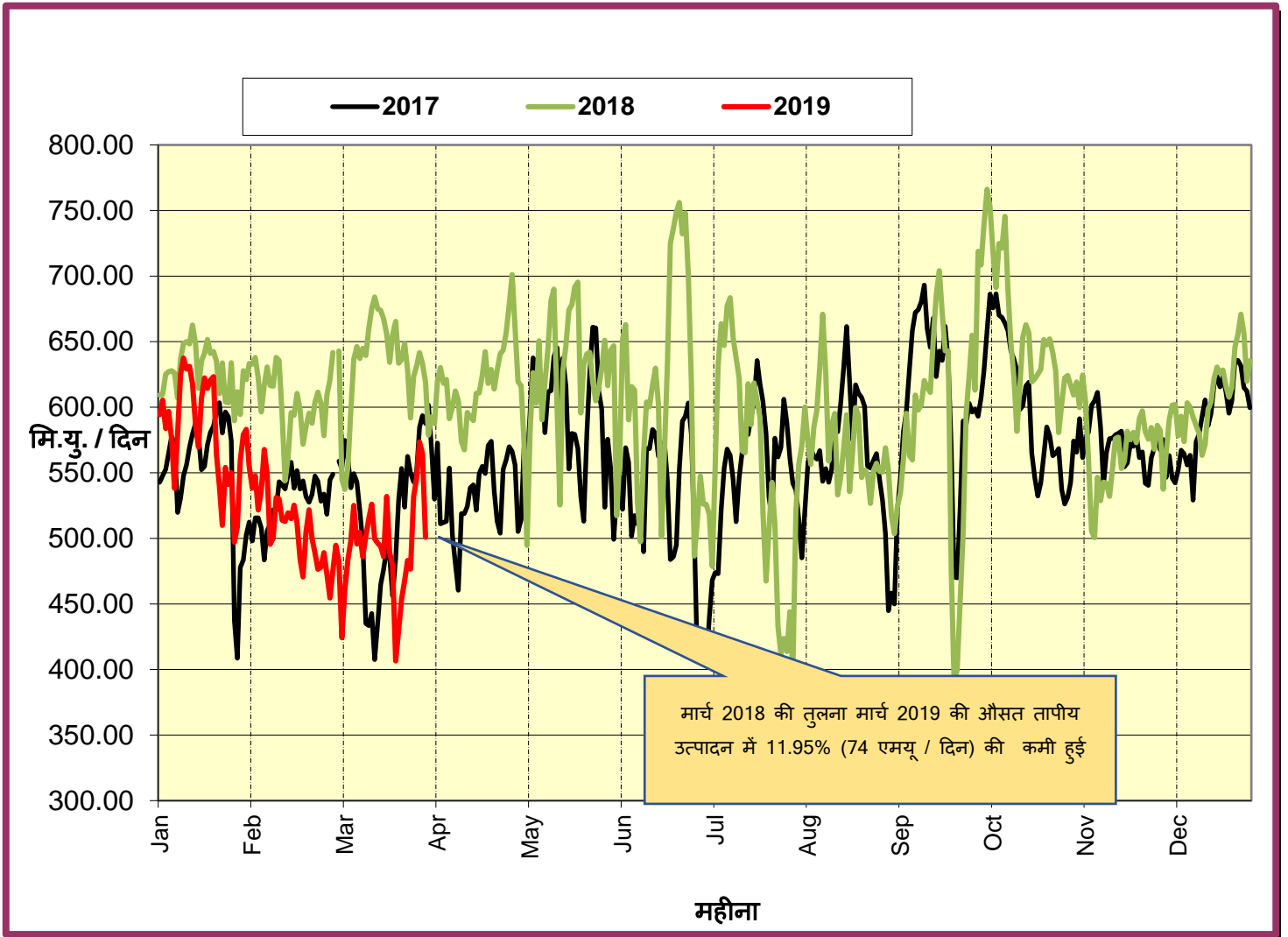
Agenda Point 21: Mapping of UFR, df/dt relay details in SCADA

Status is as under:

States	UFR	df/dt	Status	Remarks	Data Availability
J&K	No	No	-	-	-
UP	Yes	Yes	Following are provided since last status: <ul style="list-style-type: none"> • Feeder wise planned load relief in df/dt. • Alternate feeder details in UFR display. • Total planned relief in df/dt display. 	Following yet to be provided: <ul style="list-style-type: none"> • Feeder-wise planned load relief of UFR. • Telemetry of feeders (Partial details available). • Alternate feeder details in df/dt display (Partial details available for UFR). • Total planned relief in UFR display. (Stage wise) • Total actual relief. (Stage Wise) 	Very Poor
Haryana	Yes	Yes	Following are provided since last status: <ul style="list-style-type: none"> • Stage-2, 3 of df/dt included in display • Feeder wise planned load relief • Alternate feeder details • Total actual relief in UFR 	Following yet to be provided: <ul style="list-style-type: none"> • Telemetry of feeders (Partial details available) • Telemetry of alternate feeders not available • Calculation of total actual relief in df/dt seems incorrect 	Poor
Delhi	Yes	Yes	-	Following yet to be provided: <ul style="list-style-type: none"> • Total of actual analog data of MW and alternate feeders • Data suspected for most of the digital and analog value at NRLDC display but available at SLDC display 	Poor
Rajasthan	Yes	Yes	Following is provided since last status: <ul style="list-style-type: none"> • UFR display provided 	Following yet to be provided: <ul style="list-style-type: none"> • Analog value and digital data not available in UFR display (only alternate feeder details provided) 	Very Poor

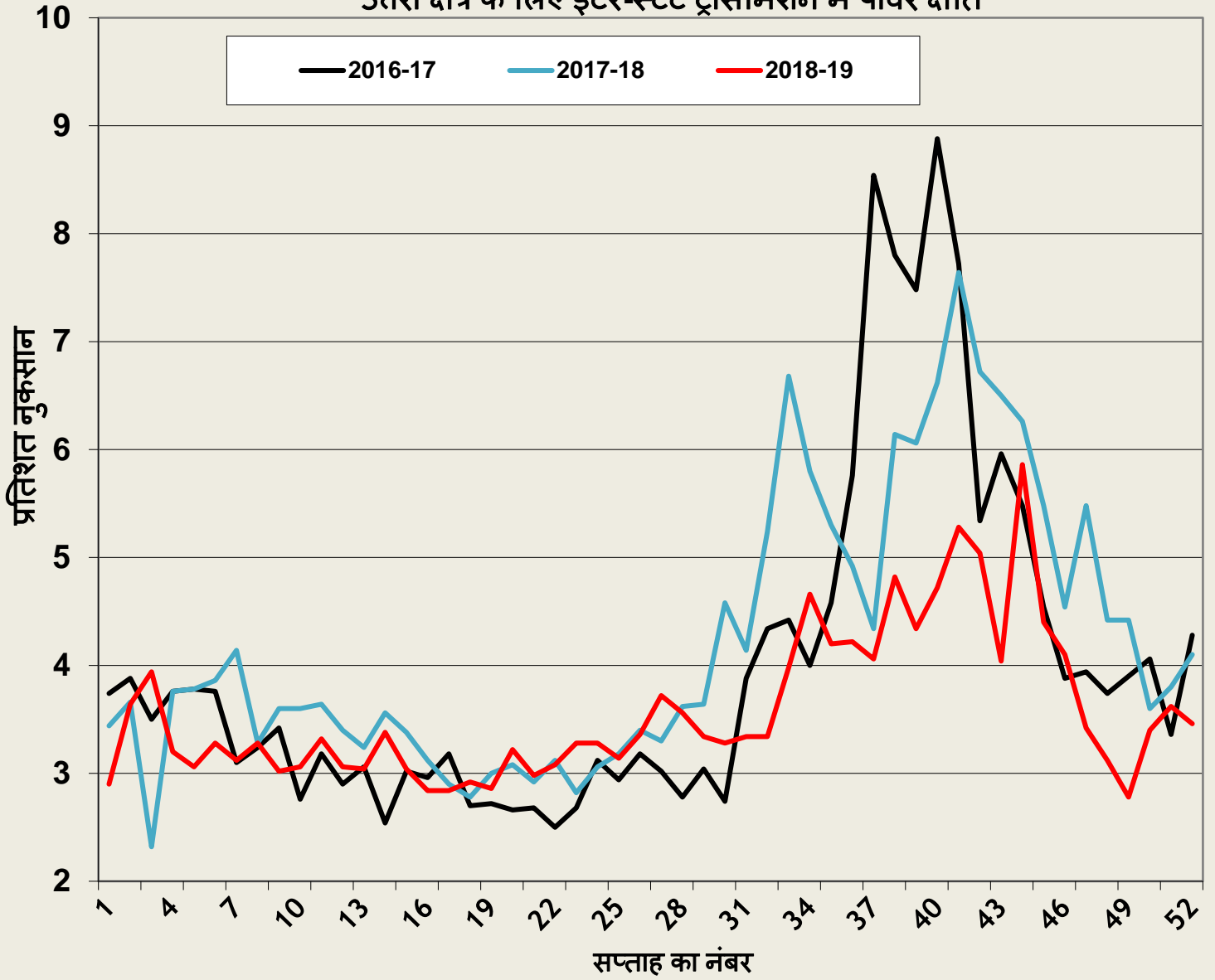
States	UFR	df/dt	Status	Remarks	Data Availability
Punjab	Yes	Yes	-	Following yet to be provided: <ul style="list-style-type: none"> • Complete telemetry of feeders. • Alternate feeders' details. • Digital Status of all the feeders 	Poor
HP	Yes	Yes	Following are provided since last status: <ul style="list-style-type: none"> • Segregation of stage wise load • Alternate feeder details • Partial telemetry of feeders 	Following yet to be provided: <ul style="list-style-type: none"> • Telemetry of feeders (partial data available) • Alternate feeder details in UFR (few not available) 	Poor
Uttarakhand	No	No	-	-	-
Punjab	Yes	Yes	-	Following yet to be provided: <ul style="list-style-type: none"> • Complete telemetry of feeders. • Alternate feeders' details. • Digital Status of all the feeders 	Poor
Rajasthan	Yes	Yes	Following is provided since last status: <ul style="list-style-type: none"> • UFR display provided 	Following yet to be provided: <ul style="list-style-type: none"> • Analog value and digital data not available in UFR display (only alternate feeder details provided) 	Very Poor

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



ट्रांसमिशन में पावर क्षति

उत्तरी क्षेत्र के लिए इंटर-स्टेट ट्रांसमिशन में पावर क्षति



Annexure-III(C)

Long Outage of Generating Units								
SL. No	Station Name	Location	Owner	Unit No	Capacity	Reason	Outage	
							Date	Time
1	Bairasiul HPS	HP	NHPC	3	60	For renovation and Modernisation of the plant	15-10-2018	9:11
2	Bairasiul HPS	HP	NHPC	2	60	For renovation and Modernisation of the plant	15-10-2018	10:02
3	Bairasiul HPS	HP	NHPC	1	60	For renovation and Modernisation of the plant	15-10-2018	10:14
4	Paricha TPS	UP	UPRVUNL	1	110	R & M Work	2/7/2016	17:30
5	URI HPS	JK	NHPC	1	120	Due to sudden fault in 11kv bus system, auxiliary supply was went off, resulting all machine tripped	24-03-2019	20:40
6	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	1	125	Bed materials leakage	11/7/2014	8:20
7	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	2	125	Boiler tube leakage	27-01-2016	15:27
8	Obra TPS	UP	UPRVUNL	12	200	Drum level high	24-09-2018	17:26
9	Bara PPGCL TPS	UP	Jaypee	2	660	Generator Transformer protection operated	22-02-2019	12:41

Annexure-III(D)

Long Outage of Transmission lines

Sl. No	Element Name	Type	Voltage Level	Owner	Outage		Reason / Remarks
					Date	Time	
1	Akal (RVPNL)-Ramgarh 400 (RVPNL) 1	Line	400 kV	RRVPNL	10/12/2018	10:15	General maintenance work.
2	Bihar sharif-Varanasi 1	Line	400 kV	PGCIL	03/04/2019	11:49	SD taken by ERTS for realignment works of mentioned above Tr. line due to construction of New Railway Line
3	Bihar sharif-Varanasi 2	Line	400 kV	PGCIL	03/04/2019	11:50	SD taken by ERTS for realignment works of mentioned above Tr. line due to construction of New Railway Line
4	400 kV 50 MVAR Line Reactor (Non-Switchable) of Bhadla(RVPNL) ckt 1 at Ramgarh 400 (RRVPNL)	Line Reactor	400 kV	RRVPNL	10/12/2018	12:00	General maintenance work.
5	50 MVAR (400kV) Bus Reactor at Moradabad (UP)	Bus Reactor	400 kV	UPPTCL	23/01/2019	10:29	For Dismantling, shifting, gasket replacement, erection & commissioning of 50 MVAR Bus Reactor & Associates works in same station.
6	Vindhyachal HVDC BtB Block 2	HVDV Station	500 kV HVDC	PGCIL	26/11/2017	14:55	Differential protection operated.
7	Akal 500 MVA ICT 4	ICT	400/220 kV	RRVPNL	05/08/2018	16:00	ICT burnt
8	Jaisalmer_2 500MVA ICT -3	ICT	400/220 kV	RRVPNL	20/02/2019	13:43	To attend hot Spot at Isolator.
9	FACT at BLB in Knp-BLB Line	FACTS	400 kV	PGCIL	02/07/2016	10:20	Y-Phase current imbalance
10	FSC of Balia-I at Lucknow	FSC	400 kV	PGCIL	29/11/2017	13:30	E/SD due to Hot Spot at Isolator
11	Chamera-1 (3*42) MVAR Bus Reactor	Bus Reactor	400 kV	NHPC	04/02/2019	15:14	For interconnection of 3x42 MVAR Bus Reactors.
12	FSC (40%) of Kanpur-II at Ballabgarh(PG)	FSC	400 kV	PGCIL	16/03/2019	14:39	Fire in B-Ph FSC at Ballabgarh end.
13	Gorakhpur 400 kV Bus 1	BUS	400 kV	UPPTCL	13/04/2019	10:42	E/S/D to attend gas leakage in CB of Bus coupler.
14	Bairasuil(NHPC)-Pong(BBMB)	Line	220 kV	PGCIL	15/10/2018	10:50	For renovation & modernization. shutdown for 6 months
15	Bairasiul(NHPC)-Jassure(HPSEB)	Line	220 kV	PGCIL	15/10/2018	12:16	For renovation & modernization. shutdown for 6 months

Annexure-III(E)

Transmission Lines
(400kV- 556 ckt. Km, 220kV – 105 ckt. Km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In kM)	Conductor Type	Owner	Actual date & time of charging (Synchronized)	
						Date	Time
1	220kV DC Moga-Mehalkalan-1	220	52.452	Single Zebra	PSTCL	27.03.2019	18:03
2	220kV DC Moga-Mehalkalan-2	220	52.452	Single Zebra	PSTCL	26.03.2019	13:07
3	400kV Gr. Noida(765kV)-Noida Sec 148-1 (bay no 412 & 407)	400	47.43	ACSR Quad Moose	UPPTCL	29.03.2019	20:34
4	400kV Gr. Noida(765kV)-Noida Sec 148-2 (bay no 409 & 408)	400	47.43	ACSR Quad Moose	UPPTCL	29.03.2019	22:03
5	400kV Bhadla(PG)-Bhadla(RRVPNL)-1 and associated bays no 401 (M)& 402 (T)and RRVPNL end 413	400	26.542	ACSR Quad Moose	PGCIL	30.03.2019	21:31
6	400kV Bhadla(PG)-Bhadla(RRVPNL)-1 and associated bays no 404 (M)& 405 (T) and RRVPNL end 416	400	26.542	ACSR Quad Moose	PGCIL	30.03.2019	22:29
7	400kV Kota-Jaipur(s) Kota bay 404-M, 405-T and Jaipur(s) bay 418-M, 417 T	400	180.118	ACSR Twin Moose	PGCIL	22.03.2019	18:21
8	400kV Jaipur(s)-RAPP D, Jaipur(s) bay 415-M, 414-T along with 50 MVAR N-switchable line reactor at Jaipur(s) and 63 MVAR N-switchable line reactor at RAPP end.	400	228.18	ACSR Twin Moose	PGCIL	26.03.2019	17:10

LILO of Transmission Lines
(220kV- 71 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	Agency/ Owner	Actual date & time of charging (Synchronized)	
								Date	Time
1	220kV Moga-Badhni Kalan { LILO of 220kV Moga-Himmatpura at Badhni Kalan}	220	66.96	31	1.27	single zebra	PSTCL	12.03.2019	19:12
2	220kV Himmatpura-Badhni Kalan { LILO of 220kV Moga-Himmatpura at Badhni Kalan}	220	66.96	38.5	1.27	single zebra	PSTCL	12.03.2019	19:15
3	220kV Pehowa(HVPNL)-Kurukshetra(PG) {LILO of 220kV Pehowa(HVPNL)-Kaul(HVPNL)-D/C at Kurukshetra(PG)}	220	13	45.85	34.105	Single Zebra	HVPNL	09.03.2019	19:26
4	220kV Kaul(HVPNL)-Kurukshetra(PG) {LILO of 220kV Pehowa(HVPNL)-Kaul(HVPNL)-D/C at Kurukshetra(PG)}	220	13	35.355	34.105	Single Zebra	HVPNL	09.03.2019	18:50

ICT
(Capacity Addition - 3645 MVA)

S.No.	Name of element	Voltage Level	Transformation Capacity (in MVA)	New/replacement /augmentation	Agency/ Owner	Actual date & time of charging (no load)		Actual date & time of charging (on load)	
						Date	Time	Remarks	Date
1	500 MVA ICT at Lucknow(PG) { Augmentation of ICT capacity by replacing 315 with 500 MVA} }	400/220/33	500	Augmentation	PGCIL			06.03.2019	14:00
2	315 MVA ICT-1 at Panki { Augmentation of ICT capacity by replacing 240 with 315 MVA} }	400/220/33	315	Augmentation	UPPTCL			08.03.2019	22:37
3	200 MVA ICT-2 at Musauli	400/132/33	200	New	UPPTCL			27.03.2019	17:33
4	500 MVA ICT-1 at Kurukshetra	400/132/33	500	New	PGCIL			09.03.2019	18:50
5	500 MVA ICT-2 at Kurukshetra	400/132/33	500	New	PGCIL			09.03.2019	18:50
6	500 MVA ICT at Lucknow(UP) { Augmentation of ICT capacity by replacing 315 with 500 MVA} }	400/132/33	500	Augmentation	UPPTCL			14.03.2019	14:00
7	500 MVA ICT-2 at Bhadla(PG)	400/132/33	500	New	UPPTCL	31.03.2019	1:08		
8	315 (3*105)MVA ICT-3 at Hamirpur(PG)	400/132/33	315	New	PGCIL			29.03.2019	10:33
9	315 ICT-4 along with associated bays no 418,218 at Daultabad	400/132/33	315	New	HVPNL	28.03.2019	15:34		

Bus Reactor & Line Reactor

(Capacity Addition –Bus Reactor 455 MVAR & Line Reactor 63 MVAR)

S. No.	Name of element	Voltage Level (kV)	Transformation Capacity (in MVAR)	New/ replacement /augmentation	Make	Agency/ Owner	Actual date & time of charging	
							Date	Time
1	125 MVAR Bus Reactor at SSCTPS & bay no Y-3	400	125	New	BHEL	RRVPNL	02.03.2019	16:41
2	80 MVAR Bus Reactor along with associated bays no 403B & 403T at Chittorgarh(RRVPNL)	400	80	New	CGL	RRVPNL	30.03.2019	21:15
3	125 MVAR Bus Reactor along with associated bays no 406B & 406T at Jaisalmer2(Bhensara)	400	125	New	BHEL	RRVPNL	06.03.2019	17:46
4	125 MVAR Bus Reactor along with associated bays no 412 at Bhadla(PG)	400	125	New	CGL	PGCIL	31.03.2019	2:03
5	63 MVAR N-Switchable line reactor of Jaipur(s)line at RAPP D	400	63	New	Alstom	NPCIL	26.03.2019	17:10

STATCOM

(Capacity Addition – capacitive 500 MVAR & inductive 500)

S.No.	Name of element	Voltage Level	Inductive MVAR capacity (+MVAR)	Capacitive MVAR capacity (-MVAR)	Coupling Transformer		TSC/MSR		TCR/MSC		Make	Agency/ Owner	Actual date & time of charging (on load)	
					Rating	Nos.	Rating	Nos.	Rating	Nos.			Date	Time
1	400kV, - 200/200 MVAR STATCOM at Nalagarh	400	200	200	169	3	125	2	125	2	RXPE	PGCIL	29.03.2019	8:15
2	400kV, - 300/300 MVAR STATCOM at Lucknow	400	300	300	173	3	125	2	125	1	RXPE	PGCIL	31.03.2019	7:05

Sr.No	Request by	Element Owner	Element Type	Element Name	Mode	Reason	Outage Request				Total Hours	OCC Comment	Status
475	POWERGRID	HVPNL	LINE	Manesar-MAU HARYANA	DAILY	GATEWAY UPGRADATION VALIDATION	2019-05-09	12:00	2019-05-09	13:00	1	approved	APPROVED
476	POWERGRID	HVPNL	LINE	Manesar-MAU HARYANA	DAILY	GATEWAY UPGRADATION VALIDATION	2019-05-09	14:00	2019-05-09	15:00	1	approved	APPROVED
477	SJVNL	POWERGRID	LINE	RAMPUR HEP (400KV)-	DAILY	To attend leakage in Rampur- Nalagarh -1 R	2019-04-20	07:30	2019-04-21	17:30	20	Revised approved	REVISED
478	SJVNL	POWERGRID	LINE	RAMPUR HEP (400KV)-	DAILY	To attend leakage in Rampur- Nalagarh -1 R	2019-04-20	07:30	2019-04-21	17:30	20	approved	APPROVED

Annexure-V

State		May-19 (MU)	May-19 (MW)
Chandigarh	Availability	185	370
	Requirement	175	370
	Surplus/Shortfall (MU)	10	0
	Surplus/Shortfall (%)	5.7%	0.00%
Delhi	Availability	3320	6980
	Requirement	3600	6750
	Surplus/Shortfall (MU)	-280	230
	Surplus/Shortfall (%)	-7.8%	3.4%
Haryana	Availability	5600	9880
	Requirement	4510	8420
	Surplus/Shortfall (MU)	1090	1460
	Surplus/Shortfall (%)	24.2%	17.3%
Himachal Pradesh	Availability	830	1460
	Requirement	860	1510
	Surplus/Shortfall (MU)	-30	-50
	Surplus/Shortfall (%)	-3.5%	-3.3%
Jammu & Kashmir	Availability	1470	2440
	Requirement	1700	3090
	Surplus/Shortfall (MU)	-230	-650
	Surplus/Shortfall (%)	-13.5%	-21.0%
Punjab	Availability	6570	9670
	Requirement	5290	10510
	Surplus/Shortfall (MU)	1280	-840
	Surplus/Shortfall (%)	24.2%	-8.0%
Rajasthan	Availability	8740	16440
	Requirement	7580	12120
	Surplus/Shortfall (MU)	1160	4320
	Surplus/Shortfall (%)	15.3%	35.6%
Uttar Pradesh	Availability	13350	18950
	Requirement	12050	20800
	Surplus/Shortfall (MU)	1300	-1850
	Surplus/Shortfall (%)	10.8%	-8.9%
Uttarakhand	Availability	1300	2140
	Requirement	1290	2140
	Surplus/Shortfall (MU)	10	0
	Surplus/Shortfall (%)	0.78%	0.00%
Total NR	Availability	41365	68330
	Requirement	37055	65710
	Surplus/Shortfall (MU)	4310	2620
	Surplus/Shortfall (%)	11.6%	4.0%

Annexure-VI

Sl. No	Name of State/Entity	Name of Entity	Name of Scheme and Unique ID No	Proposed Completion date as per sanction order	Amount Disbursed as on 31-07-2018 (Rs. Cr.)
1	Rajasthan	RRVPNL	Renovation and Upgradation of protection system of substations (003)	31-Mar-18	14.85
2	Rajasthan	RRVPNL	Installation of Bus Reactors (005)	22-Sep-17	19.33
3	Uttar Pradesh	UPPTCL	Installation of Capacitors and FSC. (025)	8-Sep-17	29.77
4	Uttar Pradesh	UPPTCL	Renovation and Upgradation of protection system of substations. (026)	30-Sep-17	89.47
5	NRPC	NRPC	Study Program on the integration of renewable energy resources (054)	29-Mar-16	4.49
6	Jammu & Kashmir	PDD-J&K	Renovation and Upgradation of protection system of substations in Jammu(023)	14-Jan-19	26.40
7	Himachal Pradesh	HPSEBL	Renovation and Upgradation of Protection System (049)	30-Nov-18	34.44
8	Jammu & Kashmir	PDD-J&K	Renovation and Upgradation of protection system of substations in Kashmir(024)	16-Sep-17	26.40
9	Delhi	DTL	Renovation and Upgradation of Protection System.(049)	25-Feb-19	20.75
10	Uttarakhand	PTCUL	Renovation and Upgradation of Protection System.(051)	16-Sep-17	101.75
11	Punjab	PSTCL	Bus bar protection (052)	16-Sep-17	

Sl. No	Name of State/Entity	Name of Entity	Name of Scheme and Unique ID No	Proposed Completion date as per sanction order	Amount Disbursed as on 31-07-2018 (Rs. Cr.)
12	Uttar Pradesh	UPPTCL	Reconductoring of existing line by HTLS conductor for relieving congestion. (027)	16-Sep-17	
13	Haryana	DHVBVN	Renovation and modernisation of distribution system of DHBVN, Haryana(077)	18-Feb-18	28.35
14	Punjab	PSTCL	Provision of second DC Source at 220KV & 132KV Grid Sub Station of PSTCL. (70)	1-Jul-18	3.01
15	POWERGRID	POWERGRID	Funding of BNC Agra HVDC (94)	9-Sep-21	
16	Uttar Pradesh	UPPTCL	Replacement of existing ACSR conductor by HTLS conductor for relieving congestion. (89)	15-Nov-18	4.74
17	Rajasthan	RRVPNL	" Smart Transmission Operation Management System (STOMS) " in Rajasthan Power System. (110)	18-May-18	1.186
18	Rajasthan	RRVPNL	Communication Backbone "Smart Transmission Network & Asset Management System " Part-B (136)	21-Nov-18	56.969
19	BBMB	BBMB(038)	Renovation and Upgradation of protection system of substations. (038)		2.33

Sl. No	Name of State/Entity	Name of Entity	Name of Scheme and Unique ID No	Proposed Completion date as per sanction order	Amount Disbursed as on 31-07-2018 (Rs. Cr.)
20	Rajasthan	RRVPL	Real Time Data Acquisition System for Monitoring & Control of Transmission Grid under STNAMS (PART A-1) (153)		
21	Uttarakhand	PTCUL	Implementation of OPGW based reliable communication at 132 kv and above substations. (129)		
22	Punjab	PSTCL	Reliable Communication and data Acquisition System upto 132kV Substation in Punjab. (138)		
23	Himachal Pradesh	HPSEBL	Strengthening of Transmission System incidentally to Inter-State- Transmission System in the State of HP (134)		
24	Himachal Pradesh	HPSEBL	Reliable Communication and data Acquisition System upto 132kV Substation in Himachal Pradesh (135)		
25	NRPC	NRPC	Creation and Maintenance of Web based Protection Database Management and PC based Protection Setting Calculation Tool for Northern Region Power System Network. (203)		
				Total:	464.24

Annexure-VII

Sr. No.	OEM Name	Name of PSS	WTG Model No.	Whether LVRT functional or not	Cap. Of WTG (MW)	No. of WTG	Total LVRT compliant installed Capacity	Total Non LVRT compliant installed Capacity	Year of comm.	Remarks
1	Siemens Gamesa		G97-2 MW IEC IIIA	Yes	2	20	40		15-16	Clean wind Power (Devgarh) PVT. Ltd. Directly connected to 132 Kv GSS Sheo (RVPN)
		Tanot	G97-2 MW IEC IIIA	Yes	2	60	120		15-16	
		Devikot	G97-2 MW IEC IIIA	Yes	2	37	74		16-17	
		Welspon	G97-2 MW IEC IIIA	Yes	2	31	62		15-16	
		Ludrwa	G58--85 KW IEC IIA	No	0.85	90		76.5	12-13/ 13-14	
2	Regen Power Tech. Pvt. Ltd.	Oddwara (Devgarh)	VENSYS 87	Yes	1.5	25	37.5		2013	
			VENSYS 87	Yes	1.5	9	13.5		2015	
			VENSYS 87	Yes	1.5	34	51		2015	
			VENSYS 82	Yes	1.5	10	15		2012	Directly connected to 132 KV GSS Dalot (RVPN)
		Kanagarh (Dalot)	VENSYS 82	Yes	1.5	20	30		2012	
			VENSYS 82	Yes	1.5	5	7.5		2012	
			VENSYS 82	Yes	1.5	5	7.5		2012	
			VENSYS 82	Yes	1.5	27	40.5		2013	
			VENSYS 87	Yes	1.5	6	9		2015	
			VENSYS 87	Yes	1.5	10	15		2017	Directly connected to 33 KV GSS Salamgarh & Dalot (AVVNL)
3		Temdarai	E 30	No	0.23	47		10.81		
			E 40	No	0.6	124		74.4		

			E 48	No	0.8	67		53.6			
	Vish Wind (India) Ltd.	Bhu	E 48	No	0.8	75		60			
			E 53	No	0.8	495		396			
		Jajiya	E 53	No	0.8	288		230.4			
		Rajgarh	E 53	No	0.8	89		71.2			
		Salodi	E 53	No	0.8	123		98.4			
				N355	NA, Stall type WTG	0.35	106				
4	Suzlon Energy Ltd.	Akal	S52	No	0.6	11		6.6			
			S82	No	1.5	122		183			
			S6X	No	1.25	70		87.5			
		Bhesada	S9X	Yes	2.1	72	151.2				
			S88	No	2.1	24		50.4			
		Kaladongar	S9X	Yes	2.1	47	98.7				
			S88	No	2.1	7		14.7			
		Basni Dawanra (Baori)	S82	No	1.5	34		51			
			S88	No	2.1	4		8.4			
		RKB (Ketu Kalan)	S82	No	1.5	75		112.5			
			S88	No	2.1	6		12.6			
			S9X	Yes	2.1	8	16.8				
		Mada	S82	No	1.5	3		4.5			
			S6X	No	1.25	176		220			
		Tejuwa (Mokala)	S88	No	2.1	164		344.4			
			S9X	Yes	2.1	1	2.1				
			S52	No	0.6	56		33.6			
		Mulana	S88	No	2.1	49		102.9			
		Kuchadi (Tejuwa-II)	S9X	Yes	2.1	96	201.6				
5	GE India Industrial Pvt. Ltd.	Pratapgarh	GE 1.6-87		1.6	40	64				
			GE 1.7-103		1.7	53	90.1				
6	InoxWind Ltd.	Dangri	INOX WT2000DF	Yes	2	9	18				
			INOX WT2000DF	Yes	2	218	436				
		Lakhmana	INOX WT2000DF	No	2	25	50				
		Khodiyasar	INOX WT2000DF	No	2	25	50				
Grand Total							1165	2839.41			

Amendment in CEA (Technical Standards for Connectivity to the Grid) Regulations 2019

Vikram Singh, Director
Grid Management Division CEA

Objectives of Connectivity Regulations:

- To ensure safe operation, integrity and reliability of the grid.
- The new connection shall not cause any **adverse effect** on the grid.
- A **requester is required to be aware, in advance**, of the standards and conditions his system has to meet for being integrated into the grid.

Amendment In Regulation 2:

Following new definitions are included in Regulation 2.

- ***(16A) Installed capacity:***

- (i) In case of coal, lignite, gas engines and hydro stations, means the summation of the name plate capacities of all the units of the generating station or Maximum Continuous Rating of the generating station; and
- (ii) in case of wind generating stations and generating stations using inverters, means the summation of the name plate capacities of wind turbines or solar generating units, as the case may be.

- ***(36) Wind farm Developer:***

- “Wind farm developer” means a person who has developed or proposes to develop the wind generating station or wind generating farm comprising more than one wind generating unit owned by the developer or any other person.

- ***(37) Solar park Developer :***

- “Solar park developer” means a person who has developed or proposes to develop the solar park or solar generating station comprising more than one solar generating unit owned by the developer or any other person.

• **(38) Wind - solar photo voltaic hybrid system:**

- “Wind-solar photo voltaic hybrid system” means a system of electricity generation, which has combination of wind and solar photo voltaic resources, with or without storage system.

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Following definitions are substituted in Regulation 2

• **(25) Requester**

- “requester” includes a generating company, captive generating plant, *energy storage system*, transmission licensee (other than Central Transmission Utility and State Transmission Utility), distribution licensee, *solar park developer, wind park developer, wind-solar photo voltaic hybrid system*, or bulk consumer seeking connection for its new or expanded electrical plant to the Grid at voltage level 33 kV and above.

• **(34) User**

- includes a generating company, captive generating plant, *energy storage system*, transmission licensee (other than the Central Transmission Utility and State Transmission Utility), distribution licensee, *solar park developer, wind park developer, wind-solar photo voltaic hybrid system*, or bulk consumer whose electrical plant is connected to the Grid at voltage level 33 kV and above.

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Additional regulations are inserted

- **10. Cyber security:**

- The requester and the user shall comply with cyber security guidelines issued by the Central Government, from time to time, and the technical standards for communication system in Power Sector laid down by the Authority.

- **11.Registration in the Registry maintained by the Authority:**

- The user or the requester, as the case may be, shall get its generating unit or station, of such capacity and with effect from **such date as specified by the Authority**, registered and get an online generated Unique Registration Number from the Authority:

Provided that no generating unit or generating station shall be granted connectivity with the grid without the unique registration number with effect from the date specified by the Authority.

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- **12.Compliance of regulations:**

- (1) The **licensee shall ensure** that before connectivity to the grid, all the provisions with regard to the connectivity specified under these regulations are **complied with by the requester**.

- (2) Before allowing connectivity to the requester, the compliance of the provisions laid down under **sub-regulations (2), (3) and (5)** of regulation 6 shall be verified by the licensee and the verification of compliance of provisions of other regulations shall be in the form of self-declaration in the proforma of connection agreement which shall be checked and verified by the concerned licensee on sample basis.

- (3) The user may be disconnected from the Grid by the licensee for non-compliance of any provision of these regulations and any non-compliance of the provisions of these regulations shall be reported by the licensee or the State Load Dispatch Centre or the Regional Load Dispatch Centre, as the case may be, to the appropriate Commission”.

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Amendment in Part II of the Schedule to the said regulations:

Existing : Provided that all generating units commissioned on or after 1.4.2014 shall be capable of operating at rated output for power factor varying from 0.85 lagging (over-excited) to 0.95 leading (under-excited)

- “Provided also that all hydro-electric generating units, where Techno-Economic Concurrence has been accorded by the Authority under section 8 of the Act, shall be capable of operating at the rated output at the power factor as specified in such techno-economic concurrence.”;

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- ***(b) For paragraph B, the following paragraph, shall be substituted, namely:***

- “B. Connectivity standards applicable to the wind generating stations, generating stations using inverters, **wind - solar photo voltaic hybrid systems and energy storage systems.**

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- (c) In clause B2, for sub-clauses (2), (3), (4) and (5), the following clauses shall be substituted, namely:

- “(2) The generating unit shall be capable of operating in the frequency range 47.5 to 52 Hz and be able to deliver rated output in the frequency range of 49.5 Hz to 50.5 Hz:

Provided that in the frequency range below 49.90 Hz and above 50.05 Hz, or, as prescribed by the Central Commission, from time to time, it shall be possible to activate the control system to regulate the output of the generating unit as per frequency response requirement as provided in sub-clause (4):

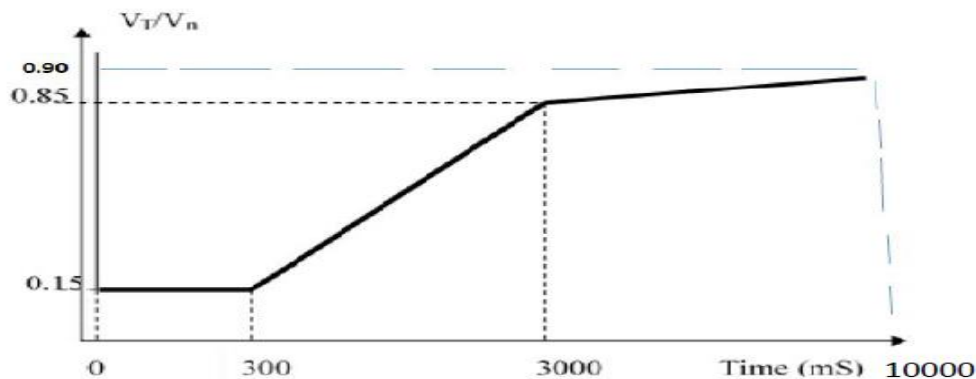
Provided further that the generating unit shall be able to maintain its performance contained in this sub-clause even with voltage variation of up to $\pm 5\%$ subject to availability of commensurate wind speed in case of wind generating stations and solar insolation in case of solar generating stations.

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- (3) The generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point on any or all phases dips up to the level depicted by the thick lines in the following curve, namely:-

V_T : Actual Voltage; V_n : Nominal Voltage-



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Provided that during the voltage dip, **the supply of reactive power has first priority, while the supply of active power has second priority** and the active power preferably be maintained during voltage drops, provided, a reduction in active power within the plant's design specifications is acceptable and **active power be restored to at least 90% of the pre-fault level within 1 sec of restoration of voltage.**

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➤(4) The generating stations with installed capacity of more than 10 MW connected at voltage level of 33 kV and above :

- (i) shall be equipped with the facility to **control active power** injection in accordance with a **set point, capable of being revised** based on directions of the State Load Dispatch Centre or Regional Load Dispatch Centre, as the case may be;
- (ii) shall have governors or frequency controllers of the units at a **droop of 3 to 6% and a dead band not exceeding ± 0.03 Hz.**

Provided that for frequency deviations in excess of 0.3 Hz, the Generating Station shall have the facility to provide an immediate (within 1 second) real power primary frequency response of at least 10% of the maximum Alternating Current active power capacity.

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- (iii) shall have the operating range of the frequency response and regulation system from **10% to 100% of the maximum** Alternating Current active power capacity, corresponding to solar insolation or wind speed, as the case may be;
- (iv) shall be equipped with the facility for controlling the rate of change of power output at a rate not more than $\pm 10\%$ per minute.
- (5) The generating stations of aggregate capacity of 500 MW and above shall have the **provision to receive the signal from the State Load Dispatch Centre or Regional Load Dispatch Centre**, as the case may be, for varying active and reactive power output.
- (6) The standards in respect of the switchyard associated with the generating stations shall be in accordance with the provisions specified in respect of 'Sub-stations' under Part III of these Standards.

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- (7) The generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point, on any or all phases (symmetrical or asymmetrical overvoltage conditions) rises above the specified values given below for specified time

Over voltage (pu)	Minimum time to remain connected (Seconds)
$1.30 < V$	0 Sec (Instantaneous trip)
$1.30 \geq V > 1.20$	0.2 Sec
$1.20 \geq V > 1.10$	2 Sec
$V \leq 1.10$	Continuous

- (8) Short Circuit Ratio at the interconnection point where the generating resource is proposed to be connected shall not be less than 5.

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- **(d) Amendment for clause B3, the following clause shall be substituted, namely:-**

➤ ***“B3. Special provision for certain Generating stations :***

The generating stations commissioned before the commencement of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 or commissioned within six months of such commencement shall comply with the provisions of these regulations as if they were not amended.

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5. Amendment in Part –IV, for paragraphs 2 and 3, the following paragraphs shall be substituted, namely:-

- (2) (i) The distribution licensee and bulk consumer shall provide adequate reactive compensation to compensate **reactive** power requirement in their system so that they do not depend upon the grid for reactive power support.
- (ii) The power factor for distribution system and bulk consumer shall be within ± 0.95 .

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(3) Voltage and Current Harmonics

- (i) The limits of voltage harmonics by the distribution licensee in its electricity system, the limits of injection of current harmonics by bulk consumers, point of harmonic measurement, i.e., point of common coupling, method of harmonic measurement and other related matters, shall be in accordance with the IEEE 519-2014 standards, as amended from time to time;
- (ii) Measuring and metering of harmonics shall be a continuous process with meters complying with provisions of IEC 61000-4-30 Class A.

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- (iii) The data measured and metered as mentioned in sub-paragraph (ii) with regard to the harmonics, shall be available with **distribution licensee and it shall also be shared with the consumer periodically.**
- (iv) The **bulk consumer shall install power quality meter** and share the recorded data thereof with the distribution licensee with such periodicity as may be specified by the appropriate Electricity Regulatory Commission:
 Provided that the **existing bulk consumer** shall comply with this provision within **twelve months** from the date of commencement of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019.

3/5/2019

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- (v) In addition to harmonics, periodic measurement of other power quality parameters such as voltage sag, swell, flicker, disruptions shall be done as per relevant International Electrotechnical Commission Standards by the **distribution licensee and the reports thereof shall be shared with the consumer.**
- (vi) The distribution licensee shall install **power quality meters** in a phased manner within three years from the date of commencement of these Regulations, covering at **least 33% of the 33 kV substations each year.**

3/5/2019

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**Amendment in CEA
(Technical Standards for
Distributed-Generation
Resources-Connectivity below
33 kilovolts) Regulations 2019**

Change of name:

- “Connectivity of the Distributed Generation Resources”, the words “**Connectivity below 33 kilovolts**” shall be substituted.
- These regulations shall come into force on the date of their publication in the Official Gazette (6th Feb 2019)

3/5/2019

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Amendment In Regulation 2:

New/ modified definitions are included in Regulation 2.

- (b) “applicant” means a generating company, **charging station, prosumer or a person seeking connectivity to the electricity system at voltage level below 33 kV;**;

‘(da)” charging point” means a facility for recharging of batteries of electric vehicle for private or public non-commercial use, connected at 415/220 Volts;

(db) “charging station” means a facility for recharging of batteries of electric vehicles for commercial use and shall also include multiple charging points for non-commercial public use and capable of transferring power from electric vehicle to the grid;’;

{(j)} “prosumer” means a person, including energy storage system, which consumes electricity from the grid and can also inject electricity into the grid, using same point of connection;’;

{(n)} “user” means a charging station, prosumer or a person who is connected to the electricity system or a generating company whose distributed generation resource is connected to the electricity system;’;

Applicability

These regulations shall apply to all generating companies or persons owning distributed generation resources, charging stations, prosumers or persons who are connected to or seeking connectivity with the electricity system below 33 kV voltage level:

Provided that in case, a licensee owning the electricity system to which connection is to be made, also owns the distributed generation resources, charging station or prosumers, these regulations shall apply mutatis mutandis.”.

3/5/2019

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New Regulations

“11A. Standards for charging station, prosumer, or a person connected or seeking connectivity to the electricity system. -

- (1)The applicant shall provide a reliable protection system to detect various faults and abnormal conditions and provide an appropriate means to isolate the faulty equipment or system automatically.
- (2)The applicant shall ensure that fault of his equipment or system does not affect the grid adversely.
- (3) The appropriate licensee shall carry out adequacy and stability study of the network before permitting connection with its electricity system.
- (4)The limits of injection of current harmonics at the point of common coupling by the user, method of harmonic measurement and other such matters, shall be in accordance with the IEEE 519-2014 standards, as amended, from time to time.
- (5) The measuring and metering of harmonics shall be a continuous process with power quality meters complying with the provisions of IEC 61000-4-30 Class A.

3/5/2019

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New Regulations

“11A. Standards for charging station, prosumer, or a person connected or seeking connectivity to the electricity system. -

(6) The data measured and metered as mentioned in sub-regulation (5), shall be available with the distribution licensee and be shared with the consumer periodically.

(7)The applicant seeking connectivity **at 11 kV or above shall install** power quality meters and share the recorded data thereof with the distribution licensee with such periodicity as may be specified by the appropriate Electricity Regulatory Commission:

Provided that the user connected at 11 kV and above shall comply with the provision of this sub-regulation within **twelve months from the date of commencement** of these Regulations.

(8)In addition to harmonics, periodic measurement of other power quality parameters such as voltage sag, swell, flicker, disruptions shall be done by the distribution licensee ^{3/5/2019} as per relevant IEC standard and the reports thereof shall be shared with the consumer²⁷”.

New Regulations

14. Registration in Registry maintained by the Authority. - The user or the applicant, as the case may be, shall get its generating unit and station of such capacity and with effect from such date as may be fixed by the Authority, registered and obtain an online generated Unique Registration Number from the Authority:

Provided No Connectivity without the unique registration number.

15.Compliance of regulations. - (1) It shall be the responsibility of concerned licensee to ensure that before connectivity to the grid, all the provisions with regard to the connectivity stipulated in these regulations are complied with by the applicant.

The user may be disconnected from the grid by the licensee for non-compliance of any provision of these regulations, under report by the licensee to the appropriate Electricity Regulatory Commission.”

New Regulations

Cyber Security-

The applicant and the user shall comply with the cyber security guidelines issued by the Central Government from time to time.”

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

Thank you

Annexure-IX

TEMPERATURE AND HUMIDITY DISPLAY

NR-2

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABDULLAPUR	21	69	3
AMRITSAR	18	64	4
BAHADURGARH	28	0	0
FATEHABAD	20	746	37
HISSAR	26	31	1
JALLANDHAR	50	102	2
KAITHAL	17	65	4
KISHENPUR	16	63	4
MALERKOTLA	0	64	0
MOGA	17	63	4
NALAGARH	17	56	3
PATIALA_PG	17	72	4
WAGOORA	0	0	0
SONIPAT	-20	35	

NR-1

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
AGRA	18	40	2
ALLAHABAD	18	45	3
ANTA	18	41	2
AURIYA	8	0	0
BADARPUR	25	54	2
BALIA	11	15	1
BALLABGARH	25	102	4
BASSI	20	18	1
BHIWADI	21	46	2
DADRI HVDC	22	40	2
GORAKHPUR	21	41	2
KANPUR	21	46	2
LUCKNOW_PG	6	0	0
MAINPURI	25	51	2
MANDOLA	26	38	1
M'BAGH	25	51	2
MEERUT	19	43	2
RAIBAREILLY	36	0	0
RIHAND (HVDC)	22	94	4
RIHAND_NT	20	26	1
SINGRAULI	20	29	1
VINDHYACHAL	19	37	2

STATES

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABLOWEL	18	36	
BADDI	33	0	
BHIWANI	5	10	
BWANA	-30	63	2
DADRI	21	***	
GLADNI	0	0	
HEERAPURA	26	27	
JUTOGH	10	0	
LUCKNOW	0	7	0
MINTORO AD	22	31	
MORADABAD	0	70	
NARWANA	33	0	
PANIPAT	20	57	
RATANGARH	11	0	
PANIPAT - BB	25	99	

Annexure-X

Haryana Demand Met

