



सत्यमेव जयते

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

सं.-उ.क्षे.वि.स./प्रचालन/106/01/2019/3712-3753

दिनांक: 18/04/2019

विषय: प्रचालन समन्वय उप-समिति की 158^{वीं} बैठक का कार्यसूची।
Subject: Agenda of 158thOCC meeting.

प्रचालन समन्वय उप-समिति की 158^{वीं} बैठक 23-04-2019 को 10:30 बजे से उ.क्षे.वि.स.सचिवालय, नई दिल्ली में आयोजित की जाएगी। उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट <http://www.nrpc.gov.in> पर उपलब्ध है।

158th meeting of the Operation Co-ordination sub-committee will be held on **23-04-2019** at **10:30am** at NRPC Secretariat, New Delhi. The agenda of this meeting has been up-loaded on the NRPC web-site <http://www.nrpc.gov.in>.

The status of various points under follow up issues from previous OCC meetings may please be furnished prior to the meeting for ensuring healthy discussions in the meeting. You are kindly request to attend the meeting and in case if not able to attend then one level junior(not below) may be nominated to attend the meeting with proper briefing of the agenda items under discussions.

Sd/-

(सौमित्र मजूमदार)
अधीक्षण अभियंता(प्रचालन)

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

Part-A NRPC

1. Confirmation of Minutes:

The minutes of the 157thOCC meeting held on 07.03.2019 and 11.03.2019 at New Delhi were issued vide letter of even number dated 25.03.2019.

No comment on the minutes has been received from any of the members till date.

The sub-committee may kindly confirm the Minutes.

2. Review of Grid operations of March, 2019:

2.1 Supply Position (Provisional) for March, 2019

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of March, 2019 is as given below:

<u>March</u>							
State	Req/ Avl	Anticipated	Actual	%age Variation	Anticipated	Actual	%age Variation
		(MU)			(MW)		
Chandigarh	Avl	125	96	-29.87	305	223	-36.77
	Req	115	97	-18.86	235	223	-5.38
Delhi	Avl	3490	1930	-80.82	5800	4016	-44.42
	Req	2080	1855	-12.10	4100	4016	-2.09
Haryana	Avl	5580	3658	-52.53	8360	6544	-27.75
	Req	3700	3658	-1.14	7536	6544	-15.16
H.P.	Avl	1030	830	-24.15	2200	1683	-30.72
	Req	880	836	-5.28	1620	1683	3.74
J&K	Avl	990	1414	29.97	2070	2622	21.05
	Req	1570	1767	11.15	2570	3277	21.57
Punjab	Avl	5169	3585	-44.18	7930	6564	-20.81
	Req	3900	3585	-8.78	7120	6564	-8.47
Rajasthan	Avl	8960	6770	-32.35	12551	11885	-5.60
	Req	6510	6774	3.90	11089	11885	6.70
U.P.	Avl	10943	8691	-25.91	16870	16220	-4.01
	Req	11377	8691	-30.91	17000	16220	-4.81
Uttarakhand	Avl	1010	987	-2.34	1760	2002	12.09
	Req	1130	990	-14.19	2000	2002	0.10

As per above, it has been observed that there are much 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. **These states are requested to submit reasons for such variations in writing so that the same can be deliberated in the meeting.**

All SLDCs are requested to furnish the provisional and revised 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 of NCR:

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)

3. Maintenance Programme of Generating Units and Transmission Lines:

3.1. Maintenance Programme for Generating Units.

The proposed maintenance programme for Generating Units for the month of May, 2019 has been discussed on 15.04.2019 at NRPC office, New Delhi.

3.2. Outage Programme for Transmission Elements.

The proposed Outage programme of Transmission lines for the month of May, 2019 has been discussed on 15.04.2019 at NRPC office, New Delhi.

4. Planning of Grid Operation:

4.1. Anticipated Power Supply Position in Northern Region for May, 2019

The Anticipated Power Supply Position in Northern Region for May, 2019 is enclosed at **Annexure-I**.

SLDCs are requested to inform/updated their estimated power supply position for May, 2019 and measures proposed to be taken to bridge the gap between demand & availability, as well to dispose of the surplus, if any, in the prescribed format.

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

The variable charges details for different generating units are available on the Merit Order Portal.

All utilities are requested to confirm if the process of Scheduling is being done as per Merit Order Despatch and in case of variations the reasons may be highlighted.

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 POWERGRID:

500 MVAR TCR at Kurukshetra: Award placed in January 2019 with completion schedule of 22 months.

41th TCC & 44th NRPC meeting dt. 18th& 19th March 2019: Representative of POWERGRID informed that few of the reactors as mentioned in annexure B.3.1 of agenda are to be done by POWERGRID instead of through TBCB as per the order of MoP and details of the same would be shared with NRPC/NRLDC.

6.3 DTL:

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

S.No.	Sub Station	Voltage level (kV)	Reactor (MVAR)	Status (As per 41 th TCC & 44 th NRPC meeting)
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 approved in the board at the earliest
5	Bamnauli	220	2x25	proposal have been prepared and it would be approved in the board at the earliest
6	Indraprastha	220	2x25	proposal have been prepared and it would be approved in the board at the earliest
TOTAL			450	

DTL may kindly update on any further progress made.

6.4 PSTCL:

PSTCL representative had earlier informed that for 400 kV bus reactor at Dhuri substation and 220 kV bus reactors at Dhuri and Nakodar substations, the Technical bids had already been opened and Price bids were put on hold due to pending PSDF approval.

As per the conditions of PSDF funding, it was decided that the LOA would be placed only after approval for PSDF funding. However, the delay in obtaining the PSDF funding approval has delayed the tendering process and the Bidders were now refusing to extend their Bid validity which could lead to jeopardizing the whole process only because of delay in approval of PSDF funding.

157th OCC Meeting dt. 07.03.2019: Representative from Punjab informed that PSDF funding approval is still pending and bidder has declined to extend the bid validity due to which tender is now being cancelled. He told that heavy interest liability arises due to delay in PSDF funding and agenda regarding the same has been put forth in upcoming NRPC meeting. He told that queries of PSDF have already been clarified and delay was due to shortage of Funds in PSDF. Complete process has to be done again which may take one year.

41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019: Representative of PSTCL informed that tender has been cancelled for Nakodar and Dhuri reactors on 28.02.2019 due to pending PSDF approval. NLDC informed that monitoring committee has approved the reactors, further concurrence has also been given by CERC and sanction order would be issued shortly by MoP.

PSTCL intimated that process of retendering would be done within 3 months, once funding from PSDF is received.

PSTCL may kindly update.

6.5 Uttarakhand:

125 MVAR reactors at Kashipur: Technical bid has been opened and is under evaluation.

Item	Background	Status
3 Nos. each of 25 MVAR (220 kV) reactors for Akal, Bikaner & Suratgarh.	DPR submitted for PSDF funding on 27.04.2018. Reply on observations made by 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 (220 kV) reactor for Barmer & 125 MVAR (400 kV) reactor for Jodhpur, included in 450 MVAR (13x25 + 1x125 MVAR) proposal	Revised DPR for 450 MVAR approved Reactor after separating STATCOM was submitted vide letter dtd. 12.10.2018 to POSOCO for approval.	Clarifications have been sought by Techno-Economic Sub Group of PSDF from Rajasthan.

PTCUL may kindly update.

6.6 Rajasthan:

The status as updated in the 155th OCC dt. 17.01.2019 meeting is placed below:

41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019: Representative of Rajasthan informed that clarifications as sought by TESC were submitted vide letter dated 01.03.2019.

Rajasthan may kindly update.

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

38th TCC & 41st NRPC meeting dt. 27th & 28th February 2018: NRPC approved that the capacitor requirement study of NR shall be conducted at 11/33 kV level from CPRI so as to obtain the true requirement of capacitor for FY 2018-19.

7.1 39th TCC and 42nd NRPC approved the Techno Commercial offer of CPRI at **Rs. 32 lakhs (Rs. 20 lakhs for previous study and Rs. 12 lakhs for additional assignment) excluding taxes** for conducting the capacitor study. In the meeting the format for data submission was shared with the members and they were requested to ensure timely submission of the data so that the study may be carried out in the stipulated time frame.

7.2 In the **150th OCC meeting dt. 21.08.2018**, members expressed concerns on the nature of the format and submitted that the format being lengthy would require some time for better understanding of the format and submission of data accordingly.

7.3 To address the concerns of the members of OCC forum, in the **151st OCC meeting dt. 13.09.2018**, representative of CPRI made a detailed presentation explaining the format in the meeting and based on the inputs received from the members, the format has been revised and has already been sent to the respective SLDC's through e-mail dated 24.09.2018. CPRI has also shared a video of the presentation explaining the format which can be viewed on Youtube at <https://youtu.be/QTXX7owPF3g>.

7.4 Members were also requested to initially fill the data format for any one 220 kV or 132 kV substation and send it to CPRI (manoharsingh@cpri.in) to check its suitability for utilization in carrying out the study and further action.

7.5 152nd OCC meeting dt. 16.10.2018: No progress has been made so far for submission of data. All the utilities were again requested to make efforts to do the needful.

7.6 40th TCC & 43rd NRPC meeting dt. 29th & 30th October 2018: Members were requested to expedite submission of the data to CPRI in the format prescribed for studies to be conducted for Capacitor requirement in NR for the year 2019-20.

7.7 153rd OCC meeting dt. 16.11.2018: MS, NRPC expressed his concerns as no data in the specified format has been received from any of the state even for a single substation which was desired to verify its suitability for utilization in carrying out the capacitor study.

7.8 Representative of Haryana stated that they had submitted data to which the representative of CPRI replied that the data submitted by Haryana was not in the format as decided in the 151st OCC meeting which was forwarded to all the utilities via e-mail dated 24.09.2018.

7.9 Representative of Rajasthan SLDC stated that the load data at 11 kV substations was not being maintained. Therefore, it was not possible for them to furnish the same.

- 7.10 EE (O), NRPC and representative of JVVNL stated that the load data was maintained at 11 kV sub-station and the same may be made available.
- 7.11 Representative of Rajasthan SLDC stated that the same would be verified and the data shall be submitted at the earliest.
- 7.12 The issue of non-submission of data for system study of capacitor requirement in NR for the year 2019-20 has been taken up with the highest management of DISCOMs, STUs and SLDCs. The letter regarding the same dated 06.11.2018 is enclosed at Annexure – Agenda item no 7 of the Agenda of the 154th OCC meeting, for reference.
- 7.13 **154thOCC meeting dt. 18.12.2018:** SE (O) stated that the matter is being pursued with the top management of the DISCOMs (refer Annexure – Agenda item no 7 of the Agenda of the 154th OCC meeting)& follow-up is also being done. He stated that all SLDCs should take up the issue with their respective DISCOMs for submission of the data as desired at the earliest.
- 7.14 **155th OCC meeting dt. 17.01.2019:** MS, NRPC stated that the sample data as received from most of the utilities were not in line as per the requirement of CPRI and the same has also been informed through mail by CPRI to the respective utilities. He further stated that due to non-availability of data in proper format, the study could not be performed and low voltage profile issue may be encountered in future.
- 7.15 Representative of DTL stated that they have incorporated the changes as suggested by CPRI and has again submitted the same to CPRI. Once approved, DTL would start compiling data for their whole network and submit the same to CPRI.
- 7.16 156th OCC meeting: All utilities were advised to expedite the collection of data, in the absence of which the study may not be got conducted.
- 7.17 **157th OCC meeting dt. 07.03.2019:** MS, NRPC stated that utilities have been pursued for collection of data but with no success.He suggested that third party may be hired for data collection or CPRI may be requested for the work of data collection and cost for the same would be borne by utilities.
- 7.18 Representative of UP told that DISCOMs are being pursued for submission of data.He emphasized that data shall be submitted by utilities by 30th March, 2019, otherwise data can be collected through third-party and cost for respective states would be borne by respective state utilities.
- 7.19 **41th TCC & 44th NRPC meeting dt. 18th& 19th March 2019:** Representative of NLDC told that Capacitor DPRs which were deemed returned may be submitted again with clarifications/inputs on all the concerns raised by TESC. He further informed that regarding PSDF funding status of bus reactor at Nakodar & Dhuri, PSTCL, and concurrence from CERC has been received on 13.03.2019 and sanction order may be issued by MoP anytime.

All utilities are requested to update.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 8.1The 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 sequencenomenclature at Dehar. The issue was further deliberated in the 138th OCC meeting held on 23.08.2017, wherein it was observed that nomenclature of phases at BBMB end has inadvertently been marked as under:

Phase of the grid	Corresponding nomenclature of the phase at BBMB end
R Phase	B Phase
Y Phase	R Phase
B Phase	Y Phase

BBMB was asked to rectify the nomenclature at their end accordingly.

- 8.2 However, BBMB raised concern that the rectification can't be done in one go, and coordination would be required from all the 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.
- 8.3 NRPC in its 41st meeting held on 28th February, 2018 approved the proposed formation of the committee and advised BBMB to rectify phase sequence nomenclature within six months.
- 8.4 BBMB drew a draft action plan which was duly deliberated by the Committee in its 1st meeting held on 04.06.18. The action plan was circulated to all the concerned utilities for - their comments and concurrence. The execution of the action plan was tentatively planned during month of November-December, 2018.
- 8.5 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. BBMB has agreed with the comments from NTPC and has furnished their reply on the comments of POWERGRID.
- 8.6 The 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 to NR-I and NR-II region of POWERGRID and final decision regarding the same has to be taken up at the level Executive Directors of respective regions.
- 8.7 Accordingly, the matter was taken up vide letter of even number dated 07.10.2018 for POWERGRID consent to the action plan. However, reply of the same is still awaited.
- 8.8 **152nd OCC meeting dt. 16.10.2018:** POWERGRID representative assured that the issue will be resolved with BBMB.
- 8.9 SE (O) requested POWERGRID to give their consent at the earliest so as the BBMB could execute the work in the upcoming months of November & December as per the decision of NRPC.
- 8.10 **40th TCC & 43rd NRPC meeting dt. 29th & 30th October 2018:** In the meeting POWERGRID stated that they have reservation regarding the action plan submitted by BBMB, as for a single circuit line it may not be optimal plan to change the Jumper configuration in view of requirement for long shut down & material. He further stated that a similar issue was encountered in Rajasthan wherein same problem was mitigated for a Double circuit line. POWERGRID was requested to submit all their reservations in writing, highlighting the issues which may be encountered at the time of implementation of above. In the meeting it was emphasised that the work should be completed in the lean period of November-December 2018.

- 8.11 **153rd OCC meeting dt. 16.11.2018:** POWERGRID updated that the site visit is planned shortly to resolve the issue. As desired in the 43rd NRPC meeting POWERGRID submitted all their reservations in writing (Annexure 8 of MoM of 153rd OCC meeting). POWERGRID was once again requested to resolve the matter immediately so that the work can be executed by BBMB in the lean period itself. BBMB representative also requested for the same as once the clearance from POWERGRID is received thereafter also the matter has to be got approved in their Protection Committee.
- 8.12 **154th OCC meeting dt. 18.12.2018:** POWERGRID submitted the details (Annexure 8 of the MOM of the 154th OCC meeting) of the issues/ difficulty which would be faced while executing the rectification of phase nomenclature mismatch. POWERGRID intimated that the site visit had been made by their site officials.
- 8.13 MS, NRPC stated that the rectification of the phase nomenclature mismatch is very important and it should be completed during the lean period itself.
- 8.14 After deliberations it was decided that a joint visit by POWERGRID, BBMB, NRLDC and NRPC would be made on 15/01/2019 so as to list out the difficulties that would be faced during rectification.
- 8.15 **155th OCC meeting dt. 17.01.2019:** Due to the schedule of OCC meeting on 16th and 17th January, the visit could not be carried out. In the meeting, it was decided that the same may be tentatively done on 23rd and 24th January 2019. The visit is again proposed on 14th & 15th February 2019.
- 8.16 **156th OCC meeting dt. 12.02.2019:** BBMB and POWERGRID were advised to mutually decide the date and conduct the visit at the earliest.
- 8.17 **157th OCC meeting dt. 07.03.2019:** BBMB and POWERGRID were again requested to decide the date for site visit at the earliest. It was agreed that site visit would be planned on 13th and 14th March, 2019. The schedule for site visit was decided as: 13th March, 2019 for Bhiwani & Rajpura S/s; 14th March, 2019 for Panchkula & Panipat S/s.
- 8.18 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:** MS NRPC requested if any financial implications were included in the works, same need to be brought up by POWERGRID/BBMB, so that same could be discussed for earliest completion of the work and might be taken care by POWERGRID or BBMB.

Representative of POWERGRID 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

- 8.19 **POWERGRID & BBMB may kindly update.**

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

- 9.1 The updated status of Agenda items is enclosed at **Annexure-II. All utilities are requested to regularly update the status.**

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

- 10.1 The updated status of FGD installation is attached at **Annexure-III. All utilities are requested to regularly update the status.**

10.2 Implementation of Environmental Norms in Thermal Power Plants

A review meeting taken up by the JS (Thermal) on 20/03/2019 at MOP, in the meeting it was discussed the immediate need for the action plan for compliance of environmental norms for the balance thermal capacity which is presently not being monitored. The total installed capacity of thermal power plant based on coal and lignite is 197,352MW out of which 166,972MW is presently monitored for the installation of FGD rest capacity which needs to be monitored is 30,380MW. The above mentioned balance capacity could not be monitored due to various reasons, such as the generators using CFBC technology, FGD already installed, units to be decommissioned, plan not available, etc. The NRPC has been requested to monitor the status as per **Annexure-IV** along with the action required by the concerned authorities. Further, a presentation from CEA is also scheduled in the meeting in this matter.

11. LVRT compliance by wind generators.

- 11.1 The CEA (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013 stipulates that wind generating stations connected at voltage level of 66 kV and above shall remain connected to the grid when voltage at the interconnection point on any or all phases dips up to specific levels and for specific periods. LVRT is the capability of the generating unit to operate through the periods of lower grid voltage by boosting the terminal voltage of the point of connection of the wind machine when there is a fault at the remote location so that transient stability support is provided.
- 11.2 CERC has already 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. CERC has also desired that all WTGs of capacity equal to or more than 500 KW except 'Stall Type WTGs' to comply with LVRT, for which SERCs may consider to allow the cost of retrofitting WTGs with LVRT under the provision of 'Change in Law' in the respective PPAs. With regard to monitoring of the installation and performance of LVRT installed on existing WTGs, CERC has directed SLDCs to prepare quarterly reports and submit it to RPCs. RPCs are directed to validate the reports submitted by SLDCs in consultation with RLDCs and report any deficiency and non-compliance to the Commission in accordance with law.
- 11.3 Many wind generators operate without LVRT/FRT feature thereby adversely responding at low voltage either due to high load condition at wind pockets or any fault condition in different parts of the grid and becomes a source for grid incident. The installed capacity having LVRT, their setting is not uniformly matching with the provisions of the Central Electricity Authority (Technical standards for connectivity to the Grid) Regulation, 2007 as amended from time to time.
- 11.4 As LVRT are not installed in many of the wind turbines in State of Rajasthan, the issue is being regularly raised in the various meetings of TCC/NRPC and OCC, so far without any result. In 38th TCC/41st NRPC meeting, NRPC directed Rajasthan to issue a notice to all the LVRT non-compliant wind generators specifying a time period within which they need to get the LVRT compliance beyond which they would be constrained to deny scheduling to these generators. In 145th OCC meeting, RRVPNL intimated that MNRE had directed WTG manufacturers to apply for LVRT testing by 15.03.2018 along with the submission of an affidavit for CEA Technical standards compliance and submission of Bank Guarantee of Rs. 1 Crore per model (to be returned after the submission of certificate of compliance to CEA Technical standards).

- 11.5 In 148th OCC meeting dt. 19.06.2018, SLDCs were requested to issue notice to all not compliant Wind Turbine generators. Rajasthan SLDC representative confirmed that notice has been served. In the 149th OCC meeting, Rajasthan representative intimated that a meeting of wind turbine manufacturers was held on 05.07.2018 by RRVPNL to sort out the issue of LVRT. It was also informed that 638 generators are LVRT complaint & 106 do not require as per the regulation and 2641 generators need to be LVRT compliant. The capacity of generators that are non-compliant is 3019 MW. It was also informed that the cost of installing LVRT is about Rs. 25-40 lakh per generator for which the generators will have to make arrangements. Subsequently, meetings with WTGs were held on 23.07.2018 and 09.10.2018 by RRVPNL. It was informed that M/S Suzlon and Inox have filed a petition for waiver of installation of LVRT on account of the additional cost involved. Further, in a meeting held on 23.10.2018 in NRPC Secretariat with the WTGs to explore GSS/PSS level solution like STATCOM and other alternatives. WTGs were requested to take up for “Pass-through tariff” under “change in law” with SERC. CEA representative proposed that SLDCs may file a petition with respective SERC indicating problem being faced by the WTGs in LVRT installation. In the 154th OCC meeting, Representative of Rajasthan SLDC informed that petition to be filled to SERC was put up for approval; but the management decided that matter may be taken up by the STU in view of the provision of B.3 of CEA (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013. SLDCs were requested in the 155th OCC meeting to comply with the CERC order on the LVRT issue by submitting quarterly report.
- 11.6 In the 156th OCC meeting, all SLDCs were once again requested to submit quarterly reports on installation & performance of LVRT on existing WTGs to NRPC, as per the order dt.05.01.2016 of CERC.
- 11.7 **RRVPNL is requested to submit the** quarterly reports on installation & performance of LVRT on existing WTGs to NRPC.
- 11.8 **157th OCC meeting dt. 12.02.2019:** Rajasthan was again requested to file the petition in SERC and implement the decision of NRPC of not scheduling the LVRT non-compliant WTGs. Representative of Rajasthan informed that notice was given to WTGs; however, Rajasthan SLDC has been questioned about the basis of served notice. It was also informed that on the request of SLDC, Rajasthan, NIWE has furnished an estimate for performance test of one unit on dated 01.03.2019 but the cost of test is very high and it has to be decided that who will bear the cost. Rajasthan was requested to share the documents related to above. They were requested to submit the details of compliant/non-compliant WTGs to NRPC/NRLDC at the earliest.
- 11.9 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:** MS informed that on 6th February 2019, CEA Technical Standards for connectivity to the Grid (amendment) regulations 2019 has been notified. 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, HVRT facility and SCADA facility (Generating stations of 500 MW & above capacity). For remaining generating stations, earlier regulation will be applicable.

Members were also apprised about the recent amendment in regulations i.e., Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019. It was informed that B.2 clause (vii) indicate towards implementation HVRT. All utilities were requested to study the new regulation. A presentation on Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 is schedule in the meeting by CEA.

12. System Protection Scheme (SPS) in NR

12.1 Revised System Protection Scheme (SPS) for 765 kV Agra-Gwalior line:

- 12.1.1 **154th OCC meeting dt. 18.12.2018:** POWERGRID representative informed that modifications related to CB ON/OFF status have been completed at both Agra and Gwalior end. He told that DTPC installation has been completed and the end to end testing has also been done for 20 links out of 21. He further stated that end to end testing is remaining only for Bhiwadi-Heerapura-Bhilwara-Chittorgarh link. He further requested the concerned states to terminate the links at the designated feeder on which the load shedding is required to be done. He told that end connections with Trip relay of the feeder to be done by States. He assured that as targeted, the mock testing can be carried out in 01/2019. Representative of NRLDC requested POWERGRID to coordinate with states and keep NRPC/NRLDC in loop for early completion of the scheme. MS NRPC requested POWERGRID to coordinate with nodal officers of the concerned states for early termination of the links at their end.
- 12.1.2 In **155th OCC meeting dt. 17.01.2019**, POWERGRID representative stated that the cable has already been laid down to the Protection panel in all substations and only the terminal connection needs to be done which has to be done by the utility concerned. Once the terminal connections are done, mock testing of the scheme can be done. Delhi, Haryana, Rajasthan, Punjab and UP were advised to expedite. POWERGRID was requested to coordinate with nodal officers of the concerned states for early termination of the links at their end.
- 12.1.3 POWERGRID was advised to pursue with the concerned utilities and get the work done at the earliest so that mock testing of the scheme may be conducted in the first week of February 2019.
- 12.1.4 **156th OCC meeting dt. 12.02.2019:** POWERGRID representative informed that states were intimated via e-mail to arrange for terminating the trip cable to respective feeders. He told that only Delhi has confirmed the termination of trip cable. He further stated that it was being coordinated with all nodal officers. Haryana, Rajasthan, Punjab and UP were requested to expedite the termination of the trip cables to respective feeders.
- 12.1.5 POWERGRID was again requested to follow up with the concerned utilities for early completion of scheme so that mock testing of the scheme may be conducted in the February 2019.

12.1.6 157th OCC meeting dt. 07.03.2019: POWERGRID informed that list of substations was circulated. He told that necessary help and coordination would be done telephonically by POWERGRID but termination at Master trip relay has to be done by the respective state utility. Sh. R.N. Gupta and Sh. M.S.Handa, from POWERGRID side were appointed as coordinators for facilitating timely termination work. MS, NRPC advised that Whatsapp group may be created wherein continuous monitoring for early implementation and mock testing could be done. Rajasthan, Haryana, Punjab and UP were requested to complete the termination by 15th March, 2019 and mock testing would be planned on 25th March, 2019. States were also requested to share the names/ mobile nos. of coordinators at every location which is needed during the mock testing.

NRLDC requested POWERGRID to ensure logging of SPS signal in SCADA. He stated that time stamping of SPS signal when sent to particular group as well as time stamping of SPS signal when received by feeders in respective group needs to be ensured. He also told that possibility of logging of receiving signal in SCADA as in Mundra-Mahidragrh SPS might also be explored.

12.1.7 41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019: Representative of POWERGRID informed that implementation revised SPS for 765 kV Agra-Gwalior line has been completed. MS, NRPC requested POWERGRID that mock testing for the scheme may be carried out at the earliest in coordination with NRPC/NRLDC and other concerned utilities.

12.1.8 POWERGRID may kindly update the status.

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

12.2.1 153rd OCC meeting dt. 16.11.2018: UPRVUNL updated that the work is under progress. BHEL had given a list of MAX-DNA Hardware to be procured by department. The offer stands received and procurement is under process. He further added that BHEL is developing the software logic of the SPS. As on date it is expected that the work would be completed by December 2018.

12.2.2 154th OCC meeting dt. 18.12.2018: UPRVUNL updated that all the hardware required has been arranged at site. BHEL Engineer will be available at site from 22/12/2018 to finalize the design of logic in 15 days. Thereafter implementation will be done in next 7-8 days. The implementation of logic is expected to be completed by 1/2019.

12.2.3 155th OCC meeting dt. 17.01.2019: UPRVUNL in its letter dated 15.01.2019 has intimated that all the hardware required has been arranged at site. BHEL engineer will be available in the 3rd week of January. The design of SPS logic is under process with BHEL and the implementation of SPS is expected to be completed by January 2019.

12.2.4 156th OCC meeting dt. 12.02.2019: UPRVUNL in its letter dated 11.02.2019 has intimated that all hardware has been arranged at site. The BHEL engineer will be available w.e.f. 20th Feb 2019 to 24th Feb, 2019. The SPS implementation is expected to be completed by Feb, 2019

12.2.5 157th OCC meeting dt. 07.03.2019: UPRVUNL informed that SPS work has been completed in DCS and input has been provided to UPPTCL as per requirement. Commissioning and testing of SPS at UPPTCL end were pending. Work was expected to be completed by UPPTCL up to 10.03.2019. Representative of UPSLDC informed that ICT-3 hasn't been included in the SPS to be implemented; hence, it needs to be reviewed. It was advised that UPSLDC, UPRVUNL and other concerned utilities to conduct a meeting wherein revision of SPS for ICTs at 765kV substation might be explored.

12.2.6 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:** Representative of UPRVUNL informed that work pertaining to them has been completed and UPPTCL has to do testing of SPS. Representative of UPSLDC informed that a meeting has been scheduled on 26.03.2019 wherein issue regarding the SPS like consideration of 3rd ICT at Unnao in SPS would be deliberated. He assured that testing would be completed by the end of March, 2019.

12.2.7 **UPRVUNL may kindly update the status.**

12.3 SPS for Kawai – Kalisindh - Chhabra generation complex:

12.3.1 **152nd OCC meeting dt. 16.10.2018:** RRVPNL representative submitted a letter from SE (Procurement-I), RVPN, Jaipur Annexure-XII of the MOM of the 152nd OCC meeting, vide which it has been intimated that the Technical specification for implementation of Automatic load shedding scheme under SPS for Kawai Kalisindh generation complex is under approval. Further, it was intimated that the contract will be awarded within 4-5 months and complete implementation of above scheme may take further 6-7 months. SLDC Rajasthan representative confirmed that Chhabra STPS units have also been wired to the SPS.

12.3.2 **155th OCC meeting dt. 17.01.2019:** RRVPNL representative stated that the tender would be floated by the end of February 2019.

12.3.3 **156th OCC meeting dt. 12.02.2019:** Rajasthan vide letter dated 06.02.2019 has requested to review SPS scheme for Kawai – Kalisindh - Chhabra generation complex upon commissioning of 400kV CTPP-Anta feeder. The agenda has been deliberated in detail at point no. 1 Part-B NRLDC.

12.3.4 **157th OCC meeting 07.03.2019:** Representative of Rajasthan informed that meeting is scheduled on 11.03.2019 to review the SPS for Kawai- Kalisindh-Chhabra generation complex. He stated that studies were being carried out by Planning Division which would deliberate the matter in the meeting. It was also 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.

12.3.4 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:** Representative of Rajasthan informed that meeting was held on 12.03.2019 wherein it was decided that SPS scheme would be implemented on OPGW and expected to be completed within 9 months.

Further, Considering the time required for implementation and criticality of that complex, Rajasthan was advised that interim arrangement needs to be planned to ensure safe and reliable evacuation of 5000MW complex during this summer.

12.3.5 **RRVPNL may update.**

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.

- 13.2 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:

State/ Utility	Status
Punjab	Not fully implemented. At SLDC level, remote tripping for 96 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.

- 13.3 In the 156thOCC meeting dt. 12.02.2019, representative of Haryana SLDC and Haryana DISCOM were not sure about the responsibility for implementing the ADMS scheme to which it was clarified that according to the IEGC clause 5.4.2 (d), it was the joint responsibility of SLDC/SEB/DISCOMs for the implementation of ADMS scheme.
- 13.4 **All the utilities are requested to update the status of 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 30 & 31.7.2012**
- 14.1 The utilities were requested to update the information as per the letter enclosed at Annexure 14 of the agenda of 156th OCC. In 155th OCC meeting, it was informed that in 8thNPC meeting held on 30thNov, 2018 the non-submission of this information was highlighted and a serious concern was shown regarding the same. The status of information received is as given below:

Submitted		Not Submitted	
NTPC (NCR)	POSOSCO	Uttar Pradesh	UT of Chandigarh
BBMB	NHPC	Himachal Pradesh	Jammu and Kashmir

Submitted		Not Submitted	
Punjab	HPGCL (Panipat TPS)	SJVNL	
Rajasthan	NPCIL	NTPC (NR-HQ)	
THDC	POWERGRID (NR-1, NR-2& NR-3)		
Delhi			

14.2 All Utilities are requested to kindly update the status.

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

15.1 The updated status as per the 156th OCC meeting is enclosed as Annexure –14.

15.2 The guidelines have been issued vide which the Ministry of Power has directed that for 5000 cktkms minimum 2 numbers of ERS are required (Annexure 16 of the MOM of the 150th OCC meeting).

15.3 **155th OCC meeting dt. 17.01.2019:**BBMB was advised to procure ERS for their system, to which BBMB replied that the decision has already been taken by their board that partner states will provide ERS to BBMB, whenever needed. MS, NRPC stated that in such a stance, BBMB partner states, shall procure 1 additional set each, for requirement of BBMB as and when arises.

15.4 **156th OCC Meeting dt. 12.02.2019:** Representative of BBMB stated that regarding the proposal for procuring one additional ERS set by each partner state of BBMB, the communication has already been done with the concerned and their reply on the same was awaited for further action

15.5 **157th OCC meeting dt. 07.03.2019:** BBMB was advised to take up the issue in the upcoming NRPC meeting wherein possibility of procuring one additional set by partner states would be explored.

15.6 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:** MS, NRPC stated that as per CEA (Grid Standards) regulations 2006, regulation No. 22, each transmission licensee shall have an arrangement for restoration of transmission lines of 400 kV and above & strategic 220 kV lines through the use of ERS in order to minimize the outage time of transmission lines in case of tower collapse. Also, Ministry of Power has directed that for 5000 ckt km minimum of 2 Nos of ERS are required. Hence, it was advisable that BBMB has a separate ERS in case of emergency.

Representative of BBMB stated that cost for ERS would be borne by partner states, if they agree ERS may be procured. Rajasthan proposed that if partner agrees, 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 towers in case of emergency.

15.7 All utilities are requested to kindly update.

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 the minutes of the meeting was issued vide letter dated 12.11.2018. All utilities were requested to stick to the timeline as brought out in the meeting 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 **156th OCC meeting dt. 12.02.2019:**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. It was intimated that requisite login ID and password may be furnished to the transmission licensees by NRPC; thereafter, online data may be furnished by respective transmission licensee.

16.3 Replacement of Porcelain Insulators by Polymer Insulators on various transmission lines of Northern Region is being progressively undertaken by PGCIL in five stages. As per the status furnished in the past TCC/NRPC meetings, replacement work under the first four stages has been completed, except Rihand-Dadri HVDC line. In the 32nd TCC and 36th NRPC meeting, NRPC concurred the recommendation of TCC to replace porcelain insulators with polymer insulators in additional 78 identified transmission lines of PGCIL in Northern Region under stage-V. In the said meeting, it was also advised to apply provisions of CERC regulations in the matter of certification of availability of transmission lines not withstanding approval of NRPC for replacement of insulators. In the 156th OCC meeting, PGCIL sought outages of ICT, reactors, bus and lines for insulator replacement work; however, it was noted that replacement work in these elements had not earlier been deliberated in the NRPC forum. PGCIL may furnish the list of elements along with following details based on which replacement of porcelain insulators (not covered under first five stages) has been envisaged:

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.

16.4 **41th TCC & 44th NRPC meeting dt. 18th & 19th March 2019:**MS, NRPC requested POWERGRID that approval of NRPC needs to be requested before submitting outage request for insulator replacement and giving it deemed availability & funding through CAPEX. He insisted that it should be ensured that insulators were being replaced in foggy and polluted areas.

Representative of POWERGRID highlighted that due to Polymer insulators no. of tripping have been reduced significantly. He told that they have considered some lines in Phase VI which would be shared with NRPC/NRLDC. He informed that few insulators were being replaced in substation nearby Delhi for which shutdowns were requested. He informed that insulators were being replaced by POWERGRID fund and not CAPEX, only issue of deemed availability needs to be deliberated.

16.5 All transmission licensees of Northern Region are requested to submit cleaning & replacement of porcelain insulators related data on online application using their respective login ID and password.

17. Cyber Security Preparedness Monitoring

A. In the 37th TCC and 40th NRPC meeting Chief Engineer (IT), CEA & CISO, MoP gave a detailed presentation on potential cyber threats for power sector along with cyber incidences and shared the desired action points to counter cyber threat. All utilities were also requested to monitor actions being taken in regard to the following points and report the status:

- a. Appointment of organization-wise Chief Information Security Officers 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.

A.1 156th OCC meeting: All utilities were requested to furnish updated status of the aforementioned points to NRPC so the compiled information may be submitted to CISO, MoP.

A.2 POWERGRID intimated that draft Crisis Management Plan (CMP) for Transmission sector has been prepared and has been submitted for approval.

A.3 **POWERGRID is requested to share the draft Crisis Management Plan (CMP) for Transmission sector with CISO, MoP, under intimation to NRPC.**

B. 156th OCC meeting dt. 12.02.2019: it was mentioned that inherent vulnerability in the ICT infrastructure or website or web applications may invite attackers to carry out malicious activities and exploit the targeted organization. In this regard it is necessary for all utilities to conduct Vulnerability Assessment & Penetration Test (VAPT) of their respective ICT infrastructure, websites and web applications for proper assessment and remedial action thereafter.

B.1 NHPC vide e-mail dated 19.02.2019 has intimated that as a Pilot location, the auditing of IT infrastructure of IT&C Division and VAPT of Two Power Stations namely Chamera-II and Teesta-V Power Stations have already been done in NHPC. For the above works the work order was placed to M/s TCG Digital Solution Pvt. Ltd. Kolkata on 31.10.2018. The Audit/VAPT of IT&C Division, CO, Teesta-V and Chamera-2 Power Station completed on 15/12/2018. The final report has also been submitted by the Firm on 31.12.2018. The compliance of the observations is under progress.

B.2 **All utilities are requested to intimate NRPC about the status of VAPT conducted in their respective organization and VAPT plan for the future.**

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 temp. of 45°C for terminal equipment ratings of both ends of the lines.

- 18.2 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 a/c variation in thermal capability of lines wrt variation of ambient temp.
- 18.3 POSOCO is in the process of populating the temp. adjusted thermal ratings in these lines in the PSSE study case.
- 18.4 All STUs and transmission licensees are requested to furnish terminal equipment ratings at all lines at 400kV and above for fully implementing the temp adjusted TTC to ensure that there is no gap in security assessment. The matter is under regular follow up since 152nd OCC meeting; only HVPNL has submitted the data (Annexure-19 of minutes of 156th OCC) so far.
- 18.5 **All other 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 imported petroleum based fuel thereby enhancing energy security of nation. However, it is observed 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. It is found that the work of transmission line for 31 traction sub stations (UP 19, Haryana 5, Punjab 1, and Rajasthan 5 & J&K 1) are yet to be completed. Further tender for transmission line work for 14 traction sub stations(UP 5,Haryana 2,Punjab 2, Rajasthan 5) are yet to be awarded and estimate for 10 traction sub stations(UP 1,Punjab 2, Rajasthan 7) are yet to be received by Railways from respective SEBs. The details are enclosed at Annexure –20 of the Agenda of the 154th OCC meeting.
- 19.2 **154th OCC meeting dt. 18.12.2018:** SE(O) stated that early commissioning of transmission line works and substation across the nation is required, so as to harness full potential of electrification. Members were requested to take up the matter with concerned utilities to expeditious completion of the transmission line works and substation and regularly update the progress of the work in monthly OCC meeting. On deliberations it was observed that for expeditious action, RAILWAY authorities should be requested to present the detail of the pending works.
- 19.3 Members are requested to update as per the Annexure –20 of the agenda of 154th OCC.
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 **148th OCC meeting dt. 19.06.2018:**
NTPC representative highlighted as under:
- Shifting of 2x500MW Rihand Stage-III units (Unit# 5&6) from NR Grid to WR Grid through Vindhyachal Pooling Station was successfully done on 28th Nov' 17 with coordination in real time between POSOCO, NTPC and POWERGRID (WRTS-II).

- With Rihand stage-III units connected to Vindhyachal Pooling Station, 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. The observations during the period 27th Nov'17 to 5th March'18 at Rihand is enclosed in the attached sheet (ANNEXURE AA of the Additional Agenda OCC 148th Meeting).
- The issue was briefly discussed in the 142nd OCC Meeting against agenda point no 18 and where it was decided that system study was required to be done to further deal with this problem. Previous experience of NTPC in this regard was also sought which was subsequently provided to NRLDC by Rihand station.
- It is apparent that DC current passes through these GTs during above situation which is detrimental for the GTs and which may lead to their failure.
- It is therefore requested that a solution may kindly be arrived to deal with the above situation at the earliest.

20.2 **142nd OCC meeting dt. 15.12.2017:** NTPC was requested to check transducer at Vindhyachal end as there was huge mismatch in MVAR and also get assessment of earthing system at Rihand done. Further it was decided that as per decision in the 38th TCC & 41st NRPC meeting the committee will look into resolving the issue.

20.3 Nominations from CEA, CTU/ POWERGRID, NTPC, POSOCO were received and the first meeting of the committee (Minutes attached at Annexure -Agenda item no. 21) was held prior to the 152nd OCC meeting.

20.4 **154th OCC dt. 18.12.2018:** NTPC and POWERGRID were again requested to submit all the information as requested during 1st meeting of the committee at the earliest.

20.5 **155th OCC meeting dt. 17.01.2019:** NTPC informed that all the relevant information has been submitted on seo-nrpc@nic.in. POWERGRID was again requested to submit the information as desired in the first meeting of the committee (Minutes were again attached at Annexure-21 of the MoM of 155th OCC).

20.6 **POWERGRID is requested to submit the information as desired in the first meeting of the committee (Minutes attached at Annexure 21 of the agenda of 156th OCC dt. 12.02.2019).**

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

21.1 The UFR and df/dt mapping is mandatory as per Hon'ble CERC regulation. The issue has been discussed in various OCC, NRPC-TCC meetings.

21.2 **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:

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

21.3 **137thOCC meeting dt. 18.07.2017:**NRPC once again 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 and emphasized upon the importance of digital breaker status of feeders in such defense schemes. In 140th, 143rd, 146th and 151st OCC meeting, all the state utilities were requested to correct the SCADA UFR, df/dt displays as per the comments. The defense schemes are extremely important schemes and can avert any major contingency. Hence, State utilities should make all possible efforts to strengthen the same.

States	UFR	df/dt	Status as per the 151 st OCC meeting	Remarks	Data Availability
J&K	No	No			
UP	Yes	Yes	<p>Following are provided since last status:</p> <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. 	<p>Following yet to be provided:</p> <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	<p>Following are provided since last status:</p> <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. 	<p>Following yet to be provided:</p> <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		<p>Following yet to be provided:</p> <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
HP	Yes	Yes	<p>Following are provided since last status:</p> <ul style="list-style-type: none"> Segregation of stage wise load. Alternate feeder details include for most of the feeders. Partial telemetry of feeders. 	<p>Following yet to be provided:</p> <ul style="list-style-type: none"> Telemetry of feeders (Partial data available). Alternate feeder details in UFR (a few not available). 	Poor
Uttarakh	No	No			

States	UFR	df/dt	Status as per the 151 st OCC meeting	Remarks	Data Availability
and					
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 are 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

21.4 Utilities are requested to submit the progress on details tabulated above 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

APCPL is having a Coal based Thermal Generating station at Jhajjar with installed capacity of 1500 MW i.e. 3 units of 500 MW each. As we know, 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.

Revisions on day basis: Example for a week

Date	Total Nos. of SG	Revisions applicable for IGSTPS
26-03-2019	111	40
27-03-2019	100	55
28-03-2019	107	60
29-03-2019	121	33
30-03-2019	199	46
31-03-2019	205	54

Schedule revisions in opposite direction example on Date: 31-03-2019

Block	Time	DC on bar	SG	Ramp	Remarks
22	05:15-05:30	497.43	288.46	4.90	Ramp Up
23	05:30-05:45	497.43	260.56	-27.90	Ramp Down
24	05:45-06:00	497.43	273.76	13.20	Ramp Up
25	06:00-06:15	497.43	318.76	45.00	Ramp Up
26	06:15-06:30	497.43	338.76	20.00	Ramp Up
27	06:30-06:45	497.43	298.76	-40.00	Ram Down
28	06:45-07:00	497.43	338.76	40.00	Ramp Up
29	07:00-07:15	497.43	308.76	-30.00	Ramp Down
30	07:15-07:30	497.43	261.76	-47.00	Ramp Down

Block	Time	DC on bar	SG	Ramp	Remarks
31	07:30-07:45	497.43	260.56	-1.20	Ramp Down
32	07:45-08:00	497.43	304.76	44.20	Ramp Up
33	08:00-08:15	497.43	308.76	4.00	Ramp Up
34	08:15-08:30	497.43	260.56	-48.20	Ramp Down

It can be inferred from the scheduling pattern that the Thermal Generating stations instead of being treated as Base Load stations are made to operate like Peak Load stations with frequent variations in Schedule Generation. The machine is forced to undergo undue stress. This kind of operation is proving detrimental to machine's health and age.

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.

Therefore, in the view of above it is requested to kindly review the frequent revision of schedules, consequent schedule revisions in reverse direction and the scheduling pattern in respect of APCPL (IGSTPS) -Jhajjar.

- 23** A presentation on digital profile mapping services during outages by SIXD India.

Topic of the discussion will be:

1. **Digital Profile Mapping (DPM)** is a breakthrough over conventional methods for Turbine Alignment. It provides customized digital solution for In-process Turbine Alignment during forced and scheduled outages saving substantial number of days and enhancing accuracy.
2. **Reverse engineering (RE) through 3D** scanning allows users to quickly digitize a part or object and create a fully surfaced CAD model which can then be used to manufacture an item.

Part-B NRLDC**1. Actions for Summer preparedness 2019**

Demand of Northern region has increased significantly in past few weeks and is likely to increase further in upcoming weeks. In 157th OCC meeting, NRLDC representative gave presentation on challenges faced during summer season and necessary actions required to overcome these. For some of the challenges, actions were to be taken by utilities, which are mentioned below:

- i) **Weather Monitoring:** It was highlighted that Northern region control centers have telemetry of temperature & humidity of various nodes from different utilities however, it needs improvement. In last OCC also, utilities were asked to take actions in co-ordination with NRLDC.

Utility	Pre 157 th OCC incorrect/ no telemetry	Post 157 th OCC (present) status incorrect/ no telemetry
NR-1 (PG)	2/10	1/10
NR-2 (PG)	7/14	6/14
NR-3 (PG)	4/12	2/12
States	10/15	10/15

Present status of station-wise telemetry is attached as **Annexure-1**. Telemetry has improved slightly from Powergrid stations. ***Utilities are requested to provide actions taken by them in this regard.***

- ii) **Load staggering:** In last OCC, Rajasthan and Haryana representatives informed they are taking up issue of sudden connection/disconnection of load with respective DISCOMs however, results are yet to be seen (**Annexure-2**). ***Rajasthan and Haryana may inform about actions taken by them in this regard.***

- iii) **Tower Strengthening and categorization of feeders:** Number of tower collapse incidents have been reported during summer in April-June months in which many EHV lines got out on tower collapse along with important inter-regional lines. Even after continuous effort being made by utilities, many lines went under outage on 07.04.2019 due to high speed winds although these were revived in short time. Several lines in Rajasthan were out on phase-earth fault due to this (details attached as **Annexure-3**).

Utilities may inform about tower strengthening works carried out by them this year especially for critical areas.

Further, manual opening of feeders shall be restricted to only those having threat to life or materials. Thus, it is important to classify feeders in 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. ***State utilities are requested to inform about progress on the same.***

iv) Defence mechanism

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

- UVLS/UFR/df/dt
- SPS
- Islanding Schemes

Utilities are requested to confirm healthiness of defense mechanisms under their jurisdiction. Moreover, it was also agreed that utilities shall share average/ normal loading of feeders identified for relief during SPS operation. Utilities are requested to furnish this data as early as possible.

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

NRLDC shared results of preliminary studies carried out for assessing the TTC/ATC of large state control area of Northern region for upcoming summer (as per network information available at NRLDC). Before summer season, each state shall assess and share its ATC/TTC as agreed earlier (also mandatory as per CERC regulations). 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 are highlighted below:

State	TTC during Summer-19 (MW)	Constraints anticipated	Actions required
Punjab	State own generation= 6000 MW (High hydro)	<ul style="list-style-type: none"> • N-1 non-compliance at Rajpura, Amritsar, Dhuri and Makhu ICTs • Many 220kV lines near Amritsar(PG) and Ludhiana(PG) are also critically loaded <p><i>Punjab has assessed ATC/TTC limits as 7000/7600MW, however this does not take care of N-1 compliance at many stations.</i></p>	<ul style="list-style-type: none"> • Increase in generation at 220kV level would help in meeting high demand & also improve voltage profile. • New 220kV lines may be planned and existing network reorganized to relieve loading on constrained ICTs
	TTC= 6800 MW (on managing the load locally at Rajpura and Amritsar ICTs)		
	ATC= 6200 MW		
	(Considering reliability margin as 600 MW)		
UP	State own generation = 10590 MW	<ul style="list-style-type: none"> • N-1 non-compliance issue at Lucknow (UP), Obra, Unnao, Sarnath ICTs • Many 220 kV lines like 	<ul style="list-style-type: none"> • Monitor and ensure N-1 compliance at Lucknow (UP), Obra, Moradabad, Sarnath, Unnao,
	TTC= 12300 MW		

State	TTC during Summer-19 (MW)	Constraints anticipated	Actions required
	ATC= 11700 MW	Bareilly-Dohna, Bareilly-CB Ganj and Meerut-Modipuram are critically loaded. • UP may also inform new network changes (UP has shared network changes till November 2018). UP representative is requested to present ATC/TTC calculations done at their end.	Gorakhpur (PG) etc. • Expedite commissioning of underlying n/w at recently commissioned 765kV & 400kV stations to reduce loading on other heavily loaded lines and ICTs
	(Considering reliability margin as 600 MW)		
	ATC has increased with commissioning/replacement of ICTs at Azamgarh&Lucknow(PG)		
Delhi	State own generation = 584 MW (No generation at BTPS)	• N-1 non-compliance issue at Mundka and HarshVihar ICTs • Loading on 220 kV Harsh Vihar - Preet Vihar - Patparganj to be monitored closely and new arrangements to feed the load to be worked on. • ATC/TTC study carried out by Delhi and results are quite similar to NRLDC study. Detailed report alongwith study also shared.	• DTL needs to expedite revival works of tower of 400kV Bamnauli-Tughlaqabad 1 which is out due to tower collapse since 12th Oct 2018. Other circuit, which is also in service through ERS, shall also then be transferred to normal tower as early as possible
	TTC= 6500 MW		
	ATC= 6200 MW		
	(Considering RM as 300 MW)		
Haryana	TTC: 7500 MW	• N-1 non-compliance at Fatehabad, Abdullapur and Panipat • 220kV lines from Hisar, Lula ahir, Abdullapur etc. are heavily loaded Haryana SLDC representative visited NRLDC and exchanged base cases. Although, Haryana representatives informed changes in network, ATC/TTC assessment also needs to be done by them.	• 220kV Hisar(PG)-Hisar(IA), 220kV lines from Lula ahir, 220kV Abdullapur-Jorian and other 132kV lines are heavily loaded and need to be strictly monitored. • Alternate arrangement for reducing loading on above lines needs to be expedited.
	ATC: 6900 MW		
Rajasthan	(Generation : 6390 MW)	• N-1 contingency of Phagi, Jodhpur &Merta ICTs • Constraint for evacuation of power from Rajwest • High loading of ICTs at Akal (two ICTs already out)	• Rajasthan may share details of discussion of internal meeting to discuss revision of SPS for Kawai-Kalisindh-Chhabra complex (as discussed in 156th and
	TTC: 5000 MW		
	ATC: 4400 MW		

State	TTC during Summer-19 (MW)	Constraints anticipated	Actions required
		<p>and Bhadla (constraint in evacuation of renewables)</p> <ul style="list-style-type: none"> • Need for reactive power support 	<p>157th OCC).</p> <ul style="list-style-type: none"> • Expedite commissioning of 3rd ICT at Phagi • New ICT to be planned at Jodhpur and Akal • Expedite commissioning of 400kV Rajwest-Barmer # 2 bays at Barmer end

Other states such as HP, Uttarakhand, J&K are also requested to share new network commissioned along with ATC/TTC assessment done at their end.

3. Requirement of modelling data of solar parks and generators

Till date, four renewables (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 has been submitted by each generator in respect of modelling & various CEA/CERC compliances:

1. Inverter data sheet
2. SLD
3. LVRT compliance
4. Generator & electric control model for dynamic modeling
5. 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:

1. Some of the generator provided LVRT compliance by just giving undertaking from the inverter supplier (though there is no mentioning of CEA standards & setting)
2. 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 manual.
3. 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

In addition to above, Solar park developer are also registering and as per connectivity regulations, the dynamic data of pooled renewable generator should be part of its connection agreement (Annex-Con-IV). As on date, two SPD (Adani &SauryaUrja) have approached NRLDC for registration. They have submitted the substation/line/ICT data, though Con-IV is missing in their connection agreement.

In respect of above observations, NRLDC has still not proceeded with registration of solar generators.

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 is enclosed in **Annexure-4**.

Member may please discuss.

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

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. All are requested to go through the documents and provide the updated information and feedback to modify the above documents.

For quick reference, some of information required for the documents is as follows:

- i) Important Grid element of Northern region: Transmission Element added from April’18-till date as per format
 - a. Line, ICTs, Bus reactor, line reactor at 400kV and above
 - b. ISTS and tie line at 220kV and below
 - c. FSC, TCSC, SVC details
 - d. Generating units > 100 MW
- ii) Operating procedure
 - a. Feedback or modification required as per the updated CERC/CEA/other provisions.
- iii) Power Map of Northern Region and related information
 - a. Updated Maps of States.
 - b. Any other relevant information in specified formats.

The respective information may also be sent to nrlcdso2@posoco.in / nrlcdso2@gmail.com till 15th May 2019.

Members may please discuss and update the data.

5. Feeders for physical regulation:

As per Indian Electricity Grid Code (IEGC), in respect of demand control, all efforts must be made to avoid situation of low frequency. The chapter on demand estimation and control may be referred for this purpose. 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**) that can be used for demand regulation by NRLDC (in addition to action by SLDC). Following are the attributes for such feeders:

- Feeders shall be radial in nature
- Usually shall have substantial load flow so that effective change can be experienced on opening of such lines.

Members may please discuss and update the list.

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 protecting in real time based on some logic. Therefore, monitoring of SPS is also important to assess its reliability. It has been observed that many times SPS mal-operation or mis-operations were occurred in the system. In 2018, around 27% of SPS operation occurred were either malfunction or false operation. A list of these incidents are tabulated below.

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 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**) was also approved in 121st OCC meeting, wherein the 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 3 days of SPS operation.

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

Members may like to discuss.

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

This agenda point on Mapping of RGMO/ FGMO status in NR SCADA data is discussed in various OCC meeting. FGMO/ RGMO status from many plants is still not integrated in SCADA. Present status of mapping is tabulated below:

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

Member may please discuss.

8. Frequent forced outages of transmission elements

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

S. 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**. 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.

Members may like to discuss.

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 have been issued from NRLDC. A list of all these events along with the status of details received by 08-Apr-19 is attached at **Annexure-8**.

Further, 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.

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

Members may like to discuss.

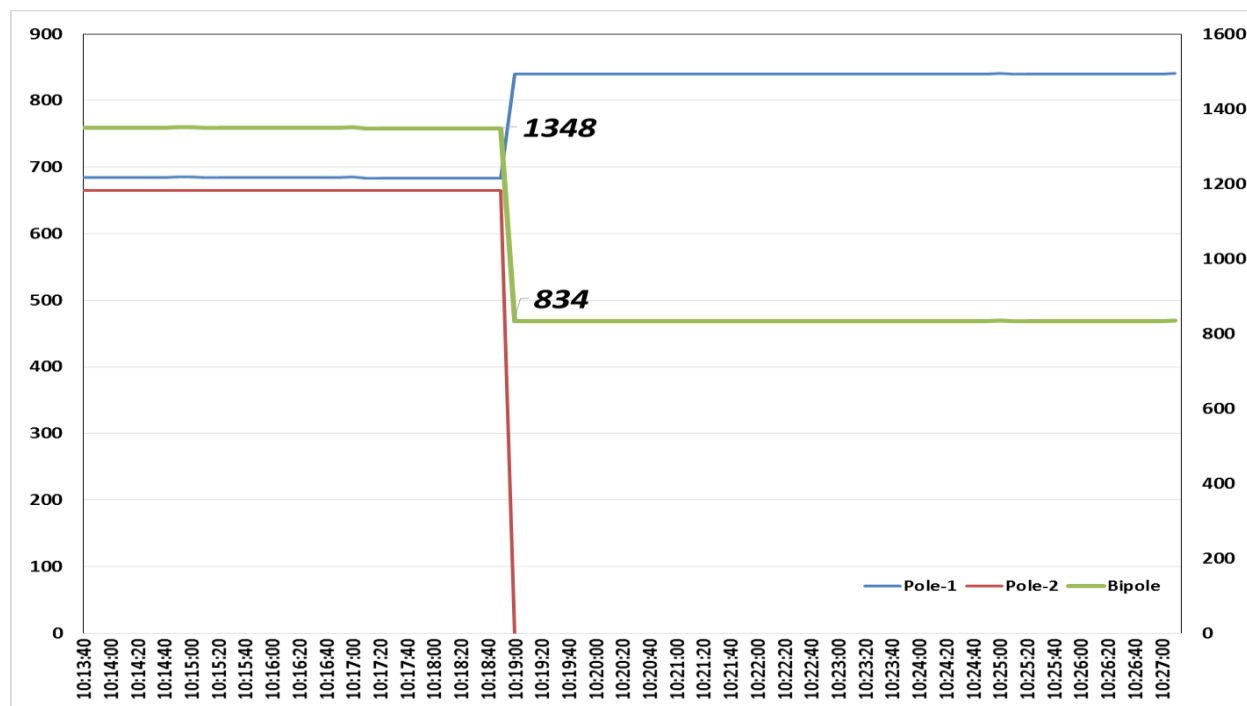
10. Details of tripping of Inter-Regional lines from Northern Region for Mar'19:

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

Members may please 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 25thMar-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 below:



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.

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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	■	220kV Mandola-Gopalpur -I	200	88	■
	220kV Mandola-Narela -II		-0	■	220kV Mandola-Gopalpur -II		64	■
UP	Feeders from 220/132 kV Muradnagar Old	100						
Rajasthan	220 kV Alwar-GSS Mandawar	25	22	■	220/132 kV Ratangarh-132 KV Sardar Sahar	26	0	■ S
Haryana					220/33 kV, 100 MVA Panipat (BBMB) ICT	50	38	■
Punjab	220 kV Malerkotla-66 kV Malerkotla	35	13	■ S				
	220 kV Malerkotla-66 kV Naudhrani		0	□				
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	□	220kV Mandola-Gopalpur -I	200	1	■ S
	220kV Mandola-Narela -II		1	□	220kV Mandola-Gopalpur -II		0	■ S
UP	Feeders from 220/132 kV Muradnagar Old	100						
Rajasthan	220 kV Alwar-GSS Mandawar	25	27	■	220/132 kV Ratangarh-132 KV Sardar Sahar	26	0	■ S
Haryana					220/33 kV, 100 MVA Panipat (BBMB) ICT	50	37	■
Punjab	220 kV Malerkotla-66 kV Malerkotla	35	0	■ S				
	220 kV Malerkotla-66 kV Naudhrani		0	□				
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-Kankerhera		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-Kankerhera		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-Narelackts in Delhi
 - Non tripping of Gobindgarh in Punjab

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- 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.

Member may like to discuss.

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-BiswanathChariali 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
21st Feb 2019	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

Date	Time	Oscillation in the Region	Reason	Remarks
23rd Feb 2019	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
14th Mar 2019	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
03rd Apr 2019	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 the such incident on 14th March 2019, the HVDC Agra-BNC pole-1 tripped as well.

Most of the oscillation captured having frequency of 2-4Hz, 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 may please apprise about the corrective measures taken/ to be taken in time bound manner.

13. Frequency response characteristic:

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

S. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf
1	12-Mar-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-Mar-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 Hon'ble CERC approved procedure has already been shared with all concerned during previous OCC meetings. FRC observed for each state control area for the events is tabulated below:

States	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:

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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%	Dhaultiganga 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 TPS	-3%	1%
Panipat TPS	132%	0%	Lalitpur TPS	No generation	No generation
Khedar TPS	No generation	No generation	Meja TPS	-1%	3%
Yamuna Nagar TPS	No generation	No generation	Vishnuprayag HEP	Suspect SCADA data	0%
CLP Jhajjar TPS	0%	16%	Alaknanda HEP	No generation	0%
Faridabad GPS	0%	0%	Rihand HEP	-7%	8%
RAJASTHAN			Obra HEP	-15%	51%
Kota TPS	49%	-29%	UTTARAKHAND		
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%
Mahi-1 HEP	8%	-5%	HP		
Mahi-2 HEP	No generation	No generation	Baspa HEP	-34%	-7%
RPS HEP	29%	4%	Malana HEP	No generation	No generation
JS HEP	-10%	13%	Sainj HEP	Suspect SCADA data	-12%
DELHI			Larji HEP	Suspect SCADA data	Suspect SCADA data
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.

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. Presentation is attached as Annexure-27 in 156th OCC MoM.

As per Hon'ble Commission order, Pilot Project on SCED has been implemented for PAN India ISGS thermal generating station from 1st Apr 2019.

This is for the information of the members.

Annexure-I

State		May-19 (MU)	May-19 (MW)
Chandigarh	Availability	185	370
	Requirement	175	370
	Surplus/Shortfall (MU)	10	0
	Surplus/Shortfall (%)	5.7%	0.0%
Delhi	Availability	3320	6980
	Requirement	3600	6750
	Surplus/Shortfall (MU)	-280	230
	Surplus/Shortfall (%)	-7.8%	3.4%
Haryana	Availability	5600	9880
	Requirement	4510	8300
	Surplus/Shortfall (MU)	1090	1580
	Surplus/Shortfall (%)	24.2%	19.0%
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	20500
	Surplus/Shortfall (MU)	1300	-1550
	Surplus/Shortfall (%)	10.8%	-7.6%
Uttarakhand	Availability	1300	2140
	Requirement	1290	2140
	Surplus/Shortfall (MU)	10	0
	Surplus/Shortfall (%)	0.8%	0.0%
Total NR	Availability	41365	66190
	Requirement	37055	60300
	Surplus/Shortfall (MU)	4310	5890
	Surplus/Shortfall (%)	11.6%	9.8%

SNO	Description of Agenda point	Details	STATUS UPDATED
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 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 SPECIFICALLY with THESE 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 Agenda. All other concerned utilities were requested to update regularly and ensure that the work is completed expeditiously.
3	Progress of installing new capacitors and repair of defective capacitors	The available up to date status of installation of new capacitors and revival of defective capacitor by the State constituents is enclosed as ANNEXURE 10/30F THE AGENDA OF THE 146TH OCC MEETING.	Information received in the 1/2019 from Uttarakhand, UP, Rajasthan & Haryana is enclosed at Annexure9/3. All other states were requested to update. HVPNL- For replacement of defective capacitor cells a PO has been placed upon M/s BHEL on Dt.31.10.2018 (HDP-2371) for supply of 530 no. 200KVAR capacitor cells and the supply is expected shortly.
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 “All the UFRs are checked and found functional”.	The information of period ending 9/2018 from Punjab, DTL stand submitted. Rajasthan was requested to update. The information ending 12/2018 was submitted by BBMB, UP and Rajasthan. All others were requested to submit. HVPNL- upto September’2018 the necessary confirmation has been supplied by the concerned field offices.

5	Strengthening of Intra-State transmission system	<p>Also all SLDCs are requested to give half yearly feedback ending 6/2018 in the month of 7/2018 to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning</p> <p>PTCUL, Punjab, Delhi & Rajasthan have submitted the information ending 6/2018 & that send submitted to concerned office.</p>	<p>UPPTCL has submitted the information ending 12/2018.</p> <p>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</p>
6	Mapping of Feeders in SCADA	<p>In the 141st OCC meeting members were informed about the “Compendium of SPS in NR” (<i>Annexure-9 of the MOM</i>) which was released in the 40th NRPC meeting. All the utilities were requested to go through the compendium and identify feeders concerning their state and map the same in SCADA.</p> <p>150th OCC meeting:</p> <p>MS NRRPC stated that as per the Compendium of SPS in NR” which was released in the 40th NRPC meeting. All the utilities are requested to go through the compendium and identify feeders concerning their state and map the same in SCADA. This document is available on NRLDC & NRPC website. NRLDC representative added that it is very important that the feeders should be mapped in SCADA. It was stated that this issue will be discussed in the Test committee meeting also. The matter under discussion in subsequent meetings but no further update</p>	<p>All states except Punjab & Rajasthan were requested to update.</p> <p>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.</p>

POWER SYSTEM DEVELOPMENT FUND(PSDF)

Status of Schemes Submitted by the Entities for funding from PSDF

Annexure II/I

Schemes approved under PSDF

All figures in Rs Crore

Sl.No	Name of State/Entity	Region	Name of Entity	Name of Scheme and Unique ID No	Project Cost accepted by Appraisal Committee.	Category of Funding	Quantum of Funding Recommended by Appraisal Committee	Grant Approved by Monitoring Committee	Date of Issuance of sanction order by MoP	Date of Signing of Agreement	Completion schedule (in Month)	Date of release of first Installment	Proposed Completion date as per sanction order	Amount Disbursed as on 31-07-2018
I	II		III	IV	IX	X	XI	XIII	XV	XVI				
1	Rajasthan	NR	RRVPNL	Renovation and Upgradation of protection system of substations (003)	159.53	5.1 (c)	90.00	143.58	31-Dec-14	6-Feb-15	24	31-Mar-16	31-Mar-18	14.85
2	Rajasthan	NR	RRVPNL	Installation of Bus Reactors (005)	23.87	5.1(b)	90.00	21.48	31-Dec-14	6-Feb-15	18	22-Mar-16	22-Sep-17	19.33
3	Uttar Pradesh	NR	UPPTCL	Installation of Capacitors and FSC. (025)	39.29	5.1(b)	90.00	35.36	11-May-15	26-Nov-15	18	8-Mar-16	8-Sep-17	29.77
4	Uttar Pradesh	NR	UPPTCL	Renovation and Upgradation of protection system of substations. (026)	202.94	5.1 (c)	90.00	182.65	11-May-15	26-Nov-15	18	31-Mar-16	30-Sep-17	89.47
5	NRPC	Central	NRPC	Study Program on the integration of renewable energy resources (054)	6.45	5.1 (e)	100.00	6.45	28-Oct-15	24-Nov-15	3	29-Dec-15	29-Mar-16	4.49
6	Jammu & Kashmir	NR	PDD-J&K	Renovation and Upgradation of protection system of substations in Jammu(023)	140.04	5.1(c)	100.00	140.04	28-Oct-15	5-Apr-16	18	14-Jul-17	14-Jan-19	26.40
7	Himachal Pradesh	NR	HPSEBL	Renovation and Upgradation of Protection System (049)	55.44	5.1(c)	100.00	55.44	5-Jan-16	8-Jan-16	18	31-May-17	30-Nov-18	34.44
8	Jammu & Kashmir	NR	PDD-J&K	Renovation and Upgradation of protection system of substations in Kashmir(024)	146.12	5.1 (c)	100.00	146.12	17-Mar-16	22-Apr-16	18	16-Sep-17	16-Sep-17	26.40
9	Delhi	NR	DTL	Renovation and Upgradation of Protection System.(049)	125.98	5.1(c)	90.00	113.38	17-Mar-16	8-May-16	27	25-Nov-16	25-Feb-19	20.75
10	Uttarakhand	NR	PTCUL	Renovation and Upgradation of Protection System.(051)	125.05	5.1(c)	100.00	125.05	17-Mar-16	8-Jun-16	18	8-Nov-16	16-Sep-17	101.75
11	Punjab	NR	PSTCL	Bus bar protection (052)	18.21	5.1(c)	90.00	16.39	17-Mar-16	29-Dec-16	18		16-Sep-17	
12	Uttar Pradesh	NR	UPPTCL	Reconductoring of existing line by HTLS conductor for relieving congestion. (027)	80	5.1(d)	75.00	60.00	17-Mar-16	Scheme withdrawn	18	20-Sep-17	16-Sep-17	
13	Haryana	NR	DHVBIN	Renovation and modernisation of distribution system of DHVBIN, Haryana(077)	364.27	5.1(d)	75.00	273.20	2-Jan-17	24-Nov-17	18		18-Feb-18	28.35
14	Punjab	NR	PSTCL	Provision of second DC Source at 220KV & 132KV Grid Sub Station of PSTCL. (70)	15.3	5.1 (c)	90.00	13.77	2-Jan-17	23-Mar-17	18		1-Jul-18	3.01
15	POWERGRID	Central	POWERGRID	Funding of BNC Agra HVDC (94)	5778	4(3)(A)	50.00	2889.00	10-Mar-17	23-May-17	54		9-Sep-21	
16	Uttar Pradesh	NR	UPPTCL	Replacement of existing ACSR conductor by HTLS conductor for relieving cogestion. (89)	63.31	5.1(d)	75.00	47.48	16-May-17	27-Jul-17	18		15-Nov-18	4.74
17	Rajasthan	NR	RRVPNL	* Smart Transmission Operation Management System (STOMS) * in Rajasthan Power System. (110)	13.18	5.1(c)	90.00	11.86	19-May-17	10-Oct-17	12		18-May-18	1.186
18	Rajasthan	NR	RRVPNL	Communication Backbone *Smart Transmission Network & Asset Management System * Part-B (136)	569.77	5.1(c)	50.00	284.89	22-May-17	10-Oct-17	18		21-Nov-18	56.969
19	BBMB	Central	BBMB(038)	Renovation and Upgradation of protection system of substations. (038)	25.86	5.1 (c)	90.00	23.27	15-Nov-17	19-Feb-18	22			2.33
20	Rajasthan	NR	RRVPNL	Real Time Data Acquisition System for Monitoring & Control of Transmission Grid under STNAMS (PART A-1) (153)	185.19	5.1(c)	50.00	92.60	15-Nov-17	23-Feb-18	24			
21	Uttarakhand	NR	PTCUL	Implementation of OPGW based reliable communication at 132 kv and above substations. (129)	37.46	5.1(c)	50.00	18.73	15-Nov-17		36			

Annexure II/1

Schemes approved under PSDF											All figures in Rs Crore			
Sl.No	Name of State/Entity	Region	Name of Entity	Name of Scheme and Unique ID No	Project Cost accepted by Appraisal Committee.	Category of Funding	Quantum of Funding Recommended by Appraisal Committee	Grant Approved by Monitoring Committee	Date of Issuance of sanction order by MoP	Date of Signing of Agreement	Completion schedule (in Month)	Date of release of first Installment	Proposed Completion date as per sanction order	Amount Disbursed as on 31-07-2018
I	II	III	IV	IX	X	XI	XIII	XV	XVI					
22	Punjab	NR	PSTCL	Reliable Communication and data Acquisition System upto 132kV Substation in Punjab. (138)	66.1	5.1(c)	50	33.05	27-Jul-18		36			
23	Himachal Pradesh	NR	HPSEBL	Strengthening of Transmission System incidentals to Inter-State- Transmission System in the State of HP (134)	24.38	5.1(d)	100	24.38	27-Jul-18		18			
24	Himachal Pradesh	NR	HPSEBL	Reliable Communication and data Acquisition System upto 132kV Substation in Himachal Pradesh (135)	18.64	5.1(c)	50	9.32	27-Jul-18		18			
25	NRPC	Central	NRPC	Creation and Maintenance of Web based Protection Database Management and PC based Protection Setting Calculation Tool for Northern Region Power System Network. (203)	28.00	5.1(e)	100	28.00	27-Jul-18		18			
Total					8,312.38			4,795.49						464.24

ANNEXURE 9/2 Annexure II/2

S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
1	400/220 kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS. Balance 4 Nos to be utilized	Commissioned	LILO of 220kV Bishnha – Hiranagar D/c line : under tendering (PMDP) (status as available with CEA) Status as updated by J&KPDD in 38 th TCC/ 41 st NRPC: LoA has been issued and Material has reached the site. Anticipated – Nov'19 Targeted Completion is required to be updated by J&KPDD
2	400/220kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned	220kV New Wanpoh –Mirbazar D/c line: under tendering (PMDP) 220 kV Alusteng- New Wanpoh line Anticipated – Nov'19 Targeted Completion is required to be updated by J&KPDD
3	400/220kV, 2x315 MVA Parbati Pooling Station	2 Nos. of 220 kV bays to be utilized.	Commissioned	220kV Charor- Banala D/c line (18km) : under construction Target completion -December 2018 as intimated by HPPTCL Update required
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned	LILO of one circuit of Kaul-Pehowa 220kV D/c line LILO of one circuit of Kaul-Bastara 220kV D/c line Work awarded. Contractual Completion period upto 31.10.2019 HVPNL requested to update further progress
5	400/220kV, 2x500 MVA Bagpat GIS	3 nos. of 220 kV d/s lines to Shamli, Muradnagar and Bagpat commissioned. Balance 5 Nos. of bays to be utilized	Commissioned	Bagpat- Baraut - energised(D/C) Bhagpat-Shamli- energised(S/C) LILO of 220kV Muradnagar II - Baghpat (PG) at Baghpat UP Bagpat(PG)-Modipuram New 220kV D/c-is under planning stage. UPPTCL requested to update.
6	400/220kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned	02 bays for Yamuna Basin (Mori substation) 2 bays for proposed S/s at Selakui PTCUL requested to update.
7	400/220 kV, 2x315 MVA Sohawal	6 Nos 220 kV bays to be utilized.	Commissioned	Sohawal-Sohawal (UP) D/C line energised Sohawal-Barabanki D/C line

ANNEXURE 9/2- Annexure - II/2				
S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
				<p>energised. 2 nos of bay of utilized for 220kV New Tanda-Sohawal line .There is a litigation process on & expected to be completed by November 2018</p> <p>UPPTCL requested to update.</p> <p>Sohawal-Behraich and Sohawal-Gonda lines are under construction and expected to be completed by January, 2019. PGCIL requested to provide the estimate for construction of Bays at PGCIL end.</p> <p>UPPTCL& PGCIL to update requested to update.</p>
8	Shahjahanpur , 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned	<p>Shajahnapur-Hardoi commissioned Shajahnapur-Azimpur D/C line is planned, land of substation identified.</p> <p>UPPTCL requested to update.</p>
9	Moga	Partially utilized. Balance 2 nos. of 220kV bays to be utilized.	Commissioned	<p>Moga-Mehalkalan 220kV D/c line Work completed. Approval from NGT for tree cutting is awaited for balance work to commission line. NGT clearance received and by 31.12.2018 work will be completed</p> <p>PSTCL to update progress.</p>
10	Hamirpur 400/220 kV 2x 315 MVA Sub-station (Augmentation by 3x105 MVA ICT)	04 nos. 220 kV downstream lines commissioned under ISTS. Balance two bays to be utilised by HPSEBL	August 2020	<p>2x220 kV bays to be utilized for connecting 220/132kV Kangoo substation of HPSEBL by 220 kV Kangoo-Hamirpur D/c line.</p> <p>HPPTCL requested to update.</p>
11	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of Transformer from Ballabhgarh).	Commissioned	<p>220kV Kaithal(PG)- Neemwala D/c line - Work awarded on 13.7.2018. Tentative completion date 31.12.2019.</p> <p>220kV S/s Neemwala-Tenders opened on 30.3.2018 & awarded on 13.7.2018.</p> <p>HVPNL requested to update further progress.</p>

Establishment of new 400/220kV substations of POWERGRID in Northern Region. All concerned utilities are requested to update.

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States
1	400/220kV Dwarka-I GIS	4x 500	Oct'18	DTL may update.
2	400/220kVTughlakabadGIS	4x 500	Commissioned	
3	220/66kV Chandigarh GIS	2x160	Feb'19	Out of 8 nos. of 66kV bays 6 no. of bays shall be utilized as per the timeline given by POWERGRID.
4	400/220kV Jauljivi GIS	2x315	December 2019	2 bays for 220kV AlmoraJauljibi line 2 bays for 220kV Brammah-Jauljibi line
5	400/220kV Sohna Road GIS	2x500	May'19 (Under TBCB) (8 bays)	-
6	400/220kV Prithla GIS	2x500	May'19 (Under TBCB) (8 bays)	Two nos. of 220kV bays for Prithla(400)-Prithla (HVPNL) 220kV D/c line Four nos. of 220kV bays for LILO of existing 220kV Palwal–RangalaRajpur D/c line at Prithla (400) (FY 2019-20) Two nos. of 220kV bays for 220kV Prithla (400)–Sector-78, Faridabad S/s D/c (FY-2020-21)
7	400/220kV Kadarpur GIS	2x500	May'19 (Under TBCB) (8 bays)	
8	400/220kV Kala Amb GIS	7*105	Commissioned (Jul'17)	HPSEBL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s. Details for remaining 4 nos. of line bays may be provided. .
9	400/220kV Amargarh GIS	7X105	Oct'18 (Under TBCB) (Sterlite Grid planning to prepone)	JKPDD to confirm for LILO of 220kV D/c Zainkote - Delina line at Amargarh. 20 ckm work completed June-18.

Annexure- IV

S.no	Regio	State	Sector	Developer	Organisation	Name of Project	Fuel Used	Unit No.	Total Capac	Remark
1	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	GIndertified for retirement	Lignite	1	125	Unit having CFBC Boiler
2	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	GIndertified for retirement	Lignite	2	125	Unit having CFBC Boiler
3	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	1	135	Unit having CFBC Boiler
4	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	2	135	Unit having CFBC Boiler
5	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	3	135	Unit having CFBC Boiler
6	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	4	135	Unit having CFBC Boiler
7	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	5	135	Unit having CFBC Boiler
8	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	6	135	Unit having CFBC Boiler
9	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	8	135	Unit having CFBC Boiler
10	NR	Rajasthan	Private Sector	Raj West Power LTD. (JSW)	RWPL (JSW)	JALIPA KAPURDI TPP	Lignite	7	135	Unit having CFBC Boiler
11	NR	Rajasthan	Central Sector	Neyveli Lignite Corporation LTD	NLC	Baarsingsar Lignite	Lignite	1	125	Unit having CFBC Boiler
12	NR	Rajasthan	Central Sector	Neyveli Lignite Corporation LTD	NLC	Baarsingsar Lignite	Lignite	2	125	Unit having CFBC Boiler
13	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Barkhera TPS	Coal	1	45	Unit having CFBC Boiler
14	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Barkhera TPS	Coal	2	45	Unit having CFBC Boiler
15	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Kambarkhera TPS	Coal	1	45	Unit having CFBC Boiler
16	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Kambarkhera TPS	Coal	2	45	Unit having CFBC Boiler
17	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Kundarki TPS	Coal	1	45	Unit having CFBC Boiler
18	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Kundarki TPS	Coal	2	45	Unit having CFBC Boiler
19	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Maqsoodpur TPS	Coal	1	45	Unit having CFBC Boiler
20	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Maqsoodpur TPS	Coal	2	45	Unit having CFBC Boiler
21	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Utraula TPS	Coal	1	45	Unit having CFBC Boiler
22	NR	Uttar Pradesh	Private Sector	Bajaj Energy Pvt. LTD.	BEPL	Utraula TPS	Coal	2	45	Unit having CFBC Boiler
23	NR	Haryana	State Sector	Haryana Power Copration Power Ltd	HPGCL	Panipat TPS	Coal	5	210	Unit that have not submitted FGD plan
24	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	Kota TPS	Coal	1	110	Unit that have not submitted FGD plan
25	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	Kota TPS	Coal	2	110	Unit that have not submitted FGD plan
26	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	Kota TPS	Coal	3	210	Unit that have not submitted FGD plan
27	NR	Rajasthan	State Sector	Rajasthan Rajya Vidyut Utpadan Nigam	RRVUNL	Kota TPS	Coal	4	210	Unit that have not submitted FGD plan
28	NR	Uttar Pradesh	State Sector	UP Rajya Vidyut Utpadan Nigam LTD	UPRVUNL	Harduaganj TPS	Coal	7	105	Unit that have not submitted FGD plan
29	NR	Uttar Pradesh	State Sector	UP Rajya Vidyut Utpadan Nigam LTD	UPRVUNL	Obra TPS	Coal	7	94	Unit that have not submitted FGD plan
30	NR	Uttar Pradesh	State Sector	UP Rajya Vidyut Utpadan Nigam LTD	UPRVUNL	Parichha TPS	Coal	1	110	Unit that have not submitted FGD plan
31	NR	Uttar Pradesh	State Sector	UP Rajya Vidyut Utpadan Nigam LTD	UPRVUNL	Parichha TPS	Coal	2	110	Unit that have not submitted FGD plan
32	NR	Delhi	State Sector	Indraprastha Power Generation Co Ltd.	IPGCL	Rajghat TPS	Coal	1	67.5	Unit not in operation
33	NR	Delhi	State Sector	Indraprastha Power Generation Co Ltd.	IPGCL	Rajghat TPS	Coal	2	67.5	Unit not in operation

TEMPERATURE AND HUMIDITY DISPLAY

NR-2

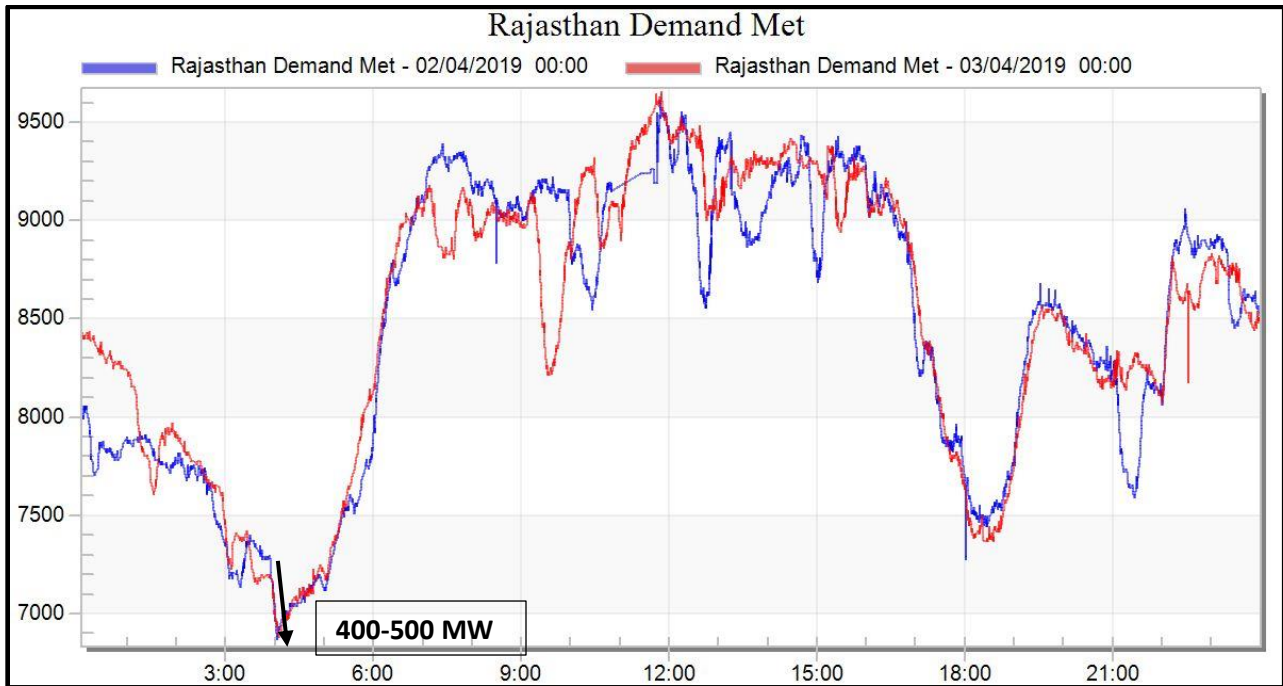
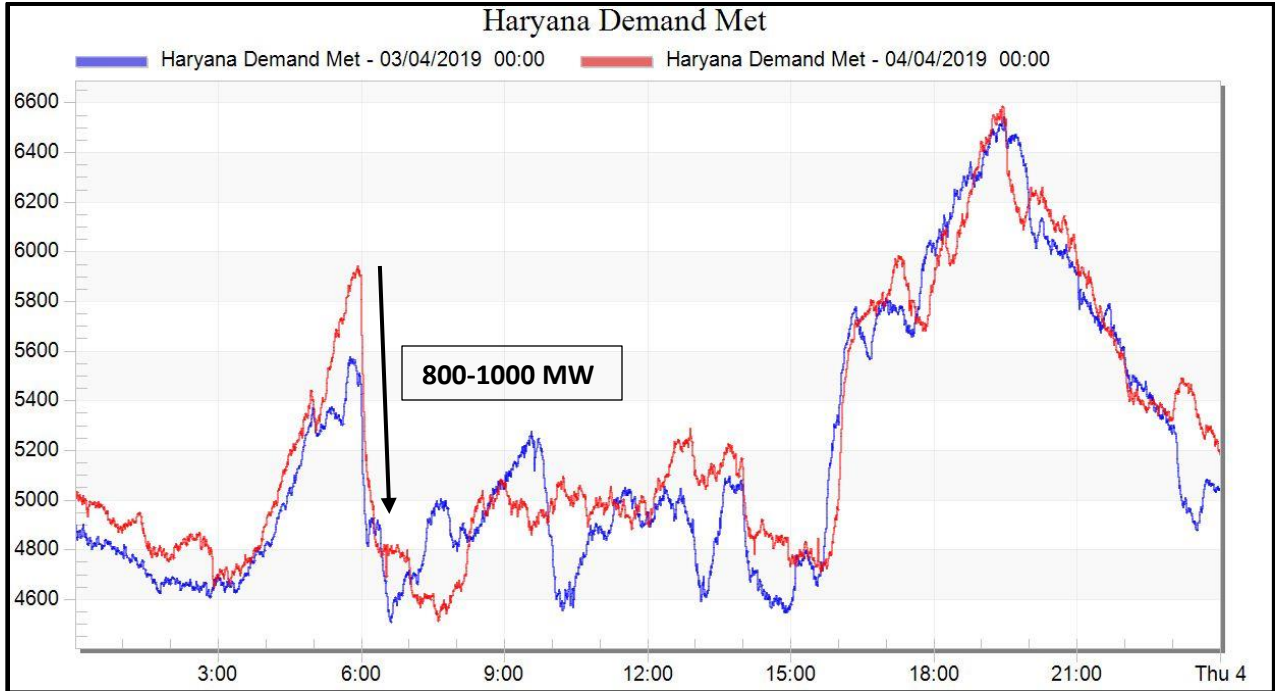
STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABDULLAPUR	32	50	2
AMRITSAR	s 43	48	s 1
BAHADURGARH	33	0	0
FATEHABAD	34	537	16
HISSAR	38	33	1
JALLANDHAR	s 50	s 102	s 2
KAITHAL	23	46	2
KISHENPUR	26	26	1
MALERKOTLA	s 0	44	0
MOGA	24	46	2
NALAGARH	s 19	s 42	s 2
PATIALA_PG	28	34	1
WAGOORA	s 0	s 0	0
SONIPAT	1	s 2	

NR-1

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
AGRA	s 19	s 60	s 3
ALLAHABAD	25	38	2
ANTA	28	17	1
AURIYA	13	s 0	s 0
BADARPUR	33	64	2
BALIA	12	11	1
BALLABGARH	s 25	s 102	s 4
BASSI	27	11	0
BHWADI	34	41	1
DADRI HVDC	29	47	2
GORAKHPUR	32	41	1
KANPUR	34	32	1
LUCKNOW_PG	s 6	s 0	s 0
MAINPURI	18	38	2
MANDOLA	31	46	1
M'BAGH	25	51	2
MEERUT	28	43	2
RAIBAREILLY	36	s 0	s 0
RIHAND (HVDC)	27	27	1
RIHAND_NT	26	28	1
SINGRAULI	27	22	1
VINDHYACHAL	27	34	1

STATES

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABLOWEL	30	16	
BADDI	r 33	r 0	
BHIWANI	s 5	s 10	
BWANA	s -30	s 8	s -0
DADRI	33	s ***	
GLADNI	s 0	s 0	
HEERAPURA	s 26	s 27	
JUTOGH	13	s 0	
LUCKNOW	s 0	s 7	0
MINTOROAD	30	44	
MORADABAD	s 0	r 70	
NARWANA	s 33	s 0	
PANIPAT	s 30	s 46	
RATANGARH	s 11	s 0	
PANIPAT - BB	25	s 99	



S. No.	Line Name	Voltage	Owner	Outage Date & Time		Revival Date & Time		Reason
1	Duni (RVPNL) - Jaipur South (PG)	220 kV	RRVPNL	04-07-2019	15:24	04-07-2019	16:29	Phase to earth fault. B-N fault
2	Ajmer II(RVPNL)-Bhilwara 400(RVPNL) 2	400 kV	RRVPNL	04-07-2019	18:06	04-08-2019	20:07	Phase to earth fault. Y-N fault,65 km from Ajmer end,FC=3.38KA
3	Ajmer II(RVPNL)-Bhilwara 400(RVPNL) 1	400 kV	RRVPNL	04-07-2019	18:08	04-08-2019	20:19	Phase to earth fault. B-N fault,61.8km from Ajmer end,FC=3.10KA
4	Bikaner-Suratgarh	400 kV	RRVPNL	04-07-2019	18:16	*	*	Phase to earth fault. B-N fault,44.5km from STPS end,FC=2.72KA
5	Ajmer II(RVPNL)-Phagi(RVPNL) 1	400 kV	RRVPNL	04-07-2019	19:12	04-08-2019	20:16	R-N fault,DIST.-2 km from Ajmer end,FC=23.47KA.
6	Charkhi Dadri-Khetri 1	220 kV	RRVPNL	04-07-2019	20:08	04-07-2019	21:19	Phase to earth fault. B-N fault, dist.-54.5km from khetri end,FC=2.87KA
7	Chabra 400 kV Bus 1	400 kV	RRVPNL	04-07-2019	21:40	04-08-2019	18:51	Bus bar protection operated.

S.No.	Utility	Plant	Generator	Exciter	Governor	Stabilizer	Remarks (data not given)
1	NHPC	Chamera-1	Yes	Yes	Partial	Yes	Governor data is not in defined model/format, not able to process that data
		Chamera-2	Yes	Yes	Yes	No	T ⁿ q0,XI & S(1.0)
		Chamera-3	Yes	Yes	Yes	Yes	S(1.0) & S(1.2)
		Dhauliganga	Yes	Yes	Yes	Yes	Exhaustive data for excitation and stabilizer but not in defined model/format
		Bairasuil	Yes	Yes	Partial	Yes	Exciter & stabilizer coupled in excitation system
		Uri-1	Yes	Yes	Yes	Yes	
		Uri-2	Yes	Partial	Yes	Yes	Exhaustive data given for AVR , though not in defined model.
		Dulhasti	Partial	Partial	yes	No	Excitation data is not in defined model
		Parbati-III	Partial	No	Partial	No	Only block diagram given for excitation system, rest data is not in defined format
		Salal	Partial	Partial	No	Partial	Excitation system block diagram with and without PSS is given. Some partial data for excitation system is given only. Data not in format
		Sewa-II	Partial	No	Yes	Yes	Governor and stabilizer block diagram has given and data is also shared. As the data is not defined for any standard model, we are checking the data
2	NTPC	Rihand	Yes	Yes	No	Yes	Stabilizer data only for Rihand -1 is given
		Dadri Thermal-2	Yes	Yes	No	No	
		Singrauli	Yes	Yes	No	No	
		Unchahar-1	Yes	Yes	No	No	
		Badarpur	Yes	Yes	No	No	Unit # 1,2,3 of 95 MW each
		Unchahar-4	Yes	Yes	Yes	No	
3	SJVNAL	NJPC	Yes	Yes	No	Yes	T ⁿ d0, T ⁿ q0 & S(1.2)
		Rampur	Yes	No	No	No	
4	UPRVUNL	Parichha	Partial	Yes	No	No	Time constants & Unit#7
		Harduaganj	Partial	No	No	No	Unit#2
		Anpara-1,2,3	Yes	Yes	No	Yes	
		Anpara- 4,5	Yes	Yes	No	Yes	
		Obra	Yes	No	No	No	
		Harduaganj Unit#7 (120 MW)	Yes	No	No	No	Model name has been given (Transfer function diagram of static excitation system also shared) [Governor model not defined]
5	HPGCL	Yamuna nagar	Yes	Yes	No	Yes	Inertia
		Panipat-1,2	Yes	Yes	No	Yes	
		Khedar	Yes	No	No	Yes	
6	PSTCL	Ropar	Yes	Yes	Yes	Yes	
		Rajpura	Yes	Yes	Yes	No	
		Talwandi Saboo	Yes	No	No	No	Model name has been given for excitation system, governor though data has not submitted
7	Karcham	Karcham Wangtoo	Yes	No	No	No	
8	Everest	Malana-2	Yes	No	No	No	
9	AD Hydro	AD Hydro	Yes	No	No	No	
10	Shree Cement	Shree Cement	Yes	No	No	No	
11	Roza-IPP	Roza	Yes	No	No	No	
12	Lalitpur-IPP	Lalitpur	Yes	Yes	No	Yes	
13	RRVNL		Partial	yes	Partial	No	XI, S(1.0),S(1.2)
14	DTL	Indra Prastha PPS-I	Partial	No	No	No	
		PPS-III	Partial	Partial	Partial	No	Not in any standard model, exhaustive data has given. Checking the data
15	HPPCL	Sainj HEP	Yes	Partial	Partial	Partial	Proposed settings are not given
16	THDC	Tehri	Yes	Yes	Yes	Yes	
		Koteshwar	Yes	Yes	Yes	Yes	

S.No.	Utility	Plant Name	Plant Capacity
1	NTPC	Dadri thermal-1	1820
		Unchahar-2,3	1050
		Dadri GPS	830
		Anta GPS	419
		Auraiya GPS	663
		Faridabad GPS (NTPC)	432
2	NHPC	Tanakpur-HPS	690
3	NPC	NAPS	440
		RAPS A (NPC)	300
		RAPS- B	440
		RAPS- C	440
4	BBMB	Bhakra HPS	1379
		Dehar HPS	990
		Pong HPS	396
5	IPP	Budhil HPS(IPP)	70
6	PSTCL	Guru Nanak Dev TPS(Bhatinda)	460
		Guru Hargobind Singh TPS(L.mbt)	920
			1320
7	Haryana	Jhajjar(CLP)	1320
8	J&K	Baglihar HPS (IPP)	1240
9	Uttarakhand	All hydro plants	1500
10	Rajasthan	kota TPS	1240
		Suratgarh TPS	1500
		Chabra TPS	1660
		Dholpur GPS	330
		Ramgarh GPS	271
		Barsingsar (NLC)	250
		Giral LTPS	250
		Rajwest LTPS (IPP)	1080
		Kalisindh	1200
11	UPPTCL	Panki TPS	210
		Tanda TPS (NTPC)	440
		Anpara-C (IPP)	1200
		Bajaj Energy Pvt.Ltd(IPP) TPS	450
		Anpara-D	1000
		Bara	1980
		Vishnuparyag HPS (IPP)	440
		Alaknanda	330
12	Delhi	Rajghat TPS	135
		Delhi Gas Turbine	282
		Rithala GPS	108
		Bawana GPS	1370
13	HPSEB	Baspa HPS (IPP)	300
		Malana HPS (IPP)	86

Rajasthan RE generators

1	PSS_132KV_DALOT_KANGARH
2	PSS_132KV_KOLAYAT_RAYS
3	PSS_132KV_NOKHADHAIYA_3No_33KV
4	PSS_132KV_PS2_GODAWARI_GREEN
5	PSS_132KV_PS2_PRECISION
6	PSS_132KV_PS3_8NO_33KV
7	PSS_132KV_PS3_WELSPUN
8	PSS_132KV_RANI_RANI
9	PSS_132KV_SHEQ_SUZLON
10	PSS_220KV_BADISID_EDEN
11	PSS_220KV_BADISID_TERRAFORM
12	PSS_220KV_BALOTRA_BALOTRA
13	PSS_220KV_BAP_MAHI_NDRA
14	PSS_220KV_BHAWAD_SNCA
15	PSS_220KV_GULABPURA_GULABPURA
16	PSS_220KV_KHINWSAR_KHI_NWSAR
17	PSS_220KV_PRATAPGARH_DEVGARH
18	PSS_220KV_PRTAPGRH_WELSPUN_TATA
19	PSS_220KV_TINWARI_3NO_33KV
20	PSS_400KV_AKAL_AKAL
21	PSS_400KV_AKAL_DEVIKOT
22	PSS_400KV_AKAL_JAJIYA
23	PSS_400KV_AKAL_BHU
24	PSS_132KV_DALOT_33KV_DALOT
25	PSS_220KV_DECHU_DSPPL
26	PSS_220KV_DECHU_RSTEPL
27	PSS_220KV_NEEMRANA_NEEM_RANA
28	PSS_220KV_TINWARI_KETUKALAN
29	PSS_132KV_AAU_AAU
30	PSS_132KV_KOLAYAT_8NO_33KV
31	PSS_132KV_OSIAN_DUNDHARA
32	PSS_132KV_SHAHPURA_SHAHPURA_BHILWA
33	PSS_400KV_AKAL_DANGRI
34	PSS_400KV_AKAL_RAJGARH
35	PSS_400KV_AKAL_MULANA
36	PSS_220KV_AMARSAGAR_MOKALA
37	PSS_220KV_AMARSAGAR_LUDARWA
38	PSS_220KV_AMARSAGAR_KALADUNGAR
39	PSS_220KV_BHOPALGARH_DEBARI
40	PSS_220KV_RAMGARH_TEJUWA_II
41	PSS_220KV_RAMGARH_RAMGARH
42	PSS_132KV_CHAMJU_DERI_A
43	PSS_132KV_PS8_SALODI
44	PSS_132KV_JAYAL_JAYAL

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN UTTAR PRADESH

S No.	Transmission element to be opened	Affected Area	Approx load relief (MW)	Remarks
1	220 kV Meerut-Gajraula	Gajraula	100	No alternate supply source
2	220 kV Baghpat (PG)-Baghpat (UP)	Baghpat	80	No alternate supply source
3	220 kV Mainpuri-Firozabad	Firozabad (TTZ Area)	200	Limited alternate supply from Agra (PG)
4	220 kV Agra (PG)-Shamsabad	Shamsabad (TTZ Area)	180	Limited alternate supply from Agra (UP)
5	220 kV Allahabad (PG)-Jhusi	Jhusi	200	Limited alternate supply from 220kV Phoolpur.

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN PUNJAB

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	132 kV Jamalpur-Ghulal D/C	Ghulal	91	-
2	66 kV Jamalpur – Chandigarh Road, Ludhiana	Chandigarh Road, Ludhiana	37	These feeders are replacement of Jamalpur-Miliarganj D/C as reported by PSTCL by Memo No. 1162/T-257 dated 23-11-12. In review, it was found that df/dt and UFR was already installed on Jamalpur-Miliarganj D/C
	66 kV Jamalpur-Sherpur, Ludhiana	Sherpur, Ludhiana	13	
3	220/66 kV ICT1, 2 & 3 at Sangrur	Sangrur and adjoining areas	166	-
4	132 kV Amritsar-Naraingarh D/C	Amritsar and Adjoining areas	100	-
5	220 kV Patiala-Nabha D/C	Nabha	190	-
6	220 kV Jalandhar-Kanjli D/C	Kapoorthala	64	-

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN JAMMU & KASHMIR

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	220 kV Kishenpur-Udhampur D/C	Udhampur	100-150	Limited alternate feed may be available from 132 kV. Generation at Chenani HEP may be affected.
	220 kV Sarna-Udhampur			
2	220 kV Kishenpur-Barn D/C	Jammu	100	Limited alternate feed may be available from Jammu
3	220 kV Sarna-Hiranagar	Jammu &	300-400	Entire Jammu region could be

	220 kV Salal-Jammu D/C	Hiranagar		affected. Alternate feed may be available from Barn and Udhampur. Generation at Sewa HEP may get affected
4	220 kV Wagoora-Ziankote D/C	Kashmir valley	200-300	Limited alternate feed may be available from Pampore. Generation at Lower Jhelum could get affected
5	220 kV Wagoora-Ziankote D/C	Kashmir valley	400-500	Though Uri generation may be evacuated through 400 kV Wagoora-Kishenpur D/C but the security would be affected.
	220 kV Wagoora-Pampore D/C			
	220 kV Kishenpur-Mir Bazar			
	220 kV Kishenpur-Ramban			

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN RAJASTHAN

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	220 kV Bhiwadi (PG)-Kushkhera	Kushkhera and Kishangarh Bas	170	Limited alternate supply may be available. 220 kV Alwar-K. G. Bas-Kushkhera line may get overloaded
	220 kV Neemrana (PG)-Kushkhera			
2	220 kV Neemrana (PG)-Neemrana	Neemrana	180	-
	220 kV Bhiwadi (PG)-Neemrana			
3	220 kV Khelna (PG)-Manoharpur	Manoharpur	100	Limited alternate supply of Manoharpur may be available from Kotputli
4	220 kV Anta-Lalsot	Lalsot Sawaimadhapur	180	Limited alternate supply may be available from Dausa
	220 kV Anta-Sawai Madhopur			
5	220 kV Dadri-Khetri-I	Khetri Chirawa	120	Limited alternate supply of Khetri and Chirawa may be available from other station
	220 kV Dadri-Khetri-II			
	220 kV Hissar-Chirawa			

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN HARYANA

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	Feeders in Schedule A	Panipat, Kurukestra, Jagadari, Hissar, Ballabgarh	305	-
2	Feeders in Schedule B	Panipat, Kurukestra, Jagadari, Hissar, Dhulkote, Ballabgarh	225	-
3	132kV Rai-Sonepat line emanating from Narela BBMB	Rai-Sonepat	55	-
4	66kV Babyal, 66kV Ambala city-1&2 emanating from Dhulkote BBMB	Babyal, Ambala city	40	-
5	66kV Globe Steel ckt-1&2 emanating	Ballabgarh	40	-

	from 220kV Samaypur(Ballabgarh) BBMB			
6	66kV A-5 Faridabad ckt-1&2 emanating from 220kV Samaypur (Ballabgarh) BBMB	Faridabad	55	-
7	66kV Sohna emanating from 220kV Samaypur (ballabgarh) BBMB	Sohna	25	-
8	220/132kV, 220/66 kV ICTs at BBMB stations such Hissar, Ch. Dadri, Kurukshetra, Jagadri. Dhulkote, can be opened. However, many 132kV, 66 kV and below feeder are covered under Schedule A & B			

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN HIMACHAL PRADESH

S.No.	Transmission element to be opened	Power supply interruption in	Approx. Relief (MW)	Remarks
1	66kV Bhakra-Rakkar	Rakkar/Una	10-18	
2	66kV Pong- Sansarpur	Sansarpur Terrace	2-5	
3	220kV Dehar-Kangoo	Kunihar/Shimla	80-140	400/220kV Dehar ICT may be overloaded.
	132kV Dehar-Kangoo			
4	220kV Khodri-Majri	Giri/Solan	80-140	Limited Alternate supply may be available from 132kV Kunihar.
	132kV Kulhal-Giri			
5	220kV Nallagarh-Nangal D/C	Nangal/Nallagarh/Baddi	180-315	Industrial load of Nangal may be affected.
6	66kV Pinjore-Parwanoo	Parwanoo	5-13	
7	33kV Ganguwal-Bilaspur	Bilaspur	6-8	

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN UTTARAKHAND

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	220 kV Bareilly- Pantnagar	Pant Nagar/ Haldwani	200	Limited alternate supply may be available from 132 kV Kashipur to Haldwani
2	132 kV Nazibad-Kotdwar	Kotdwar	20-50	Generation of Chilla P/H may be interrupted
3	220/132 kV Sitarganj ICTs	Sitarganj, Kichha	50-100	Generation of Khatima will interrupt
	132 kV Dohna-Sitarganj			
	132 kV Dohna -Kichha			
4	400/220 kV Roorkee ICTs	Roorkee	100-200	Grid disturbance may occur due to overloading of 220kV Rishikesh-Sidkul & 240MVA ICT at 400kV Rishikesh
	220 kV Nara-Roorkee			

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN DELHI

S.No.	Transmission element to be opened	Power supply interruption in	Approx. Relief (MW)	Remarks
1	220 kV Mundka-Peera Garhi ckt-1&2	Peera Garhi	100-150	
2	220 kV BTPS-Okhla 1 & 2	Okhla	200-350	-
3	33 kV Delhi Ckt-1, 2, 3 & 4 feeders from Rohtak Road (BBMB)	Rohtak Road	20-30	-
4	220 kV Maharani Bagh-Lodhi Road D/C	Lodhi Road	200-300	Reliability of VIP load from Lodhi road may be affected
5	220kV Maharani Bagh- Masjid Moth D/C	Masjid Moth		

FEEDERS FOR PHYSICAL REGULATION OF SUPPLY IN UT CHANDIGARH

S No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	220 kV Nalagarh-Kishengarh-D/C	Chandigarh	100-200	PGCIL
2	66 kV Mohali- Sector 39 D/C	Chandigarh	30-60	PSTCL
3	66 kV Mohali- Sector 56 Ckt-1	Chandigarh	20-50	PSTCL
4	66 kV Dhulekote-Chandigarh (BBMB) D/C	Chandigarh	10-20	BBMB

Roles & Responsibilities regarding SPS

- Proposal of Scheme: Any utility can propose the SPS logic along with following:
 - Contingency.
 - Scheme/Logic including different conditions for operation of SPS
 - Load/Generation relief.
- Discussion & Approval: The scheme is to be discussed in NRPC meetings viz. OCC, PCC and successively referred to NRPC-TCC (Technical Co-ordination Committee) meeting for approval.
- Identification of Load/Generation for SPS: RPC shall do the detailed study for identification of effective load loss/generation backing down required for SPS. The respective load/generation relief thereby identified is to be provided by respective agencies and agreed upon in NRPC forum. During finalization of load relief figure on the feeders/ICTs, minimum load figure to be used.
- Implementation: After approval, the SPS logic is to be implemented by CTU/STU/Utility at the substation/generating station by which system contingency is being created. Training is to be provided by CTU/STU to substation personnel where SPS is installed regarding reading of SPS signal counters etc. Along with above, SPS signal is also to be integrated with the SCADA system of Station/ALDC/SLDC/RLDC. However, this shall be applicable for future SPS Schemes.
- Nodal Officer: Two Nodal officers from each SLDC/STU, RLDC and respective agency shall be assigned.
- Reporting of SPS operation: The respective utilities/SLDC shall report the SPS operation in the approved format along with SCADA log to RPC/RLDC within 3 days of operation.
- Maintenance of SPS: Maintenance of the SPS shall be done by the implementing agency. However reliability of auxiliary power supply needs to be ensured by station authority where SPS is installed. Safety of DTPC (SPS equipment) and proper maintenance of ambience shall also be the responsibility of concerned station in charge.

- Revision in SPS: SPS may be revised based on change in the network or operational scenario / other than expected response in case of actual operation.

Annexure-7

S. NO.	Element Name	Outage Date	Outage Time	Reason/Remarks
1	800kV HVDC Champa(WR)-Kurukshehra(NR) ckt -2	19-Mar-19	03:34	Blocked due to Pole DC Differential due to lane fault (at Champa(PG) end).
		19-Mar-19	09:22	Tripped due to control maloperation.
		20-Mar-19	12:52	Filter bank limit at Champa(PG) end.
		23-Mar-19	12:54	CNAP(Common Neutral Area Protection) operated.
		28-Mar-19	15:44	CNAP(Common Neutral Area Protection) operated.
		30-Mar-19	08:52	CNAP(Common Neutral Area Protection) operated.
		30-Mar-19	16:33	Earth over current protection operated.
2	400kV Jind(PG)-Kirori(HVPNL) ckt-1	19-Mar-19	13:26	B-N fault, 43 Km from Jind(HVPNL) end. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		21-Mar-19	13:20	B-N fault, 40 Km from Jind(HVPNL) end. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		28-Mar-19	12:49	B-N fault. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		29-Mar-19	11:46	B-N fault, 18 Km from Jind(HVPNL) end. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		30-Mar-19	12:44	No fault has been observed after patrolling as reported by Haryana SLDC. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
3	400kV Agra(UP)-Unnao(UP)	11-Mar-19	12:53	Y-N fault, 262.7km from Unnao(UP) end. As per PMU, Y-N fault occurred, no auto-reclosing observed.
		17-Mar-19	23:55	R-N fault, 175.8 km from Unnao(UP) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
		26-Mar-19	02:17	B-N fault, 97 km from Unnao(UP) end. As per PMU, B-N fault occurred, no auto-reclosing observed.
		30-Mar-19	21:35	R-B fault , 234.9km from Unnao(UP) end. As per PMU, R-B fault is observed.
4	400kV Akal(RRVPNL)-Kankani(RRVPNL) ckt-1	26-Mar-19	15:05	B-N fault, 50.48 Km from Akal(Raj) end. As per PMU, no fault observed.
		27-Mar-19	13:59	B-N fault, 39.7 Km from Akal(Raj) end. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		28-Mar-19	13:14	B-N fault. As per PMU, B-N fault occurred, no auto-reclosing observed.
		31-Mar-19	14:43	R-N fault, 18.88 km from Kankani(Raj) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
5	400kV Akal(RRVPNL)-Kankani(RRVPNL) ckt-2	2-Mar-19	11:05	As per PMU, no fault observed.
		11-Mar-19	01:26	R-N fault. As per PMU, Y-N fault occurred, no auto-reclosing observed.
		11-Mar-19	02:16	Over voltage. As per PMU, Y-N fault occurred, no auto-reclosing observed.
		28-Mar-19	13:14	DT Received at Kakani(Raj) end. As per PMU, B-N fault occurred, no auto-reclosing observed.
		4-Mar-19	01:04	R-N fault. As per PMU, R-N fault occurred, no auto-reclosing observed.

6	400kV Anpara(UP)-Mau(UP)	17-Mar-19	18:35	Tripped at Mau(UP) end. As per PMU, Y-N fault occurred, no auto-reclosing observed.
		20-Mar-19	08:54	B-N fault, 54km from Mau(UP) end. As per PMU, B-N fault occurred, no auto-reclosing observed.
		25-Mar-19	10:02	Y-N fault. As per PMU, no fault observed.
7	400kV Khedar(HVPNL)-Nuhyawali(HVPNL) ckt-2	2-Mar-19	11:05	As per PMU, no fault observed.
		9-Mar-19	21:29	As per PMU, no fault observed.
		29-Mar-19	17:20	Directional earth fault relay operated at Khedar(HVPNL) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
8	400kV Lucknow(UP)-Unnao(UP)	11-Mar-19	10:54	R-N fault, 12.5km from Unnao(UP) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
		11-Mar-19	14:12	R-N fault. As per PMU, R-N fault and unsuccessful auto-reclosing observed.
		14-Mar-19	11:24	R-N fault, 16.9km from Lucknow(UP) end. As per PMU, R-N fault and unsuccessful auto-reclosing observed.
9	400kV Mainpuri 765(UP)-Orai(UP) ckt-1	3-Mar-19	03:33	As per PMU, no fault observed.
		6-Mar-19	22:51	Y-N fault. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.
		28-Mar-19	20:30	R-N fault. As per PMU, R-N fault occurred, successful autoreclosing is observed.
10	400kV Mainpuri 765(UP)-Mainpuri(PG) ckt-1	7-Mar-19	00:52	R-N fault, 5.07Km from Mainpuri(UP) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
		13-Mar-19	21:45	R-N fault, 5.07Km from Mainpuri(UP) end. As per PMU, no fault observed.
		14-Mar-19	03:26	Y-N fault, 5.9Km from Mainpuri(UP) end. As per PMU, Y-N fault occurred, no auto-reclosing observed.

Annexure-9

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	Restoration		# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time				Date	Time						
1	765kV Chittorgarh(PG)-Banashantha(PG)-1	POWERGRID	11-Mar-19	03:42	Nil	Yet to be received.	NA	11-Mar-19	10:23	NA	NO	NO		Details of tripping yet to be received.	
2	800kV HVDC Agra-BNC line-2	POWERGRID	14-Mar-19	09:05	Nil	Reverse Power Direction Trip caused due to tripping (Low AC Voltage) in NER Region.	NA	14-Mar-19	10:08	NA	YES	YES	Around 50kV difference observed between B-phase and rest of the phases in srteady state indicating probability of CVT error	System needs to be reviewed in view of voltage going less than Receiving end voltage (BNC).	From PMU and DR details, 3-phase faults occurred in NER region.
3	220kV Modak(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	15-Mar-19	11:10	Nil	CB tripped from Modak end only.	NA	15-Mar-19	12:38	NA	YES (After 24hrs)	NO		Exact reason and remedial measures yet to be received.	Information received from NR end. From PMU, no fault observed.
4	400kV RAPS C(NPC)-Shujalpur(PG)-1	NPCIL/POWERGRID	19-Mar-19	02:17	Nil	Problem in stub protection at RAPS end.	NA	19-Mar-19	16:04	NA	YES	NO	Stub protection mal-operation.	As reported, relay replacement/calibration to be expedited. Further, tentative date for the same needs to be informed.	Information received from NR end. From PMU, B-N fault observed.
5	220kV Auraiya(NTPC)-Malanpur(MPPTCL)	NTPC/MP	19-Mar-19	03:10	Nil	R-N fault, 108km (from Auraiya).	NA	19-Mar-19	03:41	NA	NO	NO	Non operation of auto-reclosing.	Details of tripping yet to be received.	From PMU, R-N fault observed without auto-reclosing.
6	800kV HVDC Champa-Kurukshetra pole-2 at Kurukshetra	POWERGRID	19-Mar-19	09:22	Nil	Tripped due to control maloperation.	NA	19-Mar-19	12:02	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in AC voltage observed.
7	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	19-Mar-19	03:34	Nil	Blocked due to Pole DC Differential due to lane fault (at Champa).	NA	19-Mar-19	05:12	NA	NO	NO		Details of tripping yet to be received.	From PMU, rise in AC voltage observed.
8	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	20-Mar-19	12:52	Nil	Filter bank limit at Champa.	NA	20-Mar-19	20:05	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.
9	800kV HVDC Champa-Kurukshetra pole-2 at Kurukshetra	POWERGRID	23-Mar-19	12:54	Nil	Tripped due to operation of CNAP(Common Neutral Area Protection).	NA	27-Mar-19	08:50	NA	NO	NO		Details of tripping yet to be received.	From PMU, Multiple dip in AC voltage observed.
10	800kV HVDC Champa-Kurukshetra pole-1 at Kurukshetra	POWERGRID	26-Mar-19	14:11	Nil	Tripped due to DC line fault.	NA	26-Mar-19	16:18	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.
11	800kV HVDC Champa-Kurukshetra line-1	POWERGRID	28-Mar-19	07:17	Nil	Tripped due to Filter Power Limit (control maloperation).	NA	28-Mar-19	08:08	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.
12	800kV HVDC Champa-Kurukshetra pole-2 at Kurukshetra	POWERGRID	28-Mar-19	15:44	Nil	Blocked due to CNAP protection.	NA	28-Mar-19	16:26	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	Restoration		# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time				Date	Time						
13	800kV HVDC Champa-Kurukshetra pole-2 at Kurukshetra	POWERGRID	30-Mar-19	08:52	Nil	Blocked due to CNAP protection.	NA	30-Mar-19	10:00	NA	NO	NO		Details of tripping yet to be received.	From PMU, multiple dip in voltage observed.
14	800kV HVDC Champa-Kurukshetra line-1	POWERGRID	30-Mar-19	16:33	Nil	Tripped due to earth over current protection operated.	GI-2	30-Mar-19	18:53	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.
15	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	30-Mar-19	16:33	Nil	Tripped due to earth over current protection operated.	GI-2	30-Mar-19	18:59	NA	NO	NO		Details of tripping yet to be received.	From PMU, dip in voltage observed.
16	800kV HVDC Champa-Kurukshetra line-2	POWERGRID	30-Mar-19	21:50	Nil	Due to CLD (Cable Longitudinal Differential) HV Line Protection operated at Kurukshetra.	NA	30-Mar-19	23:02	NA	NO	NO		Details of tripping yet to be received.	From PMU, fluctuation in AC voltage observed.

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

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

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

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

Reporting of Violation of Regulation for various issues for above tripping

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