



सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

सं.-उक्षेविस/प्रचालन/106/01/2018/10585-626

दिनांक 11/09/2018

विषय: प्रचालन समन्वय उपसमिति की 151वीं बैठक का कार्यसूची।
Subject: **Agenda of 151st OCC meeting.**

प्रचालन समन्वय उप-समिति की 151वीं बैठक 13-09-2018 को 10:00 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।

151st meeting of the Operation Co-ordination sub-committee will be held on **13-09-2018 at 10:00am** at NRPC Secretariat, New Delhi. The agenda of this meeting has been up-loaded on the NRPC web-site <http://www.nrpc.gov.in>.

It is requested that the updated status of various points under follow up issues from previous OCC M may please be furnished.

-sd-

(उपेन्द्र कुमार)

अधीक्षण अभियंता(प्रचालन)

सेवा में : प्रचालन समन्वय उपसमिति के सभी सदस्य ।
To: **All Members of OCC**

Agenda for the 151th Meeting of the Operation Coordination Sub-Committee (OCC) of NRPC to be held on 13.09.2018.

Date & time: 13-09-2018 at 10.00 hrs.

Venue: NRPC Secretariat, New Delhi

1. Confirmation of Minutes:

The minutes of the 150th OCC meeting held on 20.8.2018 and 21.08.2018 at NRPC Secretariat, New Delhi were issued vide letter of even number dated 31.08.2018.

The comments received from NTPC are enclosed at **Annexure1**

The sub-committee may kindly discuss and confirm the Minutes.

2. Review of Grid operations of August, 2018:

2.1 Supply Position (Provisional) for August, 2018

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of August, 2018 is as given below:

State	Req/ Avl	Anticipated	Actual	%age Variation	Anticipated	Actual	%age Variation
		(MW)			(MU)		
Chandigarh	Req	360	309	-14.17	180	184	1.99
	Avl	365	309	-15.34	185	184	-0.76
Delhi	Req	6540	5937	-9.22	3650	3533	-3.21
	Avl	6780	5937	-12.43	4360	3535	-18.93
Haryana	Req	10426	9415	-9.70	5660	5896	4.17
	Avl	10470	9415	-10.08	6940	5896	-15.04
H.P.	Req	1460	1479	1.30	870	828	-4.87
	Avl	1530	1435	-6.21	940	823	-12.44
J&K	Req	2750	2835	3.09	1600	1551	-3.06
	Avl	2530	2295	-9.29	1520	1255	-17.44
Punjab	Req	12150	12059	-0.75	7210	7415	2.85
	Avl	12550	12059	-3.91	8674	7415	-14.51
Rajasthan	Req	11145	11354	1.88	6837	6994	2.29
	Avl	10865	11354	4.50	8103	6988	-13.77
U.P.	Req	19500	19086	-2.12	11100	10869	-2.09
	Avl	18700	19086	2.06	10800	10869	0.63
Uttarakhand	Req	2080	2098	0.87	1260	1177	-6.57
	Avl	2180	2098	-3.76	1410	1167	-17.26

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 August, 2018 **in terms of Peak demand for Chandigarh, Delhi & Haryana and in terms of Energy requirement for Uttarakhand.**

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 June, 2018 is placed on NRPC website. (www.nrpc.gov.in/meetings/occ.html)

2.3 Detailed presentation on grid operation during August, 2018 by NRLDC.

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 October, 2018 will be discussed on 14.09.2018 at NRPC office, New Delhi.

3.2. Outage Programme for Transmission Elements.

The proposed Outage programme of Transmission lines for the month of October, 2018 will be discussed on 14.09.2018 at NRPC office, New Delhi.

4. Planning of Grid Operation:

4.1. Anticipated Power Supply Position in Northern Region for October, 2018 (As per 15th LGBR Sub-committee meeting)

The Anticipated Power Supply Position in Northern Region for October, 2018 is enclosed at **Annexure 4.**

SLDCs are requested to inform their updated estimate of power supply position for October, 2018 and measures proposed to be taken to bridge the gap in 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 38th TCC & 41st NRPC approved following elements in NR:

- a) TCR of capacity 500 MVAR at Kurukshetra 400 kV bus.
- b) Bus Reactors at 30 no. 220 kV sub-stations and 18 no 400 kV level sub-stations subject to the availability of space.

Status:

POWERGRID:

Representative of POWERGRID informed that bids for 500 MVAR TCR at Kurukshetra have been opened and is under Technical evaluation and the LOA is expected to be placed by October 2018 with commissioning schedule of 2 years from the issue of LOA.

POWERGRID representative informed that the reactor of 125 MVAR is being installed at Kurukshetra which will be commissioned by **31.08.2018**.

MoP has decided that the installation of the reactors at 400 kV ISTS substations would be done through TBCB route and a Gazette Notification dated 08.05.2018 has been issued in this regard (Copy enclosed at Annexure 6 of the Agenda of the 148th OCC meeting).

Power grid representative was requested to update regarding the installation of the reactors at 400 kV ISTS substations through TBCB route.

DTL:

Six 25 MVAR, 220 kV reactors at Mundka, Harsh Vihar, Peeragarhi, Electric lane, Bamnauli, Indraprastha substation and one 125 MVAR, 400 kV reactor at Mundka substation shall be commissioned by **December 2019**. Out of the above, scheme for five reactors at 220 kV level are under approval.

MS NRPC expressed concern that at remaining 12 substations also, the reactor installation be planned. DTL representative intimated that the space constraints issues are there at remaining 12 locations. MS, NRPC added that the intimation regarding the same should be submitted by the DTL authorities to NRPC.

NRLDC representative expressed concern on the non-availability of the above reactors in the coming winter months.

MS, NRPC proposed that a committee would be formed at the NRPC level including an officer of CEA for reviewing the problem of space constraint at remaining 12 substations.

It was also proposed that the use of the BTPS plant for absorption of reactive power may also be looked into.

PSTCL:

Tender for 400 kV level reactor has been opened (technical bid) and is in the evaluation stage. Price bid is likely to be opened within a month. As regards 220 kV level reactors, tender has been opened on 15-06-2018 (technical bid) & is under evaluation. DPR for installation of 400 kV & 220 kV reactors has been submitted for PSDF funding.

MS, NRPC requested PSTCL to expedite the issue of PSDF funding & he added that the approval of PSDF funding should be ensured before the issue of LOA as after the issue of LOA, PSDF fund would not be granted.

Uttarakhand:

PTCUL representative informed that for 125 MVAR reactors at Kashipur retendering is being done. 80 MVAR reactor at Srinagar has been received at site and shall be commissioned by 30.09.2018.

Rajasthan:

148th OCC meeting & 149th OCC meeting:

525 MVAR (450 MVAR + 75 MVAR) has been approved by WTD of RVPN and being proposed for PSDF funding. 3x25 MVAR (at 220 kV level) reactors one each at Suratgarh, Akal & Bikaner are to be funded by PSDF. As per the PSDF requirement, the DPR along with formats has been re-submitted to PSDF.

The reactive elements as per discussion in Techno-economic group of PSDF have been examined again through complete power system study. The study recommends size, rating & location suitable for providing reactive elements (Shunt reactors & STATCOMS) across various voltage levels i.e. 400 kV & 220 kV as per various level of “ Renewable Energy Integration – Reactive Compensation Elements/ Equipments for Reactive Power Management and Voltage Control for Transmission Grid under Smart Transmission Network and Asset Management System”. Therefore, DPR has been submitted for consideration & approval of standing committee / CEA vide letter dated 18.06.2018 (letter enclosed at Annexure 6B of the minutes of the 148th OCC meeting)

MS, NRPC asked Rajasthan to submit their plan for installation of reactors as per the decision of the SCPSNR meeting and subsequent approval of NRPC. The above reactor finalized based on the plan are exclusive of the reactor plan study done by Power grid, also needs to be clarified. The updated information received from Rajasthan is placed at Annexure 6C of the minutes of the 148th OCC meeting.

MS, NRPC requested Rajasthan representative to clarify the issue of installation of the reactors. He added that non installation of reactors will lead to high voltage of the system due to which lines have to be opened compromising reliability of the system. He added that 450 MVAR agreed in the standing committee should have been got installed even if the locations had changed. MS NRPC requested Rajasthan representative to take up the new proposal in the next standing committee meeting but the reactors already agreed and approved in NRPC meeting should be commissioned at the earliest. The Sub-Committee decided to write letter to Rajasthan for expediting commissioning of 25 MVAR Reactors at Suratgarh, Akal & Bikaner each.

150th OCC meeting:

Rajasthan representative stated that the clarifications sought by PSDF in respect of revised DPR for 3x25 MVAR (at 220 kV level) reactors one each at Suratgarh, Akal & Bikaner was submitted to PSDF on 28.07.2018.

Rajasthan representative was requested to give the detailed status of 150 MVAR (25 MVAR at Barmer S/s and 125 MVAR at Jodhpur S/s) in writing regarding the installation of reactors as per the decision of the 39th SCPSNR meeting and subsequent approval of NRPC.

Regarding the WTD of RVPN approved 450 MVAR reactors, Rajasthan was requested to submit the status.

POWERGRID, PSTCL, RAJASTHAN, DTL, PTCUL are requested to update in light of discussions held in the last OCC meeting.

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

- 7.1 **38th TCC & 41st NRPC meeting:** 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 and advised NRPC Secretariat to negotiate on the Techno Commercial offer submitted by CPRI, Bengaluru.

Techno Commercial revised offer submitted by CPRI for System studies for assessment of capacitor requirements in Northern region for year 2019-20 for a peak and off peak load condition was enclosed at Annexure-VII of the Agenda of the 147th OCC meeting.

- 7.2 **147th OCC meeting:** MS, NRPC informed the Sub-Committee that CPRI has given a final Techno Commercial offer of Rs. 32 lakhs (Rs. 20 lakhs for previous study and Rs. 12 lakhs for additional assignment) excluding taxes. The offer is being in principal accepted and will be placed for approval of NRPC. He requested all utilities to furnish the requested data as per the requirements of CPRI expeditiously.

All members agreed that NRPC should inform CPRI to go ahead with the study and also assured of timely submission of the data as sought by CPRI.

The offer given by CPRI was accepted by NRPC Secretariat subject to rectification (if any) in the NRPC meeting scheduled to be held on 28th June, 2018.

- 7.3 **148th OCC meeting:** In the meeting, members were apprised of the discussions held with CPRI at Bengaluru regarding the study, based on which a format for submission of data by the utilities has been finalized (**Available at NRPC website**).

All the utilities were informed that the data (load/ voltage) by each state were to be collected for their entire network in the State, for a date (to be specified later) along with their peak demand details. Based on the data furnished by the States, capacitor requirement for that particular state would be finalized. NRLDC has also agreed to finalize data of the regional peak of NR.

Stressing upon the huge data quantity to be collected, DISCOMs and SLDCs were requested to take up this matter proactively so as to ensure timely submission of data i.e. a month from the date of issue of the MOM.

Utilities were also informed that they may directly contact Dr. Manohar Singh, CPRI (manoharsingh@cpri.in, +91-96329 40855) regarding any clarification for the formats proposed for their States and if any additional data is required by CPRI.

It was also informed that after the submission of data by the state, each state was required to depute one of their officers to CPRI, Bengaluru for 2-3 days so that they may validate the data captured by CPRI for the capacitor requirement study. Any assumption if made due to missing data is to be certified by the concerned state officer and same shall form the part of the Study Report.

- 7.4 **149th OCC meeting:** In the meeting members were informed about the methodology proposed by CPRI for conducting the study (Annexure-7 attached with the MOM of the 149th OCC meeting.) which provided with three options. Of the three options, members agreed to go with the third option of working separately for each state utility(s) for its peak loading time & date to figure out the capacitor requirement for the state. After having obtained the capacitor requirement for each state individually,

the study will be carried out for the complete region so as to reduce the reactive power flow on ISTS lines (considering the capacitors which have been identified for each state).

All the utilities were advised to submit the data for their States in the prescribed format corresponding to date they have met peak requirement for their States. Utilities were requested to submit the data within a month so as to complete the study in time.

In case of any clarification at the time of data collection utilities were advised to directly contact Dr. Manohar Singh, CPRI (manoharsingh@cpri.in, +91-96329 40855).

- 7.5 150th OCC meeting:** All the utilities expressed concern on the nature of the format. It was observed in general by all constituents that the format is very lengthy & will require some time for understanding the same and providing data accordingly.

MS, NRPC proposed that all utilities should highlight the problems being faced by them by the second week of September & thereafter a separate meeting will be held with CPRI representative for better understanding of the format and to resolve the issues.

Punjab has submitted its problems regarding the format (ANNEXURE 7). All other states requested to update so that a separate meeting can be arranged.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 8.1** The action plan proposed by BBMB was duly deliberated in the first meeting held on 04.06.18. BBMB was advised to submit the detailed breakup of the work activity wise along with the team of officers responsible for execution location wise. The note submitted by BBMB was enclosed at Annexure 8 of the Agenda of the 148th OCC meeting. Further BBMB was directed to get the action plan approved in their Power Sub –Committee meeting as well as the Board meeting so that concern of all partner States is addressed. If required any clarification representative from NRPC/NRLDC/CTU may be invited by BBMB during their meeting of power Sub-Committee.
- 8.2** BBMB representative stated that they have submitted the proposed action plan to their partner States for early comments and assessment. The execution is tentatively planned during month of November –December, 2018.
- 8.3** In 149th OCC meeting all stakeholders were requested to kindly submit their comments on the proposed action plan at the earliest so that the outages for the lean period can be planned. The comments has been received from NTPC, PSTCL & POWERGRID (placed at Annexure 8 of the MOM of the 149th OCC meeting).
- 8.4** BBMB representative intimated that the issue will be taken up in their next Power Sub-Committee meeting. Sub-Committee requested BBMB to finalize the plan at the earliest and submit the activity chart to NRPC.
- 8.5 150th OCC meeting:** BBMB representative stated that the clarifications on the comments received from POWERGRID has been issued (**ANNEXURE 8**). POWERGRID representative assured that the issues raised by BBMB will be resolved by them at the earliest.
POWER GRID is requested to update.

Comments from HPSEB have also been received and the action plan proposed by BBMB is agreeable to them.

MS NRPC requested BBMB to finalize the issue in their Power Sub-Committee meeting.

BBMB representative requested that a second meeting of the group formed by NRPC may be called to form a consensus so that they can take the action plan to the Power Sub-Committee meeting for finalization.

The members of the committee/ representatives of the NTPC, POPWERGRID, HPSEBL, Haryana, Rajasthan & Punjab to discuss and finalize the issue in the meeting.

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

The detail of the updated status of Agenda items is enclosed at **Annexure 9**.

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

10.1 The list of FGDs to be installed as finalized in the 37th TCC (Special) meeting was enclosed as Annexure 13 with the Agenda of the 144th OCC meeting. All SLDCs are regularly being requested to take up with the concerned generating units where FGDs is to be installed and regularly submit the progress to NRPC. The format in which the status is to be given has already been uploaded on the NRPC website.

10.2 148th OCC Meeting: All SLDCs were requested to coordinate and update the status of FGD commissioning at the generating units in their State & submit the same regularly in each OCC as it is being monitored by Supreme Court.

CEA representative added that it is likely that the Merit Order dispatch preference / priority will be given to those units which are environment norms complaint.

MS, NRPC stressed that efforts should be made to commission FGD units as per the time frame finalized in the special TCC meeting and it is not sure that these units will be scheduled if they fail to meet the time line. He also requested all concerned to submit the status in soft copy so that the report can be compiled and timely forwarded to CEA, as the commissioning of FGDs is being monitored by Supreme Court. MS, NRPC requested Director GM Division, CEA to take up with MoP/ CERC the matter of recovery of cost of FGD installation of the generating companies.

10.3 149th OCC Meeting: MS, NRPC requested all utilities to expedite the process of installation of FGD as per the timeline fixed. He added that issue of giving an incentive is under finalization. Also he added that levying of penalty on the generating stations who do not install FGD is also being reviewed. He added that if the generators who do not install FGD within time line may be placed low in the Merit order. Regulatory commissions has given direction that the increase in the variable charges will be absorbed as it is due to change in the law. NTPC was requested to o give an approximate idea of the cost of FGD installation. NTPC representative intimated that they have pre-poned their schedule by one year.

MS, NRPC further requested all constituents to give the desired information in soft copy in excel format. He also added that the contact details of the officer who is concerned with FGD installation may also be intimated so that the information can be expeditiously collected directly from him/her

- 10.4 150th OCC meeting:** MS, NRPC stated that a meeting is scheduled on 28.08.2018 by CEA at NRPC to review the progress of FGD installation. He stated that all generators should attend the meeting. The issue of preponement of timeline for FGD installation will also be discussed in the meeting.

Rajasthan representative intimated that the consultant has given the DPR. He informed that the cost of the project has been approved by the Board of Directors and has been sent to the Government for final approval.

MS, NRPC stated that 2022 is the target date which is very crucial.

UPRVUNL has submitted that for Anpara D the tender has been floated.

All constituents were requested again to regularly update the information in soft copy in excel format. Also, contact details of the officer concerned with FGD installation may also be intimated so that the information can be expeditiously taken up directly.

NTPC has submitted the updated information placed at Annexure 10. All constituents are requested to give the desired information in soft copy in excel format. He also added that the contact details of the officer who is concerned with FGD installation may also be intimated so that the information can be expeditiously collected directly from him/her. All SLDCs may coordinate and submit the information.

11. LVRT compliance by wind generators.

- 11.1** As per the CERC order dated 05.01.2016 issued in Petition No. 420/MP/2014, CERC has directed that LVRT should be implemented in all wind turbines (except Stall Types) commissioned before 15.04.2014 having installed capacity equal to or more than 500 KW. Further, as per the CEA Technical Standard for connectivity to the Grid (Amend.) Reg.2013 (sub clause (3) of Clause B 2) of the station connected to the grid 06 months after publication of these regulations (i.e.15.04.2014) should have the LVRT capability as depicted in the sub-clause.

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 NRPC so far without any result.

- 11.2 38th TCC/41st NRPC meeting:** LVRT compliance was a pre-requisite according to CEA connectivity standards and these wind generators should not have been provided the connectivity in the first place itself. 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.

NRPC also advised other States to ensure compliance to the CEA connectivity standards and to not allow in future, connectivity to any LVRT non-compliant wind generators.

- 11.3 145th OCC meeting:** RRVPNL submitted the letter from the Ministry of New & Renewable Energy in this regard in which the following is stated regarding LVRT compliance:

“A Concerned WTG manufactures may apply for LVRT testing to any internationally accredited testing body or NTWE by 15.3.2018, which should include the following:

i An affidavit that the manufacturer would comply with CEA Technical standards for connectivity to the grid.

ii A bank guarantee of Rs 1 crore per model, which would be returned on producing the compliance certificate for LVRT and other technical standards as stipulated by CEA.”

- 11.4 147th OCC meeting:** MS, NRPC stated that all the wind generators shall be LVRT complaint for which retro fitment needs to be done & it shall be responsibility of Rajasthan SLDC to get it enforced. Rajasthan should comply with the decision of 38th TCC/41st NRPC meeting & write letters to wind generators communicating the decision of NRPC.

- 11.5 148th OCC meeting:** MS, NRPC apprised the Committee that the above reference order facilitates WTG manufactures to obtain statement of compliance/confirmation standard for demonstrating the compliance to applicable CEA Technical standards for connecting to the Grid for their WTG models which were unable to get LVRT compliance certificate from accredited testing agencies. He further stated that the time period for applying for LVRT testing to any internationally accredited testing body or NIWE stands expired on 15.3.2018. He added that notice should be issued to all Wind generators who have not done the needful. Rajasthan SLDC representative has intimated the same has been issued (Copy of the letter was placed at Annexure 11 of the MoM of the 148th OCC meeting).

MS, NRPC added that as per 38th TCC and 41st NRPC decision, SLDC should not schedule the wind generators who are not LVRT complaint. Also he added that due to LVRT non compliance on part of the wind generators has lead to a near voltage collapse instances but luckily the grid survived. NRLDC representative also added that the compliance of the wind generators is mandatory for the safety of the grid as 2-3 incidents have already occurred in the grid which could have resulted in the catastrophe.

- 11.6 149th OCC meeting:** Rajasthan representative intimated that a meeting of wind turbine manufacturers was held on 05.07.2018 to sort out the issue of LVRT and to get its compliance expeditiously. Further, the assessment of manufacturer wise non complied WTG has been identified and enclosed at Annex- XI of the MOM of the 149th OCC meeting. He informed the Sub-Committee that 638 generators are LVRT complaint & 106 do not require as per regulation. He further added that 2641 generators need to be LVRT complaint. The capacity of generators that are non – complaint is 3019 MW. He also informed that the cost of installing LVRT was 25-40 lakh per generator for which the generators will have to make arrangements. MS,

NRPC stated that the cheaper solutions are available and they should be explored cost needs to be reviewed

MS NRPC requested that Rajasthan should submit these details to their SERC. He informed additionally that the wind generators had requested for scheduling of power till they review the time line for getting work done.

Rajasthan representative also informed that the next meeting with WTG manufacturers is scheduled for 23.7.2018 for further deliberating the actions in this regard.

Director, GM division, CEA representative added that LVRT compliance is mandatory as per connectivity regulation requirement of CEA. He added that a single LVRT solution can be used on the plant which will be cheaper.

- 11.7 150th OCC meeting:** Rajasthan representative intimated that in line with the discussions in the last OCC meeting the WTG manufacturers in the meeting on 23.07.2018 has been advised to review the possibility of having a single LVRT for a plant.

MS, NRPC requested that the MOM of the meeting may be shared so that the progress in this regard can be monitored.

The MOM of the meeting held on 23.7.2018 stands shared (Annexure 11)

RRVPL is requested to update.

12. System Protection Scheme (SPS) in NR

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

In the **37th TCC and 40th NRPC meeting** recommended for convening a separate meeting comprising members from NRLDC, NRPC Secretariat and POWERGRID for reviewing revised logic of the scheme presented by POWERGRID in 140th OCC meeting. A meeting for reviewing the logic of the scheme was held on 07th November 2017 and scheme was revised and finalized.

Since OPGW has now been laid, POWERGRID agreed for utilizing the signals from circuit breaker (CB Open/ CB close) of both the ends for SPS logic so as to negate the chances of mis-operation/ mal-operation of the SPS.

POWERGRID had informed that the circuit breaker (ON/ OFF) signal was being utilized from Agra end in the logic. However, that from Gwalior end was not being utilized as the purpose of the scheme was being served by utilizing the CB signal from one end.

Representative of NRLDC stated that even if the scheme was functioning properly in normal circumstances there are chances that the scheme may not operate in case of breaker lockout from Agra end and the line getting tripped from Agra end.

NLDC also stressed on utilizing CB signals from both the ends as Agra-Gwalior is an important inter-regional transmission line and its implementation will make the scheme even more reliable.

POWERGRID agreed to implement the logic utilizing the CB signal from both the ends as per the decision of TCC. NRPC had concurred with the deliberations of TCC.

POWERGRID had informed that the work at Agra end was in progress but for the implementation at Gwalior end the issue needs to be taken up and highlighted with WRPC also

147th OCC Meeting: POWERGRID representative stated that their management has enquired about the recovery of cost that will be incurred on implementation of the scheme.

Representative of POWERGRID was informed that a decision regarding the same has already been taken in 129th OCC meeting and thereafter ratified in the 35th TCC and 39th NRPC meeting to book the cost of the implementation of revised SPS in some other ongoing project/work.

POWERGRID was advised that the decision of NRPC to be implemented at the earliest as this is an important IR line between NR & WR.

NRLDC informed that average load now prevailing on the feeders approved for SPS might have changed and these feeders might not have remained radial and as such the list of feeders needs to be reviewed.

NRPC Secretariat has written a letter dated 28.5.18 regarding this issue to ED/ NR-III, POWERGRID (was placed at Annexure 12A of the minutes of the 148th OCC meeting). This issue has also been taken up with WRPC for implementation at Gwalior end by deliberating in their OCC/ RPC meetings. A letter in this regard had been written to WRPC & the reply received thereof was placed at Annexure 12A of the minutes of the 148th OCC meeting.

148th OCC Meeting: POWERGRID representative intimated the Sub-Committee that for implementation of the scheme due coordination with the concerned States was required.

MS, NRPC requested each SLDCs to extend cooperation & provide all required support to Power Grid for early execution of the work.

39th TCC and 42nd NRPC meeting: MS, NRPC informed that there were 2 issues involved which needed to be discussed. One was for the utilization of CB signal from both the ends (Gwalior and Agra) in the logic and the other was for incorporating additional 1000 MW load for load shedding in the already approved scheme.

Regarding the additional 1000 MW load, MS stated that the same has been identified and were now pending at POWERGRID's end for wiring with the logic.

POWERGRID representative informed that the material has been received at the site and for 2 locations viz. Dadri and Bhiwadi the scheme was almost completed. Regarding other locations under the ownership of other utility, POWERGRID requested to provide the details of nodal officers with whom they may coordinate. He further stated that, once the details of the nodal officers were received, additional load of 1000 MW shall be wired within 02 months (tentatively by end of August 2018).

MS, NRPC assured POWERGRID of all possible support by the utilities and to provide them with the list of nodal officers for each substation location identified for additional load shedding.

Regarding the issue of utilizing CB from both the ends (Gwalior & Agra) in the logic

of SPS, MS, NRPC stated that even though the decision was already taken in NRPC/TCC forum, the issue of booking the cost of the scheme was again raised in the OCC forum. To this, Members expressed concerns and stated that once a decision has already been taken at NRPC/TCC forum, the issue shall not be raised again in any sub-committee of NRPC.

MS, NRPC requested POWERGRID to go ahead with the decision of 41st NRPC to utilize the CB signals from both the end in the logic of SPS so as to ensure more robust and reliable operation of the scheme. He further requested POWERGRID to not to cause any further delay in the implementation of the scheme as such delay may lead to some unforeseen catastrophic incident for the grid.

Representative of POWERGRID stated that the changed logic for utilizing CB signal from Gwalior end shall be provided to them so that the same may be incorporated in the SPS logic. Representative of NRLDC informed the committee that the logic had already been provided to POWERGRID and there was no need of again discussing the same.

POWERGRID was advised to go ahead as per the decision of NRPC and complete the scheme in time.

149th OCC meeting: MS NRPC stated that in the last OCC meeting the Name of the nodal officers for coordinating with Power grid was requested which have not been received till date. He added that as per directions of CERC a report has to be submitted within 15 days on the status of implementation of the scheme. Power grid stated that in the last week of July the mock testing can be done. Further, on it was added by MSNRPC that representative of CERC should also be called. SE(O) NRPC stated that the actual testing on the revised scheme be planned in the month of November in coordination with WRPC.

150th OCC meeting: MS, NRPC apprised the committee that mock testing for the Revised 765 kV Agra- Gwalior SPS is to be carried out after integration of additional 1000 MW load shedding and Hon'ble CERC has been intimated accordingly. He asked POWERGRID to complete the work at the earliest.

Representative of POWERGRID again requested for the Nodal Officers from the states as problems were being faced while working at the substation of state utilities.

It was informed that names of nodal officers have been requested again and again from the states but only U.P. has intimated the coordinator. MS, NRPC further asked representative of the concerned states present in the OCC to be coordinator for resolving any problems encountered by POWERGRID at substations of respective utilities. Accordingly, the following officers were nominated as Nodal officer:

Haryana – Shri. N. K. Makkar, EE, HVPNL

Punjab- Shri. Akshay Garg, ASE, PSTCL

Rajasthan – Shri. Kamal Patidar, EE, Rajasthan (SLDC)

Delhi – Shri. Loveleen Singh, GM, DTL

POWER GRID is requested to update.

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

144th & 145th OCC meeting: UPRVUNL update: “Offer to incorporate the logic of SPS at Anpara “D” is pending with BHEL. The efforts are underway to get the offer from BHEL. The work is expected to be completed by 31.03.2018. The cost of the logic of SPS at Anpara “D” is to be indemnified by UPPTCL”.

150th OCC meeting: It was informed that on continuous pursuance of matter with BHEL, negotiated offer for SPS has been received from BHEL on 16.08.2018 (ANNEXURE 12 of the MOM of the 150th OCC meeting) and the order for the same shall be placed within a week with completion target of September, 2018.

The copy of the LOI placed on BHEL is placed at Annexure 12.

UPRVUNL is requested to update.

12.3 SPS for Kawai – Kalisindh - Chhabra generation complex:

146th OCC meeting: RRVPNL updated as under:

“The communication scheme is being reviewed on PLCC/Optical fiber in place of earlier GPS scheme as tripping time on GPS scheme was higher. Tender is likely to be floated by 5/2018.”

147th OCC meeting: RRVPNL representative intimated that feeder identification has been done & tendering will be done shortly. He added that further communication scheme is being reviewed on PLCC/Optical fiber in place of earlier GPS scheme as tripping time on GPS scheme was higher. Tender is likely to be floated by May-18.

148th OCC meeting: RRVPNL representative intimated that the Technical specification is under preparation & communication link are under review. Tender is likely to be floated in July 2018. MS NRPC expressed concern over inordinate delay & requested RRVPNL to take up the issue with the communication wing expeditiously or else NRPC Secretariat will take up the matter with higher management.

149th OCC meeting: RRVPNL representative intimated that the details from the communication wing stand received. & the tender will be floated positively by next month. He explained that the details of the OPGW involved have been accounted for in the details received from the communication wing.

150th OCC meeting: RRVPNL representative intimated that the Technical Committee has rejected the proposal on the basis that the reliability of the PLCC system proposed for the load shedding at the time of outage of Kawai-Kalisindh units along with Anta-Phagi line is not present. It was added by the Committee that till March 2019 the OPGW will be laid in the entire network (12000 Kms) & the same can be used for the purpose.

MS NRPC requested RRVPNL to submit the written communication from their STU in this regard.

RRVPNL is requested to update.

12.4 SPS for Lalitpur Generating station

141st OCC meeting: UPPTCL updated as under

The Sub-committee was informed that the scheme has been commissioned at LPGCL end. If any 765 kV Lalitpur-Agra line trips, SPS would operate for their complex. At present the signal at Fatehabad end are not being received. The issue is being looked into, so that work can be completed by 31.12.17.

147th OCC meeting: UPPTCL representative intimated in this regard that the signal is being received from Fatehabad at their end whereas Lalitpur representative intimated that they were not receiving any signal.

MS NRPC proposed that UPSLDC should organize a meeting to resolve the long pending issue and make the SPS operational at the earliest.

148th OCC meeting: UPPTCL representative intimated that as desired in the last OCC a joint meeting has been organized on 6.6.18 with the officers of Lalitpur & Fatehabad. In the meeting it has been agreed that the SPS will be made operational by end of the June 2018. The final agreed scheme as intimated was placed at Annexure 12C of the MOM of the 148th OCC meeting.

149th OCC Meeting: UPPTCL representative intimated that the signal from Fatehabad to Lalitpur is not being received presently but the matter will be resolved within a week. The SPS will be commissioned within a week.

150th OCC Meeting:

UPPTCL representative stated that the status of the SPS implementation will be sent through SLDC.

UPPTCL is requested to update.

13. Automatic Demand Management System

13.1 147th OCC meeting: All utilities were once again requested to submit update on the action plan & status of implementation of the ADMS in their utility as it is mandatory requirement of IEGC.

Delhi, Haryana, Uttarakhand, & UP (SLDC) representative were requested to take up the matter expeditiously with their distribution companies. SE NPC stated that the problems if any in implementing the same may also be brought to the notice of the sub-committee as it is now 10 years, since the regulations were issued by CERC.

Punjab representative intimated that at SLDC level they were doing remote tripping for 96 locations. He added that the ADMS at 11 kV feeder level is to be implemented by Distribution Company. He added that the Tender specification had finalized and it has been targeted to be complete by 2020. The information was submitted by HP. MS, NRPC requested all SLDCs to plan and get the ADMS implemented soon in their States.

13.2 148th OCC meeting: TDDPL representative stated that the ADMS system is working well in their organization as per the latest regulations since last more than 5 years. He added that the scheme is also working in Rajadhani & Yamuna Power distribution companies.

Punjab SLDC representative stated that 26 locations remote tripping from SLDC has been tested. Around 10 percent of the running load can be disconnected through these locations. The latest status regarding implementation of ADMS by PSPCL is as under:

The matter of engaging a consultant for preparation of DPR of ADMS at balance location is under consideration with the higher authorities and work of ADMS would be implemented within stipulated time.

MS, NRPC stated that the all States should review their system demand and Automatic Demand Management System should be planned and implemented at the earliest for grid security.

13.3 149th OCC meeting: MS NRPC stated that the issue is lingering since many years & it is very important for the grid security. He stated that the States should submit a detailed scheme which they want to execute. Further Rajasthan representative stated as under:

That approval of PSDF for STNAMS (Smart Transmission Network & Assets Management System) project which is consisting of Automatic Demand Management System (ADMS) functionality at the level of 33 feeders at EHV Substation of RVPN under SCADA / EMS part of project has been received. Bid documents prepared and under final approval with the CMD, RVPN. Bidding process will be initiated immediately on approval as above. Tentative timeline is as under:-

1. Issue of NIT – June, 2018
2. Finalization of Tender / Purchase order issued – August, 2018
3. Proposed timeline to complete the work – 18 months from date of issue of LOI/NOA

Further, the Automatic Demand Management System (ADMS) functionality at 11 kV feeders from 33/11 kV substation are under the jurisdiction of the Discoms and matter is being perused with discoms authorities.

NRLDC representative added that the updated list of the feeders of the state that can directly be made available to NRLDC, and should also be shared by all states as it is required in line with CERC guidelines.

PTCUL representative added that the issue is being taken up with the DISCOMs but no update has been received.

UP representative stated that they had submitted the details of the remote operation of 132KV feeders under ADMS.

MS, NRPC advised UP to have a detailed study on their complete system. He also stated that this issue will be discussed in the meeting on 30.7.18 wherein issues related to DISCOMs will be highlighted.

13.4 150th OCC meeting:

Concerned states (UP, Haryana and PTCUL) were requested to update.

MS, NRPC stated that the responsibility lies with the SLDC & STU to get the data from the DISCOMs.

UP, Haryana and PTCUL) are requested to update

14. Status of implementation of recommendations of Enquiry Committee on grid disturbances on 30 & 31.7.2012

14.1 147th OCC meeting: All utilities were requested to update the information as per the letter enclosed at Annexure 18 with the Agenda of the 146th OCC meeting. Compliance report from POSOCO & NHPC has been received.

14.2 148th OCC meeting: SE(O) stated that it is regretted to state that no information has been received from any quarters till date in spite of repeated requests/ reminders. He added that the matter is viewed very seriously by CERC and would be taken up with higher authorities of each state utilities.

MS, NRPC emphasized that it is very essential to get the protection audit done & it is for the betterment of the system of the State & the region as a whole.

14.3 149th OCC meeting: BBMB, PSTCL, Rajasthan, Koteshwar (THDC), HPGCL, NPCIL, POWRGRID (NR-2) have submitted the data. (Annexure 15 of the MOM of the 149th OCC meeting.)

14.4 150th OCC meeting:

NTPC submitted the information for NCR (Annexure 15 of the MOM of the 150th OCC meeting).

All other utilities (except NTPC, BBMB, PSTCL, Rajasthan, Koteshwar (THDC), HPGCL, NPCIL, POWRGRID (NR-2))are requested to update the status as per the prescribed Formats

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

The updated status in the 150th OCC meeting is as under:

DTL, PSTCL & UPPTCL - 02 nos. of ERS procured.

RRVPNL: - RRVPNL management has decided to go ahead with the procurement of ERS & tender is expected to be floated in the month of August 2018.

HVPNL: - BOQ finalization it's under process.

MS NRPC stated that the deadline for finalization should be intimated as the matter is pending since long.

PTCUL: - 147th OCC: NIT was placed but due to no response same has been extended

148th OCC: PTCUL representative stated that no such action has been taken. He has been asked to clarify the matter with the management.

149th OCC: PTCUL representative stated that in light of tower being damaged issue is being discussed again and by September further progress will be intimated.

150th OCC: PTCUL representative stated that issue is under discussion.

HPSEBL: – The process of arranging funds for procurement of ERS has been initiated. HPSEBL representative intimated that they were coordinating with PTCUL. He was advised to coordinate with J&K, citing the status of PTCUL

149th OCC: The process of arranging funds is being looked into.

150th OCC: The process of arranging funds is being looked into.

J&K: - Order has been placed for 2 nos. ERS. No further update.

BBMB: - BBMB representative stated that the issue will be taken up in the Power Sub –Committee meeting of BBMB.

149th OCC: BBMB representative stated that the issue will be taken up in the Power Sub –Committee meeting of BBMB

CEA representative stated that being a transmission licensee they can go ahead with the procurement of their own ERS. He also added that instructions for procurement of ERS were issued from the Ministry. ERS are very essential for the safety of the nation also in case of any attack.

SE(O) NRPC stated that guidelines have been issued vide which the Ministry of Power has directed that for 500 ckt kms minimum 2 numbers of ERS are required (Annexure 16 of the MOM of the 150th OCC meeting). All utilities were requested to review accordingly.

BBMB was stressed in view of above to review their decision as two of their beneficiaries Haryana & Rajasthan have also not procured ERS yet.

BBMB, HPSEBL, PTCUL, Haryana & Rajasthan to update in light of discussions held in the last OCC meeting.

All other utilities are also requested to review & update in view of the Annexure 16 of the MOM of the 150th OCC meeting.

16. Cleaning and Replacement of porcelain insulators

16.1 All utilities were requested to plan insulator replacement work from September 2018 onwards. All utilities were requested to submit the insulator replacement targets set for the year 2018-19 so as proper planning of outages can be done.

16.2 148th OCC meeting: SE (O) NRPC requested all utilities to submit the plan positively by the last week of July as the outages of transmission elements for replacement of insulators will be planned with effect from the OCC for the month of August, 2018. He added that in the absence of the said action, outage will not be allowed on this account.

16.3 149th OCC meeting: BBMB & Power grid (NR 1) have submitted the data .MS NRPC requested all other utilities to update so that better outage planning could be done as from September onwards outages for replacement of porcelain insulators will

be allowed.

16.4 150th OCC meeting:

PSTCL submitted the data.

SE (O) NRPC requested all utilities to submit the plan meticulously & submit the data.

MS, NRPC added that cleaning & replacement work be planned in such a way that before the onset of fog the requisite action is taken.

All utilities (except PSTCL, BBMB, Power grid (NR 3& 1)) are requested to update the plan for the replacement of porcelain insulators.

17. Cyber Security Preparedness Monitoring

In the **37th TCC and 40th NRPC meeting** held on 27th and 28th October, Chief Engineer IT, CEA and Chief Information Security Officer, MoP, Sh. Vijay Menghani, gave a detailed presentation on potential cyber threats for power sector, the agencies working on this aspect, recent incidents of cyber attacks on and the action points to prevent the cyber threat. It was stated that in view of increasing incidents of cyber-attacks and threat to the integrated grid operation, all utilities need to monitor action being taken in regard to the following points and report the status to respective Computer Emergency Response Teams (CERTs):

- 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.

All the utilities were again requested to furnish the above information, however, except from TATA Power – DDL the information has not been received from any of the utilities. The report as submitted by TATA Power- DDL was attached at Annexure-21 with the Agenda of the 146th OCC meeting. NHPC have also submitted the status. All the other utilities were once again requested to furnish the information in the format as submitted by TATA Power.

147th OCC meeting: NTPC updated the information. All utilities (except NTPC, NHPC & TATA Power) to kindly update the status. Some of the members enquired about the training to be imparted by NRPC/CEA on cyber security. They were asked to contact CE (IT), CEA in this regard as they are organizing training on cyber security and other related issues.

148th OCC meeting: THDCIL submitted the information in the meeting. All other utilities (except NTPC, NHPC & TATA Power) were again requested to update the status. Rajasthan representative intimated that the issue is being taken up with their IT wing and information would be submitted shortly. Tata Power representative stated that they welcome any utility to visit their station for seeing the implementation of Cyber security done at their end.

149th OCC meeting & 150th OCC meeting: The information from NAPS & PSTCL stands received. **All utilities except NTPC, NHPC, Tata Power, THDCIL, NAPS & PSTCL were requested to update.** SE(O) stated that it is a long pending issue and the information in the desired format should be submitted by all utilities. Rajasthan representative stated that they had forwarded the information to CEA.

All utilities except NTPC, NHPC, Tata Power, THDCIL, NAPS & PSTCL are requested to update

18. Requirement of Data for the GIS based Energy map being developed by Energy division of NITI Aayog.

The Sub –Committee was informed that a copy of a letter from the Chief Engineer (DP&T) was placed at Annexure 22 of the Agenda of the 147th OCC meeting.

148th OCC meeting: MS, NRPC requested all DISCOMs /Power Departments to furnish the information regarding the name, voltage level, capacity, longitude & latitude of 33 kV & 66 kV Substations and lines as detailed in the letter. He informed that RPCs have been given the work of collecting the data from States and forwarding to CEA.

Except NHPC, the data has not been received from any of the utilities.

UPPTCL representative intimated that the data needs to be collected from the DISCOMs and if a communication from the NRPC secretariat is sent to the DISCOMs the matter could be expedited.

Rajasthan representative intimated that they are also taking up the issue with their distribution companies.

SE (O) stated that SLDC being the nodal agency for the state, matter should take up by them with their DISCOMs for early submission of the data. All agreed for the same.

149th OCC meeting: All utilities were again requested to submit the desired information. Rajasthan representative stated that they are taking up matter with distribution companies. MS NRPC added that the issue will also be discussed in the meeting to be held on 30.7.2018 with the DISCOMs

150th OCC Meeting: All utilities were again requested to make all out efforts and submit the desired information by taking up expeditiously with the DISCOMs.

Punjab has submitted the information that has been forwarded to concerned office of CEA. All other utilities are requested to make all out efforts and submit the desired information.

19. Distribution automation and development of smart grid in NCR

Smart grid will enable optimization of energy generation, transmission, distribution and consumption. It provides an opportunity for energy companies to make power delivery more efficient, whether by minimizing the visits of personnel to transmission and distribution locations or by enabling better decisions through timely information. Automation is the key to development of smart grid. The implementation of automation may be taken up in the selected towns initially which would be the first step towards implementation of smart grid in the NCR.

SE(O) stated that at present, the level of preparedness of distribution sector to adopt smart grid is in a very preliminary stage and every DISCOM has to prepare a clear road map for implementing automation and smart grid in their area of operation along with the financial requirement and sources for all funding to roll out the plan in coming years.

MS, NRPC stated that Delhi DISCOMs are proactive in this case. He requested that the concerned (Haryana, Rajasthan & UP) STUs & SLDCs to coordinate with the respective DISCOM & take active action for upgradation of automation by deploying smart grid. All states to take note and intimate the progress in this regard in each OCC.

All members (Haryana, Rajasthan & UP) are requested to update

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.

148th OCC meeting:

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.

The issue was deliberated in light of the discussions held earlier in the 142nd OCC meeting 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. Nominations for committee has been sought from the utilities concerned vide this office letter dated 22.6.2018. MS NRPC requested that the nominations from CTU, POSOCO, CEA and NTPC may be submitted at the earliest so that the meeting can be called at an early date

149th OCC meeting: Nomination from CTU and NTPC stands submitted. CEA & POSOCO were requested to send their nomination.

MS, NRPC proposed that the meeting should be held at Rihand. It was also stated that the nominations from BHEL & UPPTCL were also awaited. Also it was proposed that an expert in the field from it may also be included in the forum. In addition, he highlighted that the nominations from Vindhyachal & Rihand HVDC may also be included.

150th OCC meeting:

CEA, POSOCO, POWERGRID, CTU, UPPTCL & CG Power and Industrial Solutions Limited were requested to send their nomination so that further necessary action can be taken.

CEA, POSOCO, POWERGRID, CTU, UPPTCL & CG Power and Industrial Solutions Limited are requested to send their nomination.

21. Issues for Information of Sub-Committee (ANNEXURE 21)

- 1. Flexibility of coal fired power stations.**
- 2. BRPL concerns regarding coal shortages and reduction in DC at NTPC DCIdri**
- 3. Delay in commissioning of Teesta III -Kishanganj line**
- 4. Comments of stakeholders on the draft of the "Guidelines on Availability of**

Communication System"~rcg.

NRLDC AGENDA FOR 151st OCC MEETING

1. Winter Preparedness 2018-19

Challenges observed & experienced year on year during winter has been discussed in previous OCC/TCC & other special meetings. At the onset of winter in Northern region, various challenges & agreed action plan follow up is necessary to combat all the anticipated issues.

Major issues faced are as:

- Less demand especially during night hours and consequent high voltages in the grid
- Morning & evening peak ramping is significantly high
- Limited hydro generation, Optimally used for peak hours demand only.
- Lesser renewable generation (Solar & Wind)
- EHV lines tripping during fog/smog
- Load crash on inclement weather

Action Plan:

- Load generation balance
 - Daily demand forecasting based on the weather information available on IMD website
 - Adequate portfolio management
 - Proper scheduling of hydro generation & ramping it matching with ramping of peak load
 - Hydro Optimization
 - Staggering of load in case of switching of large chunks of load
- Addressing High Voltages:
 - Update all the static reactive resources and monitoring in real time through updated SCADA displays. Ensuring switch off capacitor in respective control area. Member may like to discuss the means to ensure the same.
 - Updating the list of the line reactors that can be used as bus reactor when line is not in service.
 - Keeping these in healthy and shall be used.
 - Making more line reactor's switching suitable for their use as bus reactor
 - Upcoming reactors that have already been approved are as:
80 MVAR at 400kV kurukshetra, 125 MVAR at Maharaniabagh by Powergrid

DTL	MVAR
400kV Mundka	1×125
220kV Bamnoli	2×25
220kV Indraprastha	2×25
220kV Harshvihar	2×50
220kV Electric lane	1×50
220kV Mundka	1×25

220kV Peeragarhi	1×50
220kV Maharaniabagh	2×25

- Tap optimization study by states at 220/132kV based on previous year SCADA data based scatter plots, NRPC reactive power account, offline simulation studies etc. NRLDC would provide assistance to State if required
- States/Central/Private generators shall provide MVAR absorption as per its capability curve. SLDC/RLDC would monitor the generator response in real time through SCADA displays.
 - Updation and checking of reactive power telemetry.
 - Monitoring of voltage vs. reactive power output plots
 - Sending generator reactive power response of each generator for 3 days of the month.
- Synchronous condenser mode of operation of generating station: During night hours when the demand is less and voltages are high, hydro & gas generating unit's synchronous condenser operation would be of great help in supporting dynamic voltage support to the grid.

OCC has requested all generating units to explore to extend such kind of support during high voltages in the Grid. In this direction, Larji (HP) one unit, Chamera-2 one unit, Tehri Unit #1 & 2 has been trial tested last year successfully. OCC has taken note of same and has advised that these units should be able to deliver MVAR absorption/generation as per Grid requirement. Therefore, these stations shall ensure their availability as synchronous condenser during coming winter. Pong (BBMB) would continue to provide reactive power support in synchronous condenser mode as it has done during previous winters.

In addition, other utilities should come forward and explore their machine capability to operate as synchronous condenser mode as & when required. Utilities shall update on following unit's capability as synchronous condenser mode:

- RSD in Punjab: Last year Punjab informed that OEM team is exploring the capability of RSD units for condenser mode. It is requested to please update regarding RSD capabilities and if yes, kindly share the trial testing plan for same.
 - Delhi GTs: Delhi NCR has been experiencing severe high voltage especially during night hrs due to cable transmission network. Delhi SLDC was advised to explore Delhi GTs operation for synchronous condenser operation. Though the update on same is yet to come.
 - Uttarakhand Gas station: Shrivanti & alpha-Gamma gas station has been synchronized in recent years in Uttarakhand may also explore their units capabilities to operate in condenser mode
 - Kishenganga HEP: It is new hydro station synchronized in 2018
- Opening of EHV lines based on studies and considering adequate measure to ensure reliability & safety of Grid. All utilities shall share their action plan or priority line list that they would open to contain the high voltages.

- Actions for Load crash/ Thunder storm
 - Minimize generation to technical minimum based on the grid conditions as per CERC directions.
 - Procurement of ERS tower to restore the line in case of tower collapses
 - Avoid manual opening of feeder
 - List feeder at 11kV that can remain connected during such eventualities

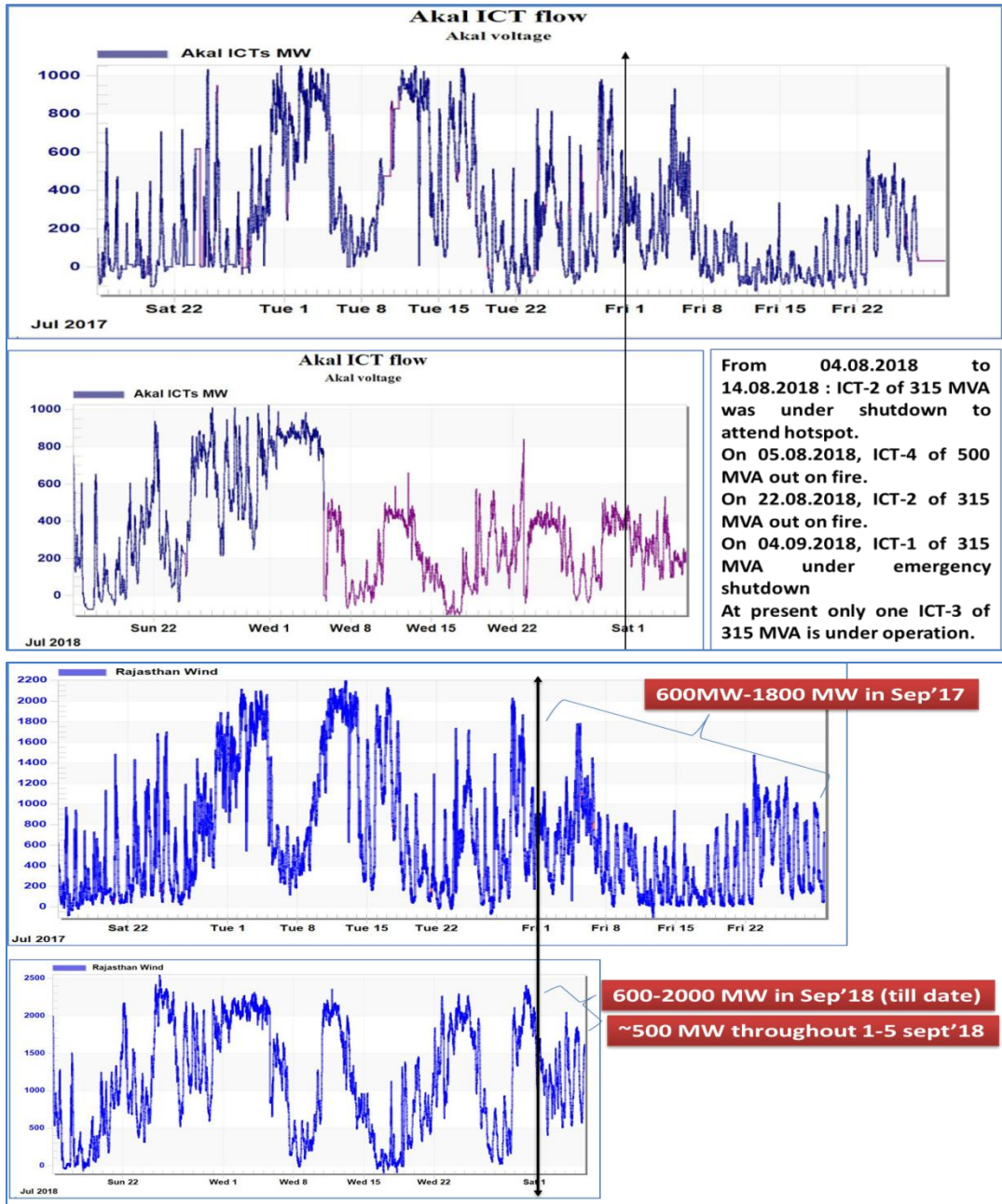
2. Wind generation evacuation issues at Akal

N-1 non-compliance issue at Akal ICTs has been addressed in various OCC/TCC meetings and also through various NRLDC communications vides letters & emails to all concerned utilities. The issues have also been raised in quarterly operational feedback of Northern region.

The same issues were flagged in 150th OCC (through NRLDC letter ref TS-03/1905-1908 dated 9th Aug 2018) wherein along with N-1 non-compliance at Akal, renewable energy evacuation further restrained due to tripping of ICT-4 of 500 MVA on fire dated 4th Aug 2018 was presented. It was requested to RVPN to explore some reorientation of the network so as to utilize 400 kV Ramgarh-Akal line for evacuating higher amount of wind generation.

As of now 400/220kV ICT-2 and ICT-1 of 315 MVA each has also gone under outage from 22nd August 2018 and 04 September 2018 respectively and only one ICT-3 of 315 MVA is available out of 1445 MVA to evacuate the pooled wind power at Akal. Since, ~ 800-1000 MW used to evacuate through Akal S/s (graph of wind & Akal ICTs of 2017 & 2018 is shown below) and even during the period of 1-5 Sept 2018, 500-1600 MW wind generation has been observed it seems that renewable energy evacuation might have restrained. RVPN please share the quantum of RE curtailment if any on account of transmission constraints at Akal.

In view of high wind season and outage of Akal ICTs, it is understood that RVPNL would have prepare action plans to maximize the evacuation of the wind generation. Therefore, it is requested to please share & document the actions plans its consequences. Moreover, RVPN also requested to share the detail report of fire incident along with remedial measures to avoid the incident in future.



Members may please like to discuss

3. Frequent forced outages of transmission elements

The following transmission elements were under frequent forced outages during the month of Aug'18:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	400 kV Bareilly(UP)-Unnao(UP) ckt -2	4	UP
2	220 kV Kishenpur(PG)-Ramban(JK)	4	POWERGRID/J&K
3	400 kV Bikaner(Raj)-Didwana(Raj) ckt-1	3	Rajasthan
4	765 kV Fatehabad(UP)-Lalitpur TPS(UP) ckt-1	3	UP
5	400 kV FSC (50%) of Koteshwar(PG)-1 at Meerut(PG)	3	POWERGRID
6	400/220 kV 500 MVA ICT-3 G.Noida	3	UP
7	800 kV HVDC Champa(PG) - Kurukshetra(PG) ckt-1	3	POWERGRID
8	400/220 kV 200 MVA ICT-1 Roza	3	UP

The complete details are attached at **Annexure-1**. The 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.

4. Multiple element tripping events in Northern region in the month of Aug'18:

A total of **27** grid events occurred in the month of Aug-2018 of which **19** 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 04-Sep-18 is attached at **Annexure-2**.

Further, despite persistent discussions/follow-up in various OCC/PCC meetings, the compliance of the regulations is still much below to the desired level. In **12** out of 27 events, no detail has been received at all.

Maximum Fault Duration is **9520ms** in the event of multiple element tripping at Rosa substation on 04th Aug 2018 at 12:01hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **9** events out of 21 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.

5. Details of tripping of Inter-Regional lines from Northern Region for Aug'18:

A total of 12 inter-regional lines tripping within a month occurred in the month of Aug'18. The list is attached at **Annexure-3**. 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.

It could be observed from attached table that not all information regarding the tripping is received from the utilities.

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

6. Frequency response characteristic:

A total of four FRC based events have occurred in the month of Aug-2018. Description of the events is as given below:

Table:

S. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf
1	06-Aug-18	13:06hrs	Tripping occurred at 400kV Chakan & 400kV Lonikhand S/S due to operation of busbar protection, Load loss of around 1000 MW occurred as per NLDC SCADA Data.	50.088	50.133	0.045
2	07-Aug-18	14:17hrs	KSK unit #2 & unit #4 tripped on operation of reverse power relay as reported by WRLDC. Total Generation loss is around 890 MW.	49.878	49.841	-0.037
3	12-Aug-18	05:31hrs	400 KV Rangpo – Binaguri II tripped on B-N phase fault, SPS-I operated and resulted into tripping of all running units of Teesta 3 (Except Unit one Unit) ,	50.044	50.008	-0.036

			one unit each of Jorethang, Tashiding, Chujachen and both unit of Dikchu (though it was supposed to trip only one unit). Total Generation loss at this point of time coming out to be 852 MW.			
4	29-Aug-18	04:02hrs	400kV Rampur-Nalagarh-1 auto-reclosed successfully and 400kV Rampur-Nalagarh-2 tripped on B-N fault. Consequently, the incident led to SPS operation at NJPC and Rampur Hydro stations causing tripping of 2 nos. units each, causing generation loss of 500 MW and 130 MW respectively. Further, at Karcham Wangtoo, Units-2 and 4 went into NLNE mode (No Load Not Excited) causing generation reduction of around 500 MW. Total Generation Loss reported was around 1230 MW.	50.005	49.940	-0.065

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 attached at **Annexure-4**.

In line with the decisions taken during various OCC meetings, the time and date of the FRC events were e-mailed to respective utilities. The FRC calculations for any or both of the above events have been received from **Punjab, Rajasthan, NHPC, Tehri HEP and UP**. Constituents may submit the FRC of their control areas for both the events and reason of poor response, if observed.

7. **RGMO/FGMO status**

It was discussed and decided in 138thOCC meeting that all the utilities shall map RGMO/FGMO status in the SCADA system and do the cabling and other work on their own expense. Further RGMO/FGMO status mapping in SCADA was also approved in 37thTCC/40thNRPC meeting.

RGMO status is **yet to be mapped** in SCADA for following plants:

- NHPC: Bairasiul, Salal, Tanakpur, Chamera-2, Uri-1, 2, Dulhasti, Parbati-3
- BBMB: All BBMB plants
- THDC: Koteswar
- S.Cement
- JSW: Karcham
- Greenko: Budhil
- Everest Power: Malana-2
- AD Hydro

Among the states Punjab, Rajasthan, Haryana and UP have mapped the RGMO/FGMO status for most of their control area generating stations.

Constituents shall expedite the availability of RGMO status to NRLDC SCADA at the earliest.

Members may please discuss.

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

The present status of UFR &df/dt is tabulated below:

States	UFR	df/dt	Improvement from status in 146 th 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 	<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. 	Poor

			<p>display.</p> <ul style="list-style-type: none"> • Feeder wise planned load relief. • Alternate feeder details. • Total actual relief in UFR. 	<ul style="list-style-type: none"> • Calculation of total actual relief in df/dt seems incorrect. 	
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
Uttarakhand	No	No			
Punjab	Yes	Yes		<p>Following yet to be provided:</p> <ul style="list-style-type: none"> • Complete telemetry of feeders. • Alternate feeders details. • Digital Status of all the feeders 	Poor
Rajasthan	Yes	Yes	<p>Following are provided since last status:</p> <ul style="list-style-type: none"> • UFR display provided. 	<p>Following yet to be provided:</p> <ul style="list-style-type: none"> • Analog value and digital data not available in UFR display (only alternate feeder details provided) 	Very Poor

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. However, it could be seen that the State UFR, df/dt displays are not exactly as per the approved format.

In 136th OCC meeting it was discussed that in addition to the SCADA mapping, States should provide the following information regarding the UFR, df/dt relays installed at their respective substations:

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

In 137th OCC meeting, MS 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, 143th OCC and 146th OCC meeting, all the state utilities were requested to correct the SCADA UFR, df/dt displays as per the comments. In addition, utilities were asked to submit the information based on the discussion points came afore in Video conference with state utilities. However, the status stands the same.

The defense schemes are extremely important schemes and can avert any major contingency. Hence, State utilities shall make all possible efforts to strengthen the same.

State 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.

Members may discuss.

9. Mock blackstart exercise in NR:

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

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

Therefore, the schedule of mock exercise dates for different hydro & Gas power station is proposed. The power stations may confirm and inform to all the concerned persons of control centre/ substations to facilitate the exercise.

The summary/schedule of mock black start exercise of ISGS hydro stations carried out in previous season is tabulated below:

S. No.	Proposed Date	Revised Date	Generating station	Remarks
1	24-Oct-17		Koldam	Carried out successfully.
2	31-Oct-17	28-Mar-18	Nathpa Jhakri & Rampur	Partially successful. Blackstart could not be extended due to repeated tripping of 400kV Nalagarh-Rampur line on over voltage while charging.
3	3-Nov-17	08-Mar-18	Dhauliganga	Carried out successfully. However, plant was not able to synchronize the island with grid. The same was carried out at Bareilly.
4	7-Nov-17		Salal	Deferred due to pending consent from SLDC-J&K.
5	10-Nov-17	3-Nov-17	Sewa-2	Carried out successfully.
6	14-Nov-17		Budhil	
7	17-Nov-17		Malana-2	Deferred by Plant
8	21-Nov-17		Parbati-3	Carried out successfully. Island collapsed while carving out.
9	24-Nov-17	04-Dec-17	Chamera-3	Carried out successfully.
10	30-Nov-17		Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh	Deferred due to pending consent from SLDC-J&K.
11	5-Dec-17	1-Dec-17	Chamera-2	Carried out successfully. Island collapsed during stage-1.
12	8-Dec-17	1-Dec-17	Chamera-1	
13	20-Dec-17		Bairasiul	Carried out successfully. Unit tripped after island synchronization with grid.
14	4-Jan-18		Koteshwar	Carried out successfully.
15	9-Jan-18	07-Mar-18	AD Hydro	Carried out successfully. However, plant was not able to synchronize the island with grid. The same was carried out at Nalagarh.
16	16-Jan-18		Karcham Wangtoo	Carried out successfully.
17	23-Jan-18		Tehri	Partially successful. Initial Island collapsed due to tripping of 400kV Koteshwar-Meerut ckt.

Out of 17 planned exercises 13 were carried out. The exercises which could not be done are highlighted in the above table. Out of 13 exercises carried out, there was change in scheduled date in 7 of them. Thus, in more than half of the exercises carried out the schedule was maintained due to reasons like load not being available, plant personnel not ready, coordination problem. **In 144th OCC meeting, constituents were requested to adhere to the finalised schedule of mock exercises during the season.**

The proposed schedule for the Mock Black start exercise is as follows:

Hydro Power Stations:

Date	Name of stations
18-Oct-18	*Kishanganga (new plant)
24-Oct-18	*Malana-2
26-Oct-18	Dhauliganga
02-Nov-18	*Salal
13-Nov-18	Nathpa Jhakri & Rampur
16-Nov-18	*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh
19-Nov-18	*Budhil
28-Nov-18	Chamera-3
30-Nov-18	Sewa-2
03-Dec-18	Chamera-1 & Chamera-2
11-Dec-18	Parbati-3
14-Dec-18	Bairasiul
19-Dec-18	Koteshwar
28-Dec-18	AD Hydro
04-Jan-19	Tehri
08-Jan-19	Karcham Wangtoo
11-Jan-19	Koldam

** Mock black-Start exercise not carried out during Year 2017-18.*

Mock black-Start procedure circulated during last exercise/ previous year may be used. The unit selection may be changed from the one taken during last year exercise.

Gas Power Stations:

Date	Name of stations
09-Oct-18	*Auraiya GPS
12-Oct-18	Dadri GPS
30-Oct-18	*Anta GPS

** Mock black-Start exercise not carried out during Year 2017-18, procedure to be developed..*

As informed by Bawana GPS, it does not have black start capability.

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

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

28		Maneri Bhali-I&II	3x30+4x76
29	Delhi	IP Extn GTs	6x30+3x30
30		Pragati GPS	2x104.6+1x121.2
31		Rithala	3x36
32	Haryana	Faridabad GPS	2x137.75+1x156.07

During last winter, SLDCs had been requested to carry out mock drills and share their experiences. However, the information was received from HP (Sainj, Baspa) and Rajasthan (only schedule of exercises) only. The information may please be shared by SLDCs and program for this year's mock black start exercises shall also be shared.

SLDCs shall submit the reports of black start exercise in their respective control area. SLDCs may also identify further generating stations/unit for black start exercise.

Members may please discuss.

10. EHV lines tripping due to fog during winter:

In order to avoid tripping of EHV line during foggy (Smog) weather in winter, preventive actions like cleaning/washing of insulator, replacement to insulators with polymer one etc. have been recommended and being done. In order to have proper information about the lines wherein such actions have been taken, it had been repeatedly agreed in OCC/TCC meetings, to update line wise data for insulator replacement and cleaning. The lines details as well as format had been shared last year during winter but detail in desired format is yet to be received from the utilities. Format is as below:

Status of replacement of Porcelain insulators with Polymer insulators												As on-		
S.No.	Name of Line/voltage /S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Target for this year)			Progress (Work already completed)			Schedule for completion of Replacement		Remarks <i>(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)</i>
			Total Length of line (in kM)	Total Towers location (Nos)	Total Insulator Strings (Nos)	Length (kM)	Total Towers Locations (Nos)	Total Insulators Strings (Nos)	Length (in kM)	Total Towers Locations (Nos)	Total Insulators Strings (Nos)	Start Date	End Date	
1	2		3	4	5	6	7	8		9		11	12	13

Note: 1. Line constructed with Polymer Insulator may please also be indicated in the table

2. Similar separate table shall be formulated for Anti-fog insulators line as well for line which would be cleaned

3. Lines for whom there is no planning of cleaning or replacement may please also be given in the table but with '--' in planning as well as progress columns

Compiled 400 kV line information (polymer replacement status) available with NRLDC is once again attached as **Annexure-5**. All the concerned utilities kindly go through the details and verify the details.

Utilities may kindly identify the transmission lines for insulator replacement and insulator cleaning for year 2018-19.

Members may like to discuss and expedite the same.

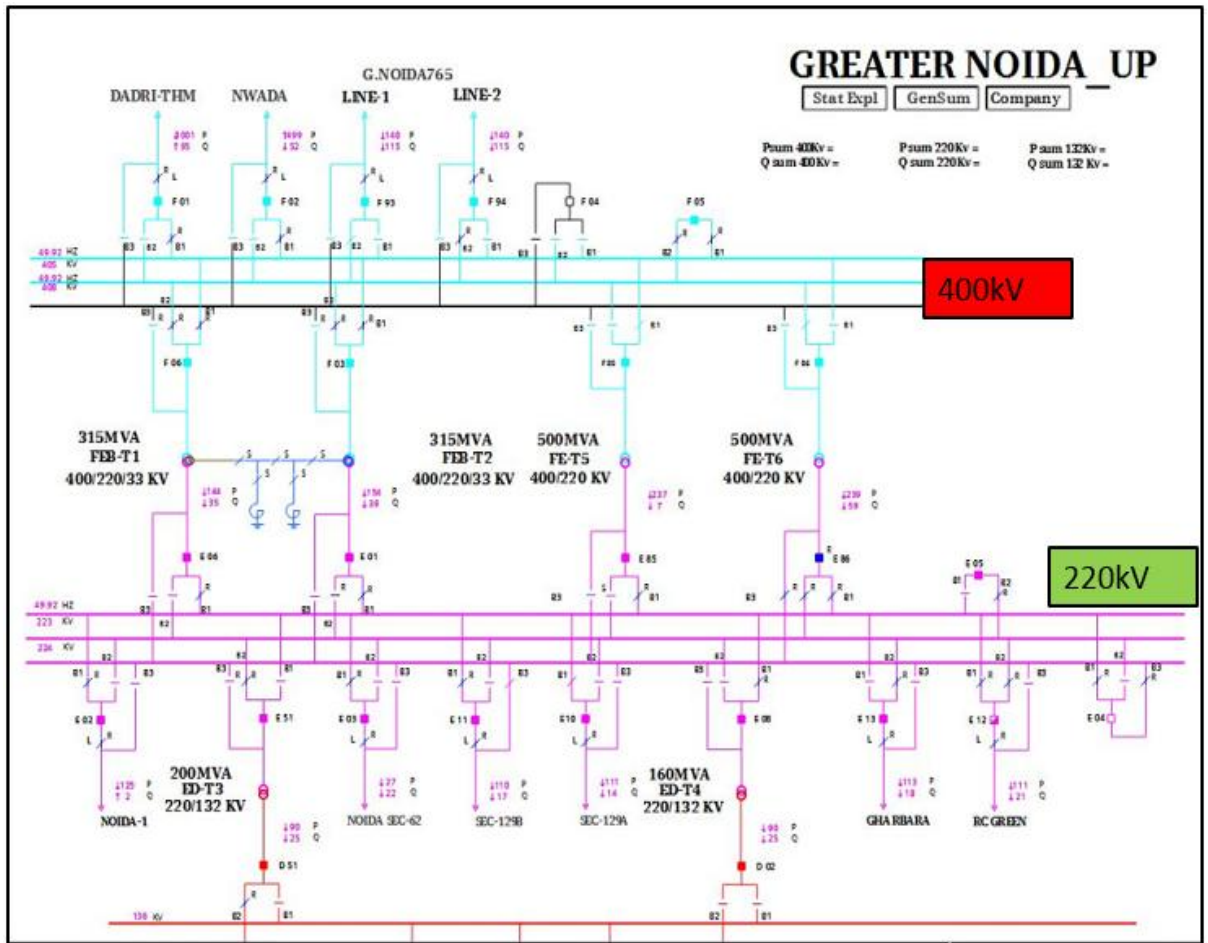
11. Complete outage of 400/220 kV G. Noida (UP) on 06 Nov 2018 at 22:40hrs:

As reported by UP SLDC, conductor of R phase 400 kV Bus-A broken at 400/220 kV G. Noida leading to 400 kV bus-bar fault at 400/220 kV G. Noida (UP). 400 kV bus bar protection did not operate at 400/220 kV G. Noida (UP). It was found that none of the breaker opened from 400 kV G. Noida (UP) end.

All the 400 kV connected lines from 400/220 kV G. Noida (UP) lines tripped from remote end. This resulted in loss of approx. 800-900 MW and frequency increasing from approx. 49.91 Hz to 50.12 Hz (thus a jump of approx. 0.11 Hz). After the tripping the line loading on remaining lines remained within limits.

As reported by NTPC Dadri, Vibration more 200 microns also sensed in Dadri stage-2 units.

400/220 kV G. Noida (UP) station is an important load feeding station in Delhi NCR with 1630MVA (2*315MVA+2*500MVA) capacity. Connectivity Diagram is as below:

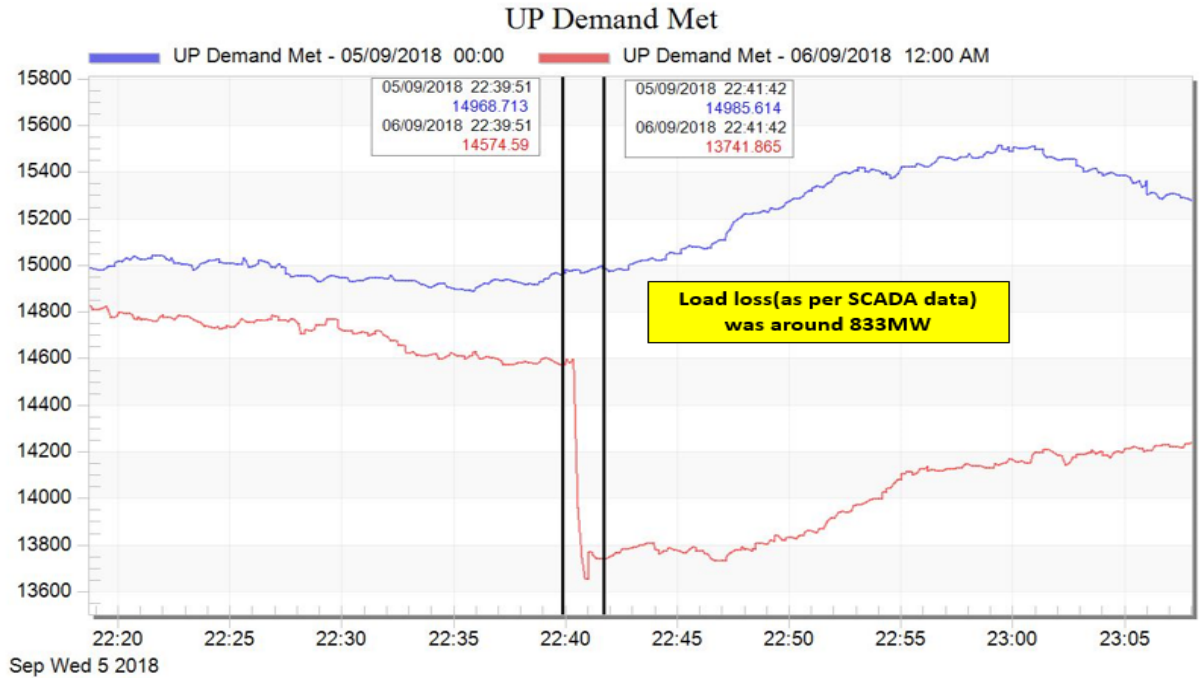


As per PMU data maximum dip in R-phase and fault clearance time was ~400ms. Delayed clearance of fault as per PMU data. PMU plot of phase voltages of Ballabhgarh (PG) is as below:



AS per PMU plot of frequency, it seems load loss occurred in the system.

As per SCADA data, load loss of ~830 MW observed in UP demand met. As informed by UP, Sector-62 Noida is further connected in the Grid through 400kV Indirapuram. All other 220 kV feeders and downward ICTs at 400/220kV G. Noida feed the radial load. SCADA data plot is as below:



As per SCADA SoE:

- 400 kV Dadri-G. Noida ckt tripped immediately from Dadri (NTPC) end. No breaker opened at 400/220 kV G. Noida end.
- Tripping also occurred at 400 kV G. Noida (765/400 kV)-G. Noida (400kV) ckt-1 & 2 from 400 kV G. Noida (765/400 kV) end. 765/400 kV 1500MVA ICT-1 also tripped at 765/400 kV G. Noida (UP).
- It seems time synchronization error in the reporting of SoE of 765/400 kV G. Noida (UP) and 400 kV Nawada (Haryana)

Time	S/S name	Voltage Level (in kV)	Element Name	Element Type	Status	Remarks	Comment
22:20:48,354	NAWADA	400kV	4GNODA1	Circuit Breaker	Open	Time Synchron error	Main CB of 400kV Nawada(end)-Greater Noida opens
22:40:09,160	As per PMU data						
22:40:09,165	DADRI (Thermal)	400kV	20GN1MA2	Circuit Breaker	Open		Tie CB of 400kV Dadri(end)-Greater Noida & 400kV Dadri(end)-Mandola ckt-2 opens
22:40:09,212	DADRI (Thermal)	400kV	21GNODA1	Circuit Breaker	Open		Main CB of 400kV Dadri(end)-Greater Noida opens
22:40:37,000	GNOD7_U	400kV	403T1	Circuit Breaker	Open	Time Synchron error	400kV side main CB of 1500 MVA ICT 1 765kV Greater Noida opens
22:40:37,000	GNOD7_U	765kV	701T1	Circuit Breaker	Open		765kV side main CB of 1500 MVA ICT 1 765kV Greater Noida opens
22:40:37,000	GNOD7_U	400kV	402T1T3	Circuit Breaker	Open		400kV side tie CB of 1500 MVA ICT 1 765kV Greater
22:40:37,000	GNOD7_U	765kV	702AGRT1	Circuit Breaker	Open		765kV side tie CB of 1500 MVA ICT 1 765kV Greater
22:40:37,000	GNOD7_U	400kV	415GNDA2	Circuit Breaker	Open		Main CB of 400kV Greater Noida(765kV)(end)-Greater noida(400kV) ckt-2 opens
22:40:37,000	GNOD7_U	400kV	418GNDA1	Circuit Breaker	Open		Main CB of 400kV Greater Noida(765kV)(end)-Greater noida(400kV) ckt-1 opens
22:40:37,000	GNOD7_U	400kV	414SPGD2	Circuit Breaker	Open		Tie CB of 400kV Greater Noida(765kV)(end)-Greater noida(400kV) ckt-2 opens
22:40:37,000	GNOD7_U	400kV	417SPGD1	Circuit Breaker	Open		Tie CB of 400kV Greater Noida(765kV)(end)-Greater noida(400kV) ckt-1 opens

Points for discussion:

- Outage of entire substation in 400 kV Delhi ring is a serious operational issue and any further tripping could result into disturbance propagating to larger area and therefore, safeguards by way of protection system improvement need to be expedited.
- Non operation of 400 kV Bus Bar Protection at 400 kV side of 400 /220 kV G. Noida (UP) is a major cause of concern and same needs to be rectified at the earliest possible.
- Instantaneous tripping of 400 kV Dadri-G. Noida ckt from Dadri end needs to be looked into as fault was in Z-2 from Dadri end.
- Tripping of 1500MVA 765/400 kV ICT-1 at 765/400 kV G. Noida (UP) needs to be looked into. Protection Co-ordination of 1500MVA ICT with 400 kV G. Noida (765/400kV)-G. Noida (400/220kV) ckts also to be checked.
- Time synchronization of SCADA SoE of 765/400 kV G. Noida (UP) and Nawada (Haryana) to be checked and corrected.
- Exact sequence of events in view of cause of event; protection operation/non-operation; opening, closing of breaker, isolator; relevant alarms and any other relevant detail to be shared.

UPPTCL may kindly update further.

12. Oscillations observed in the grid on 25th & 29th July 2018 due to tripping of one of the evacuation line from 220 kV Dhauliganga HEP:

This Agenda point was already discussed in 150th OCC meeting, in which oscillation details were shown and discussed. Following points were suggested to NHPC:

- Proper tuning/ retuning of PSS/AVR of the units at 220 kV Dhauliganga HEP
- SPS (System Protection scheme). With the following logic shall be implemented at 220 kV Dhauliganga HEP.
 - Probable logic of SPS could be: *Trip two units at Dhauliganga HEP in case of tripping of one of the 220 kV outgoing lines from Dhauliganga HEP or power flow on any of the outgoing line become zero*

Decision in 150th OCC meeting:

- NHPC representative stated that SPS logic has been prepared on the basis of power flow on lines and would be shared and approved in upcoming OCC/PSC meeting.
- NRLDC representative requested that PSS tuning shall be extensively carried out and report to be shared. Further, the dynamic machine parameters are important to assess the dynamic behavior of the system and shall be shared by NHPC and other constituents as well.
- OCC requested constituents to provide the respective details.

NHPC and other constituents may please provide the details. NHPC may please submit the SPS logic for approval of NRPC.

Members may like to discuss.

13. Observance of Oscillations in the grid on 08th Aug 2018 due to tripping of one of the evacuation line from 400kV Tehri-Koteshwar complex (N-1 contingency of line outage):

This Agenda point was already discussed in 150th OCC meeting, in which oscillation details were shown and discussed. Following action points were approved during the meeting:

- At Tehri HEP, the setting of unit #1 dead fault to be checked. Further, the sensitivity of Unit #1 as compared to other units also needs to be checked.
- Full SPS including the functional logic needs to be checked at Koteshwar(PG)/ Tehri HEP.
- In SPS logic, tripping of two units at Tehri HEP could also be thought of.
- In view of several fault incidents in recent past, strengthening of 400kV Tehri-Koteshwar-Meerut transmission lines to be looked into.
- Setting of df/dt relay operated in Punjab to be checked and shared.
- Any UFR, df/dt relay operation in any other state to be checked and confirmed.
- Long outage of FSC of 400 kV Meerut-Koteshwar ckt-2 to be looked into and revival of FSC shall be expedited.
- AVR/ PSS tuning needs to be looked into for better tuning at Tehri and Koteshwar HEP.
- Reason of outage of FSC of 400 kV Meerut-Koteshwar ckt-1 (01 Aug to 08 Aug 2018) without informing to NRLDC, to be informed and such future cases to be avoided.
- Auto reclosure issue of tie CB of 400 kV Meerut (end)-Koteshwar Pool ckt-2 to be checked and corrected.

POWERGRID/ THDC may kindly inform about the status of SPS testing.

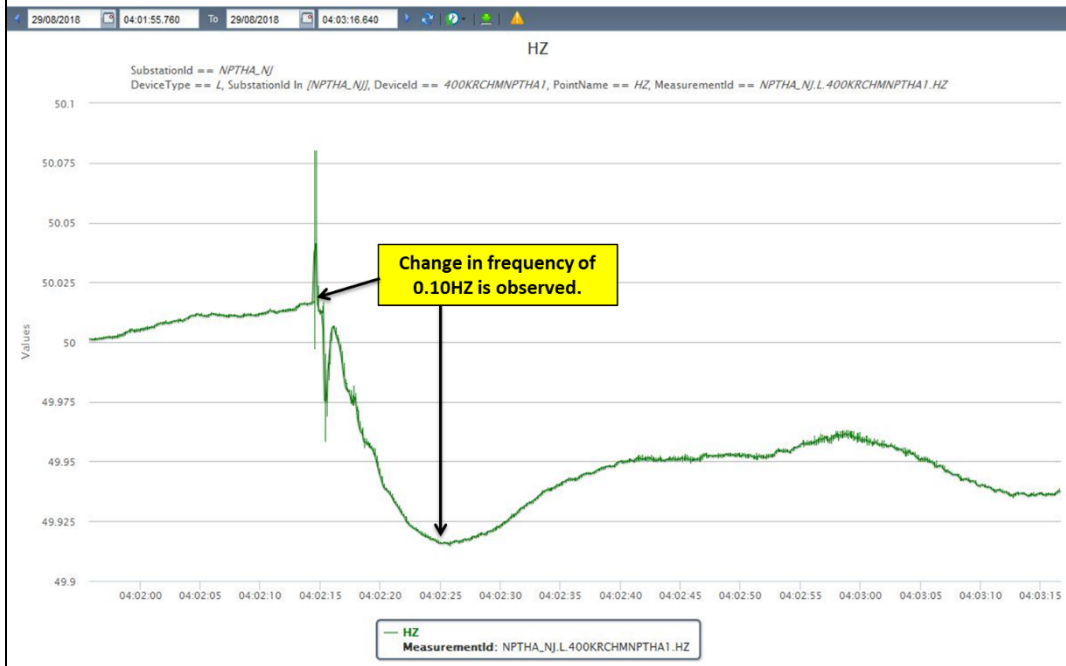
Other utility may also inform the status of action points already taken or to be taken with time frame.

14. Tripping in Jhakri-Karcham-Rampur complex due to SPS operation:

At 04:02hrs of 29-Aug-18, B-N fault (94km from Rampur end) occurred in both 400kV Rampur–Nallagarh ckt. Ckt-1 was successfully auto reclosed at both ends. However, ckt-2 was auto reclosed successfully at Nallagarh(PG) but CB failed to open at Rampur end resulting in tripping of all CBs at Rampur on pole discrepancy. Due to the above incident, SPS operated at Nathpa Jhakri and Rampur causing tripping of 2 units each at Rampur & Nathpa Jhakri hydro station. Due to SPS operation at Karcham, units-2 & 4 went into NLNE mode (No load Not Excited). The PMU plot and DR received w.r.t. the incident are shown below:

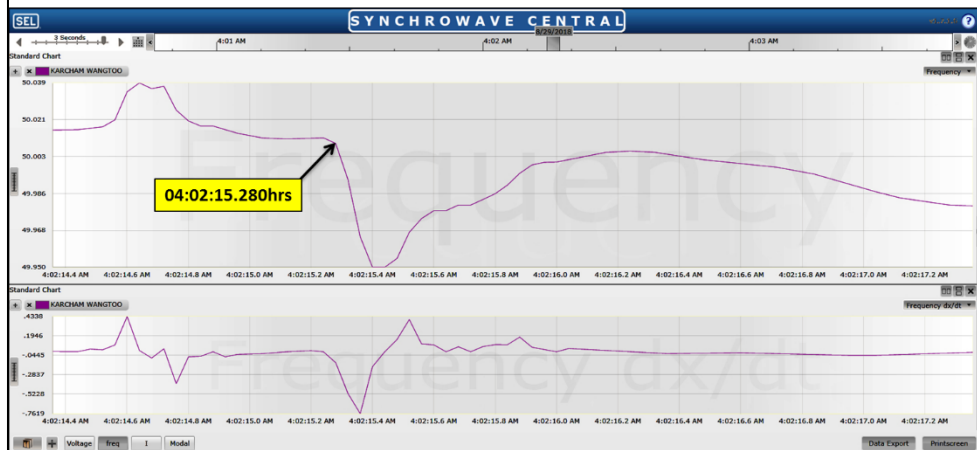
PMU Plot of frequency at Nathpa Jhakri(NJPC)

04:02hrs/29-Aug-18



PMU Plot of frequency at Karcham

04:02hrs/29-Aug-18

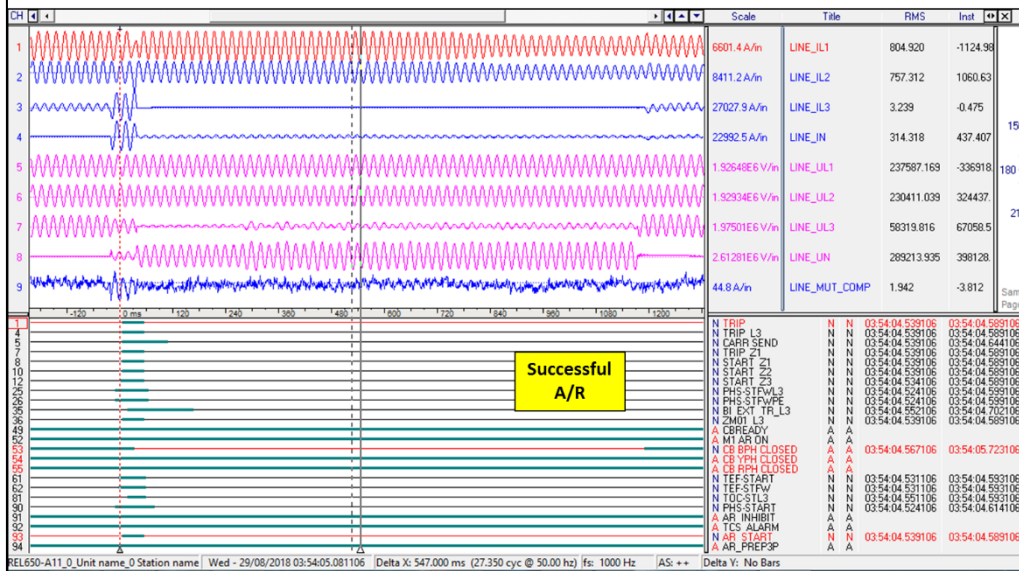


PMU Plot of phase voltage magnitude at Nathpa Jhakri(PG)

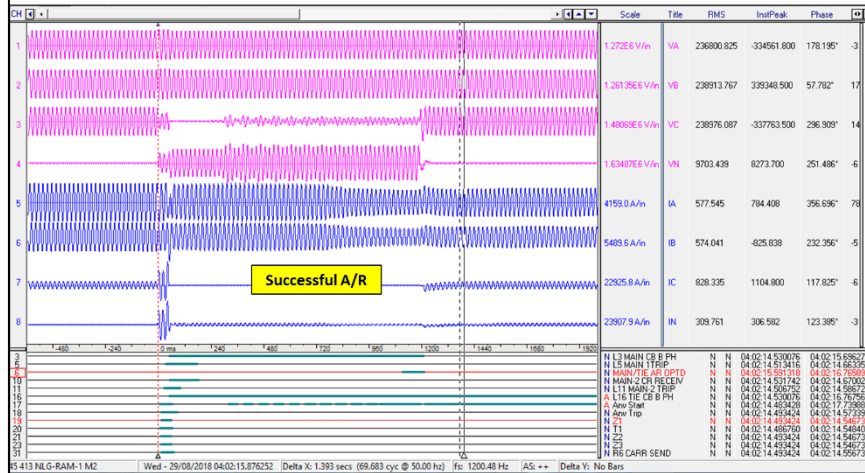
04:02hrs/29-Aug-18



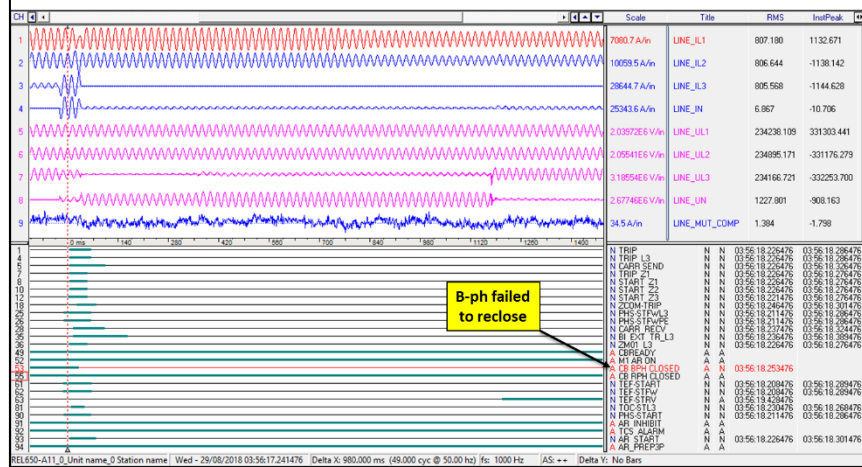
DR: 400kV Rampur(end)-Nallagarh-1



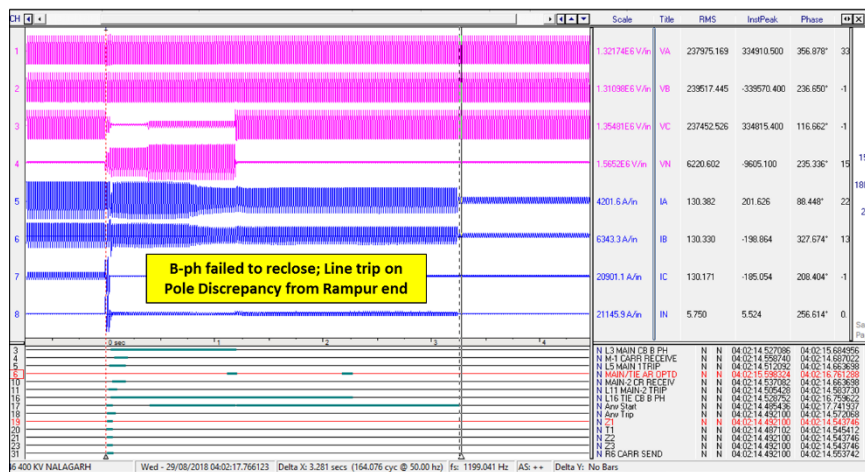
DR: 400kV Rampur-Nallagarh(end)-1



DR: 400kV Rampur(end)-Nallagarh-2



DR: 400kV Rampur-Nallagarh(end)-2



The SCADA SoE reported at NRLDC are as follows:

Time	Station	Voltage	Element	Device	Status
04:00:00,000	KARCHAM	400kV	G2H02	Circuit Breaker	Open
04:00:00,000	KARCHAM	400kV	G4H04	Circuit Breaker	Open
04:00:00,000	KARCHAM	400kV	G2H02	Circuit Breaker	Close
04:00:00,000	KARCHAM	400kV	G4H04	Circuit Breaker	Close
04:01:41,743	RAMPUR	400kV	02G2	Protection Trip	App
04:06:43,652	RAMPUR	400kV	01G1	Protection Trip	App
04:08:49,863	RAMPUR	400kV	01G1	Protection Trip	Disp
04:09:12,782	RAMPUR	400kV	02G2	Protection Trip	Disp

NJPC, JSW (Karcham), POWERGRID may look into the following points:

- Non-tripping of B-phase CB of 400kV Nalagarh-Rampur-2 at Rampur.
- Tripping of two units each at Karcham, Jhakri and Rampur is as per the case-2 of SPS logic i.e. tripping of any two lines from Jhakri or Rampur. However, only one ckt (400kV Rampur-Nallagarh-2) tripped. Therefore, SPS logic needs to be checked.
- It seems from PMU frequency data that generating units tripped before auto-reclosing attempt of lines. The following needs to be shared w.r.t. SPS:
- Logic calculation time.
- Time in which tripping command sent to units after meeting the condition for SPS.
- Logic for various SPS conditions checking.
- The reporting of SCADA SoE at NRLDC and its time synchronization to be looked into and resolved.

Subject: **Correction in NRPC 150th OCC MOM - Reg.**

Date: 03/09/18 12:03 PM

To: seo-nrpc <seo-nrpc@nic.in>,
soniag vij456 <soniag.vij456@gmail.com>

From: Shailesh Dheman <shaileshdheman@ntpc.co.in>

Cc: ms-nrpc <ms-nrpc@nic.in>,
Rama Nand Pandey <rnpandey02@ntpc.co.in>

Dear Sir,

This has reference to NRPC 150th OCC MOM wherein the following is recorded at Point No 30.5 - para(5) :

"NTPC representative stated that at present 0.9 APM Gas is available & 0.5 APM have been tied up with WR for running Auriya."

The word "APM" needs to be replaced with "Domestic Gas" and figure of "0.9" needs to be replaced with "0.09 MMSCM" as stated during the meeting.

Kindly incorporate the suitable amendments in the MOM.

सादर

शैलेश धीमन

(उप महाप्रबन्धक)

प्रचालन सेवार्ये

राष्ट्रीय राजधानी क्षेत्र मुख्यालय, नोएडा

Annexure-4

Control Area	% FRC for different events			
	6-Aug-18	7-Aug-18	12-Aug-18	29-Aug-18
PUNJAB	54%	72%	76%	-48%
HARYANA	151%	-8%	171%	79% (Decrease in schedule)
RAJASTHAN	22%	-64%	-16%	66% (Decrease in schedule)
DELHI	-8%	11%	21%	30%
UTTAR PRADESH	52%	75%	23%	-5%
UTTARAKHAND	4%	8%	-248%	79%
CHANDIGARH	9%	-11%	256% (Small Control area)	-23% (Small Control area)
HIMACHAL PRADESH	26%	65%	-8%	-17%
JAMMU & KASHMIR	5%	-100%	49%	4%
NR	45%	14%	15%	58%

Annexure-4

Control Area	% FRC for different events				Average	Median
	6-Aug-18	7-Aug-18	12-Aug-18	29-Aug-18		
Singrauli TPS	88%	15%	-7%	-2%	23%	6%
Rihand-1 TPS	Decrease in schedule	-13%	5%	25%	6%	5%
Rihand-2 TPS	Decrease in schedule	3%	12%	15%	10%	12%
Rihand-3 TPS	Decrease in schedule	Increase in Schedule	-15%	-4%	-10%	-10%
Dadri-1 TPS	58%	16%	259%	108%	110%	83%
Dadri -2 TPS	218%	45%	147%	220%	158%	182%
Unchahar TPS	9%	0%	59%	-10%	14%	5%
Unchahar stg-4 TPS	No generation	No generation	No generation	No generation	NA	NA
Jhajjar TPS	11%	78%	281%	161%	132%	119%
Dadri GPS	No generation	No generation	No generation	108%	108%	108%
Anta GPS	No generation	No generation	No generation	No generation	NA	NA
Auraiya GPS	18%	-9%	-21%	No generation	-4%	-9%
Narora APS	25%	-18%	0%	0%	2%	0%
RAPS-B	Suspect SCADA data	6%	0%	0%	2%	0%
RAPS-C	8%	41%	52%	4%	26%	25%
Chamera-1 HEP	-9%	2%	-11%	-1%	-5%	-5%
Chamera-2 HEP	19%	27%	Suspect SCADA data	Suspect SCADA data	23%	23%
Chamera-3 HEP	67%	7%	101%	4%	45%	37%
Bairasiul HEP	1%	No generation	0%	-16%	-5%	0%
Salal HEP	-1%	Suspect SCADA data	2%	4%	2%	2%
Tanakpur HEP	No generation	61%	-34%	56%	28%	56%
Uri-1 HEP	-1%	-1%	-7%	-6%	-4%	-4%
Uri-2 HEP	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	0%	0%	0%
Dhauliganga HEP	21%	Suspect SCADA data	177%	14%	71%	21%
Dulhasti HEP	61%	128%	6%	No generation	65%	61%
Sewa-II HEP	No generation	52%	235%	No generation	144%	144%
Parbati-3 HEP	0%	45%	Suspect SCADA data	Suspect SCADA data	22%	22%
Jhakri HEP	66%	No generation	-10%	36%	30%	36%
Rampur HEP	-12%	No generation	-77%	8%	-27%	-12%
Tehri HEP	17%	39%	17%	39%	28%	28%
Koteswar HEP	-63%	Suspect SCADA data	Suspect SCADA data	0%	-32%	-32%
Karcham HEP	65%	Suspect SCADA data	112%	110%	96%	110%
Malana-2 HEP	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	NA	NA
Budhil HEP	0%	9%	Suspect SCADA data	0%	3%	0%
Bhakra HEP	-4%	-8%	11%	1%	0%	-1%
Dehar HEP	-5%	-1%	-7%	2%	-3%	-3%
Pong HEP	No generation	No generation	No generation	-8%	-8%	-8%
Koldam HEP	86%	0%	0%	146%	58%	43%
AD Hydro HEP	0%	0%	0%	Suspect SCADA data	0%	0%

Annexure-4

Control Area	% FRC for different events				Average	Median
	6-Aug-18	7-Aug-18	12-Aug-18	29-Aug-18		
Ropar TPS	197%	72%	Suspect SCADA data	28%	99%	72%
L.Mohabbat TPS	142%	140%	153%	17%	113%	141%
Rajpura TPS	Suspect SCADA data	71%	150%	49%	90%	71%
T.Sabo TPS	Seems dec. in schedule	Suspect inc. in schedule	45%	37%	41%	41%
Goindwal Sahib TPS	Seems dec. in schedule	336%	209%	93%	213%	209%
Ranjit Sagar HEP	23%	Suspect dnc. in schedule	11%	-10%	8%	11%
Anandpur Sahib HEP	-8%	-8%	0%	-14%	-8%	-8%
Panipat TPS	-28%	-16%	0%	4%	-10%	-8%
Khedar TPS	No generation	No generation	No generation	No generation	NA	NA
Yamuna Nagar TPS	No generation	No generation	No generation	No generation	NA	NA
CLP Jhajjar TPS	17%	0%	2%	11%	7%	6%
Faridabad GPS	No generation	No generation	No generation	-87%	-87%	-87%
Kota TPS	14%	79%	6%	67%	41%	41%
Suratgarh TPS	57%	29%	0%	35%	30%	32%
Kalisindh TPS	Seems dec. in schedule	-3%	Suspect SCADA data	Suspect SCADA data	-3%	-3%
Chhabra TPS	No generation	No generation	No generation	No generation	NA	NA
Chhabra stg-2 TPS	11%	23%	13%	22%	17%	17%
Kawai TPS	11%	77%	209%	61%	90%	69%
Dholpur GPS	No generation	No generation	No generation	No generation	NA	NA
Mahi-1 HEP	No generation	No generation	No generation	No generation	NA	NA
Mahi-2 HEP	No generation	No generation	No generation	No generation	NA	NA
RPS HEP	No generation	No generation	No generation	No generation	NA	NA
JS HEP	No generation	Suspect SCADA data	No generation	No generation	NA	NA
Badarpur TPS	12%	9%	23%	20%	16%	16%
Bawana GPS	-21%	-26%	Suspect SCADA data	-27%	-25%	-26%
Pragati GPS	4%	-41%	15%	-17%	-10%	-7%
Obra TPS	-13%	7%	0%	3%	-1%	1%
Harduaganj TPS	342%	299%	12%	-43%	153%	156%
Paricha TPS	0%	0%	-12%	19%	2%	0%
Rosa TPS	No generation	No generation	38%	31%	35%	35%
Anpara TPS	3%	49%	-4%	1%	12%	2%
Anpara C TPS	126%	Seems increase in schedule	0%	26%	51%	26%
Anpara D TPS	23%	0%	41%	5%	17%	14%
Bara TPS	2%	7%	-19%	Suspect SCADA data	-3%	2%
Lalitpur TPS	2%	Suspect SCADA data	-24%	15%	-2%	2%
Meja TPS	No generation	No generation	No generation	No generation	NA	NA
Vishnuprayag HEP	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	NA	NA
Alaknanda HEP	135%	-8%	-8%	-3%	29%	-5%
Rihand HEP	No generation	No generation	631%	No generation	631%	631%
Obra HEP	No generation	No generation	No generation	No generation	NA	NA
Gamma Infra GPS	No generation	No generation	No generation	No generation	NA	NA
Shravanti GPS	No generation	No generation	No generation	No generation	NA	NA
Ramganga HEP	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	NA	NA
Chibra HEP	Suspect SCADA data	-38%	0%	Suspect SCADA data	-19%	-19%
Khodri HEP	No generation	No generation	No generation	No generation	NA	NA
Chilla HEP	-19%	Suspect SCADA data	23%	-5%	0%	-5%
Baspa HEP	0%	Suspect SCADA data	-14%	-2%	-5%	-2%
Malana HEP	-10%	17%	6%	4%	4%	5%
Sainj HEP	-52%	12%	Suspect SCADA data	-7%	-16%	-7%
Larji HEP	-9%	-8%	0%	15%	-1%	-4%
Bhabha HEP	20%	23%	7%	9%	15%	14%
Giri HEP	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	Suspect SCADA data	NA	NA
Baglihar-1&2 HEP	-6%	-11%	2%	-8%	-6%	-7%
Lower Jhelum HEP	No generation	No generation	No generation	No generation	NA	NA

Punjab State Transmission Corporation Limited

(Punjab Govt. Undertaking, Regd. Office Shakti Sadan Patiala)

Office of Dy. Chief Engineer P&M CIRCLE, Amritsar.

Ph. 0183-2702562, Fax. 0183-2702562 E.mail : se-pm-asr@pstcl.org

Memo no

4701/02

Dated

21-8-18

To,

✓ Chief Engineer/SLDC
PSTCL Patiala.

Memo no

Dated


Subject:- System Study for Capacitor Requirement for the year 2019-20.(149th OCC Meeting held on 18th july/2018 at NRPC Secretariat, New delhi)

Reference:- Your office memo no 1100/T-509 dated 14.08.2018 & CE/P&M PSTCL Ludhiana Endst no:-6110/14 dated 16.8.18.

Regarding the attached performa related with subject cited matter, following clarification are required:-

- *In our area, most of 66 KV lines are not feeding independently to 66/11 KV Sub-Stations but these lines are taped in between for feeding another 66/11 KV Sub-Stations. The enclosed Performa is not addressing this feature of 66 KV lines.*
- *In the enclosed Performa, 132/11 KV and 132/33 KV power transformers are not mentioned*

Regarding above mentioned queries , we talked to **Dr Manohar singh (CPRI)**, he advised for writing about these queries to **NRPC** so that these features can be included in the related performa .You are requested for obtaining these clarifications from the concerned authority.


Dy.Chief Engineer/P&M
Circle PSTCL,Amritsar

CC:- CE/P&M PSTCL, LUDHIANA.

ANNEXURE 8 REPLY OF BBMB ON COMMENTS RECEIVED FROM POWERGRID , NTPC, PSTCL

Sub: Correction of Phase mismatches nomenclature.

Please refer your mail dated Aug 7, 2018 on the subject matter, through which comments dated 01.08.18 of rtamc jammu <rtamcjammu@powergrid.co.in, NTPC and PSTCL have been forwarded.

In this regard, comments of BBMB are as under:-

1. *PGCIL has commented that "Jumpers need to be interchanged at the dead end towers terminating at BBMB stations only. If this is done, there will be no need to do any re-connection work at other sites. For example: if dead end tower jumpers of all 132, 220 & 400 kV line at BBMB Dehar are re-connected then there will be no need to make any change at the other ends connected to Dehar PH. In this regard, BBMB may be communicated to review please".*

BBMB proposal is framed to make the compliance of directions of NRPC to correct phase mismatch nomenclature between BBMB and PGCIL/PSTCL/HPSEB. PGCIL proposal is not in accordance to the NRPC directions.

If dead end tower jumpers of all 132, 220 & 400 kV line at BBMB Dehar are re-connected i.e. existing R, Y, B phase of PGCIL/PSTCL/HPSEB are reconnected with R, Y, B phase of Dehar P.H., then there shall be mismatch of phase identification of line conductors (identified with existing R, Y, B phase identification plate/strip on each tower) and the bay phase of the line (Y, B, R) at both ends.

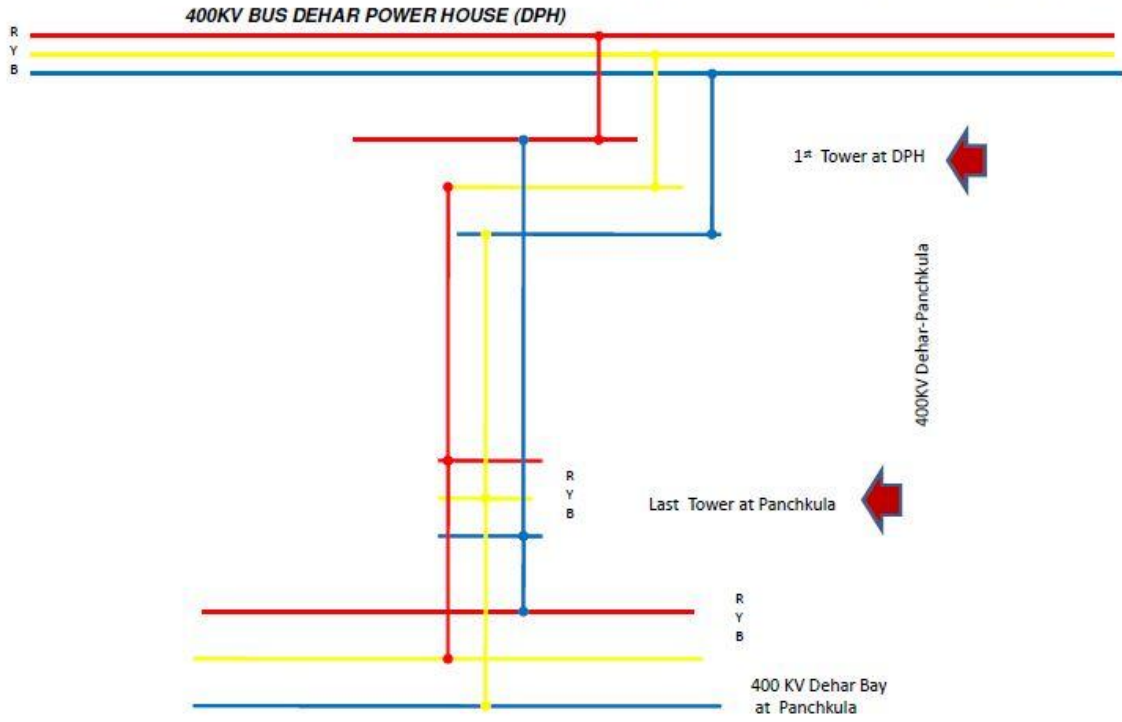
In this regard, proposed SLD (attached) for 400kV Dehar- Panchkula Line as per PGCIL proposal to interchange jumpers at Dead End Tower (1st Tower of the line at Dehar end) to correct phase nomenclature between PGCIL Panchkula and BBMB Dehar P.H. In this way, line conductor marked as Red, Yellow, Blue phase by identification plate/strip on each tower shall be connected with Y, B, R phase of bay at both end. Thus existing line phase identification marking (R, Y, B) and existing bay phase identification marking (Y, B, R) shall differ.

Hence, for proper correction of phase mismatch nomenclature, jumpers need to be interchanged at the locations where R, Y, B phases are connected with Y, B, R phase by PGCIL at Panchkula substation for Dehar-Panchkula line and Panipat – Panchkula line, Panipat substation for Panipat-Dadri Ckts, Bhiwani substation for BBMB Bhiwani-PGCIL Hisar and PGCIL Bhiwani. Work at Rajpura substation shall be mutually decided by PSTCL and PGCIL. Whereas works of phase correction at Kangoo end shall be done by HPSEB for 220kV & 132kV Dehar-Kangoo Ckts.

2. BBMB agrees with NTPC comments. Hence, 400kV BBMB Panipat Bus will be charged through from 400kV Panipat – Panchkula line instead of 400kV Panipat – Dadri after correction of phase nomenclature of 400kV system BBMB Panipat.

3. As per PSTCL, 400kV Dehar-Rajpura line is owned by PGCIL and hence the work is to be executed by them. Matter has been taken with PGCIL Patiala and only they can tell whether work is possible or not in present conditions." Hence, NRPC may take up the matter with PGCIL.

PROPOSED SLD FOR 400KV DEHAR – PANCHKULA LINE AS PER PGCIL PROPSAL TO INTERCHANGE JUMPERS AT DEAD END TOWER (1ST TOWER AT DEHAR END) TO CORRECT PHASE NOMENCLATURE BETWEEN PGCIL PANCHKULA & BBMB DEHAR P.H.



SNO	Description of Agenda point	Details	STATUS to be 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 9/1. All states were requested to update regularly.
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 details of the substations of Power Grid and their required downstream network as updated in the 1 meeting are enclosed as Annexure 9/2. All concerned utilities were requested to ensure proper utilization of the available bays on the POWERGRID SUBSTATION.
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 10/3 OF THE AGENDA OF THE 146TH OCC MEETING. 150th OCC meeting: UPPTCL submitted the information as per the required format (Annexure 9/3) All other utilities were requested to update similarly. It was stated that in the similar format all utilities should submit the information in the similar format.	All utilities to update.
4.	Healthiness of defence mechanism: Self- certification	Report of Mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that “All the UFRs are checked and	All utilities are requested to submit reports of testing in every quarter in soft copy. The reports for period ending September 2018 by all the states should be submitted positively by First week of OCTOBER.

		<p><i>found functional</i>". Reports ending march 2018 stands received from all states.</p> <p>150th OCC meeting: All utilities were requested to submit reports of testing in every quarter. The reports stands submitted for period ending June 2018 by all the states. MS NRPC stated that the information should be submitted regularly. The soft copy may please be submitted</p>	
5.	<p>UFR REPLACEMENT . In PTCUL the static type UFRs were still installed on Transformers/feeders emanating from 132KV Majra and Jwalapur Substations and 220KV Ramnagar, Roorkee and Rishikesh Substations</p>	<p>PTCUL representative intimated that the order for numeric relays procurement has been placed and he assured that efforts would be made to get the relays replaced by 31.12.2017</p> <p>150th OCC meeting: PTCUL representative stated that all UFR relays are numeric in their state. MS NRPC stated that a confirmation regarding that the requested to update that the static relays have been changed on the Substations mentioned.</p>	<p>PTCUL to update</p>
6.	<p>Strengthening of Intra-State transmission system</p>	<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>150th OCC meeting: Information from Punjab along with the comments of Planning wing stands submitted. Information from Rajasthan vide which SLDC has intimated the bottlenecks, constraints and overloading in the State transmission network to their planning wing stands submitted MS NRPC stated that this information should be submitted regularly as it is very important for future panning & grid of the system. All states were requested by SE(O) to update regularly as this</p>	<p>All states except Punjab & Rajasthan to update.</p>

		<p>information is end to the planning wing of CEA for discussion in the Standing Committee.</p>	
7	<p>Mapping of Feeders in SCADA</p>	<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: PSTCL submitted information all other</p> <p>MS NRPC 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.</p>	<p>All states except Punjab to update.</p>

POWER SYSTEM DEVELOPMENT FUND(PSDF)														
Status of Schemes Submitted by the Entities for funding from PSDF														
Status as on 31-08-2018														
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	RRVNL	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	RRVNL	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-Jun-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	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	4-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	DHVBVN	Renovation and modernisation of distribution system of DHVBVN, 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	RRVNL	" 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	RRVNL	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			2.22
20	Rajasthan	NR	RRVNL	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			
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			

Status as on 31-08-2018														
Schemes approved under PSDF														
All figures in Rs Crore														
SLNo	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				
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						464.13

ANNEXURE 9/2				
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 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 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 -October 2018
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned	LILLO of one circuit of Kaul-Pehowa 220kV D/c line LILLO of one circuit of Kaul-Bastara 220kV D/c line Work awarded. Contactual Completion period upto 31.10.2019 Progress of work to be updated by Haryan
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) LILLO of 220kV Muradnagar II - Baghat (PG) at Baghat UP Baghat(PG)-Modipuram New 220kV D/c-is planned. UPPTCL 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 TO UPDATE.
7	400/220 kV, 2x315 MVA Sohawal	6 Nos 220 kV bays to be utilized.	Commissioned	2 nos of bays utilized for Sohawal 220kV UP.-LINE ENERGISED 2 nos for Barabanki 220 kV s/s - LINE ENERGISED 2 nos of bay of utilized for 220kV New Tanda-Sohawal line .There is a litigation process on & expected to be completed within 2 months. UPPTCL TO UPDATE

ANNEXURE 9/2				
S. No.	Substation	Downstream network requirement	Schedule	Planned system and Implementation Status
8	Shahjahanpur, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned	One bay used for 220 kV Shahjahnpur-Hardoi line commissioned. 220kV Shahjahnpur - Azimpur D/c line is planned land of substation identified. UPPTCL TO UPDATE
9	Moga	Partially utilized. Balance 2 nos. of 220kV bays to be utilized.	Commissioned	Moga–Mehalkalan 220kV D/c line Work completed. Approval from NGT for tree cutting is awaited for balance work to commission line. 7.8.2018 next hearing PSTCL TO UPDATE
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	2x220 kV bays to be utilized for connecting 220/132kV Kangoo substation of HPSEBL by 220 kV Kangoo-Hamirpur D/c line. HPSEBL TO UPDATE
11	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of Transformer from Ballabhgarh).	Commissioned	220kV Kaithal(PG)- Neemwala D/c line - Work awarded on 13.7.2018. Tentative completion date 31.12.2019. 220kV S/s Neemwala-Tenders opened on 30.3.2018 & awarded on 13.7.2018. Tentative completion date 31.12.2019 HVPNL TO UPDATE.



एनटीपीसी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)

केन्द्रीय कार्यालय/ Corporate Centre

01/CP/PM/MOP

Date. 16.08.2018

Sh. H.S. Pruthi
Director (IPC, St. Thermal, UMPP)
Ministry of Power
Shram Shakti Bhawan
New Delhi-110001

Sub: New Environment norms for Thermal power project- Monitoring of the Phasing plan regarding.

Sir,

This has reference to NTPC letter dated 08.08.18 furnishing inputs on the above cited subject and the meeting taken by JS(Th) on 14.08.2018.

Annexure-I of the said letter has been updated and enclosed as Annexure-A

This has the approval of CMD, NTPC Ltd.

Thanking you.

Yours faithfully,


(D.Kar)

Addl. Gen. Manager (Corp. Planning)

Encl: As above

Copy to:

Shri S.K.Kassi
Director (Thermal), Ministry of Power

पंजीकृत कार्यालय : एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7, इन्स्टीट्यूशनल एरिया, लोधी रोड नई दिल्ली-110003

कार्पोरेट पहचान नम्बर : L40101DL1975GOI007966, टेलीफोन नं.: 011-24387333, फैक्स नं.: 011-24361018, ईमेल: ntpccc@ntpc.co.in, वेबसाइट: www.ntpc.co.in

Registered Office : NTPC Bhawan, SCOPE Complex, 7 Institutional Area, Lodi Road, New Delhi-110003

Corporate Identification Number : L40101DL1975GOI007966, Telephone No.: 011-24387333, Fax No.: 011-24361018, E-mail : ntpccc@ntpc.co.in

Website : www.ntpc.co.in

Sub: New Environmental norms for Thermal power project – Monitoring of the phasing plan regarding.

Implementation plan for NTPC units (>500 MW) located in districts that has population density in excess of 400 persons / Sq. KM or are in critically polluted area is enclosed at Appendix-I. NTPC's 48 units (24,620 MW) are falling under these criteria.

Details are given below.

FGD Implementation Plan		
	No of Units	Capacity (MW)
FGD Awarded	7	3800
Likely award in Aug, 2018	12	6320
NIT Planned between Aug ,18 -Sept,18 & Award expected by Dec-18	29	14500
Total	48	24,620
De-NOx Implementation Plan		
	No of Units	Capacity (MW)
Combustion Modification implemented/ Awarded	6	3620
Award expected in Sep 2018	3	1500
Combustion Modification NIT Planned in between Aug,18 - Sept,18 & Award expected by Dec-18. Retrofitting will be done during available major shutdown of unit(s).	22	11000
Combustion Tuning during annual Overhaul	17	8500
Total	48	24,620
SPM Plan		
SPM Compliant	41	20960
ESP under R&M	7	3660
Total	48	24,620

Other Details

NTPC has taken steps to meet the environmental norms w.r.t. SPM, SOX and NOx for its entire fleet of coal based units (Operational and under construction). Details of the same is detailed below.

a. SPM Compliance.

- i. ESP R&M implemented in 35 units – 8,500MGW
- ii. ESP R&M under implementation in 28 units- 7,520 MW
- iii. ESP R&M is under planning for 3 units – 1,500 MW
- iv. No ESP modification required in 87 units, 47 GW as the SPM level will come below the levels permitted in the new norms after implementation of FGD.
- v. No ESP R&M is envisaged at Badarpur (3x95 MW) as being phased out.

b. SOx compliance.

FGD implementation status:

Sl No.	Details	No of Units	Capacity (MW)
i	FGD implemented/ awarded and under implementation	28	17,670
ii	Award expected in August, 2018	31	17,620
iii	Award expected in Sept, 2018	4	840
iv	NIT done, award expected by Dec'18	3	1,500
v	NIT being planned progressively upto Oct, 2018, award expected by Dec'18	81	26,190
	Total	147	63,820

c. Compliance of NOx norms.

For NOx control in units installed before 31.12.2003, combustion tuning shall be done progressively during annual overhaul. After combustion tuning NOx emission level of these units will be around 600 mg/Nm³.

Combustion modification in units installed after year 2003 shall be done progressively during capital overhauling of units. After combustion modification NOx emission level of these units will be around 400-450 mg/Nm³. For further reduction other De-NOx technology shall be decided based on Pilot test report.

Regarding NOx compliance, NTPC vide letter dtd 13.08.18 has submitted that NOx emission of 100 mg/Nm³ cannot be met without installation of Selective Catalytic Reduction (SCR) system. The globally available SCR system for NOx control are not proven for Indian coal having high ash contents and abrasive ash. Moreover, there are complex layout issues for installation of SCR system in the existing units. In

existing units, no space has been provisioned for SCR system. Based on the above it is requested that for all units installed after 2003, including those awarded till 31.12.2016, should be allowed a NOx emission norm of 450 mg/ Nm³.

Keeping above constraints in mind, SCR/ SNCR may be planned for units which have been awarded after 31.12.2016, depending upon the pilot test results.

NOx compliance status.

Sl No.	Details	No of Units	Capacity (MW)	Likely NOx emission (mg/NM ³)
i	Combustion tuning is being implemented progressively during unit Overhauling	64	17,700	600
ii	Combustion Modification implemented/ Awarded	38	26,290	450
iii	NIT done, award likely by Sept'18	3	1,500	
iv	NIT in Oct'18 likely award by Mar'19	29	14,980	
v	NIT in Dec'18 likely award by May'19	13	3,350	
		147	63,820	

Appendix-1
Environmental Action Plan for NTPC Units larger than 500 MW with population density in excess of 400 persons/ sq. KM or are critically polluted area (as per CSE list)

Sr. No.	Name of Project	State	Region	Unit No	Unit Capacity	Date of Commissioning	Population Density as per CSE report	Compliance Date for SOx-As per CPCB	SPM Compliance Plan/ Status	FGD Award date/ Tender details	De-Nox Plan/ tender dates.
1	BARH II	Bihar	ER	4	660	20-11-2013	1803	30-09-2021	SPM Compliant	Award by 31-08-2018	Combustion Modification implemented.
2	BARH II	Bihar	ER	5	660	04-03-2015	1803	31-08-2022	SPM Compliant	Award by 31-08-2018	Combustion Modification implemented.
3	KHALGAON TPS	Bihar	ER	5	500	31-03-2007	1180	31-12-2022	SPM Compliant	NIT in Sep' 18	NIT in Sep' 18
4	KHALGAON TPS	Bihar	ER	6	500	16-03-2008	1180	31-12-2022	SPM Compliant	NIT in Sep' 18	NIT in Sep' 18
5	KHALGAON TPS	Bihar	ER	7	500	31-07-2009	1180	31-12-2022	SPM Compliant	NIT in Sep' 18	NIT in Sep' 18
6	TALCHER STPS	Odisha	ER	1	500	19-02-1995	199	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
7	TALCHER STPS	Odisha	ER	2	500	27-03-1986	199	31-12-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
8	TALCHER STPS	Odisha	ER	3	500	21-02-2003	199	31-12-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
9	TALCHER STPS	Odisha	ER	4	500	25-10-2003	199	31-12-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
10	TALCHER STPS	Odisha	ER	5	500	13-05-2004	199	31-12-2022	Under R&M	NIT in Aug' 18	Combustion tuning after overhaul
11	TALCHER STPS	Odisha	ER	6	500	06-02-2005	199	31-12-2022	Under R&M	NIT in Aug' 18	Combustion tuning after overhaul
12	FARAKKA STPS	West Bengal	ER	4	500	25-08-1992	1334	31-12-2022	Under R&M	NIT in Sep' 18	Combustion tuning after overhaul
13	FARAKKA STPS	West Bengal	ER	5	500	16-02-1994	1334	31-12-2022	Under R&M	NIT in Sep' 18	Combustion tuning after overhaul
14	FARAKKA STPS	West Bengal	ER	6	500	07-03-2011	1334	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
15	INDIRA GANDHI STPP	Haryana	NR	1	500	31-10-2010	522	12-31-2019	SPM Compliant	Awarded on 30.01.18	Award in September '18
16	INDIRA GANDHI STPP	Haryana	NR	2	500	05-11-2011	522	12-31-2019	SPM Compliant	Awarded on 30.01.18	Award in September '18
17	INDIRA GANDHI STPP	Haryana	NR	3	500	07-11-2012	522	12-31-2019	SPM Compliant	Awarded on 30.01.18	Award in September '18
18	RIHAND STPS	Uttar Pradesh	NR	1	500	31-03-1988	270	28-02-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
19	RIHAND STPS	Uttar Pradesh	NR	2	500	05-07-1989	270	31-12-2021	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
20	RIHAND STPS	Uttar Pradesh	NR	3	500	31-01-2005	270	31-12-2021	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
21	RIHAND STPS	Uttar Pradesh	NR	4	500	24-09-2005	270	30-04-2021	SPM Compliant	Award by 31-08-2018	NIT in Sep' 18
22	RIHAND STPS	Uttar Pradesh	NR	5	500	25-05-2012	270	28-02-2021	SPM Compliant	Award by 31-08-2018	NIT in Sep' 18
23	RIHAND STPS	Uttar Pradesh	NR	6	500	17-10-2013	270	31-12-2020	SPM Compliant	Award by 31-08-2018	NIT in Sep' 18
24	SINGRAULI STPS	Uttar Pradesh	NR	6	500	28-12-1986	270	28-02-2021	Under R&M	NIT in Sep' 18	Combustion tuning after overhaul
25	SINGRAULI STPS	Uttar Pradesh	NR	7	500	24-11-1987	270	28-02-2021	Under R&M	NIT in Sep' 18	Combustion tuning after overhaul
26	SIMHADRI	Andhra Pradesh	SR	1	500	22-02-2002	519	31-03-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
27	SIMHADRI	Andhra Pradesh	SR	2	500	24-08-2002	519	30-06-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
28	SIMHADRI	Andhra Pradesh	SR	3	500	29-03-2011	519	30-09-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
29	SIMHADRI	Andhra Pradesh	SR	4	500	30-03-2012	519	31-12-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
30	VALLUR TPP	Tamil Nadu	SR	1	500	28-03-2012	1049	30-06-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
31	VALLUR TPP	Tamil Nadu	SR	2	500	28-02-2013	1049	30-09-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
32	VALLUR TPP	Tamil Nadu	SR	3	500	28-02-2014	1049	31-12-2022	SPM Compliant	NIT in Aug' 18	Combustion tuning after overhaul
33	KORBA STPS	Chhattisgarh	WR	4	500	31-05-1987	183	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
34	KORBA STPS	Chhattisgarh	WR	5	500	25-03-1988	183	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
35	KORBA STPS	Chhattisgarh	WR	6	500	26-02-1989	183	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
36	KORBA STPS	Chhattisgarh	WR	7	500	25-11-2010	183	31-12-2022	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
37	VINDHYACHAL STPS	Madhya Pradesh	WR	7	500	08-03-1999	157	30-06-2021	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
38	VINDHYACHAL STPS	Madhya Pradesh	WR	8	500	26-02-2000	157	30-06-2021	SPM Compliant	NIT in Sep' 18	Combustion tuning after overhaul
39	VINDHYACHAL STPS	Madhya Pradesh	WR	9	500	27-07-2006	157	30-09-2021	SPM Compliant	Award by 31-08-2018	Combustion tuning after overhaul
40	VINDHYACHAL STPS	Madhya Pradesh	WR	10	500	08-03-2007	157	30-09-2021	SPM Compliant	Award by 31-08-2018	Combustion tuning after overhaul
41	VINDHYACHAL STPS	Madhya Pradesh	WR	11	500	14-06-2012	157	31-12-2021	SPM Compliant	Award by 31-08-2018	Combustion tuning after overhaul
42	VINDHYACHAL STPS	Madhya Pradesh	WR	12	500	22-03-2013	157	31-12-2021	SPM Compliant	Award by 31-08-2018	Combustion tuning after overhaul
43	MOUDA TPS	Maharashtra	WR	1	500	19-04-2012	470	31-12-2022	SPM Compliant	Award by 31-08-2018	Combustion Modification implemented.
44	MOUDA TPS	Maharashtra	WR	2	500	29-03-2013	470	31-12-2022	SPM Compliant	Award by 31-08-2018	Combustion Modification implemented.
45	MOUDA TPS	Maharashtra	WR	3	560	28-03-2016	470	31-12-2022	Under R&M	Awarded on 31.07.18	Combustion Modification implemented.
46	MOUDA TPS	Maharashtra	WR	4	660	18-03-2017	470	31-12-2020	SPM Compliant	Awarded on 31.07.18	Combustion Modification implemented.
47	Dadr	UP	NR	5	490	29-Jan-10		12-31-2019	SPM Compliant	Awarded on 30.01.18	Awarded on June 18
48	Dadr	UP	NR	6	490	30-Jun-10		12-31-2019	SPM Compliant	Awarded on 30.01.18	Awarded on June 18
				Total	48 Units	24620					

Critically Polluted

Minutes of Meeting held on 23.07.2018 at SLDC, Jaipur to discuss issues regarding installation of LVRT on Wind Turbine Generators in Rajasthan.

A meeting was held on 23.07.2018 in Conference Room, SLDC, Jaipur to discuss issue regarding installation of LVRT on Wind Turbine Generators in Rajasthan.

1. Following were present in the meeting:

1. Sh. R.P. Sharma, CE (LD), RVPNL.
2. Sh. A. K. Arya, SE (SOLD), RVPNL.
3. Sh. N.K. Gupta, SE (REMC), RVPNL.
4. Sh. Sanjay Mathur XEN (REMC), RVPNL
5. Sh. Kamal patidar XEN-1 (SOLD), RVPNL
6. Representative of WTG manufacturers and Generators

- The Chief Engineer (LD) welcomed all participants and stated that the office memorandum (File No. 293/8/2017-wind) issued by MNRE (Wind power division) which facilitates the WTG manufactures to obtain statement of compliance/confirmation standard for demonstrating the compliance to applicable CEA Technical standards for connecting to the Grid for their WTG models which were unable to get LVRT compliance certificate from accredited testing agencies. He further stated that the time period for applying for LVRT testing to any internationally accredited testing body or NIWE stands expired on 15.3.2018. He added that a notice has been issued to all Wind generators to get the LVRT compliance within one month beyond which they would be constrained to deny scheduling to non LVRT complaint generators.
- The Superintending Engineer (SOLD) informed the outcomes of 149th OCC meeting that CEA representative advised that a single LVRT solution can be used on the plant, which will be cheaper and requested to explore possibility of such solution with the manufacturer of LVRT / WTG.
- The representative of M/s Siemens Gamesha, WTG manufacturer informed and confirmed that their all models of WTG installed in Rajasthan state are already LVRT compliant.
- The representative of M/s Regen Power Tech Ltd., WTG manufacturer informed and confirmed that their all models of WTG installed in Rajasthan state are already LVRT compliant.
- The representative of M/s GE India Industrial Pvt. Ltd., WTG manufacturer informed and confirmed that their all models of WTG installed in Rajasthan state are already LVRT compliant.

- The representative of M/s Inox Wind Limited, WTG manufacturer informed that they have installed 277 Nos. "Inox WT 2000DF" WTG model having LVRT functionality features. They have provided 9 Nos. of WTG of same Model with LVRT to M/s TATA Power Renewable and balance 268 Nos. WTG have been installed without LVRT feature.
- The representative of M/s Suzlon WTG, manufacturer stated that the Petition No. 237/MP/2017 with Hon'ble CERC for seeking relief and clarity on implementation of LVRT has been listed and still pending for final hearing. The representatives also stated that the Hon'ble commission has also admitted their IA for seeking extension of time for implementation of the order dated 05.01.2016 in petition No. 420/MP/2014 till the disposal of the petition No. 237/MP/2017 and directed to not to take any coercive measure till the next date of hearing. He further requested to not to take any action till the disposal of Petition.
- The representative of Vish Wind (erstwhile Enercon), WTG manufacturer has informed that there is huge implication of financial to install the LVRT in all WTG Models and requested not to take any action till the disposal in Petition No. 237/MP/2017 of M/s Suzlon.

The Chief Engineer (LD), RVPN concluded the meeting and requested to all manufacturers and Generators to explore the possibility of single LVRT solution on the plant and send the feedback on above as soon as possible or in next meeting.

Meeting ended with vote of thanks to the chair.

**Meeting to discuss Compliance of LVRT by RE Generators held on 23.07.2018
at SLDC Building, Heerapura, Jaipur (Attendance sheet)**

Sr. No.	Name of OEM/Generator	Name of Representative	Mobile No.	E-mail address	Signature
1	Suzlon Orange Renewable	Dinesh Majithia	9560037093	dinesh.majithia@orangerenewable.net	
2	Suzlon Orange Renewable	Sidhartha Mohapatra	9599239326	sidharthamohapatra@orangerenewable.net	
3	Siemens Gamesa RE.	Ravi Singh Shekawat	7230017882	ravishekawat@siemens	
4	Siemens Gamesa	AMARESH PANDAY	9929096638	AMARESH.KKUSHNAC@Siemens	
5	VISH Wind	Rakesh Choudhary	9829916752	rchoudhary@vish.com	
6	CLP India Suzlon Global	Gaurav Jain	9983302793	gaurav.jain@suzlon.com	
7	SUZLON GLOBAL	MANOJ KUMAR VERMA	9549651323	manoj.verma@suzlon.com	
8	Vikas Energy Mytrak Energy	Vikas Jhaury	9166314222	vikas.jhaury@mytrak.com	
9	Leap Green Energy	Pushpendra Meena	7023300871	pushpendrameena@leapgreenergy.com	
10	ReGen Infra. & Services Ltd	Abdul Hakim	9529066996	abdulhakim.m@regonpowertech.com	
11	AeroFutureEnergy	Arunish Pandey	7952026487	arunish.pandey@aerofutureenergy.com	
12	CLP Wind Farms (I) Pvt Ltd	Amit Dobariya	9799875853	amit.dobariya@clpindia.in	
13	RENEW POWER LTD.	Abhinav Saraswat	9407535324	abhinav.saraswat@renewpower.in	
14	RENEW POWER LTD.	Narendra Samashi	9871364433	Narendra.Samashi@renewpower.in	
15	HOPE Pro Solutions Ltd	RATENKA UAS	9829059722	Karunika Zareyab@hope.com	
16	CLP India Windfarm	ABHAY POTDAR	9824102072	abhay.potdar@clpindia.in	
17	CLP India Windfarm	SUNIL JAIN	9924143164	sunil.jain@clpindia.in	
18	RVPN SE (REMC)	N.K. Gupta	9414061063	se.remc@rvpn.co.in	



OFFICE OF THE EXECUTIVE ENGINEER
CONTROL & INSTRUMENTATION CONSTRUCTION DIVISION- VI
ANPARA 'D' THERML POWER PROJECT
U.P.RAJYA VIDYUT UTPADAN NIGAM LIMITED
P.O. - ANPARA, DIST. - SONEBHADRA

No: 310 /C&ICD-VI/DTPP/T-1

Dated 20.08.2018

Subject: LOI for the work of Design ,Engineer, Testing & Implementation of SPS Logics in MAX-DNA based EHTC & CMC controls at Anpara 'D' station.

M/s BHEL,
Power sector-Spares and Services Business Group,
B-2,PIC-UP Bhavan,1st floor,
Vibhuti Khand, Gomti Nagar ,Lucknow-226010

With reference to your offer reference no.-SB318A76010CED054 dated 18.07.18 & email consisting final revised rate dated:16.08.18 for implementation of SPS logic in 2x500MW, DTPP, Anpara, we are pleased to intimate you that your offer has been accepted by Project Tender Committee and subsequently an order is hereby placed on approved rates, terms and conditions as per given below:-

Sl. No.	Description of work	Unit	Qty.	Negotiated Rate in INR without Taxes
1	Design and engineering charges for implementation of SPS logics in Max-DNA based EHTC & CMC controls at Anpara 'D' station for each unit.	Per unit	02	1650000.00
2	Deputation of expert service engineer for SPS scheme implementation	Per man day	10	76000.00
3	Mobilization/ de- mobilization charges -Lump sum	Per visit	03	9800.00
4	Accommodation, To and fro travel charges	At actual		At actual

Quantities at sl.no. 2&3 are tentative & subject to change as per site requirement.

The work shall be carried out as per Bill of Quantity, Scope of Work(Annexure-1) and other terms and conditions(annexure-2) as per the tender specifications. However a copy of the documents may be obtained from the office at the time of start of work .

Kindly acknowledge the receipt of this Letter of Intent.

Thanking you,


(Rinkesh Kumar)

Executive Engineer

Dated

No: /C&ICD-VI/DTPP/T-1

Copy forwarded to the following for information and necessary action:

1. Superintending Engineer,C&ICC,DTPP Anpara.
2. DGM(F), CFA&BO,2X500MW,DTPP,Anpara
3. Case file.

copy to Director (operation), UPPTCL, Shakti Bhavan
 Bst. Lucknow.

(Rinkesh Kumar)
 Executive Engineer

Annexure-1

1. Design, Engineering, Testing and implementation of SPS logics as per approved document (vide approved document from Executive Engineer/765KV Substation Electricity Transmission division, M/s UPPTCL, Anpara) in CMC Controls & EHTC controls At Anpara 'D' Station.
2. Implementation of logic at site by BHEL engineer in Max DNA controls, when the unit is available on/off load as per requirement of the system.
3. Testing by simulation and real time implementation / commissioning of implemented schemes by BHEL Engineer's, when the unit shall be available on load. Necessary approvals/ Prior permission for complete testing from M/S UPPTCL is to be coordinated by M/s UPRVUNL.
4. UPRVUNL shall provide necessary drawing /manuals/existing control logics/technical literature of the EHTC & CMC schemes for incorporating SPS Scheme.
5. BHEL to Supply of newly designed logics in CD/DVD. Hard copies of revised drawing sheets only after complete testing of the scheme (1set).
6. Supervision of necessary hardware change, cable termination as required for implementation of SPS scheme.

BILL OF QUANTITY

Sl. No.	Description of work	Unit	Qty.	Negotiated Rate in INR without Taxes
1	Design and engineering charges for implementation of SPS logics in Max-DNA based EHTC & CMC controls at Anpara 'D' station for each unit.	Per unit	02	1650000.00
2	Deputation of expert service engineer for SPS scheme implementation	Per man day	10	76000.00
3	Mobilization/ de- mobilization charges -Lump sum	Per visit	03	9800.00
4	Accommodation, To and fro travel charges	At actual		At actual

Quantity at sl.no. 2&3 is tentative & subject to change as per site requirement


(Rinkesh Kumar)
Executive Engineer

Annexure-2

1. **Validity :** The rates indicated are valid upto 31.03.2019
2. **Job Completion Period:** 10 days expected for implementation of logic, which may be less or more as per site requirement. As the work may require shut down of unit, so the actual date /days cannot be confirmed. Whereas the time period for logic preparation will be 30 days after fulfillment of clause 8(a).
3. **Additional time for job completion:** No additional time will be given, if site is available for the work.
4. **Time Extension:** Completion Period shall be extended at **actual** by UPRVUNL for delay in completion due to: Force Majeure, Delay in availability of customer inputs & facilities, and Additional Time required for execution of extra/optional works, if any.
5. **Tax and Duties:** Taxes & Duties shall be **extra** as applicable at the time of actual execution of work. G.S.T. and any other statutory taxes & duties shall be payable extra by customer as applicable. Except for income tax which shall be deducted by customer as per rule; no other taxes & duties are to be deducted by UPRVUNL.
6. For sl.no.2 of BOQ , charges will be on the basis of actual days for which service are provided plus journey days from Bangalore /other site to the project site and return to Bangalore /other site. Deputation will be arranged based on the availability of service engineer at the time of call and rates will be charged as above for the service engineer deputed.
7. **Accommodation charges**
 - a) charges shall be payable at actual for hotel stay at site. Transit stay enroute in case of necessity due to train/air timings shall also be paid actual.
 - b) In case accommodation is arranged at site by UPRVUNL, it will be free of cost. In such case a standard /air conditioned and well maintained bachelor room (non-sharing) will be provided.
 - c) BHEL engineer reserves the right to stay in Hotel in case the accommodation provided by UPRVUNL is found not suitable.
8. **Terms of Payment : As per offer given by BHEL**
 - a) 10% advance + applicable IGST@18% is payable along with order against sl no. 1 of bill of quantity.
 - b) 90% engineering charges + applicable IGST@18% is payable along with order against receipt of CD/DVD for sl no.1 of bill of quantity.
 - c) 100% deputation charges + applicable IGST@18% shall be made to the contractor within 15 days on presentation of invoice.
 - The GST shall be paid on per-diem charges, mobilization & de-mobilization charges, Travel & Hotel expenses etc. if any incurred in the means of availing the services as per the GST valuation rules & section 15 of CGST Rules 2017. Payment will be made through EFT
 - Note: Applicable TDS will be deducted only on the Basic Value of the Invoice.
 - All payment will be made in the name of BHEL as per below account details
 - Bank Name & Branch-SBI CAG Branch, New Delhi(09996), IFSC code-SBIN0009996, bank account of Corp office-10813608636.



- BHEL Invoice number will be customarily mentioned in all correspondence related to payment particulars, bank transaction details, TDS certificate etc, which are to be addressed to the following on release of payment.
- Addl. General Manager, CE-External Service Dept., Dept. Code :417,NEB-5th Floor, Electronic Division, BHEL, P.B. No. 2606, Mysore Road Bengaluru-560026, India Contact No. 09008488112 and email to sunilkumarv@bhel.in &CC to maniknaiya@bhel.in.

9. Mode of Payments: Payment shall be made through EFT.

10. GST Provisional Registration ID is 29AAACB4146P1ZB for karnatka state, IGST@18% will be paid extra as applicable and separately on the invoice value. The invoice value shall include service charge, over time charges (if any), travel expenses, accommodation charges, mobilization & de- mobilization charges and instrument hire charges(if any). This is per 6.9.2 sub rule(1) of rule 5 of taxation of services. Any revising in existing tax if introduced by the government shall also be borne by UPRVUNL.

11. Hours of work & overtime

- The normal working of 8 hours per day will be followed. Over time charges shall be twice the normal rate applicable on pro-rata basis beyond the normal working hours. Working on Sundays and holidays are considered as overtime. Days during which BHEL personnel available within the regular work week will be regarded as having actually being worked even though their services are not utilized by the UPRVUNL.

12. Statuary Act & rules: Relevant provisions of statutory acts, rules & regulations as applicable for execution of the work shall be duly complied by us.

13. Obligation on the part of UPRVUNL

Being running plant and UPRVUNL's services are required for specific periods the UPRVUNL will provide the following:-

- Working schematics, wiring diagram, test reports etc, as referred to by the UPRVUNL's maintenance staff for the use / reference of BHEL's engineer.
- Qualified technicians to assist BHEL's engineer along with their trade tools if required.
- Spares and material for replacement as and when required.
- Hardware field modifications (Mounting and installation of interposing relays and associated hardware for external commands etc if any) to suit the modified scheme for SPS/control changes if any.
- Any hardware / spares (Max-DNA DI/DO Modules etc)/ material if needed shall be in the scope of the UPRVUNL and their cost shall be borne by UPRVUNL only.
- Cable supply and laying of the cable and its consumables like glands,lugs etc. as on required basis upto BHEL DCS panels and any other interconnection for implementation of SPS scheme.

14. Security: All security arrangements at site and protection against fire and other hazards while equipments are in storage or under performance of work under present offer will be provided by UPRVUNL at his cost.

15. Access to site: The work site shall be made available free from all types of obstructions to enable us to proceed with the work unhampered and in a continuous manner.

16. Completion certificate: After availing the services as required by the UPRVUNL, the customer shall issue a completion certificate to the contractor personnel for the activities completed as per

the scope of work mutually agreed in the contract. This shall be in the form of joint inspection report or records notes of discussion.

17. Design & Implementation schedule:

- Phase -1: Upon placing the LOI/LOA/NOA and fulfillment of Clause 8.0(a) ,design will start and minimum 30 days will required for development and necessary preliminary testing at BHEL's end
- Phase-2: UPRVUNL will fulfill clause 8(b) after receiving of logics at UPRVUNL end.
- Phase -3: Once phase -1 and phase -2 listed above are fulfilled, deputation shall be planned immediately or as per mutual agreed schedule.



(Rinkesh Kumar)
Executive Engineer

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)



पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : 1st Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococo@posoco.in, Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ संख्या:पोमोको/एनएलडीसी/2018/ 227

दिनांक: 04th सितंबर, 2018



To,
The Member (Thermal),
Central Electricity Authority,
Sewa Bhawan, R. K. Puram,
Sector-1, New Delhi - 110 066

विषय: Flexibility of coal fired power stations.

महोदय,

Flexibility of coal fired power stations in India has assumed centre stage both in the context of changing electricity demand profiles as well as penetration of Renewable Energy (RE) resources. In the context of flexibility, three (3) attributes assume importance from the viewpoint of proper balancing of the system.

- (i) Minimum generation levels or turn-down levels.
 - (ii) Ramp rate (Up & Down).
 - (iii) Start-up time/Minimum up time/ Minimum down time.
- (i) On the issue of minimum generation levels, Part B, section 7(3) of the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulation, 2010 already provides for a 'control load' of 50% of Maximum Continuous Rating (MCR). With effect from 15th May 2017, in line with amendments in the Indian Electricity Grid Code (IEGC) by CERC all plants under the jurisdiction of Regional Load Despatch Centres (RLDCs) are considering 55% of capacity on bar as minimum (generally the load centre plants are required to frequently go down to this level) for the purpose of scheduling. As ISGS is just about 40% of the country's thermal capacity, it is requested that CEA may kindly take up the issue with State Gencos & other entities and facilitate 55% technical minimum at these plants too. Possibility of some load centre plants to go below 55% to say 40% could also be initiated as any mismatch in demand projection & RE capacity growth could lead to a scenario of much higher instantaneous RE penetration level. Ideally plant should be able to run continuously at their minimum load & be able to ramp up to the Maximum Continuous Rating (MCR) & quickly ramp down to the minimum load.
- (ii) On the second issue of ramp rates also, the above CEA Technical Standards, specify 3%. However, the ramp rates provided by about fifty (50) plants under the Reserve Regulation Ancillary Services (RRAS) is much less than 3% of the order less than 1%, as

would be evident from Annexure-1. Incidentally, on 22nd June 2018, Dadri stage –II (2X490MW) units were tested for 3% ramp rate as part of exercise under National Task Force on Flexibility. The poor ramp rates would mean that a 800 MW unit would take 90 minutes to ramp up from 440 MW (55% technical minimum) to 800 MW. It is requested that this aspect may also be taken up by CEA with the Generating Companies. Ramp Up rate and Ramp Down rate could be different. Further the CEA standards should have a clear definition of ramp-rate & its measurement. Generally, the issue of ramp rates would become more important for plants lower down in the merit order.

- (iii) The third attribute of cold start is important for units sitting on the margin viz having a moderate to high variable charges. The CEA Technical Standards mentioned above are silent on the start up time for cold start, warm start & hot start. The information submitted by about fifty (50) plants under RRAS is enclosed as Annexure-2. While 6-8 hours for a cold start is understood, a few 800 MW units like Kudgi STPS and CGPL Mundra have indicated 35 hours and 72 hours respectively which appears too high. While CGPL Mundra has low variable cost & is rarely under cold reserve, Kudgi is a marginal unit often under cold reserve. Earlier, Kudgi had indicated 6 hours for cold start but could not bring within this period (when instructed by NLDC/SRLDC) and leading to a subsequent reduction in availability declaration. Now, the cold start time has been revised by the power plant for period 16th August to 15th September'18. It is requested that this aspect may also be taken up by CEA with the Generating companies and start-up time codified in the CEA standards. Minimum up-time/minimum down-time for units might also be suitably defined.

It is requested that CEA may kindly intervene in the above three(3) flexibility attributes which would go a long way in ensuring reliable, economic & sustainable operation of the Indian electricity grid.

सादर धन्यवाद,

Encl: As above

भवदीय

एस. आर. नरसिम्हन

(एस.आर. नरसिम्हन)

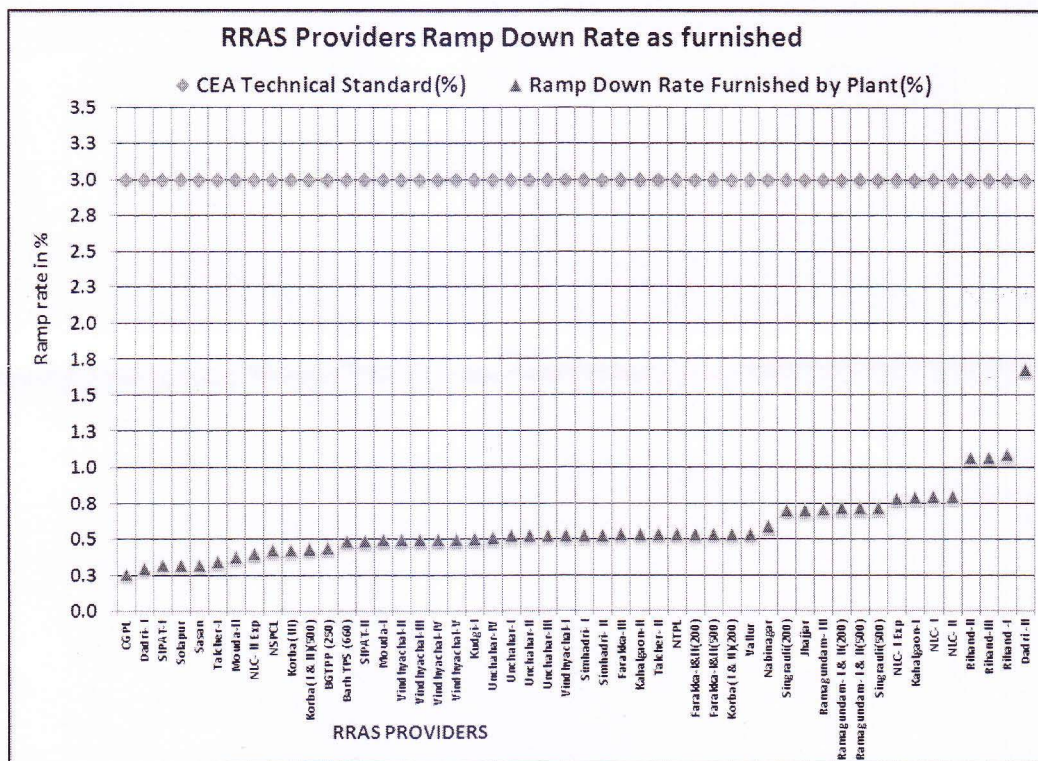
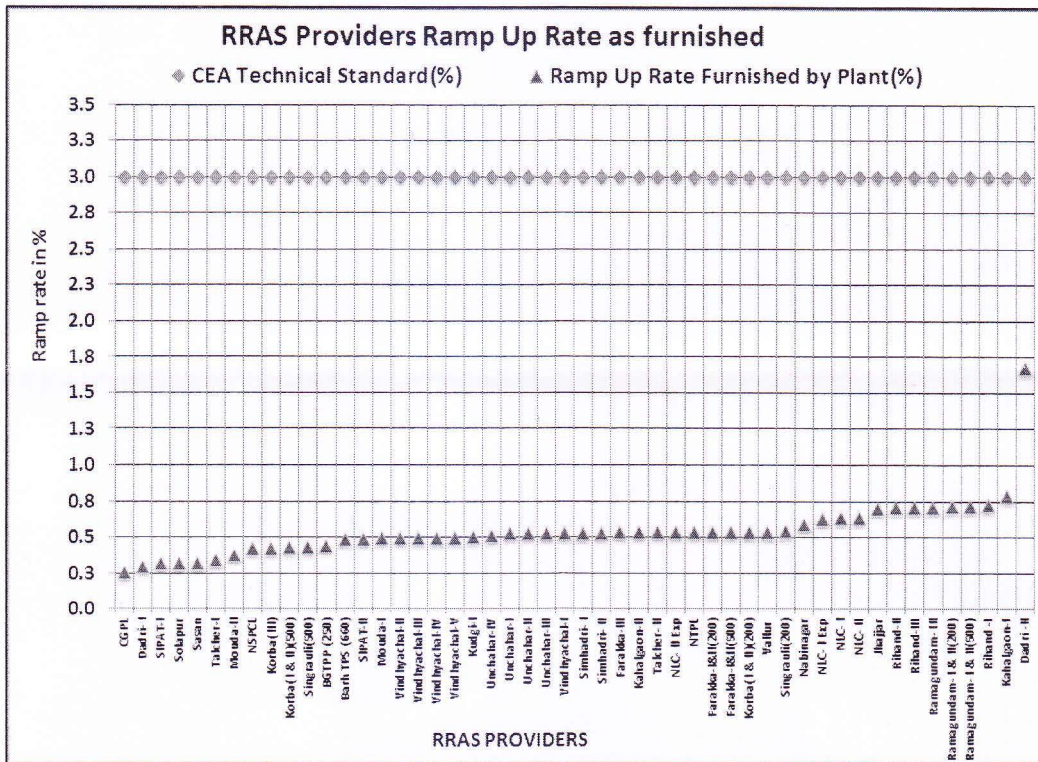
कार्यकारी निदेशक,

रा. भा. प्रे. के.

Copy to :

1. Joint Secretary(Thermal), Shram Shakti Bhawan, New Delhi - 110 001
2. Secretary ,CERC, 3rd & 4th Floor, Chanderlok Building, 36, Janpath, New Delhi- 110001
3. Member Secretary, NRPC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
4. Member Secretary, WRPC, F-3,MIDC Area,Andheri (East),Mumbai-400093
5. Member Secretary, SRPC, 29,Race Course Cross Road,Bangalore-560009
6. Member Secretary, ERPC, 14,Golf Club Road , Kolkata-700033
7. Member Secretary, NERPC, NERPC Complex, Dong Parmaw ,Lapalang, Shillong – 793006
8. Chief Engineer (Grid Management),CEA, Sewa Bhawan, R. K. Puram, Sector-1, New Delhi
9. Chief Engineer(NPC), NRPC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
- 10.Executive Director, ERLDC,14, Golf Club Road , Kolkata-700033
- 11.Executive Director, WRLDC,F-3,MIDC Area,Andheri (East),Mumbai-400093
- 12.Executive Director, NERLDC, Dongtieh, Lower Nongrah, Laplang, Shillong-793006
- 13.Executive Director, NRLDC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
- 14.Executive Director, SRLDC, 29,Race Course Cross Road,Bangalore-560009

Ramp Rate of RRAS* Providers (Thermal stations) as furnished



*RRAS-Reserves Regulation Ancillary Services

Ramp rate of RRAS* Providers (Thermal Stations) as furnished

Sl No	Plant Name	Region	Installed Capacity (MW)	Installed Capacity (MW)	Variable cost (Paisa/kWh)	Ramp UP (MW/Min)	Ramp Down (MW/Min)	Ramp Up Rate Furnished by Plant(%)	Ramp Down Rate Furnished by Plant(%)
1	Dadri -II	NR	980	2X490	346	3.33	3.33	1.7	1.7
2	Kahalgaoon-I	ER	840	4X210	237	1.5	1.5	0.8	0.8
3	Rihand -I	NR	1000	2x500	128.9	3.33	5	0.7	1.1
4	Ramagundam- I & II(500)	SR	2100	3x200+3x500	248	3.33	3.33	0.7	0.7
5	Ramagundam- I & II(200)	SR	2100	3x200+3x500	248	1.33	1.33	0.7	0.7
6	Rihand-II	NR	1000	2x500	128.3	3.33	5	0.7	1.1
7	Rihand-III	NR	1000	2x500	130.9	3.33	5	0.7	1.1
8	Ramagundam- III	SR	500	1x500	243	3.33	3.33	0.7	0.7
9	Jhajjar	NR	1500	3X500	332.3	3.33	3.33	0.7	0.7
10	NLC- I	SR	630	3x210	254	1.2	1.5	0.6	0.8
11	NLC- II	SR	840	4x210	254	1.2	1.5	0.6	0.8
12	NLC- I Exp	SR	420	2x210	234.8	1.2	1.5	0.6	0.8
13	Nabinagar	ER	500	2X250	194.2	1.33	1.33	0.6	0.6
14	Singrauli(200)	NR	2000	5X200+2X500	133.3	1	1.3	0.5	0.7
15	Vallur	SR	1500	3x500	296	2.5	2.5	0.5	0.5
16	Korba(I & II)(200)	WR	2100	3x200+3x500	130.5	1	1	0.5	0.5
17	Farakka-I&II(200)	ER	1600	3x200+2x500	234.1	1	1	0.5	0.5
18	Farakka-I&II(500)	ER	500	3x200+2x500	234.1	2.5	2.5	0.5	0.5
19	NLC- II Exp	SR	500	2x250	235.1	1.2	0.9	0.5	0.4
20	NTPL	SR	1000	2x500	304	2.5	2.5	0.5	0.5
21	Farakka-III	ER	500	1x500	235.6	2.5	2.5	0.5	0.5
22	Kahalgaoon-II	ER	1500	3x500	226.6	2.5	2.5	0.5	0.5
23	Talcher- II	SR	2000	4x500	189.9	2.5	2.5	0.5	0.5
24	Simhadri- I	SR	1000	2x500	268.3	2.5	2.5	0.5	0.5
25	Simhadri- II	SR	1000	2x500	268.8	2.5	2.5	0.5	0.5
26	Unchahar-I	NR	420	2x210	284.6	1	1	0.5	0.5
27	Unchahar-II	NR	420	2x210	284.6	1	1	0.5	0.5
28	Unchahar-III	NR	210	1x210	284.6	1	1	0.5	0.5
29	Vindhyachal-I	WR	1260	6x210	153.9	1	1	0.5	0.5
30	Unchahar-IV	NR	500	1X500	275	2.33	2.33	0.5	0.5
31	Kudgi-I	SR	1600	2X800	389.5	4	4	0.5	0.5
32	Vindhyachal-II	WR	1000	2x500	144.1	2.33	2.33	0.5	0.5
33	Vindhyachal-III	WR	1000	2x500	144.2	2.33	2.33	0.5	0.5
34	Vindhyachal-IV	WR	1000	2x500	144.5	2.33	2.33	0.5	0.5
35	Vindhyachal-V	WR	500	1X500	144.5	2.33	2.33	0.5	0.5
36	Mouda-I	WR	1000	2X500	309.9	2.33	2.33	0.5	0.5
37	SIPAT-II	WR	1000	2X500	131	2.3	2.3	0.5	0.5
38	Barh TPS (660)	ER	1320	2x660	233.9	3	3	0.5	0.5
39	BGTTP (250)	AR	250	1x250	310.4	1	1	0.4	0.4
40	Singrauli(500)	NR	2000	5X200+2X500	133.3	2	3.33	0.4	0.7
41	Korba(I & II)(500)	WR	2100	3x200+3x500	130.5	2	2	0.4	0.4
42	Korba(III)	WR	500	1x500	128.2	2	2	0.4	0.4
43	NSPCL	WR	500	2x250	240.3	1	1	0.4	0.4
44	Mouda-II	WR	1320	2X660	276.8	2.33	2.33	0.4	0.4
45	Talcher-I	ER	1000	2x500	189.9	1.6	1.6	0.3	0.3
46	Sasan	WR	3960	6x660	132.5	2	2	0.3	0.3
47	SIPAT-I	WR	1980	3X660	127.2	2	2	0.3	0.3
48	Solapur	WR	1320	2X660	455.2	2	2	0.3	0.3
49	Dadri- I	NR	840	4X210	369.1	1.3	1.3	0.3	0.3
50	CGPL	WR	4150	5x830	164.37	2	2	0.3	0.3

*RRAS-Reserves Regulation Ancillary Services

Warm and Cold Start Time (Hrs) as furnished by RRAS* Provider(Thermal)

Sl No	RRAS Provider Name	Region	Installed Capacity (MW)	Unit size	Warm start time (Hrs)	Cold start time (Hrs)
1	Unchahar TPS Stage - III	NR	210	1x210	2Hr 40Min	3Hr 25Min
2	Unchahar TPS Stage - I	NR	420	2x210	2Hr 50Min	3Hr 30Min
3	Unchahar TPS Stage - II	NR	420	2x210	2Hr 35Min	3Hr 30Min
4	Singrauli STPS	NR	2000	5X200+2X500	2Hr 30Min	4Hr
5	Simhadri STPS - I	SR	1000	2x500	2Hr 30Min	4Hr
6	Simhadri STPS - II	SR	1000	2x500	2Hr 30Min	4Hr
7	NTPC-SAIL Power Company Pvt. Ltd	WR	500	2x250	2Hr 30Min	4Hr 20Min
8	Unchahar TPS Stage - IV	NR	500	1X500	3Hr	5Hr
9	Vindhyachal-I	WR	1260	6x210	3Hr	5Hr
10	Vindhyachal-II	WR	1000	2x500	3Hr	5Hr
11	Vindhyachal-III	WR	1000	2x500	3Hr	5Hr
12	Vindhyachal-IV	WR	1000	2x500	3Hr	5Hr
13	Vindhyachal-V	WR	500	1X500	3Hr	5Hr
14	Farakka STPS - I & II	ER	1600	3x200+1x500	200 MW= 3Hr; 500MW=4Hr 30 Min	200 MW=5Hr; 500MW=6 Hr 30 Min
15	Farakka STPS - III	ER	500	1x500	3 Hr 30 Min	5 Hrs 30Min
16	Dadri TPS Stage - I	NR	840	4X210	3Hr	6Hr
17	Dadri TPS Stage - II	NR	980	2X490	3Hr	6Hr
18	Indra Gandhi STPS	NR	1500	3X500	3Hr	6Hr
19	Talcher STPS - II	SR	2000	4x500	3Hr 30Min	6Hr
20	Korba STPS STG (I & II)	WR	2100	3x200+3x500	4Hr	6Hr
21	Korba STPS STG (III)	WR	500	1x500	4Hr	6Hr
22	Talcher STPS - I	ER	1000	2x500	3Hrs	6 Hr
23	BongaigaonGTPP	AR	250	1x250	4 Hrs	6 Hr 5min
24	Ramagundam STPS - III	SR	500	1x500	3Hr 45Min	6Hr 10Min
25	NTECL - Vallur TPS	SR	1500	3x500	3Hr 45Min	6Hr 10Min
26	Kahalgaon STPS - II	ER	1500	3x500	2Hr 50 Min	6 Hr 40 Min
27	Barh TPS	ER	1320	2x660	4	6 Hr 40 Min
28	Ramagundam STPS - I & II	SR	2100	3x200+3x500	200 MW=2Hr 30Min; 500MW=3Hr 45Min	200 MW=6 hr 50 Min; 500MW=6 Hr 10 Min
29	NTPL - Tuticorin TPS	SR	1000	2x500	3Hr 30Min	7 Hr
30	SIPAT TPS Stg-II	WR	1000	2X500	5Hr 30Min	7Hr
31	Mouda STPP Stage-I	WR	1000	2X500	4Hr 5Min	7Hr
32	Nabinagar Thermal Power Project	ER	500	2X250	5Hrs	8 Hr
33	Kahalgaon STPS - I	ER	840	4X210	3 Hrs 20 Min	8 Hr
34	NLC TPS - I Exp	SR	420	2x210	3Hr	8Hr
35	Sasan Power Ltd	WR	3960	6x660	6~8 Hr	8~10 Hr
36	NLC TPS - II	SR	840	4x210	4Hr 30Min	8Hr 45Min
37	Rihand TPS Stage - I	NR	1000	2x500	5Hr	9Hr
38	Rihand TPS Stage - II	NR	1000	2x500	5Hr	9Hr
39	Rihand TPS Stage - III	NR	1000	2x500	5Hr	9Hr
40	SIPAT TPS Stg-I	WR	1980	3X660	8Hr	10Hr
41	Solapur Super Thermal Power Project	WR	1320	2X660	8Hr	10Hr
42	Mouda STPP Stage-II	WR	1320	2X660	9Hr	10Hr
43	NLC TPS - I	SR	630	3x210	4Hr 30Min	11Hr
44	NLC TPS - II Exp	SR	500	2x250	6Hr 30Min	12 Hr
45	Kudgi STPS I	SR	1600	2X800	3Hr 50Min	35Hr
46	Costal Gujarat Power Ltd	WR	4150	5x830	Not Available	72Hr

*RRAS-Reserves Regulation Ancillary Services



PMG Office: 2nd Floor, B-Block, BSES Bhawan, Nehru Place, New Delhi – 110019
Tel: 39999037, Fax- 011-39999454

No. HOD (PMG)/BRPL/LO/2018-19/3888

Dated: 28.08.2018

ED (Commercial)
NTPC Limited,
EOC Annexe, A-8A, Sector-24
Noida-201301(UP)

- Ref: - 1. Letter no. AVP(PMG)/BRPL/2016-17/3341, dated 05.09.2017
2. Letter no. HOD(PMG)/BRPL/2017-18/3363, dated 15.09.2017
3. Letter no. HOD(PMG)/BRPL/2017-18/3369, dated 21.09.2017
4. Letter no. HOD(PMG)/BRPL/2018-19/3696, dated 12.04.2018
5. Letter no. HOD(PMG)/BRPL/2018-19/3724, dated 25.04.2018
6. Letter no. HOD(PMG)/BRPL/LO/2018-19/3739, dated 09.05.2018
7. Letter no. HOD(PMG)/BRPL/LO/2018-19/3824, dated 28.06.2018

Sub: BRPL concerns regarding coal shortages and reduction in DC at NTPC Dadri

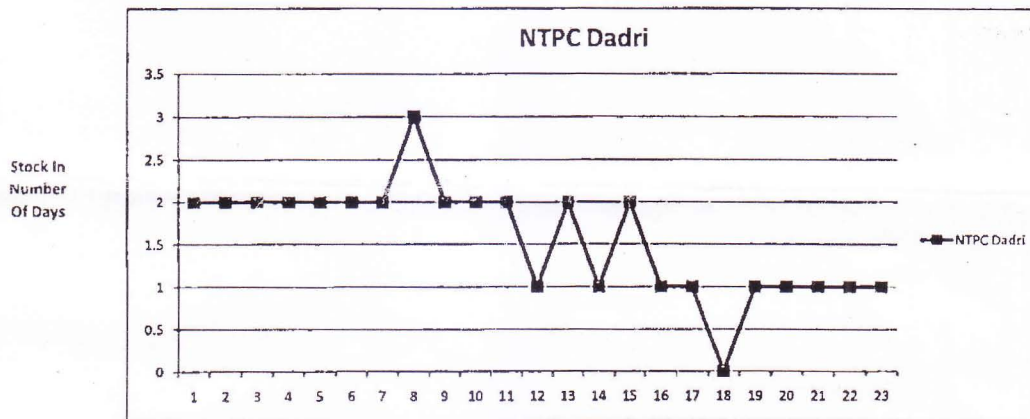
Dear Sir,

May kindly refer our earlier letters on the subject vide which we have requested for ensuring sufficient coal stock availability at Dadri-I and Dadri-II power stations which are supplying its major share of power for Delhi.

Dadri 1 & Dadri II are together supplying 1491 Mw power to Delhi which is about 21% of peak demand of Delhi ie 7016 Mw. Any sudden outage of these plants will be difficult to replace and may result in forced load shedding in BRPL area.

We have tabulated coal shortage position for August'18 month till 23th Aug'18 as under which shows that coal stock position has been deteriorating gradually and it has gone to One day stock which can lead to shut down of the Dadri plant at any moment.

Coal Stock Position Aug'18 as per CEA report




It is also observed that NTPC has also reduced declared capacity for 21.08.2018 to 73%(538/728) & 70%(650/928) for Dadri 1 & Dadri 2 respectively.

In view to ensure uninterrupted power supply to the esteemed consumer of Delhi it is requested to

- The declared DC on Day ahead basis be realistic as BRPL's day ahead planning entirely depends on DC's certainty. If there is any reduction in DC during real time it becomes unmanageable to arrange such quantum, as power exchanges also have limitations like insufficient availability of power in power exchanges on real time basis & transmission constraints, leading to load shedding.
- Once allocation of power for the next day is confirmed by NTPC it is to be ensured that there should not be variation of more than 5% or 57 MW (whichever is lower) in the DC on real time basis. Just to mention that the real time deviation limit for BRPL as per relevant DSM Regulations has been capped at 57 MW.

It is therefore requested that sufficient coal supply for all NTPC plants supplying power to Delhi especially Dadri should be ensured and intraday revisions in the DC should be avoided.

Yours Sincerely
For BSES Rajdhani Power Limited


Sanjay Srivastav
HOD (PMG)

Cc

- ED, Delhi SLDC
- GGM, NCPP Dadri (Plant)
- GM, NRLDC
- Member Secretary, NRPC

ALL INDIA POWER ENGINEERS' FEDERATION

Chief Patron
Er. Padamjit Singh

45, Ranjit Bagh, Opp.
Modi Mandir, Patiala - 147-004

No: AIPEF/MOP

Dated: 09/04/2018

To Sh R K Singh Minister of Power GOI



Sub Delay in commissioning of Teesta III -Kishanganj line

The 400 kV double circuit line from Teesta III to Kishanganj , having quad Moose conductor had a completion target of 31 March 2018 . Now the executing agency TPTL has stated (letter of 15 March) that due to severe Right of Way issues in Darjeeling district of West Bengal the line is delayed . TPTL is a JV of PGCIL and Teesta Urja Ltd , equity being 26% and 74%. Copy of TPTL letter is attached.

2 The news website India Together has published an article covering various factors delaying the Teesta III project and line.

3 TPTL should disclose what arrangement is being adopted to complete the line in absence of loop out section at Rangpo. This loop out section was to be constructed by PGCIL but was delayed and completion date is given as June 2020. The Teesta III Kishanganj line was to be looped in-looped out at Rangpo. While the loop in portion is operational the loop out portion is missing/delayed. TPTL should also disclose the time frame in which the loop out section would be modified/completed and also the time frame in completing the rest of the line upto Kishanganj.

4 Last year there was a spillage loss of 1462 GWh due to non completion of line to Kishanganj. This year the losses will repeat unless the line is completed by 01 June 2018. It is for TPTL to sort out the ROW problems as reported in Darjeeling district. Getting various clearances for line construction is the responsibility of the Transmission licensee TPTL.

AIPEF

Copy 1 PMO 2 CEA 3 PGCIL 4 TUL 5 TPTL 6 Cabinet Sectt 7 Niti Aayog 8 ERLDC/ERPC

Copy 1 CM West Bengal 2 CS West Bengal

ALL INDIA POWER ENGINEERS' FEDERATION

Chief Patron
Er. Padamjit Singh

45, Ranjit Bagh, Opp.
Modi Mandir, Patiala - 147 004

No: AIPEF/MOP

Dated: 08/04/2018

To Sh R K Singh, Minister of Power, Gol

Sub Slippage in completion of Teesta III- Kishanganj line

The 400 kV D/C Quad conductor line from Teesta III to PGCIL Kishanganj was to be commissioned by 31 March 2018. In response to RTI query the TPTL has informed that there will be a delay "due to severe ROW issues in Darjeeling district, West Bengal." (copy encl) .

2 The TPTL letter does not give any indication of extent of delay.

3 The Teesta III project of 1200 MW (1320 MW with overload) represents about Rs 14000 Cr investment with about 80% being the debt by public sector Banks and Financial institutions like REC and PFC. Unless this line to Kishanganj is completed the power project would not be operate at 1320 MW during the coming high flow season starting from June 2018 and extending upto Sept/Oct 2018. The ad hoc transmission arrangement of using the Rangpo-Binaguri line will not be able to take the full 1320 MW from Teesta III as this line has twin moose conductor whereas the Kishanganj line has quad moose conductor.

4 Due to transmission constraints the Teesta III power would have to be limited to about 900 MW out of the 1320 MW capacity , resulting in 400 MW round the clock loss for the high flow period of about 130 days. The energy loss would be around 1250 GWh. This summer higher energy rate of Rs 4 per unit can be expected from power exchange. TPTL/Govt of Sikkim would lose Rs 500 Crore due to non commissioning of the Kishanganj line.

5 PGCIL on its part has been unable to take up the loop out portion of line at Rangpo which is expected to be completed only in June 2020. PGCIL as well as TPTL must have made alternative arrangement at Rangpo so that the Kishanganj line when completed can be put on load using bypass arrangement at Rangpo. However the status/progress of this portion of line is not known.

6 It would be a matter of concern to all the Banks/Financial institutions whether TUL/Govt of Sikkim would be able to repay the loans as per schedule or whether this project also is financially stressed. In addition to the power project of Teesta III the 400 kV line has already suffered huge time over run as well as cost over run of the order of several hundred percent and still incomplete.

7 In 2014 the power project Teesta III was on verge of collapse and Power Ministry of GOI had to intervene to save the public investment of over Rs 9000 cr already sunk on the project. Now history seems to be repeating and MoPower may have to intervene to get the transmission line project back on rails.

8 Two policy decisions of GOI appear to have failed. The first policy decision is that the hydro project developer should be given the responsibility for constructing the line also. The second policy decision is to adopt the PPP mode for project /transmission line execution. In case of the transmission line even though Powergrid is 26% equity holder in TPTL , there is little sign of Powergrid efforts to complete this line.

9 This line (Teesta III to Kishanganj) may be seen as the end result of two failed GOI/MOP policies . For that reason also it becomes even more important for MoPower to intervene to ensure timely completion of line.



AIPEF

Copy 1 PMO 2 Cabinet sect 3 Niti Aayog 4 CEA 5 PGCIL 6 GoSikkim 7
CM West Bengal 8 RLDC/RPC



Teestavalley Power Transmission Ltd.

(A Govt. of Sikkim Enterprise)

JV of Teesta Urja Ltd. (Govt. of Sikkim Enterprise) & POWERGRID (Govt. of India Enterprise)

Ref. No.: TPTL/1801/1735

Date: 15/3/18

To,
Er. Padamjit Singh
45, Ranjit Bagh, Opposite Modi Mandir
Patiala-147004

Sub: Reply to your letter No. PS/RTI/TPTL-08 dated 05.03.2018

With reference to your letter mentioned in the subject, reply furnished on the information sought is, as under, based on the information provided by the respective departments and on the basis of documentary records/evidence available with the Company:

Point no.1 -regarding no. of Towers foundations completed during February 2018 and no. of Tower foundations yet to be completed as on March 01, 2018 is as under:

Reply: No. of Tower foundations completed in February, 2018 : 8 ✓
No. of Tower foundations yet to be completed as on March 01, 2018 : 22 ✓

Point no.2 -regarding no. of Towers erected in February 2018 and no. of Towers yet to be erected as on March 01, 2018 is as under:

Reply: No. of Towers erected in February, 2018: 11 ✓
No. of Towers yet to be erected as on March 01, 2018: 39 ✓

Point no.3 -regarding stringing of line completed during February 2018 in Kms. and pending Kms. of stringing yet to be completed as on March 01, 2018 is as under:

Reply: Stringing of line completed during February, 2018 : 4.78 kms ✓
Pending Kms. of stringing as on March 01, 2018: 40.91 Kms ✓

Point no.4 -regarding latest/ revised target date for completion of 400 kV line from Teesta III to kishanganj is as under:

Reply: The target date for completion of 400 kV line from Teesta III to kishanganj is March 2018. However, the same may not be possible due to severe ROW issues in Darjeeling District, West Bengal.

Thanking you,

Yours faithfully,

For Teestavalley Power Transmission limited


Public Information Officer

Violating laws, making losses, damaging environment

Teesta Urja's penchant for getting into trouble and illegalities continues unabated. Soumik Dutta reports.



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India Together**

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08 April 2018 -

The controversial 1200 MW Teesta Stage III Hydro Electric Project (HEP) in Sikkim is operating at 50% capacity due to incomplete power transmission system, thus sustaining huge losses financially, while damaging the environment silently. There is blatant illegality too in the operating system in place under which the project is operating.



River Teesta in Sikkim. Pic: Indiatgether files.

Transmission mismatch

When the Teesta Stage III project was approaching commissioning date, it was clear to the Special Purpose Vehicle (SPV) Teesta Urja Limited (TUL) constructing the project that there was only one transmission line to Kishanganj (Bihar) through which the power could be evacuated. If this line was not commissioned the entire power of Teesta III would remain bottled up and not a single megawatt could be delivered to the grid.

TUL also knew that while the Teesta III to Rangpo (Sikkim) transmission line was a short section, the section between Rangpo to Kishanganj was long and difficult to construct. So as a matter of necessity TUL concentrated on completing the shorter section of the line from Teesta III to Rangpo so that connectivity to the grid is attained and evacuation path is made available.

Attaining grid access

TUL completed one out of two circuits of the Teesta III to Rangpo line, thereby making 400 kV grid supply available. With this supply available TUL commissioned the six units of 200 MW each at Teesta III. Three units were declared commercially operational from 23 February 2017 and the remaining 3 units of 200 MW each were declared commercially operational from 28 February 2017. Hence from 28 Feb all 6 units were claimed to be on commercial operation.

As a result of this incomplete power evacuation system, the entire power generated at Teesta III was being delivered at Rangpo and thereafter through the existing/old double circuit line (of Teesta Stage V) to Binnaguri (West Bengal). In other words the double circuit line from Rangpo to Binnaguri was earlier carrying the power of Teesta V, now this line was carrying the combined power of Teesta III as well as Teesta V. Also several smaller hydro power stations of Dikchu, Jorethang and Tashiding (all in Sikkim) were also using this line to deliver their power into the grid.

The double circuit line from Rangpo to Binnaguri is presently catering to the power generated by several hydro power stations in that area (Teesta V 510 MW, Teesta III 1200 MW, Dikchu 100 MW, Jorethang 100 MW, and Tashiding 100 MW). The line to Binnaguri from Rangpo is having twin Moose conductor (which was sufficient for the original power of 510 MW from Teesta V) but this line was not envisaged to cater to power of hydro stations of over 2000 MW capacity.

During winters the power output from all the hydro stations of Sikkim is in the range of about 20% of capacity. Due to this low power generation, the Rangpo-Binnaguri line can operate within its loading limit in the winter months. However from June onwards the water inflows of all the hydro power stations in the area would be in a position to generate at 100% capacity. Under such conditions the Rangpo-Binnaguri line would face congestion and overloading due to which the hydro power generation would have to be reduced. Since the problem is primarily due to delay in Rangpo- Kishanganj line the backing down or reduction of hydro power has to be carry out by Teesta III station.

In 2017 while all the units of Teesta III station were claimed to be commissioned on 28 February, it was only in June 2017 that a crisis developed and an emergency meeting was held in Eastern Regional Power Committee (ERPC) Kolkata on 13 June. In that meeting TUL stated that Teesta III station is being restricted to 600 MW (as against 1200 MW capacity) and is daily losing 12 million units valued at INR 6 Crores. (Source, minutes of the ERPC meeting).

Legal hitches of Teesta III

The declaration of commercial operation is the date from which the units and power station have proved and passed the performance test through trial run. The trial run has to be carried out individually on each unit (to prove its capacity of 200 MW) and also the station has to prove its capacity of 1200 MW by operating at 1200 MW for specified period. In case of Power Purchase Agreement (PPA) a unit has to complete a full load operation for 24 hours continuously and the complete project with all 6 units has to operate at full load of 1200 MW for 8 hours continuously.

As per the regulations of the Central Electricity Regulatory Commission (CERC) and the Central Electricity Authority (CEA) the period of full load operation of each unit is 12 hours and for the station as a whole with all 6 units running at full load the station has to prove its capacity of 1200 MW for 12 hours.

However, in blatant violation of these norms, the Teesta III station has not carried out the full capacity test of 1200 MW either for 8 hours or for 12 hours because the transmission line to Kishanganj is incomplete and the transmission system of Rangpo-Binnaguri does not allow more than 600 MW of Teesta III power (as stated by TUL on 13 June 2017 in ERPC).

Speaking bluntly, a power station cannot generate more power than the quantum transmitted (since power cannot be stored). So when there is an admitted transmission constraint which limits the power to 600 MW it is practically and physically impossible for the power station to generate full 1200 MW for 8 hours or 12 hours as required under the mandated laws and regulations.

Despite of these anomalies, TUL filed a tariff application before CERC claiming a tariff to be charged from the four northern states which had signed PPAs for 840 MW out of 1200 MW capacity. On 23 May 2017 CERC passed an order allowing an ad hoc tariff from 23 Feb (3 units) and from 28 Feb 2017 (3 units).

The legal contradiction is clear. A tariff can be allowed/charged only after the station attaining Commercial operation Date (COD). To attain COD the station has to pass the Station capacity test at 1200 MW (full capacity) for 8 or 12 hours. The station can operate at full capacity only if the transmission lines can evacuate 1200 MW. Presently since Rangpo Kishanganj line is incomplete the transmission system cannot handle/evacuate 1200 MW power from Teesta III. Thus due to the incomplete line the power station cannot operate at 100% capacity and thereby it cannot attain the condition of COD. In absence of COD the commercial tariff cannot be charged and so the CERC order is patently erroneous.

Yet another aspect of violation of norms can be seen in the grant of long term open access (LTOA) for the Teesta III Project. The 1200 MW project was constructed by TUL on build own operate and transfer (BOOT) basis and according to the MOU signed between TUL and the government of Sikkim, TUL has to hand over the project to Sikkim after 35 years of operation.

Power Trading Corporation of India (PTC India) had signed the PPA with TUL in 2006 and signed PSA Power Sale Agreements (PSA) with the four northern states in Sept 2006, wherein PTC would buy the total power of Teesta III from TUL. PTC signed PSAs to sell power to four Northern States;

- Punjab 340 MW ✓
- Haryana 200 MW ✓
- U P 200 MW ✓
- Rajasthan 100 MW ✓

Total 840 MW which is 70 % of total capacity of 1200 MW.

Out of balance capacity of 30% i.e. 360 MW, 12% i.e. 144 MW is free power for Sikkim (as per MOU) and 18% i.e. 216 MW is for sale in open market. In summation, 840 MW sale to the northern states through LTOA and 216MW sale in market through STOA, with 144 MW free power to Sikkim which is partly consumed in Sikkim and rest is sold out to market.

The Electricity Act 2003 provides for Central Transmission Utility (CTU) for transmission at inter-state level. Power Grid Corporation of India Limited (PGCIL) is the CTU for entire India. Under Sec 38 (2) d of the Electricity Act 2003, PGCIL has the statutory duty to provide open access.

PTC filed an application for long term open access before PGCIL for the long term power sale from Teesta III to the four northern states to take place, which was granted on 26 May 2009 and further amended on 7 October 2015.

The LTOA was granted on condition that the transmission line from Teesta III to Kishanganj is to be constructed by the generation developer i.e TUL. Whereas the power project was to be executed by TUL, the transmission line to Kishanganj was to be constructed by TPTL which is a JV between TUL (74 % equity) and PGCIL (26% equity).

Power can be delivered only if LTOA is available. For LTOA the first and foremost condition is that Teesta III to Kishanganj line be completed. This line is incomplete and so the entire tariff petition filed by TUL before the CERC becomes invalid.

The CERC jurisdiction/purview is for interstate generation project

PPA has been signed with four northern states; these four states can get contracted power only through LTOA. In absence of LTOA the 4 purchaser states get excluded and this project does not remain an Inter State Generating Project. Tariff cannot be determined by CERC in such a case. Moreover, the tariff has been calculated by CERC on basis of 1200 MW capacity. When the practical capacity has been admitted by TUL as 600 MW (ERPC 13 June 2017 minutes) the entire tariff basis becomes invalid, and limiting of capacity at 600 MW indicates that the COD condition of full load operation at 1200 MW for 12 hours is not attained. In absence of COD condition charging of tariff becomes illegal and violates CERC tariff regulations.

The All India Power Engineers Federation (AIPEF) in a letter to R.K.Singh, Union Minister of power dated 19 February 2018 has expressed concerns over the inordinate delay in the completion of the transmission line between Rangpo to Kishanganj. The reports of CEA monitoring wing on progress of the transmission line do not inspire any confidence that this line will be commissioned by the stated date of March 2018 (i.e. 31 March 2018). The line has 590 tower locations and total length of 430 circuit km.

As per CEA report 42 tower foundations are pending, 61 towers are yet to be erected and 100-circuit-km stringing is pending as on 31 Jan 2018. CEA reports indicate nil progress during January 2018 while the completion date remains as March 2018.

From the CEA report it appears that the line may not be completed even by 1 June 2018 and delay may well extend up to 30 September 2018. In case the delay is beyond 1 June 2018 it would certainly lead to spillage loss - the power generation loss due to transmission constraints- in 2018 high flow season. The 1200 MW Teesta III project (excluding line) has been constructed at INR 14000 Crores as against CEA approved figure of INR 5705 Crores. This huge cost escalation has put stress on the Govt. of Indian funding agencies including banks and GOI financial institutions like rural electrification corporation (REC) etc.

Loss in the first year of project due to spillage and energy Loss

In 2017 spillage loss was estimated to be in the order of 1100 million units (MU) as against design energy of 5200 MU. Spillage loss of 300 MW is 7.2 MU per day

($300 \times 24 = 7200$ MWh i.e. 7.2 MU). 7.2 million units is that power which could have been sold in market (power exchange) at around Rs 3 per unit. Financial loss per day would be INR 21.6 million ($7.2 \times 3 = 21.6$).

To assess the quantum of energy loss, the data for the period June to September 2017 – including energy sent out ex bus from Teesta III in MU (million units) – was measured as metered by Special Energy Meters (SEM). The data also includes gross generation at Teesta III as per the CEA, energy scheduled as per the Eastern Regional Load Dispatch Centre (ERLDC), energy potential possible under high flow conditions – assuming station were to run at 100% capacity of 1320 MW (including 10% continuous overload margin as per specifications). The energy loss calculation also took into account auxiliary consumption @ 1.2%.

If the 400 kV line to Kishanganj had been commissioned, with full inflow available in Teesta, the Teesta III HEP had the potential to generate 3818.6 MU (ex bus) against which the actual energy sent out (ex bus) was only 2356.42 MU – that indicates an energy loss of 1462 MU.

TUL have indicated an energy rate of INR 5 per unit for Teesta III in the ERPC meeting of 13 June 2017. Thus, an energy loss of 1462 MU translates to a financial loss of INR 731 crore due to delay in construction of the transmission line to Kishanganj.

The original estimated cost of the Teesta III to Kishanganj transmission line was INR 770.8 crore, while the loss due to delay in the very first year is INR 731 crore, due to spillage and energy loss, AIPEF letter mentions.

Environmental impact

A joint venture was formed between Teesta Urja Limited and Power Grid Corporation of India Limited in a 75:25 ratio. The new subsidiary company – Teesta Valley Power Transmission company Limited (TVPTL) – was responsible for execution of the transmission line from Teesta III up to Kishanganj.

The cost of Teesta III-Kishanganj transmission line was initially pegged at the price levels of August 2008 at INR 770.80 crore with a commissioning schedule of 36 months from the date of Financial Closure and at a debt equity ratio of 75:25. However, due to delays in the project, the final revised cost estimate was put at INR 1450.36 Crores, as of 5 January 2016, with the revised scheduled commercial operation date fixed as 31 March 2017.

The energy loss of 1462 MU (June-September 2017) also had an environmental impact, asserted AIPEF. They argued that if the Kishanganj line had been completed before June 2017, it would have resulted in extra hydro energy generation of 1462 MU, which would have displaced thermal energy of an equivalent quantum, and saved the equivalent amount of coal-fired energy.

“As 1 kWh of coal-fired energy results in 1 kg of carbon dioxide, the conclusion is that energy loss of 1462 MU at Teesta III has resulted in the release of 1.46 million tonnes of additional carbon dioxide during the period June to September 2017,” argued Padamjit Singh, chief patron of AIPEF.

While TUL may be claiming all kinds of events and circumstances to justify the time and cost overrun of the hydro power project, the time and cost overrun of the transmission line (also constructed by TUL, along with PGCIL) was certainly to be avoided, as this time overrun is over and above the 64 months delay in commissioning the power project. This reflects sheer negligence of both the

developer and the lacunae in the functioning of the GoI monitoring agencies responsible for the project.

Soumik Dutta

08 April 2018

Soumik Dutta is a freelance investigative journalist based in Gangtok, Sikkim.



भारत सरकार/Government of India

विद्युत मंत्रालय/Ministry of Power

केंद्रीय विद्युत प्राधिकरण/Central Electricity Authority

राष्ट्रीय विद्युत समिति /National Power Committee

सं.: 15/1/Comm-Avail(CERC)/NPC/CEA/2018/882-886

Date: 07.09.2018

सेवा में/To

As per the Address List.

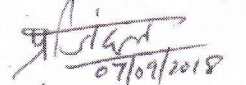
विषय: Comments of stakeholders on the draft of the "Guidelines on Availability of Communication System"-reg.

महोदय/Sir,

1. As per Regulation 7.3(i) of CERC (Communication System for Inter-State transmission of Electricity), Regulations, 2017 and CERC letter dated 27.06.2017, National Power Committee (NPC) has been entrusted to prepare Guidelines on Availability of Communication System in consultation with RPCs, NLDC, RLDC and other stakeholders.
2. Accordingly, a Working group was constituted with Chief Engineer & Member Secretary (NPC) as Chairperson of the Working group and consisting of members from all the RPCs, PGCIL, POSOCO and few of the STUs. Three meetings of the Working group were held and a draft guidelines on Availability of Communication System was finalized in the 3rd meeting held on 06th August 2018.
3. The finalized draft Guidelines are being published on CEA's website for public comments as required under CERC Regulations. The copy of the draft Guidelines is attached for your kind information and reference.
4. It is requested that these Guidelines may be circulated among your constituents for wider publicity and comments, if any, by the constituents by RPCs/constituents may be sent to us by 20th September 2018.
5. The comments/inputs could be sent on the following email addresses: cenpc-cea@gov.in.

Encl: As Above.

भवदीय /Yours faithfully,


07/09/2018

(प्रदीप जिंदल/Pardeep Jindal)

मुख्य अभियंता/Chief Engineer &
Member Secretary (NPC),

Address List:

1. ✓ Member Secretary, NRPC, New Delhi
2. Member Secretary, WRPC, Mumbai
3. Member Secretary, SRPC, Bengaluru
4. Member Secretary, ERPC, Kolkata
5. Member Secretary, NERPC, Shillong

**GUIDELINES
ON
AVAILABILITY OF COMMUNICATION SYSTEMS
FOR
INTER-STATE TRANSMISSION OF ELECTRICITY**

DRAFT

**AUGUST 2018
NEW DELHI**

**NATIONAL POWER COMMITTEE DIVISION
CENTRAL ELECTRICITY AUTHORITY**

GUIDELINES ON AVAILABILITY OF COMMUNICATION SYSTEM FOR INTER-STATE TRANSMISSION OF ELECTRICITY

1. INTRODUCTION:

1.1 As per regulation 7.3 (i) of Central Electricity Regulatory Commission (Communication System for Inter-State transmission of Electricity), Regulations, 2017, National Power Committee (NPC) has been entrusted to prepare Guidelines on Availability of Communication System in consultation with RPCs, NLDC, RLDC and other stakeholders.

1.2 The relevant provisions in the CERC (Indian Electricity Grid Code) Regulations, 2010 and Central Electricity Authority (CEA) (Technical Standards for Connectivity to the Grid), Regulations, 2007 in respect of Communication System as follows:

1.2.1 **Regulation 4.6.2 of the Indian Electricity Grid Code (IEGC)** stipulates that *'Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision/ control of the grid by the RLDC, under normal and abnormal conditions. All Users, STUs and CTU shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches/ transformer taps etc. in line with interface requirements and other guideline made available by RLDC. The associated communication system to facilitate data flow up to appropriate data collection point on CTU's system shall also be established by the concerned User or STU as specified by CTU in the Connection Agreement. All Users/STUs in coordination with CTU shall provide the required facilities at their respective ends as specified in the Connection Agreement.'*

1.2.2 **Regulation 6(3) of the CEA (Technical Standards for Connectivity to the Grid)** stipulates that *'the requester and user shall provide necessary facilities for voice and data communication and transfer of online operational data, such as voltage, frequency, line flows and status of breaker and isolator position and other parameters as prescribed by the appropriate load dispatch centre.'*

2. DEFINITIONS:

- 2.1 Words and expressions used in this methodology shall have the same meaning assigned in the Electricity Act, Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulation ,2007, CEA (Technical Standards for Communication System in Power Sector) Regulations, 2018, CERC (Indian Electricity Grid Code) Regulations, 2010 & (Communication System for Inter-State transmission of Electricity), Regulations, 2017 and amendments thereof.
- 2.2 Other words have been explained as per the context in these guidelines.

3. SCOPE AND APPLICABILITY:

- 3.1 As per Regulation 5. (i) of CERC (Communication System for Inter-State transmission of Electricity), Regulations, 2017, *“These regulations shall apply to the communication infrastructure to be used for data communication and tele -protection for the power system at National, Regional and inter-State level and shall also include the power system at the State level till appropriate regulation on Communication is framed by the respective State Electricity Regulatory Commissions.”*
- 3.2 As such, in case of ISTS i.e. for the communication system to be provided at RLDCs/NLDC, these guidelines shall be applicable for CTU and in case of State Transmission System i.e. for the communication system to be provided at SLDC, these guidelines shall be applicable to the respective State Transmission Utility (STU).
[The CTU (or STU as the case may be) shall have back to back co-ordination/agreement with transmission licensees, generators, dedicated transmission line owners for providing power system communication on their network]

4. TREATMENT OF COMMUNICATION SYSTEM OUTAGES:

- 4.1 Outage time of communication system elements (i.e. channels) due to acts of God and force majeure events beyond the control of the communication provider shall be considered as deemed available. However, onus of satisfying the Member Secretary, RPC that element outage was due to aforesaid events shall rest with the communication provider.
- 4.2 Any outage of duration less than or equal to 1 minute in a time-block shall be treated as deemed available provided such outages are not more than 10 times in a day.

(Explanation: (a) If a channel is out for a duration of more than 1 minute in a time-block, the channel shall be considered out for the whole time-block. (b) If a channel is out for a duration up to 1 minute in a time-block, and such outages are more than 10 times in a day, then such outages shall not be exempted under 4.2 of the guidelines and all the time-blocks with such outages shall be considered outages).

5. METHODOLOGY FOR COMPUTATION OF AVAILABILITY OF COMMUNICATION SYSTEM:

5.1 Availability of Communication System (A_{CS}) shall be calculated as under:

$$A_{CS} = \frac{\sum_{i=1}^N (A_i)}{N}$$

Where - N is total number of communication channels which is based on the requirement of RLDCs/NLDC and the same would be decided in consultation with respective RPCs/NPC.

- A_i is Availability of i^{th} Channel which shall be calculated as given in 5.2 (b)

5.2(a) If a channel is out for some time in a particular time-block as defined in IEGC (presently 15 minutes), for calculation of availability of communication system, it would be considered as not available during the whole block.

5.2(b) Availability of i^{th} Channel (A_i) shall be arrived as under:

$$A_i = \frac{B_T - B_{Ni}}{B_T} \times 100$$

Where B_T is Total number of time-blocks in a month

B_{Ni} is the total number of time-blocks, in which i^{th} channel was not available after considering deemed availability status of 4.1.

$$B_{Ni} = B_{ANi} - B_{Gi}$$

Where- B_{ANi} is absolute number of time-blocks in which the i^{th} channel was 'not available' on account of any reason after due consideration of provisions under 4.2.

- B_{Gi} is Number of time-blocks out of B_{ANi} , in which i^{th} channel was 'not available' on account of act of god as specified in 4.1 above.

[For example, if there are 2880 time-blocks (B_T) in a month, and a particular channel is not available for a total of 70 (B_{ANi}) time-blocks; and out of this, this channel was not available for 20 (B_{Gi}) time-block due to act of god, then- $B_{Ni} = 70 - 20 = 50$, and $A_i = (2880 - 50) / 2880 = 98.26\%$]

Annexure-1-NRLDC

S. NO.	Element Name	Outage Date	Outage Time	Reason/Remarks
1	400 kV Bareilly(UP)-Unnao(UP) ckt -2	5-Aug-18	09:20	Bus bar protection operated. As per PMU, No fault observed.
		5-Aug-18	11:41	Bus bar protection operated at Bareilly(UP). As per PMU, No fault observed.
		13-Aug-18	23:19	R-N fault, 150.9Km from Unnao(UP) end. As per PMU, R-N fault observed.
		28-Aug-18	10:51	DT received at Unnao(UP). As per PMU, slight dip in three phase voltage observed.
2	220 kV Kishenpur(PG)-Ramban(JK)	9-Aug-18	14:45	B-N Fault. As per PMU, B-N fault with no autoreclosing observed.
		15-Aug-18	13:05	B-N Fault
		16-Aug-18	11:35	B-N Fault, 12.81 kms from Ramban(JK) end. As per PMU, B-N fault observed.
		27-Aug-18	14:42	B-N fault, 11.8 kms from Ramban(JK) end. As per PMU, B-N fault with delayed clearance observed.
3	400 kV Bikaner(Raj)-Didwana(Raj) ckt-1	7-Aug-18	15:27	DT received at Deedwana(Raj). As per PMU, no fault observed.
		16-Aug-18	10:48	Tripped from Bikaner(Raj) end only.
		19-Aug-18	17:02	As per PMU, no fault observed.
4	765 kV Fatehabad(UP)-Lalitpur TPS(UP) ckt-1	24-Aug-18	07:25	As per PMU, no fault observed.
		26-Aug-18	12:03	Tripped due to B-Phase LA blast at Fatehabad(UP). As per PMU, B-N fault observed with unsuccessful auto-reclosing.
		28-Aug-18	17:46	As per PMU, no fault observed.
5	400 kV FSC (50%) of Koteswar Pool -1 at Meerut(PG)	9-Aug-18	13:00	Capacitor unbalance protection operated at Meerut(PG).
		15-Aug-18	08:54	B-phase capacitance unbalance protection operated.
		18-Aug-18	14:12	Y-phase capacitance unbalance protection operated.
6	400/220 kV 500 MVA ICT 3 G.Noida	10-Aug-18	00:40	Malfunction of REF relay.
		10-Aug-18	02:00	Malfunction of REF relay.
		20-Aug-18	10:15	Malfunction of REF relay.
7	800 kV HVDC Champa(PG) -Kurukshehra(PG) ckt-1	10-Aug-18	16:16	Converter differential alarm received at Kurukshehra(PG) end.
		17-Aug-18	16:39	Due to commutation failure.
		28-Aug-18	04:45	DC line fault.
8	400/220 kV 200 MVA ICT1 Roza	4-Aug-18	12:01	Tripped on earth fault.
		6-Aug-18	10:10	Tripping details awaited.
		7-Aug-18	10:40	Differential protection operated.

Grid Events occurred in NR: Aug'18

Annexure-2-NRLDC

S.No.	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		Event (As reported)	Genera- tion Loss(M W)	Load Loss(M W)	Category as per CEA Grid Standards	Energy Unreserved (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)
			Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
1	1) 220kV Ratangarh II(RVPNL)-Suratgarh(RVPNL) ckt 2 2) 220kV Suratgarh II(RVPNL)-Suratgarh(RVPNL) ckt 2 3) 220kV Bhadra(RVPNL)-Suratgarh(RVPNL) 4) 315MVA 400/220kV ICT1 at 400kV Suratgarh(RVPNL) 5) 315MVA 400/220kV ICT2 at 400kV Suratgarh(RVPNL) 6) 250MW Unit#3 at 400kV Suratgarh(RRVUNL) 7) 250MW Unit#4 at 400kV Suratgarh(RRVUNL) 8) Station Transformer 4 at 400kV	Rajasthan	1-Aug-18	12:08	B phase CT of 220kV Ratangarh II(RVPNL)-Suratgarh(RRVPNL) ckt 2 busted, it resulted into operation of 220kV Bus 2 Bus Bar protection at 220 kV Suratgarh (RRVPNL). It further resulted in failure of auxiliary supply of running units leading to tripping of Unit#3 & #4 at 400kV Suratgarh(RRVPNL). As per PMU, Y-N fault observed. In antecedent condition, Unit#3 & #4 generating 380MW, 315MVA 400/220kV ICT1 & ICT2 carrying 90MW each.	380		GD-1		Y(Raj)				Y(Raj)		Y(Raj)		80ms
2	1) 220kV Sarsawa(UP)-Saharanpur(PG) ckt-1 2) 220kV Sarsawa(UP)-Saharanpur(PG) ckt-2	UP & POWERGRID	2-Aug-18	01:00	Due to Bus bar protection operation at 220kV Sarsawa(UP), 220kV Sarsawa(UP)-Saharanpur(PG) ckt-1 & ckt-2 tripped. As per PMU, no fault observed during the reported time of Bus bar protection operation.			GI-1				Y (UP),Y(PG)		Y (UP),Y(PG)		Y (UP),Y(PG)		No fault observed
3	1) 200 MVA ICT1 at 400/220kV Rosa(UP) 2) 200 MVA ICT2 at 400/220kV Rosa(UP)	UP	4-Aug-18	12:01	200 MVA ICT1 & ICT2 at 400/220kV Rosa(UP) tripped on DEF. In antecedent condition, both ICTs carrying 121MW each. As per PMU, Delayed clearance is observed with maximum dip in Y phase voltage. From Delayed clearance, it seems that there may be fault in downward 220kV network of		105	GD-1	0.27			Y (UP)		Y (UP)		Y (UP)		9520ms
4	1) 220kV Pampore(JK)-Wagoora(PG) ckt-1 2) 220kV Pampore(JK)-Wagoora(PG) ckt-2	J&K and POWERGRID	4-Aug-18	20:33	220kV Pampore(JK)-Wagoora(PG) ckt-1 & 2 tripped on Y-N fault. In antecedent condition, 220kV Pampore(JK)-Wagoora(PG) ckt-1 & 2 carrying 190MW & 198MW respectively. As per PMU, Y-N fault with delayed clearance is observed.		400	GD-1	3.48			Y (JK),Y(PG)		Y (JK),Y(PG)		Y (JK),Y(PG)		760ms
6	1) 400kV Bareilly(PG)-Bareilly(UP) ckt-1 2) 400kV Bareilly(UP)-Unnao(UP) ckt-2 3) 315 MVA 400/220kV ICT 1 at Bareilly(UP) 4) 315 MVA 400/220kV ICT 3 at Bareilly(UP) 5) 400kV Bus 1 at 400/220kV Bareilly(UP)	UP & POWERGRID	5-Aug-18	09:20	Due to Bus bar protection operation at 400 kV Bus-1 of 400/220kV Bareilly(UP), 400kV Bareilly(PG)-Bareilly(UP) ckt-1, 400kV Bareilly(UP)-Unnao(UP) ckt-2, 315MVA ICT 1 & 3 at Bareilly(UP) tripped. Similiar incident also occurred at 1141 Hrs resulting in			GI-2		Y (UP)		Y(PG)		Y (UP)		Y (PG)		No fault observed
5	1) 500 MVA 400/220kV ICT 4 at Akal(RRVPNL) Following 400kV elements alongwith all 220kV elements at 400/220kV Akal(RRVPNL) were manually handtripped: 2) 400 kV Bus 2 at 400/220kV Akal(RRVPNL) 3) 315 MVA 400/220kV ICT 1 at Akal(RRVPNL) 4) 315 MVA 400/220kV ICT 3 at Akal(RRVPNL) 5) 400kV Akal(RRVPNL)-Jodhpur(RRVPNL) 6) 400kV Akal(RRVPNL)-Barmer(RRVPNL)	Rajasthan	5-Aug-18	16:00	500MVA 400/220kV ICT-IV at Akal(RRVPNL) caught fire resulting in tripping of ICT-IV due to operation of Differential Protection Relay. All other elements at 400/220kV Akal(RRVPNL) manually hand tripped for safety reasons. As per PMU, Fluctuations observed in all the phase voltages and delayed clearance of fault is observed. In antecedent condition, 400/220kV ICT-IV at Akal(RRVPNL) carrying 360 MW.	1145		GD-1		Y(Raj)			Y(Raj)			Y(Raj)		440ms
7	1) 200 MVA ICT1 at 400/220kV Rosa(UP) 2) 200 MVA ICT2 at 400/220kV Rosa(UP)	UP	6-Aug-18	10:10	200 MVA ICT1 & ICT2 at 400/220kV Rosa(UP) tripped at 1010Hrs. In antecedent condition, both ICTs carrying 125MW each. As per PMU, Delayed clearance is observed with maximum dip in Y phase voltage. From Delayed clearance, it seems that there may be fault in downward 220kV network of 400/220kV Rosa(UP) which was not cleared within time. It may resulted into tripping of		200	GD-1	1.00			Y (UP)		Y (UP)		Y (UP)		

Grid Events occurred in NR: Aug'18

Annexure-2-NRLDC

S.No.	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		Event (As reported)	Generation Loss(MW)	Load Loss(MW)	Category as per CEA Grid Standards	Energy Unserviced (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)
			Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
8	1) 315 MVA 400/220 kV ICT 2 at Ludhiana(PG) 2) 400kV Ludhiana(PG)-Patiala(PG) ckt-2	POWERGRID	7-Aug-18	23:56	LBB (Local Breaker Back up) protection operated due to fault in DC control cable leading to tripping of 400kV Ludhiana(PG)-Patiala(PG) ckt-2 & 315 MVA ICT 2 at Ludhiana(PG). As per PMU, no fault observed in the system.			GI-2		Y(PG)			Y(PG)			Y(PG)	No fault observed	
9	1. 400 kV Meerut-Koteshwar Pool ckt-2 2. 400 kV 250 MW Unit-1 at Tehri HEP	POWERGRID/ THDC	8-Aug-18	01:38	Power flow on 400 kV Meerut-Koteshwar Pool ckt-1 reached more than 1300MW after tripping of 400 kV Meerut-Koteshwar Pool ckt-2. As both the FSC was out of service, over loading of 400 kV Meerut-Koteshwar (Pool) ckt-1 resulted into	250		GD-1		Y(PG), Y(THDC)			Y(PG)		Y(THDC)	Y(PG), Y(THDC)	100ms	
10	1) 220kV Chhaur(MALN2)-Nalagarh(PG) 2) 220kV AD Hydro(ADHY)-Phojal(HP) 3) 220kV Chhaur(MALN2)-Phojal(HP)	ADHYDRO, HP & POWERGRID	12-Aug-18	23:34	220kV Chhaur(MALN2)-Nalagarh(PG) tripped on Y-N fault (Distance 14.3 km from Nalagarh(PG) end). At the same time, 220kV AD Hydro(ADHY)-Phojal(HP) & 220kV Chhaur(MALN2)-Phojal(HP) also tripped. As per PMU, Y-N fault observed with no auto-	25		GD-1		Y(ADHYDR O)	Y(PG), Y(HP)			Y(PG), Y(HP), Y(ADHYDRO)	Y(ADHYDRO)	80ms		
11	1) 400kV Baglihar(JK)-Kishenpur(PG) ckt-1 2) Unit#1 at 400kV Baglihar(JK) 3) Unit#2 at 400kV Baglihar(JK) 4) Unit#3 at 400kV Baglihar(JK)	J & K and POWERGRID	13-Aug-18	17:07	400kV Baglihar(JK)-Kishenpur(PG) ckt-1 tripped on Y-B phase to phase fault, 37.8KM from Kishenpur(PG) end. Charging attempt made at 0136 hrs on 14.08.2018 but line did not hold due to SOTF operation. After tripping of line, all three running units of 400 kV Baglihar stage-1 also tripped due to evacuation constraints. As per PMU, Y-B fault observed.	450		GD-1		Y (JK),Y(PG)			Y (JK),Y(PG)		Y (JK),Y(PG)	40ms		
12	1) 315 MVA 400/220kV ICT 1 at Rewa Road(UP). 2) 315 MVA 400/220kV ICT 2 at Rewa Road(UP). 3) 220kV Allahabad(PG)-Allahabad(UP) ckt-1 4) 220kV Allahabad(PG)-Allahabad(UP) ckt-2 5) 220kV Allahabad(PG)-Naini Railway(Railway) ckt-1 6) 220kV Allahabad(PG)-Naini Railway(Railway) ckt-	UP & POWERGRID	15-Aug-18	04:07	Bus bar protection operated at 220kV Rewa Road(UP) substation leading to blackout of the 220 kV side of 400/220 kV Rewa Road (UP) substation. At the same time, 315 MVA ICT 1 & 2 at 400kV Rewa Road(UP), also tripped. As per PMU, R-N fault followed by Y-N fault is observed.	200		GD-1	0.20	Y(UP) Y(PG)			Y(PG), Y(UP)		Y(UP)	760ms		
13	1) 200 MVA 400/132 kV ICT 1 at Agra South(UP). 2) 200 MVA 400/132 kV ICT 2 at Agra South(UP). 3) 200 MVA 400/132 kV ICT 3 at Agra South(UP).	UP & POWERGRID	15-Aug-18	23:32	200MVA ICT 1,2 & 3 at 400kV Agra South(UP) tripped with a load loss of ~200MW, due to tripping of 132kV Agra-Agra Cantt line on B-N fault with a fault current 4.36kA. The ICT's tripped due to IDMT DIR O/C and E/F protection operated. As per PMU, B-N fault observed.	200		GD-1	0.19		Y(PG), Y(UP)		Y(UP)	Y(PG)	Y(UP)	160ms		
14	1) 400kV Baglihar(JK)-Kishenpur(PG) ckt-1 2) Unit#1 at 400kV Baglihar(JK) 3) Unit#2 at 400kV Baglihar(JK) 4) Unit#3 at 400kV Baglihar(JK)	J & K and POWERGRID	16-Aug-18	04:50	400kV Baglihar(JK)-Kishenpur(PG) ckt-1 tripped on Y-N fault, 18km from Kishenpur(PG) end; Conductor snapped between tower no-169 and 170. After tripping of line, all three running units of 400 kV Baglihar stage-1 also tripped due to evacuation constraints. As per PMU, Y-N fault observed.	450		GD-1		Y (JK),Y(PG)			Y (JK),Y(PG)		Y (JK),Y(PG)	80ms		
15	1) 800kV HVDC Champa-Kurukshetra ckt-1 2) 800kV HVDC Champa-Kurukshetra ckt-2	POWERGRID	17-Aug-18	16:39	765KV Jhatikara(PG) – Bhiwani(PG) R-B fault triggered commutation failure in HVDC Champa-Kurukshetra Bipole and failure to inhibit the commutation failure by Champa(PG) end resulted in blocking of bipole; As per PMU, R-B fault observed.			GI-2		Y(PG)			Y(PG)		Y(PG)	80ms		

Grid Events occurred in NR: Aug'18

Annexure-2-NRLDC

S.No.	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		Event (As reported)	Genera- tion Loss(M W)	Load Loss(M W)	Category as per CEA Grid Standards	Energy Unreserved (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)	
			Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received		
16	1) 400 kV Bus 1 at 400kV Orai(UP) 2) 400kV Mainpuri 765(UP)-Orai(UP) ckt-2	UP	18-Aug-18	01:45	400kV Mainpuri 765(UP)-Orai(UP) ckt-2 tripped on phase to phase fault. At the same time, 400 kV Bus 1 at 400kV Orai(UP) also tripped due to LBB operation. As per PMU, Y-N fault observed.			GI-2				Y(UP)			Y(UP)		Y(UP)	80ms	
17	1) 400kV Anpara(UP)-Sarnath(UP) ckt-2 2) 400kV Anpara(UP)-Mau(UP)	UP	19-Aug-18	05:05	400kV Anpara(UP)-Sarnath(UP) ckt-2 & 400kV Anpara(UP)-Mau(UP) tripped on Y-N fault. In antecedent condition, 400kV Anpara(UP)-Sarnath(UP) ckt-2 & 400kV Anpara(UP)-Mau(UP) carrying 598 MW &			GI-2				Y(UP)			Y(UP)		Y(UP)	560ms	
18	1) 400 kV Meerut-Koteshwar Pool ckt-1 2) 400 kV 250 MW Unit-1 at Tehri HEP	POWERGRID/ THDC	20-Aug-18	06:33	Power flow on 400 kV Meerut-Koteshwar Pool ckt-2 reached more than 1250MW after tripping of 400 kV Meerut-Koteshwar Pool ckt-1. In antecedent condition, 400 kV Meerut-Koteshwar Pool ckt-1 & 2 carrying 896MW & 454 MW respectively. As FSC of 400kV Meerut-Koteshwar ckt-2 was under	250		GD-1			Y(THDC)			Y(PG), Y(THDC)		Y(PG), Y(THDC)	200ms		
19	1) 220kV AD Hydro(ADHY)-Phojal(HP) 2) 220kV AD Hydro(ADHY)-Nalagarh(PG) 3) 220kV Chhaur(MALN2)-Phojal(HP)	ADHYDRO, HP & POWERGRID	21-Aug-18	16:42	220kV AD Hydro(ADHY)-Nalagarh(PG) & 220kV AD Hydro(ADHY)-Phojal(HP) tripped on R-N fault. After patrolling, it is found that a tree has been uprooted which caused tower bent at Loc No: 142. In antecedent	160		GD-1			Y(ADHYDR O)			Y(PG), Y(HP), Y(ADHYDRO)		Y(ADHYDRO)	80ms		
20	1) 400kV Anpara(UP)-Sarnath(UP) ckt-2 2) 400kV Anpara(UP)-Mau(UP) 3) 400kV Sarnath(UP)-Varanasi(PG) ckt-2	UP & POWERGRID	24-Aug-18	14:29	400kV Anpara(UP)-Sarnath(UP) ckt-2 tripped due to Disc insulator string punctured at tower location no-113 R-Y fault. At the same time 400kV Anpara(UP)-Mau(UP) & 400kV Sarnath(UP)-Varanasi(PG) ckt-2 also tripped on R-Y fault. In antecedent condition, 400kV			GI-2			Y(UP)			Y(UP),Y(PG)		Y(UP)	80ms		
21	1) 200 MVA ICT 1 at 400/132kV Mau(UP). 2) 200 MVA ICT 2 at 400/132kV Mau(UP).	UP	27-Aug-18	10:25	200 MVA ICT 1 & ICT 2 at 400/132kV Mau(UP) tripped due to operation of backup over current earth fault trip relay. As per PMU, Initially voltage dip observed in R phase and after 2040ms, voltage dip also observed in B-Y phase. Delayed clearance is observed. It seems ICTs tripped on back up		127	GD-1	0.17					Y(UP)		Y(UP)	4520ms		
22	1) 400 kV Rampur(NJPC)-Nallagarh(PG) ckt-2 2) Unit#5 at 400kV Nathpa-Jhakri(NJPC) 3) Unit#6 at 400kV Nathpa-Jhakri(NJPC) 4) Unit#1 at 400kV Rampur(NJPC) 5) Unit#2 at 400kV Rampur(NJPC) 6) Unit#2 at 400kV Karcham Wangtoo (NLNE mode) 7) Unit#4 at 400kV Karcham Wangtoo (NLNE mode)	NJPC, JSW & POWERGRID	29-Aug-18	04:02	Auto reclosure of 400 kV Rampur(NJPC)-Nalagarh(PG) ckt-1 & 2 occurred at 0402 hrs due to B-N Fault (92 kms from Rampur). 400 kV Rampur(NJPC)-Nalagarh(PG) circuit-1 was successfully auto reclosed at both ends. 400 kV Rampur(NJPC)-Nalagarh(PG) circuit-2 was auto reclosed successfully at Nalagarh(PG) but tripped at Rampur end. As	1200		GD-1			Y(NJPC), Y(PG)			Y(JSW)		Y(NJPC), Y(PG)	Y(JSW)	Y(NJPC)	80ms
23	1) 400kV Bus 2 at Bawana CCGT 2) 400kV Bahadurgarh(PG)-Bawana(GT) 3) STG1 at 400kV Bawana CCGT	Delhi	29-Aug-18	15:28	Bus bar protection operated at Bawana CCGT leading to tripping of 400kV Bus 2 at Bawana CCGT & 400kV Bahadurgarh(PG)-Bawana(GT). STG1 also tripped with heavy jerk. In antecedent condition, 400kV Bahadurgarh-Bawana(GT) carrying 18 MW and STG 1 generating 178 MW. As per PMU, Voltage dip observed in all the three	200		GD-1						Y(DTL)		Y(DTL)		Y(DTL)	

Grid Events occurred in NR: Aug'18

Annexure-2-NRLDC

S.No.	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		Event (As reported)	Genera- tion Loss(M W)	Load Loss(M W)	Category as per CEA Grid Standards	Energy Unservd (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)
			Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
24	1) 220kV Basti(UP)-Bansi(UP) 2) 220kV Basti(UP)-Tanda(NTPC) 3) 220kV Bansi (UP)-Gorakhpur(PG)	UP, NTPC & POWERGRID	29-Aug-18	23:46	220kV Basti(UP)-Bansi(UP) & 220kV Basti(UP)-Tanda(NTPC) tripped due to B-N fault & R-Y fault respectively. At the same time, 220kV Bansi (UP)-Gorakhpur(PG) also tripped on B-N fault. As per PMU, B-N fault observed. As per SCADA data, load loss of		60	GD-1	0.04		Y(UP)	Y(PG),Y(NTPC)			Y(UP),Y(PG),Y(NTPC)		Y(UP)	120ms
25	1) 220kV Bus 2 at Samaypur(BBMB) 2) 500 MVA ICT 1 at 400/220kV Ballabgarh(PG) 3) 220KV Samaypur(BBMB)-Palwal(HVPLN) Ckt-II 4) 220KV Samaypur(BBMB)- Badshapur(HVPLN) Ckt-I 5) 220KV Samaypur(BBMB)-Palli(HVPLN) Ckt-I	BBMB, Haryana & POWERGRID	31-Aug-18	06:56	Bus bar protection of 220kV Bus 2 at Samaypur(BBMB) operated leading to tripping of 500 MVA ICT 1 at 400/220kV Ballabgarh(PG), 220KV Samaypur(BBMB)-Palwal(HVPLN) Ckt-II, 220KV Samaypur(BBMB)- Badshapur(HVPLN) Ckt-I			GI-2		Y(BBMB)		Y(Har),Y(PG)	Y(BBMB)		Y(Har),Y(PG)		Y(BBMB)	80ms
26	1) Unit#7 at 220kV Panipat TPS(HVPLN) 2) Unit#8 at 220kV Panipat TPS(HVPLN)	Haryana	31-Aug-18	11:22	Unit 7 & 8 of 220kV Panipat TPS(HVPLN) tripped due to electrical fault. In antecedent condition, Unit#7 & Unit#8 generating 192 MW & 60 MW respectively. As per PMU, Fluctuations observed in the phase voltages.	252		GD-1				Y(Har)			Y(Har)		Y(Har)	
27	1) Unit#1 at 400kV Rihand(NTPC) 2) Unit#2 at 400kV Rihand(NTPC)	NTPC	31-Aug-18	18:27	Unit 1 & 2 (Make-NEI) of Rihand Stage-1 tripped due to tripping of GSW (General Service water Pump). In antecedent condition, Unit#1 & Unit#2 generating 480	765		GD-1				Y(NTPC)			Y(NTPC)		Y(NTPC)	No fault observed

Northern Regional inter regional lines tripping for Aug-18

Annexure-3-NRLDC

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)	Remedial Action	Remarks
			Date	Time				Date	Time						
1	500kV HVDC Mundra-Mohindergarh-1	ATL	9-Aug-18	05:39	Nil	DC Earth fault resulted in busbar protection operation at Mundra.	NA	9-Aug-18	14:24	NA	YES	YES			Information received from NR end. From PMU, no fault observed.
2	800kV HVDC Champa(PG)-Kurukshehra(PG)-1	POWERGRID	10-Aug-18	16:16	Nil	Converter differential alarm received at Kurukshehra	NA	15-Aug-18	13:56	NO	NO	NO	Pole tripping on suspected AC system fault.	Protection needs to be checked and rectified.	From PMU, B-N fault observed in AC system.
3	800kV HVDC Champa(PG)-Kurukshehra(PG)-2	POWERGRID	11-Aug-18	12:33	Nil	Tripped due to common neutral protection operated at champa end.	NA	11-Aug-18	14:45	NA	NO	NO		Details of tripping yet to be received.	From PMU, no fault observed.
4	800kV HVDC Champa(PG)-Kurukshehra(PG)-1	POWERGRID	17-Aug-18	16:39	Nil	R-B fault in 765kV Jhatikara-Bhiwani occurred resulted in commutation failure. The delay in inhibit DC line protection command resulted in outage of both poles on DC line fault protection.	GI-2	17-Aug-18	18:12	NA	YES	YES	Inhibit DC line protection command delayed. Only one restart attempt in place of designed 3 attempts.	Protection needs to be checked and rectified.	Information received from NR end. From PMU, R-B fault observed in AC system.
5	800kV HVDC Champa(PG)-Kurukshehra(PG)-2	POWERGRID	17-Aug-18	16:39	Nil	R-B fault in 765kV Jhatikara-Bhiwani occurred resulted in commutation failure. The delay in inhibit DC line protection command resulted in outage of both poles on DC line fault protection.	GI-2	17-Aug-18	17:47	NA	YES	YES		Reason for DT sent from Zerda end to be ascertained and problem to be rectified.	Information received from NR end. From PMU, no fault observed.
6	220kV Auraiya(NTPC)-Mehgaon(MPPTCL)	POWERGRID/MPPTCL	18-Aug-18	16:49	Nil	CT blast at Mehgaon end resulted in bus bar protection. Line manually opened at Auraiya end.	NA	18-Aug-18	18:46	320ms	YES (After 24hrs)	YES (After 24hrs)			Information received from NR end. From PMU, B-N fault observed.
7	765kV Gwalior(PG)-Phagi(RRVPNL)-2	POWERGRID/RRVPNL	19-Aug-18	22:35	Nil	Y-Ph LA blasted at Phagi end resulted in tripping of line in Z-1.	NA	20-Aug-18	18:41	NO	YES	NO			Information received from NR end. From PMU, Y-N fault observed.
8	220kV Pusauli(PG)-Sahupuri(UP)	UPPTCL/POWERGRID	25-Aug-18	11:01	Nil	Tripped due to damage in the cables of relay panel at Sahupuri end.	NA	25-Aug-18	12:43	NA	NO	NO		Suspected mis-operation of protection. Protection needs to be checked and rectified.	From PMU, no fault observed.
9	800kV HVDC Agra(PG)-BNC(PG)-1	POWERGRID	27-Aug-18	00:23	Nil	DC Line fault. 202km from Agra end.	NA	27-Aug-18	15:28	NA	NO	NO		Details of tripping yet to be received.	From PMU, no fault observed.
10	800kV HVDC Champa(PG)-Kurukshehra(PG)-1	POWERGRID	28-Aug-18	04:45	Nil	DC line fault	NA	28-Aug-18	06:38	NA	NO	YES		Suspected tripping of pole on temporary AC system fault. Protection needs to be checked and rectified.	Information received from NR end. From PMU, Y-N fault observed in AC system.
11	800kV HVDC Agra(PG)-BNC(PG)-1	POWERGRID	29-Aug-18	09:22	Nil	During Metallic return mode, HVDC pole & line tripped on ground fault protection operated at Agra end.	NA	29-Aug-18	10:25	NA	NO	NO		Reason for DT sent from Motihati end to be ascertained and problem to be rectified.	From PMU, spiked increase in voltage is observed.
12	Vindhyachal HVDC BtB Block 1	POWERGRID	29-Aug-18	20:43	Nil	DC Over current protection trip	NA	30-Aug-18	06:55	NA	NO	NO		Details of tripping yet to be received.	From PMU, No fault 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.

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(f) 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

Annexure 4

State		MU	MW
		Oct-18	Oct-18
Chandigarh	Availability	125	335
	Requirement	125	280
	Surplus/Shortfall (MU)	0	55
	Surplus/Shortfall (%)	0.0%	19.6%
Delhi	Availability	3440	5610
	Requirement	2790	5000
	Surplus/Shortfall (MU)	650	610
	Surplus/Shortfall (%)	23.3%	12.2%
Haryana	Availability	5620	8430
	Requirement	4550	9433
	Surplus/Shortfall (MU)	1070	-1003
	Surplus/Shortfall (%)	23.5%	-10.6%
Himachal Pradesh	Availability	1050	2150
	Requirement	850	1500
	Surplus/Shortfall (MU)	200	650
	Surplus/Shortfall (%)	23.5%	43.3%
Jammu & Kashmir	Availability	890	1900
	Requirement	1570	2630
	Surplus/Shortfall (MU)	-680	-730
	Surplus/Shortfall (%)	-43.3%	-27.8%
Punjab	Availability	5876	9810
	Requirement	4900	9470
	Surplus/Shortfall (MU)	976	340
	Surplus/Shortfall (%)	19.9%	3.6%
Rajasthan	Availability	7786	11072
	Requirement	6869	11090
	Surplus/Shortfall (MU)	917	-19
	Surplus/Shortfall (%)	13.3%	-0.2%
Uttar Pradesh	Availability	11160	16070
	Requirement	11470	16500
	Surplus/Shortfall (MU)	-310	-430
	Surplus/Shortfall (%)	-2.7%	-2.6%
Uttarakhand	Availability	1090	2020
	Requirement	1180	2050
	Surplus/Shortfall (MU)	-90	-30
	Surplus/Shortfall (%)	-7.6%	-1.5%
Total NR	Availability	37037	55377
	Requirement	34304	53700
	Surplus/Shortfall (MU)	2733	1677
	Surplus/Shortfall (%)	8.0%	3.1%

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
1. HVDC lines										
A. POWERGRID										
± 800kV HVDC										
1	Agra-Bishwanath Chariali Pole-I	1	Bi-pole	1728	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between North East region & Northern Region
2	Agra-Bishwanath Chariali Pole-II	2	Bi-pole	1728	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	
3	Kurukshetra-Champa Pole-I	1	Bi-pole	1305	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between Western region & Northern Region
4	Kurukshetra-Champa Pole-II	2	Bi-pole	1305	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between Western region & Northern Region
± 500kV HVDC										
1	Balia-Bhiwadi Pole-I	1	Bi-pole	790	ACSR Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (15%)	
2	Balia-Bhiwadi Pole-II	2	Bi-pole	790		POWERGRID	POWERGRID	POWERGRID	Partial (15%)	
3	Rihand-Dadri Pole-I	1	Bi-pole	815	ACSR Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (62%)	
4	Rihand-Dadri Pole-II	2	Bi-pole	815		POWERGRID	POWERGRID	POWERGRID	Partial (43%)	
B. Adani Power Ltd (Adani Transmission India Ltd.)										
1	Adani Mundra - Mahindergarh Pole-I	1	Bi-pole	990	ACSR Quad Bersimis	ATIL	APL Mundra	APL	Partial (7%)	Interconnection between Western region & Northern Region
2	Adani Mundra - Mahindergarh Pole-II	2	Bi-pole	990		ATIL	APL Mundra	APL	Partial (7%)	
2. 765kV Transmission Line										
A. POWERGRID										
1	Agra-Fatehpur	1	S/C	335	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
2	Agra-Fatehpur	2	S/C	334	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
3	Agra-Aligarh	1	D/C	123	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Check the status of LILO portion??
4	Aligarh-Gr.Noida	2	D/C	51	Quad Bersimis	POWERGRID	POWERGRID	WUPPTCL	Polymer Insulator	
5	Agra-Jhatikara	1	S/C	252	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
6	Ajmer-Chittorgarh	1	D/C	211	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
7	Ajmer-Chittorgarh	2	D/C	211	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
8	Balia - Lucknow765 (N)	1	S/C	319	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
9	Jhatikara-Bhiwani (PG)	1	S/C	85	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
10	Jhatikara-Aligarh	1	D/C	158	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Check the status of LILO portion??
11	Kanpur(GIS)-Aligarh	1	D/C	322	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
12	Lucknow-Bareilly	1	S/C	252	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
13	Meerut-Bhiwani(PG)	1	S/C	174	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (99%)	
14	Meerut-Gr.Noida	1	S/C	119	Quad Bersimis	POWERGRID	POWERGRID	WUPPTCL	Polymer Insulator	LILO of Agra-Meerut (267 KM) line at Gr. Noida
15	Moga- Bhiwani (PG)	1	S/C	273	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (96%)	
16	Moga-Meerut	1	S/C	338	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
17	Orai-Aligarh	1	D/C	331	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
18	Orai-Aligarh	2	D/C	331	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
19	Phagi-Bhiwani(PG)	1	S/C	272	Quad Bersimis	POWERGRID	RRVNL	POWERGRID	Partial (18%)	
20	Phagi-Bhiwani(PG)	2	S/C	277	Quad Bersimis	POWERGRID	RRVNL	POWERGRID	Partial (16%)	
21	Varanasi-Balia	1	S/C	166	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
22	Varanasi-Fatehpur	1	S/C	223	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Gaya (ER)-Fatehpur at Varanasi
23	Varanasi-Kanpur(GIS)	1	S/C	326	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
24	Varanasi-Kanpur(GIS)	2	S/C	326	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks	
							End-I	End-II			
B. UPPTCL											
1	AnparaC-Unnao	1	S/C	409	Quad Bersimis	UPPTCL	LANCO	UPPTCL	Conventional	AnparaB-Unnao shifted to AnparaC and charged at 765kV	
2	AnparaC-AnparaD	1	S/C	3	Quad Bersimis	UPPTCL	LANCO	UPRVUNL	Not Available		
3	Agra(Fatehbad)-Lalitpur	1	S/C	337	Quad Bersimis	UPPTCL	UPPTCL	LPGL	Not Available		
4	Agra(Fatehbad)-Lalitpur	2	S/C	335	Quad Bersimis	UPPTCL	UPPTCL	LPGL	Not Available		
5	Bara-Mainpuri	1	S/C	377	Quad Bersimis	UPPTCL	UPPTCL	UPPTCL	Not Available		
6	Gr. Noida-Hapur	1	S/C	65	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available		
7	Gr. Noida-Mainpuri	1	S/C	181	Quad Bersimis	UPPTCL	UPPTCL	UPPTCL	Not Available		
C. RRVPNL											
1	Anta-Phagi	1	S/C	214	Quad Bersimis	RRVPNL	RRVPNL	RRVPNL	Not Available		
2	Anta-Phagi	2	S/C	212	Quad Bersimis	RRVPNL	RRVPNL	RRVPNL	Not Available		
3. 765kV Transmission Line charged at 400kV											
A. POWERGRID											
1	Kishenpur-Moga	1	S/C	275	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (1%)		
2	Kishenpur-Moga	2	S/C	287	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (1%)		
3	Tehri-Tehri pooling	1	S/C	15	Quad Bersimis	POWERGRID	POWERGRID	THDC	Conventional	LILoed at Tehri Pooing, Tehri Pooling-Meerut is 50% series compensated line	
4	Tehri-Tehri pooling	2	S/C	17	Quad Bersimis	POWERGRID	POWERGRID	THDC	Conventional		
5	Tehri Pooling-Meerut	1	S/C	176	Quad Bersimis	POWERGRID	THDC	POWERGRID	Conventional		
6	Tehri Pooling-Meerut	2	S/C	179	Quad Bersimis	POWERGRID	THDC	POWERGRID	Conventional		
7	Rihand-Vindhyachal Pool	1	S/C	31	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Not Available		
8	Rihand-Vindhyachal Pool	2	S/C	31	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Not Available		
4. 400kV HVAC Transmission Line											
A. POWERGRID											
1	Abdullapur- Bawana	1	D/C	167	Triple Snowbird	POWERGRID	POWERGRID	DTL	Partial (99%)		
2	Abdullapur- Deepalpur	1	D/C	141	Triple Snowbird	POWERGRID	POWERGRID	KT Jhajar	Partial (99%)	LILo of Abdullapur-Bawana one ckt at Deepalpur	
3	Abdullapur-Kurukshetra	1	D/C	52	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILo of Abdullapur-Sonepat ckts at Kurukshetra	
4	Abdullapur-Kurukshetra	2	D/C	52	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
5	Agra-Agra(Fatehbad)	1	S/C	45	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator		
6	Agra(UP)-Agra(Fatehbad)	1	S/C	56	Twin Moose	POWERGRID	UPPTCL	UPPTCL	Polymer Insulator		
7	Agra-Agra(UP)	1	D/C	30	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator		
8	Agra-Ballabgarh	1	S/C	181	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
9	Agra-Bassi	1	S/C	211	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	Planned for insulator replacement in 321nos towers under NR3	
10	Agra-Bhiwadi	1	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
11	Agra-Bhiwadi	2	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
12	Agra-Jaipur South	1	D/C	254	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (4%)	LILo of Agra-Bassi D/C at Jaipur South	
13	Agra-Jaipur South	2	D/C	254	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (4%)		
14	Agra-Sikar	1	D/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)		
15	Agra-Sikar	2	D/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)		
16	Ajmer-Ajmer(PG)	1	D/C	66	Quad Moose	POWERGRID	RRVPNL	POWERGRID	Not Available		
17	Ajmer-Ajmer(PG)	2	D/C	66	Quad Moose	POWERGRID	RRVPNL	POWERGRID	Not Available		
18	Allahabad-Fatehpur	3	S/C	154	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILo of Allahabad-Kanpur one ckt at Fatehpur	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
19	Allahabad-Fatehpur	1	D/C	140	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur
20	Allahabad-Fatehpur	2	D/C	140	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur
21	Allahabad-Varanasi	1	D/C	99	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi
22	Allahabad-Kanpur	1	S/C	225	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
23	Allahabad-Kanpur(New 765)	1	D/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
24	Allahabad-Kanpur(New 765)	2	D/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
25	Allahabad-Meja(NTPC)	1	D/C	28	Twin Moose	POWERGRID	POWERGRID	MUNPL	Polymer Insulator	MUNPL is joint venture between NTPC and UPRVUN
26	Allahabad-Meja(NTPC)	2	D/C	28	Twin Moose	POWERGRID	POWERGRID	MUNPL	Polymer Insulator	
27	Amritsar-Jalandhar	1	S/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
28	Amritsar-Jalandhar	2	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of 400kV Amritsar-Hamirpur at Jalandhar
29	Amritsar-Parbati Pooling (Banala)	1	D/C	251	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (49%)	
30	Auraiya-Agra	1	D/C	166	Twin Moose	POWERGRID	NTPC	POWERGRID	Partial (86%)	
31	Auraiya-Agra	2	D/C	166	Twin Moose	POWERGRID	NTPC	POWERGRID	Partial (90%)	
32	Bagpat-Kaithal	1	D/C	154	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
33	Bagpat-Kaithal	2	D/C	154	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
34	Bagpat-Saharanpur	1	D/C	121	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (41%)	
35	Bagpat-Dehradun	1	D/C	165	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (40%)	
36	Bahadurgarh-Kabulpur	1	S/C	42	Twin Moose	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
37	Bahadurgarh-Sonepat	1	D/C	53	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
38	Bahadurgarh-Sonepat	2	D/C	53	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
39	Balia-Mau	1	D/C	9	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
40	Balia-Mau	2	D/C	9	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
41	Balia-Sohawal	1	D/C	229	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
42	Balia-Sohawal	2	D/C	229	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
43	Ballabgarh-Gurgaon	1	S/C	43	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
44	Ballabgarh-Maharanibagh	1	D/C	61	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
45	Ballabgarh-Nawada	1	D/C	13	Quad Bersimis	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	Ballabgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
46	Bareilly PG-Moradabad	1	S/C	93	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Partial (3%)	
47	Bareilly PG-Moradabad	2	S/C	92	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Partial (23%)	
48	Bareilly PG-Bareilly (765kV)	1	D/C	2	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
49	Bareilly PG-Bareilly (765kV)	2	D/C	2	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
50	Bareilly PG(765kV)-Kashipur	1	D/C	101	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (90%)	
51	Bareilly PG(765kV)-Kashipur	2	D/C	101	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (90%)	
52	Bassi-Bhiwadi	2	S/C	220	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
53	Bassi-Heerapura	1	S/C	48	Twin Moose	POWERGRID	POWERGRID	RRVNL	Polymer Insulator	
54	Bassi-Heerapura	2	S/C	49	Twin Moose	POWERGRID	POWERGRID	RRVNL	Polymer Insulator	
55	Bassi-Kotputli	1	S/C	106	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bassi-Bhiwadi-2 at Kotputli
56	Bassi-Phagi	1	D/C	48	Quad Moose	POWERGRID	POWERGRID	RRVNL	Partial (26%)	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
57	Bassi-Phagi	2	D/C	48	Quad Moose	POWERGRID	POWERGRID	RRVNL	Partial (26%)	
58	Bassi-Sikar	1	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (16%)	
59	Bassi-Sikar	2	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (17%)	
60	Bawana(CCGT)-Bahadurgarh	1	D/C	49	Twin Moose	POWERGRID	DTL/Pragati CCGT	POWERGRID	Polymer Insulator	
61	Bhinmal-Kankroli	1	D/C	202	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
62	Bhiwadi-Gurgaon	1	S/C	83	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
63	Bhiwadi-Hissar	1	S/C	212	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
64	Bhiwadi-Hisar	2	D/C	144	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bhiwadi-Moga both ckts at Hisar
65	Bhiwadi-Hisar	3	D/C	144	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
66	Bhiwadi-NeemranaPG	1	D/C	48	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
67	Bhiwadi-NeemranaPG	2	D/C	48	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
68	Bhiwani BBMB - Hisar	1	S/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
69	Bhiwani (PG) - Hisar	1	S/C	64	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
70	Bhiwani (PG) - Hisar	2	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
71	Bhiwani (PG) - Hisar	3	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
72	Bhiwani PG - Jind	1	D/C	82	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
73	Bhiwani PG - Jind	2	D/C	82	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
74	Bhiwani PG- BawanaCCGT	1	D/C	97	Twin Moose	POWERGRID	POWERGRID	DTL/Pragati CCGT	Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
75	Bhiwani PG- Bhiwani BBMB	1	S/C	34	Twin Moose	POWERGRID	POWERGRID	BBMB	Polymer Insulator	LILO of Bhiwani (BBMB)- Bahadurgarh (84km) at Bhiwani (PG)
76	Bhiwani PG-Kabulpur	1	S/C	48	Twin Moose	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
77	Chamba pool - Jalandhar	1	D/C	162	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (48%)	
78	Chamba pool - Jalandhar	2	D/C	162	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (48%)	
79	Chamera-II - Chamba Pool	1	S/C	0.38	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	Two tower is S/C and one tower is D/C
80	Chamera-II-Chamera-I	1	S/C	36	Twin Moose	POWERGRID	NHPC	NHPC	Conventional	
81	Chamera-II-Kishenpur	1	S/C	135	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
82	Chamera-I-Jalandhar	1	D/C	152	Twin ACAR	POWERGRID	NHPC	POWERGRID	Partial (43%)	
83	Chamera-I-Jalandhar	2	D/C	152	Twin ACAR	POWERGRID	NHPC	POWERGRID	Partial (43%)	
84	Chittorgarh-Chittorgarh(PG)	1	D/C	49	Quad Moose	POWERGRID	RRVNL	POWERGRID	Not Available	
85	Chittorgarh-Chittorgarh(PG)	2	D/C	49	Quad Moose	POWERGRID	RRVNL	POWERGRID	Not Available	
86	Chittorgarh-Kankroli	1	D/C	71	Twin Moose	POWERGRID	RRVNL	POWERGRID	Polymer Insulator	LILO of 400 kV Rapp C-Kankroli at Chhitorgarh
87	Dadri NCTPP-G. Noida	1	D/C	13	Quad Bersimis	POWERGRID	NTPC	UPPCL	Polymer Insulator	
88	Dadri NCTPP-Maharanibagh	1	D/C	54	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
89	Dadri NCTPP-Kaithal	1	S/C	213	Twin Moose	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
90	Dadri NCTPP-Mandola	1	D/C	46	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
91	Dadri NCTPP-Mandola	2	D/C	46	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
92	Dadri NCTPP-Muradnagar New	1	S/C	33	Twin Moose	POWERGRID	NTPC	UPPTCL	Polymer Insulator	Line shifted from Muradnagar to Muradnagar New (UPPTCL)

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
93	Dadri NCTPP-Panipat	1	S/C	112	Twin Moose	POWERGRID	NTPC	BBMB	Polymer Insulator	
94	Dadri NCTPP-Panipat	2	S/C	117	Twin Moose	POWERGRID	NTPC	BBMB	Polymer Insulator	
95	Deepalpur-Bawana	1	D/C	26	Triple Snowbird	POWERGRID	KT-Jhajjar	DTL	Polymer Insulator	LILO of Abdullapr-Bawana one ckt at Deepalpur
96	Dehradun-Abdullapur	1	D/C	89	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
97	Dehradun-Abdullapur	2	D/C	89	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
98	Dulhasti-Kishenpur	1	S/C	120	Quad Moose	POWERGRID	NHPC	POWERGRID	Conventional	
99	Dulhasti-Kishenpur	2	S/C	120	Quad Moose	POWERGRID	NHPC	POWERGRID	Conventional	
100	Fatehbad PG-Hissar	1	D/C	89	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
101	Fatehpur-Kanpur	1	S/C	100	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Singrauli-Kanpur at Fatehpur
102	Fatehpur-Kanpur	2	S/C	107	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (64%)	LILO of Allahabad-Kanpur one ckt at Fatehpur
103	Fatehpur-Mainpuri	1	D/C	260	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM)
104	Fatehpur-Mainpuri	2	D/C	260	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	D/C at Fatehpur Series
105	G.Noida-Nawada	1	D/C	30	Quad Bersimis	POWERGRID	UPPTCL	HVPNL	Polymer Insulator	Ballabgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
106	Gorakhpur PG-Gorakhpur UP	1	D/C	46	Twin Moose	POWERGRID	POWERGRID	UPPCL	Polymer Insulator	Partial Planning has been completed
107	Gorakhpur PG-Gorakhpur UP	2	D/C	46	Twin Moose	POWERGRID	POWERGRID	UPPCL	Polymer Insulator	Partial Planning has been completed
108	Gorakhpur PG-Lucknow PG	1	D/C	264	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)	At crossing
109	Gorakhpur PG-Lucknow PG	2	D/C	264	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)	At crossing
110	Gurgaon-Manesar	1	D/C	18	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
111	Gurgaon-Manesar	2	D/C	18	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
112	Hamirpur-Parbati Pooling (Banala)	1	D/C	77	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Amritsar-Banala-1 at Hamirpur
113	Jaipur South-Bassi	1	D/C	84	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Agra-Bassi D/C at Jaipur South
114	Jaipur South-Bassi	2	D/C	84	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
115	Jalandhar-Nakodar	1	D/C	42	Quad Moose	POWERGRID	POWERGRID	PSTCL	Polymer Insulator	
116	Jalandhar-Hamirpur	1	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (43%)	LILO of 400kV Amritsar-Hamirpur at Jalandhar
117	Kaithal-Hissar	1	D/C	113	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Patiala-Hissar at Kaithal
118	Kaithal-Hissar	2	D/C	113	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Patiala-Hissar at Kaithal
119	Kaithal-Malerkotla	1	S/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
120	Kankroli-Jodhpur	1	S/C	188	Twin Moose	POWERGRID	POWERGRID	RRVNL	Conventional	
121	Kanpur-Agra	1	S/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
122	Kanpur-Auraiya	1	D/C	73	Twin Moose	POWERGRID	POWERGRID	NTPC	Conventional	
123	Kanpur-Auraiya	2	D/C	73	Twin Moose	POWERGRID	POWERGRID	NTPC	Conventional	
124	Kanpur-Ballabgarh	1	S/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
125	Kanpur-Ballabgarh	2	D/C	371	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
126	Kanpur-Ballabgarh	3	D/C	371	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
127	Kanpur-Panki	1	S/C	6	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
128	Kanpur-Panki	2	S/C	6	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	
129	Kanpur-Kanpur(GIS)	1	D/C	21	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
130	Kanpur-Kanpur(GIS)	2	D/C	21	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
131	Kanpur(GIS)-Lucknow(765)	1	D/C	160	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
132	Kanpur(GIS)-Lucknow(765)	2	D/C	160	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
133	Kishenpur-NewWanpoh	1	D/C	130	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
134	Kishenpur-NewWanpoh	2	D/C	130	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
135	Kishenpur-NewWanpoh	3	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
136	Kishenpur-NewWanpoh	4	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
137	Kishenpur-Samba	1	D/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
138	Kishenpur-Samba	2	D/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
139	Kota-Merta	1	D/C	256	Twin Moose	POWERGRID	POWERGRID	RRVPL	Polymer Insulator	
140	Kotputli-Bhiwadi	1	S/C	132	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bassi-Bhiwadi-2 at Kotputli
141	Kurukshetra-Jind	1	D/C	103	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
142	Kurukshetra-Jind	2	D/C	103	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
143	Kurukshetra-Sonipat	1	D/C	125	Triple Snowbird (Twin HTLS	POWERGRID	POWERGRID	POWERGRID	Partial (99%)	LILO of Abdullapr-Sonepat ckts at
144	Kurukshetra-Sonipat	2	D/C	125	for LILOportion)	POWERGRID	POWERGRID	POWERGRID	Partial (99%)	Kurukshetra
145	Kurukshetra-Jalandhar	1	D/C	267	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
146	Kurukshetra-Nakodar	1	D/C	234	Quad Moose	POWERGRID	POWERGRID	PSTCL	Polymer Insulator	
147	Lucknow PG-Lucknow UP	1	S/C	63	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
148	Lucknow PG-Unnao	1	D/C	74	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
149	Lucknow PG-Unnao	2	D/C	74	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
150	Lucknow UP-Bareilly PG	1	S/C	279	Twin Moose	POWERGRID	UPPTCL	POWERGRID	Conventional	
151	765 Lucknow (PG) - Lucknow (PG)	1	D/C	3	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
152	765 Lucknow (PG) - Lucknow (PG)	2	D/C	3	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
153	LucknowPG-Sohawal	1	D/C	98	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at
154	LucknowPG-Sohawal	2	D/C	98	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	Sohawal
155	Lucknow PG-Shahjahanpur	1	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (10%)	
156	Lucknow PG-Shahjahanpur	2	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (10%)	
157	Ludhiana-Jalandhar	1	S/C	85	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
158	Ludhiana-Malerkotla	1	S/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
159	Ludhiana-Patiala	1	D/C	76	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
160	Ludhiana-Patiala	2	D/C	76	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
161	Mainpuri-Ballabgarh	1	D/C	236	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
162	Mainpuri-Ballabgarh	2	D/C	236	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
163	Malerkotla-Patiala	1	S/C	62	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
164	Meerut-Bagpat	1	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
165	Meerut-Bagpat	2	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
166	Meerut-Mandola	1	D/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
167	Meerut-Mandola	2	D/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
168	Meerut-MuzzaFarnagar	1	S/C	37	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	
169	Moga-Fatehabad	1	D/C	179	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
170	Moga-Hissar	1	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
171	Moga-Hissar	2	D/C	206	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bhiwadi-Moga both ckts at
172	Moga-Hissar	3	D/C	206	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Hisar

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
173	Moga-Jalandhar	1	D/C	85	Twin ACAR	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
174	Moga-Jalandhar	2	D/C	85	Twin ACAR	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
175	Moradabad-Muradnagar	1	S/C	133	Twin Moose	POWERGRID	UPPTCL	UPPTCL	Polymer Insulator	
176	Nallagarh-Koldam	1	D/C	46	Quad Moose	POWERGRID	POWERGRID	NTPC	Conventional	Koldam to Parbati pool section is of PKTCL & rest is of POWERGRID
177	Nallagarh-Patiala	1	D/C	94	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
178	Nallagarh-Patiala	2	D/C	94	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Nallagarh-Kaithal at Patiala
179	Nathpa Jhakri-Panchkula	1	D/C	165	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Partial (17%)	LILO of Jhakri-Abdullapur at Panchkula
180	Nathpa Jhakri-Panchkula	2	D/C	165	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Partial (17%)	
181	Nathpa Jhakri-RampurHEP	1	D/C	21	Triple Snowbird	POWERGRID	SJVNL	SJVNL	Conventional	LILO of Jhakri-Nallagarh-1 at RampurHEP
182	Nathpa Jhakri-RampurHEP	2	D/C	21	Triple Snowbird	POWERGRID	SJVNL	SJVNL	Conventional	
183	NeemranaPG-Manesar	1	D/C	67	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
184	NeemranaPG-Manesar	2	D/C	67	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
185	NeemranaPG-Babai	1	D/C	85	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Not Available	LILO of 400kV Neemrana-Sikar at Babai by NRSSXXXVI (Essel group): Earlier 29% of Neemrana-Sikar PG
186	Sikar-Babai	1	D/C	95	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Not Available	
187	NeemranaPG-Sikar	2	D/C	176	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (29%)	
188	NewWanpoh-Wagoora	1	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
189	NewWanpoh-Wagoora	2	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
190	Orai(PG)-Orai	1	D/C	42	Quad Moose	POWERGRID	POWERGRID	UPPTCL	Not Available	
191	Orai(PG)-Orai	2	D/C	42	Quad Moose	POWERGRID	POWERGRID	UPPTCL	Not Available	
192	Panchkula -Abdullapur	1	D/C	63	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Jhakri-Abdullapur at Panchkula
193	Panchkula -Abdullapur	2	D/C	63	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Jhakri-Abdullapur at Panchkula
194	Patiala-Panchkula	1	D/C	65	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
195	Patiala-Panchkula	2	D/C	65	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
196	Patiala-Patran	1	D/C	79	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of 400 kV Kaithal-Patiala-D/C at Patran. LILO portion is of Patran Transmission Company Limited
197	Patiala-Patran	2	D/C	79	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
198	Patran-Kaithal	1	D/C	47	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
199	Patran-Kaithal	2	D/C	47	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
200	RampurHEP-Nallagarh	1	D/C	128	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Conventional	LILO of Jhakri-Nallagarh-1 at RampurHEP
201	RampurHEP-Nallagarh	2	D/C	128	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Conventional	
202	RAPS-C-Chittorgarh	1	D/C	155	Twin Moose	POWERGRID	NPCIL	RRVPNL	Partial (38%)	LILO of 400 kV Raps C-Kankroli at Chhitorgarh
203	RAPS-C-Kankroli	1	D/C	199	Twin Moose	POWERGRID	NPCIL	POWERGRID	Partial (51%)	
204	RAPS-C-Kota	1	S/C	51	Twin Moose	POWERGRID	NPCIL	POWERGRID	Partial (55%)	400kV RAPS-Jaipur line whose work was completed till Kota section is connected with 400kV Raps-Kota#2 (for antitheft purpose) and hence 400kV RapsC-Kota #2 is now two twin moose lines connected in parallel paths
205	RAPS-C-Kota	2	S/C	55	Twin Moose	POWERGRID	NPCIL	POWERGRID	Not Available	
206	Rihand-Allahabad	1	D/C	279	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
207	Rihand-Allahabad	2	D/C	279	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
208	Roorkee-Kashipur	1	D/C	151	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (72%)	
209	Roorkee-Kashipur	2	D/C	151	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (72%)	
210	Roorkee-Saharanpur	1	D/C	36	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
211	Roorkee-Dehradun	1	D/C	80	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (50%)	
212	Sarnath-Varanasi	1	D/C	70	Quad Moose	POWERGRID	UPPTCL	POWERGRID	Partial (52%)	LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi
213	Sarnath-Varanasi	2	D/C	107	Quad Moose	POWERGRID	UPPTCL	POWERGRID	Partial (52%)	
214	Shahjahanpur-Bareilly PG	1	D/C	116	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
215	Shahjahanpur-Bareilly PG	2	D/C	116	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
216	Shahjahanpur-Rosa	1	D/C	8	Twin Moose	POWERGRID	POWERGRID	UPPCL	Not Available	
217	Shahjahanpur-Rosa	2	D/C	8	Twin Moose	POWERGRID	POWERGRID	UPPCL	Not Available	
218	Shree Cement-Kota	1	D/C	208	Twin Moose	POWERGRID	Sh. Cement	POWERGRID	Polymer Insulator	LILO portion is of Shree Cement
219	Shree Cement-Merta	2	D/C	103	Twin Moose	POWERGRID	Sh. Cement	RRVPNL	Polymer Insulator	LILO portion is of Shree Cement
220	Sikar-Ratangarh	1	D/C	76	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Conventional	
221	Sikar-Ratangarh	2	D/C	76	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Conventional	
222	Singrauli-Allahabd	1	S/C	224	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
223	Singrauli-Allahabd	2	S/C	202	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
224	Singrauli-Anpara	1	S/C	25	Twin Moose	POWERGRID	NTPC	UPPTCL	Partial (91%)	
225	Singrauli-Fatehpur	1	S/C	331	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	LILO of Singrauli-Kanpur at Fatehpur
226	Singrauli-LucknowUP	1	S/C	409	Twin Moose	POWERGRID	NTPC	UPPTCL	Conventional	
227	Singrauli-Rihand	1	S/C	42	Twin Moose	POWERGRID	NTPC	NTPC	Conventional	
228	Singrauli-Rihand	2	S/C	44	Twin Moose	POWERGRID	NTPC	NTPC	Conventional	
229	Singrauli-Vindhyachal	1	S/C	3	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
230	Singrauli-Vindhyachal	2	S/C	5	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
231	Tehri pooling-Koteswar	1	D/C	3	Twin Moose	POWERGRID	POWERGRID	THDC	Conventional	
232	Tehri pooling-Koteswar	2	D/C	3	Twin Moose	POWERGRID	POWERGRID	THDC	Conventional	
233	Uri-I - Amargarh	1	D/C	62	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
234	Uri-I - Amargarh	2	D/C	62	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	LILO of 400kV Uri-I - Wagoora D/C at Amargarh
235	Amargarh - Wagoora	1	D/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
236	Amargarh - Wagoora	2	D/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
237	Uri-II - Uri-I	1	S/C	10	Twin Moose	POWERGRID	NHPC	NHPC	Conventional	
238	Uri-II - Wagoora	1	S/C	105	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
B. POWERLINK Transmission Ltd										
1	Bareilly PG-Meerut	1	D/C	250	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	LILO of Bareilly PG-Mandola-1 (241 Km) at Meerut *Series compensated was (30%) at Bareilly
2	Bareilly PG-Meerut	2	D/C	250	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	
3	Bareilly UP-Bareilly PG	1	D/C	14	Twin Moose	POWERLINK	UPPTCL	POWERGRID	Polymer Insulator	
4	Bareilly UP-Bareilly PG	2	D/C	14	Twin Moose	POWERLINK	UPPTCL	POWERGRID	Polymer Insulator	
5	Gorakhpur PG-Lucknow PG	1	D/C	246	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	*Series compensated line (30%)
6	Gorakhpur PG-Lucknow PG	2	D/C	246	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	
7	Meerut-Mandola	3	D/C	102	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	LILO of Bareilly PG-Mandola-1&2 (241 Km) at Meerut(30%)
8	Meerut-Mandola	4	D/C	102	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
C. Adani Power Ltd (Adani Transmission India Ltd.)										
1	Mahindergarh (APL)-Bhiwani PG	1	D/C	50	Twin Moose	APL/ATIL	APL	POWERGRID	Conventional	ISTS
2	Mahindergarh (APL)-Bhiwani PG	2	D/C	50	Twin Moose	APL/ATIL	APL	POWERGRID	Conventional	
3	MahindergarhHVDC-Dhanoda	1	D/C	5	Quad Moose	APL/ATIL	APL	HVPNL	Conventional	
4	MahindergarhHVDC-Dhanoda	2	D/C	5	Quad Moose	APL/ATIL	APL	HVPNL	Conventional	
D. APCPL (Aravali Power Corporation Pvt Ltd.)										
1	Jhajjar (IGSTPS)-Mundka	1	D/C	66	Twin Moose	APCPL	APCPL	DTL	Conventional	
2	Jhajjar (IGSTPS)-Mundka	2	D/C	66	Twin Moose	APCPL	APCPL	DTL	Conventional	
E. BBMB										
1	Dehar-Rajpura	1	S/C	129	Twin Morkulla in old line & Moose in LILO portion	BBMB	BBMB	PSTCL	Antifog	LILO of Dehar-Bhiwani at Rajpura
2	Bhiwani(BBMB)-Rajpura	1	S/C	213		BBMB	BBMB	PSTCL	Antifog	
3	Dehar-Panchkula	1	S/C	125	Twin Morkulla	BBMB	BBMB	POWERGRID	Antifog	LILO of Dehar-Panipat at Panchkula
4	Panchkula-Panipat	1	S/C	155	Twin Morkulla	BBMB	POWERGRID	BBMB	Antifog	
F. DTL										
1	Ballabgarh-Bamnoli	1	M/C Tower	53	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	Approx 1Km cable section at Bamnoli in each circuit. One ckt. is out and other is in service by means of ERS(Emergency restoration)
2	Ballabgarh-Bamnoli	2	M/C Tower	53	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
3	Bamnoli-Jhatikara	1	D/C	12	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
4	Bamnoli-Jhatikara	2	D/C	12	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
5	Bawana-Mundka	1	D/C	18	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
6	Bawana-Mundka	2	D/C	18	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
7	Jhatikara-Mundka	1	D/C	17	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
8	Jhatikara-Mundka	2	D/C	17	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
9	Mandola-Bawana	1	D/C	24	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
10	Mandola-Bawana	2	D/C	24	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
G. HVPNL										
1	CLP Jhajjar -Dhanonda	1	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
2	CLP Jhajjar -Dhanonda	2	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
3	CLP Jhajjar- Kabulpur	1	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
4	CLP Jhajjar- Kabulpur	2	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
5	Deepalpur-Kabulpur	1	D/C	67	Quad Moose	KT Jhajjar	KT Jhajjar	HVPNL	Conventional	
6	Deepalpur-Kabulpur	2	D/C	67	Quad Moose	KT Jhajjar	KT Jhajjar	HVPNL	Conventional	
7	Dhanoda-Daultabad	1	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	Conventional	
8	Dhanoda-Daultabad	2	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	Conventional	
9	Gurgaon-Daultabad	1	D/C	21	Quad Moose	HVPNL	POWERGRID	HVPNL	Conventional	Six towers multi-circuit with Bamnoli-Ballabgarh.
10	Gurgaon-Daultabad	2	D/C	21	Quad Moose	HVPNL	POWERGRID	HVPNL	Conventional	
11	Jhajjar-Daulatabad	1	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	Conventional	
12	Jhajjar-Daulatabad	2	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	Conventional	
13	Khedar-Fatehabad	1	D/C	40	Twin Moose	HVPNL	HPGCL	POWERGRID	Conventional	
14	Khedar-Kirori	1	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	Conventional	
15	Khedar-Kirori	2	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	Conventional	
16	Khedar-Nuhiawali	1	D/C	114	Twin Moose	HVPNL	HPGCL	HVPNL	Polymer Insulator	
17	Nuhiawali-Fatehabad	1	D/C	78	Twin Moose	HVPNL	HVPNL	POWERGRID	Antifog	
H. JPVL/JSW (Jaigad Power Transco Limited.)										
1	Abdullapur-Kala Amb	1	D/C	39	Quad Moose	JPVL	POWERGRID	PKATL	Conventional	LILO of 400kV Abdullapur-Karcham Wangtoo D/C at Kala Amb by PKTCL
2	Abdullapur-Kala Amb	2	D/C	39	Quad Moose	JPVL	POWERGRID	PKATL	Conventional	
3	Kala Amb- Karcham Wangtoo	1	D/C	175	Quad Moose	JPVL	PKATL	JSW	Conventional	
4	Kala Amb- Karcham Wangtoo	2	D/C	175	Quad Moose	JPVL	PKATL	JSW	Conventional	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
5	Baspa-Karcham Wangtoo	1	D/C	22	Triple snowbird	JPTL/JSW	JPVL	JSW	Conventional	LILO of Baspa-Jhakri at karcham Wangtoo (LILO Portion is of JPVL)
6	Baspa-Karcham Wangtoo	2	D/C	22	Triple snowbird	JPTL/JSW	JPVL	JSW	Conventional	
7	Karcham Wangtoo-NJPC	1	D/C	34	Triple snowbird	JPTL/JSW	JSW	SJVNL	Conventional	
8	Karcham Wangtoo-NJPC	2	D/C	34	Triple snowbird	JPTL/JSW	JSW	SJVNL	Conventional	
I. PDD (Jammu & Kashmir)										
1	Baglihar(stage 1)-Kishenpur	1	D/C	68	Twin Moose	POWERGRID	JKSPDCL	POWERGRID	Conventional	
2	Baglihar(stage 2)-Kishenpur	2	D/C	68	Twin Moose	POWERGRID	JKSPDCL	POWERGRID	Conventional	
J. PSTCL										
1	Makhu-Amritsar	1	D/C	64	Twin Moose	PSTCL	PSTCL	PSTCL	Partial (10%)	
2	Makhu-Amritsar	2	D/C	64	Twin Moose	PSTCL	PSTCL	PSTCL	Partial (10%)	
3	Muktsar-Makhu	1	D/C	96	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
4	Muktsar-Makhu	2	D/C	96	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
5	Nakodar-Makhu	1	D/C	52	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
6	Nakodar-Makhu	2	D/C	52	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
7	Nakodar-Moga	1	S/C	78	Twin Moose	PSTCL	PSPCL	POWERGRID	Not Available	LILO of 400kV Talwandi sabo-Nakodar at Moga
8	Rajpura-Dhuri	1	D/C	86	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	LILO of Rajpura th-Dhuri 1 at 400kV Rajpura
9	Rajpura TPS- Rajpura	1	D/C	9	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
10	Rajpura-Dhuri	2	D/C	86	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	LILO of Rajpura th-Dhuri 2 at 400kV Rajpura
11	Rajpura TPS- Rajpura	2	D/C	9	Twin Moose	PSTCL	PSPCL	PSTCL	Not Available	
12	Rajpura TPS-Nakodar	1	D/C	139	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
13	Rajpura TPS-Nakodar	2	D/C	139	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
14	Talwandi Saboo- Dhuri	1	D/C	175	Twin Moose	PSTCL	PSPCL	PSTCL	Partial (22%)	
15	Talwandi Saboo- Dhuri	2	D/C	175	Twin Moose	PSTCL	PSPCL	PSTCL	Partial (22%)	
16	Talwandi Saboo- Moga	1	D/C	102	Twin Moose	PSTCL	PSPCL	PSTCL	Not Available	LILO of 400kV Talwandi sabo-Nakodar at Moga
17	Talwandi Saboo- Nakodar	1	D/C	180	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
18	Talwandi Saboo- Muktsar	1	D/C	100	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
19	Talwandi Saboo- Muktsar	2	D/C	100	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
K. PTCUL										
1	Alaknanda(GVK)-Srinagar(PTCUL)	1	D/C	14	Twin Moose	PTCUL	UPPCL	PTCUL	Conventional	
2	Alaknanda(GVK)-Srinagar(PTCUL)	2	D/C	14	Twin Moose	PTCUL	UPPCL	PTCUL	Conventional	
3	Muradabad-Kashipur	1	S/C	108	Twin Moose	PTCUL	UPPTCL	PTCUL	Conventional	
4	Rishikesh-Nehtaur	1	D/C	124	Twin Moose	PTCUL	PTCUL	UPPTCL	Not Available	LILO of 400kV Rishikesh-Kashipur (LILO portion owned by UPPTCL)
5	Nehtaur-Kashipur	2	D/C	80	Twin Moose	PTCUL	UPPTCL	PTCUL	Not Available	
6	Roorkee-Rishikesh	1	S/C	50	Twin Moose	PTCUL	POWERGRID	PTCUL	Not Available	
L. RRVPNL										
1	Ajmer-Bhilwara	1	D/C	160	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
2	Ajmer-Bhilwara	2	D/C	160	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
3	Akal-Barmer	1	S/C	130	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
4	Akal-Jodhpur	1	S/C	245	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
5	Akal-Ramgarh	1	D/C	99	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
6	Akal-Ramgarh	2	D/C	99	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
7	Anta-Chhabra	1	D/C	90	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
8	Anta-Chhabra	2	D/C	90	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
9	Anta-Kalisindh	1	D/C	80	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
10	Anta-Kalisindh	2	D/C	80	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
11	Anta-Kawai	1	D/C	50	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
12	Anta-Kawai	2	D/C	50	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
13	Barmer-Rajwest	1	D/C	20	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
14	Bhilwara-Chhabra	1	S/C	285	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
15	Bikaner-Merta	1	S/C	172	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
16	Bikaner-Bhadla	1	D/C	180	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
17	Bikaner-Bhadla	2	D/C	180	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
18	Bikaner-Sikar	1	D/C	171	Twin Moose	RRVPNL	RRVPNL	POWERGRID	Not Available	
19	Bikaner-Sikar	2	D/C	171	Twin Moose	RRVPNL	RRVPNL	POWERGRID	Not Available	
20	Chhabra - Kawai SCTPS	1	S/C	45	Twin Moose	RRVPNL	RVUNL	APRL	Conventional	
21	Heerapura-Hindaun	1	S/C	192	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
22	Hindaun-Chhabra	1	S/C	305	Twin Moose	RRVPNL	RRVPNL	RVUNL	Conventional	
23	Merta-Heerapura	1	S/C	180	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
24	Merta-Ratangarh	1	S/C	180	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
25	Merta-Jodhpur	1	S/C	119	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
26	Merta-Jodhpur	2	S/C	120	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
27	Phagi-Ajmer(RRVPNL)	1	D/C	109	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
28	Phagi-Ajmer(RRVPNL)	2	D/C	109	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
29	Phagi-Heerapura	1	D/C	52	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
30	Phagi-Heerapura	2	D/C	52	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
31	Rajwest-Jodhpur	1	D/C	220	Twin Moose	RRVPNL	RWPL	RRVPNL	Conventional	
32	Rajwest-Jodhpur	2	D/C	220	Twin Moose	RRVPNL	RWPL	RRVPNL	Conventional	
33	Suratgarh-Bikaner	1	S/C	162	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
34	Suratgarh-Ratangarh	1	S/C	144	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
35	Suratgarh-Ratangarh	2	S/C	144	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
M. UPPTCL										
1	Agra (Fatehabad)-Agra South	1	D/C	70	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
2	Agra (Fatehabad)-Agra South	2	D/C	70	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
3	Agra (UP)-Agra(Fatehabad)	1	S/C	104	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Agra(UP)-Muradnagar(N) at Fatehabad(UP)
4	Agra UP-Unnao	1	S/C	279	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (25%)	
5	Agra(Fatehabad)-Mathura	1	S/C	142	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
6	Agra(Fatehabad)-Mathura	2	D/C	151	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
7	Aligarh-Mainpuri	1	D/C	93	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
8	Aligarh-Mainpuri	2	D/C	93	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
9	Aligarh-Muradnagar	1	S/C	177	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	*Series Compensated line (40%). It would be shifted
10	Aligarh-Sikandrabad	1	D/C	95	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
11	Aligarh-Sikandrabad	2	D/C	95	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
12	AnparaB-AnparaC	1	D/C	0.05	Quad Moose	UPPTCL	UPRVUNL	LANCO	Conventional	
13	AnparaB-AnparaC	2	D/C	0.05	Quad Moose	UPPTCL	UPRVUNL	LANCO	Conventional	
14	AnparaB-AnparaD	1	D/C	5	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Not Available	
15	AnparaB-AnparaD	2	D/C	5	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Not Available	
16	AnparaB-Mau	1	S/C	262	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial (13%)	
17	AnparaB-Obra	1	S/C	40	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
18	AnparaB-Sarnath	1	D/C	158	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial	
19	AnparaB-Sarnath	2	D/C	158	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	
20	Ataur-Hapur	1	D/C	52	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
21	Ataur-Hapur	2	D/C	52	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
22	Ataur-Indirapuram	1	D/C	15	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
23	Ataur-Indirapuram	2	D/C	15	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
24	Azamgarh-Mau	1	S/C	48	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (79%)	
25	Azamgarh-Sultanpur	1	S/C	126	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Conventional	
26	Banda-Rewa road	1	D/C	177	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
27	Banda-Rewa road	2	D/C	177	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
28	Bara-Meja	1	D/C	32	Quad Moose	UPPTCL	UPPTCL	MUNPL	Not Available	LILO of 400kV Bara-Rewa road D/C at Meja
29	Bara-Meja	2	D/C	32	Quad Moose	UPPTCL	UPPTCL	MUNPL	Not Available	
30	Bareilly UP-Unnao	1	D/C	271	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (15%)	*Series Compensated line (45%)
31	Bareilly UP-Unnao	2	D/C	271	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (15%)	*Series Compensated line (45%)
32	Gorakhpur UP-Azamgarh	1	S/C	90	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (76%)	
33	Gr. Noida(765)-Sector 148	1	D/C	47	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
34	Gr. Noida(765)-Sector 148	2	D/C	47	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
35	Gr. Noida-Gr. Noida (765)	1	D/C	45	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
36	Gr. Noida-Gr. Noida (765)	2	D/C	45	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
37	Gr.Noida-Sikandrabad	1	D/C	17	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
38	Gr.Noida-Sikandrabad	2	D/C	17	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
39	Hapur-Dasna	1	D/C	14	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
40	Hapur-Dasna	2	D/C	14	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
41	Mainpuri(UP)-Mainpuri(PG)	1	D/C	25	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Not Available	LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP)
42	Mainpuri(UP)-Mainpuri(PG)	2	D/C	26	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Not Available	LILO of 400kV Paricha-Mainpuri(PG) at Mainpuri(UP)
43	Meja-Rewa road	1	D/C	34	Quad Moose	UPPTCL	MUNPL	UPPTCL	Not Available	LILO of 400kV Bara-Rewa road D/C at Meja
44	Meja-Rewa road	2	D/C	34	Quad Moose	UPPTCL	MUNPL	UPPTCL	Not Available	
45	Muradnagar New- Mathura	1	D/C	246	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
46	Muradnagar-Ataur	2	D/C	18	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400kV Muzaffarnagar-Muradnagar at Ataur (Earlier 95%)
47	Muzaffarnagar-Ataur	1	D/C	121	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
48	Muzaffarnagar-Srinagar	1	D/C	189	Twin Moose	UPPTCL	UPPTCL	GVKPII	Conventional	
49	Muzaffarnagar-Vishnuprayag	1	D/C	280	Twin Moose	UPPTCL	UPPTCL	JPVL	Conventional	
50	Obra-Rewa road	1	S/C	179	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
51	Obra-Sultanpur	1	S/C	230	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	
52	Orai-Mainpuri(UP)	1	D/C	176	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP)
53	Orai-Paricha	1	D/C	111	Twin Moose	UPPTCL	UPPTCL	UPRVUNL	Not Available	
54	Panki-Aligarh	1	S/C	285	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (24%)	
55	Paricha-Mainpuri(UP)	1	D/C	240	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	LILO of 400kV Paricha-Mainpuri(PG) at Mainpuri(UP)
56	Rewa road -Panki	1	S/C	210	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of Bara-Panki at 400kV Rewa Road
57	Roorkee-Muzaffarnagar	1	S/C	71	Twin Moose	PTCUL	POWERGRID	UPPTCL	Not Available	

Annexure-5

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
58	Sarnath-Azamgarh	1	S/C	97	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Conventional	
59	Srinagar-Vishnuprayag	1	D/C	109	Twin Moose	UPPTCL	GVKPIL	JPVL	Conventional	
60	Sultanpur-Lucknow PG	1	S/C	164	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Conventional	
61	Unnao-Lucknow UP	1	S/C	39	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (13%)	
62	Unnao-Panki	1	S/C	49	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (41%)	
N. NTPC JV										
1	Dadri-Loni (Harsh Vihar)	1	D/C	54	Twin Moose	NTPC	NTPC	DTL	Polymer	
2	Dadri-Loni (Harsh Vihar)	2	D/C	54	Twin Moose	NTPC	NTPC	DTL	Polymer	
O. PKTCL (Parbati-Koldam Transmission)										
1	Koldam-Ludhiana	1	D/C	151	Triple Snowbird	PKTCL	NTPC	POWERGRID	Not Available	
2	Koldam-Ludhiana	2	D/C	151	Triple Snowbird	PKTCL	NTPC	POWERGRID	Not Available	
3	Koldam-Banala	1	D/C	62	Quad Moose	PKTCL	NTPC	POWERGRID	Not Available	
4	Nallagarh-Banala	1	D/C	121	Quad Moose	PKTCL	POWERGRID	POWERGRID	Not Available	Powergrid owned 46.38km
5	Parbati-II- Parbati Pooling (Banala)	1	D/C	13	Quad Moose	PKTCL	NHPC	POWERGRID	Not Available	Some portion is of Powergrid
6	Parbati-III- Parbati Pooling (Banala)	2	S/C	4	Quad Moose	PKTCL	NHPC	POWERGRID	Not Available	
7	Parbati II- Sainj	1	D/C	1	Quad Moose	PKTCL	NHPC	HPPCL	Not Available	LILO of 400kV Parbati II-Parbati III at Sainj
8	Parbati III- Sainj	1	D/C	12	Quad Moose	PKTCL	NHPC	HPPCL	Not Available	
P. Adani Transmission India Ltd.(partly with MTACL)										
1	Ajmer-Deedwana	1	S/C	110	Twin Moose	MTACL/ATIL	RRVUNL	MTACL	Not Available	
2	Bikaner-Deedwana	1	S/C	129	Twin Moose	MTACL/ATIL	RRVUNL	MTACL	Conventional	
3	Alwar-Hindaun	1	S/C	96	Twin Moose	ATSL/ATIL	ATSL	RRVUNL	Not Available	Partly owned by Aravali Transmission Services ILtd.
Q. SPTL (Sterlite Power Transmission Limited):NRSS-29 Transmission Company Limited										
1	Jalandhar-Samba	1	D/C	135	Twin Moose	SPTL	POWERGRID	POWERGRID	Not Available	
2	Jalandhar-Samba	2	D/C	135	Twin Moose	SPTL	POWERGRID	POWERGRID	Not Available	
R. Powergrid Unchahar Transmission Ltd.										
1	Fatehpur-Unchahar	1	D/C	54	Twin Moose	PUTL	POWERGRID	NBPPL	Not Available	
2	Fatehpur-Unchahar	2	D/C	54	Twin Moose	PUTL	POWERGRID	NBPPL	Not Available	
S. NRSSXXXI(B)										
1	Amritsar-Malerkotla	1	D/C	149	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
2	Amritsar-Malerkotla	2	D/C	149	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
3	Kurukshetra-Malerkotla	1	D/C	139	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
4	Kurukshetra-Malerkotla	2	D/C	139	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
5. 400kV Transmission Line charged at 220kV										
A. POWERGRID										
1	Dhauliganga-Bareilly(UP)	1	D/C	235	Twin Moose	POWERGRID	NHPC	UPPTCL	Conventional	
2	Dhauliganga-Pithoragarh	1	D/C	59	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
3	Pithoragarh-Bareilly(UP)	1	D/C	178	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
B. RRVUNL										
1	Dholpur-Hindaun	1	S/C	100	Twin Moose	RRVUNL	RRVUNL	RRVUNL	Conventional	
2	Kota-KTPS	1	D/C	7	Twin Moose	RRVUNL	POWERGRID	RRVUNL	Conventional	
3	Kota-KTPS	2	D/C	7	Twin Moose	RRVUNL	POWERGRID	RRVUNL	Conventional	

* - Fixed series capacitor (FSC) is owned by POWERGRID

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