



सत्यमेव जयते

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

संख्या: NRPC/OPR/106/01/2019/1162-1203

दिनांक: 06.02.2018

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 155 वीं बैठक का कार्यवृत्त
Minutes of 155th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 155 वीं बैठक 17.01.2019 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट <http://www.nrpc.gov.in> पर उपलब्ध है। यदि कार्यवृत्त पर कोई टिप्पणी हो तो कार्यवृत्त जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें।

155th meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 17.01.2019. The Minutes of this meeting have been up-loaded on the NRPC web-site <http://www.nrpc.gov.in>. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक: यथोपरि

Sd/-

(सौमित्र मजूमदार)
अधीक्षण अभियंता (प्रचालन)

सेवा में,
प्रचालन समन्वय उप-समिति के सभी सदस्य

Minutes of the 155th Meeting of the Operation Coordination Sub-Committee (OCC) of NRPC.

155th meeting of OCC of NRPC was held on 17.01.2018 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at **Annexure-A**.

MS, NRPC welcomed the participants to the meeting and stated that:

- Operation Coordination Committee (OCC) places on record its deep appreciation of the outstanding service rendered by Shri Upendra Kumar, SE (O), NRPC during his tenure as Member Convenor (OCC). He provided able inputs in various technical, commercial & administrative matters and made valuable contribution at NRPC.
- The fog related tripping during the current winter season has reduced and no further upward trend is expected in the remaining season. It was all because of the replacement of the porcelain insulators with polymer insulators and cleaning of the porcelain insulators in the polluted stretches.
- CERC DSM Regulations 4th amendment has caused lot of concern amongst all stakeholders especially on account of penalty provisions on no. of sign changes after every 6 time block. However, it has been observed that states are now trying to change the sign. UP's excellent management of sign change is appreciable whereas, Chandigarh & J&K have failed to work upon their drawals. All utilities are requested to maintain the discipline so that harsh penalty provisions are not required.
- Rajasthan being a Renewable Energy (RE) rich state, has been facing lot of difficulty in managing sign changes to avoid penalty as per CERC DSM Regulations 4th amendment.

PART-A: NRPC

1. Confirmation of Minutes

The minutes of the 154th OCC meeting held on 17.12.2018 and 18.12.2018 at New Delhi were issued vide letter of even number dated 03.01.2019. No comments have been received till date.

Sub-Committee confirmed the minutes of the 154th OCC meeting without any amendment.

2. Review of Grid operations of December 2018

2.1. Anticipated vis-à-vis Actual Power Supply Position (Provisional) December 2018.

Sub Committee was informed that there has been much variation (i.e. > 5.0%) in the Anticipated vis-à-vis Actual Power Supply Position (Provisional) for the month of December, 2018 in terms of Energy Requirement for Uttarakhand, J&K & UP and in terms of Peak Demand for Chandigarh, Delhi, HP, Haryana, J&K, Rajasthan & UP.

In Delhi demand in terms of MW was 4417 MW against the anticipated 4100 MW and this increase was due to coldest winter in December 2018 in last five years. In the case of Haryana, the demand in terms of MW was 6865 MW against the anticipated 7282 MW. The anticipated demand of the state was higher because increase in demand in Himachal Pradesh in terms of MW to 1700 MW from the anticipated of 1474 MW was due to abrupt changes in weather condition. Decline in demand of Uttar Pradesh in terms of energy 8502 MU against the anticipated 9300 MU and decline in demand in terms of MWs 14706 MW against anticipated 16200 MW was to absence of heating load.

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

2.2. Power Supply Position for NCR:

The Sub-Committee was informed that the NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of 11/2018 is placed on NRPC website (<http://nrpc.gov.in/operation-category/power-supply-position>)

2.3. The highlights of grid operation during December, 2018 are as under:

- Frequency remained within the IEGC band for 77.04% of the time during December 2018, which was more than that of last year during same month (December 2017) when frequency (within IEGC band) remained 73.86% of the time. The maximum and minimum frequencies recorded were 50.21 Hz (02.12.2018 at 06:00 hrs.) and 49.69 Hz (12.12.2018 at 07:35 hrs.) respectively.
- Utilities were requested to take necessary action to further improve the frequency regime viz. by not changing abruptly the loads at block boundaries and assuring primary response from the generators.
- Maximum and minimum load for the region during December 2018 were 47,844 MW (29.12.2018 at 18:25 hrs.) and 29,194 MW (03.12.2018 at 03:05 hrs.).
- The average consumption of the Northern Region, for December 2018, increased by 7.37% (63.8 MU per day) with respect to the corresponding month in previous year. The reason for the same was the dip in temperature during December 2018 as compared to the last year.
- The average Thermal generation in December 2018 increased by 4.03% (23.51 MU/Day) with respect to the corresponding month of previous year. The details are enclosed at **Annexure 2A**.
- The average Hydro generation in December 2018 increased by 5.94 MU/day with respect to the corresponding month of previous year.
- The average Renewable generation in December 2018 increased by 21.74 MU/Day with respect to the corresponding month of previous year. All utilities were requested to send the data for renewable generation regularly. The reason for the increase was highlighted as capacity addition, better sunshine & wind. Also, it was added that the telemetry of renewable has improved.

- The average nuclear generation in December 2018 decreased by 2.21 MU/day per day as compared to corresponding month of previous year.
- The net Average Inter-Regional import increased by 10.07 MU/day during the month of December 2018, as compared to the corresponding month of previous year.
- The net Average Import from Western Region increased by about 15.32 MU/day during December 2018 as compared to corresponding month of previous year.
- The net Average Import from Eastern Region increased by approximately 15.65 MU/day during December 2018 as compared to corresponding month of previous year.
- The major reason for the increase in import from other regions was the increased demand in power on account of weather conditions.
- The transmission losses are depicted at **Annexure 2B**
- The STOA summary for December 2018 is placed at **Annexure 2C**.
- The outages of generating units were discussed in detail and the same is placed at **Annexure 2D** NTPC & all State utilities were requested to review the status of generating units in view of the upcoming summer months.
- Long outages of transmission lines were discussed & all constituents were requested to revive the elements under long outages at the earliest (**Annexure 2E**).
- The new elements charged were discussed and the list is attached at **Annexure 2F**
- Total outages during December 2018 were 868 including Planned S/D (589) and Forced S/D (Trippings-150+Emergency S/D-129).

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units.

- 3.1.1.** The maintenance programme for Generating Units for the month of February, 2019 was discussed on 16.01.2019 at NRPC Secretariat, New Delhi. The approved outages of generating units as per deliberations held in OCC has been issued vide letter of even no. dated 22.01.2019.

3.2. Outage Programme for Transmission Elements.

- 3.2.1.** The Outage programme of transmission elements for the month of February, 2019 was discussed on 16.01.2019 at NRPC Secretariat, New Delhi. The approved outages of transmission elements as per deliberations in OCC has been issued vide letter of even no dated 22.01.2019.
- 3.2.2.** Regarding 400 kV Bus-1 and Bus-2 of Chhabra Thermal Power Plant for charging of 2 Km long 400 kV Double Circuit Interconnection Line between Bay 401 & 402 of CSCTPP, Chhabra & Bay 424 and 425 of CTPP, Rajasthan was advised to consult “Standing Committee on Power System Planning for Northern Region”.

4. Planning of Grid Operation:

- 4.1. Anticipated Power Supply Position in Northern Region for February, 2019 (As per 15th LGBR Sub-committee meeting)**

The Anticipated Power Supply Position in Northern Region for February, 2019 as updated is enclosed at **Annexure 4**.

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

SE (O) stated that it has been observed that the details of variable charges for different generating units are not being updated regularly on the Merit Order Portal. All SLDC's were requested to update VC on MoD regularly.

He added that all SLDCs should confirm if the process of Scheduling was being done as per Merit Order Despatch and in case of variations the reasons may please be furnished.

6. Reactive compensation at 220 kV/400kV level

6.1 In the 38th TCC & 41st NRPC following elements in NR were approved:

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

POWERGRID:

Representative of POWERGRID informed that price bids for the tender of 500 MVAR TCR at Kurukshetra have been opened and the LOA is expected to be placed by **last week of December 2018**, with commissioning schedule of 2 years from the issue of LOA.

To compensate for the prevailing high voltage conditions until the TCR gets commissioned, 125 MVAR reactor has been installed and charged on 28.09.2018.

Regarding the installation of the bus reactors at 400 kV ISTS substations which is to be done through TBCB route as per the MoP Gazette Notification dated 08.05.2018, POWERGRID representative was again requested to update the progress.

DTL:

As per the action plan submitted in the 147th OCC meeting, various schemes are being prepared and all reactors will be commissioned **before Dec 2020**, 5 Nos. 25 MVAR Reactors (1x25MVAR at Mundka (Tikrikalan), 2x25MVAR at Bamnauli and 2x25MVAR at Indraprastha), 4 Nos. 50MVAR Reactors (1x50MVAR at Peeragarhi, 2x50 MVAR at Harsh Vihar and 1 x 50 MVAR at Electric Lane) and 1 No. 125 MVAR at Mundka (Tikrikalan) Sub Station.

DTL was requested to pre-pone the commissioning schedule before the onset of winter of 2020.

DTL representative informed that in line with the deliberation held in 40th TCC and 43rd NRPC meetings regarding utilization of generators as synchronous condensers for reactive compensation, DTL had taken up the matter with CEA (copy of letter attached at **Annexure-6**) for further deliberations with Delhi Generators.

PSTCL:

Technical bid for 400 kV bus reactor at Dhuri substation has been opened and Price bids have been put on hold due to pending PSDF approval. As regards the 220 kV bus reactors at Dhuri and Nakodar substation, tender has been opened on 15.06.2018 (technical bid) & Price bid opening has been put on hold on account of pending PSDF approval.

DPR for installation of reactors has been submitted for PSDF funding. PSTCL has already submitted its reply to the queries of TESC (proposal no. 158). Order shall be placed after securing the approval for PSDF funding.

Uttarakhand:

125 MVAR reactors at Kashipur: Technical bids have been opened and are under evaluation.

Rajasthan:

Item	Background	Status
3 Nos. each of 25MVAR (220KV) reactors for Akal, Bikaner & Suratgarh.	DPR submitted for PSDF funding on 27.04.2018. Reply to the observations of NLDC submitted on 28.07.2018	Approved in the Monitoring Committee of PSDF. Minutes of the Monitoring Committee meeting to be issued.
1 No. of 25 MVAR (220KV) reactor for Barmer & 125 MVAR (400KV) reactor for Jodhpur, included in 450 MVAR (13x25+1x125MVAR) proposal	Revised DPR for 450 MVAR Reactor after separating STATCOM was submitted vide letter dtd. 12.10.2018 to POSOCO for approval.	Clarifications has been sought by Techno-Economic Sub Group of PSDF from Rajasthan.

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

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 2019-20.

- 7.1. 39th TCC and 42nd NRPC** approved the Techno Commercial offer of CPRI of **Rs. 32 lakhs (Rs. 20 lakhs for previous study and Rs. 12 lakhs for additional assignment) excluding taxes** for conducting the capacitor study. In the meeting the format for data submission was shared with the members and they were requested to ensure timely submission of the data so that the study may be carried out in the stipulated time frame.
- 7.2.** In the **150th OCC meeting**, members expressed concerns on the nature of the format and submitted that the format being lengthy would require some time for better understanding the format and submission of data accordingly.
- 7.3.** To address the concerns of the members of OCC forum, in the **151st OCC meeting**, representative of CPRI made a detailed presentation explaining the format in the meeting and based on the inputs received from the members, the format has been revised and sent to the respective SLDC's through e-mail dated 24.09.2018. CPRI has also shared a video of the presentation explaining the format on Youtube at <https://youtu.be/QTXX7owPF3g>.
- 7.4.** Members were also requested to initially fill the data format for any one 220 kV or 132 kV substation and send it to CPRI (manoharsingh@cpri.in) to check its suitability for utilization in carrying out the study and further action.

- 7.5. 152nd OCC meeting:** No progress has been made so far for submission of data. All the utilities were again requested to make efforts to do the needful.
- 7.6. 40th TCC & 43rd NRPC meeting:** Members were again requested to expedite submission of the data to CPRI in the format prescribed for studies to be conducted for Capacitor requirement in NR for the year 2019-20.
- 7.7. 153rd OCC meeting:** MS, NRPC expressed his concerns as no data in the specified format has been received from any of the state even for a single substation which was desired to verify its suitability for utilization in carrying out the capacitor study. Representative of Haryana stated that they had submitted data to which the representative of CPRI replied that the data submitted by Haryana was not in the format as decided in the 151st OCC meeting which was forwarded to all the utilities via e-mail dated 24.09.2018. Representative of Rajasthan SLDC stated that the load data at 11 kV substations was not being maintained. Therefore, it was not possible for them to furnish the same. EE (O), NRPC and representative of JVVNL stated that the load data was maintained at 11 kV sub-station and the same may be made available. Representative of Rajasthan SLDC stated that the same would be verified and the data shall be submitted at the earliest.
- 7.8.** The issue of non-submission of data for system study of capacitor requirement in NR for the year 2019-20 has been taken up with the highest management of DISCOMs, STUs and SLDCs. The letter regarding the same dated 06.11.2018 is enclosed at Annexure – Agenda item no 7 of the Agenda of the 154th OCC meeting, for reference.
- 7.9. 154th OCC meeting:** SE (O) stated that the matter is being pursued with the top management of the DISCOMs (refer Annexure – Agenda item no 7 of the Agenda of the 154th OCC meeting). He stated that all SLDCs should take up the issue with their respective DISCOMs for submission of the data as desired at the earliest.
- 7.10. 155th OCC meeting:** MS, NRPC stated that the sample data as received from most of the utilities were not in line as per the requirement of CPRI and the same has also been informed through mail by CPRI to the respective utilities. He further stated that due to non-availability of data in proper format, the study could not be performed and low voltage profile issue may be encountered in future.

Representative of DTL stated that they have incorporated the changes as suggested by CPRI and has again submitted the same to CPRI. Once approved, DTL would start compiling data for their whole network and submit the same to CPRI.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 8.1.** The Protection Sub-Committee while discussing multiple elements tripping at 400/220/132kV Dehar HEP of BBMB in its 34th meeting held on 21.04.2017 recommended inter-alia that BBMB should modify phase sequencing at Dehar as Y-B-R instead of R-Y-B. The issue was further deliberated in the 138th OCC meeting held on 23.08.2017, wherein it was observed that phases at BBMB end has inadvertently been marked as outlined below:

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

The BBMB was asked to rectify the phase issue at their end accordingly.

- 8.2** However, BBMB raised concern that the issue could not be resolved in one go, as coordination would be required from all the concerned utilities to carry out this activity and requested NRPC to form a committee comprising of BBMB and its partner states, utilities with which BBMB has interconnection, NRPC Secretariat and POWERGRID for the same. NRPC in its 41st meeting held on 28th February, 2018 approved the proposed formation of the committee and advised BBMB to resolve the issue within six months. BBMB drew a draft action plan which was duly deliberated by the Committee in its 1st meeting held on 04.06.18. The action plan was circulated to all the concerned utilities for - their comments and concurrence. The execution of the action plan was tentatively planned during month of November-December, 2018.
- 8.3** HPSEB and PSTCL agreed with action plan, however, PSTCL was of the view that 400kV Dehar-Rajpura line is owned by PGCIL and hence the work is to be executed by them. Comments on the action plan were also received from NTPC and POWERGRID. BBMB has agreed with the comments from NTPC and has given their reply on the comments of POWERGRID.
- 8.4** The reply of BBMB vis-à-vis the comments of POWERGRID were deliberated in the 151st OCC meeting wherein members were of the view that reply of BBMB was generally in order. However, POWERGRID representative stated that the matter pertains with NR-I and NR-II region of POWERGRID and final decision regarding the same is to be taken up at the level Executive Directors of respective regions.
- 8.5** Accordingly, the matter was taken up vide letter of even number dated 07.10.2018 for POWERGRID consent to the action plan. However, reply of the same is still awaited.
- 8.6** **152nd OCC meeting:** POWERGRID representative assured that the issue will be resolved with BBMB.
- 8.7** SE (O) requested POWERGRID to give their consent at the earliest so as that the BBMB could execute the work in the upcoming months of November & December as per the decision of NRPC.
- 8.8** **40th TCC & 43rd NRPC meeting:** In the meeting POWERGRID stated that they have reservation regarding the action plan submitted by BBMB, as for a single circuit line it may not be optimal plan to change the Jumper configuration in view of requirement for long shut down & material. He further stated that a similar issue was encountered in Rajasthan wherein same problem was mitigated for a Double circuit line. MS NRPC had requested POWERGRID to submit all their reservations in writing, highlighting the issues which may be encountered at the time of implementation of above. In the meeting it was stressed that the work should be completed in the lean period of November-December 2018
- 8.9** **153rd OCC meeting:** POWERGRID updated that the site visit is planned shortly to resolve the issue. As desired in the 43rd NRPC meeting POWERGRID submitted all their reservations in writing (Annexure 8 of MoM of 153rd OCC meeting). Further MS NRPC requested POWERGRID to resolve the matter immediately so that the work can be done by BBMB in the lean period. BBMB representative also requested for the same as once the clearance from POWERGRID is received thereafter the matter has to be approved by their Protection Committee.

- 8.10 154th OCC meeting:** POWERGRID submitted the details (*Annexure-8*) of the issues/difficulty which would be faced while completing the phase nomenclature mismatch work. POWERGRID intimated that the site visit had been done by their site officials. MS, NRPC stated that the completion of the phase mismatch issue work is very important and it should be completed during the lean period.
- 8.11** After deliberations it was decided that a joint visit by POWERGRID, BBMB, NRLDC and NRPC would be conducted on 15/01/2019 so as to figure out the difficulties that would be faced in order to rectify the issue as listed out by POWERGRID.
- 8.12 155th OCC meeting:** Due to the schedule of OCC meeting on 16th and 17th January, the visit could not be carried out. In the meeting, it was decided that the same may be tentatively done on 23rd and 24th January 2019.

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

The detail of the updated status of Agenda items as discussed in the 155th OCC meeting is enclosed at **Annexure –Agenda item no 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 36th TCC (Special) meeting held on 14.09.2017 was enclosed as Annexure-13 with the Agenda of the 144th OCC meeting. All SLDCs are regularly being requested since 144th OCC meeting to take up with the concerned generators where FGDs is to be installed and submit the progress of FGD installation on monthly basis regularly to NRPC in the available format on the NRPC website.
- 10.2 151st OCC meeting:** MS NRPC stated that in the meeting CEA held a meeting with generators on 28.08.2018 in which CE, TR&M, CEA informed that the FGD installation deadlines have been advanced for stations falling in NCR and also for the stations above 500 MW capacity or in stations located in the area having population density more than 400 persons per square km or are in critically polluted area. He further added that many IPPs like NPL are waiting for guidelines from the SERCs regarding the FGD installation cost adjustment. In this regard, he briefed the sub-committee that Ministry is concerned about the issue and a policy decision is being made about the cost to be adjusted duly and CERC is being directed in this regard to pass an order to the SERCs. He asked all the generators to seriously make efforts to meet the deadline of installation of FGD. All constituents were again requested to update the desired information in soft copy in excel format on a regular basis. All the utilities (except PSPCL) should give the contact details of the officer who is concerned with FGD installation so that the information can be expeditiously collected directly from him/her. All SLDCs shall coordinate and submit the information.
- 10.3 152nd OCC meeting:** SE(O) NRPC informed that in June, 2018, MoP in a letter to the CERC stated that investment in the installation of emission control technology like FGDs in TPPs in compliance to MoEF&CC norms will be considered for pass through in tariffs and TPPs can approach appropriate commission for the approval of additional capital expenditure and compensation for the increased cost on account of this change-in-law event.

The Sub-Committee was also informed about revised phasing plan received from TR&M Division of CEA placed at Annexure-10(A) of the MoM of the 152nd OCC meeting. He requested all utilities to look into the same and implement the installation plan accordingly and update.

- 10.4 153rd OCC meeting:** All utilities were requested to review the revised phasing plan that was attached at **Annexure-10(A) of the MoM of the 152nd OCC meeting.** PSPCL intimated that the Work order for carrying out the Detailed Feasibility Study for Installation of FGD at GGSSTP, Rupnagar & GHTP, Lehra Mohabbat has been placed upon M/s NTPC Consultancy Services and work is in progress.
- 10.5 154th OCC meeting:** All utilities were requested to review the revised phasing plan that was attached at Annexure-10 (A) of the MoM of the 152nd OCC meeting.
- 10.6 155th OCC meeting:** The updated status as received from NTPC, UPRVUNL, RVUN is enclosed at **ANNEXURE 10.**

11. LVRT compliance by wind generators.

- 11.1** Installation of LVRT needs to be ensured at the time of “connection” of the wind generators. The CEA (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2013 provide that wind generating station connected at voltage level of 66 kV and above shall remain connected . LVRT is the capability of the electrical device to operate through periods of lower grid voltage. LVRT mechanism boosts the terminal voltage of the point of connection of the wind machine when there is a fault at the remote location to provide transient stability support.

Many wind generation operates without LVRT/FRT feature thereby adversely responding at low voltage either due to high load condition at wind pockets or any fault condition in different parts of the grid and becomes a source for grid incident. The installed capacity having LRVT, their setting are not uniformly matching with the provisions of the Central Electricity Authority (Technical standards for connectivity to the Grid) Regulation, 2007 as amended from time to time (CEA Technical Standards for Connectivity Regulations).

Regulation B2.(3) of the CEA (Technical Standards for Connectivity) Regulations provides that Low Voltage Ride Through (LVRT) is compulsory for machines installed after 15.04.2014, but for existing wind power generating stations, LVRT should be mutually discussed. It does not exempt any station from installing LVRT. STUs/DISCOMs/SLDCs should take up the matter of getting compensation for additional capitalization on account of installing LVRT to be made “pass through “with their concerned State Electricity Regulatory Commissions.

LVRT is technical requirements from the point of view of the safety and security of the grid and its usefulness cannot be overlooked in view of the cost involved in retrofitting of LVRT. CERC has already directed all WTGs of capacity equal to or more than 500kW except Stall Type WTGs to comply with LVRT.

With regard to monitoring of the installation and performance of LVRT installed on existing WTGs, CERC has directed SLDCs to prepare quarterly reports and submit it to RPCs . RPCs are directed to validate the reports submitted by SLDCs in consultation with RLDCs and report any deficiency and non-compliance to the Commission in accordance with law.

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.

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.

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.”

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.

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 which 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.

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 23.7.2108 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.

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.

11.2 151st OCC meeting:

The MOM of the meeting held on 23.07.2018 stands shared (Annexure 11 of the Agenda of the 151st OCC meeting).

MS NRPC briefed the forum that M/S Suzlon and Inox have filed a petition for waiver of installation of LVRT on account of the additional cost involved.

RRVPNL representative intimated that the next meeting with the WTG manufacturers is scheduled tentatively for 05.10.2018.

11.3 152nd OCC Meeting:

RRVPNL representative intimated that a meeting along with presentation from LVRT solution provider (M/s Enerfra) has been convened on date 09.10.2018. MOM of said meeting are attached as Annexure-XI of the Minutes of the 152nd OCC meeting. During the meeting, he informed that it was also decided by MS, NRPC that a meeting of WTG Manufacturers and generators will be convened at NRPC on dated 23.10.2018 to discuss bottlenecks issues in implementation of LVRT in Rajasthan control area.

11.4 In a meeting held on 23.10.2018 at NRPC with the WTGs GSS/PSS level solution like STATCOM was discussed. M/s Siemens would provide voltage relief graph which would be superimposed on the system voltage profile at any S/s, If it matches with that provided by the LVRT device then Siemens would explore further possibility of having LVRT devices. Siemens was also requested to explore any other alternative for their own WTG to make them LVRT compliant. WTGs were requested to take up for “Pass-through tariff” under “change in law” with SERC.

- 11.5 40th TCC & 43rd NRPC meeting:** In the meeting it was advised to Rajasthan SLDC to enforce the decision of 42nd NRPC of not scheduling LVRT non-compliant WTGs commissioned after the date as mentioned in the CEA (Connectivity Regulation) amendment dated 15.10.2013.

CEA stated that SLDCs may file a petition with respective SERCs indicating problem being faced by the WTGs in installation of LVRTs.

MS, NRPC informed the TCC that NRPC along with Rajasthan SLDC, WTGs, OEMs is in the process of finding economic way to ensure LVRT compliance

- 11.6 153rd OCC meeting:** RRVPNL representative updated that WTGs are in the process of finding economic way to ensure LVRT compliance.

- 11.7 154th OCC meeting:** Representative of Rajasthan informed that petition to be filled to SERC was put up for approval but as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013 B.3 which states that “The generating company and the licensee of the electricity system to which the generating station is connected shall mutually discuss and agree on the measures which can be taken to meet the standards specified in (B 1) and (B2) subject to technical feasibility”, management has intimated that matter would be taken up by STU.

Director (GM), CEA told that compliance of not only CEA regulations but also CERC order needs to be ensured. He requested Rajasthan to refer CERC petition no. 420/MP/2014 for clarifications, if any.

MS, NRPC told that CERC has directed SLDCs to prepare quarterly reports and submit it to RPCs and RPCs are directed to validate the reports submitted by SLDCs in consultation with RLDCs and report any deficiency and non-compliance to the Commission in accordance with law. Accordingly, he asked SLDCs to submit the quarterly reports and report non-compliance to SERC. He requested SLDC to file to petition at the earliest and implement NRPC’s decision of not scheduling non-compliant WTGs.

- 11.8 155th OCC meeting:** MS, NRPC queried with Rajasthan representative about the filing of petition to SERC as per the decision of NRPC. Rajasthan representative stated that on the advice of NRPC, the case was again put up for filing of petition with SERC on which the higher management of Rajasthan has objected citing that it does not fall under the purview of SLDC and needs to be filed by concerned transmission utility.

For verifying the compliance of WTG are having the LVRT facility in them, avenues were being looked for testing their compliance. As per the early estimates, it would cost around Rs. 15- 20 lakhs for testing the LVRT compliance of each unit.

MS, NRPC stated that SLDC is mandated to ensure the security of the grid of the state and in that sense it was their responsibility to not schedule LVRT non-compliant WTG as per the decision of NRPC.

12. System Protection Scheme (SPS) in NR

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

In 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 complete. 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.

149th OCC meeting: It was also informed that a report has to be submitted to CERC on the status of implementation of the SPS scheme. Accordingly, CERC has been intimated the current status of implementation and CERC has also informed that a mock testing for the revised 765 kV Agra- Gwalior SPS will be carried out after integration of additional 1000 MW load shedding.

151st OCC meeting: POWERGRID informed that substations in Delhi, UP & Haryana were completed and 7 locations in Punjab & 6 locations in Rajasthan were remaining which are expected to be completed by October 2018. The mock testing for the Revised 765 kV Agra- Gwalior SPS will be carried out in November, 18 as communicated to CERC. (only after integration of additional 1000 MW load shedding that is to be carried)

152nd OCC meeting: POWERGRID updated that the work will be completed in totality by November end. He added that physical installation will be completed within this month and testing of the 21 number of links will start thereafter.

NRLDC representative stated that the mock testing would be planned thereafter in the first week of December, 2018.

In 40th TCC & 43rd NRPC meeting: POWERGRID representative informed the following:

- Physical installation at DTPC completed at all the locations.
- Communication link of all hardware would be done by November, 2018.
- RoW issue on 765kV Gwalior-Satna for stretch of 25km is faced. Expected to be resolved by December, 2018.
- Signal Extension to Sasan over OPGW from Agra has been completed. Repeaters installation is in progress and expected by November, 2018.
- Mock testing would be done in January, 2019.

153rd OCC meeting: POWERGRID updated that the connectivity work has been done on ten stations and the work on the rest of stations of Rajasthan & Punjab would be will be completed by 15.12.2018. He further ensured that as agreed in the 43rd NRPC meeting they will target to go ahead with the mock testing in 01/2019.

154th OCC meeting: POWERGRID representative informed that modifications related to CB ON/OFF status have been completed at both Agra and Gwalior end. He told that DTPC installation has been completed and the end to end testing has also been done for 20 links out of 21. He further stated that end to end testing is remaining only for Bhiwadi-Heerapura-Bhilwara-Chittorgarh link. He further requested the concerned states to terminate the links at the designated feeder on which the load shedding is required to be done. He told that end connections with Trip relay of the feeder to be done by States. He assured that as targeted the mock testing will be planned to be carried out in 01/2019. Representative of NRLDC requested POWERGRID to coordinate with states and keep NRPC/NRLDC in loop for early completion of the scheme. MS NRPC requested POWERGRID to coordinate with nodal officers of the concerned states for early termination of the links at their end.

155th OCC meeting: POWERGRID representative stated that the cable has already been laid down to the Protection panel in all substations and only the terminal connection needs to be done which has to be done by the utility concerned. Once the terminal connections are done, mock testing of the scheme can be done. Delhi, Haryana, Rajasthan and Punjab were advised to expedite.

POWERGRID was advised to pursue with the concerned utilities and get the work done at the earliest so that mock testing of the scheme may be conducted in the first week of February 2019.

Representative of NRLDC raised the issue of obtaining the signal for SPS operation at SLDCs and from there to NRLDC.

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 of the Agenda of the 151st OCC meeting.

151st OCC meeting: UPRVUNL updated that order has been placed on M/s BHEL vide letter no 310/C&D-VI /DTPP/T-1 dated 20.08.2018. The work is to be completed in around 40days. The cost of the work would be 54.20 lac & UPPTCL has been intimated about the same.

152nd OCC meeting: UPRVUNL updated that they will complete the work by November end. UPPTCL representative stated that the work at their end and LANCO is complete and once the UPRVUNL completes the work mock testing will be done. It was further added by representative of UPRVUNL and UPPTCL that only action at Anapara D is pending and therefore with the commissioning of scheme at Anapara D, entire scheme would stand commissioned.

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

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

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

12.3 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.

151st OCC meeting: RRVPNL representative submitted the written communication from their STU in this regard is enclosed at Annexure 12A of the MOM of the 151st OCC meeting. It has been intimated that the Technical specification for implementation of Automatic load shedding scheme under SPS for Kawai Kalisindh generation complex is under process of approval and the whole procedure till award of contract may be completed within 4-5 months and complete implementation of above scheme may take further at least 6-7 months.

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

153rd OCC meeting: RRVPNL representative stated that the order will be placed in 1/2019 positively for completion of work in 6-7 months thereafter.

154th OCC meeting: RRVPNL representative stated that the tender would be done by the end of the month.

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

13. Automatic Demand Management System

Since 147th OCC utilities were being requested to update on the action plan & status of implementation of the ADMS in their utility as it is mandatory requirement of IEGC. State-wise status is as under:

Punjab:

147th OCC meeting:

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 have been finalized and it has been targeted to complete by 2020.

148th OCC meeting:

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.

TPDDL: Fully Implemented

TPDDL 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.

Rajasthan:

149th OCC meeting:

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 kV 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.

152nd OCC meeting:

Rajasthan representative also added that tender for Smart Transmission Network & Assets Management System having ADMS part has been floated and Techno commercial bid has been opened on 30.08.2018. Financial Bid has also been opened and financial bid analysis is yet to be submitted for approval of WTD. Work order is expected to be placed by December-18 after lifting of model code of conduct for assembly election in Rajasthan.

154th OCC meeting: RRVPNL representative stated that the work order for Smart Transmission Network & Assets Management System having ADMS part has been issued on 12/12/2018

155th OCC meeting:

Work order has already been placed with an execution period of 18 months.

UP:

The remote operation of 132 kV feeders under ADMS has been done, but for the down below network they have taken up the issue with the DISCOMs.

Haryana:

155th OCC meeting: Representative of Haryana STU stated that the issue is being regularly followed-up with the DISCOM of Haryana but NO progress has been made into it. He stated that DISCOMs were shifting the responsibility on the part of STUs for implementation of ADMS.

MS, NRPC advised HVPN representative to take up the matter at the highest level as ADMS needs to be implemented in each state and the responsibility for implementation shall not be shifted on one another.

EE (O) advised HVPN representative to mark a copy of the correspondence to MS, NRPC so that the matter may be followed up at NRPC Secretariat level also.

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

All the utilities were requested to update the information as per the letter enclosed at Annexure 18 with the Agenda of the 146th OCC meeting. The information has been submitted by NTPC(NCR), BBMB, Punjab, Rajasthan, THDC, HPGCL, NPCIL, POWRGRID (NR-2 & NR-1), POSOCO & NHPC has been received.

All utilities were again requested to update the information.

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

The updated status as per the 155th OCC meeting is enclosed as Annexure –15.

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

In the **155th OCC meeting**, MS, NRPC advised BBMB to procure ERS for their system to which BBMB replied that the decision has already been taken in the full board that partner states will provide ERS to BBMB, whenever needed.

MS, NRPC stated that if such a stance has been taken by the partner states, the partner states shall procure 1 additional set each, to be provided to BBMB whenever they require.

16. Cleaning and Replacement of porcelain insulators

16.1 It being a regular activity, all the transmission licensees in the Northern Region are being requested in monthly OCCM since the 148th Meeting to plan insulator replacement work from September 2018 onwards.

The meeting for cleaning and replacement work of conventional insulator was held on 15.10.2018. The minutes of the meeting stand issued vide letter dated 12.11.2018.

16.2 All utilities are requested to stick to the timeline as brought out in the meeting to mitigate fog related trippings during winter season and to ensure proper submission of data regarding progress of the cleaning/ replacement work in line with the discussions held in the meeting. It is stressed that the cleaning of porcelain insulators in the polluted/fog prone area also be taken up expeditiously.

The data as per MoM of the meeting stands submitted by POWER GRID (NR3), BBMB, DTL, HVPNL, PSTCL AND POWERGRID NR-1.

POWERGRID NR-II has submitted that the replacement of porcelain insulators on all critical stretches stands completed.

154th OCC Meeting: RRVNL & UPPTCL were requested to submit information as per MOM issued, failing which outages for cleaning/replacement of insulator may not be approved. Further, all the utilities were requested to intimate the progress of the cleaning/replacement work completed may also be intimated.

155th OCC Meeting:

MS, NRPC stated that the information regarding each transmission line detailing about the cleaning and replacement done needs to be submitted. The information shall also mention the details of the fog prone zone in which the replacement has been done.

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.

The status of the information received from the following utilities:

NTPC, NHPC, Tata Power, THDC, PTCUL, NPCIL RAPS, NAPS, PSTCL, DTL, Rajasthan, SJVNL & PTCUL.

All other utilities (except from those mentioned above) were again requested to update.

POWERGRID was also requested to update regarding the guidelines they have to frame on CERT-In. He added that the guidelines once finalized will be followed by the STUs. SE (O) added that NHPC & NTPC have prepared sectoral CERT-In for Hydro & Thermal generators.

155th OCC meeting:

POWERGRID was requested to update the status regarding formulation of Cyber Security specific Crisis Management Plan (CMP) for Transmission sector.

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

Geographical Information System (GIS) based energy map for India (https://vedas.sac.gov.in/powergis_main/index.jsp) is being implemented by NITI Aayog. This would provide true locations of all energy resources including power plants and transmission lines, etc. on a map of India which would be hosted on NITI Aayog's website. CEA is a designated nodal agency for collecting power sector data and accordingly power utilities and DISCOMs were requested to submit the requisite data to CEA for onward transmission to NITI Aayog. The details required are - name, voltage level, capacity, longitude and latitude of all s/s of 33 kV and above; longitude and latitude of origin and terminating points of lines of 33 kV and above. DISCOMs and other power utilities are requested to submit the requisite data to CEA through cedpd-cea@gov.in email id at the earliest. The

All SLDCs except Punjab were again requested to update the same.

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

For conducting studies in PSSE for assessment of inter control area transfer capability, POSOCO considers thermal ratings of lines as specified in CEA's 'Manual on Transmission Planning criteria- 2013' considering ambient temp. of 45°C for terminal equipment ratings of both ends of the lines.

As there is a scope for considering temperature adjusted thermal ratings for these lines in the PSSE studies, NRCE has decided to finalize the methodology for computation of TTC/ATC/TRM taking into a/c variation in thermal capability of lines wrt variation of ambient temp.

Therefore, POSOCO is in the process of populating the temp. adjusted thermal ratings in these lines in the PSSE study case.

All STUs and transmission licensees are requested to furnish terminal equipment ratings at all lines at 400kV and above for fully implementing the temp adjusted TTC to ensure that there is no gap in security assessment. The matter is under regular follow up since 152nd OCC meeting, still no data is received so far.

All STUs and transmission licensees were requested for expeditious submission of information.

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

Ministry of Railways has accorded high priority to railway electrification projects for reducing dependence on imported petroleum based fuel thereby enhancing energy security of nation. However, it is observed progress of ongoing transmission line and substation works being executed by SEBs is not matching with the targets for railway sections planned to be commissioned on electric traction. It is found that the work of transmission line for 31 traction sub stations (UP 19, Haryana 5, Punjab 1, and Rajasthan 5 & J&K 1) is yet to be completed. Further tender for transmission line work for 14 traction sub stations(UP 5,Haryana 2,Punjab 2, Rajasthan 5) is yet to be awarded and estimate for 10 traction sub stations(UP 1,Punjab 2, Rajasthan 7) are yet to be received by Railways from respective SEBs. The details are enclosed at Annexure – Agenda item no 20 of the Agenda of the 154th OCC meeting.

154th OCC meeting: SE(O) stated that early commissioning of transmission line works and substation across the nation is required, so as to harness full potential of electrification.

Members were requested to take up the matter with concerned utilities to expeditious completion of the transmission line works and substation and regularly update the progress of the work in monthly OCC meeting.

155th OCC meeting: All utilities were requested to update as per the Annexure-20.

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

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

155th OCC Meeting:

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

22. Display of Open Cycle Schedules at NRLDC web site and Open Cycle Certification by RPC (Agenda BY NTPC)

Representative of NTPC stated that as per CERC Tariff Regulations (2014-19), Member Secretary of the respective RPC has to certify open cycle generation in respect of Gas Stations so that constituents can be billed by generators on differential Open Cycle Operational norms. According to above provisions, NRPC has been certifying O/C generation from time to time. However, NRPC Vide its letter Ref No NRPC/OPR/116/01/2018/12996 dated 16.11.2018, NRPC has certified Open Cycle Generation for the period Dec'17 to May'18 under two categories:

Category-1: O/C generation based on scheduling by beneficiaries &

Category-2: Open cycle generation based on scheduling under RRAS

In respect of Category-2, NRPC has stated that Commercial Settlement for this category may be done as per decision to be taken by NPC/NRPC. Hence billing of Open Cycle generation under RRAS for aforesaid period is still pending.

He further informed that from December 2018 onwards, there has been a paradigm shift in the modus operandi of Gas Stations which are now called to generate under RRAS by NLDC in Open Cycle. NTPC Gas Stations have been specifically asked to operate in Open Cycle under RRAS for meeting grid demand for short duration of time with quicker ramp rates. These Gas stations otherwise are remaining under RSD due to non-scheduling of power on RLNG by beneficiaries (except GTs scheduled on domestic gas). Hence, it is important that NRPC must certify Open Cycle generation under RRAS immediately on weekly basis and incorporate Open Cycle energy in REA also in line with other REA accounts so that beneficiaries can be billed in timely manner. NRPC can get the Open Cycle generation specific instructions verified by NRLDC as instructions to start/stop the machines in O/C are being processed to NTPC Gas Stations through respective RLDCs.

Representative of NTPC further stated that NRLDC web-based scheduling software does not have any provision to display Open Cycle scheduled energy separately whereas On Bar Open Cycle DC is already being declared on NRLDC web separately. Hence, NRLDC needs to incorporate display of open cycle schedules separately and the same should also reflect in implemented schedules.

Representative of NRLDC stated that scheduling system for gas stations is quite complicated already as DC is being declared on 3 fuels and incorporating display of separate open cycle schedules will further complicate the system.

MS, NRPC asked NRLDC to explore the possibility to incorporate Open cycle scheduling in web-based portal. He stated that possibility of certifying and billing open cycle generation under RRAS along with weekly RRAS account would be explored when data regarding the same is provided by NRLDC.

Representative of NTPC also pointed out that it has been observed that RRAS schedule in open cycle on RLNG is being given to NTPC even when some margin is available with machines which are on bar in close cycle. This is violation of merit order dispatch principle of scheduling. Representative of NRLDC stated that 'merit order' is one of the considerations for grid operation, however it may be violated sometimes due to other considerations like 'unit commitment'.

MS, NRPC asked NTPC to submit the details of instances where merit order violations have taken place and NRLDC/NLDC may submit the reasons for the the same would be discussed in the next meeting.

23. Tripping of important lines in NR during night/ early morning hours

NRLDC representative stated that there were multiple issues in grid operation specially during night/early morning hours due to fog related tripping, some of the issues are as below:

- There was complete outage of (3×660MW) of Talwandi Sabo TPS and another day one unit of Talwandi Sabo TPS tripped due to multiple 400 kV lines tripping in Punjab during night/ early morning hours. These tripping were suspected due to fog. Generation outage in Punjab area further resulted into load shedding in Punjab area.
- Major outage occurred in UP control area in which complete Anpara-A & B TPS tripped in the night hours and 765 kV Anpara-Unnao ckt loaded upto 2200-2300MW. Tripping of this line may have resulted into additional 2000MW generation loss in Anpara-C & D generating station. Further, it may have resulted into widespread blackout in Singrauli/Anpara/Rihand Complex due to cascade tripping.
- During Anpara incident, station supply became dead and DC battery bank also couldn't sustain the load which resulted into outage of data telemetry of complete Anpara-A & B TPS. This point has been raised multiple times in different grid disturbance report still telemetry outage issue is being faced by the operators during real time grid operation.

- Multiple times 400 kV outgoing lines from 400 kV Anpara TPS also tripped during night hours.
- In Rajasthan, 400 kV element outage occurred multiple time during night, specially in the western Rajasthan area.
- Generation loss in three major states (Punjab, Rajasthan and UP) due to multiple 400 kV elements outage during night.

NRLDC representative also stated that transmission line connected to the generating pockets are more important because tripping of these feeders affects the generation and operation of grid. Further, it resulted into load shedding in that control area. Grid operation at that moment of time is under stress.

For safe secure and reliable grid operation, following are the suggestive measures:

- Better maintenance of outgoing transmission line from generating complex.
- State/ Control area has to maintain adequate reserves to handle such contingency in real time.
- Generation should be in different pocket of state with adequate reserves to handle grid contingency.
- Extra manpower can also be deputed at control room to help during crisis situation.
- Healthiness of DC battery bank which fed the communication supply needs to be ensured.
- Healthiness of 48V DC supply available for protection and telemetry should be checked on monthly basis.

MS, NRPC also raised the concern of non-availability of telemetry during crisis time and requested all the NR constituents to submit the monthly compliance report for availability of telemetry for all the generating station and 400 kV and above grid station.

All utilities are requested to take remedial measures to minimize the tripping and take action on aforesaid points.

24. Maintenance & support (AMC) renewal of PSS®E licenses supplied under contract no. CC-CS/357-CC/ITSW-1900/3/G2/CA/4394 dated 13.08.2012 (Agenda from DTL).

Representative of NRLDC clarified to DTL that the software was procured & provided by CTU and not by NRLDC as a onetime measure with an embedded AMC period of 5 years in view of the 2012 grid disturbance after which it was noticed that the utilities did not had software at their level to run load flow and analyze the grid.

As it was a onetime exercise carried by CTU, all the STU's were advised to renew their license on their own.

AA.1 CERC DSM Regulation, (4th Amendment) - Discrepancy in Actual transmission data of Dehar Power House, BBMB. (Table agenda by BBMB)

Representative of BBMB informed that as per CERC DSM Regulation, (4th Amendment) regional entities shall have to change sign of their deviation from schedule at least once after every 6 time blocks. The violation under this clause attracts an additional charge of 20% on the daily base DSM payable/receivable. In case of Dehar Power House of BBMB when the machines are not operational and schedule is zero, the actual transmission figures are non-zero resulting in deviation from schedule. In this scenario injection of power from Dehar, the actual transmission figs. are beyond control., therefore, it is not possible to do the sign reversal of deviation from schedule stipulated in the above said regulations resulting in additional charges to BBMB.

He requested that in the above condition when there is no injection from Dehar Power House, the actual transmission figures should also be considered zero so that there are no additional charges to BBMB.

Representative of NTPC stated that their gas based generating stations would be facing a similar problem when they are under shutdown and drawing power from the grid. Representatives of NHPC & SJVNL also stated sign change is not possible in hydro stations when schedule is zero hence sign change penalty should not be imposed under such circumstances. Representative of NTPC informed that CERC has been apprised of the situation. NHPC & SJVNL have also submitted their comments to CERC in this regard.

MS, NRPC stated that though CERC has authorized NLDC to issue guidelines but so far NLDC has not communicated anything in this regard. He stated that NRPC will issue provisional weekly DSM accounts without imposing penalty of sign change in case schedule given to the generator is zero and it is drawing power from the grid but the same may be revised in future if CERC does not agree to this philosophy.

PART-B: NRLDC

1. Low frequency Operation

Low frequency operation especially during morning peak hours in winter have been observed in the Grid and this low frequency was more prominent during first week of this month. Frequency profile for first week is enclosed in Annex-I of the agenda of the meeting which showed clearly that the grid frequency has remained below the IEGC for considerable period of time during this period and on 3rd Jan 2019, the frequency remained below the band for approx. 22% of the time while recording a minimum value of ~ 49.67 Hz. Further, the frequency touched a minimum value of 49.58 Hz during morning peak hours of 4th Jan 2019.

This continuous low frequency operation below the IEGC band may be attributed to significant overdrawal by some of the constituents especially during the peak hour's demand. Deviation graph of NR constituents was presented for this duration and is enclosed in Annex-II of the agenda of the meeting. It was observed that the all the constituents were deviating from schedules.

NRLDC representative shared that low frequency during peak hours in winter is due to mismatching of load ramping with generation and such issues along with action plan has been discussed already in many previous OCC/TCC & other special meeting also. Load-

generation balance in real time operation is a continuous process and all the state utilities has been suggested for portfolio management in advance so that any deviations / imbalances in real time can be minimized. Some of the major factors that help in better co-ordination in load ramping with generation are again re-iterated below as:

- i. Demand estimation/ Load forecasting: Load forecasting is very important for better planning of portfolio management. During winter, as the peak hour's demand are very high/steep therefore, during winter load ramping forecast is also equally important so that generation procurement/scheduling can be matched up with load. Load forecasting has been discussed on regular basis and one of the milestone achieved that all the state has now started load forecasting on daily basis and same has been mapped into SCADA displays also for better visualization. It is high time to utilize these tools for real time operational planning and to minimize imbalances in real time operation.
- ii. Generation procurement/Scheduling: As per load forecasting, all the states has to manage their generation resources and schedule as per requirement. Proper attention should be on ramp rate while scheduling of thermal generator of ISGS & state generators to match the increase ramping of peak hours' demand. In case load is increasing trend, states are advised to maximize their internal generation. In addition, optimization of hydro & other resources should also plan for coordinating load-generation balance.
- iii. Maintaining reserves: It has been advised to bring back their thermal units that are out on RSD and maintain adequate reserves so that any imbalances in real time can be quickly balanced by available reserves.
- iv. Grid discipline: As per IEGC, all the user should strictly adhere to their schedule and take appropriate action to avoid deviations.

Member, NRPC expressed the concern on low frequency despite continuous efforts and discussion on preventive action plan for maintaining grid frequency within the band. It was requested again to all the states to plan load-generation/Portfolio management meticulously. It was also suggested that now all the states should forecast load more precisely and utilize such tools for better planning so that imbalances on account of forecast error can be minimized. Maintenance of adequate reserves are very essential for curbing real time deviation on account of any unprecedented conditions in the grid. All the states agreed to relook their portfolio management planning and showed that adequate measures would be initiated in pursuance of improved load generation balancing & minimizing deviations.

2. Reliability issue of Kawai-Kalisindh-Chhabra complex /South-East area of Rajasthan

Reliability issues under N-1 & N-1-1 contingencies of Kawai-Kalisindh-Chhabra complex has already been highlighted and discussed in various previous OCC/TCC meetings and operational feedback of Northern region also.

As we all are aware that ~ 4850 MW of this complex is evacuating through only five (5 nos) lines listed below:

- i. 765kV Anta-Phagi –I & II: As 765kV Phagi is also connected to 765kV Gwalior in WR, so power pooled at Phagi from this generation complex & WR (Gwalior) is

further evacuating through 765/400kV Phagi ICT –I & II of 1500 MVA each & 765kV Phagi-Bhiwani-I & II. Evacuation of power at 765/400kV Phagi is further constrained under N-1 contingency of 765/400kV Phagi ICT of 1500 MVA.

- ii. 400kV Chhabra-Hindaun & 400kV Chhabra-Bhilwara: These are long lines and number of times, many 400kv line is to be opened to control loading of these lines
- iii. 400kV Anta-Kota: This twin moose lines usually loaded to ~ 600-800 MVA almost all the times.
- iv. Single 400/220kV ICTs of 315 MVA at Kalisindh & Chhabra (Operating radially)

NRLDC representative shared that the generation complex of ~4850 MW of Kawai-Kalisindh-Chhabra-Chhabra SC is operating with reduced reliability even under N-0 conditions. It has been observed that many trunk lines are being opened on the request of SLDC Rajasthan to control the loading of other important line in this complex. Few examples are as:

- i. To control the loading of 765/400kV Phagi ICT: 400 kV Phagi-Bassi, 400 kV Phagi-Heerapura, 400 kV Phagi-Ajmer, 400 kV Bassi-Sikar, 400 kV Ajmer-Deedwana etc. are being opened. In one of such event at 1254 hrs of 01-Jan-2019, after tripping of one 765/400 kV transformer at Phagi, number of above 400 kV trunk lines are remaining open for more than 30 hrs. Relief obtained through opening of lines is shown at the Annex-III of the agenda of the meeting.
- ii. To control loading of 400kV Anta-Kota: 400kV Kota-Merta, 400 kV Kota-RAPP-C, 220kV Kota-Bhilwara, 220kV Kota-Duni, 220 kV Bus coupler at KTPS etc are being opened
- iii. Other lines: Number of times, EHV lines near Agra/Bassi/Sikar are being opened also for voltage regulation during night hours in winter.

NRLDC informed that by opening trunk 400 kV lines, the relief obtained is only marginal (in view of power shifting to other interconnected lines) but the reliability of entire power supply infrastructure reduced. In view of above, following operational planning /short term suggestions that has already been discussed was again requested:

- i. Rajasthan SLDC shall schedule the power of intra-state generators considering security constrained despatch so that security of the grid is maintained. For example, generators in this complex could be backed down and generators without evacuation constraints and having impact of reducing loading in complex may be scheduled higher.
 - a. Action plan/Security guidelines for N-0 and for N-1/N-1-1 contingencies in this complex.
- ii. Higher level of maintenance and alertness in the area by Rajasthan STU/transmission licensee so that tipping are minimized and restoration is on war footing.
- iii. Immediate implementation of the entire SPS scheme for the complex.

- iv. Detailed analysis of any tripping (such as Phagi transformer on oil surge relay) along with relevant data & graph and action plan to avoid such tripping in future.

Long term solutions are as:

- v. Early commissioning of the already planned transmission system for the complex such as
 - a. 765/400 kV 1500 MVA 3rd ICT at Phagi
 - b. 400/220 kV extension at Anta substation along with commissioning of 220 kV interconnections.
- vi. Rajasthan STU shall review the entire evacuation system of the complex and do necessary upgradation/enhancement in the transmission system like more lines from the complex.

Rajasthan SLDC representatives agreed that the complex is operating at constant risk and reliability is also reduced. It was informed that more generation at Suratgarh complex is likely to be synchronized which help in reducing the loading of lines from Kawai-Kalisindh-Chhabra complex and provide flexibility in increase/decrease of generation in any complex. Further, it was apprised that 765/400kV Phagi third ICT is likely to be commissioned in 2020.

Rajasthan SLDC was requested to formulate security constrained dispatch plan in view of importance of such large generating complex and try to implement all preventive & special protection schemes for this complex as early as possible.

NRPC asserted that security of such large generating complex is foremost and all the adequate measures should be adopted to enhance the reliability of this complex. It was requested to review the generation dispatch plan under any contingency or not normal conditions in this complex.

Rajasthan SLDC also expressed its concern towards security & reliability of complex and agreed to take further necessary arrangement/plan for reliable evacuation from this complex.

3. Requirement of power flow and dynamics data for modeling renewable energy generation in Indian grid

In view of large integration of upcoming RE power of 175 GW in Indian power system, associated challenges such as variability of RE generation, haul of power over large distances through EHV lines, change in pattern of loads connected to the grid, increasing share of power electronic based equipment and a reducing share of rotating mass in the electric grid are likely to pose new challenges in stable operation of power systems.

Section 6.3 and 6.4 of CEA manual on Transmission Planning criteria 2013 lays out considerations for stability studies in the planning horizon. Section 7.1 of CEA manual on Transmission Planning Criteria 2013 states that “The system shall be planned based on one or more of the following power system studies.... Stability Studies (including transient stability and voltage stability)”.

To ensure security of the interconnected power grid, it is imperative to conduct stability studies in both operational (short-term) and planning (long-term) horizons in the power

grid. To gain confidence in the stability studies that adequately represent system performance, fit-for-purpose models of power system elements are of utmost importance.

Procedure issued by CTU for grant of connectivity to projects based on renewable sources to Inter-state transmission system does not specify any format for collection of modelling data. Although RE generation is being progressively added to both ISTS and Intra-STTS, gap exists in terms of availability of necessary data for modelling.

Accordingly, guidelines for collection of data for modelling utility scale wind and solar generation installations in India have been prepared by POSOCO and presented in OCC meeting for wide information of members, and enclosed in Annex-IV of the agenda of the meeting. The same may be adopted as broad guidelines for collection of information for fit-for-purpose models for steady-state and dynamic simulations. The necessary data for modelling need to be furnished prior to interconnection with the grid.

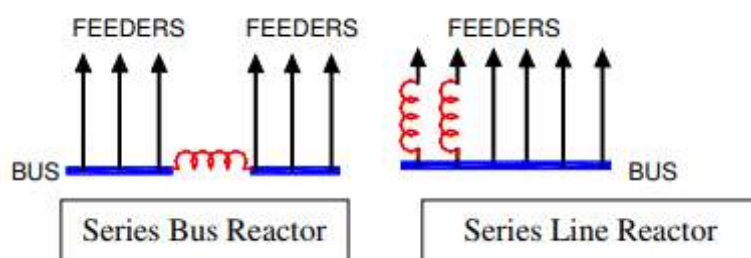
NRLDC representative explained that modeling data for offline studies is required as per above guidelines and any feedback or suggestions on above are highly solicited. It was requested to go through the document and adopt for sharing of information required during charging of new element/generation.

NRPC suggested that all the members should take a review of above guidelines and same may be discussed in next OCC meeting for further elaboration. All the members agreed for same and accordingly all are requested to share their suggestion/feedback till next OCC meeting.

4. Dynamic data & study of Series Bus & Line reactor at Mandola & Ballabhgarh

Recently, Series line & Bus reactor (single phase unit of 75 MVAR, 12 ohms) has been synchronized at 400kV Dadri-Mandola-I & II at Mandola end on 4th & 5th Dec 2018 respectively & Series Bus reactor at Mandola & Ballabhgarh end on 2nd Nov 18 & 29th Nov 18 respectively. The same was approved in 32nd standing committee meeting (SCM) of NR dated 31st Aug 2013.

NRLDC shared that as per offline simulation study, three phase short circuit level in kA at Dadri, Mandola & Ballabhgarh would be reduced by ~ 10, 20 & 14kA respectively in April'19 scenarios while as per studies presented in 32nd SCM MoM, fault kA would be reduced by ~ 15kA at Dadri with 10 ohm line reactors at four ckt from Dadri i.e. Dadri-Mandola-I & II & Dadri-Maharanibagh and Dadri-Gr.Noida.



It was informed that charging study of this series reactors has not been provided and data for offline modeling is still awaited.

NRPC stated that modeling data for offline line studies is very important for steady & stability studies and same may be submitted as requested. POWERGRID agreed to collect the data from respective agencies and submit to NRLDC.

5. Agenda for standing clearances for URS power scheduling

NRLDC apprised that as per CERC order dated 05.10.15 in petition number 310/MP/2014, ISGS shall be permitted to revise its schedule for URS power from one beneficiary to another of the same power station. Consent of the original beneficiary and the new beneficiary shall be submitted by ISGS to NRLDC.

And as per CERC order dated 17.10.2017 in petition no 16/SM/2015, both the generating station and its beneficiaries (surrendering and requesting beneficiaries) give their standing consents in writing to RLDC that the decision of the concerned RLDC will be binding on them with regard to scheduling and dispatch of URS power. In the absence of their standing clearance, methodology as per CERC order dated 05.10.15 to be followed.

Since, it is long time when standing clearances were given, all the generating station and their beneficiaries (surrendering and requesting beneficiaries) are requested to re affirm their standing consent. (Please read para 20 and 27 CERC order dated 17.10.2017 in petition no 16/SM/2015)

All the members take note of it and agreed to send standing consent once again in line with above discussion. It was requested that standing consent should be from authorized person and it should be communicating in signed written form. The same would be accorded as standing consent and keep as record for all further commercial purposes.

NRPC directed to all to submit the standing consent from the authorized personnel in written communication. All the members agreed for same.

6. Frequent forced outages of transmission elements

The following transmission elements were frequently under forced outages during the month of Dec'18:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	765kV Aligarh(PG)-Kanpur New(PG)	5	POWERGRID
2	400kV Anpara(UP)-Mau(UP)	4	UP
3	400kV Bus 1 at Orai(UP)	4	UP
4	765kV Aligarh(PG)-Orai(PG) ckt-1	3	POWERGRID
5	220kV AD Hydro-Phojal(HP)	3	AD Hydro/HP

The complete details are attached at **Annexure-5** of the Agenda. 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.

The following were the discussion on the trippings:

- 765 kV Aligarh(PG)-Kanpur New(PG): POWERGRID representative informed that this line tripped due to over voltage stage-1 operation. NRLDC representative requested POWERGRID to kindly raise the over voltage stage-1 setting from 106% to 108%, as earlier sensitive setting was due to less experience of 765 kV lines in the system. Now POWERGRID has enough experience of operation of high capacity 765 kV corridor so setting shall be revised accordingly. POWERGRID representative stated that the information related to change in setting would be provided.
- 400 kV Anpara(UP)-Mau(UP): UP representative informed that auto reclosure issue has been taken up with OeM and would be resolved. NRLDC representative requested UP to put auto reclosure in service at the earliest. Remedial measures report to be submitted.
- 400 kV Bus-1 (ABB Make) at Orai(UP): NRLDC representative informed that bus bar protection at Orai (UP) mal-operated (at the time of auto reclosing operation in the line) multiple time during line fault in any of the outgoing connected feeders to 400 kV Bus-1 of Orai (UP). NRLDC representative requested UP to arrange internal protection audit with the team comprising of SLDC member, representative from other zone of UPPTCL and POWERGRID (if requires). Team shall submit the audit report and finding to NRPC/ NRLDC. POWERGRID representative also suggested that kindly check the LBB setting, if it is 100ms instead of 200ms than it may create tripping.
- 765 kV Aligarh (PG)-Orai (PG) ckt-1: POWERGRID representative informed that line tripped due to actual line fault in the line. There was an issue of earth wire clearance, earth wire was loose in the line, it has been attended.

NRLDC representative requested all the constituents to share the report of last six month tripping and remedial measures taken by all the utilities for mitigation of such tripping incidents. Members agreed to the same. All the remedial measures reports needs to be submitted within 7days.

7. Multiple element tripping events in Northern region in the month of Dec'18:

A total of **21** grid events occurred in the month of Dec'18 of which **7** 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 09-Jan-19 is attached at **Annexure-6** of the Agenda.

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

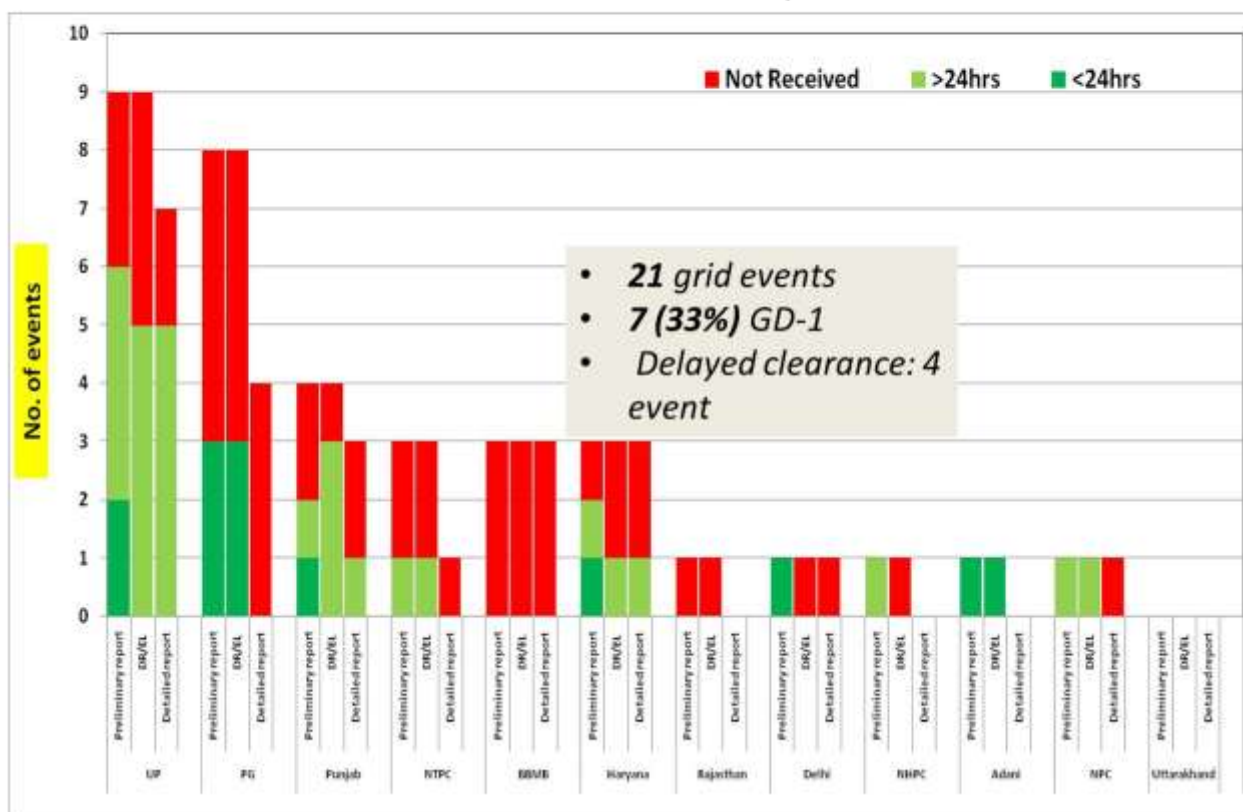
Maximum Fault Duration is **840ms** in the event of multiple element tipping at 220kV Wazirabad(DTL) substation on 20th Dec 2018 at 09:16hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **4** events out of 21 events in the month.

NRLDC representative stated that the compliance of reporting details of events has improved but is still below the desired level. He showed the consolidated status of the reporting:

B.07 Grid Events (in Dec'18): Details Received Status

Note: Details received by 09-Jan-19 are considered



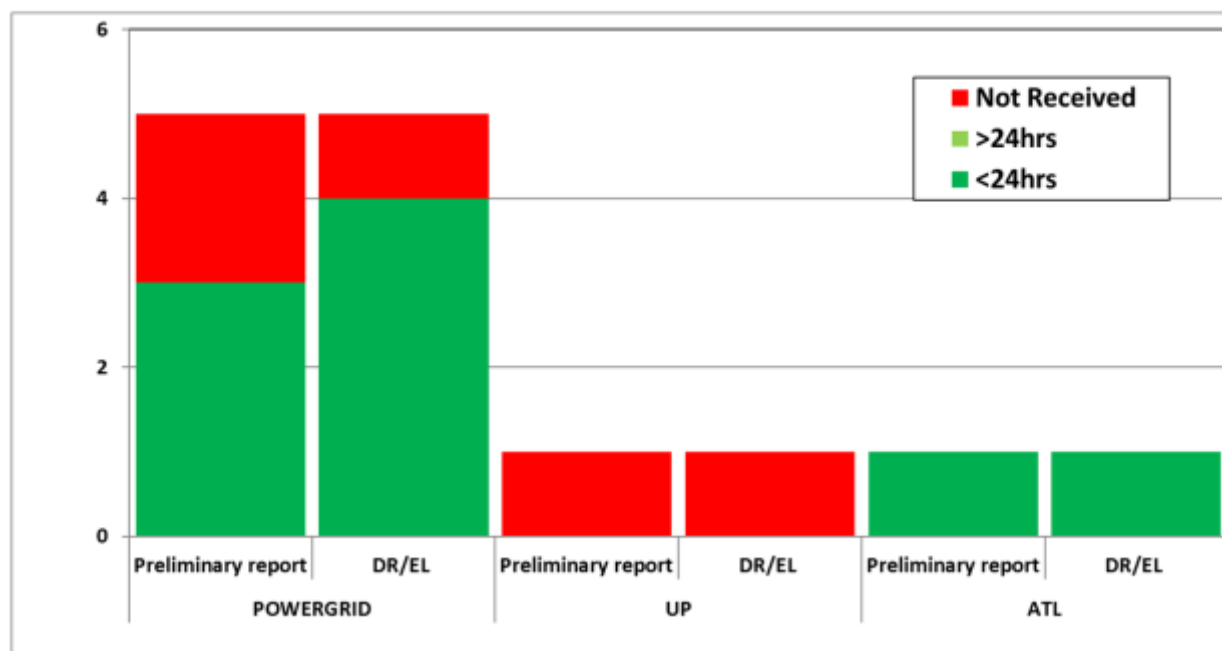
Members may take expeditious actions to avoid such tripping in future and discuss the same. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events in line with the regulations.

8. Details of tripping of Inter-Regional lines from Northern Region for Dec'18:

A total of 7 inter-regional lines tripping occurred in the month of Dec'18. The list is attached at **Annexure-7** of the Agenda. The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event is in violation of various regulations. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than mandated by CEA (Grid Standard) Regulations.

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

B.08 IR Trippings (in Dec'18): Details Received status



It could be observed from attached table that no information was received from UP w.r.t. tripping of 220kV Sasaram(PG)-Sahupuri(UP). Further, in other four trippings out of five, DR/EL received from POWERGRID and in three tripping Preliminary report received. NRLDC representative mentioned that as pointed out in 153rd OCC meeting, the DR/EL are being received from constituents mainly due to SoPR reporting. However, preliminary reports are still not being sent for all the events by the constituents.

NRLDC representative appreciated the improved reporting and further requested constituents to provide the Preliminary report also for multiple element, inter-regional tripping incident

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

9. Mock black start 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.

The schedule of mock exercise along with current status is as follows:

Hydro Power Stations:

Date	Revised Date	Name of stations	Remarks
24-Oct-18	NA	Malana-2	Exercise was not successful. It is proposed to carry out the exercise again with AD Hydro.
2-Nov-18	NA	Salal	Exercise carried out successfully. However, due to less load on account of bad weather, frequency kept on varying and island could not be synchronized with grid.
30-Nov-18	6-Dec-18	Sewa-2	NHPC confirmed. Date revised by J&K. Exercise was partially successful. Unit went under emergency stop twice.
3-Dec-18	NA	Chamera-1 & Chamera-2	Exercise was partially successful. Large variation in frequency observed in islanded operation with Chamera-1. Chamera-2 unit could not be able to synchronize to the island.
11-Dec-18	19-Dec-18	Parbati-3	Carried out successfully.
19-Dec-18	20-Dec-18	Koteshwar	Carried out successfully. 400kV Koteshwar-Koteshwar(PG)-1 tripped from Koteshwar(PG) end at first attempt during charging of Tehri ckt-1.
28-Dec-18	3-Jan-19	AD Hydro, Malana-2, Phojal (Kanchanjanga)	Exercise was partially successful. Island created and synchronized with AD Hydro. However, during blackstart, the AD Hydro running island collapsed while connecting Phojal (Kanchanjanga). Malana-2 couldn't be synchronized.
11-Jan-19	NA	Koldam	Exercise carried out successfully.
Yet to be carried out			
18-Oct-18	NA	Kishanganga (new plant)	NHPC reported that black start would be conducted next year. It is proposed to carry out the exercise with Uri, L.Jhelum, Pampore and U. Sindh.
26-Oct-18	15-Jan-19	Dhauliganga	Revised date by NHPC
13-Nov-18	21-Jan-19	Nathpa Jhakri & Rampur	Revised date by SJVNL
16-Nov-18		*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh	To be carried out after 15-Dec-18 due to load management by J&K and shutdown of 400kV Amargarh-Uri-1 ckt-2.
19-Nov-18		Budhil	To be carried out after 15-Dec-18.

Date	Revised Date	Name of stations	Remarks
28-Nov-18		Chamera-3	To be carried out after 15-Dec-18 as per Chamera-3 request.
14-Dec-18	Not possible	Bairasiul	As reported by NHPC, Power House shall be under complete shutdown since 01/10/2018 for R&M of power house.
4-Jan-19		Tehri	Exercise deferred on request of UP due to load management.
8-Jan-19		Karcham Wangtoo & Baspa	Exercise deferred on request of Haryana due to load management.

* *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.

NRLDC representative stated that this season also, the adherence to the schedule by the generating utilities is not much which has resulted into concentration of mock black start exercises in the latter part of the winter season. It was again requested to the utilities that any change in schedule to be informed well in advance.

NHPC representative stated that the collective black start exercise of Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh HEP can be carried out in last of January-2019 or first of Feb-2019. In respect of Kishanganga HEP, he stated that as the plant is new, first mock exercise is planned in presence of OeM (BHEL). OeM is not confirming the date and requested to do the exercise in next winter. NRLDC representative stated that since the above power plants fall in J&K area, due to proper coordination with J&K utilities, the tentative date needs to be provided well in advance and adhered to.

For Chamera-III, tentative date is in between 18-25th Feb was suggested by NHPC. For Dhauliganga HEP, 7th Feb 2019 was finalized in the meeting, UP also agreed to manage the load.

Mock black start exercise of Gas power stations viz. Auraiya, Dadri, Anta also to be carried out. In 153rd OCC meeting, NTPC informed that Procedure in line with Dadri GPS needs to be prepared for other gas stations as well. NTPC is requested to provide information on above.

As requested in 152nd, 153rd and 154th OCC meetings, 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 along with status as informed in 154th OCC meeting:

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)	Tentative Date as reported by SLDC
1	J&K	Baglihar	3x150	
2		Baglihar stage-2	3x150	
3		Lower Jhelum	3x35	
4		Upper Sindh	2x11+3x35	

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)	Tentative Date as reported by SLDC
5	HP	Sainj	2x50	In coordination with NRLDC
6		Larji	3x42	Jan-19
7		Bhabha	3x40	
8		Malana -I	2x43	Jan-19
9		Baspa	3x100	To be clubbed with Karcham
10	Punjab	Anandpur Sahib	4x33.5	
11		Ranjit Sagar	4x150	
12	Rajasthan	Mahi-I&II	2x25+2x45	Mar-19
13		Rana Pratap Sagar	4x43	Mar-19
14		Jawahar Sagar	3x33	
15		Gandhi Sagar	5x23	
16		Dholpur GPS	3x110	Plant under outage
17		Ramgarh GPS	1x35.5+2x37.5+1x110	
18	UP	Rihand	6x50	Carried out in Aug-18. Report to be submitted
19		Obra	3x33	Plant under outage
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	Shared the procedure

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 updated.

NRDC requested UPPTCL to carry out exercise of Rihand Hydro and Obra Hydro as it is very important for generation complex of Anpara/Rihand/Singrauli complex.

NRLDC explained the importance of black start exercise of small generators available in state control area and once again requested SLDC to conduct the mock exercise for the generators in its control area.

MS, NRPC suggested to all the NR constituents to kindly share the following details:

- MVAR capability of the generators
- Line MVAR requirement details provided by the transmission owner

SLDCs were once again requested to inform about the schedule of remaining plants and provide the complete report of the exercise after carrying out the same.

10. Revision of document for System Restoration Procedure for Northern Region:

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

In 153rd and 154th OCC meetings, constituents were requested to provide feedback, suggestion and updated information by 15th December 2018.

The following is the status of details received as on 10-Jan-19:

System Restoration Procedure		
Data Received from	Data Not received from	
NHPC	Punjab	SJVN
Delhi	Rajasthan	J&K
Haryana (Partial)	Rosa (Reliance)	Malana-I
HP (Partial)	Greenko Budhil	JAYPEE
NTPC	Railway	POWERLINK
POWERGRID	UP	PKTCL
THDC (Tehri end)	Uttarakhand	Shree Cement
	BBMB	THDC
	Chandigarh	Karcham (JSW)
	APCPL	AD Hydro
	Adani	Malana-II
	Haryana	Others...
	NPCIL	

Constituents are requested to provide the updates by 15th Jan 2019.
Member may discuss.

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

Reactive Power Management document for Northern region has been updated and latest updated document link is as below:

<https://nrlcdc.in/download/nr-reactive-power-management-2018/>

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

The following is the status of details received as before document update:

Reactive Power Document		
Data Not Received from	Data Received from	
J&K	PG NR-1	BBMB
HP	PG NR-2	NHPC
Chandigarh	PG NR3	NTPC
Uttarakhand	UP (after docx issuance)	THDC
J&K	Punjab (after docx issuance)	Rosa-Reliance
APCPL	Rajasthan	AD Hydro
JAYPEE	Haryana	Greenko Budhil
POWERLINK	Delhi	Karcham (JSW)
PKTCL	Adani	Malana-I
Shree Cement		
SJVNL		
Malana-II		
NPCIL		
Railway		
Others...		

Constituents may provide the feedback, suggestion and changes in the updated information.

12. Point other than Agenda

1. MVAr absorption by Generators

NRLDC has been showing MVAr Vs voltage graph of major generating station to monitor the response of generator MVAr absorption as per its capability curve & voltage of Grid. Following has been observed:

- i. NTPC: Dadri NCR data is still not correct (Sign need to check)
- ii. Punjab: Rajpura data was not reliable for most of the time.
- iii. Rajasthan: Suratgarh TPS voltage transducer seems erratic as still voltage telemetry is not coming correct. Response of Kawai, Kalisindh is quite less as adequate margin seems available. Chhabra TPS data was also not reliable for majority of time
- iv. Uttar Pradesh: Bara TPS data need correction (sign reversal issue), and adequate margin available at Anpara-B,C & D and at Lalitpur TPS
- v. Haryana: Adequate margin for MVAr absorption is available at Khedar & CLP Jhajjar.

The MVAr Vs voltage graph has been regularly reviewed in OCC meeting and still only little improvement has been observed so far. It was requested to please rectify the telemetry of MVAr and enhance the MVAr response as per the capability curve and voltage in the grid.

It was explained that telemetry of MVAR is from HV side and therefore, absorption seems higher than actual due to GT absorption.

All the members take note of it and agreed to take necessary action to enhance the MVAR response of Generator.

2. Multiple Element Tripping at 400/220kV Mundka (DTL) - (01 Jan 2019 at 10:17hrs)

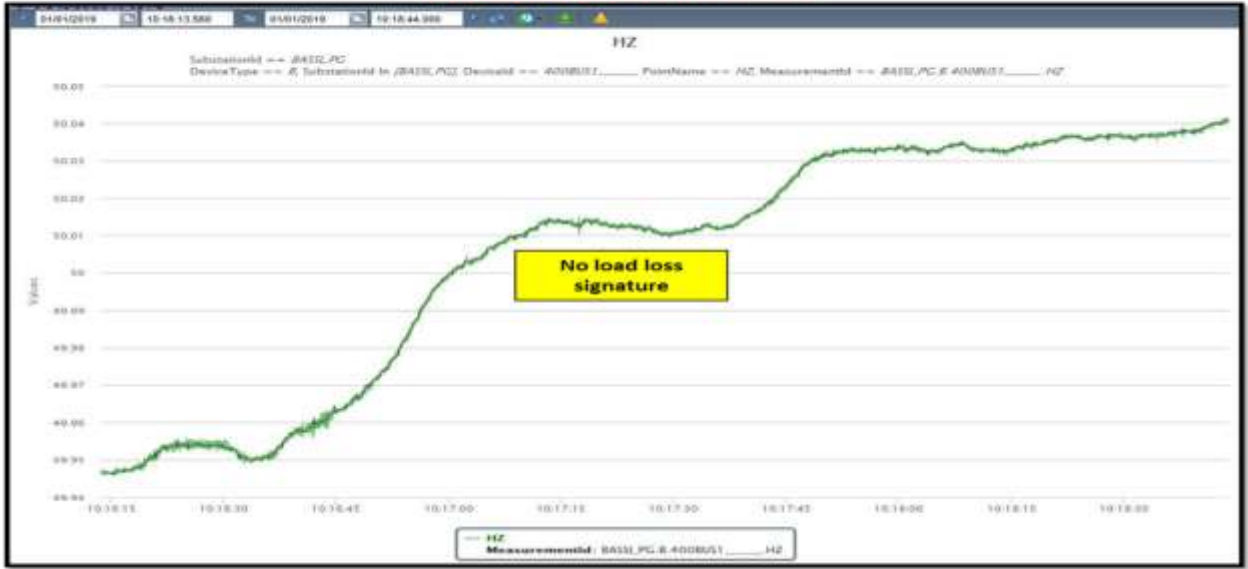
NRLDC representative stated the following:

- At 400/220 kV Mundka station have hybrid scheme includes double bus double breaker scheme for some of the feeders and one and half breaker scheme for some of the feeders. Details can be seen through single line diagram.
- 400 kV new bays 406 & 407 Bays dedicated for future 315 MVA ICT-1 at Mundka (Tikrikalan) were recently commissioned and test energised on dated 31.12.2018. However, transformer is to be provided in future.
- While facilitating the shutdown of the 400 kV Mundka-Jhatikara Ckt-II numerical differential relay of newly commissioned 400 kV bays (406 & 407) dedicated for future 315 MVA ICT-1 at 400 kV Mundka (Tikrikalan) substation operated. The differential relays operated due to creation of the differential current (Id) caused due to inadvertently interchange of HV CT-2 and LV CT terminations by the Schneider service engineer during commissioning.
- In External numerical LBB relay of HV Circuit breakers both Phase and Earth fault element were enabled. During the incident LBB operated due to current in Earth fault element of the LBB relay which triggered the tripping of all breakers at both buses through Bus Bar Protection.
- All 400 kV main bays for 400 kV Bus-1 & 2 tripped and further resulted into multiple element tripping.
- Following elements tripped during the incident:
 - 400 kV 406 & 407 Bays dedicated for future 315 MVA ICT-1 at Mundka
 - 220 kV Bay No 208 dedicated for future 220 kV I/C of 315 MVA ICT-I
 - 400 kV Mundka-Jhatikara Ckt-I (400 kV CB 40152 &40252)
 - 400 kV Mundka-Jhatikara Ckt-II (400 kV CB 40352 &40452)
 - 400 kV Mundka-Bawana Ckt-I (400 kV CB 41952 &42052)
 - 400 kV Mundka-Bawana Ckt-II (400 kV CB 41752 &41852)
 - 400 kV Mundka –Jhajjar Ckt-I (400 kV 41452 Main CB)
 - 400 kV Mundka –Jhajjar Ckt-II (400 kV 41152 Main CB)
 - 400/220 kV 315 MVA ICT-II at Mundka (400 kV CB 40952 & 41052)
 - 400/220 kV 315 MVA ICT-III at Mundka (400 kV CB 41352)
 - 400/220 kV 315 MVA ICT-IV at Mundka (400 kV CB 41652)
- Tie CB of one and half breaker scheme survived during the incident and it further survived the load of the ICTs at 400/220 kV Mundka station. Mundka ICT-3 & 4 fed load through Jhajjar ckt-1 & 2 which were charged through tie CB (bypassing the station)
- As per PMU data, there was no fault in the system.

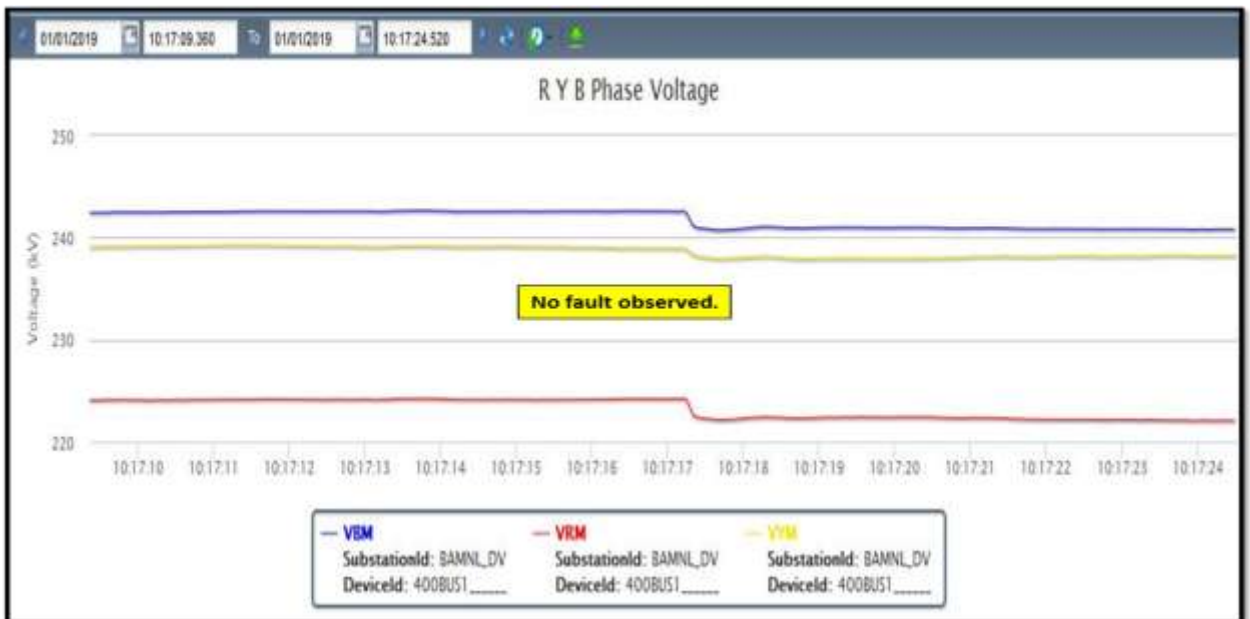
- SoE captured all the breaker tripped after 200ms of tripping of main CB of two bay (406 & 407 bay).
- Preliminary Report and DR/EL details received within 24hrs from DTL. Detailed report of the tripping has been received from DTL

The PMU plot and NRLDC SCADA data and SoE are as follows:

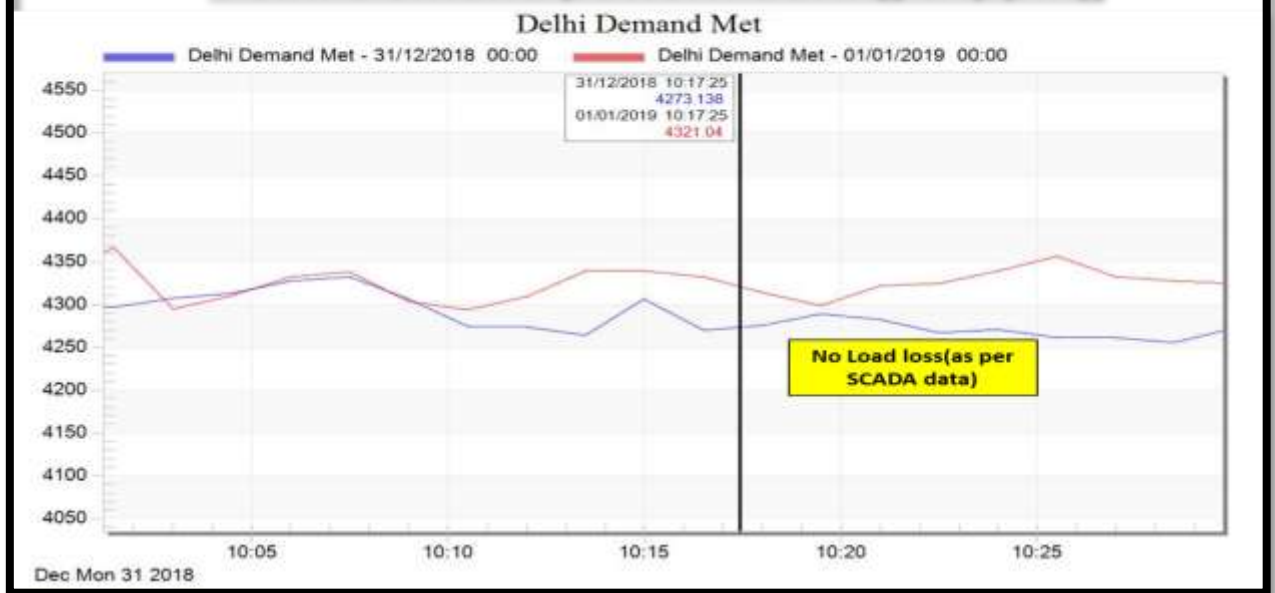
PMU Plot of frequency at Bassi(PG)
10:17hrs/01-Jan-19



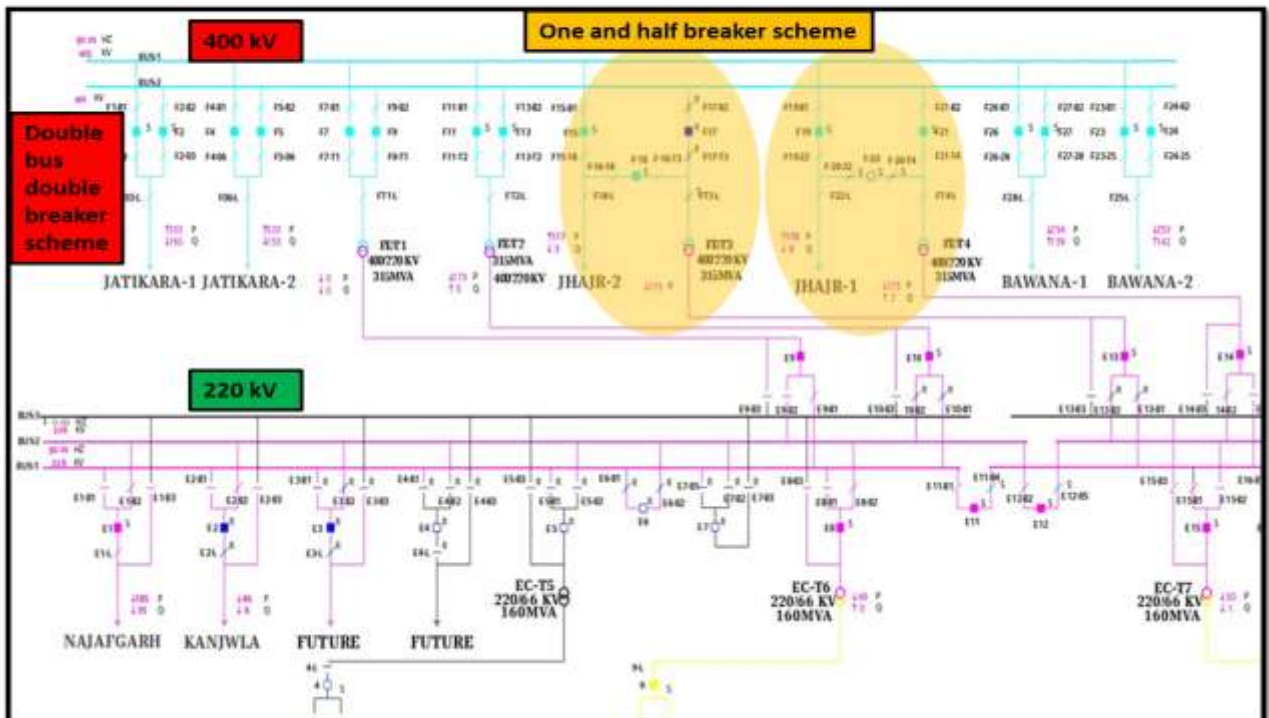
PMU Plot of phase voltage magnitude at Bamnauli(DTL)
10:17hrs/01-Jan-19



Delhi Demand pattern during tripping



Mundka (DTL) SLD



Time	S/S Name	Voltage Level (in kV)	Element Name	Element Type	Status	Remarks
10:17:09:809	MUNDKA	400kV	4JTIKR2	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-2 opens.
10:17:09:838	MUNDKA	400kV	7T1	Circuit Breaker	App	
10:17:09:838	MUNDKA	400kV	9T1	Circuit Breaker	App	
10:17:09:864	MUNDKA	400kV	9T1	Circuit Breaker	Open	400kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:864	MUNDKA	220kV	E_09(T1)	Circuit Breaker	Open	220kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:864	MUNDKA	400kV	9T1	Circuit Breaker	Disp	
10:17:09:865	MUNDKA	400kV	7T1	Circuit Breaker	Open	400kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:865	MUNDKA	400kV	7T1	Circuit Breaker	Disp	
10:17:10:130	MUNDKA	400kV	15JHAJR2	Circuit Breaker	Open	CB of 400kV Mundka(DTL)-Jhajjar ckt-2 opens.
10:17:10:131	MUNDKA	400kV	11T2	Circuit Breaker	Open	400kV side CB of315 MVA ICT 2 at 400/220kV Mundka(DTL) opens.
10:17:10:131	MUNDKA	400kV	1JTIKR1	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-1 opens.
10:17:10:131	MUNDKA	400kV	19JHAJR1	Circuit Breaker	Open	CB of 400kV Mundka(DTL)-Jhajjar ckt-1 opens.
10:17:10:131	MUNDKA	400kV	23BWANA2	Circuit Breaker	Open	CB of 400kV Bawana(DTL)-Mundka(DTL) ckt-2 opens.
10:17:10:134	MUNDKA	400kV	5JTIKR2	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-2 opens.
10:17:10:135	MUNDKA	400kV	21T4	Circuit Breaker	Open	400kV side CB of315 MVA ICT 4 at 400/220kV Mundka(DTL) opens.
10:17:10:135	MUNDKA	400kV	27BWANA1	Circuit Breaker	Open	CB of 400kV Bawana(DTL)-Mundka(DTL) ckt-1 opens.

Time	S/S Name	Voltage Level (in kV)	Element Name	Element Type	Status	Remarks
10:17:09:809	MUNDKA	400kV	4JTIKR2	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-2 opens.
10:17:09:838	MUNDKA	400kV	7T1	Circuit Breaker	App	
10:17:09:838	MUNDKA	400kV	9T1	Circuit Breaker	App	
10:17:09:864	MUNDKA	400kV	9T1	Circuit Breaker	Open	400kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:864	MUNDKA	220kV	E_09(T1)	Circuit Breaker	Open	220kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:864	MUNDKA	400kV	9T1	Circuit Breaker	Disp	
10:17:09:865	MUNDKA	400kV	7T1	Circuit Breaker	Open	400kV side CB of315 MVA ICT 1 at 400/220kV Mundka(DTL) opens.
10:17:09:865	MUNDKA	400kV	7T1	Circuit Breaker	Disp	
10:17:10:130	MUNDKA	400kV	15JHAJR2	Circuit Breaker	Open	CB of 400kV Mundka(DTL)-Jhajjar ckt-2 opens.
10:17:10:131	MUNDKA	400kV	11T2	Circuit Breaker	Open	400kV side CB of315 MVA ICT 2 at 400/220kV Mundka(DTL) opens.
10:17:10:131	MUNDKA	400kV	1JTIKR1	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-1 opens.
10:17:10:131	MUNDKA	400kV	19JHAJR1	Circuit Breaker	Open	CB of 400kV Mundka(DTL)-Jhajjar ckt-1 opens.
10:17:10:131	MUNDKA	400kV	23BWANA2	Circuit Breaker	Open	CB of 400kV Bawana(DTL)-Mundka(DTL) ckt-2 opens.
10:17:10:134	MUNDKA	400kV	5JTIKR2	Circuit Breaker	Open	CB of 400kV Jhatikara(PG)-Mundka(DTL) ckt-2 opens.
10:17:10:135	MUNDKA	400kV	21T4	Circuit Breaker	Open	400kV side CB of315 MVA ICT 4 at 400/220kV Mundka(DTL) opens.
10:17:10:135	MUNDKA	400kV	27BWANA1	Circuit Breaker	Open	CB of 400kV Bawana(DTL)-Mundka(DTL) ckt-1 opens.

Constituent Details are as follows:

As per DTL report

Summary:

- While facilitating the shut down of the 400 kV Mundka-Jhatikara Ckt-II, the C.B of this ckt made off at Mundka at 10:17hrs. At the same time bus bar protection operated tripping all the Bus-I and Bus II circuit breakers however load was not affected as being fed through Tie Breakers.

Location of Fault:

- While facilitating the shut down of the 400 kV Mundka-Jhatikara Ckt-II, the C.B of this ckt made off and during this process the power flows through newly commissioned 400kV Bays No.406 and 407.
- During the incident LBB operated due to current in Earth fault element causing tripping of all breakers at both buses through 400 kV Bus Bar Protection.

Analysis of Tripping:

- 400 kV new bays 406 & 407 Bays dedicated for future 315 MVA ICT-1 at Mundka (Tikrikalan) were recently commissioned and test energised on dated 31.12.2018. However transformer is to be provided in future.
- While facilitating the shutdown of the 400 kV Mundka-Jhatikara Ckt-II numerical differential relay of newly commissioned 400 kV bays (406 & 407) dedicated for future 315 MVA ICT-1 at 400 kV Mundka (Tikrikalan) substation operated. The differential relays operated due to creation of the differential current (Id) caused due to inadvertently interchange of HV CT-2 and LV CT terminations by the Schneider service engineer during commissioning.
- In External numerical LBB relay of HV Circuit breakers both Phase and Earth fault element were enabled. During the incident LBB operated due to current in Earth fault element of the LBB relay which triggered the tripping of all breakers at both buses through Bus Bar Protection.

As per DTL report

Action taken:

- The problem is rectified by correcting the interchanged CT terminations and removing the Earth fault element from LBB protection relay.
- Problem rectified by OEM.

Lesson Learnt:

- Only the phase current elements to be enabled in the numerical LBB relays

DTL further informed that CB status input also taken for LBB operation. So in future LBB protection would also check the breaker input before operation.

DTL representative also explained the reason of continuous neutral current, it was due to CT swapping of HV and LV side and both side CT was earthed separately. Because of multiple earthing, circulation current flows from the path and initiate the current element of LBB protection.

NRLDC representative raised concern about manual error in setting during new element charging/upgradation work. It needs to be seriously taken up by the utilities for prevention of near miss event in the grid.

DTL was requested to kindly look into the following:

- Reason of existence of neutral current in the system (406 & 407 bay) and remedies.
- Setting issue in newly commissioned bays of ICT-1 at 400/220 kV Mundka (DTL) to be checked and corrected.

- Operating procedure needs to be followed up during commissioning of newly connected elements.
- Detailed report of the incident covering all the aforesaid points shall be shared to NRPC/ NRLDC within 7days.

Multiple element tripping at 400 kV Mundka was a near miss event as Mundka is well connected station of Delhi Ring and it would have further added into major catastrophe in case of cascade tripping of one or more line in the system. In this event, only element connected in one and half breaker scheme namely 400 kV Mundka-Jhajjar ckt-1 & 2 survived and fed the load through tie CB (both main CB tripped on bus bar protection) to the ICTs at Mundka. Thus one and half breaker scheme with proper incoming and outgoing connectivity proved to be more reliable than double bus double breaker scheme in case of outage of both the buses or operation of bus bar protection for both the buses.

NRLDC representative again emphasized about the Reliability of the station in case of one and half breaker scheme and its highly dependent on connectivity of the station.

3. Multiple Element Tripping at 400kV Anpara-A&B TPS - (02 Jan 2019 at 08:32hrs):

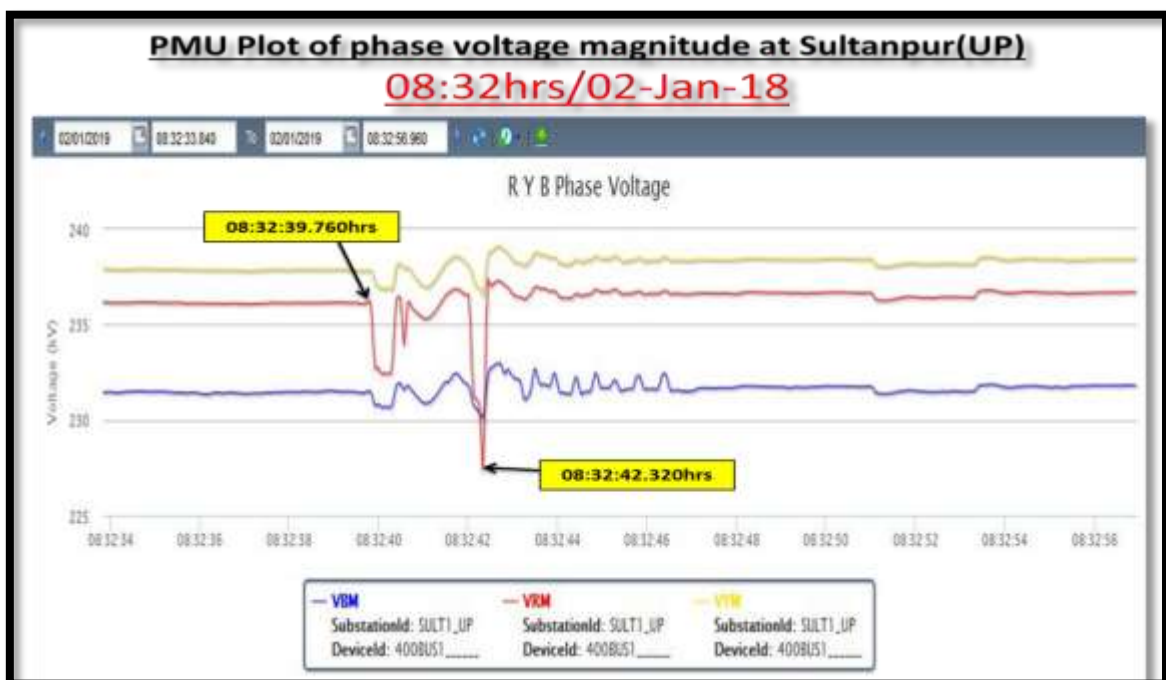
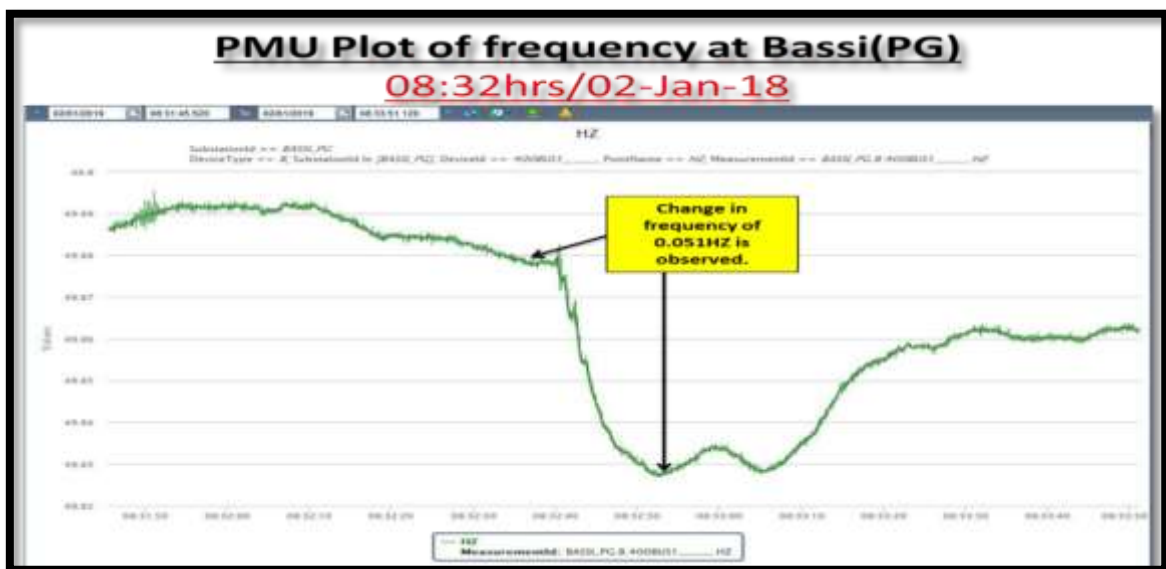
NRLDC representative stated the following:

- 400kV Anpara A&B(UP) have Double main and transfer bus scheme. Anpara A & Anpara B are sectionalized through Bus sectionaliser.
- As reported, heavy BTL was observed in Unit#4 at 400kV Anpara A&B(UP). Turbine trip command was initiated but due to non-tripping of unit Breaker and LBB operation, all 400kV lines emanating from 400kV Anpara A&B(UP) and all running units at 400kV Anpara A&B(UP) tripped.
- At 08:32hrs, LBB/ bus bar protection operated due to non-tripping of unit circuit breaker of unit-4 at Anpara-B TPS.
- Bus coupler at 400kV Anpara-B and section breaker connecting Buses of Anpara-A and Anpara-B did not open and further resulted into multiple element tripping at 400kV Anpara A&B(UP).
- Entire generation of Anpara C & D stations (generation of the order of 2200 MW) was being evacuated through only single 765 kV Anpara-Unnao line (any N-1 contingency of this line would have caused complete outage of this generation as well)
- Entire telemetry data including PMU data of the Anpara station became suspect upon loss of supply at the station. This clearly points towards problem in DC supply to the telemetry infrastructure at the station.
- Following elements tripped during the incident:
 - 400kV Anpara(UP)-Sarnath(UP) ckt-1
 - 400kV Anpara(UP)-Sarnath(UP) ckt-2
 - 400kV Anpara(UP)-Singrauli(NTPC)
 - 400kV Anpara(UP)-Sultanpur(UP) {bypassing Obra(UP)}
 - 400kV Anpara(UP)-Mau(UP)
 - 400kV Anpara(UP)-Anpara C(UP) D/C
 - 400kV Anpara(UP)-Anpara D(UP) D/C
 - 210 MW Unit#1, Unit#2 & Unit#3 at 400kV Anpara A&B(UP)

➤ 500 MW Unit#4, Unit#5 at 400kV Anpara A&B(UP)

- As per PMU data, fault clearance time is **2560ms**. Maximum voltage dip in R-phase
- As per SoE, elements tripped at different time. If LBB protection operated back to back in all three CB than tripping should have occurred within 600-700ms.
- As per PMU data, it seems blue phase breaker at 400 kV Bus-1 at Anpara- A TPS again and again charged through any of the elements
- In Preliminary stage, it seems a case of multiple improper mechanical operation of the breaker further resulted into multiple LBB operation at Anpara-A&B TPS.
- Preliminary Report of the incident received within 24hrs from UPPTCL. Detailed report and DR/EL is still awaited from UPPTCL.

The PMU plot and NRLDC SCADA data and SoE are as follows:

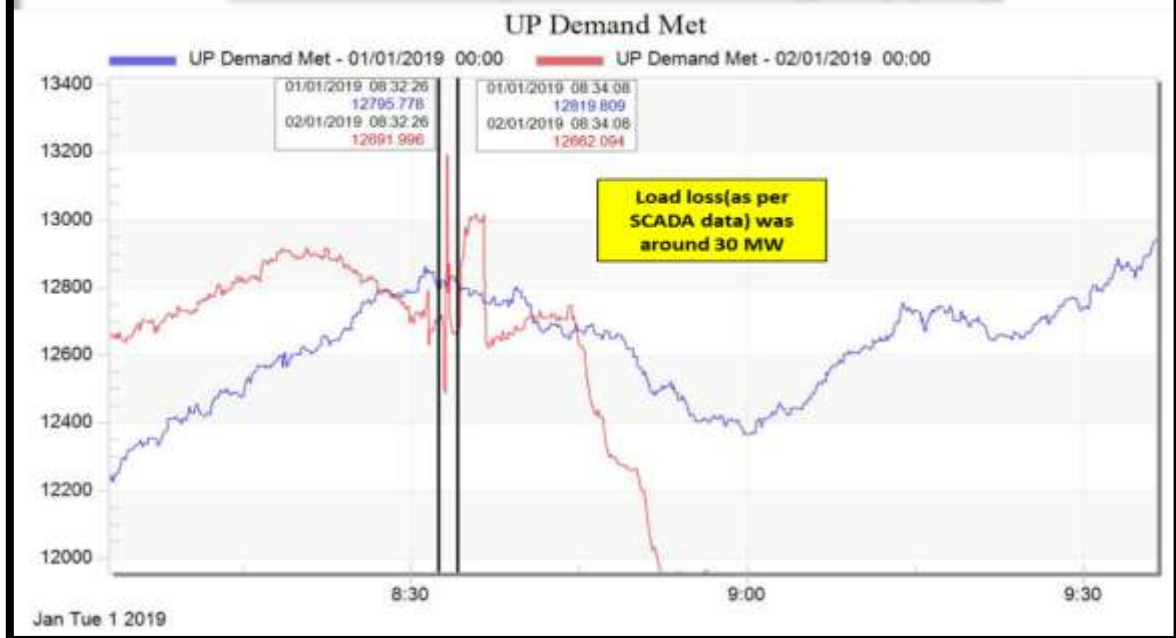


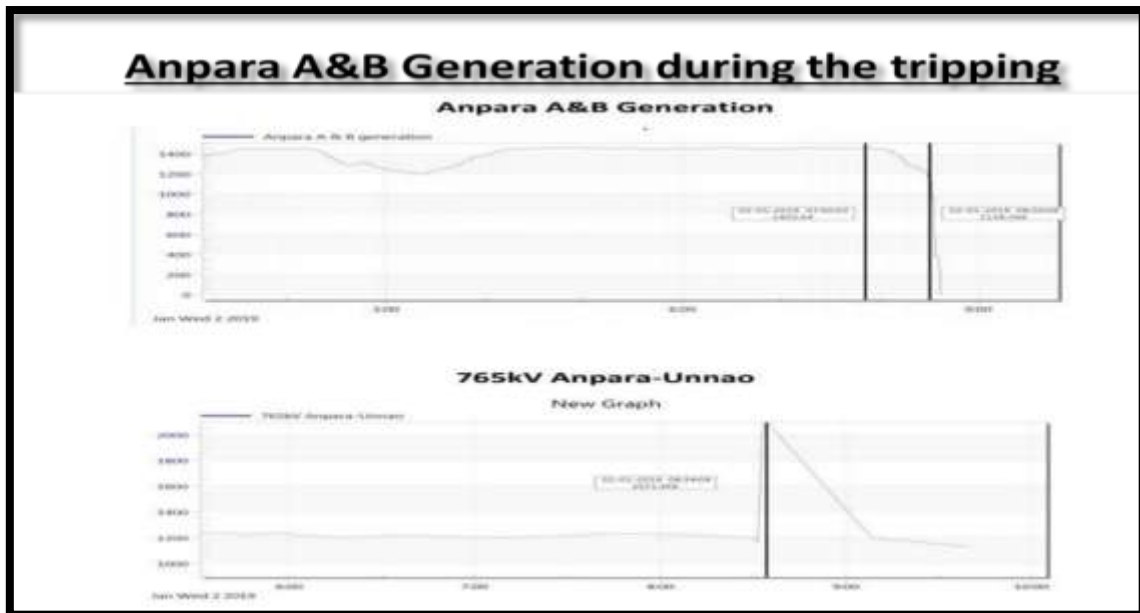
PMU Plot of phase voltage magnitude at Anpara(UP)

08:32hrs/02-Jan-18



UP Demand pattern during tripping



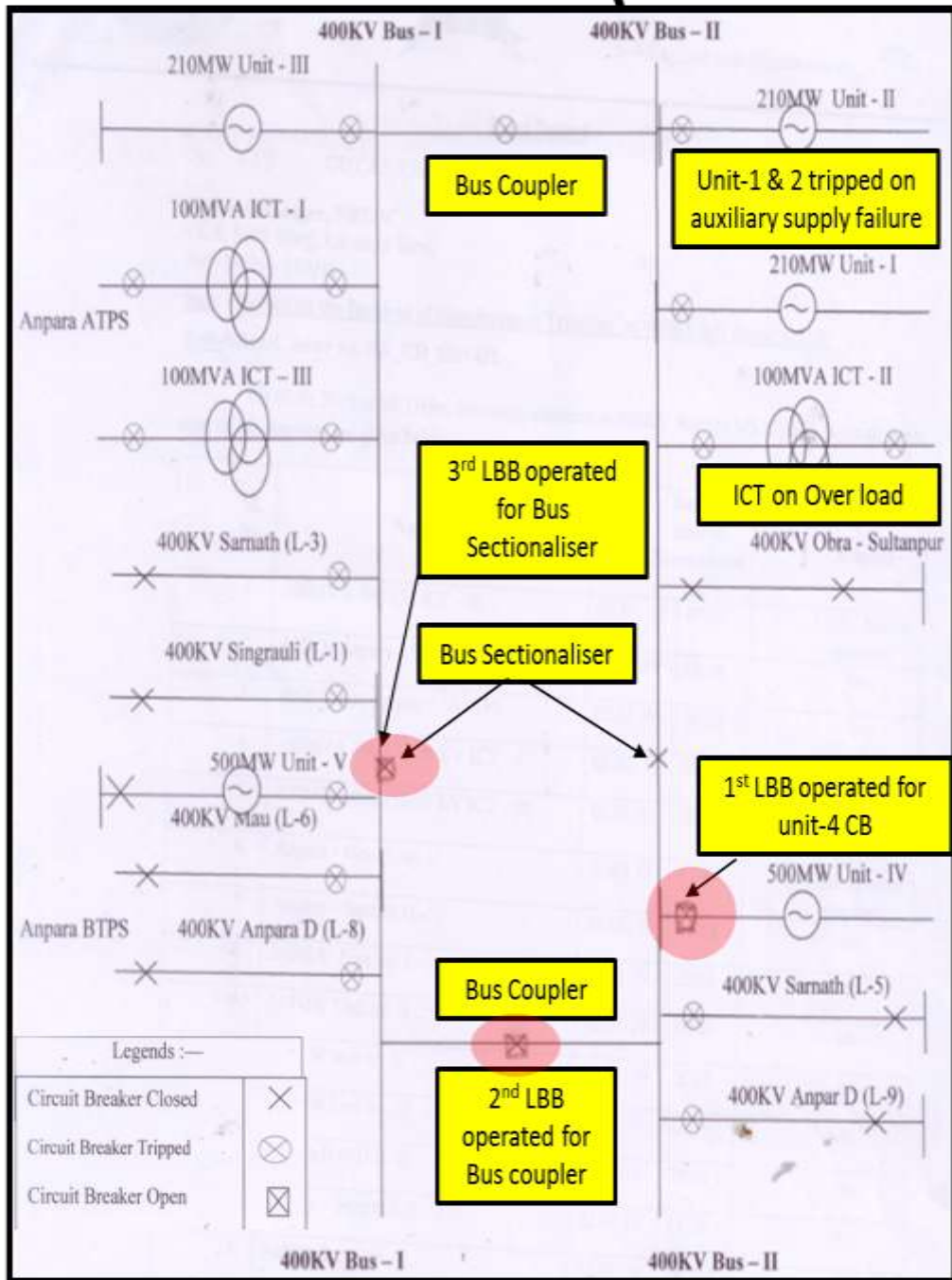


UP SCADA SOE

Time	S/S Name	Voltage Level (in kV)	Element Name	Element Type	Status	Remarks
08:32:36:882	ANPAR_UP	400kV	F_12(U04)	Circuit Breaker	Open	Cb of 500 MW Unit#4 at 400kV Anpara A&B(UP) opens.
08:32:39:874	ANPAR_UP	400kV	23B5	Circuit Breaker	disturbe	
08:32:39:875	ANPAR_UP	400kV	F_18(VRNSI-2)	Circuit Breaker	disturbe	
08:32:39:878	ANPAR_UP	400kV	F_26(ANPAD-2)	Circuit Breaker	disturbe	
08:32:40:104	ANPAR_UP	400kV	F_17(MAU_-1)	Circuit Breaker	disturbe	
08:32:40:104	ANPAC_UP	400kV	F_15(ANPAB-2)	Circuit Breaker	Open	CB of 400kV Anpara(UP)-Anpara C(UP)(end) ckt-2 opens
08:32:40:168	ANPAD_UP	400kV	F_04(ANPAR-1)	Protection Trip	App	
08:32:40:333	ANPAC_UP	400kV	F_14(ANPAB-1)	Circuit Breaker	Open	CB of 400kV Anpara(UP)-Anpara C(UP)(end) ckt-1 opens
08:32:40:400	ANPAD_UP	400kV	F_07(ANPAR-2)	Protection Trip	App	
08:32:40:461	ANPAR_UP	400kV	F_13(U05)	Circuit Breaker	Open	Cb of 500 MW Unit#5 at 400kV Anpara A&B(UP) opens.
08:32:40:574	ANPAR_UP	400kV	22TBC	Circuit Breaker	Open	Bus coupler opens
08:32:40:619	ANPAR_UP	400kV	F_25(ANPAD-1)	Circuit Breaker	Open	CB of 400kV Anpara(UP)-Anpara D(UP) ckt-1 opens
08:32:40:951	ANPAR_UP	400kV	22TBC	Circuit Breaker	disturbe	
08:32:41:415	ANPAR_UP	400kV	F_13(U05)	Protection Trip	App	
08:32:41:644	ANPAR_UP	400kV	F_25(ANPAD-1)	Circuit Breaker	disturbe	
08:32:42:065	ANPAR_UP	400kV	F_03(T3)	Circuit Breaker	disturbe	
08:32:42:066	ANPAR_UP	400kV	F_01(T1)	Circuit Breaker	disturbe	
08:32:42:067	ANPAR_UP	400kV	F_04(SINGR-1)	Circuit Breaker	disturbe	
08:32:42:070	ANPAR_UP	400kV	07MBC	Circuit Breaker	disturbe	
08:32:42:072	ANPAR_UP	400kV	F_16(VRNSI-1)	Circuit Breaker	disturbe	
08:32:42:081	ANPAR_UP	400kV	F_10(U03)	Circuit Breaker	disturbe	
08:32:42:114	ANPAR_UP	132kV	D_16(T1)	Circuit Breaker	Open	132 kV side CB of 100 MVA ICT 1 at 400kV Anpara A&B(UP) opens.
08:32:42:135	ANPAR_UP	132kV	D_12(T3)	Circuit Breaker	Open	132 kV side CB of 100 MVA ICT 3 at 400kV Anpara A&B(UP) opens.

Constituent Details are as follows:

SLD of affected area (antecedent)



Report on tripping of Units and 400 KV Lines at Anpara TPS on 02.01.2019

Status of various elements just prior to incident was as under:-

400 KV Bus I of ATPS- G3, ICT-1 & 3, L-1,L-3

400KV BUS II of ATPS- G1,,G2, ICT-2, L-2,

400KV BUS I BTPS- G5, L-6, L-8.

400KV BUS II of BTPS- G4, L-5, L-9, BTEA

BUS coupler – Both the Buses were coupled through Bus coupler at both ATPS & BTPS S/Y.

BUS SECTION- (I) Main Bus-I &II of ATPS and Main Bus-I &II of BTPS connected through Bus section.

(II) Main Bus-I &II of BTPS and Main Bus-I &II of CTPS connected through Bus section.

Description of tripping of lines with cause.

Sr. No.	Name of Element	Relay Flag	Tripping Time
1	400 KV Bus coupler 'B'TPS	Tripped on LBB (50ZR, 50ZN) & Bus Bar (96 BC) protection.	08:31 Hrs
2	Anpara B to D Line (L-9)	Tripped on Bus Bar (96 L-9) protection.	08:31:38 Hrs.
3	400 KV Bus Section-II 'B'TPS	Tripped on Bus Bar (96 B52B) protection.	08:31 Hrs.
4	Anpara B to D Line (L-8)	Tripped on Bus Bar (96 L-8) protection.	08:31:49 Hrs.
5	400 KV BT 'B'TPS	Tripped on Bus Bar (96 BTEA) protection.	08:31:49 Hrs.
6	Anpara-Singrauli Line (L-1)	Tripped on Bus Bar (96 L-1) protection.	08:32:40 hrs.
7	Anpara-Sarnath Line (L-5)	Tripped on Bus Bar (96 L-5) protection.	08:32:41 Hrs.
8	Anpara-Mau Line (L-6)	Tripped on Bus Bar (96 L-6) protection.	08:32:41 Hrs.
9	400 KV Bus Section-I 'B'TPS	Tripped on LBB (50ZR) & Bus Bar (96 BSIA, 96 BSIB) protection .	08:32
10	Anpara-Sarnath Line (L-3)	Tripped on Bus Bar (96 L-3) protection.	08:32:42Hrs.
11	400 KV Bus Section-I 'B'TPS	Tripped on Bus Bar (96 BSIA, 96 BSIB) protection .	08:32
12	400 KV Bus coupler 'A'TPS	Tripped on Bus Bar (96 BCA) protection.	08:32
13	100 MVA 400/132/33 KV ICT-1	Tripped on Bus Bar (96 AT-1) protection.	08:32:42 Hrs.
14	100 MVA 400/132/33 KV ICT-3	Tripped on Bus Bar (96 AT-3) protection.	08:32:42 Hrs.
15	100 MVA 400/132/33 KV ICT-2	Tripped on phase over current on R & Y phase	08:33:06 Hrs.

- ❖ Bus II of ATPS remain charged through 400 KV Anpara- Sultanpur Line(L-2) Line as per protection scheme
- ❖ Both the tie breaker connecting Anpara B to Anpara C (Lanco) tripped correctly due to operation of LBB protection.

Description of tripping of Units with cause.

Sr. No.	Name of Element	Relay Flag	Tripping Time
1	500MW Unit no. 4	Tripped on Local Breaker Backup (50ZR, 50ZN) & Bus Bar (96G4) protection	08:30 Hrs.
2	210 MW Unit no. 1	Tripped on condenser vacuum low low	08:33 Hrs
3	210 MW Unit no. 2	Tripped on condenser vacuum low low	08:33 Hrs
4	210 MW Unit no. 3	Tripped on Bus Bar (96 G-3) protection.	08:33 Hrs
5	500 MW Unit no. 5	Tripped on Bus Bar (96 G-5) protection	08:33 Hrs

Normalization-

Sr. No.	Name of Element	Charging Time
1	100 MVA 400/132/33 KV ICT-2	09:05 hrs.
2	Anpara-Sarnath Line (L-3)	09:46 Hrs.
3	400 KV Bus Coupler 'A' TPS	09:48 Hrs
4	100 MVA 400/132/33 KV ICT-1	10:14 Hrs
5	100 MVA 400/132/33 KV ICT-3	10:16 Hrs
6	Anpara-Mau Line (L-6)	11:47 Hrs
7	Anpara-Sarnath Line (L-5)	11:53 Hrs
8	210 MW Unit no. 1	15:03 Hrs
9	210 MW Unit no. 2	16:44 Hrs.
10	500 MW Unit no. 5	16:18 Hrs
11	210 MW Unit no. 3	18:35 Hrs.
12	Anpara B to D (L-8)	15:51 Hrs
13	Anpara-Singrauli Line (L-1)	18:27 Hrs.
14	Anpara B to D (L-9)	18:31 Hrs
15	Bus Section-I	20:05 Hrs

Analysis-

At 08:30 hrs 500 MW Unit no. 4 was being boxed up on boiler tube leakage. As the tripping command was given to the 400 KV Unit breaker, the breaker got stuck and did not tripped timely leading to the operation of LBB(50Zr, 50ZN) protection that issued tripping command to all the elements connected to 400 KV Bus-II of BTPS. However as the LBB protection operated and tripping command was issued to the 400 KV circuit breakers of all the elements connected to 400 KV bus-II BTPS the circuit breaker of Bus Coupler BTPS got stuck and lead to the operation of LBB(50ZR, 50ZN) protection which in turn issued tripping command to all the elements connected to Bus-I of BTPS. Unfortunately the circuit breaker of Bus Section-I did not tripped leading to operation of LBB (50ZR) protection of Bus Section I which in turn issued tripping command to all the elements of 400 KV Bus-I ATPS. Thus the elements connected to these respective buses tripped. Two numbers of ICTs were charged from BUS-I ATPS. Due to outage of bus I both the ICTs tripped. This in turn led to the tripping of third ICT on over current. Due to tripping of all the three ICTs the CW and Station supply to all the units failed leading to tripping of remaining units (Unit 1 & 2) of Anpara TPS.

Remedial Action

All the old M/s Hitachi make 400 KV circuit breakers of 'B' TPS switchyard are to be replaced with new M/s Alstom make circuit breakers. These new circuit breakers have already been procured and is lying in our central store. LOI for replacement of these breakers have been issued to M/s UPPTCL. The process for replacement of these breakers is being expedited on top priority.

NRLDC representative also informed following during the meeting:

NRLDC representative raised concern about manual error in setting during new element charging/ upgradation work. It needs to be seriously taken up by the utilities for prevention of near miss event in the grid.

UPPTCL was requested to kindly look into the following:

- 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.

- Reasons for non-tripping of Circuit Breaker of Unit#4 at 400kV Anpara A&B(UP) needs to be looked into.
- Reasons for not opening of Bus Coupler at 400kV Anpara A&B(UP) needs to be checked.
- Reasons for not opening of Bus sectionaliser at 400kV Anpara A&B(UP) needs to be looked into.
- Multiple LBB operation also needs to be checked in view of tripping of the elements at different time (not within 600-700ms)
- Reason of tripping of ICT-2 on over load protection needs to be looked into. Alternative back up arrangement of station auxiliary supply. (Status of UAT)
- Digital SCADA data at Anpara(UP) was suspect for most of the CB and isolators. Further, major analog data also became suspect after tripping. The availability of SCADA data needs to be ensured.
- The issue of loss of telemetry data due to non-proper upkeep batteries to be looked into.
- Detailed report of the event including above points and remedial measures to avoid such incidents in future needs to be provided. (Action: UP; Time Frame: 7 days)
- Such delayed clearance of fault near generating complex may have resulted into major catastrophe in the grid and it shall be prevented for reliable and secure grid operation.
- DR/EL detailed report considering remedial measures report is yet to be received from UP.

Multiple element tripping at 400 kV Anpara- A & B TPS was a near miss event as loading of 765 KV Anpara C-Unnao ckt reached upto 2300MW and further tripping of this line may have resulted into outage of extra 2000MW generation loss of Anpara-C & D TPS. Further it may have resulted into widespread blackout in Singrauli/Anpara/Rihand Complex due to cascade tripping. Therefore, issue needs to be addressed at highest level and UPPTCL may conduct separate committee meeting and share the outcome of the meeting.

UPPTCL/ SLDC-UP shall also share the detailed report along with remedial measures report of the incident considering the aforesaid points.

List of participants in the 155th OCC meeting held on 17th January 2019, New Delhi**BBMB**

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Name	Designation-Org.	Contact No.	Email

Jaiprakash Power Ventures Ltd.

Name	Designation-Org.	Contact No.	Email

NRPC

Name	Designation	Contact No.	Email

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HV PML:-

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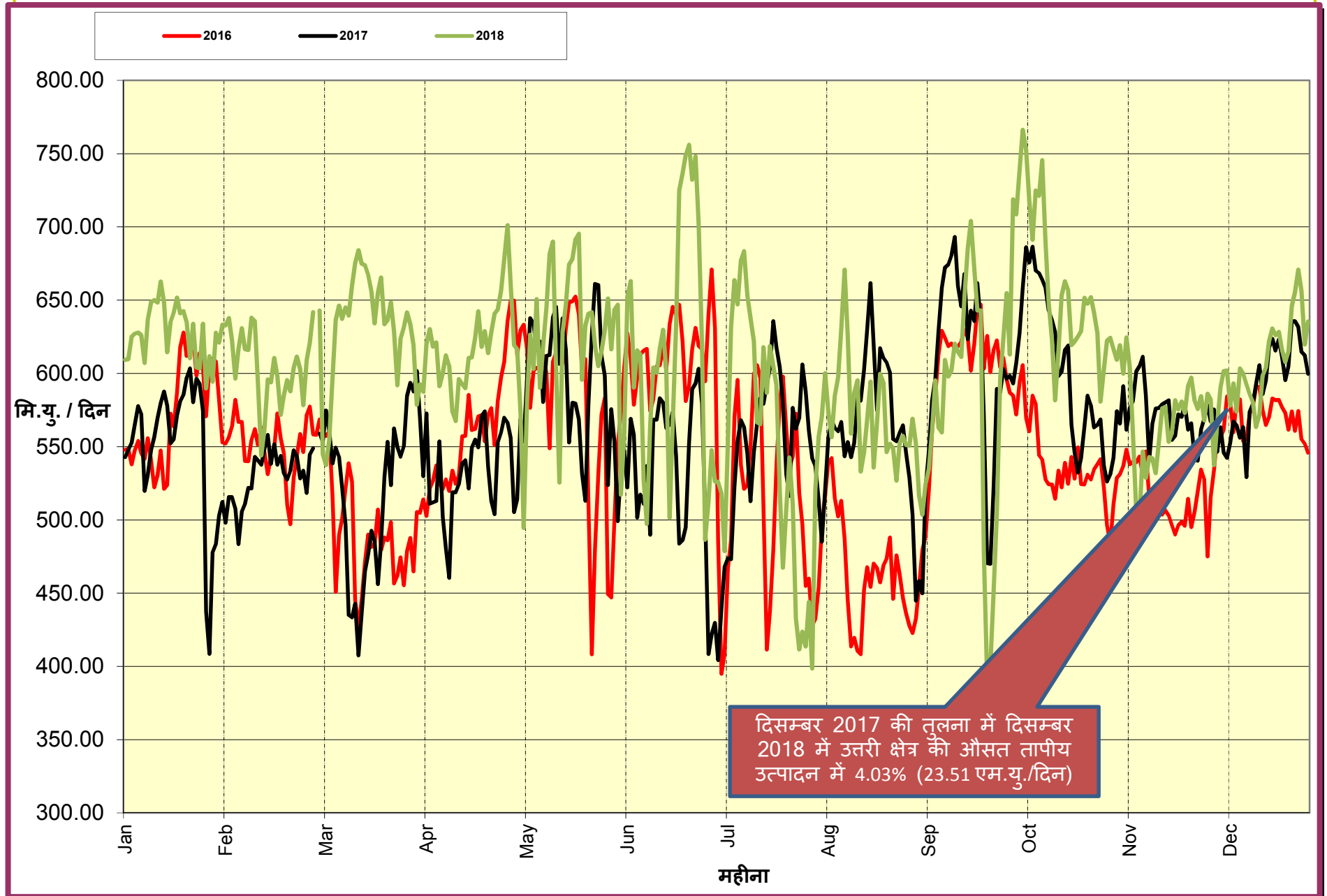
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 hvpl.com

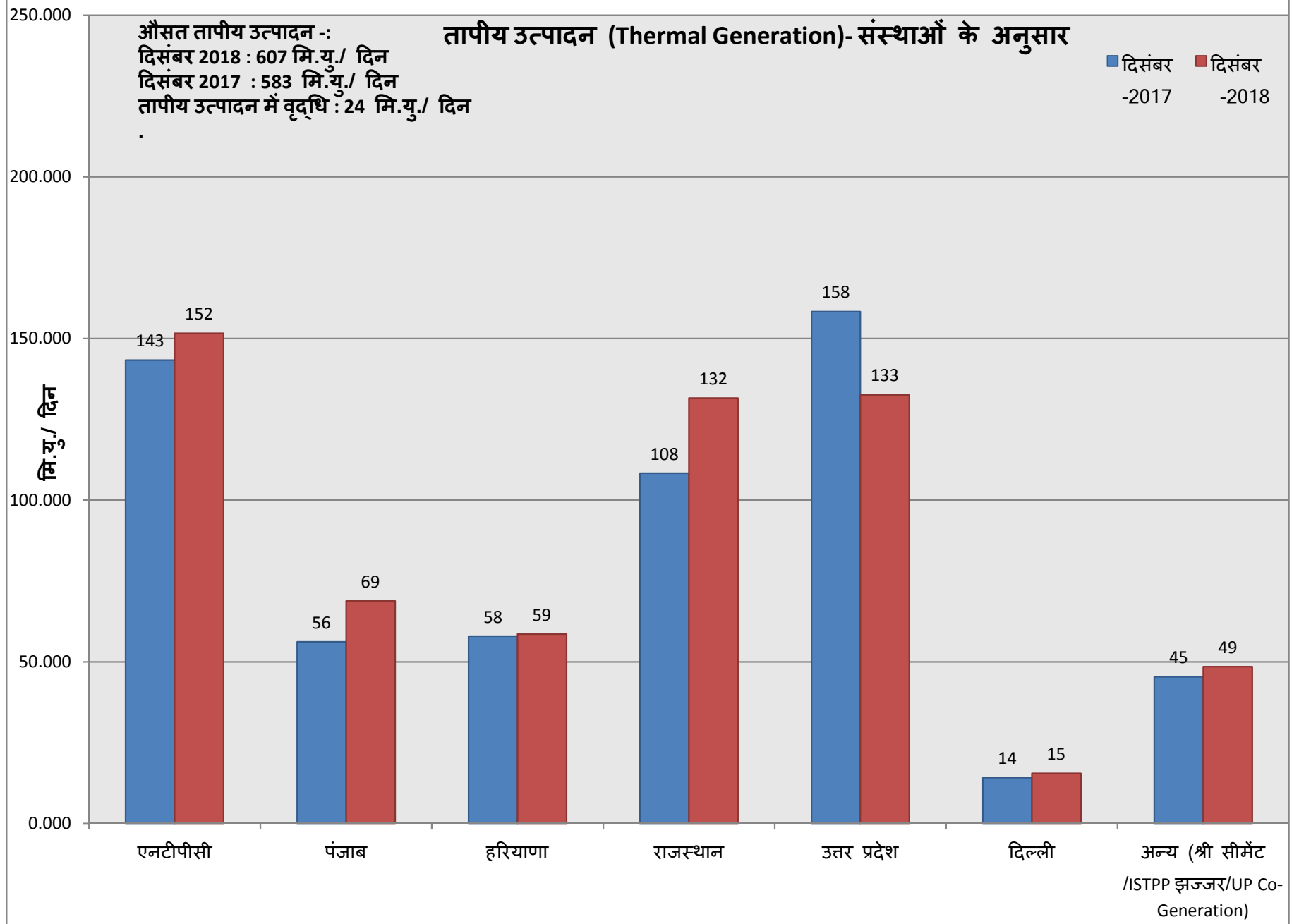
S. No.	Utility	Nominated Member		Official E-mail ID (in BLOCK letters)	Fax No.
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		Amandeep Singh	Addl. SE/PC	powerc@bmb.gov.in	0172-2653297
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5	NHPC				
6	POWERGRID				
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		P.K. SAINI	Co. Mgr (S)	PKsaini@ntpc.co.in	965099 1759
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10	NRLDC				
11	NLDC				
12	Lanco APTL				
13	SJVN/ NJHPS	ROMESH KAPOOR	Chief GM	GMCS05JVN@GMAIL.COM	0177-2660211

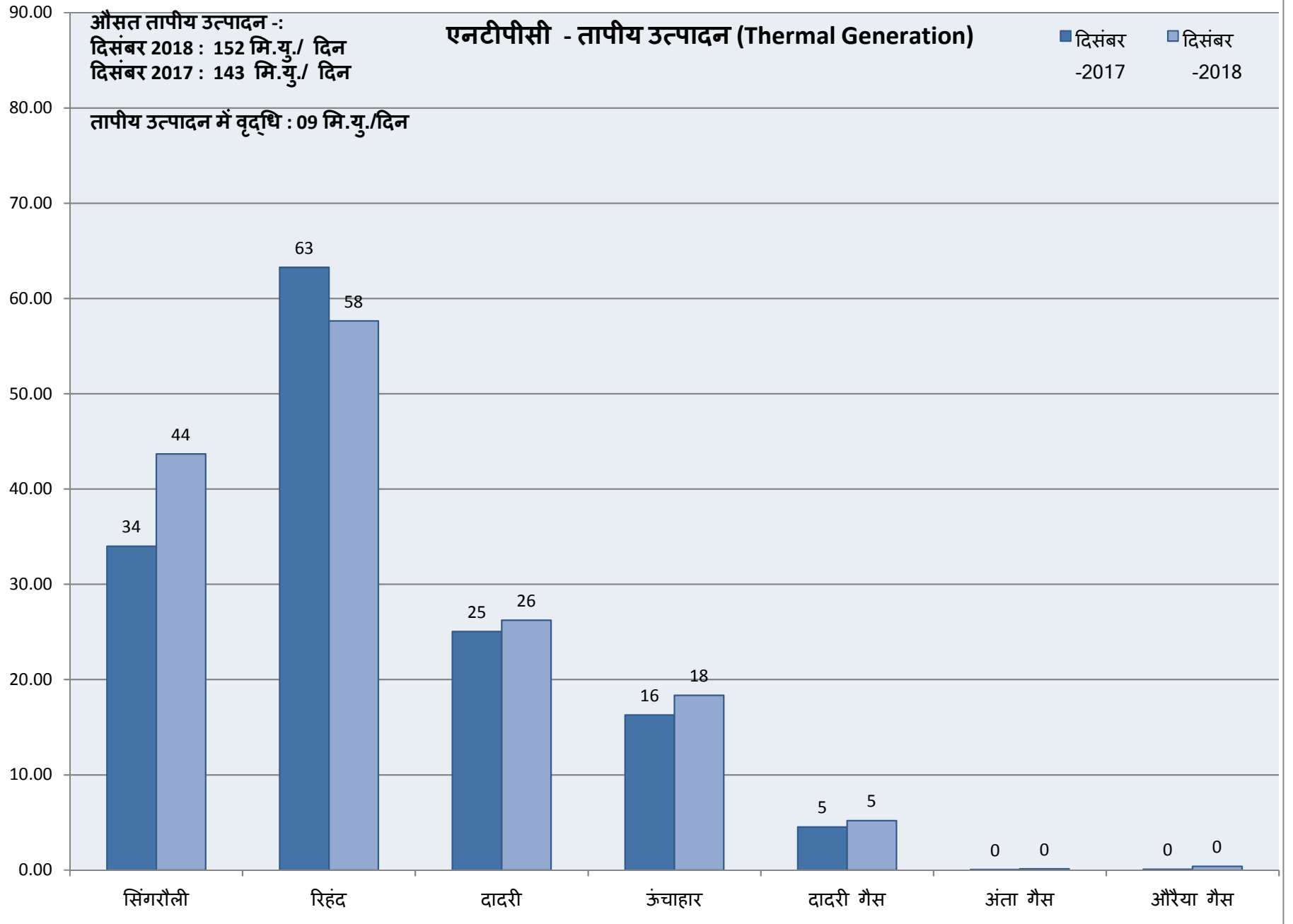
14	PTCUL/UPCL				
15	UPPTCL				
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18	THDCIL				
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20	Chandigarh				
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23	Everest PPL				
24	RPSCL				
25	HPGCL				
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28	PTC India Ltd				

29	AD Hydro				
30	DVVNL, Agra				
31	NPL				
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		SANJAY KUMAR ^(NAPS)	STE (E&I)	SANJAY_KUMAR@NPCIL.CO.IN	9412768003
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		KAMAL PATIDAR	XEN (SLDC)	se.ldrupnl@gmail.com	9413382632
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उत्तरी क्षेत्र की तापीय (Thermal) उत्पादन की स्थिति (MUs)







औसत तापीय उत्पादन :-

दिसंबर 2018 : 69 मि.यु./ दिन

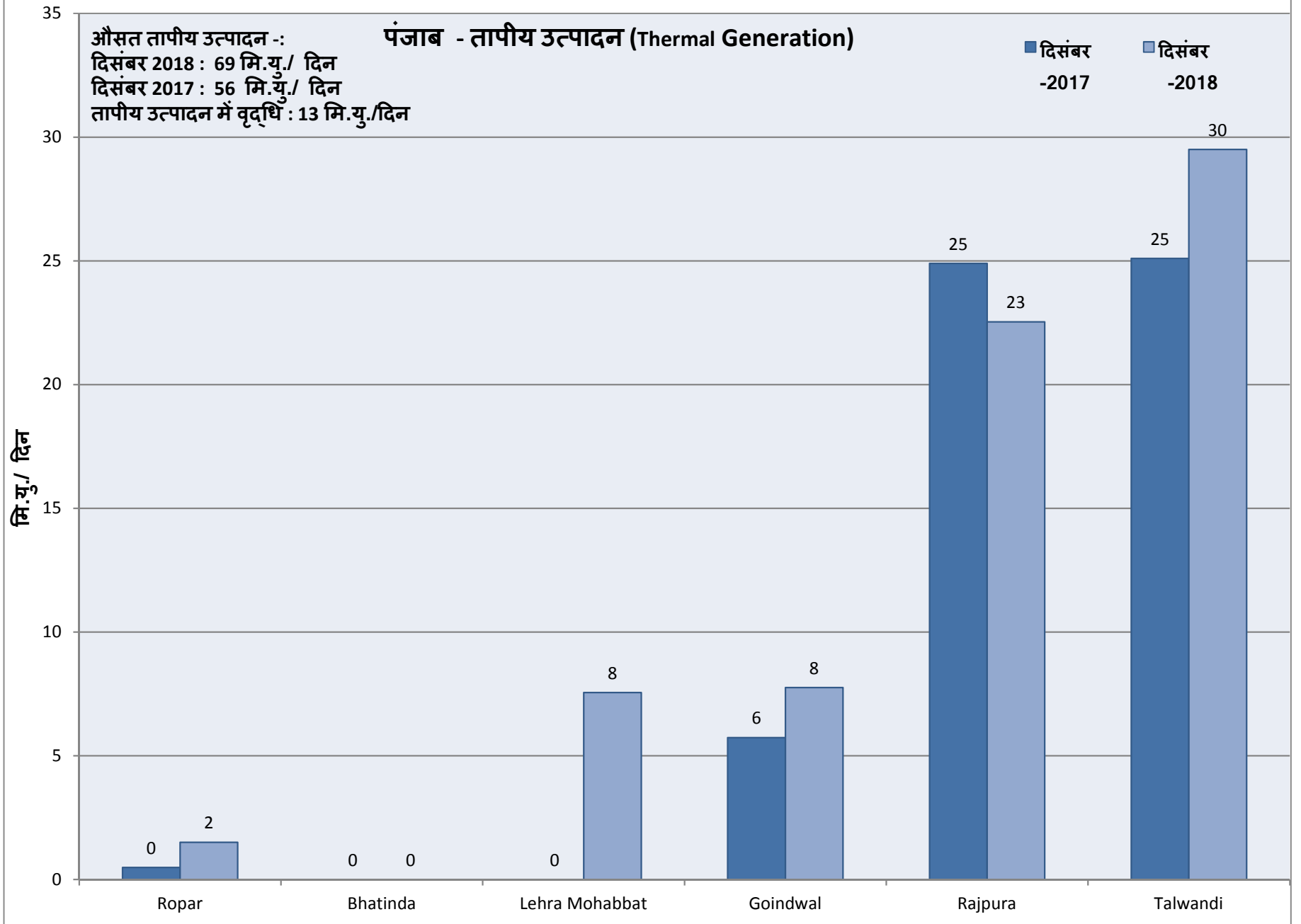
दिसंबर 2017 : 56 मि.यु./ दिन

तापीय उत्पादन में वृद्धि : 13 मि.यु./दिन

पंजाब - तापीय उत्पादन (Thermal Generation)

■ दिसंबर
-2017

■ दिसंबर
-2018

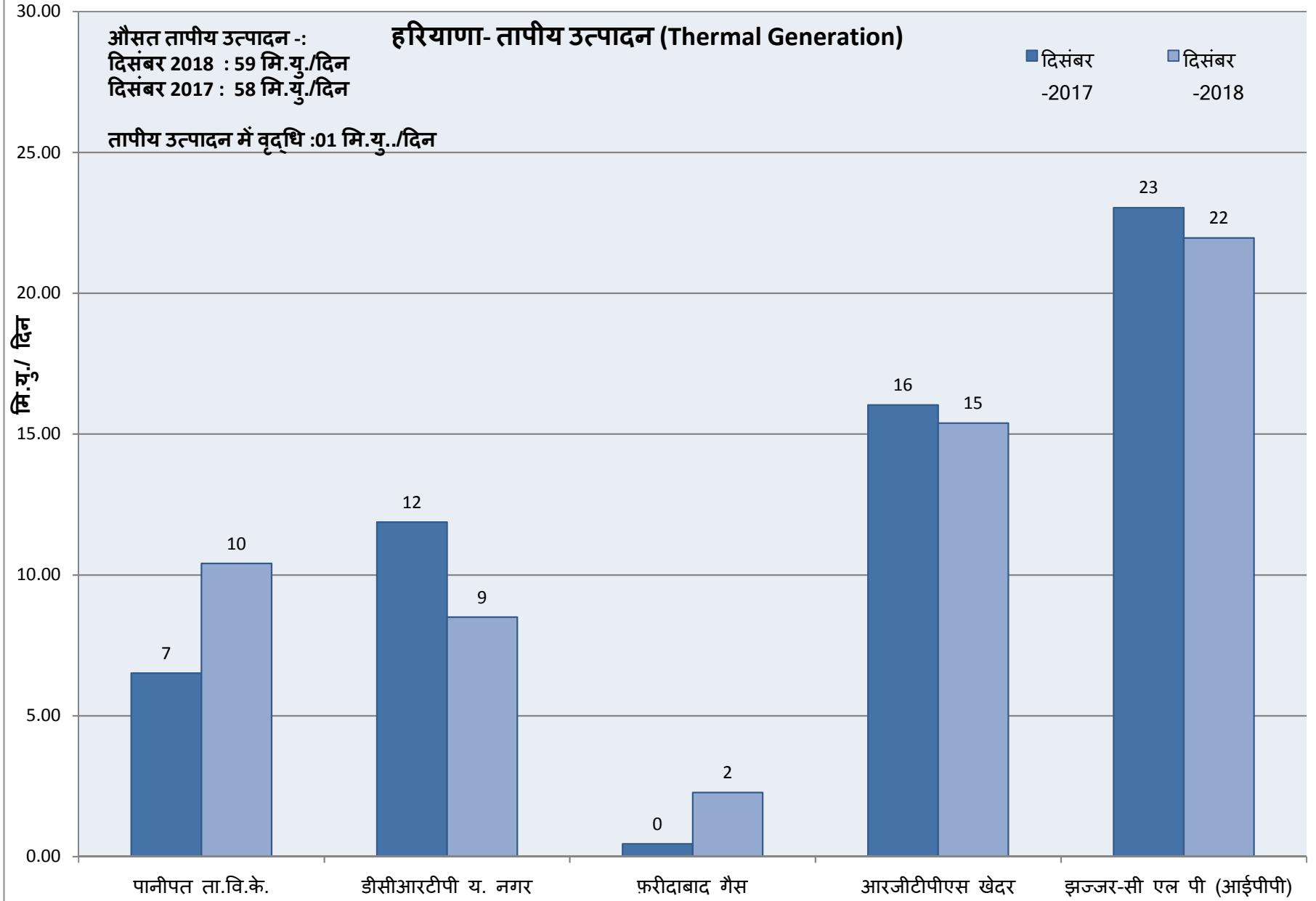


औसत तापीय उत्पादन :-
दिसंबर 2018 : 59 मि.यु./दिन
दिसंबर 2017 : 58 मि.यु./दिन

हरियाणा- तापीय उत्पादन (Thermal Generation)

■ दिसंबर -2017
■ दिसंबर -2018

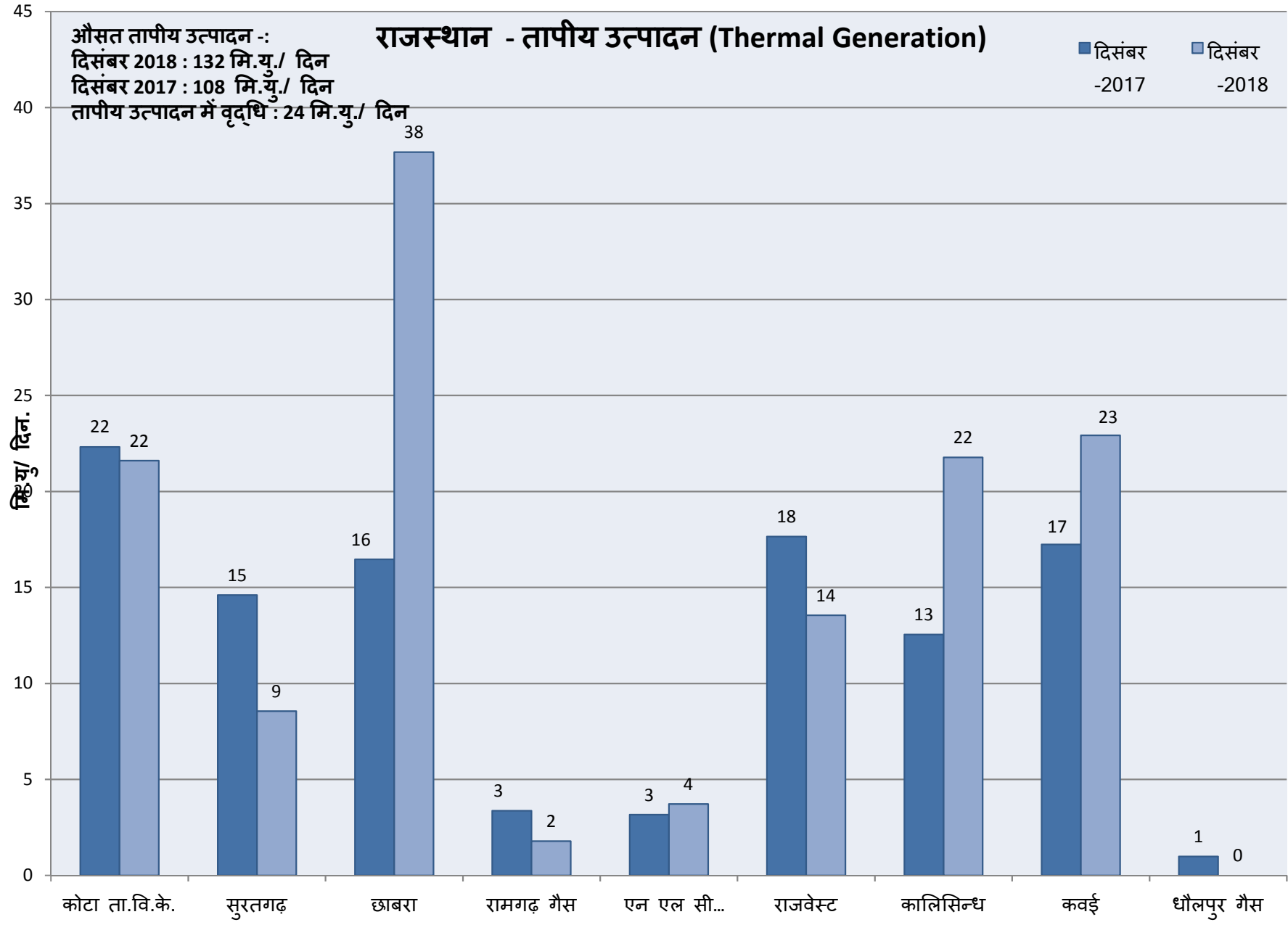
तापीय उत्पादन में वृद्धि :01 मि.यु./दिन



औसत तापीय उत्पादन :-
 दिसंबर 2018 : 132 मि.यु./ दिन
 दिसंबर 2017 : 108 मि.यु./ दिन
 तापीय उत्पादन में वृद्धि : 24 मि.यु./ दिन

राजस्थान - तापीय उत्पादन (Thermal Generation)

■ दिसंबर -2017
 ■ दिसंबर -2018



औसत तापीय उत्पादन :-

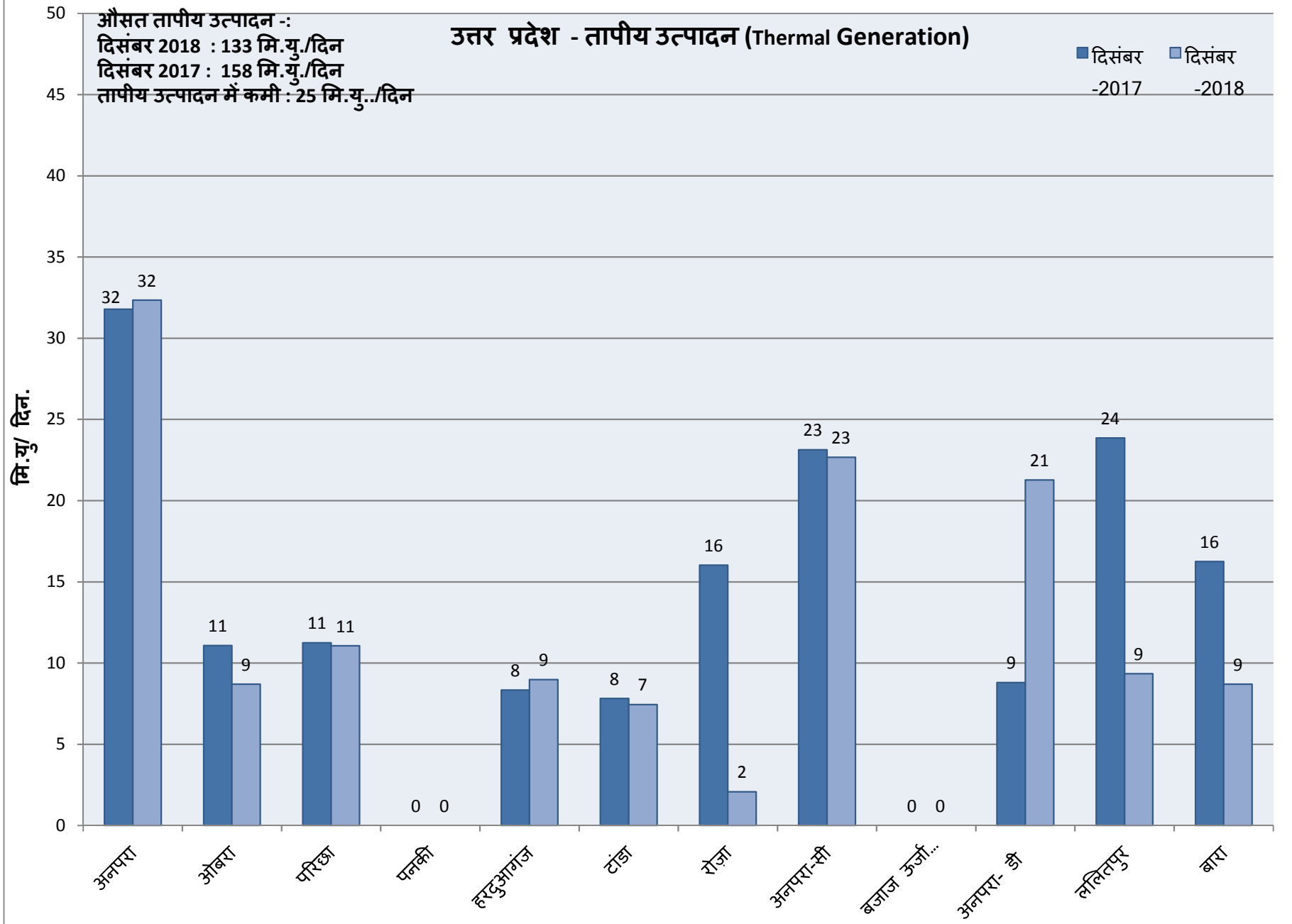
दिसंबर 2018 : 133 मि.यु./दिन

दिसंबर 2017 : 158 मि.यु./दिन

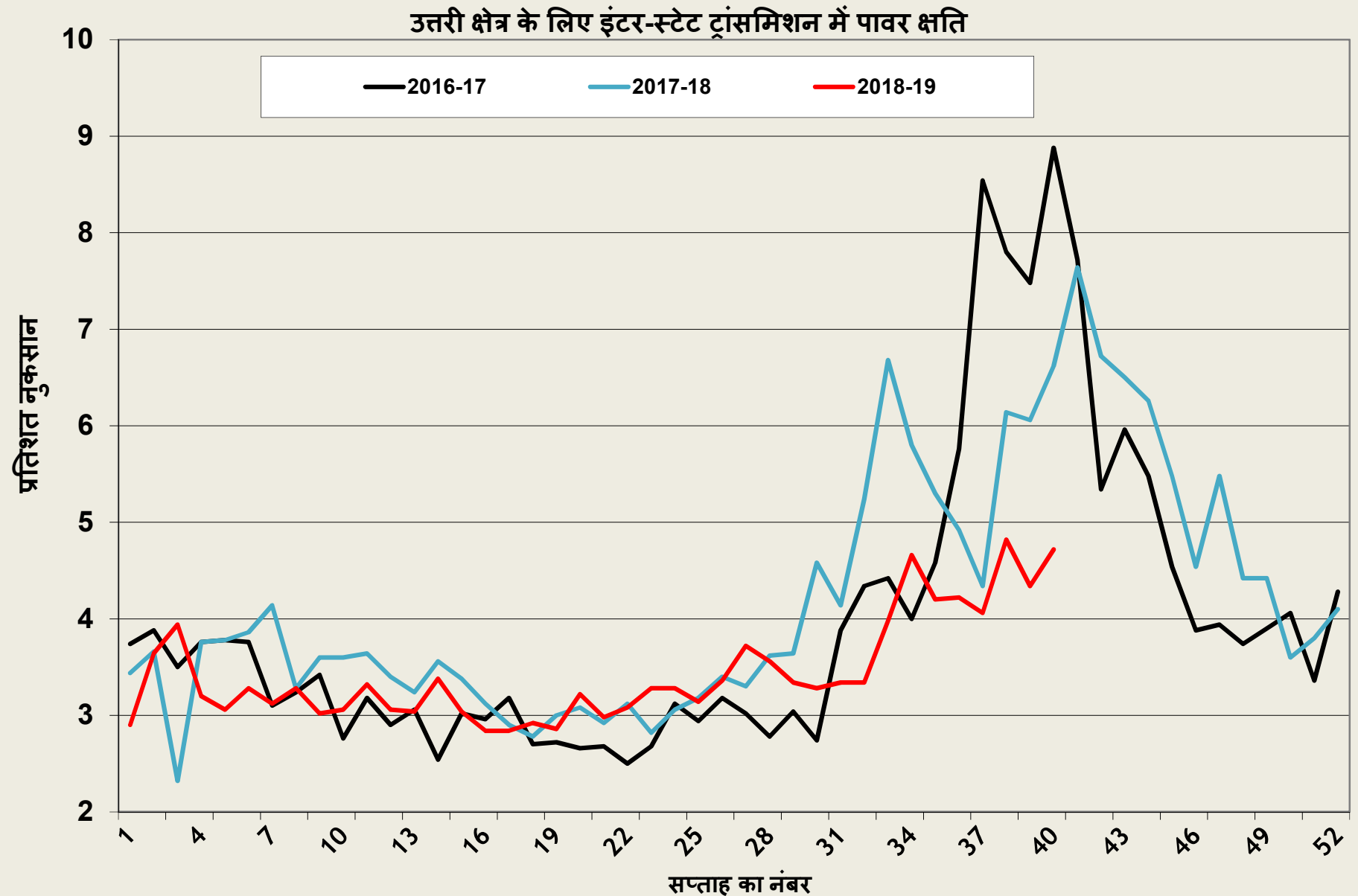
तापीय उत्पादन में कमी : 25 मि.यु./दिन

उत्तर प्रदेश - तापीय उत्पादन (Thermal Generation)

■ दिसंबर -2017
■ दिसंबर -2018



ट्रांसमिशन में पावर क्षति



एस.टी.ओ.ए (STOA) का सारांश- दिसम्बर 2017 vs दिसम्बर -2018

'ट्रांसेक्शन टाइप' के आधार पर वर्गीकृत

अनुमोदनों की संख्या			अंतः/अंतर-क्षेत्रीय लेन-देन के आधार पर वर्गीकृत		
	दिसम्बर-17	दिसम्बर -18	अनुमोदनों की संख्या		
				दिसम्बर-17	दिसम्बर-18
अगले दिन का (DA)	125	343	अंतः (Intra) क्षेत्रीय	182	215
आकस्मिक (Contingency)	114	129	अंतर (Inter) क्षेत्रीय	109	306
पहले आओ पहले पाओ (FCFS)	40	25	कुल	291	521
अग्रिम (AD)	12	24	ऊर्जा स्वीकृत (एम.यू.)		
कुल	291	521	अंतः (Intra) क्षेत्रीय	1268.55	1140.52
ऊर्जा स्वीकृत (एम.यू.)			अंतर (Inter) क्षेत्रीय	124.58	488.48
अगले दिन का (DA)	27.57	115.29	कुल	1393.13	1629.01
आकस्मिक (Contingency)	94.71	69.09	ऊर्जा स्वीकृत (एम.यू.)		
पहले आओ पहले पाओ (FCFS)	559.52	335.59	अंतः (Intra) क्षेत्रीय	1268.55	1140.52
अग्रिम (AD)	711.22	1109.03	अंतर (Inter) क्षेत्रीय	124.58	488.48
कुल	1393.13	1629.01	कुल	1393.13	1629.01

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Reason / Remarks
					Date	Time	
1	400kV Bamnauli(DTL)-Tughlakabad(PGCIL)-1	Line	400 kV	DTL	12/10/2018	8:15	SD taken by DTL for replacement of Tower No 173 by new Tower.
2	Akal (RVPNL)-Ramgarh 400 (RVPNL) 1	Line	400 kV	RRVNL	10/12/2018	10:15	General maint work.
3	Dhuri(400) 500 MVA ICT 3	ICT	400/220 kV	PSTCL	8/12/2018	16:48	General internal inspection work of ICT by BHEL person.
4	400 kV 50 MVAR Line Reactor (Non-Switchable) of Bhadla(RVPNL) ckt 1 at Ramgarh 400 (RRVNL)	L/Reactor	400 kV	RRVNL	10/12/2018	12:00	General maint work.
5	Vindhyachal HVDC BtB Block 2	HVDV Station	500 kV HVDC	PGCIL	26-11-2017	14:55	Differential protection operated.
6	Akal 500 MVA ICT 4	ICT	400/220 kV	RRVNL	5/8/2018	16:00	ICT burnt
7	Akal 315 MVA ICT 2	ICT	400/220 kV	RRVNL	22-08-2018	22:55	ICT burnt.
8	Panki 240 MVA ICT 1	ICT	400/220 kV	UPPTCL	6/10/2018	15:49	ES/D. To attend abnormal heating at bottom cover bolt.
9	FACT at BLB in Knp-BLB Line	FACTS	400 kV	PGCIL	2/7/2016	10:20	Y-Phase current imbalance
10	FSC (50%) of Koteshwar Pool -2 at Meerut (PG)	FSC	400 kV	PGCIL	14-07-2017	19:22	Fire in Y-ph unit
11	FSC of Balia-I at Lucknow	FSC	400 kV	PGCIL	29-11-2017	13:30	E/SD due to Hot Spot at Isolator
12	FSC (40%) of Fatehpur-II at Mainpuri(PG)	FSC	400 kV	PGCIL	5/8/2018	0:10	Minimum oil protection operated. Presently out due to Low current.
13	Bairasuil(NHPC)-Pong(BBMB)	Line	220 kV	PGCIL	15-10-2018	10:50	for renovation & modernization. shutdown for 6 months
14	Bairasuil(NHPC)-Jassure(HPSEB)	Line	220 kV	PGCIL	15-10-2018	12:16	for renovation & modernization. shutdown for 6 months

Long Outage of Generating Units

SL. No	Station Name	Location	Owner	Unit No	Capacity	Reason	Outage		Remarks
							Date	Time	
1	Bairasiul HPS	HP	NHPC	3	60	For renovation and Modernisation of the plant	15-10-2018	9:11	
2	Bairasiul HPS	HP	NHPC	2	60	For renovation and Modernisation of the plant	15-10-2018	10:02	
3	Bairasiul HPS	HP	NHPC	1	60	For renovation and Modernisation of the plant	15-10-2018	10:14	
4	Obra TPS	UP	UPRVUNL	7	100	R & M work	1/7/2010	13:44	
5	Paricha TPS	UP	UPRVUNL	1	110	R & M Work	2/7/2016	17:30	
6	Pong HPS	HP	BBMB	2	66	Repair and Replacement of draft tube gates.	28-03-2018	16:20	
7	Dadri-I TPS	UP	NTPC	3	210	Under overhauling for 35 days. from 00:00 hrs. of 23.12.18	5/12/2018	23:45	
8	Faridabad GPS	HARYANA	NTPC	1	137.75	Non availability of cheap gas.	11/12/2018	15:00	
9	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	1	125	Bed materials leakage.	11/7/2014	8:20	
10	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	2	125	Boiler tube leakage	27-01-2016	15:27	
11	Obra TPS	UP	UPRVUNL	13	200	R & M work	23-02-2018	7:00	
12	Bara PPGCL TPS	UP	Jaypee	2	660	Unit tripped due to emergency stop valve damaged.	15-09-2018	14:04	
13	Obra TPS	UP	UPRVUNL	12	200	Tripping details awaited.	24-09-2018	17:26	
14	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	5	210	Problem in GT.Details awaited.	14-12-2018	7:15	
15	Chhabra TPS	RAJASTHAN	RRVUNL	1	250	Tripped due to HPS-5 level very high	17-12-2018	18:57	
16	RGTPP(Khedar)	HARYANA	HPGCL	1	600	Ash hopper problem.	18-12-2018	11:30	

Central Sector reserve shutdown (532 MW)

SL. No	Station Name	Location	Owner	Unit No	Capacity	Reason	Outage		Remarks
							Date	Time	
1	Auraiya GPS	UP	NTPC	6	109.3	Reserve Shutdown Non-availibilty of gas	30-11-2018	5:47	
2	Dadri GPS	UP	NTPC	6	154.51	Reserve Shutdown	22-12-2018	11:18	
3	Dadri GPS	UP	NTPC	4	130.19	Reserve Shutdown	27-12-2018	9:35	
4	Faridabad GPS	HARYANA	NTPC	1	137.75	Non availability of cheap gas.	11/12/2018	15:00	

State Sector reserve shutdown/Coal shortage (4905 MW)

SL. No	Station	Location	Owner	Unit No	Capacity	Reason(s)	Outage		Expected Revival Date
							Date	Time	
1	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	4	210	Reserve Shutdown	11/10/2018	13:10	
2	Lalitpur TPS	UP	LPGCL	2	660	Reserve Shutdown Machine is out on coal shortage as on 03.01.2019	7/11/2018	23:41	
3	Lalitpur TPS	UP	LPGCL	1	660	Reserve Shutdown Machine is out on coal shortage as on 03.01.2019	13-11-2018	0:15	
4	Paricha TPS	UP	UPRVUNL	2	110	Reserve Shutdown	13-11-2018	21:00	
5	Harduaganj-C TPS	UP	UPRVUNL	7	105	Reserve Shutdown	13-11-2018	21:15	
6	Rosa TPS	UP	ROSA	4	300	Reserve Shutdown	13-11-2018	23:00	
7	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	6	210	Reserve Shutdown	22-11-2018	22:40	
8	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	1	210	Reserve Shutdown	3/12/2018	22:50	
9	Suratgarh TPS	RAJASTHAN	RRVUNL	4	250	Reserve Shutdown	7/12/2018	12:45	
10	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	2	210	Reserve Shutdown	15-12-2018	21:55	
11	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	4	250	Reserve Shutdown	20-12-2018	20:43	
12	Rosa TPS	UP	ROSA	3	300	Reserve Shutdown	25-12-2018	8:00	
13	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	3	210	Reserve Shutdown	30-12-2018	17:45	
14	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	3	250	Reserve Shutdown	31-12-2018	11:37	
15	Panipat TPS	HARYANA	HPGCL	5	210	Less Demand	4/1/2019	11:14	
16	Panipat TPS	HARYANA	HPGCL	6	210	Less Demand	4/1/2019	20:46	
17	Rosa TPS	UP	ROSA	1	300	Reserve Shutdown	15-11-2018	12:00	
18	Paricha TPS	UP	UPRVUNL	6	250	Reserve Shutdown	26-11-2018	13:12	

Transmission Lines
(400kV – 48 ckt. Km and 220kV- 28 ckt. km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In km)	Conductor Type	Owner	Remarks	Actual date & time of charging (Synchronized)	
							Date	Time
1	400kV DC Jind-Kirori-1 along with associated bay no 410(main), 411(tie) at Kirori end	400	50.5	Twin Moose	Haryana		22.12.2018	14:16
2	400kV DC Jind-Kirori-2 along with associated bay no 407 at Kirori end	400	50.5	Twin Moose	Haryana		22.12.2018	14:16
3	400kV DC Akal-Kankani(Jodhpur New) line-1 along with 50 MVAR non-switchable LR at both ends and associated bay no Dia 401 at Akal and Dia 408 at Kakani	400	223.49	Quad Moose	Rajasthan		21.12.2018	17:43
4	400kV DC Akal-Kankani(Jodhpur New) line-2 along with 50 MVAR non-switchable LR at Kankani end & associated bay no Dia 402A at Akal and Dia 407A & 407B at Kakani	400	223.49	Quad Moose	Rajasthan		24.12.2018	20:53
5	220kV Ludhiana-Doraha and bay no 210 & A5	220	27.79	Single Zebra	Punjab		27.12.2018	14:05

ICT

(Capacity Addition - 315 MVA)

S.No.	Name of element	Voltage Level	Transformation Capacity (in MVA)	New/replacement /augmentation	Agency/ Owner	Location	Actual date & time of charging (no load)		Actual date & time of charging (on load)	
							Date	Time	Remarks	Date
1	315 MVA ICT-3 at Fatehabad(PG)	400	315	New (BHEL)	PGCIL	Haryana	28.12.2018	20:30	29.12.2018	21:11

Bus Reactor

(Capacity Addition –Series Bus Reactor 150 MVAR, Bus Reactor 205 MVAR AND Line Reactor 100 MVA)

S. No.	Name of element	Voltage Level (kV)	Transformation Capacity (in MVAR)	New/ replacement /augmentation	Make	Agency/ Owner	Remarks	Actual date & time of charging	
								Date	Time
1	125 MVAR Bus Reactor at Akal	400	125	New	BHEL	RRVPNL		19.12.2018	19:50
2	80 MVAR Bus Reactor at Kankani and associated bay no 404B	400	80	New	BHEL	RRVPNL		22.12.2018	18:05
3	75 MVAR, 12 ohm Dadri series line reactor-1 at Mandola	400	75	New	Trench	PGCIL		04.12.2018	18:20
4	75 MVAR, 12 ohm Dadri series line reactor-2 at Mandola	400	75	New	Trench	PGCIL		05.12.2018	17:02
5	400kV 50 MVAR N-switchable LR of DC Akal-Kakani(Jodhpur New) line-1 at both ends	400	50	New	BHEL	RRVPNL		21.12.2018	17:43
6	400kV 50 MVAR N-switchable LR of DC Akal-Kakani(Jodhpur New) line-2 at Kankani	400	50	New	BHEL	RRVPNL		24.12.2018	20:53

Annexure-4

State		MU	MW
		Feb-19	Feb-19
Chandigarh	Availability	110	315
	Requirement	100	230
	Surplus/Shortfall (MU)	10	85
	Surplus/Shortfall (%)	10.0%	37.0%
Delhi	Availability	3220	5770
	Requirement	1790	4110
	Surplus/Shortfall (MU)	1430	1660
	Surplus/Shortfall (%)	79.9%	40.4%
Haryana	Availability	5030	8380
	Requirement	3510	7550
	Surplus/Shortfall (MU)	1520	830
	Surplus/Shortfall (%)	43.3%	11.0%
Himachal Pradesh	Availability	920	2320
	Requirement	790	1650
	Surplus/Shortfall (MU)	130	670
	Surplus/Shortfall (%)	16.5%	40.6%
Jammu & Kashmir	Availability	770	2040
	Requirement	1610	2800
	Surplus/Shortfall (MU)	-840	-760
	Surplus/Shortfall (%)	-52.2%	-27.1%
Punjab	Availability	4782	8144
	Requirement	3350	6890
	Surplus/Shortfall (MU)	1432	1254
	Surplus/Shortfall (%)	42.7%	18.2%
Rajasthan	Availability	8052	12318
	Requirement	6392	12198
	Surplus/Shortfall (MU)	1660	120
	Surplus/Shortfall (%)	26.0%	1.0%
Uttar Pradesh	Availability	9520	16700
	Requirement	7980	15400
	Surplus/Shortfall (MU)	1540	1300

	Surplus/Shortfall (%)	19.3%	8.4%
Uttarakhand	Availability	900	1950
	Requirement	1170	2150
	Surplus/Shortfall (MU)	-270	-200
	Surplus/Shortfall (%)	-23.1%	-9.3%
Total NR	Availability	33304	55987
	Requirement	26692	48700
	Surplus/Shortfall (MU)	6612	7287
	Surplus/Shortfall (%)	24.8%	15.0%

5

DELHI TRANSCO LIMITED

(A Govt. of NCT of Delhi Undertaking)

[Office of GM (Planning)]

Room No.4, Shaktideep Building, Jhandewalan Extn, New Delhi-55.

Regd. Office: Shakti Sadan, Kotla Road, New Delhi-2.

Corporate Identification Number (CIN) - U40103DL2001SGC111529

Tel. No. 23552070 Fax- 23622707 Website -www.dtl.gov.in

No: F.DTL/202/ GM(Plg)/2018-19/F-20/ 136

Dated : 24.12.2018

Chief Engineer
Central Electricity Authority
Power System Planning & Appraisal-I Division
Sewa Bhawan, R.K. Puram-1, New Delhi-110066

Subject: - Reactive Power Compensation in Grid Network.

Sir,


40th TCC and 43rd NRPC meeting held on 29-30 October, 18 at Amritsar. The issue of reactive power compensation at 220/400kV level was discussed and during deliberation, the committee opined that possibility of utilizing existing generators as synchronous condenser should be explored as VAR compensation will be much smoother depending upon the changing demand in Delhi.

In Delhi, as you are aware that 02 Nos. Power Generating Stations like IP Power and Rajghat Power House have been closed in past and recently BTPS has also been declared for permanent closer as per direction of EPCA. Further, GT (Installed Capacity-330MW), Pragati generation station (Installed Capacity-282MW) and Bawana CCGT (Installed Capacity 1500MW) are also not running on their full capacity due to restriction of gas allocation.

As per the discussion and suggestions in NRPC Meeting as referred above, these generators can be utilized as reactive power compensation device as and when required by Delhi Grid. The utilization of generator can be done as Reactive Power Compensator: On under-excited condition, the motor runs with lagging power factor (and absorbs VARs from the grid) and on over-excited mode, the motor runs with leading power factor (and supplies VARS to the Grid).

Therefore, it requested to take up the matter at appropriate level for issuance of necessary direction to Generators, so that they could utilized optimally in support to the Grid requirement.

Thanking you.


(Birendra Prasad) 24/12/18
General Manager (T) Planning

Copy for favour kind information:-

1. CMD, DTL
2. Director (Operations)
3. Executive Director(Tech)
4. DGM(Planning)

पावर ग्रिड कारपोरेशन ऑफ इंडिया लिमिटेड

(भारत सरकार का उद्यम)

POWER GRID CORPORATION OF INDIA LIMITED

(A Government of India Enterprise) पावरग्रिड



उत्तरी क्षेत्र-1, मुख्यालय, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016, दूरभाष: 26560112, 26560115, फैक्स: 011-26601081 तार 'नेटग्रिड'
Northern Region-1, Headquarters, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016 Tel.: 26560112, 26560115, Fax : 011-26601081 Gram: 'NETGRID'

संदर्भ संख्या / Ref. No. :

दिनांक / Dated :

Ref: NR-1/AM/NRPC/

Date :- 17th December'2018

To,

ANNEXURE-8

The Member Secretary,
Northern Regional Power Committee,
18-A, Qutab Institutional Area,
Katwaria Sarai, New Delhi-110 016

Subject:- Phase nomenclature mismatch issue with BBMB.

Ref :- NRPC/Opr/106/01/2018/11740-41 dt. 06/10/2018

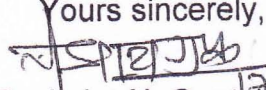
In subject reference the following technical infeasibility issues need to be addressed requiring materials, skilled gang and shutdowns.

- Require de-stringing of the droppers from the last tower to gantry and then re-stringing in the correct phase. The terminations at Panipat (BBMB) are from Dadri-Panipat lines which are of single circuit design and are very old towers. The re-stringing of the last conductor spans can cause additional forces on the tower/terminal equipment and which may be problematic in the future.
- The de-stringing and then re-stringing at all these stations can cause clearance problems after work completion, which may lead to phase to phase and phase to earth faults.
- Wave trap and LMU of one phase will have to be shifted with all pipe structure, etc. Earthing riser and flats also need to be changed.
- There will be requirement of PLCC engineer for PLCC and LMU tuning with co-ordination at both ends.
- A Full stringing gang with T&P is required to execute this work. However looking at the quantum of work finding a suitable party will be challenging.
- At least 4-5 days of shutdown will be required at all sites along with financial implication for carrying out the above work.

In view of the above technical infeasibility and additional financial implication, it is proposed to enable the same with phase interchange at Dehar (BBMB) station itself in phased manner..

Thanking you.

पंजीकृत कार्यालय : बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Regd. Office : B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016

Yours sincerely,

(Ravindra N. Gupta) 17/12/2018
GM (AM, NR-1)

Encl :- As above

आप हमसे हिन्दी में पत्र व्यवहार कर सकते हैं।

Copy :- i) Chief GM(AM), NR1

Possible Problems while changing phase conductors as per plan proposed by BBMB

The connections at Panchkula, Rajpura (PSTCL), Bhiwani (BBMB) and Panipat (BBMB) are to be interchanged as per BBMB plan which would require de-stringing of the droppers from the last tower to gantry and then re-stringing in the correct phase. However as per site visits the following technical problems are anticipated:

1. The terminations at Panipat (BBMB) are from Dadri-Panipat lines which are of single circuit design and are very old towers. The restringing of the last conductor spans can cause additional forces on the tower/ terminal equipment and which may be problematic in the future.
2. The de-stringing and then re-stringing at all these stations can cause clearance problems after work completion, which may lead to phase to phase and phase to earth faults.
3. Wave trap and LMU of one phase will have to be shifted with all pipe structure, etc. Earthing riser and flats also need to be changed.
4. There will be requirement of PLCC engineer for PLCC and LMU tuning with co-ordination at both ends.
5. A Full stringing gang with T&P is required to execute this work. However looking at the quantum of work finding a suitable party will be challenging.
6. At least 4-5 days of shutdown will be required at all sites along with financial implication for carrying out the above work.

In view of the above technical difficulties, outage requirement and the financial implications involved, it is proposed that some other possibilities be explored for resolving the phase nomenclature issue.

SNO	Description of Agenda point	Details	STATUS UPDATED
1	Monitoring of schemes funded from PSDF (Agenda by NPC)	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in Northern Region. Utilities are requested to expedite implementation of the schemes and submit information of physical as well as financial progress in the prescribed format by first week of every month on regular basis to Member Convener, PSDF Project Monitoring Group (AGM, NLDC and POSOCO) with a copy to NPC Division	The updated status available was attached as Annexure 9/1 of the Agenda. Punjab & DTL updated status. All other utilities were requested to update
2	Sub-stations likely to be commissioned in next 6 months.	All the concerned states were requested to submit the details of the downstream network associated SPECIFICALLY with THESE POWERGRID substations along with the action plan of their proposed/approved networks.	The details of the substations of Power Grid and their required downstream network were enclosed as Annexure 9/2 of the Agenda. PSTCL updated as under: Moga-Mehalkalan 220 KV D/C line work has been completed. Expected date of commissioning of line is 31.01.2019 All other concerned utilities were requested to update regularly and ensure that the work is completed expeditiously.
3	Progress of installing new capacitors and repair of defective capacitors	The available up to date status of installation of new capacitors and revival of defective capacitor by the State constituents is enclosed as ANNEXURE 10/3 OF THE AGENDA OF THE 146TH OCC MEETING.	Information received in the 1/2019 from Uttarakhand , UP, Rajasthan & Haryana is enclosed at Annexure 9/3. All other states were requested to update.
4.	Healthiness of defence mechanism: Self-certification	Report of Mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that “All the UFRs are checked and found functional”.	Information from for period ending September 2018 has not been received from Punjab, Delhi, Rajasthan the same may please be submitted. The information of period ending 9/2018 from Punjab, DTL stand submitted. Rajasthan was requested to update. The information ending 12/2018 was submitted by BBMB and all others were requested to submit.



5	Strengthening of Intra-State transmission system	<p>Also all SLDCs are requested to give half yearly feedback ending 6/2018 in the month of 7/2018 to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning</p> <p>PTCUL, Punjab, Delhi & Rajasthan have submitted the information ending 6/2018 & that send submitted to concerned office.</p>	<p>UPPTCL has submitted the information ending 12/2018.</p> <p>ALL other SLDCs were requested to give half yearly feedback ending 12/2018 in the month of 1/2019 to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning</p>
6	Mapping of Feeders in SCADA	<p>In the 141st OCC meeting members were informed about the “Compendium of SPS in NR” (<i>Annexure-9 of the MOM</i>) which was released in the 40th NRPC meeting. All the utilities were requested to go through the compendium and identify feeders concerning their state and map the same in SCADA.</p> <p>150th OCC meeting:</p> <p>MS NRRPC stated that as per the Compendium of SPS in NR” which was released in the 40th NRPC meeting. All the utilities are requested to go through the compendium and identify feeders concerning their state and map the same in SCADA. This document is available on NRLDC & NRPC website. NRLDC representative added that it is very important that the feeders should be mapped in SCADA. It was stated that this issue will be discussed in the Test committee meeting also. The matter under discussion in subsequent meetings but no further update</p>	<p>All states except Punjab & Rajasthan were requested to update.</p>

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	SPM Compliance Plan/ Status	FGD Award date/ Tender details	SO2 Targeted value mg/Nm3	De-Nox Plan/ tender dates.	Expected Overhauling Period (as planned now)	NOx Targeted value mg/Nm3
1	BARH II	Bihar	ER	4	660	20-11-2013	SPM Compliant	Award on 18.09.18	200	Combustion Modification implemented.	--	400
2	BARH II	Bihar	ER	5	660	04-03-2015	SPM Compliant	Award on 18.09.18	200	Combustion Modification implemented.	--	400
3	KAHALGAON TPS	Bihar	ER	5	500	31-03-2007	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
4	KAHALGAON TPS	Bihar	ER	6	500	16-03-2008	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
5	KAHALGAON TPS	Bihar	ER	7	500	31-07-2009	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
6	TALCHER STPS	Odisha	ER	1	500	19-02-1995	SPM Compliant	NIT on 31.08.18*	200	Combustion tuning after overhaul	22Jul'19-25Aug'19	600
7	TALCHER STPS	Odisha	ER	2	500	27-03-1996	SPM Compliant	NIT on 31.08.18*	200	Combustion tuning after overhaul	22Oct'18-21-Nov'18	600
8	TALCHER STPS	Odisha	ER	3	500	21-02-2003	SPM Compliant	NIT on 31.08.18*	200	Combustion tuning after overhaul	03Sep'19-27 Sep'19	600
9	TALCHER STPS	Odisha	ER	4	500	25-10-2003	Under R&M	NIT on 31.08.18*	200	Combustion tuning after overhaul	21Jun'19-15Jul'19	600
10	TALCHER STPS	Odisha	ER	5	500	13-05-2004	Under R&M	NIT on 31.08.18*	200	NIT done on 06 Sep' 18	--	400
11	TALCHER STPS	Odisha	ER	6	500	06-02-2005	SPM Compliant	NIT on 31.08.18*	200	NIT done on 06 Sep' 18	--	400
12	FARAKKA STPS	West Bengal	ER	4	500	25-09-1992	Under R&M	NIT made on 28.09.18*	200	Combustion tuning after overhaul	11Mar'20-09Apr'20	600
13	FARAKKA STPS	West Bengal	ER	5	500	16-02-1994	Under R&M	NIT made on 28.09.18*	200	Combustion tuning after overhaul	11Mar'19-09Apr'19	600
14	FARAKKA STPS	West Bengal	ER	6	500	07-03-2011	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
15	INDIRA GANDHI STPP	Haryana	NR	1	500	31-10-2010	SPM Compliant	Awarded on 30.01.18	200	Award in October 18	--	400
16	INDIRA GANDHI STPP	Haryana	NR	2	500	05-11-2011	SPM Compliant	Awarded on 30.01.18	200	Award in October 18	--	400
17	INDIRA GANDHI STPP	Haryana	NR	3	500	07-11-2012	SPM Compliant	Awarded on 30.01.18	200	Award in October 18	--	400
18	RIHAND STPS	Uttar Pradesh	NR	1	500	31-03-1988	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	09 Sep'19 - 23 Oct'19	600
19	RIHAND STPS	Uttar Pradesh	NR	2	500	05-07-1989	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	10Aug'19 - 03Sep'19	600
20	RIHAND STPS	Uttar Pradesh	NR	3	500	31-01-2005	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
21	RIHAND STPS	Uttar Pradesh	NR	4	500	24-09-2005	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
22	RIHAND STPS	Uttar Pradesh	NR	5	500	25-05-2012	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
23	RIHAND STPS	Uttar Pradesh	NR	6	500	17-10-2013	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
24	SINGRAULI STPS	Uttar Pradesh	NR	6	500	23-12-1986	Under R&M	NIT made on 28.09.18*	200	Combustion tuning after overhaul	01-25-Sep'19	600
25	SINGRAULI STPS	Uttar Pradesh	NR	7	500	24-11-1987	Under R&M	NIT made on 28.09.18*	200	Combustion tuning after overhaul	01-25 Aug'20	600
26	SIMHADRI	Andhra Pradesh	SR	1	500	22-02-2002	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	01Nov'18 - 14Dec'18	600
27	SIMHADRI	Andhra Pradesh	SR	2	500	24-08-2002	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	15Jun'19 - 14Jul'19	600
28	SIMHADRI	Andhra Pradesh	SR	3	500	29-03-2011	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
29	SIMHADRI	Andhra Pradesh	SR	4	500	30-03-2012	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
30	VALLUR TPP	Tamil Nadu	SR	1	500	28-03-2012	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
31	VALLUR TPP	Tamil Nadu	SR	2	500	28-02-2013	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
32	VALLUR TPP	Tamil Nadu	SR	3	500	28-02-2014	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
33	KORBA STPS	Chhatisgarh	WR	4	500	31-05-1987	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	20Aug'20 - 13 sep'20	600
34	KORBA STPS	Chhatisgarh	WR	5	500	25-03-1988	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	05Nov'19-06Dec'19	600
35	KORBA STPS	Chhatisgarh	WR	6	500	26-02-1989	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	15Dec'19-08Jan'19	600
36	KORBA STPS	Chhatisgarh	WR	7	500	25-11-2010	SPM Compliant	NIT made on 28.09.18*	200	NIT done on 06 Sep' 18	--	400
37	VINDHYACHAL STPS	Madhya Pradesh	WR	7	500	03-03-1999	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	20-Mar'19-02May'19	600
38	VINDHYACHAL STPS	Madhya Pradesh	WR	8	500	26-02-2000	SPM Compliant	NIT made on 28.09.18*	200	Combustion tuning after overhaul	20Jul'20-13Aug'20	600
39	VINDHYACHAL STPS	Madhya Pradesh	WR	9	500	27-07-2006	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
40	VINDHYACHAL STPS	Madhya Pradesh	WR	10	500	08-03-2007	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
41	VINDHYACHAL STPS	Madhya Pradesh	WR	11	500	14-06-2012	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
42	VINDHYACHAL STPS	Madhya Pradesh	WR	12	500	22-03-2013	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
43	MOUDA TPS	Maharashtra	WR	1	500	19-04-2012	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
44	MOUDA TPS	Maharashtra	WR	2	500	29-03-2013	SPM Compliant	Award on 18.09.18	200	NIT done on 06 Sep' 18	--	400
45	MOUDA TPS	Maharashtra	WR	3	660	28-03-2016	Under R&M	Awarded on 31.07.18	100	Combustion Modification implemented.	--	400
46	MOUDA TPS	Maharashtra	WR	4	660	18-03-2017	SPM Compliant	Awarded on 31.07.18	100	Combustion Modification implemented.	--	400
47	Dadri	UP	NR	5	490	29-Jan-10	SPM Compliant	Awarded on 30.01.18	200	Awarded on June 18	--	400
48	Dadri	UP	NR	6	490	30-Jul-10	SPM Compliant	Awarded on 30.01.18	200	Awarded on June 18	--	400
Total				48 Units	24620							

*Expected award in December 18.

Critically Polluted, Population Density < 400 persons/ sq. Km

	<p>Er. S.P.Chaubey Chief Engineer</p>		<p>THERMAL OPERATION UNIT U.P. RAJYA VIDYUT UTPADAN NIGAM LTD. 14th FLOOR, SHAKTI BHAWAN Extn., LUCKNOW. Ph. No. - 0522-2287873 Email ID - cgm.to@uprvunl.org CIN: U40101UP1980SGC005065</p>
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Ref: - 52/ CE. (TO)/HQ/NRPC/OCC

Dated: - 15.01.2019

MEMBER SECRETARY,
N.R.P.C.
18-A, Saheed Jeet Singh Marg,
Katwaria Sarai,
New Delhi-110016

By e-mail

Sub:-Update on points of agenda for 155th OCC meeting of N.R.P.C. scheduled for 17.01.2019

Kindly find below update on points of Agenda for the 155th OCC meeting of N.R.P.C. pertaining to U.P.R.V.U.N.L. Stations.

1-Point No. 3.1:- Maintenance Program for Generating Units.

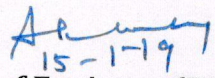
Sl. No.	Name of Station	Unit No.	Capacity (MW)	Date from which under outage	Expected date of revival	Reason of outage
1	Parichha TPS	06	250	16.12.2018	07.02.2019	Capital O.H.
2	Anpara TPS	01	210	15.02.2019	31.03.2019	Capital O.H.

2-Point No. 10:- Status of FGD installation vis-à-vis installation plan at identified TPS.

- The status is attached in desired format at **Annexure-01.**

3-Point No.12.2:- SPS for ICTs at 765kV Unnao sub-station.

All the hardware required has been arranged at site. The BHEL engineer will be available in 3rd week of Jan. 2019. BHEL intimated that design of SPS is under process. The SPS implementation is expected to be completed by Jan. 2019.


15-1-19
Chief Engineer (TO)

CC: - 1. Director (Operation), UPPTCL, 11th floor, Shakti Bhawan Extn., Lucknow.

2. Director (SLDC) UPPTCL, 5th Floor, Shakti Bhawan, Lucknow.

AGENDA ITEM NO. 12.2

OCC - 155th

STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS

S.No.	Attribute	Status
1.	Developer	UPRVUNL
2.	Name of Project	ANPARA 'D' TPS
3.	Sector (State / Central /Private)	State
4.	State	U.P.
5.	Region (NR, ER etc)	NR
6.	Unit No	6&7
7.	Unit Capacity (MW)	2x500 MW
8.	DT-of COMMISSIONING (DD/MM/YYYY)	Unit-6 – 08.06.2015 Unit-7 – 06.03.2016
9.	Age in years (Till 18.06.2018)	Unit-6 – 3 years Unit-7 – 2.25 years
10.	Whether FGD Installed (Y/N)	N
11.	Whether FGD space available (Y/N)	Y
12.	Whether FGD planned (Y/N)	Y
13.	Feasibility Study Started (Y/N)	Y
14.	Feasibility Study Completed (Y/N)	Y
15.	Tender Specifications Made (Y/N)	Y
16.	NIT Issued (Y/N)	Y
17.	Bids Opened (Y/N)	Y
18.	Bid Opening Date (DD/MM/YYYY)	Techno commercial bid-stage-I has been opened on 27.11.2018
19.	Bids Awarded (Y/N)	N
20.	Regulator Petition Cleared (Y/N)	N
21.	% Progress of FGD Installation	–
22.	FGD Commissioned (Y/N)	N
23.	FGD working satisfactorily (Y/N)	–
24.	FGD Phasing Plan for Implementation (DD/MM/YYYY)	Unit-6 – May-June-2021 Unit-7 – March-April-2021
25.	Current Status& remarks	Part-I (Techno-comm. Bid) opened on 27.11.2018

15/11/19

AGENDA ITEM NO.

OCC -

STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS

S.No.	Attribute	Status
1.	Developer	UPRVUNL
2.	Name of Project	ParichhaTPS (2X210MW) & (2X250MW) Harduaganj TPS (2X250MW)
3.	Sector (State / Central /Private)	State
4.	State	U.P.
5.	Region (NR, ER etc)	NR
6.	Unit No	ParichhaTPS Unit no. 3,4 & 5, 6 Harduaganj TPS Unit no. 8 & 9
7.	Unit Capacity (MW)	(2X210MW) & (2X250MW) ParichhaTPS (2X250MW)Harduaganj TPS
8.	DT-of COMMISSIONING (DD/MM/YYYY)	ParichhaTPS Unit-3 – 29.03.2006 Unit-4 – 28.12.2006 Unit-5 – 24.05.2012 Unit-6– 11.03.2013 Harduaganj TPS Unit-8 – 27.09.2011 Unit-9 – 25.05.2012
9.	Age in years (Till 18.06.2018)	ParichhaTPS Unit-3 – 12.2 years Unit-4 – 11.5 years Unit-5 – 6 years Unit-6– 5.2 years Harduaganj TPS Unit-8 – 6.75 years Unit-9 – 6 years
10.	Whether FGD Installed (Y/N)	N
11.	Whether FGD space available (Y/N)	Y
12.	Whether FGD planned (Y/N)	Y
13.	Feasibility Study Started (Y/N)	Y
14.	Feasibility Study Completed (Y/N)	Y
15.	Tender Specifications Made (Y/N)	Y
16.	NIT Issued (Y/N)	Y
17.	Bids Opened (Y/N)	N
18.	Bid Opening Date (DD/MM/YYYY)	25/01/2019 (Techno commercial Bid stage-I)
19.	Bids Awarded (Y/N)	N

[Handwritten signatures and dates]
15/01/19

AGENDA ITEM NO.**OCC -****STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS**

20.	Regulator Petition Cleared (Y/N)	-
21.	% Progress of FGD Installation	-
22.	FGD Commissioned (Y/N)	N
23.	FGD working satisfactorily (Y/N)	-
24.	FGD Phasing Plan for Implementation (DD/MM/YYYY)	ParichhaTPS Unit-3 – March-April- 2022 Unit-4 – March-April- 2022 Unit-5 – Jan.-Feb.-2022 Unit-6 – Nov.-Dec.2022 Harduaganj TPS Unit-8 – 31.12.2019 Unit-9 – 31.12.2019
25.	Current Status& remarks	NIT has been published on 16.11.2018

Signature
15/01/19

AGENDA ITEM NO.

OCC -

STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS

S.No.	Attribute	Status
1.	Developer	UPRVUNL
2.	Name of Project	ANPARA 'A' & 'B' TPS
3.	Sector (State / Central /Private)	State
4.	State	U.P.
5.	Region (NR, ER etc)	NR
6.	Unit No	1,2,3 & 4,5
7.	Unit Capacity (MW)	3x210 MW & 2x500 MW
8.	DT-of COMMISSIONING (DD/MM/YYYY)	Anpara A TPS Unit-1 – 24.03.1986 Unit-2 – 28.02.1987 Unit-3 – 12.03.1988 Anpara B TPS Unit-4 – 19.07.1993 Unit-5 – 04.07.1994
9.	Age in years (Till 18.06.2018)	Anpara A TPS Unit-1 – 32 years Unit-2 – 31 years Unit-3 – 30 years Anpara B TPS Unit-4 – 25 years Unit-5 – 24 years
10.	Whether FGD Installed (Y/N)	N
11.	Whether FGD space available (Y/N)	Y
12.	Whether FGD planned (Y/N)	Y
13.	Feasibility Study Started (Y/N)	Y
14.	Feasibility Study Completed (Y/N)	Y
15.	Tender Specifications Made (Y/N)	N
16.	NIT Issued (Y/N)	N
17.	Bids Opened (Y/N)	N
18.	Bid Opening Date (DD/MM/YYYY)	-
19.	Bids Awarded (Y/N)	N
20.	Regulator Petition Cleared (Y/N)	N
21.	% Progress of FGD Installation	-
22.	FGD Commissioned (Y/N)	N

Signature
15/01/19

AGENDA ITEM NO.

OCC -


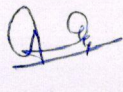
STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS

23.	FGD working satisfactorily (Y/N)	-
24.	FGD Phasing Plan for Implementation (DD/MM/YYYY)	Anpara A TPS Unit-1 – Sept-Oct 2022 Unit-2 – July- Aug 2022 Unit-3 – May-June 2022 Anpara B TPS Unit-4 – March-April 2022 Unit-5 – Jan-Feb 2022
25.	Current Status& remarks	Order for Pre award consultancy services has been placed to M/s NTPC on 09.10.2018

S. Kumar
15/01/19 *R. R.*

AGENDA ITEM NO.**OCC -****STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS**

S.No.	Attribute	Status
1.	Developer	UPRVUNL
2.	Name of Project	OBRA 'B' TPS
3.	Sector (State / Central /Private)	State
4.	State	U.P.
5.	Region (NR, ER etc)	NR
6.	Unit No	9,10,11,12 &13
7.	Unit Capacity (MW)	2x500 MW
8.	DT-of COMMISSIONING (DD/MM/YYYY)	Unit- 9 – 26.10.1980 Unit -10 – 14.01.1979 Unit- 11 – 31.12.1977 Unit- 12 – 28.03.1981 Unit- 13 – 21.07.1982
9.	Age in years (Till 18.06.2018)	Unit- 9 – 38 years Unit -10 – 39 years Unit- 11 – 41 years Unit- 12 – 37 years Unit- 13 – 36 years
10.	Whether FGD Installed (Y/N)	N
11.	Whether FGD space available (Y/N)	Y
12.	Whether FGD planned (Y/N)	Y
13.	Feasibility Study Started (Y/N)	Y
14.	Feasibility Study Completed (Y/N)	Y
15.	Tender Specifications Made (Y/N)	N
16.	NIT Issued (Y/N)	N
17.	Bids Opened (Y/N)	N
18.	Bid Opening Date (DD/MM/YYYY)	-
19.	Bids Awarded (Y/N)	N
20.	Regulator Petition Cleared (Y/N)	N
21.	% Progress of FGD Installation	-
22.	FGD Commissioned (Y/N)	N
23.	FGD working satisfactorily (Y/N)	-

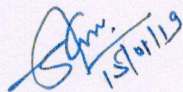
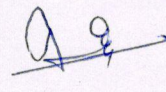
 15/10/19 

AGENDA ITEM NO.

OCC -

STATUS OF FGD INSTALLATION VIS-À-VIS INSTALLATION PLAN AT IDENTIFIED TPS

24.	FGD Phasing Plan for Implementation (DD/MM/YYYY)	Unit-9 – July- Aug 2022 Unit-10 – Sept- Oct.2022 Unit-11 – Nov-Dec 2022 Unit-12 – May-June.2022 Unit-13 – March-April.2022
25.	Current Status& remarks	Order for Pre award consultancy services has been placed to M/s Fichtner on 03.12.2018

 15/01/19 



RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LTD.

Corporate Identity Number (CIN) - U40102RJ2000SGC016484

Vidyut Bhawan, Jan path, Jaipur-302005

OFFICE OF THE ADDL. CHIEF ENGINEER (PPMC & IT)

Room No. 304, 3rd Floor, Jeevan Nidhi Bhawan-II,
Bhawani Singh Marg, Jaipur-302005

Telephone: 0141-2740989, Fax: 0141-2740006

email : pp.rvun@gmail.com

web. : energy.rajasthan.gov.in/rvunl



No.RVUN /ACE (PPMC & IT)/SE(PP)/D. 2071

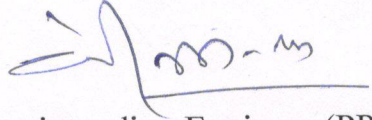
Dated: 15-01-2019

The Superintending Engineer (Opr),
NRPC , 18-A,
Shaheed Jeet Singh Marg,
New Delhi -110016
E-mail:- seo-nrpc@nic.in

Sub: Status of FGD Installation.

On the subject cited above, please find enclosed here with status of FGD installation vis-à-vis installation plan of RRVUNL Power Project.

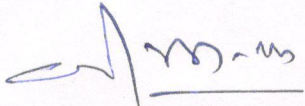
Enclosed: As above


Superintending Engineer (PP)

RVUNL, Jaipur

Copy forwarded to the following alongwith enclosures as above for information:

1. General Manager, Northern Region Load Despatch Centre, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi -110016
2. SE (SO&LD), RVPNL, Heerapura, Jaipur alongwith enclosures as above.


Superintending Engineer (PP)

RVUNL, Jaipur

B2

STATUS OF FGD INSTALLATION VIS - A VIS INSTALLATION PLAN AT IDENTIFIED TPS

S. No.	Attribute	Koda Super Thermal Power Station (KSSTPS)												Surangadh Super Thermal Power Station (SSSTPS)												Chhabra Thermal Power Project (CTPP)												Kalsindh Thermal Power Project (KaITPP)		Chhabra Super Critical Thermal Power Project (CSCTPP)		Surangadh Super Critical Thermal Power Project (SSCTPP)	
		Rajasthan Rajya Vidyut Utpadan Nigam Ltd												Rajasthan Rajya Vidyut Utpadan Nigam Ltd												Rajasthan												Rajasthan		Rajasthan		Rajasthan	
Developer	Name of Project	KSSTPS												SSSTPS												CTPP												KaITPP		CSCTPP		SSCTPP	
Sector (State/Central/Private)	State	State												State												State												State		State		State	
Region (NR, ER etc)	Unit No.	1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	2	4	1	2	2	4	1	2	5	6	7 & 8																
Unit Capacity (MW)	Date of Commissioning (DD/MM/YYYY)	110	110	210	210	210	195	195	250	250	250	250	250	250	250	250	250	250	600	600	600	600	600	600	660	660	2660 MW																
Age in years	Whether FGD installed (Y/N)	35 yrs & 10 months	35 yrs & 3 months	30 yrs & 01 months	29 yrs & 6 months	24 yrs & 7 months	15 yrs & 03 months	9 yrs 02 months	20 yrs & 5 months	18 yrs & 7 months	17 yrs	16 yrs & 7 months	15 yrs & 4 months	9 yrs & 2 months	9 yrs	8 yrs & 5 months	5 yrs & 1 months	4 yrs & 4 months	4 yrs & 5 months	3 yrs & 4 months	1 yr & 6 months	Under Commissioning	Under Commissioning	Under Commissioning	Under Commissioning																		
Whether FGD space available (Y/N)	Whether FGD planned (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																	
Feasibility Study Started (Y/N)	Feasibility Study Completed (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																	
Tender Specification Made (Y/N)	NIT Issued (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N																	
Bids Opened (Y/N)	Bids Opening Date (DD/MM/YYYY)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N																	
Bids Awarded (Y/N)	Regulator Petition Cleared (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N																	
% Progress of FGD Installation	FGD Commissioned (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N																	
FGD working satisfactorily (Y/N)	FGD Phasing Plan for Implementation (DD/MM/YYYY)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA																	
31.12.20	31.12.20	31.12.20	31.12.20	31.12.20	31.12.22	31.12.22	31.10.22	31.12.22	31.10.22	31.10.22	31.08.22	30.06.22	30.04.22	28.02.22	31.12.21	31.10.21	31.08.21	31.08.21	30.06.21	30.04.21	30.04.20	-	-	-	-	-																	
25	Status	Feasibility Studies under process																																									
26	Remarks	Draft DPR submitted & Final DPR to be submitted later this month (Jan. 19)																																									
		1. Consultancy Services to assess the feasibility in commissioned/fully to be commissioned Units for implementation of revised emission norms in Power Stations of RVUN are being provided by M/s Fischer Consulting Engineers (India) Pvt. Ltd., Chennai vide work order No. R/VUN/CEC/Chh/Environment/D/581 dated 01.02.2018 2. Final DPR for implementation of revised emission norms in these Power Plants has been received. 3. Technical Specifications for FGD in SSCTPS Surangadh, CSCTPP Chhabra, KATPP Jhalawar, SSSTPS Surangadh & KSSTPS, Koda has been received has been received. 4. Technical Specification & Bid Documents of FGD installation in SSCTPP Surangadh, CSCTPP Chhabra & KATPP Jhalawar have been finalized and case for approval for floating NIT has been processed for approval from WTD's Jhalawar has been submitted to the State Govt. and is under process. 2. Draft DPR submitted & Final DPR to be submitted during this month (Jan. 19)																																									

State-wise Emergency Restoration system in NR #				
Transmission Licensee	Requirement of Total no of ERS in State	Number of ERS available in state	No of ERS to Be Procured	Remark if Any
POWERGRID		2 sets of 400 kV & 2 sets 765 kV	-	-
DTL		2 sets	-	-
PSTCL		2 sets	-	-
UPPTCL		2 sets	-	-
PTCUL			2 sets	DPR under finalization
HVPN			2 sets	Under tendering
RRVPN			2 sets	NIT floated
HPPTCL			2 sets	Matter under consideration regarding funds availability
PDD J&K		2 sets	-	-
BBMB		0	0	##
Sterlite*				

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

Data as available with NRPC Sectt.

In the 155th OCC meeting, MS, NRPC advised BBMB to procure ERS for their system to which BBMB replied that the decision has already been taken in the full board decision of BBMB that the partner states will provide ERS to BBMB whenever needed.

MS, NRPC stated that if such a stance has been taken by the partner states, the partner states shall procure 1 additional set each to be provided to BBMB whenever they require.

Annexure

Summary of Transmission line work being executing by various State electricity board				
SN	STATE	Tr. Line work to be expedited (Annexure-I)	Contact yet to Award (Annexure-II)	Estimate awaited (Annexure-III)
1	Madhya Pradesh	13	4	4
2	Odisha	11	2	
3	Andhra Pradesh	5		
4	Karnataka	2	4	5
5	West Bengal	5	2	
6	Assam	1	4	
7	Uttar Pradesh ✓	19	5	1
8	Haryana ✓	5	2	
9	Punjab ✓	1	2	2
10	Rajasthan ✓	5	5	7
11	Bihar	6	11	1
12	Jharkhand	2	3	
13	Gujarat	2	7	4
14	Telangana	1		
15	Tamil Nadu	2	1	3
16	Jammu & Kashmir ✓	1		
17	Maharashtra		7	
18	Chhattisgarh		1	
19	Damodar Valley Corporation Limited		5	
Total		81	65	27

Transmission line for which commissioning to be expedited

SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
1	CHHINDWARA-KALUMNA (RVNL)	Chhindwara	Linga	10.5 Kms.	MADHYA PRADESH
2	CHHINDWARA-KALUMNA (RVNL)	Boregaon	Sausar	19Kms.	MADHYA PRADESH
3	Jabalpur- Satna –Rewa (CORE)	Katni	Patwara	20	MADHYA PRADESH
4	Jabalpur- Satna –Rewa (CORE)	Maihar	Bhadanpur	13	MADHYA PRADESH
5	Jabalpur- Satna –Rewa (CORE)	Kotar	Kaima	26	MADHYA PRADESH
6	Manikpur – Shankargarh (CORE)	Sirmour	Dabhaura	56	MADHYA PRADESH
7	Manikpur – Jhansi (CORE)	Naugaon	Harpalpur	51	MADHYA PRADESH
8	Manikpur – Jhansi (CORE)	Prithvipur	Niwari	23	MADHYA PRADESH
9	Jabalpur- Nainpur – Gondia (CORE)	Lalbra	Balaghat	20	MADHYA PRADESH
10	Jabalpur- Nainpur – Gondia (CORE)	Nainpur	Ghansore	38	MADHYA PRADESH
11	Jabalpur- Nainpur – Gondia (CORE)	Nainpur	Nainpur	8	MADHYA PRADESH
12	Ratlam-Nimach (CORE)	Jaora	Jaora	5	MADHYA PRADESH
13	Ratlam-Nimach (CORE)	Mandore	Sindpan	15	MADHYA PRADESH
14	Angul-Sukinda new line (RVNL)	Kamakhya Nagar	Kamakhya Nagar	5.226	ODISHA
15	Angul-Sukinda new line (RVNL)	Jabamayee	Sukinda	3.678	ODISHA
16	Haridaspur-Paradeep (RVNL)	Marshaghai	Kendrapara	13.251	ODISHA
17	Vizianagaram-Rayagada-Titlagarh (CORE)	Munguda	Bissamcullack	13.5	ODISHA
18	Vizianagaram-Rayagada-Titlagarh (CORE)	Bhawanipatna	Lanjigarh	34.5	ODISHA
19	Titlagarh-Sambalpur-Jharsuguda (CORE)	Kanatapali	Godbhaga	13	ODISHA
20	Titlagarh-Sambalpur-Jharsuguda (CORE)	Barapali	Dungripali	8	ODISHA
21	Titlagarh-Sambalpur-Jharsuguda (CORE)	Tusura	Deogaon Road	15	ODISHA
22	Singapur Road-Damanjodi (CORE)	Theruvalli	Bhalumaska	31	ODISHA
39	Singapur Road-Damanjodi (CORE)	Lakshmipur	Kakriguma	27	ODISHA
40	Singapur Road-Damanjodi (CORE)	Lakshmipur	Tikri	24	ODISHA
23	Angul-Sambalpur (ECoR)	Boinda	Boinda	3.3	ODISHA
24	Angul-Sambalpur (ECoR)	Maneswar	Maneswar	6.09	ODISHA
25	Diguvametta- Guntakal (CORE)	Nandyal	Nandyal	6.3	ANDHRA PRADESH

SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
26	Diguvametta- Guntakal (CORE)	Somayajula-palli	Ramgapuram	2.5	ANDHRA PRADESH
27	Diguvametta- Guntakal (CORE)	Nansurulia	Pendekallu	12	ANDHRA PRADESH
28	Nallapadu- Pigidipalli (CORE)	Rentachintala	Guraj	15	ANDHRA PRADESH
29	Nallapadu- Pigidipalli (CORE)	Sattenapalli	Sattenapalli	5	ANDHRA PRADESH
30	HOSPET-BALLERY-GUNTAKAL (RVNL)	Alipura	Bellary cant	3	KARNATAKA
31	WD-RC-GTL Pkg-2 (RVNL)	Khanapur	Yadgir	12 Km	KARNATAKA
32	Katihar-New Jalpaiguri (CORE)	Dalkhola	Dalkhola	2.5	WEST BENGAL
33	Katihar-New Jalpaiguri (CORE)	Tista Canal fall	Rangapani	7.4	WEST BENGAL
34	RANINAGAR JALPAIGUDI-NEW BONGAIGAON (RVNL)	New Mayanaguri	New Mayanaguri	1.5 km	WEST BENGAL
35	RANINAGAR JALPAIGUDI-NEW BONGAIGAON (RVNL)	New Cooch Behar	Pundibari	10 Km	WEST BENGAL
36	Katwa-Azimganj (CORE)	Raghunathganj	Jangipur	7	WEST BENGAL
37	RANINAGAR-JALPAIGURI-NEW BONGAIGAON (RVNL)	-	Gosangaon	10	ASSAM
73	NEW BONGAIGAON-GUWAHATI (RVNL)	-	Kamakhya	5 km	ASSAM
38	CHHAPRA-BALLIA-GHAZIPUR-VARANASI-ALLAHABAD (RVNL)	Chitbara Gaon	Bansdin Road	29.57 Km	UTTAR PRADESH
39	CHHAPRA-BALLIA-GHAZIPUR-VARANASI-ALLAHABAD (RVNL)	Ghazipur	Ghazipur	38.52 Km	UTTAR PRADESH
40	CHHAPRA-BALLIA-GHAZIPUR-VARANASI-ALLAHABAD (RVNL)	Aurai	Kachhwa Road	15.0 Km	UTTAR PRADESH
41	UTRATI RAIBARELI-AMETHI-JANGHAI (RVNL)	Bachharawan	Harchanapur	18 Km	UTTAR PRADESH
42	UTRATI RAIBARELI-AMETHI-JANGHAI (RVNL)	Gauriganj	Gauriganj	12.5 Km	UTTAR PRADESH
43	UTRATI RAIBARELI-AMETHI-JANGHAI (RVNL)	Ranganj	Pithiganj	7 Km	UTTAR PRADESH
44	Garwa Rd- Remkut (CORE)	Rihand Thermal power station	Remkut	5.5	BIHAR-INDIA
45	Remkut- Singrauli (CORE)	Obra Thermal power station	Obra Dam	7	UTTAR PRADESH
46	Jhansi- Manikpur (CORE)	Allara	Engwai	20	UTTAR PRADESH
47	Jhansi- Manikpur (CORE)	Pahar	Khal	17	UTTAR PRADESH
48	Jhansi- Manikpur (CORE)	Ghatampur	Ghatampur	7	UTTAR PRADESH
49	Gorakhpur-Kaptanganj (CORE)	Motram	Kaptanganj	15	UTTAR PRADESH
50	Shikohabad-Farrukhabad (CORE)	Neevaura	Bhugra	3	UTTAR PRADESH

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SN.	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
51	Kaptanganj-Chhapra Kacheri (CORE)	Rajapakar	Tariyasujan	18	UTTAR PRADESH
52	Mankapur-Katra-Ayodhya (CORE)	Katra	Katra	12	UTTAR PRADESH
53	Mathura-Kasganj-Kalyanpur (IRCON)	Sikandrara	Kasganj	35	UTTAR PRADESH
54	Mathura-Kasganj-Kalyanpur (IRCON)	Kayanganj	Kempil Road	18	UTTAR PRADESH
56	Mathura-Kasganj-Kalyanpur (IRCON)	Chhibramau	Khudaganj	22	UTTAR PRADESH
56	MANHERU-HISAR (RVNL)	Hisar-Hansi LILO arrangement	Satrod	2.5 Km	HARYANA
57	REWARI-MANHERU (RVNL)	Lulaoahir	Jatusana	10.6 Km	HARYANA
58	REWARI-MANHERU (RVNL)	kalanaur	Manheru	30.0 Km	HARYANA
59	Rohtak-Bathinda-Lehra Muhabbat (CORE)	Chander khurd	Jakhhal	18	HARYANA
60	Rohtak-Bathinda-Lehra Muhabbat (CORE)	Talwandi	Maiserkhana	18	Punjab
61	Rohtak-Bhiwani (CORE)	Kalanaur	Kalanaur	4	HARYANA
62	Ajmer-Ajmer-Jaipur (CORE)	Nangal Pyariwas	khanbhakari	30	RAJASTHAN
63	Ajmer-Mavli-Udaipur (CORE)	Nasirabad	Nasirabad	9	RAJASTHAN
64	Ajmer-Mavli-Udaipur (CORE)	Senthi	Ghosunda	10	RAJASTHAN
65	Ajmer-Mavli-Udaipur (CORE)	DakanKotra	Umra	3	RAJASTHAN
66	Ajmer-Rani (CORE)	Kharachi	Marwar	3	RAJASTHAN
67	Barauni- Mansi-Katihar (CORE)	LILO arrangement at 132kV line near to Naugachhia	Naugachhia	5	BIHAR
68	Bakhtiyarpur-Manpur-Tilaiya (CORE)	Nalanda	Nalanda	6	BIHAR
69	Muzaffarpur-Valmikinagar (CORE)	Motipur	Mahwal	3	BIHAR
70	Muzaffarpur-Valmikinagar (CORE)	Motipur	Jivdhara	10	BIHAR
71	Muzaffarpur-Valmikinagar (CORE)	Bettiah	Majhauhya	10	BIHAR
72	Muzaffarpur-Valmikinagar (CORE)	Ramnagar	Harinagar	5	BIHAR
73	Garwa Road- Singrauli (CORE)	LILO arrangement near to Nagaurati	Nagaruntari	10	JHARKHAND

SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
74	Ranchi-Lohardaga-Tori (CORE)	LILC arrangement near to Piska	Piska	5	JHARKHAND
75	Ahmedabad-Mahesana-Palanpur (CORE)	Soja	Ambliyasari	43	GUJARAT
76	Ahmedabad-Mahesana-Palanpur (CORE)	Kheralu	Dharawara	53	GUJARAT
77	Nalapadu-Pagdipalli (CORE)	Miryalaguda	Miryalaguda	5	TELANGANA
78	Erode-Karur-TPJ (CORE)	Pagaluru	Pagaluru	1 km UG	TAMIL NADU
79	Erode-Karur-TPJ (CORE)	Pettaivatala	Pettaivatala	2.5	TAMIL NADU
80	Jammu Tawi- Udhampur SVDK (CORE)	Bhattal	Manwal	3.4 km	JAMMU & KASHMIR
81	Noli-Tapri (CORE)	Thanabhawan	Hind	18 Km	UTTAR PRADESH

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SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
1	Daund Manmand (RVNL)	Kopergaon	Kopergaon 2 nd feeder	2.95	MAHARASHTRA
2	Bhigwan-Solapur section of (Pune-Wadi-Guntakal) RVNL	Parewadi	Parewadi	5 km	MAHARASHTRA
3	Bhigwan-Solapur section of (Pune-Wadi-Guntakal) RVNL	LILO Kuruwadi-Jeur line	Kurtiwadi	7 km	MAHARASHTRA
4	Bhigwan-Solapur section of (Pune-Wadi-Guntakal) RVNL	Mohol	Mohol	7.5 km	MAHARASHTRA
5	Solapur-Gulberga section of (Pune-Wadi-Guntakal) RVNL	Hotagi	Hotagi	6 km	MAHARASHTRA
6	Solapur-Gulberga section of (Pune-Wadi-Guntakal) RVNL	Godgaon	Godgaon		KARNATAKA
7	CHHINDWARA-KALUMNA (RVNL)	LILO	Patansaongi	3.6	MAHARASHTRA
8	Daund-Baramati (RVNL)	Shirsufal	Shirsai	5 km.	MAHARASHTRA
9	Ratlam-Nimach (CORE)	Nimach	Nimach	11	MADHYA PRADESH
10	RAIPUR-TITLAGARH (RVNL)	Paraswani	Mahasamund	11	CHHATTISGARH
11	Haridaspur-Paradeep (RVNL)	Paradeep	SIJU	5.000	ODISHA
12	Singapur Road-Damanjodi (CORE)	Lakshmiipur	Lakshmiipur	2.5	ODISHA
61	HOSPET-BALLERY-GUNTAKAL (RVNL)	Aipura	Bellary cant	3	KARNATAKA
13	Kengeri - Mysore (CORE)	Tubalkare	Yelliyur	6	KARNATAKA
14	Kengeri - Mysore (CORE)	Hootabally	Mysore	7	KARNATAKA
15	Calicut-Mangalore (CORE)	Mangalore	Jakotte	5	KARNATAKA
16	Pakur-Malda (CORE)	Malda	Khaltipur	23	WEST BENGAL
17	Katwa-Azimganj (CORE)	Gokarna	Kharghat	16	WEST BENGAL
18	NEW BONGAIGAON-GUWAHATI (RVNL)	-	New Bongaigaon	10 Km	ASSAM
19	NEW BONGAIGAON-GUWAHATI (RVNL)	-	Sarbhog	2 Km	ASSAM
20	NEW BONGAIGAON-GUWAHATI (RVNL)	-	Nalbari	5 Km	ASSAM
21	NEW BONGAIGAON-GUWAHATI (RVNL)	-	Kamakhya	5 Km	ASSAM
22	Bhandai-Udi (CORE)	Bah	Bah	24.6	UTTAR PRADESH
23	Bhandai-Udi (CORE)	Bah	Fathabad	20.6	UTTAR PRADESH
24	Urnao-Unchahar (CORE)	Saran	Raghuraj singh	12	UTTAR PRADESH

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SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
25	Chunar-Chopan (CORE)	Robortganj	Robortganj	6	UTTAR PRADESH
26	Mathura-Achnera	Agra	Achnera	30	UTTAR PRADESH
27	Rohtak-Bathinda-Lehra Muhabbat (CORE)	Chandi	Kharainti	3	HARYANA
28	Rohtak-Bhiwani (CORE)	Kalanaur	Kalanaur	4	HARYANA
28	Delhi-Rewari (CORE)	Garhi-Harsaru	Garhi-Harsaru	4	HARYANA
29	Rewari-Phulera (CORE)	Ringas	Ringas	4	RAJASTHAN
30	Ajmer-Mavli-Udaipur (CORE)	Hamirgarh	Hamirgarh	4	RAJASTHAN
31	Ajmer Rani (CORE)	Jethana	Makrera	7	RAJASTHAN
32	Hanuman-Suratgarh (CORE)	Hanumangarh	Hanumangarh		RAJASTHAN
33	Atwar-Ajmer-Jaipur (CORE)	Nala Power house Jaipur	Jaipur	01 km UG cable	RAJASTHAN
34	JAKHAL-DHURI-LUDHIANA (RVNL)	Chajli	Chajli	1.5 Km	PUNJAB
35	JAKHAL-DHURI-LUDHIANA (RVNL)	Sandhora	KUP	12 Km	PUNJAB
36	Bakhtiyarpur-Manpur-Tilaya (CORE)	Wazirganja	Tilaya	25	BIHAR
37	Bonidanga-Barharwa-sahibganj Kiul (CORE)	Sabaur	Sabaur	5	BIHAR
38	Bonidanga-Barharwa-sahibganj Kiul (CORE)	Jamalpur	Jamalpur	5	BIHAR
39	Kaptanganj-Chhapra Kacheri (CORE)	Rajapatu	Rajapatti	10	BIHAR
40	Biharsharif-Daniawan & Fatuha-Istampur (CORE)	Ekrangar Sarai	Ekrangar Sarai	6	BIHAR
41	Darbhanga-Jaynagar (CORE)	Pandaul	Pandaul	6	BIHAR
42	Samastipur-Khagaria (CORE)	Rosara	Hasanpur	22	BIHAR
43	Raxaul-Sitamarhi-Darbhanga-	Raxaul	Raxaul	5	BIHAR
44	Samastipur	Dhaka	Bargaincha	22	BIHAR
45	(CORE)	Runnishaidpur	Bajpatti	25	BIHAR
46	Kiul Tilaya (CORE)	Shekhpura	Shekhpura	10	BIHAR
47	Bonidanga-Sahibganj (CORE)	Sahibganj	Kanacurda	5	BIHAR
48	Bonidanga-Sahibganj (CORE)	Rajmanal	Imphal	2	BIHAR
49	Ranchi-Lehardaga Ton (CORE)	Lehardaga	Lehardaga	7	JHARKHAND
50	Ahmedabad Rajkot (CORE)	Wakode	Wakode	25	GUJARAT
51	Ahmedabad -Rajkot (CORE)	Trudhal	Savaldarnagar	17	GUJARAT
52	Ahmedabad -Rajkot (CORE)	Jakhwari	Jakhwari	4	GUJARAT

SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
53	Mahesana-Viramgarm-Samakhiyali (CORE)	Mitha	Katosan	20	GUJARAT
54	Mahesana-Viramgarm-Samakhiyali (CORE)	Sadla	Sadla	44	GUJARAT
55	Mahesana-Viramgarm-Samakhiyali (CORE)	Mansar	Ghansyangarh	7	GUJARAT
56	Mahesana-Viramgarm-Samakhiyali (CORE)	Morvi	Maliya	35	GUJARAT
57	Katni - Singrauli (IRCON)	Beohari	Beohari	10 KM	MADHYA PRADESH
58	Katni - Singrauli (IRCON)	Sidhi	Marwasgram	54 KM	MADHYA PRADESH
59	Katni - Singrauli (IRCON)	Dongarital	Gajara Bahara	30 KM	MADHYA PRADESH
60	Erode-Karur-TPJ (CORE)	Namakkal	Namakkal	10	TAMIL NADU
61	Koderma- Hazaribag-Barkakana-Ranchi (CORE)	Barhi	Barhi	4.7 km	Damodar Valley Corporation limited
62	Koderma- Hazaribag-Barkakana-Ranchi (CORE)	Hazaribagh	Hazaribagh	19 km	Damodar Valley Corporation limited
63	Koderma- Hazaribag-Barkakana-Ranchi (CORE)	Sidhwar	Ramgarh	8 km	Damodar Valley Corporation limited
64	Koderma-Giridih (CORE)	Koderma	Kanweer	15	Damodar Valley Corporation limited
65	Koderma-Giridih (CORE)	Runny Saidpur	Navadih	35	Damodar Valley Corporation limited

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Estimate awaited from various State Electricity Board

SN	Electrification Project/Agency	Name of Grid Sub Station	Name of Rly TSS	Tr. Line (kms)	STATE
1	Jabalpur- Nainpur – Gondia (CORE)	Bargi	Jamtara	8	MADHYA PRADESH
2	Ratlam-Fatehabad-Laxmibainagar (CORE)	Fatehabad	Fatehabad	10	MADHYA PRADESH
3	Ratlam-Fatehabad-Laxmibainagar (CORE)	Vadnagar	Vadnagar	5	MADHYA PRADESH
4	Vijapur-Makshi	Rajgarh	Biaora	24	MADHYA PRADESH
5	Gadag-Hotgi (CORE)	Belavanike	Mallapur	3	KARNATAKA
6	Gadag-Hotgi (CORE)	Navanagar	Navanagar	2	KARNATAKA
4	Gadag-Hotgi (CORE)	Mukartihal	Basavana Bagewadi	10	KARNATAKA
8	Gadag-Hotgi (RVNL)	Kiadb	Vjayapura	8	KARNATAKA
9	Gadag-Hotgi (CORE)	Lachyan	Lachyan	2	KARNATAKA
10	Unnao-Balamau-Sitapur (CORE)	Bbangamau	Mallava		UTTAR PRADESH
11	Jaipur- Phulera- Madar	Phulera	Phulera	2	RAJASTHAN
12	Ajmer-Rani (CORE)	Haripur	Bar	13	
13	Ajmer-Rani (CORE)	Falna	Khimal	3	RAJASTHAN
14	Phulera-Madar (CORE)	Kishangarh	Kishangarh		RAJASTHAN
15	Bharatpur-Bandikui (CORE)	Nadawai	Nadawai	8.5	RAJASTHAN
16	Bharatpur-Bandikui (CORE)	Bandikui	Bandikui	10	RAJASTHAN
17	Hanuman-Suratgarh (CORE)	Suratgarh	Suratgarh	5	RAJASTHAN
18	Ara-Sasaram (CORE)	Bikram ganj	Piro	25	BIHAR
19	Samakhiali-Gandhidham-Kandla port (CORE)		Bachhao		GUJARAT
20	Surendarnagar-Pipavav		Kurdali		GUJARAT
21	Surendarnagar-Pipavav		Jalia		GUJARAT
22	Surendarnagar-Pipavav		Padada		GUJARAT
23	Trichirapali-Tanjavaur (CORE)		Tanjavaur		TAMIL NADU
24	Trichirapali-Tanjavaur (CORE)	Location yet to be finalised	Thiruvarur		TAMIL NADU
25	Trichirapali-Tanjavaur (CORE)		Karaikal		TAMIL NADU
26	Hisar-Bhatinda-Suratgarh (CORE)	Bhatinda	Gahri bhagi	7	Punjab
27	Hisar-Bhatinda-Suratgarh (CORE)	Location yet to be finalised	Mandi dabwali		Punjab





सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

No: NRPC/OPR/106/01/2018/

Dated: 26.11.2018

To: Members of the Committee (As per List)

Subject: **Minutes of first meeting of the committee formed for examining the 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 on 16.10.2018- reg.**

The first meeting of the committee constituted for examining the Problem of excessive vibrations in GTs of Rihand Stage – III and Vindhyachal Stage-IV during operation of Rihand - Dadri HVDC in monopole mode with ground return was held on 16.10.2018 at NRPC Secretariat along with 152nd OCC meeting

The minutes of the meeting are enclosed herewith for information and necessary action at your end.

PGCIL and NTPC are requested to furnish the information sought in the meeting expeditiously to this office via e-mail seo-nrpc@nic.in.

(Bhanwar Singh Meena)
Executive Engineer (O), NRPC

List of Nominated members of Committee

S. No.	Name of Officer	Name of the Organisation
1.	Sh. M. A. K. P. Singh, MS	NRPC
2.	Sh. Vikram Singh, Director (GM Div.)	CEA
3.	Sh. A. Sensharma, AGM (AM)	POWERGRID/CTU
4.	Sh. S. K. Sudhakar, AGM (EMD)	Rihand STPS
5.	Sh. R. K. Porwal, DGM (SO)	NRLDC
6.	Sh. Debashish Ghosh, AGM (EMD)	Vindhyachal STPS

Minutes of first meeting of the committee formed for examining the 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 on 16.10.2018

The first meeting of the committee constituted for examining the Problem of excessive vibrations in GTs of Rihand Stage – III and Vindhyachal Stage-IV during operation of Rihand - Dadri HVDC in monopole mode with ground return was held on 16.10.2018 at NRPC Secretariat along with 152nd OCC meeting.

Representative of NTPC briefed the members about the problems being encountered in the GTs of Rihand Stage – III and Vindhyachal Stage-IV during monopole operation of Rihand - Dadri HVDC. He stated that the problem of excessive vibrations was observed since the Unit # 5 & 6 of Rihand Stage - III are connected to the Western Region bus through the Vindhyachal Pooling Station. He further stated that during the monopole operation of HVDC Rihand-Dadri if one of the unit out of two units of Stage III is under shutdown, the intensity of vibrations in the GT of the running increases. Similar problem was also being observed in the GT of Vindhyachal Stage-IV units.

NTPC and POWERGRID has performed some test to simulate the operation of monopole operation in ground return mode on HVDC Rihand – Dadri and observed vibrations in the various GTs of Rihand Stage-III. Based on the study they have reached to a consensus that under monopole operation of HVDC Rihand - Dadri in ground return mode, the power flow should be restricted to 300 MW to restrict the vibrations within limit. At the time of testing, both the units of Vindhyachal Stage-IV were running. Representative of POWERGRID stated that during this test only one unit at Rihand Stage-III was running. In case both the units are under operation, the power flow may go up to 600 MW as the DC current through the GTs will get distributed for the acceptable limits of vibration.

NTPC representative stated that as the testing was done only for a single machine, the power flow limit cannot be commented upon for the situation when both the units are under shutdown and the HVDC is in monopole operation in ground return mode. Similar testing may be done so as to arrive at a figure of power flow which does not lead to significant amount of vibrations in the GTs.

Director, GM Division, CEA shared two instances where SSR has been reported very prominently. The first case was of Manitoba Hydro, Canada. Canada and USA are connected through an HVDC link and because of switching operation in HVDC, the rotor of one of the unit of Manitoba hydro got damaged due to SSR. The other case was of KSK Mahanadi Power Project where also SSR was observed as some line was LILOed in its vicinity. KSK Mahanadi had appointed IIT, Mumbai that has conducted study so as to provide solutions to reduce these SSR vibrations. He stated that such type of study may be required to be conducted by some academician for the excessive vibrations being encountered at Rihand Stage-III. He, further

stated that it was also the responsibility of PGCIL to get the study conducted, if in the vicinity of their line any such vibrations are reported to them.

MS, NRPC queried that if it was already planned that the Stage-III would be connected to WR bus, whether such vibration analysis was done beforehand by CTU or not.

PGCIL representative stated that the same is to be confirmed from their study group. There would have been some study carried out at the time of connecting Stage-III to NR and thereafter to WR. He stated that it was a strange phenomenon as when Stage-III was connected to NR no such vibrations were observed and now the vibrations are being reported when it is connected to WR bus for which it was actually planned. He stated that the above study report would be shared with the committee for analysis.

Representative of NRLDC stated that if there are some oscillations being observed due to SSR on the mechanical side, the same should reflect on the electrical side also, which was not the case here as no SSR vibrations were observed neither in the PMU data nor in the DR. Thus, he stated that these may not be due to SSR.

PGCIL representative stated that they are planning shutdown of one pole of Rihand-Dadri in the last week of October or first week of November 2018. The vibration measurements could be done during the shutdown period.

NRLDC representative requested PGCIL to share with the committee, the report of any study conducted before shifting Rihand Stage-III to WR either by PGCIL or by the study group of PGCIL regarding the ground return impedance. PGCIL representative stated that such kind of a study/ review may be done as the system (HVDC Rihand – Dadri) is under service since past 30 years and many generator has come into service during this time like Sasan, Singrauli, Anpara, Obra in and around the Rihand complex.

NTPC representative further stated that whenever the ground return operation of an HVDC is planned, such type of study would have been conducted well in advance before they are commissioned.

POWERGRID representative stated that many elements / generator have come around the area later and it was not intended that the ground currents should go in to any of the element. Till now such kind of problem was never observed and now that the same is being reported a study may got conducted to examine the ground return impedance in and around Rihand complex.

NTPC representative stated that ground current in an HVDC monopole operation complete its path through the earth electrode at the two ends. There may have been some deterioration in the earth electrode because of which the ground current is taking some other path or the resistivity of the earth would have also changed.

SE (O) expressed that the resistivity of the earth and the health of earth electrode also needs to be verified and taken into account.

NRLDC representative stated that the reason as to why the DC current was more in the Stage-III GTs and less in stage-I & II also needs to be looked into. Any difference in the resistivity of the two areas should also be verified.

NTPC representative stated that the vibrations were observed not only in Stage-III but also in Stage-IV of Vindhyachal STPS. He stated that such vibrations are being observed in Vindhyachal Stage-IV since past one and a half years. However, its severity has increased since Rihand Stage-III got connected to WR bus. On the query of NRLDC about the data of DC current recorded in Vindhyachal Stage-IV when the vibrations were initially observed, NTPC representative stated that at that instance no such measurement was done as they were not aware of the actual cause of vibrations in the GTs. However, the data has been recorded since vibrations were observed in Rihand Stage-III and were shared with POSOCO.

NTPC was requested to share the data with the committee also.

Director, GM Division, CEA queried NTPC about whether rotor of some of its generators at Rihand had been damaged and replaced in past to which representative of NTPC replied negatively and stated that some problem in the exciter was reported in the past but nothing was reported in the rotor side. MS, NRPC requested NTPC to clarify the same from Rihand station.

PGCIL representative requested NTPC to collect the DC current capability of the GTs installed at Rihand from the OEM and the same be shared with the members of the committee.

NTPC representative stated that restriction of power flow on the HVDC link was the only solution to which members replied negatively stating that it was not an economic solution. On pursuance of NTPC, members suggested NTPC to back down their generation rather than reducing power flow on HVDC. NTPC representative stated that there was sufficient power evacuation corridor available for evacuation of their generation and there was no need for them to back down.

MS, NRPC stated that before inviting any academician to the committee, it was necessary to share all the data with the committee members so that the same may be analyzed. NTPC and PGCIL stated that the same would be submitted within a week.

MS, NRPC queried NTPC, whether they had communicated or had some discussions with the GTs OEM as the vibrations were being observed in the new GTs only. NTPC representative stated that it was not an issue of any defect in GTs as when the Stage-III of Rihand is connected to NR bus, there were no such vibrations observed.

PGCIL representative stated that the limiting values of vibrations in all the GTs and that recorded during monopole operation needs to be submitted by NTPC to the committee.

NTPC representative stated that if the data submitted by them is not found to be sufficient, the test may be conducted again and the data shall be shared with the committee.

PGCIL representative stated that the measurements for vibrations shall be taken at the points on the GTs as specified by the manufacturer and compared accordingly.

MS, NRPC requested PGCIL to share the study carried out by them based on which Dedicated Metallic return was opted in HVDC Champa-Kurukshetra.

Regarding the condition of earth electrodes at the two ends, PGCIL representative informed that there has not been any significant corrosion and it may not be the reason for vibrations due to DC currents in the GTs.

Ms, NRPC queried NTPC that whether such vibrations was also observed at Sasan to which NTPC representative stated that the same would be verified with Sasan and reported to the committee.

NTPC and PGCIL was requested to submit all the information as brought out in the meeting at the earliest to the committee members for study before the next meeting.