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

संख्या: NRPC/OPR/106/01/2019/14619-14660 दिनांक: 28.11.2019

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 165वीं बैठक का कार्यवृत |

Subject: Minutes of 165th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 165वीं बैठक 15.11.2019 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट http://www.nrpc.gov.in पर उपलब्ध है। यदि कार्यवृत पर कोई टिप्पणी हो तो कार्यवृत जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें |

165th meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 15.11.2019. The Minutes of this meeting has been uploaded on the NRPC website http://www.nrpc.gov.in. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक: यथोपरि

(सौमित्र मजूमदार)
अधीक्षण अभियंता (प्रचालन)

सेवा में,

प्रचालन समन्वय उप-समिति के सभी सदस्य

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Minutes of the 165th meeting of the Operation Coordination Sub-Committee (OCC) of NRPC

165th meeting of OCC of NRPC was held on 15.11.2019 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at ***Annexure-A.I***.

PART-A: NRPC

1. Confirmation of Minutes

Comments from **PSPCL**:

In agenda point No. 3 of Part B the statement "*Order has been placed and will be delivered till **March-2019**."* shall be replaced with "*Order has been placed and will be delivered till **April-2020**."*

Comments from **PGCIL**:

In agenda point No. 2 (b) of Part B the statement "*After the deliberation and consensus of OCC forum, Member Secretary advised that routine replacement and upgradation work of substation equipment like CT, PT, CVT, CB, Isolator, LA etc. may be allowed on the basis of undertaking stating that all the safety measures have been taken care by respective transmission licensees **and a copy of application to the concerned authority for safety clearance**."* shall be replaced with the following

"*After the deliberation and consensus of OCC forum, Member Secretary advised that routine replacement and upgradation work of substation equipment like CT, PT, CVT, CB, Isolator, LA etc. may be allowed on the basis of undertaking stating that all the safety measures have been taken care by respective transmission licensees **and a copy of same shall be sent to CEA with details of make & Sl.No. of the replaced equipment for their information and records."***

i. After due deliberation the forum accepted the amendments as sought by PSPCL, therefore, statement in agenda point No. 3 of Part B was amended as "*Order has been placed and will be delivered till **April-2020**."*

ii. In agenda point No. 2 (B) of Part B the amended statement after due deliberation reads as follows:

> ***"After the deliberation OCC forum opined that routine replacement and upgradation work of substation equipment like CT, PT, CVT, CB, Isolator and LA may be allowed on the basis of undertaking stating that all the safety measures have been taken care by respective transmission and generating utilities and a copy of application along with undertaking to the concerned authority for safety clearance may be submitted**."*

iii. The following statement before Part-A of the minutes "*164th meeting of OCC of NRPC was held on 15.10.2019 at **NRPC Secretariat, New Delhi**."* was also

replaced with *"164th meeting of OCC of NRPC was held on 15.10.2019 at **NTPC, Dadri, UP**."*

OCC confirmed the minutes along with the above three (03) amendments.

It was also decided that CEI Division, CEA will be intimated about the deliberation at sl. no. ii above.

2. Review of Grid operations of October 2019

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

Sub Committee was informed that the data of Haryana & Himachal Pradesh were inadvertently got exchanged with each other and similarly, the data of Uttar Pradesh and Uttarakhand were also inadvertently exchanged with each other in the agenda. Further, it was informed that there were variations (i.e. > 5.0%) in the Anticipated Vis-à-vis Actual Power Supply Position (Provisional) for the month of October, 2019 in terms of Energy Requirement for all states and UTs of Northern region and in terms of Peak Demand for all states and UT except Haryana and J&K.

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

Delhi - There is no load shedding due to shortage of power. Due to change in weather condition, there is negative growth in energy demand.

Haryana - The consumption and load decrease is because of weather parameters in the month of October.

Punjab - Due to festive season in the last week of October19. Due to early sowing of paddy, which was advanced by a week, lesser AP supply hours was given in October 19 on account of early maturity of crop. The south west monsoon retreat was delayed this year thus resulting into lesser demand. The paddy crop in about four-five districts of Punjab was damaged in the month of August 19 due to continuous opening of Bhakra flood gates. This caused reduced demand in later months due to permanent crop damage.

Rajasthan - Due to delay in end of monsoon. Due to fall of avg. temperature in night (16.5°C) as compared to last years (20°C)

Uttarakhand - Due to extended monsoon during Oct'19.

UP - Due to mild weather in Oct'19 and better demand side management by DISCOMs

2.2. Power Supply Position for NCR:

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

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

2.3.1. Frequency remained within the IEGC band for **77.05%** of the time during

October 2019, which is lower than that of last year during same month (October 2018) when frequency (within IEGC band) remained 79.19% of the time.

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

2.3.3. Maximum and minimum load for the region during October 2019 were 50,630 MW (16.10.2019 at 19:10 hrs) and 28,553 MW (28.10.2019 at 03:20 hrs).

2.3.4. The average Thermal generation in October 2019 decreased by 22.41 % (148.68 MU/ Day) with respect to the corresponding month in the previous year. The details are enclosed at ***Annexure-A.II (A).***

2.3.5. The average Hydro generation in October 2019 decreased by 11.28 % (22.03 MU/ Day) with respect to the corresponding month in previous year. The details are enclosed at ***Annexure-A.II (B).***

2.3.6. The average Nuclear generation in October 2019 increased by 3 MU/ Day as compared to corresponding month in previous year. The details are enclosed at ***Annexure-A.II (C).***

2.3.7. The average Renewable generation in October 2019 decreased by 0.63 MU/ Day with respect to the corresponding month in previous year. All utilities were requested to send the data for renewable generation regularly. The details are enclosed at ***Annexure-A.II (D).***

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

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

2.3.10. The new elements charged were discussed and the list is attached at ***Annexure-A.II (G)***.

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units.

The maintenance programme for Generating Units for the month of December 2019 was discussed on 14.11.2019 at NRPC Secretariat, New Delhi. The proposed shutdown of Unit#1 of APCPL Jhajjar for boiler OH, LP Turbine OH & modification for environmental norms was discussed and agreed by OCC forum

3.2. Outage Programme for Transmission Elements.

The maintenance programme for Generating Units for the month of December 2019 was discussed on 14.11.2019 at NRPC Secretariat, New Delhi. Proposed shutdown of POWERGRID's 765 kV Aligarh – Jhatikara ckt-1 for pre winter maintenance , 765 kV Agra-Jhatikara ckt-1 for tower strengthening works were discussed and agreed by OCC forum.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region during November 2019

4.1.1. **Delhi SLDC** informed that anticipated peak demand will be 4500 MW in place of 4450 MW.

4.1.2. **Haryana SLDC** informed that anticipated peak demand will be 7100 MW in place of 6870 MW.

4.1.3. **Uttarakhand SLDC** vide mail has informed that anticipated energy availability will be 1038.5 MU in place of 1130 MU and the anticipated energy requirement will be 1054 MU in place of 1170MU. Further, anticipated peak demand will be 1900 MW in place of 2150 MW and anticipated peak availability will be 1850 MW in place of 2090 MW.

4.1.4. **HP SLDC** informed that anticipated energy availability will be 921 MU in place of 1060 MU and anticipated energy requirement will be 919 MU in place of 920 MU. Further, anticipated peak availability will be 1595 MW in place of 2120 MW.

4.1.5. **UP SLDC** has informed that anticipated energy availability will be 9300 MU in place of 9350 MU and the anticipated energy requirement will be 8370 MU in place of 8850 MU. Further, anticipated peak demand will be 15000 MW in place of 16000 MW and anticipated peak availability will be 15500 MW in place of 16050 MW.

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

5.1. OCC was briefed about the outcome of the meeting held on 01.11.2019 along with the timeline for various activities. The date and time as intimated by the SLDCs for which their respective data is collected is as under:

Delhi: - 10.07.2018 (15:26:58 Hrs)

Rajasthan: - 13.01.2018 (08:15 Hrs)

Uttar Pradesh: - 12.08.2019 (20:00 Hrs)

Haryana: - 11.07.2018 (00:45 Hrs)

Punjab: - 10.07.2018 (10:45 Hrs.)

5.2. Punjab intimated the aforementioned date and time on 13.11.19. However, in order to stick to the timelines as decided in the meeting held on 01.11.19, it was decided to start the study of Haryana in the first instance in place of Punjab.

5.3. NRLDC representative informed that the basecase file for the date and time as specified by Haryana has been prepared and sent to Haryana for any comment.

5.4. Haryana representative was requested to verify the base-case file as prepared by NRLDC after which the same could be forwarded to CPRI for going ahead with the study of Haryana.

6. Phase nomenclature mismatch issue with BBMB and interconnected stations

6.1. The information has been submitted by Rajasthan, BBMB and Punjab. UP and Delhi were requested to provide the information in the specified format, duly signed by Chief Engineer, SLDC.

6.2. All other utilities were advised to submit the desired information in the prescribed format, duly signed by the respective Chief Engineer, SLDC by 30.11.2019.

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

The detail of the updated status as discussed in the 165th OCC meeting is placed at ***Annexure-A.III***.

8. System Protection Scheme (SPS) in NR

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

UP informed that the testing of revised logic is expected to be done by 30.11.2019.

8.2. SPS for Kawai – Kalisindh - Chhabra generation complex

The in-principle approval of the logic to be implemented was given by NRPC Secretariat based on the approved logic in OCC meetings vide letter dated 11.11.2019.

Rajasthan representative informed that the revised SPS will be implemented within 02 months. OCC advised Rajasthan to compress the implementation schedule.

Further, it was informed that some data has been received from BHEL and was mailed to NRPC. NRLDC was requested to verify the same and revert accordingly.

9. Automatic Demand Management System

9.1. Punjab SLDC informed that at SLDC level, remote tripping of 110 feeders at 66 kV is possible.

There is also a proposal of Software OEM for display of drawal at various points through RTU which can extend software controlled service of CB operation in control room to regulate drawal under pre-defined logic (OD ≥ 150MW or Frequency ≤ 49.85Hz). This scheme may be implemented with the addition of extra module and minimal hardware. In this regard, a meeting is scheduled to be held with M/s Siemens and the outcome of the same would be updated to the forum.

9.2. UP SLDC informed that they had taken up the matter with their SCADA team which was of the view that under present circumstances, the ADMS scheme could not be implemented. UP was advised to coordinate with Punjab SLDC and look for the logic being proposed by them to M/s Siemens.

9.3. HPSEBL representative stated that 02 feeders could be operated from SLDC through manual intervention. In this regard, letter has been sent to HP-SLDC for making its operation automatic.

10. Cyber Security Preparedness Monitoring

10.1. Members were informed about the training on cyber security which was conducted on 11.11.19 at NRPC Secretariat through C-DAC.

10.2. Representative of NPCIL shared the details of the cyber-attack which was reported in Kudankulam nuclear power plant. In view of the above all the utilities were advised to observe extreme caution and ensure cyber security preparedness of their infrastructure.

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

11.1. It was decided in the 164th OCC meeting that SLDC shall regularly check UFR, df/dt mapping display and share the changes on monthly basis to RLDC before 5th of every month for further updation at NRLDC SCADA. SLDC shall also calculate the average % data availability on monthly basis and report the same to NRPC/ NRLDC.

11.2. NRLDC has conducted video conferencing (VC) meeting with SLDC- UP, Haryana, Punjab and Rajasthan.

11.3. **General Recommendations:**

11.3.1. Each state SLDC shall check the UFR, df/dt display in view of desired load relief, % actual load relief (monthly average), % data telemetry (monthly) and changes in the SCADA mapping points or any other changes in UFR and df/dt mapping & share with NRLDC/ NRPC by 5th of every month.

11.3.2. Each state SLDC shall calculate the quarterly average of actual load of each feeder mapped in UFR and df/dt, calculate the yearly average and cross verify the designed load relief figure with yearly average value. (one time exercise in a year). **(Time Frame- 30 days, All SLDC)**

11.3.3. Complete updated list of feeders identified for UFR and df/dt (stage wise information) based load relief along with nature of load (radial/ non radial) to be provided. **(Time Frame- 30 days, All SLDC)**

11.3.4. Relay specific details of UFR and df/dt relay shall be shared in desired format attached as Annexure. **(Time Frame- 30 days, All SLDC)**

11.3.5. SCADA Analog and Digital data shall come into the SCADA mapping. All the state utilities shall plan the new scheme for RTU implementation and communication system and further expedite the process of ongoing scheme.

11.3.6. Each state SLDC shall share the name and contact details (Mobile number, Mail ID etc) of two nodal officers for UFR, df/dt relay related communication with NRLDC/ NRPC. **(Time Frame- 7 days, All SLDC)**

11.3.7. SCADA Mapping shall be done in common format in all the SLDCs. Sample format is tabulated below:

UFR or df/dt stage (Name and setting)	State/ Utility	S. No.	S/S Name and Voltage Level (in kV)	Feeder name along with voltage level (in kV)	Designed load relief (Average)	SCADA data			UFR or df/dt relay status (in service- Green/ out of service- Red/ Relay operated- Blue)	Alternate SCADA data			Remarks
						Digital data status of CB (ON/ OFF)	Station end (MW)	Remote end (MW)		S/S Name and Voltage level (in kV)	Feeder name along with voltage level (in kV) or Transformer Name with both voltage level	MW Flow	

11.4. NRLDC requested NRPC to follow up of this agenda point also in TeST committee meeting to monitor the progress of implementation of the various scheme for availability of SCADA analog and digital data of all the main feeders. Target shall be finalized and monitored for data telemetry of the main feeders come under

defense mechanism

State Specific Points:

11.5. **Uttar Pradesh:**

11.5.1. Name of the feeders was not updated in the SCADA UFR mapping. Analog data and digital data were not available for most of the main feeders that's why healthy remote end of higher voltage level or ICT data was mapped as a main UFR feeder. Name and SCADA data of alternate feeders was mapped for next highest voltage level. It resulted into false impression of actual load relief. SCADA mapping needs to be revised with actual feeder name and respective details.

11.5.2. Total stage wise sum of planned and actual load relief also to be mapped in both UFR and df/dt stages

11.5.3. Non-availability of analog/digital data of most of the main feeders for all the UFR stages and some of the df/dt main feeders.

11.6. **Haryana:**

11.6.1. Name of the feeders was properly updated in the SCADA mapping but analog and digital data was not available for some of the main feeders. Name and SCADA data of alternate feeders was also mapped.

11.6.2. Analog & digital data of many of the main and analog data of alternate feeder was suspected.

11.6.3. UFR & df/dt relay field status (enable or disable) has already been mapped in SCADA for some of the locations.

11.6.4. Some of the feeders showing reverse direction of MW value.

11.6.5. Summation of alternate feeder data also to be done.

11.6.6. It was observed that some of the feeders were mapped in both UFR & df/dt scheme.

11.7. **Punjab:**

11.7.1. Name of the feeders was properly updated in the SCADA mapping but analog and digital data was not available for many of the feeders. Name and SCADA data of alternate feeders was not mapped where main feeder data was available.

11.7.2. Analog & digital data is partially available for main feeders.

11.7.3. Some of the feeders showing reverse direction of MW value.

11.7.4. Analog (MW value) and digital data of alternate feeder for all main feeder yet to be added. Summation of alternate feeder data also to be done.

11.7.5. Mapping of UFR & df/dt status in view of relay status at field enable or disable.

11.7.6. RTU would be installed at 100% of the 220 & 132kV station till December-2020.

11.7.7. Total designed load relief of each stage of UFR and df/dt was almost similar to stipulated load relief. Designed load relief should have at least 1.4 times of the target load relief to achieve the actual target. Other states are doing the same practice.

11.8. **Rajasthan:**

11.8.1. Name of the feeders and alternate feeders was properly updated in the SCADA mapping but analog data and digital data was not available for most

of the main feeders in UFR (Under Frequency Relay) mapping.

11.8.2. Digital data status was not available for most of the df/dt (Rate of change of frequency) mapping.

11.8.3. Total actual load relief & designed load relief of each stage of df/dt was less than the target load relief.

11.8.4. Summation of MW value of alternate feeder was not matching with the value.

11.8.5. New scheme for installation of RTU for all 132kV stations is under progress and would be completed before Feb-2020. After completion of the project data telemetry would be available for all the UFR & df/dt locations.

11.8.6. Mapping of UFR & df/dt relay field status (enable or disable) in SCADA shall be done

12. Non-operation of LVRT/ Protection related problem observed during an event on 16.09.2019 at 400/220kV Bhadla (PG)

12.1. SE (O), NRPC informed the forum that the issue was deliberated in a special meeting on 13.11.2019 at NRPC Secretariat.

12.2. The outcomes of the meeting are:

12.2.1. Presently, the solar developers are ensuring LVRT compliance at the inverter terminal, however, the compliance need to be ensured at the inter-connection point with the grid. Solar developers were advised to comply with the same and in case of any difficulty they may approach CEA.

12.2.2. Citing the lack of availability of data of the solar stations at NRLDC and SLDC level, it was decided that for ISTS connected solar generators, requisite information shall be made available with NRLDC by the solar developers and for the intra-state connected solar generators, it is the responsibility of SLDC to collect the information from the generators and make it available to NRLDC/NRPC for analysis and other operational purposes.

12.2.3. For ensuring the above mentioned requirement, the need for having PMU at the generator end was felt. Also, the requirement was highlighted for ensuring the frequency of data made available from the solar generators in msec.

12.2.4. Further, a Standing Committee having representation from NRLDC, CEA, Rajasthan SLDC and 03 solar developers under the chairmanship of SE (O), NRPC was decided to be formed to come up with guidelines for ensuring uniformity in settings of various solar plants and handle solar and wind generation related issues.

12.3. OCC appreciated the initiative in view of the huge quantum of solar and wind generators which would be integrated in the coming time.

13. Complete outage of Multi Terminal HVDC BNC-APD-Agra on 16th Sep 2019

13.1. PGCIL representative stated that the reply to the clarifications which were sought by NRPC Secretariat are submitted via e-mail dated 11.11.19.

13.2. SE (O), NRPC informed PGCIL representative that the reply received from POWERGRID does not portrays a clear picture of the reason for occurrence of fault

and the remedial action taken.

13.3. In view of the above, it was decided that a separate Protection Analysis Sub-Group (PSAG) meeting may be held explicitly to deliberate the event, having representation from NRPC Secretariat, NRLDC, PGCIL and Adani Power Limited (special invitee).

13.4. PGCIL representative was advised to convey the same to the concerned personnel in their organisation.

14. Certification of personnel involved in planning at CTU and STU

14.1. OCC forum were apprised about the draft proposal prepared by NLDC proposal for certification of Power System Planners. The draft proposal is available on https://bit.ly/34ETioV.

14.2. All STUs were requested to go through the draft proposal and submit their comments, if any by 20.11.2019 to NLDC/ CTU.

15. Replacement of 450 MVA ICT-2 at BBMB, Panipat (agenda by PGCIL)

15.1. OCC in-principle approved the proposal of POWERGRID to replace all three phase units of 3x150 MVA ICT-2 at BBMB Panipat with new units through additional capitalization subject to consent from Haryana.

15.2. Haryana representative was advised to take up the matter with their management at the earliest and revert to NRPC Secretariat by next week.

16. Significant mismatch in SCADA and SEM Drawl Data (agenda by UHBVN)

16.1. It was informed that matter was deliberated at length in the TeST Sub-Committee meeting dt. 14.11.2019 at NRPC Secretariat. Further, NRLDC representative stated that the particular incident as being brought out by UHBVN occurred as the data of Jind-Kirori and Mahendargarh-Dhanonda line became freezeed (19.10.19) and fluctuating conditions (27.10.19) to the tune of 150-200 MW (on each circuit) respectively.

16.2. So as to avoid such issues, all SLDCs and Haryana in particular was advised to take data from both ends so as to maintain redundancy and prevent deviation charges due to lack of availability of real time data.

17. Tower sabotage by militant in Shopian area of Budgam district (Table agenda by PGCIL)

17.1. PGCIL representative informed that New Wanpoh (Distt.: Anantnag) and Wagoora (Distt.: Badgam) stations of POWERGRID are located in Kashmir Valley for catering the need of power supply. There are four lines on D/C tower from New Wanpoh to Kishanpur connecting the valley. On 24th October, the D/C line tower at location no. 348 of 400 KV Wagoora-New Wanpoh-1 & 2 had been sabotaged by militant in Shopian area of Budgam district.

17.2. Two legs B & C have been cut from stub by using gas cutter. Some photographs are attached herewith for reference. A note was also left at site by the militants that no one should try to restore the tower legs otherwise there would be serious

consequences.

17.3. The area lies in south Kashmir which is very sensitive and notorious for militant activities and it was not possible to approach without proper police protection.

17.4. It was informed that the next day the complaint was lodged with local police and temporary measures had been taken under police protection in order to keep the tower intact. However, possibilities are being explored for permanent rectification of the tower. This would need at least seven days of outage on both the ckts.

17.5. He further stated that the conditions being faced by POWERGRID staff in Kashmir valley are not only beyond the control of POWERGRID but life threatening also. Any outage due to terrorist activities such as above shall be treated accordingly and the outage shall not be held on account of PGCIL.

17.6. NRPC Secretariat advised PGCIL to restore the tower at the earliest and stated that the request for deemed availability would be examined at the time of submission of outage details for certifications of availability.

18. Requirement of schedule for De-Nox Boiler Modification Test (Table agenda by APCPL)

18.1. APCPL representative informed that APCPL, Jhajjar has carried out boiler modification in Unit # 3 for reduction of NOx emission in line with new environment norms, amended on 7th December 2015. The modification has been carried out by M/s BHEL.

18.2. The contractual terms envisage Performance Guarantee Test as an integral part. He stated that the tests have to be carried out at Full Load Generation on the Unit (# 3). The Full load requirement at the unit is for approximately 18 hours in a total of 3 tranches, i.e. full load of 500 MW in three (3) tranches of six (6) hours each.

18.3. On the request of providing schedule so as to facilitate De-Nox Boiler Modification Test, OCC forum gave its in-principle approval. APCPL was advised to intimate the date for which the schedule was required to NRLDC/NRPC.

19. Requirement of schedule for Ramp Test (Table agenda by APCPL)

19.1. APCPL representative stated that APCPL is serving the grid and generating as per schedule requirements and are also fulfilling the ramp of schedule as envisaged. In view of the new regulations for 'Ramp Test' they would like to test their machines for 2% and 3% ramp rate also. This shall also help them in documenting the effects of ramp on their unit parameters.

19.2. It was stated that they want to carry out Ramp Tests in all the three (3) units. At present two (2) units are on bar, Unit # 1 and Unit #3 and the test may be performed on them at the earliest. The third unit checks may be planned for mid- December 19. Accordingly, APCPL requested for providing schedule from Technical minimum (Gross 275 MW) to Full Load (gross 500 MW) and ramp back in staggered manner as under:

S. No.	Block	Gross Generation (MW)	Change in Schedule (MW)
1	1	275	0
2	2	350	37.5

3	3	350	0
4	4	425	37.5
5	5	425	0
6	6	500	37.5
7	7	500	0
8	8	425	(-)37.5
9	9	425	0
10	10	350	(-)37.5
11	11	350	0
12	12	275	(-)37.5

19.3. The above schedule revision may be provided on different occasions so as to facilitate ramp tests for ramp up and ramp down for each of the three units for 1%, 2% and 3% tests.

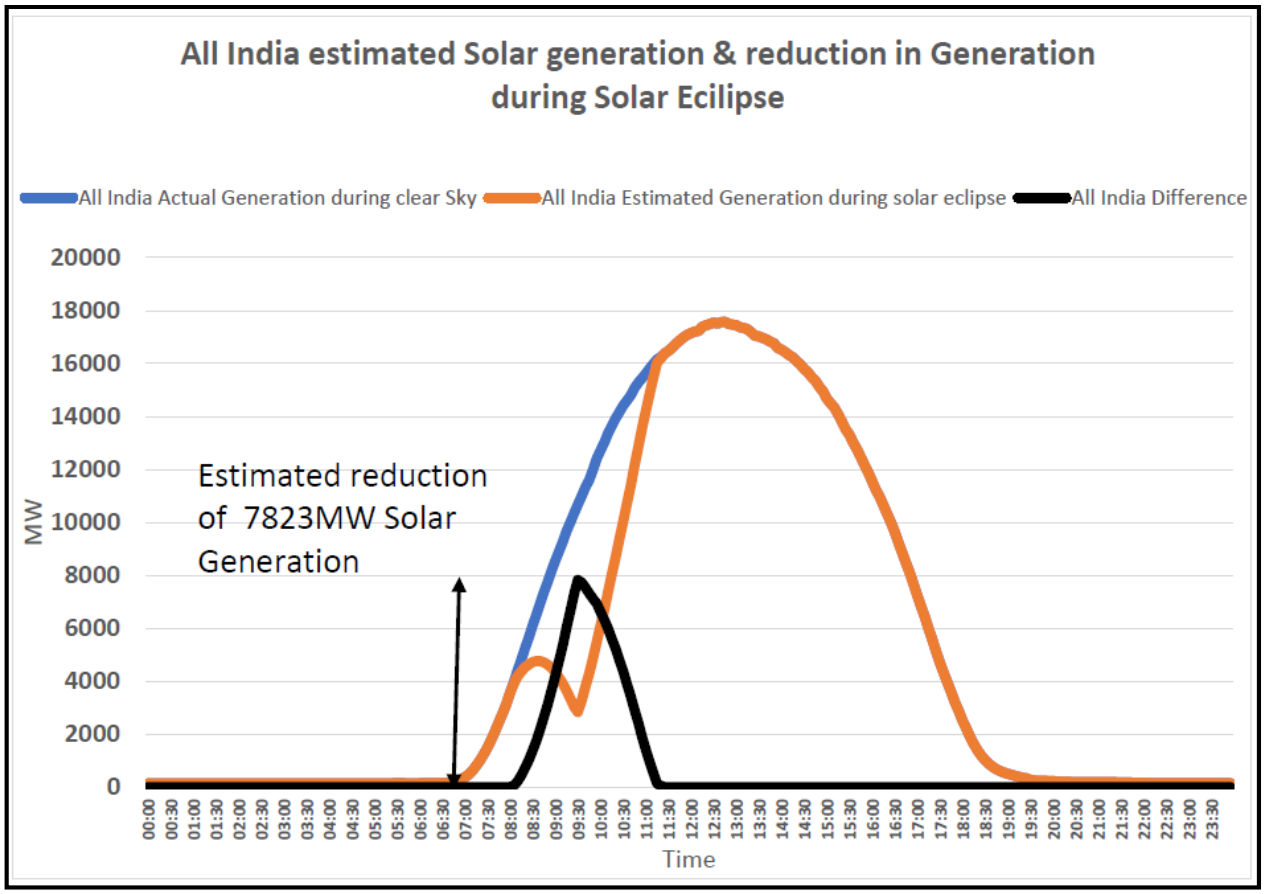
19.4. OCC forum gave its in-principle approval for providing the aforementioned schedule. APCPL was advised to intimate the date for which the schedule was required to NRLDC/NRPC.

Part-B: NRLDC

1. 2019-20 Solar eclipses Preparation:

NRLDC representative stated that as discussed in 162nd OCC meeting, India is expected to witness two annular solar eclipses on 26th Dec 2019 and 21st Jun 2020. Since share of solar generation has been on increasing trend and has significant portion in our portfolio, it is necessary that we prepare ourselves for impact of solar eclipse on this solar PV generation.

For 26th Dec 2019 solar eclipse, it is estimated that eclipse shall lead to reduction of PV generation by approximately 7823MW on all India basis. During initial period of eclipse, the generation is likely to reduce by 1124 MW in 1:15 hrs. However, after maximum magnitude of the solar eclipse, the generation from the solar PV plant is likely to increase by 13344 MW in 1:50 hrs. This condition will pose serious challenge to system operators to maintain load and generation balance during the eclipse period i.e. 08:04 AM to 11:58 AM. (Final estimation of reduction in PV generation would be carried out in the first fortnight of December 2019)



It is estimated that Northern Region PV generation would decrease by approximately 1000MW within 1.00 hour from start of eclipse and would increase by almost 2100 MW within 1:45 hrs after the maximum impact of the eclipse.

To maintain the load generation balance due to reduction in PV generation during solar eclipse, around 7823 MW generation (pan-India') from other sources (i.e. Thermal, Hydro, and Gas) is required within a short duration of time. There could be 1 to 2 % average drop in demand during the eclipse compared to a normal day due to human behaviour.

Following points were discussed and actions finalized during OCC meeting:

- Power output from PV plants is highly dependent on Cloud coverage. Day ahead forecast of PV is very important for 26th December 2019.
- State utilities especially Rajasthan shall estimate the total solar power reduction, ramp rates and anticipated demand reduction due to Solar eclipse. All the constituents shall prepare an operational plan to maintain the load and generation balance during the eclipse period.
- Advance coordination between SLDCs /RLDCs and NLDC is required to address ramp issues
- Keeping all state hydro units on bar and maintaining generation at minimum possible levels before start of the eclipse and increasing the generation once Solar eclipse starts. If required gas stations can also be kept on bar.
- Ramp up and Ramp down during solar eclipse start and end time needs to be closely monitored.
- Planned Shutdown of Conventional Power Stations / Transmission lines may be avoided on 26th December 2019.

- HVDC set points may be kept such that adequate margin is available to tackle any contingency during solar reduction or major over drawl by states from inter-regional corridor.
- Data such as irradiance, Power, Temperature, wind speed etc of all the plants of 50 MW and above may be shared with NRLDC /NRPC after actual impact.

Apart from this, contact details of different control centres (including solar generators) available with NRLDC were shared in the meeting and utilities were asked to keep necessary contact details of all control centres ready with them.

2. Demand and Generation projections of Q4 2019-20 for POC charges calculation

In line with CERC sharing of ISTS charges and losses regulation 2010 and subsequent amendments thereof, all the DICs have to submit the data for new transmission assets, Yearly transmission charges (YTC), forecast injection and withdrawal and node wise injection/withdrawal data to implementing agency for computation of PoC charges and losses for the application period. The format for data submission is available on NLDC website at **https://posoco.in/transmission-pricing/formats-for-data-submission/.**

NLDC vide its letter dated 09.10.2019 had requested utilities to furnish Technical and commercial data for Jan'20-Mar'20 Q4 (2019-2020). Further, generation and load projection has been done by NLDC/RLDCs based on monthly maximum injection/demand met in the last 3 years from actual metered data and accordingly projections have been made as attached in Annexure-I of agenda.

Following was discussed in the meeting:

- Data as submitted by Haryana, UP and NTPC was finalised
- HP representative shared their data. Demand and generation of HP were finalised as 1768MW and 340MW respectively.
- NHPC representative agreed to share data within one week.
- Rajasthan representative stated they would share data shortly after approval from higher authorities.
- Other utilities were also requested to share their data at the earliest.

3. Tap optimization exercise in Northern region

NRLDC representative stated that based on present tap positions details provided by NR-1, NR-2, NR-3, and RRVPNL and scatter plots of nodes for the month of October 2019, need for tap change at different nodes has been studied. Study report was attached as Annexure-II of agenda.

OCC approved the tap change exercise to be carried out at nodes as suggested in study report and asked utilities to coordinate so that it could be completed within next few weeks.

Apart from this, NRLDC once again asked all the states to optimize tap changes at lower voltage levels so that VARs injection from low voltage side to high voltage side in the grid is minimized. This shall help to tackle issue of high voltages in the grid.

Delhi SLDC representative stated that tap position of all 220kV and below voltage level have been already optimized but still due to MVAr generation from cables it is difficult to control high voltages.

It was also decided that SLDCs shall furnish month wise consolidated details of tap changes carried out at 220kV and below voltage levels.

4. Reactive power performance of generators

NRLDC representative stated that reactive power response of generating stations is being regularly discussed in OCC meetings. Reactive power response from generators in respect of MVAr vs Voltage for 24.10.19 - 08.11.19 as per NRLDC SCADA data was enclosed in Annexure-III of agenda. Based on available data, it is observed that there are margins available as per capability curves for most of the generating stations and hence more MVAr absorption could be done. In addition, telemetry (sign and magnitude of MVAR) of various generating station is yet to be corrected. The matter has been discussed in numbers of OCC/TCC meetings, still significant improvement is yet to be seen.

Based on available data, MVAr performance of generators is shown below:

Rihand:	Absorbing up to 350 MVAr
Singrauli:	Absorbing up to 250 MVAr
Dadri Stage1:	Generating and absorbing in range of 80 to -60 MVAr **(can absorb more MVAR)**
Dadri Stage2:	Generating and absorbing in the range of 80 to -80 MVAr **(data needs check) (can absorb more MVAR)**
IGSTPP Jhajjar:	Generating and absorbing in the range of 150 to -250 MVAr **(can absorb more MVAR)**
Unchahar:	Absorption and generation -50 to 100 MVAr **(MVAr response needs improvement)**
Anpara-C:	Generating up to 150 MVAR most of the time **(MVAr response needs improvement)**
Bara TPS:	Generating MVAR most of the time **(data needs check)**
Anpara-D:	Absorption and generation -100 to 100 MVAr **(MVAr response needs improvement)**
Anpara TPS:	Absorption and generation -50 to 100 MVAr **(MVAr response needs improvement)**
Khedar:	Absorption and generation -250 to 50 MVAr **(can absorb more MVAR)**
Kawai:	Absorption and generation -200 to 50 MVAr

Kalisindh:	Absorption and generation -200 to 100 MVAr
Suratgarh:	Absorption and generation -100 to 100 MVAr **(Telemetry not reliable)**
Chhabra:	Absorption and generation -100 to 100 MVAr
Rajpura:	Generating MVAR most of the time **(data needs check)**
Talwandi Saboo:	Absorption up to 300 MVAr

IEGC Section 6.6.6 states that:

"*The ISGS and other generating stations connected to regional grid shall generate/absorb reactive power as per instructions of RLDC, within capability limits of the respective generating units, i.e. without sacrificing on the active generation required at that time. No payments shall be made to the generating companies for such VAr generation/absorption."*

In this regard, it was discussed that reactive power capability testing of generators, whose response is not found to be adequate, may be carried out after discussions in OCC meeting. This shall also help the generators to provide response for MVAr absorption / generation and hence help to provide better response from generators at the time of need. Apart from this, every generator shall carry out reactive power capability testing at least every three years and share the report with NRLDC/NRPC. OCC suggested that same may also be discussed in upcoming 44th TCC/ 47th NRPC meeting.

It was agreed in previous OCC meetings that states shall also develop MVAr vs voltage plots for generators under their jurisdiction. This would also help to improve telemetry of MVAr data and more reliable MVAr vs voltage plots would be available. UP informed that they are developing MVAr vs voltage plot on regular basis and sharing the details with generators in their control area. NRLDC requested to share the details pertaining to above with NRLDC/NRPC also.

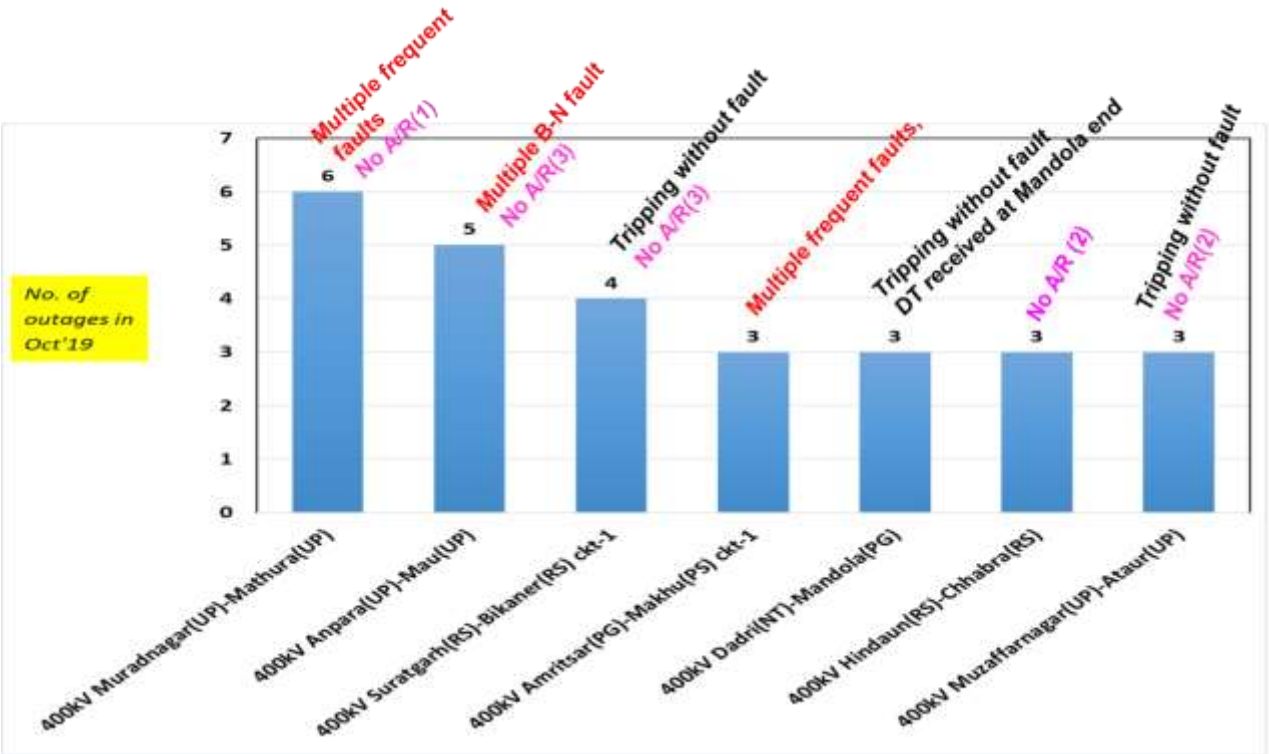
It was once again requested that states and generators shall also develop MW vs MVAR and Voltage vs MVAR plots at their end so that their operation based on capability curve be also assessed.

5. Frequent forced outages of transmission elements in the month of Oct'19:

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

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	400kV Muradnagar(UP)-Mathura(UP)	6	UP

2	400kV Anpara(UP)-Mau(UP)	5	UP
3	400kV Suratgarh(RS)-Bikaner(RS) ckt-1	4	Rajasthan
4	400kV Amritsar(PG)-Makhu(PS) ckt-1	3	Punjab/ POWERGRID
5	400kV Dadri(NT)-Mandola(PG)	3	NTPC/ POWERGRID
6	400kV Hindaun(RS)-Chhabra(RS)	3	Rajasthan
7	400kV Muzaffarnagar(UP)-Ataur(UP)	3	UP



The complete details are attached at **Annexure B.4** of the Agenda**.** The following was discussed in the meeting:

- *400kV Muradnagar(UP)-Mathura(UP) ckt:* UP representative informed that there was a problem in suspension strings & jumper problem. Shutdown has been taken for 10-17th Nov 2019 and further action has also been taken for replacement of short jumpers, providing pilot strings & replacement of suspension strings. Details of work done in the line shared during meeting.

- *400kV Anpara (UP)-Mau (UP) ckt:* UP representative informed that on 01st Oct 2019, Y-phase disc insulator was found damage during line patrolling and it has been replaced immediately. On 07th Oct 2019, kite-manja & bird nest found at the tower location number 373 and it has been removed on the same day. He further informed that there was auto reclosure problem at 400 kV Mau (UP) and it has been attended. OCC advised UPPTCL to kindly do one to one A/R testing of 400 kV Anpara-Mau ckt and submit the report within 7days.
- *400kV Suratgarh (Raj)-Bikaner (Raj) ckt-1:* Rajasthan representative informed that frequent tripping of the line was occurred due to migrating bird in this season. Birds are found dead nearby transmission line. OCC advised Rajasthan to check the non-operation of A/R in the line, correct it and submit the remedial measures report within 7days.
- *400kV Amritsar (PG)-Makhu (PS) ckt-1:* Punjab representative informed that insulator disc flashed and damaged. Conventional insulator string has been replaced. There was peak season of pollution due to crop burning and it resulted into frequent tripping in this line. Punjab representative further confirmed that pre winter maintenance will be completed before 15th Dec 2019. Punjab representative also informed that replacement 1000 insulator strings has approved internally, BoQ has been approved and LoA to be placed, details will be shared subsequently.
- *400kV Dadri (NTPC)-Mandola (PG) ckt-2:* NTPC representative agreed to check the reason of DT send from Dadri end, correct it and submit the remedial measures report within 7days.
- *400kV Hindaun (Raj)-Chhabra (Raj) ckt:* NRLDC representative informed that earlier it was reported that A/R in the line has been taken into service however again it seems line didn't A/R. OCC advised Rajasthan to check the non-operation of A/R in the line, correct it and submit the remedial measures report within 7days.
- *400kV Muzaffarnagar(UP)-Ataur(UP) ckt:* UP representative informed that there may be problem in insulator strings. OCC advised UPPTCL to check the non-operation of A/R in the line, correct it and submit the remedial measures report within 7days.
- *NRLDC representative informed that Despite of regular OCC agenda, remedial measures report and supporting details are still awaited for most of the tripped elements.*
- As discussed in 38th PSC meeting & 164th OCC meeting, compiled information of monthly transmission elements outage list starting from Oct 2018 to Jun 2019 is attached at **Annexure-B.6.1 of 164th OCC MoM (Minutes of Meeting)**. Action taken and identified during the OCC meeting is also part of the details.

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

MS, NRPC raised concern on non-submission of details to NRPC/ NRLDC and suggested to all the SLDCs to compile the information and share the remedial

measures report for last ten months tripping presented in various OCC meeting.

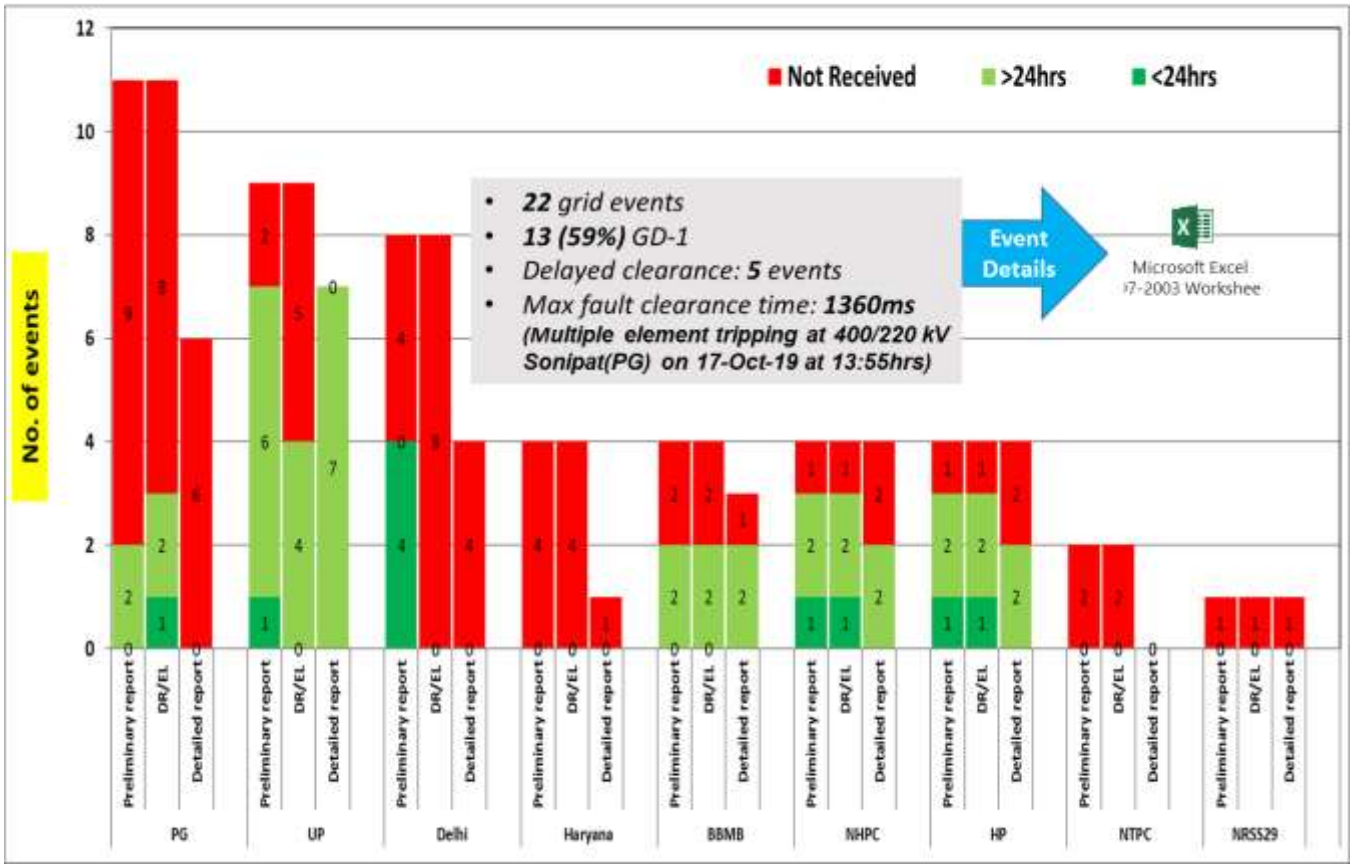
All the concerned utility shall prepare the presentation on remedial measures taken from Oct-2018 onward and present it during next (166th) OCC meeting.

6. Multiple element tripping events in Northern region in the month of Oct'19:

A total of **22** grid events occurred in the month of July'19 of which **13** are of GD-1 category. The preliminary report of all the events have been issued from NRLDC. A list of all these events along with the status of details received by 05-Nov-19 is attached at **Annexure-B.5** of the Agenda.

NRLDC representative showed the following status of receipt of details:

***Note:** Details received by 03-Nov-19 are considered*



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

Maximum Fault Duration is **1360ms** in the event of multiple element tripping at 400/220 kV Sonipat(PG) on 17-Oct-19 at 13:55hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **5** events out of 22 grid events occurred in the month.

POWERGRID representative informed that delayed clearance of fault was due to non-clearance of fault in 220 kV Mohana-Samlakha line, Sonipat (PG) ICTs tripped on backup over current earth fault protection resulted into final clearance of fault.

ICTs backup protection tripped as per desired setting. Main & back protection of 220 kV Mohana-Samlakha ckt was not operated correctly.

OCC advised HVPNL to kindly check the tripping details of 220 kV Mohana-Samlakha and take corrective action accordingly and submit the report within 7days.

Protection co-ordination between 220 kV Sonipat (PG)-Mohana ckt & 400/220 kV 315 MVA ICT-1 at Sonipat (PG) needs to be checked and corrected by POWERGRID.

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.

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

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

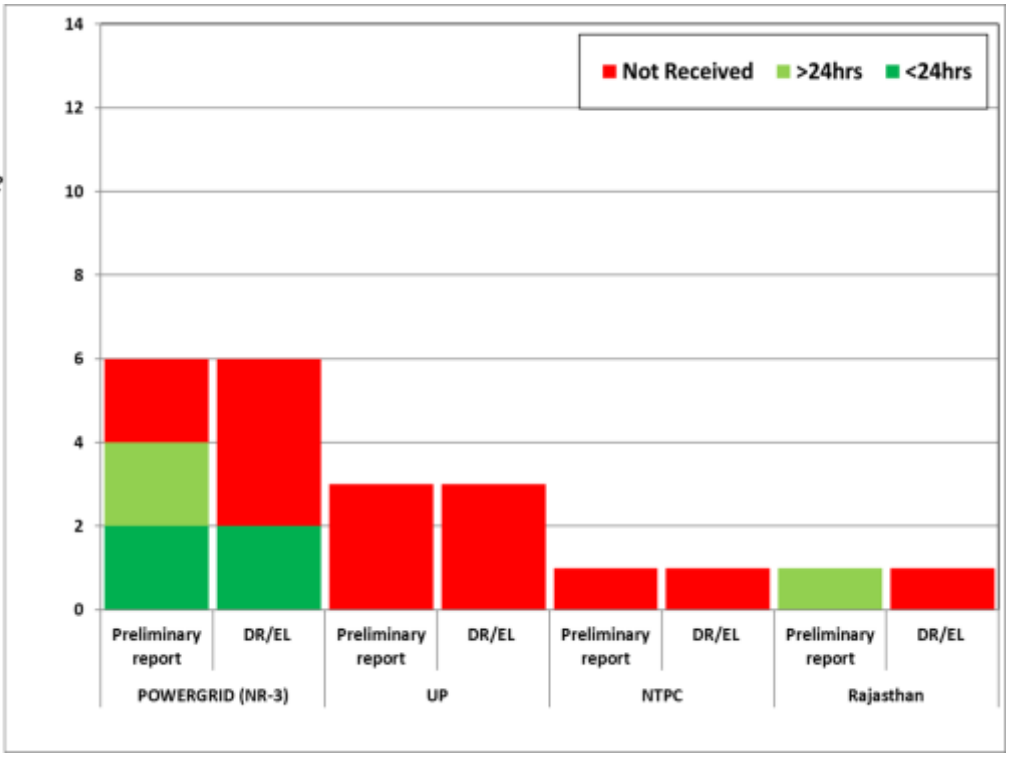
NRLDC representative informed that online web based portal for reporting of tripped element has been kept online from 01st Nov 2019 and all the members can now upload their tripping details on web portal. This information was already shared with all the constituents through mail.

7. Details of tripping of Inter-Regional lines from Northern Region for Oct'19:

A total of **11** inter-regional lines tripping occurred in the month of Oct'19. The list is attached at **Annexure-B.6** of the Agenda. Out of 11 number of trippings, 5 tripping incidents are related to HVDC system. The status of receipt of preliminary reports, DR/EL within 24hrs of the event was shown as below:

Note:

- *Details received by 05-Nov-19 are considered*
- *No Details received in three events from UP, in one event from NTPC and two events from PG-NR-3*



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.

POWERGRID representative informed the following during the meeting

- ***On 2nd Oct 2019, HVDC Agra-BNC pole tripped during line fault in APD-BNC section. This tripping was also due to telecommunication failure, issue has been kept in the knowledge of OeM and POWERGRID corporate centre. Remedial measures to be finalized, it will be shared with NRPC/ NRLDC.***
- ***On 2nd Oct 2019, 400 kV Varanasi-Biharshariff ckt-2 tripped due to lightening, flashover mark was captured on Y-phase jumper.***
- ***On 07th Oct 2019, HVDC Agra-BNC pole-3 tripped due to convertor differential protection. Protection co-ordination issue has been taken up with OeM. OeM engineer reached on site on 17th Oct 2019, issue has been addressed and attended. Accordingly, protection setting has been revised. Details will be shared within 7days***
- ***On 13th Oct 2019, Vindhyachal BtB block-1 & 2 tripped due to fault in ICT at Vindhyachal (NTPC) section in WR side. Block-1 tripped within 10 second due to sensitive over current setting and block-2 tripped due to outage of evacuation path. Sensitive over current setting of Vindhyachal BtB block-1 & 2 was to protect thyristor block.***
- ***Control section of HVDC Vindhyachal BtB will be replaced by May-2021, project has been awarded.***

NRLDC representative raised concern for frequent tripping of Agra-BNC due to telecommunication failure and it needs to be addressed as soon as possible.

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

NRPC advised for separate PSAG meeting for frequent tripping of HVDC Agra-BNC poles, date and time of the meeting will be separately communicated. In which POWERGRID-CC and OeM of the HVDC will also be present for detailed deliberation about tripping and remedial measures. Adani representative can also be consulted in view of special case reported by its representative and remedial measures taken in that case.

8. Mock black start exercises in NR:

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

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

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

Scheduled Date	Revised scheduled Date	Name of stations	Comments/Remarks
09-Oct-19		Anta GPS	To be confirmed by Anta. Internal black start reportedly conducted on 18-Oct-19.
22-Oct-19	15-Nov-19	*Dhauliganga	Revised schedule due to load provision in UP. Successfully conducted
25-Oct-19	First week of Dec'19	*N. Jhakri and Rampur	Revised schedule due to overhauling activity at Jhakri.
31-Oct-19	31-Oct-19	*Bairasiul	Exercise was partial successful. Island created but could not sustain long and unit tripped. Final synchronization of island with the grid could not be successful at Bairasiul due to problem in synchronization at Bairasiul HEP.

05-Nov-19		Sewa-2	Revised schedule due to load provision in J&K.
8-Nov-19	in Dec'19	*Karcham and Baspa	Exercise deferred by Karcham due to reported internal problem.
15-Nov-19	13, 14-Nov-19	*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's, Upper Sindh and Kishanganga	NHPC revised dates due to 15th being Friday. Confirmation yet to be received from J&K.
19-Nov-19		Parbati-3 and *Sainj	
21-Nov-19		Salal	
26-Nov-19		*Chamera-3	
28-Nov-19		Koteshwar	
04-Dec-19		*Auraiya GPS	
10-Dec-19		Chamera-1 and 2	Due to outages of Unit#1 & Unit#2, the mock black start exercise at Chamera-2 Power Station may be avoided.
12-Dec-19		Malana-2, AD Hydro and Phozal	
19-Dec-19		*Dadri GPS	
27-Dec-19		Tehri	
02-Jan-20		Koldam	

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

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

S. NO.	Utility	Hydro Power Station	Installed Capacity(MW)
1	J&K	Baglihar	3x150
2		Baglihar stage-2	3x150
3		Lower Jhelum	3x35

4		Upper Sindh	2x11+3x35
5		Larji	3x42
6		Bhabha	3x40
7		Malana -I	2x43
8		Baspa	3x100
9	Punjab	Ranjit Sagar	4x150
10	Rajasthan	Mahi-I&II	2x25+2x45
11		Rana Pratap Sagar	4x43
12		Jawahar Sagar	3x33
13		Gandhi Sagar	5x23
14		Dholpur GPS	3x110
15		Ramgarh GPS	1x35.5+2x37.5+1x110
16	UP	Rihand	6x50
17		Obra	3x33
18		Vishnuprayag	4x100
19		Srinagar (Alaknanda)	4x82.5
20	Uttarakhand	Gamma Infra	2x76+1x73
21		Shravanti	6x75
22		Ramganga	3x66
23		Chibro	4x60
24		Khodri	4x30
25		Chilla	4x36
26		Maneri Bhali-I&II	3x30+4x76
27	Delhi	IP Extn GTs	6x30+3x30
28	Haryana	Faridabad GPS	2x137.75+1x156.07

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

During 163rd OCC meeting, members agreed to confirm the schedule by the end of September'19. However, details are still awaited from all the utilities. It is

once again requested to all the members to kindly confirm the schedule as it would be difficult to change the schedule once finalized.

It has been observed that though the dates of mock black start exercises of *Dhauliganga, N. Jhakri-Rampur, Bairasiul, Sewa-2 and Karcham-Baspa* were fixed up in 164th OCC meeting, mock exercise was materialized for *Bairasiul HEP* only.

In 165th OCC meeting the following were discussed:

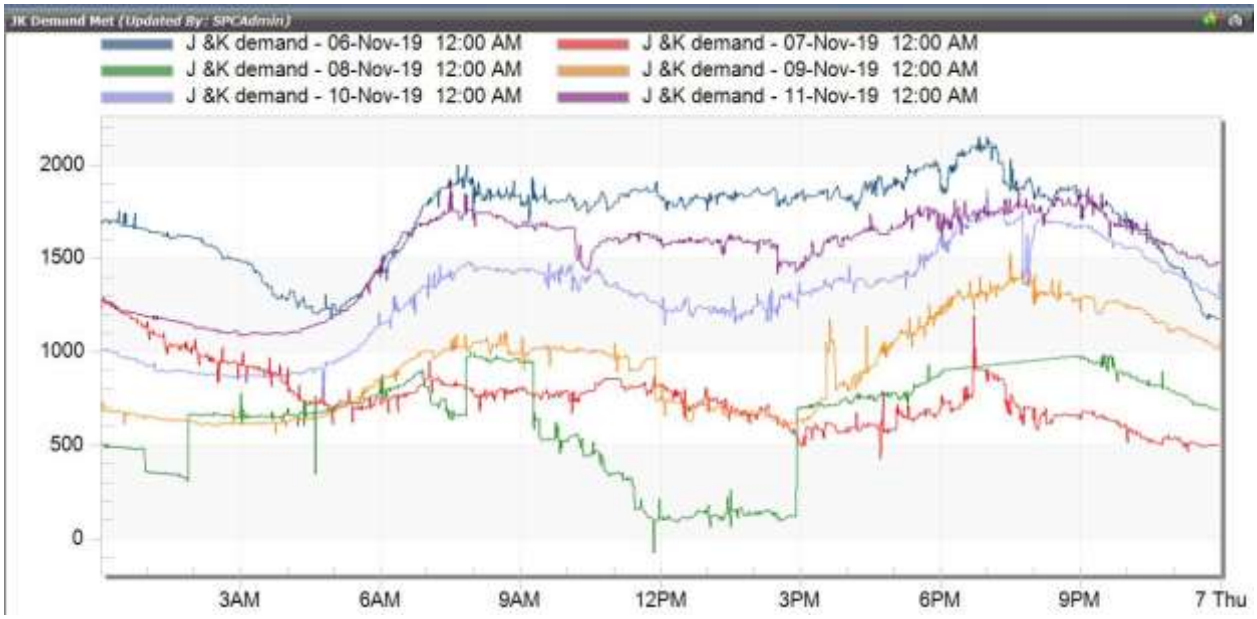
- *Black start of Dhauliganga HEP was rescheduled on 15th Nov 2019 (UPPTCL changed the date to provide the load), it is already running.*
- *Black start of Bairasiul was partially successful in view of stopping of unit due to problem in island synchronization with the main grid at Bairasiul HEP*
- *Mock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

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

NRLDC representative stated that despite of continuous follow up in various OCC meeting, progress to carry out mock drills in state control area is very slow and it needs to be expedited. State SLDCs shall co-ordinate the mock exercise for intra state generators and share the report with NRPC/ NRLDC as soon as possible

9. Multiple tripping in Kashmir valley due to heavy snowfall on 07, 08 November 2019:

All 220kV and below level lines in Kashmir valley tripped during snowfall / inclement weather condition in valley on 07, 08 November 2019. Consequently, it resulted in complete interruption of power supply in valley including generation loss of around 150-200MW at Kishanganga HEP (NHPC) and 80MW state own generation. However, valley remained connected through the rest of the grid at 400kV level. Uri generation was getting evacuated through 400kV network for most of the time except short interruption on account of evacuation constraint. During the restoration of grid, it was found that except 220kV Kishanganga-Delina D/C, other 220kV circuits at Delina damaged thus rendering 220kV Kishanganga-Delina D/C as only evacuation for Kishanganga HEP. Load at Pampore, Zainakote was revived after restoration of downstream network. To revive the load at downstream of Delina, Kishanganga HEP was requested to Black start but Kishanganga HEP was unable to black start the units. It is pertinent to mention that black start of Kishanganga HEP would have resulted in restoration of load at Delina. J&K, POWERGRID and NHPC representative requested to brief the event and current status of power system in and around the valley. J&K demand pattern for 06-11 Nov 2019 is given below:



J&K representative was not attended the meeting that's why issue couldn't discussed in length.

POWERGRID representative informed that there was heavy snowfall observed in the month of Nov itself, in general planning for pre winter maintenance activities is to be completed before November end.

NHPC representative informed that black start exercise of Uri-1 Uri-2 HEP couldn't done in last two year due to no co-ordination from J&K state control area. This issue needs to be addressed.

OCC advised the following:

- **NHPC to take up the matter with OEM to expedite the black start of Kishanganga HEP. M/S NHPC agreed for the same**
- **J&K and POWERGRID shall also consider the early snowfall in that area for pre winter maintenance**

NRPC Secretariat also agreed to communicate with J&K for persistent issue in the area of pre winter maintenance, black start exercise, capacitor related information etc.

10. Protection setting changes during FTC (First Time charging of the element) (Table Agenda)

Currently during FTC of new elements in NR, NRLDC are asking for protection related details only at the time of trial run request by Licensee and no detail is being sought/no clearance being given regarding protection system before first time charging.

NRLDC proposed following protection settings for better protection coordination during First time charging (FTC):

- In case of Idle charging of the element, keep Z1 and Z2 setting instantaneous and Stage-1 O/V setting as 107% for the node from which line is charged. Although over current setting is disabled at 400 kV and above level but in case of idle charging of 400 kV and above transmission line to avoid any non-operation of distance protection on high resistive fault the O/C setting be set such that it is above the line charging current with a safety margin of 100 Amps and the time setting be such that all transient switching currents are died out completely. All other adjacent nodes will give protection confirmation. A caution should also be included that in case of final charging of line from both ends, the O/C setting should be disabled.
- In case line is LILOed- Suppose line A to B is LILOed at C. protection settings confirmation is to be taken from all the adjacent nodes of A, B and C.
- In case of ICT charging or any line charging, protection setting confirmation to be taken from all adjacent nodes.

It was further informed that same practice has been adopted in WR region also.

OCC approved this agenda point and suggested all the constituents to adhere with.

List of participants in the 165th OCC meeting held on 15th November 2019, New Delhi

BBMB

Name	Designation	Contact No.	Email
Jatinder Singh	DPC	94180-04884	dypowercc@bbmb.nic.in

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Jaiprakash Power Ventures Ltd.

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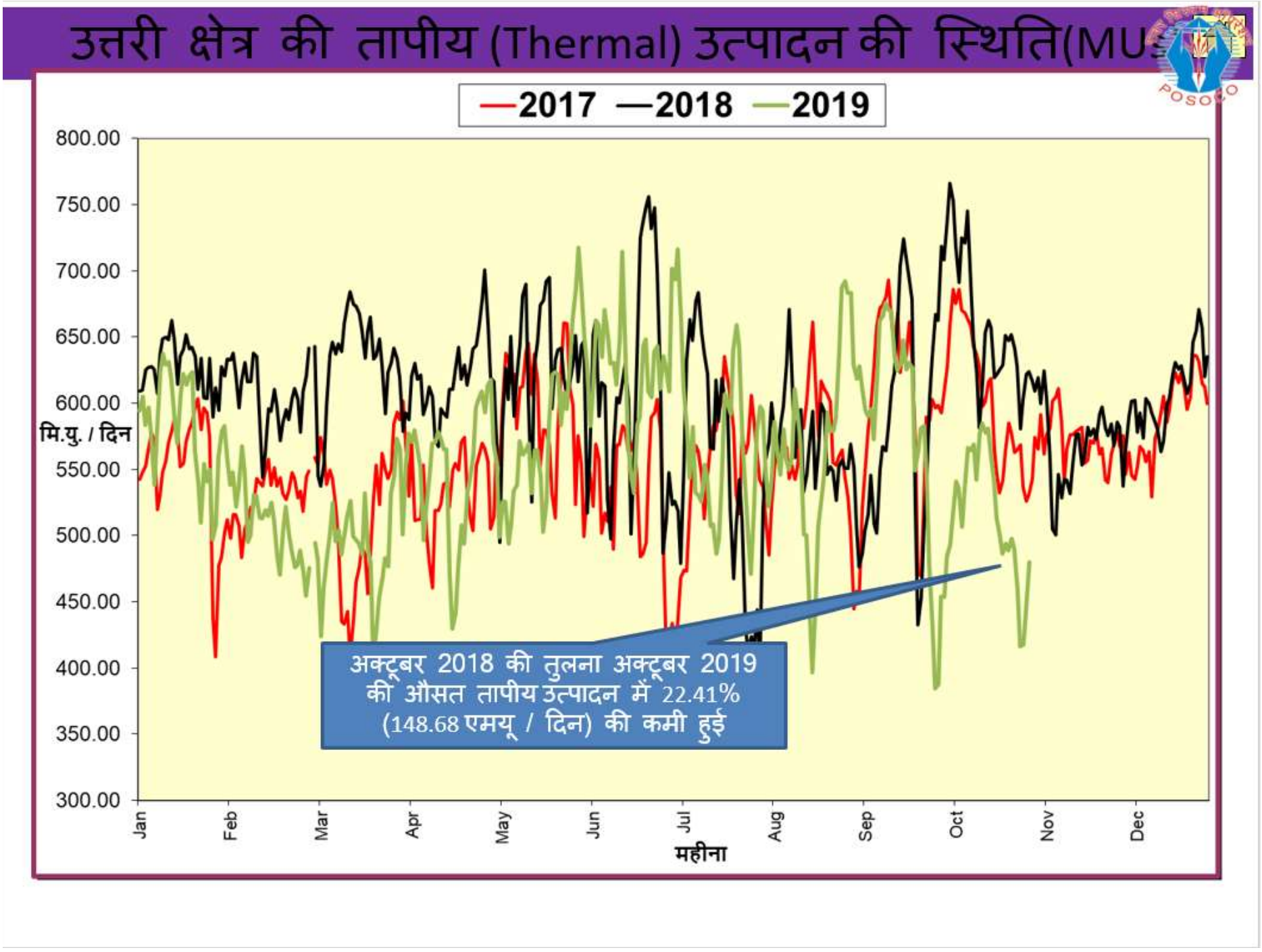
Annexure-A.II (A)



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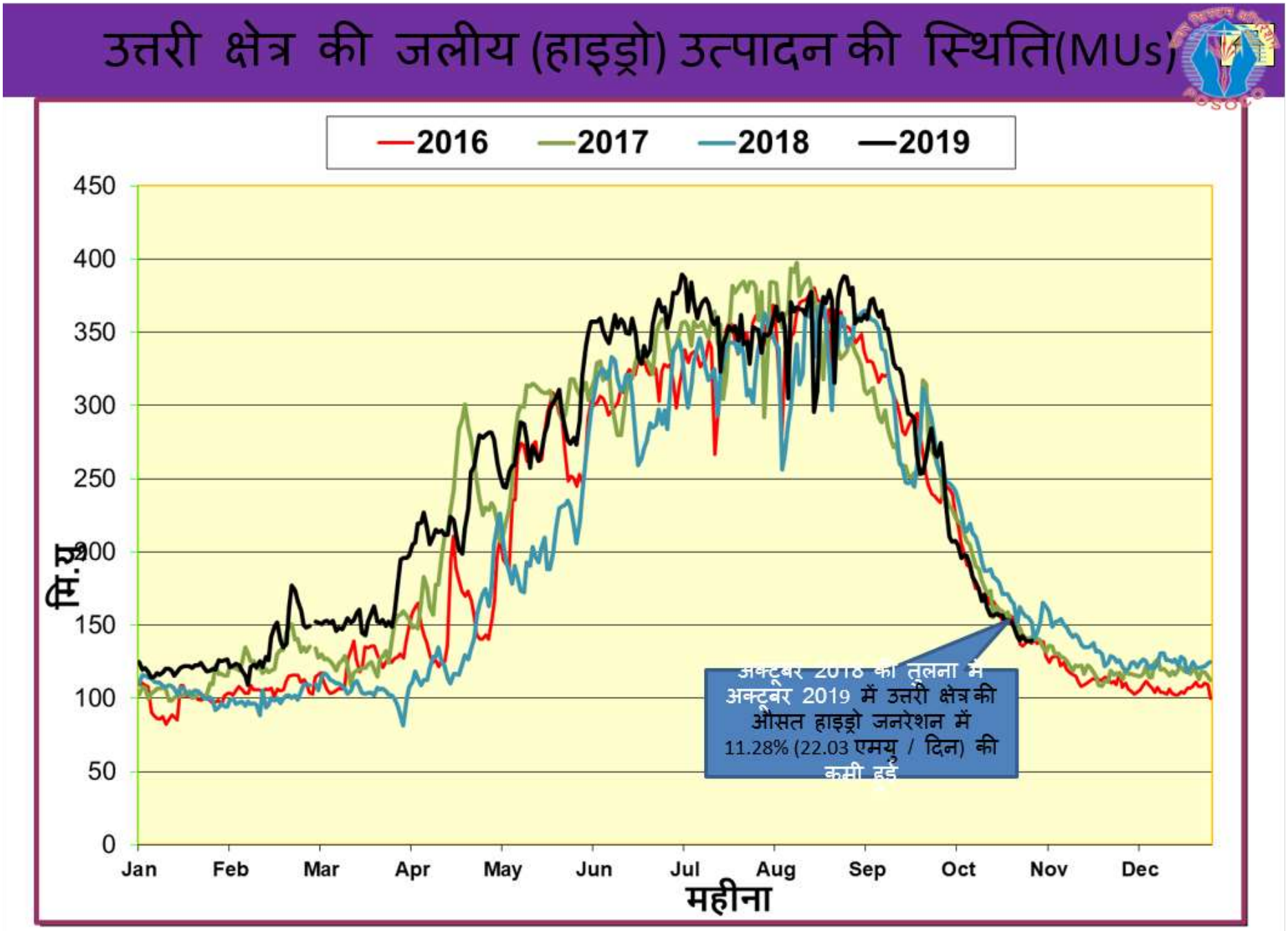
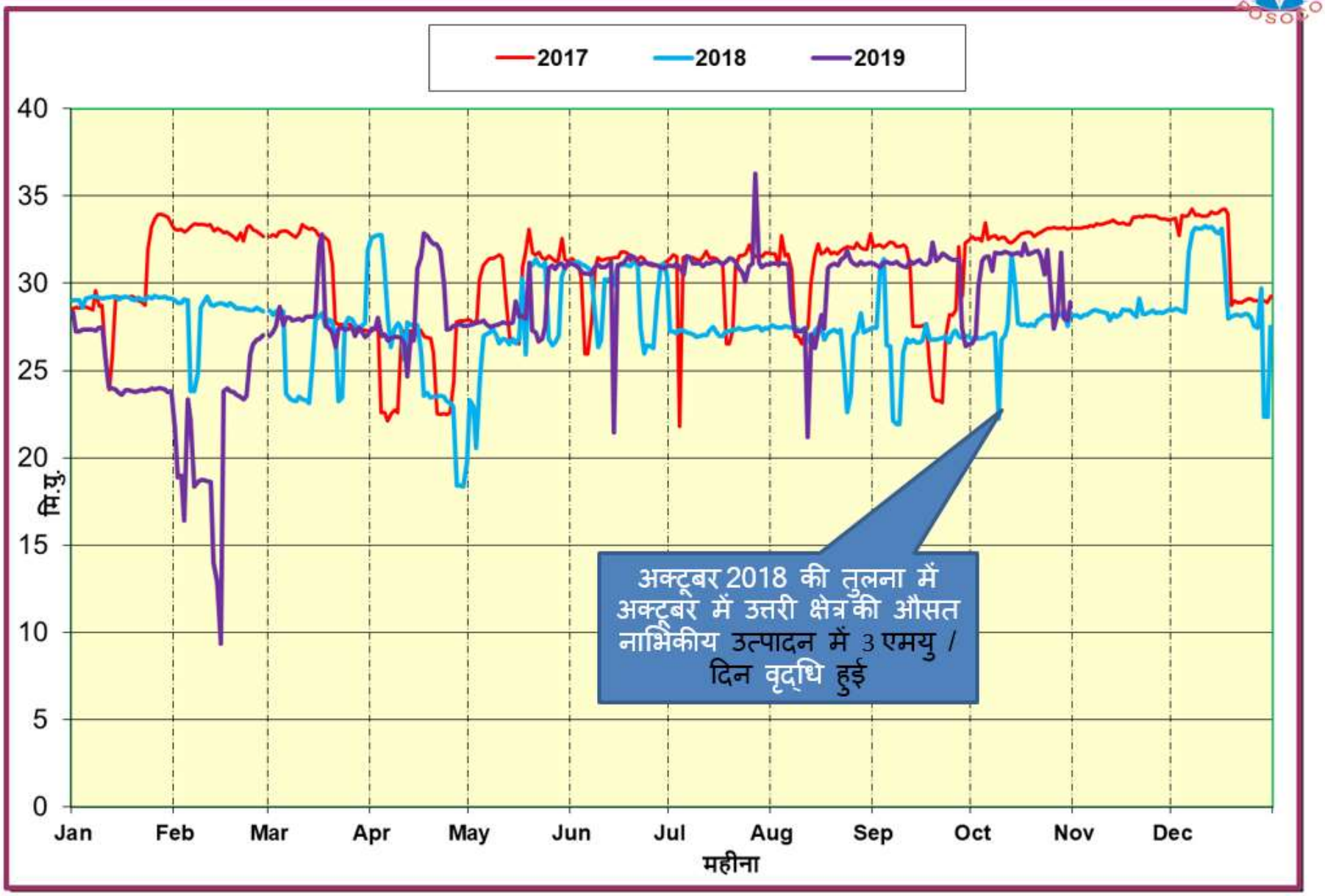


Annexure-A.II (C)

उत्तरी क्षेत्र की नाभिकीय उत्पादन की स्थिति (MUs)



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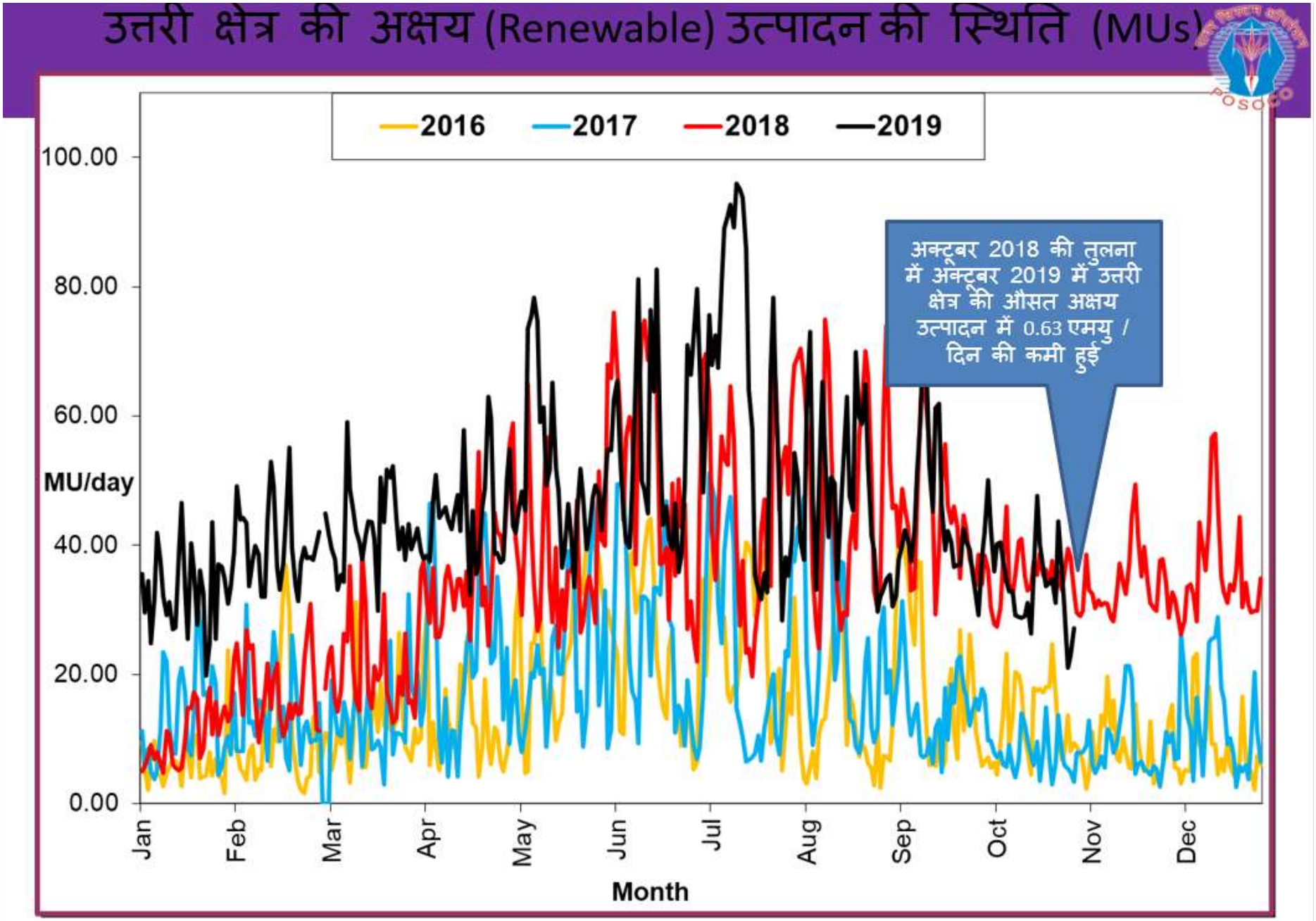


Long Outage of Generating Units

S.No	Station	Location	Owner	Unit No	Capacity MW	Reason(s)	Outage		Outage Duration
							Date	Time	
1	RAPS-A	RAJASTHAN	NPCIL	1	100	subject to regulatory clearance . unit is to be decommissioned.	09-10-04	22:58	5515
2	Giral (IPP) LTPS	RAJASTHAN	RRVPNL	1	125	bed material leakage	11-07-14	8:20	1953
3	Giral (IPP) LTPS	RAJASTHAN	RRVPNL	2	125	Boiler tube leakage	27-01-16	15:27	1388
4	Paricha TPS	UP	UPPTCL	1	110	r&m work	02-07-16	17:30	1231
5	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSPCL	2	210	permanently boxed up	25-12-17	22:50	690
6	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSPCL	1	210	permanently boxed up	28-12-17	0:40	687
7	Bairasiul HPS	HP	NHPC	2	60	renovation and modernization of the plant	15-10-18	10:02	396
8	Panipat TPS	HARYANA	HPGCL	5	210	Reserve Shutdown	04-01-19	11:14	315
9	Panipat TPS	HARYANA	HPGCL	6	210	Reserve Shutdown	07-01-19	11:45	312
10	Bhakra HPS	PUNJAB	BBMB	3	126	Renovation and Maintenance work	01-04-19	9:20	228
11	Chamera II HPS	HP	NHPC	2	100	turbine problem	07-08-19	3:54	100
12	Chamera II HPS	HP	NHPC	1	100	turbine problem	07-08-19	8:58	100
13	Faridabad GPS	HARYANA	NTPC,HVPNL	2	137.75	Reserve Shutdown	20-08-19	13:05	87
14	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSPCL	3	210	Reserve Shutdown	17-09-19	7:25	59
15	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSPCL	1	210	Reserve Shutdown	18-09-19	6:52	58
16	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSPCL	3	250	Reserve Shutdown	19-09-19	11:43	57
17	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSPCL	4	250	Reserve Shutdown	24-09-19	0:14	52
18	Bara PPGCL TPS	UP	UPPTCL,JPVL	2	660	Coal Shortage	24-09-19	19:39	52
19	Dehar HPS	HP	BBMB	1	165	maintenance of stator during poor/reduced inflows.	26-09-19	8:30	50

Long Outage of Generating Units

S.No	Station	Location	Owner	Unit No	Capacity MW	Reason(s)	Outage		Outage Duration
							Date	Time	
20	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSPCL	4	210	Reserve Shutdown	27-09-19	7:55	49
21	Dadri-I TPS	DELHI	NTPC	3	210	Reserve Shutdown	29-09-19	17:50	47
22	Bhakra HPS	PUNJAB	BBMB	6	157	annual maintenance during low irrigation demand.	30-09-19	10:15	46
23	Suratgarh TPS	RAJASTHAN	RRVPNL	6	250	oil leakage in oil supply	30-09-19	21:25	46
24	Faridabad GPS	HARYANA	NTPC,HVPNL	3	156.07	Reserve Shutdown	01-10-19	4:40	45
25	Faridabad GPS	HARYANA	NTPC,HVPNL	1	137.75	Reserve Shutdown	01-10-19	4:48	45
26	Dadri-I TPS	DELHI	NTPC	2	210	Reserve Shutdown	02-10-19	0:09	44
27	Meja TPS	UP	UPPTCL,NTPC	1	660	hp turbine vibration high	06-10-19	23:22	40
28	DCRTPP (Yamuna Nagar)	HARYANA	HVPNL	1	300	Reserve Shutdown	09-10-19	22:01	37
29	DCRTPP (Yamuna Nagar)	HARYANA	HVPNL	2	300	Reserve Shutdown	09-10-19	23:31	37
30	Auraiya GPS	UP	NTPC	5	109.3	Reserve Shutdown	10-10-19	21:45	36

SL. No		Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
						Date	Time		
1	400 KV JAISALMER-BARMER (RS) CKT-2	Line	400KV	RRVPNL	11-05-19	21:34	14-11-19	187	tower collapsed 2 tower collapse in 11.05.2019 and 4 towers collapsed on 16.05.2019
2	400/220 KV 315 MVA ICT 1 AT BHILWARA(RS)	ICT	400/220KV	RRVPNL	12-05-19	23:42	14-11-19	186	oil leakage in transformer
3	220 KV CHAMERA_3(NH)-CHAMBA(PG) (PG) CKT-2	Line	220KV	POWERGRID	14-05-19	11:56	14-11-19	184	Tower at loc no. 25 has been bend due to soil sinking and land slide. During shifting of Chamera Pool-2 line from 220 kV Bus-2 to Bus-1 at Chamera 3 GIS.Line isolator and circuit breaker of line 2 got damaged at Chamera-3 GIS.
4	80.01 MVAR BUS REACTOR NO 1 AT 400KV KOLDAM(NT)	BR	400KV	NTPC	07-06-19	11:05	14-11-19	160	80 MVAR/400kV bus reactor at Koldam is not available due to some abnormal parameters.
5	400/220 KV 500 MVA ICT 2 AT AGRA(UP)	ICT	400/220KV	UPPTCL	05-08-19	17:35	14-11-19	101	oil dga test failed. transformer to be repaired.
6	400 KV GORAKHPUR(PG)-MOTIHARI(BS) (PG) CKT-1	Line	400KV	POWERGRID	13-08-19	22:04	14-11-19	93	e/sd due to soil erosion at tower no.132 near gandak river bank

SL. No		Element Name	Type	Voltage Level	Owner	Outage		Outage duration (days)	Reason / Remarks
						Date	Time		
6	400 KV GORAKHPUR(PG)-MOTIHARI(BS) (PG) CKT-1	Line	400KV	POWERGRID	13-08-19	22:04	14-11-19	93	e/sd due to soil erosion at tower no.132 near gandak river bank
7	400 KV GORAKHPUR(PG)-MOTIHARI(BS) (PG) CKT-2	Line	400KV	POWERGRID	13-08-19	22:05	14-11-19	93	e/sd due to soil erosion at tower no.132 near gandak river bank
8	3252 BUS SECTIONALIZER BAY - 400KV BUS 2 AT DADRI(NT) AND 400KV BUS 4 AT DADRI(NT)	BAY	400KV	NTPC	28-09-19	20:48	14-11-19	47	400 kv bus sectionalizer bus -2 & bus-4 normally opened
9	220 KV BHIWANI-CHARKHI DADRI (BB) CKT-1	Line	220KV	BBMB	01-10-19	9:56	14-11-19	44	sd taken by bbmb erection of t. no. 80-82 by nhai authorities
10	220 KV BHIWANI-CHARKHI DADRI (BB) CKT-2	Line	220KV	BBMB	01-10-19	10:29	14-11-19	44	sd taken by bbmb for erection of t. no. 80-82 by nhai authorities
11	132 KV CHANDOLI(UP)-KARAMNASA(BS) (UP) CKT-1	Line	132KV	UPPTCL	03-10-19	16:30	14-11-19	42	supply changeover
12	125 MVAR BUS REACTOR NO 1 AT 400KV REWA ROAD(UP)	BR	400KV	UPPTCL	05-10-19	14:54	14-11-19	40	the 125mva bus reactor tripped due to prv operated at 11:40 hrs today.

Si. No.	Type of transmission element	Total No
1	400kV lines	04
2	220kV lines	02
3	132kV lines	01
4	1500 MVA ICTs	01
5	500 MVA ICTs	01
6	200 MVA ICT	01
7	150 MVA Power Transformer	02
8	125 MVA Power Transformer	02
9	125 MVAR Bus Reactor	02
Total New Elements charged		16

Transmission Lines
(400kV line- 318 ckt. Km, 220kV line-28 ckt.-Km,132kV line– 69 ckt. Km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In kM)	Conductor Type	wner	Remarks	Actual date & time of charging (Synchronized)	
							Date	Time
1	400kV Prithala(GPTL)-Aligarh(PG) line-1	400	49.419	HTLS Twin	GPTL		30.10.2019	20:41
2	400kV Prithala(GPTL)-Aligarh(PG) line-2	400	49.419	HTLS Twin	GPTL		30.10.2019	11:54
3	400kV Allahabad-Singrauli along with 50 MVAR non-switchable line reactor at Allahabad end	400	214.85	ACSR Twin Moose	PGCIL		22.10.2019	10:20
4	220kV ACME-Bhadla(PG) S/C line	220	10.45	Single Zebra	ACME		04.10.2019	18:54
5	132kV Balia-Bansdih line-1	132	68.85	Single Panthar	UPPTCL		**24.10.2019**	**15:45**
6	220kV DC AREPRL-Bhadla(PG) line-2	220	17.296	Single Zebra	APEPRL		**19.10.2019**	**17:59**
7	400kV Bikaner(PG)-Bikaner(ReNew)-Single ckt line-1	400	4.49	Twin Moose	Renew		**27.10.2019**	**7:30**

ICT
(ICT Capacity Addition - 2750 MVA)

S.No.	Name of element	Voltage Level	Transformation Capacity (in MVA)	New/replacement /augmentation	Agency/ Owner	Remarks	Actual date & time of charging (on load)	
							Remarks	Date
1	500 MVA ICT-1 at Prithala	400/220/33	500	New	GPTL	At load	31.10.2019	16:45
2	150 MVA Transformer-1 at ACME	220/33	150	New	ACME		04.10.2019	19:44
3	150 MVA Transformer-2 at ACME	220/33	150	New	ACME		06.10.2019	18:24
4	200 MVA ICT at Balia	400/132	200	old	PGCIL		05.10.2019	18:13
5	1500 MVA ICT-2 at Aligarh	765/400	1500	New	PGCIL	At load	26.10.2019	14:25
6	125 MVA Power Transformer-1	400/33	125	New	Renew		27.10.2019	7:30
7	125 MVA Power Transformer-2	400/33	125	New	Renew		27.10.2019	7:30

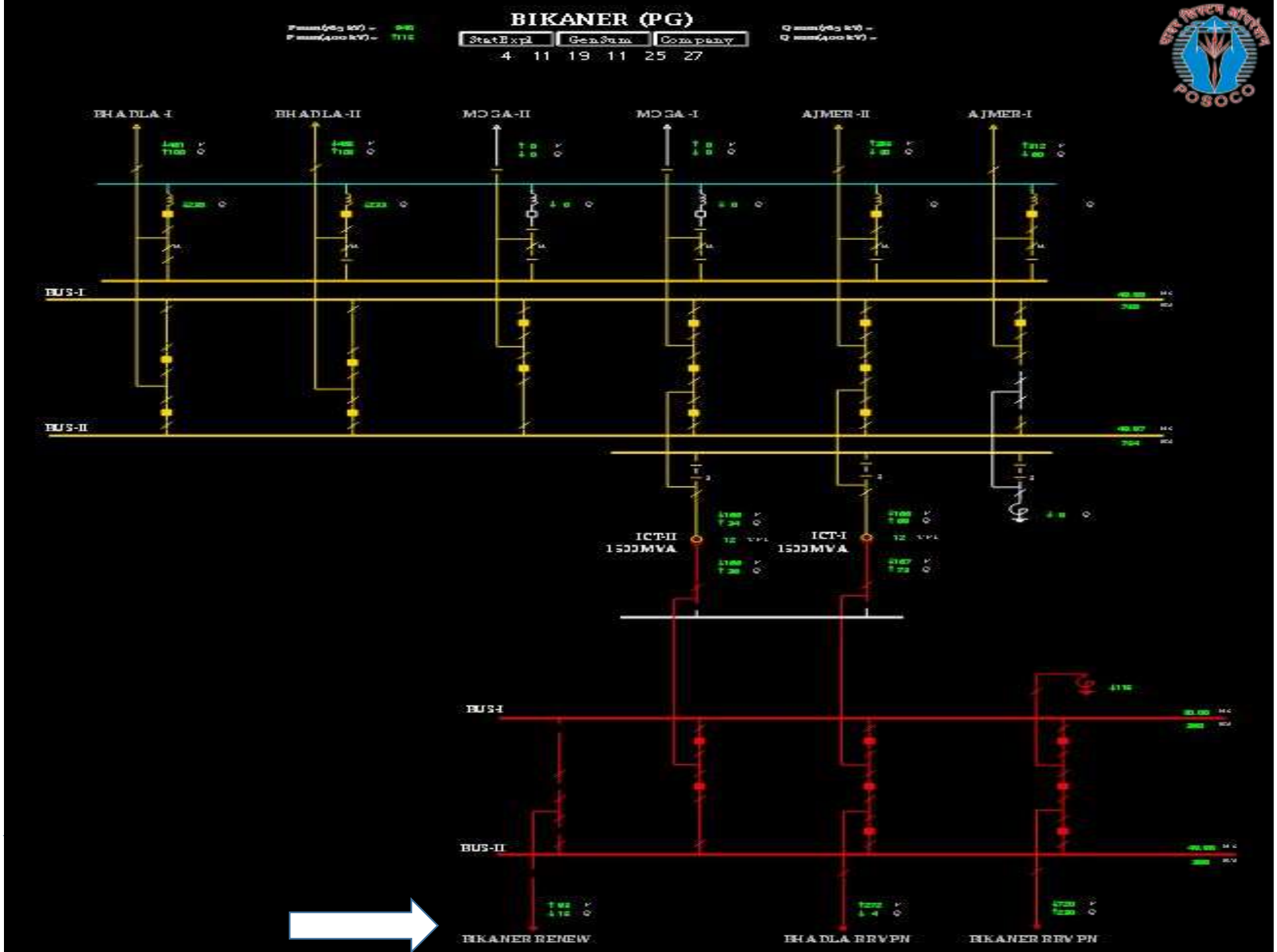
Bus Reactor

(Capacity Addition –Bus Reactor 250 MVAR)

S. No.	Name of element	Voltage Level (kV)	Transformation Capacity (in MVAr)	New/ replacement /augmentation	Type	Agency/ Owner	Remarks	Actual date & time of charging	
								Date	Time
1	125 MVAR Bus Reactor at Gorakhpur(UP) bay no 401{Replacement of 50 MVAR BR}	400	125	New	Line Reactor	UPPTCL		**24.10.2019**	**13:00**
2	125 MVAR Bus Reactor at Masauli bay no 412	400	125	New	Line Reactor	UPPTCL		**01.10.2019**	**17:32**

Details of Solar Plant Commissioned(1410 MW)

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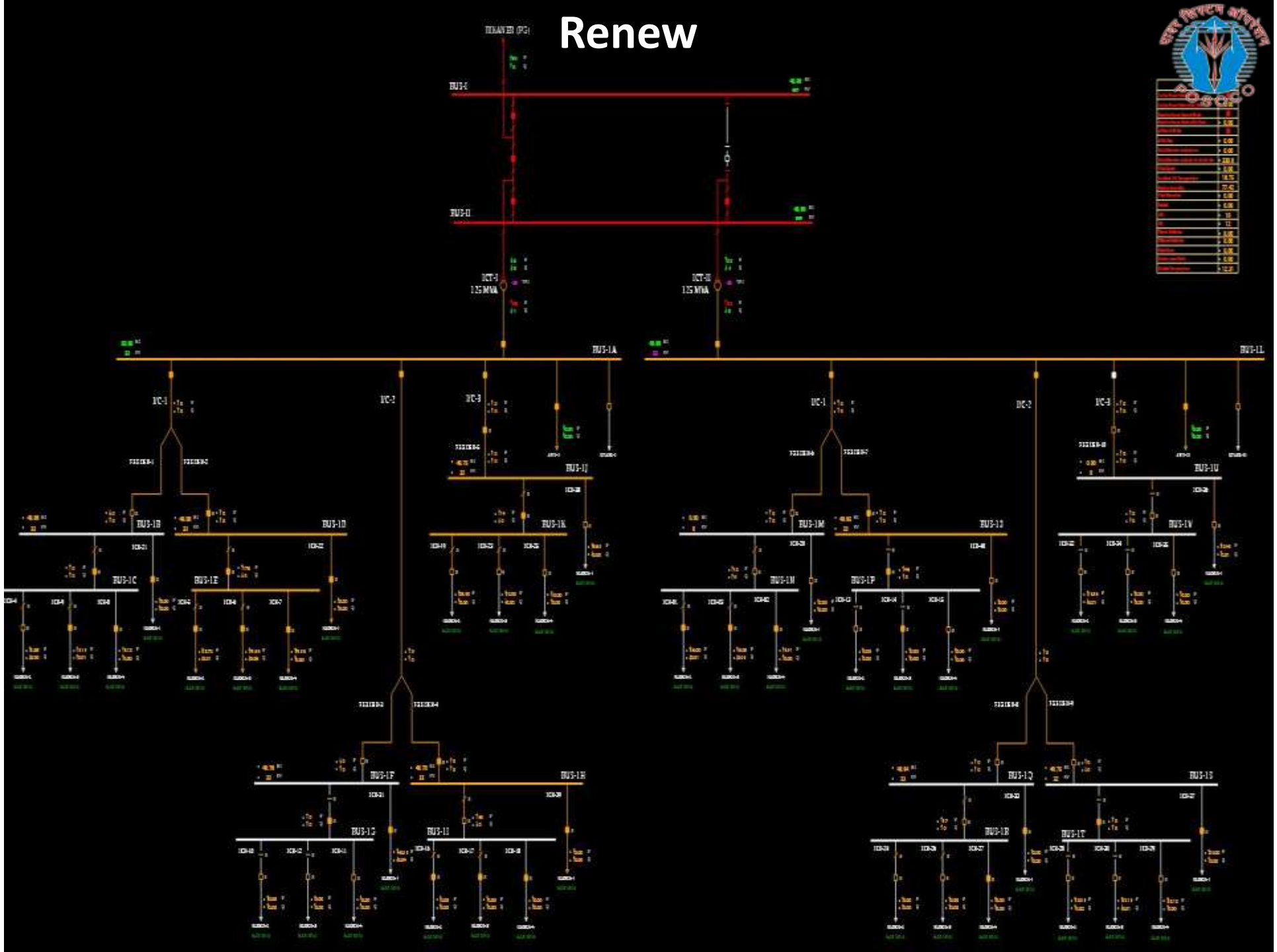
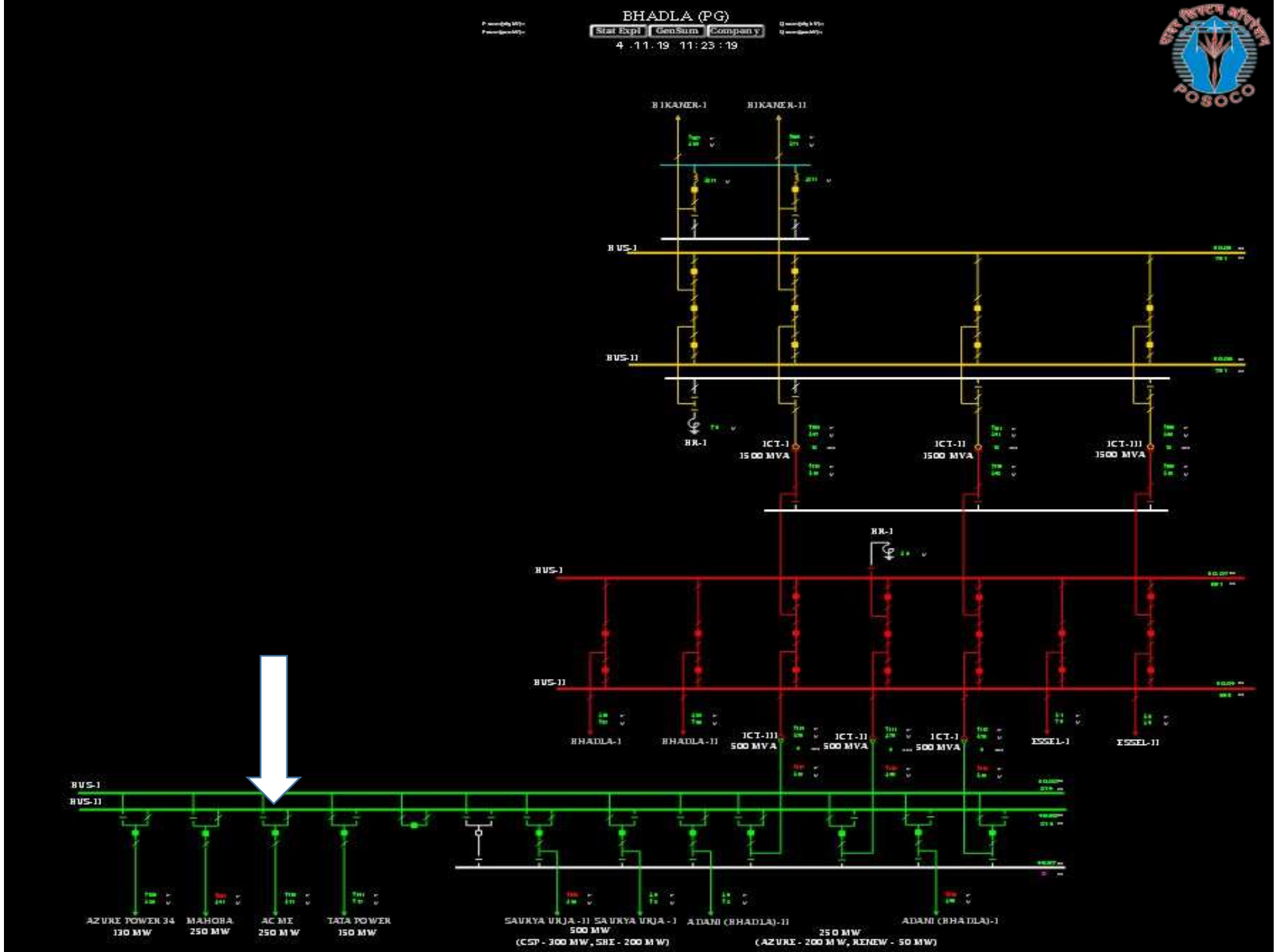
Renew

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BUS-II
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MAHOBA
250 MW
AC ME
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TATA POWER
150 MW
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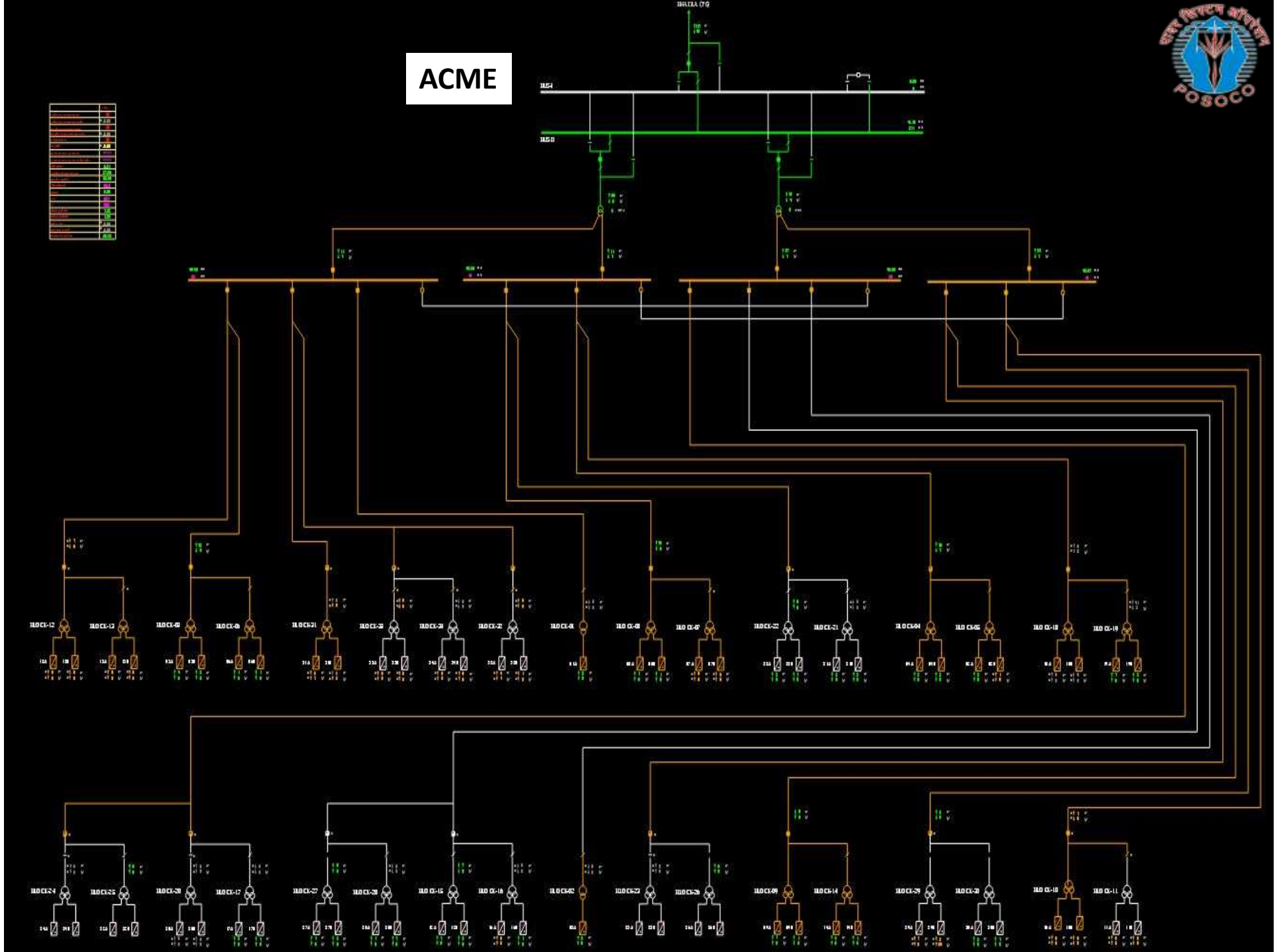
ADANI (BHADLA)-I


ACME
POSOCO

Annexure-A.III

Follow up issues from previous OCC meetings

Sl. No.	Agenda point	Details	Status
1.	Monitoring of schemes funded from PSDF (*Agenda by NPC*)	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in NR. Utilities are requested to expedite implementation of the schemes and submit information of physical as well as financial progress in the prescribed format by **first week of every month** on regular basis to Member Convener, PSDF Project Monitoring Group (AGM, NLDC and POSOCO) with a copy to NPC Division.	The updated status for the month of **Sep'19** has been received from **Punjab, Delhi, HP, UP and Rajasthan,** All other states were requested to update the status of the schemes to be funded from PSDF.
2.	Sub-stations likely to be commissioned in next six months.	All the concerned states were requested to submit the details of the downstream network associated specially with POWERGRID substations along with the action plan of their proposed/approved networks.	The updated details of the substations of POWERGRID and their required downstream network is enclosed in ***Annexure-A.III.I*** of the agenda note. All states are requested to update the status of remaining downstream networks on regular basis.
3.	Progress of installing new capacitors and repair of defective capacitors	Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.	Information received from **Delhi, UP, Rajasthan and HP (up to Oct'2019)** and **Uttarakhand and UT of Chandigarh (up to Sep'19)**. All other states were requested to furnish updated status up to second quarter.
4.	Healthiness of defence mechanism: Self-certification	Report of mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that "*All the UFRs are checked and found functional*".	The information of period ending **Sep'2019** received from **UP, Delhi, Haryana, HP and BBMB.** **Punjab and Rajasthan** have submitted information up to **June'2019.** Observations on the recent self-certification reports enclosed at Annexure-A.2.2 of agenda note. All states were requested to submit details of feeder-wise expected

Sl. No.	Agenda point	Details	Status
			load relief through UFR and df/dt relays in the format enclosed at Annexure-A.2.3 of agenda note.
5.	Recommendations of Enquiry Committee on grid disturbances on 30 & 31.7.2012	Based on the recommendations of the Enquiry Committee on grid disturbances on 30th & 31st July 2012, utilities of NR were requested to take necessary action and submit compliance/status report to NRPC.	Updated status awaited from HVPNL, Chandigarh and J&K
6.	Status of FGD installation vis-à-vis installation plan at identified TPS	List of FGDs to be installed in NR was finalized in the 36th TCC (special) meeting dt. 14.09.2017. All SLDCs were regularly requested since 144th OCC meeting to take up with the concerned generators where FGD was required to be installed. Further, progress of FGD installation work on monthly basis is monitored in OCC meetings.	Updated status for the month of October 2019 has been received from Punjab, NTPC and UP. All states/utilities are requested to update status on monthly basis. Compiled status on FGD installation is enclosed at Annexure-A.2.4 of agenda note. CEA has asked to submit phasing plan for following units commissioned after 31.03.2018: • Unit#5 of Tanda TPP • Unit#6 of Chhabra TPP Ext. Rajasthan and NTPC NR were requested to submit phasing plan for aforementioned units.

7. Reactive compensation at 220 kV/ 400 kV level

Sl. No.	Owner	Substation	Reactor	Updated Status
1.	POWERGRID	Kurukshetra	500 MVAr TCR	Anticipated commissioning: Jan-Mar'2021
2	DTL	Peeragarhi	1x50 MVAr at 220 kV	Under Tendering, expected to be commissioned by Mar'2021
		Mundka	1x125 MVAr at 400 kV	
			1x25 MVAr at 220 kV	
		Harsh Vihar	2x50 MVAr at 220 kV	
		Electric Lane	1x50 MVAr at 220 kV	Under Financial Concurrence
		Bamnauli	2x25 MVAr at 220 kV	PR created
		Indraprastha	2x25 MVAr at 220 kV	Under Tendering
3.	Punjab	Dhuri	1x125 MVAr at 400 kV	Tendering process to be restarted. Anticipated commissioning: Mid 2021
			1x25 MVAr at 220 kV	
		Nakodar	1x25 MVAr at 220 kV	
4.	PTCUL	Kashipur	1x125 MVAR at 400kV	Funding issues
5.	Rajasthan	Akal	1x25 MVAr	PSDF funding sanctioned. Under tendering
		Bikaner	1x25 MVAr	
		Suratgarh	1x25 MVAr	
		Barmer	1x25 MVAr	Response awaited from TESG of PSDF.
		Jodhpur	1x125 MVAr	

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
1	400/220kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS. Balance 4 nos. to be utilized	Commissioned (1^{st} & 2^{nd} – Mar'13 3^{rd} – Oct'16) Bays - Mar'13	• LILO of 220 kV Bishnha – Hiranagar D/c line. Target completion - **Nov, 2019** • 220 kV D/c Samba (PG) – Samba (JKPDD) approved in 1^{st} NRSCT.
2	400/220kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned in Jul'14 Bays-Jul'14	• 220 kV New Wanpoh - Mirbazar D/c line. • 220 kV Alusteng - New Wanpoh Line.
3	400/220 kV, 2x315 MVA Parbati Pooling Station (Banala)	2 Nos. of 220 kV bays to be utilized.	Commissioned in Dec'17	220 kV Charor- Banala D/c line (18 km). Charged from Banala end and Telemetry issue at Charor (expected to be resolved by **20.11.19**).
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned in Mar'17.	• LILO of one circuit of Kaul-Pehowa 220 kV D/c line at Bhadson (Kurukshetra). Commissioned on 07.03.2019 • LILO of one circuit of Kaul-Bastara 220 kV D/c line Bhadson(Kurukshetra). Commissioned on 27.06.2019 • 220kV D/c Bhadson (Kurukshetra) – Salempur with HTLS conductor equivalent to twin moose. P.O. issued on 15.10.18. Contract agreement signed on 30.11.18. Likely date of completion is **30.04.2020**.
5	400/220 kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned in Jan'17	• 220 kV Dehradun-Jhajra line. Target completion: **Nov 2021**

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
6	Shahjahanpu, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned in Jun/Sep'14	• Shajahnapur-Hardoi **Commissioned** • Shajahnapur-Azimpur D/C line is planned,expected by **Dec, 2020** • 220 kV D/C Shajahnapur-Gola line expected by **Dec, 2020**
7	Hamirpur 400/220 kV 2x 315 MVA Sub-station (Augmentation by 3x105 MVA ICT)	2 nos. bays utilized under ISTS. Balance 6 nos to be utilized	1st-Dec'13, 2nd – Mar'14 & 3rd Mar'19. 4 bays-Dec'13, 2 bays-Mar'14 2 bays-Mar'19	• 220 kV D/C Hamirpur-Dehan line. Target completion – **Dec, 2020**
8	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of transformer from Ballabhgarh)	Commissioned	• 220 kV Kaithal(PG)-Neemwala D/c line. Target completion - **30.04.2020.**
9	Sikar 400/220kV, 1x 315 MVA S/s	2 Nos. of 220 kV bays	Commissioned	RVPNL clarified that survey is yet to be carried out, which may finalize the requirement of cable as there is a possibility to carry out work without cable.
10	Bhiwani 400/220kV S/s	6 nos. of 220kV bays	Commissioned	• 220kV Bhiwani (PG) - Isherwal (HVPNL) D/c line. Target completion – **Nov, 2020**
11	Jind 400/220kV S/s	6 nos. of 220kV bays	Commissioned	• LILO of both circuits of 220kV D/c Narwana – Mund line at Jind (PG). Target completion – **Nov, 2020**

Annexure-AIII.I

Sl. No.	Substation	Downstream network bays	Commissioning status of S/s / Transformer	Planned 220 kV system and Implementation Status
12	400/220kV Tughlakabad GIS (10 no of 220kV bays)	4x 500	Commissioned	• RK Puram – Tughlakabad (UG Cable) 220kv D/c line. Scheme will be revised Target completion – **March 2023** • Okhla – Tughlakabad 220kv D/c line. • Mehrauli – Tughlakabad 220kv D/c line. • BTPS – Tughlakabad 220kv D/c line. • **Commissioned**. • Masjid Mor – Tughlakabad 220kv D/c line. Target completion – **Dec, 2021**.
13	400/220kV Kala Amb GIS (TBCB) (6 nos. of 220kV bays)	7x105	Commissioned (Jul'17)	HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s. Details for remaining 4 nos. of line bays may be provided. Target completion – **Dec, 2021**

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