सत्यमेव जयते

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

**विषय: प्रचालन समन्वय उप-समिति की 225 वीं बैठक की कार्यसूची।**

**Subject: Agenda of the 225th OCC meeting.**

प्रचालन समन्वय उप-समिति की **225 वीं** बैठक का आयोजन वीडियो कॉन्फ्रेंसिंग के माध्यम से दिनांक **12.11.2024** को **10:30** बजे से किया जायेगा । उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है ।

बैठक में सम्मिलित होने के लिए लिंक व पासवर्ड सभी सदस्यों को ई-मेल द्वाराप्रदान किया जाएगा।

कृपया बैठक में उपस्थित होने की सुविधा प्रदान करें।

The **225th** meeting of the Operation Co-ordination sub-committee will be conducted through Video Conferencing on **12.11.2024** from **10:30 Hrs**. The agenda of this meeting has been uploaded on the NRPC web-site http://164.100.60.165.

The link and password for joining the meeting will be e-mailed to respective e-mail IDs in due course.

Kindly make it convenient to attend the meeting.

(डी. के. मीना)
अधीक्षण अभियंता (प्रचालन)

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

Signed by Dharmendra Kumar Meena
Date: 08-11-2024 18:57:15

List of addressee (via mail)

| OCC Members for FY 2024-25 | | | |
|---|---|---|---|
| **S. No.** | **OCC Member** | **Category** | **E-mail** |
| 1 | NLDC | National Load Despatch Centre | nomination awaited<br>rk.porwal@grid-india.in |
| 2 | NRLDC | Northern Regional Load Despatch Centre | somara.lakra@grid-india.in |
| 3 | CTUIL | Central Transmission Utility | kashish@powergrid.in |
| 4 | PGCIL | Central Government owned Transmission Company | rtamc.nr1@powergrid.in<br>rtamcjammu@powergrid.in<br>cpcc.nr3@powergrid.in |
| 5 | NTPC | Central Generating Company | hrastogi@ntpc.co.in |
| 6 | BBMB | | powerc@bbmb.nic.in |
| 7 | THDC | | ravindrasrana@thdc.co.in |
| 8 | SJVN | | sjvn.cso@sjvn.nic.in |
| 9 | NHPC | | surendramishra@nhpc.nic.in |
| 10 | NPCIL | | df@npcil.co.in |
| 11 | Delhi SLDC | State Load Despatch Centre | gmsldc@delhisldc.org |
| 12 | Haryana SLDC | | cesocomml@hvpn.org.in |
| 13 | Rajasthan SLDC | | ce.ld@rvpn.co.in |
| 14 | Uttar Pradesh SLDC | | cepso@upsldc.org |
| 15 | Uttarakhand SLDC | | se_sldc@ptcul.org |
| 16 | Punjab SLDC | | ce-sldc@pstcl.org |
| 17 | Himachal Pradesh SLDC | | cehpsldc@gmail.com |
| 18 | DTL | State Transmission Utility | bl.gujar@dtl.gov.in |
| 19 | HVPNL | | cetspkl@hvpn.org.in |
| 20 | RRVPNL | | ce.ppm@rvpn.co.in |
| 21 | UPPTCL | | smart.saxena@gmail.com |
| 22 | PTCUL | | ce_oandmk@ptcul.org |
| 23 | PSTCL | | ce-tl@pstcl.org |
| 24 | HPPTCL | | gmprojects.tcl@hpmail.in |
| 25 | IPGCL | State Generating Company | ncsharma@ipgcl-ppcl.nic.in |
| 26 | HPGCL | | seom2.rgtpp@hpgcl.org.in |
| 27 | RRVUNL | | ce.ppmcit@rrvun.com |
| 28 | UPRVUNL | | cgm.to@uprvunl.org |
| 29 | UJVNL | | gm_engg_ujvn@yahoo.co.in |
| 30 | HPPCL | | gm_generation@hppcl.in |
| 31 | PSPCL | State Generating Company & State owned Distribution Company | ce-ppr@pspcl.in |
| 32 | UHBVN | State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.) | nomination awaited<br>(md@uhbvn.org.in) |
| 33 | Jodhpur Vidyut Vitran Nigam Ltd. | | addlcehqjdvvnl@gmail.com |
| 34 | Paschimanchal Vidyut Vitaran Nigam Ltd. | | nomination awaited<br>(md@pvvnl.org) |
| 35 | UPCL | | cgmupcl@yahoo.com |
| 36 | HPSEB | | cesysophpsebl@gmail.com |
| 37 | Prayagraj Power Generation Co. Ltd. | IPP having more than 1000 MW installed capacity | sanjay.bhargava@tatapower.com |

| | | | |
|---|---|---|---|
| 38 | Aravali Power Company Pvt. Ltd | | amit.hooda01@gmail.com |
| 39 | Apraave Energy Ltd., | | rajneesh.setia@apraava.com |
| 40 | Talwandi Sabo Power Ltd. | | ravinder.thakur@vedanta.co.in |
| 41 | Nabha Power Limited | | Durvesh.Yadav@larsentoubro.com |
| 42 | MEIL Anpara Energy Limited | | arun.tholia@meilanparapower.com |
| 43 | Rosa Power Supply Company Ltd | | Suvendu.Dey@relianceada.com |
| 44 | Lalitpur Power Generation Company Ltd | | avinashkumar.ltp@lpgcl.com |
| 45 | MEJA Urja Nigam Ltd. | | rsjuneja@ntpc.co.in |
| 46 | Adani Power Rajasthan Limited | | manoj.taunk@adani.com |
| 47 | JSW Energy Ltd. (KWHEP) | | roshan.zipta@jsw.in |
| 48 | TATA POWER RENEWABLE | IPP having less than 1000 MW installed capacity (alphabetical rotational basis) | nomination awaited (dhmahabale@tatapower.com) |
| 49 | UT of J&K | From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory. | sojpdd@gmail.com |
| 50 | UT of Ladakh | | cepdladakh@gmail.com |
| 51 | UT of Chandigarh | | elop2-chd@nic.in |
| 52 | Noida Power Company limited | Private Distribution Company in region (alphabetical rotational basis) | nomination awaited (ssrivastava@noidapower.com) |
| 53 | Fatehgarh Bhadla Transmission Limited | Private transmission licensee (nominated by central govt.) | nomination awaited (nitesh.ranjan@adani.com) |
| 54 | NTPC Vidyut Vyapar Nigam Ltd. | Electricity Trader (nominated by central govt.) | nomination awaited (ceonvvn@ntpc.co.in) |

# Contents

## खण्ड-क: उ.क्षे.वि.स. Part-A: NRPC

### A.1. Confirmation of Minutes

224th OCC meeting was held on 18.10.2024. Minutes of the meeting were issued vide letter dt. 07.11.2024.

**Decision required from Forum:**

*Forum may approve the minutes of 224th OCC meeting.*

### A.2. Status of action taken on decisions of 224th OCC meeting of NRPC

A.2.1. Status of action taken on decisions of 224th NRPC meeting is attached as **Annexure- A.0**.

### A.3. Review of Grid operations

A.3.1. **Power Supply Position (Provisional) for October 2024**

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of October-2024 is as under:

| State / UT | Req. / Avl. | Energy (MU) | | | Peak (MW) | | |
|---|---|---|---|---|---|---|---|
| | | Anticipated | Actual | % Variation | Anticipated | Actual | % Variation |
| CHANDIGARH | (Avl) | 130 | 145 | 11.6% | 310 | 298 | -3.9% |
| | (Req) | 142 | 145 | 2.2% | 304 | 298 | -2.1% |
| DELHI | (Avl) | 3423 | 3243 | -5.2% | 5650 | 6161 | 9.0% |
| | (Req) | 2700 | 3244 | 20.1% | 5650 | 6161 | 9.0% |
| HARYANA | (Avl) | 6126 | 6161 | 0.6% | 10263 | 11087 | 8.0% |
| | (Req) | 5601 | 6161 | 10.0% | 10602 | 11087 | 4.6% |
| HIMACHAL PRADESH | (Avl) | 1069 | 1065 | -0.4% | 1935 | 1947 | 0.6% |
| | (Req) | 1084 | 1066 | -1.7% | 1915 | 1947 | 1.7% |
| J&K and LADAKH | (Avl) | 1390 | 1546 | 11.2% | 3090 | 2742 | -11.3% |
| | (Req) | 1872 | 1558 | -16.8% | 3235 | 3068 | -5.2% |
| PUNJAB | (Avl) | 6150 | 6268 | 1.9% | 10080 | 14311 | 42.0% |
| | (Req) | 6499 | 6268 | -3.6% | 12748 | 14311 | 12.3% |
| RAJASTHAN | (Avl) | 8330 | 9846 | 18.2% | 17860 | 16206 | -9.3% |
| | (Req) | 9461 | 9846 | 4.1% | 15300 | 16206 | 5.9% |
| UTTAR PRADESH | (Avl) | 13020 | 14226 | 9.3% | 25500 | 26756 | 4.9% |
| | (Req) | 12710 | 14227 | 11.9% | 25500 | 26756 | 4.9% |
| UTTARAKHAND | (Avl) | 1287 | 1349 | 4.9% | 2260 | 2412 | 6.7% |
| | (Req) | 1271 | 1355 | 6.6% | 2200 | 2412 | 9.6% |
| NORTHERN REGION | (Avl) | 40924 | 43849 | 7.1% | 76900 | 73700 | -4.2% |
| | (Req) | 41340 | 43869 | 6.1% | 70500 | 73700 | 4.5% |

As per above, negative / significant variation (≥5%) in Actual Power Supply Position (Provisional) vis-à-vis Anticipated figures is observed for the month of October-2024 in terms of Energy Requirement for Delhi, Haryana, HP, UTs of J&K and Ladakh, Punjab, UP, and Uttarakhand and in terms of Peak Demand similar variation is noted

for Chandigarh, Delhi, UTs of J&K and Ladakh, Punjab, Rajasthan, and Uttarakhand. These states/UTs are requested to submit reason for such variations so that the same can be deliberated in the meeting.

All SLDCs are requested to furnish provisional and revised power supply position in prescribed formats on NRPC website portal by 2nd and 15th day of the month respectively for the compliance of Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007.

## A.4. Maintenance Programme of Generating Units and Transmission Lines

### A.4.1. Maintenance Programme for Generating Units

The meeting on proposed maintenance programme for Generating Units for the month of December-2024 is scheduled on 11-November-2024 via Video Conferencing.

### A.4.2. Outage Programme for Transmission Elements

The meeting on proposed outage programme of Transmission elements for the month of December-2024 is scheduled on 11-November-2024 via Video conferencing.

## A.5. Planning of Grid Operation

### A.5.1. Anticipated Power Supply Position in Northern Region for December 2024

The Anticipated Power Supply Position in Northern Region for December 2024 is as under:

| State / UT | Availability / Requirement | Revised Energy (MU) | Revised Peak (MW) | Date of revision |
|---|---|---|---|---|
| CHANDIGARH | Availability | 120 | 290 | No Revision submitted |
| | Requirement | 123 | 307 | |
| | Surplus / Shortfall | -3 | -17 | |
| | % Surplus / Shortfall | -2.4% | -5.4% | |
| DELHI | Availability | 3320 | 6070 | No Revision submitted |
| | Requirement | 2174 | 5508 | |
| | Surplus / Shortfall | 1146 | 562 | |
| | % Surplus / Shortfall | 52.7% | 10.2% | |
| HARYANA | Availability | 5800 | 10450 | No Revision submitted |
| | Requirement | 4250 | 8954 | |
| | Surplus / Shortfall | 1550 | 1496 | |
| | % Surplus / Shortfall | 36.5% | 16.7% | |

| State / UT | Availability / Requirement | Revised Energy (MU) | Revised Peak (MW) | Date of revision |
|---|---|---|---|---|
| | Availability | 620 | 2250 | |
| HIMACHAL PRADESH | Requirement | 1145 | 2146 | No Revision submitted |
| | Surplus / Shortfall | -525 | 104 | |
| | % Surplus / Shortfall | -45.9% | 4.8% | |
| J&K and LADAKH | Availability | 1240 | 3130 | No Revision submitted |
| | Requirement | 2062 | 3245 | |
| | Surplus / Shortfall | -822 | -115 | |
| | % Surplus / Shortfall | -39.9% | -3.5% | |
| PUNJAB | Availability | 6100 | 10100 | No Revision submitted |
| | Requirement | 4531 | 8991 | |
| | Surplus / Shortfall | 1569 | 1109 | |
| | % Surplus / Shortfall | 34.6% | 12.3% | |
| RAJASTHAN | Availability | 9060 | 18360 | No Revision submitted |
| | Requirement | 10886 | 19278 | |
| | Surplus / Shortfall | -1826 | -918 | |
| | % Surplus / Shortfall | -16.8% | -4.8% | |
| UTTAR PRADESH | Availability | 14290 | 27530 | No Revision submitted |
| | Requirement | 10378 | 22277 | |
| | Surplus / Shortfall | 3912 | 5253 | |
| | % Surplus / Shortfall | 37.7% | 23.6% | |
| UTTARAKHAND | Availability | 1333 | 2450 | 05-Nov-24 |
| | Requirement | 1380 | 2490 | |
| | Surplus / Shortfall | -47 | -40 | |
| | % Surplus / Shortfall | -3.4% | -1.6% | |
| NORTHERN REGION | Availability | 41883 | 73500 | |
| | Requirement | 36929 | 66700 | |
| | Surplus / Shortfall | 4955 | 6800 | |
| | % Surplus / Shortfall | 13.4% | 10.2% | |

SLDCs are requested to update the anticipated power supply position of their respective state / UT for the month of December-2024 and submit the measures proposed to be taken to bridge the gap between demand & availability, as well to dispose-off the surplus, if any, in the prescribed format.

## A.6. Follow-up of issues from previous OCC Meetings- Status update.

The updated status of agenda items is enclosed at ***Annexure-A.I***.

***All utilities are requested to update the status.***

## A.7. NR Islanding scheme

Latest status of Islanding Scheme of NR is attached as **Annexure-A.II.**

***Members may kindly deliberate.***

## A.8. Coal Supply Position of Thermal Plants in Northern Region

A.8.1 In 186th OCC meeting, it was agreed that coal stock position of generating stations in northern region may be reviewed in the OCC meetings on the monthly basis.

A.8.2 Accordingly, coal stock position of generating stations in northern region during current month (till 05th November 2024) is as follows:

| Station | Capacity (MW) | PLF % (prev. months) | Normative Stock Reqd (Days) | Actual Stock (Days) |
|---|---|---|---|---|
| ANPARA C TPS | 1200 | 0.59 | 14 | 9.1 |
| ANPARA TPS | 2630 | 0.83 | 14 | 7.5 |
| BARKHERA TPS | 90 | 0.43 | 22 | 8.8 |
| DADRI (NCTPP) | 1820 | 0.23 | 22 | 10.0 |
| GH TPS (LEH.MOH.) | 920 | 0.13 | 22 | 22.3 |
| GOINDWAL SAHIB TPP | 540 | 0.35 | 22 | 18.5 |
| HARDUAGANJ TPS | 1265 | 0.43 | 22 | 16.1 |
| INDIRA GANDHI STPP | 1500 | 0.61 | 22 | 28.8 |
| KAWAI TPS | 1320 | 0.60 | 22 | 22.6 |
| KHAMBARKHERA TPS | 90 | 0.49 | 22 | 13.2 |
| KOTA TPS | 1240 | 0.55 | 22 | 13.3 |
| KUNDARKI TPS | 90 | 0.41 | 22 | 12.3 |
| LALITPUR TPS | 1980 | 0.58 | 22 | 9.9 |
| MAHATMA GANDHI TPS | 1320 | 0.61 | 22 | 24.1 |
| MAQSOODPUR TPS | 90 | 0.43 | 22 | 12.5 |
| MEJA STPP | 1320 | 0.54 | 22 | 12.7 |
| OBRA TPS | 1094 | 0.56 | 22 | 6.9 |
| PANIPAT TPS | 710 | 0.43 | 22 | 27.4 |
| PARICHHA TPS | 1140 | 0.52 | 22 | 12.6 |
| PRAYAGRAJ TPP | 1980 | 0.59 | 22 | 15.6 |
| RAJIV GANDHI TPS | 1200 | 0.34 | 22 | 22.9 |
| RAJPURA TPP | 1400 | 0.51 | 22 | 12.9 |
| RIHAND STPS | 3000 | 0.74 | 14 | 10.2 |
| ROPAR TPS | 840 | 0.19 | 22 | 28.9 |

| Station | Capacity (MW) | PLF % (prev. months) | Normative Stock Reqd (Days) | Actual Stock (Days) |
|---|---|---|---|---|
| ROSA TPP Ph-I | 1200 | 0.56 | 22 | 15.3 |
| SINGRAULI STPS | 2000 | 0.66 | 14 | 8.5 |
| SURATGARH TPS | 1500 | 0.24 | 22 | 8.8 |
| TALWANDI SABO TPP | 1980 | 0.46 | 22 | 9.2 |
| TANDA TPS | 1760 | 0.55 | 22 | 10.9 |
| UNCHAHAR TPS | 1550 | 0.48 | 22 | 9.4 |
| UTRAULA TPS | 90 | 0.44 | 22 | 15.4 |
| YAMUNA NAGAR TPS | 600 | 0.25 | 22 | 13.8 |
| CHHABRA-I PH-1 TPP | 500 | 0.76 | 22 | 8.4 |
| KALISINDH TPS | 1200 | 0.33 | 22 | 9.8 |
| SURATGARH STPS | 1320 | 0.61 | 22 | 4.1 |
| CHHABRA-I PH-2 TPP | 500 | 0.76 | 22 | 8.8 |
| CHHABRA-II TPP | 1320 | 0.74 | 22 | 4.3 |

## A.9. Status of availability of ERS towers in Northern Region (Agenda by NRPC Sectt.)

A.9.1 In the 68th meeting of NRPC issues arising due to non-availability of sufficient ERS were discussed and it was decided that ERS availability monitoring shall be taken as rolling/follow-up agenda in OCC meetings for regular monitoring of ERS under different utilities in Northern region.

A.9.2 Subsequently matter was deliberated in 211th OCC meeting wherein NRLDC representative briefed about the Requirement of ERS, recent experience in Northern Region, CEA Regulation on ERS, Govt. Guidelines and Present situation on ERS.

A.9.3 NRPC Sectt. vide letter dated 26.09.2023 requested all transmission utilities of NR to furnish the length of transmission line (ckt-kms) and number of ERS towers available with them at different voltage levels (e.g. 220 kV, 400 KV 765 KV and + -500 kV HVDC via email at **seo-nrpc@nic.in**.

A.9.4 In this regard, inputs received from utilities are attached as **Annexure-A.III.**

***Transmission utilities of NR to update status***.

## A.10. Updating outage Details by Generating Station/utilities (Agenda by CEA)

A.10.1. To enhance the monitoring of approved Planned Maintenance schedules, Member (GO&D), CEA has directed that actual maintenance availed against approved planned maintenance is to be updated on priority by respective RPCs regularly on monthly basis.

A.10.2. In the 221st OCC meeting of NRPC, forum asked generating stations of NR to update the status of Planned Maintenance schedules versus actual maintenance availed for the previous month before every OCC meeting and it was decided that

to enhance the monitoring of approved Planned Maintenance schedules the said agenda item shall be taken as rolling/follow-up agenda in OCC meetings.

A.10.3. In this regard, list of Planned Maintenance schedules versus actual maintenance availed for the year 2024-25 for the month of October 2024 is attached as **Annexure-A.IV.**

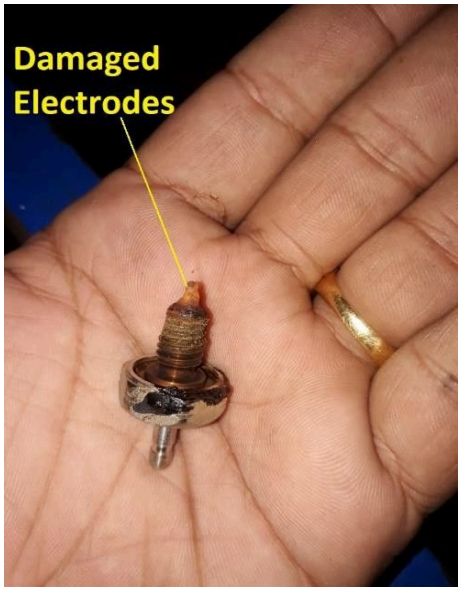
A.10.4. In this, regard, Generating Station/utilities of NR are requested to submit each month the details of the maintenance activities that transpired against the originally planned schedule. Further, any deviations from the planned schedule shall be explained by the concerned generating entities.

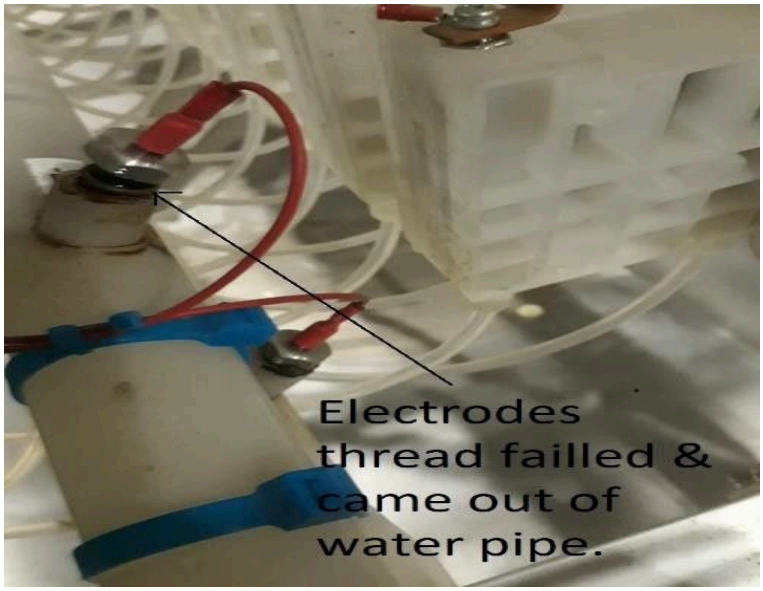
***Generating utilities of NR to update status***.

**A.11. Installation of Co2 injection (seeding) system in HVDC Mundra and Mahendragarh Terminal system (agenda by ATIL)**

A.11.1. ±500 kV HVDC Mundra Mahendragarh Transmission system is a critical interconnection between the western region and the Northern Region. The system is in service since the last 12 years. Every year, the system is taken into outage for 6-8 days majorly to check the valve cooling system with checks of deposition of the electrode cooling tubes. The reason of deposition is during circulation of DM water for cooling of thyristor, it meets aluminum alloy heat sinks of the thyristor. Very slow chemical process happens which releases aluminum in DM water while circulation within thyristor heat sink. Released aluminum particles in microns circulate inside water tubes of valve hall. Siemens has provided electrodes on colling tubes of valve hall. Aluminum particles with other impurities deposit on electrodes provided on colling tubes of valve hall. It is very critical to check these electrodes every year so that electrodes with high deposition can be replaced.

A.11.2. Some images of the deposition formed are:




A.11.3. While this electrode deposition and replacement activity had been carried out once a year, we have observed increased deposition in electrodes in the past 5 years. Below is the trend of deposition observed:

| | Location | 2019 | 2020 | 2021 | 2022 | 2023 | Grand Total |
|---|---|---|---|---|---|---|---|
| REPLACEMENT OF GRADING ELECTRODE | Mundra | 15 | 20 | 32 | 44 | 47 | 158 |
| | Mahendragarh | 7 | 9 | 18 | 25 | 28 | 87 |

A.11.4. Moreover, ATIL has had 5 nos. of emergency outages availed in the past 2 years due to deposition and water leakage in the valve hall. The problem is aggravating and it is required that ATIL would have to check the deposition on electrodes on 6 monthly basis i.e. 16 days outage of HVDC system.

A.11.5. ATIL had approached OEM (M/S Siemens) to provide a solution for such deposition. M/S Siemens has proposed installation of Co2 dosing (injection) system. The purpose of the CO2-dosing system is to inject gaseous CO2 in the cooling system in order to modify the conditions of the cooling water. According to the CO2 amount the pH-value of the cooling water and the conductivity changes. Through the conductivity value the injected CO2 amount is controlled. The CO2-dosing system is needed to reduce/stop the formation of aluminum coating on the grading electrodes used inside the converter. Thus, the injection system maintains the pH of DM water to 7 which prevents such scaling.

A.11.6. ATIL has submitted that the above-mentioned solution is proven and globally recommended. Enclosed (**Annexure-V**) is a technical paper published by “Internal Journal of electrochemical science” on the subject with Siemens’ experience on the same. In India, Power grid has installed the same in its Talcher and Kolar HVDC terminals and the results are very good. Co2 injection system has reduced impurity deposition which has resulted in long maintenance and emergency outages.

A.11.7. The estimate cost of supply and installation is Rs 10 crore/pole/terminal (total Rs 40 crore for both Mundra and Mahendragarh). The installation would require an outage of 6-8 days outage/pole.

A.11.8. ATIL seeks approval of the forum to install the Co2 injection system as an additional capitalization for technical upgradation project and requests approval of the outage duration for installation of the same as deemed available to ATIL.

A.11.9. The cited subject was also discussed in the 51$^{st}$ TCC and 76$^{th}$ NRPC meeting wherein NRPC Board referred matter to OCC forum for detailed technical deliberation on this agenda.

***Members may kindly deliberate***.

## A.12. Procurement of cold spare transformers and reactor for Northern Region (Agenda by POWERGRID)

A.12.1 Hon’ble CERC had set up a committee on dated 15.03.2018 consisting of representatives from CERC, NLDC, CEA & POWERGRID under the Chairmanship of the Chief (Engineering) of the CERC to assess the requirement of regional spares including bus reactors, line reactors, ICTs, etc. This would ensure reliability of the grid and reduce downtime in case of any failure/outage.

A.12.2 In As per CERC Committee recommendation, the following spares transformers & reactors are required to be kept as spare for Northern Region as per POWERGRID assets base:

**i) <u>Transformer:</u>**

| Sl No | State/ UT | MVA Rating and Phase | Volt | Total installed unit | Spare Required as per CERC report | RPC Approved Spares | Qty Proposed for procurement | Approx Cost (Rs. In Crore) | Availability of RPC Spare | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DELHI | 3Ø-500 MVA | 400/220 | 10 | 1 | 1 | 0 | | Tughlakabad | |
| 2 | DELHI | 3Ø-315 MVA | 400/220 | 3 | 1 | 0 | 1 | 20.24 | | Maharanibagh/ Bawana |
| 3 | HARYANA | 3Ø-500 MVA | 400/220 | 17 | 2 | 2 | 0 | | Manesar GIS Panchkula (Given to PSTCL) | |
| 4 | HARYANA | 3Ø-315 MVA | 400/220 | 22 | 2 | 1 | 0 | | | |
| 5 | HIMACHAL PRADESH | 3Ø-315 MVA | 400/220 | 3 | 1 | 0 | 1 | 20.24 | | Required at Nallagarh |
| 6 | JAMMU & KASHMIR | 3Ø-315 MVA | 400/220 | 3 | 1 | 0 | 1 | 20.24 | | Required at Sambha |
| 7 | PUNJAB | 3Ø-500 MVA | 400/220 | 12 | 1 | 1 | 0 | | Moga | |
| 8 | PUNJAB | 3Ø-315 MVA | 400/220 | 10 | 1 | 2 | 0 | | 01no. under procurement Ludhiana - Given to DTL | |
| 9 | RAJASTHAN | 3Ø-500 MVA | 400/220 | 32 | 2 | 1 | 0 | | | |
| 10 | RAJASTHAN | 3Ø-315 MVA | 400/220 | 18 | 1 | 1 | 0 | | Bhiwadi - Given to | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | RVPNL | |
| 11 | UTTAR PRADESH | 3Ø-500 MVA | 400/220 | 15 | 1 | 1 | 0 | | Lucknow | |
| 12 | UTTAR PRADESH | 3Ø-315 MVA | 400/220 | 21 | 2 | 2 | 0 | | 02nos. under procurment | |
| 13 | UTTAR PRADESH | 3Ø-200 MVA | 400/132 | 1 | 1 | 0 | 1 | 13.27 | | Required at Ballia |
| 14 | UTTAR PRADESH | 3Ø-200 MVA | 220/132 | 2 | 1 | 1 | 0 | | Raibareilly | |
| 15 | UTTARAKHAND | 3Ø-500 MVA | 400/220 | 1 | 1 | 0 | 1 | 26.81 | | Required at Roorkee |
| 16 | UTTARAKHAND | 3Ø-315 MVA | 400/220 | 4 | 1 | 0 | 1 | 20.24 | | Required at Dehradun |
| 17 | CHANDIGARH | 3Ø-160 MVA | 220/66 | 2 | 1 | 0 | 1 | 11.7 | | Required at Chandigarh |
| | | | | | | | **Total** | **132.74** | | |

**Special type of Transformer**

| **Sl No** | **Location** | **MVA Rating and Phase** | **Voltage** | **Total installed unit** | **Spare Required as per CERC report** | **RPC Approved Spares** | **Qty Proposed for procurement** | **Approx Cost (Rs. In Crore)** | **Availability of RPC Spare** | **Remarks** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GIS Maharani Bagh | 3Ø-500 MVA | 400/220 | 2 | 1 | 0 | 1 | 30 | | HV bushings: Oil to GIS IV Bushings: Oil to Oil |
| 2 | GIS Baghpat | 3Ø-500 MVA | 400/220 | 2 | 1 | 0 | 1 | 30 | | |
| | | | | | | | **Total** | **60** | | |

ii) **Reactors:**

| Sl. No. | State | Voltage Rating | Capacity in MVAR | Total installed Unit | Spare required as per CERC Committee report | RPC Approved Spares | Qty Proposed for procurement | Approx Cost (Rs. In Crore) | Availability of RPC Spare | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Delhi | 420 kV | 125 | 3 | 1 | 0 | 1 | 13.00 | | |
| 2 | Haryana | 220 kV | 25 | 2 | 1 | 0 | 1 | 5.00 | | |
| 3 | Haryana | 420 kV | 50 | 12 | 1 | 0 | 1 | 9.26 | | |
| 4 | Haryana | 420 kV | 80 | 7 | 1 | 0 | 1 | 11.25 | | |
| 5 | Haryana | 420 kV | 125 | 11 | 1 | 0 | 1 | 13.00 | | |
| 6 | HP | 420 kV | 50 | 4 | 1 | 0 | 0 | | | |
| 7 | HP | 420 kV | 63 | 2 | 1 | 0 | 1 | 9.56 | | |
| 8 | HP | 420 kV | 80 | 4 | 1 | 0 | 1 | 11.25 | | |
| 9 | HP | 420 kV | 125 | 1 | 1 | 0 | 1 | 13.00 | | |
| 10 | J&K | 420 kV | 50 | 5 | 1 | 0 | 0 | | | |
| 11 | J&K | 420 kV | 63 | 3 | 1 | 0 | 1 | 9.56 | | |
| 12 | J&K | 420 kV | 80 | 2 | 1 | 0 | 1 | 11.25 | | |
| 13 | J&K | 420 kV | 125 | 2 | 1 | 0 | 1 | 13.00 | | |
| 14 | J&K | 220 kV | 25 | 1 | 1 | 0 | 1 | 5.00 | | |
| 15 | LADAKH | 220 kV | 25 | 2 | 1 | 0 | 1 | 5.00 | | |
| 16 | Punjab | 420 kV | 50 | 8 | 1 | 0 | 0 | | | |
| 17 | Punjab | 420 kV | 63 | 4 | 1 | 0 | 1 | 9.56 | | |
| 18 | Punjab | 420 kV | 80 | 2 | 1 | 0 | 1 | 11.25 | | |
| 19 | Punjab | 420 kV | 125 | 7 | 1 | 0 | 1 | 13.00 | | |
| 20 | Punjab | 220 kV | 25 | 3 | 1 | 0 | 1 | 5.00 | | |
| 21 | Rajasthan | 420 kV | 50 | 22 | 2 | 0 | 0 | | | |
| 22 | Rajasthan | 420 kV | 63 | 2 | 1 | 0 | 1 | 9.56 | | |
| 23 | Rajasthan | 420 kV | 80 | 7 | 1 | 0 | 1 | 11.25 | | |
| 24 | Rajasthan | 420 kV | 125 | 12 | 1 | 0 | 1 | 13.00 | | |
| 25 | UP | 420 kV | 50 | 36 | 2 | 0 | 1 | 9.26 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | UP | 420 kV | 63 | 11 | 1 | 0 | 1 | 9.56 | | |
| 27 | UP | 420 kV | 80 | 16 | 1 | 0 | 1 | 11.25 | | |
| 28 | UP | 420 kV | 125 | 21 | 2 | 0 | 1 | 13.00 | | |
| 29 | UP | 220 kV | 25 | 1 | 1 | 0 | 1 | 5.00 | | |
| 30 | Uttrakhand | 220 kV | 25 | 2 | 1 | 0 | 1 | 5.00 | | |
| 31 | Uttrakhand | 420 kV | 50 | 0 | 0 | 0 | 1 | 9.26 | | |
| 32 | Uttrakhand | 420 kV | 80 | 1 | 1 | 0 | 1 | 11.25 | | |
| 33 | Uttrakhand | 420 kV | 125 | 2 | 1 | 0 | 1 | 13.00 | | |
| | | | | | | | Total | 288.33 | | |

**Special Type of Reactors**

| Sl. No. | Location | Voltage Rating | Capacity in MVAR | Total installed Unit | Spare required as per CERC Committee report | RPC Approved Spares | Qty Proposed for procurement | Approx Cost (Rs. In Crore) | Availability of RPC Spare | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GIS Manesar | 420 kV | 125 | 2 | 1 | 0 | 1 | 14.00 | | HV bushings: Oil to GIS |
| 2 | GIS Baghpat | 420 kV | 125 | 1 | 1 | 0 | 1 | 14.00 | | |
| | | | | | | | Total | 28 | | |

**Grand Total: 509.07 Cr.**

A.12.3 In view of the above, Powergrid has requested for approval for procurement of cold spare transformers & reactors of various ratings as per CERC committee recommendation as mentioned above. The Tariff for the investment made is to be shared by constituents as per CERC notification.

A.12.4 The cited subject matter was also discussed in the 51st TCC and 76th NRPC meeting wherein NRPC Board referred matter to OCC forum for detailed technical deliberation on this agenda.

A.12.5 In the 51st TCC and 76th NRPC meeting MS, NRPC also conveyed that the status of availability/requirements of ICTs/Reactors may be taken as agenda in the OCC meetings regularly to know the present scenario of these assets.

***Members may kindly deliberate.***

**A.13. Review of availability for power line crossing & OPGW diamond formation by upcoming new Transmission line projects (Agenda by POWERGRID NR-1)**

A.13.1. This is in reference to the NRTS Availability and the classification of outages required for power line crossings and OPGW diamond formations associated with upcoming transmission line projects. Powergrid NR-1 has mentioned that these outages are not currently being considered under the "LCSD" category (Line Shutdowns for Construction Activities of New Systems Executed by Licensee) on availability certification, which accurately reflects the purpose of these shutdowns as they support essential construction activities for new system integrations.

A.13.2. The construction of the 765kV Bhadla-2 to Sikar-2 transmission line, as approved in the 6th NCT meeting held on 30.09.2019 (MoM point no-4.3.5, pages 11-12 copy attached as **Annexure-A.VI**), is progressing steadily. Additionally, the commissioning of the Fatehgarh-2 to Bhadla-2 Circuits 3 & 4 is underway as per the approved 6th NCT scheme. Both these critical transmission lines require planned shutdowns at multiple locations where they cross existing 765kV and 400kV lines. These planned shutdowns, intended for power line crossings and OPGW diamond formations, have been discussed and formally approved in the outage meeting of OCC.

A.13.3. Powergrid NR-1 has requested that total outage period (mentioned in attached **Annexure-A.VII**) may be reviewed and considered deemed available for power line crossing & OPGW diamond formation by upcoming new Transmission line projects.

***Members may kindly deliberate.***

**खण्ड-ख: उ.क्षे.भा.प्रे.के. Part-B: NRLDC**

## B.1. NR Grid Highlights for October 2024

| S.No. | Constituents | Max Demand met (in MW) | Date & Time of Max Demand met | Max Consumption (in MUs) | Date of Max Consumption | Average Demand met (in Mus) |
|---|---|---|---|---|---|---|
| 1 | Chandigarh | 298 | 01.10.24 at 19:00 | 6.0 | 31.10.24 | 4.7 |
| 2 | Delhi | 6161 | 03.10.24 at 15:30 | 128.3 | 31.10.24 | 104.8 |
| 3 | Haryana | 11087 | 04.10.24 at 19:00 | 235.2 | 31.10.24 | 198.8 |
| 4 | H.P. | 1947 | 25.10.24 at | 36.8 | 31.10.24 | 34.4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 07:45 | | | |
| 5 | J&K | 2742 | 03.10.24 at 19:00 | 53.7 | 06.10.24 | 49.9 |
| 6 | Punjab | 14311 | 04.10.24 at 15:15 | 289.5 | 31.10.24 | 204.4 |
| 7 | Rajasthan | 16206 | 29.10.24 at 12:00 | 343.8 | 13.10.24 | 317.6 |
| 8 | U.P | 26756 | 04.10.24 at 19:20 | 524.5 | 27.10.24 | 459.0 |
| 9 | Uttarakhand | 2412 | 09.10.24 at 19:00 | 48.4 | 31.10.24 | 44.2 |
| 10 | **Northern Region** | **73686** | 04.10.24 at 20:00 | **1665.7** | **31.10.24** | **1417.8** |

*As per SCADA

- In Oct'24, the Maximum energy consumption of Northern Region was **1666 MUs** on 31th Oct'24 and it was 17 % higher than Oct'23 (1422 MU 10th Oct'23)

- In Oct'24, the Average energy consumption per day of Northern Region was **1418 MUs** and it was 14 % higher than Oct'23 (1248 MUs/day)

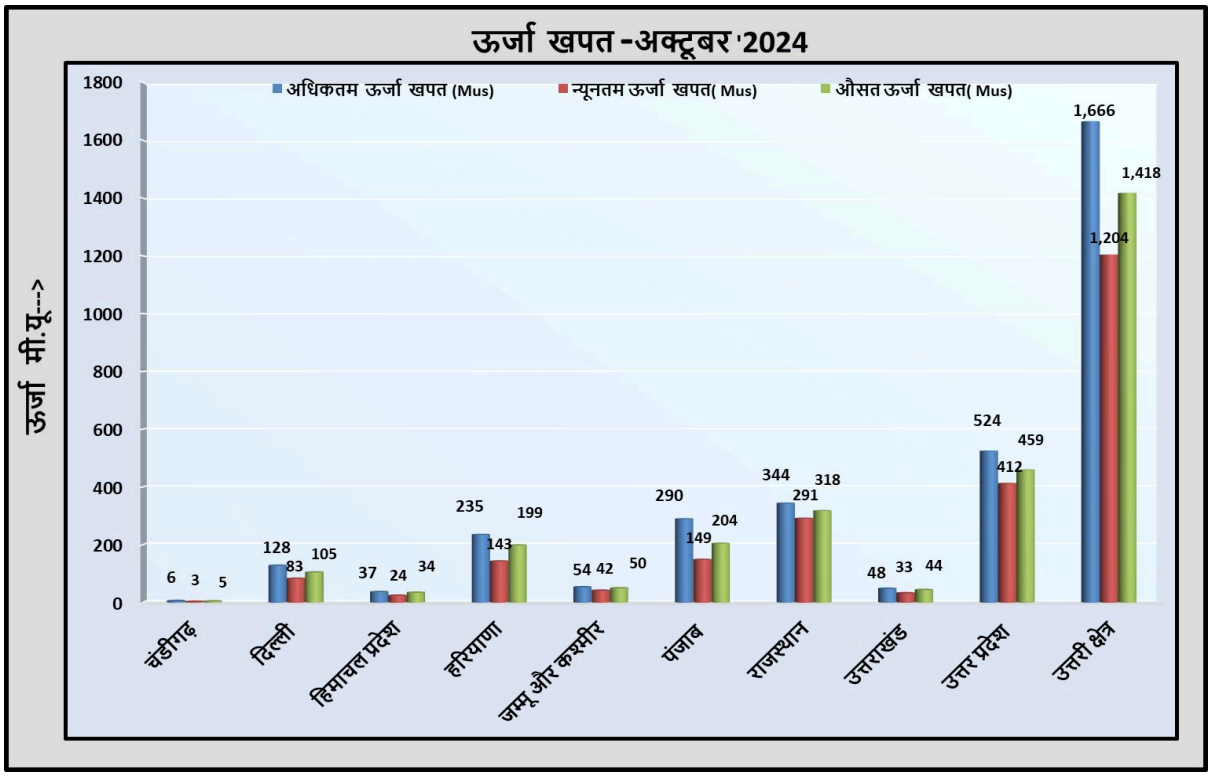
- In Oct'24, the Maximum Demand met of Northern Region was 73686 **MW** on 04th Oct'24 @20:00 hours (*as per scada data)* as compared to 67829 MW on 10th Oct'23 @12:47hours.

**Comparison of Average Energy Consumption (MUs/Day) of NR States for the Oct'23 vs Oct'24**

| क्षेत्र/राज्य | अक्टूबर- 2023 | अक्टूबर- 2024 | % अंतर |
|---|---|---|---|
| चंडीगढ़ | 4.1 | 4.7 | 14.6% |
| दिल्ली | 90.5 | 104.8 | 15.9% |
| हिमाचल प्रदेश | 32.6 | 34.4 | 5.6% |

| | | | |
|---|---|---|---|
| हरियाणा | 172.4 | 198.8 | 15.3% |
| जम्मू और कश्मीर | 48.5 | 49.9 | 2.8% |
| पंजाब | 173.9 | 204.4 | 17.6% |
| राजस्थान | 294.5 | 317.6 | 7.8% |
| उत्तराखंड | 40.0 | 44.2 | 10.4% |
| उत्तर प्रदेश | 391.1 | 459.0 | 17.4% |
| **उत्तरी क्षेत्र** | **1247.6** | **1417.8** | **13.6%** |

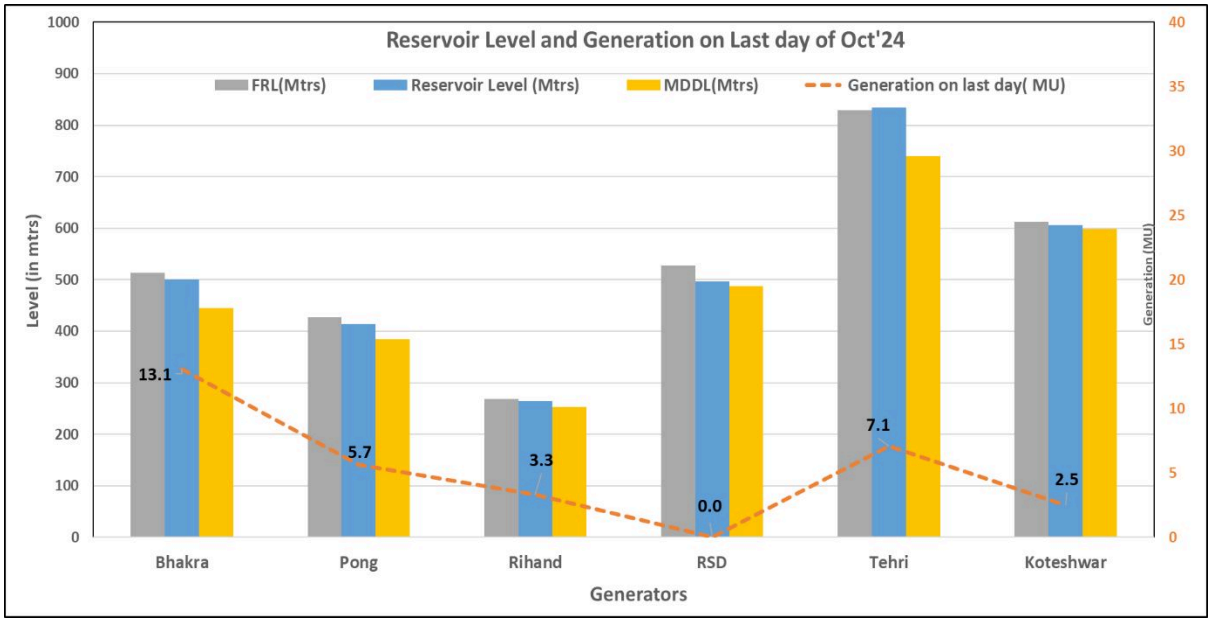
## Energy Consumptions




## Frequency profile

| Month | Avg. Freq. (Hz) | Max. Freq. (Hz) | Min. Freq. (Hz) | <49.90 (% time) | 49.90 – 50.05 (% time) | >50.05 (% time) |
|---|---|---|---|---|---|---|
| **Oct'24** | 50.00 | 50.388 (25.10.24 at 13:03:30 hrs) | 49.585 (16.10.24 at 17:58:20 hrs) | 4.9 | 80.3 | 14.8 |
| **Oct'23** | 49.99 | 50.30 27.10.23 at 16:03:50 hrs | 49.47 16.10.23 at 14:56:40 hrs | 8.9 | 74.4 | 16.7 |

**Reservoir Level and Generation on Last Day of Month**




**Reservoir Level comparison w.r.t. last year as on 31.10.2024:**

| RESERVOIR | Parameters | | | Present Parameters | | LAST YEAR | |
|---|---|---|---|---|---|---|---|
| | MDDL (Mts) | FRL (Mts) | Energy Content at FRL | Level (Mts) | Energy (MU) | Level (Mts) | Energy (MU) |
| Bhakra | 445.62 | 513.59 | 1,728.8 | 499.18 | 1,065 | 506.14 | 1,367 |
| Chamera-I | 748.75 | 760 | 753.95 | 758.7 | 2 | - | - |
| Gandhisagar | 381 | 399.9 | 725 | - | - | - | - |
| Jawahar Sagar | 295.96 | 298.7 | 2.01 | - | - | - | - |
| Koteshwar | 598.5 | 612.5 | 610.73 | 611.65 | 5 | 611.78 | 5 |
| Pong | 384.05 | 426.72 | 1,084 | 411.83 | 556 | 420.02 | 889 |
| RPS | 343.81 | 352.81 | 175.66 | - | - | - | - |
| RSD | 487.91 | 527.91 | 390.3 | 501.27 | 113 | 514.15 | 259 |
| Rihand | 252.98 | 268.22 | 860.5 | 263.93 | 540 | 259.32 | 268 |
| Tehri | 740.04 | 830 | 1,164.11 | 827.99 | 1,122 | 824.89 | 1,057 |
| TOTAL | - | - | - | - | 3,403 | - | 3,845 |

Detailed presentation on grid highlights of Oct'2024 will be shared by NRLDC in OCC meeting.

## B.2. Demand forecasting and resource adequacy related

Hon'ble CERC In the matter of Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 has issued suo-motto order 9/SM/2024 dated 07.10.2024. Order is available at **Annexure-B.I.**

Commission has issued the following directions to NLDC, RLDCs, and SLDCs in connection with the implementation of Regulations 31 and 33 of the Grid Code to

address the anticipated surge in demand of electricity during October 2024 on account of seasonal variations:

a) All the State Load Despatch Centres and RLDCs shall furnish the details of operational planning undertaken by them in terms of Regulation 31(4) (a) of the Grid Code especially for October 2024. RLDC shall validate the adequacy of resources in terms of Regulation 31(4)(b) of the Grid Code.

b) All State Load Despatch Centres and Regional Load Despatch Centres shall prepare the worst-case scenario due to possible surge in demand during the period 1.10.2024 to 31.10.2024 in their respective control area and submit within seven days to the Commission with a copy to National Load Despatch Centre.

c) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, should assess their demand-generation scenario in the upcoming months, ensure the optimum generation, avoid undesirable planned outages, and advise the generating company to offer their availability. The State Load Despatch Centre or Regional Load Despatch Centre shall ensure the optimum scheduling during the shortage period and surplus power to get despatched during the deficit period.

d) The Distribution Companies, in case of a shortage scenario, can procure the power from surplus or requisitioned capacity of other states so that optimum despatch can be ensured for safe and reliable power system operations. The State Load Despatch Centre shall monitor the generation-demand deficit of the respective distribution companies.

e) The generating companies operating their plant with capacity less than its installed capacity due to technical issues, i.e., capacity under partial outage or forced outage, are advised to fix the issues to ensure the maximum generation capacity on-bar.

f) The draw schedule of the respective control area needs to adhere to prevent the reduction of system frequency. The State Load Despatch Centre or Regional Load Despatch Centre, as the case may be, shall monitor the deviation of the key system parameters.

g) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, shall issue the system alerts to their respective grid-connected entities for the possible deficit during the likely surge in demand

The Regional Load Despatch Centres and State Load Despatch Centres shall submit the report on the implementation of the above measures, a load-generation scenario in their respective control areas, and any other measures taken to address the deficit of power supply during the period 1.10.2024 to 31.10.2024.

NLDC, RLDCs, and SLDCs were directed to submit their responses to the measures contained in para 9 of this order by 16.10.2024.

As per the information available with NRLDC, only HP & Uttarakhand have submitted their formal reply to CERC.

Punjab and J&K have shared some information with NRLDC, but formal communication to CERC from their side is yet to be done.

Whereas other states have neither submitted their response to CERC nor NRLDC with regard to order 9/SM/2024 dated 07.10.2024.

It is requested that Delhi, UP, Haryana, Rajasthan and Chandigarh may provide update in this regard. Punjab and J&K are also requested to provide update whether they have submitted the information to CERC.

With reference to the Clause 31(2) of Central Electricity Regulatory Commission-IEGC Regulations, 2023 and the Operating Procedure of NRLDC prepared in accordance with the same, each SLDC has to furnish the demand estimation for day ahead, week ahead, month ahead (with time block wise granularity) and demand estimation for year ahead (with hour granularity). The sub-clause 31(2) (h) of IEGC-2023 states the following timeline for the submission of demand estimate data to RLDC.

| **Type of Demand Estimation** | **Timeline** |
|---|---|
| Daily | 10:00 hours of previous day |
| Weekly | First working day of previous week |
| Monthly | Fifth day of previous month |
| Yearly | 30th September of previous year |

Status of Day Ahead Forecasting & generation adequacy submission status for October-2024 as per Clause 31(4) (a) & (b) of IEGC-2023 is shown below:

| S.no | State | 01-Oct | 02-Oct | 03-Oct | 04-Oct | 05-Oct | 06-Oct | 07-Oct | 08-Oct | 09-Oct | 10-Oct | 11-Oct | 12-Oct | 13-Oct | 14-Oct | 15-Oct | 16-Oct | 17-Oct | 18-Oct | 19-Oct | 20-Oct | 21-Oct | 22-Oct | 23-Oct | 24-Oct | 25-Oct | 26-Oct | 27-Oct | 28-Oct | 29-Oct | 30-Oct | 31-Oct |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JK & Ladakh(UT) | N | N | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N |
| 2 | Punjab | Y | N | N | N | N | N | Y | Y | Y | Y | Y | N | N | N | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 3 | UP | Y | N | Y | Y | Y | N | Y | Y | Y | Y | N | N | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 4 | Uttrakhand | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | N | N | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Y | N | N |
| 5 | Chandigarh | 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 | Y | Y | Y | Y | Y | Y |
| 6 | Rajasthan | Y | N | Y | N | N | Y | N | Y | N | N | N | N | N | N | N | N | Y | N | Y | N | Y | N | N | Y | Y | Y | N | N | N | N | N |
| 7 | Delhi | N | Y | N | N | Y | Y | Y | Y | N | Y | Y | Y | N | N | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 8 | Haryana | N | N | Y | N | Y | Y | N | N | Y | N | N | Y | N | Y | Y | Y | Y | Y | Y | Y | N | Y | N | Y | N | Y | Y | Y | N | Y | Y |
| 9 | HP | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y |

Status of Week Ahead Forecasting data Submission status for the month of October 2024 is shown below:

| S.no | State | 07-10-2024 to 13-10-2024 | 14-10-2024 to 20-10-2024 | 21-10-2024 to 27-10-2024 | 28-10-2024 to 03-11-2024 | 04-11-2024 to 10-11-2024 |
|---|---|---|---|---|---|---|
| 1 | JK & Ladakh(UT) | N | N | N | N | N |
| 2 | Punjab | N | N | N | N | N |
| 3 | UP | N | N | N | Y | Y |
| 4 | Uttrakhand | N | N | N | N | N |
| 5 | Chandigarh | N | N | N | N | N |
| 6 | Rajasthan | N | N | N | N | N |
| 7 | Delhi | N | N | N | N | N |
| 8 | Haryana | N | N | N | N | N |
| 9 | HP | Y | Y | Y | Y | Y |

Status of Month Ahead (October'2024) and Year Ahead Demand forecasting submission status:

| Region | State | Monthly Data submission (Y/N) | Yearly Data submission (Y/N) |
|---|---|---|---|
| NR | Punjab | N | N |
| | Haryana | N | N |
| | Rajasthan | N | N |
| | Delhi | N | Y |
| | UP | Y | Y |
| | Uttarakhand | N | N |
| | HP | Y | Y |
| | J&K | N | N |
| | Chandigarh | N | N |
| | Railways_NR | N | N |

In accordance with above, all SLDCs are requested to timely furnish the demand estimation data along with generation adequacy data as per the formats available at *https://drive.google.com/drive/folders/1KWY4G9gTBLV5wTJkhGEIeRptKP-QbhjL?usp=drive_link* to NRLDC through mail (nrldcmis@grid-india.in) and FTP as per above timeline.

The relevant clauses from IEGC 2023 related to demand forecasting exercise and resource adequacy exercise are tabulated below:

| Clause No. | Responsible Entity | Compliance Assignment |
|---|---|---|
| **5.2(i)** | Each distribution licensee within a State | Estimate the demand in its control area including the demand of open access consumers and factoring in captive generating plants, energy efficiency measures, distributed generation, demand response, in |

| | | |
|---|---|---|
| | | different time horizons, namely long-term, medium term and short-term. |
| **5.2(ii)** | STU (on behanlf of distribution licensee)/other designated agency | Estimate the demand for the entire State duly considering the diversity in different time horizons, namely long-term, medium term and short-term. |
| **5.3(a)** | Each distribution licensee | (i) assess the existing generation resources and identify the additional generation resource requirement to meet the estimated demand in different time horizons,<br>(ii) prepare generation resource procurement plan. |
| **5.3(c)** | Each distribution licensee | Generation resource procurement planning (specifying procurement from resources under State control area and regional control area) shall be undertaken in different time horizons, namely long-term, medium term and short-term to ensure<br>(i) adequacy of generation resources and<br>(ii) planning reserve margin (PRM) taking into account loss of load probability and energy not served as specified by CEA. |
| **5.3(d)** | STU (on behalf of distribution licensee)/other designated agency | STU or other designated agency by state comission shall provide to NLDC,<br>•the details regarding demand forecasting,<br>•assessment of existing generation resources<br>•such other details as may be required for carrying out a national level simulation for generation resource adequacy for States. |
| **5.3(e)** | NLDC | Based on the information received, NLDC shall carry out a simulation to assist the States in drawing their optimal generation resource adequacy plan. |
| **5.3(f)** | Each distribution licensee | Each distribution licensee shall ensure demonstrable generation resource adequacy for such period as specified by the respective SERC |
| **31.1(a)** | NLDC/RLDC/SLDC | Operational planning in advance by NLDC, RLDCs and SLDCs within their respective control areas: Monthly and Yearly time horizons in co-ordination with CTU, RPCs or STUs, as applicable. |
| **31.1(b)** | NLDC/RLDC/SLDC | Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas on Intra-day, Day Ahead, Weekly time horizons. |
| **31.1(c)** | NLDC/RLDC | Procedure and data format by NLDC/RLDC for following activity<br>•Operational planning analysis<br>•Real-time monitoring,<br>•Real-time assessments.<br><br>Format is available at https://posoco.in/wp- |

| | | |
|---|---|---|
| | | content/uploads/2024/03/Final-NLDC-Operating-Procedure_as-submitted-to-CERC-dated-290923.pdf |
| **31.1(d)** | SLDC | SLDC may also issue procedures and formats for data collection for the above purposes. |
| **31.2(a)** | SLDC | Each SLDC shall carry out demand estimation (active & reactive) as part of operational planning after duly factoring in the demand estimation done by STU as part of resource adequacy planning referred to in Chapter 2 of these regulations. |
| **31.2(b)** | SLDC | Each SLDC shall develop methodology for daily, weekly, monthly, yearly demand estimation in MW and MWh for operational analysis as well as resource adequacy purposes |
| **31.2(c)** | SLDC | The demand estimation by each SLDC shall be done on day ahead basis with time block wise granularity for the daily operation and scheduling . Revision in real-time demand estimate by SLDC if major change is observed and sharing with RLDC |
| **31.2(d)** | SLDC | Each SLDC shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVA on a monthly and quarterly basis for the nodes 110 kV and above |
| **31.2(e)** | SLDC | SLDC shall also estimate peak and off-peak demand (active as well as reactive power) on a weekly and monthly basis for load - generation balance planning as well as for operational planning analysis |
| **31.2(f)** | ISTS connected bulk consumers or distribution licensees | The entities such as bulk consumers or distribution licensees that are directly connected to ISTS shall estimate and furnish such a demand estimate to the concerned RLDC |
| **31.2(g)** | RLDC/NLDC | Based on the demand estimate furnished by the SLDCs and other entities directly connected to ISTS, each RLDC shall prepare the regional demand estimate and submit it to the NLDC. NLDC, based on regional demand estimates furnished by RLDCs, shall prepare national demand estimate |
| **31.2(h)** | SLDC | Submission of demand estimate data by SLDCs or other entities directly connected to ISTS, as applicable, to the respective RLDC and RPC as per below timeline :<br>- Daily: 10:00 hrs of previous day<br>- Weekly: First workinh day of previus week<br>- Monhtly: Fifth day of previous month<br>- Yearly: 30th September of the previous year |
| **31.2(i)** | SLDC/RLDC/NLDC | Compute forecasting error for intra-day, dayahead, weekly, monthly and yearly forecasts and analyse the same in order to |

| | | |
|---|---|---|
| | | reduce forecasting error in the future. The computed forecasting errors shall be made available by SLDCs, RLDCs and NLDC on their respective websites. |
| **31.3(a)** | SLDC | The generation estimation by each SLDC shall be done on day ahead basis with time block wise granularity for the daily operation and scheduling . Revision in real-time generation estimate by SLDC if major change is observed and sharing with RLDC |
| **31.3(b)** | RLDC | RLDC shall forecast generation from wind, solar, ESS and Renewable Energy hybrid generating stations that are regional entities and SLDC shall forecast generation from such sources that are intra-state entities, for different time horizons as referred to in clause (1) of Regulation 31 of these regulations for the purpose of operational planning |
| **31.4(a)** | SLDC | SLDCs estimate and ensure the adequacy of resources, identify generation reserves, demand response capacity and generation flexibility requirements with due regard to the resource adequacy framework as specified under Chapter 2 of these regulations |
| **31.4(b)** | SLDC | Furnishing time block-wise information for the following day in SLDC respect of all intra-state entities to the concerned RLDC who shall validate the adequacy of resources with due regard to the following:<br>(i) Demand forecast aggregated for the control area;<br>(ii) Renewable energy generation forecast for the control area;<br>(iii) Injection schedule for intra-State entity generating station;<br>(iv) Requisition from regional entity generating stations<br>(v) Secondary and planned procurement through Tertiary reserve requirement;<br>(vi) Planned procurement of power through other bilateral or collective transactions, if any. |
| **33.1** | NLDC, RLDC, SLDC & (RPC: Monthly & Yearly) | Based on the operational planning analysis data, operational planning study shall be carried out by various agencies for time horizons such as Real time, Intra Day , Weekly , Monthly & Yearly |
| **33.2** | SLDC, RLDCs and NLDC | SLDCs, RLDCs and NLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study. |
| **33.3** | SLDC | SLDCs shall perform day-ahead, weekly, monthly and yearly operational studies for the |

| | | |
|---|---|---|
| | | concerned State for:<br>(a) assessment and declaration of total transfer capability (TTC) and available transfer capability (ATC) for the import or export of electricity by the State. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on SLDC website with all the assumptions and limiting constraints;<br>(b) planned outage assessment;<br>(c) special scenario assessment;<br>(d) system protection scheme assessment;<br>(e) natural disaster assessment; and<br>(f) any other study relevant in operational scenario. |
| **33.4** | RLDCs and NLDC | RLDCs and NLDC shall perform day-ahead, weekly, monthly and yearly operational studies for:<br>(a) assessment of TTC and ATC at inter-regional, intra-regional, and inter-state levels;<br>(b) planned outage assessment;<br>(c) special scenario assessment;<br>(d) system protection scheme assessment;<br>(e) natural disaster assessment; and<br>(f) any other study relevant to operational scenarios |
| **33.5** | RLDCs | RLDC shall assess intra-regional and inter-state level TTC and ATC and submit them to NLDC. NLDC shall declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, and crossborder interconnections 11 (Eleven) months in advance for each month on a rolling basis. |
| **33.6** | RLDCs | Operational planning study shall be done to assess whether the planned operations shall result in deviations from any of the system operational limits defined under these regulations and applicable CEA Standards. The deviations, if any, shall be reviewed in the monthly operational meeting of RPC and significant deviations shall be monitored by RPC for early resolution. |
| **33.7** | NLDC, RLDCs, RPCs and SLDCs | NLDC, RLDCs, RPCs and SLDCs shall maintain records of the completed operational planning study, including date specific power flow study results, the operational plan and minutes of meetings on operational study. |
| **33.8** | NLDC, RLDCs, RPCs and SLDCs | NLDC, RLDCs, RPCs and SLDCs shall have operating plans to address potential deviations from system operational limit identified as a result of the operational planning study. |
| **33.9** | SLDCs | Each SLDC shall undertake a study on the |

| | | |
|---|---|---|
| | | impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC |
| **33.10** | RLDCs | Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intrastate system on the inter-state system and share the results of the studies with NLDC |
| **33.11** | NLDC | NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intraregional system on the inter-regional system. |
| **33.12** | NLDC, RLDCs and SLDCs | NLDC, RLDCs and SLDCs shall compare the results of the studies of the impact of new elements on the system and transfer capability addition with those of the interconnection and planning studies by CTU and STUs |
| **33.13** | concerned user or SLDC or RLDC or NLDC | Defense mechanisms like system protection scheme, load-rejection scheme, generation run-back, islanding scheme or any other scheme for system security shall be proposed by the concerned user or SLDC or RLDC or NLDC and shall be deployed as finalized by the respective RPC |

All SLDCs need to take actions at their end for timely submission of demand forecasting and resource adequacy data on day-ahead, week-ahead, month ahead and year ahead basis. It is also requested to share actions being taken at your end to ensure compliance of above listed clauses of IEGC 2023.

***Members may please discuss.***

## B.3. Critical operation of Rajasthan Grid during upcoming winter season:

Issues related to grid operation in Rajasthan state control area have been highlighted from NRLDC side in last several OCC/TCC/NRPC meetings. It is to be noted that such issues get aggravated during winter months when agricultural demand in state is on the higher side. Several issues were encountered in Rajasthan control area during last winter season. Issues were discussed in detail in 224 OCC meeting held on 18.10.2024 and separate meeting organised on 19.10.2024. Some of the actions that were agreed are listed below:

1. SLDC to take up the matter with DISCOMs for shifting of non-essential demand being provided in day-time till transmission network capacity augmentation takes place

2. Additional ICT at Hindaun 400 KV to be commissioned in December 2024. Voltage will improve but not much considering voltages are reaching critical low of approx. 300 KV.

3. As Dholpur Gas plant has also been run in the recent past and significant improvement in Voltages and grid parameters have been observed, RVUNL to ensure the running of Dholpur units as ultimate solution in present condition.

4. RE plants installed in state control area should also provide MVAR support to RE plants as per the CEA standards as being implemented in ISGS RE plants.

5. For safely meeting 18000 MW load of Rajasthan with voltage in IEGC band, 4000 MVAR support additionally is required. After installing 2500 MVAR of capacitor banks in the study files the base case is converging with voltages at low of 360 KV at 400 KV sub-stations being observed. The base cases were simulated using the real time data. Hence, there was urgent requirement of installation of capacitor banks to prevent system collapse.

6. DISCOMs are requested to approach MoP with complete proposal for installation of Capacitor banks through RDSS fund. It was also stated that the detailed proposal was already made for all the 04 power companies of Rajasthan when funding through PSDF fund was envisaged earlier.

7. It was again reiterated that low voltages in Rajasthan network was a major area of concern it has to be flagged at the highest level. If PSDF/RDSS fund is not available, funding through other routes/schemes to be taken up for installation of Capacitor banks.

8. Expediting capacity augmentation at substations and coordinate with PGCIL/CTU to ensure N-1 compliance to prevent major grid disturbances.

Location wise constraints presented by NRLDC representative and RRVPNL Comments is summarised as below:

C

| Name of Substation | MVA Capacity | Total Loading (MW) (variations throughout day during Dec'23-Jan'24) | SPS Status as available with NRLDC | RRVPNL comment in the meeting |
|---|---|---|---|---|
| Bhiwadi(PG) | 3*315=945 | 300-700 | Not implemented | |
| Neemrana(PG) | 315+500=815 | 200-450 | Not implemented | |
| Bassi(PG) | 2*315+500=1130 | 300-1000 | Not implemented | |
| Sikar(PG) | 2*315+500=1130 | 150-750 | Not implemented | |
| Jaipur South(PG) | 2*500=1000 | 150-650 | Not implemented | |
| Kankroli(PG) | 3*315=945 | 250-650 | Not implemented | |
| Kotputli(PG) | 2*315=630 | 150-500 | Not implemented | |
| Hindaun (RVPN) | 2*315 =630 | 250-550 | Implemented | Additional ICT to be commissioned by Nov'24 |
| Chittorgarh (RVPN) | 3*315 =945 | 200-700 | Implemented | SPS is under revision. 4th ICT is proposed |
| Ajmer (RVPN) | 2*315 =630 | 200-600 | Implemented | Additional 500 MVA ICT to be commissioned by 06.09.2025 |
| Merta (RVPN) | 2*315 =630 | 250-550 | Implemented | |
| Bikaner (RVPN) | 2*315 =630 | 100-550 | Implemented | |
| Jodhpur (RVPN) | 2*315 =630 | 200-500 | Implemented | 3rd ICT by 12.09.2025 |
| Heerapura(RVPN) | 3*250+315=1065 | 300-900 | Not implemented | SPS to be proposed. Additional ICT is proposed. |
| Bhilwara (RVPN) | 1*500+1*315 =815 | 300-550 | Under Implementation | SPS implemented, additional ICT proposed |
| Ratangarh(RVPN) | 3*315=945 | 300-750 | Implemented | 4th ICT proposed |
| Deedwana(RVPN) | 2*315=630 | 150-500 | Not implemented | Under study presently no SPS proposed |
| Suratgarh(RVPN) | 2*315=630 | 100-500 | Implemented | Space constraint |

CTUIL/RRVPNL is requested to provide update regarding ICT capacity augmentation at 400/220kV POWERGRID substations:

(i) 400/220kV Neemrana
(ii) 400/220kV Sikar
(iii) 400/220kV Jaipur South
(iv) 400/220kV Kotputli

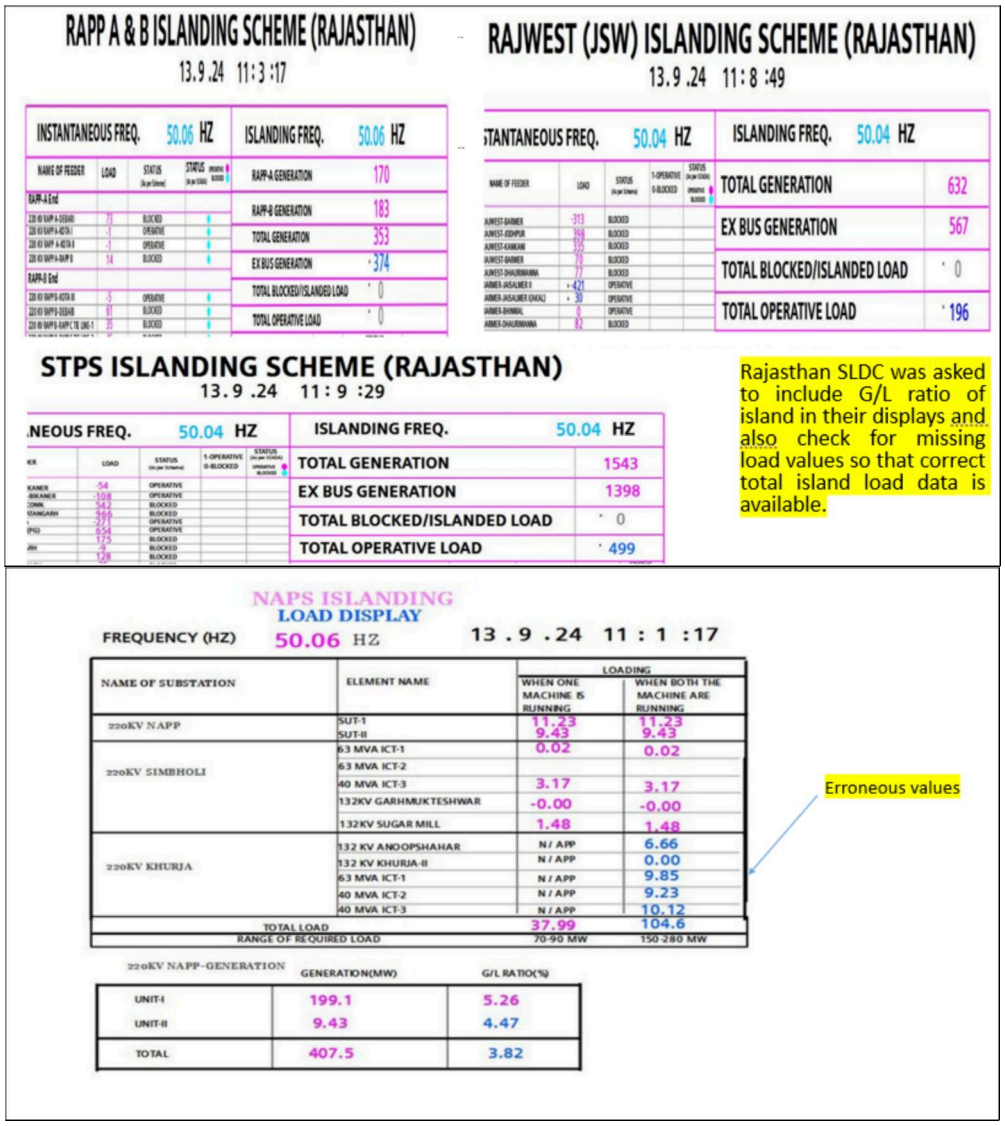
It is to be noted that new 500MVA ICT capacity augmentation has already been approved for 400/220kV Bhiwadi, 400/220kV Bassi and 400/220kV Kankroli substations and under implementation.

***Rajasthan SLDC and RRVPNL(STU) are requested to provide update on all the above points.***

## B.4. Mock testing of islanding scheme and simulation studies

Following four islanding schemes are operational in the Northern Region: NAPP Islanding Scheme (Uttar Pradesh), RAPP Islanding Scheme (Rajasthan), Bawana Islanding Scheme (Delhi), and Pathankot-RSD Islanding Scheme (Punjab). As per the SOP for mock islanding schemes approved in the recently concluded OCC 223, SLDCs are requested to prepare and share their plans for conducting mock testing of islanding schemes in their control areas.

None of the four utilities have yet created a SCADA network map for their island areas. However, Uttar Pradesh and Rajasthan have developed SCADA displays with partial island summaries, although telemetry issues still need resolution.



**RAPP A & B ISLANDING SCHEME (RAJASTHAN)**
13.9.24 11:3:17

| INSTANTANEOUS FREQ. | 50.06 HZ | ISLANDING FREQ. | 50.06 HZ |
|---|---|---|---|
| | | RAPP-A GENERATION | 170 |
| | | RAPP-B GENERATION | 183 |
| | | TOTAL GENERATION | 353 |
| | | EX BUS GENERATION | -374 |
| | | TOTAL BLOCKED/ISLANDED LOAD | 0 |
| | | TOTAL OPERATIVE LOAD | 0 |

**RAJWEST (JSW) ISLANDING SCHEME (RAJASTHAN)**
13.9.24 11:8:49

| STANTANEOUS FREQ. | 50.04 HZ | ISLANDING FREQ. | 50.04 HZ |
|---|---|---|---|
| | | TOTAL GENERATION | 632 |
| | | EX BUS GENERATION | 567 |
| | | TOTAL BLOCKED/ISLANDED LOAD | 0 |
| | | TOTAL OPERATIVE LOAD | 196 |

**STPS ISLANDING SCHEME (RAJASTHAN)**
13.9.24 11:9:29

| NEOUS FREQ. | 50.04 HZ | ISLANDING FREQ. | 50.04 HZ |
|---|---|---|---|
| | | TOTAL GENERATION | 1543 |
| | | EX BUS GENERATION | 1398 |
| | | TOTAL BLOCKED/ISLANDED LOAD | 0 |
| | | TOTAL OPERATIVE LOAD | 499 |

Rajasthan SLDC was asked to include G/L ratio of island in their displays and also check for missing load values so that correct total island load data is available.

**NAPS ISLANDING LOAD DISPLAY**

FREQUENCY (HZ) 50.06 HZ 13.9.24 11:1:17

| NAME OF SUBSTATION | ELEMENT NAME | LOADING: WHEN ONE MACHINE IS RUNNING | LOADING: WHEN BOTH THE MACHINE ARE RUNNING |
|---|---|---|---|
| 220KV NAPP | SUT-I | 11.23 | 11.23 |
| | SUT-II | 9.43 | 9.43 |
| 220KV SIMBHOLI | 63 MVA ICT-1 | 0.02 | 0.02 |
| | 63 MVA ICT-2 | | |
| | 40 MVA ICT-3 | 3.17 | 3.17 |
| | 132KV GARHMUKTESHWAR | -0.00 | -0.00 |
| | 132KV SUGAR MILL | 1.48 | 1.48 |
| 220KV KHURJA | 132 KV ANOOPSHAHAR | N/APP | 6.66 |
| | 132 KV KHURJA-II | N/APP | 0.00 |
| | 63 MVA ICT-1 | N/APP | 9.85 |
| | 40 MVA ICT-2 | N/APP | 9.23 |
| | 40 MVA ICT-3 | N/APP | 10.12 |
| TOTAL LOAD | | 37.99 | 104.6 |
| RANGE OF REQUIRED LOAD | | 70-90 MW | 150-280 MW |

Erroneous values

| 220KV NAPP-GENERATION | GENERATION(MW) | G/L RATIO(%) |
|---|---|---|
| UNIT-I | 199.1 | 5.26 |
| UNIT-II | 9.43 | 4.47 |
| TOTAL | 407.5 | 3.82 |

During 224 OCC meeting, NRLDC representative mentioned that only the NAPS Islanding Scheme of UP has incorporated the G/L ratio in its SCADA display according to the shared format. UP representative added that due to a recent fire incident at Khurja S/S, the telemetry from the 220kV Khurja S/S is currently unavailable, and they promised to share an update on the restoration of telemetry from Khurja as soon as possible.

NRLDC representative also requested that all concerned utilities provide updated islanding base cases for different load-generation balance scenarios (Summer: Peak/Off-peak and Winter: Peak/Off-peak) along with dynamic data of the generators in the island for conducting dynamic simulation studies. He reiterated that the Islanding SCADA display should be made available at NRLDC as per the format shared in previous OCC meetings.

**UP, Rajasthan, Punjab and Delhi SLDC are requested to provide update.**

## B.5. Winter preparedness 2024-25

Winter in Northern region is likely to start from mid of October till February end, and the challenges faced during these months are well known to all the utilities. During winter,

demand of NR states except Rajasthan and hilly states is on the lower side. With decreasing temperatures and festivals, onset of winter also brings some severe challenges to NR grid operators. Moreover, there is possibility for severe winter during this season due to the impact of LA-NINA. IMD in their press release dated 05.09.2024, Extended range Forecast for next two weeks (5- 18 Sept, 2024) mentioned that "*The latest MMCFS forecast indicates higher likelihood of La Niña conditions are likely to develop during end of monsoon season*". Accordingly, number of measures were discussed and implemented for better grid operation during winter months:

Based on the detailed discussion held in last OCC meeting, following actions were suggested:

- Transmission utilities to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. It was agreed that same may be shared by utilities via mail with NRPC/NRLDC before next OCC meeting. Plan has been received from POWERGRID NR-2.

- To carry out tap change exercise at 220kV and below voltage level. NRLDC will also be studying voltage profile of 400/220kV substations in NR for the month of Oct 2024. Accordingly, tap changes at following 400/220kV substations are being proposed based on present tap positions, study at NRLDC end and previous year experiences:
  (i) 400/220kV Bhiwani PG) (increase by 2 steps)
  (ii) 400/220kV Sonepat PG) (increase by 2 steps)
  (iii) 400/220kV Dehar (BBMB) (increase by 2 steps)
  (iv) 400/220kV Daultabad (increase by 2 steps)
  (v) 400/220kV Bamnauli (increase by 2 steps)

  (vi) 400/220kV Allahabad(PG) (reduction by 2 steps)
  (vii) 400/220kV Amritsar(PG) (reduction by 1 step)
  (viii) 400/220kV Jalandhar(PG) (reduction by 1 step)
  (ix) 400/220kV Kaithal(PG) (reduction by 1 step)

- With low temperature across Northern region and with high humidity in the air, fog starts to appear across the Northern region. This problem is generally most severe from 15Dec- 15Feb period & more prominent in areas having high pollution. During this time, additional care need to be taken by system operator as many multiple element tripping events have been reported in the past especially in Punjab, Rajasthan, Haryana and Eastern UP. Such tripping are more severe if the lines are tripping from generation complex.

  To furnish details of Progress on cleaning and replacement of porcelain insulator with polymer insulator. NRLDC has already requested vide emails dated 26.09.2024, 30.09.2024 & 07.11.2024, all transmission utilities to furnish the utility-wise latest status of the replacement of porcelain insulators with polymer insulators so that crucial lines for which such works are pending may be identified & prioritized. List is also attached as **Annexure-B.II** of agenda.

List of line that reported tripping on 4 or more instances last year during Dec-Jan months during fog-prone time of 21:00-10:00hrs along with their insulator status is shown below:

| S. No. | Line Name | Tripping instances | Owner | Insulator status |
|---|---|---|---|---|
| 1 | 220 KV RAPS_A(NP)-Sakatpura(RS) Ckt-2 | 12 | RRVPNL | N/A |
| 2 | 220 KV RAPS_B(NP)-Sakatpura(RS) Ckt-1 | 10 | RRVPNL | N/A |
| 3 | 220 KV RAPS_A(NP)-Sakatpura(RS) Ckt-1 | 9 | RRVPNL | N/A |
| 4 | 400 KV Agra-Unnao Ckt-1 | 8 | UPPTCL | Partial polymer (25%) |
| 5 | 220 KV Debari(RS)-RAPS_A(NP) Ckt-1 | 6 | RRVPNL | N/A |
| 6 | 220 KV Nara(UP)-Roorkee(UK) Ckt-1 | 5 | UPPTCL | N/A |
| 7 | 220 KV Ratangarh(RS)-Sikar(PG) Ckt-1 | 5 | POWERGRID | N/A |
| 8 | 220 KV Panipat(BB)-Chajpur(HV) Ckt-2 | 5 | HVPNL | N/A |
| 9 | 400 KV Muktsar-Makhu Ckt-2 | 5 | PSTCL | Porcelain |
| 10 | 400 KV Suratgarh(RVUN)-Ratangarh(RS) Ckt-1 | 4 | RRVPNL | Porcelain |
| 11 | 220 KV Shahjahanpur(PG)-Lakhimpur(Gola) Ckt-2 | 4 | UPPTCL | N/A |
| 12 | 220 KV Ratangarh(RS)-Sikar(PG) Ckt-2 | 4 | POWERGRID | N/A |
| 13 | 400 KV Shree Cement(SCL)-Kota(PG) Ckt-1 | 4 | POWERGRID | Polymer |
| 14 | 400 KV Muradnagar_2-Mathura Ckt-1 | 4 | UPPTCL | N/A |

- To ensure that all over flux setting of transformers and overvoltage settings of transmission lines are as per approved protection philosophy of NRPC.

  On number of occasions, it is seen that utilities are correcting their protection settings after tripping events. It is important all the protection settings are as approved by NRPC. Utilities are requested to confirm the same from field and ensure that protection settings are only as approved by NRPC.

- OCC expressed concern on the lack of progress of DTL reactors and asked them to expedite their works. Status of reactors under commissioning in Delhi control area in Northern region as per discussion in 223 OCC MoM is shown below:

| Substation | Reactor | Status as per 222 OCC MoM |
|---|---|---|
| Mundka | 1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV | Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision. |
| Bamnauli | 2x25 MVAr at 220 kV | Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision. |
| Electric Lane | 1x50 MVAr at 220 kV | Under Re-tendering due to Single Bid |
| Indraprastha | 2x25 MVAr at 220 kV | Bay work completed on 07.11.2023. Reactor part tender is dropped and at present same is under revision. |

NRLDC representative also presented the voltage profile of these substations for last winter season in the meeting and emphasized on urgent requirement of these reactors. It is requested to expedite the commissioning of these reactors apart from the measures listed above.

- Some of the generators have already been tested (Tehri, Chamera, Pong, RSD etc.) and shall be available for condenser mode of operation as and when required. States/SLDCs are also advised to explore synchronous condenser operation of Hydro & Gas units in their state control area. It is requested that all other utilities may explore possibility of running units as synchronous condenser. Since reactive energy charges are now payable to generators also therefore, it would also be providing them financial support in case units are supporting through synchronous condenser mode of operation.

  During 224 OCC meeting,

  NHPC representative agreed to make Chamera-II available to operate as a synchronous condenser this winter season, as needed for grid stability. He noted that the unit had not been run as a synchronous condenser since 2018 due to maintenance issues, which have now been addressed.

  Punjab representative informed the forum that currently only one machine at RSD can operate as a synchronous condenser. For the other three machines, they have engaged ABB to install additional equipment to enable synchronous condenser functionality.

  The BBMB representative mentioned that they would provide an update on their synchronous condenser capabilities to the forum shortly.

- Utilities to submit feedback on NRLDC reactive power document including for line reactors which can be used as bus reactors as per requirement.

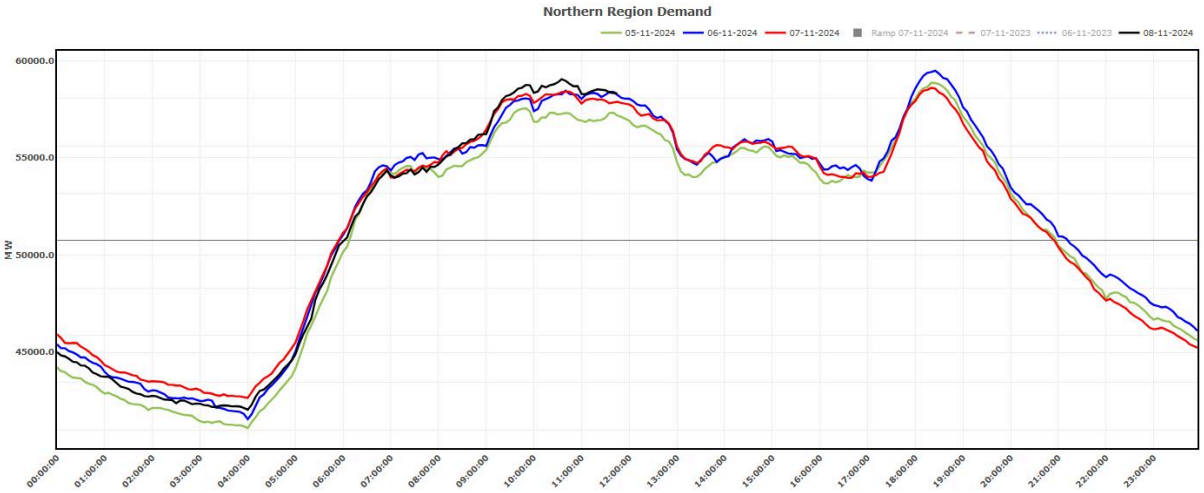
**Ramping support requirement from states during winter season:**

Off-peak to peak demand ratio of NR falls to around 0.5 to 0.6 during winter, morning and evening load ramp is quite steep together with limited hydro resources etc. This increases the importance of Portfolio management as per load forecast especially during high ramp up and ramp down periods.

Generation planning becomes very important especially with the in-surge of renewable integration with the grid, generation resources should be optimally planned, taking care to maintain adequate reserves.

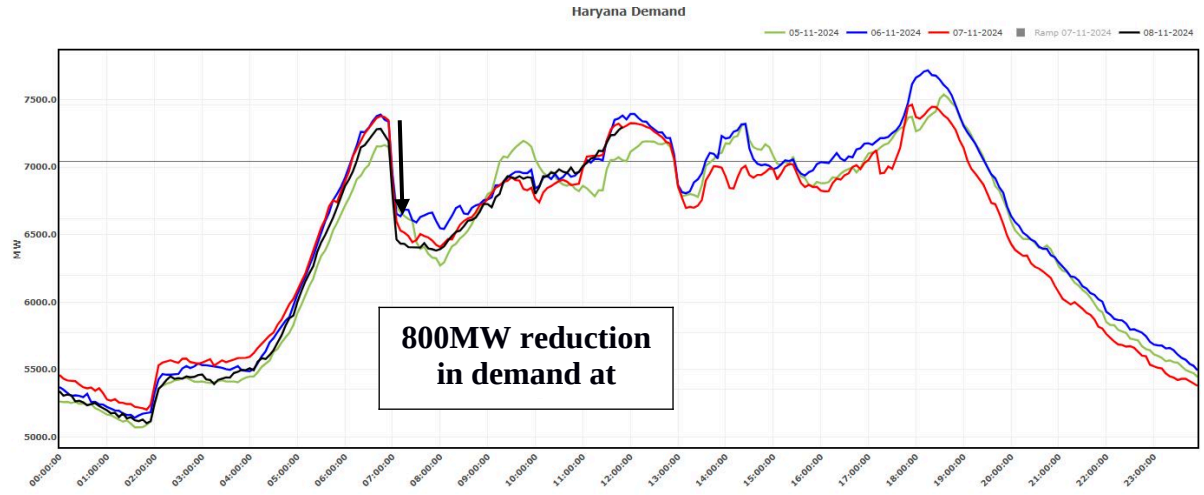
Hydro generation resource which becomes all the more important due to ramping requirement; it starts depleting due to limited inflow of water (most of the hydro stations of NR are snow fed). With increasing solar generation during the day-time, the ramping requirements during evening hours are rising and posing serious challenge to the system operators to maintain frequency within the band.

Demand pattern for last 3 days (05.11.2024, 06.11.2024, 07.11.2024) is shown below:

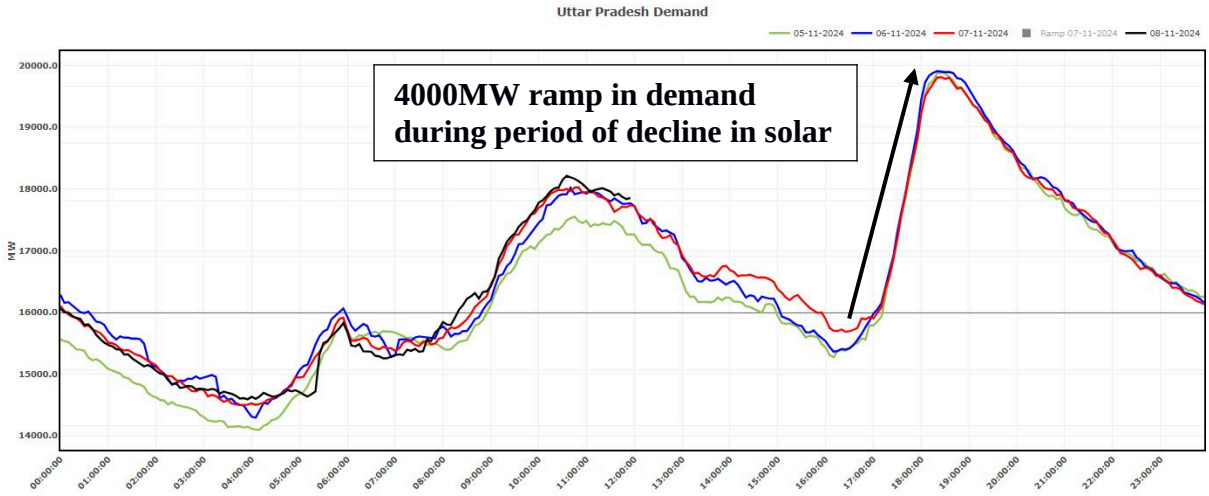



As can be seen there is high ramp in demand during 0400-0800 hrs and also during 1700-1830 hrs. It is requested that all intrastate generating resources are also scheduled optimally to support this ramp in demand.

Further, from demand pattern of Haryana for last few days it is seen that there is sudden decline in demand at 06:00hrs. Haryana SLDC is requested to provide the reasons for the same.




Further from the demand pattern of UP state it is seen that there is sharp rise in demand from 1700-1830 hrs. This rise of 4000MW in demand is observed when the solar generation in the grid is declining. This is leading to extra pressure on the grid resources to meet this ramp in demand.




***Utilities are requested to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. Same may be shared by utilities via mail with NRPC/NRLDC before OCC meeting. Members may please discuss.***

## B.6. Reactive power performance of generators

During winter season, demand of Northern region is low and high voltages are a common phenomenon predominantly in Punjab, Haryana and Delhi area. Even after several actions being taken by control centers, it is seen that there is persistent high voltage in Northern region. The reactive power absorption by generators becomes an important resource that helps in managing high voltages in the grid. However, even after continuous follow up in OCC meetings, it is seen that MVAR data telemetry is poor/ inaccurate from most of the generating stations. For some of the generators it is seen that there is inadequate reactive power absorption based on their capability curve especially during night hours. The performance of generators in absorption of reactive power for last 7 days (01 Nov 2024 – 07 Nov 2024) is shown below:

| S.No. | Station | Unit No. | Capacity | Geographical location | MVAR capacity as per capability curve (on LV side) | MVAR performance (-) Absorption (+) Generation (HV side data) | Voltage absorption above (in KV) |
|---|---|---|---|---|---|---|---|
| 1 | Dadri NTPC | 1 | 490 | Delhi-NCR | -147 to 294 | -150 to 110 | Data freeze |
| | | 2 | 490 | | -147 to 294 | -150 to 110 | |
| 2 | Singrauli NTPC | 1 | 200 | UP | -60 to 120 | 0 to 20 | 404 |
| | | 2 | 200 | | -60 to 120 | 0 to 20 | 402 |
| | | 3 | 200 | | -60 to 120 | -5 to 20 | 402 |
| | | 4 | 200 | | -60 to 120 | -25 to 0 | 394 |
| | | 5 | 200 | | -60 to 120 | -10 to 5 | 398 |
| | | 6 | 500 | | -150 to 300 | 5 to 50 | 404 |
| | | 7 | 500 | | -150 to | 10 to 40 | 402 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 300 | | |
| 3 | Rihand NTPC | 1 | 500 | UP | -150 to 300 | -50 to 0 | 394 |
| | | 2 | 500 | | -150 to 300 | -20 to 20 | 396 |
| | | 3 | 500 | | -150 to 300 | -50 to 0 | 394 |
| | | 4 | 500 | | -150 to 300 | -60 to -10 | 394 |
| 4 | Kalisindh RS | 1 | 600 | Rajasthan | -180 to 360 | - | - |
| | | 2 | 600 | | -180 to 360 | -150 to 50 | 400 |
| 5 | Anpara C UP | 1 | 600 | UP | -180 to 360 | -110 to 0 | 770 |
| | | 2 | 600 | | -180 to 360 | -120 to -20 | 768 |
| 6 | Talwandi Saboo PB | 1 | 660 | Punjab | -198 to 396 | -200 to 0 | 410 |
| | | 2 | 660 | | -198 to 396 | -200 to 0 | 410 |
| | | 3 | 660 | | -198 to 396 | - | - |
| 7 | Kawai RS | 1 | 660 | Rajasthan | -198 to 396 | -100 to 50 | 402 |
| | | 2 | 660 | | -198 to 396 | -70 to 20 | 404 |
| 8 | IGSTPP Jhajjar | 1 | 500 | Haryana | -150 to 300 | -80 to 50 | 410 |
| | | 2 | 500 | | -150 to 300 | -90 to 150 | 412 |
| | | 3 | 500 | | -150 to 300 | -110 to 50 | 409 |
| 9 | Rajpura (NPL) | 1 | 700 | Punjab | -210 to 420 | -250 to 0 | 405 |
| | | 2 | 700 | | -210 to 420 | -250 to 0 | 402 |
| 10 | MGTPS | 1 | 660 | Haryana | -198 to 396 | -120 to 120 | 412 |
| | | 2 | 660 | | -198 to 396 | -130 to 100 | 408 |
| 11 | Bawana | 1 | 216 | Delhi-NCR | -65 to 130 | -70 to 10 | 406 |
| | | 2 | 216 | | -65 to 130 | - | - |
| | | 3 | 216 | | -65 to 130 | - | - |
| | | 4 | 216 | | -65 to 130 | - | - |
| | | 5 | 253 | | -65 to 130 | -50 to 50 | 408 |
| | | 6 | 253 | | -65 to 130 | - | - |
| 12 | Bara PPGCL | 1 | 660 | UP | -198 to 396 | 0 to 80 | 775 |
| | | 2 | 660 | | -198 to 396 | 0 to 100 | 775 |
| | | 3 | 660 | | -198 to 396 | -70 to 20 | 765 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | Lalitpur TPS | 1 | 660 | UP | -198 to 396 | -50 to 50 | 765 |
| | | 2 | 660 | | -198 to 396 | -50 to 50 | 765 |
| | | 3 | 660 | | -198 to 396 | -100 to 50 | 760 |
| 14 | Anpara D UP | 1 | 500 | UP | -150 to 300 | -200 to -100 | - |
| | | 2 | 500 | | -150 to 300 | -150 to -100 | - |
| 15 | Chhabra TPS | 1 | 250 | Rajasthan | -75 to 150 | -40 to 40 | 410 |
| | | 2 | 250 | | -75 to 150 | -70 to 20 | 408 |
| | | 3 | 250 | | -75 to 150 | -60 to 40 | 410 |
| | | 4 | 250 | | -75 to 150 | - | - |
| | | 5 | 660 | | -198 to 396 | -50 to 150 | 412 |
| | | 6 | 660 | | -198 to 396 | -50 to 150 | 410 |

All generating stations are requested to resolve any issues related to telemetry and make sure that MVAr absorption is as per grid requirement and capability curve of machine.

Since with IEGC 2023 implementation, reactive energy performance also has financial impact, it is desirable that all generating stations continue to support grid voltages by having reactive power performance as per their capability curve and grid requirement.

Some of the generating units such IGSTPP Jhajjar, MGTPS Jhajjar, Bara need to explore possibility of further MVAR absorption. Further, intrastate generators in Rajasthan control area may be asked to support through adequate reactive power generation during day-time when Rajasthan grid experiences low voltage.

Following was discussed in 224 OCC meeting:

Singrauli representative informed that they would look into the issue of Unit 4 and Unit 5.

IGSTPP Jhajjar representative informed the forum that their machine is capable of absorbing reactive power as per its capability curve. However, they have manually set a voltage threshold of 408kV for Unit-3, and they plan to adjust the voltage threshold of 412kV in Unit-2 by making suitable tap changes to align it with Unit-3.

Regarding Talwandi Sabo, Punjab representative stated that they have consulted PSPCL, which confirmed that the settings were configured as per the OEM's specifications and have not been adjusted since. Punjab representative requested guidance on any standard settings or documents that could be shared with the OEM for tuning the system.

The forum advised that the settings could be aligned with the unit’s capability curve. Subsequently, Punjab SLDC representative proposed inviting a PSPCL representative to the upcoming Northern Region protection meeting to resolve the issue.

Representative from Bara also agreed to rectify the issue and same has been taken up with their protection team.

CGM(NRLDC) informed all such plants to take suitable actions at their end so that the reactive power performance of generators aligns with the requirement of the grid.

Following are few observations based on data of 01Nov-07Nov 2024 analysed at NRLDC end:

- Some of the machines at NTPC Singrauli are generating MVAr whereas some are absorbing MVAr
- Data of Dadri Stage-II was not available for analysis.
- IGSTPP Jhajjar performance needs improvement.
- Performance of Unit-2 at MGTPS Jhajjar was better than for Unit-1
- Performance of Unit03 at Bara is as required, whereas Unit-1 and Unit-2 performance needs improvement/ data check.
- Rajasthan SLDC to monitor performance of intrastate thermal units to obtain better voltage support during low voltage conditions in the grid.

***All generating stations are requested to resolve any issues related to telemetry and make sure that MVAr absorption is as per grid requirement and capability curve of machine. Generators may also set their Vsch (voltage set point) such that units are absorbing MVAR as per their capability and grid requirement with intimation to RLDC/SLDC.***

## B.7. Sharing of ATC/TTC assessment and basecase with NRLDC

All NR states except Chandigarh UT are sharing basecase and ATC/TTC assessment with NRLDC. OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

CERC vide their order dated 29.09.2023 has granted approval of "'Detailed Procedure for Allocation of Transmission Corridor for Scheduling of General Network Access and Temporary General Network Access under Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022".

Detailed roles and responsibilities for State Load Dispatch Centers in various timelines of the approved procedure are provided in the table below.

| ***Purpose*** | ***S No*** | ***Action of Stakeholder*** | ***Responsibility*** | ***Submission to*** | ***Data/ Information Submission Time line*** |
|---|---|---|---|---|---|
| ***1. Revision 0 TTC/ATC Declaration for Month 'M'*** | *1(a)* | *Submission of node wise Load and generation data along with envisaged* | *SLDC* | *RLDC* | *10th Day of 'M-12' month* |
| | | *scenarios for assessment of transfer capability* | | | |
| | | *Assessment of TTC/ATC of the import/export capability of the state and intra-state system and* | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | *sharing of updated network simulation models* | | | |
| | *1(b)* | *Declaration of TTC/ATC of the intra- state system by SLDC in consultation with RLDC* | | | *26th Day of 'M-12' month* |
| ***2. Interconnection Studies for elements to be integrated in the month 'M'*** | *2(a)* | *Submission of node-wise load and generation data & sharing of network simulation models for intra-state elements coming in the next six months* | *SLDC* | *RLDC* | *8th Day of 'M- 6' month* |
| | *2(b)* | *Sharing of inter-connection study results* | | | *21st Day of 'M-6' month* |
| ***3. Month Ahead TTC/ATC Declaration & Base case for Operational Studies for Month 'M'*** | *3(a)* | *Submission of node wise Load and generation data along with envisaged scenarios for assessment of transfer capability* | *SLDC* | *RLDC* | *8th Day of 'M- 1' month* |
| | | *Assessment of TTC/ATC of the intra- state system and sharing of updated network simulation models* | | | |
| | *3(b)* | *Declaration of TTC/ATC of the intra- state system in consultation with RLDC* | *SLDC* | *RLDC* | *22nd Day of 'M-1' month* |

To encourage participation from SLDCs regarding basecase preparation and ATC/TTC assessment, two workshops have been conducted from Grid-India/NRLDC side. One workshop was conducted 31.08.2023 before the finalization of the procedure and another on 10.01.2024 recently to involve further participation from SLDCs.

Although all SLDCs are now involved in preparation of basecase & ATC/TTC assessment, it is seen that the timelines as per CERC approved procedure are not being followed and number of times basecases are not received from SLDC side.

### B.7.1 ATC/TTC assessment sharing 11 months in advance

The procedure mentions that:

"SLDCs in consultation with RLDCs shall declare the import and export TTC, ATC, and TRM of the individual control/bid areas within the region in accordance with Regulation 44 (3) of the Grid Code 2023. RLDCs shall assess the import and export TTC, TRM and ATC for the group of control/bid areas within the region (if required). The computed TTC, TRM and ATC figures shall be published on the website of respective SLDCs and RLDCs, along with the details of the basis of calculations, including assumptions, if any, **at least eleven (11) months in advance**. The specific constraints indicated in the system study shall also be published on the website."

Accordingly, SLDCs are requested to send the PSSE cases for four scenarios for Oct'25 i.e. Afternoon Peak, Solar Peak, Evening Peak & Off-Peak hours as communicated from NRLDC side. It is requested that the basecases as well as ATC/TTC assessments may be shared with NRLDC as per CERC approved procedure. Further, the above exercise needs to be carried out regularly monthly.

***It was discussed in last several OCC meetings & all states were requested to share basecase as well as ATC/TTC assessments for M-12 scenarios on monthly basis with NRLDC as per CERC approved procedure. Accordingly, it is requested to submit the basecase as well as ATC/TTC assessments***.

**B.7.2 Sharing of Data and study results for interconnection studies**

As per **Regulation 33 of IEGC 2023,**

*(9) Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.*
*(10) Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intra-state system on the inter-state system and share the results of the studies with NLDC.*
*(11) NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intra-regional system on the inter-regional system.*

In line with above, utilities are requested to share the list of elements/LGB data/interconnection study results etc as per the approved procedure which are expected to be commissioned within next six months. This needs to be practised as monthly exercise on regular basis.

***The agenda was discussed in last several OCC meetings & all utilities were requested to share list of elements/LGB data/interconnection study results etc as per the approved procedure on monthly basis***.

**B.7.3 TTC/ATC of state control areas for monsoon 2024 (M-1)**

As discussed in previous OCC meetings, most of the NR states except Ladakh and Chandigarh U/Ts are sharing basecase and ATC/TTC assessment with NRLDC.

Based on simulation studies and discussions between SLDCs and NRLDC, ATC/TTC limits for NR states for the month of Dec'2024 are attached as **Annexure-B.III**.

OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

The agenda was also discussed in last several OCC meetings wherein all states agreed to send the data as well as PSSE basecases on time for all three (M-1, M-6, M-11) scenarios.

In 224 OCC meeting,

- NRLDC representative stated that the agenda was also discussed in last several OCC meeting wherein all states agreed to send the data as well as PSSE basecases on time for all three (M-1, M-6, M-11) scenarios. CGM

NRLDC asked states to get help from NRLDC in case of any difficulty and emphasized on the need for regularity in sharing the data.

- NRLDC representative presented the status of basecase and data sharing by NR states for the last six months.
- It was mentioned that UP, Punjab, Rajasthan and J&K are regularly sharing basecase as well ATC/TTC assessment with NRLDC. Haryana, Uttarakhand and HP are sharing data, but on some occasions it is getting missed. It was requested that all SLDCs may timely share the same.
- All SLDCs agreed to share basecase as well as ATC/TTC assessment as per CERC approved procedure.

Still, it is being observed that response from some SLDCs is not as per desired levels.

| June 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (July-24) | | M-11 (June-25) | | M-6 (Dec-24) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | No | No | No | No | No | No |
| Delhi | No | No | Yes | Yes | No | No |
| Haryana | No | No | No | No | No | No |
| Himachal | No | No | No | No | No | No |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | No | No | No | No | No | No |
| Punjab | No | No | Yes | No | No | No |
| Rajasthan | No | No | No | No | No | No |
| Uttar Pradesh | Yes | Yes | Yes | Yes | No | No |
| Uttarakhand | No | No | No | No | No | No |

| July 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (August-24) | | M-11 (July-25) | | M-6 (Jan-25) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | No | No | No | No | No | No |
| Delhi | No | No | No | No | No | No |
| Haryana | No | No | No | No | No | No |
| Himachal | No | No | No | No | No | No |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | No | No | No | No | No | No |
| Punjab | No | No | No | No | No | No |
| Rajasthan | No | No | No | No | No | No |
| Uttar Pradesh | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttarakhand | No | Shared only for 1 cardinal point | No | No | No | No |

| August 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (September-24) | | M-11 (August-25) | | M-6 (Feb-25) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | No | No | No | No | No | No |
| Delhi | No | No | Yes | Yes | No | No |
| Haryana | No | 1 cardinal point | No | No | No | No |
| Himachal | No | No | No | No | No | No |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | No | No | No | No | No | No |
| Punjab | No | No | Yes | Yes | Yes | Yes |
| Rajasthan | No | No | No | No | No | No |
| Uttar Pradesh | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttarakhand | No | No | No | No | No | No |

| September 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (October-24) | | M-12 (September-25) | | M-6 (Mar-25) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | No | No | No | No | No | No |
| Delhi | No | No | No | No | No | No |
| Haryana | No | No | No | No | No | Shared only for 1 cardinal point |
| Himachal | Shared only for 1 cardinal point | Shared only for 1 cardinal point | Shared only for 1 cardinal point | Shared only for 1 cardinal point | No | No |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | No | No | No | No | No | No |
| Punjab | No | No | Yes | Yes | Yes | Yes |
| Rajasthan | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttar Pradesh | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttarakhand | No | No | No | No | No | No |

Submitted with one month delay

| October 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (November-24) | | M-12 (October-25) | | M-6 (Apr-25) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | No | No | No | No | No | No |
| Delhi | No | No | No | No | No | No |
| Haryana | Yes | Yes | No | No | No | No |
| Himachal | Yes | Yes | Yes | Yes | No | No |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | No | No | No | No | No | No |
| Punjab | No | No | Yes | Yes | Yes | Yes |
| Rajasthan | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttar Pradesh | Yes | Yes | Yes | Yes | Yes | Yes |
| Uttarakhand | Shared only TTC value and TTC case, no data regarding cardinal points | | No | No | No | No |

| November 2024 Mails | | | | | | |
|---|---|---|---|---|---|---|
| | ATC/TTC Declaration | | | | Interconnection Studies | |
| | M-1 (December-24) | | M-12 (November-25) | | M-6 (May-25) | |
| | Data Values | Basecases | Data Values | Basecases | Data Values | Basecases |
| Chandigarh | | | | | | |
| Delhi | | | Yes | Yes | | |
| Haryana | | | | | | |
| Himachal | | | | | | |
| J & K | Yes | Yes | Yes | Yes | Yes | Yes |
| Ladakh | | | | | | |
| Punjab | | | | | | |
| Rajasthan | | | | | | |
| Uttar Pradesh | | | | | | |
| Uttarakhand | | | | | | |

All SLDCs are requested to provide update.

***Members may please discuss.***

Status of action taken on decision of 224th OCC meeting of NRPC

| S.N. | Agenda | Decision of 224th OCC meeting of NRPC | Status of action taken |
|---|---|---|---|
| 1 | A.15. N-1 contingency violation in 400/220/33KV 315MVA ICT-I at BBMB Dehar (Agenda by Powergrid NR-2) | Forum asked BBMB, PSTCL and HPPTCL to jointly have a meeting and explore the technical modalities for implementation of SPS at Dehar and same may be presented in next OCC meeting | BBMB, PSTCL and HPPTCL to update the status. |
| 2 | A.16. Regarding installation of CSD in 400KV Kalaamb Wangtoo and 400KV Kalaamb Sorang to control switching surges (Agenda by Powergrid NR-2) | *Forum recommended that CTU to do a study and submit its observations to NRLDC on the following*<br>*a. Whether the reactor currently installed at the Karcham end could be relocated to either Wangtoo or Sorang, or alternatively, a new reactor could be installed.*<br>*b. Determine whether to install a reactor at Wangtoo or Sorang, or alternatively, to install a Capacitor Switching Device (CSD) on the 400 kV Wangtoo and 400 kV Sorang lines at Kalaamb substation to manage switching surges.* | CTU to update the status. |
| 3 | A.17. Power flow congestion to Delhi Ring Main unit through 400 kV Switchyard at 765/400KV Jhatikra substation (Agenda by Powergrid NR-1) | *Forum asked CTU to provide detailed study report in consultation with NRLDC on load congestion relieving measures at Jhatikra S/S including provision for upcoming ICTs at Jhatikra S/S and Narela S/s.* | CTU to update the status. |

Status of action taken on decision of 224th OCC meeting of NRPC

| | | | |
|---|---|---|---|
| 4 | A.21 Requirement of complete 400 kV Bus-1 &2 shutdown at Mandola & Ballabgarh SS for replacement of damaged sections 400 kV jack buses (Agenda by Powergrid NR-1) | *Forum asked DTL and HVPN to submit before OCC meeting how they will manage their load during the complete shutdown of 400 kV Bus-1 and Bus-2 at Mandola and Ballabgarh substation, respectively.* | DTL and HVPN to update the status. |

## Follow up issues from previous OCC meetings

Annexure-A.I

<table>
<tr><td>1</td><td>Down Stream network by State utilities from ISTS Station</td><td>Augmentation of transformation capacity in various existing substations, addition of new substations along with line bays as well as requirement of line bays by STUs for downstream network are under implementation at various locations in Northern Region. Further, 220kV bays have already been commissioned at various substations in NR. For its utilization, downstream 220kV system needs to be commissioned.</td><td>List of downstream networks is enclosed in Annexure-A.I.I.</td></tr>
<tr><td>2</td><td>Progress of installing new capacitors and repair of defective capacitors</td><td>Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.</td><td>Data upto following months, received from various states / UTs:<br>◎ CHANDIGARH — Sep-2019<br>◎ DELHI — Jul-2024<br>◎ HARYANA — Aug-2024<br>◎ HP — Sep-2024<br>◎ J&K and LADAKH — Not Available<br>◎ PUNJAB — Sep-2024<br>◎ RAJASTHAN — Sep-2024<br>◎ UP — Sep-2024<br>◎ UTTARAKHAND — Oct-2024<br>All States/UTs are requested to update status on monthly basis.</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Healthiness of defence mechanism: Self-certification</td><td>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”.</td><td>Data upto following months, received from various states / UTs:<br>◎ CHANDIGARH — Not Available<br>◎ DELHI — Sep-2024<br>◎ HARYANA — Sep-2024<br>◎ HP — Aug-2024<br>◎ J&K and LADAKH — Not Available<br>◎ PUNJAB — Sep-2024<br>◎ RAJASTHAN — Jun-2024<br>◎ UP — Sep-2024<br>◎ UTTARAKHAND — Sep-2024<br>◎ BBMB — Jun-2024<br>All States/UTs are requested to update status for healthiness of UFRs on monthly basis for islanding schemes and on quartely basis for the rest .</td></tr>
<tr><td>In compliance of NPC decision, NR states/constituents agreed to raise the AUFR settings by 0.2 Hz in 47th TCC/49th NRPC meetings.</td><td>Status:<br>◎ CHANDIGARH — Not Available<br>◎ DELHI — Increased<br>◎ HARYANA — Increased<br>◎ HP — Increased<br>◎ J&K and LADAKH — Increased<br>◎ PUNJAB — Increased<br>◎ RAJASTHAN — Increased<br>◎ UP — Increased</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>◎</td><td>UTTARAKHAND</td><td>Increased</td></tr>
<tr><td>◎</td><td>BBMB</td><td>Increased</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Status of FGD installation vis-à-vis installation plan at identified TPS</td><td>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.<br>Further, progress of FGD installation work on monthly<br>basis is monitored in OCC meetings.</td><td>Status of the information submission (month) from states / utilities is as under:
<table>
<tr><td>◎</td><td>HARYANA</td><td>Jun-2024</td></tr>
<tr><td>◎</td><td>PUNJAB</td><td>Jun-2024</td></tr>
<tr><td>◎</td><td>RAJASTHAN</td><td>Jul-2024</td></tr>
<tr><td>◎</td><td>UP</td><td>Jan-2024</td></tr>
<tr><td>◎</td><td>NTPC</td><td>Feb-2023</td></tr>
</table>
FGD status details are enclosed as Annexure-A.I.II.<br>All States/utilities are requested to update status of FGD installation progress on monthly basis.</td></tr>
<tr><td>5</td><td>Submission of breakup of Energy Consumption by the states</td><td>All states/UTs are requested to submit the requisite data as per the billed data information in the format given as under:
<table>
<tr><td>Category→</td><td>Consumption by Domestic Loads</td><td>Consumption by Commercial Loads</td><td>Consumption by Agricultural Loads</td><td>Consumption by Industrial Loads</td><td>Traction supply load</td><td>Miscellaneous / Others</td></tr>
<tr><td><Month></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>Status of the information submission (month) from states / utilities is as under:
<table>
<tr><td></td><td>State / UT</td><td>Upto</td></tr>
<tr><td>◎</td><td>CHANDIGARH</td><td>Not Submitted</td></tr>
<tr><td>◎</td><td>DELHI</td><td>Jun-24</td></tr>
<tr><td>◎</td><td>HARYANA</td><td>Sep-24</td></tr>
<tr><td>◎</td><td>HP</td><td>Aug-24</td></tr>
<tr><td>◎</td><td>J&K and LADAKH</td><td>JPDCL- Mar’24<br>KPDCL- Not Submitted</td></tr>
<tr><td>◎</td><td>PUNJAB</td><td>Aug-24</td></tr>
<tr><td>◎</td><td>RAJASTHAN</td><td>Jul-24</td></tr>
<tr><td>◎</td><td>UP</td><td>Jun-24</td></tr>
<tr><td>◎</td><td>UTTARAKHAND</td><td>Jun-24</td></tr>
</table>
Chandigarh is requested to submit the requisite data w.e.f. April 2018 as per the billed data information in the given format</td></tr>
<tr><td>6</td><td>Information about variable charges of all generating units in the Region</td><td>The variable charges detail for different generating units are available on the MERIT Order Portal.</td><td>All states/UTs are requested to submit daily data on MERIT Order Portal timely.</td></tr>
<tr><td>7</td><td>Status of Automatic Demand Management System in NR states/UT’s</td><td>The status of ADMS implementation in NR, which is mandated in clause 5.4.2 (d) of IEGC by SLDC/SEB/DISCOMs is presented in the following table:</td><td>The status of ADMS implementation in NR is enclosed in Annexure-A.I.II.
<table>
<tr><td>◎</td><td>DELHI</td><td>Scheme Implemented but operated in manual mode.</td></tr>
<tr><td>◎</td><td>HARYANA</td><td>Scheme not implemented</td></tr>
<tr><td>◎</td><td>HP</td><td>Scheme not implemented</td></tr>
<tr><td>◎</td><td>PUNJAB</td><td>Scheme not implemented</td></tr>
<tr><td>◎</td><td>RAJASTHAN</td><td>Under implementation.</td></tr>
<tr><td>◎</td><td>UP</td><td>Scheme implemented by NPCIL only</td></tr>
</table></td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | ◎ | UTTARAKHAND | Scheme not implemented |

| 8 | Reactive compensation at 220 kV/ 400 kV level at 8 substations | | | |
|---|---|---|---|---|
| | State / Utility | Substation | Reactor | Status |
| i | DTL | Peeragarhi | 1x50 MVAr at 220 kV | 1x50 MVAr Reactor at Peeragarhi has been commissioned on dated 18.09.2023 |
| ii | DTL | Harsh Vihar | 2x50 MVAr at 220 kV | 2x50 MVAR Reactor at Harsh Vihar has been commissioned on dated 31th March 2023. |
| iii | DTL | Mundka | 1x125 MVAr at 400 kV & 1x25 MVAr at 220 kV | Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision. |
| iv | DTL | Bamnauli | 2x25 MVAr at 220 kV | Bay work completed on 25.03.2023. Reactor part tender is dropped and at present same is under revision. |
| v | DTL | Indraprastha | 2x25 MVAr at 220 kV | Bay work completed on 07.11.2023. Reactor part tender is dropped and at present same is under revision. |
| vi | DTL | Electric Lane | 1x50 MVAr at 220 kV | Under Re-tendering due to Single Bid |
| vii | PTCUL | Kashipur | 1x125 MVAR at 400 kV | SLDC informed that PTCUL has intimated that bid extension has been done till 18.07.2024. In 220th OCC meeting, PTCUL was suggested to seek assistance from Powergrid in |
| viii | RAJASTHAN | Jodhpur | 1x125 MVAr | Agreement signed on dt. 22.06.2020. Grant of Ist Instalment received on dt.19.02.21 & work order placed on dt. 07.04.2022 to M/s Kanohar Electricals Ltd. Schedule time is 18 months. 01 No. of 125 MVAR reactor is under testing which is expected to done by end of May 2024. Tentaive charging plan is to be intimated by Rajasthan SLDC. |

Annexure-A-I.I

**1. Down Stream network by State utilities from ISTS Station:**

| Sl. No. | Substation | Downstream network bays | Status of bays | Planned 220 kV system and Implementation status | Revised Target | Remarks |
|---|---|---|---|---|---|---|
| 1 | 400/220kV, 3x315 MVA Samba | Commissioned: 8<br>Total: 8 | Utilized: 6<br>Unutilized: 2 | • Network to be planned for 2 bays. | Mar'25 | 02 No. of bays shall be utilized for LILO-II of 220kV Jatwal-Bishnah Transmission Line, the work of which is delayed due to persisting RoW issues. expected date of completion is Mar 2025 subject to availability of funds and resolving of RoW issues), Updated in 220th OCC by JKPTCL. |
| 2 | 400/220kV, 2x315 MVA New Wanpoh | Commissioned: 6<br>Total: 6 | Utilized: 2<br>Unutilized: 4 | • 220 kV New Wanpoh - Alusteng D/c Line | Mar'25 | 02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Alusteng D/c Line. RoW issues persisting; At present new-wampoh-mirbazar 5km and harwan-alstung 16km have been completed, expected date of completion is Mar 2025 subject to availability of funds and resolving of RoW issues), Updated in 214th OCC by JKPTCL. |
| | | | | • 220 kV New Wanpoh - Mattan D/c Line | End of 2024 | 02 No. of bays are to be utilized for connecting 220kV New Wanpoh-Mattan D/c Line. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL. |
| 3 | 400/220kV, 2x315 MVA Amargarh | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • 220kV D/C line from 400/220kV Kunzar - 220/33kV Sheeri | End of 2024 | 02 No. of bays are proposed to be utilized for connecting 220/132 kV GSS Loolipora. The funding source for the project is being identified and the project is expected to be completed by ending 2024. Updated in 204th OCC by JKPTCL. |
| 4 | 400/220kV, 2x500 MVA Kurukshetra (GIS) | Commissioned: 8<br>Total: 8 | Utilized: 6<br>Unutilized: 2 | • 220kV Bhadson (Kurukshetra) – Ramana Ramani D/c line | Mar'25 | Under construction.Updated in 222nd OCC by HVPNL |
| 5 | 400/220 kV, 2x315 MVA Dehradun | Commissioned: 6<br>Total: 6 | Utilized: 2<br>Unutilized: 4 | • Network to be planned for 4 bays | - | PTCUL to update the status. |
| 6 | Shahjahanpur, 2x315 MVA 400/220 kV | Commissioned: 6<br>Approved/Under Implementation:1 | Utilized: 7 | • 220 kV D/C Shahajahanpur (PG) - Gola line | Commissioned | Energization date: 26.10.2023 updated by UPPTCL in 215th OCC |
| | | | | • LILO of Sitapur – Shahjahanpur 220 kV SC line at Shahjahanpur (PG) | Commissioned | Energization date: 25.02.2022 updated by UPPTCL in 196th OCC |
| 7 | Hamirpur 400/220 kV Sub-station | Commissioned: 8<br>Total: 8 | Utilized: 4<br>Unutilized: 4 | • 220 kV Hamirpur-Dehan D/c line | Commissioned | HPPTCL has commissioned the Planned 220kV Dehan-Hamirpur TL utilizing 2 No. 220kV Bays.Commisioned date: 09.06.2022. Updated in 198th OCC by HPPTCL |
| | | | | • Network to be planned for 4 bays | - | HPPTCL to update the status. |
| 8 | Sikar 400/220kV, 1x 315 MVA S/s | Commissioned: 8<br>Total: 8 | Utilized: 6<br>Unutilized: 2 | • LILO of 220 kV Sikar (220 kV GSS)-Dhod S/c line at Sikar (PG) | Commissioned | LILO of 220 kV S/C Sikar-Dhod line at 400 kV GSS PGCIL, Sikar has been charged on dt. 31.03.2022 |
| | | | | • Network to be planned for 2 bays. | - | Against the 3rd ICT at 400 kV GSS Sikar, only 2 bays were constructed and same has been utilized by RVPN by constructing LILO of 220 kV S/C Sikar – Dhod line as updated by RVPNL in 195th OCC |
| 9 | Bhiwani 400/220kV S/s | Commissioned: 6<br>Total: 6 | Utilized: 2<br>Unutilized: 4 | • 220 kV D/C line Bhiwani (PG) – Bhiwani (HVPNL) line | Commissioned | Updated in 202nd OCC by HVPNL |
| | | | | • 220 kV Bhiwani (PG) - Isherwal (HVPNL) D/c line. | Dec'24 | Issue related to ROW as intimated in 218th OCC by HVPNL.<br>**Status:**<br>Work was stalled since 29.07.2021 due to ROW issues and farmers agitation and further restarted on 9.10.2023 with the help of district administration. Now, work was again stalled since30.11.2023 due to severe ROW issues.<br>Expected to be completed by 31.12.2024.<br>Foundation 209/212. Erection 193/212. Stinging 37.8/50.3 km |
| | | | | • 220 kV Bhiwani (PG) - Dadhibana (HVPNL) D/c line. | Oct'25 | Line work awarded to M/s R S Infra Projects Pvt. Ltd. Noida, Uttar Pardesh on dated 09.03.2024. Work of route plan and route alignment has been started by the firm as intimated in 218th OCC by HVPNL. |
| 10 | Jind 400/220kV S/s | Commissioned: 4<br>Approved:4<br>Total: 8 | Utilized: 4<br>Unutilized: 0 | • LILO of both circuits of 220 kV Jind HVPNL to PTPS D/C line at 400 kV substation PGCIL Khatkar (Jind) with 0.5 sq inch ACSR conductor | Dec'24 | Work in progress. Updated in 220th OCC by HVPNL. |
| 11 | 400/220kV Tughlakabad GIS | Commissioned: 6<br>Under Implementation: 4 | Utilized: 6<br>Unutilized: 0 | • RK Puram – Tughlakabad (UG Cable) 220kV D/c line – March 2023. | Commissioned | Updated in 216th OCC by DTL |
| | | | | • Masjid Mor – Tughlakabad 220kV D/c line. | Commissioned | Updated in 216th OCC by DTL |

| Sl. No. | Substation | Downstream network bays | Status of bays | Planned 220 kV system and Implementation status | Revised Target | Remarks |
|---|---|---|---|---|---|---|
| 12 | 400/220kV Kala Amb GIS (TBCB) | Commissioned: 6<br>Total: 6 | Utilized: 2<br>Unutilized: 2<br>Under Implementation:2 | • HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s | Commissioned | Energization date: 31.05.2024 updated by HPPTCL in 220th OCC |
| | | | | • HPPTCL has planned one no. of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Giri S/s | - | Tendering process is yet to be started.Updated in 219th OCC by HPPTCL |
| | | | | • Network to be planned for 2 bays | - | HPPTCL to update the status. |
| 13 | 400/220kV Kadarpur Sub-station | Commissioned: 8<br>Total: 8 | Utilized: 0<br>Unutilized: 8 | • D/C line Kadarpur - Sec-56 Gurugram. | Not awarded yet | Initial proposal of LILO of 220kV Pali-Sector 56 Line and Pali-Sector 52 line was descoped due to forest issue.<br>Proposal to evacuate power from 220kV D/C Pali-Sector 56 line to Sector 56 and 52 with bunching of lines is under consideration. Updated in 218th OCC by HVPNL |
| | | | | • S/C line Kadarpur - Sec-52 Gurugram | Not awarded yet | Initial proposal of LILO of 220kV Pali-Sector 56 Line and Pali-Sector 52 line was descoped due to forest issue.<br>Proposl to evacuate power from 220kV D/C Pali-Sector 56 line to Sector 56 and 52 with bunching of lines is under consideration. Updated in 218th OCC by HVPNL |
| | | | | • S/C line Kadarpur - Pali | Not awarded yet | Initial proposal of LILO of 220kV Pali-Sector 56 Line and Pali-Sector 52 line was descoped due to forest issue.<br>Proposl to evacuate power from 220kV D/C Pali-Sector 56 line to Sector 56 and 52 with bunching of lines is under consideration. Updated in 218th OCC by HVPNL |
| 14 | 400/220kV Sohna Road Sub-station | Commissioned: 8<br>Total: 8 | Utilized: 4<br>Unutilized: 4 | • LILO of both circuits of 220kV D/c Sohna-Rangla Rajpur at Roj Ka Meo line at 400kV Sohna Road | Dec'24 | Updated in 216th OCC by HVPNL |
| | | | | • LILO of both circuits of 220kV D/c Badshahpur-Sec77 line at 400kV Sohna Road | - | The matter is subjudice in Hon'ble Punjab & Haryana High court, Chandigarh Updated in 205th OCC by HVPNL.<br>**Status:-**<br>Earlier 02 nos 220 kV line bays were to be utilized for the 220 kV GIS S/Stn. Sec-77, Gurugram but due to denotification of land of the 220 kV GIS S/Stn. Sec-77 the said substation is now going to be dismantled and a new substation is proposed at Sec-75A, Gurugram. Now, these 02 no. 220 kV line bays may be utilized at 220 kV GIS S/Stn Sec-75A, Gurugram. |
| 15 | 400/220kV Prithla Sub-station | Commissioned: 8<br>Aprroved: 2<br>Total: 10 | Utilized: 4<br>Unutilized: 4<br>Under Implementation:2 | • 220kV D/C line from Prithla to Harfali with LILO of one circuit at 220kV Meerpur Kurali | Mar'25 | Contract awarded on 08.08.23 to M/s Skipper with completion in March 25.Updated in 218th OCC by HVPNL |
| | | | | • LILO of both ckt of 220kV D/c Ranga Rajpur – Palwal line | Commissioned | Energization date: 31.12.2021. Updated in 198th OCC by HVPNL |
| | | | | • 220kV D/C for Sector78, Faridabad | 31.01.2025 | Issue related to ROW and Pending crossing approval from Northern Railways and DFCCIL. as intimated in 223rd OCC by HVPNL. |
| | | | | • Prithla - Sector 89 Faridabad 220kV D/c line | Jul'25 | Work awarded to M/s Man Structurals Pvt Ltd. JV M/s Aquarian Enterprises on 09.01.2024.<br>Contractual date: 06.05.2025 and Tentative date of completion :06.05.2025<br>Route has been approved and further work is in progress.Updated in 218th OCC by HVPNL |
| 16 | 400/220kV Sonepat Sub-station | Commissioned: 6<br>Under Implementation:2<br>Total: 8 | Utilized: 2<br>Unutilized: 4<br>Under Implementation:2 | • LILO of both circuits of 220kV Samalkha - Mohana line at Sonepat | 31.12.2024 | Updated in 224th OCC by HVPNL.<br>**Status:**<br>The stringing work between TL No. 19 & 20, TL No. 22 & 23 and TL No. 22 & 24 is pending for want of necessary consent from the forest department.<br>The case has already been uploaded on Parivesh portal and is currently pending at the O/o AIGF, Forest Dept. Panchkula. |
| | | | | • Sonepat - HSIISC Rai 220kV D/c line | Commissioned | Energization date: 31.05.2024 updated by HVPNL in 220th OCC |
| | | | | • Sonepat - Kharkhoda Pocket A 220kV D/c line | 08.03.2025 | Updated in 212th OCC by HVPNL.<br>**Status:**<br>Work order has been issued to M/s R.S Infra on dated 09.08.2023 by O/o CE/PD&C, Panchkula for construction of line.<br>Both bays are under construction and erection of electrical equipment is under progress.<br>Tetative date of completion of both bays at PGCIL end is end of July 2024. |
| 17 | 400/220kV Neemrana Sub-station | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • LILO of Bhiwadi - Neemrana 220kV S/c line at Neemrana (PG) | - | Work is under progres. Stub Setting: 14/2017.<br>Permission for Highway is awaited from concerned department as updated in 218th OCC by RVPNL. |
| 18 | 400/220kV Kotputli Sub-station | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • Kotputli - Pathreda 220kV D/c line | - | Date of bid opening has been extended up to 30.04.2024 as updated in 218th OCC by RVPNL. |
| 19 | 400/220kV Jallandhar Sub-station | Commissioned: 10<br>Total: 10 | Utilized: 8<br>Unutilized: 2 | • Network to be planned for 2 bays | Nov'24 | LILO of 220 kV BBMB Jalandhar - Butari line at 400 kV PGCIL Jalandhar being planned. Work expected to be completed by May 2024. Updated in 198th OCC by PSTCL. 6 months more are needed due to ROW issues as updated by PSTCL in 220th OCC |

| Sl. No. | Substation | Downstream network bays | Status of bays | Planned 220 kV system and Implementation status | Revised Target | Remarks |
|---|---|---|---|---|---|---|
| 20 | 400/220kV Roorkee Sub-station | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • Roorkee (PG)-Pirankaliyar 220kV D/c line | Commissioned | Roorkee (PG)-Pirankaliyar 220kV D/c line commissioned in 2020 as intimated by PTCUL in 197th OCC |
| 21 | 400/220kV Lucknow Sub-station | Commissioned: 8<br>Total: 8 | Utilized: 4<br>Unutilized: 4 | • Network to be planned for 2 bays | Commissioned | • Lucknow -Kanduni, 220 kV D/C line work energized on 05.10.2023. Updated in 212th OCC by UPPTCL.<br>_____<br>• No planning for 2 no. of bays upated by UPPTCL in 196th OCC. The same has been communicated to Powergrid. |
| 22 | 400/220kV Gorakhpur Sub-station | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • Network to be planned for 2 bays | Commissioned | • Gorakhpur(PG)- Maharajganj, 220 kV D/C line energized on 27.09.2023 updated by UPPTCL in 212th OCC |
| 23 | 400/220kV Fatehpur Sub-station | Commissioned: 8<br>Under Implementation:2<br>Total: 10 | Utilized: 6<br>Unutilized: 2<br>Under Implementation:2 | • Network to be planned for 2 bays | - | • UPPTCL intimated that 02 no. of bays under finalization stage. In 201st OCC, UPPTCL intimated that it is finalized that Khaga s/s will be connected (tentative time 1.5 years).<br>_____<br>• No planning for 2 no. of bays updated by UPPTCL in 196th OCC. The same has been communicated to Powergrid. |
| 24 | 400/220kV Abdullapur Sub-station | Commissioned: 10<br>Under Implementation:2<br>Total: 12 | Utilized: 10<br>Unutilized: 0<br>Under Implementation:2 | • Abdullapur – Rajokheri 220kV D/c line | Commissioned | Ckt-1 commissioned at 16:13hrs on dated 06.08.24 & Ckt-2 commissioned at 20:10 hrs on dated 05.08.24. Updated in 223rd OCC by HVPNL |
| 25 | 400/220kV Pachkula Sub-station | Commissioned: 8<br>Under tender:2<br>Total: 10<br>Out of these 10 nos. 220kV | Utilized: 2<br>Unutilized: 4<br>Under Implementation:2 | • Panchkula – Pinjore 220kV D/c line | Commissioned | Updated in 218th OCC by HVPNL |
| | | | | • Panchkula – Sector-32 220kV D/c line | Commissioned | Energization date: 24.05.2024 updated by HVPNL in 220th OCC |
| | | | | • Panchkula – Raiwali 220kV D/c line | Commissioned | Updated in 194th OCC by HVPNL |
| | | | | • Panchkula – Sadhaura 220kV D/c line: Sep'23 | Mar'25 | Updated in 222nd OCC by HVPNL |
| 26 | 400/220kV Amritsar S/s | Commissioned:7<br>Approved in 50th NRPC- 1 no.<br>Total: 8 | Utilized: 6<br>Under Implementation:2 | • Amritsar – Patti 220kV S/c line | 31.08.2024 | Issue in connectivity agreement with CTU. PSTCL has taken up the issue with CTU and accordingly CTU has been asked by OCC forum to plan a meeting with PSTCL and CEA at the earliest. Updated in 224th OCC by PSTCL. |
| | | | | • Amritsar – Rashiana 220kV S/c line (2 bays shall be required for above lines. However, 1 unutilized bay shall be used for Patti and requirement of one additional bay approved for Rashiana by NRPC) | 31.08.2024 | Issue in connectivity agreement with CTU. PSTCL has taken up the issue with CTU and accordingly CTU has been asked by OCC forum to plan a meeting with PSTCL and CEA at the earliest. Updated in 224th OCC by PSTCL. |
| 27 | 400/220kV Bagpat S/s | Commissioned: 8<br>Total: 8 | Utilized:6<br>Unutilized: 2 | • Bagpat - Modipuram 220kV D/c line | Commissioned | Updated in 201st OCC by UPPTCL |
| 28 | 400/220kV Bahardurgarh S/s | Commissioned: 4<br>Approved: 4<br>Total: 8 | Utilized:2<br>Unutilized: 2 | • LILO of 220 kV Nunamajra- Daultabad S/c line at 400 kV Bahadurgarh PGCIL | Mar'25 | Updated in 220th OCC by HVPNL.<br>**Status:**<br>NIT has been floated vide NIT No. EPC-D-96 dated 15.10.23 to be opened on 22.12.23.<br>• Now, the tender has been dropped and likely to be refloated by 31.07.2024. |
| | | | | • Bahadurgarh - METL 220kV D/c line (Deposit work of M/s METL) | Mar'25 | Updated in 220th OCC by HVPNL.<br>**Status:**<br>• Revised BOQ forwarded from Design wing to contract wing.<br>• Tender has floated vide NIT No. EPC-D-100 dated 04.01.2024 with tender opening date of 26.02.2024.<br>• Tender has been opened on 26.03.24 and 03 nos. bids has been received. The work is likely to be awarded by the 31.07.2024. |
| | | | | • Bahadurgarh - Kharkhoda Pocket B 220kV D/c line | 08.03.2025 | Updated in 220th OCC by HVPNL.<br>**Status:**<br>Contract awarded on 09.08.23 to M/s R S Infra Noida. Work has been started. |
| 29 | 400/220kV Jaipur (South) S/s | Commissioned: 4<br>Total: 4 | Utilized:2<br>Unutilized: 2 | • LILO of 220 kV S/C Dausa – Sawai Madhopur line at 400 kV GSS Jaipur South (PG) | 06.10.2025 | Work order has been issued on 06.10.2023, work under progress as updated by RVPNL in 215th OCC |
| 30 | 400/220kV Sohawal S/s | Commissioned: 8<br>Total: 8 | Utilized: 8 | • Sohawal - Barabanki 220kV D/c line | Commissioned | Energization date: 14.04.2018 updated by UPPTCL in 196th OCC |
| | | | | • Sohawal - New Tanda 220kV D/c line | Commissioned | Energization date: 28.05.2019 updated by UPPTCL in 196th OCC |
| | | | | • Network to be planned for 2 bays | Commissioned | • Sohawal - Gonda 220kV S/c line (Energization date: 27.04.2020) updated by UPPTCL in 196th OCC<br>_____<br>• Sohawal - Bahraich 220kV S/c line (Energization date: 15.02.2021) updated by UPPTCL in 196th OCC |
| 31 | 400/220kV, Kankroli | Commissioned: 6<br>Total: 6 | Utilized: 4<br>Unutilized: 2 | • 220 kV D/C Kankroli(PG) - Nathdwara line | - | Standard bid document has been finalized on 13.08.2024 and bid is under preparation as updated by RVPN in 222nd OCC. |

| Sl. No. | Substation | Downstream network bays | Status of bays | Planned 220 kV system and Implementation status | Revised Target | Remarks |
|---|---|---|---|---|---|---|
| 32 | 400/220kV, Manesar | Commissioned: 8<br>Total: 8 | Utilized: 4<br>Unutilized: 4 | • Network to be planned for 2 bays | - | Status:-<br>2nos bays are being utilised for 220 kV D/C Panchgaon (PGCIL)-Panchgaon Ckt-I & 220 kV D/C Panchagon (PGCIL)-Panchgaon Ckt-II, charged on dated 05.09.2022 & 20.10.2022 respectively.<br>The 2nos bays may be utilised by HVPNL in future. |
| 33 | 400/220kV, Saharanpur | Commissioned: 6<br>Under Implementation:2<br>Total: 8 | Utilized: 6<br>Unutilized: 0<br>Under Implementation:2 | • Network to be planned for 2 bays | Commissioned | Saharanpur(PG)-Devband D/c line (Energization date: 20.04.2023) updated by UPPTCL in 207th OCC |
| 34 | 400/220kV, Wagoora | Commissioned: 10<br>Total: 10 | Utilized: 6<br>Unutilized: 4 | • Network to be planned for 4 bays | - | PDD, J&K to update the status. |
| 35 | 400/220kV, Ludhiana | Commissioned: 9<br>Total: 9 | Utilized: 8<br>Unutilized: 1 | • Network to be planned for 1 bay | Commissioned | Direct circuit from 220 kV Lalton Kalan to Dhandari Kalan to be diverted to 400 kV PGCIL Ludhiana. Work completed , final agrrement is expected to be signed by May'24. Updated in 218th OCC by PSTCL. |
| 36 | 400/220kV, Chamba (Chamera Pool) | Commissioned: 3<br>Under tender:1<br>Total: 4 | Utilized:3<br>Unutilized: 0<br>Under tender:1 | • Stringing of 2nd ckt of Chamera Pool – Karian 220kV D/c line | Commissioned | Stringing of 2nd Circuit of Chamera Pool-Karian Tansmission line has been completed & terminal bay at 400/220 kV chamera pooling substation (PGCIL) is commissioned on 20.01.2024. Updated in 217th OCC by HPPTCL. |
| 37 | 400/220kV, Mainpuri | Commissioned: 6<br>Under Implementation:2<br>Total: 8 | Utilized: 6<br>Unutilized: 0<br>Under Implementation:2 | • Network to be planned for 2 bays | - | • 02 no. of bays under finalization stage updated by UPPTCL in 196th OCC. Mainpuri S/s planned. Land is not finalized, therefore timeline not available as intimated by UPPTCL in 201st OCC. |
| 38 | 400/220kV, Patiala | Commissioned: 8<br>Total: 8 | Utilized: 6<br>Unutilized: 2 | • Network to be planned for 2 bays | May'25 | 2 Nos. bays for 400 kV PGCIL Patiala - 220 kV Bhadson (D/C) line being planned. Tender is yet to be awarded. Timeline one year communicated by PSTCL in 220th OCC meeting |
| | | | | | | |

# FGD Status

# Updated status of FGD related data submission

| **NTPC (27.02.2023)** |
|---|
| MEJA Stage-I |
| RIHAND STPS |
| SINGRAULI STPS |
| TANDA Stage-I |
| TANDA Stage-II |
| UNCHAHAR TPS |
| **UPRVUNL (10.01.2024)** |
| ANPARA TPS |
| HARDUAGANJ TPS |
| OBRA TPS |
| PARICHHA TPS |

| **PSPCL (18.06.2024)** |
|---|
| GGSSTP, Ropar |
| GH TPS (LEH.MOH.) |
| **RRVUNL (09.07.2023)** |
| CHHABRA SCPP |
| CHHABRA TPP |
| KALISINDH TPS |
| KOTA TPS |
| SURATGARH SCTPS |
| SURATGARH TPS |

# Updated status of FGD related data submission

| |
|---|
| **Lalitpur Power Gen. Co. Ltd. (10.01.2024)** |
| Lalitpur TPS |
| **Lanco Anpara Power Ltd. (01.01.2024)** |
| ANPARA-C TPS |

| |
|---|
| **HGPCL (14.06.2024)** |
| PANIPAT TPS |
| RAJIV GANDHI TPS |
| YAMUNA NAGAR TPS |

| |
|---|
| **Adani Power Ltd. (18.02.2022)** |
| KAWAI TPS |

| |
|---|
| **Rosa Power Supply Company (01.01.2024)** |
| Rosa TPP Phase-I |
| **Prayagraj Power Generation Company Ltd. (05.01.2024)** |
| Prayagraj TPP |
| **APCPL (01.05.2024)** |
| INDIRA GANDHI STPP |

# Pending submissions

| **GVK Power Ltd.** |
| --- |
| GOINDWAL SAHIB |

| **NTPC** |
| --- |
| DADRI (NCTPP) |
| **Talwandi Sabo Power Ltd.** |
| TALWANDI SABO TPP |
| **L&T Power Development Ltd.** |
| Nabha TPP (Rajpura TPP) |

# Target Dates for FGD Commissioning (Utility-wise)

| | |
|---|---|
| **Adani Power Ltd.** | KAWAI TPS U#1 (Target: 31-12-2024), KAWAI TPS U#2 (Target: 31-12-2024) |
| **APCPL** | INDIRA GANDHI STPP U#2 (Target: 30-09-2023), INDIRA GANDHI STPP U#3 (Target: 30-06-2023) |
| **GVK Power Ltd.** | GOINDWAL SAHIB U#1 (Target: 30-04-2020), GOINDWAL SAHIB U#2 (Target: 29-02-2020) |
| **HGPCL** | PANIPAT TPS U#6 (Target: 31-12-2026), PANIPAT TPS U#7 (Target: 31-12-2026), PANIPAT TPS U#8 (Target: 31-12-2026), RAJIV GANDHI TPS U#1 (Target: 31-12-2024), RAJIV GANDHI TPS U#2 (Target: 31-12-2024), YAMUNA NAGAR TPS U#1 (Target: 31-12-2024), YAMUNA NAGAR TPS U#2 (Target: 31-12-2024) |

| | |
|---|---|
| **NTPC** | DADRI (NCTPP) U#1 (Target: 31-12-2020), DADRI (NCTPP) U#2 (Target: 31-10-2020), DADRI (NCTPP) U#3 (Target: 31-08-2020), DADRI (NCTPP) U#4 (Target: 30-06-2020), DADRI (NCTPP) U#5 (Target: 30-06-2022), DADRI (NCTPP) U#6 (Target: 31-03-2023), RIHAND STPS U#1 (Target: 31-10-2025), RIHAND STPS U#2 (Target: 30-06-2026), RIHAND STPS U#3 (Target: 31-12-2024), RIHAND STPS U#4 (Target: 31-03-2025), RIHAND STPS U#5 (Target: 30-06-2025), RIHAND STPS U#6 (Target: 31-10-2025), SINGRAULI STPS U#1 (Target: 31-12-2024), SINGRAULI STPS U#2 (Target: 31-12-2024), SINGRAULI STPS U#3 (Target: 31-12-2024), SINGRAULI STPS U#4 (Target: 31-12-2024), SINGRAULI STPS U#5 (Target: 31-03-2025), SINGRAULI STPS U#6 (Target: 31-06-2024), SINGRAULI STPS U#7 (Target: 31-03-2024), UNCHAHAR TPS U#1 (Target: 31-12-2023), UNCHAHAR TPS U#2 (Target: 31-12-2023), UNCHAHAR TPS U#3 (Target: 30-09-2023), UNCHAHAR TPS U#4 (Target: 30-09-2023), UNCHAHAR TPS U#5 (Target: 30-09-2023), UNCHAHAR TPS U#6 (Target: 31-08-2022), MEJA Stage-I U#1 (Target: 31-10-2023), MEJA Stage-I U#2 (Target: 30-06-2023), TANDA Stage-I U#3 (Target: ), TANDA Stage-I U#4 (Target: ), TANDA Stage-II U#3 (Target: 31-03-2023), TANDA Stage-II U#4 (Target: 30-09-2023) |

| | |
|---|---|
| **L&T Power Development Ltd (Nabha)** | Nabha TPP (Rajpura TPP) U#1 (Target: 30-04-2021), Nabha TPP (Rajpura TPP) U#2 (Target: 28-02-2021) |
| **Lalitpur Power Gen. Company Ltd.** | LALITPUR TPS U#1 (Target: 31-12-2026), LALITPUR TPS U#2 (Target: 30-09-2026), LALITPUR TPS U#3 (Target: 30-06-2026) |
| **Lanco Anpara Power Ltd.** | ANPARA C TPS U#1 (Target: 31-12-2025), ANPARA C TPS U#2 (Target: 31-12-2025) |
| **Prayagraj Power Generation Company Ltd.** | PRAYAGRAJ TPP U#1 (Target: 31-12-2026), PRAYAGRAJ TPP U#2 (Target: 31-12-2026), PRAYAGRAJ TPP U#3 (Target: 31-12-2026) |
| **PSPCL** | GH TPS (LEH.MOH.) U#1 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#2 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#3 (Target: 31-12-2026), GH TPS (LEH.MOH.) U#4 (Target: 31-12-2026), GGSSTP, Ropar U#3 (Target: 31-12-2026), GGSSTP, Ropar U#4 (Target: 31-12-2026), GGSSTP, Ropar U#5 (Target: 31-12-2026), GGSSTP, Ropar U#6 (Target: 30-12-2026) |

| | |
|---|---|
| **Rosa Power Supply Company** | ROSA TPP Ph-I U#1 (Target: 31-12-2026), ROSA TPP Ph-I U#2 (Target: 31-12-2026), ROSA TPP Ph-I U#3 (Target: 31-12-2026), ROSA TPP Ph-I U#4 (Target: 31-12-2026) |
| **RRVUNL** | KOTA TPS U#5 (Target: 31-08-2024), KOTA TPS U#6 (Target: 31-08-2024), KOTA TPS U#7 (Target: 31-08-2024), SURATGARH TPS U#1 (Target: 31-12-2026), SURATGARH TPS U#2 (Target: 31-12-2026), SURATGARH TPS U#3 (Target: 31-12-2026), SURATGARH TPS U#4 (Target: 31-12-2026), SURATGARH TPS U#5 (Target: 31-12-2026), SURATGARH TPS U#6 (Target: 31-12-2026), SURATGARH SCTPS U#7 (Target: 28-02-2025), SURATGARH SCTPS U#8 (Target: 28-02-2025), CHHABRA TPP U#1 (Target: 31-12-2026), CHHABRA TPP U#2 (Target: 31-12-2026), CHHABRA TPP U#3 (Target: 31-12-2026), CHHABRA TPP U#4 (Target: 31-12-2026), CHHABRA SCPP U#5 (Target: 28-02-2025), CHHABRA SCPP U#6 (Target: 28-02-2025), KALISINDH TPS U#1 (Target: 28-02-2025), KALISINDH TPS U#2 (Target: 28-02-2025) |
| **Talwandi Sabo Power Ltd.** | TALWANDI SABO TPP U#1 (Target: 28-02-2021), TALWANDI SABO TPP U#2 (Target: 31-12-2020), TALWANDI SABO TPP U#3 (Target: 31-10-2020) |
| **UPRVUNL** | ANPARA TPS U#1 (Target: 31-12-2025), ANPARA TPS U#2 (Target: 31-12-2025), ANPARA TPS U#3 (Target: 31-12-2025), ANPARA TPS U#4 (Target: 31-12-2025), ANPARA TPS U#5 (Target: 31-12-2025), ANPARA TPS U#6 (Target: 31-12-2025), ANPARA TPS U#7 (Target: 31-12-2025), HARDUAGANJ TPS U#8 (Target: 31-12-2026), HARDUAGANJ TPS U#9 (Target: 31-12-2026), OBRA TPS U#9 (Target: 31-12-2026), OBRA TPS U#10 (Target: 31-12-2026), OBRA TPS U#11 (Target: 31-12-2026), OBRA TPS U#12 (Target: 31-12-2026), OBRA TPS U#13 (Target: 31-12-2026), PARICHHA TPS U#3 (Target: 31-12-2026), PARICHHA TPS U#4 (Target: 31-12-2026), PARICHHA TPS U#5 (Target: 31-12-2026), PARICHHA TPS U#6 (Target: 31-12-2026) |

Annexure-A.II

**MIS Report for Status of Islanding Schemes**

**Implemented Schemes**

| Sl. No. | Islanding Scheme | SLDC | Status | Submission of Self Certification of Healitheness | SOP | SCADA Display Page | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | NAPS IS | UP | Implemented | Yes (08-10-2021) | Yes | Yes | - |
| 2 | RAPS IS | Rajasthan | Implemented | 16-Aug-21 | Yes | Yes | List of officials in-charge, format for generation, islanding scheme sld and relays in RAPP IS submitted by RVPN on 04.12.2021. |
| 3 | Delhi IS | Delhi | Implemented | | | | |
| 4 | Pathankot-RSD IS | Punjab | Implemented | | | | |

**Under Implementation/ Newly Proposed/Under Discussion**

| Sl. No. | Islanding Scheme | SLDC | Status | Details of progress | DPR for PSDF funding (Required / Not Required) | Timelines Status - Proposed/Actual | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Study | | Design | | Approval | | Procurement | | Commissioning | |
| | | | | | | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual | Proposed | Actual |
| 1 | Lucknow-Unchahar IS | UP | Under Implementation | Scheme has been approved in 59th NRPC meeting held on 31.10.2022. In the 223rd OCC meeting, UPPTCL representative apprised that Unchahar-Lucknow Islanding scheme has been successfully implemented and same is visible at SCADA of UPSLDC also (except 03 Substation: Namely 132 kV S/s tripula, 132 kV S/s bachhrawan and 132 kV S/s Hussainganj.) The data of above 03 substation is not available at UPSLDC due to lack of OPGW. The work of laying OPGW cable is under progress and same shall be completed by next month. | | - | | - | - | - | - | - | - | - | - |
| 2 | Agra IS | UP | Under Implementation | Scheme has been approved in 71th NRPC meeting held on 29.01.2024. In 224th OCC, UPPTCL representative apprised forum that tender for UFR procurement is under progress. | | - | | - | - | - | - | - | - | - | - |
| 3 | Jodhpur-Barmer-Rajwest IS | Rajasthan | Under Implementation | Scheme has been approved in 60th NRPC meeting held on 30.11.2022. In 224th OCC, RRVPNL representative mentioned logic for Jodhpur-Barmer-Rajwest islanding scheme is is finalized and draft DPR is not yet submitted to NRPC Sectt. In 224th OCC , RRVPNL representative had submitted to provide the DPR by next OCC. | - | - | | - | - | - | - | - | - | - | - |
| 4 | Suratgarh IS | Rajasthan | Under Implementation | Scheme has been approved in 60th NRPC meeting held on 30.11.2022. In 224th OCC, RRVPNL representative mentioned DPR for implementation of Suratgarh islanding scheme is under finalization. | - | - | | - | - | - | - | - | - | - | - |
| 5 | Patiala-Nabha Power Rajpura IS | Punjab | Under Implementation | Scheme has been approved in 60th NRPC meeting held on 30.11.2022. In 224th OCC, Punjab SLDC apprised forum that DPR for PSDF funding is submitted to NLDC for PSDF Funding . | | - | | - | - | - | - | - | - | - | - |
| 6 | Kullu-Manali-Mandi IS | HP | Under Implementation | Scheme has been approved in 60th NRPC meeting held on 30.11.2022. In 224th OCC, HPSLDC representative informed that proposed UFR scheme for both Kullu- Manali has been recommended by the Appraisal Committee of the State PSDF for approval of Hon'ble HPERC. The islanding scheme will go to Monitoring committee for State PSDF funding approval. Monitoring committee is expected to be scheduled in November first week. | | - | | - | - | - | - | - | - | - | - |
| 7 | Shimla-Solan IS | HP | Under Implementation | Scheme has been approved in 60th NRPC meeting held on 30.11.2022. A meeting was held on 18.09.24 with stakeholders under the chairmanship of MS NRPC. HPSEBL informed in the meeting that payment to GE shall be made within two months and subsequently implementation of settings shall be completed within one month. HPSLDC was requested to follow up with all stakeholders within the scheme for implementation and expedite the same. | | | | | | | | | | | |

## Status of availability of ERS towers in NR

| Sl. No. | Transmission Utility | Voltage Level (220kV/400kV/765kV/ 500 kV HVDC etc.) | Length of the transmission lines owned by the Utility (Ckt. Kms.) | Number of ERS Sets ( towers) available (Nos.) | ERS Set ( towers) required as per the Govt. norms. | Location | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | PTCUL | 400kV | 418.394 | NIL | 1 | | Tender has been opened and contract activities under process |
| | | 220kV | 1045.135 | NIL | 1 | | |
| 2 | Powergrid NR-1 | 220 KV | 1842.88 | NIL | 1 | | |
| | | 400 KV | 11074.26 | 12 Towers | 3 | All 400kV ERS at Ballabhgarh | make-Lindsey |
| | | 765 KV | 4721.85 | 15 Towers | 1 | All 765kV ERS at Meerut | Make-SBB |
| | | 500 KV HVDC | 653.88 | NIL | 1 | | |
| | | 800 KV HVDC | 416.58 | NIL | 1 | | |
| 3 | Powergrid NR-2 | 66 KV | 37.56 | Nil | 1 | | ERS tower available for 400KV rating can be used in place of lower as well as higher voltage Towers. In case used for 765KV Line, No of towers can be erected will reduce due to increase in Tower Hight. |
| | | 132 KV | 262.7 | Nil | 1 | | |
| | | 220 KV | 2152 | Nil | 1 | | |
| | | 400 KV | 8097.3 | 02 Set (32 Towers) | 2 | Kishenpur & Jalandhar | |
| | | 765 KV | 337.5 | Nil | 1 | | |
| 4 | Powergrid NR-3 | 800KV HVDC | 2205 | NIL | 1 | | 400KV ERS will be also be used in other voltage level lines |
| | | 500KV HVDC | 2566 | NIL | 1 | | |
| | | 765KV | 4396 | NIL | 1 | | |
| | | 400KV | 12254 | 26 Towers | 3 | Kanpur | |
| | | 220KV | 1541 | NIL | 1 | | |
| | | 132KV | 207 | NIL | 1 | | |
| 5 | PARBATI KOLDAM TRANSMISSION COMPANY LIMITED | 400kV | 457 | NIL | 1 | | Procurement under process. |
| 6 | PATRAN TRANSMISSION COMPANY LTD | 400kV | 0.4 | NIL | 1 | It is kept in Bhopal and on need basis is moved across region | Not available, will tie up based on the requirements in future. However the parent company IndiGrid owns one set of ERS for all five regions. |
| 7 | NRSS-XXIX TRANSMISSION LTD | 400kV | 853 | NIL | 1 | | |
| 8 | GURGAON PALWAL TRANSMISSION LTD | 400kV | 272 | NIL | 1 | | |
| 9 | RAPP Transmission Company Limited. | 400kV | 402 | NIL | 1 | | |
| 10 | NRSS XXXVI Transmission Limited | 400kV | 301.924 | NIL | 1 | | Element I - Operational comprising of 3 kms. Element II - Work Under Progress comprising of 221.924 kms. Element II - Work Under Progress comprising of 77 kms. |
| 11 | HPPTCL | 220 kV | 659 | NIL | 1 | | |
| | | 400 kV | 75.7 | NIL | 1 | | |
| 12 | RVPN | 132 kV | 18969.958 | 1 | 4 | 01 No. ERS available at 220 kV GSS Heerapura, Jaipur | ERS proposed : 01 Set at 400 kV GSS, Jodhpur. 01 set at 400 kV GSS Bikaner |
| | | 220 kV | 16227.979 | | 3 | | |
| | | 400 kV | 6899.386 | | 2 | | |
| | | 765 kV | 425.498 | | 1 | | |
| 13 | DTL | 220kV | 915.498 | NIL | 1 | 400kV Bamnauli Sub station | ERS tower available for 400KV rating can also be used for lower voltage lines as well |
| | | 400kV | 249.19 | 02 Sets (32 towers) | 1 | | |
| 14 | JKPTCL | | | | | | JKPTCL, Jammu: being procured |
| 15 | HVPN | | | | | | JKPTCL, Kashmir:10 tower procured (out of which 3 on loan to JKPTCL, Jammu) |

| Sl. No. | Transmission Utility | Voltage Level (220kV/400kV/765kV/ 500 kV HVDC etc.) | Length of the transmission lines owned by the Utility (Ckt. Kms.) | Number of ERS Sets ( towers) available (Nos.) | ERS Set ( towers) required as per the Govt. norms. | Location | Remarks |
|---|---|---|---|---|---|---|---|
| 16 | PSTCL | 400 kV | 1666.43 | 2 | 2 | | |
| | | 220 kV | 7921.991 | | | | |
| 17 | UPPTCL 1- Meerut | 132KV | 27508.321 | 24 Nos(15 Running+9 Angle) | | 400 kV S/s Gr. Noida | ERS will be also be used in other voltage level lines. |
| | | 220KV | 14973.453 | | | | |
| | | 400KV | 6922.828 | | | | |
| | UPPTCL 2-Prayagraj | 765KV | 839.37 | 24 Towers | | 220 kv S/s phulpur | ERS will also be used in other voltage lines. |
| | | 400KV | 1804.257 | | | | |
| | | 220KV | 2578.932 | | | | |
| | | 132KV | 4714.768 | | | | |
| 18 | POWERLINK | | | | | | |
| 19 | POWERGRID HIMACHAL TRANSMISSION LTD | | | | | | |
| 20 | Powergrid Ajmer Phagi Transmission Limited | | | | | | |
| 21 | Powergrid Fatehgarh Transmission Limited | | | | | | |
| 22 | POWERGRID KALA AMB TRANSMISSION LTD | | | | | | |
| 23 | Powergrid Unchahar Transmission Ltd | | | | | | |
| 24 | Powergrid Khetri Transmission Limited | | | | | | |
| 25 | POWERGRID VARANASI TRANSMISSION SYSTEM LTD | | | | | | |
| 26 | ADANI TRANSMISSION INDIA LIMITED | | 2090 | 1 Set (12 towers) | 1 set (12 towers) | Sami (Gujarat) | Make-Lindsey<br>ERS set available for 400KV & 500KV rating can be used for lower as well as higher voltage Towers. In case used for 765KV Line, No of towers can reduce due to increase in Tower Height & nos of conductors. |
| 27 | BIKANER KHETRI TRANSMISSION LIMITED | | 482 | | | | |
| 28 | FATEHGARH BHADLA TRANSMISSION LIMITED | 500 kV HVDC<br>400 kV HVAC | 291 | | | | |
| 29 | NRSS-XXXI(B) TRANSMISSION LTD | 400 kV | 577.74 | Not Available | Not Available | | In the advance stage of process of finalising arrangement for providing ERS on need basis with other transmission utility (M/s INDIGRID). |
| 30 | ARAVALI POWER COMPANY PVT LTD | 765 kv HVAC | | | | | |

*The transmission Utility with line length less than 500 ckt kms (of 400 KV lines) may be given option either to procure ERS or have agreement with other transmission utilities for providing ERS on mutually agreed terms, when need arises. (As per MoP directions)

| | | | | | | | | | | | Approved Planned Outage-1 | | | Actual Planned Outage-1 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (MW) 30-11-2023 | Name of Station | UNIT_NM | STN_TYPE_ID | SECTOR | REGION_NM | ST_NM | SH_NM | IPP | FUEL_NM | Capacity (MW) 31-03-2025 | Start Date | End Date | Reason | Start Date | End Date | Reason for any deviation |
| 660 | TALWANDI SABO TPP | 3 | T | IPP SECTOR | Northern | Punjab | TSPL | FALSE | COAL | 660 | 7-Oct-24 | 31-Oct-24 | AOH | | | |
| 135 | JALIPA KAPURDI TPP | 7 | T | IPP SECTOR | Northern | Rajasthan | JSWBL | FALSE | LIGNITE | 135 | 23-Oct-24 | 30-Oct-24 | AOH | | | |
| 135 | JALIPA KAPURDI TPP | 5 | T | IPP SECTOR | Northern | Rajasthan | JSWBL | FALSE | LIGNITE | 135 | 15-Oct-24 | 22-Oct-24 | AOH | | | |
| 135 | JALIPA KAPURDI TPP | 6 | T | IPP SECTOR | Northern | Rajasthan | JSWBL | FALSE | LIGNITE | 135 | 5-Oct-24 | 12-Oct-24 | AOH | | | |
| 250 | CHHABRA TPP | 3 | T | STATE SECTOR | Northern | Rajasthan | RRVUNL | FALSE | COAL | 250 | 1-Oct-24 | 20-Oct-24 | AOH | | | |
| 660 | CHHABRA TPP | 6 | T | STATE SECTOR | Northern | Rajasthan | RRVUNL | FALSE | COAL | 660 | 1-Sep-24 | 5-Oct-24 | AOH | | | |
| 110 | TANDA TPS | 3 | T | CENTRAL SECTOR | Northern | Uttar Pradesh | NTPC Ltd. | FALSE | COAL | 110 | 1-Oct-24 | 30-Oct-24 | AOH | | | |
| 225 | KASHIPUR CCPP | 1 | T | IPP SECTOR | Northern | Uttarakhand | SrEPL | FALSE | NATURAL GAS | 225 | 30-Sep-24 | 2-Oct-24 | Offline Waterwash | | | |
| 214 | KASHIPUR CCPP | 2 | T | IPP SECTOR | Northern | Uttarakhand | SrEPL | FALSE | NATURAL GAS | 214 | 6-Oct-24 | 8-Oct-24 | Offline Waterwash | | | |
| 214 | KASHIPUR CCPP | 2 | T | IPP SECTOR | Northern | Uttarakhand | SrEPL | FALSE | NATURAL GAS | 214 | 21-Oct-24 | 23-Oct-24 | Offline Waterwash | | | |

# Analysis of corrosion and scaling in high-voltage direct-current valve cooling water system

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**Abstract.** In this paper, the problems of corrosion and scaling in the converter valve tower cooling water system based on the ± 500kV Baode HVDC transmission project with Siemens light-triggered thyristor HVDC transmission technology are analyzed in detail. The corrosion and scaling phenomenon can cause the closure or emergency shutdown of converter valves and bring potential dangers to the safe and stable operation of power grid. So far, there is no fundamental solution to this problem. Based on the investigation of scaling phenomenon of grading electrode and corrosion of thyristor aluminum alloy heat sinks, the scaling law of the grading electrode is proposed and the cause of scaling is put forward and analyzed. Some suggestions are given.

## 1. Introduction

Converter valve is the core equipment of a high-voltage, direct current (HVDC) electric power transmission system. Considering the valve loss, which inevitably exists, the heat generated by valve loss could largely harm the performance of converter valve. Thus, the internal water cooling system, which effectively helps dissipating the heat out of valve, is of great significance to ensure the normal operation of the converter valve [1]. Unfortunately, operating experiences show that the problem of corrosion and scaling is very common in inner cooling water system of converter valves [2-12]. Despite the use of mixed ion exchange resin for desalination and purification of the internal cooling water of the converter valve, corrosion and scaling still exist in the internal cooling water system of the converter valve, leading to an unsatisfied performance of the heat dissipation and insulation of the converter valve. Accordingly, the safe and stable operation of the thyristor, reactor, damper capacitor and water pipe of the converter valve could be negatively affected.

In this paper, the scaling problem of bipolar grading electrodes in the ±500 kV Baode HVDC power transmission project is taken as the research object and the corrosion and scaling issues of the internal cooling water system of the converter valve are analyzed and the relevant recommendations and solutions are proposed.

## 2. Valve cooling water path and grading electrode

### *2.1. HVDC transmission system*

The HVDC transmission technology is one of the most advanced and energy-saving power transmission and transformation technologies in the world, and it is also the key developing technology in Chinese technical equipment field. It has the advantages of asynchronous operation between two AC systems,

fast response, precise adjustment, convenient operation, stable voltage distribution along the line and low operation loss. Moreover, the investment and operation cost of HVDC transmission line are less than that of AC transmission system [13]. HVDC transmission system usually consists of rectifier station, inverter station and HVDC transmission line. Its wiring principle is shown in figure 1.

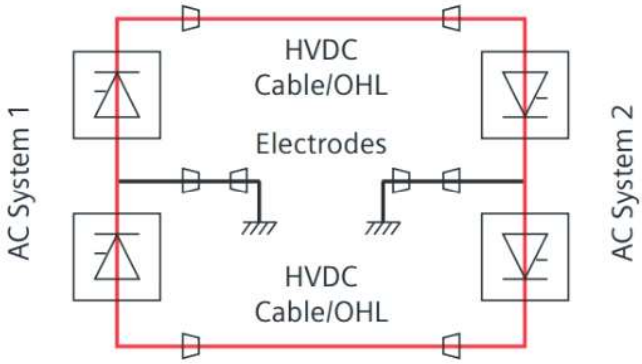


**Figure 1.** HVDC transmission system

*2.2. Valve cooling water system*

Converter valve is one of the most important equipment in HVDC transmission system. Under normal operation, the thyristor generates high heat with high current flowing, which causes the temperature of the thyristor to rise sharply. The thyristor must be cooled effectively, or it will be burnt out. The temperature of the thyristor of the converter valve is generally less than 90°C. The heat dissipation of thyristor is realized by the aluminum alloy heat sinks which is closely contacted with thyristor by internal cooling water cooling. The system flow chart is shown in figure 2.

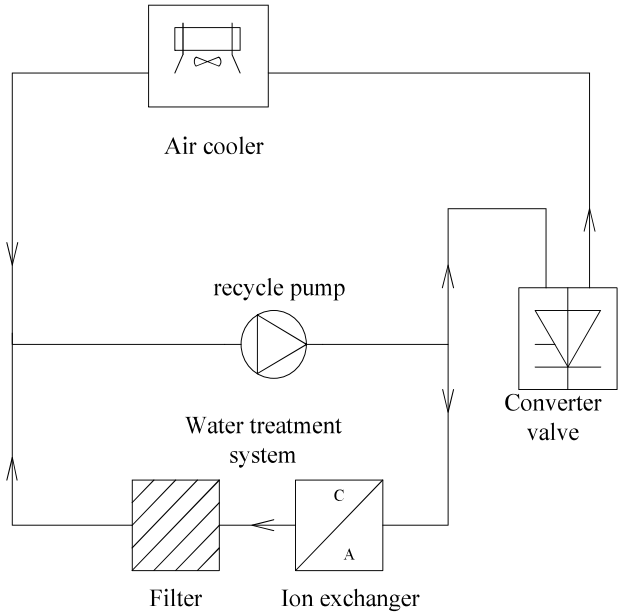


**Figure 2.** Air cooling water system

*2.3. Valve assembly waterway*

The valve hall of the converter valve is divided into three phases, namely A, B and C. Each phase is subdivided into left (L) and right (R) sides, each side being split into six layers. Each valve assembly is composed of series thyristors. The thyristors are separated by aluminum alloy heat sinks. The heat sinks are connected by waterways, and the heat of the heat sinks is derived by cooling water.

The connection modes of cooling water pipeline of valve assembly could be segmented to series type, parallel type and series-parallel type. The series type of connection mode is mainly based on ABB technology route. The flow rate in series type is large, but the temperature difference between the head and the tail is huge too. The parallel type is mainly based on SIEMENS technology route. The series-parallel type, mainly based on Zhonglian Puri technology route, combines the advantages of ABB and SIEMENS given water route arrangement of flow and temperature.

SIEMENS technology route was adopted in ±500 kV converter station. Its valve assembly waterway was parallel, A is thyristor, B is heat sinks, C is connecting water pipe. The schematic diagram is shown in figure 3, and the valve assembly is shown in figure 4.

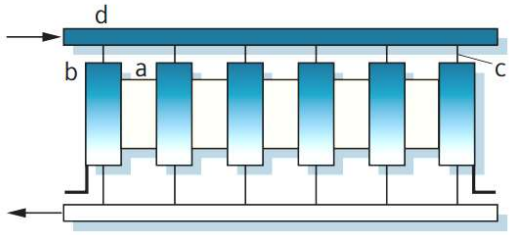


**Figure 3.** Parallel connection water line

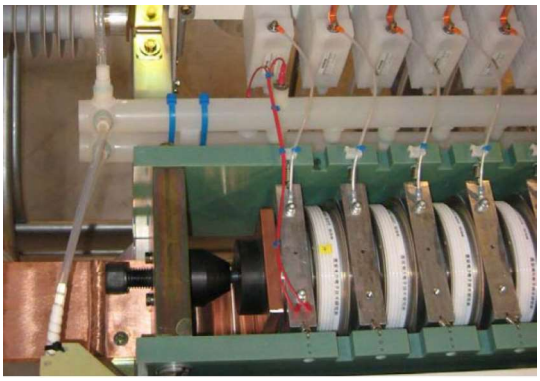

**Figure 4.** SIEMENS Valve assembly

*2.4. Grading electrode position*

In order to avoid discharging unevenly on the inner and outer wall of cooling water pipeline in the converter valve due to uneven voltage distribution, and leakage current caused by the contact between metal equipment and water pipeline in the valve assembly, grading electrodes were installed on the main cooling water pipe of the valve tower and the water distribution and catchment pipes in the valve assembly. The appearance of the grading electrodes is shown in Figure 5. For the grading electrode, the effective part presented is platinum, of 23.8 mm in length and 2 mm in diameter; the remaining part is stainless steel. The installation of grading electrodes could help realizing even voltage distribution on the inner and outer wall of the main water cooling pipeline and help releasing leakage current, which now transfer from thyristor aluminum alloy heat sinks to inert platinum electrode. By doing this, the corrosion phenomenon of electrical equipment could be avoided [14].

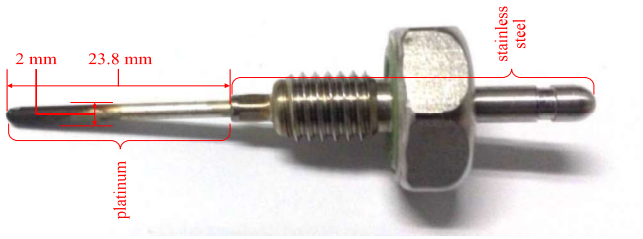


**Figure 5.** Grading electrodes

There were 432 grading electrodes installed in the single pole of Baoji Converter Station, including 24 zero potential electrodes. The number of grading electrodes installed on the T-type connection part of valve assemblies and main water pipe was 144, the number of grading electrodes installed on the anode side of thyristor valve assemblies was 288 and the number of grading electrodes installed on the cathode side was 288. The rest were electrode valve tower interlayer electrodes. The installation positions of grading electrodes could be divided into the following categories, as shown in table 1, L: left side, R: right side, L1: on the left and level 1, R1: on the right and level 1, R2\L3\L4\R4\R5\L6 and so on.

**Table 1.** Grading electrode positions in the valve tower

| Valve tower electrode location (A phase, B phase, C phase) | | Number of electrodes |
|---|---|---|
| Top part tube | L sides | 2 |
| | R sides | 2 |
| S-shape tube | L1 and R1 upper part | 4 |
| | R2 upper part | 2 |
| | L3 upper part | 2 |
| | L4 and R4 upper part | 4 |
| | R5 upper part | 2 |
| | L6 upper part | 2 |
| T-type tube | L and R sides | 12 |
| Water distribution pipe and confluence pipe | Cathode sides. | 24 |
| | Anode sides | 24 |
| Bottom part tube | L and R side | 2 |

## 3. Scaling on Grading Electrodes

Based on the investigation of several HVDC transmission projects in China, it is found that the scaling phenomenon of grading electrodes exists in different degrees. Figure 6 (a) and (b) illustrate the difference in scaling for grading electrodes of ABB technical route and grading electrode of Siemens technical route, respectively. In addition, figure 6(c) shows a third type of grading electrode of Zhonglian Puri technical route with some scaling presented.

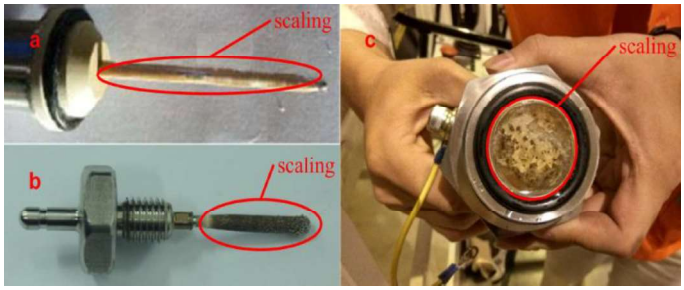


**Figure 6.** Three types of electrode scaling

*3.1. Scaling phenomenon in Inverter station*

The scaling phenomena in Baoji Converter Station were as following: the scaling of the grading electrodes on the anode side of thyristor on the valve assembly was slight and loose; the scaling of the grading electrodes on the cathode side was serious and firm; the zero potential point of the main water pipe of the valve tower was not scaling. The scaling of the grading electrode at the T-type connection between the water distributing pipe of the valve assembly and the main water pipe was moderate, but scaling was very firm.

The scaling on the anode side was slight. The thickness of the scaling of electrode could be calculated as the following: the diameter of the electrode with scaling minus the diameter of the electrode without scaling, and then divide the result by 2. The average thickness of scaling was 0.1-0.2 mm. The scaling distributed evenly, the scaling was crisp and easy to fall off. The scaling on the upstream side was slightly thicker than that on the back side. Only the root part was not covered by scaling, as shown in figure 7.

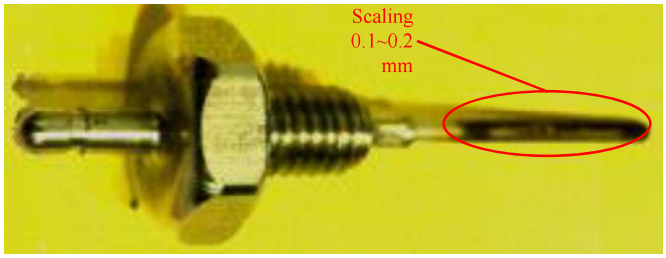


**Figure 7.** Deposit on grading electrodes at anode side of valve assembly of Invert station

The scaling of the grading electrodes on the cathode side is serious. Generally, the scaling thickness is 0.6-0.8 mm, the end is thick, the tail is thin, the scaling is firm, and it is not easy to fall off. There is no difference between the scaling on the front and back surfaces. Only the root is not covered by scaling, as illustrated in figure 8.

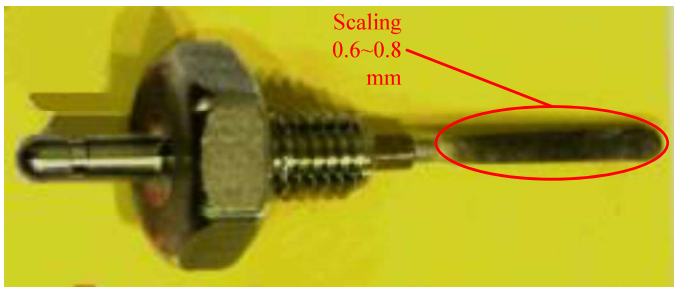

**Figure 8.** Deposition of grading electrodes at cathode side of valve assembly of Invert station

Observing the grading electrode at the T-type connection of valve assembly distributing pipeline and main water pipe, general scale thickness is 0.6-0.8 mm, scaling distributed evenly, scaling is very firm, firmly attached to the electrode surface. The scaling is no difference between water front side and back side. Only half of length of the platinum electrode part is covered by scaling, as seen in figure 9.

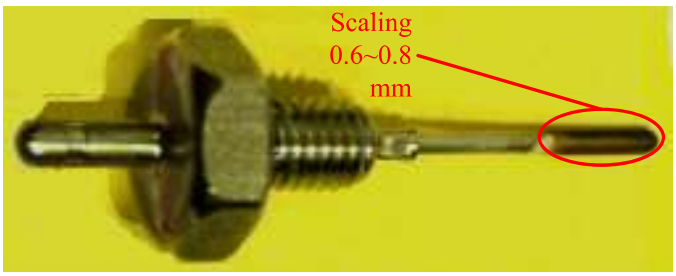


**Figure 9.** Deposition of grading electrodes at T-junction of the valve assembly and the main water pipe of Invert station

*3.2. Scaling phenomenon in Rectifier station*

Deyang converter station basically operates as a rectifier, and the scaling of anode side grading electrodes on valve assembly was serious, as shown in Figure 10, which was basically consistent with the scaling of cathode side of valve assembly in rectifier station. The scaling of grading electrodes on cathode side was slight, as shown in figure 11, which was basically consistent with the scaling of anode side of valve assembly in rectifier station; the zero potential point of main water pipe in valve tower was not scaling. The scaling degree of grading electrodes installed on T-type connection of water distributing pipe and main water pipe was at intermediate level, as seen in figure 12.

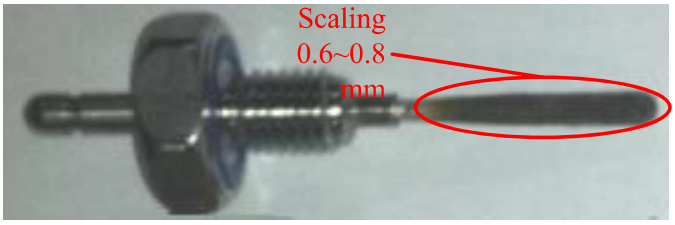


**Figure 10.** Deposit on grading electrodes at anode side of valve assembly of rectifier station

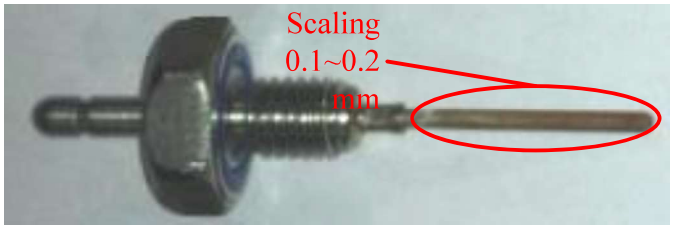


**Figure 11.** Deposit on grading electrodes at cathode side of valve assembly of rectifier station

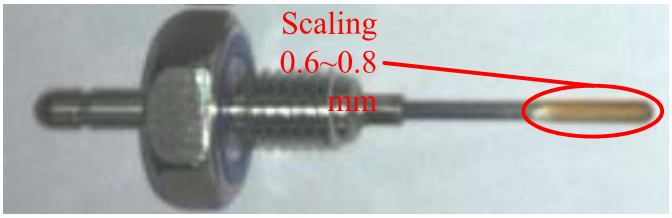


**Figure 12.** Deposit on grading electrodes at T-junction of the valve assembly and the main water pipe of rectifier station

## 4. Scale distribution principle

### *4.1. Distribution characteristics of scaling*

According to the electrode scaling thickness, that is, the diameter of the electrode after scaling minus the diameter of the electrode without scaling, and then divided by 2, and position of grading electrodes scaling, the 864 branch electrodes of bipolar at the BAOJI converter station were all sampled for detection. The electrodes scaling were divided into 6 classes: valve assembly cathode side with serious scaling; anode side with slight scaling; valve assembly T-type tube electrodes with scaling in the middle; S-shape tube electrodes, top part electrodes, pole II bottom screen electrodes with scaling situation in agreement with those at anode side; and pole I bottom screen electrode with scaling situation in agreement with those at cathode side, as seen in tables 2 and 3, the diameter of the electrode after scaling is listed. note: The pole I converter valve has been operating for 44 months, the bottom voltage of the valve tower is -500 kV, the pole II has been operating for 39 months, and the bottom voltage of the valve tower is +500 kV. CL:CL represents the left side of the valve tower of the C phase converter valve, CR\BL\BR\AL\AR and so on.

**Table 2.** Pole I grading electrode with deposits' data analysis (unit: mm)

| Average value | CL | CR | BL | BR | AL | AR |
|---|---|---|---|---|---|---|
| Top part | 2.04 | 2.04 | 2.02 | 2.02 | 2.03 | 2.05 |
| Mid-upper part | 2.11 | 2.02 | 2.00 | 2.01 | 2.01 | 2.02 |
| S-type tube | 2.05 | 2.04 | 2.07 | 2.05 | 2.03 | 2.03 |
| Cathode side | 2.63 | 2.94 | 2.96 | 2.95 | 2.94 | 2.94 |
| Anode side | 2.13 | 2.23 | 2.23 | 2.23 | 2.23 | 2.23 |
| T-shape tube | 2.04 | 2.16 | 2.13 | 2.08 | 2.12 | 2.09 |
| Bottom part | 2.88 | 2.72 | 2.73 | 2.65 | 2.68 | 2.83 |

**Table 3.** Pole II grading electrode with deposits' data analysis (unit: mm )

| Average value | CL | CR | BL | BR | AL | AR |
|---|---|---|---|---|---|---|
| Top part | 2.04 | 2.05 | 2.04 | 2.04 | 2.04 | 2.04 |
| Mid-upper part | 2.45 | 2.52 | 2.49 | 2.72 | 2.62 | 2.02 |
| S-shape tube | 2.06 | 2.04 | 2.06 | 2.06 | 2.05 | 2.08 |
| Cathode side | 2.34 | 2.28 | 2.30 | 2.28 | 2.31 | 2.29 |
| Anode side | 2.99 | 2.93 | 3.09 | 2.89 | 2.95 | 3.05 |
| T-type tube | 2.24 | 2.10 | 2.23 | 2.14 | 2.19 | 2.07 |
| Bottom part | 2.01 | 2.01 | 2.02 | 2.01 | 2.02 | 2.03 |

### *4.2. Distribution and treatment of scaling*

Baoji converter station functions as an inverter station, therefore, the scale distribution of 432 grading

electrodes of pole I and pole II were basically identical. Thus, the scaling regularity of grading electrodes of Inverter station could be obtained: scaling on the cathode side of thyristor is serious and sturdy, the scaling on the anode side is slight and loose, while scaling degree at the T-type connection is moderate and very firmly attached.

As a rectifier station, the scale distribution of 432 grading electrodes of pole I and pole II in Deyang converter station were the same, but it was different from that in Baoji converter station. Therefore, the scaling regularity of grading electrodes could be concluded that: scaling on the anode side of thyristor is serious, scaling on the cathode side is slight and scaling on the T-type connection is moderate.

Therefore, according to the scaling distribution law of grading electrodes, scaling removal could be carried out purposefully. Inverter station could aim at removing scaling on the cathode side of thyristor of valve assembly, while rectifier station could only focus on scaling on the anode side of thyristor of valve assembly [15].

## 5. Related detection analysis and treatment recommendations

### *5.1. Scale analysis*

The scales of all grading electrodes were broken and dissolved in hot dilute sulfuric acid with 35% mass concentration. By doing this, the content of metal elements was detected by ICP emission spectrometer. Aluminum elements accounted for 90-96%, iron elements 5-8%, calcium elements 0.1-0.5%, magnesium elements 0.1-0.5%, sodium elements 0.05-0.1%.Detecting the resistance values of the extreme and tail parts of the grading electrode after scaling ,the resistance values were found to be 280-350 kΩ.This indicates that the main harm of the scaling of the electrode lies in the gradual loss of the original function of grading voltage and transferring leakage current.

### *5.2. Water quality inspection*

The main metal element found in scaling was aluminum. Analyzing the mass concentration of metal elements in inner cooling water and makeup water of pole I and pole II, seen in Table 4. It was found that the mass concentration of aluminum was very low, only 1.1-1.3 ug/L. This indicates that the medium aluminum in scaling of grading electrode may come from the makeup water of valve tower. Therefore, the concentration of $Mg^{2+}$ and $Ca^{2+}$ and the mass concentration of aluminum in the makeup water should be reduced.

**Table 4.** Water sample analysis of data on cation ion contents (μg/L)

| Sample name | $Na^{+}$ | $NH^{4+}$ | $K^{+}$ | $Mg^{2+}$ | $Ca^{2+}$ | Al |
|---|---|---|---|---|---|---|
| Pole I de-gas jar | 2.6 | 0.2 | 1.5 | 0.3 | 5.9 | 1.3 |
| Pole II de-gas jar | 1.1 | 0.2 | 0.8 | 0.2 | 3.6 | 1.1 |
| makeup water | 1105.8 | 0.2 | 389.5 | 10.3 | 75.8 | 1.5 |

### *5.3. Structure of aluminum alloy heat sinks*

The aluminum alloy material directly contacting the internal cooling water system is only the aluminum alloy heat sinks of the thyristor. Unfolding a piece of aluminum alloy heat sinks running for 3 years, it could be found that there were many black corrosion points in the water inlet and outlet. As shown in figure 13, the water inlet channel (the so-called “double mosquito perfume water path” section) was bright and clean, while the outlet channel had black corrosion spots, as shown in figure 14. The results show that the corrosion products of aluminum alloy may come from the scaling of the grading electrodes, and the corrosion effect exerts no obvious harm to the aluminum alloy heat sinks.

**Figure 13.** Inlet and outlet section of the heat sink

**Figure 14. "**Double mosquito perfume water path" section inside of the heat sink

*5.4. Waterway voltage analysis*

Since grading electrodes connect with heat sink, grading electrodes potentiality varies with the heat sink potentiality, the voltage difference among the grading electrodes is the sum of several heat sink voltage difference, the results listed in table 5.

**Table 5.** Voltage in the water circuit

| Title | Voltage at two ends(V) | Valve condition | Current direction |
|---|---|---|---|
| Two electrodes | 26 | turn-on | Anode to Cathode |
| Neighboring heat sinks | 2 | turn-on | Anode to Cathode |
| Head-tail heat sinks | 26 | turn-on | Anode to Cathode |
| Two electrodes | 41665 | turn-off | Cathode to Anode |
| Neighboring heat sinks | 3205 | turn-off | Cathode to Anode |
| Head-tail heat sinks | 41665 | turn-off | Cathode to Anode |

*5.5. Electrolytic corrosion and scaling analysis*

Based on the aluminum-hydroelectric potential-pH chart [16], the following patterns are possible. If the potential exceeds 1.35V above zone with oxygen reaction, the electrolytic water product is oxygen, see Eg.(1). If the potential is below 0.12V zone with the hydrogen reaction, see Equation (2). If the potential

is between 0.12-1.35V, the absorption oxygen corrosion will take place, see Equation (3). If the potential is over -1.676V, aluminum loses electrons and is electrolyzed, see Equation (4).

$$4OH^- - 4e^- \rightarrow 2H_2O + O_2\uparrow \quad (1)$$

$$2H^+ + 2e \rightarrow H_2 \quad (2)$$

$$O_2 + 2H_2O + 4e^- \rightarrow 4OH^- \quad (3)$$

$$Al \rightarrow Al^{3+} + 3e \quad (4)$$

Through the calculation of $Al(OH)_3$ pks=32.89 and $H_3AlO_3$ pK1=11.2, at 18~25℃, the pH value is 5.6~5.8, the oxide film of alumina has the minimum solubility, that is, the aluminum alloy protective film is the best. When the pH value is less than 4.6 or more than 8.3, the protective film begins to dissolve, see Equations (5) and (6):

$$Al(OH)_3 \leftrightarrow Al(OH)^{2+} + 2OH^- \quad (5)$$

$$Al(OH)_3 \leftrightarrow H_3AlO_3 \leftrightarrow H_2AlO_3^- + H^+ \quad (6)$$

Therefore, the aluminum alloy heat sink is subject to electrolytic corrosion. The production of hydrogen or oxygen will generate $Al(OH)_4^-$. So, in the cooling water system, when the valve is turned on, the aluminum hydroxide is absorbed by the electrode surface of valve anode side. When the valve is turned off, the aluminum hydroxide is absorded by the electrode surface of valve cathode side. In addition, the electrode at the positive potential can produce oxygen, with its volume being about 50% of that at the negative potential, and the electrolysis gas can remove the scaling. Therefore, both rectifier and invert stations have more severe scaling in the electrode at the positive potential than at the negative one.

## 6. Conclusions

Corrosion in HVDC valves cooling water system was analyzed. The chemical composition of the scaling on the electrodes revealed a large amount of aluminum. Further investigation showed that the aluminum detected was a corrosion product coming from the makeup water of internal cooling water and aluminum alloy heat sinks. It could be found that the surface conductive resistance of the grading electrode increased significantly and the function of grading voltage and transferring leakage current were lost after scaling. Observing the internal of the heat sinks of aluminum alloy, corrosion spots were found. But they are not enough to harm its safe operation. The experiments illustrated that the scaling at the positive potential was higher than that at the negative potential. The scaling principle was different in the rectifier and inverter stations. In the rectifier station, the scaling of grading electrodes at the anode side of valve is serious, while the scaling of grading electrodes at the cathode side is more severe in the inverter station. Based on these regularities of the distribution of the scaling on grading electrodes, targeted scale removal measurements could be carried out. On account of the corrosion of aluminum alloy heat sinks caused by leakage current electrolysis, the conductivity of the internal cooling water system should be lowered as far as possible, and the pH value should be adjusted to a reasonable range.

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*Short Communication*

# Corrosion Behavior of Aluminum in Carbon Dioxide Aqueous Solution at 50 ºC

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In this work, the corrosion behavior of aluminum in carbon dioxide solutions with different concentrations at high temperature (50 ºC) was studied. The corrosion of aluminum in the carbon dioxide solutions was inhibited to a certain extent compared to the corrosion in deionized water. It was found that an aluminum electrode in 0.84 μmol $L^{-1}$ carbon dioxide solution with pH 4.35 had the lowest corrosion rate as observed from its lowest corrosion current, the most positive corrosion potential, and the maximum charge transfer impedance. The mechanism for aluminum corrosion inhibition was that $HCO_3^-$ generated by carbon dioxide ionization developed an ordered charge field on the aluminum surface, shielding the diffusion of aluminum ions and inhibiting the dissolution of the oxide film on the aluminum surface. SEM, EDS and XRD confirmed that the corrosion products covering the surface of the aluminum electrode were $Al(OH)_3$ and/or $Al_2O_3$. Based on the above, it was elucidated that the Pt grading electrodes of the high voltage direct current (HVDC) valve cooling system lower the scaling rate in solutions with a certain concentration of carbon dioxide, and it was shown that the concentration of aluminum ions in the inner cooling water is a crucial factor affecting the scaling of grading electrodes. Therefore, reducing the concentration of aluminum ions in the inner cooling water, in other words, inhibiting the corrosion of aluminum, is the fundamental means for solving the scaling problem of the grading electrode. This paper will contribute to the research on production improvement techniques used for HVDC valve cooling systems.

**Keywords:** Aluminum, Corrosion, Carbon dioxide solution, Bicarbonate radical, Radiator, Thyristor, High voltage direct current

## 1. INTRODUCTION

High voltage direct current (HVDC) transmission systems have become the preferred resource allocation and long distance power transportation method due to their narrow transmission corridor, high transmission efficiency, and low power consumption [1, 2]. Unfortunately, the scaling of grading electrodes in deionized water cooling circuits of HVDC power transmission modules is a long-known and unsolved problem that has a great impact on the safe operation of the HVDC transmission system. Deionized water is used as the cooling water circulating in the in-valve cooling system, and its working temperature is in the range of 48-52 $^{o}$C. Grading electrodes are cylindrical bright platinum electrodes with deposition of mixed aluminum oxides and hydroxides (alumina) [3, 4]. The aluminum element in the deposition is derived from corrosion of the aluminum radiator and is precipitated on the surface of the grading electrodes under appropriate conditions. To solve the scaling problem of the grading electrode, it is necessary to suppress the corrosion behavior of the aluminum radiator in the in-valve cooling water system [5]. Previous reports have focused on the corrosion characteristics of aluminum in weak acid media (hydrochloric acid, sulfuric acid) [6, 7], aqueous alkaline solutions [8, 9] and neutral dilute salt solutions (for instance, halide media [10, 11] and sodium sulfate solution [12]).

According to the studies by Weber [13] and Siemen [14], the introduction of a certain concentration of carbon dioxide in the deionized water at 25 $^{o}$C lowered the scaling rate of grading electrodes. However, they did not identify the origin for the lowering of the grading electrode scaling rate. The scaling on the surface of the grading electrode is due to aluminum deposition, indicating that the corrosion behavior of the aluminum radiator in the inner cooling water system was suppressed when the scaling rate was lowered. This paper discusses the electrochemical corrosion behavior of aluminum in different concentrations of carbon dioxide aqueous solution at 50 $^{o}$C in order to elucidate the corrosion mechanisms, providing guidance for solving the scaling problem of the grading electrode in the HVDC valve cooling system.

## 2. EXPERIMENTAL SECTION

### *2.1. Electrochemical system*

An electrochemical system for testing consisted of a working electrode, a reference electrode, a counter electrode and an electrolyte. Platinum black electrodes were used as the counter electrodes, and saturated calomel electrodes (SCE) were used as the reference electrodes. The SCE potential at 50 $^{o}$C is 0.228 V (relative to the standard hydrogen electrode (SHE)). The working electrodes were cut from the aluminum radiator with a 1 cm × 1 cm working surface. The model 3003 aluminum electrode was used [15] that was composed of Si (0.57 wt%), Fe (0.63 wt%), Cu (0.14 wt%), Mn (1.27 wt%), Zn (0.09 wt%), Li (0.03 wt%) and Al (97.31wt%). All of the surfaces other than the 1 cm$^2$ working surface were coated with epoxy resin. Prior to testing, the working electrodes were polished with diamond paper and nano-alumina powder, cleaned with deionized water and absolute ethanol, and dried and immersed in the testing electrolytes for 24 h.

Different concentrations of carbon dioxide electrolyte were prepared by the aeration method, and the concentration was controlled by different ventilation times. First, $N_2$ was injected into deionized water (100 mL) for 5 min (excluding the dissolved air in deionized water), and then $CO_2$ was injected into deionized water for 0, 10, 20, 30, 40, 50 and 60 min. Finally, all electrolytes were closed and left standing for 12 h. The concentrations of the carbon dioxide solutions were tested according to the ISO 925-1997 standard [16]. An S470 pH meter was used to test the pH of the electrolytes.

### *2.2. Electrochemical Test*

Steady state polarization curves and electrochemical impedance spectroscopy (EIS) spectra were obtained using a CHI660D electrochemical workstation. The potential scan rate was 1 mV $s^{-1}$, and the potential range was 0.8 V (ranging from the potential 0.4 V lower than the stable potential to the potential 0.4 V higher than the stable potential). The corrosion potential and corrosion current density were obtained from the polarization curves.

The corrosion characteristics of the aluminum surface were determined from the results of EIS analysis that was performed over a frequency range from 1 Hz to $10^5$ Hz with an amplitude of 5 mV. The electrolyte temperatures for all tests were between 48 and 52 $^oC$. During the testing, the electrochemical systems were kept in a shielding box.

### *2.3. Characterization*

All of the SEM, EDS, and XRD test samples underwent accelerated corrosion by potentiostatic anodic oxidation for a more clear observation and analysis of the corrosion surface and corrosion products of aluminum. The anodization process used a two-electrode system with platinum as the cathode and an aluminum electrode after pre-treatment (polished, washed) as the anode. The stable potential (open circuit potential) at various concentrations was tested prior to the anodization. Based on the stable potential, the oxidation overpotential of 30 mV was increased to conduct accelerated corrosion experiments. The compositions of corrosion products were determined using a D8-Focus X-ray powder diffraction instrument with a Cu target. The scanning angle range was from 5 to 80 degrees, and the scan rate was 8° $min^{-1}$. SEM was performed using an SU8010 ultrahigh resolution field emission scanning electron microscope equipped with high performance X-ray energy dispersive spectroscopy (EDS).

## 3. RESULTS AND DISCUSSION

### *3.1. Different concentrations and pH of carbon dioxide solutions*

The concentrations and pH of the carbon dioxide solution at different ventilation times are shown in Table 1. For 0-30 min, as the ventilation time increased, the concentration of the carbon dioxide solution gradually increased and the pH gradually decreased. Until the ventilation time of 40 min, the concentration and pH of the carbon dioxide solution tended to be stable, indicating that the prepared

carbon dioxide solution was near saturation. The concentration of $HCO_3^-$ in the carbon dioxide solution was calculated according to formula (3), and the concentration of $HCO_3$ showed the same trend as the concentration of the carbon dioxide solution.

$$CO_2 + H_2O = H_2CO_3 \quad (1)$$

$$H_2CO_3 = H^+ + HCO_3^- \quad (2)$$

$$C(H^+) = C(HCO_3^{2-}) = \sqrt{C(CO_2)K_{a1}} \quad (3)$$

$$HCO_3^- = H^+ + CO_3^{2-} \quad (4)$$

**Table 1.** Concentration and pH of the carbon dioxide solution at different ventilation times

| Ventilation time of carbon dioxide solution (min) | Concentration of carbon dioxide solution (μmol $L^{-1}$) | pH | Calculated concentration of $HCO_3^-$ in electrolytes (μmol $L^{-1}$) |
|---|---|---|---|
| 0 | 0 | 6.12 | 0.76 |
| 10 | 345 | 5.76 | 1.74 |
| 20 | 535 | 5.37 | 4.27 |
| 30 | 750 | 4.67 | 21.38 |
| 40 | 850 | 4.36 | 43.65 |
| 50 | 886 | 4.35 | 44.67 |
| 60 | 876 | 4.35 | 44.67 |

According to the ionization reactions (1), (2) and (4) of carbon dioxide in water, $CO_2$, $H_2CO_3$ molecules, and $HCO_3^-$ and $CO_3^{2-}$ ions are present in the carbon dioxide solution. For the study of the corrosion mechanisms of aluminum in the carbon dioxide solution, the $CO_2$ and $H_2CO_3$ molecules and the $HCO_3^-$ and $CO_3^{2-}$ ions in the carbon dioxide solution should be analyzed. Examination of the equilibrium ionization constants shows that the second-order ionization constant ($Ka_2 = 4.7 \times 10^{-11}$) of carbonic acid is far weaker than the first-order ionization constant ($Ka_1 = 4.7 \times 10^{-7}$). Thus, there are more $HCO_3^-$ ions in the solution. Therefore, it is speculated that $HCO_3^-$ ions play a major role in inhibiting aluminum corrosion in the carbon dioxide solution.

### *3.2. Polarization curves*

The polarization curves of the aluminum electrodes are shown in Fig. 1. It is well known that the more positive the corrosion potential and the lower the corrosion current, the lower the aluminum corrosion rate [17, 18]. As the concentration of the carbon dioxide solution increased to 850 μmol $L^{-1}$, the corrosion potential of aluminum was gradually positively shifted, indicating that the corrosion of aluminum in the carbon dioxide solution was inhibited.

The data for the corrosion potential and the corrosion current density of the aluminum electrodes in the electrolytes are shown in Table 2. The corrosion current of aluminum in the carbon dioxide solution was lower than that in deionized water, indicating that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in deionized water. The lowest corrosion current density and the

most positive corrosion potential of aluminum were measured in the 850 μmol $L^{-1}$ carbon dioxide solution, indicating that the lowest corrosion rate of aluminum was obtained in the 850 μmol $L^{-1}$ carbon dioxide solution. Thus, injection of $CO_2$ into deionized water can reduce the corrosion of aluminum.

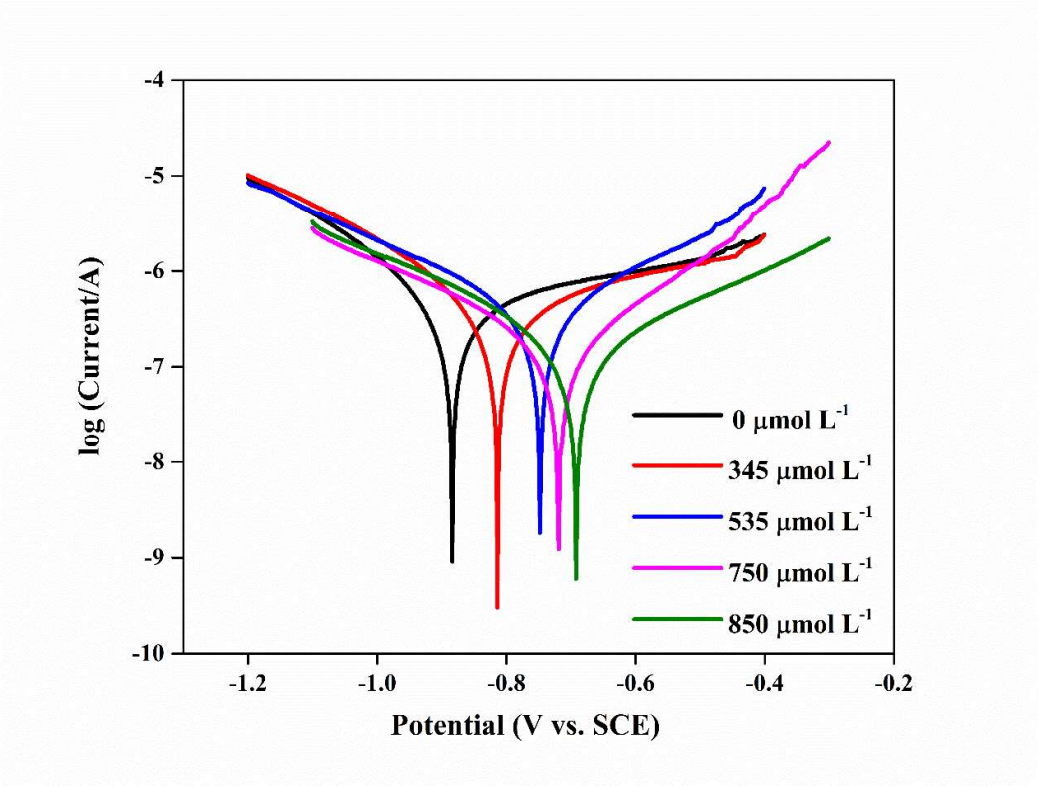


**Figure 1.** Polarization curves of aluminum in the carbon dioxide solution.

**Table 2.** Corrosion potential and current densities of aluminum in carbon dioxide solution at 50 °C.

| Concentration of carbon dioxide solution (μmol $L^{-1}$) | Corrosion potential (V) | Corrosion current density (nA $cm^{-2}$) | Anodic Tafel slope (V $dec^{-1}$) | Cathodic Tafel slope (V $dec^{-1}$) |
|---|---|---|---|---|
| 0 | -0.884 | 248.9 | 0.209 | -0.124 |
| 345 | -0.814 | 237.4 | 0.214 | -0.145 |
| 535 | -0.748 | 219.9 | 0.217 | -0.221 |
| 750 | -0.719 | 167.1 | 0.220 | -0.272 |
| 850 | -0.692 | 122.6 | 0.226 | -0.195 |

*3.3. EIS curves*

According to the analysis of the surface state of the aluminum electrode, contributions from charge transfer impedance due to the oxidation of aluminum, diffusion impedance of ions in the electrolyte, impedance of the electric double layer capacitor, and impedance of the cladding layer should be present. The EIS curves of the aluminum electrode in carbon dioxide solutions with different concentrations are shown in Fig. 2a. The Nyquist diagrams of aluminum corrosion in carbon dioxide solutions with different concentrations show similar plots consisting of a semicircle and a straight line.

The physical meaning of the semicircle diameter in the high-frequency region is the charge transfer impedance (Rct) during the etching process, and the charge transfer impedance reflects the corrosion resistance of the aluminum in the solution. The lower the charge transfer impedance, the lower the aluminum corrosion resistance [19-21]. The equivalent circuit diagram of the electrochemical impedance spectrum is shown in Fig. 2c.

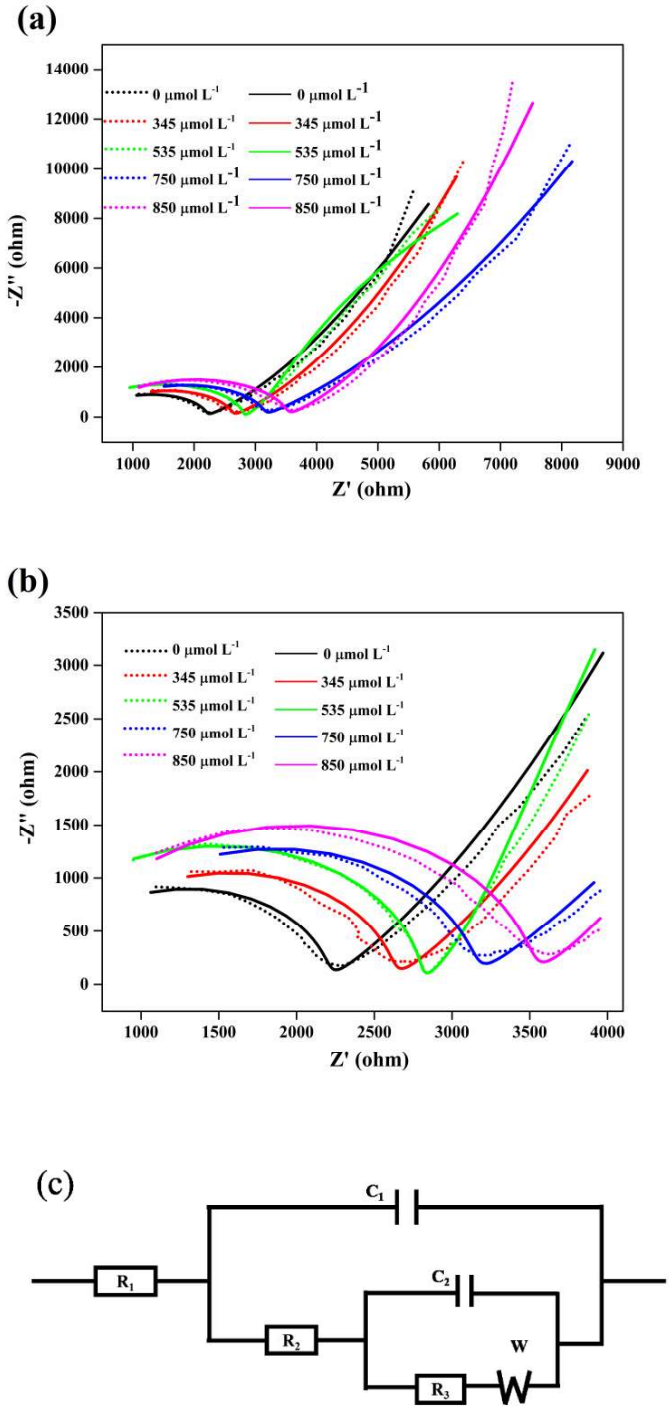


**Figure 2.** EIS curves (a), partially enlarged view of the curves (b), and their equivalent circuit model (c) for the aluminum electrodes in the carbon dioxide solutions at stable potential. The original data curves and the fitting curves are indicated by dotted and solid lines, respectively.

$R_1$ represents the resistance of the solution between the aluminum electrode and the reference electrode, $R_2$ represents the impedance of the electrolyte through the deposition layer, $R_3$ represents the charge transfer impedance for aluminum oxidation, $C_1$ represents the capacitance of the cladding layer, $C_2$ represents the capacitance of the double layer, and W represents the diffusion impedance of the ions in the electrolyte [22, 23].

**Table 3.** EIS parameters obtained by fitting the data to equivalent circuit model.

| Concentration (μmol $L^{-1}$) | $R_1$ (Ω) | $R_2$ (Ω) | $R_3$ ($10^{-6}$Ω) | $C_1$ ($10^{-9}$F) | $C_2$ ($10^{-6}$F) |
|---|---|---|---|---|---|
| 0 | 753.0 | 1773 | 25.82 | 1.709 | 4.346 |
| 345 | 706.5 | 2064 | 30.26 | 1.464 | 4.865 |
| 535 | 639.9 | 2615 | 33.83 | 1.233 | 9.418 |
| 750 | 552.2 | 2825 | 38.79 | 1.168 | 2.249 |
| 850 | 273.3 | 3068 | 39.93 | 1.449 | 5.173 |

The data for the corresponding numerical simulations of the equivalent circuit are shown in Table 3. As the concentration of the carbon dioxide solution increased to 850 μmol $L^{-1}$, the charge transfer resistance gradually increases, indicating that the corrosion resistance of aluminum gradually increases and that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in the deionized water. The highest charge transfer impedance was observed for the oxidation of aluminum in the 850 μmol $L^{-1}$ carbon dioxide solution. This result was consistent with the results of the polarization curves shown in Fig. 1.

### *3.4. SEM and EDS*

The surface morphologies of the aluminum electrode after corrosion in carbon dioxide solutions with different concentrations are shown in Fig. 3. Fig. 3b shows the presence of significant corrosion on the aluminum electrode surface in deionized water, with gullies, pores, and corrosion products observed. However, the corrosion of aluminum in the carbon dioxide solutions was relatively mild. Fig. 3c and 3d show that only small corrosion holes appeared on the electrode surface for the carbon dioxide solutions at the lower concentrations (345, 535 μmol $L^{-1}$). In Fig. 3e, and 3f, it is observed that the electrode surfaces were very smooth in the carbon dioxide solutions with higher concentrations (750, 850 μmol $L^{-1}$), and no obvious corrosion occurred.

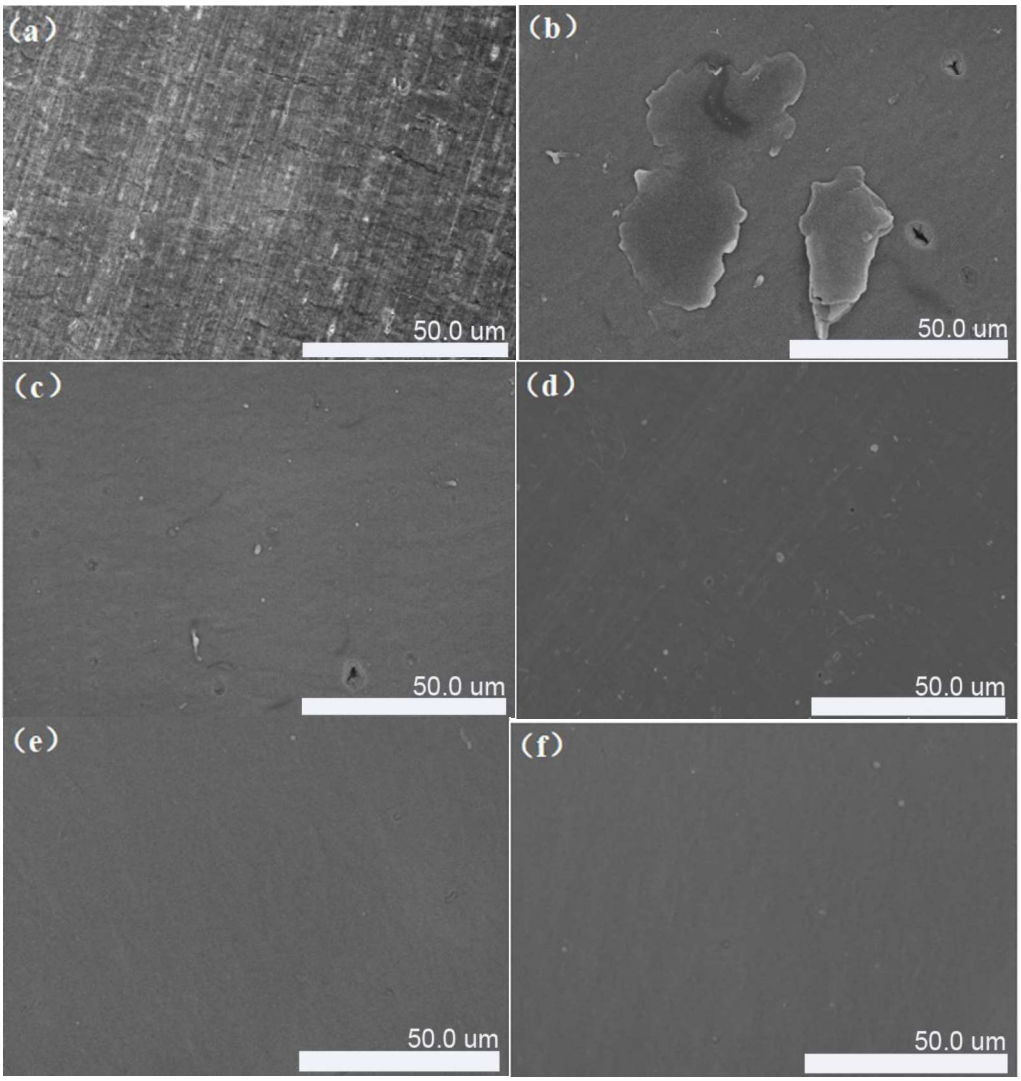


**Figure 3.** SEM images of the original aluminum (a) and the aluminum electrode surface in 0 μmol $L^{-1}$ (b), 345 μmol $L^{-1}$ (c), 535μmol $L^{-1}$ (d), 750 μmol $L^{-1}$ (e) , and 850 μmol $L^{-1}$ (f) carbon dioxide solution.

The SEM and EDS of the corrosion products of the aluminum electrode in deionized water and in the 850 μmol $L^{-1}$ carbon dioxide solution are shown in Fig. 4. It is observed from Figs. 4a and 4e that the corrosion of aluminum in deionized water was more severe and that more holes appeared. According to the EDS elemental diagram, the distributions of elements for the corrosion products in deionized water and in the 850 μmol $L^{-1}$ carbon dioxide solution were similar. Aluminum was uniformly distributed on the electrode surface, while oxygen was mainly concentrated in the corrosion products. The elemental contents of the corrosion products of the aluminum electrode in deionized water and in the 850 μmol $L^{-1}$ carbon dioxide solution are shown in Table 4. It was found that the corrosion products consisted mainly of aluminum and oxygen. The corrosion products of the aluminum electrode in deionized water and in the carbon dioxide solution should be consistent. The corrosion product of the aluminum electrode in the carbon dioxide solution did not develop either aluminum carbonate or aluminum hydrogen carbonate.

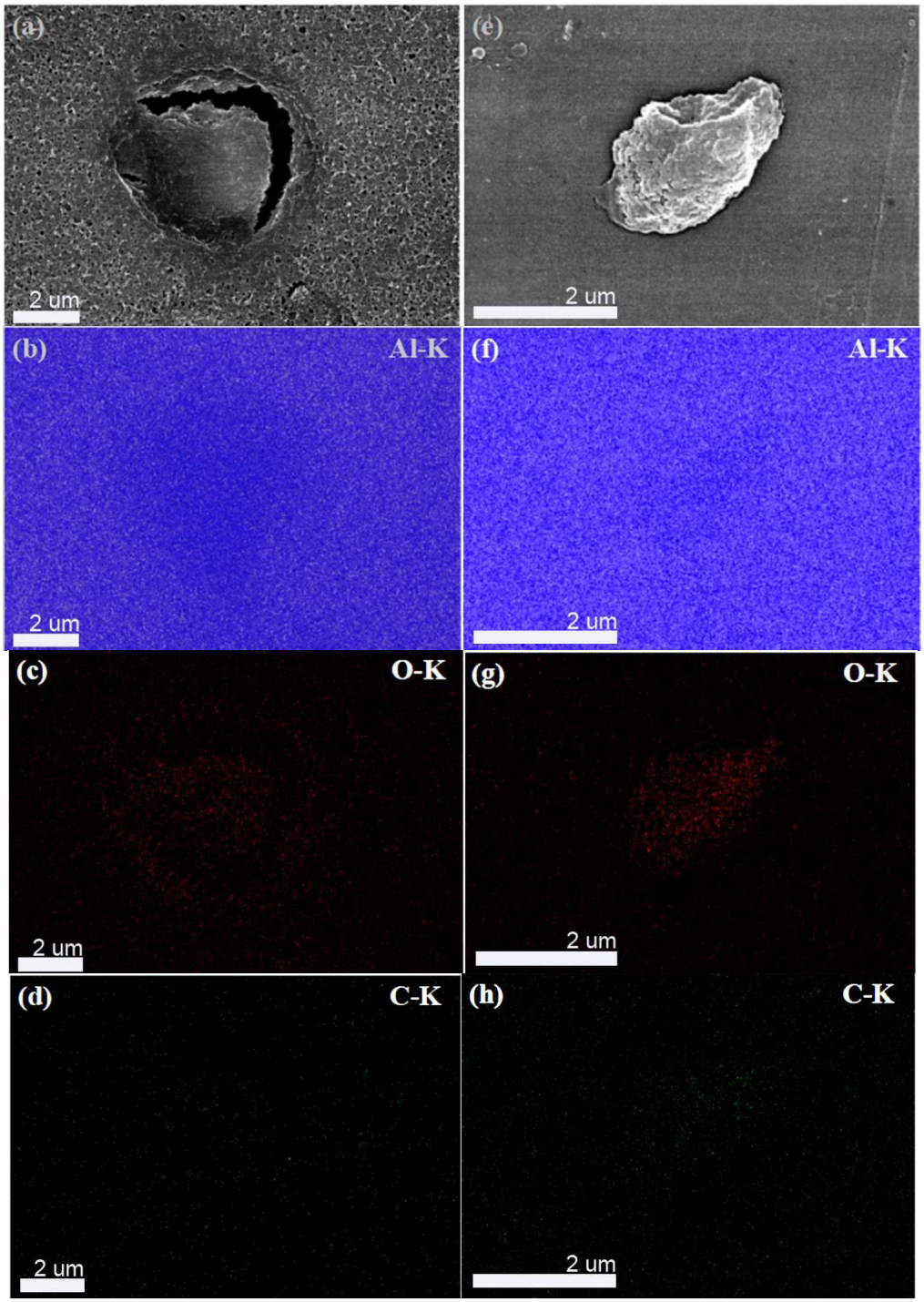


**Figure 4**. SEM images (a) and Al (b), O (c) and C (d) of EDS elemental analysis for corrosion products of aluminum in 0 μmol $L^{-1}$ carbon dioxide solution, and SEM images (e) and Al (f), O (g) and C (h) of EDS elemental analysis for the corrosion products of aluminum in the 850 μmol $L^{-1}$ carbon dioxide solution.

**Table 4.** Elemental contents obtained from the EDS analysis results presented in Figure 4.

| Concentration of carbon dioxide solution (μmol $L^{-1}$) | Al-K | | O-K | | C-K | |
|---|---|---|---|---|---|---|
| | *Wt %* | *At%* | *Wt %* | *At%* | *Wt %* | *At%* |
| 0 | 84.51 | 75.35 | 12.63 | 18.90 | 2.86 | 5.72 |
| 850 | 86.36 | 77.10 | 11.53 | 18.31 | 2.11 | 4.59 |

*3.5. XRD*

The XRD spectra of the corrosion products of the aluminum electrodes in carbon dioxide solutions with different concentrations are shown in Fig. 5. For all of the samples, four strong peaks are observed at 39°, 45°, 65°, and 78° that match well to Al (PDF#040-708). Two strong peaks observed at 25° and 63° also correspond well to $Al(OH)_3$(PDF#26-0025) and $Al_2O_3$ (PDF#33-0018), respectively. This indicates that the corrosion products of aluminum electrodes in the carbon dioxide solutions and the deionized water contained $Al(OH)_3$ and $Al_2O_3$. This was consistent with the corrosion products of aluminum in moist air [24, 25]. As the concentration of the carbon dioxide solution increased, the peaks of the $Al(OH)_3$ and $Al_2O_3$ corrosion products at 25° and 63° gradually weakened. The peak of the corrosion product in the 850 μmol $L^{-1}$ carbon dioxide solution almost disappeared. This indicated that the corrosion resistance of aluminum in the carbon dioxide solution was better than that in deionized water and that the lowest corrosion rate of aluminum was obtained in the 850 μmol $L^{-1}$ carbon dioxide solution.

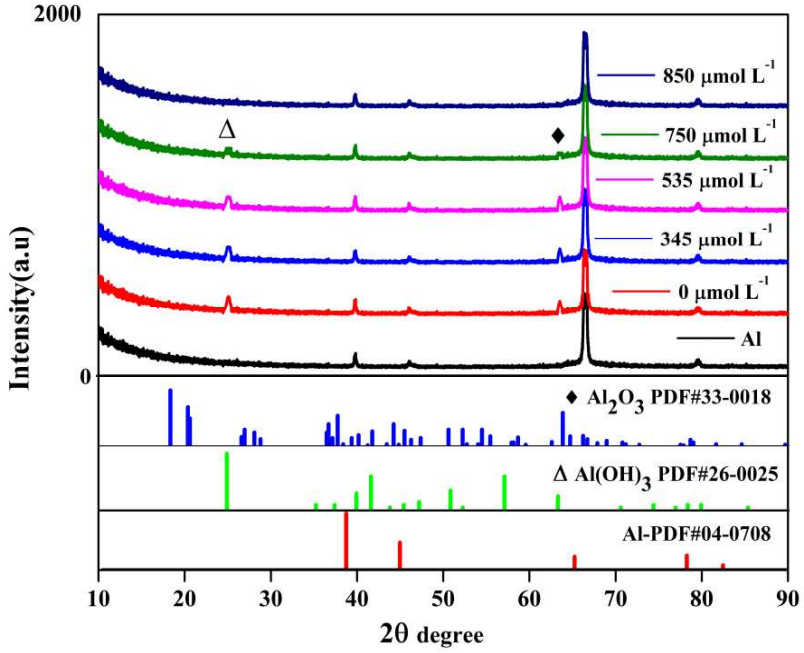


**Figure 5.** XRD spectrum of the corrosion products on the aluminum surface in the carbon dioxide solution.

### *3.6. Corrosion mechanism*

It is speculated that $HCO_3^-$ ions play a major role in inhibiting aluminum corrosion in carbon dioxide solutions. This paper mainly explores the origin for the inhibition of aluminum corrosion by $HCO_3^-$ ions.

According to the work of Lashgari [26], the following processes are involved in the aluminum corrosion phenomena: damage of oxide/passive film (hydroxylation process) [27, 28], anodic metallic dissolution, and proton reduction. The oxide films are often chemically unstable in aqueous media and dissolve gradually through the interaction with water molecules, corresponding to the so-called hydroxylation process. At the interface region, some particular anions such as $Cl^-$ [29, 30] can facilitate the hydroxylation process at the high energy surface active sites. However, $HCO_3^-$ anion is relatively large and is adsorbed at a long distance and brings fewer water molecules onto the surface-active sites. Therefore, $HCO_3^-$ ions inhibit aluminum corrosion based on suppressing the dissolution of the oxide film on the aluminum surface.

In the carbon dioxide electrolyte, $HCO_3^-$ generated by carbon dioxide ionization adsorbed on the aluminum surface, eliminating the electric field on the original Al surface. The layer of bicarbonate $HCO_3^-$ becomes electrostatically repulsive, reversing the charge in the oxide film layer for $OH^-$, which will suppress the deposition of aluminum on the surface. $HCO_3^-$ continuously gathers on the surface of the electrode to form a shielding layer, shielding the diffusion of aluminum ions in solution. The $Al^{3+}$ of the Helmholtz layer and the aluminum electrodes reach equilibrium of dissolution-precipitation. Because the continuous dissolution of aluminum is suppressed, aluminum corrosion is also suppressed.

## 4. CONCLUSIONS

The corrosion behavior of aluminum in weakly acidic carbon dioxide solution was studied. The electrolyte was simulated according to the working conditions of HVDC. The corrosion environment of aluminium was also special, such as high temperature, low conductivity and so on. Aluminum corrosion under these specific conditions was rarely reported. The results showed that compared to deionized water, the corrosion of aluminum in the carbon dioxide solution was suppressed. It was found that an aluminum electrode in the 0.84 μmol $L^{-1}$ carbon dioxide solution with pH 4.35 had the lowest corrosion rate as observed from its lowest corrosion current, the most positive corrosion potential, and the maximum charge transfer impedance. It was confirmed that $HCO_3^-$ plays a major role in inhibiting aluminum corrosion in carbon dioxide solutions. $HCO_3^-$ inhibited aluminum corrosion by inhibiting the dissolution of the oxide film on the aluminum surface and by electrostatic repulsion of $OH^-$ in solution.

This report focused on the primary reason for the grading electrodes scaling in HVDC valve cooling systems. It was elucidated that reducing the concentration of aluminum ions in the inner cooling water, in other words, inhibiting the corrosion of aluminum, is the fundamental means for solving the scaling problem of the grading electrode. This paper will provide guidance for the future application of aluminum in HCDC systems.

ACKNOWLEDGMENTS
This work was supported by the Programs of the China Southern Power Grid (CGYKJXM20180394, CGYKJXM20160094).

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I/7249/2019

Annexure-A.VI

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग
Power System Planning & Appraisal - I Division

सेवा में / To

| | | | |
|---|---|---|---|
| 1. | Chairperson,<br>Central Electricity Authority<br>Sewa Bhawan, R.K. Puram,<br>New Delhi – 110 066. | 2. | Member (Power System),<br>Central Electricity Authority<br>Sewa Bhawan, R.K. Puram,<br>New Delhi – 110 066. |
| 3. | Member (Economic & Commercial),<br>Central Electricity Authority<br>Sewa Bhawan, R.K. Puram,<br>New Delhi – 110 066. | 4. | Director (Trans)<br>Ministry of Power<br>Shram Shakti Bhawan,<br>New Delhi-110001. |
| 5. | Chief Operating Officer,<br>Central Transmission Utility<br>POWERGRID, Saudamini, Plot No. 2,<br>Sector-29, Gurgaon – 122 001. | 6. | Manoj Kumar Upadhyay<br>Deputy Adviser<br>NITI Aayog, Parliament Street,<br>New Delhi – 110 001. |
| 7. | Shri P. K. Pahwa,<br>Ex. Member (GO&D), CEA<br>428 C, Pocket -2,<br>Mayur Vihar, Phase -1, Delhi – 110091. | 8. | Shri Prabhakar Singh,<br>Ex. Director (Projects), POWERGRID<br>D 904, Tulip Ivory, Sector-70,<br>Gurgaon – 122 001. |

**Subject: 6th meeting of "National Committee on Transmission" (NCT) held on 30th September, 2019 – Minutes of Meeting**

Sir/Madam,

6th meeting of the "National Committee on Transmission" (NCT) was held on **30th September, 2019 at 3:30 pm** under the chairmanship of Shri P. S. Mhaske, Chairperson, CEA in conference Room of CEA (Chintan), 2nd Floor, Sewa Bhawan, R.K. Puram, New Delhi. Minutes of the meeting are available on CEA website http://www.cea.nic.in. (path to access: Home Page-Wing-Power System-PSPA I-National Committee on Transmission)

Yours faithfully,

18/10/2019.

(Goutam Roy)
Chief Engineer(PSPA-I) & Member Secretary (NCT)

MVAr MSC, 2x125 MVAr MSR at both Fatehgarh-II and Bhadla–II S/s for voltage stability.

4.3.4.2 NCT agreed with the proposal and recommended the following:

(a) Transmission scheme "Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase II –Part B1 (765/400/220 ICT augmentation at Fatehgarh II and Bhadla-II**)" may be considered for implementation through RTM route as it involves upgradation of substation /addition of transformation capacity in under implementation substation**.

(b) The completion schedule for scheme would be same as the completion schedule of the scheme "Transmission system strengthening for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase II –Part B"

(c) SECI to invite bids for setting up of Solar RE projects for the entire potential of 2.2 GW in Fatehgarh and 1.05 GW in Bhadla in similar time frame and ensure that entire capacity is bid out to avoid non-utilization of ISTS scheme.

**4.3.5 Name of the Scheme: Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase-II- Part C**

| Sl. No. | Scope of the Transmission Scheme | Capacity /km | Estimated Cost (in Rs Cr) |
|---|---|---|---|
| 1. | Establishment of 765/400 kV, 2x1500 MVA at Sikar – II with 400kV (1x125 MVAR) and 765 kV (2x330 MVAr) bus reactor<br><br>*Future provisions:*<br>*Space for-*<br>*765/400kV ICT along with bays -2*<br>*765 kV line bays along with switchable line reactors – 10*<br>*400 kV line bays along with switchable line reactor –6*<br>*400/220kV ICT along with bays -4*<br>*220kV bays -8*<br>*400kV bus reactor -2* | 765/400 kV, 1500 MVA ICT – 2<br>765/400 kV, 500 MVA spare single phase ICT-1<br><br>765 kV ICT bays – 2<br>400 kV ICT bays – 2<br>765 kV line bays –2<br>400 kV line bays- 2<br>125 MVAr, 420 kV bus reactor-1<br>420 kV reactor bay – 1<br>330 MVAr, 765 kV bus reactor- 2<br>765 kV reactor bay- 2<br>110 MVAR, 765 kV, 1 ph Reactor (spare unit) -1 | 322 |
| 2. | Bhadla-II PS – Sikar-II 765kV D/c line | Length- 310 km | 1452 |
| 3. | 2 no. of 765 kV line bays at Bhadla- II for Bhadla-II PS | 765 kV line bays –2 | 40 |

| | | | |
|---|---|---|---|
| | – Sikar-II 765kV D/c line | | |
| 4. | 1x330 MVAr switchable line reactor for each circuit at Sikar-II end of Bhadla-II PS – Sikar-II 765kV D/c line | 330MVAr, 765 kV reactor- 2<br><br>Switching equipment for 765 kV reactor - 2 | 62 |
| 5. | 1x240MVAr switchable line reactor for each circuit at Bhadla-II end of Bhadla-II PS – Sikar-II 765kV D/c line | 240MVAr, 765 kV reactor- 2<br><br>Switching equipment for 765 kV reactor - 2 | 50 |
| 6. | Sikar-II – Neemrana 400kV D/c line (Twin HTLS*) | Length-140 | 238 |
| 7. | 2 no. of 400 kV line bays at Neemrana for Sikar-II – Neemrana 400kV D/c line (Twin HTLS*) | 400 kV line bays- 2 | 18 |
| | | **Total** | **2182** |

**with minimum capacity of 2200 MVA on each circuit at nominal voltage*

Note:

i. *Powergrid to provide space for 2 no of 765 kV bays at Bhadla II and space for 2 no of switchable line reactors at Bhadla II substation*
ii. *Powergrid to provide space for 2 no of 400 kV bays each at Neemrana*
iii. *The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey*

4.3.5.1 CEA stated that the scheme "Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase II –Part C" has been planned to enable the evacuation of RE power from Ramgarh, Fatehgarh and Bhadla SEZs under phase II.

4.3.5.2 NCT agreed with the proposal and recommended the following:

**(a)** Transmission scheme "Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase II –Part C" **may be considered for implementation through TBCB route**

(b) SECI to invite bids for setting up of Solar RE projects for the entire potential of 1.9 GW in Ramgarh, 2.2 GW in Fatehgarh and 1.05 GW in Bhadla in similar time frame and ensure that entire capacity is awarded.

(e) The implementation time-frame of the transmission schemes associated with Ph-II of 66.5 GW RE integration is December' 2021. However, the implementation time-frame of the transmission scheme associated with solar RE projects in

# DIAMOND CROSSING CASE UPTO OCTOBER

| CODE | EVENT NO. | ELEMENT NAME | OUTAGE | | Classification/ Category Code | REASON OF OUTAGE |
|---|---|---|---|---|---|---|
| | | | DATE TIME | DATE TIME | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| N1PFTL1 | TBCB108 24022 | 765KV FATEHGARH_2-BHADLA_2 Ckt-I (PFTL) | 09-08-2024 18:19 | 10-08-2024 02:11 | LCSD | Shutdown for diamond arrangement of Earthwire and OPGW of ckt -1 & Ckt -2 with upcoming Ckt -3 & ckt -4. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.3(1,2,3) on page no 09. |
| N1PFTL1 | TBCB108 24030 | 765KV FATEHGARH_2-BHADLA_2 Ckt-I (PFTL) | 10-08-2024 17:33 | 12-08-2024 00:55 | LCSD | Shutdown for diamond arrangement of Earthwire and OPGW of ckt -1 & Ckt -2 with upcoming Ckt -3 & ckt -4. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.3(1,2,3) on page no 09. |
| N1PFTL2 | TBCB108 24023 | 765KV FATEHGARH_2-BHADLA_2 Ckt-II (PFTL) | 09-08-2024 18:19 | 10-08-2024 03:12 | LCSD | Shutdown for diamond arrangement of Earthwire and OPGW of ckt -1 & Ckt -2 with upcoming Ckt -3 & ckt -4. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.3(1,2,3) on page no 09. |
| N1PFTL2 | TBCB108 24031 | 765KV FATEHGARH_2-BHADLA_2 Ckt-II (PFTL) | 10-08-2024 17:34 | 12-08-2024 00:56 | LCSD | Shutdown for diamond arrangement of Earthwire and OPGW of ckt -1 & Ckt -2 with upcoming Ckt -3 & ckt -4. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.3(1,2,3) on page no 09. |
| N1PFTL1 | | 765 KV BHADLA_2 (PG)-FATEHGARH_II(PG) (PFTL) CKT-1 (PFTL) | 10-10-2024 17:00 | 10-10-2024 23:00 | LCSD | for Diamond crossing of OPGW between AP 2/0-3/0 to complete the commissioning work of upcoming 765 KV D/C Bhadla-II-Sikar-II line. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.5 on page no 11-12. |
| N1PFTL2 | | 765 KV BHADLA_2 (PG)-FATEHGARH_II(PG) (PFTL) CKT-2 (PFTL) | 10-10-2024 17:00 | 10-10-2024 23:00 | LCSD | for Diamond crossing of OPGW between AP 2/0-3/0 to complete the commissioning work of upcoming 765 KV D/C Bhadla-II-Sikar-II line. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.5 on page no 11-12. |
| N1PBTL1 | | 765 KV BHADLA_2 (PG)-FATEHGARH_II(PG) (PBTL) CKT-3 (PBTL) | 10-10-2024 17:00 | 10-10-2024 23:00 | LCSD | for Diamond crossing of OPGW between AP 2/0-3/0 to complete the commissioning work of upcoming 765 KV D/C Bhadla-II-Sikar-II line. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.5 on page no 11-12. |
| N1PBTL2 | | 765 KV BHADLA_2 (PG)-FATEHGARH_II(PG) (PBTL) CKT-4 (PBTL) | 10-10-2024 17:00 | 10-10-2024 23:00 | LCSD | for Diamond crossing of OPGW between AP 2/0-3/0 to complete the commissioning work of upcoming 765 KV D/C Bhadla-II-Sikar-II line. Approved in 6th NCT meeting dated 30.09.2019 vide MOM point no-4.3.5 on page no 11-12. |
| NR176528 | | 765 KV AJMER-BHADLA_2 (PG) CKT-1 (RTM) | 21-10-2024 17:33 | 22-10-2024 04:49 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |

# DIAMOND CROSSING CASE UPTO OCTOBER

| CODE | EVENT NO. | ELEMENT NAME | OUTAGE | | Classification/ Category Code | REASON OF OUTAGE |
|---|---|---|---|---|---|---|
| | | | DATE TIME | DATE TIME | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| NR176528 | | 765 KV AJMER-BHADLA_2 (PG) CKT-1 (RTM) | 22-10-2024 17:09 | 23-10-2024 05:33 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176528 | | 765 KV AJMER-BHADLA_2 (PG) CKT-1 (RTM) | 23-10-2024 17:23 | 24-10-2024 00:51 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176528 | | 765 KV AJMER-BHADLA_2 (PG) CKT-1 (RTM) | 24-10-2024 17:26 | 24-10-2024 23:04 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176529 | | 765 KV AJMER-BHADLA_2 (PG) CKT-2 (RTM) | 21-10-2024 17:33 | 22-10-2024 03:06 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176529 | | 765 KV AJMER-BHADLA_2 (PG) CKT-2 (RTM) | 22-10-2024 17:10 | 23-10-2024 05:10 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176529 | | 765 KV AJMER-BHADLA_2 (PG) CKT-2 (RTM) | 23-10-2024 17:25 | 24-10-2024 01:02 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176529 | | 765 KV AJMER-BHADLA_2 (PG) CKT-2 (RTM) | 24-10-2024 17:26 | 24-10-2024 23:10 | LCSD | for Diamond crossing of Earth wire as well as OPGW of 765kV D/C Ajmer- Bhadla 2 T/L at Tower number 218-219. Approved in 2nd NRSCT meeting dated 13.11.2018 vide MOM no.-2.3(v) & 2.3(xxi) on page no. 108 & 109. |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-1 | 26-10-2024 13:23 | 26-10-2024 21:04 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-1 | 27-10-2024 08:27 | 27-10-2024 20:15 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-1 | 28-10-2024 14:22 | 28-10-2024 20:24 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |

# DIAMOND CROSSING CASE UPTO OCTOBER

| CODE | EVENT NO. | ELEMENT NAME | OUTAGE | | Classification/ Category Code | REASON OF OUTAGE |
|---|---|---|---|---|---|---|
| | | | DATE TIME | DATE TIME | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-2 | 26-10-2024 13:28 | 26-10-2024 21:05 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-2 | 27-10-2024 08:27 | 27-10-2024 20:17 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |
| NR176530 | | 400 KV BASSI-SIKAR (PG) CKT-2 | 28-10-2024 14:23 | 28-10-2024 20:25 | LCSD | for Power Line overhead crossing work of upcoming Sikar II Bhadla II ckt 1 & 2. |

Annexure-B.II

| S.No. | Voltage Level | Name of Line | Circuit ID | Tower Configura | Line Length | O&M by | Agency at | | Type of conductor | Remarks | Replaced with Polymer Insulator (As a % of Total Line | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | End-I | End-II | | | | |
| **1. HVDC lines** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | ± 800kV | Agra-Bishwanath Chariali Pole-I | 1 | Bi-pole | 1728 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | HVDC capcacity 6000 MW, only two physical lines | Partial (11%) | |
| 2 | ± 800kV | Agra-Bishwanath Chariali Pole-II | 2 | Bi-pole | 1728 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 3 | ± 800kV | Agra-Alipurduar Pole-I | 1 | Bi-pole | 1296* | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 4 | ± 800kV | Agra-Alipurduar Pole-II | 2 | Bi-pole | 1296* | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 5 | ± 800kV | Kurukshetra-Champa Pole-I | 1 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | HVDC capcacity 6000 MW, only two physical lines | Partial (11%) | |
| 6 | ± 800kV | Kurukshetra-Champa Pole-II | 2 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 7 | ± 800kV | Kurukshetra-Champa Pole-III | 3 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 8 | ± 800kV | Kurukshetra-Champa Pole-IV | 4 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 9 | ± 500kV | Balia-Bhiwadi Pole-I | 1 | Bi-pole | 790 | POWERGRID | POWERGRID | POWERGRID | ACSR Quad Bersimis | HVDC capacity 2500 MW | Partial (15%) | |
| 10 | ± 500kV | Balia-Bhiwadi Pole-II | 2 | Bi-pole | 790 | POWERGRID | POWERGRID | POWERGRID | | | Partial (15%) | |
| 11 | ± 500kV | Rihand-Dadri Pole-I | 1 | Bi-pole | 815 | POWERGRID | POWERGRID | POWERGRID | ACSR Quad Bersimis | HVDC capacity 1500 MW | Partial (62%) | |
| 12 | ± 500kV | Rihand-Dadri Pole-II | 2 | Bi-pole | 815 | POWERGRID | POWERGRID | POWERGRID | | | Partial (43%) | |
| **B. Adani Power Ltd (Adani Transmission India Ltd.)** | | | | | | | | | | | | |
| 1 | ± 500kV | Adani Mundra - Mahindergarh Pole-I | 1 | Bi-pole | 990 | ATIL | APL Mundra | ATIL | ACSR Quad Bersimis | HVDC capacity 2500 MW | Partial (43%) | |
| 2 | ± 500kV | Adani Mundra - Mahindergarh Pole-II | 2 | Bi-pole | 990 | ATIL | APL Mundra | ATIL | | | Partial (43%) | |
| **2. 765kV Transmission Line** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 765kV | Agra-Aligarh | 1 | D/C | 123 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Agra-Gr. Noida at Aligarh (LILO portion | Polymer Insulator | |
| 2 | 765kV | Aligarh-Gr.Noida | 1 | D/C | 51 | POWERGRID | POWERGRID | WUPPTCL | Quad Bersimis | | Polymer Insulator | |
| 3 | 765kV | Agra-Fatehpur | 1 | S/C | 335 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 4 | 765kV | Agra-Fatehpur | 2 | S/C | 334 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 5 | 765kV | Agra-Jhatikara | 1 | S/C | 252 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 6 | 765kV | Ajmer-Chittorgarh | 1 | D/C | 211 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 7 | 765kV | Ajmer-Chittorgarh | 2 | D/C | 211 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 8 | 765kV | Ajmer-Bhadla II | 1 | D/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG) | Not Available | |
| 9 | 765kV | Ajmer-Bhadla II | 2 | D/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG) | Not Available | |
| 10 | 765kV | Balia - Lucknow765 (N) | 1 | S/C | 319 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 11 | 765kV | Bikaner - Bhadla | 1 | D/C | 167 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 12 | 765kV | Bikaner - Bhadla | 2 | D/C | 167 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 13 | 765kV | Bikaner- Moga | 1 | D/C | 367 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 14 | 765kV | Bikaner- Moga | 2 | D/C | 367 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 15 | 765kV | Bikaner-Bhadla II | 1 | D/C | 197 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG) | Not Available | |
| 16 | 765kV | Bikaner-Bhadla II | 2 | D/C | 197 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG) | Not Available | |
| 17 | 765kV | Kanpur(GIS)-Aligarh | 1 | D/C | 322 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Kanpur-Jhatikara at Aligarh | Polymer Insulator | |
| 18 | 765kV | Aligarh-Jhatikara | 1 | D/C | 158 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 19 | 765kV | Jhatikara-Bhiwani (PG) | 1 | S/C | 85 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 20 | 765kV | Koteshwar(PG)-Meerut | 1 | S/C | 176 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | Earlier charged at 400kV | Not Available | |
| 21 | 765kV | Koteshwar(PG)-Meerut | 2 | S/C | 176 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Not Available | |
| 22 | 765kV | Lucknow-Bareilly | 1 | S/C | 252 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 23 | 765kV | Meerut-Bhiwani(PG) | 1 | S/C | 174 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (99%) | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 765kV | Meerut-Gr.Noida | 1 | S/C | 119 | POWERGRID | POWERGRID | WUPPTCL | Quad Bersimis | Agra-Meerut LILOed at G. Noida by UPPTCL | Polymer Insulator | |
| 25 | 765kV | Moga- Bhiwani (PG) | 1 | S/C | 273 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (96%) | |
| 26 | 765kV | Moga-Meerut | 1 | S/C | 338 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 27 | 765kV | Orai-Aligarh | 1 | D/C | 331 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 28 | 765kV | Orai-Aligarh | 2 | D/C | 331 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 29 | 765kV | Phagi-Bhiwani(PG) | 1 | S/C | 272 | POWERGRID | RRVPNL | POWERGRID | Quad Bersimis | | Partial (18%) | |
| 30 | 765kV | Phagi-Bhiwani(PG) | 2 | S/C | 277 | POWERGRID | RRVPNL | POWERGRID | Quad Bersimis | | Partial (16%) | |
| 31 | 765kV | Varanasi-Balia | 1 | S/C | 166 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 32 | 765kV | Varanasi-Fatehpur | 1 | S/C | 223 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Gaya (ER)-Fatehpur at Varanasi | Conventional | |
| 33 | 765kV | Varanasi-Kanpur(GIS) | 1 | S/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| 34 | 765kV | Varanasi-Kanpur(GIS) | 2 | S/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| **B. PKTSL** | | | | | | | | | | | | |
| 1 | 765kV | Khetri-Jhatikara | 1 | D/C | 146 | PKTSL | PKTSL | POWERGRID | Hexa Zebra | | Not Available | |
| 2 | 765kV | Khetri-Jhatikara | 2 | D/C | 146 | PKTSL | PKTSL | POWERGRID | Hexa Zebra | | Not Available | |
| **C. PFTL** | | | | | | | | | | | | |
| 1 | 765kV | Fatehgarh II-Bhadla II | 1 | D/C | 186 | PFTL | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 2 | 765kV | Fatehgarh II-Bhadla II | 2 | D/C | 186 | PFTL | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| **D. FBTL** | | | | | | | | | | | | |
| 1 | 765kV | Fatehgarh II-Bhadla | 1 | D/C | 175 | FBTL | POWERGRID | POWERGRID | Hexa Zebra | Loop in of 400kV Fatehgarh (FBTL)- | Polymer Insulator | |
| 2 | 765kV | Fatehgarh II-Bhadla | 2 | D/C | 175 | FBTL | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| **E. BKTL** | | | | | | | | | | | | |
| 1 | 765kV | Bikaner-Khetri | 1 | D/C | 241 | BKTL | POWERGRID | PKTSL | Hexa Zebra | | Polymer Insulator | |
| 2 | 765kV | Bikaner-Khetri | 2 | D/C | 241 | BKTL | POWERGRID | PKTSL | Hexa Zebra | | Polymer Insulator | |
| **F. PAPTL** | | | | | | | | | | | | |
| 1 | 765kV | Ajmer-Phagi | 1 | D/C | 134 | PAPTL | POWERGRID | RRVPNL | Hexa Zebra | | Not Available | |
| 2 | 765kV | Ajmer-Phagi | 2 | D/C | 134 | PAPTL | POWERGRID | RRVPNL | Hexa Zebra | | Not Available | |
| **G. PASTL** | | | | | | | | | | | | |
| 1 | 765kV | Aligarh(PG)-SIKAR_2 | 1 | D/C | 265 | PASTL | PSTL | POWERGRID | Hexa Zebra | Anti theft charged from Aligarh(PG) Upto | Not Available | |
| 2 | 765kV | Aligarh(PG)-SIKAR_2 | 2 | D/C | 265 | PASTL | PSTL | POWERGRID | Hexa Zebra | | Not Available | |
| **STATE LINES** | | | | | | | | | | | | |
| **A. UPPTCL** | | | | | | | | | | | | |
| 1 | 765kV | Agra Fatehabad-Ghatampur | 1 | S/C | 229 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 2 | 765kV | Agra Fatehabad-Gr. Noida | 1 | S/C | 159 | UPPTCL | UPPTCL | UPPTCL | ACSR Quad Bersimis | | Not Available | |
| 3 | 765kV | Agra(Fatehbad)-Lalitpur | 1 | S/C | 337 | UPPTCL | UPPTCL | LPGCL | Quad Bersimis | | Not Available | |
| 4 | 765kV | Agra(Fatehbad)-Lalitpur | 2 | S/C | 335 | UPPTCL | UPPTCL | LPGCL | Quad Bersimis | | Not Available | |
| 5 | 765kV | AnparaC-AnparaD | 1 | S/C | 3 | UPPTCL | LANCO | UPRVUNL | Quad Bersimis | | Not Available | |
| 6 | 765kV | AnparaC-Unnao | 1 | S/C | 409 | UPPTCL | LANCO | UPPTCL | Quad Bersimis | | Conventional | AnparaB-Unnao shifted to AnparaC and charged at 765kV |
| 7 | 765kV | AnparaD-Obra_C | 1 | D/C | 53 | UPPTCL | UPRVUNL | UPPTCL | Quad Bersimis | After LILO of 765 KV ANPARA D-UNNAO LINE | Not Available | |
| 8 | 765kV | Obra_C-Unnao | 1 | D/C | 390 | UPPTCL | UPRVUNL | UPPTCL | Quad Bersimis | | Not Available | |
| 9 | 765kV | Bara-Mainpuri | 1 | S/C | 377 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 10 | 765kV | Gr. Noida-Meerut_PMSTL | 1 | S/C | 100 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | After LILO of 765 KV GREATER NOIDA | Not Available | |
| 11 | 765kV | Meerut_PMSTL-Hapur | 1 | S/C | 37 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 12 | 765kV | Gr. Noida-Jawaharpur | 1 | D/C | 162 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | After LILO of 765 KV MAINPURI(SEUPPTCL)- | Not Available | |
| 13 | 765kV | Jawaharpur-Mainpuri | 1 | D/C | 40 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 14 | 765kV | Hapur(UP)-Rampur_PRSTL (UP) | 1 | S/C | 230 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | LILO of 765kV Hapur-Ghatampur at Rampur. LILO portion is on D/C tower 2.5km 5towers | Not Available | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 765kV | Mainpuri(UP)-Hapur(UP) | 1 | S/C | 217 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| **B. RRVPNL** | | | | | | | | | | | | |
| 1 | 765kV | Anta-Phagi | 1 | S/C | 214 | RRVPNL | RRVPNL | RRVPNL | Quad Bersimis | | Not Available | |
| 2 | 765kV | Anta-Phagi | 2 | S/C | 212 | RRVPNL | RRVPNL | RRVPNL | Quad Bersimis | | Not Available | |
| **3. 765kV Transmission Line charged at 400kV** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 765kV charged at 400kV | Kishenpur-Moga | 1 | S/C | 275 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (1%) | |
| 2 | | Kishenpur-Moga | 2 | S/C | 287 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (1%) | |
| 3 | | Tehri-Koteshwar(PG) | 1 | S/C | 15 | POWERGRID | THDC | POWERGRID | Quad Bersimis | | Conventional | |
| 4 | | Tehri-Koteshwar(PG) | 2 | S/C | 17 | POWERGRID | THDC | POWERGRID | Quad Bersimis | | Conventional | |
| 5 | | Rihand-Vindhyachal Pool | 1 | S/C | 31 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Not Available | |
| 6 | | Rihand-Vindhyachal Pool | 2 | S/C | 31 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Not Available | |
| **4. 400kV HVAC Transmission Line** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 400kV | Abdullapur- Bawana | 1 | D/C | 167 | POWERGRID | POWERGRID | DTL | Triple Snowbird | | Partial (99%) | |
| 2 | 400kV | Abdullapur- Deepalpur | 1 | D/C | 141 | POWERGRID | POWERGRID | KT Jhajjar | Triple Snowbird | LILO of Abdullapur-Bawana one ckt at Deepalpur by Jhajjar KT | Partial (99%) | LILO of Abdullapur-Bawana one ckt at Deepalpur |
| 3 | 400kV | Abdullapur-Kurukshetra | 1 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird+Twin HTLS for LILO | LILO of Abdullapur-Sonipat line at Kurukshetra | Polymer Insulator | LILO of Abdullapur-Sonepat ckts at Kurukshetra |
| 4 | 400kV | Abdullapur-Kurukshetra | 2 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | | LILO of Abdullapur-Sonipat line at Kurukshetra | Polymer Insulator | |
| 5 | 400kV | Agra-Agra(Fatehbad) | 1 | S/C | 45 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of Agra(PG)-Agra(UP) ckt-2 at Fatehabad (765kV Agra UP) | Polymer Insulator | |
| 6 | 400kV | Agra(UP)-Agra(Fatehbad) | 1 | S/C | 56 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Polymer Insulator | |
| 7 | 400kV | Agra-Agra(UP) | 1 | D/C | 30 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 8 | 400kV | Agra-Ballabgarh | 1 | S/C | 181 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 9 | 400kV | Agra-Bassi | 1 | S/C | 211 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | Planned for insulator replacement in 321nos towers under NR3 |
| 10 | 400kV | Agra-Bhiwadi | 1 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 11 | 400kV | Agra-Bhiwadi | 2 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 12 | 400kV | Agra-Jaipur South | 1 | D/C | 254 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Partial (4%) | LILO of Agra-Bassi D/C at Jaipur South |
| 13 | 400kV | Agra-Jaipur South | 2 | D/C | 254 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Partial (4%) | |
| 14 | 400kV | Agra-Sikar | 1 | D/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | |
| 15 | 400kV | Agra-Sikar | 2 | D/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | |
| 16 | 400kV | Ajmer-Ajmer(PG) | 1 | D/C | 66 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 17 | 400kV | Ajmer-Ajmer(PG) | 2 | D/C | 66 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 18 | 400kV | Allahabad-Fatehpur | 3 | S/C | 154 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Allahabad-Kanpur one ckt at Fatehpur | Polymer Insulator | |
| 19 | 400kV | Allahabad-Fatehpur | 1 | D/C | 140 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur | Conventional | |
| 20 | 400kV | Allahabad-Fatehpur | 2 | D/C | 140 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur | Conventional | |
| 21 | 400kV | Allahabad-Varanasi | 1 | D/C | 99 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Allahabad-Sarnath shifted from Sarnath to varanasi | Conventional | |
| 22 | 400kV | Allahabad-Kanpur | 1 | S/C | 225 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 23 | 400kV | Allahabad-Kanpur(New 765) | 1 | D/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 24 | 400kV | Allahabad-Kanpur(New 765) | 2 | D/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 25 | 400kV | Allahabad-Meja(NTPC) | 1 | D/C | 28 | POWERGRID | POWERGRID | MUNPL | Twin Moose | | Polymer Insulator | MUNPL is joint venture between NTPC and UPRVUN |
| 26 | 400kV | Allahabad-Meja(NTPC) | 2 | D/C | 28 | POWERGRID | POWERGRID | MUNPL | Twin Moose | | Polymer Insulator | |

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| 27 | 400kV | Amritsar-Jalandhar | 1 | S/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 28 | 400kV | Amritsar-Jalandhar | 2 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of 400kV Amritsar-Hamirpur at Jalandhar |
| 29 | 400kV | Amritsar-ParbatiPooling (Banala) | 1 | D/C | 251 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (49%) | |
| 30 | 400kV | Auraiya-Agra | 1 | D/C | 166 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Partial (86%) | |
| 31 | 400kV | Auraiya-Agra | 2 | D/C | 166 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Partial (90%) | |
| 32 | 400kV | Baglihar II-Kishenpur | 1 | S/C | 130 | POWERGRID | JKSPDCL | POWERGRID | Twin Moose | LILO of 400kV Kishenpur-New Wanpoh ckt-2 at Baglihar. LILO portion is of JK PDD | Conventional | |
| 33 | 400kV | Baghlihar II-New Wanpoh | 1 | S/C | 130 | POWERGRID | JKSPDCL | POWERGRID | Twin Moose | | Not Available | |
| 34 | 400kV | Bagpat-Kaithal | 1 | D/C | 154 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 35 | 400kV | Bagpat-Kaithal | 2 | D/C | 154 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 36 | 400kV | Bagpat-Saharanpur | 1 | D/C | 121 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (41%) | |
| 37 | 400kV | Bagpat-Dehradun | 1 | D/C | 165 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (40%) | |
| 38 | 400kV | Bahadurgarh-Kabulpur | 1 | S/C | 42 | POWERGRID | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | LILO of Bahadurgarh-Bhiwani at Kabulpur |
| 39 | 400kV | Bahadurgarh-Sonepat | 1 | D/C | 53 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 40 | 400kV | Bahadurgarh-Sonepat | 2 | D/C | 53 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 41 | 400kV | Balia-Mau | 1 | D/C | 9 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 42 | 400kV | Balia-Sohawal | 1 | D/C | 229 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Balia-LUCKNOW D/C at Sohawal | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 43 | 400kV | Balia-Sohawal | 2 | D/C | 229 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Balia-LUCKNOW D/C at Sohawal | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 44 | 400kV | Ballabgarh-Tughlakabad | 1 | M/C | 40 | DTL | POWERGRID | POWERGRID | HTLS INVAR (LILO portion) & Bersimis (before LILO) | Tower is quad circuit tower | Polymer | |
| 45 | 400kV | Ballabgarh-Tughlakabad | 2 | M/C | 40 | DTL | POWERGRID | POWERGRID | | Tower is quad circuit tower | Polymer | |
| 46 | 400kV | Ballabhgarh-Gurgaon | 1 | S/C | 43 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 47 | 400kV | Ballabhgarh-Maharanibagh | 1 | D/C | 61 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | Bypassed at Maharanibagh to form Dadri-Ballabgarh | Polymer Insulator | |
| 48 | 400kV | Ballabhgarh-Nawada | 1 | D/C | 13 | POWERGRID | POWERGRID | HVPNL | Quad Bersimis | | Polymer Insulator | Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana) |
| 49 | 400kV | Bareilly PG-Moradabad | 1 | D/C | 93 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Partial (3%) | |
| 50 | 400kV | Bareilly PG-Rampur_PRSTL | 1 | S/C | 40 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL) | Not Available | |
| 51 | 400kV | Rampur_PRSTL-Moradabad | 1 | S/C | 57 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL) | Not Available | |
| 52 | 400kV | Bareilly PG-Bareilly (765kV) | 1 | D/C | 2 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Conventional | |
| 53 | 400kV | Bareilly PG-Bareilly (765kV) | 2 | D/C | 2 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Conventional | |

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| 54 | 400kV | Bareilly PG(765kV)-Kashipur | 1 | D/C | 101 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (90%) | |
| 55 | 400kV | Bareilly PG(765kV)-Kashipur | 2 | D/C | 101 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (90%) | |
| 56 | 400kV | Bassi-Bhiwadi | 2 | S/C | 220 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 57 | 400kV | Bassi-Heerapura | 1 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Polymer Insulator | |
| 58 | 400kV | Bassi-Heerapura | 2 | D/C | 49 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Polymer Insulator | |
| 59 | 400kV | Bassi-Kotputli | 1 | S/C | 106 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 60 | 400kV | Bassi-Phagi | 1 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Quad Moose | | Partial (26%) | |
| 61 | 400kV | Bassi-Phagi | 2 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Quad Moose | | Partial (26%) | |
| 62 | 400kV | Bassi-Sikar | 1 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (16%) | |
| 63 | 400kV | Bassi-Sikar | 2 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (17%) | |
| 64 | 400kV | Bawana(CCGT)-Bahadurgarh | 1 | D/C | 49 | POWERGRID | DTL/Pragati CCGT | POWERGRID | Twin Moose | | Polymer Insulator | |
| 65 | 400kV | Bhadla-Bhadla(PG) | 1 | D/C | 27 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 66 | 400kV | Bhadla-Bhadla(PG) | 2 | D/C | 27 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 67 | 400kV | Bhadla-Bhadla II | 1 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS+Hexa Zebra | 48.309KM Twin HTLS conductor of POWERGRID and 3.73 KM HEXA Zebra of FBTL | Not Available | |
| 68 | 400kV | Bhadla-Bhadla II | 2 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS+Hexa Zebra | | Not Available | |
| 69 | 400kV | Bhinmal-Kankroli | 1 | D/C | 202 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Bhinmal to form 400kV Kankroli Zerda ckt-2 | Polymer Insulator | |
| 70 | 400kV | Bhiwadi-Gurgaon | 1 | S/C | 83 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 71 | 400kV | Bhiwadi-Hissar | 1 | S/C | 212 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 72 | 400kV | Bhiwadi-Hissar | 2 | D/C | 144 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bhiwadi-Moga both ckts at Hisar |
| 73 | 400kV | Bhiwadi-Hissar | 3 | D/C | 144 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 74 | 400kV | Bhiwadi-NeemranaPG | 1 | D/C | 48 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 75 | 400kV | Bhiwadi-NeemranaPG | 2 | D/C | 48 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 76 | 400kV | Bhiwani BBMB - Hissar | 1 | S/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Bhiwani BBMB-Fatehabad | Polymer Insulator | |
| 77 | 400kV | Bhiwani (PG) - Hissar | 1 | S/C | 64 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Moga-Bhiwani(PG) | Polymer Insulator | LILO of Bawana-Hisar (132KM) at Bhiwani PG |
| 78 | 400kV | Bhiwani (PG) - Hissar | 2 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Bhiwani(PG) to form Mahindergarh(ATIL) | Polymer Insulator | |
| 79 | 400kV | Bhiwani (PG) - Hissar | 3 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 80 | 400kV | Bhiwani PG - Jind | 1 | D/C | 82 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 81 | 400kV | Bhiwani PG - Jind | 2 | D/C | 82 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 82 | 400kV | Bhiwani PG- BawanaCCGT | 1 | D/C | 97 | POWERGRID | POWERGRID | DTL/ CCGT | Twin Moose | | Polymer Insulator | LILO of Bawana-Hisar (132KM) at Bhiwani PG |
| 83 | 400kV | Bhiwani PG- Bhiwani BBMB | 1 | S/C | 34 | POWERGRID | POWERGRID | BBMB | Twin Moose | | Polymer Insulator | LILO of Bhiwani (BBMB)- Bahadurgarh (84km) at Bhiwani (PG) |
| 84 | 400kV | Bhiwani PG-Kabulpur | 1 | S/C | 48 | POWERGRID | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | LILO of Bahadurgarh-Bhiwani at Kabulpur |
| 85 | 400kV | Bikaner_2 (PBTSL)-Bikaner(PG) | 1 | D/C | 43 | POWERGRID | PBTSL | POWERGRID | Quad Moose | | Not Available | |
| 86 | 400kV | Bikaner_2 (PBTSL)-Bikaner(PG) | 2 | D/C | 43 | POWERGRID | PBTSL | POWERGRID | Quad Moose | | Not Available | |
| 87 | 400kV | Chamba pool - Jalandhar | 1 | D/C | 162 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (48%) | |
| 88 | 400kV | Chamba pool - Jalandhar | 2 | D/C | 162 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (48%) | |
| 89 | 400kV | Chamera-II - Chamba Pool | 1 | S/C | 0.38 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | Two tower is S/C and one tower is D/C |
| 90 | 400kV | Chamera-II-Chamera-I | 1 | S/C | 36 | POWERGRID | NHPC | NHPC | Twin Moose | | Conventional | |
| 91 | 400kV | Chamera-II-Kishenpur | 1 | S/C | 135 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | |

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| 92 | 400kV | Chamera-I-Jalandhar | 1 | D/C | 152 | POWERGRID | NHPC | POWERGRID | Twin ACAR | | Partial (43%) | |
| 93 | 400kV | Chamera-I-Jalandhar | 2 | D/C | 152 | POWERGRID | NHPC | POWERGRID | Twin ACAR | | Partial (43%) | |
| 94 | 400kV | Chittorgarh-Chittorgarh(PG) | 1 | D/C | 49 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 95 | 400kV | Chittorgarh-Chittorgarh(PG) | 2 | D/C | 49 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 96 | 400kV | Chittorgarh-Kankroli | 1 | D/C | 71 | POWERGRID | RRVPNL | POWERGRID | Twin Moose | | Polymer Insulator | LILO of 400 kV Rapp C-Kankroli at Chhitorgarh |
| 97 | 400kV | Dadri NCTPP-G. Noida | 1 | D/C | 13 | POWERGRID | NTPC | UPPCL | Quad Bersimis | | Polymer Insulator | |
| 98 | 400kV | Dadri NCTPP-Maharanibagh | 1 | D/C | 54 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | Bypassed at Maharanibagh to form Dadri-Ballabgarh | Polymer Insulator | |
| 99 | 400kV | Dadri NCTPP-Kaithal | 1 | S/C | 213 | POWERGRID | NTPC | POWERGRID | Twin Moose | LILO of Dadri-Malerkotla at Kaithal | Polymer Insulator | |
| 100 | 400kV | Dadri NCTPP-Mandola | 1 | D/C | 46 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 101 | 400kV | Dadri NCTPP-Mandola | 2 | D/C | 46 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 102 | 400kV | Dadri NCTPP-Muradnagar New | 1 | S/C | 33 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Polymer Insulator | Line shifted from Muradnagar to Muradnagar New (UPPTCL) |
| 103 | 400kV | Dadri NCTPP-Panipat | 1 | S/C | 112 | POWERGRID | NTPC | BBMB | Twin Moose | | Polymer Insulator | |
| 104 | 400kV | Dadri NCTPP-Panipat | 2 | S/C | 117 | POWERGRID | NTPC | BBMB | Twin Moose | | Polymer Insulator | |
| 105 | 400kV | Deepalpur-Bawana | 1 | D/C | 26 | POWERGRID | KT-Jhajjar | DTL | Triple Snowbird | LILO of 400kV Bawana-Abdullapur one circuit at Deepalpur by Jhajjar KT | Polymer Insulator | |
| 106 | 400kV | Dehradun-Abdullapur | 1 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 107 | 400kV | Dehradun-Abdullapur | 2 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 108 | 400kV | Dulhasti-Kishenpur | 1 | S/C | 120 | POWERGRID | NHPC | POWERGRID | Quad Moose | | Conventional | |
| 109 | 400kV | Dulhasti-Kishenpur | 2 | S/C | 120 | POWERGRID | NHPC | POWERGRID | Quad Moose | | Conventional | |
| 110 | 400kV | Dwarka-Jhatikara | 1 | S/C | 18 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | After LILO of 400kV Jhatikara-Bamnoli-I at Dwarka(PG) | Not Available | |
| 111 | 400kV | Dwarka-Bamnauli | 1 | S/C | 10 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 112 | 400kV | Fatehbad PG-Hissar | 1 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Bhiwani BBMB-Fatehabad | Polymer Insulator | |
| 113 | 400kV | Fatehpur-Kanpur | 1 | S/C | 100 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Kanpur to form Fatehpur-Panki | Polymer Insulator | LILO of Singrauli-Kanpur at Fatehpur |
| 114 | 400kV | Fatehpur-Kanpur | 2 | S/C | 107 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (64%) | LILO of Allahabad-Kanpur one ckt at Fatehpur |
| 115 | 400kV | Kanpur-Panki | 1 | S/C | 6 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | Bypassed at Kanpur to form Fatehpur-Panki | Polymer Insulator | |
| 116 | 400kV | Kanpur-Panki | 2 | S/C | 6 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 117 | 400kV | Fatehpur-Mainpuri | 1 | D/C | 260 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur<br>Series compensated line (Degree of comp. - 40%) |
| 118 | 400kV | Fatehpur-Mainpuri | 2 | D/C | 260 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 119 | 400kV | G.Noida-Nawada | 1 | D/C | 30 | POWERGRID | UPPTCL | HVPNL | Quad Bersimis | Lilo of Ballabgarh-G.Noida at Nawada | Polymer Insulator | Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana) |
| 120 | 400kV | Gorakhpur PG-Gorakhpur UP | 1 | D/C | 46 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Polymer Insulator | Partial Planning has been completed |
| 121 | 400kV | Gorakhpur PG-Gorakhpur UP | 2 | D/C | 46 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Polymer Insulator | Partial Planning has been completed |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 122 | 400kV | Gorakhpur PG-Lucknow PG | 1 | D/C | 264 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | At crossing |
| 123 | 400kV | Gorakhpur PG-Lucknow PG | 2 | D/C | 264 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | At crossing |
| 124 | 400kV | Gorakhpur PG-Basti (UP) | 1 | D/C | 117 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Gorakhpur PG-Lucknow PG ckt-4 at Basti (UP). LILO portion is of UP | Not Available | |
| 125 | 400kV | Gorakhpur PG-Basti (UP) | 2 | D/C | 108 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Gorakhpur-3 at Basti. LILO portion is of UP | Not Available | |
| 126 | 400kV | Basti (UP)-Lucknow PG | 1 | D/C | 204 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 127 | 400kV | Gurgaon-Sohna Road | 1 | D/C | 7 | POWERGRID | POWERGRID | GPTL | Quad Moose | LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL | Not Available | |
| 128 | 400kV | Gurgaon-Sohna Road | 2 | D/C | 7 | POWERGRID | POWERGRID | GPTL | Quad Moose | | Not Available | |
| 129 | 400kV | Hamirpur-ParbatiPooling (Banala) | 1 | D/C | 77 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Amritsar-Banala-1 at Hamirpur |
| 130 | 400kV | Jaipur South-Bassi | 1 | D/C | 37 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Polymer Insulator | LILO of Agra-Bassi D/C at Jaipur South |
| 131 | 400kV | Jaipur South-Bassi | 2 | D/C | 37 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Polymer Insulator | |
| 132 | 400kV | Jaipur South-Kota | 1 | D/C | 180 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 133 | 400kV | Jaipur South-RAPP D | 1 | D/C | 228 | POWERGRID | POWERGRID | NPCIL | Twin Moose | | Not Available | |
| 134 | 400kV | Jalandhar-Nakodar | 1 | D/C | 42 | POWERGRID | POWERGRID | PSTCL | Quad Moose | | Polymer Insulator | |
| 135 | 400kV | Jalandhar-Hamirpur | 1 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (43%) | LILO of 400kV Amritsar-Hamirpur at Jalandhar |
| 136 | 400kV | Kaithal-Hissar | 1 | D/C | 113 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | LILO of Patiala-Hissar at Kaithal | |
| 137 | 400kV | Kaithal-Hissar | 2 | D/C | 113 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | LILO of Patiala-Hissar at Kaithal | |
| 138 | 400kV | Kaithal-Malerkotla | 1 | S/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 139 | 400kV | Kankroli-Jodhpur | 1 | S/C | 188 | POWERGRID | POWERGRID | RRVPNL | Twin HTLS | | Conventional | |
| 140 | 400kV | Kanpur-Agra | 1 | S/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 141 | 400kV | Kanpur-Auraiya | 1 | D/C | 73 | POWERGRID | POWERGRID | NTPC | Twin Moose | | Conventional | |
| 142 | 400kV | Kanpur-Auraiya | 2 | D/C | 73 | POWERGRID | POWERGRID | NTPC | Twin Moose | | Conventional | |
| 143 | 400kV | Kanpur-Ballabgarh | 1 | S/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 144 | 400kV | Kanpur-Ballabgarh | 2 | D/C | 371 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 145 | 400kV | Kanpur-Ballabgarh | 3 | D/C | 371 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 146 | 400kV | Kanpur-Kanpur(GIS) | 1 | D/C | 21 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 147 | 400kV | Kanpur-Kanpur(GIS) | 2 | D/C | 21 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 148 | 400kV | Kanpur(GIS)-Lucknow(765) | 1 | D/C | 160 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 149 | 400kV | Kanpur(GIS)-Lucknow(765) | 2 | D/C | 160 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 150 | 400kV | Kishenpur-NewWanpoh | 1 | D/C | 130 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 151 | 400kV | Kishenpur-NewWanpoh | 3 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 152 | 400kV | Kishenpur-NewWanpoh | 4 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 153 | 400kV | Kishenpur-Samba | 1 | D/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 154 | 400kV | Kishenpur-Samba | 2 | D/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 155 | 400kV | Kota-Merta | 1 | D/C | 256 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 156 | 400kV | Kotputli-Bhiwadi | 1 | S/C | 132 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bassi-Bhiwadi-2 at Kotputli |
| 157 | 400kV | Kurukshetra-Jind | 1 | D/C | 103 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 158 | 400kV | Kurukshetra-Jind | 2 | D/C | 103 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 159 | 400kV | Kurukshetra-Sonipat | 1 | D/C | 125 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird (Twin HTLS for LILOportion) | LILO of Abdullapur-Sonipat line at Kurukshetra | Partial (99%) | LILO of Abdullapr-Sonipat ckts at |
| 160 | 400kV | Kurukshetra-Sonipat | 2 | D/C | 125 | POWERGRID | POWERGRID | POWERGRID | | | Partial (99%) | |
| 161 | 400kV | Kurukshetra(PG)-Dhanansu(PS) | 1 | D/C | 165 | POWERGRID | POWERGRID | PSTCL | Quad Moose | LILO of 400kv Kurukshetra-Jalandhar (LILO portion is of | Polymer Insulator | LILO portion to be checked |
| 162 | 400kV | Dhanansu(PS)-Jalandhar(PG) | 1 | D/C | 106 | POWERGRID | PSTCL | POWERGRID | Quad Moose | | Polymer Insulator | |
| 163 | 400kV | Kurukshetra-Nakodar | 1 | D/C | 234 | POWERGRID | POWERGRID | PSTCL | Quad Moose | | Polymer Insulator | |
| 164 | 400kV | Lucknow-Basti | 1 | D/C | 203 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 165 | 400kV | Lucknow-Basti | 2 | D/C | 203 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 166 | 400kV | Lucknow PG-Lucknow UP | 1 | S/C | 63 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 167 | 400kV | Lucknow PG-Unnao | 1 | D/C | 74 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 168 | 400kV | Lucknow PG-Unnao | 2 | D/C | 74 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 169 | 400kV | Lucknow UP-Bareilly PG | 1 | S/C | 279 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | | Conventional | |
| 170 | 400kV | 765 Lucknow (PG) - Lucknow (PG) | 1 | D/C | 3 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 171 | 400kV | 765 Lucknow (PG) - Lucknow (PG) | 2 | D/C | 3 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 172 | 400kV | LucknowPG-Sohawal | 1 | D/C | 98 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 173 | 400kV | LucknowPG-Sohawal | 2 | D/C | 98 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 174 | 400kV | Lucknow PG-Shahjahanpur | 1 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (10%) | |
| 175 | 400kV | Lucknow PG-Shahjahanpur | 2 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (10%) | |
| 176 | 400kV | Lucknow-Jehta | 1 | D/C | 32 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of | Not Available | |
| 177 | 400kV | Lucknow-Jehta | 2 | D/C | 32 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 178 | 400kV | Ludhiana-Jalandhar | 1 | S/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 179 | 400kV | Ludhiana-Malerkotla | 1 | S/C | 36 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 180 | 400kV | Ludhiana-Patiala | 1 | D/C | 76 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 181 | 400kV | Ludhiana-Patiala | 2 | D/C | 76 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 182 | 400kV | Mainpuri-Ballabgarh | 1 | D/C | 236 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 183 | 400kV | Mainpuri-Ballabgarh | 2 | D/C | 236 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 184 | 400kV | Malerkotla-Patiala | 1 | S/C | 62 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 185 | 400kV | Manesar- Sohna Road | 1 | D/C | 17 | POWERGRID | POWERGRID | GPTL | Quad Moose | LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL | Not Available | |
| 186 | 400kV | Manesar- Sohna Road | 2 | D/C | 17 | POWERGRID | POWERGRID | GPTL | Quad Moose | | Not Available | |
| 187 | 400kV | Mandola-Maharanibagh | 1 | D/C (LILO towers are M/C) | 29 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | After LILO of 400KV Mandola-Bawana D/C Lines at 400KV Maharanibagh(PG) | Not Available | |
| 188 | 400kV | Mandola-Maharanibagh | 2 | D/C (LILO towers are M/C) | 29 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | | Not Available | |
| 189 | 400kV | Maharanibagh-Bawana | 1 | D/C | 29 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 190 | 400kV | Maharanibagh-Bawana | 2 | D/C | 29 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 191 | 400kV | Meerut-Bagpat | 1 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 192 | 400kV | Meerut-Bagpat | 2 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 193 | 400kV | Meerut-Mandola | 1 | D/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 194 | 400kV | Meerut-Mandola | 2 | D/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 195 | 400kV | Meerut-Muzzafarnagar | 1 | S/C | 37 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 196 | 400kV | Moga-Fatehabad | 1 | D/C | 179 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 197 | 400kV | Moga-Hissar | 1 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Moga-Bhiwani(PG) | Polymer Insulator | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 198 | 400kV | Moga-Hissar | 2 | D/C | 206 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bhiwadi-Moga both ckts at Hisar |
| 199 | 400kV | Moga-Hissar | 3 | D/C | 206 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 200 | 400kV | Moga-Jalandhar | 1 | D/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin ACAR | | Polymer Insulator | |
| 201 | 400kV | Moga-Jalandhar | 2 | D/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin ACAR | | Polymer Insulator | |
| 202 | 400kV | Muradnagar-Hapur | 1 | S/C | 28 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | Moradabad-Muradnagar LILOed at Hapur; LILO portion of | Not Available | |
| 203 | 400kV | Moradabad-Hapur | 2 | S/C | 109 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 204 | 400kV | Nallagarh-Koldam | 1 | D/C | 46 | POWERGRID | POWERGRID | NTPC | Quad Moose | | Conventional | Koldam to Parbati pool section is of |
| 205 | 400kV | Nallagarh-Patiala | 1 | D/C | 94 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 206 | 400kV | Nallagarh-Patiala | 2 | D/C | 94 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 207 | 400kV | Nathpa Jhakri-Gumma | 1 | D/C | 55 | POWERGRID | SJVNL | HPPTCL | Triple Snowbird | LILO of DC Jhakri-Panchkula line at Gumma | Not Available | |
| 208 | 400kV | Nathpa Jhakri-Gumma | 2 | D/C | 55 | POWERGRID | SJVNL | HPPTCL | Triple Snowbird | | Not Available | |
| 209 | 400kV | Gumma-Panchkula | 1 | D/C | 112 | POWERGRID | HPPTCL | POWERGRID | Triple Snowbird | | Not Available | |
| 210 | 400kV | Gumma-Panchkula | 2 | D/C | 112 | POWERGRID | HPPTCL | POWERGRID | Triple Snowbird | | Not Available | |
| 211 | 400kV | Nathpa Jhakri-RampurHEP | 1 | D/C | 21 | POWERGRID | SJVNL | SJVNL | Triple Snowbird | Nathpa Jhakri-Nallagarh LILOed at Rampur HEP | Conventional | LILO of Jhakri-Nalagarh-1 at RampurHEP |
| 212 | 400kV | Nathpa Jhakri-RampurHEP | 2 | D/C | 21 | POWERGRID | SJVNL | SJVNL | Triple Snowbird | | Conventional | |
| 213 | 400kV | NeemranaPG-Manesar | 1 | D/C | 67 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 214 | 400kV | NeemranaPG-Manesar | 2 | D/C | 67 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 215 | 400kV | NeemranaPG-Babai | 1 | D/C | 85 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar-1 at Babai | Not Available | LILO of 400kV Neemrana-Sikar at Babai by NRSSXXXVI (Essel group): Earlier 29% of Neemrana-Sikar PG |
| 216 | 400kV | NeemranaPG-Sikar | 2 | D/C | 176 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 217 | 400kV | NewWanpoh-Wagoora | 1 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 218 | 400kV | NewWanpoh-Wagoora | 2 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 219 | 400kV | Orai(PG)-Orai | 1 | D/C | 42 | POWERGRID | POWERGRID | UPPTCL | Quad Moose | | Not Available | |
| 220 | 400kV | Orai(PG)-Orai | 2 | D/C | 42 | POWERGRID | POWERGRID | UPPTCL | Quad Moose | | Not Available | |
| 221 | 400kV | Panchkula -Abdullapur | 1 | D/C | 63 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | LILO of Jhakri-Abdullapur at Panchkula |
| 222 | 400kV | Panchkula -Abdullapur | 2 | D/C | 63 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | LILO of Jhakri-Abdullapur at |
| 223 | 400kV | Patiala-Panchkula | 1 | D/C | 65 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 224 | 400kV | Patiala-Panchkula | 2 | D/C | 65 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 225 | 400kV | Patiala-Patran | 1 | D/C | 79 | POWERGRID | POWERGRID | PTCL | Triple Snowbird | LILO of 400kV D/C Patiala – Kaithal Line at Patran SS under the ownership of PTCL. | Polymer Insulator | LILO of 400 kV Kaithal- |
| 226 | 400kV | Patiala-Patran | 2 | D/C | 79 | POWERGRID | POWERGRID | PTCL | Triple Snowbird | | Polymer Insulator | |
| 227 | 400kV | Patran-Kaithal | 1 | D/C | 47 | POWERGRID | PTCL | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 228 | 400kV | Patran-Kaithal | 2 | D/C | 47 | POWERGRID | PTCL | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 229 | 400kV | RampurHEP-Nallagarh | 1 | D/C | 128 | POWERGRID | SJVNL | POWERGRID | Triple Snowbird | Nathpa Jhakri-Nallagarh LILOed at Rampur HEP | Conventional | LILO of Jhakri-Nalagarh-1 at RampurHEP |
| 230 | 400kV | RampurHEP-Nallagarh | 2 | D/C | 128 | POWERGRID | SJVNL | POWERGRID | Triple Snowbird | | Conventional | |
| 231 | 400kV | RAPS-C-Chittorgarh | 1 | D/C | 155 | POWERGRID | NPCIL | RRVPNL | Twin Moose | | Partial (38%) | LILO of 400 kV Rapp C-Kankroli at Chhitorgarh |
| 232 | 400kV | RAPS-C-Kankroli | 1 | D/C | 199 | POWERGRID | NPCIL | POWERGRID | Twin Moose | | Partial (51%) | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 233 | 400kV | RAPS-C-Kota | 1 | S/C | 51 | POWERGRID | NPCIL | POWERGRID | Twin Moose | | Partial (55%) | 400kV RAPS-Jaipur line whose work was completed till Kota section is connected with 400kV Raps-Kota#2 (for antitheft purpose) and hence 400kV RapsC-Kota #2 is now two twin moose lines connected in parallel paths |
| 234 | 400kV | RAPS-C-Kota | 2 | D/C | 55 | POWERGRID | NPCIL | POWERGRID | Twin Moose | D/C with 400kV Jaipur-RAPP D line | Not Available | |
| 235 | 400kV | Rasra-Balia | 1 | S/C | 46 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | LILO of 400kV Balia-Mau-II at Rasara. LILO portion is of UP | Not Available | |
| 236 | 400kV | Rasra-Mau | 1 | S/C | 38 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 237 | 400kV | Rihand-Allahabad | 1 | D/C | 279 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 238 | 400kV | Rihand-Allahabad | 2 | D/C | 279 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 239 | 400kV | Roorkee-Kashipur | 1 | D/C | 151 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (72%) | |
| 240 | 400kV | Roorkee-Kashipur | 2 | D/C | 151 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (72%) | |
| 241 | 400kV | Roorkee-Saharanpur | 1 | D/C | 36 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 242 | 400kV | Roorkee-Dehradun | 1 | D/C | 80 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (50%) | |
| 243 | 400kV | Sarnath-Varanasi | 1 | D/C | 70 | POWERGRID | UPPTCL | POWERGRID | Quad Moose | | Partial (52%) | LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi |
| 244 | 400kV | Sarnath-Varanasi | 2 | D/C | 107 | POWERGRID | UPPTCL | POWERGRID | Quad Moose | | Partial (52%) | |
| 245 | 400kV | Shahjahanpur-Bareilly PG | 1 | D/C | 116 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 246 | 400kV | Shahjahanpur-Bareilly PG | 2 | D/C | 116 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 247 | 400kV | Shahjahanpur-Rosa | 1 | D/C | 8 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Not Available | |
| 248 | 400kV | Shahjahanpur-Rosa | 2 | D/C | 8 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Not Available | |
| 249 | 400kV | Shree Cement-Kota | 1 | D/C | 208 | POWERGRID | Sh. Cement | POWERGRID | Twin Moose | | Polymer Insulator | |
| 250 | 400kV | Shree Cement-Merta | 2 | D/C | 103 | POWERGRID | Sh. Cement | RRVPNL | Twin Moose | | Polymer Insulator | |
| 251 | 400kV | Sikar-Babai | 1 | D/C | 95 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar 1 at Babai | Not Available | |
| 252 | 400kV | Sikar-Ratangarh | 1 | D/C | 76 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |
| 253 | 400kV | Sikar-Ratangarh | 2 | D/C | 76 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |
| 254 | 400kV | Singrauli-Allahabad | 1 | S/C | 224 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 255 | 400kV | Singrauli-Allahabad | 2 | S/C | 202 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 256 | 400kV | Singrauli-Allahabad | 3 | S/C | 215 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Not Available | |
| 257 | 400kV | Singrauli-Anpara | 1 | S/C | 25 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Partial (91%) | |
| 258 | 400kV | Singrauli-Fatehpur | 1 | S/C | 331 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | LILO of Singrauli-Kanpur at Fatehpur |
| 259 | 400kV | Singrauli-LucknowUP | 1 | S/C | 409 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Conventional | |
| 260 | 400kV | Singrauli-Rihand | 1 | S/C | 42 | POWERGRID | NTPC | NTPC | Twin Moose | | Conventional | |
| 261 | 400kV | Singrauli-Rihand | 2 | S/C | 44 | POWERGRID | NTPC | NTPC | Twin Moose | | Conventional | |
| 262 | 400kV | Singrauli-Vindhyachal | 1 | S/C | 3 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 263 | 400kV | Singrauli-Vindhyachal | 2 | S/C | 5 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 264 | 400kV | Koteswar(PG)-Koteswar(THDC) | 1 | D/C | 3 | POWERGRID | POWERGRID | THDC | Twin Moose | | Conventional | |
| 265 | 400kV | Koteswar(PG)-Koteswar(THDC) | 2 | D/C | 3 | POWERGRID | POWERGRID | THDC | Twin Moose | | Conventional | |
| 266 | 400kV | Tehri-Koteshwar(PG) | 3 | S/C | 14 | POWERGRID | THDC | POWERGRID | Quad Moose | | Not Available | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 267 | 400kV | Unnao-Jehta | 1 | D/C | 70 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP | Not Available | |
| 268 | 400kV | Unnao-Jehta | 2 | D/C | 70 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP | Not Available | |
| 269 | 400kV | Uri-II - Uri-I | 1 | S/C | 10 | POWERGRID | NHPC | NHPC | Twin Moose | | Conventional | LILO of 400kV Uri-I - Wagoora D/C at Amargarh |
| 270 | 400kV | Uri-II - Wagoora | 1 | S/C | 105 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | |
| 271 | 400kV | Jauljivi-Bareilly_2 | 1 | D/C | 205 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG) | Not Available | |
| 272 | 400kV | Jauljivi-Bareilly_2 | 2 | D/C | 205 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG) | Not Available | |
| **B. POWERLINK Transmission Ltd** | | | | | | | | | | | | |
| 1 | 400kV | Bareilly PG-Meerut | 1 | D/C | 250 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Bareilly PG-Mandola-1 (241 Km) at |
| 2 | 400kV | Bareilly PG-Meerut | 2 | D/C | 250 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 3 | 400kV | Bareilly UP-Bareilly PG | 1 | D/C | 14 | POWERLINK | UPPTCL | POWERGRID | Twin Moose | | Polymer Insulator | |
| 4 | 400kV | Bareilly UP-Bareilly PG | 2 | D/C | 14 | POWERLINK | UPPTCL | POWERGRID | Twin Moose | | Polymer Insulator | |
| 5 | 400kV | Gorakhpur PG-Lucknow PG | 1 | D/C | 246 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | *Series compensated line |
| 6 | 400kV | Gorakhpur PG-Lucknow PG | 2 | D/C | 246 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 7 | 400kV | Meerut-Mandola | 3 | D/C | 102 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Bareilly PG-Mandola-1&2 (241 Km) |
| 8 | 400kV | Meerut-Mandola | 4 | D/C | 102 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| **C. PKTSL** | | | | | | | | | | | | |
| 1 | 400kV | Khetri-Sikar | 1 | D/C | 78 | PKTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available | |
| 2 | 400kV | Khetri-Sikar | 2 | D/C | 78 | PKTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available | |
| **D. Adani Transmission India Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Mahindergarh (APL)-Bhiwani PG | 1 | D/C | 50 | ATIL | APL | POWERGRID | Twin Moose | | Conventional | |
| 2 | 400kV | Mahindergarh (APL)-Bhiwani PG | 2 | D/C | 50 | ATIL | APL | POWERGRID | Twin Moose | | Conventional | |
| 3 | 400kV | Mahindergarh (APL)-Bhiwani PG | 3 | D/C | 56 | ATIL | APL | POWERGRID | Twin Moose | Bypassed at 400kV Bhiwani to form 400kV Bypassed at Dhanonda to form | Not Available | |
| 4 | 400kV | Mahindergarh (APL)-Bhiwani PG | 4 | D/C | 56 | ATIL | APL | POWERGRID | Twin Moose | | Not Available | |
| 5 | 400kV | MahindergarhHVDC-Dhanonda | 1 | D/C | 5 | ATIL | APL | HVPNL | Quad Moose | | Conventional | |
| 6 | 400kV | MahindergarhHVDC-Dhanonda | 2 | D/C | 5 | ATIL | APL | HVPNL | Quad Moose | | Conventional | |
| **E. APCPL (Aravali Power Corporation Pvt Ltd.)** | | | | | | | | | | | | |
| 1 | 400kV | Jhajjar (IGSTPS)-Mundka | 1 | D/C | 66 | APCPL | APCPL | DTL | Twin Moose | | Polymer | |
| 2 | 400kV | Jhajjar (IGSTPS)-Mundka | 2 | D/C | 66 | APCPL | APCPL | DTL | Twin Moose | | Polymer | |
| **F. PHTL (Powergrid Himachal Transmission Limited)** | | | | | | | | | | | | |
| 1 | 400kV | Abdullapur-Kala Amb | 1 | D/C | 39 | PHTL | POWERGRID | PKATL | Quad Moose | | Conventional | |
| 2 | 400kV | Abdullapur-Kala Amb | 2 | D/C | 39 | PHTL | POWERGRID | PKATL | Quad Moose | | Conventional | |
| 3 | 400kV | Kala Amb- Wangtoo (HP) | 1 | D/C | 174 | PHTL | PKATL | HPPTCL | Quad Moose | Karcham-Kala Amb LILOed at Wangtoo (HP) | Not Available | |
| 4 | 400kV | Karcham Wangtoo - Wangtoo (HP) | 1 | D/C | 1 | PHTL | JSW | HPPTCL | Quad Moose | | Not Available | |
| 5 | 400kV | Karcham Wangtoo - Wangtoo (HP) | 2 | D/C | 1 | PHTL | JSW | HPPTCL | Quad Moose | | Not Available | |
| 6 | 400kV | Baspa-Karcham Wangtoo | 1 | D/C | 22 | PHTL | JPVL | JSW | Triple snowbird | | Conventional | |
| 7 | 400kV | Baspa-Karcham Wangtoo | 2 | D/C | 22 | PHTL | JPVL | JSW | Triple snowbird | | Conventional | |
| 8 | 400kV | Karcham Wangtoo-NJPC | 1 | D/C | 34 | PHTL | JSW | SJVNL | Triple snowbird | | Conventional | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 400kV | Karcham Wangtoo-NJPC | 2 | D/C | 34 | PHTL | JSW | SJVNL | Triple snowbird | | Conventional | |
| 10 | 400kV | Sorang-Wangtoo | 1 | D/C | 21 | PHTL | SORANG | HPPTCL | Quad Moose | | Not Available | |
| 11 | 400kV | Sorang-Kala Amb | 1 | D/C | 160 | PHTL | SORANG | PKATL | Quad Moose | | Not Available | |
| **G. PKTCL (Parbati-Koldam Transmission)** | | | | | | | | | | | | |
| 1 | 400kV | Koldam-Ludhiana | 1 | D/C | 151 | PKTCL | NTPC | POWERGRID | Triple Snowbird | | 27% Polymer & 73% porcelain | |
| 2 | 400kV | Koldam-Ludhiana | 2 | D/C | 151 | PKTCL | NTPC | POWERGRID | Triple Snowbird | | 27% Polymer & 73% porcelain | |
| 3 | 400kV | Koldam-Banala | 1 | D/C | 67 | PKTCL | NTPC | POWERGRID | Quad Moose | | 100% porcelain | |
| 4 | 400kV | Nallagarh-Banala | 1 | D/C | 62 | PKTCL | POWERGRID | POWERGRID | Quad Moose | | 100% porcelain | Powergrid owned 46.38km |
| 5 | 400kV | Parbati-II- ParbatiPooling (Banala) | 1 | S/C | 13 | PKTCL | NHPC | POWERGRID | Quad Moose | | 100% porcelain | Some portion is of Powergrid |
| 6 | 400kV | Parbati-III- ParbatiPooling (Banala) | 1 | S/C | 4 | PKTCL | NHPC | POWERGRID | Quad Moose | | 100% porcelain | |
| 7 | 400kV | Parbati II- Sainj | 1 | S/C | 1 | PKTCL | NHPC | HPPCL | Quad Moose | | 100% porcelain | LILO of 400kV Parbati II-Parbati III at Sainj |
| 8 | 400kV | Parbati III- Sainj | 1 | S/C | 9 | PKTCL | NHPC | HPPCL | Quad Moose | | 100% porcelain | |
| **H. INDIGRID:NRSS-29 Transmission Company Limited** | | | | | | | | | | | | |
| 1 | 400kV | Jalandhar-Samba | 1 | D/C | 135 | NRSS-29 | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 2 | 400kV | Jalandhar-Samba | 2 | D/C | 135 | NRSS-29 | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 3 | 400kV | Amargarh-Samba | 1 | D/C | 286 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 4 | 400kV | Amargarh-Samba | 2 | D/C | 286 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 5 | 400kV | Uri-I - Amargarh | 1 | D/C | 62 | NRSS-29 | NHPC | NRSS-29 | Twin Moose | LILO of 400kV D/C Uri-I – Wagoora Line at Amargarh SS under the ownership of NRSS-XXIX. | Polymer | |
| 6 | 400kV | Uri-I - Amargarh | 2 | D/C | 62 | NRSS-29 | NHPC | NRSS-29 | Twin Moose | | Polymer | |
| 7 | 400kV | Amargarh - Wagoora | 1 | D/C | 36 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 8 | 400kV | Amargarh - Wagoora | 2 | D/C | 36 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| **I. Powergrid Unchahar Transmission Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Fatehpur-Unchahar | 1 | D/C | 54 | PUTL | POWERGRID | NBPPL | Twin Moose | | Not Available | |
| 2 | 400kV | Fatehpur-Unchahar | 2 | D/C | 54 | PUTL | POWERGRID | NBPPL | Twin Moose | | Not Available | |
| **J. NRSSXXXI(B) (Sekura Energy)** | | | | | | | | | | | | |
| 1 | 400kV | Amritsar-Malerkotla | 1 | D/C | 149 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 2 | 400kV | Amritsar-Malerkotla | 2 | D/C | 149 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 3 | 400kV | Kurukshetra-Malerkotla | 1 | D/C | 139 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 4 | 400kV | Kurukshetra-Malerkotla | 2 | D/C | 139 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| **K. Gurgaon Palwal Transmission Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Dhanoda-Neemrana | 1 | D/C | 47 | GPTL | HVPNL | POWERGRID | Twin HTLS | Bypassed at Dhanonda to form | Polymer | |
| 2 | 400kV | Dhanoda-Neemrana | 2 | D/C | 47 | GPTL | HVPNL | POWERGRID | Twin HTLS | | Polymer | |
| 3 | 400kV | Prithala-Kadarpur | 1 | D/C | 29 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 4 | 400kV | Prithala-Kadarpur | 2 | D/C | 29 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 5 | 400kV | Prithala(GPTL)-Aligarh(PG) | 1 | D/C | 49 | GPTL | GPTL | POWERGRID | Twin HTLS | | Polymer | |
| 6 | 400kV | Prithala(GPTL)-Aligarh(PG) | 2 | D/C | 49 | GPTL | GPTL | POWERGRID | Twin HTLS | | Polymer | |
| 7 | 400kV | Kadarpur-Sohna Road | 1 | D/C | 10 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 8 | 400kV | Kadarpur-Sohna Road | 2 | D/C | 10 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| **L. FBTL** | | | | | | | | | | | | |
| 1 | 400kV | AREPRL-Fatehgarh Pooling | 1 | D/C | 1 | FBTL | FBTL | FBTL | Quad moose | | Not Available | |
| 2 | 400kV | AREPRL-Fatehgarh Pooling | 2 | D/C | 1 | FBTL | FBTL | FBTL | Quad moose | | Not Available | |
| 3 | 400kV | Fatehgarh II-Fatehgarh Pooling | 1 | D/C | 45 | FBTL | POWERGRID | FBTL | Hexa Zebra+ Twin HTLS | LILO of 400kV Fatehgarh I-Bhadla-1 at Fatehgarh II. LILO Portion is of Powergrid | Not Available | |
| 4 | 400kV | Fatehgarh II-Fatehgarh Pooling | 2 | D/C | 45 | FBTL | POWERGRID | FBTL | Hexa Zebra+ Twin HTLS | | Not Available | |
| **M. PBTSL** | | | | | | | | | | | | |
| 1 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 1 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 2 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 3 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 3 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 4 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 4 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 5 | 400kV | Khetri (PKTSL)-Bhiwadi(PG) | 1 | D/C | 126 | PBTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available |
| 6 | 400kV | Khetri (PKTSL)-Bhiwadi(PG) | 2 | D/C | 126 | PBTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available |
| **N. PRTL** | | | | | | | | | | | |
| 1 | 400kV | Jaisalmer(RS)-Fatehgarh_III(PG) | 1 | D/C | 50 | PRTL | RAJASTHAN | PRTL | Twin HTLS | | Not Available |
| 2 | 400kV | Jaisalmer(RS)-Fatehgarh_III(PG) | 2 | D/C | 50 | PRTL | RAJASTHAN | PRTL | Twin HTLS | | Not Available |
| 3 | 400kV | Fatehgarh_III(PG)- Fatehgarh_II(PG) | 1 | D/C | 44 | PRTL | PRTL | POWERGRID | Twin HTLS | | Not Available |
| 4 | 400kV | Fatehgarh_III(PG)- Fatehgarh_II(PG) | 2 | D/C | 44 | PRTL | PRTL | POWERGRID | Twin HTLS | | Not Available |
| **O. NRSS-36** | | | | | | | | | | | |
| 1 | 400kV | Babai(RS)-Bhiwani(PG) | 1 | D/C | 111 | NRSS-36 | NRSS-36 | POWERGRID | Twin Moose | | Not Available |
| 2 | 400kV | Babai(RS)-Bhiwani(PG) | 2 | D/C | 111 | NRSS-36 | NRSS-36 | POWERGRID | Twin Moose | | Not Available |
| **RE Connected at ISTS Dedicated Lines** | | | | | | | | | | | |
| **A. RENEW** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG) - Bikaner (Renew) | 1 | S/C | 5 | RENEW | POWERGRID | RENEW | Twin Moose | | Not Available |
| **B. Avaada** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Avaada | 1 | S/C | 14 | AEPL | POWERGRID | AEPL | Twin Moose | | Not Available |
| **C. ARPOPL** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Ayana | 1 | S/C | 12 | ARPOPL | PGCIL | Ayana | ACSR Twin Moose+AL 59 | | Not Available |
| **D. Azure** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Azure 43 PSS | 1 | S/C | 9 | Azure | POWERGRID | Azure 43 PSS | Twin Moose | | Not Available |
| 2 | 400kV | Azure43(RSS)-Azure 43 PSS | 1 | S/C | 3 | Azure | Azure 43 PSS | Azure 43 RSS | Twin Moose | | Not Available |
| **E. RSRPL** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(RENEW) - Renew Surya Ravi | 1 | S/C | 13 | RSRPL | RENEW | RSRPL | Twin Moose | | Not Available |
| **F. NTPC** | | | | | | | | | | | |
| 1 | 400kV | Bhadla II - Kolayat | 1 | D/C | 29 | NTPC | POWERGRID | NTPC | Quad Moose | | Not Available |
| 2 | 400kV | Kolayat - Kolayat_2 | 1 | D/C | 2 | NTPC | NTPC | NTPC | Quad Moose | | Not Available |
| **STATE LINES** | | | | | | | | | | | |
| **A. DTL** | | | | | | | | | | | |
| 1 | 400kV | Bamnauli-Tughlakabad | 1 | M/C | 68 | DTL | DTL | POWERGRID | | Tower is quad circuit tower | Polymer Insulator |
| 2 | 400kV | Bamnauli-Tughlakabad | 2 | M/C | 68 | DTL | DTL | POWERGRID | | Tower is quad circuit tower | Polymer Insulator |
| 3 | 400kV | Bamnoli-Jhatikara | 1 | D/C | 12 | DTL | DTL | POWERGRID | Quad bersimis | | Polymer Insulator |
| 4 | 400kV | Bamnoli-Jhatikara | 2 | D/C | 12 | DTL | DTL | POWERGRID | Quad bersimis | | Polymer Insulator |
| 5 | 400kV | Bawana-Mundka | 1 | D/C | 18 | DTL | DTL | DTL | Quad bersimis | | Polymer Insulator |
| 6 | 400kV | Bawana-Mundka | 2 | D/C | 18 | DTL | DTL | DTL | Quad bersimis | | Polymer Insulator |
| 7 | 400kV | Jhatikara-Mundka | 1 | D/C | 17 | DTL | POWERGRID | DTL | Quad bersimis | | Polymer Insulator |
| 8 | 400kV | Jhatikara-Mundka | 2 | D/C | 17 | DTL | POWERGRID | DTL | Quad bersimis | | Polymer Insulator |
| **B. HVPNL** | | | | | | | | | | | |
| 1 | 400kV | CLP Jhajjar -Dhanonda | 1 | D/C | 20 | HVPNL | CLP Jhajjar | HVPNL | Twin Moose | | Conventional |
| 2 | 400kV | CLP Jhajjar -Dhanonda | 2 | D/C | 20 | HVPNL | CLP Jhajjar | HVPNL | Twin Moose | | Conventional |
| 3 | 400kV | CLP Jhajjar- Kabulpur | 1 | D/C | 35 | JKTPL | CLP Jhajjar | HVPNL | Quad Moose | | Already had Anti fog |
| 4 | 400kV | CLP Jhajjar- Kabulpur | 2 | D/C | 35 | JKTPL | CLP Jhajjar | HVPNL | Quad Moose | | Polymer Insulator |
| 5 | 400kV | Deepalpur-Kabulpur | 1 | D/C | 67 | JKTPL | KT Jhajjar | HVPNL | Quad Moose | | Installed on every |
| 6 | 400kV | Deepalpur-Kabulpur | 2 | D/C | 67 | JKTPL | KT Jhajjar | HVPNL | Quad Moose | | towers |

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| 7 | 400kV | Dhanoda-Daultabad | 1 | D/C | 73 | HVPNL | HVPNL | HVPNL | Quad Moose | | Already had Polymer Insulator | |
| 8 | 400kV | Dhanoda-Daultabad | 2 | D/C | 73 | HVPNL | HVPNL | HVPNL | Quad Moose | | | |
| 9 | 400kV | Gurgaon-Daultabad | 1 | D/C | 21 | HVPNL | POWERGRID | HVPNL | Quad Moose | | | Six towers multi-circuit with Bamnauli- |
| 10 | 400kV | Gurgaon-Daultabad | 2 | D/C | 21 | HVPNL | POWERGRID | HVPNL | Quad Moose | | | |
| 11 | 400kV | Jhajjar-Daulatabad | 1 | D/C | 64 | HVPNL | APCPL | HVPNL | Twin Moose | | Polymer Insulator | Partial (84%), |
| 12 | 400kV | Jhajjar-Daulatabad | 2 | D/C | 64 | HVPNL | APCPL | HVPNL | Twin Moose | | Polymer Insulator | Remaining pending |
| 13 | 400kV | Khedar-Fatehabad | 1 | D/C | 40 | HVPNL | HPGCL | POWERGRID | Twin Moose | | Conventional | Presently there is no planning of replacment of Convention disc Insulator with Polymer Insulators |
| 14 | 400kV | Jind-Kirori | 1 | D/C | 51 | HVPNL | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | |
| 15 | 400kV | Jind-Kirori | 2 | D/C | 51 | HVPNL | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | |
| 16 | 400kV | Khedar-Kirori | 1 | D/C | 6.2 | HVPNL | HPGCL | HVPNL | Twin Moose | | Conventional | Presently there is no planning of replacment |
| 17 | 400kV | Khedar-Kirori | 2 | D/C | 6 | HVPNL | HPGCL | HVPNL | Twin Moose | | | |
| 18 | 400kV | Khedar-Nuhiawali | 1 | D/C | 114 | HVPNL | HPGCL | HVPNL | Twin Moose | | Conventional | Existing disc insulator |
| 19 | 400kV | Nuhiawali-Fatehabad | 1 | D/C | 78 | HVPNL | HVPNL | POWERGRID | Twin Moose | | Conventional | are of Porcelain |
| **C. PDD (Jammu & Kashmir)** | | | | | | | | | | | | |
| 1 | 400kV | Baglihar(stage 1)-Kishenpur | 1 | D/C | 68 | JK PDD | JKSPDCL | POWERGRID | Twin Moose | | Conventional | |
| 2 | 400kV | Baglihar(stage 1)-Kishenpur | 2 | D/C | 68 | JK PDD | JKSPDCL | POWERGRID | Twin Moose | | Not Available | |
| **D. PSTCL** | | | | | | | | | | | | |
| 1 | 400kV | Behman Jassa- HMEL | 1 | D/C | 17 | PSTCL | PSTCL | PSTCL | Twin Moose | | Not Available | |
| 2 | 400kV | Behman Jassa- HMEL | 2 | D/C | 17 | PSTCL | PSTCL | PSTCL | Twin Moose | | Not Available | |
| 3 | 400kV | Behman Jassa- Moga | 1 | S/C | 113 | PSTCL | PSTCL | PSTCL | Twin Moose | After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh | Not Available | |
| 4 | 400kV | Makhu-Amritsar | 1 | D/C | 64 | PSTCL | PSTCL | PSTCL | Twin Moose | | Partial (10%) | |
| 5 | 400kV | Makhu-Amritsar | 2 | D/C | 64 | PSTCL | PSTCL | PSTCL | Twin Moose | | Partial (10%) | |
| 6 | 400kV | Muktsar-Makhu | 1 | D/C | 96 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 7 | 400kV | Muktsar-Makhu | 2 | D/C | 96 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 8 | 400kV | Nakodar-Makhu | 1 | D/C | 52 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 9 | 400kV | Nakodar-Makhu | 2 | D/C | 52 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 10 | 400kV | Nakodar-Moga | 1 | S/C | 78 | PSTCL | PSPCL | POWERGRID | Twin Moose | | Not Available | LILO of 400kV Talwandi sabo-Nakodar at Moga |
| 11 | 400kV | Rajpura-Dhuri | 1 | D/C | 86 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | Lilo of Rajpura th-Dhuri |
| 12 | 400kV | Rajpura TPS- Rajpura | 1 | D/C | 9 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | 1 at 400kV Rajpura |
| 13 | 400kV | Rajpura-Dhuri | 2 | D/C | 86 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | Lilo of Rajpura th-Dhuri |
| 14 | 400kV | Rajpura TPS- Rajpura | 2 | D/C | 9 | PSTCL | PSPCL | PSTCL | Twin Moose | | Not Available | 2 at 400kV Rajpura |
| 15 | 400kV | Rajpura TPS-Nakodar | 1 | D/C | 139 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 16 | 400kV | Rajpura TPS-Nakodar | 2 | D/C | 139 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 17 | 400kV | Talwandi Saboo- Dhuri | 1 | D/C | 175 | PSTCL | PSPCL | PSTCL | Twin Moose | | Partial (22%) | |
| 18 | 400kV | Talwandi Saboo- Dhuri | 2 | D/C | 175 | PSTCL | PSPCL | PSTCL | Twin Moose | | Partial (22%) | |
| 19 | 400kV | Talwandi Saboo- Behman Jassa | 1 | D/C | 20 | PSTCL | PSPCL | PSTCL | Twin Moose | After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh | Not Available | |
| 20 | 400kV | Talwandi Saboo- Nakodar | 1 | D/C | 180 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 21 | 400kV | Talwandi Saboo- Muktsar | 1 | D/C | 100 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 22 | 400kV | Talwandi Saboo- Muktsar | 2 | D/C | 100 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| **E. PTCUL** | | | | | | | | | | | | |
| 1 | 400kV | Alaknanda(GVK)-Srinagar(PTCUL) | 1 | D/C | 14 | PTCUL | GVKPIL | PTCUL | Twin Moose | | Conventional | |
| 2 | 400kV | Alaknanda(GVK)-Srinagar(PTCUL) | 2 | D/C | 14 | PTCUL | GVKPIL | PTCUL | Twin Moose | | Conventional | |
| 3 | 400kV | Muradabad-Kashipur | 1 | S/C | 108 | PTCUL | UPPTCL | PTCUL | Twin Moose | | Conventional | |
| 4 | 400kV | Rishikesh-Nehtaur | 1 | D/C | 124 | PTCUL | PTCUL | UPPTCL | Twin Moose | | Not Available | LILO of 400kV |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 400kV | Nehtaur-Kashipur | 2 | D/C | 80 | PTCUL | UPPTCL | PTCUL | Twin Moose | | Not Available | Rishikesh-Kashipur |
| 6 | 400kV | Roorkee-Rishikesh | 1 | S/C | 50 | PTCUL | POWERGRID | PTCUL | Twin Moose | LILO portion is of POWERGRID | Not Available | |
| 7 | 400kV | Roorkee-Muzaffarnagar | 1 | S/C | 71 | PTCUL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| **F. RRVPNL** | | | | | | | | | | | | |
| 1 | 400kV | Ajmer-Bhilwara | 1 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 2 | 400kV | Ajmer-Bhilwara | 2 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 3 | 400kV | Akal-Barmer | 1 | S/C | 124 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 4 | 400kV | Akal-Jodhpur | 1 | S/C | 225 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 5 | 400kV | Akal-Ramgarh | 1 | D/C | 99 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 6 | 400kV | Akal-Ramgarh | 2 | D/C | 99 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 7 | 400kV | Anta-Chhabra | 1 | S/C | 90 | RRVPNL | RRVPNL | RVUNL | Quad Moose | Bypassed at Anta to form Chhabra-Kota(PG) | Not Available | |
| 8 | 400kV | Anta-Chhabra SC | 1 | D/C | 89 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 9 | 400kV | Anta-Chhabra SC | 2 | D/C | 89 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 10 | 400kV | Anta-Kalisindh | 1 | D/C | 80 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 11 | 400kV | Anta-Kalisindh | 2 | D/C | 80 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 12 | 400kV | Anta-Kawai | 1 | D/C | 50 | RRVPNL | RRVPNL | Kawai(Adani) | Quad Moose | | Not Available | |
| 13 | 400kV | Anta-Kawai | 2 | D/C | 50 | RRVPNL | RRVPNL | Kawai(Adani) | Quad Moose | | Not Available | |
| 14 | 400kV | Anta-Kota (PG) | 1 | S/C | 91 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | Bypassed at Anta to form Chhabra-Kota(PG) | Not Available | |
| 15 | 400kV | Barmer-Bhinmal | 1 | D/C | 144 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 16 | 400kV | Barmer-Bhinmal | 2 | D/C | 144 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 17 | 400kV | Barmer-Jaisalmer-II (Bhaesada) | 1 | D/C | 117 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 18 | 400kV | Barmer-Jaisalmer-II (Bhaesada) | 2 | D/C | 117 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 19 | 400kV | Barmer-Rajwest | 1 | D/C | 15 | RRVPNL | RRVPNL | RAJWEST | Twin Moose | | Conventional | |
| 20 | 400kV | Bhadla-Jodhpur | 1 | D/C | 106 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 21 | 400kV | Bhilwara-Chhabra | 1 | S/C | 303 | RRVPNL | RRVPNL | RVUNL | Twin Moose | | Conventional | |
| 22 | 400kV | Bhilwara-Chittorgarh(RRVPNL) | 1 | D/C | 49 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 23 | 400kV | Bhilwara-Chittorgarh(RRVPNL) | 2 | D/C | 49 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 24 | 400kV | Bikaner-Bhadla | 1 | D/C | 189 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 25 | 400kV | Bikaner-Bhadla | 2 | D/C | 189 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 26 | 400kV | Bikaner-Merta | 1 | S/C | 172 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 27 | 400kV | Bikaner-Sikar(PG) | 1 | D/C | 171 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 28 | 400kV | Bikaner-Sikar(PG) | 2 | D/C | 171 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 29 | 400kV | Chhabra - Kawai SCTPS | 1 | S/C | 45 | RRVPNL | RVUNL | APRL | Twin Moose | | Conventional | |
| 30 | 400kV | Chhabra-Chhabra SC | 1 | D/C | 2 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 31 | 400kV | Chhabra-Chhabra SC | 2 | D/C | 2 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 32 | 400kV | Heerapura-Hindaun | 1 | S/C | 192 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 33 | 400kV | Hindaun-Chhabra | 1 | S/C | 305 | RRVPNL | RRVPNL | RVUNL | Twin Moose | | Conventional | |
| 34 | 400kV | Kakani (Jodhpur New)-Jodhpur | 2 | S/C | 102 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 35 | 400kV | Kankani (Jodhpur New)-Akal | 1 | D/C | 223 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 36 | 400kV | Kankani(Jodhpur New)-Jaisalmer-II(Bhainsra) | 1 | D/C | 177 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | LILO of 400kV Kankani(Jodhpur New)-Akal ckt-2 | Not Available | |
| 37 | 400kV | Jaisalmer-II(Bhainsra)-Akal | 1 | D/C | 61 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 38 | 400kV | Kankani (Jodhpur New)-Jodhpur | 1 | S/C | 67 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 39 | 400kV | Kankani (Jodhpur New)-Merta | 1 | S/C | 140 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Merta-1 at Kakani | Not Available | |
| 40 | 400kV | Merta-Bhadla | 1 | D/C | 175 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Merta-2 at Bhadla | Not Available | |
| 41 | 400kV | Merta-Heerapura | 1 | S/C | 175 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 42 | 400kV | Merta-Ratangarh | 1 | S/C | 173 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 400kV | Phagi-Ajmer(RRVPNL) | 1 | D/C | 109 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 44 | 400kV | Phagi-Ajmer(RRVPNL) | 2 | D/C | 109 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 45 | 400kV | Phagi-Heerapura | 1 | D/C | 52 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 46 | 400kV | Phagi-Heerapura | 2 | D/C | 52 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 47 | 400kV | Rajwest - Kankani (Jodhpur New) | 1 | S/C | 209 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Rajwest-I at Kakani | Not Available | |
| 48 | 400kV | Rajwest-Jodhpur | 1 | D/C | 209 | RRVPNL | RWPL | RRVPNL | Twin Moose | | Conventional | |
| 49 | 400kV | Ramgarh-Bhadla | 1 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 50 | 400kV | Ramgarh-Bhadla | 2 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 51 | 400kV | Suratgarh-Bikaner | 1 | S/C | 146 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 52 | 400kV | Suratgarh-Ratangarh | 1 | S/C | 144 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 53 | 400kV | Suratgarh-Ratangarh | 2 | S/C | 144 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 54 | 400kV | Suratgarh-Suratgarh SC | 1 | S/C | 2 | RRVPNL | RVUNL | RVUNL | Quad Moose | | Not Available | |
| 55 | 400kV | Suratgarh SC-Bikaner | 1 | D/C | 140 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Not Available | |
| 56 | 400kV | Suratgarh SC-Bikaner | 2 | D/C | 140 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Not Available | |
| **G. UPPTCL** | | | | | | | | | | | | |
| 1 | 400kV | Agra (Fatehbad)-Agra South | 1 | D/C | 70 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 2 | 400kV | Agra (UP)-Agra(Fatehbad) | 1 | S/C | 104 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Agra(UP)-Muradnagar(N) at Fatehabad(UP) |
| 3 | 400kV | Agra UP-Unnao | 1 | S/C | 279 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (25%) | |
| 4 | 400kV | Agra(Fatehbad)-Mathura | 1 | S/C | 142 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 5 | 400kV | Agra(Fatehbad)-Mathura | 2 | D/C | 151 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura |
| 6 | 400kV | Alakhnanda-Vishnuprayag | 1 | D/C | 109 | UPPTCL | GVKPIL | JPVL | Twin Moose | | Not Available | |
| 7 | 400kV | Aligarh-Mainpuri | 1 | D/C | 93 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 8 | 400kV | Aligarh-Mainpuri | 2 | D/C | 93 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 9 | 400kV | Aligarh-Muradnagar | 1 | S/C | 177 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | *Series Compensated line (40%). It would be shifted |
| 10 | 400kV | Aligarh-Sikandrabad | 1 | D/C | 95 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 11 | 400kV | Aligarh-Harduaganj | 1 | S/C | 40 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 12 | 400kV | AnparaB-AnparaC | 1 | D/C | 0.05 | UPPTCL | UPRVUNL | LANCO | Quad Moose | | Conventional | |
| 13 | 400kV | AnparaB-AnparaC | 2 | D/C | 0.05 | UPPTCL | UPRVUNL | LANCO | Quad Moose | | Conventional | |
| 14 | 400kV | AnparaB-AnparaD | 1 | D/C | 5 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Not Available | |
| 15 | 400kV | AnparaB-AnparaD | 2 | D/C | 5 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Not Available | |
| 16 | 400kV | AnparaB-Mau | 1 | S/C | 262 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial (13%) | |
| 17 | 400kV | AnparaB-Obra B | 1 | S/C | 40 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial | |
| 18 | 400kV | AnparaB-Sarnath | 1 | D/C | 158 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial | |
| 19 | 400kV | AnparaB-Sarnath | 2 | D/C | 158 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Conventional | |
| 20 | 400kV | Ataur-Hapur | 1 | D/C | 52 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 21 | 400kV | Ataur-Hapur | 2 | D/C | 52 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 22 | 400kV | Ataur-Indirapuram | 1 | D/C | 15 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 23 | 400kV | Ataur(UP)-Noida Sec 123(UP) | 1 | D/C | 19 | UPPTCL | UPPTCL | UPPTCL | Quad Moose (LILO portion Twin HTLS) | LILO of 400 KV ATAUR-INDIRAPURAM CKT-II at 400 KV NOIDA SECTOR 123 | Not Available | |
| 24 | 400kV | Indirapuram(UP)-Noida Sec 123(UP) | 1 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose (LILO portion Twin HTLS) | | Not Available | |
| 25 | 400kV | Azamgarh-Mau | 1 | S/C | 48 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (79%) | |
| 26 | 400kV | Azamgarh-Tanda | 1 | D/C | 153 | UPPTCL | UPPTCL | NTPC | Twin Moose | | Not Available | |
| 27 | 400kV | Badaun-Sambhal | 1 | D/C | 77 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 28 | 400kV | Badaun-Sambhal | 2 | D/C | 77 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 29 | 400kV | Banda-Orai | 1 | D/C | 108 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |

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| 30 | 400kV | Banda-Orai | 2 | D/C | 108 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 31 | 400kV | Banda-Rewa road | 1 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 32 | 400kV | Banda-Rewa road | 2 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 33 | 400kV | Bara-Meja | 1 | D/C | 32 | UPPTCL | UPPTCL | MUNPL | Quad Moose | | LILO of 400kV Bara-Rewa road D/C at Meja | |
| 34 | 400kV | Bara-Meja | 2 | D/C | 32 | UPPTCL | UPPTCL | MUNPL | Quad Moose | | | |
| 35 | 400kV | Bareilly UP-Unnao | 1 | D/C | 271 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (15%) | *Series Compensated line (45%) |
| 36 | 400kV | Bareilly UP-Unnao | 2 | D/C | 271 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (15%) | *Series Compensated line (45%) |
| 37 | 400kV | Gorakhpur UP-Azamgarh | 1 | S/C | 90 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (76%) | |
| 38 | 400kV | Gr. Noida(765)-Sector 148 | 1 | D/C | 47 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 39 | 400kV | Gr. Noida(765)-Sector 148 | 2 | D/C | 47 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 40 | 400kV | Gr. Noida-Gr. Noida (765) | 1 | D/C | 45 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 41 | 400kV | Gr. Noida-Gr. Noida (765) | 2 | D/C | 45 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 42 | 400kV | Gr.Noida-Sikandrabad | 1 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 43 | 400kV | Gr.Noida-Sikandrabad | 2 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 44 | 400kV | Hapur-Dasna | 1 | D/C | 14 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 45 | 400kV | Hapur-Dasna | 2 | D/C | 14 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 46 | 400kV | Hapur-Moradabad | 1 | S/C | 109 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 47 | 400kV | Hapur-Muradnagar | 1 | S/C | 28 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 48 | 400kV | Harudaganj-Sikandarabad | 1 | S/C | 115 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 49 | 400kV | Mainpuri(UP)-Mainpuri(PG) | 1 | D/C | 25 | UPPTCL | UPPTCL | POWERGRID | Twin Moose | | Not Available | LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP) |
| 50 | 400kV | Mainpuri(UP)-Mainpuri(PG) | 2 | D/C | 26 | UPPTCL | UPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 51 | 400kV | Meja-Musauli | 1 | D/C | 65 | UPPTCL | MUNPL | UPPTCL | Quad Moose | | Not Available | |
| 52 | 400kV | Meja-Rewa road | 1 | D/C | 45 | UPPTCL | MUNPL | UPPTCL | Quad Moose | | Not Available | |
| 53 | 400kV | Muradnagar New- Mathura | 1 | D/C | 246 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura |
| 54 | 400kV | Muradnagar-Ataur | 2 | D/C | 18 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 55 | 400kV | Musauli-Rewa road | 1 | D/C | 34 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 56 | 400kV | Muzaffarnagar-Alakhnanda | 1 | D/C | 189 | UPPTCL | UPPTCL | GVKPIL | Twin Moose | | Not Available | |
| 57 | 400kV | Muzaffarnagar-Ataur | 1 | D/C | 121 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 58 | 400kV | Muzaffarnagar-Vishnuprayag | 1 | D/C | 280 | UPPTCL | UPPTCL | JPVL | Twin Moose | | Conventional | |
| 59 | 400kV | Noida Sec 148 - Noida Sec 123 | 1 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 60 | 400kV | Noida Sec 148 - Noida Sec 123 | 2 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 61 | 400kV | Noida Sec 148-Noida Sec 123 | 1 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 62 | 400kV | Noida Sec 148-Noida Sec 123 | 2 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 63 | 400kV | Obra-Rewa road | 1 | S/C | 179 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 64 | 400kV | Obra-Sultanpur | 1 | S/C | 230 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Conventional | |
| 65 | 400kV | Obra B - Obra C | 1 | S/C | 1 | UPPTCL | UPRVUNL | UPRVUNL | Twin Moose | | Not Available | |
| 66 | 400kV | Orai-Mainpuri(UP) | 1 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 67 | 400kV | Orai-Mainpuri(UP) | 2 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 68 | 400kV | Orai-Paricha | 1 | D/C | 111 | UPPTCL | UPPTCL | UPRVUNL | Twin Moose | | Not Available | |
| 69 | 400kV | Orai-Paricha | 2 | D/C | 111 | UPPTCL | UPPTCL | UPRVUNL | Twin Moose | | Not Available | |

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| 70 | 400kV | Panki-Aligarh | 1 | S/C | 285 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (24%) | |
| 71 | 400kV | Rewa road -Panki | 1 | S/C | 210 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of Bara-Panki at 400kV Rewa Road |
| 72 | 400kV | Rosa-Badaun | 1 | D/C | 85 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 73 | 400kV | Rosa-Badaun | 2 | D/C | 85 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 74 | 400kV | Sarnath-Azamgarh | 1 | S/C | 97 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 75 | 400kV | Lucknow_1(PG)-Mohanlalganj (PGYTL) | 1 | S/C | 58 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV LUCKNOW(PG)- | Conventional | |
| 76 | 400kV | Sultanpur(UP)-Mohanlalganj (PGYTL) | 1 | S/C | 133 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Conventional | |
| 77 | 400kV | Sultanpur-Tanda | 1 | D/C | 103 | UPPTCL | UPPTCL | NTPC | Twin Moose | | Not Available | |
| 78 | 400kV | Tanda-Basti | 1 | D/C | 44 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 79 | 400kV | Tanda-Basti | 2 | D/C | 44 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 80 | 400kV | Mohanlalganj (PGYTL)-Unnao(UP) | 1 | S/C | 104 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | LILO of 400 KV SAROJANI | Partial (13%) | Status after LILO? |
| 81 | 400kV | Lucknow(UP)-Mohanlalganj (PGYTL) | 1 | S/C | 89 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (13%) | |
| 82 | 400kV | Unnao-Panki | 1 | S/C | 49 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (41%) | |
| 83 | 400kV | Varanasi-Jaunpur | 1 | D/C | 73 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 84 | 400kV | Varanasi-Jaunpur | 2 | D/C | 73 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 85 | 400kV | Jaunpur (UP)-Obra_B(UP) | 1 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | After LILO of 400 KV OBRA B- OBRA-C CKT- | Not Available | |
| 86 | 400kV | Obra_C_TPS(UP)-Jaunpur (UP) | 1 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 87 | 400kV | Sambhal-Rampur | 1 | D/C | 74 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 88 | 400kV | Sambhal-Rampur | 2 | D/C | 74 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 89 | 400kV | Simbholi-Meerut_PMSTL | 1 | D/C | 29 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 90 | 400kV | Simbholi-Meerut_PMSTL | 2 | D/C | 29 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 91 | 400kV | Simbholi_PMSTL (UP)-Muradnagar_2(UP) | 1 | D/C | 71 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 92 | 400kV | Simbholi_PMSTL (UP)-Muradnagar_2(UP) | 2 | D/C | 71 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 93 | 400kV | Panki-Panki_TPS | 1 | S/C | 1 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| **H. PJFTL** | | | | | | | | | | | | |
| 1 | 400kV | Firozabad-Jawaharpur | 1 | D/C | 40 | PJFTL | PJFTL | UPRVUNL | Quad Moose | Anti-theft charging from Firozabad(PJFTL) | Not Available | |
| 2 | 400kV | Firozabad-Jawaharpur | 2 | D/C | 40 | PJFTL | PJFTL | UPRVUNL | Quad Moose | | Not Available | |
| 3 | 400kV | Agra South-Firozabad PJFTL | 1 | D/C | 79 | PJFTL | UPPTCL | PJFTL | Twin Moose | LILO of 400kV Agra South-Agra Fatehabad ckt-2 at Firozabad PJFTL | Not Available | |
| 4 | 400kV | Agra(Fatehabad)-Firozabad PJFT | 1 | D/C | 79 | PJFTL | UPPTCL | PJFTL | Twin Moose | | Not Available | |
| **I. GTL** | | | | | | | | | | | | |
| 1 | 400kV | Kanpur(PG)-Ghatampur_TPS(UP) | 1 | D/C | 49 | GTL | POWERGRID | UPPTCL | Twin Moose | Antitheft charging from Kanpur(PG) Upto DEAD | Not Available | |
| 2 | 400kV | Kanpur(PG)-Ghatampur_TPS(UP) | 2 | D/C | 49 | GTL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| **J. HPPTCL** | | | | | | | | | | | | |
| 1 | 400kV | Lahal-Chamba | 1 | D/C | 35 | HPPTCL | HPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 2 | 400kV | Lahal-Chamba | 2 | D/C | 35 | HPPTCL | HPPTCL | POWERGRID | Twin Moose | | Not Available | |
| **K. NTPC JV** | | | | | | | | | | | | |
| 1 | 400kV | Dadri-Loni (Harsh Vihar) | 1 | D/C | 54 | NTPC | NTPC | DTL | Twin Moose | | Polymer | |
| 2 | 400kV | Dadri-Loni (Harsh Vihar) | 2 | D/C | 54 | NTPC | NTPC | DTL | Twin Moose | | Polymer | |
| **L. MTSCL** | | | | | | | | | | | | |
| 1 | 400kV | Ajmer-Deedwana | 1 | S/C | 110 | MTSCL | RRVPNL | MTSCL | Twin Moose | | Not Available | |
| 2 | 400kV | Bikaner-Deedwana | 1 | S/C | 129 | MTSCL | RRVPNL | MTSCL | Twin Moose | | Conventional | |
| **M. Aravali Transmission Service Company Ltd (ATSCL)** | | | | | | | | | | | | |
| 1 | 400kV | Alwar-Hindaun | 1 | S/C | 96 | ATSCL | ATSL | RRVPNL | Twin Moose | | Not Available | Partly owned by Aravali Transmission Services lLtd. |
| **N. BBMB** | | | | | | | | | | | | |
| 1 | 400kV | Dehar-Rajpura | 1 | S/C | 129 | BBMB | BBMB | PSTCL | Twin Morkulla+ LILO portion is of twin moose | Dehar-Bhiwani LILOed at Rajpura | Antifog | LILO of Dehar-Bhiwani at Rajpura |
| 2 | 400kV | Bhiwani(BBMB)-Rajpura | 1 | S/C | 213 | BBMB | BBMB | PSTCL | | Dehar-Bhiwani LILOed at Rajpura | Antifog | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 400kV | Dehar-Panchkula | 1 | S/C | 125 | BBMB | BBMB | POWERGRID | Twin Morkulla+ LILO portion is of twin moose | POWERGRID owned LILO portion of 9.034Km | Antifog | LILO of Dehar-Panipat at Panchkula |
| 4 | 400kV | Panchkula-Panipat | 1 | S/C | 155 | BBMB | POWERGRID | BBMB | | | Antifog | |
| **OTHER DEDICATED LINES** | | | | | | | | | | | | |
| **A. THDC** | | | | | | | | | | | | |
| 1 | 400kV | Aligarh-Khurja | 1 | D/C | 35 | THDC | POWERGRID | THDC | Twin Moose | | Not Available | |
| 2 | 400kV | Aligarh-Khurja | 2 | D/C | 35 | THDC | POWERGRID | THDC | Twin Moose | | Not Available | |
| **5. 400kV Transmission Line charged at 220kV** | | | | | | | | | | | | |
| **STATE LINES** | | | | | | | | | | | | |
| **A. RRVPNL** | | | | | | | | | | | | |
| 1 | 400kV charged at 220kV | Dholpur-Hindaun | 1 | S/C | 100 | RRVPNL | RRVUNL | RRVPNL | Twin Moose | | Conventional | |
| 2 | 400kV charged at 220kV | Kota-KTPS | 1 | D/C | 7 | RRVPNL | POWERGRID | RRVUNL | Twin Moose | | Conventional | |
| 3 | 400kV charged at 220kV | Kota-KTPS | 2 | D/C | 7 | RRVPNL | POWERGRID | RRVUNL | Twin Moose | | Conventional | |

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

# National Load Despatch Centre
## Import Capability of Punjab for December 2024

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Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 10300 | 500 | 9800 | 5497 | 4303 | | https://www.punjabsldc.org/ATC_TTC.aspx |
| **Limiting Constraints** | | N-1 contigency of 400/220KV ICT at Rajpura, Ludhiana, Jalandhar, Muktsar<br>Loading close to N-1 contingency limits of 400/220kV Patran, Malerkotla and Patiala ICTs<br>220 kV underlying network at Jalandhar, Ludhiana and Amritsar | | | | | | |

# National Load Despatch Centre
## Import Capability of Uttar Pradesh for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 17300 | 600 | 16700 | 10165 | 6535 | | https://www.upsldc.org/documents/20182/0/ttc_atc_24-11-16/4c79978e-35f2-4aef-8c0f-7f30d878dbde |
| **Limiting Constraints** | N-1 contingency of 400/220kV Obra, Allahabad(PG), Gorakhpur (UP), Agra(PG), Lucknow (PG) ICTs | | | | | | | |

# National Load Despatch Centre
## Import Capability of Haryana for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 10300 | 300 | 10000 | 5418 | 4582 | | https://hvpn.org.in/#/atcttc |
| **Limiting Constraints** | N-1 contingency of 400/220kV ICT at Deepalpur, Hisar, Kabulpur and Panipat(BBMB) | | | | | | | |

# National Load Despatch Centre
## Import Capability of Rajasthan for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 7600 | 600 | 7000 | 5755 | 1245 | | https://sldc.rajasthan.gov.in/rrvpnl/scheduling/downloads |
| **Limiting Constraints** | | N-1 contingency of 400/220kV Heerapura, Jodhpur, Bikaner, Ajmer, Merta, Hindaun and Ratangarh ICTs | | | | | | |

# National Load Despatch Centre
## Import Capability of Delhi for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 7300 | 300 | 7000 | 4810 | 2190 | | https://www.delhisldc.org/resources/atcttcreport.pdf |
| **Limiting Constraints** | N-1 contingency of 400/220kV Mundka, HarshVihar and Bawana (bus-split) ICTs. | | | | | | | |

# National Load Despatch Centre
## Import Capability of Uttarakhand for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 1710 | 100 | 1610 | 1402 | 208 | | https://uksldc.in/ttc-atc |
| **Limiting Constraints** | | N-1 contingency of 400/220kV Kashipur ICTs. High loading of 220kV Roorkee-Roorkee and 220kV CBGanj-Pantnagar lines | | | | | | |

# National Load Despatch Centre
## Import Capability of HP for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 2386 | 100 | 2286 | 1130 | 1156 | | https://hpsldc.com/mrm_category/ttc-atc-report/ |
| **Limiting Constraints** | | Overloading of 2*100MVA Giri transformers | | | | | | |

# National Load Despatch Centre
## Import Capability of J&K for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 3200 | 100 | 3100 | 1977 | 1123 | | |
| **Limiting Constraints** | | N-1 contigency of 400/220KV ICTs at Amargarh<br>220 kV underlying network at Amargarh, Wagoora | | | | | | |

# National Load Despatch Centre
## Import Capability of Chandigarh for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 400 | 20 | 380 | 342 | 38 | | |
| **Limiting Constraints** | | N-1 contigency of 220kV Nallagarh-Kishengarh | | | | | | |

# CENTRAL ELECTRICITY REGULATORY COMMISSION
# (NEW DELHI )

**Suo-Motu Petition No. 9/SM/2024**

**Coram:**
**Shri Jishnu Barua, Chairperson**
**Shri Ramesh Babu V., Member**
**Shri Harish Dudani, Member**

**Date of Order : 7th October, 2024**

**In the matter of :**

**Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023.**

**And in the matter of :**

1. National Load Despatch Centre,
   Grid Controller of India Ltd. (CIN U40105DL2009GOI188682)
   B-9 (1st Floor), Qutab Institutional Area, Katwaria Sarai,
   New Delhi -110016

2. Northern Regional Load Despatch Centre,
   Grid Controller of India Ltd.
   18-A, Shaheed Jeet Singh Sansanwal Marg,
   Katwaria Sarai, New Delhi -110016

3. Western Regional Load Despatch Centre, Mumbai
   Grid Controller of India Ltd.
   F-3, M.I.D.C. Area, Marol Andheri (East),
   Mumbai -400093

4. Southern Regional Load Despatch Centre
   29, Race Course Cross Road,
   Bangalore -560009

5. Eastern Regional Load Despatch Centre, Kolkata
   Grid Controller of India Ltd. 14, Golf Club Road, Tollygunge, Kolkata -700 03

6. North Eastern Load Despatch Centre, Shillong
   Grid Controller of India Ltd.
   Lower, Nongrah, Lapalang, Shillong,
   Meghalaya 793006

7. The Chief Engineer,
   State Load Dispatch Centre,
   SLDC Complex. PSTCL,
   Near 220 kV G/Stn,
   Ablowal, Patiala- 147001

8. The Chief Engineer (LD),
   Electricity Department,
   UT Secretariat,
   Sector - 9D, UT of Chandigarh-160009

9. The Managing Director,
   Himachal Pradesh Power Transmission Corporation Limited,
   Barowalias House,
   Khalini,Shimla-171002

10. The Executive Director,
    State Load Despatch Centre,
    Delhi Transco Ltd, 33kV Substation Building,
    Minto Road, New Delhi, 110002

11. The Superintending Engineer
    State Load Dispatch Centre.
    Rajasthan Rajya Vidua Prasaran Nigam Limited.
    Ajmer Road, Heerapur. Jaipur – 302004

12. The Managing Director,
    Slate Load Despatch Centre,
    Haryana,
    Behind BBMB Power house,
    Sewah, Panipat, Haryana 132103

13. The Chief Engineer
    State Load Despatch Center,
    SLDC Complex TOTU,
    Shimla, Himachal Pradesh-17 10 1 1

14. The Director,
    State Load Despatch Centre,

Uttar Pradesh Power Transmission Corporation Limited (UPPTCL),
Phase II, Vibhuti Khand, Lucknow- 226001

15. The Chief Engineer,
State Load Dispatch Centre,
Vidyut Bhawan, Saharanpur Road Majra,
Near ISBT Dehradun-248001
Uttarakhand

16. The Chief Engineer,
Maharashtra State Load Dispatch Centre,
Thane-Belapur Road. Airoli
Navi Mumbai-400 708

17. The Chief Engineer,
State Load Despatch Centre,
Gujrat Energy Transmission Corporation Limited (GETCO),
GSSC Compound Near TB Hospital,
Gotri Road, Gotri, Vadodara - 390 021

18. The Chief Engineer (LD),
State Load Despatch Centre (SLDC),
Chhattisgarh State Power Transmission Co. Ltd.
Danganiya, Raipur, Chhattisgarh- 492013

19. The Chief Engineer,
State 3 Despatch Centre,
MP Power Transmission Co. Ltd
Nayagaon, Rampur, Jabalpur-482008

20. The Chief Engineer (Electrical),
State Load Despatch Centre (SLDC),
Race Course Cross Road, A. R. Circle, Bengaluru-560009

21. The Chief Engineer,
State Load Despatch Centre (SLDC),
Transmission corporation of Andhra Pradesh Limited (APTRANSCO),
Vidvut Soudha, Gunadala,
Eluru Road Vijayawada, Andhra Pradesh 520004

22. The Chief Engineer/Operation,
State Load Dispatch Centre,
Tamil Nadu Transmission Corporation Limited (TANTRANSCO),
144 Anna Salai, Chennai- 600002

23. The Chief Engineer,

State Load Despatch Centre (SLDC), Transmission Corporation of Telangana Ltd. (TSTRANSCO),
Vidvut Soudha, Khairatabad. Hyderabad- 500 082

24. The Chief Engineer (Transmission- System Operation),
State Load Despatch Centre (SLDC)
Vaidyuthi Bhavanam, Pottam, Trivandrum- 695 009 Kerala

25. The Chief Engineer (TRANS., O&M),
State Load Despatch Center (SLDC),
Bihar State Power Transmission Company Limited (BSPTCL),
4th Floor, Vidyut Bhawan, Bailey Road, Patna-1

26. The Chief Load Despatcher,
State Load Despatch Centre (SLDC),
SLDC Building. GR1DCO Colony,
P.O. Mancheswar Railway Colony,
Bhubaneswar- 751017

27. The Chief Engineer,
State Load Despatch
Center, Jharkhand Urja Sancharan Nigam Limited,
Engineering Building, H.E.C.,
Dhurwa. Ranchi – 834004

28. The Chief Engineer,
West Bengal State Load Despatch Centre WBSLDC),
Danesh Seikh Lane,
Andul Road, Howrah-711109

29. The Additional Chief Engineer,
State Load Despatch Centre (SLDC),
Power Department, Govt. of Sikkim, Gangtok-737201

30. The Chief Engineer,
State Load Despatch Centre (SLDC), Damodar
Valley Corporation (DVC), Danesh Saikh Lane,
Andul Road, Howarh 711109

31. The Executive Engineer (SLDC),
Department of Power,
Government of Arunachal Pradesh,
National Highway 52A,Vidyut Bhawan, Itanagar-791111

32. The Asst. General Manager,
SLDC Division,
Assam Electricity Grid Corporation Ltd.,

ASEB Colony, Power House Kahilipara,
Guwahati-781 019

33. The Superintending Engineer,
P&E Office Complex, North Block (III Floor)
Electric Veng, Aizawl- 796001, Mizoram.

34. The Superintending Engineer,
Load Despatch Centre
Meghalaya Power Transmission Corporation Limited,
Short Round Road,
Lum Jingshai, Meghalaya, Shillong 793022.

35. The Chief Engineer,
Department of Power Govt. of Nagaland, Kohima-797 001

36. The General Manager, State Load Despatch Centre
Manipur State Power Company Ltd (MSPCL)
Electricity Complex, Keisumphat Junction,
Imphal-795001, Manipur.

37. The Director (Tech.),
Tripura State Electricity Corporation Ltd (TSECL),
Banamalipur, Agartala -799 001

38. Northern Regional Power Committee, New Delhi
Shaheed Jeet Singh Marg,
Qutab Institutional Area,
New Delhi -110016

39. Western Regional Power Committee, Mumbai
M.I.D.C. Central Road,
Krantiveer Lakhuji Salve Marg, Seepz,
Andheri East, Mumbai, Maharashtra-400093

40. Southern Regional Power Committee,
29, Race Course Rd, Nehru Nagar,
Gandhi Nagar, Bengaluru,
Karnataka 560009

41. Eastern Regional Power Committee, Kolkata
14, Golf Club Rd, Golf Gardens,
Tollygunge, Kolkata,
West Bengal- 70003316

42. North Eastern Regional Power Committee,
Jowai Rd, Umpling, Shillong,

Meghalaya-793006

43. Central Electricity Authority,
Sewa Bhawan, R. K. Puram, Sector-1,
New Delhi ....**Respondents**

## ORDER

This Commission, in the exercise of the powers conferred under Section 178 read with Section 79(1)(h) of the Electricity Act, 2003 (hereinafter referred to as "the Act"), has specified CERC (Indian Electricity Grid Code), Regulations 2023 (hereinafter referred as "the Grid Code") on 29.05.2023 effective from 1.10.2023. Section 28(2) of the Act provides that the Regional Load Despatch Centre shall comply with such principles, guidelines and methodologies in respect of wheeling and optimum scheduling and despatch of electricity as the Central Commission may specify in the Grid Code. Section 29(1) of the Act provides that the Regional Load Despatch Centre shall issue such directions and exercise such supervision and control as may be required for ensuring the stability of the grid operation and for achieving the maximum economy and efficiency in the operation of the power system in the region under its control. Section 33(3) of the Act provides that the State Load Despatch Centre shall comply with the directions of the Regional Load Despatch Centre ("RLDC"). Section 29(4) of the Act provides that the Regional Power Committee in the region may, from time to time, agree on matters concerning the stability and smooth operation of the integrated grid and the economy and efficiency of the power system within the region. Therefore, the Act envisages and assigns responsibilities to the

Regional Load Despatch Centres and State Load Despatch Centres as apex bodies at the regional level and state level, respectively, to ensure safe, secure, stable, and integrated operation of the power system in the respective region or the state, as the case may be, and to the Regional Power Committees to coordinate among the constituents in their respective regions to achieve agreement with regard to stability and smooth operation of the integrated grid.

2. Regulation 31 of the Grid Code provides for the time horizon for operational planning, demand estimation, generation estimation, and adequacy of resources for the purpose of operational planning in the following manner: -

(a) For operational planning, National Load Despatch Centre, Regional Load Despatch Centres, and State Load Despatch Centres have been assigned the responsibility to carry out operational planning within their respective control areas on Intra-day, Day Ahead, and Weekly time horizons.

(b) For demand estimation, the State Load Despatch Centres are mandated to carry out demand estimation as part of operational planning for both active power and reactive power incidents on the transmission systems based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State and to estimate the peak and off-peak demand on a weekly and monthly basis for load - generation balance planning as well as for operational planning. Based on the demand estimate furnished by SLDCs and other entities directly connected to the ISTS, RLDCs shall prepare regional

demand estimates based on which NLDC shall prepare national demand estimates.

(c) For generation estimation, RLDCs have been mandated to forecast generation from wind, solar, ESS, and renewable energy hybrid generating stations, which are regional entities, and SLDCs have been mandated to forecast generation from such resources which are intra-State entities for different time horizons, for the purpose of operational planning.

(d) SLDCs are required to estimate and ensure adequacy of resources, identify generation, demand response capacity, and generation flexibility requirements, and furnish time block-wise information for the following day in respect of all intra-State entities to the concerned RLDCs who shall validate the adequacy of resources with due regard to the aggregated demand forecast for the control area, renewable energy generation forecast for the control area, injection schedule of intra-State entity generating stations, requisition from regional entity generating stations, secondary and planned procurement through tertiary reserve requirements, and planned procurement through bilateral or collective transactions.

3. Regulation 33 provides that based on the operational planning analysis data, NLDC, RLDCs, and SLDCs shall carry out operational planning studies in real time, intra-day, day-ahead, and weekly basis, and RPCs shall carry out operational planning studies on monthly/yearly basis. This Regulation further provides that operational studies shall be carried out to assess whether the planned operations would result in

deviations from any of the operational limits defined under the Grid Code and applicable standards issued by the Central Electricity Authority. Regulation 33 further enjoins upon Regional Power Committees to monitor significant deviations for early resolution. NLDCs, RLDCs, RPCs, and SLDCs are required to develop operating plans to address potential deviation from system operational limits identified as a result of the operational planning study and communicate the same to the users in advance for taking corrective measures. The detailed reasons and explanations given by the users shall be discussed in the monthly operation sub-committee of the respective regions, and quarterly reports shall be submitted by RPCs to the Commission and CEA.

4. An extract of Regulations 31 and 33 of the Grid Code is enclosed in this order for the convenience of reference.

5. The Commission sought details of the load-generation scenario for the months of September and October 2024 from NLDC, followed by meetings of the Commission with the officers of NLDC. NLDC has submitted forecast scenarios for the months of September 24 and October 2024. The NLDC has also conducted the meeting of the Forum of Load Despatchers to ensure the proper projection of demand by the State Load Despatch Centre. We have considered the peak demand forecast for the month of October 2024. A summary of these scenarios is as under:-

**Table 1: Peak demand forecast and load generation balance during Oct-24**

*(in GW)*

| | Oct-24 |
|---|---|
| **Demand Forecast** | |
| Peak Demand forecast | 230 |
| Peak Demand (including ISTS losses) forecast | 232.2 |
| Available generation (other than thermal generation) | 59.4 |
| Ex-bus Thermal Requirement (without reserve) | 172.8 |
| Gross Thermal Requirement (without reserve) | 187.9 |
| **Estimated Thermal Generation** | |
| Net available thermal capacity | 182.20 |
| **Availability of generation required** | |
| Additional generation required | 5.7 |
| Additional generation required (with reserve 3% of peak demand) | 12.60 |

It is observed from the above table that the projected load generation balance based on peak demand during October 2024 indicates the requirement for additional generation. The rise in demand during solar generation hours can be met from renewable generation provided the solar generation is as per the past trends. However, during non-solar hours (including evening and morning peaks), there is a requirement of additional requirement of Generation resources of about 12.60 GW with a reserve requirement of 3% to meet contingency.

6. The Grid Code enjoins the responsibility upon all concerned stakeholders to ensure stable and economic operation of power system and resolve the issues of significant deviations, if any. The Commission, taking cognizance of the previous year's record, intends to impress upon all the stakeholders that there is an imperative need for prudent planning of load generation balance and issue of alerts to all the grid-connected user entities of the concerned control areas to make them aware about the

anticipated challenges in the operation of the power system and for undertaking the preventive measures as may be required to maintain load generation balance.

7. The Commission is of the view that there is a need to sensitize all the stakeholders, monitor their actions, and bring about behavioural changes through specific and proactive regulatory interventions The Commission believes that it is advisable to take preventive *ex-ante* measures instead of the ex-post reactive measures of finding instances of violation of the Grid Code, initiating penal proceedings for violation, and imposing penalty under the provisions of the Act. This proactive approach would also help to encourage collective efforts on the part of the National Load Despatch Centre, Regional Load Despatch Centres, State Load Despatch Centres, and the grid connected entities to make concerted efforts to ensure stable and economic operation of the grid.

8. The projected requirement of generation is significantly higher than the annual growth of the electricity demand and the addition of generation capacity. The projected requirement of thermal generation during October, 2024 needs proper operational planning and adequacy of resources in terms of Regulation 31(4) of the Grid Code. Any uncertain variation in the electricity demand arising on account of seasonal variations leading to a rapid increase in demand causes undesirable stress in the power system. The steep rise in electricity demand without adequate generation sources may put the power system operation at risk. It is the statutory responsibility of the RLDCs and SLDCs to carry out the operational planning for the increase in demand due to seasonal variations while discharging their functions under Sections 28

and 32 of the Act, respectively, read with the provisions of Regulations 31 and 33 of the Grid Code. 12. In light of the above, the Commission feels that there is a need to prepare the system operators and the stakeholders to meet the situation arising out of the abrupt increase in demand due to seasonal variations, especially during October 2024. Regulation 60 of the Grid Code empowers the Commission to issue practice directions through suo-moto proceedings with regard to implementation of the provisions of the said Regulations. Regulation 60 of the Grid Code is extracted as under:-

> *"60. Issue of Suo Motu Orders and Directions*
>
> *The Commission may from time to time issue suo motu orders and practice directions with regard to implementation of these regulations and matters incidental or ancillary thereto, as the case may be."*

9. In exercise of the powers vested under Regulation 60, read with all relevant provisions of the Grid Code, the Commission issues the following directions to NLDC, RLDCs, and SLDCs in connection with the implementation of Regulations 31 and 33 of the Grid Code to address the anticipated surge in demand of electricity during October 2024 on account of seasonal variations:

a) All the State Load Despatch Centres and RLDCs shall furnish the details of operational planning undertaken by them in terms of Regulation 31(4) (a) of the Grid Code especially for October 2024. RLDC shall validate the adequacy of resources in terms of Regulation 31(4)(b) of the Grid Code.
b) All State Load Despatch Centres and Regional Load Despatch Centres shall prepare the worst-case scenario due to possible surge in demand during the

period 1.10.2024 to 31.10.2024 in their respective control area and submit within seven days to the Commission with a copy to National Load Despatch Centre.

c) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, should assess their demand-generation scenario in the upcoming months, ensure the optimum generation, avoid undesirable planned outages, and advise the generating company to offer their availability. The State Load Despatch Centre or Regional Load Despatch Centre shall ensure the optimum scheduling during the shortage period and surplus power to get despatched during the deficit period.

d) The Distribution Companies, in case of a shortage scenario, can procure the power from surplus or requisitioned capacity of other states so that optimum despatch can be ensured for safe and reliable power system operations. The State Load Despatch Centre shall monitor the generation-demand deficit of the respective distribution companies.

e) The generating companies operating their plant with capacity less than its installed capacity due to technical issues, i.e., capacity under partial outage or forced outage, are advised to fix the issues to ensure the maximum generation capacity on-bar.

f) The draw schedule of the respective control area needs to adhere to prevent the reduction of system frequency. The State Load Despatch Centre or Regional Load Despatch Centre, as the case may be, shall monitor the deviation of the key system parameters.

g) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, shall issue the system alerts to their respective grid-connected entities for the possible deficit during the likely surge in demand.

10. The Regional Load Despatch Centres and State Load Despatch Centres shall submit the report on the implementation of the above measures, a load-generation scenario in their respective control areas, and any other measures taken to address the deficit of power supply during the period 1.10.2024 to 31.10.2024.

11. The objective of the present proceedings is to prepare the system operators and other stakeholders to meet the challenges and threats to the power system that may arise due to the abrupt increase in demand. The responses of the SLDCs, RLDCs, and NLDC with regard to the implementation of the measures detailed in para 9 of this order shall, in the first instance, be examined in detail by a Single-Member Bench comprising a Member of the Commission. Accordingly, in the exercise of powers under Section 97 of the Electricity Act,2003, the Commission nominates Shri Ramesh Babu V., Member, to conduct the proceedings for this purpose. The Single Member Bench shall provide due opportunity to the parties to make their submissions. The Single Member Bench shall have the authority to direct the parties to submit such further information and to take such remedial measures as may be considered necessary. The Single Member Bench shall submit a report to the Commission with regard to the preparedness of the System Operators and other stakeholders to meet the challenges arising on account of the sudden surge in demand for power and his recommendations with regard to the remedial measures to be taken for the future. The

Commission, after consideration of the report of the Single Member Bench shall issue appropriate directions as may be considered appropriate.

12. NLDC, RLDCs, and SLDCs are directed to submit their responses to the measures contained in para 9 of this order by 16.10.2024.

| | | |
|---|---|---|
| **Sd./-** | **Sd./-** | **Sd./-** |
| **(Shri Harish Dudani)** | **(Shri Ramesh Babu V)** | **(Shri Jishnu Barua)** |
| **Member** | **Member** | **Chairperson** |

# Extract of Regulation 31 and 33 of the Grid Code

## 31. OPERATIONAL PLANNING

(1) Time Horizon

(a) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas with Monthly and Yearly time horizons in co-ordination with CTU, RPCs or STUs, as applicable.

(b) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas on Intra-day, Day Ahead, Weekly time horizons.

(c) RLDCs in consultation with NLDC shall issue procedures and formats for data collection to carry out:

(i) Operational planning analysis,

(ii) Real-time monitoring,

(iii) Real-time assessments.

(d) SLDC may also issue procedures and formats for data collection for the above purposes.

(2) Demand Estimation

(a) Each SLDC shall carry out demand estimation as part of operational planning after duly factoring in the demand estimation done by STU as part of resource adequacy planning referred to in Chapter 2 of these regulations. Demand estimation by SLDC shall be for both active power and reactive power incidents on the transmission system based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State.

(b) Each SLDC shall develop methodology for daily, weekly, monthly, yearly demand estimation in MW and MWh for operational analysis as well as resource adequacy purposes. Each SLDC, while estimating demand may utilize state of the art tools, weather data, historical data and any other data. For this purpose, all distribution licensees shall maintain a historical database of demand.

(c) The demand estimation by each SLDC shall be done on day ahead basis with time block wise granularity for the daily operation and scheduling. In case SLDC observes a major change in demand in real time for the day, it shall immediately submit the revised demand estimate to the concerned RLDC for demand estimate correction.

(d) Each SLDC shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVA on a monthly and quarterly basis for the nodes 110 kV and above for the preparation of scenarios for computation of TTC and ATC by the concerned RLDC and NLDC.

(e) SLDC shall also estimate peak and off-peak demand (active as well as reactive power) on a weekly and monthly basis for load - generation balance planning as well as for operational planning analysis, which shall be a part of the operational planning data. The demand estimates mentioned above shall have granularity of a time block. The estimate shall cover the load incident on the grid as well as the net load incident taking into account embedded generation in the form of roof-top solar and other distributed generation.

(f) The entities such as bulk consumers or distribution licensees that are directly connected to ISTS shall estimate and furnish such a demand estimate to the concerned RLDC.

(g) Based on the demand estimate furnished by the SLDCs and other entities directly connected to ISTS, each RLDC shall prepare the regional demand estimate and submit it to the NLDC. NLDC, based on regional demand estimates furnished by RLDCs, shall prepare national demand estimate.

(h) Timeline for submission of demand estimate data by SLDCs or other entities directly connected to ISTS, as applicable, to the respective RLDC and RPC shall be as follows:

(i) SLDCs, RLDCs and NLDC shall compute forecasting error for intra-day, dayahead, weekly, monthly and yearly forecasts and analyse the same in order to reduce forecasting error in the future. The computed forecasting errors shall be made available by SLDCs, RLDCs and NLDC on their respective websites.

(3) Generation Estimation

(a) The modalities of generation estimation by entities shall be as per the Procedure referred to in sub-clause (c) of clause (1) of Regulation 31 of these regulations.

(b) RLDC shall forecast generation from wind, solar, ESS and Renewable Energy hybrid generating stations that are regional entities and SLDC shall forecast generation from such sources that are intra-state entities, for different time horizons as referred to in clause (1) of Regulation 31 of these regulations for the purpose of operational planning.

(4) Adequacy of Resources

(a) SLDCs shall estimate and ensure the adequacy of resources, identify generation reserves, demand response capacity and generation flexibility requirements with due regard to the resource adequacy framework as specified under Chapter 2 of these regulations.

(b) SLDCs shall furnish time block-wise information for the following day in respect of all intra-state entities to the concerned RLDC who shall validate the adequacy of resources with due regard to the following:

(i) Demand forecast aggregated for the control area;

(ii) Renewable energy generation forecast for the control area;

(iii) Injection schedule for intra-State entity generating station;

(iv) Requisition from regional entity generating stations;

(v) Secondary and planned procurement through Tertiary reserve requirement;

(vi) Planned procurement of power through other bilateral or collective transactions, if any.

**33. OPERATIONAL PLANNING STUDY**

(1) Based on the operational planning analysis data, operational planning study shall be carried out by various agencies for time horizons as under:

(2) SLDCs, RLDCs and NLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study. All users shall make available at all times real time error free operational data for the successful execution of network analysis using EMS/SCADA. Failure to make available such data shall be immediately reported to the concerned SLDC, the concerned RLDC and NLDC along with a firm timeline for restoration. The performance of online network estimation tools at SLDC and RLDC shall be reviewed in the monthly operational meeting of RPC. Any telemetry related issues impacting the online network estimation tool shall be monitored by RPC for their early resolution.

(3) SLDCs shall perform day-ahead, weekly, monthly and yearly operational studies for the concerned State for:

(a) assessment and declaration of total transfer capability (TTC) and available transfer capability (ATC) for the import or export of electricity by the State. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on SLDC website with all the assumptions and limiting constraints;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant in operational scenario.

(4) RLDCs and NLDC shall perform day-ahead, weekly, monthly and yearly operational studies for:

(a) assessment of TTC and ATC at inter-regional, intra-regional, and inter-state levels;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant to operational scenarios

(5) RLDC shall assess intra-regional and inter-state level TTC and ATC and submit them to NLDC. NLDC shall declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, and crossborder interconnections 11 (Eleven) months in advance for each month on a rolling basis. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on the websites of the NLDC and respective RLDCs with all the assumptions and limiting constraints

(6) Operational planning study shall be done to assess whether the planned operations shall result in deviations from any of the system operational limits defined under these regulations and applicable CEA Standards. The deviations, if

any, shall be reviewed in the monthly operational meeting of RPC and significant deviations shall be monitored by RPC for early resolution.

(7) NLDC, RLDCs, RPCs and SLDCs shall maintain records of the completed operational planning study, including date specific power flow study results, the operational plan and minutes of meetings on operational study.

(8) NLDC, RLDCs, RPCs and SLDCs shall have operating plans to address potential deviations from system operational limit identified as a result of the operational planning study. These operating plans shall be communicated to users in advance so that they can take corrective measures. In case any user is unable to adhere to such an operating plan, it shall inform the respective SLDC, RLDC and NLDC in advance with detailed reasons and explanations for the non-adherence. These detailed reasons and explanations shall be discussed in the monthly operation sub-committee of the respective region and a quarterly report shall be submitted by the respective RPC to the Commission and CEA.

(9) Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.

(10) Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intrastate system on the inter-state system and share the results of the studies with NLDC

(11) NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intraregional system on the inter-regional system.

(12) NLDC, RLDCs and SLDCs shall compare the results of the studies of the impact of new elements on the system and transfer capability addition with those of the interconnection and planning studies by CTU and STUs, and any significant

variations observed shall be communicated to CEA, RPCs, CTU and STUs for immediate and long-term mitigation measures.

(13) Defense mechanisms like system protection scheme, load-rejection scheme, generation run-back, islanding scheme or any other scheme for system security shall be proposed by the concerned user or SLDC or RLDC or NLDC and shall be deployed as finalized by the respective RPC.

# CENTRAL ELECTRICITY REGULATORY COMMISSION
# (NEW DELHI )

**Suo-Motu Petition No. 9/SM/2024**

**Coram:**
**Shri Jishnu Barua, Chairperson**
**Shri Ramesh Babu V., Member**
**Shri Harish Dudani, Member**

**Date of Order : 7th October, 2024**

**In the matter of :**

**Planning for safe, secure, and reliable integrated operation of the power system during critical periods arising on account of seasonal variations wherein the electricity demand increases rapidly by undertaking specific measures to mitigate the risks on the power system, under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003 and the Regulation 31 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023.**

**And in the matter of :**

1. National Load Despatch Centre,
   Grid Controller of India Ltd. (CIN U40105DL2009GOI188682)
   B-9 (1st Floor), Qutab Institutional Area, Katwaria Sarai,
   New Delhi -110016

2. Northern Regional Load Despatch Centre,
   Grid Controller of India Ltd.
   18-A, Shaheed Jeet Singh Sansanwal Marg,
   Katwaria Sarai, New Delhi -110016

3. Western Regional Load Despatch Centre, Mumbai
   Grid Controller of India Ltd.
   F-3, M.I.D.C. Area, Marol Andheri (East),
   Mumbai -400093

4. Southern Regional Load Despatch Centre
   29, Race Course Cross Road,
   Bangalore -560009

5. Eastern Regional Load Despatch Centre, Kolkata
   Grid Controller of India Ltd. 14, Golf Club Road, Tollygunge, Kolkata -700 03

6. North Eastern Load Despatch Centre, Shillong
   Grid Controller of India Ltd.
   Lower, Nongrah, Lapalang, Shillong,
   Meghalaya 793006

7. The Chief Engineer,
   State Load Dispatch Centre,
   SLDC Complex. PSTCL,
   Near 220 kV G/Stn,
   Ablowal, Patiala- 147001

8. The Chief Engineer (LD),
   Electricity Department,
   UT Secretariat,
   Sector - 9D, UT of Chandigarh-160009

9. The Managing Director,
   Himachal Pradesh Power Transmission Corporation Limited,
   Barowalias House,
   Khalini,Shimla-171002

10. The Executive Director,
    State Load Despatch Centre,
    Delhi Transco Ltd, 33kV Substation Building,
    Minto Road, New Delhi, 110002

11. The Superintending Engineer
    State Load Dispatch Centre.
    Rajasthan Rajya Vidua Prasaran Nigam Limited.
    Ajmer Road, Heerapur. Jaipur – 302004

12. The Managing Director,
    Slate Load Despatch Centre,
    Haryana,
    Behind BBMB Power house,
    Sewah, Panipat, Haryana 132103

13. The Chief Engineer
    State Load Despatch Center,
    SLDC Complex TOTU,
    Shimla, Himachal Pradesh-17 10 1 1

14. The Director,
    State Load Despatch Centre,

Uttar Pradesh Power Transmission Corporation Limited (UPPTCL),
Phase II, Vibhuti Khand, Lucknow- 226001

15. The Chief Engineer,
State Load Dispatch Centre,
Vidyut Bhawan, Saharanpur Road Majra,
Near ISBT Dehradun-248001
Uttarakhand

16. The Chief Engineer,
Maharashtra State Load Dispatch Centre,
Thane-Belapur Road. Airoli
Navi Mumbai-400 708

17. The Chief Engineer,
State Load Despatch Centre,
Gujrat Energy Transmission Corporation Limited (GETCO),
GSSC Compound Near TB Hospital,
Gotri Road, Gotri, Vadodara - 390 021

18. The Chief Engineer (LD),
State Load Despatch Centre (SLDC),
Chhattisgarh State Power Transmission Co. Ltd.
Danganiya, Raipur, Chhattisgarh- 492013

19. The Chief Engineer,
State 3 Despatch Centre,
MP Power Transmission Co. Ltd
Nayagaon, Rampur, Jabalpur-482008

20. The Chief Engineer (Electrical),
State Load Despatch Centre (SLDC),
Race Course Cross Road, A. R. Circle, Bengaluru-560009

21. The Chief Engineer,
State Load Despatch Centre (SLDC),
Transmission corporation of Andhra Pradesh Limited (APTRANSCO),
Vidvut Soudha, Gunadala,
Eluru Road Vijayawada, Andhra Pradesh 520004

22. The Chief Engineer/Operation,
State Load Dispatch Centre,
Tamil Nadu Transmission Corporation Limited (TANTRANSCO),
144 Anna Salai, Chennai- 600002

23. The Chief Engineer,

State Load Despatch Centre (SLDC), Transmission Corporation of Telangana Ltd. (TSTRANSCO),
Vidvut Soudha, Khairatabad. Hyderabad- 500 082

24. The Chief Engineer (Transmission- System Operation),
State Load Despatch Centre (SLDC)
Vaidyuthi Bhavanam, Pottam, Trivandrum- 695 009 Kerala

25. The Chief Engineer (TRANS., O&M),
State Load Despatch Center (SLDC),
Bihar State Power Transmission Company Limited (BSPTCL),
4th Floor, Vidyut Bhawan, Bailey Road, Patna-1

26. The Chief Load Despatcher,
State Load Despatch Centre (SLDC),
SLDC Building. GR1DCO Colony,
P.O. Mancheswar Railway Colony,
Bhubaneswar- 751017

27. The Chief Engineer,
State Load Despatch
Center, Jharkhand Urja Sancharan Nigam Limited,
Engineering Building, H.E.C.,
Dhurwa. Ranchi – 834004

28. The Chief Engineer,
West Bengal State Load Despatch Centre WBSLDC),
Danesh Seikh Lane,
Andul Road, Howrah-711109

29. The Additional Chief Engineer,
State Load Despatch Centre (SLDC),
Power Department, Govt. of Sikkim, Gangtok-737201

30. The Chief Engineer,
State Load Despatch Centre (SLDC), Damodar
Valley Corporation (DVC), Danesh Saikh Lane,
Andul Road, Howarh 711109

31. The Executive Engineer (SLDC),
Department of Power,
Government of Arunachal Pradesh,
National Highway 52A,Vidyut Bhawan, Itanagar-791111

32. The Asst. General Manager,
SLDC Division,
Assam Electricity Grid Corporation Ltd.,

ASEB Colony, Power House Kahilipara,
Guwahati-781 019

33. The Superintending Engineer,
P&E Office Complex, North Block (III Floor)
Electric Veng, Aizawl- 796001, Mizoram.

34. The Superintending Engineer,
Load Despatch Centre
Meghalaya Power Transmission Corporation Limited,
Short Round Road,
Lum Jingshai, Meghalaya, Shillong 793022.

35. The Chief Engineer,
Department of Power Govt. of Nagaland, Kohima-797 001

36. The General Manager, State Load Despatch Centre
Manipur State Power Company Ltd (MSPCL)
Electricity Complex, Keisumphat Junction,
Imphal-795001, Manipur.

37. The Director (Tech.),
Tripura State Electricity Corporation Ltd (TSECL),
Banamalipur, Agartala -799 001

38. Northern Regional Power Committee, New Delhi
Shaheed Jeet Singh Marg,
Qutab Institutional Area,
New Delhi -110016

39. Western Regional Power Committee, Mumbai
M.I.D.C. Central Road,
Krantiveer Lakhuji Salve Marg, Seepz,
Andheri East, Mumbai, Maharashtra-400093

40. Southern Regional Power Committee,
29, Race Course Rd, Nehru Nagar,
Gandhi Nagar, Bengaluru,
Karnataka 560009

41. Eastern Regional Power Committee, Kolkata
14, Golf Club Rd, Golf Gardens,
Tollygunge, Kolkata,
West Bengal- 70003316

42. North Eastern Regional Power Committee,
Jowai Rd, Umpling, Shillong,

Meghalaya-793006

43. Central Electricity Authority,
Sewa Bhawan, R. K. Puram, Sector-1,
New Delhi ....**Respondents**

## ORDER

This Commission, in the exercise of the powers conferred under Section 178 read with Section 79(1)(h) of the Electricity Act, 2003 (hereinafter referred to as "the Act"), has specified CERC (Indian Electricity Grid Code), Regulations 2023 (hereinafter referred as "the Grid Code") on 29.05.2023 effective from 1.10.2023. Section 28(2) of the Act provides that the Regional Load Despatch Centre shall comply with such principles, guidelines and methodologies in respect of wheeling and optimum scheduling and despatch of electricity as the Central Commission may specify in the Grid Code. Section 29(1) of the Act provides that the Regional Load Despatch Centre shall issue such directions and exercise such supervision and control as may be required for ensuring the stability of the grid operation and for achieving the maximum economy and efficiency in the operation of the power system in the region under its control. Section 33(3) of the Act provides that the State Load Despatch Centre shall comply with the directions of the Regional Load Despatch Centre ("RLDC"). Section 29(4) of the Act provides that the Regional Power Committee in the region may, from time to time, agree on matters concerning the stability and smooth operation of the integrated grid and the economy and efficiency of the power system within the region. Therefore, the Act envisages and assigns responsibilities to the

Regional Load Despatch Centres and State Load Despatch Centres as apex bodies at the regional level and state level, respectively, to ensure safe, secure, stable, and integrated operation of the power system in the respective region or the state, as the case may be, and to the Regional Power Committees to coordinate among the constituents in their respective regions to achieve agreement with regard to stability and smooth operation of the integrated grid.

2. Regulation 31 of the Grid Code provides for the time horizon for operational planning, demand estimation, generation estimation, and adequacy of resources for the purpose of operational planning in the following manner: -

(a) For operational planning, National Load Despatch Centre, Regional Load Despatch Centres, and State Load Despatch Centres have been assigned the responsibility to carry out operational planning within their respective control areas on Intra-day, Day Ahead, and Weekly time horizons.

(b) For demand estimation, the State Load Despatch Centres are mandated to carry out demand estimation as part of operational planning for both active power and reactive power incidents on the transmission systems based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State and to estimate the peak and off-peak demand on a weekly and monthly basis for load - generation balance planning as well as for operational planning. Based on the demand estimate furnished by SLDCs and other entities directly connected to the ISTS, RLDCs shall prepare regional

demand estimates based on which NLDC shall prepare national demand estimates.

(c) For generation estimation, RLDCs have been mandated to forecast generation from wind, solar, ESS, and renewable energy hybrid generating stations, which are regional entities, and SLDCs have been mandated to forecast generation from such resources which are intra-State entities for different time horizons, for the purpose of operational planning.

(d) SLDCs are required to estimate and ensure adequacy of resources, identify generation, demand response capacity, and generation flexibility requirements, and furnish time block-wise information for the following day in respect of all intra-State entities to the concerned RLDCs who shall validate the adequacy of resources with due regard to the aggregated demand forecast for the control area, renewable energy generation forecast for the control area, injection schedule of intra-State entity generating stations, requisition from regional entity generating stations, secondary and planned procurement through tertiary reserve requirements, and planned procurement through bilateral or collective transactions.

3. Regulation 33 provides that based on the operational planning analysis data, NLDC, RLDCs, and SLDCs shall carry out operational planning studies in real time, intra-day, day-ahead, and weekly basis, and RPCs shall carry out operational planning studies on monthly/yearly basis. This Regulation further provides that operational studies shall be carried out to assess whether the planned operations would result in

deviations from any of the operational limits defined under the Grid Code and applicable standards issued by the Central Electricity Authority. Regulation 33 further enjoins upon Regional Power Committees to monitor significant deviations for early resolution. NLDCs, RLDCs, RPCs, and SLDCs are required to develop operating plans to address potential deviation from system operational limits identified as a result of the operational planning study and communicate the same to the users in advance for taking corrective measures. The detailed reasons and explanations given by the users shall be discussed in the monthly operation sub-committee of the respective regions, and quarterly reports shall be submitted by RPCs to the Commission and CEA.

4. An extract of Regulations 31 and 33 of the Grid Code is enclosed in this order for the convenience of reference.

5. The Commission sought details of the load-generation scenario for the months of September and October 2024 from NLDC, followed by meetings of the Commission with the officers of NLDC. NLDC has submitted forecast scenarios for the months of September 24 and October 2024. The NLDC has also conducted the meeting of the Forum of Load Despatchers to ensure the proper projection of demand by the State Load Despatch Centre. We have considered the peak demand forecast for the month of October 2024. A summary of these scenarios is as under:-

**Table 1: Peak demand forecast and load generation balance during Oct-24**

*(in GW)*

| | Oct-24 |
|---|---|
| **Demand Forecast** | |
| Peak Demand forecast | 230 |
| Peak Demand (including ISTS losses) forecast | 232.2 |
| Available generation (other than thermal generation) | 59.4 |
| Ex-bus Thermal Requirement (without reserve) | 172.8 |
| Gross Thermal Requirement (without reserve) | 187.9 |
| **Estimated Thermal Generation** | |
| Net available thermal capacity | 182.20 |
| **Availability of generation required** | |
| Additional generation required | 5.7 |
| Additional generation required (with reserve 3% of peak demand) | 12.60 |

It is observed from the above table that the projected load generation balance based on peak demand during October 2024 indicates the requirement for additional generation. The rise in demand during solar generation hours can be met from renewable generation provided the solar generation is as per the past trends. However, during non-solar hours (including evening and morning peaks), there is a requirement of additional requirement of Generation resources of about 12.60 GW with a reserve requirement of 3% to meet contingency.

6. The Grid Code enjoins the responsibility upon all concerned stakeholders to ensure stable and economic operation of power system and resolve the issues of significant deviations, if any. The Commission, taking cognizance of the previous year's record, intends to impress upon all the stakeholders that there is an imperative need for prudent planning of load generation balance and issue of alerts to all the grid-connected user entities of the concerned control areas to make them aware about the

anticipated challenges in the operation of the power system and for undertaking the preventive measures as may be required to maintain load generation balance.

7. The Commission is of the view that there is a need to sensitize all the stakeholders, monitor their actions, and bring about behavioural changes through specific and proactive regulatory interventions The Commission believes that it is advisable to take preventive *ex-ante* measures instead of the ex-post reactive measures of finding instances of violation of the Grid Code, initiating penal proceedings for violation, and imposing penalty under the provisions of the Act. This proactive approach would also help to encourage collective efforts on the part of the National Load Despatch Centre, Regional Load Despatch Centres, State Load Despatch Centres, and the grid connected entities to make concerted efforts to ensure stable and economic operation of the grid.

8. The projected requirement of generation is significantly higher than the annual growth of the electricity demand and the addition of generation capacity. The projected requirement of thermal generation during October, 2024 needs proper operational planning and adequacy of resources in terms of Regulation 31(4) of the Grid Code. Any uncertain variation in the electricity demand arising on account of seasonal variations leading to a rapid increase in demand causes undesirable stress in the power system. The steep rise in electricity demand without adequate generation sources may put the power system operation at risk. It is the statutory responsibility of the RLDCs and SLDCs to carry out the operational planning for the increase in demand due to seasonal variations while discharging their functions under Sections 28

and 32 of the Act, respectively, read with the provisions of Regulations 31 and 33 of the Grid Code. 12. In light of the above, the Commission feels that there is a need to prepare the system operators and the stakeholders to meet the situation arising out of the abrupt increase in demand due to seasonal variations, especially during October 2024. Regulation 60 of the Grid Code empowers the Commission to issue practice directions through suo-moto proceedings with regard to implementation of the provisions of the said Regulations. Regulation 60 of the Grid Code is extracted as under:-

> *"60. Issue of Suo Motu Orders and Directions*
>
> *The Commission may from time to time issue suo motu orders and practice directions with regard to implementation of these regulations and matters incidental or ancillary thereto, as the case may be."*

9. In exercise of the powers vested under Regulation 60, read with all relevant provisions of the Grid Code, the Commission issues the following directions to NLDC, RLDCs, and SLDCs in connection with the implementation of Regulations 31 and 33 of the Grid Code to address the anticipated surge in demand of electricity during October 2024 on account of seasonal variations:

a) All the State Load Despatch Centres and RLDCs shall furnish the details of operational planning undertaken by them in terms of Regulation 31(4) (a) of the Grid Code especially for October 2024. RLDC shall validate the adequacy of resources in terms of Regulation 31(4)(b) of the Grid Code.
b) All State Load Despatch Centres and Regional Load Despatch Centres shall prepare the worst-case scenario due to possible surge in demand during the

period 1.10.2024 to 31.10.2024 in their respective control area and submit within seven days to the Commission with a copy to National Load Despatch Centre.

c) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, should assess their demand-generation scenario in the upcoming months, ensure the optimum generation, avoid undesirable planned outages, and advise the generating company to offer their availability. The State Load Despatch Centre or Regional Load Despatch Centre shall ensure the optimum scheduling during the shortage period and surplus power to get despatched during the deficit period.

d) The Distribution Companies, in case of a shortage scenario, can procure the power from surplus or requisitioned capacity of other states so that optimum despatch can be ensured for safe and reliable power system operations. The State Load Despatch Centre shall monitor the generation-demand deficit of the respective distribution companies.

e) The generating companies operating their plant with capacity less than its installed capacity due to technical issues, i.e., capacity under partial outage or forced outage, are advised to fix the issues to ensure the maximum generation capacity on-bar.

f) The draw schedule of the respective control area needs to adhere to prevent the reduction of system frequency. The State Load Despatch Centre or Regional Load Despatch Centre, as the case may be, shall monitor the deviation of the key system parameters.

g) The State Load Despatch Centres or Regional Load Despatch Centres, as the case may be, shall issue the system alerts to their respective grid-connected entities for the possible deficit during the likely surge in demand.

10. The Regional Load Despatch Centres and State Load Despatch Centres shall submit the report on the implementation of the above measures, a load-generation scenario in their respective control areas, and any other measures taken to address the deficit of power supply during the period 1.10.2024 to 31.10.2024.

11. The objective of the present proceedings is to prepare the system operators and other stakeholders to meet the challenges and threats to the power system that may arise due to the abrupt increase in demand. The responses of the SLDCs, RLDCs, and NLDC with regard to the implementation of the measures detailed in para 9 of this order shall, in the first instance, be examined in detail by a Single-Member Bench comprising a Member of the Commission. Accordingly, in the exercise of powers under Section 97 of the Electricity Act,2003, the Commission nominates Shri Ramesh Babu V., Member, to conduct the proceedings for this purpose. The Single Member Bench shall provide due opportunity to the parties to make their submissions. The Single Member Bench shall have the authority to direct the parties to submit such further information and to take such remedial measures as may be considered necessary. The Single Member Bench shall submit a report to the Commission with regard to the preparedness of the System Operators and other stakeholders to meet the challenges arising on account of the sudden surge in demand for power and his recommendations with regard to the remedial measures to be taken for the future. The

Commission, after consideration of the report of the Single Member Bench shall issue appropriate directions as may be considered appropriate.

12. NLDC, RLDCs, and SLDCs are directed to submit their responses to the measures contained in para 9 of this order by 16.10.2024.

| | | |
|---|---|---|
| **Sd./-** | **Sd./-** | **Sd./-** |
| **(Shri Harish Dudani)** | **(Shri Ramesh Babu V)** | **(Shri Jishnu Barua)** |
| **Member** | **Member** | **Chairperson** |

# Extract of Regulation 31 and 33 of the Grid Code

## 31. OPERATIONAL PLANNING

(1) Time Horizon

(a) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas with Monthly and Yearly time horizons in co-ordination with CTU, RPCs or STUs, as applicable.

(b) Operational planning shall be carried out in advance by NLDC, RLDCs and SLDCs within their respective control areas on Intra-day, Day Ahead, Weekly time horizons.

(c) RLDCs in consultation with NLDC shall issue procedures and formats for data collection to carry out:

(i) Operational planning analysis,

(ii) Real-time monitoring,

(iii) Real-time assessments.

(d) SLDC may also issue procedures and formats for data collection for the above purposes.

(2) Demand Estimation

(a) Each SLDC shall carry out demand estimation as part of operational planning after duly factoring in the demand estimation done by STU as part of resource adequacy planning referred to in Chapter 2 of these regulations. Demand estimation by SLDC shall be for both active power and reactive power incidents on the transmission system based on the details collected from distribution licensees, grid-connected distributed generation resources, captive power plants and other bulk consumers embedded within the State.

(b) Each SLDC shall develop methodology for daily, weekly, monthly, yearly demand estimation in MW and MWh for operational analysis as well as resource adequacy purposes. Each SLDC, while estimating demand may utilize state of the art tools, weather data, historical data and any other data. For this purpose, all distribution licensees shall maintain a historical database of demand.

(c) The demand estimation by each SLDC shall be done on day ahead basis with time block wise granularity for the daily operation and scheduling. In case SLDC observes a major change in demand in real time for the day, it shall immediately submit the revised demand estimate to the concerned RLDC for demand estimate correction.

(d) Each SLDC shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVA on a monthly and quarterly basis for the nodes 110 kV and above for the preparation of scenarios for computation of TTC and ATC by the concerned RLDC and NLDC.

(e) SLDC shall also estimate peak and off-peak demand (active as well as reactive power) on a weekly and monthly basis for load - generation balance planning as well as for operational planning analysis, which shall be a part of the operational planning data. The demand estimates mentioned above shall have granularity of a time block. The estimate shall cover the load incident on the grid as well as the net load incident taking into account embedded generation in the form of roof-top solar and other distributed generation.

(f) The entities such as bulk consumers or distribution licensees that are directly connected to ISTS shall estimate and furnish such a demand estimate to the concerned RLDC.

(g) Based on the demand estimate furnished by the SLDCs and other entities directly connected to ISTS, each RLDC shall prepare the regional demand estimate and submit it to the NLDC. NLDC, based on regional demand estimates furnished by RLDCs, shall prepare national demand estimate.

(h) Timeline for submission of demand estimate data by SLDCs or other entities directly connected to ISTS, as applicable, to the respective RLDC and RPC shall be as follows:

(i) SLDCs, RLDCs and NLDC shall compute forecasting error for intra-day, dayahead, weekly, monthly and yearly forecasts and analyse the same in order to reduce forecasting error in the future. The computed forecasting errors shall be made available by SLDCs, RLDCs and NLDC on their respective websites.

(3) Generation Estimation

(a) The modalities of generation estimation by entities shall be as per the Procedure referred to in sub-clause (c) of clause (1) of Regulation 31 of these regulations.

(b) RLDC shall forecast generation from wind, solar, ESS and Renewable Energy hybrid generating stations that are regional entities and SLDC shall forecast generation from such sources that are intra-state entities, for different time horizons as referred to in clause (1) of Regulation 31 of these regulations for the purpose of operational planning.

(4) Adequacy of Resources

(a) SLDCs shall estimate and ensure the adequacy of resources, identify generation reserves, demand response capacity and generation flexibility requirements with due regard to the resource adequacy framework as specified under Chapter 2 of these regulations.

(b) SLDCs shall furnish time block-wise information for the following day in respect of all intra-state entities to the concerned RLDC who shall validate the adequacy of resources with due regard to the following:

(i) Demand forecast aggregated for the control area;

(ii) Renewable energy generation forecast for the control area;

(iii) Injection schedule for intra-State entity generating station;

(iv) Requisition from regional entity generating stations;

(v) Secondary and planned procurement through Tertiary reserve requirement;

(vi) Planned procurement of power through other bilateral or collective transactions, if any.

**33. OPERATIONAL PLANNING STUDY**

(1) Based on the operational planning analysis data, operational planning study shall be carried out by various agencies for time horizons as under:

(2) SLDCs, RLDCs and NLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study. All users shall make available at all times real time error free operational data for the successful execution of network analysis using EMS/SCADA. Failure to make available such data shall be immediately reported to the concerned SLDC, the concerned RLDC and NLDC along with a firm timeline for restoration. The performance of online network estimation tools at SLDC and RLDC shall be reviewed in the monthly operational meeting of RPC. Any telemetry related issues impacting the online network estimation tool shall be monitored by RPC for their early resolution.

(3) SLDCs shall perform day-ahead, weekly, monthly and yearly operational studies for the concerned State for:

(a) assessment and declaration of total transfer capability (TTC) and available transfer capability (ATC) for the import or export of electricity by the State. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on SLDC website with all the assumptions and limiting constraints;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant in operational scenario.

(4) RLDCs and NLDC shall perform day-ahead, weekly, monthly and yearly operational studies for:

(a) assessment of TTC and ATC at inter-regional, intra-regional, and inter-state levels;

(b) planned outage assessment;

(c) special scenario assessment;

(d) system protection scheme assessment;

(e) natural disaster assessment; and

(f) any other study relevant to operational scenarios

(5) RLDC shall assess intra-regional and inter-state level TTC and ATC and submit them to NLDC. NLDC shall declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, and crossborder interconnections 11 (Eleven) months in advance for each month on a rolling basis. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on the websites of the NLDC and respective RLDCs with all the assumptions and limiting constraints

(6) Operational planning study shall be done to assess whether the planned operations shall result in deviations from any of the system operational limits defined under these regulations and applicable CEA Standards. The deviations, if

any, shall be reviewed in the monthly operational meeting of RPC and significant deviations shall be monitored by RPC for early resolution.

(7) NLDC, RLDCs, RPCs and SLDCs shall maintain records of the completed operational planning study, including date specific power flow study results, the operational plan and minutes of meetings on operational study.

(8) NLDC, RLDCs, RPCs and SLDCs shall have operating plans to address potential deviations from system operational limit identified as a result of the operational planning study. These operating plans shall be communicated to users in advance so that they can take corrective measures. In case any user is unable to adhere to such an operating plan, it shall inform the respective SLDC, RLDC and NLDC in advance with detailed reasons and explanations for the non-adherence. These detailed reasons and explanations shall be discussed in the monthly operation sub-committee of the respective region and a quarterly report shall be submitted by the respective RPC to the Commission and CEA.

(9) Each SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC.

(10) Each RLDC shall undertake a study on the impact of new elements to be commissioned in the next six (6) months in (a) the ISTS of the region and (b) the intrastate system on the inter-state system and share the results of the studies with NLDC

(11) NLDC shall undertake study on the impact of new elements to be commissioned in the next six (6) months in (a) inter-regional system, (b) cross-border link and (c) intraregional system on the inter-regional system.

(12) NLDC, RLDCs and SLDCs shall compare the results of the studies of the impact of new elements on the system and transfer capability addition with those of the interconnection and planning studies by CTU and STUs, and any significant

variations observed shall be communicated to CEA, RPCs, CTU and STUs for immediate and long-term mitigation measures.

(13) Defense mechanisms like system protection scheme, load-rejection scheme, generation run-back, islanding scheme or any other scheme for system security shall be proposed by the concerned user or SLDC or RLDC or NLDC and shall be deployed as finalized by the respective RPC.

Annexure-B.II

| S.No. | Voltage Level | Name of Line | Circuit ID | Tower Configura | Line Length | O&M by | Agency at | | Type of conductor | Remarks | Replaced with Polymer Insulator (As a % of Total Line | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | End-I | End-II | | | | |
| **1. HVDC lines** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | ± 800kV | Agra-Bishwanath Chariali Pole-I | 1 | Bi-pole | 1728 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | HVDC capcacity 6000 MW, only two physical lines | Partial (11%) | |
| 2 | ± 800kV | Agra-Bishwanath Chariali Pole-II | 2 | Bi-pole | 1728 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 3 | ± 800kV | Agra-Alipurduar Pole-I | 1 | Bi-pole | 1296* | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 4 | ± 800kV | Agra-Alipurduar Pole-II | 2 | Bi-pole | 1296* | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 5 | ± 800kV | Kurukshetra-Champa Pole-I | 1 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | HVDC capcacity 6000 MW, only two physical lines | Partial (11%) | |
| 6 | ± 800kV | Kurukshetra-Champa Pole-II | 2 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 7 | ± 800kV | Kurukshetra-Champa Pole-III | 3 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 8 | ± 800kV | Kurukshetra-Champa Pole-IV | 4 | Bi-pole | 1305 | POWERGRID | POWERGRID | POWERGRID | Hexagon Lapwing | | Partial (11%) | |
| 9 | ± 500kV | Balia-Bhiwadi Pole-I | 1 | Bi-pole | 790 | POWERGRID | POWERGRID | POWERGRID | ACSR Quad Bersimis | HVDC capacity 2500 MW | Partial (15%) | |
| 10 | ± 500kV | Balia-Bhiwadi Pole-II | 2 | Bi-pole | 790 | POWERGRID | POWERGRID | POWERGRID | | | Partial (15%) | |
| 11 | ± 500kV | Rihand-Dadri Pole-I | 1 | Bi-pole | 815 | POWERGRID | POWERGRID | POWERGRID | ACSR Quad Bersimis | HVDC capacity 1500 MW | Partial (62%) | |
| 12 | ± 500kV | Rihand-Dadri Pole-II | 2 | Bi-pole | 815 | POWERGRID | POWERGRID | POWERGRID | | | Partial (43%) | |
| **B. Adani Power Ltd (Adani Transmission India Ltd.)** | | | | | | | | | | | | |
| 1 | ± 500kV | Adani Mundra - Mahindergarh Pole-I | 1 | Bi-pole | 990 | ATIL | APL Mundra | ATIL | ACSR Quad Bersimis | HVDC capacity 2500 MW | Partial (43%) | |
| 2 | ± 500kV | Adani Mundra - Mahindergarh Pole-II | 2 | Bi-pole | 990 | ATIL | APL Mundra | ATIL | | | Partial (43%) | |
| **2. 765kV Transmission Line** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 765kV | Agra-Aligarh | 1 | D/C | 123 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Agra-Gr. Noida at Aligarh (LILO portion | Polymer Insulator | |
| 2 | 765kV | Aligarh-Gr.Noida | 1 | D/C | 51 | POWERGRID | POWERGRID | WUPPTCL | Quad Bersimis | | Polymer Insulator | |
| 3 | 765kV | Agra-Fatehpur | 1 | S/C | 335 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 4 | 765kV | Agra-Fatehpur | 2 | S/C | 334 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 5 | 765kV | Agra-Jhatikara | 1 | S/C | 252 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 6 | 765kV | Ajmer-Chittorgarh | 1 | D/C | 211 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 7 | 765kV | Ajmer-Chittorgarh | 2 | D/C | 211 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 8 | 765kV | Ajmer-Bhadla II | 1 | D/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG) | Not Available | |
| 9 | 765kV | Ajmer-Bhadla II | 2 | D/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG) | Not Available | |
| 10 | 765kV | Balia - Lucknow765 (N) | 1 | S/C | 319 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 11 | 765kV | Bikaner - Bhadla | 1 | D/C | 167 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 12 | 765kV | Bikaner - Bhadla | 2 | D/C | 167 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 13 | 765kV | Bikaner- Moga | 1 | D/C | 367 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 14 | 765kV | Bikaner- Moga | 2 | D/C | 367 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 15 | 765kV | Bikaner-Bhadla II | 1 | D/C | 197 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-1 at Bhadla II(PG) | Not Available | |
| 16 | 765kV | Bikaner-Bhadla II | 2 | D/C | 197 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | LILO of 765kV D/C Ajmer-Bikaner-2 at Bhadla II(PG) | Not Available | |
| 17 | 765kV | Kanpur(GIS)-Aligarh | 1 | D/C | 322 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Kanpur-Jhatikara at Aligarh | Polymer Insulator | |
| 18 | 765kV | Aligarh-Jhatikara | 1 | D/C | 158 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 19 | 765kV | Jhatikara-Bhiwani (PG) | 1 | S/C | 85 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 20 | 765kV | Koteshwar(PG)-Meerut | 1 | S/C | 176 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | Earlier charged at 400kV | Not Available | |
| 21 | 765kV | Koteshwar(PG)-Meerut | 2 | S/C | 176 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Not Available | |
| 22 | 765kV | Lucknow-Bareilly | 1 | S/C | 252 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 23 | 765kV | Meerut-Bhiwani(PG) | 1 | S/C | 174 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (99%) | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 765kV | Meerut-Gr.Noida | 1 | S/C | 119 | POWERGRID | POWERGRID | WUPPTCL | Quad Bersimis | Agra-Meerut LILOed at G. Noida by UPPTCL | Polymer Insulator | |
| 25 | 765kV | Moga- Bhiwani (PG) | 1 | S/C | 273 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (96%) | |
| 26 | 765kV | Moga-Meerut | 1 | S/C | 338 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 27 | 765kV | Orai-Aligarh | 1 | D/C | 331 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 28 | 765kV | Orai-Aligarh | 2 | D/C | 331 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 29 | 765kV | Phagi-Bhiwani(PG) | 1 | S/C | 272 | POWERGRID | RRVPNL | POWERGRID | Quad Bersimis | | Partial (18%) | |
| 30 | 765kV | Phagi-Bhiwani(PG) | 2 | S/C | 277 | POWERGRID | RRVPNL | POWERGRID | Quad Bersimis | | Partial (16%) | |
| 31 | 765kV | Varanasi-Balia | 1 | S/C | 166 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Conventional | |
| 32 | 765kV | Varanasi-Fatehpur | 1 | S/C | 223 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | LILO of Gaya (ER)-Fatehpur at Varanasi | Conventional | |
| 33 | 765kV | Varanasi-Kanpur(GIS) | 1 | S/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| 34 | 765kV | Varanasi-Kanpur(GIS) | 2 | S/C | 326 | POWERGRID | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| **B. PKTSL** | | | | | | | | | | | | |
| 1 | 765kV | Khetri-Jhatikara | 1 | D/C | 146 | PKTSL | PKTSL | POWERGRID | Hexa Zebra | | Not Available | |
| 2 | 765kV | Khetri-Jhatikara | 2 | D/C | 146 | PKTSL | PKTSL | POWERGRID | Hexa Zebra | | Not Available | |
| **C. PFTL** | | | | | | | | | | | | |
| 1 | 765kV | Fatehgarh II-Bhadla II | 1 | D/C | 186 | PFTL | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| 2 | 765kV | Fatehgarh II-Bhadla II | 2 | D/C | 186 | PFTL | POWERGRID | POWERGRID | Hexa Zebra | | Not Available | |
| **D. FBTL** | | | | | | | | | | | | |
| 1 | 765kV | Fatehgarh II-Bhadla | 1 | D/C | 175 | FBTL | POWERGRID | POWERGRID | Hexa Zebra | Loop in of 400kV Fatehgarh (FBTL)- | Polymer Insulator | |
| 2 | 765kV | Fatehgarh II-Bhadla | 2 | D/C | 175 | FBTL | POWERGRID | POWERGRID | Hexa Zebra | | Polymer Insulator | |
| **E. BKTL** | | | | | | | | | | | | |
| 1 | 765kV | Bikaner-Khetri | 1 | D/C | 241 | BKTL | POWERGRID | PKTSL | Hexa Zebra | | Polymer Insulator | |
| 2 | 765kV | Bikaner-Khetri | 2 | D/C | 241 | BKTL | POWERGRID | PKTSL | Hexa Zebra | | Polymer Insulator | |
| **F. PAPTL** | | | | | | | | | | | | |
| 1 | 765kV | Ajmer-Phagi | 1 | D/C | 134 | PAPTL | POWERGRID | RRVPNL | Hexa Zebra | | Not Available | |
| 2 | 765kV | Ajmer-Phagi | 2 | D/C | 134 | PAPTL | POWERGRID | RRVPNL | Hexa Zebra | | Not Available | |
| **G. PASTL** | | | | | | | | | | | | |
| 1 | 765kV | Aligarh(PG)-SIKAR_2 | 1 | D/C | 265 | PASTL | PSTL | POWERGRID | Hexa Zebra | Anti theft charged from Aligarh(PG) Upto | Not Available | |
| 2 | 765kV | Aligarh(PG)-SIKAR_2 | 2 | D/C | 265 | PASTL | PSTL | POWERGRID | Hexa Zebra | | Not Available | |
| **STATE LINES** | | | | | | | | | | | | |
| **A. UPPTCL** | | | | | | | | | | | | |
| 1 | 765kV | Agra Fatehabad-Ghatampur | 1 | S/C | 229 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 2 | 765kV | Agra Fatehabad-Gr. Noida | 1 | S/C | 159 | UPPTCL | UPPTCL | UPPTCL | ACSR Quad Bersimis | | Not Available | |
| 3 | 765kV | Agra(Fatehbad)-Lalitpur | 1 | S/C | 337 | UPPTCL | UPPTCL | LPGCL | Quad Bersimis | | Not Available | |
| 4 | 765kV | Agra(Fatehbad)-Lalitpur | 2 | S/C | 335 | UPPTCL | UPPTCL | LPGCL | Quad Bersimis | | Not Available | |
| 5 | 765kV | AnparaC-AnparaD | 1 | S/C | 3 | UPPTCL | LANCO | UPRVUNL | Quad Bersimis | | Not Available | |
| 6 | 765kV | AnparaC-Unnao | 1 | S/C | 409 | UPPTCL | LANCO | UPPTCL | Quad Bersimis | | Conventional | AnparaB-Unnao shifted to AnparaC and charged at 765kV |
| 7 | 765kV | AnparaD-Obra_C | 1 | D/C | 53 | UPPTCL | UPRVUNL | UPPTCL | Quad Bersimis | After LILO of 765 KV ANPARA D-UNNAO LINE | Not Available | |
| 8 | 765kV | Obra_C-Unnao | 1 | D/C | 390 | UPPTCL | UPRVUNL | UPPTCL | Quad Bersimis | | Not Available | |
| 9 | 765kV | Bara-Mainpuri | 1 | S/C | 377 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 10 | 765kV | Gr. Noida-Meerut_PMSTL | 1 | S/C | 100 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | After LILO of 765 KV GREATER NOIDA | Not Available | |
| 11 | 765kV | Meerut_PMSTL-Hapur | 1 | S/C | 37 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 12 | 765kV | Gr. Noida-Jawaharpur | 1 | D/C | 162 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | After LILO of 765 KV MAINPURI(SEUPPTCL)- | Not Available | |
| 13 | 765kV | Jawaharpur-Mainpuri | 1 | D/C | 40 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| 14 | 765kV | Hapur(UP)-Rampur_PRSTL (UP) | 1 | S/C | 230 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | LILO of 765kV Hapur-Ghatampur at Rampur. LILO portion is on D/C tower 2.5km 5towers | Not Available | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 765kV | Mainpuri(UP)-Hapur(UP) | 1 | S/C | 217 | UPPTCL | UPPTCL | UPPTCL | Quad Bersimis | | Not Available | |
| **B. RRVPNL** | | | | | | | | | | | | |
| 1 | 765kV | Anta-Phagi | 1 | S/C | 214 | RRVPNL | RRVPNL | RRVPNL | Quad Bersimis | | Not Available | |
| 2 | 765kV | Anta-Phagi | 2 | S/C | 212 | RRVPNL | RRVPNL | RRVPNL | Quad Bersimis | | Not Available | |
| **3. 765kV Transmission Line charged at 400kV** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 765kV charged at 400kV | Kishenpur-Moga | 1 | S/C | 275 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (1%) | |
| 2 | | Kishenpur-Moga | 2 | S/C | 287 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | | Partial (1%) | |
| 3 | | Tehri-Koteshwar(PG) | 1 | S/C | 15 | POWERGRID | THDC | POWERGRID | Quad Bersimis | | Conventional | |
| 4 | | Tehri-Koteshwar(PG) | 2 | S/C | 17 | POWERGRID | THDC | POWERGRID | Quad Bersimis | | Conventional | |
| 5 | | Rihand-Vindhyachal Pool | 1 | S/C | 31 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Not Available | |
| 6 | | Rihand-Vindhyachal Pool | 2 | S/C | 31 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Not Available | |
| **4. 400kV HVAC Transmission Line** | | | | | | | | | | | | |
| **ISTS LINES** | | | | | | | | | | | | |
| **A. POWERGRID** | | | | | | | | | | | | |
| 1 | 400kV | Abdullapur- Bawana | 1 | D/C | 167 | POWERGRID | POWERGRID | DTL | Triple Snowbird | | Partial (99%) | |
| 2 | 400kV | Abdullapur- Deepalpur | 1 | D/C | 141 | POWERGRID | POWERGRID | KT Jhajjar | Triple Snowbird | LILO of Abdullapur-Bawana one ckt at Deepalpur by Jhajjar KT | Partial (99%) | LILO of Abdullapur-Bawana one ckt at Deepalpur |
| 3 | 400kV | Abdullapur-Kurukshetra | 1 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird+Twin HTLS for LILO | LILO of Abdullapur-Sonipat line at Kurukshetra | Polymer Insulator | LILO of Abdullapur-Sonepat ckts at Kurukshetra |
| 4 | 400kV | Abdullapur-Kurukshetra | 2 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | | LILO of Abdullapur-Sonipat line at Kurukshetra | Polymer Insulator | |
| 5 | 400kV | Agra-Agra(Fatehbad) | 1 | S/C | 45 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of Agra(PG)-Agra(UP) ckt-2 at Fatehabad (765kV Agra UP) | Polymer Insulator | |
| 6 | 400kV | Agra(UP)-Agra(Fatehbad) | 1 | S/C | 56 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Polymer Insulator | |
| 7 | 400kV | Agra-Agra(UP) | 1 | D/C | 30 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 8 | 400kV | Agra-Ballabgarh | 1 | S/C | 181 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 9 | 400kV | Agra-Bassi | 1 | S/C | 211 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | Planned for insulator replacement in 321nos towers under NR3 |
| 10 | 400kV | Agra-Bhiwadi | 1 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 11 | 400kV | Agra-Bhiwadi | 2 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 12 | 400kV | Agra-Jaipur South | 1 | D/C | 254 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Partial (4%) | LILO of Agra-Bassi D/C at Jaipur South |
| 13 | 400kV | Agra-Jaipur South | 2 | D/C | 254 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Partial (4%) | |
| 14 | 400kV | Agra-Sikar | 1 | D/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | |
| 15 | 400kV | Agra-Sikar | 2 | D/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | |
| 16 | 400kV | Ajmer-Ajmer(PG) | 1 | D/C | 66 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 17 | 400kV | Ajmer-Ajmer(PG) | 2 | D/C | 66 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 18 | 400kV | Allahabad-Fatehpur | 3 | S/C | 154 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Allahabad-Kanpur one ckt at Fatehpur | Polymer Insulator | |
| 19 | 400kV | Allahabad-Fatehpur | 1 | D/C | 140 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur | Conventional | |
| 20 | 400kV | Allahabad-Fatehpur | 2 | D/C | 140 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Lilo of Allahabad-Mainpuri (PG) D/C at Fatehpur | Conventional | |
| 21 | 400kV | Allahabad-Varanasi | 1 | D/C | 99 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Allahabad-Sarnath shifted from Sarnath to varanasi | Conventional | |
| 22 | 400kV | Allahabad-Kanpur | 1 | S/C | 225 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 23 | 400kV | Allahabad-Kanpur(New 765) | 1 | D/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 24 | 400kV | Allahabad-Kanpur(New 765) | 2 | D/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 25 | 400kV | Allahabad-Meja(NTPC) | 1 | D/C | 28 | POWERGRID | POWERGRID | MUNPL | Twin Moose | | Polymer Insulator | MUNPL is joint venture between NTPC and UPRVUN |
| 26 | 400kV | Allahabad-Meja(NTPC) | 2 | D/C | 28 | POWERGRID | POWERGRID | MUNPL | Twin Moose | | Polymer Insulator | |

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| 27 | 400kV | Amritsar-Jalandhar | 1 | S/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 28 | 400kV | Amritsar-Jalandhar | 2 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of 400kV Amritsar-Hamirpur at Jalandhar |
| 29 | 400kV | Amritsar-ParbatiPooling (Banala) | 1 | D/C | 251 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (49%) | |
| 30 | 400kV | Auraiya-Agra | 1 | D/C | 166 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Partial (86%) | |
| 31 | 400kV | Auraiya-Agra | 2 | D/C | 166 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Partial (90%) | |
| 32 | 400kV | Baglihar II-Kishenpur | 1 | S/C | 130 | POWERGRID | JKSPDCL | POWERGRID | Twin Moose | LILO of 400kV Kishenpur-New Wanpoh ckt-2 at Baglihar. LILO portion is of JK PDD | Conventional | |
| 33 | 400kV | Baghlihar II-New Wanpoh | 1 | S/C | 130 | POWERGRID | JKSPDCL | POWERGRID | Twin Moose | | Not Available | |
| 34 | 400kV | Bagpat-Kaithal | 1 | D/C | 154 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 35 | 400kV | Bagpat-Kaithal | 2 | D/C | 154 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 36 | 400kV | Bagpat-Saharanpur | 1 | D/C | 121 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (41%) | |
| 37 | 400kV | Bagpat-Dehradun | 1 | D/C | 165 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (40%) | |
| 38 | 400kV | Bahadurgarh-Kabulpur | 1 | S/C | 42 | POWERGRID | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | LILO of Bahadurgarh-Bhiwani at Kabulpur |
| 39 | 400kV | Bahadurgarh-Sonepat | 1 | D/C | 53 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 40 | 400kV | Bahadurgarh-Sonepat | 2 | D/C | 53 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 41 | 400kV | Balia-Mau | 1 | D/C | 9 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 42 | 400kV | Balia-Sohawal | 1 | D/C | 229 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Balia-LUCKNOW D/C at Sohawal | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 43 | 400kV | Balia-Sohawal | 2 | D/C | 229 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Balia-LUCKNOW D/C at Sohawal | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 44 | 400kV | Ballabgarh-Tughlakabad | 1 | M/C | 40 | DTL | POWERGRID | POWERGRID | HTLS INVAR (LILO portion) & Bersimis (before LILO) | Tower is quad circuit tower | Polymer | |
| 45 | 400kV | Ballabgarh-Tughlakabad | 2 | M/C | 40 | DTL | POWERGRID | POWERGRID | | Tower is quad circuit tower | Polymer | |
| 46 | 400kV | Ballabhgarh-Gurgaon | 1 | S/C | 43 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 47 | 400kV | Ballabhgarh-Maharanibagh | 1 | D/C | 61 | POWERGRID | POWERGRID | POWERGRID | Quad Bersimis | Bypassed at Maharanibagh to form Dadri-Ballabgarh | Polymer Insulator | |
| 48 | 400kV | Ballabhgarh-Nawada | 1 | D/C | 13 | POWERGRID | POWERGRID | HVPNL | Quad Bersimis | | Polymer Insulator | Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana) |
| 49 | 400kV | Bareilly PG-Moradabad | 1 | D/C | 93 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Partial (3%) | |
| 50 | 400kV | Bareilly PG-Rampur_PRSTL | 1 | S/C | 40 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL) | Not Available | |
| 51 | 400kV | Rampur_PRSTL-Moradabad | 1 | S/C | 57 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | After LILO of 400 KV BAREILLY(PG)-MORADABAD(UPPTCL) CIRCUIT-II at RAMPUR(PRSTL) | Not Available | |
| 52 | 400kV | Bareilly PG-Bareilly (765kV) | 1 | D/C | 2 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Conventional | |
| 53 | 400kV | Bareilly PG-Bareilly (765kV) | 2 | D/C | 2 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Conventional | |

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| 54 | 400kV | Bareilly PG(765kV)-Kashipur | 1 | D/C | 101 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (90%) | |
| 55 | 400kV | Bareilly PG(765kV)-Kashipur | 2 | D/C | 101 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (90%) | |
| 56 | 400kV | Bassi-Bhiwadi | 2 | S/C | 220 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 57 | 400kV | Bassi-Heerapura | 1 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Polymer Insulator | |
| 58 | 400kV | Bassi-Heerapura | 2 | D/C | 49 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Polymer Insulator | |
| 59 | 400kV | Bassi-Kotputli | 1 | S/C | 106 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 60 | 400kV | Bassi-Phagi | 1 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Quad Moose | | Partial (26%) | |
| 61 | 400kV | Bassi-Phagi | 2 | D/C | 48 | POWERGRID | POWERGRID | RRVPNL | Quad Moose | | Partial (26%) | |
| 62 | 400kV | Bassi-Sikar | 1 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (16%) | |
| 63 | 400kV | Bassi-Sikar | 2 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (17%) | |
| 64 | 400kV | Bawana(CCGT)-Bahadurgarh | 1 | D/C | 49 | POWERGRID | DTL/Pragati CCGT | POWERGRID | Twin Moose | | Polymer Insulator | |
| 65 | 400kV | Bhadla-Bhadla(PG) | 1 | D/C | 27 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 66 | 400kV | Bhadla-Bhadla(PG) | 2 | D/C | 27 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 67 | 400kV | Bhadla-Bhadla II | 1 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS+Hexa Zebra | 48.309KM Twin HTLS conductor of POWERGRID and 3.73 KM HEXA Zebra of FBTL | Not Available | |
| 68 | 400kV | Bhadla-Bhadla II | 2 | D/C | 52 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS+Hexa Zebra | | Not Available | |
| 69 | 400kV | Bhinmal-Kankroli | 1 | D/C | 202 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Bhinmal to form 400kV Kankroli Zerda ckt-2 | Polymer Insulator | |
| 70 | 400kV | Bhiwadi-Gurgaon | 1 | S/C | 83 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 71 | 400kV | Bhiwadi-Hissar | 1 | S/C | 212 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 72 | 400kV | Bhiwadi-Hissar | 2 | D/C | 144 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bhiwadi-Moga both ckts at Hisar |
| 73 | 400kV | Bhiwadi-Hissar | 3 | D/C | 144 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 74 | 400kV | Bhiwadi-NeemranaPG | 1 | D/C | 48 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 75 | 400kV | Bhiwadi-NeemranaPG | 2 | D/C | 48 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 76 | 400kV | Bhiwani BBMB - Hissar | 1 | S/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Bhiwani BBMB-Fatehabad | Polymer Insulator | |
| 77 | 400kV | Bhiwani (PG) - Hissar | 1 | S/C | 64 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Moga-Bhiwani(PG) | Polymer Insulator | LILO of Bawana-Hisar (132KM) at Bhiwani PG |
| 78 | 400kV | Bhiwani (PG) - Hissar | 2 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Bhiwani(PG) to form Mahindergarh(ATIL) | Polymer Insulator | |
| 79 | 400kV | Bhiwani (PG) - Hissar | 3 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 80 | 400kV | Bhiwani PG - Jind | 1 | D/C | 82 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 81 | 400kV | Bhiwani PG - Jind | 2 | D/C | 82 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 82 | 400kV | Bhiwani PG- BawanaCCGT | 1 | D/C | 97 | POWERGRID | POWERGRID | DTL/ CCGT | Twin Moose | | Polymer Insulator | LILO of Bawana-Hisar (132KM) at Bhiwani PG |
| 83 | 400kV | Bhiwani PG- Bhiwani BBMB | 1 | S/C | 34 | POWERGRID | POWERGRID | BBMB | Twin Moose | | Polymer Insulator | LILO of Bhiwani (BBMB)- Bahadurgarh (84km) at Bhiwani (PG) |
| 84 | 400kV | Bhiwani PG-Kabulpur | 1 | S/C | 48 | POWERGRID | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | LILO of Bahadurgarh-Bhiwani at Kabulpur |
| 85 | 400kV | Bikaner_2 (PBTSL)-Bikaner(PG) | 1 | D/C | 43 | POWERGRID | PBTSL | POWERGRID | Quad Moose | | Not Available | |
| 86 | 400kV | Bikaner_2 (PBTSL)-Bikaner(PG) | 2 | D/C | 43 | POWERGRID | PBTSL | POWERGRID | Quad Moose | | Not Available | |
| 87 | 400kV | Chamba pool - Jalandhar | 1 | D/C | 162 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (48%) | |
| 88 | 400kV | Chamba pool - Jalandhar | 2 | D/C | 162 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (48%) | |
| 89 | 400kV | Chamera-II - Chamba Pool | 1 | S/C | 0.38 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | Two tower is S/C and one tower is D/C |
| 90 | 400kV | Chamera-II-Chamera-I | 1 | S/C | 36 | POWERGRID | NHPC | NHPC | Twin Moose | | Conventional | |
| 91 | 400kV | Chamera-II-Kishenpur | 1 | S/C | 135 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | |

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| 92 | 400kV | Chamera-I-Jalandhar | 1 | D/C | 152 | POWERGRID | NHPC | POWERGRID | Twin ACAR | | Partial (43%) | |
| 93 | 400kV | Chamera-I-Jalandhar | 2 | D/C | 152 | POWERGRID | NHPC | POWERGRID | Twin ACAR | | Partial (43%) | |
| 94 | 400kV | Chittorgarh-Chittorgarh(PG) | 1 | D/C | 49 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 95 | 400kV | Chittorgarh-Chittorgarh(PG) | 2 | D/C | 49 | POWERGRID | RRVPNL | POWERGRID | Quad Moose | | Not Available | |
| 96 | 400kV | Chittorgarh-Kankroli | 1 | D/C | 71 | POWERGRID | RRVPNL | POWERGRID | Twin Moose | | Polymer Insulator | LILO of 400 kV Rapp C-Kankroli at Chhitorgarh |
| 97 | 400kV | Dadri NCTPP-G. Noida | 1 | D/C | 13 | POWERGRID | NTPC | UPPCL | Quad Bersimis | | Polymer Insulator | |
| 98 | 400kV | Dadri NCTPP-Maharanibagh | 1 | D/C | 54 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | Bypassed at Maharanibagh to form Dadri-Ballabgarh | Polymer Insulator | |
| 99 | 400kV | Dadri NCTPP-Kaithal | 1 | S/C | 213 | POWERGRID | NTPC | POWERGRID | Twin Moose | LILO of Dadri-Malerkotla at Kaithal | Polymer Insulator | |
| 100 | 400kV | Dadri NCTPP-Mandola | 1 | D/C | 46 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 101 | 400kV | Dadri NCTPP-Mandola | 2 | D/C | 46 | POWERGRID | NTPC | POWERGRID | Quad Bersimis | | Polymer Insulator | |
| 102 | 400kV | Dadri NCTPP-Muradnagar New | 1 | S/C | 33 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Polymer Insulator | Line shifted from Muradnagar to Muradnagar New (UPPTCL) |
| 103 | 400kV | Dadri NCTPP-Panipat | 1 | S/C | 112 | POWERGRID | NTPC | BBMB | Twin Moose | | Polymer Insulator | |
| 104 | 400kV | Dadri NCTPP-Panipat | 2 | S/C | 117 | POWERGRID | NTPC | BBMB | Twin Moose | | Polymer Insulator | |
| 105 | 400kV | Deepalpur-Bawana | 1 | D/C | 26 | POWERGRID | KT-Jhajjar | DTL | Triple Snowbird | LILO of 400kV Bawana-Abdullapur one circuit at Deepalpur by Jhajjar KT | Polymer Insulator | |
| 106 | 400kV | Dehradun-Abdullapur | 1 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 107 | 400kV | Dehradun-Abdullapur | 2 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 108 | 400kV | Dulhasti-Kishenpur | 1 | S/C | 120 | POWERGRID | NHPC | POWERGRID | Quad Moose | | Conventional | |
| 109 | 400kV | Dulhasti-Kishenpur | 2 | S/C | 120 | POWERGRID | NHPC | POWERGRID | Quad Moose | | Conventional | |
| 110 | 400kV | Dwarka-Jhatikara | 1 | S/C | 18 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | After LILO of 400kV Jhatikara-Bamnoli-I at Dwarka(PG) | Not Available | |
| 111 | 400kV | Dwarka-Bamnauli | 1 | S/C | 10 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 112 | 400kV | Fatehbad PG-Hissar | 1 | D/C | 89 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Bhiwani BBMB-Fatehabad | Polymer Insulator | |
| 113 | 400kV | Fatehpur-Kanpur | 1 | S/C | 100 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Kanpur to form Fatehpur-Panki | Polymer Insulator | LILO of Singrauli-Kanpur at Fatehpur |
| 114 | 400kV | Fatehpur-Kanpur | 2 | S/C | 107 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (64%) | LILO of Allahabad-Kanpur one ckt at Fatehpur |
| 115 | 400kV | Kanpur-Panki | 1 | S/C | 6 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | Bypassed at Kanpur to form Fatehpur-Panki | Polymer Insulator | |
| 116 | 400kV | Kanpur-Panki | 2 | S/C | 6 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 117 | 400kV | Fatehpur-Mainpuri | 1 | D/C | 260 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur<br>Series compensated line (Degree of comp. - 40%) |
| 118 | 400kV | Fatehpur-Mainpuri | 2 | D/C | 260 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 119 | 400kV | G.Noida-Nawada | 1 | D/C | 30 | POWERGRID | UPPTCL | HVPNL | Quad Bersimis | Lilo of Ballabgarh-G.Noida at Nawada | Polymer Insulator | Ballabhgarh-Gnoida LILOed at Nawada (Faridabad,Haryana) |
| 120 | 400kV | Gorakhpur PG-Gorakhpur UP | 1 | D/C | 46 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Polymer Insulator | Partial Planning has been completed |
| 121 | 400kV | Gorakhpur PG-Gorakhpur UP | 2 | D/C | 46 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Polymer Insulator | Partial Planning has been completed |

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| 122 | 400kV | Gorakhpur PG-Lucknow PG | 1 | D/C | 264 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | At crossing |
| 123 | 400kV | Gorakhpur PG-Lucknow PG | 2 | D/C | 264 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (3%) | At crossing |
| 124 | 400kV | Gorakhpur PG-Basti (UP) | 1 | D/C | 117 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Gorakhpur PG-Lucknow PG ckt-4 at Basti (UP). LILO portion is of UP | Not Available | |
| 125 | 400kV | Gorakhpur PG-Basti (UP) | 2 | D/C | 108 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Gorakhpur-3 at Basti. LILO portion is of UP | Not Available | |
| 126 | 400kV | Basti (UP)-Lucknow PG | 1 | D/C | 204 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 127 | 400kV | Gurgaon-Sohna Road | 1 | D/C | 7 | POWERGRID | POWERGRID | GPTL | Quad Moose | LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL | Not Available | |
| 128 | 400kV | Gurgaon-Sohna Road | 2 | D/C | 7 | POWERGRID | POWERGRID | GPTL | Quad Moose | | Not Available | |
| 129 | 400kV | Hamirpur-ParbatiPooling (Banala) | 1 | D/C | 77 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Amritsar-Banala-1 at Hamirpur |
| 130 | 400kV | Jaipur South-Bassi | 1 | D/C | 37 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Polymer Insulator | LILO of Agra-Bassi D/C at Jaipur South |
| 131 | 400kV | Jaipur South-Bassi | 2 | D/C | 37 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Agra-Bassi D/C at Jaipur South | Polymer Insulator | |
| 132 | 400kV | Jaipur South-Kota | 1 | D/C | 180 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 133 | 400kV | Jaipur South-RAPP D | 1 | D/C | 228 | POWERGRID | POWERGRID | NPCIL | Twin Moose | | Not Available | |
| 134 | 400kV | Jalandhar-Nakodar | 1 | D/C | 42 | POWERGRID | POWERGRID | PSTCL | Quad Moose | | Polymer Insulator | |
| 135 | 400kV | Jalandhar-Hamirpur | 1 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (43%) | LILO of 400kV Amritsar-Hamirpur at Jalandhar |
| 136 | 400kV | Kaithal-Hissar | 1 | D/C | 113 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | LILO of Patiala-Hissar at Kaithal | |
| 137 | 400kV | Kaithal-Hissar | 2 | D/C | 113 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | LILO of Patiala-Hissar at Kaithal | |
| 138 | 400kV | Kaithal-Malerkotla | 1 | S/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 139 | 400kV | Kankroli-Jodhpur | 1 | S/C | 188 | POWERGRID | POWERGRID | RRVPNL | Twin HTLS | | Conventional | |
| 140 | 400kV | Kanpur-Agra | 1 | S/C | 240 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 141 | 400kV | Kanpur-Auraiya | 1 | D/C | 73 | POWERGRID | POWERGRID | NTPC | Twin Moose | | Conventional | |
| 142 | 400kV | Kanpur-Auraiya | 2 | D/C | 73 | POWERGRID | POWERGRID | NTPC | Twin Moose | | Conventional | |
| 143 | 400kV | Kanpur-Ballabgarh | 1 | S/C | 386 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 144 | 400kV | Kanpur-Ballabgarh | 2 | D/C | 371 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 145 | 400kV | Kanpur-Ballabgarh | 3 | D/C | 371 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | *Series Compensated,Ckt 1-35%, Ckt-2 & 3-40% |
| 146 | 400kV | Kanpur-Kanpur(GIS) | 1 | D/C | 21 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 147 | 400kV | Kanpur-Kanpur(GIS) | 2 | D/C | 21 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 148 | 400kV | Kanpur(GIS)-Lucknow(765) | 1 | D/C | 160 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 149 | 400kV | Kanpur(GIS)-Lucknow(765) | 2 | D/C | 160 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 150 | 400kV | Kishenpur-NewWanpoh | 1 | D/C | 130 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 151 | 400kV | Kishenpur-NewWanpoh | 3 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 152 | 400kV | Kishenpur-NewWanpoh | 4 | D/C | 135 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 153 | 400kV | Kishenpur-Samba | 1 | D/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 154 | 400kV | Kishenpur-Samba | 2 | D/C | 35 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 155 | 400kV | Kota-Merta | 1 | D/C | 256 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 156 | 400kV | Kotputli-Bhiwadi | 1 | S/C | 132 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bassi-Bhiwadi-2 at Kotputli |
| 157 | 400kV | Kurukshetra-Jind | 1 | D/C | 103 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 158 | 400kV | Kurukshetra-Jind | 2 | D/C | 103 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Not Available | |
| 159 | 400kV | Kurukshetra-Sonipat | 1 | D/C | 125 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird (Twin HTLS for LILOportion) | LILO of Abdullapur-Sonipat line at Kurukshetra | Partial (99%) | LILO of Abdullapr-Sonipat ckts at |
| 160 | 400kV | Kurukshetra-Sonipat | 2 | D/C | 125 | POWERGRID | POWERGRID | POWERGRID | | | Partial (99%) | |
| 161 | 400kV | Kurukshetra(PG)-Dhanansu(PS) | 1 | D/C | 165 | POWERGRID | POWERGRID | PSTCL | Quad Moose | LILO of 400kv Kurukshetra-Jalandhar (LILO portion is of | Polymer Insulator | LILO portion to be checked |
| 162 | 400kV | Dhanansu(PS)-Jalandhar(PG) | 1 | D/C | 106 | POWERGRID | PSTCL | POWERGRID | Quad Moose | | Polymer Insulator | |
| 163 | 400kV | Kurukshetra-Nakodar | 1 | D/C | 234 | POWERGRID | POWERGRID | PSTCL | Quad Moose | | Polymer Insulator | |
| 164 | 400kV | Lucknow-Basti | 1 | D/C | 203 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 165 | 400kV | Lucknow-Basti | 2 | D/C | 203 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 166 | 400kV | Lucknow PG-Lucknow UP | 1 | S/C | 63 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 167 | 400kV | Lucknow PG-Unnao | 1 | D/C | 74 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 168 | 400kV | Lucknow PG-Unnao | 2 | D/C | 74 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Conventional | |
| 169 | 400kV | Lucknow UP-Bareilly PG | 1 | S/C | 279 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | | Conventional | |
| 170 | 400kV | 765 Lucknow (PG) - Lucknow (PG) | 1 | D/C | 3 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 171 | 400kV | 765 Lucknow (PG) - Lucknow (PG) | 2 | D/C | 3 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 172 | 400kV | LucknowPG-Sohawal | 1 | D/C | 98 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Balia-Lucknow (316 KM) D/C at Sohawal |
| 173 | 400kV | LucknowPG-Sohawal | 2 | D/C | 98 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 174 | 400kV | Lucknow PG-Shahjahanpur | 1 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (10%) | |
| 175 | 400kV | Lucknow PG-Shahjahanpur | 2 | D/C | 170 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Partial (10%) | |
| 176 | 400kV | Lucknow-Jehta | 1 | D/C | 32 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of | Not Available | |
| 177 | 400kV | Lucknow-Jehta | 2 | D/C | 32 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 178 | 400kV | Ludhiana-Jalandhar | 1 | S/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 179 | 400kV | Ludhiana-Malerkotla | 1 | S/C | 36 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 180 | 400kV | Ludhiana-Patiala | 1 | D/C | 76 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 181 | 400kV | Ludhiana-Patiala | 2 | D/C | 76 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 182 | 400kV | Mainpuri-Ballabgarh | 1 | D/C | 236 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 183 | 400kV | Mainpuri-Ballabgarh | 2 | D/C | 236 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 184 | 400kV | Malerkotla-Patiala | 1 | S/C | 62 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 185 | 400kV | Manesar- Sohna Road | 1 | D/C | 17 | POWERGRID | POWERGRID | GPTL | Quad Moose | LILO of 400kV Gurgaon-Manesar D/C at Sohna Road by GPTL | Not Available | |
| 186 | 400kV | Manesar- Sohna Road | 2 | D/C | 17 | POWERGRID | POWERGRID | GPTL | Quad Moose | | Not Available | |
| 187 | 400kV | Mandola-Maharanibagh | 1 | D/C (LILO towers are M/C) | 29 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | After LILO of 400KV Mandola-Bawana D/C Lines at 400KV Maharanibagh(PG) | Not Available | |
| 188 | 400kV | Mandola-Maharanibagh | 2 | D/C (LILO towers are M/C) | 29 | POWERGRID | POWERGRID | POWERGRID | Twin HTLS | | Not Available | |
| 189 | 400kV | Maharanibagh-Bawana | 1 | D/C | 29 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 190 | 400kV | Maharanibagh-Bawana | 2 | D/C | 29 | POWERGRID | POWERGRID | DTL | Twin HTLS | | Not Available | |
| 191 | 400kV | Meerut-Bagpat | 1 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 192 | 400kV | Meerut-Bagpat | 2 | D/C | 71 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | LILO of Meerut-Kaithal DC at Baghpat | Polymer Insulator | |
| 193 | 400kV | Meerut-Mandola | 1 | D/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 194 | 400kV | Meerut-Mandola | 2 | D/C | 60 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 195 | 400kV | Meerut-Muzzafarnagar | 1 | S/C | 37 | POWERGRID | POWERGRID | UPPTCL | Twin Moose | | Polymer Insulator | |
| 196 | 400kV | Moga-Fatehabad | 1 | D/C | 179 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 197 | 400kV | Moga-Hissar | 1 | D/C | 209 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | Bypassed at Hissar to form Moga-Bhiwani(PG) | Polymer Insulator | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 198 | 400kV | Moga-Hissar | 2 | D/C | 206 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | LILO of Bhiwadi-Moga both ckts at Hisar |
| 199 | 400kV | Moga-Hissar | 3 | D/C | 206 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 200 | 400kV | Moga-Jalandhar | 1 | D/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin ACAR | | Polymer Insulator | |
| 201 | 400kV | Moga-Jalandhar | 2 | D/C | 85 | POWERGRID | POWERGRID | POWERGRID | Twin ACAR | | Polymer Insulator | |
| 202 | 400kV | Muradnagar-Hapur | 1 | S/C | 28 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | Moradabad-Muradnagar LILOed at Hapur; LILO portion of | Not Available | |
| 203 | 400kV | Moradabad-Hapur | 2 | S/C | 109 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 204 | 400kV | Nallagarh-Koldam | 1 | D/C | 46 | POWERGRID | POWERGRID | NTPC | Quad Moose | | Conventional | Koldam to Parbati pool section is of |
| 205 | 400kV | Nallagarh-Patiala | 1 | D/C | 94 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 206 | 400kV | Nallagarh-Patiala | 2 | D/C | 94 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 207 | 400kV | Nathpa Jhakri-Gumma | 1 | D/C | 55 | POWERGRID | SJVNL | HPPTCL | Triple Snowbird | LILO of DC Jhakri-Panchkula line at Gumma | Not Available | |
| 208 | 400kV | Nathpa Jhakri-Gumma | 2 | D/C | 55 | POWERGRID | SJVNL | HPPTCL | Triple Snowbird | | Not Available | |
| 209 | 400kV | Gumma-Panchkula | 1 | D/C | 112 | POWERGRID | HPPTCL | POWERGRID | Triple Snowbird | | Not Available | |
| 210 | 400kV | Gumma-Panchkula | 2 | D/C | 112 | POWERGRID | HPPTCL | POWERGRID | Triple Snowbird | | Not Available | |
| 211 | 400kV | Nathpa Jhakri-RampurHEP | 1 | D/C | 21 | POWERGRID | SJVNL | SJVNL | Triple Snowbird | Nathpa Jhakri-Nallagarh LILOed at Rampur HEP | Conventional | LILO of Jhakri-Nalagarh-1 at RampurHEP |
| 212 | 400kV | Nathpa Jhakri-RampurHEP | 2 | D/C | 21 | POWERGRID | SJVNL | SJVNL | Triple Snowbird | | Conventional | |
| 213 | 400kV | NeemranaPG-Manesar | 1 | D/C | 67 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 214 | 400kV | NeemranaPG-Manesar | 2 | D/C | 67 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 215 | 400kV | NeemranaPG-Babai | 1 | D/C | 85 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar-1 at Babai | Not Available | LILO of 400kV Neemrana-Sikar at Babai by NRSSXXXVI (Essel group): Earlier 29% of Neemrana-Sikar PG |
| 216 | 400kV | NeemranaPG-Sikar | 2 | D/C | 176 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Not Available | |
| 217 | 400kV | NewWanpoh-Wagoora | 1 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 218 | 400kV | NewWanpoh-Wagoora | 2 | D/C | 57 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 219 | 400kV | Orai(PG)-Orai | 1 | D/C | 42 | POWERGRID | POWERGRID | UPPTCL | Quad Moose | | Not Available | |
| 220 | 400kV | Orai(PG)-Orai | 2 | D/C | 42 | POWERGRID | POWERGRID | UPPTCL | Quad Moose | | Not Available | |
| 221 | 400kV | Panchkula -Abdullapur | 1 | D/C | 63 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | LILO of Jhakri-Abdullapur at Panchkula |
| 222 | 400kV | Panchkula -Abdullapur | 2 | D/C | 63 | POWERGRID | POWERGRID | POWERGRID | Triple Snowbird | | Polymer Insulator | LILO of Jhakri-Abdullapur at |
| 223 | 400kV | Patiala-Panchkula | 1 | D/C | 65 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 224 | 400kV | Patiala-Panchkula | 2 | D/C | 65 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Polymer Insulator | |
| 225 | 400kV | Patiala-Patran | 1 | D/C | 79 | POWERGRID | POWERGRID | PTCL | Triple Snowbird | LILO of 400kV D/C Patiala – Kaithal Line at Patran SS under the ownership of PTCL. | Polymer Insulator | LILO of 400 kV Kaithal- |
| 226 | 400kV | Patiala-Patran | 2 | D/C | 79 | POWERGRID | POWERGRID | PTCL | Triple Snowbird | | Polymer Insulator | |
| 227 | 400kV | Patran-Kaithal | 1 | D/C | 47 | POWERGRID | PTCL | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 228 | 400kV | Patran-Kaithal | 2 | D/C | 47 | POWERGRID | PTCL | POWERGRID | Triple Snowbird | | Polymer Insulator | |
| 229 | 400kV | RampurHEP-Nallagarh | 1 | D/C | 128 | POWERGRID | SJVNL | POWERGRID | Triple Snowbird | Nathpa Jhakri-Nallagarh LILOed at Rampur HEP | Conventional | LILO of Jhakri-Nalagarh-1 at RampurHEP |
| 230 | 400kV | RampurHEP-Nallagarh | 2 | D/C | 128 | POWERGRID | SJVNL | POWERGRID | Triple Snowbird | | Conventional | |
| 231 | 400kV | RAPS-C-Chittorgarh | 1 | D/C | 155 | POWERGRID | NPCIL | RRVPNL | Twin Moose | | Partial (38%) | LILO of 400 kV Rapp C-Kankroli at Chhitorgarh |
| 232 | 400kV | RAPS-C-Kankroli | 1 | D/C | 199 | POWERGRID | NPCIL | POWERGRID | Twin Moose | | Partial (51%) | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 233 | 400kV | RAPS-C-Kota | 1 | S/C | 51 | POWERGRID | NPCIL | POWERGRID | Twin Moose | | Partial (55%) | 400kV RAPS-Jaipur line whose work was completed till Kota section is connected with 400kV Raps-Kota#2 (for antitheft purpose) and hence 400kV RapsC-Kota #2 is now two twin moose lines connected in parallel paths |
| 234 | 400kV | RAPS-C-Kota | 2 | D/C | 55 | POWERGRID | NPCIL | POWERGRID | Twin Moose | D/C with 400kV Jaipur-RAPP D line | Not Available | |
| 235 | 400kV | Rasra-Balia | 1 | S/C | 46 | POWERGRID | UPPTCL | POWERGRID | Twin Moose | LILO of 400kV Balia-Mau-II at Rasara. LILO portion is of UP | Not Available | |
| 236 | 400kV | Rasra-Mau | 1 | S/C | 38 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 237 | 400kV | Rihand-Allahabad | 1 | D/C | 279 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 238 | 400kV | Rihand-Allahabad | 2 | D/C | 279 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 239 | 400kV | Roorkee-Kashipur | 1 | D/C | 151 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (72%) | |
| 240 | 400kV | Roorkee-Kashipur | 2 | D/C | 151 | POWERGRID | POWERGRID | PTCUL | Quad Moose | | Partial (72%) | |
| 241 | 400kV | Roorkee-Saharanpur | 1 | D/C | 36 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Polymer Insulator | |
| 242 | 400kV | Roorkee-Dehradun | 1 | D/C | 80 | POWERGRID | POWERGRID | POWERGRID | Quad Moose | | Partial (50%) | |
| 243 | 400kV | Sarnath-Varanasi | 1 | D/C | 70 | POWERGRID | UPPTCL | POWERGRID | Quad Moose | | Partial (52%) | LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi |
| 244 | 400kV | Sarnath-Varanasi | 2 | D/C | 107 | POWERGRID | UPPTCL | POWERGRID | Quad Moose | | Partial (52%) | |
| 245 | 400kV | Shahjahanpur-Bareilly PG | 1 | D/C | 116 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 246 | 400kV | Shahjahanpur-Bareilly PG | 2 | D/C | 116 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 247 | 400kV | Shahjahanpur-Rosa | 1 | D/C | 8 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Not Available | |
| 248 | 400kV | Shahjahanpur-Rosa | 2 | D/C | 8 | POWERGRID | POWERGRID | UPPCL | Twin Moose | | Not Available | |
| 249 | 400kV | Shree Cement-Kota | 1 | D/C | 208 | POWERGRID | Sh. Cement | POWERGRID | Twin Moose | | Polymer Insulator | |
| 250 | 400kV | Shree Cement-Merta | 2 | D/C | 103 | POWERGRID | Sh. Cement | RRVPNL | Twin Moose | | Polymer Insulator | |
| 251 | 400kV | Sikar-Babai | 1 | D/C | 95 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | LILO PORTION IF OF NRSS36(B), LILO of 400kV Neemrana-Sikar 1 at Babai | Not Available | |
| 252 | 400kV | Sikar-Ratangarh | 1 | D/C | 76 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |
| 253 | 400kV | Sikar-Ratangarh | 2 | D/C | 76 | POWERGRID | POWERGRID | RRVPNL | Twin Moose | | Conventional | |
| 254 | 400kV | Singrauli-Allahabad | 1 | S/C | 224 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 255 | 400kV | Singrauli-Allahabad | 2 | S/C | 202 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 256 | 400kV | Singrauli-Allahabad | 3 | S/C | 215 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Not Available | |
| 257 | 400kV | Singrauli-Anpara | 1 | S/C | 25 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Partial (91%) | |
| 258 | 400kV | Singrauli-Fatehpur | 1 | S/C | 331 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | LILO of Singrauli-Kanpur at Fatehpur |
| 259 | 400kV | Singrauli-LucknowUP | 1 | S/C | 409 | POWERGRID | NTPC | UPPTCL | Twin Moose | | Conventional | |
| 260 | 400kV | Singrauli-Rihand | 1 | S/C | 42 | POWERGRID | NTPC | NTPC | Twin Moose | | Conventional | |
| 261 | 400kV | Singrauli-Rihand | 2 | S/C | 44 | POWERGRID | NTPC | NTPC | Twin Moose | | Conventional | |
| 262 | 400kV | Singrauli-Vindhyachal | 1 | S/C | 3 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 263 | 400kV | Singrauli-Vindhyachal | 2 | S/C | 5 | POWERGRID | NTPC | POWERGRID | Twin Moose | | Conventional | |
| 264 | 400kV | Koteswar(PG)-Koteswar(THDC) | 1 | D/C | 3 | POWERGRID | POWERGRID | THDC | Twin Moose | | Conventional | |
| 265 | 400kV | Koteswar(PG)-Koteswar(THDC) | 2 | D/C | 3 | POWERGRID | POWERGRID | THDC | Twin Moose | | Conventional | |
| 266 | 400kV | Tehri-Koteshwar(PG) | 3 | S/C | 14 | POWERGRID | THDC | POWERGRID | Quad Moose | | Not Available | |

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| 267 | 400kV | Unnao-Jehta | 1 | D/C | 70 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP | Not Available | |
| 268 | 400kV | Unnao-Jehta | 2 | D/C | 70 | POWERGRID | UPPTCL | UPPTCL | Twin Moose | LILO of 400kV Lucknow-Unnao DC at Jehta (UP). LILO portion is of UP | Not Available | |
| 269 | 400kV | Uri-II - Uri-I | 1 | S/C | 10 | POWERGRID | NHPC | NHPC | Twin Moose | | Conventional | LILO of 400kV Uri-I - Wagoora D/C at Amargarh |
| 270 | 400kV | Uri-II - Wagoora | 1 | S/C | 105 | POWERGRID | NHPC | POWERGRID | Twin Moose | | Conventional | |
| 271 | 400kV | Jauljivi-Bareilly_2 | 1 | D/C | 205 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG) | Not Available | |
| 272 | 400kV | Jauljivi-Bareilly_2 | 2 | D/C | 205 | POWERGRID | POWERGRID | POWERGRID | Twin Moose | After LILO of 400kV Dhauliganga - Bareilly(UP) Double circuit line(Initially LILOed at Pithoragarh and charged at 220kV level) at Jauljivi(PG) | Not Available | |
| **B. POWERLINK Transmission Ltd** | | | | | | | | | | | | |
| 1 | 400kV | Bareilly PG-Meerut | 1 | D/C | 250 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Bareilly PG-Mandola-1 (241 Km) at |
| 2 | 400kV | Bareilly PG-Meerut | 2 | D/C | 250 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 3 | 400kV | Bareilly UP-Bareilly PG | 1 | D/C | 14 | POWERLINK | UPPTCL | POWERGRID | Twin Moose | | Polymer Insulator | |
| 4 | 400kV | Bareilly UP-Bareilly PG | 2 | D/C | 14 | POWERLINK | UPPTCL | POWERGRID | Twin Moose | | Polymer Insulator | |
| 5 | 400kV | Gorakhpur PG-Lucknow PG | 1 | D/C | 246 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | *Series compensated line |
| 6 | 400kV | Gorakhpur PG-Lucknow PG | 2 | D/C | 246 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| 7 | 400kV | Meerut-Mandola | 3 | D/C | 102 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | LILO of Bareilly PG-Mandola-1&2 (241 Km) |
| 8 | 400kV | Meerut-Mandola | 4 | D/C | 102 | POWERLINK | POWERGRID | POWERGRID | Twin Moose | | Conventional | |
| **C. PKTSL** | | | | | | | | | | | | |
| 1 | 400kV | Khetri-Sikar | 1 | D/C | 78 | PKTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available | |
| 2 | 400kV | Khetri-Sikar | 2 | D/C | 78 | PKTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available | |
| **D. Adani Transmission India Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Mahindergarh (APL)-Bhiwani PG | 1 | D/C | 50 | ATIL | APL | POWERGRID | Twin Moose | | Conventional | |
| 2 | 400kV | Mahindergarh (APL)-Bhiwani PG | 2 | D/C | 50 | ATIL | APL | POWERGRID | Twin Moose | | Conventional | |
| 3 | 400kV | Mahindergarh (APL)-Bhiwani PG | 3 | D/C | 56 | ATIL | APL | POWERGRID | Twin Moose | Bypassed at 400kV Bhiwani to form 400kV Bypassed at Dhanonda to form | Not Available | |
| 4 | 400kV | Mahindergarh (APL)-Bhiwani PG | 4 | D/C | 56 | ATIL | APL | POWERGRID | Twin Moose | | Not Available | |
| 5 | 400kV | MahindergarhHVDC-Dhanonda | 1 | D/C | 5 | ATIL | APL | HVPNL | Quad Moose | | Conventional | |
| 6 | 400kV | MahindergarhHVDC-Dhanonda | 2 | D/C | 5 | ATIL | APL | HVPNL | Quad Moose | | Conventional | |
| **E. APCPL (Aravali Power Corporation Pvt Ltd.)** | | | | | | | | | | | | |
| 1 | 400kV | Jhajjar (IGSTPS)-Mundka | 1 | D/C | 66 | APCPL | APCPL | DTL | Twin Moose | | Polymer | |
| 2 | 400kV | Jhajjar (IGSTPS)-Mundka | 2 | D/C | 66 | APCPL | APCPL | DTL | Twin Moose | | Polymer | |
| **F. PHTL (Powergrid Himachal Transmission Limited)** | | | | | | | | | | | | |
| 1 | 400kV | Abdullapur-Kala Amb | 1 | D/C | 39 | PHTL | POWERGRID | PKATL | Quad Moose | | Conventional | |
| 2 | 400kV | Abdullapur-Kala Amb | 2 | D/C | 39 | PHTL | POWERGRID | PKATL | Quad Moose | | Conventional | |
| 3 | 400kV | Kala Amb- Wangtoo (HP) | 1 | D/C | 174 | PHTL | PKATL | HPPTCL | Quad Moose | Karcham-Kala Amb LILOed at Wangtoo (HP) | Not Available | |
| 4 | 400kV | Karcham Wangtoo - Wangtoo (HP) | 1 | D/C | 1 | PHTL | JSW | HPPTCL | Quad Moose | | Not Available | |
| 5 | 400kV | Karcham Wangtoo - Wangtoo (HP) | 2 | D/C | 1 | PHTL | JSW | HPPTCL | Quad Moose | | Not Available | |
| 6 | 400kV | Baspa-Karcham Wangtoo | 1 | D/C | 22 | PHTL | JPVL | JSW | Triple snowbird | | Conventional | |
| 7 | 400kV | Baspa-Karcham Wangtoo | 2 | D/C | 22 | PHTL | JPVL | JSW | Triple snowbird | | Conventional | |
| 8 | 400kV | Karcham Wangtoo-NJPC | 1 | D/C | 34 | PHTL | JSW | SJVNL | Triple snowbird | | Conventional | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 400kV | Karcham Wangtoo-NJPC | 2 | D/C | 34 | PHTL | JSW | SJVNL | Triple snowbird | | Conventional | |
| 10 | 400kV | Sorang-Wangtoo | 1 | D/C | 21 | PHTL | SORANG | HPPTCL | Quad Moose | | Not Available | |
| 11 | 400kV | Sorang-Kala Amb | 1 | D/C | 160 | PHTL | SORANG | PKATL | Quad Moose | | Not Available | |
| **G. PKTCL (Parbati-Koldam Transmission)** | | | | | | | | | | | | |
| 1 | 400kV | Koldam-Ludhiana | 1 | D/C | 151 | PKTCL | NTPC | POWERGRID | Triple Snowbird | | 27% Polymer & 73% porcelain | |
| 2 | 400kV | Koldam-Ludhiana | 2 | D/C | 151 | PKTCL | NTPC | POWERGRID | Triple Snowbird | | 27% Polymer & 73% porcelain | |
| 3 | 400kV | Koldam-Banala | 1 | D/C | 67 | PKTCL | NTPC | POWERGRID | Quad Moose | | 100% porcelain | |
| 4 | 400kV | Nallagarh-Banala | 1 | D/C | 62 | PKTCL | POWERGRID | POWERGRID | Quad Moose | | 100% porcelain | Powergrid owned 46.38km |
| 5 | 400kV | Parbati-II- ParbatiPooling (Banala) | 1 | S/C | 13 | PKTCL | NHPC | POWERGRID | Quad Moose | | 100% porcelain | Some portion is of Powergrid |
| 6 | 400kV | Parbati-III- ParbatiPooling (Banala) | 1 | S/C | 4 | PKTCL | NHPC | POWERGRID | Quad Moose | | 100% porcelain | |
| 7 | 400kV | Parbati II- Sainj | 1 | S/C | 1 | PKTCL | NHPC | HPPCL | Quad Moose | | 100% porcelain | LILO of 400kV Parbati II-Parbati III at Sainj |
| 8 | 400kV | Parbati III- Sainj | 1 | S/C | 9 | PKTCL | NHPC | HPPCL | Quad Moose | | 100% porcelain | |
| **H. INDIGRID:NRSS-29 Transmission Company Limited** | | | | | | | | | | | | |
| 1 | 400kV | Jalandhar-Samba | 1 | D/C | 135 | NRSS-29 | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 2 | 400kV | Jalandhar-Samba | 2 | D/C | 135 | NRSS-29 | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 3 | 400kV | Amargarh-Samba | 1 | D/C | 286 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 4 | 400kV | Amargarh-Samba | 2 | D/C | 286 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 5 | 400kV | Uri-I - Amargarh | 1 | D/C | 62 | NRSS-29 | NHPC | NRSS-29 | Twin Moose | LILO of 400kV D/C Uri-I – Wagoora Line at Amargarh SS under the ownership of NRSS-XXIX. | Polymer | |
| 6 | 400kV | Uri-I - Amargarh | 2 | D/C | 62 | NRSS-29 | NHPC | NRSS-29 | Twin Moose | | Polymer | |
| 7 | 400kV | Amargarh - Wagoora | 1 | D/C | 36 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| 8 | 400kV | Amargarh - Wagoora | 2 | D/C | 36 | NRSS-29 | NRSS-29 | POWERGRID | Twin Moose | | Polymer | |
| **I. Powergrid Unchahar Transmission Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Fatehpur-Unchahar | 1 | D/C | 54 | PUTL | POWERGRID | NBPPL | Twin Moose | | Not Available | |
| 2 | 400kV | Fatehpur-Unchahar | 2 | D/C | 54 | PUTL | POWERGRID | NBPPL | Twin Moose | | Not Available | |
| **J. NRSSXXXI(B) (Sekura Energy)** | | | | | | | | | | | | |
| 1 | 400kV | Amritsar-Malerkotla | 1 | D/C | 149 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 2 | 400kV | Amritsar-Malerkotla | 2 | D/C | 149 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 3 | 400kV | Kurukshetra-Malerkotla | 1 | D/C | 139 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| 4 | 400kV | Kurukshetra-Malerkotla | 2 | D/C | 139 | NRSSXXXI(B) | POWERGRID | POWERGRID | Twin Moose | | Polymer | |
| **K. Gurgaon Palwal Transmission Ltd.** | | | | | | | | | | | | |
| 1 | 400kV | Dhanoda-Neemrana | 1 | D/C | 47 | GPTL | HVPNL | POWERGRID | Twin HTLS | Bypassed at Dhanonda to form | Polymer | |
| 2 | 400kV | Dhanoda-Neemrana | 2 | D/C | 47 | GPTL | HVPNL | POWERGRID | Twin HTLS | | Polymer | |
| 3 | 400kV | Prithala-Kadarpur | 1 | D/C | 29 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 4 | 400kV | Prithala-Kadarpur | 2 | D/C | 29 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 5 | 400kV | Prithala(GPTL)-Aligarh(PG) | 1 | D/C | 49 | GPTL | GPTL | POWERGRID | Twin HTLS | | Polymer | |
| 6 | 400kV | Prithala(GPTL)-Aligarh(PG) | 2 | D/C | 49 | GPTL | GPTL | POWERGRID | Twin HTLS | | Polymer | |
| 7 | 400kV | Kadarpur-Sohna Road | 1 | D/C | 10 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| 8 | 400kV | Kadarpur-Sohna Road | 2 | D/C | 10 | GPTL | GPTL | GPTL | Twin HTLS | | Polymer | |
| **L. FBTL** | | | | | | | | | | | | |
| 1 | 400kV | AREPRL-Fatehgarh Pooling | 1 | D/C | 1 | FBTL | FBTL | FBTL | Quad moose | | Not Available | |
| 2 | 400kV | AREPRL-Fatehgarh Pooling | 2 | D/C | 1 | FBTL | FBTL | FBTL | Quad moose | | Not Available | |
| 3 | 400kV | Fatehgarh II-Fatehgarh Pooling | 1 | D/C | 45 | FBTL | POWERGRID | FBTL | Hexa Zebra+ Twin HTLS | LILO of 400kV Fatehgarh I-Bhadla-1 at Fatehgarh II. LILO Portion is of Powergrid | Not Available | |
| 4 | 400kV | Fatehgarh II-Fatehgarh Pooling | 2 | D/C | 45 | FBTL | POWERGRID | FBTL | Hexa Zebra+ Twin HTLS | | Not Available | |
| **M. PBTSL** | | | | | | | | | | | | |
| 1 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 1 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 2 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 3 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 3 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 4 | 400kV | Bikaner_2 (PBTSL)-Khetri (PKTSL) | 4 | D/C (some towers M/C) | 275 | PBTSL | PBTSL | PKTSL | Twin HTLS | | Not Available |
| 5 | 400kV | Khetri (PKTSL)-Bhiwadi(PG) | 1 | D/C | 126 | PBTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available |
| 6 | 400kV | Khetri (PKTSL)-Bhiwadi(PG) | 2 | D/C | 126 | PBTSL | PKTSL | POWERGRID | Twin HTLS | | Not Available |
| **N. PRTL** | | | | | | | | | | | |
| 1 | 400kV | Jaisalmer(RS)-Fatehgarh_III(PG) | 1 | D/C | 50 | PRTL | RAJASTHAN | PRTL | Twin HTLS | | Not Available |
| 2 | 400kV | Jaisalmer(RS)-Fatehgarh_III(PG) | 2 | D/C | 50 | PRTL | RAJASTHAN | PRTL | Twin HTLS | | Not Available |
| 3 | 400kV | Fatehgarh_III(PG)- Fatehgarh_II(PG) | 1 | D/C | 44 | PRTL | PRTL | POWERGRID | Twin HTLS | | Not Available |
| 4 | 400kV | Fatehgarh_III(PG)- Fatehgarh_II(PG) | 2 | D/C | 44 | PRTL | PRTL | POWERGRID | Twin HTLS | | Not Available |
| **O. NRSS-36** | | | | | | | | | | | |
| 1 | 400kV | Babai(RS)-Bhiwani(PG) | 1 | D/C | 111 | NRSS-36 | NRSS-36 | POWERGRID | Twin Moose | | Not Available |
| 2 | 400kV | Babai(RS)-Bhiwani(PG) | 2 | D/C | 111 | NRSS-36 | NRSS-36 | POWERGRID | Twin Moose | | Not Available |
| **RE Connected at ISTS Dedicated Lines** | | | | | | | | | | | |
| **A. RENEW** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG) - Bikaner (Renew) | 1 | S/C | 5 | RENEW | POWERGRID | RENEW | Twin Moose | | Not Available |
| **B. Avaada** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Avaada | 1 | S/C | 14 | AEPL | POWERGRID | AEPL | Twin Moose | | Not Available |
| **C. ARPOPL** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Ayana | 1 | S/C | 12 | ARPOPL | PGCIL | Ayana | ACSR Twin Moose+AL 59 | | Not Available |
| **D. Azure** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(PG)-Azure 43 PSS | 1 | S/C | 9 | Azure | POWERGRID | Azure 43 PSS | Twin Moose | | Not Available |
| 2 | 400kV | Azure43(RSS)-Azure 43 PSS | 1 | S/C | 3 | Azure | Azure 43 PSS | Azure 43 RSS | Twin Moose | | Not Available |
| **E. RSRPL** | | | | | | | | | | | |
| 1 | 400kV | Bikaner(RENEW) - Renew Surya Ravi | 1 | S/C | 13 | RSRPL | RENEW | RSRPL | Twin Moose | | Not Available |
| **F. NTPC** | | | | | | | | | | | |
| 1 | 400kV | Bhadla II - Kolayat | 1 | D/C | 29 | NTPC | POWERGRID | NTPC | Quad Moose | | Not Available |
| 2 | 400kV | Kolayat - Kolayat_2 | 1 | D/C | 2 | NTPC | NTPC | NTPC | Quad Moose | | Not Available |
| **STATE LINES** | | | | | | | | | | | |
| **A. DTL** | | | | | | | | | | | |
| 1 | 400kV | Bamnauli-Tughlakabad | 1 | M/C | 68 | DTL | DTL | POWERGRID | | Tower is quad circuit tower | Polymer Insulator |
| 2 | 400kV | Bamnauli-Tughlakabad | 2 | M/C | 68 | DTL | DTL | POWERGRID | | Tower is quad circuit tower | Polymer Insulator |
| 3 | 400kV | Bamnoli-Jhatikara | 1 | D/C | 12 | DTL | DTL | POWERGRID | Quad bersimis | | Polymer Insulator |
| 4 | 400kV | Bamnoli-Jhatikara | 2 | D/C | 12 | DTL | DTL | POWERGRID | Quad bersimis | | Polymer Insulator |
| 5 | 400kV | Bawana-Mundka | 1 | D/C | 18 | DTL | DTL | DTL | Quad bersimis | | Polymer Insulator |
| 6 | 400kV | Bawana-Mundka | 2 | D/C | 18 | DTL | DTL | DTL | Quad bersimis | | Polymer Insulator |
| 7 | 400kV | Jhatikara-Mundka | 1 | D/C | 17 | DTL | POWERGRID | DTL | Quad bersimis | | Polymer Insulator |
| 8 | 400kV | Jhatikara-Mundka | 2 | D/C | 17 | DTL | POWERGRID | DTL | Quad bersimis | | Polymer Insulator |
| **B. HVPNL** | | | | | | | | | | | |
| 1 | 400kV | CLP Jhajjar -Dhanonda | 1 | D/C | 20 | HVPNL | CLP Jhajjar | HVPNL | Twin Moose | | Conventional |
| 2 | 400kV | CLP Jhajjar -Dhanonda | 2 | D/C | 20 | HVPNL | CLP Jhajjar | HVPNL | Twin Moose | | Conventional |
| 3 | 400kV | CLP Jhajjar- Kabulpur | 1 | D/C | 35 | JKTPL | CLP Jhajjar | HVPNL | Quad Moose | | Already had Anti fog |
| 4 | 400kV | CLP Jhajjar- Kabulpur | 2 | D/C | 35 | JKTPL | CLP Jhajjar | HVPNL | Quad Moose | | Polymer Insulator |
| 5 | 400kV | Deepalpur-Kabulpur | 1 | D/C | 67 | JKTPL | KT Jhajjar | HVPNL | Quad Moose | | Installed on every |
| 6 | 400kV | Deepalpur-Kabulpur | 2 | D/C | 67 | JKTPL | KT Jhajjar | HVPNL | Quad Moose | | towers |

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| 7 | 400kV | Dhanoda-Daultabad | 1 | D/C | 73 | HVPNL | HVPNL | HVPNL | Quad Moose | | Already had Polymer Insulator | |
| 8 | 400kV | Dhanoda-Daultabad | 2 | D/C | 73 | HVPNL | HVPNL | HVPNL | Quad Moose | | | |
| 9 | 400kV | Gurgaon-Daultabad | 1 | D/C | 21 | HVPNL | POWERGRID | HVPNL | Quad Moose | | | Six towers multi-circuit with Bamnauli- |
| 10 | 400kV | Gurgaon-Daultabad | 2 | D/C | 21 | HVPNL | POWERGRID | HVPNL | Quad Moose | | | |
| 11 | 400kV | Jhajjar-Daulatabad | 1 | D/C | 64 | HVPNL | APCPL | HVPNL | Twin Moose | | Polymer Insulator | Partial (84%), |
| 12 | 400kV | Jhajjar-Daulatabad | 2 | D/C | 64 | HVPNL | APCPL | HVPNL | Twin Moose | | Polymer Insulator | Remaining pending |
| 13 | 400kV | Khedar-Fatehabad | 1 | D/C | 40 | HVPNL | HPGCL | POWERGRID | Twin Moose | | Conventional | Presently there is no planning of replacment of Convention disc Insulator with Polymer Insulators |
| 14 | 400kV | Jind-Kirori | 1 | D/C | 51 | HVPNL | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | |
| 15 | 400kV | Jind-Kirori | 2 | D/C | 51 | HVPNL | POWERGRID | HVPNL | Twin Moose | | Polymer Insulator | |
| 16 | 400kV | Khedar-Kirori | 1 | D/C | 6.2 | HVPNL | HPGCL | HVPNL | Twin Moose | | Conventional | Presently there is no planning of replacment |
| 17 | 400kV | Khedar-Kirori | 2 | D/C | 6 | HVPNL | HPGCL | HVPNL | Twin Moose | | | |
| 18 | 400kV | Khedar-Nuhiawali | 1 | D/C | 114 | HVPNL | HPGCL | HVPNL | Twin Moose | | Conventional | Existing disc insulator |
| 19 | 400kV | Nuhiawali-Fatehabad | 1 | D/C | 78 | HVPNL | HVPNL | POWERGRID | Twin Moose | | Conventional | are of Porcelain |
| **C. PDD (Jammu & Kashmir)** | | | | | | | | | | | | |
| 1 | 400kV | Baglihar(stage 1)-Kishenpur | 1 | D/C | 68 | JK PDD | JKSPDCL | POWERGRID | Twin Moose | | Conventional | |
| 2 | 400kV | Baglihar(stage 1)-Kishenpur | 2 | D/C | 68 | JK PDD | JKSPDCL | POWERGRID | Twin Moose | | Not Available | |
| **D. PSTCL** | | | | | | | | | | | | |
| 1 | 400kV | Behman Jassa- HMEL | 1 | D/C | 17 | PSTCL | PSTCL | PSTCL | Twin Moose | | Not Available | |
| 2 | 400kV | Behman Jassa- HMEL | 2 | D/C | 17 | PSTCL | PSTCL | PSTCL | Twin Moose | | Not Available | |
| 3 | 400kV | Behman Jassa- Moga | 1 | S/C | 113 | PSTCL | PSTCL | PSTCL | Twin Moose | After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh | Not Available | |
| 4 | 400kV | Makhu-Amritsar | 1 | D/C | 64 | PSTCL | PSTCL | PSTCL | Twin Moose | | Partial (10%) | |
| 5 | 400kV | Makhu-Amritsar | 2 | D/C | 64 | PSTCL | PSTCL | PSTCL | Twin Moose | | Partial (10%) | |
| 6 | 400kV | Muktsar-Makhu | 1 | D/C | 96 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 7 | 400kV | Muktsar-Makhu | 2 | D/C | 96 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 8 | 400kV | Nakodar-Makhu | 1 | D/C | 52 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 9 | 400kV | Nakodar-Makhu | 2 | D/C | 52 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | |
| 10 | 400kV | Nakodar-Moga | 1 | S/C | 78 | PSTCL | PSPCL | POWERGRID | Twin Moose | | Not Available | LILO of 400kV Talwandi sabo-Nakodar at Moga |
| 11 | 400kV | Rajpura-Dhuri | 1 | D/C | 86 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | Lilo of Rajpura th-Dhuri |
| 12 | 400kV | Rajpura TPS- Rajpura | 1 | D/C | 9 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | 1 at 400kV Rajpura |
| 13 | 400kV | Rajpura-Dhuri | 2 | D/C | 86 | PSTCL | PSTCL | PSTCL | Twin Moose | | Conventional | Lilo of Rajpura th-Dhuri |
| 14 | 400kV | Rajpura TPS- Rajpura | 2 | D/C | 9 | PSTCL | PSPCL | PSTCL | Twin Moose | | Not Available | 2 at 400kV Rajpura |
| 15 | 400kV | Rajpura TPS-Nakodar | 1 | D/C | 139 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 16 | 400kV | Rajpura TPS-Nakodar | 2 | D/C | 139 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 17 | 400kV | Talwandi Saboo- Dhuri | 1 | D/C | 175 | PSTCL | PSPCL | PSTCL | Twin Moose | | Partial (22%) | |
| 18 | 400kV | Talwandi Saboo- Dhuri | 2 | D/C | 175 | PSTCL | PSPCL | PSTCL | Twin Moose | | Partial (22%) | |
| 19 | 400kV | Talwandi Saboo- Behman Jassa | 1 | D/C | 20 | PSTCL | PSPCL | PSTCL | Twin Moose | After LILO of 400 KV TSPL to 400 KV Moga at 400 KV Behman Jassa Singh | Not Available | |
| 20 | 400kV | Talwandi Saboo- Nakodar | 1 | D/C | 180 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 21 | 400kV | Talwandi Saboo- Muktsar | 1 | D/C | 100 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| 22 | 400kV | Talwandi Saboo- Muktsar | 2 | D/C | 100 | PSTCL | PSPCL | PSTCL | Twin Moose | | Conventional | |
| **E. PTCUL** | | | | | | | | | | | | |
| 1 | 400kV | Alaknanda(GVK)-Srinagar(PTCUL) | 1 | D/C | 14 | PTCUL | GVKPIL | PTCUL | Twin Moose | | Conventional | |
| 2 | 400kV | Alaknanda(GVK)-Srinagar(PTCUL) | 2 | D/C | 14 | PTCUL | GVKPIL | PTCUL | Twin Moose | | Conventional | |
| 3 | 400kV | Muradabad-Kashipur | 1 | S/C | 108 | PTCUL | UPPTCL | PTCUL | Twin Moose | | Conventional | |
| 4 | 400kV | Rishikesh-Nehtaur | 1 | D/C | 124 | PTCUL | PTCUL | UPPTCL | Twin Moose | | Not Available | LILO of 400kV |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 400kV | Nehtaur-Kashipur | 2 | D/C | 80 | PTCUL | UPPTCL | PTCUL | Twin Moose | | Not Available | Rishikesh-Kashipur |
| 6 | 400kV | Roorkee-Rishikesh | 1 | S/C | 50 | PTCUL | POWERGRID | PTCUL | Twin Moose | LILO portion is of POWERGRID | Not Available | |
| 7 | 400kV | Roorkee-Muzaffarnagar | 1 | S/C | 71 | PTCUL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| **F. RRVPNL** | | | | | | | | | | | | |
| 1 | 400kV | Ajmer-Bhilwara | 1 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 2 | 400kV | Ajmer-Bhilwara | 2 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 3 | 400kV | Akal-Barmer | 1 | S/C | 124 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 4 | 400kV | Akal-Jodhpur | 1 | S/C | 225 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 5 | 400kV | Akal-Ramgarh | 1 | D/C | 99 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 6 | 400kV | Akal-Ramgarh | 2 | D/C | 99 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 7 | 400kV | Anta-Chhabra | 1 | S/C | 90 | RRVPNL | RRVPNL | RVUNL | Quad Moose | Bypassed at Anta to form Chhabra-Kota(PG) | Not Available | |
| 8 | 400kV | Anta-Chhabra SC | 1 | D/C | 89 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 9 | 400kV | Anta-Chhabra SC | 2 | D/C | 89 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 10 | 400kV | Anta-Kalisindh | 1 | D/C | 80 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 11 | 400kV | Anta-Kalisindh | 2 | D/C | 80 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 12 | 400kV | Anta-Kawai | 1 | D/C | 50 | RRVPNL | RRVPNL | Kawai(Adani) | Quad Moose | | Not Available | |
| 13 | 400kV | Anta-Kawai | 2 | D/C | 50 | RRVPNL | RRVPNL | Kawai(Adani) | Quad Moose | | Not Available | |
| 14 | 400kV | Anta-Kota (PG) | 1 | S/C | 91 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | Bypassed at Anta to form Chhabra-Kota(PG) | Not Available | |
| 15 | 400kV | Barmer-Bhinmal | 1 | D/C | 144 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 16 | 400kV | Barmer-Bhinmal | 2 | D/C | 144 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 17 | 400kV | Barmer-Jaisalmer-II (Bhaesada) | 1 | D/C | 117 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 18 | 400kV | Barmer-Jaisalmer-II (Bhaesada) | 2 | D/C | 117 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 19 | 400kV | Barmer-Rajwest | 1 | D/C | 15 | RRVPNL | RRVPNL | RAJWEST | Twin Moose | | Conventional | |
| 20 | 400kV | Bhadla-Jodhpur | 1 | D/C | 106 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 21 | 400kV | Bhilwara-Chhabra | 1 | S/C | 303 | RRVPNL | RRVPNL | RVUNL | Twin Moose | | Conventional | |
| 22 | 400kV | Bhilwara-Chittorgarh(RRVPNL) | 1 | D/C | 49 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 23 | 400kV | Bhilwara-Chittorgarh(RRVPNL) | 2 | D/C | 49 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 24 | 400kV | Bikaner-Bhadla | 1 | D/C | 189 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 25 | 400kV | Bikaner-Bhadla | 2 | D/C | 189 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 26 | 400kV | Bikaner-Merta | 1 | S/C | 172 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 27 | 400kV | Bikaner-Sikar(PG) | 1 | D/C | 171 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 28 | 400kV | Bikaner-Sikar(PG) | 2 | D/C | 171 | RRVPNL | RRVPNL | POWERGRID | Twin Moose | | Not Available | |
| 29 | 400kV | Chhabra - Kawai SCTPS | 1 | S/C | 45 | RRVPNL | RVUNL | APRL | Twin Moose | | Conventional | |
| 30 | 400kV | Chhabra-Chhabra SC | 1 | D/C | 2 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 31 | 400kV | Chhabra-Chhabra SC | 2 | D/C | 2 | RRVPNL | RRVPNL | RVUNL | Quad Moose | | Not Available | |
| 32 | 400kV | Heerapura-Hindaun | 1 | S/C | 192 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 33 | 400kV | Hindaun-Chhabra | 1 | S/C | 305 | RRVPNL | RRVPNL | RVUNL | Twin Moose | | Conventional | |
| 34 | 400kV | Kakani (Jodhpur New)-Jodhpur | 2 | S/C | 102 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 35 | 400kV | Kankani (Jodhpur New)-Akal | 1 | D/C | 223 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 36 | 400kV | Kankani(Jodhpur New)-Jaisalmer-II(Bhainsra) | 1 | D/C | 177 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | LILO of 400kV Kankani(Jodhpur New)-Akal ckt-2 | Not Available | |
| 37 | 400kV | Jaisalmer-II(Bhainsra)-Akal | 1 | D/C | 61 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 38 | 400kV | Kankani (Jodhpur New)-Jodhpur | 1 | S/C | 67 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 39 | 400kV | Kankani (Jodhpur New)-Merta | 1 | S/C | 140 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Merta-1 at Kakani | Not Available | |
| 40 | 400kV | Merta-Bhadla | 1 | D/C | 175 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Merta-2 at Bhadla | Not Available | |
| 41 | 400kV | Merta-Heerapura | 1 | S/C | 175 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |
| 42 | 400kV | Merta-Ratangarh | 1 | S/C | 173 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Conventional | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 400kV | Phagi-Ajmer(RRVPNL) | 1 | D/C | 109 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 44 | 400kV | Phagi-Ajmer(RRVPNL) | 2 | D/C | 109 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 45 | 400kV | Phagi-Heerapura | 1 | D/C | 52 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 46 | 400kV | Phagi-Heerapura | 2 | D/C | 52 | RRVPNL | RRVPNL | RRVPNL | Quad Moose | | Not Available | |
| 47 | 400kV | Rajwest - Kankani (Jodhpur New) | 1 | S/C | 209 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | LILO of 400kV Jodhpur-Rajwest-I at Kakani | Not Available | |
| 48 | 400kV | Rajwest-Jodhpur | 1 | D/C | 209 | RRVPNL | RWPL | RRVPNL | Twin Moose | | Conventional | |
| 49 | 400kV | Ramgarh-Bhadla | 1 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 50 | 400kV | Ramgarh-Bhadla | 2 | D/C | 160 | RRVPNL | RRVPNL | RRVPNL | Twin Moose | | Not Available | |
| 51 | 400kV | Suratgarh-Bikaner | 1 | S/C | 146 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 52 | 400kV | Suratgarh-Ratangarh | 1 | S/C | 144 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 53 | 400kV | Suratgarh-Ratangarh | 2 | S/C | 144 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Conventional | |
| 54 | 400kV | Suratgarh-Suratgarh SC | 1 | S/C | 2 | RRVPNL | RVUNL | RVUNL | Quad Moose | | Not Available | |
| 55 | 400kV | Suratgarh SC-Bikaner | 1 | D/C | 140 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Not Available | |
| 56 | 400kV | Suratgarh SC-Bikaner | 2 | D/C | 140 | RRVPNL | RVUNL | RRVPNL | Twin Moose | | Not Available | |
| **G. UPPTCL** | | | | | | | | | | | | |
| 1 | 400kV | Agra (Fatehbad)-Agra South | 1 | D/C | 70 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 2 | 400kV | Agra (UP)-Agra(Fatehbad) | 1 | S/C | 104 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Agra(UP)-Muradnagar(N) at Fatehabad(UP) |
| 3 | 400kV | Agra UP-Unnao | 1 | S/C | 279 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (25%) | |
| 4 | 400kV | Agra(Fatehbad)-Mathura | 1 | S/C | 142 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 5 | 400kV | Agra(Fatehbad)-Mathura | 2 | D/C | 151 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura |
| 6 | 400kV | Alakhnanda-Vishnuprayag | 1 | D/C | 109 | UPPTCL | GVKPIL | JPVL | Twin Moose | | Not Available | |
| 7 | 400kV | Aligarh-Mainpuri | 1 | D/C | 93 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 8 | 400kV | Aligarh-Mainpuri | 2 | D/C | 93 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 9 | 400kV | Aligarh-Muradnagar | 1 | S/C | 177 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | *Series Compensated line (40%). It would be shifted |
| 10 | 400kV | Aligarh-Sikandrabad | 1 | D/C | 95 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 11 | 400kV | Aligarh-Harduaganj | 1 | S/C | 40 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 12 | 400kV | AnparaB-AnparaC | 1 | D/C | 0.05 | UPPTCL | UPRVUNL | LANCO | Quad Moose | | Conventional | |
| 13 | 400kV | AnparaB-AnparaC | 2 | D/C | 0.05 | UPPTCL | UPRVUNL | LANCO | Quad Moose | | Conventional | |
| 14 | 400kV | AnparaB-AnparaD | 1 | D/C | 5 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Not Available | |
| 15 | 400kV | AnparaB-AnparaD | 2 | D/C | 5 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Not Available | |
| 16 | 400kV | AnparaB-Mau | 1 | S/C | 262 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial (13%) | |
| 17 | 400kV | AnparaB-Obra B | 1 | S/C | 40 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial | |
| 18 | 400kV | AnparaB-Sarnath | 1 | D/C | 158 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Partial | |
| 19 | 400kV | AnparaB-Sarnath | 2 | D/C | 158 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Conventional | |
| 20 | 400kV | Ataur-Hapur | 1 | D/C | 52 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 21 | 400kV | Ataur-Hapur | 2 | D/C | 52 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 22 | 400kV | Ataur-Indirapuram | 1 | D/C | 15 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 23 | 400kV | Ataur(UP)-Noida Sec 123(UP) | 1 | D/C | 19 | UPPTCL | UPPTCL | UPPTCL | Quad Moose (LILO portion Twin HTLS) | LILO of 400 KV ATAUR-INDIRAPURAM CKT-II at 400 KV NOIDA SECTOR 123 | Not Available | |
| 24 | 400kV | Indirapuram(UP)-Noida Sec 123(UP) | 1 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose (LILO portion Twin HTLS) | | Not Available | |
| 25 | 400kV | Azamgarh-Mau | 1 | S/C | 48 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (79%) | |
| 26 | 400kV | Azamgarh-Tanda | 1 | D/C | 153 | UPPTCL | UPPTCL | NTPC | Twin Moose | | Not Available | |
| 27 | 400kV | Badaun-Sambhal | 1 | D/C | 77 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 28 | 400kV | Badaun-Sambhal | 2 | D/C | 77 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 29 | 400kV | Banda-Orai | 1 | D/C | 108 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |

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| 30 | 400kV | Banda-Orai | 2 | D/C | 108 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 31 | 400kV | Banda-Rewa road | 1 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 32 | 400kV | Banda-Rewa road | 2 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 33 | 400kV | Bara-Meja | 1 | D/C | 32 | UPPTCL | UPPTCL | MUNPL | Quad Moose | | LILO of 400kV Bara-Rewa road D/C at Meja | |
| 34 | 400kV | Bara-Meja | 2 | D/C | 32 | UPPTCL | UPPTCL | MUNPL | Quad Moose | | | |
| 35 | 400kV | Bareilly UP-Unnao | 1 | D/C | 271 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (15%) | *Series Compensated line (45%) |
| 36 | 400kV | Bareilly UP-Unnao | 2 | D/C | 271 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (15%) | *Series Compensated line (45%) |
| 37 | 400kV | Gorakhpur UP-Azamgarh | 1 | S/C | 90 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (76%) | |
| 38 | 400kV | Gr. Noida(765)-Sector 148 | 1 | D/C | 47 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 39 | 400kV | Gr. Noida(765)-Sector 148 | 2 | D/C | 47 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 40 | 400kV | Gr. Noida-Gr. Noida (765) | 1 | D/C | 45 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 41 | 400kV | Gr. Noida-Gr. Noida (765) | 2 | D/C | 45 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 42 | 400kV | Gr.Noida-Sikandrabad | 1 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 43 | 400kV | Gr.Noida-Sikandrabad | 2 | D/C | 17 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 44 | 400kV | Hapur-Dasna | 1 | D/C | 14 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 45 | 400kV | Hapur-Dasna | 2 | D/C | 14 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 46 | 400kV | Hapur-Moradabad | 1 | S/C | 109 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 47 | 400kV | Hapur-Muradnagar | 1 | S/C | 28 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 48 | 400kV | Harudaganj-Sikandarabad | 1 | S/C | 115 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 49 | 400kV | Mainpuri(UP)-Mainpuri(PG) | 1 | D/C | 25 | UPPTCL | UPPTCL | POWERGRID | Twin Moose | | Not Available | LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP) |
| 50 | 400kV | Mainpuri(UP)-Mainpuri(PG) | 2 | D/C | 26 | UPPTCL | UPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 51 | 400kV | Meja-Musauli | 1 | D/C | 65 | UPPTCL | MUNPL | UPPTCL | Quad Moose | | Not Available | |
| 52 | 400kV | Meja-Rewa road | 1 | D/C | 45 | UPPTCL | MUNPL | UPPTCL | Quad Moose | | Not Available | |
| 53 | 400kV | Muradnagar New- Mathura | 1 | D/C | 246 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura |
| 54 | 400kV | Muradnagar-Ataur | 2 | D/C | 18 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 55 | 400kV | Musauli-Rewa road | 1 | D/C | 34 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 56 | 400kV | Muzaffarnagar-Alakhnanda | 1 | D/C | 189 | UPPTCL | UPPTCL | GVKPIL | Twin Moose | | Not Available | |
| 57 | 400kV | Muzaffarnagar-Ataur | 1 | D/C | 121 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 58 | 400kV | Muzaffarnagar-Vishnuprayag | 1 | D/C | 280 | UPPTCL | UPPTCL | JPVL | Twin Moose | | Conventional | |
| 59 | 400kV | Noida Sec 148 - Noida Sec 123 | 1 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 60 | 400kV | Noida Sec 148 - Noida Sec 123 | 2 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 61 | 400kV | Noida Sec 148-Noida Sec 123 | 1 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 62 | 400kV | Noida Sec 148-Noida Sec 123 | 2 | D/C | 20 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 63 | 400kV | Obra-Rewa road | 1 | S/C | 179 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 64 | 400kV | Obra-Sultanpur | 1 | S/C | 230 | UPPTCL | UPRVUNL | UPPTCL | Twin Moose | | Conventional | |
| 65 | 400kV | Obra B - Obra C | 1 | S/C | 1 | UPPTCL | UPRVUNL | UPRVUNL | Twin Moose | | Not Available | |
| 66 | 400kV | Orai-Mainpuri(UP) | 1 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 67 | 400kV | Orai-Mainpuri(UP) | 2 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 68 | 400kV | Orai-Paricha | 1 | D/C | 111 | UPPTCL | UPPTCL | UPRVUNL | Twin Moose | | Not Available | |
| 69 | 400kV | Orai-Paricha | 2 | D/C | 111 | UPPTCL | UPPTCL | UPRVUNL | Twin Moose | | Not Available | |

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| 70 | 400kV | Panki-Aligarh | 1 | S/C | 285 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (24%) | |
| 71 | 400kV | Rewa road -Panki | 1 | S/C | 210 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | LILO of Bara-Panki at 400kV Rewa Road |
| 72 | 400kV | Rosa-Badaun | 1 | D/C | 85 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 73 | 400kV | Rosa-Badaun | 2 | D/C | 85 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 74 | 400kV | Sarnath-Azamgarh | 1 | S/C | 97 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 75 | 400kV | Lucknow_1(PG)-Mohanlalganj (PGYTL) | 1 | S/C | 58 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | LILO of 400kV LUCKNOW(PG)- | Conventional | |
| 76 | 400kV | Sultanpur(UP)-Mohanlalganj (PGYTL) | 1 | S/C | 133 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Conventional | |
| 77 | 400kV | Sultanpur-Tanda | 1 | D/C | 103 | UPPTCL | UPPTCL | NTPC | Twin Moose | | Not Available | |
| 78 | 400kV | Tanda-Basti | 1 | D/C | 44 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 79 | 400kV | Tanda-Basti | 2 | D/C | 44 | UPPTCL | UPPTCL | UPPTCL | Quad Moose | | Not Available | |
| 80 | 400kV | Mohanlalganj (PGYTL)-Unnao(UP) | 1 | S/C | 104 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | LILO of 400 KV SAROJANI | Partial (13%) | Status after LILO? |
| 81 | 400kV | Lucknow(UP)-Mohanlalganj (PGYTL) | 1 | S/C | 89 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (13%) | |
| 82 | 400kV | Unnao-Panki | 1 | S/C | 49 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Partial (41%) | |
| 83 | 400kV | Varanasi-Jaunpur | 1 | D/C | 73 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 84 | 400kV | Varanasi-Jaunpur | 2 | D/C | 73 | UPPTCL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| 85 | 400kV | Jaunpur (UP)-Obra_B(UP) | 1 | D/C | 177 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | After LILO of 400 KV OBRA B- OBRA-C CKT- | Not Available | |
| 86 | 400kV | Obra_C_TPS(UP)-Jaunpur (UP) | 1 | D/C | 176 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 87 | 400kV | Sambhal-Rampur | 1 | D/C | 74 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 88 | 400kV | Sambhal-Rampur | 2 | D/C | 74 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 89 | 400kV | Simbholi-Meerut_PMSTL | 1 | D/C | 29 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 90 | 400kV | Simbholi-Meerut_PMSTL | 2 | D/C | 29 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 91 | 400kV | Simbholi_PMSTL (UP)-Muradnagar_2(UP) | 1 | D/C | 71 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 92 | 400kV | Simbholi_PMSTL (UP)-Muradnagar_2(UP) | 2 | D/C | 71 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| 93 | 400kV | Panki-Panki_TPS | 1 | S/C | 1 | UPPTCL | UPPTCL | UPPTCL | Twin Moose | | Not Available | |
| **H. PJFTL** | | | | | | | | | | | | |
| 1 | 400kV | Firozabad-Jawaharpur | 1 | D/C | 40 | PJFTL | PJFTL | UPRVUNL | Quad Moose | Anti-theft charging from Firozabad(PJFTL) | Not Available | |
| 2 | 400kV | Firozabad-Jawaharpur | 2 | D/C | 40 | PJFTL | PJFTL | UPRVUNL | Quad Moose | | Not Available | |
| 3 | 400kV | Agra South-Firozabad PJFTL | 1 | D/C | 79 | PJFTL | UPPTCL | PJFTL | Twin Moose | LILO of 400kV Agra South-Agra Fatehabad ckt-2 at Firozabad PJFTL | Not Available | |
| 4 | 400kV | Agra(Fatehabad)-Firozabad PJFT | 1 | D/C | 79 | PJFTL | UPPTCL | PJFTL | Twin Moose | | Not Available | |
| **I. GTL** | | | | | | | | | | | | |
| 1 | 400kV | Kanpur(PG)-Ghatampur_TPS(UP) | 1 | D/C | 49 | GTL | POWERGRID | UPPTCL | Twin Moose | Antitheft charging from Kanpur(PG) Upto DEAD | Not Available | |
| 2 | 400kV | Kanpur(PG)-Ghatampur_TPS(UP) | 2 | D/C | 49 | GTL | POWERGRID | UPPTCL | Twin Moose | | Not Available | |
| **J. HPPTCL** | | | | | | | | | | | | |
| 1 | 400kV | Lahal-Chamba | 1 | D/C | 35 | HPPTCL | HPPTCL | POWERGRID | Twin Moose | | Not Available | |
| 2 | 400kV | Lahal-Chamba | 2 | D/C | 35 | HPPTCL | HPPTCL | POWERGRID | Twin Moose | | Not Available | |
| **K. NTPC JV** | | | | | | | | | | | | |
| 1 | 400kV | Dadri-Loni (Harsh Vihar) | 1 | D/C | 54 | NTPC | NTPC | DTL | Twin Moose | | Polymer | |
| 2 | 400kV | Dadri-Loni (Harsh Vihar) | 2 | D/C | 54 | NTPC | NTPC | DTL | Twin Moose | | Polymer | |
| **L. MTSCL** | | | | | | | | | | | | |
| 1 | 400kV | Ajmer-Deedwana | 1 | S/C | 110 | MTSCL | RRVPNL | MTSCL | Twin Moose | | Not Available | |
| 2 | 400kV | Bikaner-Deedwana | 1 | S/C | 129 | MTSCL | RRVPNL | MTSCL | Twin Moose | | Conventional | |
| **M. Aravali Transmission Service Company Ltd (ATSCL)** | | | | | | | | | | | | |
| 1 | 400kV | Alwar-Hindaun | 1 | S/C | 96 | ATSCL | ATSL | RRVPNL | Twin Moose | | Not Available | Partly owned by Aravali Transmission Services lLtd. |
| **N. BBMB** | | | | | | | | | | | | |
| 1 | 400kV | Dehar-Rajpura | 1 | S/C | 129 | BBMB | BBMB | PSTCL | Twin Morkulla+ LILO portion is of twin moose | Dehar-Bhiwani LILOed at Rajpura | Antifog | LILO of Dehar-Bhiwani at Rajpura |
| 2 | 400kV | Bhiwani(BBMB)-Rajpura | 1 | S/C | 213 | BBMB | BBMB | PSTCL | | Dehar-Bhiwani LILOed at Rajpura | Antifog | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 400kV | Dehar-Panchkula | 1 | S/C | 125 | BBMB | BBMB | POWERGRID | Twin Morkulla+ LILO portion is of twin moose | POWERGRID owned LILO portion of 9.034Km | Antifog | LILO of Dehar-Panipat at Panchkula |
| 4 | 400kV | Panchkula-Panipat | 1 | S/C | 155 | BBMB | POWERGRID | BBMB | | | Antifog | |
| **OTHER DEDICATED LINES** | | | | | | | | | | | | |
| **A. THDC** | | | | | | | | | | | | |
| 1 | 400kV | Aligarh-Khurja | 1 | D/C | 35 | THDC | POWERGRID | THDC | Twin Moose | | Not Available | |
| 2 | 400kV | Aligarh-Khurja | 2 | D/C | 35 | THDC | POWERGRID | THDC | Twin Moose | | Not Available | |
| **5. 400kV Transmission Line charged at 220kV** | | | | | | | | | | | | |
| **STATE LINES** | | | | | | | | | | | | |
| **A. RRVPNL** | | | | | | | | | | | | |
| 1 | 400kV charged at 220kV | Dholpur-Hindaun | 1 | S/C | 100 | RRVPNL | RRVUNL | RRVPNL | Twin Moose | | Conventional | |
| 2 | 400kV charged at 220kV | Kota-KTPS | 1 | D/C | 7 | RRVPNL | POWERGRID | RRVUNL | Twin Moose | | Conventional | |
| 3 | 400kV charged at 220kV | Kota-KTPS | 2 | D/C | 7 | RRVPNL | POWERGRID | RRVUNL | Twin Moose | | Conventional | |

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

# National Load Despatch Centre
## Import Capability of Punjab for December 2024

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Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 10300 | 500 | 9800 | 5497 | 4303 | | https://www.punjabsldc.org/ATC_TTC.aspx |
| **Limiting Constraints** | | N-1 contigency of 400/220KV ICT at Rajpura, Ludhiana, Jalandhar, Muktsar<br>Loading close to N-1 contingency limits of 400/220kV Patran, Malerkotla and Patiala ICTs<br>220 kV underlying network at Jalandhar, Ludhiana and Amritsar | | | | | | |

# National Load Despatch Centre
## Import Capability of Uttar Pradesh for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 17300 | 600 | 16700 | 10165 | 6535 | | https://www.upsldc.org/documents/20182/0/ttc_atc_24-11-16/4c79978e-35f2-4aef-8c0f-7f30d878dbde |
| **Limiting Constraints** | N-1 contingency of 400/220kV Obra, Allahabad(PG), Gorakhpur (UP), Agra(PG), Lucknow (PG) ICTs | | | | | | | |

# National Load Despatch Centre
## Import Capability of Haryana for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 10300 | 300 | 10000 | 5418 | 4582 | | https://hvpn.org.in/#/atcttc |
| **Limiting Constraints** | N-1 contingency of 400/220kV ICT at Deepalpur, Hisar, Kabulpur and Panipat(BBMB) | | | | | | | |

# National Load Despatch Centre
## Import Capability of Rajasthan for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 7600 | 600 | 7000 | 5755 | 1245 | | https://sldc.rajasthan.gov.in/rrvpnl/scheduling/downloads |
| **Limiting Constraints** | | N-1 contingency of 400/220kV Heerapura, Jodhpur, Bikaner, Ajmer, Merta, Hindaun and Ratangarh ICTs | | | | | | |

# National Load Despatch Centre
## Import Capability of Delhi for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 7300 | 300 | 7000 | 4810 | 2190 | | https://www.delhisldc.org/resources/atcttcreport.pdf |
| **Limiting Constraints** | N-1 contingency of 400/220kV Mundka, HarshVihar and Bawana (bus-split) ICTs. | | | | | | | |

# National Load Despatch Centre
## Import Capability of Uttarakhand for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 1710 | 100 | 1610 | 1402 | 208 | | https://uksldc.in/ttc-atc |
| **Limiting Constraints** | | N-1 contingency of 400/220kV Kashipur ICTs. High loading of 220kV Roorkee-Roorkee and 220kV CBGanj-Pantnagar lines | | | | | | |

# National Load Despatch Centre
## Import Capability of HP for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 2386 | 100 | 2286 | 1130 | 1156 | | https://hpsldc.com/mrm_category/ttc-atc-report/ |
| **Limiting Constraints** | | Overloading of 2*100MVA Giri transformers | | | | | | |

# National Load Despatch Centre
## Import Capability of J&K for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 3200 | 100 | 3100 | 1977 | 1123 | | |
| **Limiting Constraints** | | N-1 contigency of 400/220KV ICTs at Amargarh<br>220 kV underlying network at Amargarh, Wagoora | | | | | | |

# National Load Despatch Centre
## Import Capability of Chandigarh for December 2024

Issue Date: -  Issue Time: 1600  Revision No. 0

| Date | Time Period in IST (hrs) | Total Transfer Capability (TTC) (MW) | Reliability Margin (MW) | Available Transfer Capability (ATC) (MW) | Approved General Network Access (MW) | Margin Available for Temporary General Network Access(MW) | Changes in TTC w.r.t. Last Revision | Comments |
|---|---|---|---|---|---|---|---|---|
| 1st December 2024 to 31st December 2024 | 00-24 | 400 | 20 | 380 | 342 | 38 | | |
| **Limiting Constraints** | | N-1 contigency of 220kV Nallagarh-Kishengarh | | | | | | |