सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (61वीं)/2022/ **568-615** दिनाँक: 19, जनवरी, 2023

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक का कार्यवृत ।
Subject: 61st meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 61वीं बैठक दिनांक **26th दिसंबर , 2022** को **1100** बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 61st meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **26th December, 2022** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

(नरेश भंडारी)
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

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18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

List of NRPC Members

1. Chairperson, Northern Regional Power Committee & CMD, Delhi Transco Limited (DTL), Shakti Sadan, Kotla Marg, New Delhi-110002
2. MD, PTCUL, Dehradun-248001, (Fax- 0135-2764496)
3. MD, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
4. CMD, RRVPNL, Jaipur-302005, (Fax -01412740168)
5. Member (GO&D), CEA, New Delhi, (Fax-011-26108834)
6. CMD, PSTCL, Patiala-147001, (Fax-0175-2307779)
7. Commissioner/Secretary, PDD, J&K, Jammu, (Fax-0191- 2545447/ 01942452352)
8. Managing Director, HVPN Ltd, Panchkula -134109 (Fax-0172-2560640)
9. Chairman, BBMB, Chandigarh-160019, (Fax-0172-2549857/2652820)
10. Chief Engineer, UT of Chandigarh, Chandigarh-160066, (Fax-0172-2637880)
11. Managing Director, DTL, New Delhi-110002, (Fax-011-23234640)
12. General Manager, SLDC, DTL, New Delhi-110002, (Fax-011-23221069)
13. Managing Director, IPGCL, New Delhi-110002, (Fax-011-23275039)
14. Chief Engineer (SO&C), SLDC, HVPNL, Panipat, (Fax-0172-2560622/2585266)
15. Managing Director, HPGCL, Panchkula-134109, (Fax-0172-5022400)
16. Representative of DHBVNL (Haryana Discom)
17. Managing Director, HPSEB Ltd, Shimla -171004 (Fax-0177-2658984)
18. Managing Director, HPPTC Ltd, Himfed Bhawan, Shimla-171005, (Fax-0177-2832384)
19. Managing Director, HPSLDC, HP State Load Despatch Authority, Totu, Shimla, (Fax-0177-2837649)
20. Managing Director, J&K State Power Dev. Corp., Srinagar, J&K, (Fax-0194-2500145)
21. Chairman and Managing Director, PSPCL, Patiala-147001, (Fax-0175-2213199)
22. Chief Engineer (LD), SLDC, Heerapur, Jaipur-302024, (Fax-0141-2740920)
23. CMD, RRVUNL, Jaipur-302005, (Fax-0141-2740633)
24. Representative of JVVNL (Rajasthan Discom)
25. Managing Director, SLDC, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
26. Managing Director, UPRVUNL, Lucknow-226001, (Fax-0522-2288410)
27. Representative of MVVNL (UP Discom)
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29. Managing Director, UJVNL, Dehradun-248001, (Fax-0135-2763507)
30. Managing Director, UPCL, Dehradun-248001, (Fax-0135-2768867/2768895)
31. Director (Technical), NHPC, Faridabad-121003, (Fax-0129-2258025)
32. Director (Finance), NPCIL, Mumbai-400094, (Fax-022-25563350)
33. Director (Commercial), NTPC, New Delhi-110003, (Fax-011-24368417)
34. Representative of CTUIL, Gurgaon-122001
35. CMD, SJVNL, New Delhi, (Fax-011-41659218/0177-2660011)
36. Director (Technical), THDC, Rishikesh-249201, (Fax-0135-2431519)
37. Director (Commercial), POSOCO, New Delhi-110016, (Fax-011-26560190)
38. ED, NRLDC, New Delhi-110016, (Fax-011-26853082)
39. CEO, Aravali Power Company Pvt. Ltd., NOIDA, (Fax-0120-2591936)
40. CEO, Jhajjar Power Ltd., Haryana, (Fax-01251-270105)
41. Representative of Lanco Anpara Power Ltd., (Fax-124-4741024)
42. Station Director, Rosa Power Supply Company Ltd., (Fax-05842-300003)
43. Director and head regulatory and POWER Sale, JSW Energy Ltd., New Delhi (Fax- 48178740)
44. COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 07925557176)
45. COO, Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659248083)
46. MD, Lalitpur Power Generation Company Ltd., Noida-201301(Fax: 01204045100/555, 2543939/40)
47. Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 01141659144,41659145)
48. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
49. Representative of Prayagraj Power Generation Co. Ltd.
50. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
51. Representative of TPDDL (Delhi Private Discom)

Special Invitee:

i. Member Secretary, WRPC, Mumbai-400 093.
ii. Member Secretary, SRPC, Bangalore-560 009
iii. Member Secretary, ERPC, Kolkata-700 033.
iv. Member Secretary, NERPC, Shillong-793 003.
v. RE generators/Holding companies as per mail list.

Content

उत्तरी क्षेत्रीय विद्युत समिति की 61वीं बैठक

61st MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11:00 HRS; 26 December 2022

Venue: Video Conferencing

Minutes of Meeting

The meeting was started with an opening remark from Chairperson, NRPC & CMD DTL. Chairperson, NRPC emphasised that the need of the hour is to prepare for the ongoing foggy and winter season and to maintain the voltage profile and reactive power management. He also instructed the state utilities to take necessary steps to minimise tripping due to fog and smog in this winter season.

Adding to it, MS NRPC highlighted that a number of lines are opened due to high voltage conditions. He also emphasised to take adequate measures to prevent unprecedented tripping due to fog. He also informed the forum that NRLDC/Grid-India had already issued letter in this regard to member utilities to take precautionary measures in this regard.

MS, NRPC touched upon the issue of curtailment in western Rajasthan for around 3 weeks due to delay in commissioning of transmission network with generation in place. He appreciated CTU for their efforts in taking up the issue and their proposal for SPS. He also thanked CMD, RVPN for efforts done by RVPN in implementation of SPS at Bikaner.

MS, NRPC also touched upon the new DSM Regulations came into effect from 05.12.2022. He highlighted that the DSM Regulations, 2022 aims at ensuring that all grid connected entities adhere to schedules and that deviations should only be inadvertent to be managed by the system operator through Ancillary Services.

A.1 Approval of MoM of 60th NRPC meeting

A.1.1 EE (P&SS), NRPC apprised the forum that minutes of 60th NRPC meeting (held on 30.11.2022) has been issued vide letter dtd. 08.12.2022. No comment has been received till the date.

A.1.2 Hence, forum approved the minutes as issued.

A.2 Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges (agenda by CTUIL)

A.2.1 EE (P&SS), NRPC apprised the forum that CTUIL, in his letter dated 14.12.2022 (**Annexure-I**) apprised to NRPC Sectt. that in line with CERC order dated 08.03.2019 passed in petition No. 92/MP/ 2015, CTU calculated relinquishment charges for LTAs relinquished by various generators and uploaded the same on its website from time to time. However, the relinquishment charges computed and notified by CTU in line with above CERC Order dated 08.03.2019 in Petition No. 92/MP/2015 was disputed by more than 20 relinquishing IPPs, who had filed appeals in APTEL which are pending adjudication. In view of pending disputes and GST issues concerning the raising invoices, CTU issued demand letters to concerned relinquishing LTA customers pending disposal of appeals in APTEL.

A.2.2 During the proceedings in the matter, APTEL vide its order dated 08.10.2020 in appeal no. 251 of 2019, had restrained CTU from raising invoices with respect to the relinquishment charges during pendency of similar appeals except where insolvency proceedings are faced by the generators. All the appeals on the relinquishment charges are yet to be decided as on date and matter is being pursued by CTU. Further, where the IPPs are undergoing insolvency proceedings, CTU had filed claims before RPs/Liquidators for recovery of relinquishment charges.

A.2.3 Meanwhile, CTU encashed the CBGs of some of the IPPs who have abandoned their projects or undergoing insolvency proceedings and the encashed BG amount of approx. Rs 400 Crores was kept in FDs since the legal proceedings on relinquishment charges are still to be concluded and the BG amount may have to be refunded to IPPs along with interest in case of judgements in their favour in future.

A.2.4 The status of relinquishment charges and treatment of encashed BG amount has been reviewed in recent 42nd SRPC meeting held in Jun'22 and it was desired by the state utilities of SRPC that the BG amount be disbursed to all the DICs pending settlement of disputes on relinquishment charges. CTU informed that it is common money of all the five regions and cannot be given state-wise or region-wise and hence it needs to be taken up with all the RPCs for their consent. CTU further informed that, in case the BG amount is disbursed to the DICs in the pool and disputes are settled in favour of the relinquishing IPPs later, the amount so disbursed in the pool shall be collected from respective DICs along with interest to refund to the IPPs. Hence, CTU requested for deliberation on the above and provide consent on disbursing the encashed BG amount to the DICs in the pool with the conditions mentioned above.

A.2.5 CTU representative apprised the forum that the matter has been deliberated in 59th NRPC meeting wherein it was decided that DICs of NR may submit comments regarding the agenda to CTU with copy to NRPC in one month (i.e by 30 November 2022). However, no comments have been received from DICs of NR in this regard.

A.2.6 He added that the issue was already deliberated in ERPC, NERPC and WRPC meetings apart from SRPC. In NERPC meeting, all the NERPC constituents opined that this particular encashed CBG amount may be retained with the CTU for the time being, until the outcome of appeal filed by various generators in APTEL come wherein ERPC and WRPC in their meetings opined that the matter may be discussed in respective CCM (Commercial Sub-Committee).

A.2.7 In the meeting, views were asked from states, however, no comment received.

A.2.8 MS, NRPC stated that since the matter is subjudice to APTEL, any decision on the instant matter may not be tenable. He added that since the matter pertains to all pan India level, the same may be taken up by CTU as an agenda in NPC Forum.

A.2.9 SE, NRPC endorsed the views of MS, NRPC and suggested that status quo may be maintained.

A.2.10 CTU accepted the views of MS, NRPC and stated that in case the BG amount is disbursed to the DICs in the pool and disputes are settled in favour of the relinquishing IPPs later, then return of amount with interest may be difficult.

A.2.11 Accordingly, it was decided to maintain status quo. CTU was requested to take up the agenda in next NPC meeting.

A.3 Draft guidelines on manpower adequacy for SLDCs (agenda by GM Division, CEA)

A.3.1 EE (P&SS), NRPC apprised the forum that GM Division, CEA in its letter dated 14.12.2022 informed that the meeting was taken by Secretary (P) with CEA and GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. Draft guidelines for strengthening of SLDCs in India is attached as **Annexure-II.**

A.3.2 MS, NRPC stated that since the matter pertains to all RPCs, the same could be taken up as an agenda and to be discussed on NPC Forum.

A.3.3 Representative from Punjab deliberated that provision regarding performance based incentive as well as Certification Retainer-ship Amount to the employees of SLDCs is missing in the draft guidelines and need to be included. He also added that cyber security is a crucial issue of the hour, however, the manpower strength (2-4 personnel) mentioned in guideline is quite less. He also suggested that certification exam should be conducted twice a year.

A.3.4 In response to this, MS NRPC stated that the incentive to system operators will surely boost their morale. He highlighted that NRLDC gets performance based incentive. As the work of SLDCs are similar to NRLDC, SLDCs may also have performance based incentive. He further added that manpower requirement for cyber security could be increased.

A.3.5 In charge, NRLDC stated that earlier a letter was sent to states for short term posting in different SLDCs/RLDCs. However, states have not shown much interest in this regard. He emphasized that the constituent SLDCs may comment on the recommended number-of human resources in a SLDC and deployment of system operators from one SLDC to other for short term exposure. Regarding performance linked incentives, he suggested that states may approach their respective SERCs. He mentioned that certificate link incentive is not provided in NRLDC. However, NRLDC employees get performance based incentive.

A.3.6 MS, NRPC suggested to change the categories of SLDCs (Large, Medium and Small) to Established SLDCs (Large+Medium) and Emerging SLDCs.

A.3.7 UPSLDC representative apprised the forum that due to lack of ring-fencing in SLDCs, the system operators are usually transferred /promoted to other sub-companies despite possessing certification of Basic/Specialist/Intermediate/Advance level which leads to shortage of experienced manpower in SLDCs. He further added that due to the large transmission network under big states, a large manpower is required to coordinate with RLDC, related litigations, SCADA mapping, energy and accounting of injecting entities, tripping analysis and facilitating shutdowns in real-time. He requested that minimum posting for a tenure of three years should be made mandatory for any official posted in SLDC.

A.3.8 MS, NRPC endorsed the opinion of UPSLDC. He further added that certification is must within 6 months and retention of 3 years should be mandatory.

A.3.9 After deliberation, GM Division, CEA was requested to take up the agenda in next NPC meeting.

A.3.10 It was also decided that this agenda may be discussed in upcoming OCC meeting also. If any other additional view comes there, same shall be communicated to GM Division, CEA.

A.4 Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/Barmer Complex) (agenda by CTU)

A.4.1 EE (P&SS), NRPC apprised the forum that CTU vide mail dtd. 19.12.2022 has proposed scheme for transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2:7.5GW) (Jaisalmer/ Barmer Complex).The scheme is attached as **Annexure-III.**

A.4.2 CTU representative apprised that the above scheme has been discussed in NR Joint study meeting held on 05.12.2022, and 13th CMETS-WR meeting held on 07.12.2022.

A.4.3 The scheme is also discussed & agreed in the 14th CMETS-NR meeting held on 23.12.2022.

A.4.4 He apprised that northern region remain surplus in winters and particularly in afternoon. Therefore, scheme has been proposed for power evacuation to WR along with BESS. 50% wind generation has been assumed in the planning.

A.4.5 MS, NRPC enquired regarding the reason behind the high cost required for the transmission system and cost breakup. He also added that since the transmission system is designed to supply power to WR from NR, the same could have been planned by HVDC system with better controllability and comparatively lesser cost.

A.4.6 Rajasthan representative also emphasized the need of HVDC in inter-regional power flow.

A.4.7 CTU representative clarified that the transmission system which were planned in Phase-III were in hybrid mode (AC+DC). A similar kind of phasing is being done in Phase-IV also. He added that AC system have lesser gestation period (24 months) than HVDC system (42 months). In first part of Ph-IV, AC system is envisaged for RE generation envisaged by 2025, which is about 24 months from now/stage of award. In Ph-IV subsequent parts, HVDC is planned for next phase Hybrid RE generation (2026-27) from Barmer complex.

A.4.8 MS, NRPC also touched upon the 50 percent wind dispatch in planning by CTU. He also enquired the possible evacuation constraints and the issues that may arise in case BESS doesnot come up.

A.4.9 CTU representative clarified that the 50 percent dispatch for wind was kept considering past trends of the wind in the region. However, an inherent margin is kept to take care of the eventualities. Further, proposed transmission system is planned for net dispatch RE capacity (7.5 GW) after accounting for BESS. In case BESS (3 GWh) as planned comes up, more RE can be integrated (about 10.5 GW).

A.4.10 In charge, NRLDC requested that commissioning of STATCOMS may also be done in matching with RE generation.

A.4.11 With above deliberation, forum approved the scheme as proposed by CTU with a note that for future inter-regional projects may be planned in hybrid mode (AC+DC) for better control.

A.5 Installation/reshuffling programme of 33 KV shunt capacitor banks at various GSS of RVPN (agenda by RVPN)

A.5.1 EE (P&SS), NRPC apprised that RVPN has submitted DPR along with justification note and methodology to NRPC Sectt. vide letter dtd. 10.11.2022 for technical approval for PSDF grant for installation/re-shuffling of 33 KV shunt capacitor banks at various GSS of RVPN in Ajmer (22 X 5.43 MVAR), Jaipur (29 x 5.43 MVAR) and Jodhpur (50 x 5.43 MVAR) zones. Proposal is attached as **Annexure-IV.**

A.5.2 He added that installation of 548.43 MVAR (101 X 5.43 MVAR) capacitor banks and diversion of 59.73 MVAR (11X 5.43 MVAR) capacitor banks to newly identified locations has been proposed by RVPN. The proposal has been discussed on 03.11.2022 in a meeting with RVPN, NRPC Officials and NRLDC and in physical meeting dated 21.12.2022 of NRPC Sectt. with RVPN.

A.5.3 MS, NRPC asked RVPN regarding the utilisation of already installed capacitors in Rajasthan. RVPN representative stated that nearly 95% of capacitors are in use. Some capacitors are being shifted to upcoming GSS substations.

A.5.4 Forum accorded technical approval to RVPN for the above proposal.

A.6 Insulator cleaning and replacement of damaged insulators/porcelain insulator with polymer insulators (agenda by NRLDC)

A.6.1 NRLDC representative stated that the importance of carrying out insulator cleaning and replacement of damaged insulators was discussed in the 199th – 202nd OCC meetings and 58th -60th NRPC meetings. Northern Regional power transmission lines especially those close to NCR are exposed to the high pollution levels along their routes. Such pollution levels with the onset of the winter season and foggy weather conditions lead to the frequent tripping and finally to breakdown and long outages of the transmission lines. These outages make the grid vulnerable, thereby endangering the grid reliability and security.

A.6.2 Therefore, in order to avoid/mitigate tripping of lines during foggy (smog) weather in winter season, preventive actions like cleaning/washing of insulators, replacement of conventional insulators with polymer insulators have been recommended and are being taken every year.

A.6.3 This being a regular activity, all the transmission licensees in the Northern Region are being requested in monthly OCC and NRPC meetings to update line wise data for insulator replacement and cleaning in the format attached as **Annexure-V**. Same has also been requested vide NRLDC mail dated 09.11.2022 and 14.11.2022 to provide the latest status.

A.6.4 Details have been received from some of the utilities such as POWERGRID, HP, PSTCL, RVPN, DTL (**Annexure-VI**). However, no details received from UPPTCL, HVPNL, BBMB, etc.

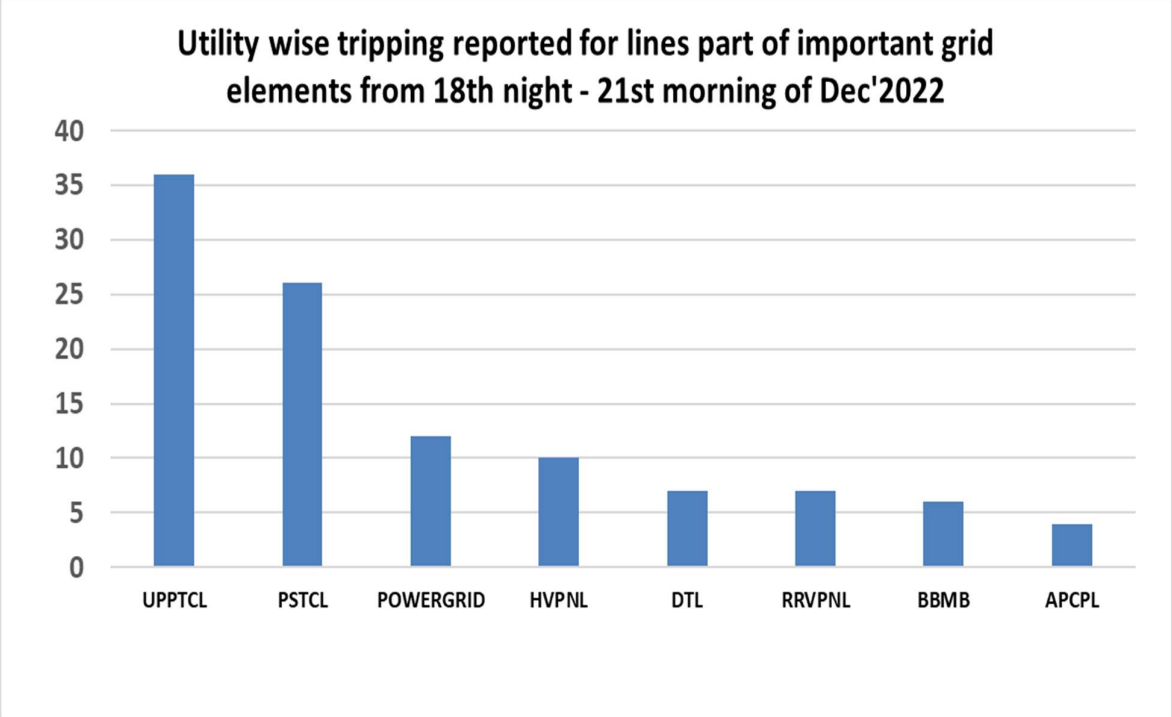
A.6.5 Even after insulator cleaning and replacement work carried out by utilities, number of tripping are also being observed in real-time especially during pre-dominant fog hours especially of lines for which insulator cleaning has not been reported to NRLDC. Such frequent tripping are big challenge in ensuring safe and secure operation of grid and also reduce life of transmission lines due to frequent flashovers/ trippings.

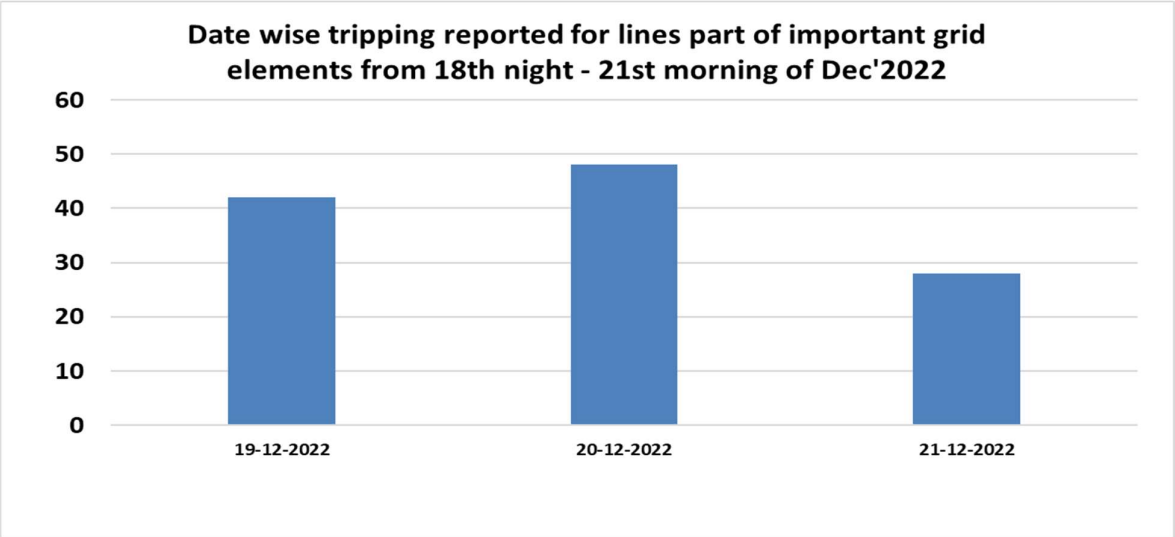
A.6.6 NRLDC representative highlighted that these line tripping are apart from the lines already opened to manage high voltage. Since around 40-60 EHV lines are opened to control high voltage on daily basis and further 40-50 lines are tripping during fog timings, it becomes really challenging for the system operator to ensure safe and reliable grid operation. Moreover, these figures are only for lines for which switching codes are issued

by NRLDC. Apart from these lines, there are numerous other intrastate lines which are opened on high voltage or trip during fog conditions which are not monitored at RLDC level.

A.6.7 Snapshot of fog observed on 20.12.2022 at 05:00hrs as presented in the meeting is shown below:

A.6.8 It was mentioned that on 20.12.2022, due to tripping of EHV lines on fog, generation at Bara (UP) (Around 350 MW: 01 Unit tripped) and Jhajjar (APCPL) (All 03 Units Tripped) was effected. Moreover, around 150 MW Load loss in Haryana was reported due to multiple element tripping at 220kV Panipat.





A.6.9 Further, following lines have tripped for three times during last 3 days (18th night – 21st morning):

- 220 KV Mandola(PG)-Gopalpur(DTL) (DTL) Ckt-1
- 400 KV Aligarh-Muradnagar_1 (UP) Ckt-1
- 400 KV Muktsar-Makhu (PS) Ckt-2
- 400 KV Aligarh-Sikandrabad (UP) Ckt-1
- 400 KV Harduaganj -Sikandrabad (UP) Ckt-1
- 400 KV Muktsar-Makhu (PS) Ckt-1
- 400 KV Jhajjar(APCPL)-Mundka(DV) (APCL) Ckt-2
- 400 KV Bawana(DV)-Maharanibagh(PG) (DTL) Ckt-2

A.6.10 CGM (I/C), NRLDC stated that numerous tripping were reported in Northern region during last one-two week during fog timings. Such tripping also lead to generation loss at Bara (SPS operation on two days), IGSTPP Jhajjar and load loss as well. During last two winter seasons, fog related tripping were slightly on the lower side, however number of tripping are being reported this year especially in Punjab and UP.

A.6.11 Since this phenomenon is observed every year, therefore actions are required at utility level on long-term basis such as insulator replacement from porcelain insulator to polymer insulator apart from short term activity such as washing and cleaning of insulators.

A.6.12 APCPL lines were taken under shutdown for diversion works, and it was expected that cleaning/ washing activity would have been carried out, but still lines have tripped during fog hours.

A.6.13 All concerned transmission licensees were once again requested to review insulator cleaning/ washing activities and replacement of porcelain insulators by polymer insulators at their end and further plan for such activities on priority in the lines reportedly tripping during fog hours.

A.6.14 PSTCL representative stated that they have carried out maintenance activity for 400kV Makhu-Muktsar ckt-2, however insulator damage are being observed near fault location and the same is being investigated.

A.6.15 POWERGRID representative stated that for lines which are opened on high voltage, code may be provided so that maintenance activities can be carried out during day-time.

A.6.16 NRLDC representative stated that all the maintenance activities are planned activities therefore, shutdown as well as maintenance including manpower allocation should be planned well in advance. NRLDC is also issuing shutdown on opportunity basis to other utility in case shutdown is availed by one utility. It was also highlighted that generally lines are opened during night and taken back in service during morning hours when voltages are in limits.

A.6.17 MS NRPC stated that NRLDC is already providing shutdown on opportunity basis. However, as POWERGRID has mentioned that there are some lines which remain opened for full day, POWERGRID may identify such lines which remained open full day frequently and the matter may be further discussed.

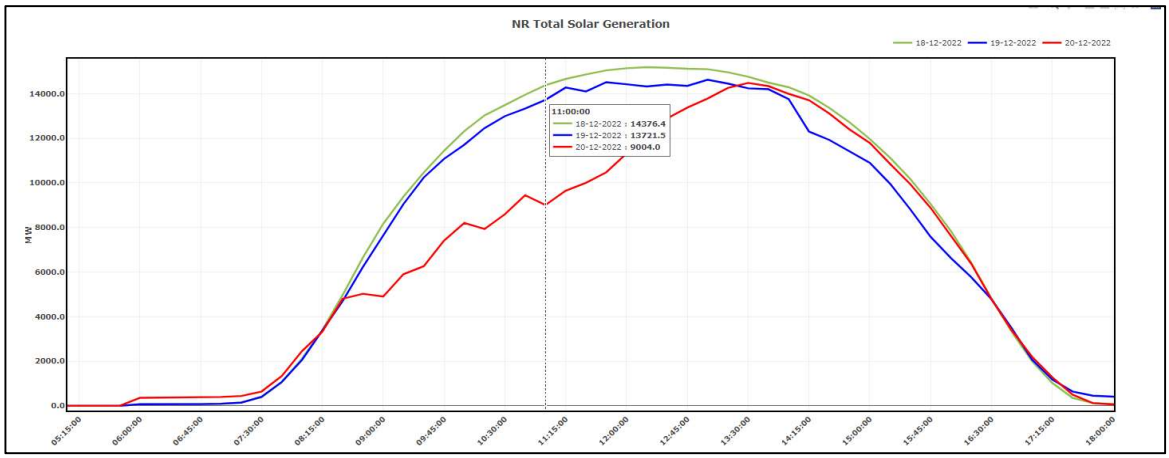
A.6.18 All the members were requested to prioritize line cleaning/ washing activities and furnish status on monthly basis to NRPC/ NRLDC.

A.7 Large forecast errors and deviations in NR solar generation due to fog (agenda by NRLDC)

A.7.1 NRLDC representative stated that Scheduling for renewable energy sources at NRLDC level is being done as per CERC 'Procedure for implementation of framework on Forecasting, Scheduling and Imbalance Handling for Renewable Energy generating station including power parks based on wind and solar at inter-state level'.

A.7.2 RE generators need to provide the forecast to the concerned RLDC which may be based on their own forecast or RLDCs forecast as per the format mentioned as 'Annex-II' in the CERC procedure. RE Generators may prepare their schedule based on the forecast done by RLDC or their own forecast. Any commercial impact on account of deviation from schedule based on the forecast chosen by the wind and solar generator shall be borne by the respective generator. RE generators supplying power under LTA/MTOA are allowed to revise their schedule effective from 4th time block, the first being the time-block in which notice was given.

A.7.3 On 20.12.2022, the solar generation in Northern region was on the lower side as compared to previous days. From the plot shown below it can be seen that there was maximum difference of around 4-5GW in solar generation w.r.t. previous two days.



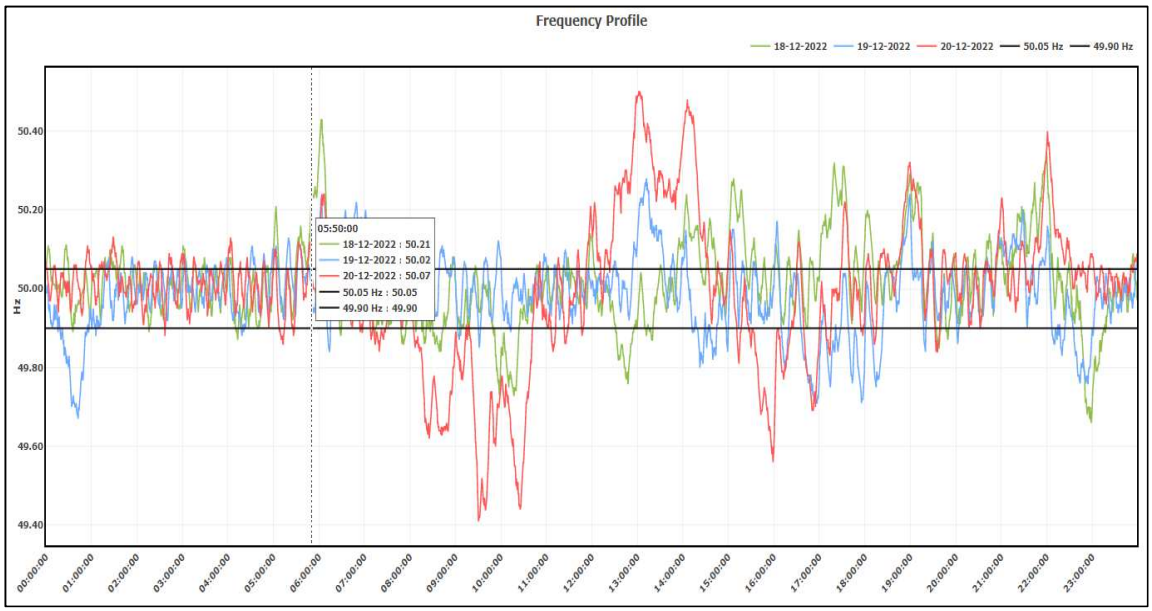
A.7.4 From the table shown below, it can also be seen that the % error was on the higher side during morning time (0800-1400 hrs) on 20.12.2022. Such large errors in forecast are big challenge to system operators in managing the frequency within the prescribed IEGC band.

Installed Capacity (MW)	Average Error as compared with schedule (Act-Schd) *100/AVC	% of time error is more than 15% as compared with schedule	Average Error as compared with forecast (Act-Frcst) *100/AVC	% of time error is more than 15% as compared with forecast
11300.5	22.12%	52.97%	22.23%	52.08%

Note: above error data is average data for 0800-1400hrs of 20.12.2022.

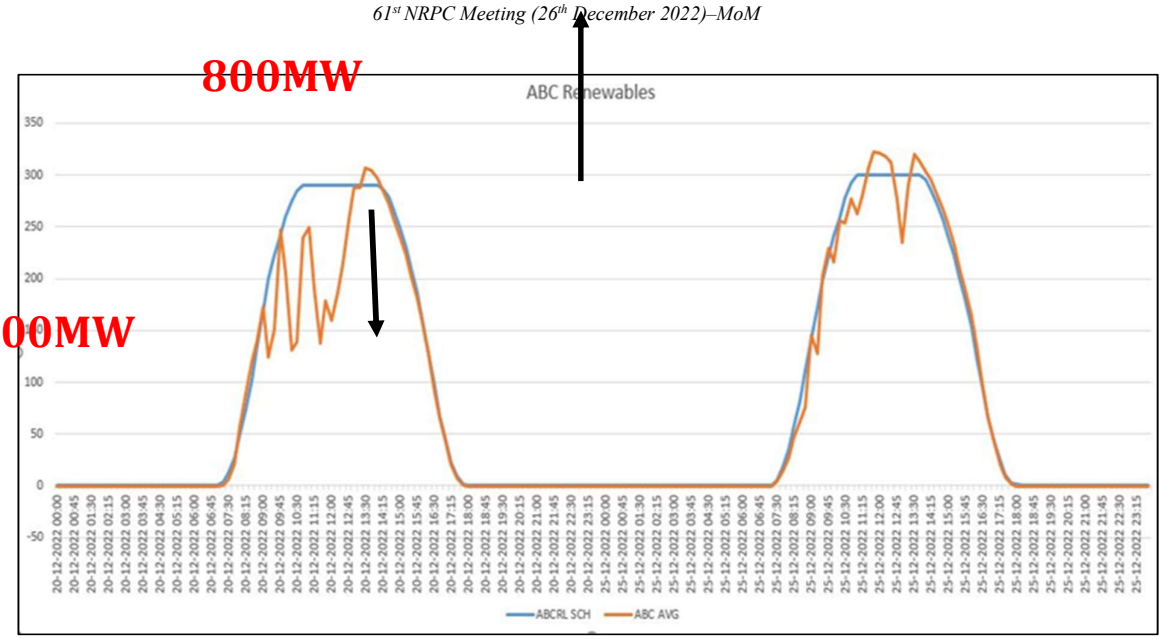
Details are attached as **Annexure-VII**.

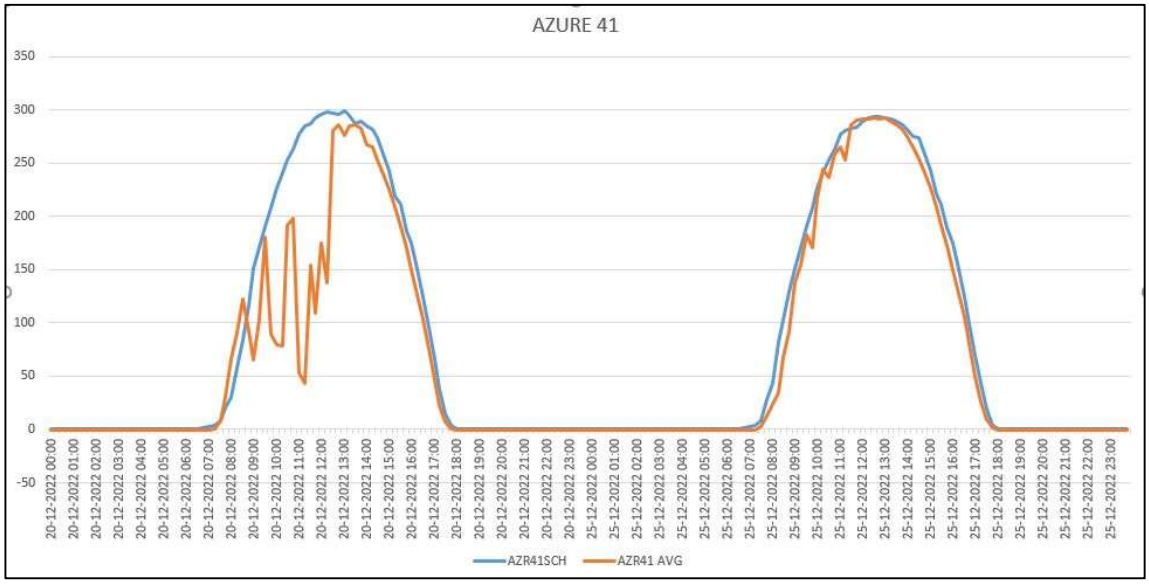
A.7.5 Due to such large differences in actual generation w.r.t. scheduled generation, continuous low frequency operation of grid (minimum of 49.41Hz) was observed on 20.12.2022 during morning hours (09:31 hrs) as shown below. Moreover, as the generation reached its maximum value around 1300 hrs, high frequency (50.50Hz) operation was also observed on the same day as shown below:



A.7.6 With increasing renewable penetration such large forecast errors may prove to be detrimental for secure grid operation and requires preventive actions. Some plots of difference between actual generation and day head forecast of different plants was presented in the meeting and shown below:

A.7.7





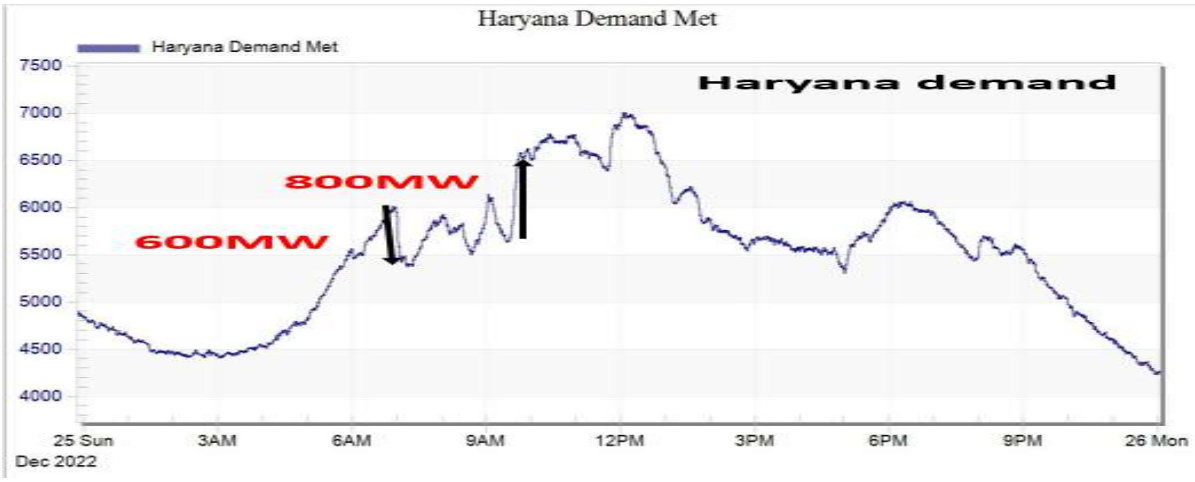
A.7.8 As per latest information available with NRLDC, solar developers are not including fog forecast in their generation forecast which is leading to huge difference on fog days. NRLDC representative added that NRLDC would be taking up the matter separately with ISTS solar developers.

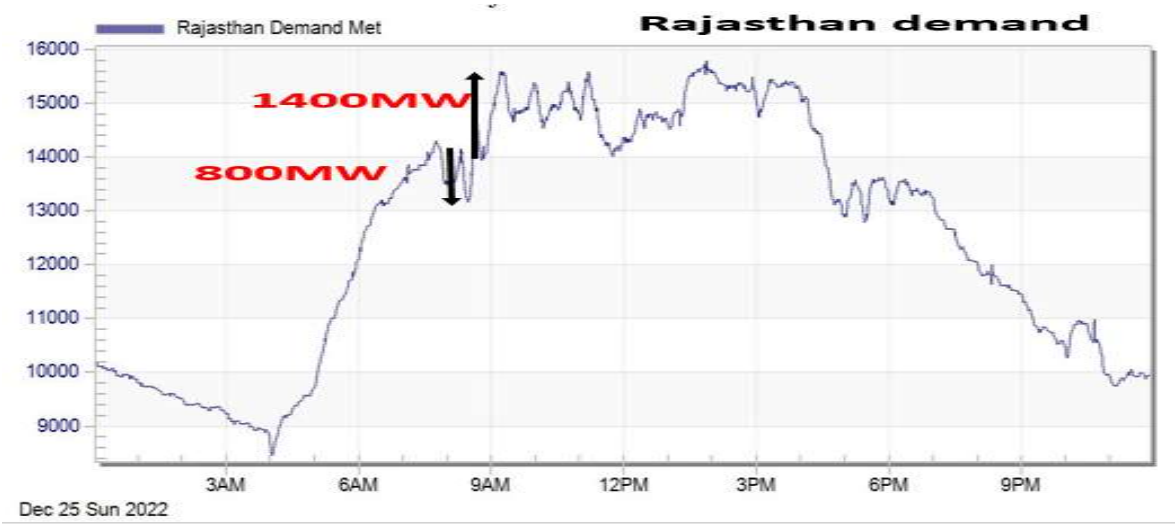
A.7.9 CGM(I/C), NRLDC stated that two actions are required from solar developer end i.e. better forecasting of solar generation including for foggy days and also quick revision in schedule in case of any change in weather scenario so that system operator has sufficient time margin for taking necessary generation balancing action.

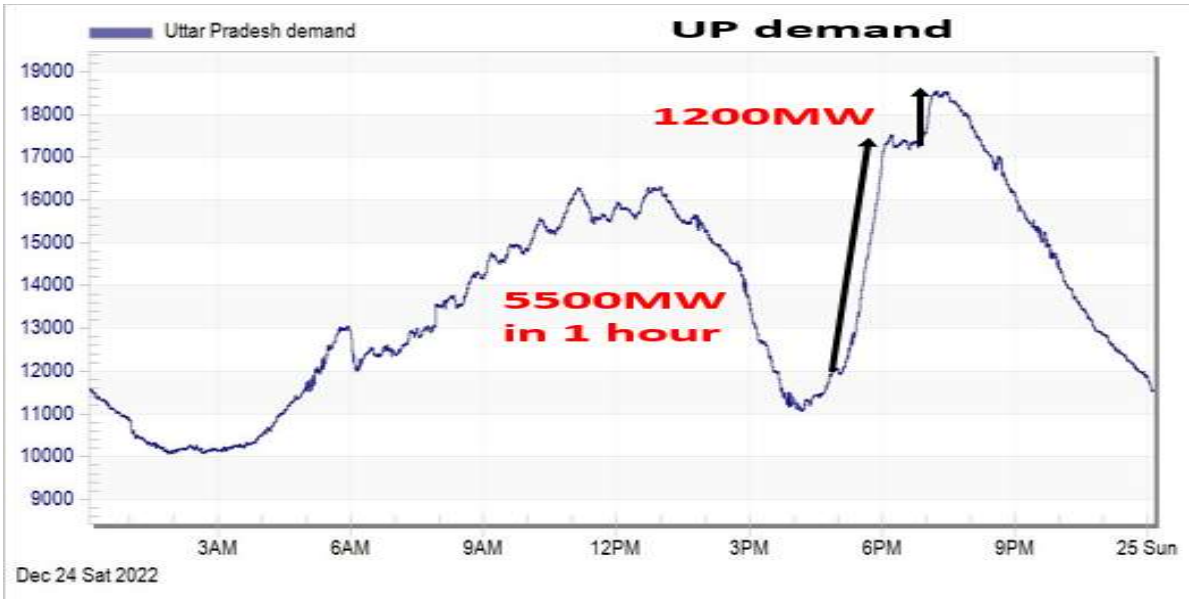
A.7.10 No solar developer was available for comments in NRPC meeting.

A.7.11 It was also discussed that in real-time also, drawing utilities should try and maintain their drawls as close to schedule as possible, avoid large connection/ disconnection of loads and generators should provide primary frequency response mandated as per IEGC regulation 5.2(g).

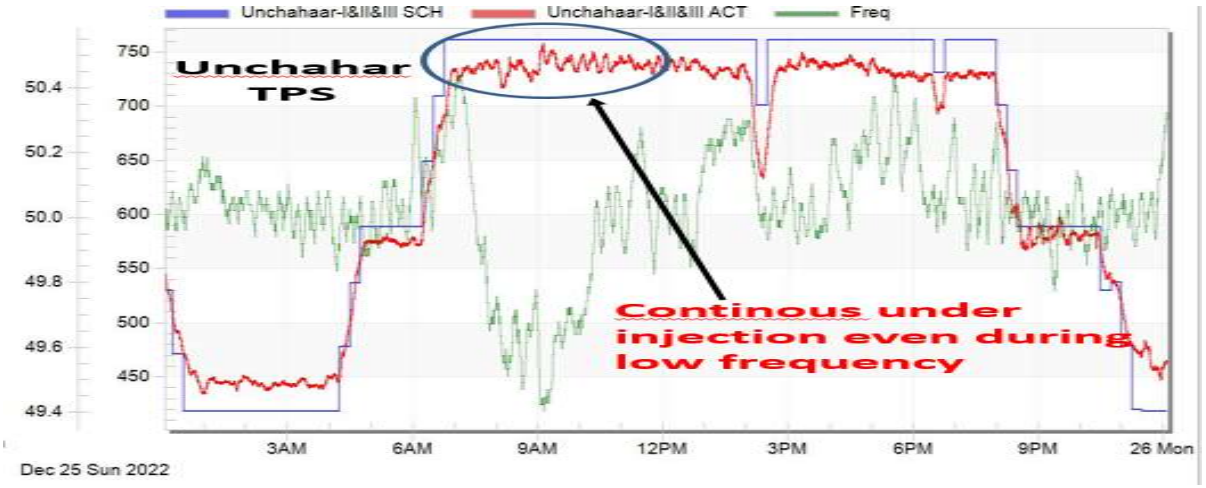
A.7.12 Plots were presented for Haryana, Rajasthan and UP for 25 Dec 2022 and it was mentioned that there is margin for further reduction in sudden connection/ disconnection of demand for these states.

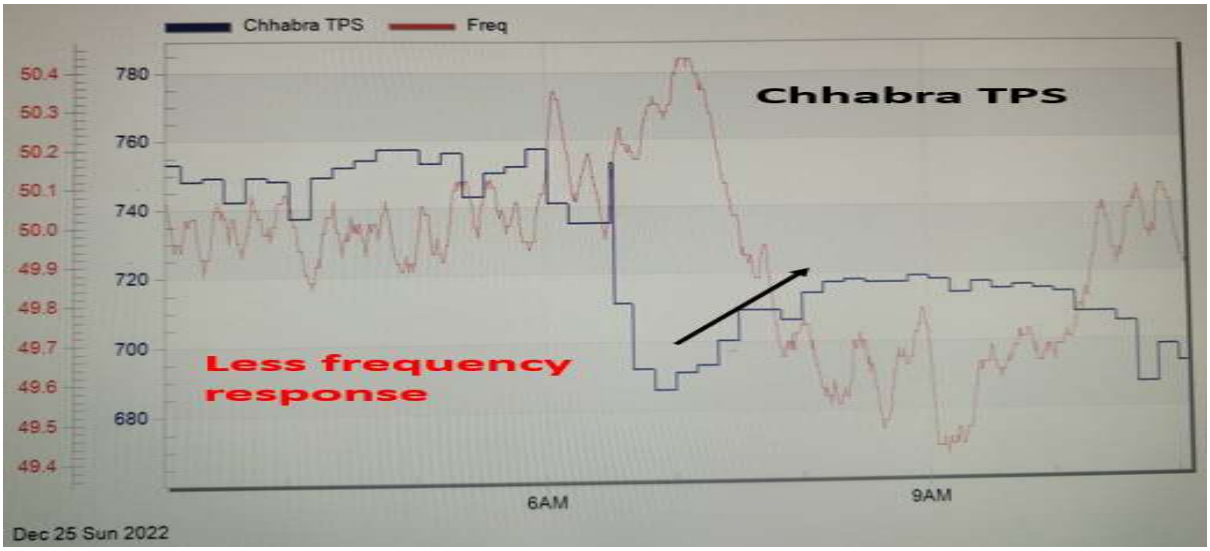


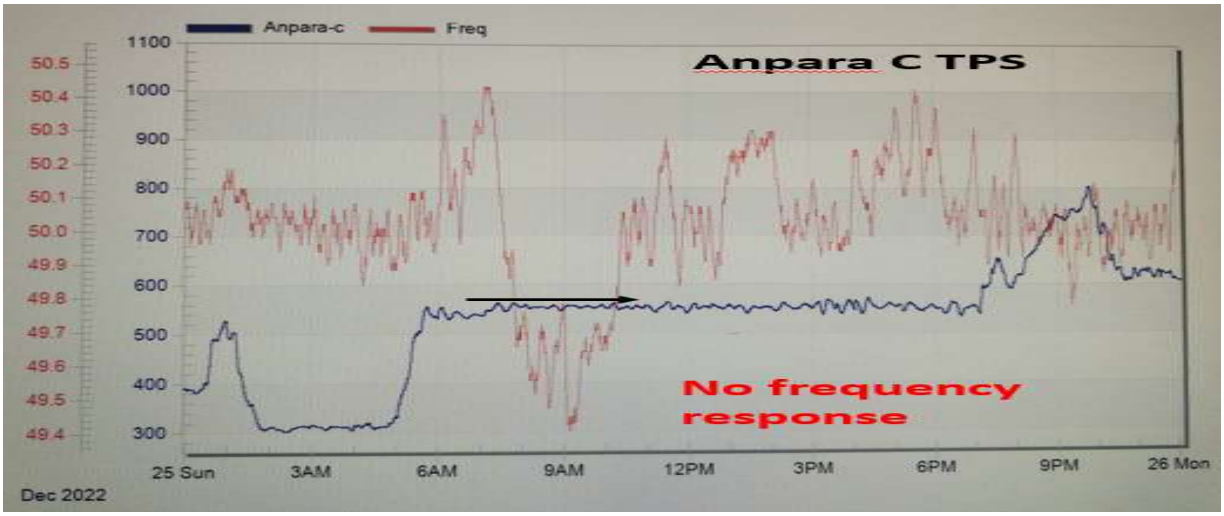




A.7.13 It was also mentioned that some generators are not providing desired primary frequency response which is desirable to ensure that the grid frequency remains within IEGC band. Sample plots for Unchahar TPS, Anpara-C and Chhabra TPS were presented in the meeting.







A.7.14 CGM(I/C) NRLDC representative that following actions are required at utility level for ensuring safe and secure operation of grid:

- Generators should provide primary frequency response mandated as per IEGC regulation
- Drawing utilities should try and maintain their drawls as close to schedule as possible, avoid large connection/ disconnection of loads

- UFR load shedding set at 49.4 Hz was reported on 20th Dec 2022 against the actual minimum frequency of 49.41 Hz. All states need to share the UFR load shedding details and check for any mal-operation.
- For timing generally for which ancillary support is provided, utilities try and avoid any overdrawl, which is collectively leading to underdrawl from the grid and high frequency operation of the grid during ancillary support time. Such actions should be avoided.

There was discussion in NRPC forum regarding the changes in grid operation activity at generator and SLDC level with newly implemented DSM regulations. Generators and SLDCs expressed concerns being faced at their end since effectiveness of new DSM regulations.

A.7.15 CGM(I/C) NRLDC stated that Grid-India would be submitting their feedback with Hon'ble CERC regarding issues being observed in grid operation with new DSM regulations.

A.7.16 NRPC forum noted concerns highlighted by members.

*****

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
CENTRAL TRANSMISSION UTILITY OF INDIA LIMITED
(Wholly Owned Subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Annexure I

Date:14-12-2022

To,
Member Secretary,
18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg,
Katwaria Sarai, New Delhi-110 016

Sub: Agenda from CTUIL for 61st NRPC meeting on **"Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges"**

Sir,

Please find enclosed Agenda from CTUIL on "Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges" and the same may be included for 61st NRPC meeting to be held on 23.12.2022.

Thanking you,

Yours faithfully,

14/12/22

(V. Srinivas)
Chief General Manager (Commercial)
For & on behalf of CTUIL

CC: COO, CTUIL, Gurgaon

Agenda
on
Disbursement of encashed CBG amount to DICs pending settlement of legal disputes on relinquishment charges

In line with CERC Order dated 8.3.2019 passed in Petition No.92/MP/2015, CTU calculated relinquishment charges for LTAs relinquished by various generators and uploaded the same on its website from time to time. However, the relinquishment charges computed and notified by CTU in line with above CERC Order 08.03.2019 in Petition No. 92/MP/2015 was disputed by more than 20 relinquishing IPPs, who had filed appeals in APTEL which are pending adjudication. In view of pending disputes and GST issues concerning the raising of invoices, CTU issued demand letters to concerned relinquishing LTA customers pending disposal of appeals in APTEL.

During the proceedings in the matter, APTEL vide its order dated 08.10.2020 in appeal no 251 of 2019, had restrained CTU from raising invoices with respect to the relinquishment charges during pendency of similar Appeals except where insolvency proceedings are faced by the generators. All the appeals on relinquishment charges are yet to be decided as on date and matter is being pursued by CTU. Further, where the IPPs are undergoing insolvency proceedings, CTU had filed claims before RPs/Liquidators for recovery of relinquishment charges.

Meanwhile, CTU encashed the CBGs of some of the IPPs who have abandoned their projects or undergoing insolvency proceedings and the encashed BG amount of approx. Rs 400 Crores was kept in FDs since the legal proceedings on relinquishment charges are still to be concluded and the BG amount may have to be refunded to IPPs along with interest in case of judgements in their favour in future.

The status of relinquishment charges and treatment of encashed BG amount has been reviewed in recent 42nd SRPC meeting held in Jun'22 and it was desired by the state utilities of SRPC that the BG amount be disbursed to all the DICs pending settlement of disputes on relinquishment charges. CTU informed that it is common money of all the five regions and cannot be given state-wise or region-wise and hence it needs to be taken up with all the RPCs for their consent. CTU further informed that, in case the BG amount is disbursed to the DICs in the pool and the disputes are settled in favor of the relinquishing IPPs

later, the amount so disbursed in the pool shall be collected from respective DICs along with interest to refund to the IPPs. Hence, CTU requested for deliberation on the above and provide consent on disbursing the encashed BG amount to the DICs in the pool with the conditions mentioned above.

Subsequently, the matter has been deliberated by CTU in recent 59th NRPC meeting held in Oct'22. The same has been reviewed and decided that, DICs of NR may submit comments regarding the agenda to CTU with copy to NRPC in one month (i.e by 30 November 2022). However, comments are yet to be received from DICs of NR. Copy of relevant extract of MOM of 59th NRPC meeting is enclosed.

The status of consent from DICs may be reviewed.

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Issue No : I/25047/2022

Annexure II

File No.CEA-GO-12-29/2/2022-GM Division

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
ग्रिड प्रबंधन प्रभाग
Grid Management Division
****

Sub : Guidelines on manpower adequacy for SLDCs

It is to inform that the meeting was taken by Secretary(P) with CEA & GCI (erstwhile POSOCO) on 30.11.2022 to discuss draft guidelines on manpower adequacy for SLDCs. The draft circulated by MoP on 29.11.2022 was discussed (copy enclosed).

It was decided for restructuring of the draft report including organogram of typical SLDC & capturing new areas like cyber security, resource adequacy, disturbances etc.

For the above activity the list of documents to be referred are as below:

(1) Pradhan Committee Report 2008-GoI (Report of the Combined Committee on Manpower Certification, Incentives for System Operators and Ring Fencing Load Despatch Centres)
(2) Detailed organogram
(3) Model distribution structure
(4) GCI (erstwhile POSOCO) report filed to CERC
(5) Other documents as mentioned under references of the draft circulated by MoP on 29.11.2022.

It is requested to submit views/inputs of all stakeholders of the RPCs for preparation/ restructuring of above cited draft report. It is also requested that the views/inputs may be discussed in some forum of RPCs and compiled views may be submitted to this Division.

This issues with the approval of Member(GO&D~~)/Chairperson~~, CEA

(M M Dhakate)
Chief Engineer

Member Secretary (NRPC/WRPC/SRPC/ERPC/NERPC)

No: CEA-GO-12-29/2/2022-GM Division दिनांक:14.12.2022

Draft

Guidelines for Strengthening of State Load Despatch Centres in India

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Guidelines For Strengthening of State Load Despatch Centres in India

1. Background

The Electricity Act 2003 designates the Load Despatch Centres (LDCs) as apex bodies to ensure integrated, secure, reliable, economic, and efficient operation of power system under their jurisdiction. The LDCs would play an important rote in facilitating the energy transition towards a sustainable and decarbonised electricity grid. The availability of human resources in the State Load Despatch Centres was reviewed by, Secretary (Power), Ministry of Power, Government of India on 16th September 2022. These guidelines have been formulated to provide a benchmark to the State governments / utilities for strengthening -the State Load Despatch Centres by ensuring adequacy of trained and certified human resources.

2. Categorization of State Load Despatch Centres

Considering the diversity of power system profile of different states in terms of their peak demand met, energy consumption and installed capacity of Renewable Energy Sources, the thirty-five SLDCs could be grouped into three categories —Large SLDCs{Medium SLDCs, Emerging SLDCs.

No.	Large SLDCs	Medium SLDCs	Emerging SLDCs
1	Andhra Pradesh	Assam	Arunachal Pradesh
2	Gujarat	Bihar	Chandigarh
3	Haryana	Chhattisgarh	*Dadra and Nagar Haveli
4	Karnataka	Damodar Valley Corporation	Daman & Diu
5	Maharashtra	Delhi	Goa
6	Madhya Pradesh	Himachat Pradesh	Manipúr
7	Punjab	'Jammu & Kashmir and Ladakh	Meghataya
8	Rajasthan	Jharkhand	Mizoram
9	Tamil Nadu	Kerala	Nagaland
10	Telangana	Odisha	Puducherry
11	Uttar Ptadesh	Uttarakhand	Sikkim
12	West Bengal		Tripura

3. Functional areas within State Load Despatch Centre

The functions discharged by SLDCs could be broadly classified into following categories System Operation (SO), Market Operation (MO), System Logistics, and Support services. The System Operation function covers operational planning, real-time operation and post despatch analysis. The market operation function covers open access administration, day ahead market, real-time market, energy accounting and settlement activities. System logistics covers decision support, Information technology and cyber security related activities. The regulatory and legal affairs; human resource management contract services, finance and account, establishment, administration are support services. Further details regarding these functions are enclosed as Annexure-I.

There are Thirteen Renewable Energy Management Centre (REMC) in India which includes the REMCs in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra Telangana Tamil Nadu: Karnataka and Uttar Pradesh which are collocated with SLDCs. The REMCs are also envisaged for UT Ladakh and UT Andaman Nicobar. takes care of forecasting, scheduling and real-time monitoring renewable energy resources

4. Recommended deployment of human resources

The recommended number-of human resources in a SLDC would vary depending upon whether the SLDC is large, medium', or emerging. The SLDCs where REMC is co-located would require additionaL18-24 nos. of executives. SLDCs should staff 2- 4 nos of experts for ensuring compliance to cyber security protocols and guidelines. Typically, the number of personnel in any SLDC, REMC and Cyber Security functions should be in the range as indicated in the table below. These numbers include only the executive staff including Supervisors but- excluding- staff for physical infrastructure security and sub-LDCs. It may further be noted that the SLDCs where a dedicated Cyber Security operation Centre is established would require additional human resources

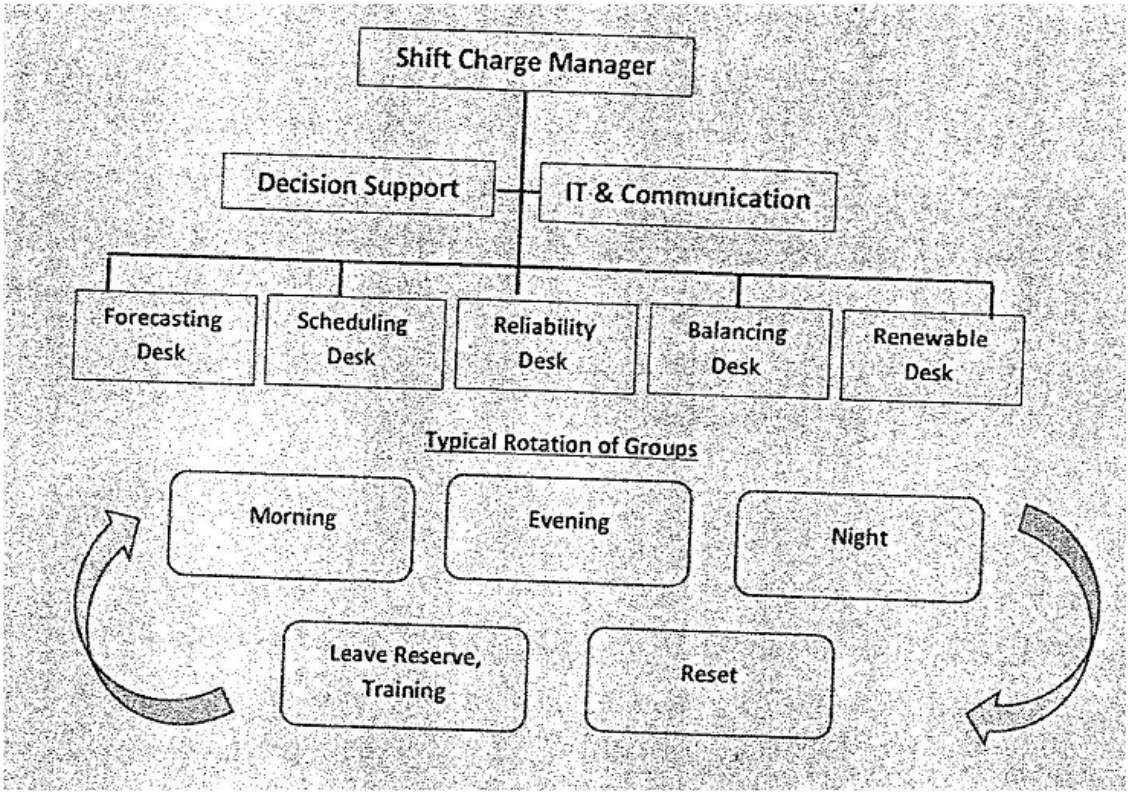
Table 1:- HR Requirement in Diff. Categories of SLDCs

Category of SLDCs	Total personnel required for SO, MO, Sys-Logistics & Support services	Personnel for REMC	Personnel for Cyber Security
Large	100 - 150	18-24	2-4
Medium	70- 100		
Emerging	30 - 50		

In order to maintain an optimum balance of staff in critical functions, it is recommended that the proportion of executive staff in System Operation, Market Operation, System Logistics, Support services is maintained in the range of (35 - 45) % : (20- 30) % : (15 - 20) % : (10 15) % of the total strength. The ratio of (Executive + Supervisors) to Nonexecutive must be endeavored to be maintained at around 95%: 5%. The regular personnel deployed in non-core, non-critical functions may be optimized by out-sourcing and automation of routine activities.

Real-Time operation is at the heart of any SLDC. Thereforet adequate deployment of trained and certified personnel is required. Each control room must operate in five shift groups with 3-8 Nos. per shift.' The fifth group is recommended to factor leave reserves and training needs of real-time operations personnel: Thus the HR budget for real-time operatiðns should take •into account round-the clock operationst entitled leaves, public holidays, festivalst business travely training, special assignments etc. making a total of 15-40 Nos. Overall for control room shift operation.

Figure 1:- Typical Organization of Rea/ Time Team for LDC



5. Training of System Operators

System operators need to be up-to-date with the evolving technology, policies, rules standards, regulations, procedures and best practices. Therefore, capacity building through training and refresher programme has been implemented through National Power Training Institute (NPTI) for Load Despatchers. It is categorized into 3 levels - Basic Level Specialist Level and Management Level. Basic Level System Operation programme is the foundation course required for all System Operators and can also be attended by those

posted in other functional areas in LDCs. Basic Level Course on Cyber Security is required for those posted in IT & OT functions. The specialist courses on topics such as Reliability, Regulatory Framework in Power Sector, and Advanced course on Cyber Security are available for experienced specialist professionals employed in these respective fields in LDCs,, The payment of Tuition fee for these courses is exempt for employees of SLDCs.

Detailed list of Training Courses for LDC personnel is given at Annexure-II.

6. Certification of System Operators

National Power Training Institute has been entrusted as Nodal Agency for certification of System Operators and various certification exams for Basic and Specialist Level are being conducted by NPTI. List of training/certification programs is given at Annexure-ll. Basic Level Certifications are mandatory to work in critical area of System Operation in an LDC. Guidelines regarding mandatory certification are being separately notified vide Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulationsó2022: Specialist level certification is optional. Each certificate has a validity of 03 years and must be renewed thereafter.

7. Short term exposure Programme for System Operators

A Short Term Exposure Programme has been envisaged provide opportunity the system operators to learn from each other and to propagate best-practices Rotation of System Operators would also enhance cohesive working and coordination in operations.The programme Will include 2-10 days' duration rotational assignments to other LDCs.The officials from one LDC will be rotated to other LDCs in System Operation, Market Operation and Logistics functions.' Detailed modalities of the Short-Term Exposure Programme ate given as Annexure- III.

8. Tenure of Posting in SLDCs

Reliable and safe operation of power systems is critical to the country. Tacit knowledge gained through practical experience is essential for handling minute to minute challenges and entrants. Therefore, a minimum posting for a period of three years is recommended for any Official posted in SLDC. Any person posted in an CDC shall be provided training -and must acquire relevant basic level certificate within six months of being posted in the LDC.

Annexure-I : Functional areas in a Load Despatch Centre

1. System Operation functions

System Operation function includes but shall not be limited to the following functions:

a) Operational Planning ;

i) Load Forecasting ii) RE forecasting iii) Fuel security assessment iv) Production cost optimization studies v) Generating outage planning vi) Transmission outage planning vii) Assessment of Transfer Capability víii) Reactive Power studies ix) Short circuit and transient stability studies x) Small Signal stability studies xi) Electromagnetic transient studies xii) Mock black start drills xiii) Operation of back up control centre xiv) Preparations for special events like festivals, natural calamities like cyclone, floods etc. xv) Documentation of procedures (operating, restoration)

b) Scheduling and Despatch on day-ahead and real-time basis

i) Day ahead security studies factoring all outages ii) Unit commitment iii) Day ahead optimization and scheduling 'iv) Shift Crew Resource Management v) Anticipating and mitigating congestion vi) Preparation for speciat events vii) -Handling requests for emergency/urgent outages unforeseen In operational planning horizon

c) Reat Time Operation

i) Frequency Control ii) Voltage control iii) Tie line loading control iv)•Congestion management v) Ensuring security at all times vi) Ancillary -Services vii) Balancing Services, Automatic Generation Control viii) Real Time Contingency Analysis ix) Dynamic Security Assessment x) Monitoring weather updates xi) Handling emergency outage requests xii) Restoration of network after tripping xiii) Rescheduling of generation xiv) Reporting of a grid disturbance (GD)/grid incident(GI) xv) Periodic communication with stakeholders and sensitizing in case of emergency xvi) De-briefing after an extreme event

d) After the Fact or Post Despatch Analysis.

i) Analysis of frequency and voltage ii) Analysis of Grid Code violations and follow up with agencies iii) Analysis of Grid Events (GD/GI) iv) Evaluating primary response viz. computation of Frequency Response Characteristics (FRC) of individual control areas v) Low Frequency Oscillations (IFO) monitoring and analysis vi) Detailed reports of Grid Disturbances/Grid Events vii) Simulation of events and learnings thereof viii) Event replay, lessons learnt and dissemination of same ix) Taking up shortcomings with stakeholders Submission of Operational feedback to policy makers/regulators/planners f) Information dissemination

2. Market Operation functions

Market Operation function includes but shall not be limited to the following functions: (a) facilitating grid access to new entities including but not limited to first time charging of elements (b) feedback in respect of electricity market design, • for complementing reliability and causing economy (c) open access administration, (d) finalization of Interchange schedules for energy accounting (e) Day Ahead Market, (f) Real Time Market, (g) Ancillary Services Market (h) Interface Energy Metering (i) energy accounting and settlement.

3. System Logistics functions

System Logistics functions includes designs operations and maintenance of but shall not be limited to the Engineering of new SCADA/EMS/WAMS/RÉMC upgrades (b) Maintenance of- SCADA/EMS/WAMS/REMC infrastructure (c) Synchro- ' phasor technologies (d) Real time software applications (e) Off-line software applications (f) Big Data •Analytics tools (g) ' k Decision Support Systems Information Technology Networking and Communication systems Including websites; Wi-Fi access security and other related systems (i) conference and meeting related facilities including audio-visual equipment such as video conference equipment etc., (j) Power supp(y system (k) firefighting and alarm systems (l) Ergonomic systems (m) Public Address System.

Annexure II: Training and Certification Program for capacity building

1 . System Operator Training Programmes

SN	Name of the Training Program	Level	Duration of the Training Pro rams	Remarks
1	Basic Level Programme on power System Operation	Basic	03 weeks (Full Length) 3 Days (Refresher)	Mandatory
2	Power Market	Specialist	02 weeks	Desirable
3	Regulatory Framework in Power Sector	Specialist	02 weeks	Desirable
4	Power System Logistics	Specialist	02 weeks	Desirable
5	Power System Reliability	Specialist	02 weeks (Full Length) 03 Days Refresher	Desirable
6	RE source and Grid Integration	Specialist	02 weeks	Desirable
7	Familiarization on Despatcher Training Simulator		02 weeks	Desirable
Cyber Security (Training cum Certification)				
8	Training and Certification Program on Cyber Security	Basic	02 weeks	Mandatory
9	'Training and Certification Program on Cyber Security	Intermediate	02 weeks	Desirable
10	Training and Certification Program on Cyber Security	Advance	02 weeks	Desirable

2. System Operator Certification

SN	Name of the Certification	Level	Validity of Certification	Remarks
1	Basic Level Power System Operation Certification	Basic	03 Years	Mandatory

2	Specialist Level Power System Reliability Certification	Specialist	03 Years	Desirable
3	Specialist Level Regulatory Framework in Power Sector Certification	Specialist	03 Years	Desirable
4	Specialist Level Power System Logistics Certification	Specialist	03 Years	Desirable

Annexure-III: Short Term Exposure Program

A Short-Term Exposure Programme to facilitate rotation of System Operators, to enhance cohesion and exposure among System Operators in LDCs is being implemented for all State Load Despatch Centres, Regional Load Despatch Centres and National Load Depatch Centre. The objective of this programme is to propagate best-practices, facilitate peer-to-peer learning from each other and propagate best-practices through hands on exposure of real time working of other LDCs This will be beneficial for new and emerging SLDCs, where resource adequacy concerns for multi-tasking executive's have been expressed. The planned programme comprises of rotation of LDC officials to other LDCs for a duration of Two to Ten Days.

1. Modalities

a. Rotational assignments will be done on reciprocity basis. Generally the ratio of requirement and number of persons to be rotated will endeavored to be kept as 1 : 1; however, .in certain cases especially for emerging LDCs this can be relaxed

b. All LDCs will analyse their own requirement, work out number of officers they wish to post' to other LDCs for exposure, clearly specifying periods of assignments in both cases. Each LDC can prepare an Annual Rotation Plan for— (i) officials they wish to rotate to other LDCs and (ii) officials they can host in their LDC keeping in mind their Human Resource Adequacy.

c. The host organization may design specific programme Including a few-class-room Sessions to facilitate the learning delivery in share with the visiting organization beforehand

d. In order to leverage familiarity and already established sense of comfort, initially the rotation will be within the same

e: The Rotation will be in the areas of System Operation; Market Operation, Logistics and REMC Functions.

f. Any short-term assignment will be for a minimum period of 2 working days but not exceeding 10 working days in total.

2. Eligibility:-

a. All LDC officials working in System Operation, Market Operation, Logistics and REMC functions will be eligible to be rotated to other LDCs-

b. LDC officials should have minimum 1 year or regular service in an LDC before they can be considered for the exposure programme.

3. Execution

a. LDCs can send their Annual Rotation Plan to the Forum of Load Despatchers (FOLD) Secretariat at the beginning of the financial year.

b. FOLD secretariat will compile requirements and assist in devising a Region-wise rotational plan on round-robin basis so that Human Resource adequacy is maintained at all Load Despatch Centres.

c. This programme is focused on increasing capacity building of SLDCs, therefore, the focus must be on giving exposure to SLDC officials. However, to kickstart the

programme, RLDCs and NL-DC will start by posting their officers out to SLDCs and host officers from other LDCs in their region. FOLD Secretariat will coordinate the liasoning with LDCs, if require. Travel arrangement including accommodation & logistics will be done by respective LDCs.

4. TADA including accommodation expenses will be borne by the parent organization as per their rules. Host organization wilt not be obligated to provide ,any facility to the visiting officer.*

Annexure to Short Term Exposure Programme:- Requirement Detail Format

Name of the LDC
-Total number of Job Roles identified for officers from other LDCs
Details of the rotes identified for officers from other LDCs

st. No.	Department	Area of the task/ project	Proposed Assignment Details (To which the officer from LDCs will be deputed)	Proposed Period of the Assignment (Start Date & End Date)

References

1 Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2022 -- Draft regulation,

2. MOP 0M No. 13/3/2019-OM-Part(1) dated 23rd March, 2022- Mandatory certification for personnel posted in Load Despatch Centres (NLDC/ RLDCs / SLDCs).

3. NPTI Letter - NPTI/PSTI/PSO/2022-23 dated 26th April, 2022 & 1 st September, 2022 Training & Certification of System Operators.

Capacity Building of Indian Load Despatch Centres (CABIL) Report 2018 - Report of the Forum of Regulators Technical Committee sub-group.

5. Dhiman Committee Report, 2010 (Report of the Combined Committee for Training and Certification of System Operators, March 2010).

6 Reports of task Force headed by Chairperson, CEA on Manpower Selection and Recruitment Procedure and Tenures for Personnel in SLDCs, June 2009 (Rakesh Nath Committee Report 2009).

7. Pradhan Committee Report 2008 - GoI (Report of the Committee on Manpower Certification; Incentives for System Operators and Ring Fencing Load Despatch Centres).

Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

S. No.	Items	Details
1.	**Name of Scheme**	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 7.5GW) (Jaisalmer/Barmer Complex)
2.	**Scope of the scheme**	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) **(Jaisalmer/Barmer Complex)** **Fatehgarh-IV : 4GW (4GW Solar, 4GW Wind, 2GW BESS) and Barmer-I : 3.5GW (3 GW Solar, 3 GW Wind, 1 GW BESS**) **A. Fatehgarh-IV : 4 GW (4 GW Solar + 4GW Wind + 2 GW BESS)** • Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Fatehgarh- IV (Section-2) Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor* • Fatehgarh-IV (Section-2) PS – Bhinmal (PG) 400 kV D/c line (Twin HTLS) along with 50 MVAr switchable line reactor on each ckt at each end (~200 km) • LILO of both ckts of 765 kV Fatehgarh-III- Beawar D/c line(2nd) at Fatehgarh-IV (Section-2) PS along with 330 MVAr switchable line reactors at Fatehgarh-IV PS end of each ckt of 765 kV Fatehgarh-IV- Beawar D/c line** (formed after LILO) (~15 km) • Beawar- Mandsaur PS 765 kV D/c line along with 240 MVAr switchable line reactor on each circuit at each end (~250 km) • Augmentation by 1x1500 MVA, 765/400 kV ICT at Fatehgarh-II PS (7th) • 6 nos. of 220 kV line bays at Fatehgarh-IV PS (for RE connectivity) • 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Fatehgarh- IV (Section-2) Pooling Station ***Future provisions at Fatehgarh-IV PS is already approved in 8th NCT meeting dated 25.03.22*** ***^incl 1x500MVA ICT to fulfill 'N-1' requirement*** ****Incl. spare one ICT unit (500MVA) and spare one reactor unit (80MVAr) at Fatehgarh-IV PS*** *****Incl spare one reactor unit (110MVAr) at Fatehgarh-IV PS*** **B. Barmer-I : 3.5 GW (3 GW Solar + 3GW Wind + 1 GW BESS)** • Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor* **<u>Future provisions at Barmer-I S/s:</u>**

S. No.	Items	Details
		Space for ➢ 765/400kV ICT along with bays- 2 no. ➢ 765 kV line bays along with switchable line reactors – 4 nos. ➢ 765kV Bus Reactor along with bay: 1 no. ➢ 400 kV line bays –4 ➢ 400 kV line bays along with switchable line reactor –4 nos. ➢ 400/220kV ICT along with bays -5 nos. ➢ 400 kV Bus Reactor along with bay: 1 no. ➢ 400kV Sectionalization bays: 2 sets ➢ 220 kV line bays for connectivity of RE Applications -8 nos. ➢ 220kV Sectionalization bay: 2 sets ➢ BC (2 nos.) & TBC (2 nos.) ➢ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) • Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line (Quad)(~50 km) • 6 nos. of 220 kV line bays at Barmer-I PS (for RE connectivity) • 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Barmer-I PS **^incl 1x500MVA ICT to fulfill 'N-1' requirement** ***Incl. spare one ICT unit (500MVA) and spare one reactor unit (80MVAr) at Barmer-I PS*** **C. Common Transmission System for Fatehgarh-IV and Barmer-I in NR** • Establishment of 2x1500 MVA, 765/400 kV Substation at suitable location near Jalore PS along with 2x240 MVAr (765 kV) & 2x125 MVAr (400 kV) Bus Reactor * **<u>Future provisions at Jalore S/s:</u>** **Space for** ➢ 765/400kV ICT along with bays- 4 no. ➢ 765 kV line bays along with switchable line reactors – 4 no. ➢ 765kV Bus Reactor along with bay: 1 no. ➢ 400 kV line bays along with switchable line reactor –4 no. ➢ 400 kV line bays –4 no. ➢ 400 kV Bus Reactor along with bay: 1 no. ➢ 400kV Sectionalization bay: 2 sets ➢ 400/220kV ICT along with bay - 6 no. ➢ 220kV line bays -10 no. ➢ 220kV Sectionalization bay: 2 sets ➢ BC (3 nos.) & TBC (3 nos.) ➢ STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr) • Fatehgarh-IV (Section-2) PS – Jalore PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end(~200 km) • Barmer-I PS– Jalore PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at Jalore PS end **(~165 km)

S. No.	Items	Details
		• Jalore PS-Chittorgarh (PG) 400 kV D/c line along with 50 MVAr switchable line reactor for each circuit at each end (Quad) (~200 km) • Jalore PS- Mandsaur PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at each end(~320 km) ***Incl. spare one ICT unit (500MVA) and spare one reactor unit (80MVAr) at Jalore PS*** ****Incl spare one reactor unit (110MVAr) at Jalore PS end*** **In addition to the above, following transmission scheme is also required in Western region for further dispersal of power for above RE complexes (Fatehgarh-IV and Barmer-I)** **D. Common Transmission System for Fatehgarh-IV (4GW) and Barmer-I (3.5GW) in Western Region** • Establishment of 765kV Mandsaur Pooling Station along with 2x330MVAr (765kV) Bus Reactors (with 1x110MVAr & 1x80MVAr, 765kV spare single phase reactor unit for line/bus reactor) **Future Scope**: **Space for** ➢ 765/400kV ICT along with bays- 6 no. ➢ 765 kV line bays along with switchable line reactors – 6 nos. ➢ 765kV Bus Reactor along with bay: 2 no. ➢ 765kV Sectionaliser bay: 1 -set ➢ 400 kV line bays along with switchable line reactor – 12 nos. ➢ 400/220kV ICT along with bays -8 nos. ➢ 400 kV Bus Reactor along with bay: 2 no. ➢ 400kV Sectionalization bay: 1- set ➢ 220 kV line bays: 16 nos. ➢ 220kV Sectionalization bay: 2 sets ➢ 220kV BC and TBC: 3 nos. ➢ STATCOM (±300MVAr) along with MSC (2x125 MVAr) & MSR (1x125 MVAr): 1 no. • Mandsaur PS – Indore(PG) 765 kV D/c Line (200km) along with 1x330MVAr switchable line reactor (SLR) on each ckt at Mandsaur end • Establishment of 765/400 (2x1500MVA) 400/220 (2x500MVA) & 220/132kV (3x200MVA) Kurawar S/s (with 1x500MVA spare single phase transformer unit) with 2x330MVAr 765kV bus reactor and 1x125MVAr 420kV bus

S. No.	Items	Details
		reactor (with 1x110MVAr & 1x80MVAr, 765kV spare single phase reactor unit for line/bus reactor) **Future Scope**: **Space for** ➢ 765/400kV ICT along with bays- 4 no. ➢ 765 kV line bays along with switchable line reactors – 8 nos. ➢ 765kV Bus Reactor along with bay: 2 no. ➢ 765kV Sectionaliser bay: 1 -set ➢ 400 kV line bays along with switchable line reactor – 10 nos. ➢ 400/220kV ICT along with bays -6 nos. ➢ 400 kV Bus Reactor along with bay: 2 no. ➢ 400kV Sectionalization bay: 1- set ➢ 220 kV line bays: 12 nos. ➢ 220kV Sectionalization bay: 2 sets ➢ 220kV BC and TBC: 3 nos. ➢ 220/132kV ICT along with bays: 3 nos. ➢ 132kV line bays: 8 ➢ 132kV Sectionalization bay: 1 set ➢ STATCOM (±300MVAr) along with MSC (2x125 MVAr) & MSR (1x125 MVAr): 1 no. • Mandsaur – Kurawar 765kV D/c line (~235km.) with 240MVAr switchable line reactors at both ends • LILO of Indore – Bhopal 765kV 765kV S/c line at Kurawar (LILO route length ~15km.) • Kurawar – Ashtha 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (~65km) • LILO of one circuit of Indore – Itarsi 400kV D/c line at Astha (LILO route length ~ 30km.) • Shujalpur – Kurawar 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (~40km)
3.	**Depiction of the scheme on Transmission Grid Map**	Attached at **Exhibit-I**
4.	**Upstream/downstream system associated with the scheme**	765/400/220kV Fatehgarh-III PS and Beawar S/s is under bidding as part of Rajasthan REZ Ph-III system and proposed to be interconnected with Ph-II/Ph-III system whereas 765/400kV Chittorgarh S/s and 400/220kV Bhinmal S/s are existing S/s. 765/400kV Chittorgarh S/s is connected with Banaskantha (WR) and Ajmer (Proposed to be LILOed at Beawar) S/s through 765kV D/c lines and 400V interconnection with Chittorgarh (RVPN) S/s. 400/220kV Bhinmal S/s is connected

<table>
<tr><th>S. No.</th><th>Items</th><th>Details</th></tr>
<tr><td></td><td></td><td>with Zerda (WR) and Kankroli S/s (to be bypassed in future) as well as Barmer (RVPN) S/s.</td></tr>
<tr><td>5.</td><td>Objective / Justification</td><td>
1. The transmission scheme shall faciliatate evacuation of about 7.5GW power from Rajasthan REZ Ph-IV (Part-2) envisaged in Jaisalmer/Barmer Complex.
2. Ministry of Power vide letter No. 15-3/2017-Trans (part 1) dated 7th December, 2021, had constituted a Committee on Transmission Planning for RE under the Chairmanship of Chairperson, CEA, for planning of the requisite Inter- State Transmission System required for the targeted RE capacity by 2030.
3. Renewable Energy Zones (REZs) were identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030 in eight states, which includes 75 GW REZ potential in Rajasthan comprising of 15 GW Wind and 60 GW Solar.
4. Accordingly, a Comprehensive transmission scheme was evolved for evacuation of 181.5 GW RE power including 75GW from Rajasthan. As part of committee report as well as MNRE/SECI inputs, 12GW potential (Wind: 6GW, Solar: 6GW) along with 4GW BESS envisaged at Fatehgarh-IV in Jaisalmer complex by 2030. Out of 12GW potential, 8GW potential (Wind: 4GW, Solar: 4GW) along with 2GW BESS considered by 2027 at Fatehgarh-IV PS. Similarly, 7GW potential (Wind: 3GW, Solar: 4GW) along with 1.5GW BESS envisaged at Barmer-I in Barmer complex by 2030. Out of 7GW potential, 6GW potential (Wind: 3GW, Solar: 3GW) along with 1GW BESS considered in Barmer-I by 2027.
5. BESS of 3GW (Fatehgarh-IV : 2GW, Barmer-I : 1GW) is considered for net dispatch at Fatehgarh-IV PS and Barmer-I PS while evolving the evacuation scheme
<table>
<tr><th rowspan="2">Pooling Station</th><th colspan="3">Total RE Potential (by 2030)</th><th>RE Potential (by 2027)</th><th>Net (Max) Dispatch Considered by 2027(GW)</th></tr>
<tr><th>Source</th><th>Capacity (GW)</th><th>Capacity (GW)</th></tr>
<tr><td>Fatehgarh-IV</td><td>Wind</td><td>6</td><td>4</td><td rowspan="3">4</td></tr>
<tr><td></td><td>Solar</td><td>6</td><td>4</td></tr>
<tr><td></td><td>BESS</td><td>4</td><td>2</td></tr>
<tr><td>Barmer-I</td><td>Wind</td><td>3</td><td>3</td><td rowspan="3">3.5</td></tr>
<tr><td></td><td>Solar</td><td>4</td><td>3</td></tr>
<tr><td></td><td>BESS</td><td>1.5</td><td>1</td></tr>
<tr><td></td><td colspan="3"></td><td>Total (GW)</td><td>7.5</td></tr>
</table>
6. As part of Rajasthan REZ Ph-III (20GW) transmission system, 400/220kV Fatehgarh-IV PS and associated transmission system is already under bidding. The evacuation system planned earlier in Ph-III from 400/220kV Fatehgarh-IV PS is adequate for evacuation of about 2 GW RE capacity. Considering above, space provision for separate 765/400//220kV (Section-2) at
</td></tr>
</table>

S. No.	Items	Details
		Fatehgarh-IV PS was already approved in 8th NCT meeting held on 25.03.22 7. At present, St-II Connectivity for about 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV PS and Stage-II connectivity received has already exceeded the envisaged potential of Fathegrah-IV PS [Ph-III potential: 2.1 GW). Considering grant of connectivity to new RE generators at Fatehgarh-IV PS as well as for evacuation of power from Fatehgarh-IV PS beyond 2 GW in Jaisalmer Complex and Barmer-I PS in Barmer complex, 765kV high capacity corridors will be required from above pooling stations **8.** Accordingly, system studies were carried out and study plots along with network files were sent to all stakeholders dated 30.11.22. A Joint Study Meeting was held in virtual mode on 05.12.22 with NRPC, CEA, GRID-INDIA (Formerly known as POSOCO), RVPN, HVPN, UPPTCL, PSTCL and other STUs of Northern region to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex). **Minutes of above Joint study meeting is enclosed in Annexure-1.** 9. In the meeting, GRID-INDIA/NRLDC stated that switching on/off of 330MVAr bus reactor may cause large voltage variation on ISTS pooling station under various operating condition. To minimize this impact, bus reactors of lower capacity i.e. 240MVAr may be considered in place of 330MVAr on new pooling stations proposed in this scheme. Accordingly, based on studies, CTU reviewed and modified the bus reactor capacity from 330MVAr to 240MVAr at Fatehgarh-IV PS, Barmer-I PS and Jalore PS in the revised proposal. GRID-INDIA/NRLDC also requested to provide evening peak (summer season) and off peak file (winter season) with proposed system. 10. In the meeting, RVPN stated that Rajasthan is facing high voltage issues in night off peak time due to integration of large RE generation at Intra state as well as inter state level. Therefore, HVDC corridors may be planned in future to control power flow as well as voltages in RVPN system. It was deliberated that adequate reactive commiseration (bus+line) as well as STATCOMs (with MSC+MSR) planned at inter state level, however reactive MVAr shall flow from intra state system to ISTS network. In view of that it was stated that RVPN may also plan suitable static/ dynamic compensation in existing and proposed RVPN system. It was also stated that in subsequent phases HVDC Corridors will be planned from Jaisalmer/Barmer complex. 11. RVPN also enquired that with proposed interconnection of Fatehgarh-IV with Bhinmal S/s may cause loading issues in underlying network of Bhinmal S/s after bypassing scheme. CTU stated that in studies, loading of Bhinmal ICTs as well as underlying network is in order in

S. No.	Items	Details
		all scenarios after considering bypassing scheme. It was also stated that Bypassing scheme at Bhinmal along with reconductoring (Jodhpur-Kankroli) is already agreed with implementation timeframe progressively from Nov'23 with a provision of suitable switching arrangement inside the Bhinmal substation. 12. PSTCL in the meeting as well as their mail dated 08.12.22 stated to increase the intra state generation and load of Punjab in winter and summer solar maximized scenario along with inclusion of solar capacity connected at intra state level. In meeting UPPTCL also stated to review the intra state generation of UP system in both the scenarios. Accordingly, CTU reviewed the load generation of Punjab and UP and modified in the revised study files circulated on 16.12.22. HVPN stated that they do not have any observations on proposal as well as on studies. 13. Based on observations received from Stakeholders as well as discussion held in joint study meeting, CTU shared the revised study files along with evening peak/off peak files to all constituents on 16.12.22 incorporating the suggestions and inputs from UP, Punjab & GRID-INDIA/NRLDC. **Result of system studies enclosed in Exhibit-II.** 14. In Feb solar maximized scenario (revised case) loading of 400kV RAPP- Shujalpur D/c line is marginally higher (about 910MW) in N-1 contingency. The loading of above line will be reviewed with progress of RE generation projects at Rajasthan and strengthening requirement will be identified later, if required. In revised and additional cases, line loadings of other lines in above RE complex were found to be in order as well as voltages were within limits on all substations. 15. Subsequently, the scheme is being taken up for approval in 14th CMETS-NR scheduled to be held on 23.12.22. Detailed scope of the scheme is mentioned in S. No. 2 (as agreed in Joint study meeting) 16. The transmission system for WR portion was discussed in a meeting amongst CEA, CTUIL, MPPTCL and GRID-INDIA on 01.12.2022, wherein the above system was in-principally agreed. The scheme was further agreed in 13th CMETS-WR meeting held on 07.12.2022 (MOM awaited)
6.	**Estimated Cost**	**Total: Rs. 19,623.17 Cr.** • **Rs. 13656.05 Cr. (NR Portion)** • **Rs. 5967.12 Cr. (WR Portion)**
7.	**Need of phasing, if any**	Not Applicable
8.	**Implementation timeframe**	24 months from allocation of project
9.	**System Study for evolution of the proposal**	Studies discussed and agreed in following meetings • NR Joint study meeting held on 05.12.22 (Minutes of meeting enclosed in **Annexure-I**)

S. No.	Items	Details
		• 13th CMETS-WR meeting held on 07.12.2022 (Minutes of meeting awaited • The scheme is being taken up for approval in 14th CMETS-NR meeting scheduled to be held on 23.12.22 Load flow results is attached at **Exhibit-II** Study assumptions are enclosed in **Annexure-II**

Annex-I

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उदयम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: C/CTU/N/ REZ Ph-IV (Part-2) **Date:**16th December,2022

As per distribution list

Sub: Minutes of Joint Study Meeting held on 05.12.2022 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

Dear Sir,

Please find enclosed the Minutes of Joint Study Meeting held on 05.12.2022 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex) through virtual mode.

Thanking you,

Yours Faithfully,

16/12/22

(Kashish Bhambhani)
GM (CTU)

Encl : Minutes of Meeting

Distribution List:

Chief Engineer (PSP&A – I) Central Electricity Authority Sewa Bhawan, R.K.Puram, New Delhi-110 066	**Member Secretary** Northern Regional Power Committee 18A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi – 110 016
Director (SO) Grid Controller of India Ltd. 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi-110 016	**CGM I/c** Northern Regional Load Despatch Centre 18-A, Qutab Institutional Area, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi– 110 016
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Development Commissioner (Power) Power Development Department Grid Substation Complex, Janipur, Jammu	**Director (Technical)** Rajasthan Rajya Vidyut Prasaran Nigam Ltd. Vidyut Bhawan, Jaipur, Rajasthan-302005.
Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Road, New Delhi-110 002	**Superintending Engineer (Operation)** Electricity Circle, 5th Floor, UT Secretariat, Sector-9 D, Chandigarh - 161009
Director (Technical) Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana	

Minutes of Joint Study Meeting held on 05.12.22 to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

A Joint Study Meeting was held in virtual mode on 05.12.22 with CEA, GRID-INDIA (Formerly known as POSOCO), RVPN, HVPN, UPPTCL, PSTCL and other STUs of Northern region to finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 :7.5GW) (Jaisalmer/Barmer Complex). **List of participants is enclosed at Annexure A.**

Gist of the discussions is given as below:

1. CTU stated that Renewable Energy Zones (REZs) were identified by MNRE/SECI with a total capacity of 181.5 GW for likely benefits by the year 2030 in eight states, which includes 75 GW REZ potential in Rajasthan comprising of 15 GW Wind and 60 GW Solar. In this regard a Committee on Transmission Planning for RE was constituted by MOP for planning of the requisite Inter State Transmission System required for the targeted RE capacity by 2030.

2. In this regard, a Comprehensive transmission plan for evacuation of 75GW RE potential from Rajasthan is evolved. As part of committee report as well as MNRE/SECI inputs, 12GW potential (Wind: 6GW, Solar: 6GW) along with 4GW BESS envisaged at Fatehgarh-IV in Jaisalmer complex by 2030. Out of 12GW potential, 8GW potential (Wind: 4GW, Solar: 4GW) along with 2GW BESS considered by 2027 at Fatehgarh-IV PS.

   Similarly, 7GW potential (Wind: 3GW, Solar: 4GW) along with 1.5GW BESS envisaged at Barmer-I in Barmer complex by 2030. Out of 7GW potential, 6GW potential (Wind: 3GW, Solar: 3GW) along with 1GW BESS considered in Barmer-I by 2022.

S.No	Pooling Station	Total RE Potential (by 2030)		RE Potential (by 2027)	Net (Max) Dispatch Considered by 2027(GW)	Application Status
		Source	Capacity (GW)	Capacity (GW)		
1	Fatehgarh-IV	Wind	6	4	**4**	At present St-II Connectivity for 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV (Section-1).
		Solar	6	4		
		BESS	4	2		
2	Barmer-I	Wind	3	3	**3.5**	No application received yet
		Solar	4	3		
		BESS	1.5	1		
				Total (GW)	**7.5**	

Solar Dispatch considered @100%, Wind dispatch considered @50% in June Solar Max Scenario

3. It was deliberated that as part of Rajasthan REZ Ph-III (20GW) transmission system, 400/220kV Fatehgarh-IV PS and associated transmission system is already under bidding. The evacuation system planned earlier in Ph-III from 400/220kV Fatehgarh-IV PS is adequate for evacuation of about 2 GW RE capacity. Considering above, space provision for separate 765/400//220kV (Section-2) at Fatehgarh-IV PS was already approved in 8th NCT meeting held on 25.03.22

4. CTU stated that at present, St-II Connectivity for about 2.8 GW RE, against the potential of 2.1 GW (under Ph-III), is already received at Fatehgarh-IV PS and Stage-II connectivity received has already exceeded the envisaged potential of Fathegrah-IV PS [Ph-III potential : 2.1 GW).

5. Considering grant of connectivity to new RE generators at Fatehgarh-IV PS as well as for evacuation of power from Fatehgarh-IV PS beyond 2 GW in Jaisalmer Complex and Barmer-I PS in Barmer complex, 765kV high capacity corridors will be required from above pooling stations

6. Accordingly, system studies were carried out and study plots along with network files were sent to all stakeholders dated 30.11.22. It was stated in the meeting that loading of 400kV RAPP- Shujalpur D/c line is marginally higher in Feb solar maximized scenario (about 910MW) in N-1 contingency. The loading of above line will be reviewed with progress of RE generation projects at Rajasthan and strengthening requirement will be identified later, if required.

7. GRID-INDIA/NRLDC stated that it was observed that switching on/off of 330MVAr bus reactor may cause large voltage variation on ISTS pooling station under various operating condition. To minimize this impact, bus reactors of lower capacity i.e. 240MVAr may be considered in place of 330MVAr on new pooling stations proposed in this scheme. CTU stated that they will review the bus reactor capacity (330MVAr or 240MVAr) on new pooling stations as per voltages in solar max as well as night off peak scenario. Accordingly, based on studies, CTU modified the bus reactor capacity from 330MVAr to 240MVAr at Fatehgarh-IV PS, Barmer-I PS and Jalore PS in the revised proposal. GRID-INDIA/NRLDC also requested to provide evening peak (summer season) and off peak file (winter season) with proposed system.

8. RVPN stated that Rajasthan is facing high voltage issues in night off peak time due to integration of large RE generation at Intra state as well as inter state level. Therefore, HVDC corridors may be planned in future to control power flow as well as voltages in RVPN system. CTU replied that they have planned adequate reactive commiseration (bus+line) as well as STATCOMs (with MSC+MSR) at inter state level, however reactive MVAr shall flow from intra state system to ISTS network. In view of that it was stated that RVPN may also plan suitable static/ dynamic compensation in existing and proposed RVPN system. CTU also stated that in subsequent phases HVDC Corridors will be planned from Jaisalmer/Barmer complex.

9. RVPN also enquired that with proposed interconnection of Fatehgarh-IV with Bhinmal S/s may cause loading issues in underlying network of Bhinmal S/s after bypassing scheme. CTU stated that in studies, loading of Bhinmal ICTs as well as underlying network is in order in all scenarios after considering bypassing scheme. It was also stated that Bypassing scheme at Bhinmal along with reconductoring (Jodhpur-Kankroli) is already agreed with implementation timeframe progressively from Nov'23 with a provision of suitable switching arrangement inside the Bhinmal substation.

10. PSTCL in the meeting as well as their mail dated 08.12.22 stated to increase the intra state generation and load of Punjab in winter and summer solar maximized scenario along with inclusion of solar capacity connected at intra state level. In meeting UPPTCL also stated to review the intra state generation of UP system in both the scenarios as generation in summer is on lower side whereas in winters generation is on higher side. CTU stated that they will review the load generation of Punjab and UP and incorporate it suitably in revised file. Accordingly, CTU incorporated inputs from UP and Punjab in the revised study files circulated on 16.12.22. HVPN stated that they do not have any observations on proposal as well as on studies.

11. Based on observations received from Stakeholders as well as discussion held in joint meeting, CTU shared the revised study files to all constituents on 16.12.22 incorporating the suggestions and inputs from UP, Punjab & GRID-INDIA/NRLDC. In revised and additional cases, line loadings in above RE complex were found to be in order as well as voltages were within limit. With above observations the scheme was agreed and to be taken up in ensuing CMETS-NR meeting. The agreed comprehensive Transmission scheme is as under:

Proposed Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 7.5 GW)

Northern Region

A. Fatehgarh-IV PS: 4 GW (4GW (Solar) + 4GW (Wind) + 2 GW BESS)

- Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Fatehgarh- IV (Section-2) Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-IV (Section-2) PS – Bhinmal (PG) 400 kV D/c line (Twin HTLS) along with 50 MVAr switchable line reactor at each end (~200 km)
- LILO of both ckts of 765 kV Fatehgarh-III- Beawar D/c line (2nd) at Fatehgarh-IV (Section-2) PS along with 330 MVAr switchable line reactors at Fatehgarh-IV PS end of each ckt of 765 kV Fatehgarh-IV PS - Beawar D/c line (formed after LILO) (~15 km)
- Beawar- Mandsaur PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end (~250 km)
- Augmentation by 1x1500 MVA, 765/400 kV ICT at Fatehgarh-II PS (7th)
- 6 nos. of 220 kV line bays at Fatehgarh-IV PS (for RE connectivity)
- 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Fatehgarh- IV PS

Future provisions at Fatehgarh-IV PS is already approved in 8th NCT meeting dated 25.03.22
^incl 1x500MVA ICT to fulfill 'N-1' requirement

B. Barmer-I PS: 3.5GW (3GW (Solar) + 3GW (Wind) +1 GW BESS)

- Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA^, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAr (765 kV) Bus Reactor & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line (Quad) (~50 km)
- 6 nos. of 220 kV line bays at Barmer-I PS (for RE connectivity)
- 220kV Sectionalization bay (1 set) along with BC (2 nos.) and TBC (2 nos.) at Barmer-I PS

Future provisions at Barmer-I PS:

Space for

- 765/400kV ICT along with bays- 2 no.
- 765 kV line bays along with switchable line reactors – 4 nos.
- 765kV Bus Reactor along with bay: 1 no.
- 400 kV line bays –2 no.
- 400 kV line bays along with switchable line reactor –4 nos.
- 400/220kV ICT along with bays -5 nos.
- 400 kV Bus Reactor along with bay: 1 no.
- 400kV Sectionalization bays: 2 sets
- 220 kV line bays for connectivity of RE Applications -6 nos.
- 220kV Sectionalization bay: 2 sets
- BC (2 nos.) & TBC (2 nos.)
- STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)

^incl 1x500MVA ICT to fulfill 'N-1' requirement

C. Common Transmission System for Fatehgarh-IV and Barmer-I in NR

- Establishment of 2x1500 MVA, 765/400 kV Substation at suitable location near Jalore PS along with 2x240 MVAr (765 kV) & 2x125 MVAr (400 kV) Bus Reactor
- Fatehgarh-IV (Section-2) PS – Jalore PS 765 kV D/c line along with 240 MVAr switchable line reactor for each circuit at each end (~200 km)
- Barmer-I PS– Jalore PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at Jalore PS end (~165 km)
- Jalore PS-Chittorgarh (PG) 400 kV D/c line along with 50 MVAr switchable line reactor for each circuit at each end (Quad) (~200 km)
- Jalore PS- Mandsaur PS 765 kV D/c line along with 330 MVAr switchable line reactor for each circuit at each end (~320 km)

Future provisions at Jalore PS:

Space for

- 765/400kV ICT along with bays- 4 no.
- 765 kV line bays along with switchable line reactors – 4 no.
- 765kV Bus Reactor along with bay: 1 no.
- 400 kV line bays along with switchable line reactor –4 no.
- 400 kV line bays –4 no.
- 400 kV Bus Reactor along with bay: 1 no.
- 400kV Sectionalization bay: 2 sets
- 400/220kV ICT along with bay - 6 no. *
- 220kV line bays -10 no.*
- 220kV Sectionalization bay: 2 sets
- BC (3 nos.) & TBC (3 nos.)
- STATCOM (2x±300MVAr) along with MSC (4x125 MVAr) & MSR (2x125 MVAr)

**** RVPN may confirm the drawl requirement from Jalore PS in future***

Estimated Cost : Rs 14000 Cr (NR Portion)

Implementation Time-frame: 24 months from SPV transfer/ OM

The agreed transmission scheme Map is attached at **Exhibit-I**

In addition to above, following transmission scheme is also required in Western region for further dispersal of power for above RE complexes (Fatehgarh-IV and Barmer-I).

Western Region

Common Transmission System for Fatehgarh-IV (4GW) and Barmer-I (3.5GW) in Western Region

- Establishment of 765kV Mandsaur Pooling Station along with 2x330MVAr (765kV) Bus Reactors
- Mandsaur PS – Indore(PG) 765 kV D/c Line (200km) along with 1x330MVAr switchable line reactor (SLR) on each ckt at Mandsaur end
- Establishment of 765/400 (2x1500MVA) 400/220 (2x500MVA) & 220/132kV (3x200MVA) Kurawar S/s with 2x330MVAr 765kV bus reactor and 1x125MVAr 420kV bus reactor
- Mandsaur – Kurawar 765kV D/c line (~235km.) with 240MVAr switchable line reactors at both ends
- LILO of Indore – Bhopal 765kV 765kV S/c line at Kurawar (LILO length 15km.)
- Kurawar – Ashtha 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (65km.)
- LILO of one circuit of Indore – Itarsi 400kV D/c line at Astha (LILO length 30km.)
- Shujalpur – Kurawar 400kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line (40km.)

Implementation Time-frame: 24 months from SPV transfer/ OM

Estimated Cost : Rs 6000 Cr (WR Portion)

The transmission system for WR portion was discussed in a meeting amongst CEA, CTUIL, MPPTCL and GRID-INDIA on 01.12.2022, wherein the above system was in-principally agreed. The scheme was further agreed in 13th CMETS-WR meeting held on 07.12.2022

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Exhibit-I

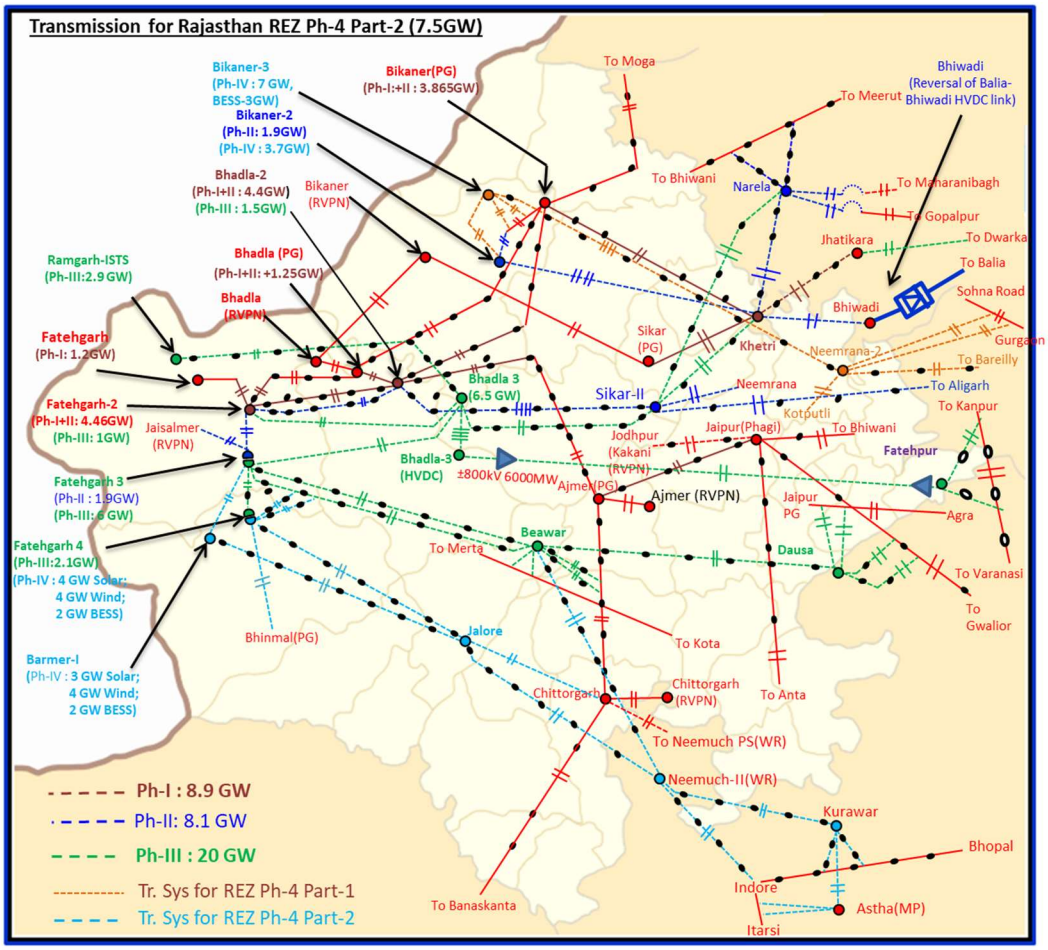


Fig 1: Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2) (Jaisalmer/Barmer Complex)

Annexure A

List of Participants

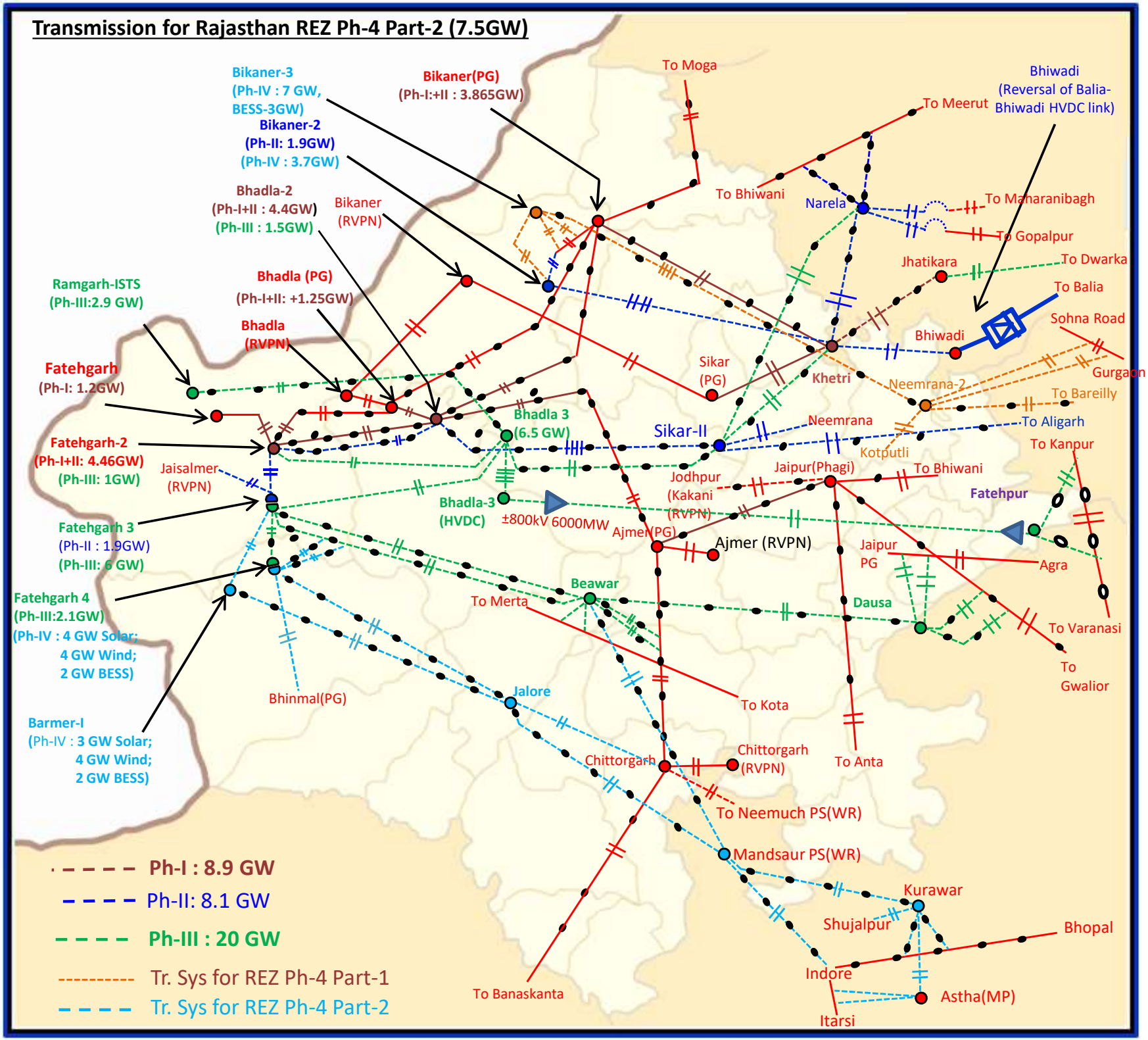
S.No	Name /Designation	Organization
1	Sh. Rajat Dixit	NRPC
2	Ms. Komal	CEA
3	Sh Kanhaiya Singh Kushwaha	CEA
4	Sh Nitin Deswal	CEA
5	Sh. Asif	NRLDC
6	Sh. Gaurav Singh	NRLDC
7	Sh. Sanjay Mathur	RVPN
8	Sh. Rajesh Kumar Jangra	HVPNL
9	Sh. Satyendra Kumar Kumar	UPPTCL
10	Sh. Vivek Khanna	PSTCL
11	Sh. Nitin	PSTCL
12	Sh. Lovleen Singh	DTL
13	Sh. Kashish Bhambhani	CTUIL
14	Sh. Sandeep Kumawat	CTUIL
15	Ms. Ankita Singh	CTUIL
16	Sh. R. Narendra Sathvik	CTUIL

Annexure-II

Study Assumptions

1. Studies were carried out for 2027 time frame for solar maximized scenario (afternoon peak) in June and February seasons. Further, studies were also carried out for June Evening peak & Feb Night Off Peak scenarios based on NR stakeholders request.
2. For evacuation studies,100% Solar dispatch for ISTS solar generation and 80% for intra state solar is considered in Northern region. Solar generation in other regions is considered 90-95%. In evening peak & night off peak scenarios, no solar generation is considered.
3. During solar maximized scenario of June season, wind Generation of NR is considered as 50% whereas wind generation of other regions is considered 50-55%. During evening peak of June season, wind Generation of NR is considered as 70% whereas wind generation of other regions is considered 70-75%. In Feb Season (Winter), low dispatch (up to 10%) of wind generation is considered in in all regions and all scenarios (solar max and night off peak)
4. During solar maximized scenario, Hydro Generation of NR, ER & NER is considered 60-70% and in other regions 30-40% is considered in June season. In Feb season, hydro generation is considered as 30% in all regions.
5. During evening peak scenario, Hydro Generation of NR, ER & NER is considered 90-95 % and in other regions 60-70% is considered in June season.
6. All India projected Peak Demand by 2027 is considered as per the 19th EPS of CEA as well as based on NR constituents' inputs.
7. Central sector/IPP Thermal generation is taken based on merit order dispatch with 55% technical minimum. State sector units dispatched to variable dispatch (55-85%) in a way that maximum thermal units will be available for generation in evening peak.
8. In the studies, all India transmission network up to 220kV level has been simulated. It includes, existing as well as under construction transmission network

Exhibit-I

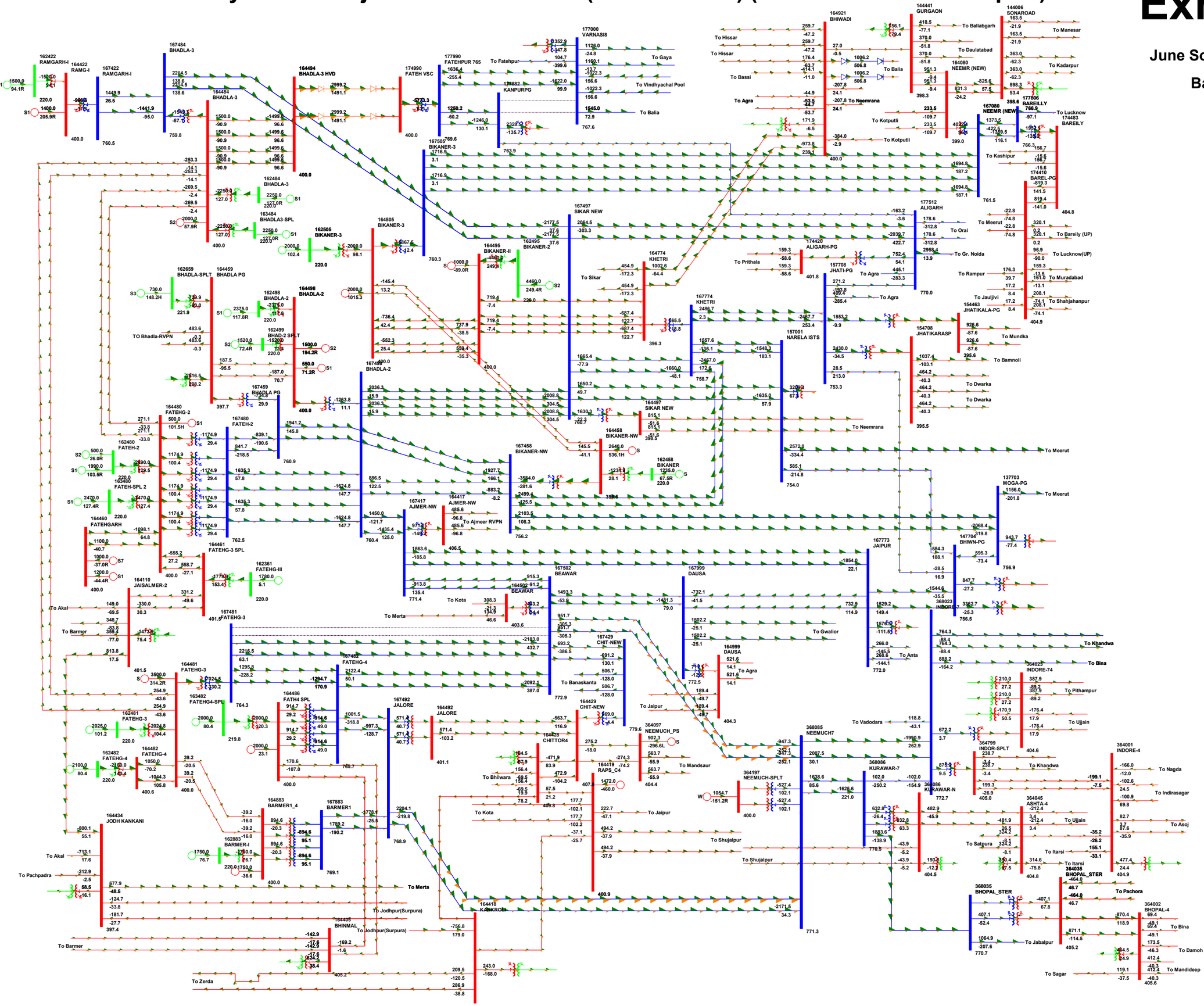

Transmission for Rajasthan REZ Ph-4 Part-2 (7.5GW)
Bikaner-3
(Ph-IV : 7 GW,
BESS-3GW)
Bikaner-2
(Ph-II: 1.9GW)
(Ph-IV : 3.7GW)
Bhadla-2
(Ph-I+II : 4.4GW)
(Ph-III : 1.5GW)
Ramgarh-ISTS
(Ph-III:2.9 GW)
Fatehgarh
(Ph-I: 1.2GW)
Fatehgarh-2
(Ph-I+II: 4.46GW)
(Ph-III: 1GW)
Fatehgarh 3
(Ph-II : 1.9GW)
(Ph-III: 6 GW)
Fatehgarh 4
(Ph-III:2.1GW)
(Ph-IV : 4 GW Solar;
4 GW Wind;
2 GW BESS)
Barmer-I
(Ph-IV : 3 GW Solar;
4 GW Wind;
2 GW BESS)
Bikaner(PG)
(Ph-I:+II : 3.865GW)
Bikaner
(RVPN)
Bhadla (PG)
(Ph-I+II: +1.25GW)
Bhadla
(RVPN)
Jaisalmer
(RVPN)
Bhadla 3
(6.5 GW)
Bhadla-3
(HVDC)
±800kV 6000MW
Bhinmal(PG)
Jalore
Beawar
To Merta
To Kota
Chittorgarh
Chittorgarh
(RVPN)
To Neemuch PS(WR)
Mandsaur PS(WR)
To Banaskanta
Sikar
(PG)
Sikar-II
Ajmer(PG)
Ajmer (RVPN)
Jodhpur
(Kakani
(RVPN)
To Moga
To Meerut
To Bhiwani
Narela
To Maharanibagh
To Gopalpur
Bhiwadi
(Reversal of Balia-
Bhiwadi HVDC link)
Jhatikara
To Dwarka
To Balia
Bhiwadi
Sohna Road
Gurgaon
Khetri
Neemrana-2
To Bareilly
To Aligarh
Neemrana
Kotputli
To Kanpur
Jaipur(Phagi)
To Bhiwani
Fatehpur
Jaipur
PG
Agra
Dausa
To Varanasi
To
Gwalior
To Anta
Kurawar
Shujalpur
Bhopal
Indore
Astha(MP)
Itarsi
Ph-I : 8.9 GW
Ph-II: 8.1 GW
Ph-III : 20 GW
Tr. Sys for REZ Ph-4 Part-1
Tr. Sys for REZ Ph-4 Part-2

Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

Exhibit-II

June Solar Max Scenario

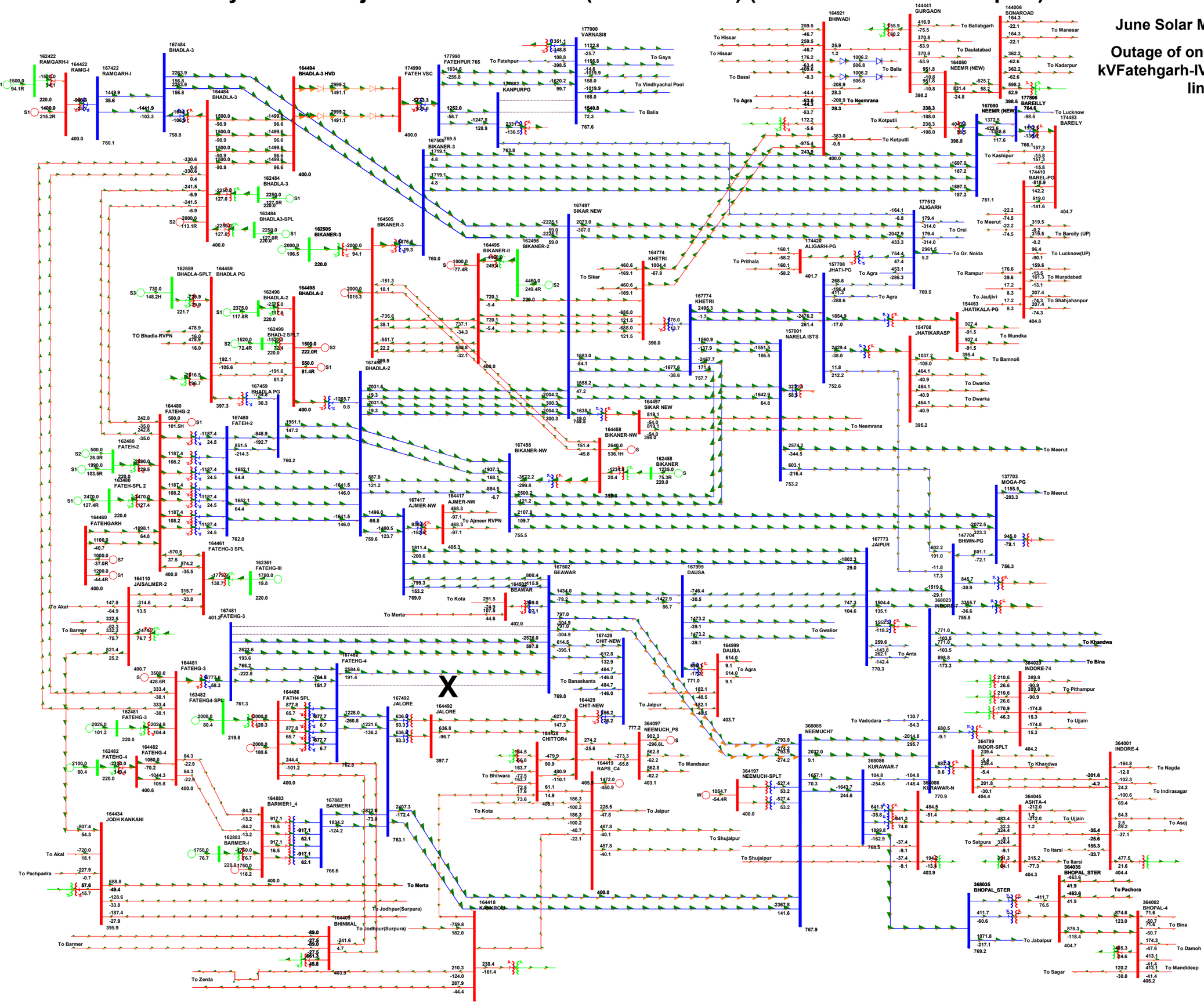
Base Case



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

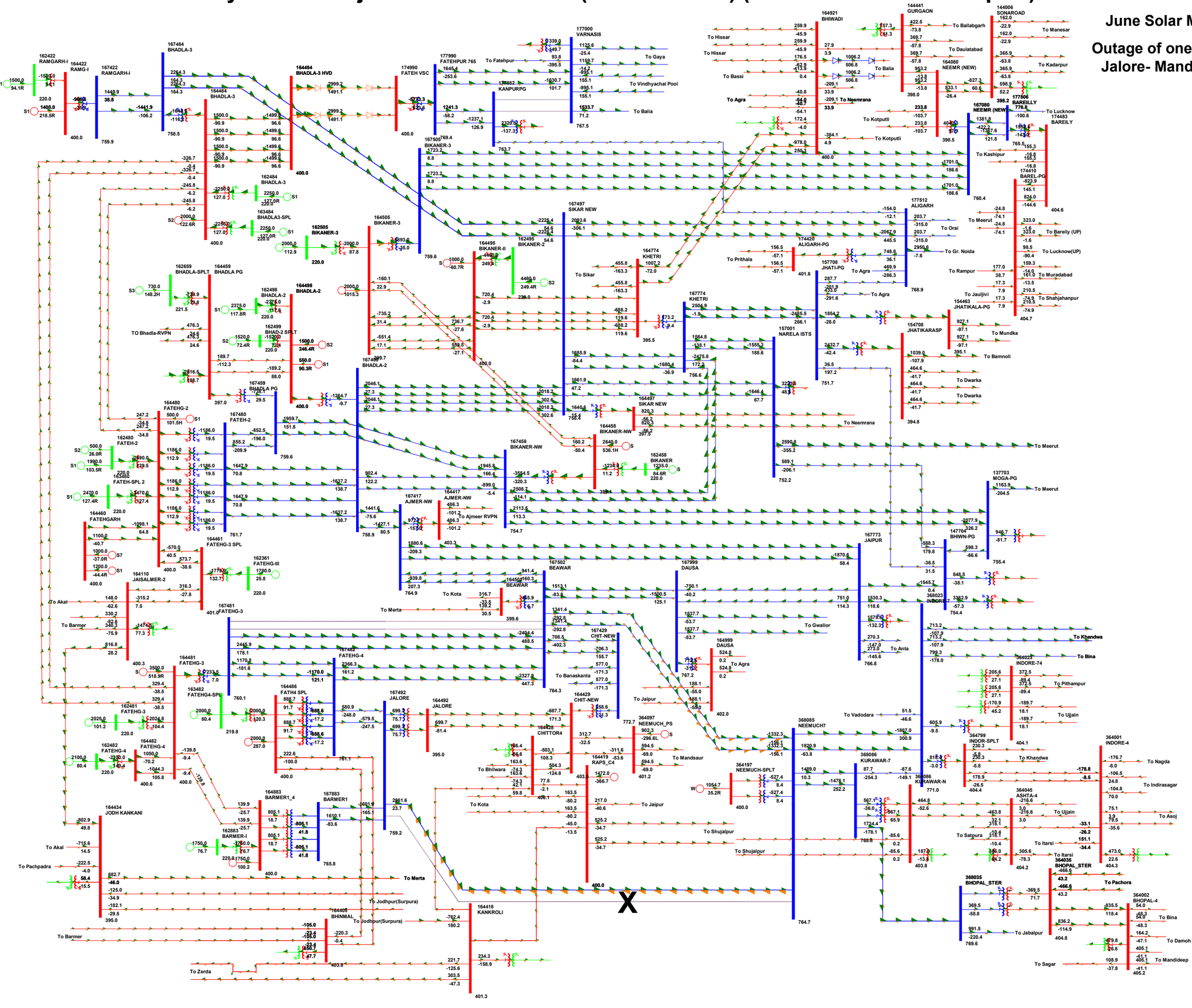
Outage of one ckt of 765 kVFatehgarh-IV- Beawer D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

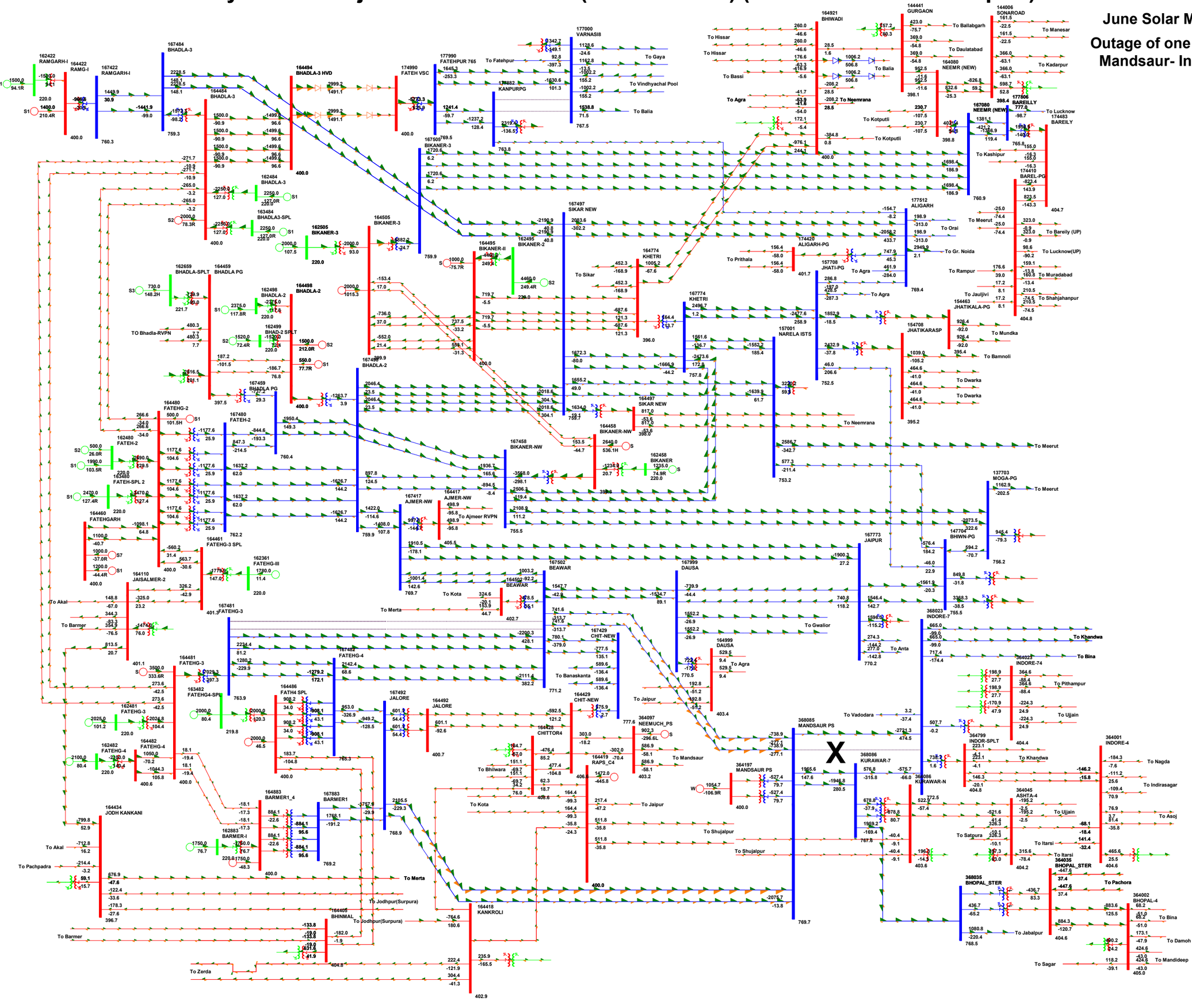
Outage of one ckt of 765 kV Jalore- Mandsaur D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

June Solar Max Scenario

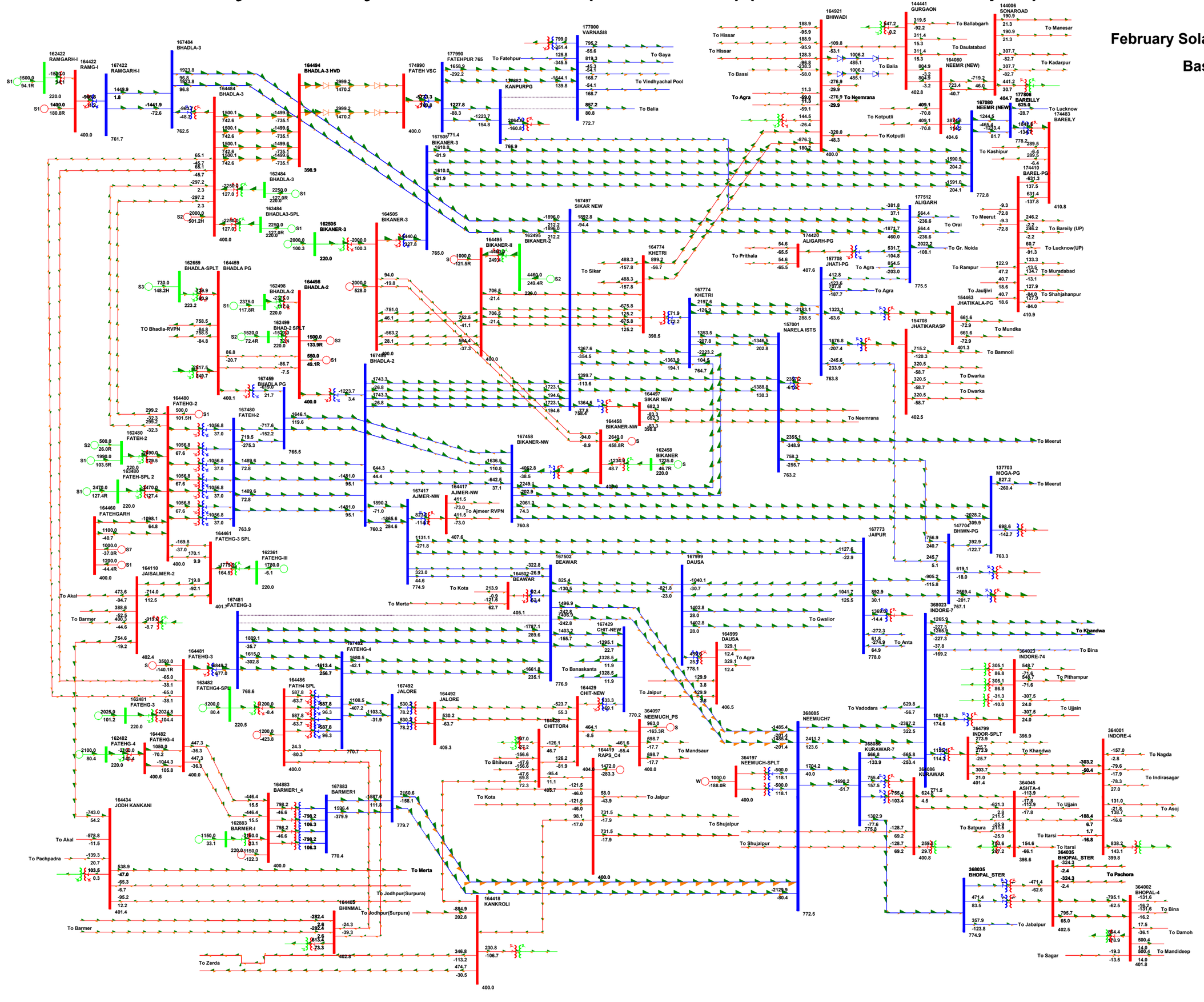
Outage of one ckt of 765 kV Mandsaur- Indore D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

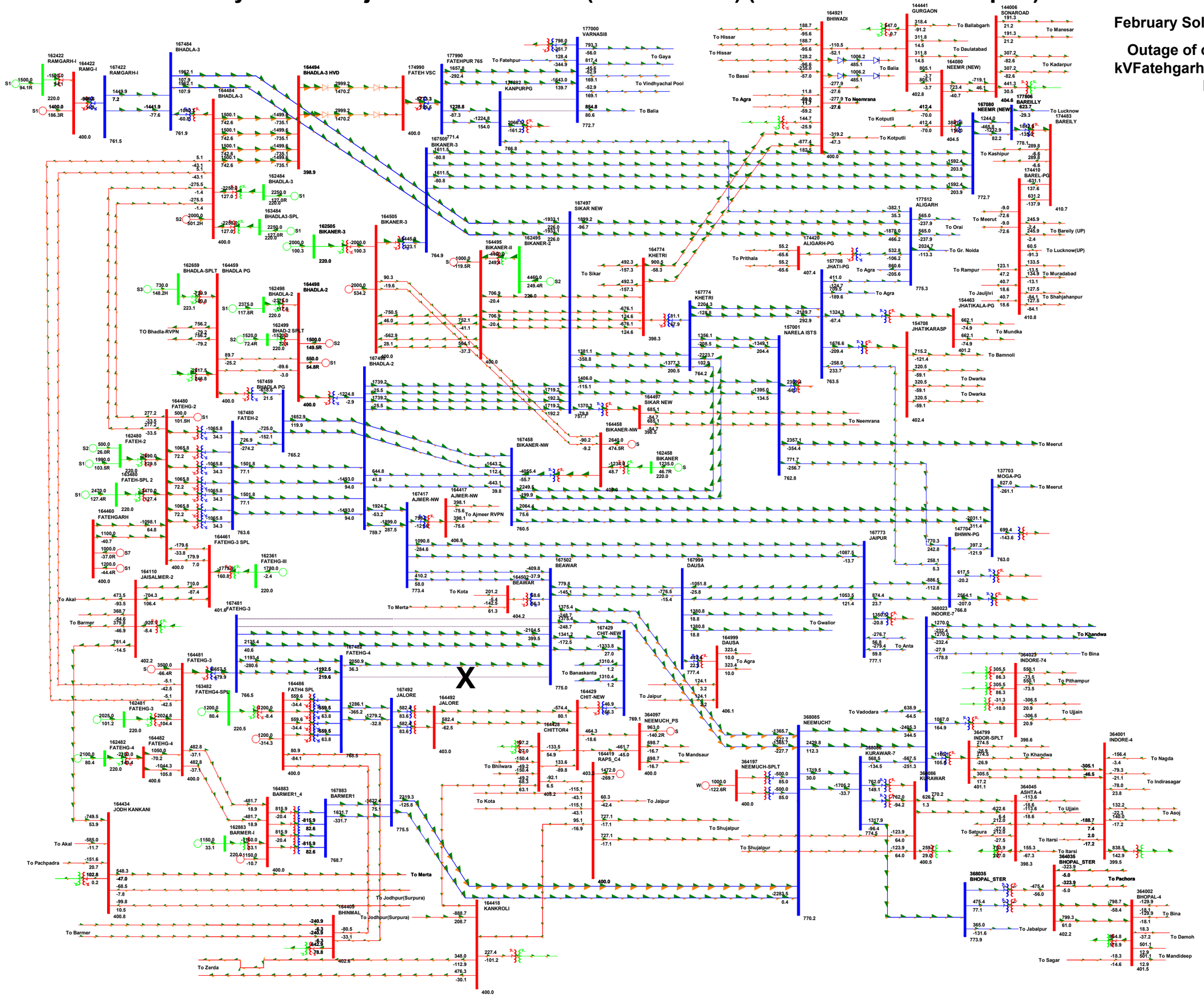
Base Case



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

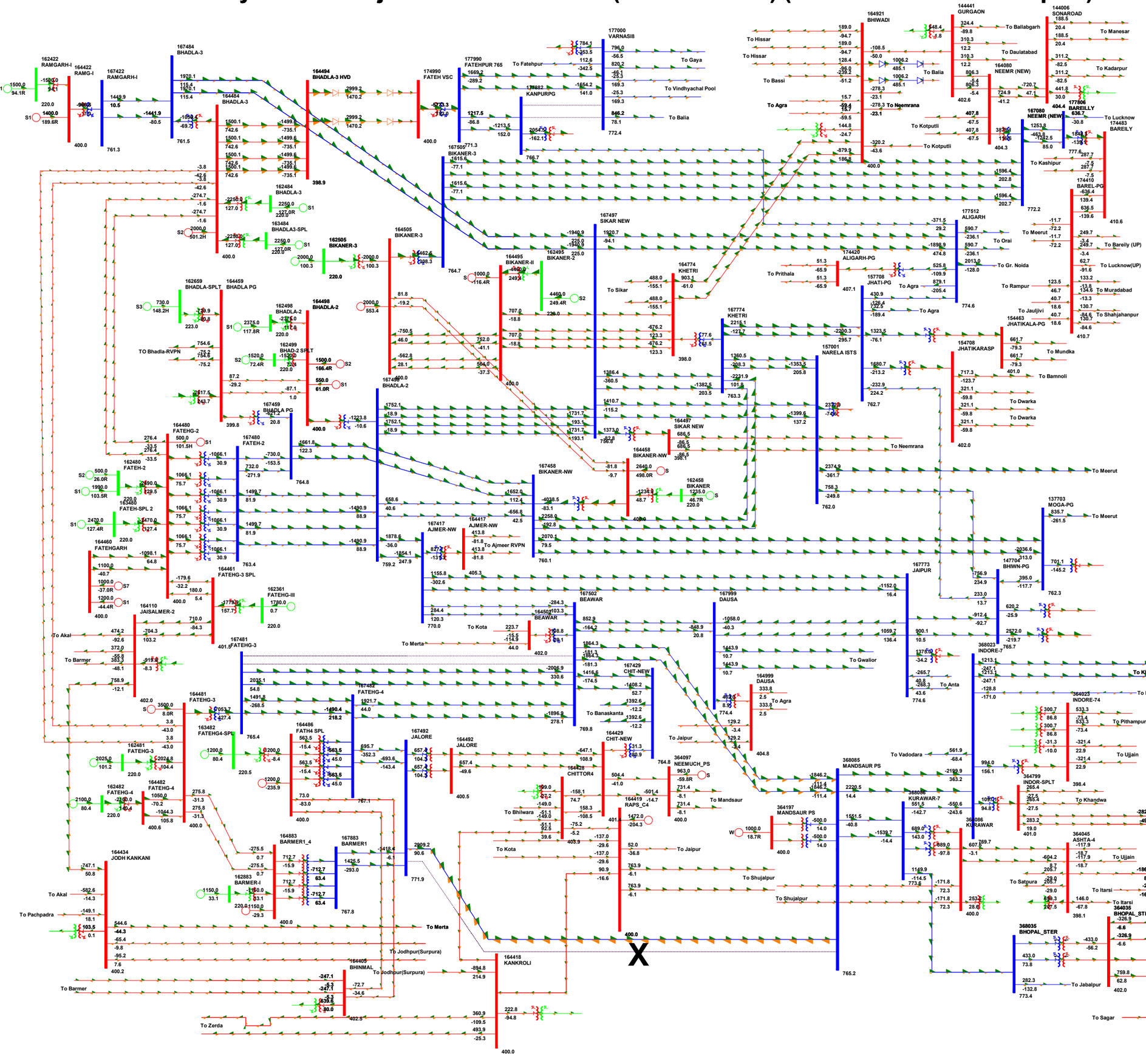
Outage of one ckt of 765 kVFatehgarh-IV- Beawer D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

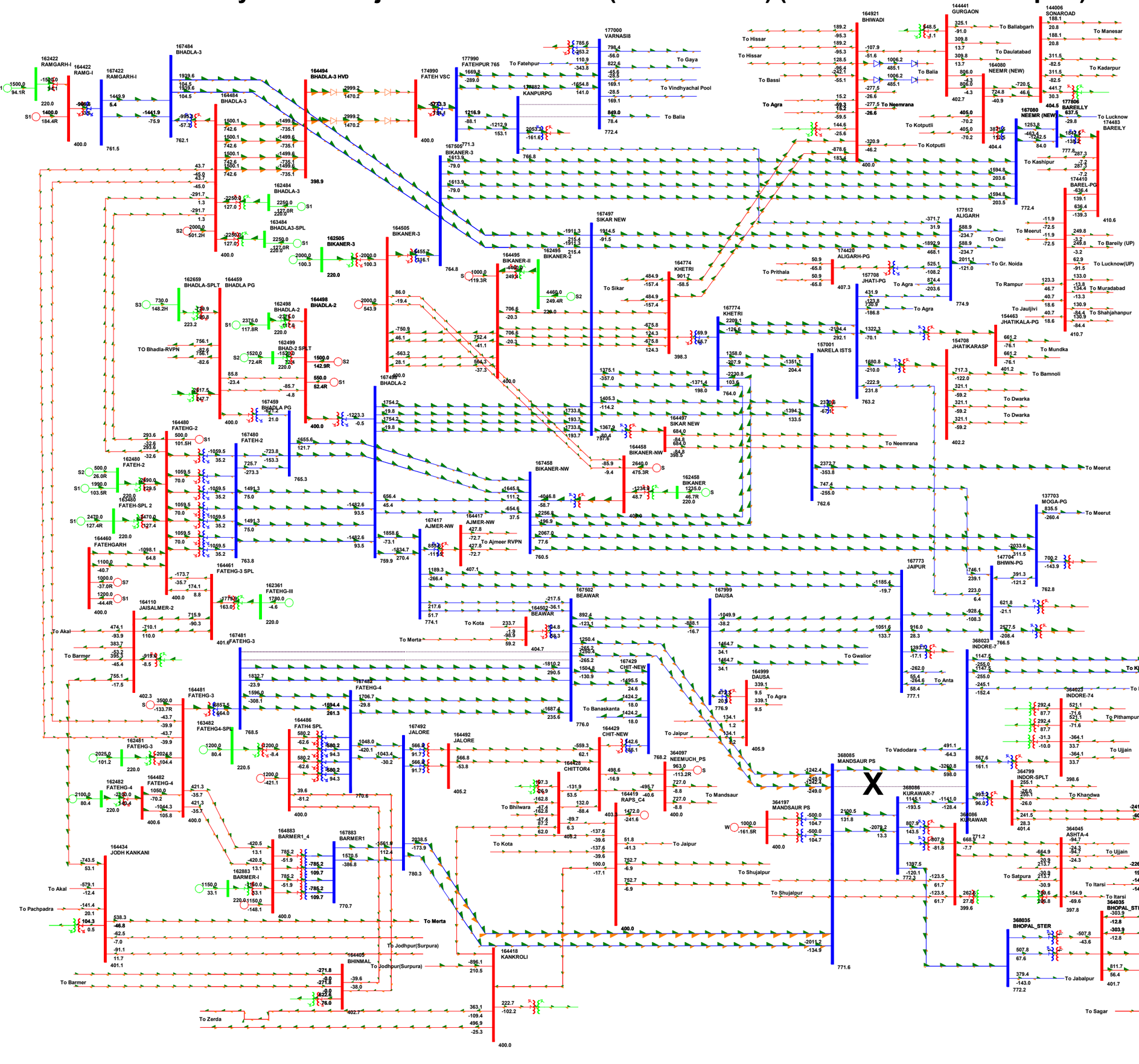
Outage of one ckt of 765 kV Jalore- Mandsaur D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

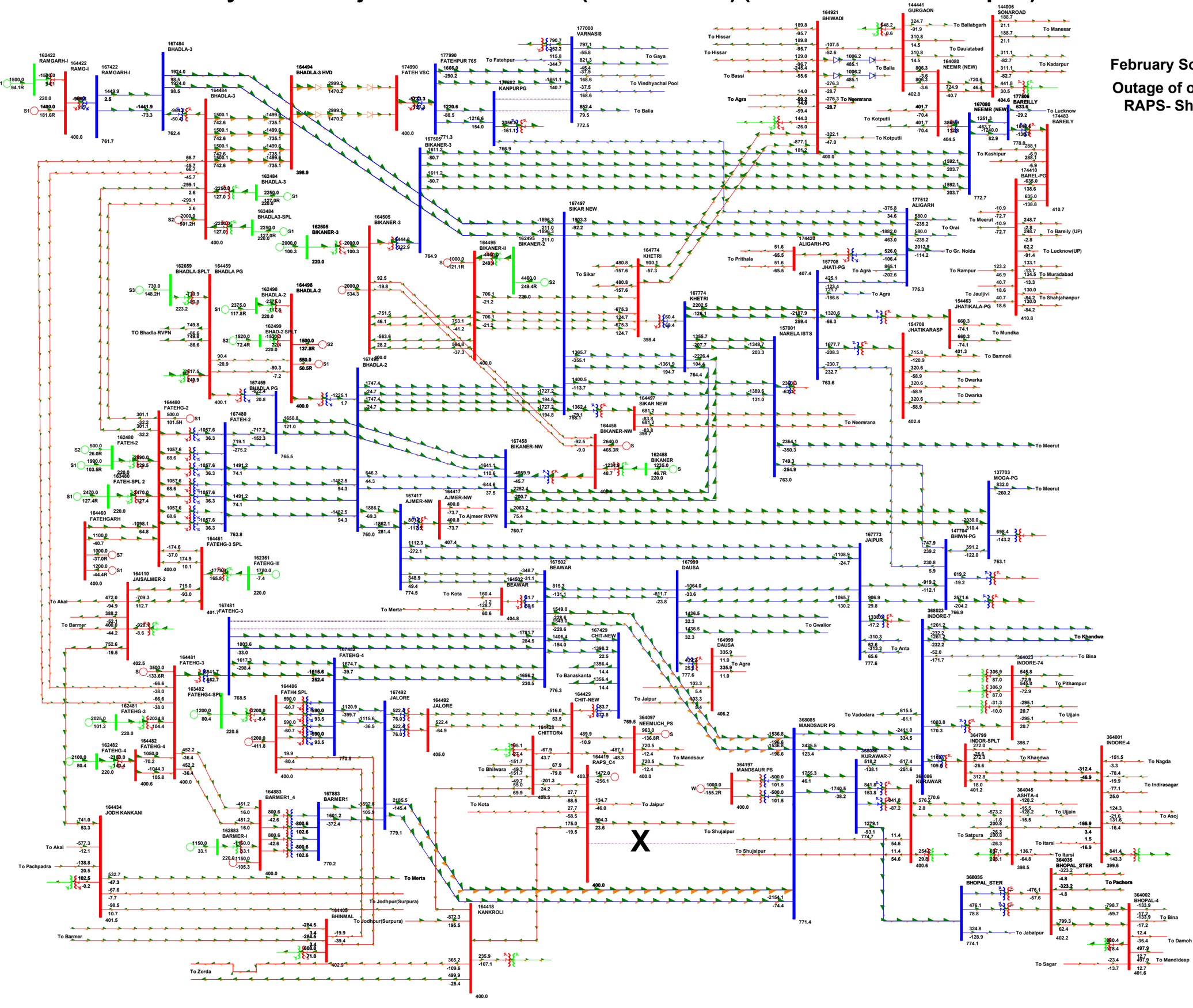
Outage of one ckt of 765 kV Mandsaur- Indore D/c line



Transmission System for Rajasthan SEZ Phase-IV(Part-2 :7.5GW) (Jaisalmer/Barmer Complex)

February Solar Max Scenario

Outage of one ckt of 400 kV RAPS- Shujalpur D/c line



Annexure IV

Rajasthan Rajya Vidyut Prasaran Nigam Ltd.

(Project, Planning & Monitoring Wing)

DETAILED PROJECT REPORT

FOR

33KV CAPACITOR BANK INSTALLTION/ RE-SHUFFLING PROGRAMME (2021-22)

JUSTIFICATION OF THE SCHEME

The demand for active power in the transmission system is met by the power generated from the electrical generating stations. Although in alternating power system, reactive power also plays a major role. The demand for this reactive power is mainly originated from the inductive load connected to the system. These inductive loads are generally electromagnetic circuits of electric motors, electrical transformers, the inductance of transmission and distribution networks, induction furnaces, fluorescent lightings, etc. This reactive power should be properly compensated otherwise, the ratio of actual power consumed by the load, to the total power i.e. vector sum of active and reactive power, of the system becomes quite less.

This ratio is alternatively known as the electrical power factor, and a lower ratio indicates a poor power factor of the system. If the power factor of the system is poor, the ampere burden of the transmission, distribution network, transformers, alternators and other types of equipment connected to the system, becomes high for required active power. And hence reactive power compensation becomes so important. This is commonly done by a capacitor bank.

At present the peak load of State of Rajasthan is 14690MW against which total installed capacity of the capacitor banks is 4347MVAR. As per the load profile, the load of the State is growing at 6.54% annual growth rate. This increase load also require additional reactive power compensation using installation of capacitor banks at various substations to maintain power factor and also to maintain a good voltage profile in the transmission system.

Further, the Govt. of Rajasthan has announced to feed the agriculture load through 3-phase supply in two block supply arrangement. During the last winter peak season (agriculture season) due to sudden rise in the agriculture load, high reactive power was observed in some districts of Rajasthan. This had resulted in low voltage issue and low power factor at many locations. Further, to supply the power in two blocks, the transmission system is to be strengthen to a great extent with installation of additional transformers & reactors, transmission lines etc. For this increase in the reactive load sufficient reactive power compensation shall be required.

The installation of additional capacitor banks will not only improve the voltage profile and the power factor but will also reduce the transmission & distribution losses in the State which in turn reflected in savings.

In view of achieve above mentioned benefits, to avoid the power cuts and for providing reliable un-interrupted power supply to the industrial and domestic consumers, farmers; zone-wise requirement of installation of additional capacitor banks have been planned as per following details:

1. REQUIREMENT OF CAPACITOR BANK IN AJMER ZONE:

A) New Capacitor Banks:

S. No.	Name of Circle	No. of Bank of 5.43 MVAR	Name of GSS where Cap. Bank is required
1.	SE (T&C), Ajmer	3	220 KV GSS Jethana and 132 KV GSS Roopangarh & Sawar

2.	SE (T&C), Sikar	6	220 KV GSS Danta Ramgarh, Dhod & 132 KV GSS Kundan, W/W (Sanwali Road), Ranoli, Piprali
3.	SE (T&C), Merta	4	220 KV GSS Khinvsar & 132 KV GSS Heesaba, Gogelaw, Narwa.
4.	SE (T&C), Babai	1	132 KV GSS Nangli
5.	SE (T&C), Chittor	6	132 KV GSS Baroli, Begun, Dhoriya Choraha, Kanera & Mokhampur (Pratapgarh), Chhoti Sadri
6.	SE (T&C), Bhilwara	2	132 KV GSS Kotri, Beegod
TOTAL		**22**	**22X5.43MVAR**

B) Diversion/Shifting of already installed Capacitor Banks:

S.No	Diverted from		Diverted to	
	Name of GSS	Present Existing Shunt Capacity	Name of GSS	Cap. Bank to be Diverted
1.	132 KV GSS Pilani (T&C Babai)	3*5.43 MVAR	132 KV GSS Mahapalwas (T&C Babai)	1*5.43 MVAR, Make- Universal
2.	132 KV GSS Bidiyad (T&C Merta)	2*5.43 MVAR	220 KV GSS Kuchhera (T&C)	1*5.43 MVAR, Make-Shreem
3.	132 KV GSS Bagot (T&C Merta)	2*5.43 MVAR	132 KV GSS Merta Road (T&C Merta)	1*5.43 MVAR, Make-Universal
4.	220 KV GSS Hamirgarh (T&C Bhilwara)	2*5.43 MVAR	132 KV GSS Kachola (T&C Bhilwara)	1*5.43 MVAR, Make-Shreem
5.	132 KV GSS Bagidora (T&C, Chittor)	2*5.43 MVAR	132 KV GSS Dalot (T&C Chittor)	1*5.43 MVAR, Make ABB
6.	132 KV GSS Rishabhdeo (T&C, Udaipur)	2*5.43 MVAR	132 KV GSS Bhopalsagar(T&C, Chittor)	1*5.43 MVAR, Make-Universal
7.	220 KV GSS Madri	3*5.43 MVAR	220 KV GSS Sawa (T&C Chittor)	1*5.43 MVAR, Make-BHEL
8.	132 KV GSS Pratapnagar (T&C Udaipur)	3*5.43 MVAR	220 KV GSS Chittor (T&C Chittor)	1*5.43 MVAR, Make-ABB
TOTAL				**8x5.43 MVAR**

2. REQUIREMENT OF CAPACITOR BANK IN JAIPUR ZONE:

A) New Capacitor Banks:

S. No.	Name of Circle	No. of Bank of 5.43 MVAR	Name of GSS where Cap. Bank is required
1.	SE (T&C), Kota	6	220 KV GSS Bhawanimandi, Baran and 132 KV GSS Kishanganj, Mangrol, Bapawar & Mamoni
2.	SE (T&C), Alwar	8	220 KV GSS Bansur, 132 KV GSS Govindgarh, Kherli, Laxmangarh, Ramgarh, Pinan, Thanagazi, Telco
3.	SE (T&C), Hindaun	5	132 KV GSS Nangal Sherpur, RIICO Dholpur, Bari, Marena.
4.	SE (T&C), SWM	8	220 KV GSS Gangapurcity, 132 KV GSS Bamanwas, Keshoraipatan, Bundi, Dabi, Baler, Dablana
5.	SE (T&C), Jaipur Rural	2	220 KV GSS Manoharpur, Niwana
TOTAL		**29**	**29X5.43MVAR**

3. REQUIREMENT OF CAPACITOR BANK IN JODHPUR ZONE:

A) New Capacitor Banks:

S. No.	Name of Circle	No. of Bank of 5.43 MVAR	Name of GSS where Cap. Bank is required
1.	SE (T&C) JODHPUR	8	132 KV GSS S S Nagar, Bapini, Dechu, Chamu, Setrawa, Kalau, Lohawat
2.	SE (T&C) KANKANI	4	132 KV GSS Nathdau, Bana ka Bas, Bera, Hatundi
3.	SE (T&C) SIROHI	9	220 KV GSS Sayala, 132 KV GSS Reodar, Paladar, Bhadroona, Bagora, Poonasa, Daspan, Posaliya, , Swaroopganj
4.	SE (T&C) BARMER	8	220 KV GSS Dhorimanna, 132 KV GSS Sedwa, Sata, Ranasar, Sawa, Mehloo, Chouhtan, Gadra road
5.	SE (T&C) BIKANER	10	132 KV GSS Chhattargarh, 132 KV GSS Bajju, Bhamattsar, Dulchasar, Deshnok, Kitasar, Lalandesar, Mundsar, Sherera
6.	SE (T&C) JAISALMER	6	132 KV GSS Chandan, Sangarh, Jhinjhiali, Ajasar
7.	SE(T&C), Hanumanarh	4	220 KV GSS Bhadra, 132 KV GSS Fatehgarh, TIBBI, Pallu,
8.	SE (T&C) Ratangarh	1	220 KV GSS Halasar
TOTAL		**50**	**50X5.43MVAR**

B) Diversion/Shifting of already installed Capacitor Banks:

S. No.	Diverted from	Diverted to	Capacitor Bank details	Remark
	Name of GSS	Present Existing Shunt Capacity	Name of GSS	Cap. Bank to be Diverted
1	132 KV GSS Banar (T&C Jodhpur)	2x5.43 MVAR	132 KV GSS Kirmarsariya (T&C Jodhpur)	1x5.43 MVAR BHEL Make
2	132 KV GSS Barmer (T&C Barmer)	2x5.43 MVAR	132 KV GSS Juna Meetha Khera (T&C Barmer)	1x5.43 MVAR ABB Make
3	132 KV GSS Pugal Road (T&C Bikaner)	2x5.43 MVAR	132 KV GSS RD-710 (T&C Bikaner)	1x5.43 MVAR BHEL Make
TOTAL				**3x5.43 MVAR**

As elaborated above, there is a total requirement of installation of **548.43 MVAR (101x5.43 MVAR)** of new 33 kV Shunt Capacitor Banks for the FY 2021-22 and also diversion of **59.73 MVAR (11x5.43 MVAR)** capacitor banks to newly identified substations.

ESTIMATED COST OF SCHEME

The tentative estimated cost for the scheme of capacitor bank installation/ re-shuffling program 2021-22 works out to **Rs. 3887.37 lacs** as per the abstract cost estimate of the scheme is given at **Annex.-I**. The zone-wise breakup of the estimated cost has been given at **Annex-II, III & IV**. The estimation has been made as per the standard layout and quantity of the material required for installation of capacitor bank at a substation which is placed at **Annex-V** and estimate for diversion of an existing capacitor bank has been given at **Annex-VI**.

PROVISION IN ANNUAL PLAN

A tentative provision of Rs. 600 lacs has been kept in the Annual Plan 2021-22 in the head of installation of capacitor banks, which shall be utilised for starting the execution of this scheme. Sufficient provisions (if required) shall be made for this scheme during revision of the Annual Plan 2021-22 by diversion of budget from the other schemes in which there is slow progress of work. The balance provision required for completion of this scheme shall be made as per progress of this scheme.

Requisite approval of the Govt. of Rajasthan under section- 68 of the Electricity Act, 2003 shall be obtained. A copy of the project scheme shall also be sent to the RERC as per regulation 3(1) of the “Investment Approval Regulations” after approval of the scheme by the WTDs.

APPROVAL OF SCHEME

The Whole Time Director (WTDs) of RVPN on dated 02.07.2021 have considered the proposal and accorded administrative and financial approval for the scheme of capacitor bank installation/ re-shuffling program 2021-22 at total estimated cost of **Rs. 3887.37 lacs** as per following details:

S.NO.	ZONE	COST OF NEW BANK INSTALLTION	COST OF DIVERTED CAPACITOR BANKS	TOTAL (RS. LACS)
1	JAIPUR	1053.86	-	1053.86
2	AJMER	799.48	157.84	957.32
3	JODHPUR	1817.00	59.19	1876.19
	TOTAL	**3670.34**	**217.03**	**3887.37**

The Whole Time Director (WTDs) of RVPN accorded its administrative & financial sanction of said scheme subjected to the approval of funding of the scheme from the Power System Development Fund (PSDF) through NLDC, POSOCO.

******

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED.
[Corporate Identity Number (CIN):U40109RJ2000SGC016485]
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RVPN
An ISO 9001:2015 Certified Company

150 YEARS OF CELEBRATING THE MAHATMA

No. RVPN/SE(P&P)/XEN -2/AE-III/ F. 197[A] /D 1499 Jaipur, Dt. 10/11/2022

Member Secretary
Northern Regional Power Committee,
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai,
New Delhi-110016

Sub:- Submission of "Detailed Justification Note" with adopted methodology for calculation for 33 kV Capacitor Banks Installation/Re-shuffling programme of RVPN for FY 2021-22.

Ref:- Meeting discussion dated 03.11.2022 with NRPC.

Dear Sir,

This is in reference to meeting held on 03.11.2022 regarding Capacitor Banks Installation/Re-shuffling programme of RVPN for FY 2021-22. As per the discussion, a detailed justification note with methodology adopted for calculation of capacitor banks is being submitted to supplement the DPR, already submitted to your office for kind consideration and early appraisal of the scheme.

Yours sincerely,

(K.K.Meena)
Chief Engineer (PP&D)

Copy submitted to the following for information and further necessary action:-

1. The Chief Engineer (LD), RVPN, Heerapura, Jaipur.

Chief Engineer (PP&D)

Rajasthan Rajya Vidyut Prasaran Nigam Ltd.

(Project, Planning & Monitoring Wing)

DETAILED JUSTIFICATION FOR DPR for 33 kV CAPACITOR BANK INSTALLTION/ RE-SHUFFLING PROGRAMME (2021-22)

A meeting was convened through video conferencing on 03.11.2022 with NRPC regarding 33 kV Shunt Capacitor Installation/Re-Shuffling programme of RVPN. As per the discussion in the meeting, detailed justification note along with adopted methodology is being submitted to supplement the DPR for consideration & approval of the NRPC-

It is well established fact that any power system requires adequate rective power compensation not only to improve the voltage profile and the power factor but also to reduce the transmission & distribution losses in the State which in turn reflects in the savings. In Rajasthan, being an agrarian & renewable energy surplus state, there exists multi dimensional power system which is in dire need of adequate reactive power compensation. Installation of capacitor banks will help Rajasthan in managing multiple issues such as-

1. *Increasing Peak Load*- As per the recent study, Rajasthan's peak demand of 16012 MW has been registered in June-22 with 9.6% growth as compared to last year. In winters, due to agriculture season, it is expected to further rise to 16500-17000 MW. This load will also require additional reactive power compensation using installation of capacitor banks at various substations.

2. *Two Block Supply-* Government of Rajasthan, in its commitment to help farmers meet out their load demand, has announced feeding the agricultural load through 2 block supply arrangment. This shift from 3-block supply arrangement to 2-block supply arrangement will require system strengthning i.e. installation of additional transformers, reactors & laying of more EHV lines etc. This will require more units of capacitor banks for reactive power compensation. Furthermore, in last winter season due to sudden rise in the agriculture load, high reactive power was observed in some districts of Rajasthan. This had resulted in low voltage issue and low power factor at many locations. To counter this issue, sufficient reactive compensation is required.

3. *Connectivity of RVPN's grids with Solar/Wind gerenation-* Presently, Rajasthan has approximately 14.5 GW of solar generation & 4.5 GW of wind gerenation connected with RVPN's grid. Seasonal & diurnal changes in RE generation causes changes in voltage profile of the substations which in turn causes fluctuations in the power system. These fluctuations may result into severe low voltage problems at various ends disrupting the balance of power system. Further, reactive power compensation at solar level has been inadequate so far, hence RVPN urgently needs capacitor bank units at various substations to overcome the extreme low voltage problems due to RE generation.

4. *Absence of adequate reactive compensation at DISCOMs level-* Reactive power compensation at 33kV or 11 kV level is very poor, which enables reactive power to travel to EHV systems and cause severe voltage problems. This issue can be addressed with installation of adequate capacitor banks at EHV level as well as at 33kV/11kV level.

5. *Control of Power Factor & low volatge problems-* As per the guidelines, power factor should be close to unity but must not be less than 0.95, wherever possible. In order to achieve that, installation of capacitor banks is necessary.

❖ ***Methodology adopted for calculation of requirement of Capacitor banks***

- Firstly, peak load of the FY 19-20 & 20-21 for individual grid substations was collected along with registered power factor and voltages at that instant for 33 kV level. It is noteworthy that Rajasthan being an agriculture dependent state, most of substations' peak load is registered in the month of January during Rabi season. Peak load data of FY 21-22 was incorporated later to show the continuous load growth in the region and to justify the demand of capacitor banks as proposed.

- Using the data collected, maximum MVAR drawl was calculated at that GSS; & comparing the data for last three years, it is evident that MVAR drawl is increasing per year with increasing load. Also, it is assumed that maximum MVAR drawl was at the same time at which peak load has been registered because historically, both the peak load data and maximum MVAR drawl has been registered in the month of January only.

- Further, to increase the the power factor above 0.95 and near to unity, effect of proposed shunt capacitor bank was taken into consideration to arrive at the anticipated power factor. Resultantly, power factor have improved considerably due to proposed shunt capacitor banks.

- This methodology was applied on various proposals received from the field and after due evaluation, 101 Nos. of shunt capacitor banks of 5.43 MVAR capacity were proposed to be installed and 11 Nos. of existing capacitor banks were proposed to be diverted to another location for improved power factor correction.

The Whole Time Director (WTDs) of RVPN on dated 02.07.2021 have considered the proposal and accorded administrative and financial approval for the scheme of capacitor bank installation/ re-shuffling program 2021-22 at total estimated cost of Rs. 3887.37 lacs as per following details:

S.NO.	***ZONE***	***COST OF NEW BANK INSTALLTION***	***COST OF DIVERTED CAPACITOR BANKS***	***TOTAL (RS. LACS)***
1	JAIPUR	1053.86	-	1053.86
2	AJMER	799.48	157.84	957.32
3	JODHPUR	1817.00	59.19	1876.19
	TOTAL	**3670.34**	**217.03**	**3887.37**

ESTIMATED COST OF SCHEME

The tentative estimated cost for the scheme of capacitor bank installation/ re-shuffling program 2021-22 works out to **Rs. 3887.07 lacs** as per the abstract cost estimate of the scheme.

Detailed Justification for capacitor banks under Jodhpur Zone

50 Nos. of capacitor banks have been identified to be installed at 46 Nos. of locations along with 04 Nos. of capacitor banks to be diverted from one location to another as detailed hereunder-

A) New Capacitor Banks:

S. No.	Name of Circle	No. of Bank of 5.43 MVAR	Name of GSS where Cap. Bank is required
1.	SE (T&C) JODHPUR	8	132 KV GSS S S Nagar, Bapini, Dechu, Chamu, Setrawa, Kalau, Lohawat
2.	SE (T&C) KANKANI	4	132 KV GSS Nathdau, Bana ka Bas, Bera, Hatundi
3.	SE (T&C) SIROHI	9	220 KV GSS Sayala, 132 KV GSS Reodar, Paladar, Bhadroona, Bagora, Poonasa, Daspan, Posaliya, , Swaroopganj
4.	SE (T&C) BARMER	8	220 KV GSS Dhorimanna, 132 KV GSS Sedwa, Sata, Ranasar, Sawa, Mehloo, Chouhtan, Gadra road
5.	SE (T&C) BIKANER	10	132 KV GSS Chhattargarh, 132 KV GSS Bajju, Bhamattsar, Dulchasar, Deshnok, Kitasar, Lalandesar, Mundsar, Sherera
6.	SE (T&C) JAISALMER	6	132 KV GSS Chandan, Sangarh, Jhinjhinyali, Ajasar
7.	SE(T&C), Hanumanarh	4	220 KV GSS Bhadra, 132 KV GSS Fatehgarh, TIBBI, Pallu,
8.	SE (T&C) Ratangarh	1	220 KV GSS Halasar
TOTAL		**50**	**50X5.43MVAR**

B) Diversion/Shifting of already installed Capacitor Banks:

S. No.	Diverted from	Diverted to	Capacitor Bank details	Remark
	Name of GSS	Present Existing Shunt Capacity	Name of GSS	Cap. Bank to be Diverted
1	132 KV GSS Banar (T&C Jodhpur)	2x5.43 MVAR	132 KV GSS Kirmarsariya (T&C Jodhpur)	1x5.43 MVAR BHEL Make

2	132 KV GSS Barmer (T&C Barmer)	2x5.43 MVAR	132 KV GSS Juna Meetha Khera (T&C Barmer)	1x5.43 MVAR ABB Make
3	132 KV GSS Pugal Road (T&C Bikaner)	2x5.43 MVAR	132 KV GSS RD-710 (T&C Bikaner)	1x5.43 MVAR BHEL Make
TOTAL				**3x5.43 MVAR**

Corresponding calculations have been attached as Annexure-A.

Key outcomes are mentioned as follows-

1. Jodhpur zone, due to its topology & terrain, is heavily dependent on agriculture. Coupled with scanty rainfall, irrigation become major source of water for crops and that makes the electricity a chief component of their livlihood. As such, year by year agriculture load is increasing on grid substations forcing RVPN to enhance their transformer capacities. This increased load has resulted in increased MVAR drawl which needs to be compensated by installing capacitor banks.
2. Being a renewable energy surplus area, seasonal & diurnal changes in RE generation causes changes in voltage profile of the substations which in turn causes fluctuations in the power system. These fluctuations may result into severe low voltage problems at various ends disrupting the balance of power system. Further, reactive power compensation at solar level has been inadequate so far, hence RVPN urgently needs capacitor bank units at various substations to overcome the extreme low voltage problems due to RE generation.
3. Moreover, as per recent directions of Government of Rajasthan, agriculture load is to be supplied through two block supply instead of earlier given three block supply, which has directly caused increase in load upto 1.5 times of the existing load.
4. Effect of these factors is seen on the voltage profiles of the substations where severe low voltages have been recorded and transformer tap operations need to be performed to maintain voltages near 33 kV/132 kV level.
5. In those areas, where new substations have been constructed nearby the existing ones diverting their load, capacitor banks due to redundency have been diverted to new locations. i.e. 132 kV GSS Barmer to 132 kV GSS Juna Metha Khera & 132 kV GSS Pugal to 132 kV GSS RD 710.
6. As 132 kV GSS Banar is being upgraded to 220 kV level, its 33/11 kV yard is getting dismantled. Due to this, already existing 02 Nos. of capacitor banks at Banar have been diverted to 132 kV GSS Kirmarsariya & 132 kV GSS Bana Ka Bas.

Detailed Justification for capacitor banks under Ajmer Zone

22 Nos. of capacitor banks have been identified to be installed at 22 Nos. of locations along with 08 Nos. of capacitor banks to be diverted from one location to another as detailed hereunder-

A) <u>New Capacitor Banks:</u>

S. No.	Name of Circle	No. of Bank of 5.43	Name of GSS where Cap. Bank is required

		MVAR	
1.	SE (T&C), Ajmer	3	220 KV GSS Jethana and 132 KV GSS Roopangarh & Sawar
2.	SE (T&C), Sikar	6	220 KV GSS Danta Ramgarh, Dhod & 132 KV GSS Kundan, W/W (Sanwali Road), Ranoli, Piprali
3.	SE (T&C), Merta	4	220 KV GSS Khinvsar & 132 KV GSS Heesaba, Gogelaw, Narwa.
4.	SE (T&C), Babai	1	132 KV GSS Nangli
5.	SE (T&C), Chittor	6	132 KV GSS Baroli, Begun, Dhoriya Choraha, Kanera & Mokhampur (Pratapgarh), Chhoti Sadri
6.	SE (T&C), Bhilwara	2	132 KV GSS Kotri, Beegod
TOTAL		**22**	**22X5.43MVAR**

B) Diversion/Shifting of already installed Capacitor Banks:

S.No	Diverted from		Diverted to	
	Name of GSS	Present Existing Shunt Capacity	Name of GSS	Cap. Bank to be Diverted
1.	132 KV GSS Pilani (T&C Babai)	3*5.43 MVAR	132 KV GSS Mahapalwas (T&C Babai)	1*5.43 MVAR, Make- Universal
2.	132 KV GSS Bidiyad (T&C Merta)	2*5.43 MVAR	220 KV GSS Kuchhera (T&C)	1*5.43 MVAR, Make-Shreem
3.	132 KV GSS Bagot (T&C Merta)	2*5.43 MVAR	132 KV GSS Merta Road (T&C Merta)	1*5.43 MVAR, Make-Universal
4.	220 KV GSS Hamirgarh (T&C Bhilwara)	2*5.43 MVAR	132 KV GSS Kachola (T&C Bhilwara)	1*5.43 MVAR, Make-Shreem
5.	132 KV GSS Bagidora (T&C, Chittor)	2*5.43 MVAR	132 KV GSS Dalot (T&C Chittor)	1*5.43 MVAR, Make ABB
6.	132 KV GSS Rishabhdeo (T&C, Udaipur)	2*5.43 MVAR	132 KV GSS Bhopalsagar(T&C, Chittor)	1*5.43 MVAR, Make-Universal
7.	220 KV GSS Madri	3*5.43 MVAR	220 KV GSS Sawa (T&C Chittor)	1*5.43 MVAR, Make-BHEL
8.	132 KV GSS Pratapnagar (T&C Udaipur)	3*5.43 MVAR	220 KV GSS Chittor (T&C Chittor)	1*5.43 MVAR, Make-ABB
TOTAL				**8x5.43 MVAR**

Corresponding calculations have been attached as Annexure-B.

Key outcomes are mentioned as follows-

1. Ajmer zone is a combination of Agriculture, urban & industrial load along with renewable energy inputs at few grid substations. Seasonal & diurnal changes in RE generation causes changes in voltage profile of the substations which in turn causes fluctuations in the power system. These can be ovecome by adequate compensation at places like 132 kV GSS Dalot.
2. Moreover, as per recent directions of Government of Rajasthan, agriculture load is to be supplied through two block supply instead of earlier given three block supply, which has directly caused increase in load upto 1.5 times of the existing load.
3. Effect of these factors is seen on the voltage profiles of the substations where severe low voltages have been recorded and transformer tap operations need to be performed to maintain voltages near 33 kV/132 kV level.
4. In those areas, where new substations have been constructed nearby the existing ones diverting their load, capacitor banks due to redundency have been diverted to new locations.

Detailed Justification for capacitor banks under Jaipur Zone

29 Nos. of capacitor banks have been identified to be installed at 27 Nos. of locations along as detailed hereunder-

A) New Capacitor Banks:

S. No.	Name of Circle	No. of Bank of 5.43 MVAR	Name of GSS where Cap. Bank is required
1.	SE (T&C), Kota	6	220 KV GSS Bhawanimandi, Baran and 132 KV GSS Kishanganj, Mangrol, Bapawar & Mamoni
2.	SE (T&C), Alwar	8	220 KV GSS Bansur, 132 KV GSS Govindgarh, Kherli, Laxmangarh, Ramgarh, Pinan, Thanagazi, Telco
3.	SE (T&C), Hindaun	5	132 KV GSS Nangal Sherpur, RIICO Dholpur, Bari, Marena.
4.	SE (T&C), SWM	8	220 KV GSS Gangapurcity, 132 KV GSS Bamanwas, Keshoraipatan, Bundi, Dabi, Baler, Dablana
5.	SE (T&C), Jaipur Rural	2	220 KV GSS Manoharpur, Niwana
TOTAL		**29**	**29X5.43MVAR**

Corresponding calculations have been attached as Annexure-C .

Key outcomes are mentioned as follows-

1. Jaipur zone is highly industrialized and urban centered along with vast patches of agricultural field with renewable energy inputs at few grid substations. Seasonal

& diurnal changes in RE generation causes changes in voltage profile of the substations which in turn causes fluctuations in the power system. The pace at which industrialization is taking place in Jaipur zone specially NCR forces RVPN to enhance transformer capacities at various places.

2. Moreover, as per recent directions of Government of Rajasthan, agriculture load is to be supplied through two block supply instead of earlier given three block supply, which has directly caused increase in load upto 1.5 times of the existing load.
3. Effect of these factors is seen on the voltage profiles of the substations where severe low voltages have been recorded and transformer tap operations need to be performed to maintain voltages near 33 kV/132 kV level.

REQUIREMENT OF NEW SHUNT CAPACITOR BANKS FOR THE FY 2021-22 **Annexure-C**

Name of Zone : ZCE (T&C) RVPN JAIPUR

S. No.	Name of Circle	Name of GSS	132/33 KV Transformer MVA Capacity	Approved 132/33 KV Transformer Aug. MVA Capacity	Total 132/33 KV Transformer Capacity after Augumention	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							Anticipated P.F.	Maximum recorded load FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of shunt capacitor banks after proposed	Remarks
							Max MVAR	At Maximum MVAR							Max. MVAR	Corresponding load in MW	Corresponding voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Corresponding PF	Switched on capacity of Shunt Capacitor (MVAR)				
								Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	P.F.	Swiched on capacity of Shunt Capacitor (MVAR)												
1	KOTA	220 KV GSS BHAWANIMANDI	25	25	50	0	11.46	20.22	33.8	133	219	0.87	0	0.958	12.68	19.64	33	132	203	0.84	0	0.938	5.43	1	Power factor is improving considerably after installation of 01 No. of capacitor bank.
2		220 KV GSS Baran	25		25	0	4.60	8.32	33.5	133	206	0.97	0	0.995	3.45	13.75	32.5	132	206	0.97	0	0.990	5.43	1	Looking to the future load growth in nearby Kota-Baran-Chabra area, capacitor bank is proposed.
3		132 KV GSS Kishanganj	50		50	5.43	4.78	23.54	33	129.7		0.98	5.43	1.000	13.92	38.36	33.3	129		0.94	5.43	0.976	5.43	2	With existing one capacitor bank, power factor has dropped to 0.94 in 20-21. Also, new 20/25 MVA Trf-II augmented on 08.10.2020. A new Capacitor Bank of 5.43 MVAR Required as Mostly the load is agricultural.
4		132 kV GSS RVPN, Mangrol	25		25	0	4.21	9.24	32	126		0.91	0	0.991	8.71	17.01	33.5	133		0.89	0	0.982	5.43	1	Capacitor bank is required as pf is hovering around 0.9.
5		132 KV GSS BAPAWAR	37.5		37.5	5.43	16.60	34.28	33	129.5		0.9	5.43	0.951	16.60	34.28	33	130		0.9	5.43	0.951	5.43	2	Power factor is improving considerably after installation of 01 No. of capacitor bank.
6		132KV GSS RVPN Mamoni (Baran)	50		50	5.43	6.21	24.78	33	125	-	0.97	5.43	1.000	12.96	42.22	33.9	125	-	0.96	5.43	0.984	5.43	2	The 132KV Kelwara-Mamoni Line is Radial feeder and voltage received at mamoni in the Agriculture season is low up to 112 KV and PF is also low position variable, therefore for 01 No. 33KV ,5.43 MVAR Capacitor bank must be required.
7		132 KV GSS,GOVINDGARH(ALWAR)	50		50	5.43	10.63	19.8	33	126.5		0.881	0	1.000	8.13	23.50	33.4	128		0.95	5.43	0.993	5.43	2	Due to its location in NCR and presence of high urban & industrial load, further growth is expected in future, thus proposing a new capacitor bank.

S. No.	Name of Circle	Name of GSS	132/33 KV Transformer MVA Capacity	Approved 132/33 KV Transformer Aug. MVA Capacity	Total 132/33 KV Transformer Capacity after Augumention	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							Anticipated P.F.	Maximum recorded load FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of shunt capacitor banks after proposed	Remarks
							Max MVAR	At Maximum MVAR							Max. MVAR	Corresponding load in MW	Corresponding voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Corresponding PF	Switched on capacity of Shunt Capacitor (MVAR)				
								Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	P.F.	Swiched on capacity of Shunt Capacitor (MVAR)												
8	ALWAR	132 KV GSS, RVPN, Kherli (Alwar)	75		75	10.86	11.66	46.52	32.5	132		0.97	10.86	0.991	13.89	47.62	33	130		0.96	5.43	0.998	5.43	3	Due to its location in NCR and presence of high urban & industrial load, further growth is expected in future, thus proposing a new capacitor bank.
9		132 KV GSS, Laxmangarh	100		100	16.29	22.77	69.29	32.80	130		0.95	16.29	0.970	34.43	80.83	33.2	133		0.92	0	0.988	5.43	4	Due to its location in NCR and presence of high urban & industrial load, further growth is expected in future, thus proposing a new capacitor bank.
10		132 KV GSS Ramgarh	75	25	100	16.29	20.33	61.84	33	131.5		0.95	10.86	0.988	18.18	62.33	33	128		0.96	16.3	0.980	5.43	4	1x20/25 MVA Transformer is under augumentation & will be replaced by 40/50 MVA. So Total capacity will be increased from 75 MVA to 100 MVA.
11		132 KV GSS,Pinan	50		50	5.43	15.74	36.96	132	129		0.92	5.43	0.963	15.95	37.44	128	128		0.92	5.43	0.963	5.43	2	Power factor is improving considerably after installation of 01 No. of capacitor bank.
12		132 KV GSS Thanagazi	62.5		62.5	10.86	11.37	45.37	32.5	128.8		0.97	10.86	0.992	6.85	48.04	33	132		0.99	8.15	1.000	5.43	3	Due to its location in NCR and presence of high urban & industrial load, further growth is expected in future, thus proposing a new capacitor bank.
13		132 KV TELCO CIRCLE ALWAR	25		25	0	GSS COMMERCIAL CHARGE ON DATED 20.05.2020								9.38	18.30	####			0.89	0	0.978	5.43	1	Recorded power factor is very low, hence capacitor bank is required.
14		220 KV GSS, RVPN, Bansur (Alwar)	75		75	5.43	4.87	19.44	32	128	212	0.97	5.43	1.000	5.81	23.2	32.5	130	214	0.97	5.43	1.000	5.43	2	Due to its location in NCR and presence of high urban & industrial load, further growth is expected in future, thus proposing a new capacitor bank.

S. No.	Name of Circle	Name of GSS	132/33 KV Transformer MVA Capacity	Approved 132/33 KV Transformer Aug. MVA Capacity	Total 132/33 KV Transformer Capacity after Augumention	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							Anticipated P.F.	Maximum recorded load FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of shunt capacitor banks after proposed	Remarks
							Max MVAR	At Maximum MVAR							Max. MVAR	Corresponding load in MW	Corresponding voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Corresponding PF	Switched on capacity of Shunt Capacitor (MVAR)				
								Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	P.F.	Swiched on capacity of Shunt Capacitor (MVAR)												
15	Hindaun	132 KV GSS Nangal Sherpur	50		50	5.43	7.10	34.96	33	122		0.98	0	0.994	7.15	35.22	32.5	120		0.98	5.43	0.999	5.43	2	Being an agricultural area, load growth is expected more than others, thus in future capacitor bank is required.
16		AEN(132 KV GSS) RVPN RIICO DHOLPUR	25	25	50	0	7.07	19.49	31.5	114.2		0.940	0	0.996	5.42	18.59	32.5	125		0.96	0	1.000	5.43	1	Being an industrial area, load growth is expected more than others, thus in future capacitor bank is
17		132 KV GSS RVPN BARI	25	9	34	0	9.08	19.93	33	129		0.910	0	0.996	10.34	20.19	33	122		0.890	0	1.000	10.86	1	Power factor is improving considerably after installation of 01 No. of capacitor bank.
18		132 KV GSS, Marena	25		25	5.43	6.16	14.07	33.1	118.5		0.916	0	0.949	7.42	22.58	33	123		0.95	5.43	0.996	5.43	2	Being an agricultural area, load growth is expected more than others, thus in future capacitor bank is
19	Sawai Madhopur	220 KV GSS Gangapur City	25		25	0	3.99	11	33.15	132.2	220.1	0.94	0	0.992	4.69	11.00	33.2	132	220	0.92	0	0.998	5.43	1	Being an agricultural area, load growth is expected more than others, thus in future capacitor bank is
20		132 KV GSS Bamanwas	25		25	0	3.36	7.37	33	131		0.91	0	0.963	3.36	7.37	33	131		0.91	0	0.963	5.43	1	CAPACITOR BANK REQUIRED due to power factor improvement.
21		132 KV GSS , Keshoraipatan	50		50	0	8.14	22.43	32.5	132		0.94	0	0.993	8.47	23.34	34	130		1	0	0.995	10.86	2	CAPACITOR BANK REQUIRED due to power factor improvement.
22		132 KV GSS , Bundi	75		75	10.86	29.16	64	33	132		0.91	0	0.980	26.60	67.31	33	131		0.930	10.9	0.954	5.43	3	CAPACITOR BANK REQUIRED due to power factor improvement.
23		132 KV GSS DABI	25		25	0	3.80	8.34	32.3	129		0.91	0	0.981	3.42	8.03	33.3	131		0.92	0	0.970	5.43	1	CAPACITOR BANK REQUIRED due to power factor improvement.

S. No.	Name of Circle	Name of GSS	132/33 KV Transformer MVA Capacity	Approved 132/33 KV Transformer Aug. MVA Capacity	Total 132/33 KV Transformer Capacity after Augumention	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							Anticipated P.F.	Maximum recorded load FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of shunt capacitor banks after proposed	Remarks
							Max MVAR	At Maximum MVAR							Max. MVAR	Corresponding load in MW	Corresponding voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Corresponding PF	Switched on capacity of Shunt Capacitor (MVAR)				
								Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	P.F.	Swiched on capacity of Shunt Capacitor (MVAR)												
24		132 KV GSS Baler	25		25	0	0.00	0	0	128		0	0	0.000	4.23	16.61	####	128		0.969	0	0.997	5.43	1	Due to two block supply , load is expected to increase 1.5 times.
25		132 KV GSS DABLANA	50		50	0	11.72	19.75	32.9	127.5	NA	0.86	0	0.953	11.98	20.19	32.7	128	NA	0.86	0	0.951	5.43	1	Capacitor Bank Not installed since commissining of GSS & NOW total installed capacity is 20/25MVA +20/25MVA=40/50 MVA from 04.02.2021
26	Jaipur Rural	220 KV GSS, RVPN, Manoharpur	100		100	10.86	21.86	68	33	133	212	0.952	10.86	0.972	17.21	59	33	132	211	0.960	5.43	0.994	5.43	3	01. Approx. 200 A (15MW) load in 33 KV Side 1*5.43 MVAR Capacitor bank is ON as per guidelines of capacitor wing of RVPNL 02. Presently the max. load of GSS is 59 mw & two block supply system in under process by O&M Wing which may increase the 10% load
27		220 KV GSS NIWANA	25		25	0	11.33	20	33	131	224	0.87	0	0.959	9.43	18.4	33	132	226	0.89	0	0.977	5.43	1	01 No. capacitor bank is required due to MVAR flow in power system and low power flow due to agriculture / industiral load.

REQUIREMENT OF NEW SHUNT CAPACITOR BANKS FOR THE FY 2021-22 Name of Zone : Jodhpur

Annexure-A

S No	Name of Circle	Name of GSS	MVA Capacity (As on 31.01.2021	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR) Yes or No	Qty of capacitor banks after proposed	Remarks for justification, comments & space available etc.	
					Max MVAR	At Maximum MVAR					Anticipated P.F.	Max. MVAR	At Maximum MVAR										
						Load in MW	Vol in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	PF	Swiched on capacity of Shunt Capacitor (MVAR)		Load in MW	Vol in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV	PF	Swiched on capacity of Shunt Capacitor (MVAR)				
1	SE (T&C) JODHPUR	132 KV GSS Kiramsariya	50	5.43	4.39	21.62	32.50	127.00		0.98	5.43	1.00	12.98	39.49	32.50	130.00		0.95	5.43	0.98	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN 7. POWER FACTOR IN 2021-22 IS **0.93 LAG.**	Diverted from 132 kV GSS Banar as Banar is getting upgraded into 220 & 132 kV yard is getting dismantled.
2		132 KV GSS S S NAGAR	75	0.00	22.07	38.95	32.40	129.00		0.87	NA	0.92	20.10	33.88	32.50	129.00		0.86	0.00	0.92	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN 7. POWER FACTOR IS ONLY IN 2021-22 **0.83 LAG.** **8. 01 no. diversion of cap bank from 132 KV GSS CHB Jodhpur is also pending for instalation and commissioning. 01 more required & after installation of both capacitor bank, pf will improve to 0.96.** **9. Installed capacity has been increased to 75 MVA from 50 MVA in 2022-23.**	
3		132 KV GSS BAPINI	75	5.43	7.48	36.85	32.70	131.00		0.98	5.43	1.00	17.54	32.50	32.70	117.00		0.88	0.00	0.98	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 20/25 MVA transformer has been augmented to 40/50 MVA in 2022-23. Total installed capacity is 75 MVA.**	
4		132 KV GSS DECHU	**75**	16.29	24.83	54.50	33	124		0.91	16.29	0.94	27.35	50.67	32.5	126		0.88	10.86	0.95	5.43	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 20/25 MVA transformer is to be augmented to 40/50 MVA as per plan 2021-22. Total installed capacity will increase to 100 MVA.**	
5		132 KV GSS CHAMU	100	10.86	34.63	76.00	33.00	126.00		0.91	10.86	0.95	50.38	78.00	32.60	125.00		0.84	5.43	0.92	10.86	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
6		**132 KV GSS Setrawa**	**50**	5.43	14.00	35.42	32.00	128.00		0.93	5.43	0.97	18.71	36.33	32.50	132.00		0.89	0.00	0.98	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 20/25 MVA transformer is to be augmented to 40/50 MVA as per plan 2021-22. Total installed capacity will be 75 MVA.**	

7		**132 KV GSS KALAU**	**100**	10.86	16.79	46.25	33.00	124.00		0.94	10.86	0.97	21.49	50.44	33.40	131.00		0.92	0.00	0.99	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 20/25 MVA transformer has been augmented to 40/50 MVA in 2022-23. Total installed capacity is 100 MVA.**	
8		**132 KV GSS LOHAWAT**	100	16.29	17.70	87.16	32.50	131.00		0.98	16.29	0.99	26.27	90.08	32.50	129.00		0.96	16.29	0.97	5.43	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
9		132 KV GSS NATHDAU	50	5.43	10.12	14.89	32.88	124.00		0.84	0.00	1.00	10.62	17.9	32.4	125.6		0.86	0	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. New 20/25 MVA transformer has been installed thus increasing total Capacity to 50 MVA.**	
10	SE (T&C) KANKANI	132KV GSS Bana ka Bas	50	0.00	12.57	18.01	33.81	126.00		0.82	0.00	0.93	12.06	18.67	33.24	125.40		0.84	0.00	0.94	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. Cap bank is already sanctioned under diversion programme for year 2022-23 from 132 KV GSS Banar.** **8. New 20/25 MVA transformer has been installed thus increasing total Capacity to 50 MVA.**	01 No. Diverted from 132 kV GSS Banar as Banar is getting upgraded into 220 & 132 kV yard is getting dismantled. 01 new required.
11		132KV GSS Bera	25	0.00	4.30	10.10	32.60	129.00		0.92	0.00	0.99	4.69	10.30	32.50	125.00		0.91	0.00	1.00	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. There is no cap bank installed at this GSS.**	
12		132KV GSS HATUNDI	50	10.86	13.62	28.13	32.50	128.00		0.90	2.72	1.00	17.59	32.59	32.60	126.00		0.88	2.72	0.99	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
13		132 KV GSS REODAR	75	16.29	20.45	70.13	30.00	120.60		0.96	16.29	0.98	19.30	77.02	33.00	109.00		0.97	16.29	0.98	5.43	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
14		132 KV GSS PALADAR	50	5.43	7.16	21.77	33.00	130.00		0.95	5.43	1.00	7.16	21.77	33.00	131.00		0.95	5.43	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 No. new 20/25 MVA transformer has been installed in 2021-22.**	
15		132 kv gss bhadroona	62.5	10.86	19.48	30.16	32.00	130.00		0.84	0.00	0.99	14.37	39.59	32.00	130.00		0.94	10.86	0.98	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	

16	SE (T&C) SIROHI	132 KV GSS BAGORA	75	16.29	18.65	56.74	33.00	120.00		0.95	16.29	0.97	26.60	49.28	33.00	118.00		0.88	5.43	0.98	5.43	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
17		132KV GSS POONASA	75	10.86	18.25	40.05	33.00	129.00		0.91	10.86	0.95	23.23	54.53	33.00	125.00		0.92	10.86	0.95	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
18		132 KV GSS Daspan	50	10.86	14.82	40.84	32.50	126.00		0.94	5.43	1.00	17.74	38.68	32.50	127.00		0.91	5.43	0.98	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. 40/50 MVA transformer is to be augmented in place of 20/25MVA as such total capacity will be 75 MVA.**	
19		132 KV GSS POSALIYA	50	5.43	9.51	26.21	33.00	124.00		0.94	0.00	0.99	9.51	26.21	33.00	124.00		0.94	0.00	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer has been commissioned in 2021-22. Total capacity is 50 MVA.**	
20		220 KV GSS SAYALA	50	5.43	17.4	27.28	33	133	223	0.8	5.43	0.92	17.43	28.86	33	133	209	0.856	0.00	0.98	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
21		132 KV GSS SWAROOPGANJ	25	0	6.08	15.59	33.3	118.3		0.9	0	1.00	8.66	17.89	33.4	120.8		0.9	0	0.98	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
22		220 KV GSS DHORIMANNA	75	10.86	6.34	44.47	33.00	133.00	218.00	0.99	10.86	1.00	15.51	53.17	33.00	134.00	225.00	0.96	10.86	0.98	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is proposed in 2022-23 plan thus by increasing total capacity to 100 MVA**	
23		132 KV GSS SEDWA	50	5.43	9.59	38.28	32.00	122.00		0.97	5.43	0.99	15.13	38.27	33.00	119.00		0.93	5.43	0.97	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
24		132 KV GSS SATA	37.5	5.43	9.97	30.33	32.00	124.00		0.95	5.43	0.99	10.66	29.38	32.00	120.00		0.94	5.43	0.98	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	

25		132 KV GSS RANASAR	37.5	5.43	6.20	24.73	32.00	125.00		0.97	4.07	1.00	8.86	26.96	32.00	123.00		0.95	4.07	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
26	SE (T&C) BARMER	132KV GSS Juna Meetha Khera	25	5.43	2.88	20.19	33.10	128.00		0.99	5.43	0.99	4.25	20.92	33.60	130.00		0.98	5.43	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is proposed in 2022-23 plan thus by increasing total capacity to 50 MVA.**	Diverted from 132 kV GSS Barmer
27		132 KV GSS SAWA	50	10.86	10.84	43.24	33.00	126.00		0.97	10.86	0.99	13.21	40.18	33.00	127.00		0.95	10.86	0.98	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
28		132 KV GSS MEHLOO	37.5	5.43	6.57	32.37	32.00	133.00		0.98	5.43	1.00	9.35	32.04	33.00	131.00		0.96	5.43	0.99	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is proposed in 2022-23 plan thus by increasing total capacity to 50 MVA.**	
29		132 KV GSS CHOUHTAN	25	0.00	7.34	15.16	32.00	124.00		0.90	0.00	0.99	10.76	16.01	32.00	126.00		0.83	0.00	0.95	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is proposed in 2022-23 plan thus by increasing total capacity to 50 MVA.**	
30		132 KV GSS Gadra road	50	5.43	3.01	21.11	33.00	136.00		0.99	5.43	0.99	5.73	28.23	33.00	136.00		0.98	5.43	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
31		132 KV GSS BAJJU	75	0.00	16.03	37.64	32.50	126.00		0.92	0.00	0.96	17.76	41.70	32.50	120.00		0.92	0.00	0.96	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. 40/50 MVA tfr. has been augmented in place of 20/25MVA thus increasing the capacity to 75MVA.**	
32		132 KV GSS Bhamattsar	25	0.00	8.64	16.00	32.40	126.00		0.88	0.00	0.98	10.67	13.75	33.50	124.00		0.79	0.00	0.93	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25MVA transformer is proposed as the present transformer is overloaded .**	

33		220 KV GSS Chhattargarh	50	0.00	12.78	24.95	33.00	119.00		0.89	0.00	1.00	14.47	24.38	32.50	108.00		0.86	0.00	0.99	10.86	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
34		132 KV GSS DULCHASAR	75	10.86	21.61	50.72	33.00	122.00		0.92	10.86	0.95	24.56	50.70	32.00	120.00		0.90	10.86	0.94	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
35	SE (T&C) BIKANER	132 KV GSS DESHNOK	75	10.86	27.28	64.04	32.00	119.00		0.92	10.86	0.95	27.46	60.27	32.00	119.00		0.91	10.86	0.94	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
36		132KV GSS KITASAR	50	5.43	12.72	16.96	33.00	124.00		0.80	0.00	0.99	12.10	17.34	33.00	123.00		0.82	0.00	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
37		132 KV GSS LALAMDESAR	50	10.86	6.41	31.59	33.50	131.00		0.98	10.86	1.00	16.61	25.71	33.00	130.00		0.84	0.00	0.92	5.43	3	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
38		132 KV GSS MUNDSAR	25	5.43	10.80	18.20	33.00	129.00		0.86	5.43	0.96	6.75	20.53	33.00	127.00		0.95	5.43	1.00	5.43	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is sanctioned in plan 2021-22**	
39		132KV GSS RD710	25	0.00	2.94	7.44	32.70	132.00		0.93		0.95	3.13	12.48	32.70	132.00		0.97		0.98	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	Diverted from 132 kV GSS Pugal
40		132KV GSS SHERERA	50	5.43	5.74	22.89	125.00	128.00		0.97	5.43	1.00	8.55	13.24	130.00	125.00		0.84	5.43	0.97	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
41		132 KV GSS CHANDAN	100	10.86	37.66	73.50	118.30	118.30		0.89	10.86	0.94	40.16	74.40	116.60	116.60		0.88	10.86	0.93	10.86	4	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. 40/50 MVA transformer is under augmentation in place of 20/25 MVA thus increasing the total capacity to 125 MVA.**	

42	SE (T&C) JAISALMER	132 KV GSS SANGARH	50	0.00	24.25	33.49	33.20	128.00		0.81		0.93	29.05	40.12	33.20	126.00		0.81		0.91	10.86	2	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 75 MVA.**	
43		132 KV GSS JHINJHINYALI	25	0.00	0.00	0.00	0.00	0.00		0.00		0.00	16.47	22.75	32.20	118.00		0.81		0.90	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 50 MVA.**	
44		132 KV GSS Ajasar	25	0.00	11.04	16.42	31.50	119.00		0.83		0.95	11.50	17.11	31.50	119.00		0.83	0.00	0.94	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 50 MVA.**	
45	SE(T&C), Hanumanarh	132 KV GSS Fatehgarh	25	0.00	5.13	8.28	33.00	131.80		0.85		1.00	8.26	15.30	32.50	130.00		0.88		0.98	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
46		132 KV GSS TIBBI	25	0.00	0.00	0.00	0.00	0.00		0.00		0.00	9.88	19.28	33.30	130.90		0.89		0.97	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 50 MVA.**	
47		132 KV GSS Pallu	25	0.00	9.63	17.00	32.50	132.00		0.87		0.97	10.65	18.80	33.30	134.00		0.87		0.96	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 75 MVA.**	
48		220 KV GSS Bhadra	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	4.08	14.00	33.78	133.00	210.00	0.96		1.00	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN	
49	SE (T&C) Ratangarh	220 KV GSS HALASAR	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	11.78	23.00	32.90	137.00	239.00	0.89		0.96	5.43	1	1. PURELY AGRICULTURE LOAD AREA 2. CAP BANK PROPOSED AS PER 2 BLOCK SUPPLY INSTEAD OF 3 BLOCK 3. AS PER TWO BLOCK SUPPLY, LOAD IS ALMOST 1.5 TIMES OF THIS MAX. LOAD OF 3 BLOCK 4. DISCOM WILL RELEASE MORE AG-CONNECTIONS IN PRESENT AND COMING YEARS AND LOAD IS BOUND TO INCREASE 5. GROUNG WATER DEPLETION- LEVELS GOING DOWN INTURN INCREASING UN AUTHORISED LOAD OF MOTORS. 6. COMMISSIONING OF THIS PROPOSED CAP BANK WILL TAKE ALMOST 1 TO 1.5 YEARS, LOAD WILL INCREASE BY THEN **7. 01 no. new 20/25 MVA transformer is to be installed as per plan thus making total capacity to 75 MVA.**	

REVISED REQUIREMENT OF NEW SHUNT CAPACITOR BANKS FOR THE FY 2021-22

Name of Zone : Ajmer Zone

Annexure-B

S.No.	Name of Circle	Name of GSS	MVA Capacity (As on 31.01.2021	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20							Anticipated P.F.	FY 2020-21							Anticipated P.F.	Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of Capacitor banks after proposed	Remarks / Justification
					At Maximum MVAR																		
						Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	PF	Switched on capacity of Shunt Capacitor (MVAR)			Corresponding load in MW	Corresponding load in KV	Corresponding P.F.	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Switched on capacity of Shunt Capacitor (MVAR)				
1	SE (T&C) AJMER	132KV GSS, SAWAR	25	0	4.74	16.71	32.80	131.70	NA	0.96	0.00	1.00	7.16	15.43	32.70	0.91	131.50	NA	0.00	0.99	5.43	1	Power factor in FY 2020-21 has been recorded low i.e. 0.91. Thus for impromevemt of power factor & looking to the future industrial load growth, 5.43 MVAR has been proposed.
2		220 KV GSS Jethana	25	0	8.76	20.56	32.50	133.60	221.60	0.92	0.00	0.99	9.28	21.78	32.70	0.92	131.40	212.30	0.00	0.98	5.43	1	Power factor in FY 2020-21 has been recorded low i.e. 0.92. Thus for impromevemt of power factor & looking to the future industrial load growth, 5.43 MVAR has been proposed.
3		132KV GSS Roopangarh	75	10.86	9.47	37.77	33.00	131.00	NA	0.97	10.86	0.99	10.70	42.68	33.00	0.97	131.00	NA	10.86	0.99	5.43	3	Due to presence of industries near Roopangarh area, inductive load growth has been expected, thus recommending 5.43 MVAR capacitor bank.
4	SE(T&C) BABAI	132KV GSS MAHAPALWAS	50	5.43	14.40	29.74	33.30	130.50	NA	0.90	5.43	0.96	11.86	30.02	32.80	0.93	131.70	NA	5.43	0.98	5.43	2	Agriculture load increasing day by day as area converted from Dark Zone to Normal. Installing 5.43 MVAR will improve power factor considerably.
5		132KV GSS Nangali	50	10.86	6.57	26.22	32.92	131.80	NA	0.97	10.86	1.00	12.91	30.30	32.86	0.92	130.50	NA	5.43	0.998	5.43	3	For improving power factor near to 1 & compensation of 7.5 MVAR is also required.
6	SE(T&C) MERTA	220 KV GSS Khinvsar	100	16.29	26.80	67.81	33.60	126.80	206.20	0.93	14.93	0.96	27.66	69.98	32.60	0.93	127.00	204.80	14.93	0.96	5.43	4	High fertile land, Agriculture inductive load and industrial area is developing, hence for compensation of MVAR, more Bank is required. 1.36 MVAR is presently under outage, which will be rectified soon.
7		132 KV GSS HEESABA	100	10.86	36.76	56.00	33.00	130.00	NA	0.84	0.00	0.94	38.64	75.43	33.00	0.89	128.00	NA	10.86	0.92	5.43	3	The Khinvsar-Heesaba-Narwa region has tendency of increasing agriculture load exponentially due to fertile land. One capacitor bank has been proposed at each GSS i.e Khinvsar, Heesaba & Narwa. Due to nearby vicinity, installation of capacitor banks at Khinvsar & Narwa will definitely have an impact on Heesaba increasing its power factor. Thus only 1 capacitor bank has been proposed at Heesaba.
8		220 KV GSS Kuchera	25	0	9.74	15.08	32.80	131.00	209.00	0.84	0.00	0.96	9.17	18.93	32.10	0.90	117.00	207.00	0	0.98	5.43	1	Since commissioning of GSS i.e. dated 30/12/2015, Capacitor Bank not provided & Augmentation of 20/25 MVA Trf. Proposed in 2022-23, looking to inductive load in the area Capacitor Banks is Required.
9		132KV GSS Merta Road	75	10.86	18.54	43.51	33.30	131.00	NA	0.92	10.86	0.96	28.83	44.63	32.90	0.84	130.00	NA	0.00	0.96	5.43	3	Power factor will improve considerably after installation of capacitor bank.
10		132KV GSS GOGELAW	25	0	7.86	19.14	33.00	132.00	NA	0.93	0.00	0.99	8.03	20.31	33.00	0.93	131.00	NA	0.00	0.99	5.43	1	Since commissioning of GSS i.e. dated 18/07/2018, Capacitor Bank not provided & Augmentation of 20/25 MVA Trf. Proposed in 2022-23 & also 3 Nos. of industrial feeders proposed in 2022-23 looking to inductive load in the area Capacitor Banks is Required.
11		132KV GSS Narwa	75	10.86	13.48	41.00	32.50	129.00	NA	0.95	10.86	0.98	13.45	40.91	32.00	0.95	127.00	NA	10.86	0.98	5.43	3	Installed capacity has been increased to 75 MVA in FY 2021-22, thus this GSS will more draw more MVAR in coming time. Hence, despite 0.95 pf, new capacitor bank has been proposed.
12	SE(T&C) SIKAR	220KV GSS DANTARAMGARH	75	10.00	11.59	39.73	33.00	131.00	214.70	0.96	10.00	0.99	14.50	36.70	33.50	0.93	131.00	220.30	10.00	0.97	5.43	3	1 no. new fdr. For PHED proposed in 2022-23, hence looking to increasing load Capacitor Bank is required
13		220KV GSS Dhod	100	16.29	7.77	47.69	131.00	132.80	NA	0.99	10.86	1.00	17.07	46.62	33.20	0.94	132.40	214.00	10.86	0.99	5.43	4	Load is expected to increase exponentially in the Dhod-Kudan area in coming times, hence 1 No. of capacitor bank has been proposed.
14		132 KV GSS RVPN KUDAN	50	10.86	20.56	29.45	33.00	129.60	NA	0.82	0.00	0.99	10.96	33.36	32.50	0.95	131.30	NA	10.86	0.99	5.43	3	Load is expected to increase exponentially in the Dhod-Kudan area in coming times, hence 1 No. of capacitor bank has been proposed.
15		132 KV GSS, Ranoli	50	10.86	20.40	32.92	33.00	130.00	NA	0.85	0.00	0.99	11.25	34.22	32.50	0.95	130.00	NA	10.86	0.99	5.43	3	25 MVA Trf. Upgradation to 50 MVA Trf. is sanction in 2022-23, there will be total 75 MVA Capacity in Future, looking to increasing load Capacitor Bank is required.
16		132 KV GSS, Water Works, Sikar	75	0	6.54	19.88	32.70	129.80	NA	0.95	0.00	1.00	13.75	30.19	32.50	0.91	131.8	NA	0	0.96	5.43	1	Since commissioning of GSS i.e. dated 31/03/2017, Capacitor Bank not provided, looking to inductive load in the area Capacitor Banks is Required for improvement of pf from 0.91 to 0.96.
17		132KV GSS Piprali	75	10.86	20.42	36.04	32.50	128.10	NA	0.87	0.00	0.99	8.75	34.91	33.30	0.97	129.00	NA	10.86	1.00	5.43	3	For future agriculture & industrial load growth, capacitor bank is needed.
18		132 KV GSS KOTRI	25	0	11.73	18.93	32.80	130.80	NA	0.85	0.00	0.95	9.68	16.31	33.00	0.86	130.00	NA	0	0.97	5.43	1	Since commissioning of GSS in 2019, Capacitor Bank not provided also Augmentation of 25 MVA trf is under progress hence Cap.Bank is required for improving the pf.

REVISED REQUIREMENT OF NEW SHUNT CAPACITOR BANKS FOR THE FY 2021-22

Name of Zone : Ajmer Zone

Annexure-B

S.No.	Name of Circle	Name of GSS	MVA Capacity (As on 31.01.2021	Installed Shunt Capacitor Capacity (MVAR) (As on 31.01.21)	FY 2019-20								FY 2020-21								Shunt Capacitor proposed for financial year 2021-22 (MVAR)	Qty of Capacitor banks after proposed	Remarks / Justification
					At Maximum MVAR																		
						Load in MW	Voltage in kV	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	PF	Switched on capacity of Shunt Capacitor (MVAR)	Anticipated P.F.		Corresponding load in MW	Corresponding load in KV	Corresponding P.F.	Corresponding Voltage at 132 kV level	Corresponding Voltage at 220 kV level (For 220 kV GSS)	Switched on capacity of Shunt Capacitor (MVAR)	Anticipated P.F.			
19	SE (T&C) BHILWARA	132 KV GSS RVPN KACHHOLA	25	5.43	**5.08**	21.02	32.80	128.70	NA	0.97	5.43	1.00	**16.20**	23.56	32.80	0.82	129.60	NA	5.43	0.91	**5.43**	**2**	Power factor in FY 2020-21 has been recorded low i.e. 0.82. Thus for impromevemt of power factor & looking to the future industrial load growth, 5.43 MVAR has been proposed.Also, Augmentation of 25 MVA trf and 6 nos. outgoing feeder is under progress hence Cap.Bank is required.
20		132KV GSS Beegod	50	5.43	**8.81**	23.85	32.60	131.10	NA	0.94	5.43	0.99	**8.25**	22.72	32.90	0.94	125.50	NA	5.43	0.99	**5.43**	**2**	Complete agriculture load and MVAR is too high during peak time hence Cap.Bank is required.
21	SE(T&C) CHITTOR	220 KV GSS CHITTORGARH	75	10.86	**11.16**	26.20	33.30	130.00	207.00	0.92	10.86	0.98	**9.70**	38.70	33.00	0.97	130.00	206.00	10.86	0.99	**5.43**	**3**	For future agriculture & industrial load growth, capacitor bank is needed.
22		132 KV GSS BEGUN	75	10.86	**18.23**	50.23	33.00	126.00	NA	0.94	10.86	0.97	**21.05**	58.00	33.00	0.94	125.00	NA	10.86	0.97	**5.43**	**3**	Complete agriculture load and 3 nos. bays under progress hence Cap.Bank is required to improve pf from 0.94 to 0.97.
23		132 KV GSS BAROLI	37.5	5.43	**6.18**	21.18	32.50	130.00	NA	0.96	5.43	1.00	**5.99**	20.53	32.50	0.96	130.00	NA	5.43	1.00	**5.43**	**2**	For future agriculture & industrial load growth, capacitor bank is needed.
24		220 KV GSS SAWA	37.5	5.43	**4.59**	15.74	32.80	130.20	218.60	0.96	5.43	1.00	**8.22**	22.66	32.90	0.94	130.50	215.60	5.43	0.99	**5.43**	**2**	For future agriculture & industrial load growth, capacitor bank is needed.
25		132 KV GSS Dhoriya choraha	25	0	**9.12**	13.57	32.50	132.50	NA	0.83	0.00	0.96	**10.42**	20.33	33.30	0.89	131.00	NA	0.00	0.97	**5.43**	**1**	Since commissioning of GSS in 2018, Capacitor Bank not provided also Augmentation of 25 MVA trf is under progress hence Cap.Bank is required.
26		132 KV GSS Bhopalsagar	25	0	**8.63**	14.54	33.00	130.00	NA	0.86	0.00	0.98	**8.66**	14.60	32.90	0.86	131.00	NA	0.00	0.98	**5.43**	**1**	Since commissioning of GSS in 2018, Capacitor Bank not provided also 1 no. outgoing feeder is under progress hence Cap.Bank is required.
27		132 KV GSS KANERA	25	0	**8.61**	13.33	32.60	129.20	NA	0.84	0.00	0.97	**9.33**	14.44	33.00	0.84	122.90	NA	0.00	0.97	**5.43**	**1**	Since commissioning of GSS in 2017, Capacitor Bank not provided hence for improving power factor Cap.Bank is required.
28		132 KV GSS Mokhampura	37.5	0	**13.71**	17.26	31.30	129.40	NA	0.78	0.00	0.90	**16.07**	26.15	31.42	0.85	128.20	NA	0.00	0.93	**5.43**	**1**	Since commissioning of GSS in 2017, Capacitor Bank not provided hence for improving power factor Cap.Bank is required.
29		132 KV GSS Dalot	75	5.43	**26.66**	38.20	32.70	128.60	NA	0.82	0.00	0.92	**31.60**	47.02	31.25	0.83	125.00	NA	5.43	0.87	**5.43**	**2**	Due to wind power generation p.f. is not maintained hence Cap.Bank is required.
30		132KV GSS Chhoti Sadri	50	10.86	**8.55**	23.56	33.00	132.50	NA	0.94	5.43	1.00	**8.40**	28.80	32.20	0.96	127.90	NA	10.86	0.99	**5.43**	**3**	Augmentation of 25 MVA trf and 3 nos. outgoing feeder is under progress hence Cap.Bank is required.

Annexure v

Status of replacement of Porcelain insulators with Polymer insulators												
S.No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks *(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)*
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												

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

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

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

Annexure VI

Action plan for cleaning of conventional Insulators in polluted stretches_POWERGRID NR-1	2022-23
	23.11.2022

Sr No.	Name of the line	Name of TL Group	Nos. of Locations proposed for cleaning	Nos. of Porcelain Insulator strings to be cleaned (in Nos)	Departmantly/ contract basis.	No. of Days of Outage Required	Tentative Start Date	Tentative Finish Date	Remarks
1	400 KV Bassi-Phagi-I	Bassi	37	222	Departmantly				Insulator washing/ claeaning completed during SD on dt 18.11.2022
2	400 KV Bassi-Phagi-II	Bassi	37	222	Departmantly				Insulator washing/ claeaning completed during SD on dt 22.11.2022
3	765 kV Gwalior-Phagi I	Bassi	9	27	Departmantly	1	15.12.2022	15.12.2022	Will be done during opportunity Shut down for NHAI Diversion work
	765 kV Gwalior-Phagi I	Jaipur	9	14	Departmantly	1	15.12.2022	15.12.2022	Will be done during opportunity Shut down for NHAI Diversion work
4	765 kV Gwalior-Phagi II	Jaipur	16	64	Departmantly	2	06.12.2022	07.12.2022	Cleaning/ washing shall be done in Dec-22
	765 kV Gwalior-Phagi II	Bassi	16	64	Departmantly	2	06.12.2022	07.12.2022	Cleaning/ washing shall be done in Dec-22
5	765 kV Phagi-Bhiwani I	Jaipur	55	20	Departmantly				Not required since there is no bird in this line area
	765 kV Phagi-Bhiwani I	Bhiwani	52	20	Departmantly	2	11.11.2022	12.11.2022	Cleaning/ washing shall be done in Dec-22
	765 kV Phagi-Bhiwani I	Sikar	44	132	Departmantly	2	11.11.2022	12.11.2022	Cleaning/ washing shall be done in Dec-22
6	400 kV Agra-Sikar I	Sikar	34	102	Departmantly	2	14.11.2022	16.11.2022	Cleaning completed in Jul & Aug-22 Cleaning/ washing shall be done in Nov-22
7	400 kV Agra-Sikar II	Sikar	34	102	Departmantly	2	17.11.2022	17.11.2022	Cleaning completed in Jul & Aug-22 Cleaning/ washing shall be done in Nov-22
8	400 kV Agra-Sikar I	Neemrana	23	552	Departmantly	2	14.11.2022	16.11.2022	Not required since there is no pollution in this area
9	400 kV Agra-Sikar II	Neemrana	27	648	Departmantly	2	17.11.2022	17.11.2022	Not required since there is no pollution in this area
10	400 kV Sikar-Ratangarh I	Sikar	18	54	Departmantly				Cleaning completed in Sept-22
11	400 kV Sikar -Ratangarh II	Sikar	18	54	Departmantly				Cleaning completed in Sept-22
12	400 kV Babai-Sikar-I	Sikar	17	51	Departmantly				Cleaning completed in Oct-22
13	400 KV NEEMRANA-BABAI-I	Neemrana	13	39	Departmantly	1	16.12.2022	16.12.2022	Cleaning/ washing shall be done in Dec-22
14	400 kV Nimrana-Sikar-II	Sikar	17	51	Departmantly				Cleaning completed in Oct-22
15	400 kV Sikar-Bassi I	Sikar	12	36	Departmantly				Cleaning completed in Oct-22
16	400 kV Sikar-Bassi II	Sikar	12	36	Departmantly				Cleaning completed in Oct-22
17	400 kV Sikar-Bassi I	Bassi	26	78	Departmantly				Cleaning completed in Oct-22
18	400 kV Sikar-Bassi II	Bassi	26	78	Departmantly				Cleaning completed in Oct-22
19	765 kV Koteshwar-Meerut-I	Roorkee	51	285	Contract basis	4	05.12.2022	08.12.2022	Proposal has been initated vide E office no 545745
20	765 kV Koteshwar-Meerut-II	Roorkee	50	275	Contract basis	4	09.12.2022	12.12.2022	
21	400 kV Dehradun-Bagpat TL	Roorkee	50	280	Contract basis	2	13.12.2022	14.12.2022	
22	400 kV Dehradun-Roorkee TL	Roorkee	30	151	Contract basis	1	15.12.2022	15.12.2022	
23	400 kV Saharanpur-Bagpat TL	Roorkee	40	211	Contract basis	2	16.12.2022	17.12.2022	

24	400 kV S/C Hisar-Bhiwadi line-I	Hisar	2	2	Departmantly	1	15.12.2022	16.12.2022	shall be done during SD for Stringing of 400 kV D/C Mahendragarh-Bhiwani TL at Loc.39/0-40/0
25	220 kV D/C Hisar-Hisar IA I&II	Hisar	1	1	Departmantly				Cleaning completed on 08.09.2022

Note: In addition to above line insulator cleaning also carried out in following lines

26	500KV HVDC Balia- Bhiwadi Pole-1	Bhiwadi			Departmantly				Cleaning/washing of insulators completed in Sept-22 during opportunity SD
		Ballabhgarh			Departmantly				Cleaning/washing of insulators completed in Sept-22 during opportunity SD
27	500KV HVDC Balia- Bhiwadi Pole-2	Bhiwadi			Departmantly				Cleaning/washing of insulators completed in Sept-22 during opportunity SD
		Ballabhgarh			Departmantly				Cleaning/washing of insulators completed in Sept-22 during opportunity SD
28	500KV HVDC Rihand- Dadri Pole-1	Dadri			Departmantly				Cleaning/washing of insulators completed in NOV-22 during opportunity SD
29	500KV HVDC Rihand- Dadri Pole-2	Dadri			Departmantly				Cleaning/washing of insulators completed in NOV -22 during opportunity SD

Updated Status of Replacement of Porcelain Insulators with Polymer Insulators in Transmission lines of Power Grid, NR-1, Delhi

A) Planning for Insulator Replacement as on date 23.11.2022

Sl.No.	Name of Line/voltage/S/C or D/C	Name of TL Group	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for replacement despite completion in any year)		Insulators to be replaced by Polymer (Target for Present year)		Progress (Work already completed wrt present year target)		Progress (Work already completed wrt total line)		Schedule for completion of Replacement		Remarks
				Total Length of line (in km)	Total Towers location (Nos)		Total Towers location		Total Towers location		Total Towers location		Total Towers location				
					Susp. Tower (Nos)	Tension Tower (Nos)	Susp. Tower (Nos)	Tension Tower (Nos)	Susp. Tower (Nos)	Tension Tower (Nos)	Susp. Tower (Nos)	Tension Tower (Nos)	Susp. Tower (Nos)	Tension Tower (Nos)	Start Date	End Date	
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	GWALIOR-PHAGI I	Jaipur	765 kV	306.2	1416	424	1416	424	0	0	0	0	1416	424			No procelain Insulator in these line under Jaipur South TLM jurisdiction.
2	GWALIOR-PHAGI I & II	Jaipur	765 kV		1242	345	1242	345	0	0	0	0	1242	345			
3	GWALIOR-PHAGI II	Jaipur	765 kV	311.3	1587	345	1587	345	0	0	0	0	1587	345			
4	PHAGI-BHIWANI I	Sikar	765 kV	271.6	352	84	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone & shall be remained under observation. Cleaning is scheduled in Dec'22
5	PHAGI-BHIWANI II	Sikar	765 kV	278.0	352	84	0	0	0	0	0	0	0	0			
6	AGRA-JAIPUR(S)- I	Bassi	400	254.4	297	113	297	113	0	113	84	0	297	0			Suspension Insulators replaced with polymer. However tension insulator are kept under observation, since there is no history of tripping due to pollution in tension insulators.
7	AGRA-JAIPUR(S)- II	Bassi	400	254.4	297	113	297	113	0	113	84	0	381	0			
8	AGRA-SIKAR-I	Sikar	400	385.8	243	81	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone. Cleaning already done in Aug'22. Further in the upcoming S/D again cleaning is scheduled in Nov'22.
9	AGRA-SIKAR-II	Sikar	400	393.9	568	223	0	0	0	0	0	0	0	0			
10	AGRA-SIKAR-I	Neemrana	400	385.8	152	72	152	72	0	22	152	50	152	50			at present these 22 nos is under observation and replacement will be carried out as per need. However cleaning will be done if any insulator found polluted.
11	AGRA-SIKAR-II	Neemrana	400	385.8	152	72	152	72	0	22	152	50	152	50			
12	BASSI-PHAGI-I	Bassi	400	48.0	355	127	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone and shall be kept under observation Cleaning is Completed in Nov'22
13	BASSI-PHAGI-II	Bassi	400	48.0	355	127	0	0	0	0	0	0	0	0			
14	SIKAR-BASSI I	Sikar	400	170.0	91	30	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone and shall be kept under observation Cleaning is completed in Oct'22
15	SIKAR-BASSI II	Sikar	400	170.0	91	30	0	0	0	0	0	0	0	0			
16	MEERUT-KOTESHWER-I	Meerut	765	178.7	137	34	137	34	0	0	0	0	137	34			Completed
17	MEERUT-KOTESHWER-II	Meerut	765	175.6	141	29	141	29	28	4	0	0	113	25			Replacement not required as no pollution zone and shall be kept under observation
18	MEERUT-KOTESHWER-I	Roorkee	765	178.7	78	103	78	18	0	18	0	0	78	0			Replacement not required as no pollution zone and shall be kept under observation
19	MEERUT-KOTESHWER-II	Roorkee	765	175.6	86	92	78	24.5	0	24.5	0	0	78	0			
20	MEERUT-KOTESHWER-I	Koteshwar	765	178.7	14	90	14	25	6	17	0	0	8	8			Replacement not required as no pollution zone and shall be kept under observation
21	MEERUT-KOTESHWER-II	Koteshwar	765	175.6	7	93	7	38	7	32	0	0	0	6			
22	NIMRANA-BABAI	Neemrana	400	85.3	115	35	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone and shall be kept under observation
23	BABAI-SIKAR-I	Sikar	400	95.2	220	103	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone and shall be kept under observation Cleaning is completed in Oct'22
24	NIMRANA-SIKAR-II	Sikar	400	175.9	220	103	0	0	0	0	0	0	0	0			
25	SIKAR-Ratangarh I	Sikar	400	76.4	150	60	0	0	0	0	0	0	0	0			Replacement not required as no pollution zone and shall be kept under observation Cleaning completed in Sept'22
26	SIKAR-Ratangarh II	Sikar	400	76.4	150	60	0	0	0	0	0	0	0	0			
27	Bagpat-Dehradun	Roorkee	400	164.0	258	97	114	48	114	48	0	0	0	0			Cleaning done under observation

28	Roorki-Dehradun	Roorkee	400	79.5	56	14	56	14	56	14	0	0	0	0		Cleaning done under observation
29	500 kV HVDC B-B P1 (Under Ballabgarh TL jurisdiction)	Ballabgarh	500kV	128.0	276	70	276	70	0	0	276	0	276	0		Suspension Insulators replaced with polymer. However tension insulator are kept under observation, since there is no history of tripping due to pollution in tension insulators.Cleaning completed in Sept-22
30	500 kV HVDC B-B P2 (Under Ballabgarh TL jurisdiction)		500kV	128.0	276	70	276	70	0	0	276	0	276	0		

Status of replacement of Porcelain insulators with Polymer insulators in POWERGRID, NR-2 (as on 09.11.2022) **Annexure-B.II**

S.No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks *(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)*
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	13
1	400kV Banala-Parbati-3 and 400kV Banala - Hamirpur TL simultaneously	400	2.252	7	0	7	7	0	0	01.12.2022	04.12.2022	Only pilot string of both multicircuit towers to be replaced on alternate day basis
2	400kV Banala-Koldam and 400kV Banala-Amritsar TL simultaneously	400	0.845	3	0	3	3	0	0	01.12.2022	04.12.2022	
3	400kV Banala-Nalagarh TL	400	48.078	4	0	4	4	0	0	05.12.2022	08.12.2022	
4	400kV Banala-Parbati-2 TL	400	0.814	4	0	4	4	0	0	05.12.2022	08.12.2022	
5	400kV Banala-Parbati-3	400	2.252	7	0	7	7	0	0	05.12.2022	12.12.2022	
6	400kV Sainj-Parbati-3	400	2.252	7	0	7	7	0	0	05.12.2022	12.12.2022	
7	400kV Banala Amritsar TL	400	251.000	728		20	20	0	671	21.12.2022	30.12.2022	46 nos towers Pilot strings to be replaced.
8	400kV Banala Hamirpur TL	400	75.247			28	28	0		21.12.2022	30.12.2022	
9	400kV Hamirpur Jalandhar TL	400	137.700			6	6	0		26.12.2022	30.12.2022	
10	400 KV Banala-Amritsar TL LILO at Hamirpur	400	Incld in S No. 8			3	3	0		28-12-2022	30-12-2022	02 nos towers Pilot strings to be replaced.
				760		**89**	**89**	**0**	671			

Status of replacement of Porcelain insulators with Polymer insulators in POWERGRID, NR-3 (as on 09.11.2022) Annexure-B.II

S. No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks *(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)*
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1	400kV Allahabad – Fatehpur 1 & 2	400	139.73	86	294	58	58	0	0	21.11.22	30.11.22	LILO portion is planned Loc No - 1-58
2	400kV Fatehpur - Mainpuri 1 & 2	400	260.05	133	476	53	53	0	0	21.11.22	30.11.22	LILO portion is planned Loc No - 1-53
3	765kV Gaya Ballia	765	70.656	80	116	16	16	0	0	Jan'23	Jan'23	
4	400kV Singrauli Allahabad 1	400	225.28	188	425							
5	400kV S/C Kanpur Agra	400	234.21	135	512	5	5	0	0	March'23	March'23	

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

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

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

Detail of lines having Porcelain Insulator in Himachal Pradesh along with Cleaning Status

SI. No.	Name of Transmission Line	Owner Name	Cleaning Status	Plan for replacing the Porcelain Insulators with Polymer Insulator
1	220 kV D/C Hatkoti to Gumma Transmission Line-26 Km	HPPTCL (STU-HP)	Nil.	No
2	400kV D/C LILO of Jhakri-Panchkula at Gumma-3 Km	HPPTCL (STU-HP)	Nil.	
3	220 kV D/C D/C Sunda to Hatkoti Transmission Line-23 Km	HPPTCL (STU-HP)	Nil.	
4	220 kV D/C Kashang to Bhaba Transmission Line-39 Km	HPPTCL (STU-HP)	Nil.	
5	220 kV S/C Khodri to Majri Transmission Line- 70 Km	HPPTCL (STU-HP)	Nil.	
6	220 kV D/C Line on 400 kV towers from PGCIL Reru to 220/66 kV Substation at Upperla Nangal -3.3 Km	HPPTCL (STU-HP)	Nil.	
7	220 kV D/C Line from Kunihar to Panchkula-31 Km	HPPTCL (STU-HP)	Nil.	
8	220 kV S/C Lahal to Budhil Transmission Line- 1.8 Km	HPPTCL (STU-HP)	Nil.	
9	220 kV D/C Karian to Rajera Transmission Line (One Circuit)-3.8 Km	HPPTCL (STU-HP)	Nil.	
10	220 kV S/C Thein Dam to Jassure Transmission Line-26 Km	HPPTCL (STU-HP)	Nil.	
11	220 kV D/C Phojal to Patlikuhal LILO line-7 Km	HPPTCL (STU-HP)	Nil.	
12	220 kV D/C Charor to Banala Transmission Line-18 Km	HPPTCL (STU-HP)	Nil.	
13	220 kV S/C Dehar to Kangoo Transmission Line-4.1 Km	HPPTCL (STU-HP)	Nil.	
14	220KV D/C Uperla Nangal to Baddi.	HPSEBL (DISCOM-HP)	Cleaning done at the time of preventive maintenance.	
15	220KV Baddi to Mandhala	HPSEBL (DISCOM-HP)		
17	220KV D/C Bhaba - Kotla	HPSEBL (DISCOM-HP)		
18	220 kV Lilo Line Hamirpur Nehrian	HPSEBL (DISCOM-HP)		
19	220 kV Kangoo Rauri	HPSEBL (DISCOM-HP)		

PROPOSED SHUTDOWN FOR THE WORK OF WASHING OF INSULATORS STRINGS IN VARIOUS 400kV LINES OF PSTCL

Sr. No.	Name of Line	Proposed Date And Time		No. of Shutdown Days
		From Date	To Date	
1	Rajpura-Nakodar Ckt-2	16.11.2022	21.11.2022	6
2	NPL- Rajpura Ckt-1	22.112022	23.112022	2
3	NPL- Rajpura Ckt-2	24.112022	25.112022	2
4	Rajpura- Dhuri Ckt-1	26.112022	29.112022	4
5	Dhuri- Talwandi Saboo Ckt-1	30.11.2022	03.12.2022	4
6	Nakodar-Moga	04.12.2022	06.12.2022	3
7	Muktsar-Makhu Ckt-2	07.12.2022	10.12.2022	4
8	Makhu-Amritsar Ckt-2	11.12.2022	14.12.2022	4
	Total			

This is for your information & Necessary approval may be got from OCC/NRPC

Chief Engineer
P.S.T.C.L., Ludhiana.

Status of replacement of Porcelain insulators with Polymer insulators of Rajasthan State

S.No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for replacement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks (If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)
			Total Length of line (in	Total Towers location		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1	220 KV PGCIL (Bhiwadi)-Khushkhera D/C line	220	10.775	29	16	--	--	--	--	--	--	Disc Cleaning file under process & the work will be completed by 15.12.2022
2	220 KV PGCIL (Neemrana)- Khushkhera S/C line	220	56.5	42	134	--	--	--	--	--	--	
3	220 KV Khushkhera Alwar/ Kishaangarh Bas D/C line	220	37.22	39	107	--	--	--	--	--	--	
4	220 KV Bhiwadi – PGCIL CKT-I S/C	220 KV	7.766	15	20	17	5	0	NIL	01.01.2023	31.12.2026	Shutdown limitations due to load constraints in this area.Cleaning done on yearly basis for suspension towers
5	220 KV Bhiwadi – PGCIL CKT-II S/C	220 KV	10.131	13	25	17	5	0	NIL	01.01.2023	31.12.2026	

6	220 KV MIA-BTPS Line	220 KV	131.7	62	370	NIL	NIL	NIL	NIL	–	–	Due to the low ground clearance of live conductor at Delhi, Faridabad and Ballabhgarh area, therefore porcelain insulator can not be replaced with polymer insulator. Cleaning of Disc insulator string will be done upto 31.12.2022
7	220kV D/C Beawar-KTPS	220kV	190	30	108	138	32 nos. (560-528)	--	--	--	--	as per line patrolling under jurisdiction of 220kV GSS, Beawar
8	220kV D/C Beawar-Gulabpura line	220kV	51.5	30	108	160	32 nos. (560-528)	--	--	--	--	
9	220kV S/C Beawar-Bhilwara line (D/C +S/C)	220kV	93	22	119	141	22 nos. (228-250)	--	--	--	--	

Annexure-B.II

Status of replacement of Porcelain insulators with Polymer insulators (as on 09.11.2022)

Sl. No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks (If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1	765 kV S/C (QUAD) Bara - Mainpuri Transmission Line CKT-II	765 kV	377.415	256	643	0	0	0	0			
2	400 kV D/C (QUAD) Mainpuri-Aligarh Transmission Line CKT-I	400 kV	93.254	52	167	0	0	0	0			
3	400 kV D/C (QUAD) Mainpuri-Aligarh Transmission Line CKT-II	400 kV	93.254									
3	400 kV D/C (Twin) Mainpuri to Mainpuri PG Transmission Line CKT-I	400 kV	22.66	37	31	0	0	0	0			
4	400 kV D/C (Twin) Mainpuri to Mainpuri PG Transmission Line CKT-II	400 kV	22.66									
4	400 kV D/C (Twin) Orai - Mainpuri Transmission Line CKT-I	400 kV	23.07	40	27	0	0	0	0			
5	400 kV D/C (Twin) Orai - Mainpuri Transmission Line CKT-II	400 kV	23.07									
5	400 kV D/C (QUAD) Rewa Road-Meja Tranmission Line - (Rewa Rd - Meja CKT)	400 kV	34.25	41	50	0	0	0	0			
6	400 kV D/C (QUAD) Rewa Road-Meja Tranmission Line (Rewa Rd -Masauli CKT) up to LILO POINT (Total Line Length:65.56 KM)	400 kV	32.66									
7	400 kV D/C (QUAD) Rewa Road-Meja Tranmission Line (Masauli LILO Point - Meja) (Total Line Length: 33.66 KM)	400 kV	1.59									
8	400 kV D/C (QUAD) Bara - Meja Transmission Line CKT-I	400 kV	32.33	31	52	0	0	0	0			
9	400 kV D/C (QUAD) Bara - Meja Transmission Line CKT-II	400 kV	32.33									
10	400 kV S/C (Twin) Obra-Rewa Road Transmission Line (Total Line Length: 178.9 KM)	400 kV	0.3	2		0	0	0	0			
11	400 kV S/C (Twin) Rewa Road-Pariki Transmission Line (Total Line Length:209.67KM)	400 kV	0.3									
Total CKT KM Line			789.143	459	970	0	0	0	0	0	0	

Note:1. Line constructed with Polymer Insulator may please also be indicated in the table
2. Similar separate table shall be formulated for Antifog insulators line as well for line which would be cleaned
3. Lines for whom there is no planning of cleaning or replacement may please also be given in the table but with '--' in planning as well as progress columns

Status of replacement of Porcelain insulators with Polymer insulators (as on 09.11.2022) Annexure-B.II

S. No.	Name of Line/voltage/ S/C or D/C	Voltage Level (in kV)	Line details			Insulators to be replaced by Polymer (Total target for repalcement despite completion in any year)	Insulators to be replaced by Polymer (Target for Present year)	Progress (Work already completed wrt to present year target)	Progress (Work already completed wrt to total line)	Schedule for completion of Replacement		Remarks *(If only partial location of the line has planned then may please indicate the location numbers or part kMs of line which have been planned)*
			Total Length of line (in kM)	Total Towers location (Nos)		Total Towers location (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Total Towers Locations (Nos)	Start Date	End Date	
				Tension	Suspension							
1	2	3	4	5		6	7	8	9	10	11	12
1	220kV Gopalpur- wazirabad	220	4.3	12	7	N.A.						
2	220kV Geeta Colony - Patparganj	220	4.4	13	6							
3	220kV IP- RPH	220	1.5	10	0							
4	220kV IP- Pragati	220	1.9	9	0							
5	220kV Pragati- GT	220	0.2	2	0							
6	220kV Gopalpur - Subzi Mandi	220	7.3	34	0							
7	220kV Wazirabad- Kashmeri Gate	220	5.7	23	3							
8	220kV Mehrauli- Vasant kunj	220	6.4	49	9							

Note:1. Line constructed with Polymer Insulator may please also be indicated in the table
2. Similar separate table shall be formulated for Antifog insulators line as well for line which would be cleaned
3. Lines for whom there is no planning of cleaning or replacement may please also be given in the table but with '--' in planning as well as progress columns

Remark:
1) All other lines except these 8 has already been converted with polymer insulators.
2)Washing has been done on all these lines before 15 of November.
3) 220kv kV IP-PPG and Gopalpur – Subzi Mandi lines will be converted to HTLS with polymer insulators in year 2023-24.
4) For other lines data may be taken from planning deptt.

Annexure VII

Name of Station	Installed Capacity (MW)	Average Error as compared with schedule (Act-Schd) *100/AVC	% of time error is more than 15% as compared with schedule	Average Error as compared with forecast (Act-Frcst) *100/AVC	% of time error is more than 15% as compared with forecast
Azure Power Forty Three	**600**	15.06%	33.84%	12.45%	31.48%
AHEJ4L_S_FTG1	**600**	1.72%	0.00%	58.71%	95.56%
ASEJOPL_S_FTG2	**420**	54.43%	95.70%	60.18%	91.26%
NTPC Kolayat	**400**	20.30%	50.35%	18.63%	47.30%
AHEJOL_S_FTG2	**360**	17.90%	52.43%	57.31%	92.09%
ASunceEPL_BKN	**350**	85.59%	89.74%	90.45%	96.67%
Bhadla Clean Solar Power	**300**	28.66%	55.89%	20.28%	66.16%
Tata Power Renewable Energy	**300**	19.99%	65.88%	19.18%	55.20%
SBE6PL	**300**	21.04%	60.06%	18.87%	57.42%
ERCPL_FTG2	**300**	16.93%	48.82%	18.09%	62.69%
RSWPL3_FTG2	**300**	16.83%	50.49%	16.64%	59.78%
RSEJ3L	**300**	17.54%	57.28%	15.35%	47.71%
AHEJ2L_S_FTG2	**300**	16.24%	45.77%	15.01%	42.44%

AHEJ3L_S_FTG2	**300**	18.28%	62.14%	13.89%	37.45%
A41PL_BHDL	**300**	23.00%	56.31%	23.44%	71.15%
RSBPL_FTG2	**300**	18.84%	54.51%	16.04%	52.01%
ARP1PL_BKN	**300**	17.09%	44.38%	14.28%	40.92%
RSUPL_FTG2	**300**	16.96%	45.08%	15.20%	49.51%
AvSusRJPPL_BKN	**300**	15.97%	43.00%	12.62%	33.01%
TS1PL	**300**	11.47%	31.48%	12.29%	32.18%
AHPPL	**300**	17.60%	44.80%	16.38%	41.75%
ABC Renewables	**300**	20.74%	46.32%	19.82%	48.96%
ASEPL	**300**	20.73%	51.60%	18.20%	53.95%
NTPC Nidaan	**296**	22.55%	73.51%	16.01%	48.68%
Azure Maple	**257**	9.35%	23.16%	10.01%	26.49%
ACME POWER	**250**	21.79%	51.32%	17.45%	43.13%
Renew Bikaner	**250**	15.46%	41.75%	12.60%	34.12%
Mahindra Renewable Energy	**250**	21.26%	71.15%	20.17%	52.84%
CSP Jodhpur	**250**	20.63%	53.54%	19.60%	47.57%
MSUPL	**250**	18.98%	53.81%	16.76%	41.05%
Avada Rjhns	**240**	14.83%	39.25%	11.26%	30.65%
DSNTPC_FTG2	**240**	37.11%	67.27%	12.56%	31.62%
TPGEL	**225**	27.31%	56.73%	19.94%	41.61%

SBSRPC11PL_FTG2	**212.5**	17.10%	40.92%	16.31%	40.78%
Bhadla Adani Azure Power	**200**	20.49%	54.92%	16.53%	51.32%
Bhadla Soft Bank Power	**200**	28.32%	71.43%	20.28%	60.75%
ARERJL	**200**	40.70%	100.00%	40.92%	100.00%
RSRPL_BKN	**150**	11.62%	28.29%	10.90%	21.64%