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 (62वीं)/2023/1780-1827 दिनाँक: 20, फ़रवरी, 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 62वीं बैठक का कार्यवृत ।
Subject: 62nd meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 62वीं बैठक दिनांक **31st जनवरी , 2023** 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 62nd meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **31st January, 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,

Naresh

(नरेश भंडारी) 20/2/23
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 ई-मेल: ms -nrpc@nic.in वेबसाईट: www.nrpc.gov.in
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, NRPC & 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)
28. Managing Director, SLDC, PTCUL, Rishikesh, (Fax-0135-2451160)
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.

Contents

उत्तरी क्षेत्रीय विद्युत समिति की 62वीं बैठक

62nd MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting:11:00 HRS; 31st January 2023

Venue: Video Conferencing

Minutes of Meeting

The meeting was started with the opening remark by Director (Operations, DTL & Chairperson, TCC) on behalf of Chairperson, NRPC. Director (Operations), DTL had mentioned that Northern region has witnessed multiple tripping ,especially in the third week of December, 2022. He highlighted that despite switching over to polymer insulators and cleaning of insulators under pre-winter preparedness, still such incidents of unprecedented tripping is observed during winters. In view of this, he had asked the forum to constitute a group to study such incidents so as to minimise them in near future. He also suggested for PID testing of insulators.

Secondly, he asked the beneficiaries and utilities to be prepared for the upcoming summers as India as well as the Northern Region will experience high power demand in coming months. He also asked the utilities to do the necessary preventive maintenance.

Adding to this, MS, NRPC suggested that a meticulous planning should be chalked out as winter set-in. Also a task force should be constituted to rectify/minimise such issues of tripping. MS, NRPC also informed that as per the directions of Ministry of Power, the preventive maintenance work for upcoming summers is being carried out. He informed that April to Mid-May are crucial months in view of power demand and as per directions of MoP, no planned shutdown shall be approved within this time period.

A.1 Approval of MoM of 61st NRPC meeting

A.1.1 EE (P& SS), NRPC apprised the forum that minutes of 61st NRPC meeting (held on 26.12.2022) has been issued vide letter dtd.19.01.2023.

A.1.2 He added that NRLDC vide mail dtd. 24.01.2023 has requested for addition in above MoM regarding agenda no. 4 i.e.Transmission System for evacuation of power from Rajasthan REZ Ph-IV (Part 2: 7.5GW) (Jaisalmer/Barmer complex), as below:

Quote

Following issues were highlighted by CGM (I/C), NRLDC during the meeting:

i. In the proposed scheme, 765kV D/C line from Jalore-Mandsaur has been proposed which would be nearly 320km long inter-regional line. In Feb scenario,

the line is carrying 2200MW on each ckt. And under N-1 contingency, loading would be nearly 3000MW with angular difference around 25 deg.

ii. In case both lines trip, the angular difference would further increase to 37 deg. Therefore, in future, in case both lines trip and need to be revived during peak solar generation time, the system may not be stable.

iii. New intermediate substation in between may also be proposed and the line length may be reduced as switching of 320km long inter-regional line may lead to issues in future.

CTU representative informed the following:

i. Outage of 765kV D/C line from Jalore-Mandsaur has not been studied as transmission system is being planned for N-1 contingency only and any additional transmission system would come with additional cost.

Unquote

A.1.3 CTU representative apprised the forum that in the 61st NRPC meeting, CTU had mentioned that in case of N-1 contingency, the angular difference is around 25 degrees which is under the stipulated planning criteria. As what mentioned by NRLDC i.e. when both lines trip is an N-1-1 contingency. This is a rare contingency and this too may occur during peak solar. He also informed forum regarding possibility of making LILO of line so as to reduce line length in future. Secondly, CTU representative informed that an additional corridor is being planned from Jalore. So, in that condition, angular control will be much better in future.

A.1.4 Forum approved the minutes with incorporating above discussion at para no A.4.10 of minutes of 61st NRPC meeting as below:

Quote

Following issues were highlighted by CGM (I/C), NRLDC during the meeting:

i. In the proposed scheme, 765kV D/C line from Jalore-Mandsaur has been proposed which would be nearly 320km long inter-regional line. In Feb scenario, the line is carrying 2200MW on each ckt. And under N-1 contingency, loading would be nearly 3000MW with angular difference around 25 deg.

ii. In case both lines trip, the angular difference would further increase to 37 deg. Therefore, in future, in case both lines trip and need to be revived during peak solar generation time, the system may not be stable.

iii. New intermediate substation in between may also be proposed and the line length may be reduced as switching of 320km long inter-regional line may lead to issues in future.

CTU representative informed the following:

i. Outage of 765kV D/C line from Jalore-Mandsaur has not been studied as transmission system is being planned for N-1 contingency only and any additional transmission system would come with additional cost.

ii. In case of N-1 contingency, the angular difference is around 25 degrees which is under the stipulated planning criteria. As what mentioned by NRLDC i.e. when both lines trip is an N-1-1 contingency. This is a rare contingency and this too may occur during peak solar. He also informed forum regarding possibility of making LILO of line so as to reduce line length in future. He further informed that an additional corridor is being planned from Jalore. Therefore, in that condition, angular control will be much better in future.

Unquote

A.2 Requirement of 02 Nos. 500MVA, 400/220 kV and 02 Nos. 160 MVA 220/66 kV Power Transformer (agenda by PSETD Division, CEA)

A.2.1 EE (P& SS), NRPC apprised the forum that PSETD Division, CEA in its letter dated 23.01.2023 (**Annexure –I**) has referred the issue of DTL to NRPC Sectt. for requirement of 02 Nos. 500MVA, 400/220 kV and 02 Nos. 160 MVA 220/66 kV Power Transformer

A.2.2 He added that DTL in its letter No. F.DTL/Dir (O)/201/2022-23/F.03/216 dated 11.01.2023 had requested CEA to direct other State Transmission Utility (STUs) to provide 02 Nos. 500 MVA and 02 Nos. 160 MVA Transformers on returnable basis or cost-plus basis so that DTL may have spare Power Transformers in-hand to overcome any exigency during the period of G-20 events scheduled to be held in Delhi in the year 2023.

A.2.3 He apprised that PSETD Division, CEA has mentioned that DTL was well aware in advance about the hosting of G-20 Summit in the year 2023 by India and many related events including Summit to be held in the Capital City of Delhi. Therefore keeping in view, the importance of the said event, DTL may have taken the advance action for ensuring the availability of the spare transformers for the reliable power supply in the said event.

A.2.4 Also, PSETD Division, CEA had mentioned that CEA would explore and assess the availability of the spare transformers with constituent of Northern Region for making available to DTL. However, DTL has also to take the necessary action in this regard for

getting the spare transformers for ensuring the reliability of power supply during G-20 event.

A.2.5 DTL representative in the meeting highlighted that they have floated tender on multiple times for procurement of transformers but it could not be materialized due to covid-19 situation and price fluctuation due to the other global events. He intimated that they are already in process of shifting one 315 MVA transformer from Ballabgarh to Mundka and POWERGRID has agreed to it and target date for completion of cited activity is 15th April'23. Taking this into consideration there will be total 3 transformers in Mundka and it would be n-1 compliant. He further added that DTL is planning HTLS for Bamnuali, Najafgarh, Kanjawala and Bawana circuit then power flow will be from Bamnuali to Bawana and henceforth n-1 requirement will be met for two transformers at Bawana and it is expected to be completed by April'24.

A.2.6 DTL representative highlighted that they are doing procurement through short term tender basis for two 100MVA, two 160 MVA and two 500 MVA transformer and expected delivery schedule is 7 to 12 months. The same would be returned to the constituent of Northern Region from whom spare transformer is being arranged. With this there will be no bottleneck in the transmission constraint of DTL for reliable power supply during the hosting of G-20 summit.

A.2.7 POWERGRID stated that they have already given 2 nos of 315 MVA transformers each at Bawana and Mundka Sub-station of DTL. Additionally, another 315 MVA transformer is also being shifted to Mundka from Ballabhgarh by POWERGRID. He expressed that POWERGRID may hold 315 MVA transformer (to be shifted to Bhinmal) at Ludhiana for use of DTL G-20 meeting.

A.2.8 DTL requested that one 315 MVA transformer may be given at Mundka in place of holding it at Ludhiana as it may take time for transportation in case of requirement.

A.2.9 Forum decided that POWERGRID shall provide one 315 MVA transformer (earlier to be shifted to Bhinmal) from Ludhiana to Mundka in view of request of DTL for preparation of G-20 meeting scheduled in Sept' 2023.

A.2.10 In view of above, it has been noted by NRPC forum that there is very high dependency of DTL on POWERGRID in relation to transformation capacity. MS, NRPC mentioned that NRPC Sectt. may write a letter to CMD, DTL for taking necessary action to decrease dependency on POWERGRID.

A.3 Unchahar#6 (St-IV U#1) Flue Gas De-Sulphurisation (FGD) unit Performance Guarantee (PG) Test (agenda by NTPC)

A.3.1 EE (P&SS), NRPC apprised that the issue regarding the Performance Guarantee Test of Unchahar#6 (St-IV U#1) was deliberated in 57th NRPC meeting held on 31.08.2022. Minutes of Meeting is attached as **Annexure-II.**

A.3.2 In the meeting, NTPC representative apprised forum that PG Test of Unchahar#6 unit was initially scheduled from 00:00 hrs of 23.08.2022 to 24.00 Hrs of 25.08.2022 in compliance of Ministry of Environment, Forest and Climate Change (MoEFCC) directives & strict Supreme Court deadlines. Unit was to be operated at full load for above 72 Hrs. to meet the test conditions.

A.3.3 Further, He intimated forum that to ensure full load, major beneficiaries were approached to maintain full drawl schedule for above period. Rajasthan, J&K and Haryana given their consent to maintain full drawl schedule. However, UP has not responded/ not given consent for maintaining schedule.

A.3.4 He highlighted that technical minimum of UP & full schedule of rest beneficiaries and with some quantum of over injection, test conditions can be achieved, and Test can be performed at 75% load with minor deviations.

A.3.5 He emphasized that meeting SOX emissions within limits as per MoEFCC directives is a statutory requirement and compliance of above is mandatory. Moreover, in future all Units with FGD installation must have to satisfy above compliance by conducting PG Test, which is not possible under the circumstances as mentioned above.

A.3.6 EE (P&SS), NRPC apprised that as per decisions taken in 57th NRPC meeting, UPPCL was requested to cooperate with NTPC for the facilitation of the PG test (as FGD is a statutory requirement) by providing the adequate schedule.

A.3.7 NRLDC representative stated that there are issues in this-first, the ownership is with NTPC and second, the 100% allocation is with the states. He suggested that scheduling for PG test of FGD should be done with proper planning about the time for which full schedule is required for the test. Cost of FGD testing (due to un-scheduled generation) may be included in FGD project cost. He also suggested that since the month of March and April will be high load months, all the states will punch for full schedule requisition and Generating Unit will get full schedule during these months. Therefore, NTPC may plan accordingly.

A.3.8 Adding to this, MS, NRPC stated that since MoEFCC directives is a statutory requirement. Therefore, it is necessary to comply by it. He stressed that a philosophy should have to be proposed so that station should not face such issues in not getting schedule to perform testing.

A.3.9 UP representative stated that suitable amendment in CERC Regulations may be done for facilitating such tests in violation of Merit Order Despatch (MOD).

A.3.10 MS,NRPC suggested NTPC to plan the testing in the month of April so as to get full schedule during that time so as to prevent restrictions due to Merit Order Violation.

A.4 Replacement of 420kV 80 MVAR 3-Ph Bus Reactor at Ballabgarh under Add-Cap 2019-2024 (Agenda by PGCIL)

A.4.1 EE (P&SS), NRPC apprised the forum that PGCIL vide mail dtd. 24.01.2023 has informed that during 53rd NRPC meeting (held on 29.04.2022), it was agreed for replacement of 05 nos. transformers and reactors under Add-Cap except replacement

of 420kV 80MVAR Bus Reactor at Ballabgarh substation and it was decided that it may be discussed first in CMETS of NR.

A.4.2 Accordingly, the matter was discussed in 8th CMETS meeting of NR on 30.06.2022 (**Annexure-III**) and it was recommended for replacement of 420kV 80 MVAR Bus reactor at Ballabgarh with 125MVAR (420kV) bus reactor in view of prevailing high voltage situations in NR.

A.4.3 Further, the issue was again deliberated in 56th NRPC meeting (held on 29.07.2022) and POWERGRID was asked to submit the cost details in next NRPC meeting.

A.4.4 In view of the above, the details of cost for replacement of 80 MVAR 420kV Bus reactor at Ballabgarh with 125 MVAR 420kV Bus reactor under Add-Cap 2019-2024 is given by POWERGRID as below:

Cost of New 125MVAR 420kV Reactor	:	Rs. ~10.09 Cr
Gross Block of 80MVAR 420kV reactor at Ballabgarh	:	Rs. ~2.5 Cr

A.4.5 Accordingly, Replacement of 80 MVAR 420kV Bus reactor at Ballabgarh with 125 MVAR 420kV Bus reactor under ADD-CAP 2019-2024 is proposed by POWERGRID.

A.4.6 MS, NRPC stated that the matter is already deliberated in 8th CMETS meeting and CMETS had recommended the same for replacement of 420kV 80 MVAR Bus reactor at Ballabgarh with 125MVAR (420kV) Bus reactor, the same may be approved.

A.4.7 In view of this, forum approved the proposal of POWERGRID to go for Add-Cap and replace 420kV 80 MVAR Bus reactor at Ballabgarh with 125MVAR (420kV) Bus reactor.

A.5 Utilisation of spare 400/220kV 500MVA ICT (Without OLTC) available at Patna substation for replacement of 1x315MVA 400/220kV ICT (ICT-1) at Ludhiana substation with 1x500MVA 400/220kV ICT(Agenda by PGCIL)

A.5.1 EE (P&SS), NRPC apprised the forum that PGCIL vide mail dtd. 24.01.2023 has informed that replacement of 1x315MVA 400/220kV ICT (ICT-1) at 400/220kV Ludhiana (PG) substation with 1x500MVA 400/220kV ICT was approved vide CTU Office Memorandum ref. no. C/CTU/AI/00/9th CCTP dated 28th November 2022 (**Annexure IV**) with Implementation time frame of 18 months.

A.5.2 CMD PSTCL vide letter dated 25.11.2022 (**Annexure IV**) requested POWERGRID to complete the work by 31st May 2023 before onset of next summer/ paddy season.

A.5.3 POWERGRID stated that the lead time for procurement of new transformer is 15 months, therefore, in view of urgency of replacement of ICT at Ludhiana 400/220kV, spare 400/220kV 500MVA ICT (without OLTC) available at 400/220kV Patna substation of POWERGRID may be utilised at Ludhiana. It is also to mention that 01 no. without OLTC 400/220kV 500MVA ICT has already commissioned at Ludhiana substation in May'2022 and same is working fine. It is further to mention that voltage at Ludhiana substation is controlled with the help of SVC available at Ludhiana sub-station.

A.5.4 In view of the above, it is proposed by POWERGRID to divert the spare 400/220kV 500MVA ICT (without OLTC) available at the Patna substation to Ludhiana substation

for replacement of 1x315MVA 400/220kV ICT (ICT-1) at 400/220kV Ludhiana (PG) substation with 1x500MVA 400/220kV ICT to meet the upcoming demand in Punjab.

A.5.5 NRLDC representative stated that ICT at Ludhiana is much required. Punjab is connecting more 220 KV lines at Ludhiana. He stressed upon need of OLTC at Ludhiana.

A.5.6 PSTCL representative stated that ICT is very much required. The same is required by 31st May 2023.

A.5.7 MS, NRPC asked POWERGRID representative to confirm whether the replacement of 1x315MVA 400/220kV ICT (ICT-1) at 400/220kV Ludhiana (PG) substation with 1x500MVA 400/220kV ICT available at Patna sub-station will be completed by 31st May, 2023.To this, PGCIL ensured that they will try to complete it within the time frame.

A.5.8 NRPC forum approved the proposal of POWERGRID to divert the spare 400/220kV 500MVA ICT (without OLTC) available at the Patna substation to Ludhiana substation for replacement of 1x315MVA 400/220kV ICT (ICT-1) at 400/220kV Ludhiana (PG) substation with 1x500MVA 400/220kV ICT to meet the upcoming demand in Punjab. PGCIL was requested to replace the transformer by 31st May, 2023 before the onset of next summer/paddy season.

A.6 Provision of Phasor Measurement Units (PMUs) at POI in RE feeders in Rajasthan (Agenda by PGCIL)

A.6.1 EE (P&SS), NRPC apprised the forum that PGCIL vide mail dtd. 24.01.2023 has intimated that during 58th NRPC meeting (held on 30.09.2022), POWERGRID had proposed to install PMUs in 63 nos. feeders connected to RE generators in Rajasthan at an estimated cost of Rs. ~ 14.0 Cr on request of POSOCO. During 58th NRPC meeting (**Annexure V**), it was deliberated that a sub-committee has been constituted under Member Secretary, WRPC and report from sub-committee may be asked for further discussion on the matter.

A.6.2 POWERGRID has informed that vide letter dated 04th Nov 2022, they have requested MS, WRPC to provide the report of WRPC sub-committee on installation of PMUs at POI. However, the said report is still awaited.

A.6.3 NRLDC representative requested to expedite the approval of this proposal since the renewable energy is increasing with time and the problems associated with it is also increasing.

A.6.4 MS, NRPC informed that the matter is under consideration with NPC Division, CEA and the report may be approved in the coming NPC meeting. After approval by NPC, the same may be implemented.

A.6.5 Adding to it, EE (P&SS), NRPC apprised that recently on 15th December 2022, a meeting was chaired by MS, WRPC for finalization of reports on PMU and AUFLS implementation. In the report, minimum criteria for PMUs has been listed. To this, MS, NRPC stated that the report was a draft report and not the final approved report and cannot be taken into cognizance, since it is not approved by Chairperson, CEA.

A.6.6 MS, NRPC stated to wait till the final approved report comes and after approval it may be straightforward implemented. He also enquired whether GRID-INDIA and POWERGRID highlighted the need of PMUs at POI in meetings of sub-committee.

A.6.7 CGM (I/C), NRLDC stated that till the time, report is approved by NPC Division, CEA, we may approve PMUs at each 220 KV bus of POI sub-station at least. He stated that sub-stations in Bikaner and Fatehgarh may be targeted.

A.6.8 MS, NRPC asked POWERGRID to provide estimate for PMUs and its cost.

A.6.9 POWERGRID stated that for Fatehgarh-II, Bhadla, Bikaner, and Bhadla-II, there may be requirement of 13 PMUs in case of open condition of Bus-Sectionalizer. If, bus-sectionalizer is considered close, 8 PMUs may be required.

A.6.10 MS, NRPC enquired cost of 8 PMUs. POWERGRID confirmed estimated cost as Rs. 1.5 Cr.

A.6.11 Considering urgency expressed by NRLDC, forum accorded the approval for 8 nos. PMU at each 220 KV bus of Fatehgarh-II, Bhadla, Bikaner, and Bhadla-II s/s of POWERGRID at an estimated cost of Rs. 1.5 Cr.

A.7 OPGW installation on 400kV D/C Malerkotla – Kurukshetra line (Owned by M/s Sekura) (Agenda by CTU)

A.7.1 CTU representative apprised the forum that Reliable Communication Scheme for Central Sector in Northern region covering installation of 7398 kms OPGW was agreed for implementation by POWERGRID in the 39th, 40th & 47th NRPC meetings held on 02.05.2017, 28.10.2017 & 11.12.2019 respectively.

A.7.2 As part of the above scheme, Installation of OPGW on 400kV Kurukshetra - Malerkotla line by POWERGRID by replacing the existing earth wire was also envisaged. It is pertinent to mention that 400kV Kurukshetra - Malerkotla transmission line was constructed under TBCB route by M/s Sekura NRSS-XXXI (B) Trans Ltd (M/s Sekura) & was commissioned on 18.01.2017 with two Earthwire(s) without OPGW as per the relevant RFP.

A.7.3 However, due to issues raised by M/s Sekura regarding indemnification towards outage/ tripping during the installation of OPGW and return of the earth wire replaced by OPGW, work wasn't started.

A.7.4 In this regard, a petition vide Petition No. 94/MP/2021 had been filed by CTU before Hon'ble Central Electricity Regulatory Commission (CERC) seeking directions from CERC regarding installation of OPGW on the 400kV Kurukshetra - Malerkotla transmission line.

A.7.5 On 29th Mar'22, CTU has submitted a compliance certificate before CERC mentioning that POWERGRID has communicated that it has no objection if the implementation of laying of OPGW is undertaken by M/s Sekura.

A.7.6 M/s Sekura vide letter dtd. 23.01.2023 (**Annexure VI**) has given their consent for installation of OPGW on the 400kV Kurukshetra - Malerkotla line (140km) and has submitted detailed proposal.

A.7.7 In view of above, it is proposed that M/s Sekura shall install the 24 F OPGW (approx. cost of Rs.7 Cr. for 140 Km) on the said line in live line conditions as per the broad specifications provided by CTU for RTM Projects with completion schedule of 18 months from the date of allocation.

A.7.8 Representative from M/s Sekura apprised the forum that the petition which was filed by CTU last year is still subjudice before Hon'ble CERC. Last year, PGCIL stated through CTU affidavit that it has no objection if the said OPGW is laid by M/s Sekura Based on that affidavit and hearing from all the parties at CERC, the commission

directed that all party should rework and settle most of the issues mutually and report to commission for the limited issues. Based on that hearing and direction and statement given by CTU, M/s Sekura started assessment and feasibility of laying OPGW on 400kV Kurukshetra - Malerkotla line.

A.7.9 He also apprised the forum that in their recent proposal to CTU, M/s Sekura has proposed that they intended to lay optical fibers of 48 core in both the lines while earlier in the 47th NRPC meeting, the scheme was limited to Kurukshetra line with 24 core. The deviations from the initial scheme is proposed in view of future requirements. He apprised the forum that 48 Core OPGW costs nearly 10-12% higher than 24 Core. He highlighted that this is a sectorial issue and passing any order in this meeting may derail CERC's opinion.

A.7.10 MS, NRPC stated that since the Commission had directed M/s Sekura to rework and settle the issue through mutual discussion, the same may be discussed in the forum.

A.7.11 Representative from M/s Sekura opined that putting up this agenda for approval before NCT will not be appropriate at this point of time because anything which is going to be put up before NCT should be either a fresh package or there is some requirement of modification of existing infrastructure. Since the OPGW installation on line is neither a new project as such nor a modification of existing infrastructure. Here only the earth wire is being replaced by OPGW.

A.7.12 Representative from CTU opined that as far as RFP is concerned, 24 core fibre is considered for straight lines and for the LILO portion, 48 fibre core is considered. Secondly, the deviation that M/s Sekura has proposed is after the affidavit submitted in this regard to CERC. The changes that NRSS has proposed are not as per norms of RTM.

A.7.13 MS, NRPC asked CTU to give reply to the letter of M/s Sekura and then may apprise this matter before CERC. This is because the project is under TBCB and therefore a proper method is required to be formulated for any extra expenses in this project.

A.7.14 He raised serious concern over the delay of the project and stated that it is affecting the reliability of our effective grid operation due to absence of this communication scheme.

A.7.15 NRPC Forum noted that the scheme was approved in 2018 and still the project is incomplete. The forum stressed that the issue may be worked out by CTU, POWERGRID and M/s Sekura and Hon'ble CERC may be apprised accordingly for decision on the matter.

A.7.16 The forum also highlighted that if there is any plan of M/S Sekura for revenue sharing for OPGW, M/S Sekura may inform upfront to CERC so that a holistic decision may be taken by the Commission.

A.8 Non-payment of outstanding dues by DTL (Agenda by SJVN)

A.8.1 SJVN apprised the forum that they had signed the Power Purchase Agreement with Delhi Transco Ltd (DTL) for selling the power of Naphtha Jhakri Hydro Power Station to Delhi on 27.03.2003 as per allocation made by MoP, Government of India.

A.8.2 DERC vide order no. F.17 (115)/Engg./DERC/2006-07 dated 31.03.2007 had assigned the Power Purchase Agreements between DTL and various CPSUs to Delhi Discoms (BRPL, BYPL and NDPL, now TPDDL) w.e.f. 01.04.2007. DTL is no more in business with SJVN for power supply from NJHPS and paid all its energy payments for the sale of power from NJHPS before it was assigned to Delhi Discoms.

A.8.3 Thereafter, the tariff petition no. 20/2008 for the period 2004-2009 was approved provisionally by CERC on 31/12/2008. Accordingly, the arrear bills were raised on 20.02.2009 to all the beneficiaries including DTL. The details of Arrears of Energy Bill for the period 2004-05, 2005-06 & 2006-07 are attached as **Annexure VII.**

A.8.4 Till August 2011, no payment was received from M/s DTL against the above bills. In 2011-12, Income Tax refund for the period 2004-09 amounting to Rs. 13,85,66,738/- was received from M/S DTL on 28.09.2011.

A.8.5 He added that liabilities and LPS till 2015 was settled and approved by DTL board but the same was not approved by SJVN board.

A.8.6 He further informed the forum that though various correspondences were made in regards to settlement of payment of arrears, yet, DTL had not fully liquidated the principal amount as well as Late Payment Surcharge (LPS) levied, resulting into accumulation of dues of principal amount of Rs. 56,50,52,359.00 and LPS levied on this.

A.8.7 Representative from DTL stated that DTL is very postive in clearing these dues. He informed that the file is with Finance Department of DTL. He also assured the forum that the matter will be discussed with Finance Department of DTL and dues will be cleared.

A.8.8 MS, NRPC concluded the discussion asking DTL to expedite the process of clearing the dues to SJVN. He also asked SJVN to submit an affidavit that after clearance of dues by DTL, stating that no further dues is left to be paid from DTL side.

A.9 Issues related to Rajasthan state control area (Agenda by NRLDC)

A.9.1 NRLDC representative stated that as discussed in 59th and 60th NRPC meeting held on 31.10.2022 and 30.11.2022 respectively, RVPN was asked to submit pointwise reply to following issues:

i. Action plan to meet the 16000-17000MW peak demand during winter.
ii. Establishing additional connectivity of 400 kV Alwar from Bhiwadi / Bassi / Phagi. Gas generation at Dholpur may also help till connectivity established.
iii. Minimising planned/ forced outage of intrastate thermal generating units.
iv. Operating intrastate RE generators in voltage control mode.
v. Load MVAR drawl management including identification of nodes at 220kV and 132kV level which are drawing huge MVAR from the grid.
vi. Expediting upgradation of 400kV Jodhpur (Kankani) to 765kV along with associated 765kV lines.
vii. Additional reactive power support devices for maintaining grid voltages within IEGC prescribed limits.

A.9.2 In 202nd OCC meeting held on 16.12.2022, Rajasthan SLDC informed that they are awaiting response from STU for some points. NRLDC representative asked Rajasthan SLDC to submit reply for points that have been compiled at their end and for other points reply may be submitted after receipt of same from STU. Rajasthan SLDC agreed for the same. However, reply from Rajasthan side is still pending.

A.9.3 The matter was subsequently discussed in 203rd OCC meeting held on 18.01.2023 wherein the issues were once again highlighted by NRLDC and RVPN was asked to provide their reply at the earliest.

A.9.4 Point wise reply as submitted by RVPN in the meeting is mentioned below:

1. **Establishing additional connectivity of 400 kV Alwar from Bhiwadi/Bassi/Phagi. Gas generation at Dholpur may also help till connectivity established.**

RVPN Representative replied that 400 kV D/C line from 765/400 kV GSS Ajarka (Alwar) [Newly Proposed RVPN GSS] to 400 kV GSS Alwar (PPP) is technically approved & under process for Administrative & Financial Sanction.

2. **Load MVAR drawl management including identification of nodes at 220 kV & 132 kV level which are drawing huge MVAR from the grid.**

RVPN Representative replied that RVPN has already identified the 132 kV & 220 kV substations where reactive power compensation is required due to load MVAR drawl and consequently a comprehensive programme has been prepared to install capacitor banks, STATCOMs & Bus Reactors at 220 kV level at various substations of RVPN. Total MVAR requirement in Rajasthan state is approx. 10000 MVAR, out of which 50% needs to be installed by RVPN and remaining 50% by DISCOMs.

i. At 220 kV level, 13 Nos. of 25 MVAR reactors & 01 No. of 125 MVAR reactor has been approved and under installation. STATCOMs of 500 MVAR are under approval with CEA.
ii. At 132/33 kV level, RVPN has present installed capacity of approx. 4500 MVAR & addition of 548 MVAR (101 Nos. of capacitor banks) has been proposed. The proposal is under approval with NRPC for availing required grant from PSDF.
iii. Additionally, reactive power compensation has also been proposed at 11 kV level at various 33/11 kV substations falling under the jurisdiction of state DISCOMs. Agenda for the same has already been put before NRPC forum in anticipation of the early approval for seeking grant of PSDF to achieve the desired outcomes.

3. **Expediting up gradation of 400 kV Jodhpur (Kankani) to 765 kV along with associated 765 kV lines.**

RVPN Representative replied that Additional land for 765 kV GSS Kankani (AIS) is under finalization. For associated line, due to its location in GIB area, land is being surveyed for submission to Hon'ble Supreme Court committee for approval.

4. **Additional reactive power support devices for maintaining grid voltages within IEGC prescribed limits.**

RVPN Representative replied that RVPN has comprehensively studied the voltage issue due to existing and continuously increasing Renewable Energy (RE) capacity in Rajasthan and has devised a program for installation of reactive compensation devices consisting of Bus Reactors, STATCOMs & capacitor banks at various voltage levels. RVPN seeks required support from NRPC & PSDF (for availing required grant) in approving reactive compensation requirements so that grid voltages can be maintained within the prescribed limit as per the IEGC. Following STATCOMs are

presently under approval with CEA, all the relevant documents have been submitted to the CEA for early approval of the same.

S. No.	Name of substation	Voltage Rating of Reactor (kV)	Capacity of Reactor (MVAR)
1.	**STATCOM (Dynamic Compensation)**		
400 KV GSS Bhadla		220	±300
220 KV GSS Phalodi		220	±100
220 KV GSS Tinwari		220	±100
Total MVAR (II)			**±500**

765 kV & 400 kV Bus reactors have already been approved from CEA, which are as detailed hereunder:-

S. No.	Name of substation	Voltage Rating of Reactor (kV)	Capacity of Reactor (MVAR)
1.	**BUS Reactors (Static Compensation)**		
	765 KV Reactor		
1.1	Anta (Baran)	765	240
	400 KV Reactor		
1.2	765 KV GSS Anta (Baran)	400	125
1.3	400 KV GSS Heerapura	400	125
1.4	400 KV GSS Ajmer	400	125
1.5	400 KV GSS Bhilwara	400	125
1.6	400 KV GSS Babai	400	125
1.7	400 KV GSS Chittorgarh	400	125
1.8	400 KV GSS Jodhpur (Kankani) (to be upgraded in 765 KV)	400	125
1.9	400 KV GSS Barmer	400	125
Total MVAR (I)			**1240**

Additionally, power flow control devices has also been proposed to restrict the downstream power flow in case of high RE input. For example- At 400 kV GSS, Bhadla, huge RE power is integrated. Further, generation of the solar at 220 kV GSS Kanasar is also injected on the Bhadla GSS. This power tends to flow in the downstream network of the 220 kV Bhadla-Bap and 220 kV Bhadla-Badisid lines resulting in overloading of the above lines. Power flow control devices (PFCDs) are

required in restricting the power flow on the above mentioned transmission lines within the permissible limits. This will help in pushing the power on 400 kV transmission lines by stepping up at the Bhadla GSS and obviate overloading on the 220 kV lines. Details of the PFCDs are mentioned hereunder:-

S. No.	Name of substation	Voltage Rating of Reactor (kV)	Capacity of Reactor (MVAR)
	Power Flow Control Devices/Solution		
1.	Power Flow Control Device/Solutions on 220 KV Line between 400 KV GSS Bhadla-BadiSid	220	45
2.	Power Flow Control Device/Solutions on 220 KV Line between 400 KV GSS Bhadla- Bap	220	45
Total MVAR (iii)			**90**

In-principle approval is required from NRPC for the reactive elements & power flow controllers, so that the DPRs be submitted to PSDF for requisite grant.

Point wise reply to following SLDC issues:-

1. **Action plan to meet the 16000-17000 MW peak demand during winter.**
   Peak demand of state is being met by optimum utilisation of solar generation and adjusting agriculture load block accordingly and 17206 MW peak demand has been met on 18.01.2023 at 14.30 Hrs.

2. **Minimising planned/ forced outage of intrastate thermal generating unit.**
   Issue has been discussed with RVUN and they are doing their best to revive faulty units at the earliest. Planned shutdowns of units are being avoided during winter Rabi season.

3. **Operating intrastate RE generation in voltage control mode.**
   In this regard, last meeting with solar developer/generators with support of NRLDC was convened on 13.12.2022. The minutes of the same had been shared with NRLDC.
   The old solar generators are not able to operate in voltage control mode as they are not equipped with PPC (Power Plant Controller). They are advised to explore the possibility of installing PPC to support the grid. The feasibility of operation of their plant inverter on Q-V mode as advised by NRLDC, are being assessed.
   Other most of the generators having PPC are operating in voltage control mode and support the grid by injecting reactive power in grid up to some extent during low voltage in grid.

A.9.5 NRLDC representative stated that in the reply submitted by RVPN, actions being taken at their end have been included, but timeline for implementation of these works is not clear. It was requested that timelines for these proposals are also submitted at the earliest. It was also requested to confirm whether these issues would be attended before winter 2023-24.

A.9.6 RVPN representative agreed to provide implementation time frame of these works with NRPC/ NRLDC.

A.9.7 NRLDC representative stated that apart from above issues, other issues are also being observed in real-time. NRLDC (GRID-INDIA) has been continuously highlighting several issues related to Rajasthan state control area over last several months. Even after several communications from NRLDC (GRID-INDIA), it is observed that number of issues still persist which are once again highlighted for quick actions at RVPN end:

1. **N-1 violation related**:

a. NRLDC has been continuously raising the issue of N-1 non-compliance at 400/220kV Inter Connected Transformers (ICTs) across major RVPN substations. Although SPS has been implemented at number of 400/220kV substations in RVPN, it can be seen that loading is beyond the N-1 contingency limits at the time when demand is slightly on the higher side (>14500MW). N-1 non-compliance is observed at following 400/220kV ICTs:

Name of Substation	MVA Capacity	N-1 contingency limit (MW)	Total Loading (MW)
Hindaun	2*315 =630	400	300-550
Chittorgarh	2*315 =630	440	300-600
Ajmer	2*315 =630	430	300-600
Merta	2*315 =630	440	300-550
Bikaner	2*315 =630	410	300-550
Jodhpur	2*315 =630	430	300-550
Bhilwara	1*500+1*315 =815	460	300-550

b. From the above table, it can be seen that the loading of 400/220kV ICTs is very high and it is likely that SPS relief will not be able to bring ICT loading within safe limits under N-1 contingency of one ICT. This issue was also highlighted by NRLDC in 202nd and 203rd OCC meetings.

c. It was mentioned that there have been multiple tripping at 400/220kV Hindaun wherein 2*315 MVA ICTs have tripped on overloading (6 events of load loss from Nov'22-Jan'23) and no SPS is implemented at 400/220kV Hindaun. Apart from Hindaun, presently no SPS is implemented at 400/220kV Bhilwara.

d. RVPN representative agreed to implement SPS at Hindaun. It was mentioned that for capacity augmentation at other substations, bid documents are ready and NIT would be floated by 15th Feb. It was mentioned that N-1 non-compliance issues would again be observed in winter 2023-24.

e. Rajasthan SLDC representative agreed with issues highlighted by NRLDC and stated that the load is very high and even load shedding is being done for some of the substations such as Chittorgarh.

f. NRLDC representative stated that the issues regarding N-1 violation of 400/220kV ICTs is being discussed in every OCC meeting every year, so RVPN should have timely planned and executed ICT capacity augmentation so that such situation could have been avoided.

g. NRPC forum advised RVPN to submit action plan on managing higher demand during winter 2023-24.

h. For the substations at which SPS has been implemented by RVPN, Rajasthan SLDC was asked to assess the safe loading limits and manage loadings within these limits such that SPS relief is able to make sure that one 400/220kV ICT survives and does not trip on overload, in case of N-1 contingency.

2. Huge Reactive power drawl at 400/220kV Substations:

a. RVPN 400/220kV It was mentioned that it is being observed that apart from high MW loading, there is high MVAR drawl at number of substations

ICTs MW drawl, MVAr drawl, Power factor and S/s voltage for Solar hours (10:00-14:00hrs) for Rajasthan Control area (Dec'22-Jan'23)					
400/220 Sub-Station_ICTs	ICTs Capacity (MVA)	MW Drawl	MVAr Drawl	**Power factor**	**Voltage(kV)**
Jodhpur	2*315	400-550	200-350	0.73-0.75	375-385
Kankani	(315+500)	400-550	150-300	0.87-0.90	360-370
Merta	2*315	400-550	150-250	0.90-0.92	380-390
Bhinmal(Powergrid)	2*315	400-500	200-350	0.82-0.85	370-390
Bikaner(RVPN)	2*315	400-550	200-400	0.60-0.80	360-390
Ratangarh	3*315	600-800	300-450	0.80-0.90	380-390
Bhilwara	(315+500)	400-550	100-200	0.91-0.95	380-390

Hindaun	2*315	400-550	100-200	0.90-0.95	340-370
Alwar	2*315	250-350	100-200	0.86-0.95	330-360
Barmer	2*315	200-250	150-200	0.60-0.90	380-390
Akal #	315+ 3*500	100 -200	100-200	0.80-0.95	380-390
Ramgarh#	3*500	200 -300	100-150	0.80-0.95	360-390
Bhadla (RVPN)	3*500	1200-1300 (injection)	200-400	0.95-0.98	360-390

b. Plots depicting above issues are attached as **Annexure-VIII**.

c. Poor power factor is resulting in low voltages in the system and therefore expeditious commissioning of network elements and shunt capacitor both at transmission and distribution level is required. It is also essential that load MVAR drawl management including identification of nodes at 220kV and 132kV level which are drawing huge MVAR from the grid and remedial actions is carried out on priority. It may be ensured that RE generators are complying with various regulations of CEA (Technical Standards for Connectivity to the Grid) and amendments thereof.

d. NRLDC representative stated that RVPN may submit actions being taken at their end to make sure that such poor factor and low voltages are not observed during next winter season. It was also requested to take actions to minimize this high MVAR drawl and low voltage for remaining high demand season.

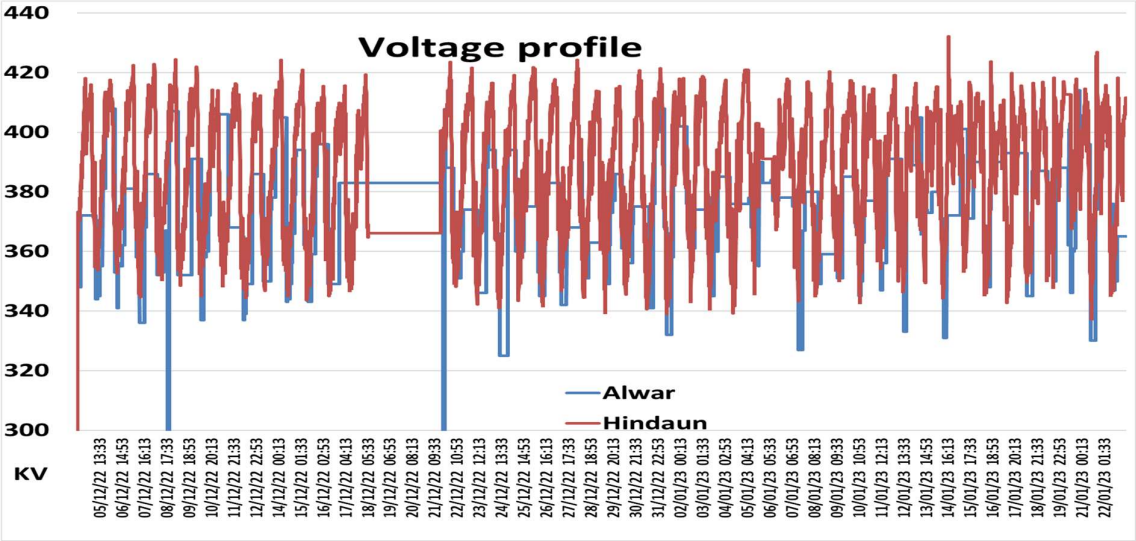
e. RVPN representative stated that:

   i. New capacitor banks recently approved by NRPC may be provided in A5 format for PSDF funding.
   ii. New capacitor banks (~500MVAr at 132kV level) at DISCOM are under approval and PSDF grant is awaited.
   iii. Some relief is expected next winter season with expected commissioning of these capacitors.
   iv. RVPN would submit written reply along with timelines for execution of these works.

f. NRPC forum advised RVPN to take actions at the earliest so as to avoid low voltage issues during next winter.

3. Perennial issue of low voltage at 400/220kV Hindaun & Alwar:

a. The issue of low voltage at 400/220kV Hindaun and Alwar substation was first discussed in detail in 44th Technical Coordination Sub-committee (TCC) & 47th Northern Regional Power Committee (NRPC) meetings held on 10th and 11th December, 2019 wherein it was highlighted that voltages at 400kV Hindaun and Alwar vary by 50-60kV (400kV level) in single day with voltages falling below 360kV at these substations. The issue has been subsequently highlighted on number of occasions in Operation Coordination Committee (OCC)/ NRPC meetings and through written communication. Voltage profile of Dec'22-Jan'23 is shown below:



b. It was mentioned that in the last three years voltage profile at Hindaun and Alwar has worsened and now it is falling below 340kV on several occasions, it is essential that RVPN acts immediately to resolve these low voltage issues at Hindaun and Alwar.
c. RVPN representative stated that CEA has approved 400/220 kV Dholpur substation which is likely to provide Improvement in voltage profile of 400kV Hindaun/Alwar area by 5-10kV which may be higher during peak winter season. Loading of 400/220kV Hindaun ICTs would be relieved by 20%.
d. NRPC forum advised that since the commissioning of 400/220 kV Dholpur substation would take time, short term actions also need to be taken by RVPN to make sure that low voltage issues at 400kV Hindaun/Alwar is minimized.

4. Pending commissioning of 765kV at Jodhpur (Kankani):

a. Proposal for upgradation of 400kV Jodhpur to 765kV and interconnection with 765kV Phagi was discussed in standing committee meetings held in 2019, wherein it was stressed by RVPN that this would help in existing RE evacuation and future planned Renewable Energy (RE) generation evacuation. In several meetings related to Inter State Transmission System (ISTS) connected RE generation evacuation, Central Transmission Utility of India Limited (CTUIL) has highlighted that they have been considering this substation while planning transmission system for upcoming ISTS connected RE generation whereas the works are getting delayed.

b. Upgradation of 400kV Jodhpur to 765kV and commissioning of proposed interconnections would help in improving voltage profile in the area and would increase system strength. Therefore, it is suggested to expedite works for upgradation of 400kV Jodhpur to 765kV.
c. RVPN representative stated that additional land for 765 kV GSS Kankani (AIS) is under finalization. For associated line, due to its location in GIB area, is being surveyed for submission to Hon'ble Supreme Court committee for approval.
d. NRPC forum advised RVPN to take actions at the earliest.

5. Installation of PMU at RVPN substations:

a. As discussed in previous OCC and NRPC meetings, frequent voltage oscillation events have also been observed during solar generation period 10:00hrs-14:00hrs in Rajasthan control area as well as in ISTS RE pooling stations. Several issues related to LVRT/HVRT non-compliance are being observed at different ISTS connected RE generators. PMUs provide high resolution data and enables real-time monitoring and analysis of oscillations and Low voltage ride through (LVRT)/High voltage ride through (HVRT) compliance related issues of different RE generators.

b. Therefore, it is suggested that RVPN may install Phasor Measurement Units (PMUs) at all RE connected and nearby substations such as 400/220kV Kankani, Ramgarh, Akal, Bhadla (RVPN) and Bikaner (RVPN) at feeders connected to point of Interconnection to locate the exact source of oscillation and analyse Rajasthan Intra-state RE plants behavior during any event of fault.

c. RVPN representative stated that PMUs are under commissioning at 400kV Akal, Ramgarh, Bhadla, Bikaner, Kankani and are expected to be reporting to SLDC shortly. Regarding data sharing with NRLDC, the matter would be discussed with NRLDC SCADA team. Apart from above 25 PMUs would also be implemented at 220kV feeders at number of different RVPN substations.

d. NRPC forum agreed that PMU data availability at SLDC/ RLDC would help in identifying the source of oscillation & checking compliances of intrastate RE generators and commissioning may be expedited.

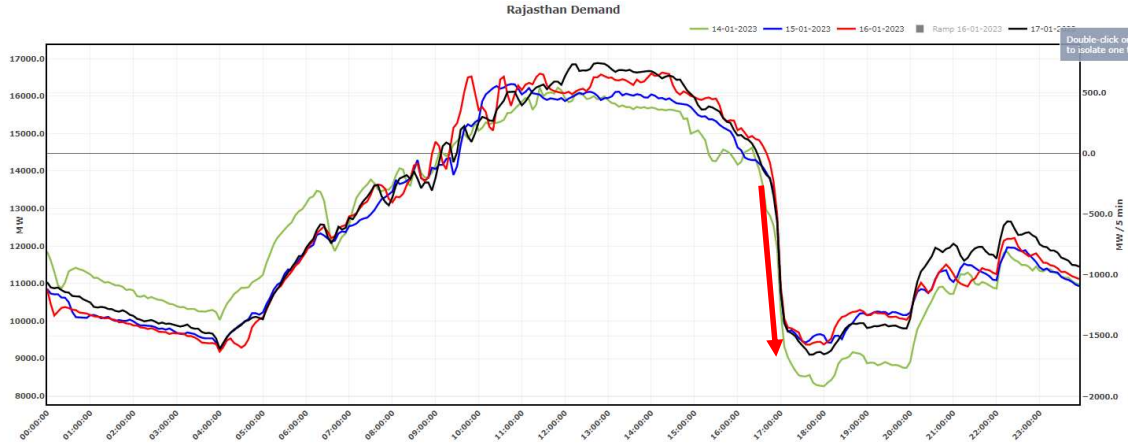
6. Sudden disconnection of load @17:00 hrs

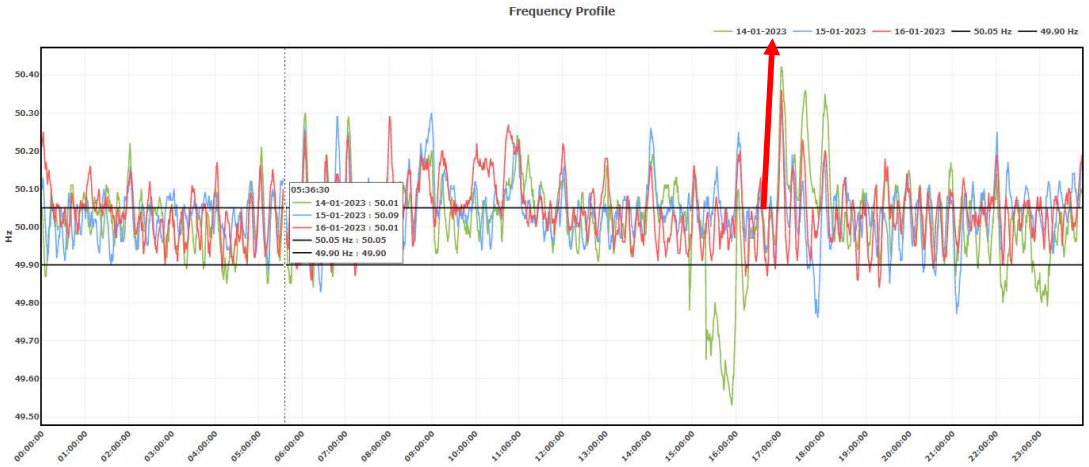
a. NRLDC representative stated that they have been continuously taking up the issues of sudden connection/ disconnection of load at OCC level.

b. As per IEGC clause 5.2 (j), "No user/ SEB shall cause a sudden variation in its load by more than one hundred (100MW) withour prior intimation to and consent of the RLDC."

c. New issue of sudden disconnection of load (more than 4000MW on several days) at 17:00 hrs is being observed since 14.01.2023. This is leading to large

deviations from schedule in the range of 1500MW which is violation of Indian Electricity Grid Code clause 5.2 (j) and also against grid security.

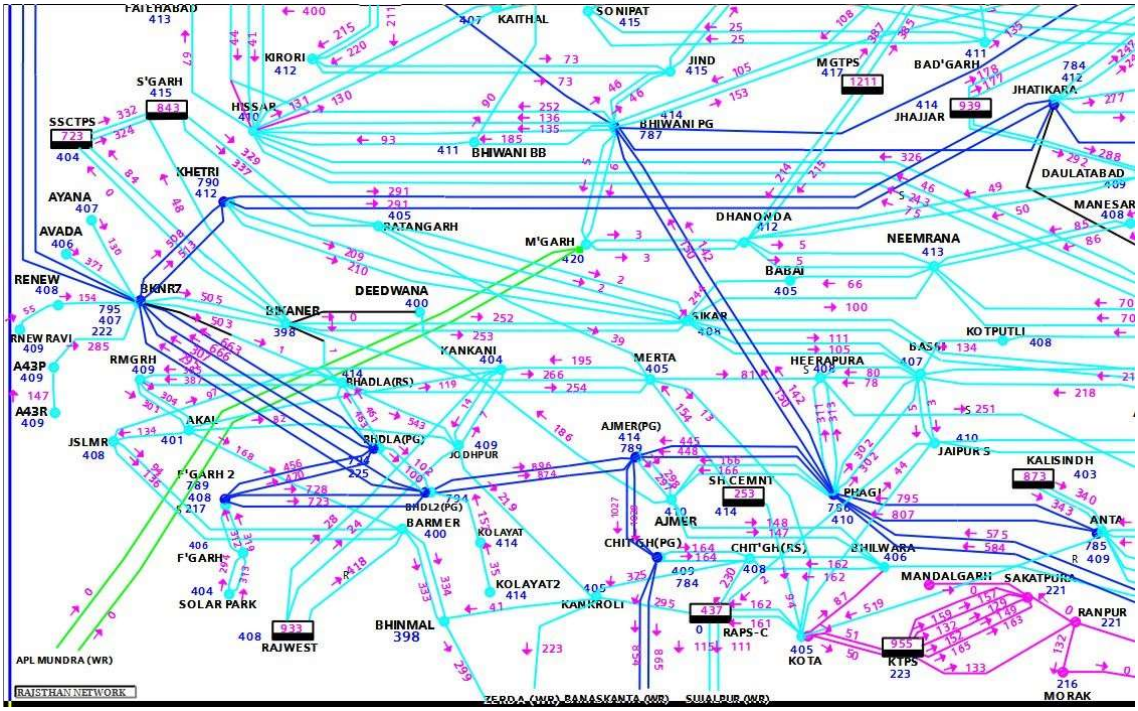




d. Such action by Rajasthan is leading to high voltage and high frequency at the time of sudden disconnection of load and has also lead to tripping of important lines on overvoltage. This needs to be immediately stopped by Rajasthan considering system security and staggering of load connection/ disconnection needs to be implemented at the earliest.

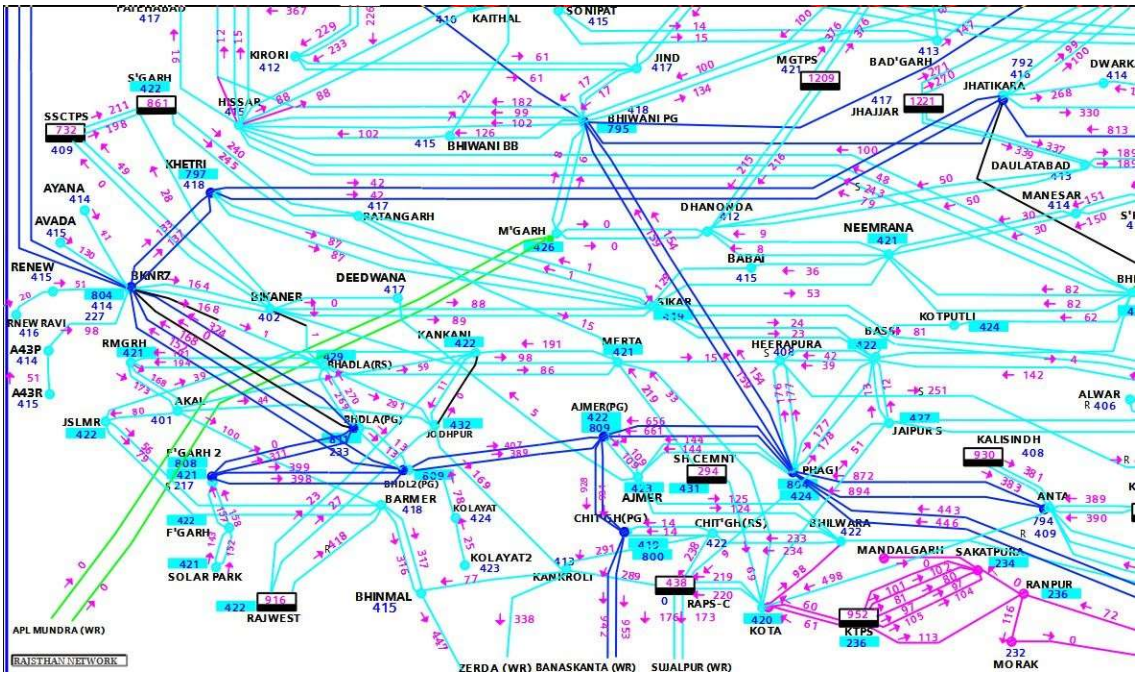
e. Snapshots shown below are of two instants

- one before this sudden load disconnection @ 16:30hrs



It can be seen that grid voltages are well within limits in Western Rajasthan at both intrastate as well as interstate substations.

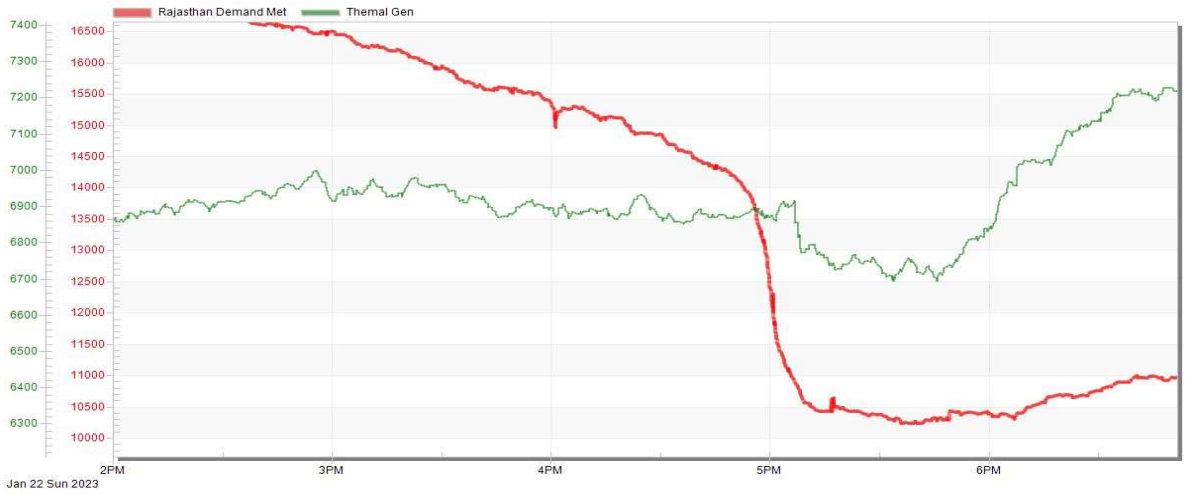
- After sudden disconnection of load @17:15 hrs

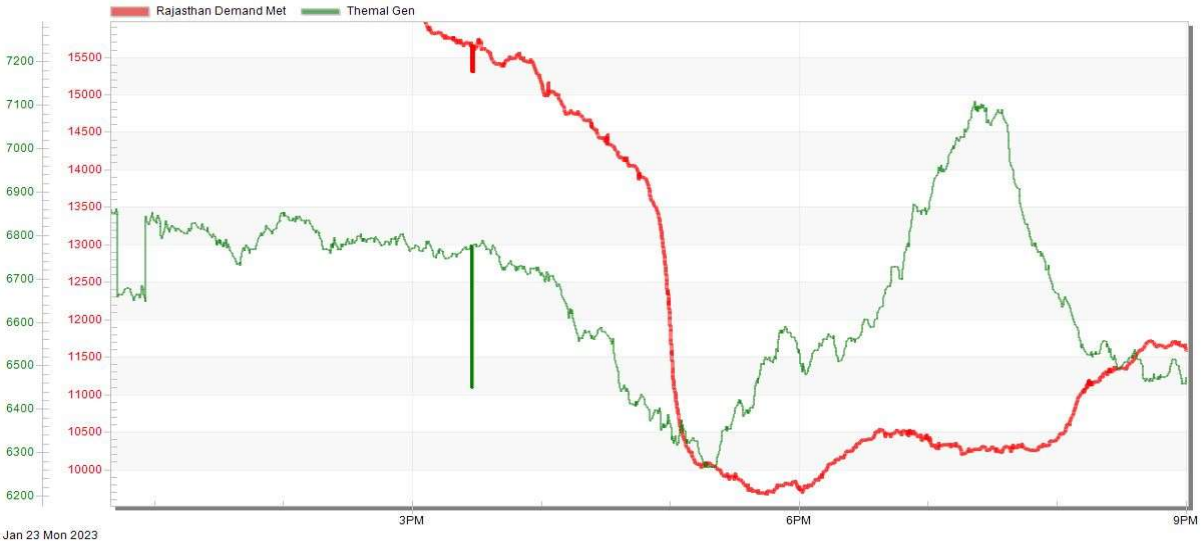


It can be seen that voltages at number of substations are on the higher side. This has also lead to tripping of lines on overvoltage and also increases stress on the transmission elements.

f. Moreover, it is also being observed that Rajasthan is not reducing its thermal generation as per this disconnection of load and is mostly relying on change in drawl schedule for this load disconnection. Plots for two days i.e. 22 and 23 Jan

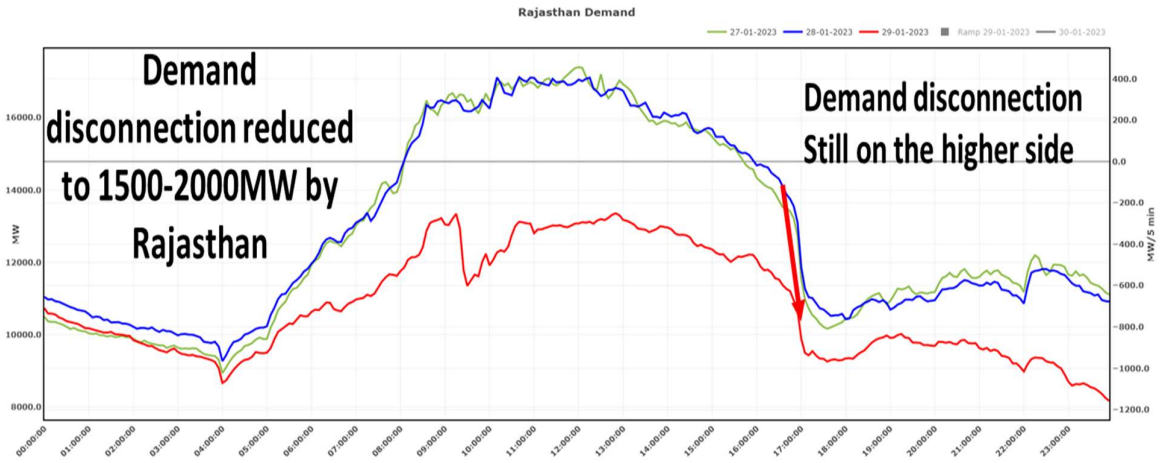
2023 are shown below. It is clear from the plots that thermal generation is not being reduced significantly at the time of load disconnection.





g. RVPN also needs to make sure that it is not solely relying on the grid for sudden disconnection of load.

h. It was also mentioned that this demand disconnection has reduced to 1500-2000MW, but it still further needs to be minimized.



i. It was once again suggested that RVPN acts swiftly to resolve the issues highlighted above to improve the security and resilience of the grid.

j. Rajasthan SLDC representative stated that the issue is being taken seriously by management and DISCOMs has started disconnecting 1-phase agricultural feeders drawing load beyond certain limit. Matter has been taken up with DISCOMs and the sudden demand disconnection is likely to reduce further.

k. NRPC forum expressed concern on the issues highlighted by NRLDC and asked RVPN to act in expeditious manner to resolve issues raised by NRLDC.

A.10 N-1 violation related issues in Himalayan states of NR during winter 2022-23 (Agenda by NRLDC)

A.10.1 NRLDC representative stated that apart from Rajasthan, winter months are also associated with high demand season in Himalayan states such as HP, Uttarakhand and J&K and Ladakh U/Ts. During this period, the primary internal generation source which is hydro generation is available in limited amount, therefore these states are mostly dependent on grid for import of power and meeting their demand. During this high import, some constraints are observed in real-time grid operation which are regularly being discussed in OCC meetings and also submitted to CTUIL/CEA by Grid-India as quarterly operational feedback. Some of these constraints at interstate level along with remedial measures as discussed in the meeting are shown below:

STATE	CONSTRAINTS	REMEDIAL ACTION TO MITIGATE THE CONSTRAINTS
	N-1 Contingency of 3*315 MVA ICT at Nallagarh	New ICT/ Capacity augmentation to be proposed by HPPTCL/ PSTCL
	N-1 Contingency of 220kV Nallagarh – Upernangal	New lines or additional supply may be provided. Switchgear ratings at Nallagarh end to be uprated for utilising full line capacity. POWERGRID informed bay equipments under ownership of HPSEB.

Uttarakhand	N-1 Contingency of 2*315 MVA ICT at Kashipur	New ICT/ Capacity augmentation to be planned by PTCUL. SPS implemented at Kashipur.
	High loading of 220kV CB Ganj-Pantnagar	Additional connectivity/ conductor upgradation to be planned by PTCUL
	High loading of 220kV lines from Roorkee (PG)	Additional connectivity/ conductor upgradation to be planned by PTCUL
	N-1 Contingency of 2*315 MVA ICT at Amargarh	New ICT/ Capacity augmentation may be expedited by JKPDD (planned for Mar'2026). Additional planned 220kV and low voltage lines to be expedited to manage drawl from Amargarh.
	High loading of 220kV lines from ISTS substations such as Wagoora(PG), Amargarh (NRSSXXIX), New Wanpoh(PG)	Additional connectivity to be planned and already approved schemes to be expedited by JKPTCL
	Low voltage issues during winter season	Large dependency on SVC at New Wanpoh for MVAR support. Capacitor installation at low voltage level to be expedited.

A.10.2 Relevant plots depicting the above issues are attached as Annexure-IX.

A.10.3 Following was discussed in the meeting:

Himachal Pradesh: It was informed by HPSEB representative informed that equipment at both Nallagarh and Upernangal end of 220kV Nallagarh-Upernangal are of sufficient ratings. POWERGRID representative stated that CT ratio need to be changed at Nallagarh(PG) 220kV level and would be done in next shutdown of the line.

Regarding future proposals for capacity augmentation to draw more power from 400/220kV Nallagarh, it was mentioned that proposals may be first discussed internally between HPSEB, HPPTCL and HP SLDC.

Regarding capacity augmentation at 400/220kV Nallagarh, it was agreed that the matter would be discussed in CMETS meeting of CTUIL and then can be taken up for further discussion in NRPC.

Uttarakhand: Numerous tripping were reported in Apr-Sep 2022 at 400/220kV Kashipur ICTs on overloading. After number of load loss events and highlight of issues by NRLDC, SPS has been implemented at 400/220kV Kashipur to avoid complete load loss.

PTCUL representative informed that bid opening is planned in Feb 2023 for new 315MVA ICT at Kashipur. New 220kV S/s is being proposed in Pantanagar area, which would relieve loading of 220kV CBGanj-Pantnagar. New 400kV Landhora S/S has been proposed in Roorkee area which would relieve loading of 220kV lines from Roorkee, same has been discussed with CTUIL.

Jammu & Kashmir U/T: It was mentioned that there have been number of events reported wherein tripping of one 220kV line has led to tripping of other 220kV line on overloading or some load shedding had to be done to facilitate shutdown of one line. For instance, shutdown of 220 KV Wagoora(PG)-Ziankote(JK) (PDD JK) Ckt-2 was availed on 11.10.2022. To facilitate the shutdown, 100MW of load had to be shed as the power carrying capacity of ckt1 was limited. On 03.11.2022 at 13:02 hrs 220kV Amargarh – Ziankote ckt 2 tripped due to B-ph fault which caused tripping of ckt 1 on overloading. Load loss of approx. 300MW at Ziankote was reported.

A.10.4 CTUIL representative stated that new ICT at 400/220kV Amargarh has already been approved and implementation of these ICTs before their timeline of 2026 would be discussed with CEA.

A.10.5 POWERGRID representative stated that on the day of tripping of SVC at New Wanpoh voltages in valley area fell to 360kV (400 side) and 170kV (220side). It was requested that additional reactive compensation may be planned at these substations. CTUIL representative informed that some new 220kV and underlying network is under implementation in J&K control area which is expected to improve voltage profile in area. However, the matter would be discussed with CEA & JKPTCL.

A.10.6 All NR states except J&K, Ladakh and Chandigarh U/Ts are sharing basecase and ATC/TTC assessment with NRLDC. NRPC/OCC has advised all states to timely declare TTC/ATC for prospective months and revise the figures as per requirement.

A.10.7 J&K representatives had intimated during 47th TCC and 49th NRPC meeting that they would be sharing ATC/TTC assessment with NRLDC from October 2021, however the same is still awaited. J&K and Ladakh U/Ts were once again requested to advise the concerned officers to evaluate their ATC/TTC limits in coordination with NRLDC and share latest assessment with NRLDC and NRPC.

A.10.8 J&K officers may also take online/ offline assistance from NRLDC officers if required.

A.10.9 NRPC forum asked these states to take expeditious actions to make sure that states are able to meet their increased demand in future without any constraints.

A.11 Actions for ensuring reliable grid operation during summer-monsoon 2023 (Agenda by NRLDC)

A.11.1 NRLDC publishes the TTC/ATC of all the states on its website after discussion with respective SLDCs. For each state, the limiting constraint is declared in the TTC/ATC sheet by the RLDC and SLDCs.

A.11.2 Number of issues were observed in grid operation during Summer-Monsoon 2022 including loading beyond N-1 compliance limits at number of 400/220kV substations as shown below-

STATE	CONSTRAINTS	REMEDIAL ACTION LATEST STATUS AVAILABLE WITH NRLDC
	N-1 Contingency of 2*315 MVA ICT at Deepalpur	New 500MVA ICT approved in 4 NRPCTP held on 05.10.2021. SPS commissioned as immediate measure. ICT commissioning delayed to PPP substation model issues as informed by HVPN.
	N-1 Contingency of 3*150+500 MVA ICT at Panipat BBMB	Proposal for new ICT to be given by HVPN/DTL. Drawl to be planned from other nearby stations. Lack of space at Panipat as informed by BBMB in OCC meeting
	N-1 Contingency of 2*500 MVA ICT at Kurukshetra (PG)	New 500MVA ICT approved in 4 NRPCTP held on 05.10.2021.
	High loading of 220kV Hissar (PG)-Hissar (IA)	Reconductoring of 220kV Hisar (PG)- Hisar (IA) to be taken up for approval.
	N-1 Contingency of 2*500 MVA ICT at Patran	New 500MVA ICT approved in 11 CMETS held on 30.09.2022
	N-1 Contingency of 2*315 MVA ICT at Nakodar	Capacity augmentation to 2*500MVA ICTs expected before paddy 2023
	N-1 Contingency of 2*500+1*250+1*315 MVA ICT at Moga	One 250MVA ICT to be replaced by 500MVA ICT. Bay equipment of higher ratings to be used. Approved in 11 CMETS held on 30.09.2022
	N-1 Contingency of 2*315+2*500 MVA ICT at Ludhiana	One 315MVA ICT to be replaced by 500MVA ICT. Approved in 11 CMETS held on 30.09.2022
	N-1 contingency of 400kV Rajpura (Th)-Rajpura D/C	Additional evacuation path from Rajpura TPS may be planned. Line length is small.
	N-1 Contingency of 2*500 MVA ICT at Azamgarh	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented
	N-1 Contingency of 3*315+1*500 MVA ICT at Sarnath	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented. Commissioning of 400/220kV Sahupuri S/S likely to provide relief
	N-1 Contingency of 2*315+1*240 MVA ICT at Obra	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS under implementation by UPPTCL.
	N-1 Contingency of 3*315 MVA ICT at Allahabad	New ICT/ Capacity augmentation may be proposed by UPPTCL. Commissioning of 400/220kV Jaunpur S/S likely to provide relief

STATE	CONSTRAINTS	REMEDIAL ACTION LATEST STATUS AVAILABLE WITH NRLDC
	N-1 Contingency of 2*315 MVA ICT at Sohawal(PG)	New 500MVA ICT approved in 3 NRPCTP held on 19.02.2021. SPS implemented
	N-1 Contingency of 2*200 MVA ICT at Nehtaur	New ICT/ Capacity augmentation to be planned by UPPTCL. SPS implemented
	N-1 Contingency of 1*240+1*315+1*500 MVA ICT at Gorakhpur (UP)	Capacity augmentation at Gorakhpur (UP) from 1055MVA to 1315MVA (expected by Oct 2022). SPS implemented
	N-1 contingency of 2*315 MVA ICT at Bawana	After bus -split due to high fault level at Bawana, ICTs N-1 non-compliant. Additional ICT/ load shifting to other station to be planned.
	N-1 Contingency of 3*315 MVA ICT at Mundka	New ICT/ Capacity augmentation to be planned by DTL. One ICT under prolonged outage may be revived.

A.11.3 Discussion held in 62nd NRPC meeting is mentioned below:

Haryana: CTUIL representative stated that 220kV Hisar(PG)-Hisar(IA)-Hisar(BBMB) section remains highly loaded, so during shutdown of line for reconductoring works arrangement need to be made so as to avoid any interruption of supply. HVPN has written letter to CEA in this regard, however, proposal from HVPN side is awaited.

Punjab: PSTCL representative informed that ICT capacity augmentation at Ludhiana is expected before paddy 2023. New ICT at Patran would be commissioned by May 2024. ICT capacity at Nakodar would be augmented from 315MVA to 500MVA by July 2023 (1st ICT) and Sep 2023 (2nd ICT). POWERGRID representative stated that Moga ICT is expected to be commissioned by May'2023.

Uttar Pradesh: NRLDC representative stated that new ICT at Sohawal may be commissioned before summer 2023. 400/220kV Jaunpur S/s is likely to be commissioned before summer 2023. Commissioning of this substation would provide relief to 400/220kV Azamgarh and Sarnath. 240MVA ICT at Obra would be replaced by 315MVA ICT. 400/220kV Sahupuri S/s is likely to be commissioned by Oct'2023 which would also provide relief in Obra-Allahabad-Varanasi area. Capacity augmentation at 400/220kV Gorakhpur is also expected before summer 2023.

Delhi: NRLDC representative stated that following high loading issues are expected in Delhi during summer 2023:

- After bus -split due to high fault level at Bawana, ICTs N-1 non-compliant. Additional ICT/ load shifting to other station to be planned.
- New ICT/ Capacity augmentation at 400/220kV Mundka to be planned by DTL. One ICT under prolonged outage may be revived.

A.11.4 NRLDC representative requested that ATC/TTC assessment of all states be submitted well before high demand season of 2023 in NR.

A.11.5 NRPC forum advised utilities to commission new transmission elements at the earliest as discussed so that challenge of meeting load in high demand season can be met with minimal issues.

B. Tower strengthening activities:

A.11.6 NRLDC representative stated that there have been number of instances of tower collapse & damage in the past during thunder storms which resulted in constraints in supply power for extended duration of time. Number of tower collapse incidents occurred during last summer also in May/Jun 2021 & 2022 in which many EHV lines including 765kV lines were out on tower collapse.

A.11.7 All utilities were requested to ensure availability of Emergency Restoration System (ERS) for early restoration of supply. Each utility shall work on plan for tower repairing work before April. Extra precautions need to be taken care for important lines which have history of tripping during thunderstorm/ windstorm.

A.11.8 NRPC advised all utilities to ensure availability of ERS and take necessary actions for tower repairing work before April 2023.

A.12 Multiple events of tripping in generation complexes in UP state (Agenda by NRLDC)

A.12.1 Northern region witnesses dense fog during winter every year. Due to pollution & fog (SMOG), EHV lines used to trip during such weather conditions. In order to avoid tripping of EHV lines during foggy weather, cleaning & washing of insulators, replacement of porcelain insulators with polymer insulators and other maintenance activities are being carried out. This year also since Sep'22, NRLDC has started raising this issue for prompt actions by all utilities including UPPTCL.

A.12.2 However despite above, since start of fog from 19th Dec 2022 this year on frequent basis, lines in UP state are tripping from large generating complexes of Anpara, Bara, Meja, Harduaganj etc., e.g., 400kV Anpara-Mau has tripped 5 times, Bara-Meja D/C have tripped 4 times, 765kV Bara-Mainpuri ckt 4 times and 765kV AnparaC-Unnao 3 times since mid-December 2022.

1. Bara evacuation related issues

a) On 12th Jan 2023, tripping of 400kV BaraTPS-MejaTPS both ckts and subsequent tripping of 765kV BaraTPS-Mainpuri resulted in outage of 1980 MW (3*660 = 1980 MW) Bara TPS plant. Apart from above, there have been other instances of tripping of 765kV Bara-Mainpuri when SPS at Bara had operated leading to tripping of one unit at Bara TPS.

b) As per PMU, delayed clearance of fault is observed during most of the incidents and A/R operation is also not observed during these incidents.

c) Apart from above, the commissioning of 765kV Bara-Mainpuri ckt1 and 2nd 765/400kV ICT at Bara is pending since long. Due to this Bara evacuation is not even N-1 non-compliant and SPS has implemented in complex after discussion in OCC

forum. It is to be noted that the generation from Bara TPS is being evacuated without N-1 compliance since its commissioning in 2016-17.

d) UP SLDC representative stated that new 1500MVA ICT at Bara is expected to be commissioned by March 2023. 765kV Bara-Mainpuri ckt1 commissioning would take atleast two years as informed by implementing agency.

e) UP SLDC representative also expressed concern on communication issues being encountered as there are three private players involved in Bara evacuation and it was difficult to extract information from these private players.

f) MS NRPC and NRLDC representative stated that grid code has provided authority to SLDC and if any agency is not cooperating with SLDC, the matter may be brought out to notice of appropriate commission for further actions.

g) All concerned were once again advised by NRPC forum to take immediate corrective actions and also for carrying out meticulous preparatory work in advance, every year.

2. **Prolonged outage of 765kV AnparaD-Unnao S/C**

a) 765kV AnparaD-Unnao line was taken under shutdown on 8th Feb 2022 for Loop in Loop Out works of the said line at 765/400kV Obra C. and it was expected that the line works would be completed in 1-2 month and the same would be available before summer season of year 2022. However, it was brought out during discussion in 196th OCC meeting held on 22.06.2022 that
"LILO of 765kV AnparaD-Unnao which were to be terminated at Obra have been reversed i.e. the bay in which AnparaD line was to be installed, Unnao line has been commissioned and vice-versa. The issue is there because reactor was to be commissioned in Obra-Unnao section whereas as per this scheme it is physically for AnparaD-Obra section."

b) NRLDC representative stated that the said line is very critical for safe power evacuation from Singrauli-Anpara complex in case of any shutdown or line contingency. Due to absence of this lines, SPS is in service in the complex, which leads to generation shedding in case of outage of 765kV AnparaC-Unnao line beyond certain power order.

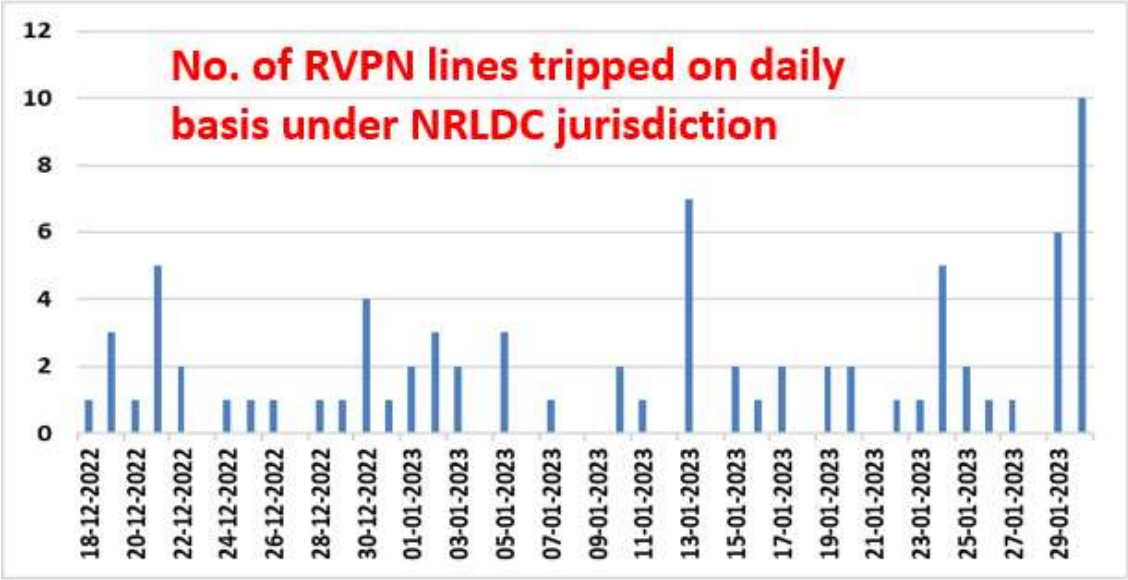
c) Moreover, high loadings in other 400kV lines from Anpara is observed due to the absence of this line, which is leading to limitations on power flow of HVDC Vindhyachal Back To Back (BTB) HVDC (making power flow from Western Region (WR) to Northern Region(NR)). As Vindhyachal Back-to-back HVDC is not being taken towards NR, it further creates high loading on 765kV Vindhyachal-Varanasi D/C line which is an important line as it carries majority of the power imported by Northern region. Taking Vindhyachal BTB towards NR would relieve the loading of 765kV Vindhyachal-Varanasi D/C line especially during high demand season, therefore there is urgent requirement of revival of 765kV AnparaD-Unnao line especially before summer season in Northern region in view of ensuring grid reliability and security.

d) UP SLDC representative informed that 765kV AnparaD-Unnao S/C line is expected to be revived by 10th March 2023 with LILO at Obra-C.

3. Multiple tripping during fog-time in Rajasthan:

a) NRLDC representative stated that:

- 2 events of complete generation loss have been observed in Rajwest TPS due to loss of evacuation path. On both occasions (13.01.23 & 30.01.23) tripping near @05:00hrs
- Number of RVPN lines have tripped on daily basis especially in Rajwest and Kota area
- Insulator type and cleaning status of lines under RVPN may be furnished to NRLDC/ NRPC



b) SLDC representative informed that tripping of lines from Rajwest TPS was encountered on days of very dense fog, Rajwest area also has severe pollution due to lignite fields. Concerned transmission licenses have been asked to carry out cleaning and washing of lines and also explore possibility of replacement of porcelain insulators with polymer insulators.

c) NRPC forum asked all transmission licensees to carry out cleaning and washing of lines before winter and also explore possibility of replacement of porcelain insulators with polymer insulators especially for lines prone to severe pollution. Comprehensive analysis to be done and submitted in NRPC by all transmission licenses in this regard.

A.13 Multiple Generation loss event in ISTS RE complex in Western Rajasthan (Agenda by NRLDC)

A.13.1 NRLDC representative highlighted the multiple events of generation loss in Rajasthan RE generation complex of Northern Region were reported on dated 14th Jan 2023:

1. **Event 1: RE generation drop of approx. 1100MW in Rajasthan RE generation complex**

   At 12:06hrs, multiple elements tripping occurred at 220kV Heerapura S/s (Raj). As per PMU, R-N phase to earth fault in system is observed. At the same time, RE generation drop of approx. 1100MW (as per SCADA) observed in Rajasthan RE generation complex (connected at ISTS pooling stations)

2. **Event 2: RE Generation loss of around 2340 MW at 13:03hrs**

   At 13:03hrs, 765kV Ajmer-Bhadla2 ckt-2 tripped after unsuccessful A/R operation on permanent R-N fault. At the same time, reduction in RE generation of approx. 2340MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

3. **Event 3: RE Generation loss of around 3210 MW at 14:55hrs**

   At 14:55hrs, 400kV Bassi-Heerapura ckt-2 tripped on R-Y phase to phase fault. At the same time, significant reduction in RE generation also observed with delayed recovery due to non compliance of LVRT which led to the over voltage in system. On this over voltage multiple 765kV ISTS lines at 765kV pooling stations tripped. As per PMU, R-Y-N double phase to earth fault is observed. As per SCADA, total reduction in RE generation of approx. 3210MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

4. **Event 4: RE Generation loss of around 4468 MW at 15:18hrs**

   At 15:18hrs, 400kV Phagi-Heerapura ckt-1 tripped on R-Y phase to phase fault. At the same time, significant reduction in RE generation also observed with delayed recovery due to non compliance of LVRT which led to the over voltage in system. On this over voltage multiple 765kV ISTS lines at 765kV pooling stations tripped. During same time, 400kV Fatehgarh1-Fatehgarh2-I also tripped on over voltage which was only emanating path left for RE generation at Adani Solar Park during. Prior to this, at 14:54 hrs on 14th Jan 2023, 400kV Fatehgarh1-Fatehgarh2-II tripped subsequent to multiple tripping at 765kV ISTS pooling station of RE on R-Y-N (L-L-G) fault at 400kV Bassi-Heerapura-II. Thus, evacuation path for 400kV Adani solar park loss at 15:18 hrs.

A.13.2 At the same time, SPS to relive transmission congestions in Bikaner complex operated due to tripping of multiple 765kV lines at Bikaner (PG). On action of SPS, Thar Surya, SBSR, Tata Green Power and RENEW Power RE stations tripped. As per PMU, R-Y-N double phase to earth fault is observed. As per SCADA, total reduction in RE generation of approx. 4468MW observed in Rajasthan RE generation complex (connected at ISTS pooling station).

A.13.3 NRLDC has separately taken up the matter with RE developers through emails/ letters as the faults were cleared timely and the RE generators failed to comply with present LVRT/ HVRT regulations.

A.13.4 Station wise generation loss reported during these events are shown below:

Station Name/ Time of event	Plant capacity (MW)	Generation loss (MW)		
		13:03	14:55	15:16
Bikaner(PG)	2928	375	839	651
Bhadla(PG)	3080	223	1128	1117
Fatehgarh-II(PG)	3180	1196	908	1168
Fatehgarh-I(Adani Pooling)	996	136	79	839
Bhadla-II(PG)	1720	226	433	746
Total ISTS Generation	11904	2156	3387	4521

A.13.5 To analyse the events in detail, following information are required from each Plant for all the event of 14th Jan 2023:

1. Active Power (MW) of Inverters terminal with resolution of atleast 50ms.
2. Reactive Power (MVAR) of Inverters terminals with resolution of atleast 50ms.
3. Instantaneous and RMS voltage at Inverter terminal with resolution of atleast 50ms.
4. SOE of Plant showing tripping (if any) of 220kV lines, 220/33kV ICTs, 33kV feeders, 33/0.69 kV or 33/0.63 kV IDTs, Inverters.
5. Present implemented settings (Downloaded settings) from inverters for LVRT, HVRT, Active power Ramp up rate, Over & Under voltage and Over & Under frequency.
6. Present implemented settings (Downloaded settings from PPC), firmware version of PPC.
7. Reason for significant reduction in active power before any plant evacuating element tripping.
8. Reason for slow active power ramp up rate.
9. Reason for not injecting MVAR during the fault and not absorbing MVAR during high voltage.
10. Detailed report on the analysis done at Plant end for the events.
11. Total generation reduction for the events may be segregated in following categories by the plant to identify the exact reason.

Reason for Generation loss	Quantum of Generation loss (MW) due mentioned reason
PLL Loss of Synchronism	
Momentary Cessation	
Slow Active Power Recovery	
Inverter AC Overvoltage	
Feeder AC Overvoltage	
Inverter AC Undervoltage	
Feeder AC Undervoltage	
Inverter DC Voltage Unbalance	
Inverter AC Overcurrent	
Inverter DC Overcurrent	
Inverter Overfrequency	
Inverter Underfrequency	
Inverter UPS Failure	
Tripping of Any elements (If any) and details thereof	

A.13.6 In all the events, RE generation reduced significantly at major of the RE plants. The generation at some plants picked up only after 2-3 minutes. This large outage of solar/wind generation could be interpreted either as failure of LVRT/HVRT capability of the PV inverters /WTG or tripping of lines/transformer connecting the plants to respective pooling stations leading to over voltage in system. Such behaviour during transients is neither expected nor desirable.

A.13.7 Latest status as available with NRLDC of details of present implemented settings at these plants is attached as **Annexure-X**.

A.13.8 As per preliminary analysis done by NRLDC:

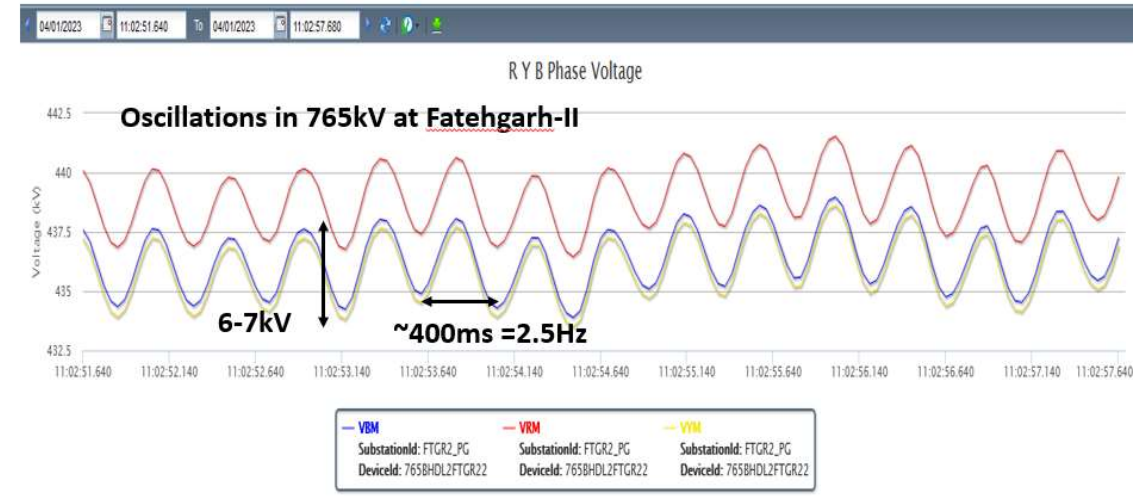
1. ASEJ1PL_450MW_Fatehgarh-II(PG) tripped on instantaneous undervoltage during fault at 13:03hrs (Plant kept Under voltage DR triggering and tripping also at 0.9pu voltage on 220kV line), after tripping Plant rectified it and disable tripping at 0.9pu. Later at 14:55hrs and 15:18hrs, plant was able to recover MW.
2. ASEJ1PL is recently commissioned plant whose Inverters setting were kept as came from the studies and HVRT settings for different stages were increased.
3. It has also been observed those plants which have increased the HVRT settings for different stages are having better performance in recovering and retaining the generation.
4. Eden also changed the HVRT settings, no inverters tripping (failure of generation recovery) occurred in Eden solar plant, at 15:18hrs 220kV line tripped due to OV (setting were 112%, 5sec).
5. Those plants whose settings are mentioned wrong and communicated to plants earlier after on Oct'22 are found to be failed to recover the generation in all the event like Clean Solar Power (Jodhpur) Pvt. Ltd., Mahindra Renewable Pvt. Ltd. etc.
6. Several plants are yet to submit the present implemented settings and in different event some wrong undesirable settings have been found in different RE plants.

A.13.9 No Solar developer was available for comments in the meeting.

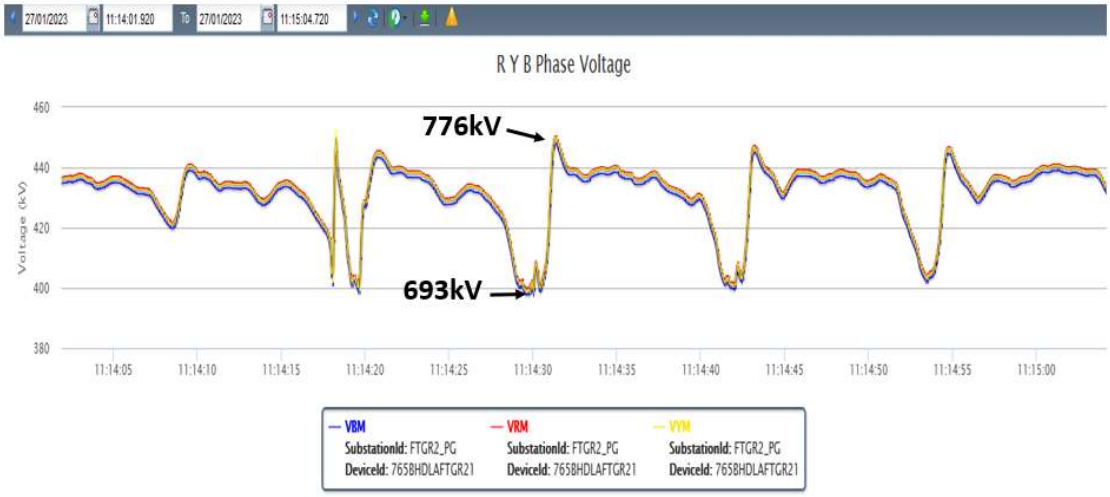
A.13.10 ED, NRLDC and MS NRPC expressed concern on non-participation of solar developers in NRPC.

A.13.11 Apart from LVRT/HVRT related issue, tripping were also there on account of loss of evacuation path, therefore, it was advised that the already delayed transmission system for RE evacuation Phase-II may be expedited, to avoid generation loss on account of loss of evacuation path.

A.13.12 NRLDC representative stated that frequent voltage oscillation events have also been observed during solar generation period 10:00hrs-14:00hrs in Rajasthan control area as well as in ISTS RE pooling stations. In majority of the cases the oscillation frequency is observed to be around 2.5Hz with predominant oscillations in voltage.



A.13.13 Apart from above huge variations in voltages were also observed on 27th Jan 2023 with voltages at 765kV Fatehgarh-II varying from 693kV to 776kV within few seconds.



A.13.14 NRLDC has already written letters to plants 13.04.2022 and 08.08.2022 to carry out power quality measurement tests and harmonic distortion analysis as mandated in CEA regulations. Same was also requested in meeting held with RE developers on 13.06.2022, 21.06.2022 and 21.09.2022 and various other mails. Reply from ISTS RE developers is still awaited.

A.13.15 MS NRPC also expressed concern on the same and asked NRLDC to issue non-compliance messages to RE developers with copy to Member (Grid Operation) and MS NRPC. CEA and NRPC would also then separately take up the matter with Ministry of Power.

A.13.16 Following actions were requested from RE plants:

- Taking actions for LVRT/HVRT compliance
- Harmonic testing report submission to NRLDC/ CTUIL
- Submission of details of all events as requested by NRLDC
- Quick actions for RE curtailment as suggested by NRLDC in case of oscillations in the grid

A.13.17 In this situation, Rajasthan was asked to take following actions on immediate basis:

1. Improve the power factor and reduce the MVAr drawls at mentioned sub-stations in previous agenda.
2. Quantum of load and time block wise breakup being connected in Jodhpur-Kankani and Merta load center area may be reviewed.
3. Check whether oscillation is getting initiated on connecting load during Solar/Wind ramping period and when Rajasthan demand exceeds 14500MW.
4. Expedite installing PMU at Kankani, Ramgarh, Akal,Bhadla (RS) and Bikaner (RS) substations to locate the exact source of oscillation and analyse Rajasthan Intra-state RE plants behavior during any event of fault.

A.13.18 Apart from above, it was requested that POWERGRID may expedite commissioning of STATCOMs in ISTS-RE Pooling substations. During commissioning of STATCOMs, it may be ensured that POD (power oscillation damping) functionality is enabled and study report of POD may be shared with NRLDC before first time charging for any comments/ observations.

A.13.19 CTU was asked to provide update regarding the utility of STATCOMs in damping out oscillations being observed in the grid and other remedial measures.

A.13.20 POWERGRID representative stated that the STATCOM are expected to be first time charged by March 2023 and they would be tuning Power oscillation damper in coordination with their Corporate Engg. team.

A.13.21 NRPC forum expressed concern on the same and asked all utilities to take necessary actions as deliberated.

A.14 Connectivity of Central Control room of Sterlite with Hotline Exchanges (Agenda by NRLDC)

A.14.1 Sterlite Power vide letter no: SPTL/O&M/2022-23/11/01 dated 25.11.2022 (**Annexure-XI**) has informed that M/s Sterlite Power Transmission Limited is setting up Remote Control Centre at Gurugram intended as central coordination node of all assets/SPV's (including operational and under construction projects) of Sterlite Power.

A.14.2 So, for centralized coordination of the of SPTL central control room at Gurugram with NRLDC, STPL has requested NRLDC allow VOIP link connectivity access of their Control Room with NRLDC and onward towards all other RLDC's.

A.14.3 It may be noted that as per Communication Regulations, 2017 "The CTU shall provide access to its wideband network for grid management and asset management by all users."

A.14.4 In this regard, CTU is requested to update procedure to integrate with Hotline exchange. Matter was also discussed in 21st TeST Meeting held on 13.12.2022.

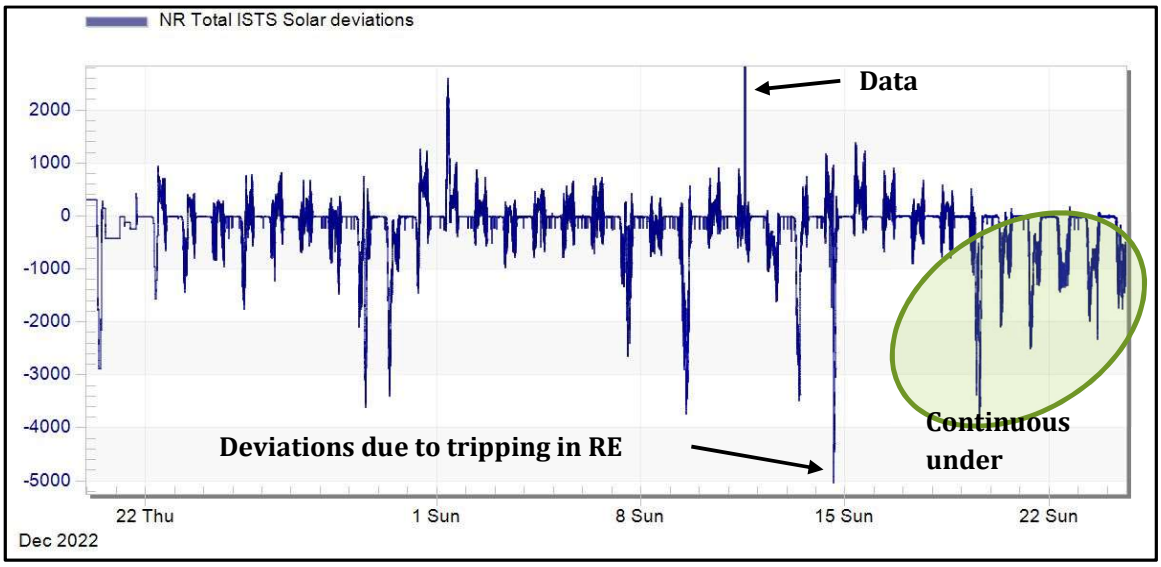
A.14.5 MS NRPC advised SE(O), NRPC to call special meeting to discuss the issue at the earliest as agreed in 21st Test meeting. Thereafter, the matter may be taken up in NRPC forum.

A.15 Issues related to ISTS RE generators (Agenda by NRLDC)

A.15.1 Huge deviations by ISTS connected solar generation

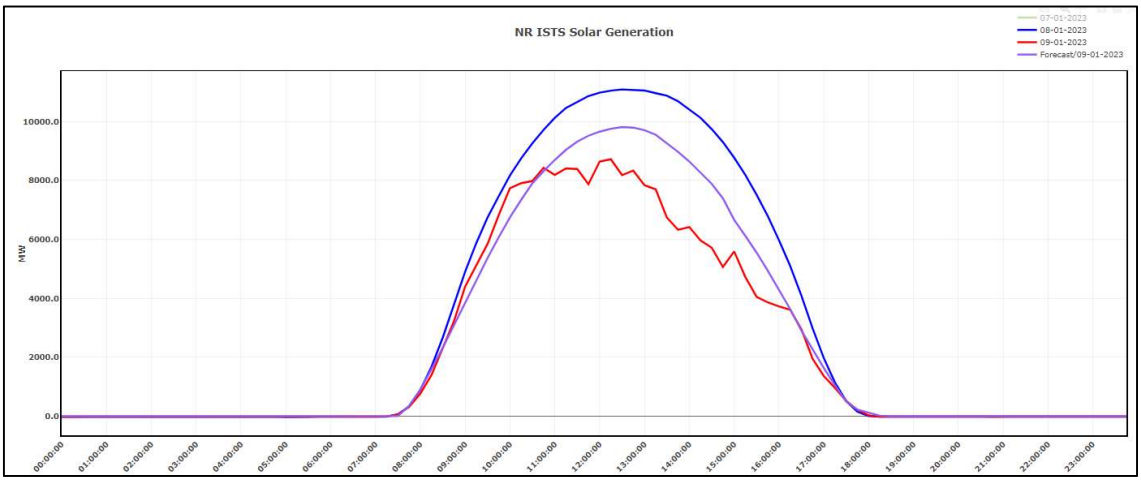
a) It has been emphasised many times that actual generation should not deviate from the schedule in order to maintain load generation balance and therefore grid frequency with in the IEGC band. However, it is being observed that there is a large difference between schedule and actual generation of RE plants connected to ISTS grid in Northern Region.

b) NRLDC representative stated that on number of days, during Dec-2022 to Jan-2023, there were huge deviations by ISTS Solar generators. Plot showing deviations of ISTS connected Solar generation in Northern region for 15Dec 2022 -22Jan 2023 as presented in the meeting is shown below:

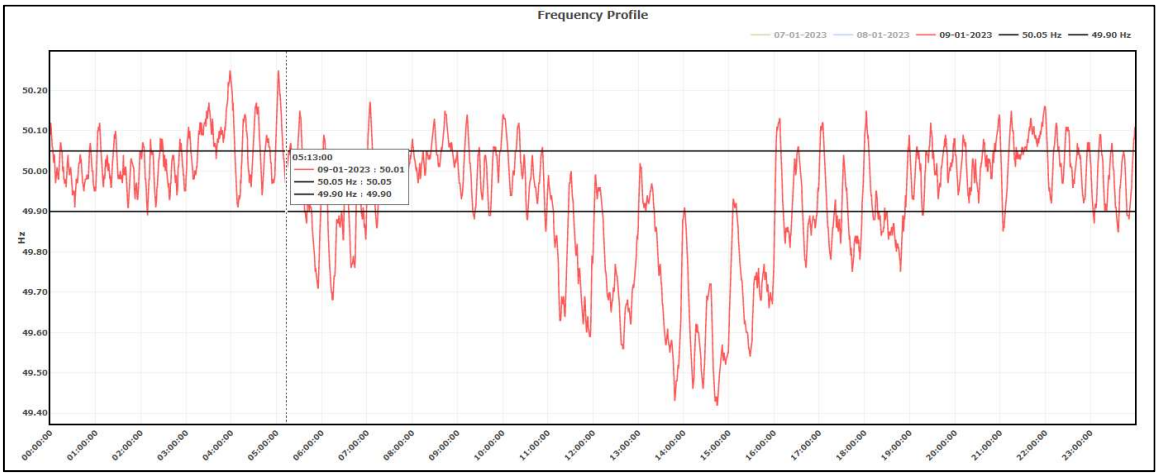


c) It can be seen that there are huge deviations by ISTS connected solar generators on some days. Managing the grid frequency due to such under injections become very challenging as schedule are also not timely revised by these generators.

d) Instance of 9th Jan'23 was presented in the meeting, approx. 2700MW difference was observed between 14:45 Hrs to 15:00 Hrs due to large variation in actual generation and schedule as shown below:



e) In the view of above the frequency even touched to 49.41Hz between 14:45 Hrs to 15:00 Hrs. Further continuously low grid frequency was observed from 11:00 Hrs to 16:00 Hrs during under injection of NR ISTS connected RE plants.



f) These events bring out following from RE developer side:

(i) Inaccurate forecast to take care of fog/cloud cover issues.
(ii) Poor utilization of schedule revision facilities by RE plants.

g) ED NRLDC expressed concern and stated that there are large number of issues arising out of deviations by ISTS connected solar generators. Less number of units are available on bar, which are already being fully scheduled in case of under injection by RE plants. As less capacity is available for balancing, low frequency operation are being observed due to under injection by RE developers.

h) Response from RE developers is very poor and on number of occasions the person on phone is directing NRLDC control room officers to talk to other persons.

i) NRPC forum expressed concern on the situation and stated that RE developers need to take quick actions for resolution of issues highlighted by NRLDC.

j) RE developers were asked to improve the forecast as well as prompt schedule revision by observing ground conditions and fog/cloud forecasts.

A.15.2 Communication related Issues with RE plants

a) In the meeting held on 21st June 2022 with all RE developers, it was discussed and agreed to establish control room (24x7) with Landline/Mobile no, dedicated email id, address and shift operation timing.

b) Azure, Adani, Avaada and Renew have submitted details regarding common control room for communication with all plants under individual owners.

c) Moreover, on number of occasions it is being observed that the contact details provided at the time of registration/ first time charging details are changed and in real-time, NRLDC control room officers are not able to contact the responsible person.

d) It was requested that all other plants provide details of common control room and also regularly update contact details so that NRLDC is aware of the responsible person including control room operators of these RE plants for quick actions.

e) NRPC forum expressed concern on the situation and stated that RE developers need to take quick actions for resolution of issues highlighted by NRLDC.

*****

File No.CEA-PS-14-95/1/2023-PSETD Division/66-71

Annexure I

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली अभियांत्रिकी एवं प्रौद्योगिकी विकास प्रभाग
Power System Engineering & Technology Development Division
3rd Floor, Sewa Bhawan, R.K. Puram
New Delhi – 66, Telephone: 26732435
(Email: ce-psetd@gov.in)

To,

Shri Mukesh Kumar Sharma,
Director (Operations), Delhi Transco Limited,
Shakti Sadan, Kotla Road, New Delhi-110002

विषय: Requirement of 02 Nos. 500 MVA, 400/220 kV and 02 Nos. 160 MVA, 220/66 kV Power Transformers-reg.

महोदय,

Please refer to your letter No. F.DTL/Dir(O)/201/2022-23/F.03/216 dated 11.01.2023 on the subject matter vide which CEA was requested to direct other State Transmission Utility (STUs) to provide 02 Nos. 500 MVA and 02 Nos. 160 MVA Transformers on returnable basis or cost-plus basis so that DTL may have spare Power Transformers in-hand to overcome any exigency during the period of G-20 events scheduled to be held in Delhi in the year 2023.

2. It is understood that DTL was well aware in advance about the hosting of G-20 Summit in the year 2023 by India and many related events including Summit to be held in Capital city of Delhi. Therefore, keeping in view, the importance of the said event, DTL may have taken the advance action for ensuring the availability of the spare transformers for the reliable power supply in the said event.

3. In this regard, it is to mention that CEA would explore and assess the availability of the spare transformers with constituent of Northern Region for making available to DTL. However, DTL has also to take the necessary action in this regard for getting the spare transformers for ensuring the reliability of power supply during G-20 event.

भवदीय/ Regards

23/01/2023

(भंवर सिंह मीना /Bhanwar Singh Meena)
उपनिदेशक/ Deputy Director

Copy to:

1. Joint Secretary (Transmission), Ministry of Power
2. Member Secretary, NRPC-With a request to take up the issue with constituent members of NRPC to facilitate requested capacity Power Transformers to DTL on returnable or cost-plus basis.
3. SA to Chairperson, CEA
4. SA to Member (GO&D), CEA
5. SA to Member(PS), CEA

A.7.1 NTPC apprised that PG Test of Unchahar#6 unit was scheduled from 00:00 hrs of 23.08.2022 to 24.00 Hrs of 25.08.2022 in compliance of MOEF Directives & strict Supreme court deadlines. Unit was to be Operated at full Load for above 72 Hrs, to meet the test conditions.

A.7.2 To ensure full load, major beneficiaries were approached to maintain full drawl schedule for above period. Rajasthan, J&K, Haryana have given their consent to maintain full drawl schedule. UP has not responded/ not given consent for maintaining schedule.

A.7.3 With assumptions that technical minimum of UP & Full schedule of rest beneficiaries and some quantum of over injection, test conditions can be achieved, and Test can be performed at 75% load with minor deviations.

A.7.4 In real time, UP has restricted their drawl schedule (to 15 MW), less than their share of Tech minimum, even though other beneficiaries were drawing full share of allocation. Therefore, ongoing PG test have to be suspended on 23.08.2022.

A.7.5 This issue has been discussed in 198th OCC but approval was not given on above dates in view of reservations from UP.

A.7.6 Meeting SOX emissions within limits as per MOEF Directives is a statutory requirement and compliance of above is mandatory. Moreover, in future all Units with FGD installation must have to prove above compliance by conducting PG Test, which is not possible under the circumstances as above.

A.7.7 NTPC stressed over need for requirement of full schedule for compliance of MOEF directives and stated they got the consent of other beneficiaries but UP has been resistant to provide the same. He added that after their request for full schedule, UP has further decreased the scheduling from 120 MW to 15 MW i.e. even below UP's share of TM.

A.7.8 A graphical presentation was also made by NRPC Sectt. regarding overdrawl and maket purchase by UP in first fortnight of Aug'22. It was highlighted that UP has taken energy from RTM and DAM in more than 60 time blocks of a day from 6th Aug'22 onwards.

A.7.9 UP claimed that deviations may be in peak only and power may have been purchased from open access consumers. UP has not found machine suitable for scheduling as per MOD. Further, UP requested that forum may press hard for necessary changes in CERC regulations for facilitating such shutdowns.

A.7.10 MS, NRPC stated that a letter may be sent to Chief Secretary, UP, MD, UPPCL with copy to Chairperson, CEA for apprising the issue. He opined that UP should cooperate with NTPC as FGD is a statutory requirement.

A.7.11 NRLDC was also requested to explore whether full schedule can be facilitated by them under any provisions of IEGC/CERC Regulation since it is a mandatory requirement.

from Dhaulasidh to Sujanpur with single zebra configuration along with two number of 220kV bays at Sujanpur. Accordingly, it was decided that SJVNL to approach HPPTCL for grant of connectivity and CTU to revoke the connectivity granted & revise LTA for Dhaulasidh HEP at Hamirpur.

HPPTCL vide intimation dated 15/12/2021 had granted Connectivity to Dhaulasidh HEP (66 MW) through HPPTCL transmission system subject to capex approval of Sujanpur switching station by HPERC. In the 3rd CMETS meeting, SJVN requested to keep the revocation of Connectivity under ISTS on hold till resolution of capex approval issue as per HPPTCL intimation.

Subsequently, SJVNL vide email dated 14/06/2022 reverted that matter regarding capex approval as well as the evacuation of power from Dhaulasidh HEP through the HPPTCL network has been discussed and resolved with HPPTCL. SJVNL has also submitted the application for grant of LTA for Dhaulasidh HEP to /HPPTCL, which is under process.

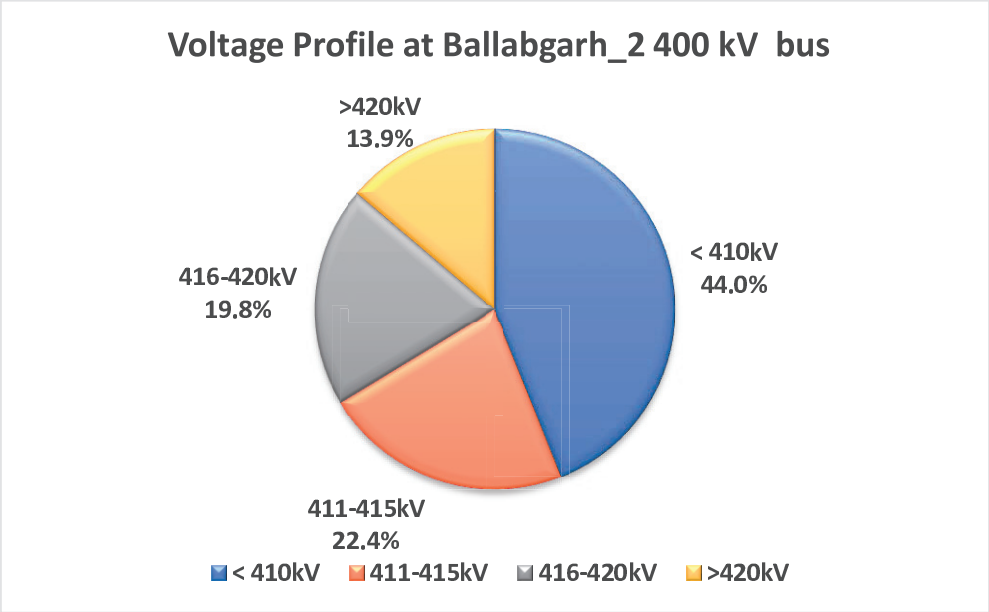
In view of above, it was decided that Connectivity granted to SJVN Ltd. for Dhaulasidh HEP in ISTS shall to be revoked and LTA in ISTS for the same shall also be revised for connectivity with the grid through HPPTCL's system.

B. ISTS Expansion in Northern Region

1. Replacement of 420kV 80 MVAR 3-Ph Bus Reactor at Ballabgarh

It was deliberated that in the 53rd NRPC meeting held on 29.04.22, POWERGRID agenda for replacement of 420kV 80 MVAR 3-Ph Bus Reactor at Ballabgarh was discussed. POWERGRID had approached CPRI to carry out Residual Life Assessment Studies for the 80 MVAR bus reactor at 400 kV Ballabgarh S/s. The bus reactor has completed 32 years of service and thus crossed its useful life of 25 years from commissioning. CPRI has recommended a replacement for the same. Considering above, NRPC decided that the matter may first be discussed in the Consultative Meeting of NR.

From the study results it was observed that taking the 80 MVAr bus reactor into service results in a voltage drop of around 1 kV at Ballabgarh Bus. If the 80 MVAr bus reactor is replaced with 125 MVAr the resultant voltage drop is around 2 kV. Voltage profile of 400 kV Ballabgarh S/s for the last one year (June'21-June'22) is as under:



From above, it may be seen that 400kV Ballabgarh S/s voltage remained >415 kV for about 34% time. Considering above and the high voltage prevailing in NR grid, it is recommended to replace 420 kV 80MVAr bus reactor at Ballabgarh with 420 kV 125 MVAr bus reactor.

CEA and POSOCO also recommended for Replacement of 80MVAR (420kV) Bus Reactor at Ballabgarh S/s with 125 MVAR (420kV) Bus Reactor in view of prevailing high voltage issues in NR. POWERGRID also confirmed feasibility of replacement. In view of above, proposal for 125 MVAR (420kV) Bus Reactor was agreed.

2. Implementation of "N -1" contingency at RE pooling substations in NR

It was deliberated that CEA transmission planning criteria, section 16.2 mentions that "The *'N-1' criteria may not be applied to the immediate connectivity of wind/solar farms with the ISTS/Intra-STS grid i.e. the line connecting the farm to the grid and the step-up transformers at the grid station."* The above criteria is also followed in planning of transmission system for integration of renewable energy zones in Rajasthan.

Annexure IV

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
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/AI/00/9th CCTP

28th November 2022

OFFICE MEMORANDUM

Sub: Inter-State Transmission Schemes (costing up to Rs.100 Cr.) to be taken up for implementation under Regulated Tariff Mechanism (RTM).

The undersigned is directed to inform that CTU has approved the implementation of the following ISTS costing less than or equal to Rs.100 Cr. in line with the MoP office order dated 28.10.2021 under the Regulated Tariff Mechanism (RTM) mode by the implementing agencies as indicated in the table below:

Sl.	Name of scheme	Implementing Agency
Western Region		
1.	Implementation of 1 no. 220kV line bay at Bhuj PS for providing Connectivity to M/s NTPC Renewable Energy Ltd. (300MW)	Power Grid Corporation of India Ltd.
2.	Transmission System for providing connectivity to M/s VEH Jayin Renewables Pvt. Ltd. at Rajgarh (PG) S/s	Power Grid Corporation of India Ltd.
3.	Western Region Expansion Scheme XXXI (WRES-XXXI): Part C	Power Grid Corporation of India Ltd.
4.	Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part D	Power Grid Corporation of India Ltd.
Northern Region		
5.	Implementation of 2 nos. of 220 kV line bays at 400/220 kV Panchkula (Barwala) (PG) S/s for interconnection with 220 kV Dera Bassi S/s.	Power Grid Corporation of India Ltd.
6.	Replacement of 1x315 MVA 400/220kV ICT (ICT-1) at 400/220 kV Ludhiana (PG) S/s with 1x500 MVA 400/220kV ICT	Power Grid Corporation of India Ltd.
7.	Replacement of 1x250 MVA, 400/220 kV ICT at 765/400/220 kV Moga (PG) S/s with 1x500 MVA 400/220kV ICT along with associated works at 220kV level.	Power Grid Corporation of India Ltd.
8.	Augmentation of Transformation Capacity by 1x500 MVA, 400/220kV ICT (3rd) at 400/220 kV Patran (GIS) S/s	Patran Transmission Company Ltd. (PTCL) (a subsidiary of India Grid Trust)
9.	Implementation of 1 no. of 220 kV line bay at 400/220kV Bikaner-II PS for interconnection of solar project (M/s NHPC Ltd.):	POWERGRID Bikaner Transmission System Ltd. {a subsidiary of Power Grid Corporation of India Ltd. [erstwhile known as Bikaner-II Bhiwadi Transco Ltd.]

Eastern Region		
10.	Eastern Region Expansion Scheme-XXX (ERES-XXX)	Power Grid Corporation of India Ltd.
11.	Eastern Region Expansion Scheme-XXXIII (ERES-XXXIII)	Power Grid Corporation of India Ltd.
North Eastern Region		
12.	North Eastern Region Expansion Scheme-XVIII (NERES-XVIII)	Power Grid Corporation of India Ltd.
13.	North Eastern Region Expansion Scheme-XX (NERES-XX)	Power Grid Corporation of India Ltd.
Southern Region		
14.	Implementation of 1 no. 400kV line bay at Kurnool New S/s for providing Connectivity to M/s Greenko AP01 IREP Pvt. Ltd. (2nd 400kV line bay for M/s Greenko)	Power Grid Corporation of India Ltd.

The detailed scope of works for the above transmission schemes, as approved by CTU is given at **Annexure-I**.

Implementing agencies shall enter into a concession agreement with CTU for the implementation of the above-mentioned schemes through the Regulated Tariff Mechanism (RTM).

This issues with the approval of Competent Authority.

Jasbir Singh
28/12/22

(Jasbir Singh)
Chief General Manager

Encl: as stated.

To:

1. **The Chairman & Managing Director** Power Grid Corporation of India Ltd., Saudamini, Plot No. 2, Sector-29, Gurgaon- 122 001	2. **Shri Lokendra Singh Ranawat** Head (Regulatory) Patran Transmission Company Ltd., (PTCL) (a subsidiary of India Grid Trust) Unit No. 101, First Floor, Windsor, Village KoleKalyan, off CST Road, Vidyanagari Marg, Kalina, Santacruz (East), Mumbai – 400 098

Copy to:

1. **Shri Ishan Sharan** Chief Engineer & Member Secretary (NCT) Central Electricity Authority Sewa Bhawan, R. K. Puram, New Delhi-110 066.	2. **Shri Goutam Ghosh** Director (Trans) Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi 110 001

Annexure-I

Western Region

1. Implementation of 1 no. 220kV line bay at Bhuj PS for providing Connectivity to M/s NTPC Renewable Energy Ltd. (300MW)

Sl.	*Scope of the Transmission Scheme*	*Capacity /km*	*Implementation Timeframe.*
1	1 no. 220kV line bay at Bhuj PS associated with M/s NTPC Renewable Energy Ltd. (300MW)	220kV line bay: 1 no.	15 months from the date of issue of OM by CTUIL (*refer Note a*).
		Total Estimated Cost:	**INR 5.84 Crore**

Note:

a. *Best efforts shall be carried out to implement the transmission scheme within 12 months from the issue of OM by CTUIL.*

2. Transmission System for providing connectivity to M/s VEH Jayin Renewables Pvt. Ltd. at Rajgarh (PG) S/s

Sl.	*Scope of the Transmission Scheme*	*Capacity /km*	*Implementation Timeframe.*
1.	220kV bus extension (GIS) of Rajgarh 400/220 kV (PG) S/s along with 220kV Bus Coupler bay for extended bus.	• Bus Extension along with 220kV Bus coupler bay- 1 no. using GIS • Space provision in 220kV GIS Hall for accommodating 5 nos. 220kV future bays	21 months from the issue of OM by CTUIL.
2.	220kV bus sectionaliser bay (GIS) between existing & extended 220 kV bus of Rajgarh S/s.	• 220kV Bus Sectionaliser – 1 set (GIS)	
3.	220kV GIS line bay at Rajgarh 400/220 kV (PG) S/s (on extended bus) for RE interconnection.	• 220kV line bay: 1 no. (GIS) along with 220kV Bus Duct for Bus Extension (AIS to GIS building)	
		Total Estimated Cost:	**INR 29.33 Crore**

3. Western Region Expansion Scheme XXXI (WRES-XXXI): Part C

Sl.	*Scope of the Transmission Scheme*	*Capacity /km*	*Implementation Timeframe.*
1.	Augmentation of transformation capacity at Pune (GIS) 765/400	• 765/400 kV, 1500 MVA ICT – 1 no.	21 months from the issue of OM by CTUIL (refer note-a)

Sl.	Scope of the Transmission Scheme	Capacity /km	Implementation Timeframe.
	kV substation by 1x1500 MVA ICT (3rd)	• 400 kV ICT bay (GIS) – 1 no. • 765/400kV, 1500MVA ICT in existing bay with GIS bus duct along with associated GIS to AIS termination, Erection hardware are required.	
		Total Estimated Cost:	**INR 86.01 Crore**

Note:

a. Best efforts shall be carried out to implement the transmission scheme within 18 months from the issue of OM by CTUIL.

b. 1 no. 765kV ICT bay is available (up to wall of GIS building)

4. Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part D

Sl.	Scope of the Transmission Scheme	Capacity /km	Implementation Timeframe.
1.	Installation of 1x500 MVA, 400/220 kV ICT (4th) along with associated ICT bays at Satna(PG)	• 400/220 kV, 500 MVA ICT – 1 no. • 400 kV ICT bay – 1 no. • 220 kV ICT bay – 1 no. (includes 220kV Cable interconnection for 220kV side of ICT)	18 months from the issue of OM by CTUIL
2.	2 No. of 220kV line bays at Satna for LILO of Satna 220kV - Maihar 220kV line at Satna (PG) S/s	220kV line bay – 2 nos.	
		Total Estimated Cost:	**INR 77.52 Crore**

Northern Region

5. Implementation of 2 nos. of 220 kV line bays at 400/220 kV Panchkula (Barwala) (PG) S/s for interconnection with 220 kV Dera Bassi S/s

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1	Implementation of 2 nos. of 220 kV line bays at 400/220 kV Panchkula (Barwala) (PG) S/s for interconnection with 220 kV Dera Bassi S/s	220 kV line bays – 2 nos.	31.05.24
		Total Estimated Cost:	**INR 11.68 Crore**

6. Replacement of 1x315 MVA 400/220kV ICT (ICT-1) at 400/220 kV Ludhiana (PG) S/s with 1x500 MVA 400/220kV ICT

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1	Replacement of 1x315 MVA 400/220kV ICT (ICT-1) at 400/220 kV Ludhiana (PG) S/s with 1x500 MVA 400/220kV ICT * *along with 66kV cable for shifting auxiliary supply to SVC from ICT-1 to ICT-2	500 MVA 400/220 kV ICT- 1no.	18 months from the issue of OM by CTUIL (refer note-a)
		Total Estimated Cost:	**INR 26.98 Crore**

Note:

a. *TSP may expedite the implementation of the above transmission scheme to the extent possible, as per the request of PSTCL vide letter dated 06.09.22 for implementation schedule of May'23 (reconfirmed to 31.05.23 vide mail dated 01.11.22)*

7. Replacement of 1x250 MVA, 400/220 kV ICT at 765/400/220 kV Moga (PG) S/s with 1x500 MVA 400/220kV ICT along with associated works at 220kV level

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	Replacement of 1x250 MVA, 400/220 kV ICT at 765/400/220 kV Moga (PG) S/s with 1x500 MVA 400/220kV ICT along with associated works at 220 kV level	500 MVA 400/220 kV ICT- 1no. (with associated works at 220 kV level)	18 months from the issue of OM by CTUIL (refer note a)
		Total Estimated Cost:	**INR 27.03Crore**

Note:

a. *TSP may expedite the implementation of the above transmission scheme to the extent possible, as per the request of PSTCL vide letter dated 06.09.22 for implementation schedule of May'23 (reconfirmed to 31.05.23 vide mail dated 01.11.22)*

8. Augmentation of Transformation Capacity by 1x500 MVA, 400/220kV ICT (3rd) at 400/220 kV Patran (GIS) S/s

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	Augmentation of Transformation Capacity by 1x500 MVA, 400/220kV ICT (3rd) at 400/220 kV Patran (GIS) S/s along with GIS duct (at 400kV and 220kV) in new diameter of ICT – Tie– Line.	• 500 MVA 400/220 kV ICT- 1no. • 400 kV ICT bay (GIS) – 1 no. • 400kV bay (GIS) for diameter completion for	21 months from the issue of OM by CTUIL.

		future line (duct up to outside GIS Hall) – 1 no. • 220 kV ICT bay (GIS) – 1 no.	
		Total Estimated Cost:	**INR 65.19 Crore**

Note:

a. Best efforts shall be carried out to implement the transmission scheme by 31.05.2024 as per the request of PSTCL letter vide dated 06.09.22 and mail dated 01.11.2022

9. Implementation of 1 no. of 220 kV line bay at 400/220kV Bikaner-II PS for interconnection of solar project (M/s NHPC Ltd.)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	1 no. of 220 kV line bay at 400/220 kV Bikaner-II PS for interconnection of RE project (NHPC Ltd.)	• 220 kV line bay – 1 no. (refer note a)	15 months from the issue of OM by CTUIL
2.	Implementation of 220kV Bus sectionalizer along with bus coupler and transfer bus coupler at 400/220kV Bikaner–II PS	• 220kV Bus Sectionalizer Bay–1 Set • 220kV Bus Coupler Bay–1 No. • 220kV Transfer Bus Coupler Bay–1No. • Bus works for future Bays (4 Nos. of Line Bays & 3 Nos. of ICT Bays)	
		Total Estimated Cost:	**INR 29.21 Crore**

Note:

a. At 220 kV Bikaner-II, future line bays in Section-C are proposed to be allocated to RE developers with bays in developer's scope (no. 230-231) and ISTS scope (no. 226-227). Accordingly, 220 kV bus works may also be suitably taken up under the above scope.

Eastern Region

10. Eastern Region Expansion Scheme-XXX (ERES-XXX)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe

1.	Installation of existing spare 132/66kV, 1x50MVA ICT (already stationed at Gangtok) as 3rd ICT at Gangtok (POWERGRID) S/s along with conversion of existing 132kV TBC bay as 132kV ICT bay for 3rd ICT and construction of new 66kV ICT bay in Hybrid/Outdoor GIS with suitable modification in the gantry structure of 66kV side.	• 132/66kV, 50MVA spare ICT as 3rd ICT – 1 no. • Conversion of 132kV TBC bay to ICT bay – 1 no. • New 66kV ICT bay (in Hybrid/Outdoor GIS) – 1 no.	21 months from the issue of OM by CTUIL (*best efforts may be made for early commissioning to the extent possible)*
2.	Construction of new 132kV TBC bay in Hybrid/Outdoor GIS.	• New 132kV TBC bay (in Hybrid/Outdoor GIS) – 1 no.	
		Total Estimated Cost:	**INR 11.64 Crore**

11. Eastern Region Expansion Scheme-XXXIII (ERES-XXXIII)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	Reconductoring of Rangpo – Gangtok 132kV D/c line with single HTLS conductor of 800A (at nominal voltage level).	Ckt-1: 28km Ckt-2: 26km	24 months from the issue of OM by CTUIL.
2.	Upgradation of CTs at Gangtok end in both circuits of Rangpo – Gangtok 132kV D/c line from 600A to rating commensurate with rating of HTLS conductor (800A)	-	
		Total Estimated Cost:	**INR 23.08 Crore**

North Eastern Region

12. North Eastern Region Expansion Scheme-XVIII (NERES-XVIII)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	Reconductoring of Melriat (GIS) (POWERGRID) – Zuangtui (Mizoram) 132kV ACSR Panther S/c line with Single HTLS conductor of 900A (at nominal voltage level) ***Note:*** *The existing line bay and dead tower at Melriat (POWERGRID) end of Melriat (POWERGRID) – Zuangtui (Mizoram) 132kV HTLS S/c line may be kept as spare bay after shifting of the line to newly constructed bay.*	10.13km	Apr 2025

2.	One (1) new 132kV line bay at Melriat (GIS) (POWERGRID) S/s (of rating commensurate with rating of HTLS viz. 900A) for shifting of Melriat (GIS) (POWERGRID) – Zuangtui (Mizoram) 132kV HTLS line from existing bay and termination of the HTLS line in the new bay (0.5km including approx. 5 nos. towers)	• 132kV GIS line bay – 1 no. • New 132kV S/c HTLS line section – 0.5km *(including approx. 5 nos. towers)*	
3.	Replacement of existing CT of 600/1A at Zuangtui (Mizoram) end in Melriat (GIS) (POWERGRID) – Zuangtui (Mizoram) 132kV S/c line with rating commensurate with ampacity (900A) of HTLS conductor.	-	
4.	Reconductoring of Aizawl (POWERGRID) – Luangmual (Mizoram) 132kV ACSR Panther S/c line with Single HTLS conductor of 800A (at nominal voltage level)	0.8km	
5.	Replacement of existing CT of 600/1A at Luangmual (Mizoram) end in Aizawl (POWERGRID) – Luangmual (Mizoram) 132kV S/c line with rating commensurate with ampacity (800A) of HTLS conductor.	-	
6.	Installation of OPGW in Aizawl (POWERGRID) – Luangmual (Mizoram) 132kV S/c line	0.8km	
		Total Estimated Cost:	**INR 11.49 Crore**

13. North Eastern Region Expansion Scheme-XX (NERES-XX)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1.	Reconductoring of existing Single ACSR Panther Kopili (NEEPCO) – Khandong (NEEPCO) 132kV S/c line-1 (10.9km) of POWERGRID with Single HTLS conductor of ampacity of 800A (at nominal voltage level) along with replacement of existing wave trap at Kopili end and CT at Khandong end with rating commensurate with ampacity (800A) of HTLS conductor	10.9km	24 months from the issue of OM by CTUIL.
2.	Reconductoring of existing Single ACSR Panther Khandong (NEEPCO) – Khliehriat (POWERGRID) 132kV S/c line-1 (42.48km) of POWERGRID with Single HTLS conductor of ampacity of 800A (at nominal voltage level) along with replacement of existing CTs at both ends with rating commensurate with ampacity (800A) of HTLS conductor.	42.48km	

3.	Reconductoring of existing Single AAAC Panther Khandong (NEEPCO) – Khliehriat (POWERGRID) 132kV S/c line-2 (40.93km) of POWERGRID with Single HTLS conductor of ampacity of 800A (at nominal voltage level) along with replacement of existing CTs at both ends & wave trap at Khandong end with rating commensurate with ampacity (800A) of HTLS conductor, and strengthening of requisite tower members (approx. 0.348 MT).	40.93km	
4.	Reconductoring of existing Single ACSR Panther Khliehriat (POWERGRID) – Khliehriat (MePTCL) 132kV S/c POWERGRID line-1 (7.8km) of POWERGRID with Single HTLS conductor of ampacity of 800A (at nominal voltage level) along with replacement of existing CTs at both ends with rating commensurate with ampacity (800A) of HTLS conductor, and strengthening of requisite tower members (approx. 0.121 MT).	7.8km	
5.	Reconductoring of existing Single AAAC Panther Khliehriat (POWERGRID) – Badarpur (POWERGRID) 132kV S/c line (76.64km) with Single HTLS conductor of ampacity of 900A (at nominal voltage level) along with replacement of existing CTs at both ends with rating commensurate with ampacity (900A) of HTLS conductor.	76.64km	
6.	Replacement of existing bus coupler bay CT at Khandong HEP (NEEPCO) switchyard from 600A to 800A		
		Total Estimated Cost:	**INR 77.04 Crore**

Southern Region

14. Implementation of 1 no. 400kV line bay at Kurnool New S/s for providing Connectivity to M/s Greenko AP01 IREP Pvt. Ltd. (2nd 400kV line bay for M/s Greenko)

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation timeframe
1	Implementation of 1 no. 400kV line bay at Kurnool New S/s for providing Connectivity to M/s Greenko AP01 IREP Pvt. Ltd. (2nd 400kV line bay for M/s Greenko)	• 400kV line bay – 1 No (Bay No. 412, SLD enclosed).	15 months from the issue of OM by CTUIL (refer note a.)
		Total Estimated Cost:	**INR 8.55 Crore**

Note:

a. *Best efforts shall be carried out to implement the transmission scheme by 15.12.2023 as per the request of M/s Greenko AP01 IERP Pvt. Ltd. in its application / grant for enhancement of Connectivity.*

A Venu Prasad I.A.S.
Chairman-cum-Managing Director

PUNJAB STATE TRANSMISSION CORPORATION LIMITED

Phone : 0175-2212053
Fax : 0175-2307779
E-mail : cmd@pstcl.org

D.O. No. 673/SPS/D(T)

Punjab State Transmission Corporation Ltd.
Regd. Office : PSEB Head Office,
The Mall, Patiala - 147 001
CIN No. : U40109PB2010SGC033814

Date. 25-11-2022.

Subject: **Addition/ Augmentation at 400kV Substations of PGCIL in the Punjab Control Area.**

*****

Dear K. Sreekant ji,

Following additions/ augmentations have been approved in the 57th NRPC and 11th CMETS meeting which are to be carried out at PGCIL substations, before the onset of next summer/ paddy season i.e. by 31.05.2023.

Sr. No.	Description	Status
1.	Augmentation of one 315 MVA 400/220kV ICT with 1 No. 500MVA 400/220kV ICT at 400KV PGCIL Ludhiana.	Work is to be allotted.
2.	Augmentation of one 250 MVA 400/220kV ICT with one 500MVA 400/220kV ICT at 400KV PGCIL Moga.	Work is to be allotted, one 500MVA ICT available at Malerkotla
3.	Addition of one 500MVA 400/220kV ICT at Work in progress 400KV PGCIL Patiala (Faggan Majra).	Work in progress.

The above works are very critical for the power supply needs and ISTS ATC/ TTC limits of the State. You are requested to impart instructions to the concerned officers to complete all these three works within the stipulated time i.e. by 31st May 2023.

With Regards.

Yours sincerely,

(A Venu Prasad)

Sh. K Sreekant,
Chairman & Managing Director,
Power Grid Corporation of India Limited,
Gurgaon.

Annexure V

e. Upgradation of SCADA

i. POWERGRID apprised that upgradation of SCADA project is likely to be commissioned from January, 2025 to June, 2025 in phased manner. Accordingly, RLDCs/State utilities may extend their ongoing AMC contract for a period of two years as per provisions of AMC contracts.

ii. RVPN stated that AMC is done by POWERGRID only.

iii. POWERGRID stated that they may explore the contract document and accordingly AMC may be done by POWERGRID or State as mentioned in contract document.

A.2.5 Himachal Pradesh raised issue that insurance has been expired last year and is due for renewal. The same has been requested to POWERGRID.

A.2.6 POWERGRID stated payment of insurance cost is pending from states. However, the matter shall be taken up at appropriate level by POWERGRID.

A.2.7 Some states also raised issue that SIEMENS does not listen to them. POWERGRID assured to take up the matter.

A.3 Provision of Phasor measurement units (PMUs) at POI in RE feeders in Rajasthan (agenda by POWERGRID)

A.3.1 CGM, POWERGRID apprised that in the wake of recent grid disturbances in Northern region (RE complex in Rajasthan), a meeting of various stakeholders was convened by POSOCO on 21 September 2022 to discuss the relevant issues. The issue of lack of oscillography data at Inverter terminals and POI was discussed during the meeting. In this context, POSOCO requested POWERGRID to make provision for phasor measurement units (PMUs) at Point of interconnection (POI) i.e. POWERGRID bus and integrate the same in NRLDC system for capturing data during such events.

A.3.2 A list of RE feeders (including upcoming RE generators) terminating at various pooling stations of POWERGRID in Rajasthan is as below (List attached as Annexure-I of agenda):

S. N.	POWERGRID pooling substation	No. of RE feeders (nos.)
1	765/400/220kV Fatehgarh-2 substation	23
2	765/400/220kV Bhadla substation	14
3	765/400/220kV Bhadla-II substation	18

4	765/400/220kV Bikaner substation	8
		63

A.3.3 On the request of POSOCO, it is proposed to install PMUs in above mentioned 63 nos. feeders connected to RE generators for improved dynamic snapshot of the system during grid events/disturbances. The total estimated cost of installation of PMUs in 63 nos. feeders is Rs. ~14.0 Cr.

A.3.4 MS, NRPC enquired that as PMU is available at generator end located generally at 10-20 km distance of POI sub-station, whether data from same PMU can be used for analysis at sub-station end.

A.3.5 CGM, NRLDC stated that PMU at point of inter-connection is required for examining regulatory compliance of RE generators. There may be slight difference due to distance between generator ends and sub-station. However, possibility of accommodating 2 feeders in 1 PMU may be explored. Future projects may also be kept in mind while finalizing PMU numbers and locations.

A.3.6 POWERGRID stated that 1 PMU may accommodate 2 feeders only when both are in same kiosk. He also highlighted that PMU at both ends are required considering dynamics of power flow.

A.3.7 CGM, NRLDC stated that a sub-committee has been constituted under Member Secretary, WRPC. Its report may also be referred.

A.3.8 MS, NRPC stated that report from WRPC sub-committee may be asked and thereafter matter may be discussed in upcoming NRPC meeting.

A.4 UPPCL request for review of SRPC methodology in view of issue of calculation of transmission charges for UPPCL share in UCH Stage-II (132 MW), UCH Stage-III (66 MW) (Agenda by NRPC Sectt.)

A.4.1 Forum was apprised that the issue was discussed in 57th NRPC meeting wherein it was decided that the issue may be discussed separately at NRPC Secretariat.

A.4.2 A separate meeting was held on 23 September 2022 at NRPC Sectt., New Delhi, wherein, the issue was discussed (MoM attached as Annexure-II of agenda) and it was concluded that:

(i) As per SRPC methodology, UP's request for exemption in transmission charges in case of UCH-II, & UCH-III is not tenable as STU network is not sufficient to evacuate its share.

पावरग्रिड
POWERGRID

पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

C/AM/

Date: 04th Nov 2022

To
The Member Secretary,
Western Regional Power Committee,
F3 MIDC Area, Marol,
Andheri East, Mumbai 400093

Subject: WRPC sub-committee report on Phasor Measurement Units (PMUs) at POI in RE feeders

Dear Sir,

Bhadla-Fatehgarh RE Complex in Rajasthan is a major source of renewable generation in the Northern Grid. Recently, few incidents of generation loss in this complex have occurred which could be categorized as near-miss Grid events.

On 11th Sep'22 there was loss of approximate 1100 MW RE generation. This led to trippings of multiple 765kV lines connected at these stations, due to overvoltage. A similar incidence had also occurred on 11th Aug'22 in which there was loss of approx. 6100 MW RE generation.

Further, a meeting of various stakeholders was convened by POSOCO on 21st Dec'22 to discuss the relevant issues. The issue of lack of oscillography data at Inverter terminals and POI was discussed during the meeting. In this context, POSOCO requested POWERGRID to make provision for phasor measurement units (PMUs) at Point of interconnection (POI) i.e. POWERGRID bus and integrate the same in NRLDC system for capturing data during such events.

On request of POSOCO, POWERGRID proposed to install the PMUs in feeders connected to RE generators for improved dynamic snapshot of the system during grid events/ disturbances.

The matter was discussed in 58th NRPC meeting held on 30/09/2022. During the meeting, NRLDC stated that a committee has been constituted under MS, WRPC. In response MS, NRPC stated that report from WRPC sub-committee may be asked and thereafter matter may be discussed in upcoming NRPC meeting. The relevant excerpts of MOM of 58th NRPC is attached for ready reference.

In view of the above, it is requested to provide the report of WRPC sub-committee on installation of PMUs at POI.

Thanking you.

Yours faithfully

4/11/22

(Y.K. Dixit)
Executive Director

Copy: **MS, NRPC**

Annexure VI

NRSS XXXI (B) Transmission Limited

Ref. No. - NR31B.REG.EXM.044.00.23012023
Date: 23rd Jan 2023

To,
Chief Operating Officer, Central Transmission Utility of India Ltd.
"Saudamini", First Floor, Plot no. -02, Sec-29,
Near IFFCO Chowk Metro Station, Gurgaon- 122001, Haryana.
Email.: pcgarg@powergrid.in

Kind Attn. : Shri. P. C. Garg

Sub: NRSS XXXI (B) Transmission Limited Technical proposal for laying the OPGW wire on 400 kV D/C Kurukshetra-Malerkotla-Amritsar transmission lines

Ref.: 1. CTUIL filed Petition no. 94/MP/2021 in CERC

2. CTUIL filed compliance affidavit dt. 29th Mar 2022 in Petition no. 94/MP/2021

Dear Sir,

We are writing this communication in reference to Petition No. 94/MP/2021 wherein the issue of laying down of OPGW wires on the 400 kV D/C Kurukshetra-Malerkotla transmission line owned and operated by NRSS XXXI (B) Transmission Limited (NBTL) is involved and is pending before the Hon'ble Central Commission.

On 29th Mar 2022, CTUIL has been pleased to file a compliance affidavit before the Hon'ble Central Commission mentioning *that POWERGRID has communicated that it has no objection if the implementation of laying of OPGW is undertaken by M/s Sekura* NRSS III(B) Transmission Limited (STL).

Accordingly, NBTL has explored the possibility of OPGW installation on its 400 kV D/C Kurukshetra-Malerkotla- Amritsar transmission lines and has prepared a Detailed Technical Proposal covering the necessary technical aspects involved in laying down the OPGW wires, submitted herewith for your perusal and for seeking suggestions on technical as well as on other feasibility issues. Based on your inputs, the work scope would be finalized by NBTL for laying down of OPGW wires.

Kindly communicate the suggestions (if any) at the earliest.

Thanking you,

For **NRSS XXXI (B) Transmission Limited**

NRSS XXXI (B) Transmission Limited

Authorized Signatory

Encl.: NBTL Technical proposal for laying OPGW wire on 400 kV D/C Kurukshetra-Malerkotla-Amritsar line.

Copy to : Shri. A. K. Agarwal, Chief General Manager, CTUIL, "Saudamini", Gurgaon.

NRSS XXXI (B) Transmission Ltd. ("NBTL")

Proposal

For the Installation of OPGW Wire on

400 KV D/C Kurukshetra – Malerkotla - Amritsar

Inter-state Transmission Lines

Date: 23rd Jan 2023

NRSS XXXI(B) Transmission Limited

Contents

1. Background/ Context

Northern Region Strengthening Scheme XXXI B

Transmission is a vital element of the power sector value chain. A well-developed transmission network helps in efficient evacuation of electricity from generating stations to the load centres. The transmission system in India is predominantly categorized into voltage levels of 220 kV, 400 kV, 765 kV in AC system and 320 kV, 500 kV and 800 kV in DC system. As per statistics by the Central Electricity Authority (CEA), India has a cumulative transmission line length of 4,61,768 ckt km and a cumulative substation capacity of 11,30,712 MVA upto July 2022. Growing power demand due to the Government's focus on improving the infrastructure for and in the distribution sector: the last mile in power sector, addition of RE capacity and adoption of new technologies to address challenges linked to RE integration, are likely to drive growth of power transmission in India.

In India, the transmission system is a two-tier structure comprising of intra-state transmission system grids and inter-state transmission system grids. Historically, transmission system was first developed considering it too be part of the Generating Station and thereafter with amendments made in the Indian Electricity Act, 1910 in the year 1998 the transmission was identified as an independent activity and developed by central and state level utilities as transmission licensees under capital cost-based tariff. However, in terms of Section 63 of the Electricity Act, 2003 and the Tariff Policy dated 06th January 2006, the Ministry of Power (MoP) issued "Guidelines for Encouraging Competition in Development of Transmission Projects" and Tariff Based Competitive Bidding Guidelines for Transmission Services" (the "Guidelines"). These Guidelines laid down a transparent procedure for facilitating competition in the transmission sector and paved a way for wide participation in providing transmission services and tariff determination through a process of tariff based competitive bidding.

Post the above referred guidelines, the MoP issued standard bidding documents such as request for qualification ("RFQ"), request for proposal ("RFP"), transmission service agreements ("TSA") and appointed PFC Consulting Limited ("PFC") and REC Transmission Projects Company Limited ("REC") as the bid process coordinators (each, a "BPC") for carrying out the bidding process.

REC, acting as the BPC, issued a RFQ dated July 31, 2013, for the purpose of selection of Bidder as Transmission Service Provider ("TSP") to establish Transmission System under Northern Region System Strengthening Scheme XXXI (B) ("NRSS") through tariff based competitive bidding ("TBCB") mode. Further, NRSS XXXI (B) Transmission Ltd. ("NBTL") was a special purpose vehicle ("SPV") incorporated by REC for setting up the proposed Transmission project and subsequently acting as the Transmission Service Provider ("TSP"). In the bid process conducted for the same, M/s Essel Infraprojects Ltd ("EIL") emerged as the successful bidder and acquired NBTL for developing the below mentioned proposed transmission project elements on a *build own operate and maintain* (BOOM) basis.

- 400 kV D/C Kurukshetra – Malerkotla transmission line (139.2 kms),
- 400 kV D/C Malerkotla – Amritsar transmission line (149.6 kms)

In May 2019, controlling shares in NBTL was acquired by Sekura Energy Private Limited ("SEPL"), a Portfolio Company of Edelweiss Infrastructure Yield Plus. Since then, SEPL has been managing NBTL and carrying out the operation & maintenance of all the elements of NBTL regularly in an effective manner.

Significance of NRSS XXXIB

400/220kV substation of POWERGID at Amritsar is connected to Jalandhar through a 400 kV S/C line owned and operated by PGCIL. To meet its growing power demand, 1x500 MVA 400/220 kV ICT was also being implemented. Connectivity of 400 kV to Parbati Pooling station and Makhu (PSTCL substation) was being implemented to augment power supply of Amritsar 400 kV S/S. However, the power supply to Amritsar area envisaged mainly through Jalandhar 400 kV substation as during winters the generation of hydro projects would reduce to very low level and in case of low generation at Talwandi Saboo TPS, Makhu S/s may draw power from Amritsar S/S, hence there was a necessity that power supply arrangement to Amritsar S/S is augmented. A HVDC station at Kurukshetra was being established for supply of power from pit head generation station of Chhattisgarh. Accordingly, for augmenting power supply to Amritsar S/S, 400 kV D/C Kurukshetra – Malerkotla and Malerkotla – Amritsar transmission line works were discussed and approved in the 31st CEA Standing Committee.

The Transmission Scheme was approved to augment the power supply to West Punjab by connecting Amritsar Sub-station with HVDC Station at Kurukshetra, which would get the supply from pit head Generating Stations in Chhattisgarh through Champa – Kurukshetra HVDC bi-pole. The extract of **31st CEA Standing Committee Minutes of Meeting** is as under:

> ***"c) Additional Corridor to Amritsar***
> *CEA stated that 400/220 kV Amritsar substation is having 2x315 MVA transformation capacity and considering the load growth in Amritsar area, augmentation of transformation capacity by 1x500 MVA is under implementation. At present Amritsar S/s is being fed by a 400 kV S/c line from Jalandhar and is also going to be connected with Parbati Pooling station by a 400 kV D/c line. In addition, as part of PSTCL system, 400 kV Makhu – Amritsar D/c line is being constructed for providing connectivity of STU grid with ISTS grid.*
>
> *POWERGRID stated that although, Amritsar S/s is planned to be connected to Parbati Pooling station and Makhu (PSTCL substation), however the power supply to Amritsar area would be mainly through Jalandhar 400kV substation as during winters the generation of hydro projects would reduce to very low levels as well as in case of low generation at Talwandi Saboo TPS, Makhu S/s*

may also draw power from Amritsar. It is therefore necessary that power supply arrangement to Amritsar S/s is augmented. It was further stated, HVDC station at Kurukshetra is being established for supply of power from pit head generating stations of Chhattisgarh. Accordingly, for augmenting power supply to Amritsar S/s, following transmission works were proposed to be implemented through Tariff Based Competitive Bidding as System strengthening scheme of NR:

- *400 kV Kurukshetra – Malerkotla D/c line*
- *400 kV Malerkotla – Amritsar D/c line."*

Transmission Service Agreement

NBTL has twenty-four Long-Term Transmission Customers (LTTCs) which are the beneficiaries of the project. A Transmission Service Agreement (TSA) was also executed on January 02, 2014, for a term of 35 years tenure, between the NBTL and LTTCs for procurement of Transmission services under NRSS scheme. The list of Long-Term Transmission Customers (LTTC) as mentioned in the TSA are as per below:

Table 1: List of LTTCs of NRSS XXXI B Tr. Ltd.

Sl. No	LONG TERM TRANSMISSION CUSTOMER (LTTC) LIST
1	AD Hydro Power Limited
2	Haryana Power Purchase Centre
3	Punjab State Power Corporation Limited
4	Himachal Sorang Power Pvt. Ltd.
5	Adani power Limited, Mundra
6	Jaipur Vidyut Vitran Nigam Limited
7	Ajmer Vidyut Vitran Nigam Limited
8	Jodhpur Vidyut Vitran Nigam Limited
9	Lanco Anpara Power Limited
10	Lanco Green Power Pvt. Limited
11	Power Development Dept. Govt. of J&K
12	North Central Railway
13	Jaiprakash Power Ventures Limited
14	BSES Yamuna Power Limited
15	BSES Rajdhani Power Limited
16	Tata Power Delhi Distribution Limited
17	New Delhi Municipal Corporation
18	Electricity Wing of engineering Department, Union Territory of Chandigarh
19	Power Grid Corporation of India Limited
20	U.P Power Corporation Limited

Sl. No	LONG TERM TRANSMISSION CUSTOMER (LTTC) LIST
21	PTC (Budhil), PTC India Limited
22	PTC (Everest), PTC India Limited
23	Uttarakhand Power Corporation Limited
24	Himachal Pradesh State Electricity Board Limited

As per TSA, all LTTCs appointed & authorized U.P. Power Corporation Limited ("UPPCL") as the **Lead LTTC** to represent all the LTTCs for discharging the rights and obligations of the LTTCs, which are required to be undertaken by all the LTTCs.

Further, a Supplementary TSA was also executed on August 04, 2016, between NBTL and Central Transmission Utility of India Ltd. ("CTUIL"). The said Supplementary Agreement was signed pursuant to the Central Electricity Regulatory Commission (Sharing of Inter-State Transmission Charges and Losses), Regulations 2010 to govern the provision of inter-State Transmission services including sharing of transmission charges and losses amongst the ISTS Customers (termed as 'Designated ISTS Customers or DICs) and disbursing the transmission charges collected by the CTUIL to the respective ISTS Licensees.

Transmission License

The Transmission License u/s 14 of Electricity Act-2003 has been granted by the Hon'ble Central Electricity Regulatory Commission ("CERC") to the NBTL vide its Order dated on 25.8.2014 in Petition No. 90/TL/2014. The present License is valid for an initial period of 25 years with provision of extension of license period for another term.

2. Requirement of laying OPGW wire in NBTL Line

The Ministry of Power vide its directive issued in Oct 2016 provided for Reliable Communication Scheme to provide reliable communication from stations of 132 KV and above voltage level to be taken up. CTU/Powergrid was given mandate to implement the scheme for Central Sector portion and implementation of State portion by respective states. Accordingly, the schemes were taken up for approval in all regions.

Northern Region Scheme was approved in 40th NRPC meeting held on 27th October 2017 on Tariff route basis. This scheme envisaged establishment of 7248 Kms of OPGW Network for reliable fibre optical connectivity for Central Sector station including IPPs.

Subsequently requirement of OPGW on 400 KV D/C Kurukshetra-Malerkotla Transmission Line, owned & operated by NBTL was approved by NRPC in 47th NRPC meeting to provide redundant path connectivity to Malerkotla PG Substation. The reliable communication from this station is vital as the above transmission system acts as a major source of power evacuation to Punjab state

considering that it is also connected to ±800 KV HVDC Kurukshetra Substation (of 6000 MW capacity).

Accordingly, CTU/Powergrid planned implementation of the above scheme as per Ministry of Power, GOI directive on tariff route basis and investment made by Powergrid is to be recovered in the form of tariff as per the notifications of the Hon'ble Central Electricity Regulatory Commission. CTU/Powergrid planned the above work to implement under Package – B: Communication System for Central sector under Northern Region -II (reliable scheme) and awarded this work to M/S APAR Industries Ltd. Vadodara to execute & complete. The work schedule in regard to the above was also approved in OCC meeting & CTU/Powergrid, thereafter, requested NBTL for seeking its consent to avail live line outage of its 400 kV D/C Kurukshetra-Malerkotla transmission line for the installation of OPGW.

A communication for implementation of such scheme was issued by CTU/Powergrid to NBTL for the first time in Sept-2020 wherein it was proposed that the existing NBTL earth wire along with the hardware & fittings were to be dismantled and taken away by CTU/Powergrid's contractor after installation of new OPGW. It was informed that this factor had been taken into consideration by the agency to arrive at the optimized cost of OPGW. This way Project Cost was reduced as bidders had taken this factor into consideration while quoting the price for supply of Goods & Services for OPGW installation. As per them, this will eventually result in reduced tariff once the project is completed, commissioned & capitalized.

NRSS raised its concerns before CTU/Powergrid for this proposed work of laying OPGW wire on NBTL transmission lines vide its letter dated 05th Oct 2020.

Subsequently, CTUIL filed a petition before the Hon'ble Central Electricity Regulatory Commission (CERC) for seeking direction for installation of optical ground wire on 400 kV D/C Kurukshetra – Malerkotla line ("Petition no. 94MP2021"). After due deliberations by the Hon'ble Central Electricity Regulatory Commission, it was directed to CTUIL to implead all transmission licensees in this matter along with Powergrid also a necessary respondent.

Further, on hearing dt. 10th March 22, the Hon'ble Central Electricity Regulatory Commission directed to CTU to hold further meeting(s) with the transmission licensees and come out with a suitable proposal for smooth and proper adjudication of the issues involved. The Hon'ble Central Electricity Regulatory Commission further directed CTU to apprise the Commission once the proposal is finalized and the accordingly the petition will be listed for hearing.

On 29th Mar 2022, CTU filed a compliance affidavit before the Hon'ble Central Electricity Regulatory Commission mentioning *that PGCIL has communicated that it has no objection if the implementation of laying of OPGW is undertaken by NBTL.*

Accordingly, NBTL has explored the possibility of OPGW installation on NBTL transmission lines.

As per the Powergrid's earlier approach, Powergrid had proposed to lay 24 Optical Fibre on NBTL 400 kV D/C Kurukshetra-Malerkotla line but keeping in view the increasing data requirement in near future, NBTL is now proposing to have 48 Optical Fibre instead of 24 Optical Fibre on its both transmission lines – 400 kV D/C Kurukshetra-Malerkotla & 400 kV D/C Malerkotla -Amritsar line, extend the reliable communication connectivity among PGCIL Kurukshetra- Malerkotla & Amritsar substation ends .

This work will entail capital infusion and estimated costs of which is mentioned in point no. 8.

3. **Project Highlights:**

a.	Project	OPGW Installation (48 Fibers) in 400 KV Kurukshetra – Malerkotla and Malerkotla-Amritsar Transmission Lines of Northern Region Strengthening Scheme XXXI B (NRSS)
b.	Location of the Project	Between District - Kurukshetra – Malerkotla and Malerkotla-Amritsar in State Haryana & Punjab
c.	Technical Specifications	Optical Ground Wire Cable with 48 Fibres Loose Tube of material PBT (Polybutylene Terephthalate)
d.	Work Completion timelines	12 months including Supply, installation, and commissioning from the date of approval of the Hon'ble Central Electricity Regulatory Commission
e.	Commissioning schedule	Supply 3 months Installation 9 months
f.	Outage of NBTL transmission lines availed for implementation of OPGW work	The shutdown availed for the implementation of OPGW work on NBTL transmission lines is to be allowed & considered as "Deemed Available" as per prevailing Tariff Regulations-2019

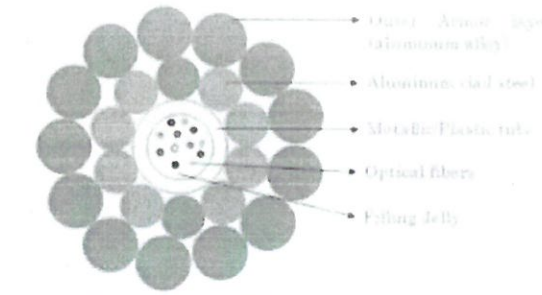
4. **Technical specification of OPGW**

A brief about OPGW:

OPGW or known as Optical Ground Wire is a type of cable or wire that is used in transmission lines construction. It is also known as optical fibre composite overhead ground wire. It can serve as a grounding wire, shielding wire, and at the same time a cable used for communication purposes.

OPGW contains a tubular structure with one or more optical fibres in it. It is then surrounded by layers of steel and aluminium wire. It can be compared like an ACSR, except that steel is the one covering the tube with fibre optics inside.

OPGW have the characteristic that there is no effect of high voltage induction on the data being transmitted through the Fibres. Hence this characteristic of the Fibre is taken into advantage to transmit the data along the high-power transmission lines.



Typical diagram of an OPGW Cable

An Optical fibre is composed of a light guiding core surrounded by cladding. Both the core and the cladding are typically made of high purity glass typically derived from doped germanium or pure silica. The core and the cladding are then surrounded by one or two protective coatings of Acrylate that improves the strength characteristics of the Optical fibres.

OPGW cable with stainless Steel and aluminium clad steel tube is available in fibre counts to 48. The cable can be designed into single or dual layered construction in accordance with the mechanical and electrical requirements as per application needs of the end-user. Due to its unique small size this becomes the perfect solution for overloaded towers with its small diameter and light weight construction. The fibres are protected from environmental conditions to ensure reliability and long life.

Technical Specifications:

1	No. of Fibres Dual Window Single-Mode:	48
2	Buffer type:	Loose Tube
3	Buffer Tube material:	PBT (Polybutylene Terephthalate)
4	No. of Buffer Tubes:	4
5	No. of Fibres per buffer tube:	12
6	Expected Cable Life:	25 Years
7	UTS:	9470 Kgf (92.9 KN)
8	Effective area (mm^2):	58.4
9	Weight (kg/Km):	445
10	Diameter (mm):	12
11	Short Circuit (KA^2 Sec):	40

Note: any other requirement in terms of equipment supply & other would be incorporated based on CTUIL inputs/ feedback.

5. **Adoption of new technologies in communication: OPGW**

(Ref. – National Electricity Plan – 2017)

Based on Communication in *Power Sector 221476/2018/OFFICE OF BIHARI LAL 5710 Revised Draft National Electricity Plan (Vol-II) Transmission, 2016 Central Electricity Authority Chapter 4: Technologies in Transmission 4.8*, The communication system plays an important role in reliability, availability, and security of the Grid system. Fibre Optic based Communication System is being widely used to meet the power system communication bandwidth requirements with reliability. The PLCC based communication system has limitations regarding data communication as the performance of this system deteriorates after two hops. Further, due to frequency congestion only limited number of channels can be provided on PLCC.

Power System in the country is expanding very fast with increased number of interconnections between regions, many new technologies are being implemented. In addition, Indian Grid is characterized by wide variation Power flow due to daily / monthly / seasonal variation in demand / generation. Further, consumer aspiration for quality and reliability of power supply is increasing. As a result, the complexity in Grid operation has increased manifold, which necessitates dynamic monitoring of Grid parameters / conditions on real-time basis. The existing SCADA/EMS provides the data which are steady state in nature and not suitable for dynamic monitoring and control for the Grid due to high degree of latency of tele-metered data and non-synchronized sampling of data. Emerging technologies like Phasor Measurement Unit (PMU), Wide Area Measurement (WAM) system provide dynamic monitoring of network on real time basis. Such monitoring through the said measurements shall facilitate development of various control, regulation, and preventive features like Remedial Action Schemes (RAS), System Integrated Protection Scheme (SIPS), Adaptive islanding, Self-healing Grid etc.

These emerging technologies are being deployed for development of a Smart Grid for Power transmission system. These emerging technologies require a highly reliable communication system with least latency. The Fibre Optic based communication system in the form of OPGW would be most suitable for such applications. Further OPGW suits the requirement of the current differential protection being considered for transmission lines now a days. Considering above aspects, after detailed deliberations it emerged that in all upcoming transmission lines of 132kV and above, OPGW needs to be provided in place of the conventional earth wire(s) as part of transmission system planning. In Central Sector, POWERGRID has taken up OPGW requirement for all upcoming lines. All utilities at State level must consider the same during planning of transmission system. One out of two earth wires being provided at 400 kV & above voltage levels need to be OPGW.

It is also necessary to ensure that OPGW system being installed with new technologies is done in a manner consistent with connectivity and compatible to the OPGW system installed in the sub stations of others involved downstream and upstream connecting the transmission system of

NBTL and accordingly the coordination is required while setting up the OPGS on the transmission system of NBTL with other agencies.

6. Scope of work for NBTL

The present Detailed Proposal covers the following scope of work:

a. Procurement of OPGW cable, hardware and other required accessories for complete installation and commissioning of OPGW from CTUIL approved Vendor
b. Destringing of existing installed earth wire on the NBTL transmission lines
c. Stringing of OPGW and installation of hardware's
d. Testing and commissioning
e. Payment of ROW compensation and crop compensation for the damage done during the work execution which will form part of the overall cost for OPGW installation.
f. Coordination with other agencies.

Note: any other requirement in terms of equipment supply & other would be incorporated based on CTUIL inputs/ feedback.

7. Scope of CTUIL / PGCIL

The OPGW Fibre is to be implemented by NBTL through it existing under operation Kurukshetra-Malerkotla- Amritsar lines, which terminated at PGCIL owned Kurukshetra, Malerkotla and Amritsar substations. Hence, to terminate NBTL proposed OPGW Fibre, CTUIL is to provide the complete technical details of its existing communication system in terms of hardware & software at its Kurukshetra, Malerkotla and Amritsar substations.

Powergrid Team would provide hindrance free access to NBTL Team to implement & maintain this work at their Kurukshetra, Malerkotla and Amritsar substations.

8. Work Methodology

OPGW installation will be carried out in live line conditions. Suitable mechanism for stopping of auto reclosure from the connecting substations will be made, so that in any eventuality the line should not try to get reenergize/ recharge in auto mode and should get in shutdown mode. This is very important from safety point of view for all the team members working in live line conditions.

Following Specific tools & plants will be used for carrying out the works :

- Winch machines of 3.0 & 5.0 tons
- special Pilot wire ropes minimum 15 Kms,
- small size arial rollers 200 Nos.

NRSS XXXI(B) Transmission Limited

- open pulleys 60 Nos.
- closed pulleys 60 Nos
- D Shackles 30 Nos.
- PP ropes 20 Kms
- discharge rods 15,
- safety PPEs like helmets, gloves, full body harness, safety shoes etc will be required for carrying out the works.

9. Installation Process

First, work permits will be issued to the team by the authorized person. Discharge rods will then be put on the terminal towers & fixed properly. Pilot wire will be hoisted on arial roller and will be pulled towards next tower. on this pilot wire, OPGW will be attached and pulled along with the Pilot. At every small length of around 50 Mts, another arial roller will be hoisted. This arrangement will restrict the intermediate sagging of pilot ad OPGW which should not touch the top phase conductors below the earth-wire. The pilot pulling along with the conductor will continue till the completion of drum length.

Once the OPGW reaches to the designated tower as per the OPGW drum schedule, it is hold through tension clamp hardware to keep it in the required tension & avoidance of any extra sag which can lead to any chance of OPGW coming near to live conductor. The earth-wire is then released from the tower and fixed on to the Pilot wire which is then pulled back to the original position from where the initial operation of sending the OPGW had started. OPGW is strung similarly for other spans. At the towers where the OPGW is to be jointed a loop of OPGW is made & kept on the plane section of the tower & tied with the lead clamps to the leg of the tower. OPGW splicing is done to maintain the continuity of the fibres & checked with the instruments for the healthiness of all the fibres. Approach cable is used from the last terminal towers to the substation control room for data connectivity of the two substations.

Installation and quality checks will be maintained as per standard utility practices, NBTL guidelines and SOP's.

10. Estimated Project Cost:

Complete project cost will consist of expenses on account of below line items:

- cost of Supply of OPGW, hardware's and accessories – Including freight, insurance, loading and unloading of material at factory and site, material inspection at factory,
- Cost of destringing of NBTL existing earth wire,
- Cost of stringing of OPGW and hardware installation
- Right of Way (RoW) and crop compensation

- Cost of Erection all Risk/ Industrial all Risk) EAR/IAR Insurance to be taken during execution of work
- Worker compensation insurance, Liability, burglary insurances to be taken during execution of work.
- Expenses on account of applicable statutory requirements & Compliances –e.g. Contract Labour Regulation Act registration (CLRA), Building or other Construction Work (BOCW) registration, Inter State Migrant Workers (ISMW) cost etc.
- Expenses for the deployment of quality engineers from any reputed agency at site during execution of work and for factory inspection
- Contingency – To meet any exigency as same work need to be done during monsoon season.

11. Project estimated timelines.

The total schedule time for carrying out the OPGW installation for 400 KV Kurukshetra – Malerkotla & Malerkotla – Amritsar Line is line is "12 months" post the receipt of Hon'ble CERC approval for implementing this OPGW work. This comprises the lead time for the manufacturing the OPGW along with the supply of required hardware fittings and execution thereafter. The above timelines are subject to regular supply chain operations and working conditions. In case of supply chain disruptions or work affected because of the reasons beyond NBTL & its vendor control/ any force majeure events, including but not limited to RoW, riots, strikes or for any other reasons, events beyond the control of NBTL, the timelines will be extended proportionately and consequently cost of project implementation may also increase.

12. Approvals

All necessary statutory/ regulatory approval for the implementation of this work shall be secured by NBTL post getting go-ahead from Hon'ble Central Electricity Regulatory Commission for carrying out the works.

13. Project Management details

The project management activities like project planning, contractor and supplier engagements, preparing implementation schedule, progress monitoring will be done by the NBTL team, which will be further supported by team of Sekura Energy Private Limited from Mumbai.

14. Health, Safety and Environment during implementation of project

The complete project works including but not limited to material movement, earth wire de-stringing, OPGW stringing, hardware fittings installation, testing and commissioning at site will be done in accordance with the SHEQ policy of NRSS and in line with prudent utility practices.

Agenda items for inclusion in 62 th forthcoming NRPC meeting

Non payment of outstanding dues by DTL

SJVN had signed the Power Purchase Agreement with Delhi Tranco Ltd (DTL) for selling the power of Nathpa Jhakri Hydro Power Station (NJHPS) to Delhi on 27/03/2003 as per allocation made by MOP, Govt of India. Delhi Electricity regulatory Commission (DERC) vide order no. F.17 (115)/Engg. / DERC / 2006-07 dated 31.03.2007 had assigned the Power Purchase Agreements between DTL and various CPSU's to Delhi Discoms (BRPL, BYPL and NDPL, now TPDDL) w.e.f. 01.04.2007. DTL is no more in business with SJVN for power supply from NJHPS and paid all its energy payments for the sale of power from NJHPS before it was assigned to Delhi Discoms.

Thereafter, the tariff petition no. 20/2008 for the period 2004-2009 was approved provisionally by CERC on 31/12/2008. Accordingly, the arrear bills were raised on 20/02/2009 to all the beneficiaries including DTL .

Details of Arrears of Energy Bill for the Period 2004-05 , 2005-06 & 2006-07:

Period	Energy & Capacity Charges(Rs.)	Incentive (Rs.)	Interest on Energy & Capacity Charges(Rs.)	Interest on Incentive (Rs.)	Total including interest(Rs.)
	1	2	3	4	5=1+2-(3+4)
2004-05	-230689894	145956897	-21261845	38870385	-67124457
2005-06	194055345	0	52080138	527182	246662665
2006-07	-28089403	-1424666	-3350299	1217525	-31646843
Total	**-64723952**	**144532231**	**27467994**	**40615092**	**147891365**

Another MAT bill No. 98 dtd. 6.10.2009 amounting to Rs. 5951191/-was raised on account of refundable for the period 2004-05 and recovery for the period 2005-06, 2006-07 as per following details:

Details of Recovery of MAT Bill for 2005-06 & 2006-07 & refundable amount for 2004-05:

Period	Amount Refundable on a/c of MAT (Rs.)	Amount Recoverable on a/c of MAT(Rs.)	Total MAT recoverable including interest(Rs.)
A	B	C	d=b+c
2004-05	-1515644	0	-1515644
2005-06	0	4202917	4202917

2006-07	0	3263918	3263918
Total	**-1515644**	**7466835**	**5951191**

Till, Aug 2011, no payment was received from M/S DTL against the above bills. In 2011-12, Income Tax refund for the period 2004-09 amounting to Rs. 138566738/- was adjusted against the outstanding amount of DTL on 02.09.2011 Further, a payment of Rs. 1527778/- was received from M/S DTL on 28.09.2011.

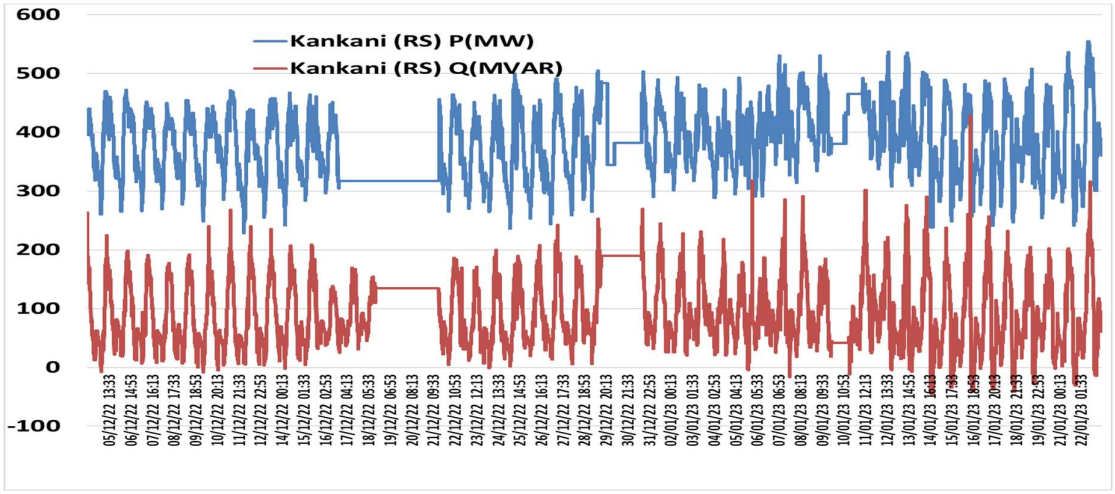
These amount were adjusted as per company policy as under :

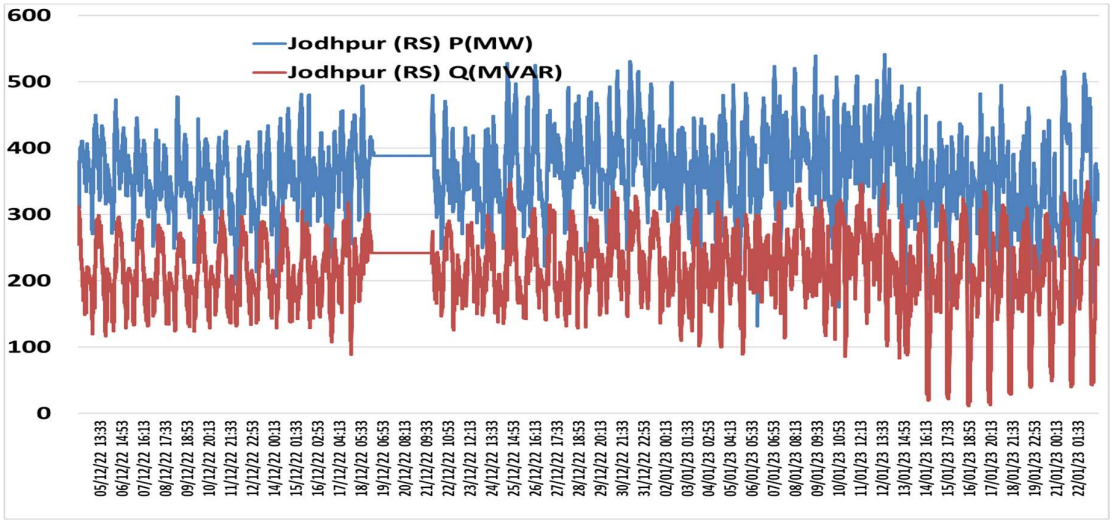
Sr. No.	**Description of Bill**	**Billed Amount (Rs)**	**Late Payment Surcharge up to 2.09.2011 (Rs.)**	**Total (Rs.)**
A	B	c	D	e=(c+d)
	Arrear Bill raised on dtd. 20.02.09	147891364	52693896	200585260
ii	MAT bill dtd. 6.10.09	5951191	1560353	7511544
	TOTAL	153842555.	54254249	208096804
	Adjustment on a/c of refund of Income tax for the period 2004-09 i.e. Rs. 138566738/-	84312489	54254249	138566738
	Balance	69530066	0	69530066
	LPS upto 28/09/2011		800071	
	Total dues upto 28/09/2011	69530066	800071	70330137
	Adjustment on a/c of release of payment i.e. Rs. 15277778/- by DTL	14477707	800071	15277778
	Balance as on 28/09/2011	**55052359**	**0**	**55052359**

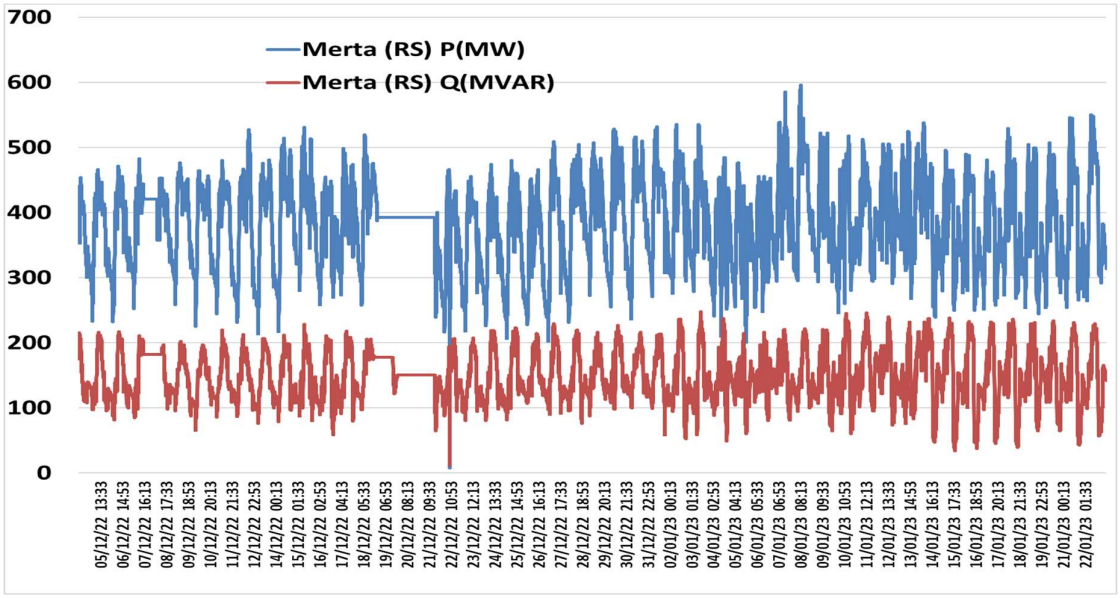
Though various correspondences were made in regards to settlement of payment of arrears, however DTL had not fully liquidated the principal amount as well as Late Payment Surcharge (LPS) levied, resulting into accumulation of dues of principal amount of Rs 5,50,52,359.00 and LPS levied on this.

SJVN request DTL to clear the outstanding dues at the earliest.

Annexure VIII



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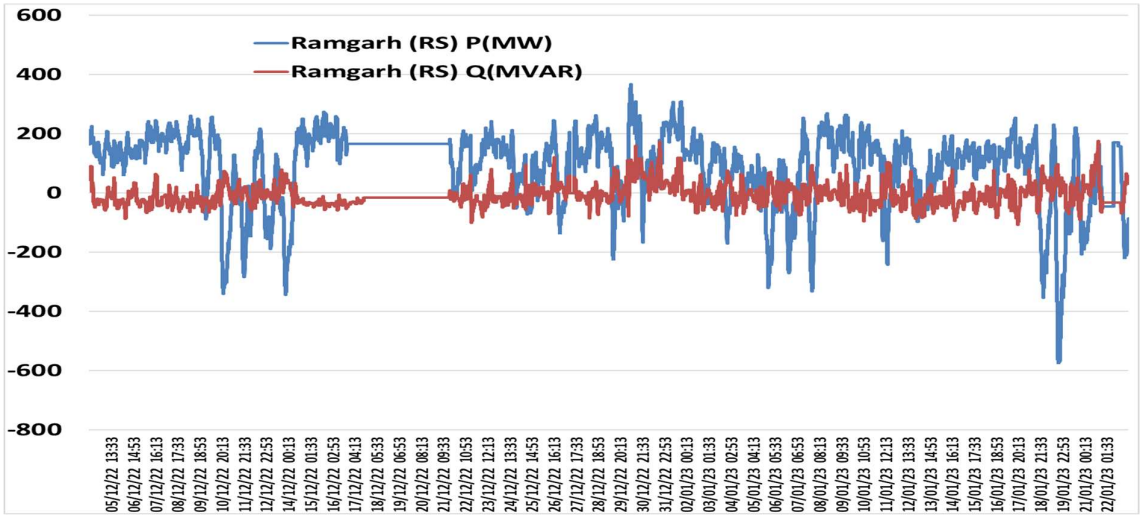
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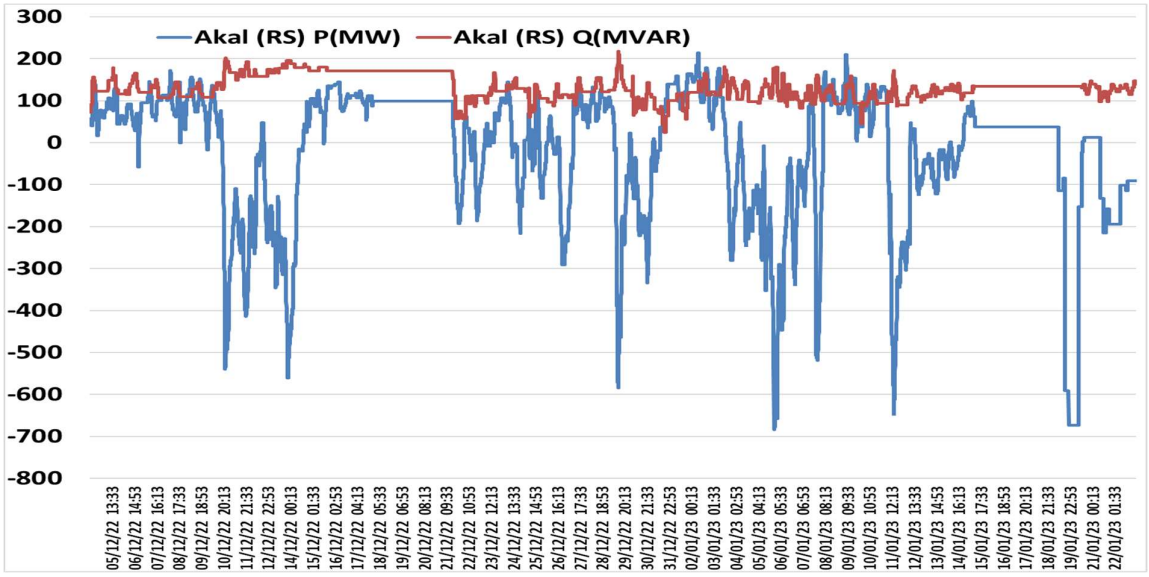
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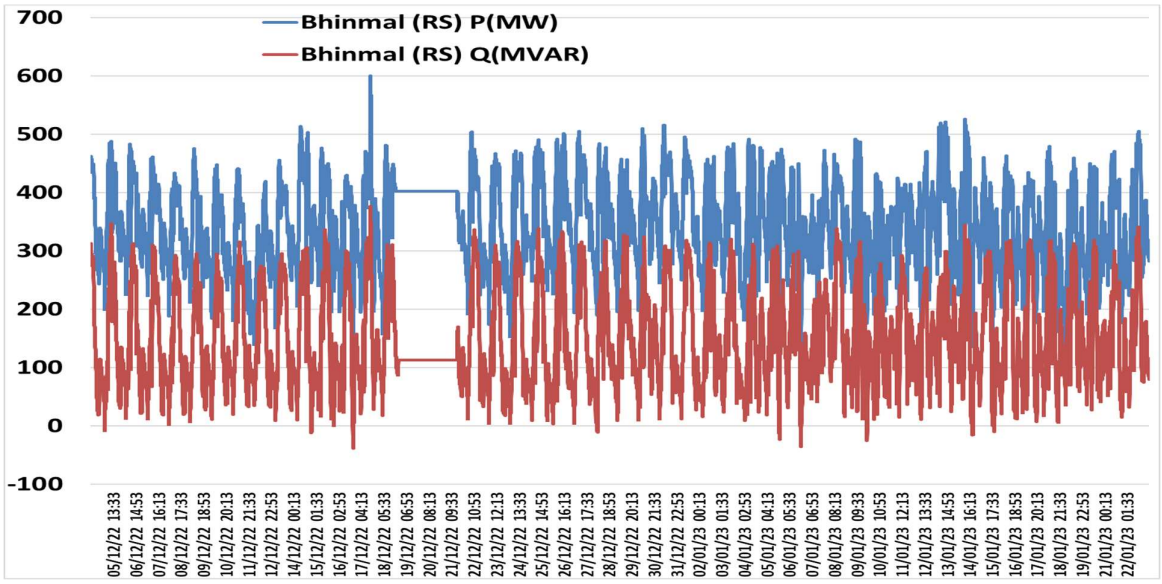
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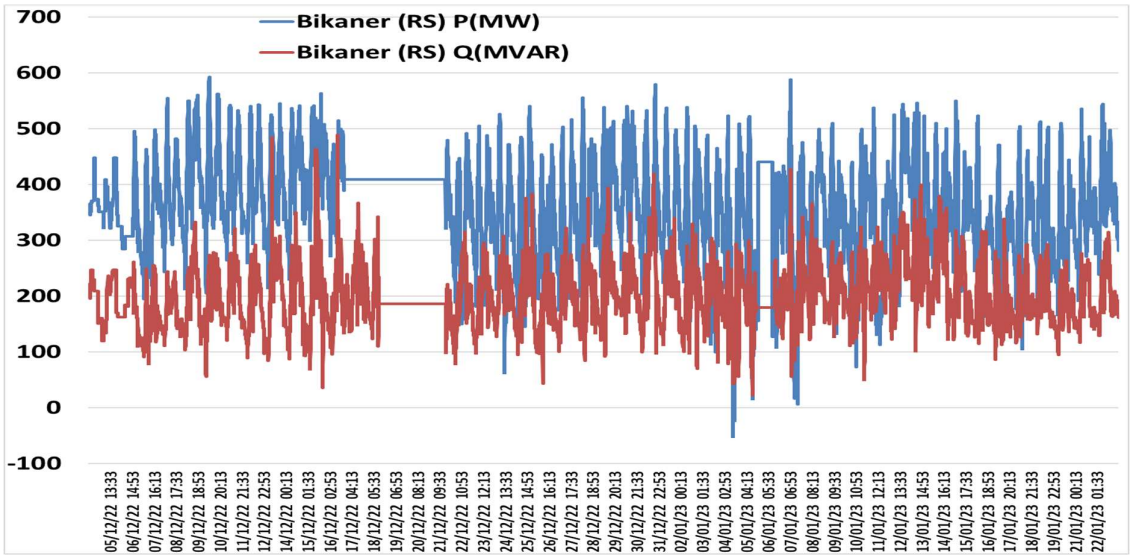
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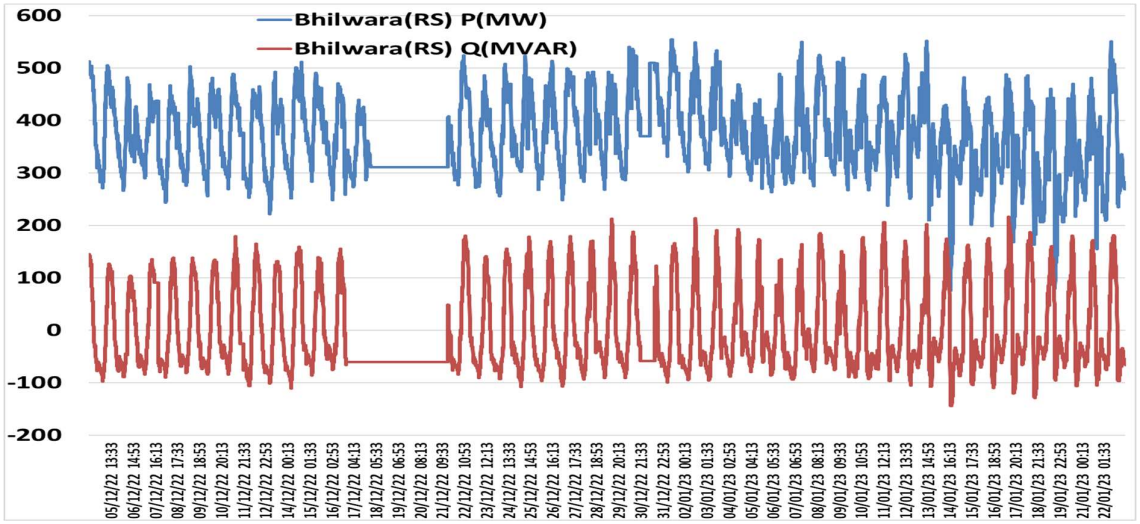
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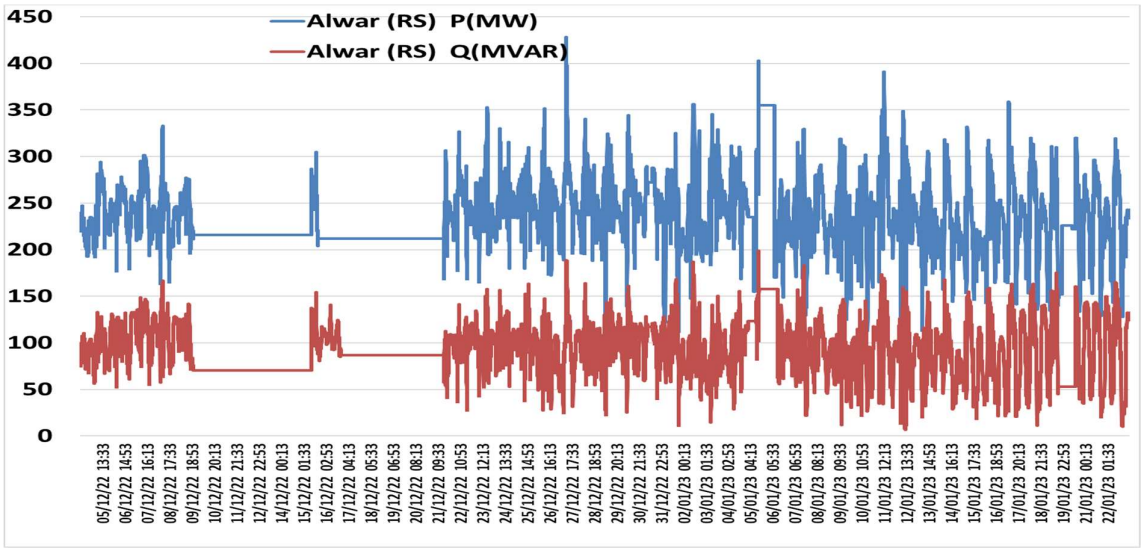
Alwar (RS) P(MW)
Alwar (RS) Q(MVAR)
450
400
350
300
250
200
150
100
50
0
05/12/22 13:33
06/12/22 14:53
07/12/22 16:13
08/12/22 17:33
09/12/22 18:53
10/12/22 20:13
11/12/22 21:33
12/12/22 22:53
14/12/22 00:13
15/12/22 01:33
16/12/22 02:53
17/12/22 04:13
18/12/22 05:33
19/12/22 06:53
20/12/22 08:13
21/12/22 09:33
22/12/22 10:53
23/12/22 12:13
24/12/22 13:33
25/12/22 14:53
26/12/22 16:13
27/12/22 17:33
28/12/22 18:53
29/12/22 20:13
30/12/22 21:33
31/12/22 22:53
02/01/23 00:13
03/01/23 01:33
04/01/23 02:53
05/01/23 04:13
06/01/23 05:33
07/01/23 06:53
08/01/23 08:13
09/01/23 09:33
10/01/23 10:53
11/01/23 12:13
12/01/23 13:33
13/01/23 14:53
14/01/23 16:13
15/01/23 17:33
16/01/23 18:53
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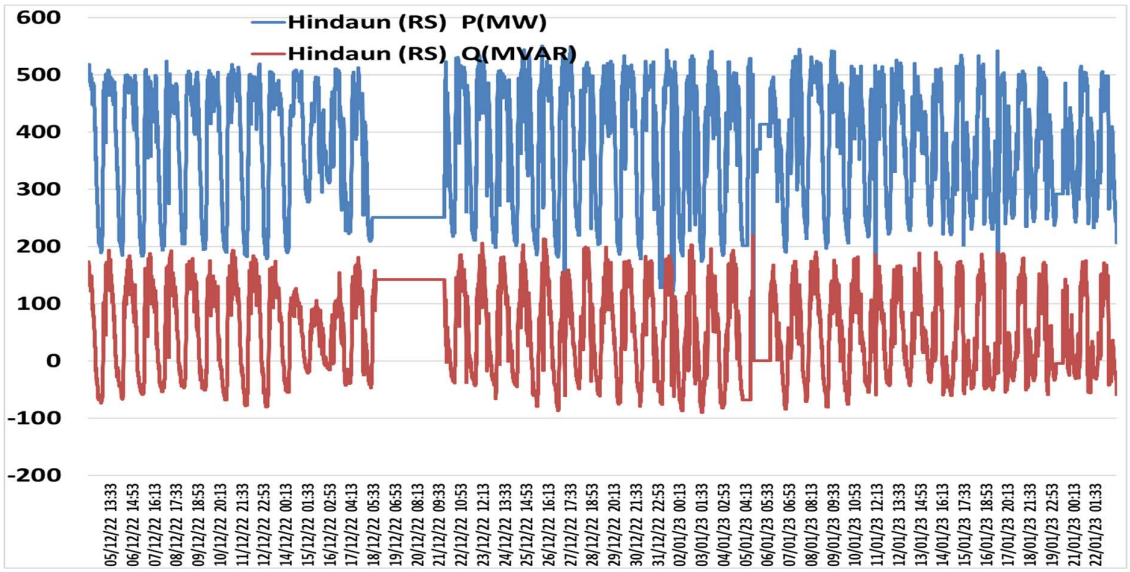
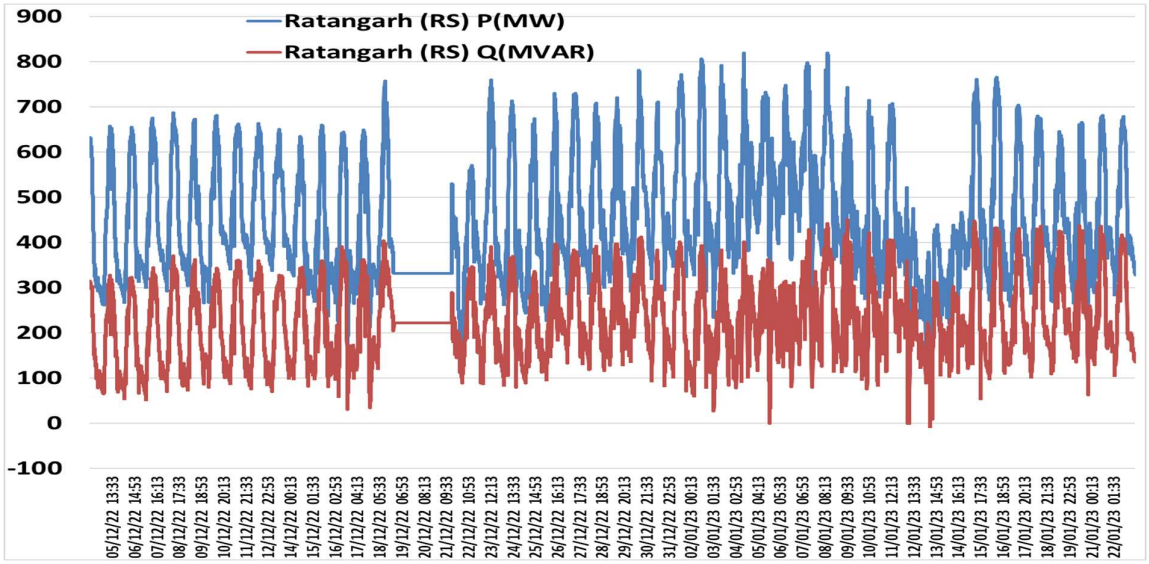
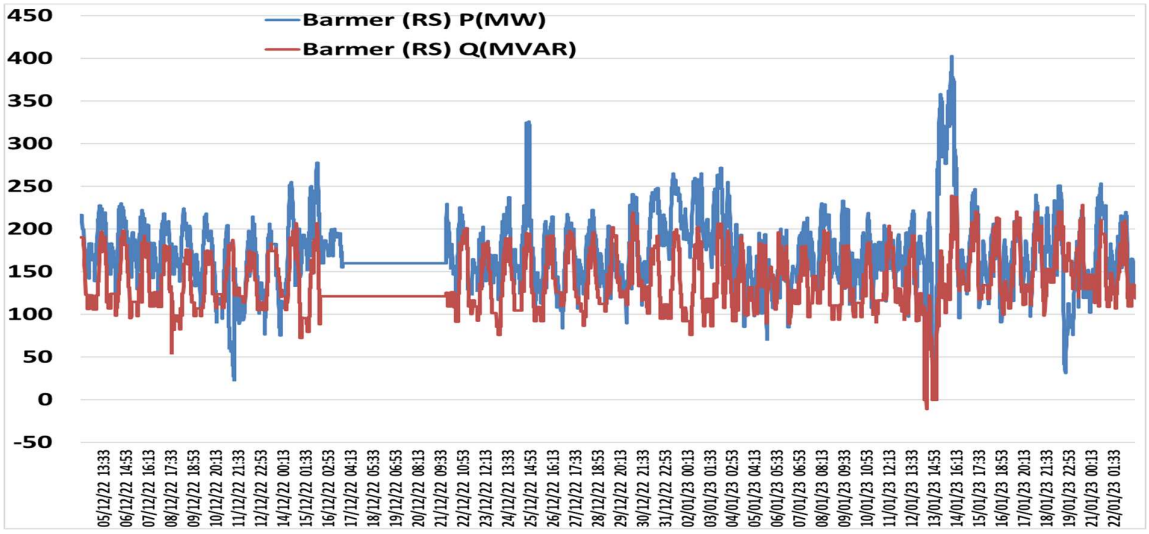
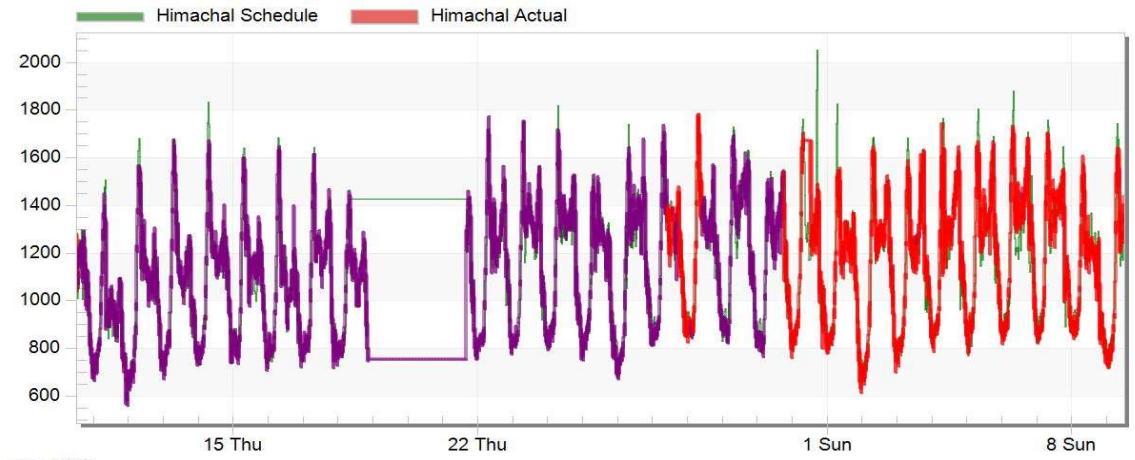
18/01/23 21:33
19/01/23 22:53
21/01/23 00:13
22/01/23 01:33

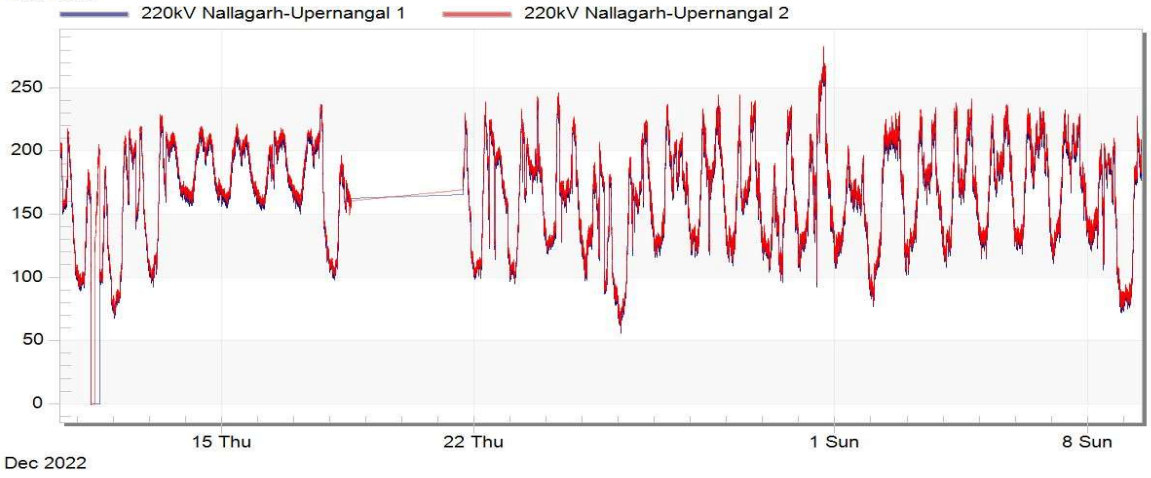

Hindaun (RS) P(MW)
Hindaun (RS) Q(MVAR)
600
500
400
300
200
100
0
-100
-200
05/12/22 13:33
06/12/22 14:53
07/12/22 16:13
08/12/22 17:33
09/12/22 18:53
10/12/22 20:13
11/12/22 21:33
12/12/22 22:53
14/12/22 00:13
15/12/22 01:33
16/12/22 02:53
17/12/22 04:13
18/12/22 05:33
19/12/22 06:53
20/12/22 08:13
21/12/22 09:33
22/12/22 10:53
23/12/22 12:13
24/12/22 13:33
25/12/22 14:53
26/12/22 16:13
27/12/22 17:33
28/12/22 18:53
29/12/22 20:13
30/12/22 21:33
31/12/22 22:53
02/01/23 00:13
03/01/23 01:33
04/01/23 02:53
05/01/23 04:13
06/01/23 05:33
07/01/23 06:53
08/01/23 08:13
09/01/23 09:33
10/01/23 10:53
11/01/23 12:13
12/01/23 13:33
13/01/23 14:53
14/01/23 16:13
15/01/23 17:33
16/01/23 18:53
17/01/23 20:13
18/01/23 21:33
19/01/23 22:53
21/01/23 00:13
22/01/23 01:33

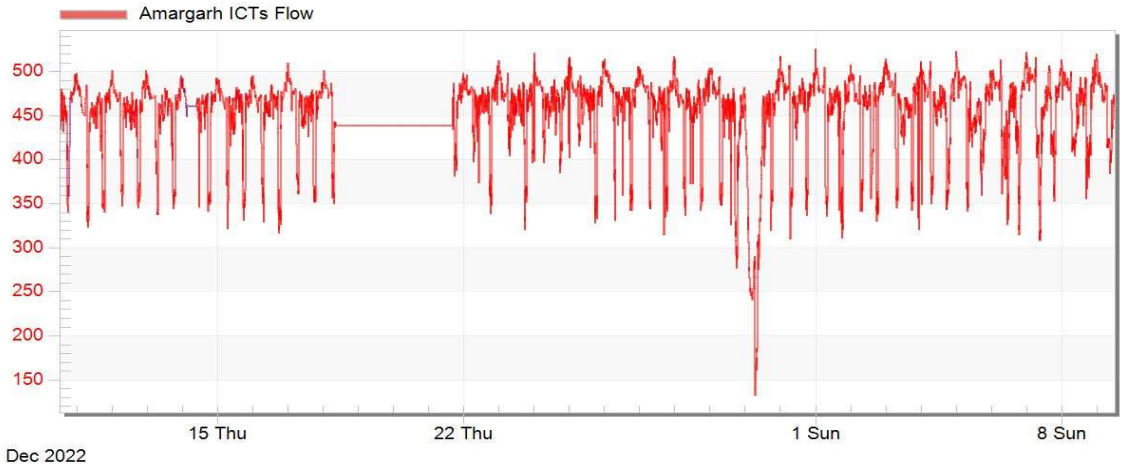

Ratangarh (RS) P(MW)
Ratangarh (RS) Q(MVAR)
900
800
700
600
500
400
300
200
100
0
-100
05/12/22 13:33
06/12/22 14:53
07/12/22 16:13
08/12/22 17:33
09/12/22 18:53
10/12/22 20:13
11/12/22 21:33
12/12/22 22:53
14/12/22 00:13
15/12/22 01:33
16/12/22 02:53
17/12/22 04:13
18/12/22 05:33
19/12/22 06:53
20/12/22 08:13
21/12/22 09:33
22/12/22 10:53
23/12/22 12:13
24/12/22 13:33
25/12/22 14:53
26/12/22 16:13
27/12/22 17:33
28/12/22 18:53
29/12/22 20:13
30/12/22 21:33
31/12/22 22:53
02/01/23 00:13
03/01/23 01:33
04/01/23 02:53
05/01/23 04:13
06/01/23 05:33
07/01/23 06:53
08/01/23 08:13
09/01/23 09:33
10/01/23 10:53
11/01/23 12:13
12/01/23 13:33
13/01/23 14:53
14/01/23 16:13
15/01/23 17:33
16/01/23 18:53
17/01/23 20:13
18/01/23 21:33
19/01/23 22:53
21/01/23 00:13
22/01/23 01:33

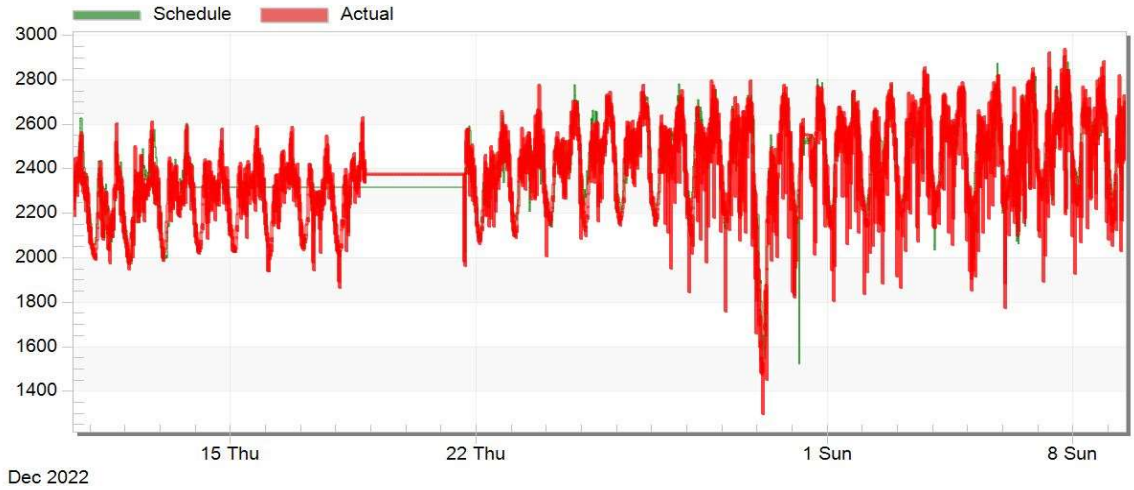

Barmer (RS) P(MW)
Barmer (RS) Q(MVAR)
450
400
350
300
250
200
150
100
50
0
-50
05/12/22 13:33
06/12/22 14:53
07/12/22 16:13
08/12/22 17:33
09/12/22 18:53
10/12/22 20:13
11/12/22 21:33
12/12/22 22:53
14/12/22 00:13
15/12/22 01:33
16/12/22 02:53
17/12/22 04:13
18/12/22 05:33
19/12/22 06:53
20/12/22 08:13
21/12/22 09:33
22/12/22 10:53
23/12/22 12:13
24/12/22 13:33
25/12/22 14:53
26/12/22 16:13
27/12/22 17:33
28/12/22 18:53
29/12/22 20:13
30/12/22 21:33
31/12/22 22:53
02/01/23 00:13
03/01/23 01:33
04/01/23 02:53
05/01/23 04:13
06/01/23 05:33
07/01/23 06:53
08/01/23 08:13
09/01/23 09:33
10/01/23 10:53
11/01/23 12:13
12/01/23 13:33
13/01/23 14:53
14/01/23 16:13
15/01/23 17:33
16/01/23 18:53
17/01/23 20:13
18/01/23 21:33
19/01/23 22:53
21/01/23 00:13
22/01/23 01:33

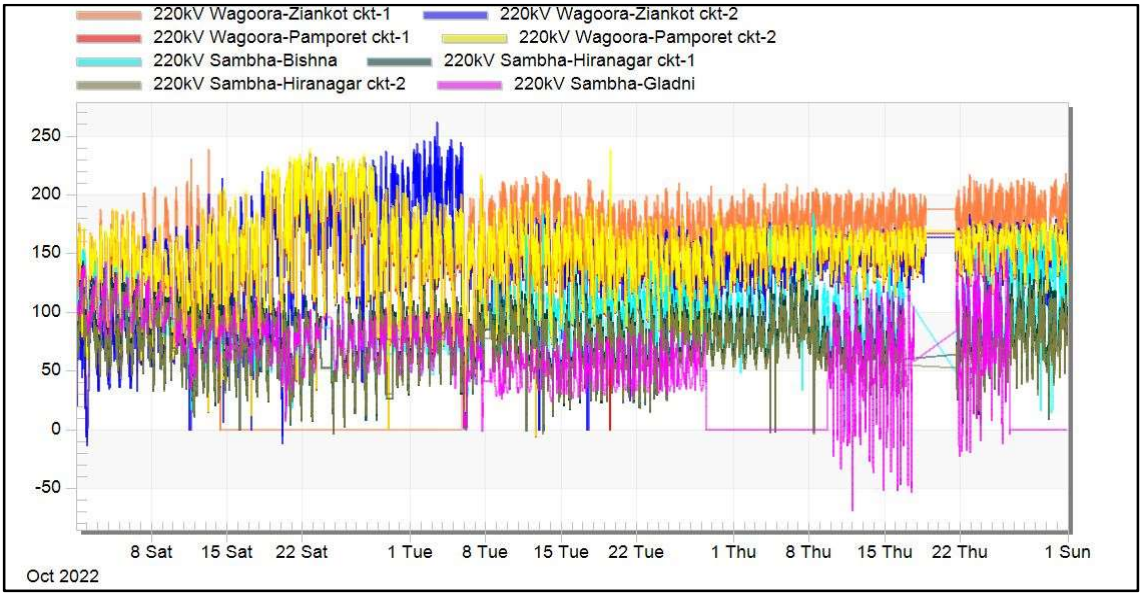
Annexure IX

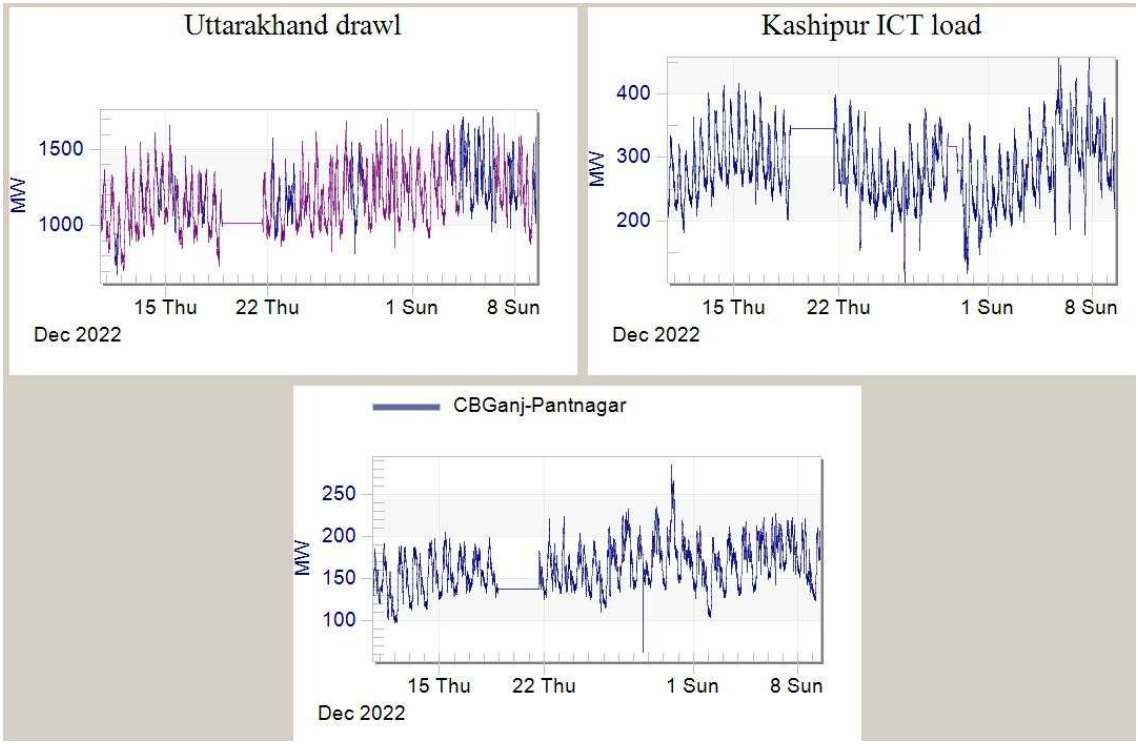

Himachal Schedule
Himachal Actual
2000
1800
1600
1400
1200
1000
800
600
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022


220kV Nallagarh-Upernangal 1
220kV Nallagarh-Upernangal 2
250
200
150
100
50
0
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022


Amargarh ICTs Flow
500
450
400
350
300
250
200
150
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022


Schedule
Actual
3000
2800
2600
2400
2200
2000
1800
1600
1400
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022


220kV Wagoora-Ziankot ckt-1
220kV Wagoora-Ziankot ckt-2
220kV Wagoora-Pamporet ckt-1
220kV Wagoora-Pamporet ckt-2
220kV Sambha-Bishna
220kV Sambha-Hiranagar ckt-1
220kV Sambha-Hiranagar ckt-2
220kV Sambha-Gladni
250
200
150
100
50
0
-50
8 Sat
15 Sat
22 Sat
1 Tue
8 Tue
15 Tue
22 Tue
1 Thu
8 Thu
15 Thu
22 Thu
1 Sun
Oct 2022


Uttarakhand drawl
MW
1500
1000
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022
Kashipur ICT load
MW
400
300
200
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022
CBGanj-Pantnagar
MW
250
200
150
100
15 Thu
22 Thu
1 Sun
8 Sun
Dec 2022

Developers	Data received on the format circulated
Adani	Received (Plant wise data and WTGs data not received, received for Sungrow and Huawei Inverters)
Renew	Received
Ayana	Received
Eden	Received
Hero Solar	Received
Avaada	Not Received
Mahindra	Received
ACME	Not Received
Azure	Downloaded setting taken during plant visit
Tata Power	Not Received
NTPC	Received only for NTPC Kolayat
SBSR	Not Received
Thar Surya	Not Received

Settings Received from RE developers and comments on HVRT settings

Plant Name	Inverters Make	Status of protection setting	Settings in Format	Remarks	Setting shared in model during FTC
Eden Solar Plant	SUNGROW	Received	https://drive.google.com/file/d/1BcPVqiii-nyA4FG8wdeVD7rlyYG7Nzjp/view?usp=share_link	**Settings seems OK**	Setting at Inverter Terminal is kept same as defined for POI For 1.11 pu at Inverter terminal delay is 5sec For 1.2 pu at Inverter terminal delay is 2sec. For 1.3 pu at Inverter terminal delay is 0ms (Instantaneous tripping) **Final updated model is required as changes in settings have been made in field.**
ReNew Sun waves Pvt. Ltd.	SUNGROW	Received	https://docs.google.com/document/d/1SozRIkC-C0zF1YvTZsEu4IhufEENYrsL/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true	Partial correct HVRT setting (Settings as shared) For 1.10125 pu at Inverter terminal delay is 2sec For 1.2 pu at Inverter terminal delay is 0.2sec. For 1.3 pu at Inverter terminal delay is 40ms	
Renew Sun Bright Pvt. Ltd. (RSEJ4L)	HUAWEI	Received	https://docs.google.com/document/d/1K6fDEEEZ6xOsqEboUZA5j4D1EJ_fK1Iw/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true	Wrong HVRT setting (Settings as shared) For 1.1 pu at Inverter terminal delay is 2.5sec For 1.2 pu at Inverter terminal delay is 0.5sec. For 1.3 pu at Inverter terminal delay is 50ms	
ReNew Solar Energy (Jharkhand Three) Pvt. Ltd.	HUAWEI	Received	https://docs.google.com/document/d/1-fwAPvthot6DC6l15r44qMhDB-dUAlAk/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true	Partial correct HVRT setting (Settings as shared) For 1.15 pu at Inverter terminal delay is 2.5sec For 1.2 pu at Inverter terminal delay is 0.5sec. For 1.3 pu at Inverter terminal delay is 50ms	
ReNew Solar Urja Pvt. Ltd.	SUNGROW & TBEA	Received	https://docs.google.com/document/d/1FIKJhWdZxQs3dkctCPXrGwT0uG1xc8wV/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true	Partial correct HVRT setting (Settings as shared) For 1.10125 pu at Inverter terminal delay is 2sec For 1.2 pu at Inverter terminal delay is 0.2sec. For 1.3 pu at Inverter terminal delay is 40ms	
Mega Surya Urja Pvt. Ltd.	SINENG	Received	https://drive.google.com/file/d/1WduvjChsI1AGAaaWiMqfEOwyvxlAbIf1/view?usp=share_link	Partial correct HVRT setting (Settings as shared) For 1.11 pu at Inverter terminal delay is 2sec For 1.2 pu at Inverter terminal delay is 0.2sec. For 1.3 pu at Inverter terminal delay is 10ms	
Mahindra Renewable Pvt. Ltd.	SUNGROW	Received	https://drive.google.com/file/d/1Zx2wbd9t73rToihI1XUXSHptCztV8Ng-/view?usp=share_link	Wrong HVRT setting (Settings as shared) For 1.1 pu at Inverter terminal delay is 2sec For 1.2 pu at Inverter terminal delay is 0.2sec. For 1.3 pu at Inverter terminal delay is 100ms	
Clean Solar Power (Jodhpur) Pvt. Ltd.	SUNGROW	Received	https://docs.google.com/spreadsheets/d/1VskFcDHrE2u-Y8lFgIkYNkDufPFwKLH_/edit?usp=share_link&ouid=116564959777146685176&rtpof=true&sd=true	Wrong HVRT setting (Settings as shared) For 1.1 pu at Inverter terminal delay is 2sec For 1.2 pu at Inverter terminal delay is 0.2sec. For 1.3 pu at Inverter terminal delay is 0ms (Instantaneous trip)	
Adani Green Energy Ltd.	SUNGROW	Received	https://drive.google.com/file/d/1wYui-aqcrKTICcE_UySIRWKIj7HNEdtO/view?usp=share_link	Setting at Inverter Terminal is kept same as defined for POI For 1.1 pu at Inverter terminal delay is 10sec For 1.2 pu at Inverter terminal delay is 2sec. For 1.3 pu at Inverter terminal delay is 0ms (Instantaneous tripping)	
	HUAWIE	Received	https://drive.google.com/file/d/1kCTO-DMF9ZuoFofZlbpCX4Met0PDeVmw/view?usp=share_link	Setting at Inverter Terminal is kept same as defined for POI For 1.15 pu at Inverter terminal delay is 10sec (Changed recently) For 1.2 pu at Inverter terminal delay is 2sec. For 1.3 pu at Inverter terminal delay is 0ms (Instantenous tripping)	

Sterlite Power

DLF Cyber Park, Block B, 9TH Floor, Udyog Vihar Phase III, Sector -20, Gurugram-122001

Ref. No: SPTL/O&M/2022-23/11/01 Date: 25 Nov 2022

To,
Executive Director,
Northern Regional Load Dispatch Centre
Katwaria Sarai, New Delhi

Sub: Request for VOIP connectivity of Upcoming Sterlite Remote Control Room at Gurugram with NRLDC, WRLDC, SRLDC, ERLDC and NERLDC

Dear Sir,

We take this opportunity to thank you for the support provided from time to time. We are glad to inform you that M/s Sterlite Power Transmission Limited is setting up Remote Control Center at Gurugram intended as central coordination node of all assets/SPV's (including operational and under construction projects) of Sterlite Power namely:

1. Mumbai Urja Marg Limited – WR region and NER region
2. Lakadia Vadodara Transmission Projects Limited – WR region
3. Goa Tamnar Transmission Project Limited – WR region
4. Udupi Kasargode Transmission Limited – SR region
5. Nangalbibra Bongaigaon Transmission Ltd - ER
6. Kishtwar Transmission Limited – NR region

So, for centralized coordination of the assets and considering the proximity of SPTL central control room at Gurugram with NRLDC, requesting you to kindly review and further allow VOIP link connectivity access of our Control Room with NRLDC and onward towards all other RLDC's.

Kindly note that the optical fiber link required for end-to-end connectivity will be made available once your kind approval is received.

Thanking You,
Yours Truly,

Raghvendra Patil
Chief Manager – O&M