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 (63वीं)/2023/2670-2717 दिनाँक: 14, मार्च, 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 63वीं बैठक का कार्यवृत ।
Subject: 63rd meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 63वीं बैठक दिनांक **24th फ़रवरी, 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 63rd meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **24th February, 2023** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

(नरेश भंडारी)
(Naresh Bhandari)
सदस्य सचिव
Member Secretary
14/3/23

List of NRPC Members (FY 22-23)

1. Chairperson, Northern Regional Power Committee & CMD, Delhi Transco Limited (DTL), Shakti Sadan, Kotla Marg, New Delhi-110002
2. MD, PTCUL, Dehradun-248001, (Fax- 0135-2764496)
3. MD, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
4. CMD, RRVPNL, Jaipur-302005, (Fax -01412740168)
5. Member (GO&D), CEA, New Delhi, (Fax-011-26108834)
6. CMD, PSTCL, Patiala-147001, (Fax-0175-2307779)
7. Commissioner/Secretary, PDD, J&K, Jammu, (Fax-0191- 2545447/ 01942452352)
8. Managing Director, HVPN Ltd, Panchkula -134109 (Fax-0172-2560640)
9. Chairman, BBMB, Chandigarh-160019, (Fax-0172-2549857/2652820)
10. Chief Engineer, UT of Chandigarh, Chandigarh-160066, (Fax-0172-2637880)
11. Managing Director, DTL, New Delhi-110002, (Fax-011-23234640)
12. General Manager, SLDC, DTL, New Delhi-110002, (Fax-011-23221069)
13. Managing Director, IPGCL, New Delhi-110002, (Fax-011-23275039)
14. Chief Engineer (SO&C), SLDC, HVPNL, Panipat, (Fax-0172-2560622/2585266)
15. Managing Director, HPGCL, Panchkula-134109, (Fax-0172-5022400)
16. Representative of UHBVNL (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 AVVNL (Rajasthan Discom)
25. Managing Director, SLDC, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
26. Managing Director, UPRVUNL, Lucknow-226001, (Fax-0522-2288410)
27. Representative of DVVNL (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. COO, CTUIL, Gurgaon-122001
35. CMD, SJVNL, New Delhi, (Fax-011-41659218/0177-2660011)
36. Executive Director (PSP & APP), 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, CLP 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, KWHEP, 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. Representative of Tata Power trading company Ltd.
48. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
49. Representative of Prayagraj Power Generation Co. Ltd.
50. CEO, MEJA Urja Nigam Ltd., New Delhi
51. Representative of Mahindra Susten Private Ltd., Mumbai (Member IPP<1000 MW)
52. Representative of Adani Transmission India Pvt. Ltd., Ahmedabad (private transmission licensee)
53. Representative of BSES Rajdhani Power Ltd. (Private Discom)

Special Invitee:

1. RE generators/Holding companies in Northern Region as per mail list.

Contents

उत्तरी क्षेत्रीय विद्युत समिति की 63वीं बैठक

63rd MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11:00 HRS; 24th February 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 mentioned that the need of the hour is to prepare for upcoming summers as the Northern Region will witness high power demand during summers. The various steps such as system strengthening, preventive maintenance etc. should be taken timely for optimal utilisation of assets during peak power demand season.

Member Secretary, NRPC emphasised that the month of February is the time when we should focus upon preventive maintenance of our generating units for the coming summer months. He also informed the forum that the shutdown for maintenance of generating units were allowed in the OCC meeting and the generating companies have been asked to complete the work positively by 31st March, 2023. Ministry of Power has directed that no planned shutdowns will be allowed from 1st April, 2023 till 15th May, 2023 in view of high power demand expected in the month of April and crunch of Hydro power in the Northern region.

He also informed the forum that creation of a National Portal for surplus power is under process and will be functional by the first week of March. He highlighted that the portal will be a good avenue for stakeholders to tap the available resource and surplus power pan-India. A key feature of the portal is that the power availability will be at a regulated (tariff) price and the stakeholders will not experience any price fluctuations like market portals. This will help in managing deficit of power in a particular region by surplus power in another region.

He also informed the forum regarding the webinar organised jointly by Ministry of Power and Ministry of New and Renewable Energy on 23rd February, 2023. He appreciated the remarks given by CMD, Grid-India in webinar regarding need to create generation nearer to load so that issues of hunting etc. may be avoided and grid will remain stable with integration of huge RE power.

A.1 Approval of MoM of 62nd NRPC meeting

A.1.1 AEE (System Study), NRPC apprised the forum that minutes of 62nd NRPC meeting (held on 31.01.2023) has been issued vide letter dtd.20.02.2023.

A.1.2 CTU representative requested the forum regarding small correction required in point no. A.1.4 of minutes of 62nd NRPC meeting as below –

(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.

A.1.3 Accordingly, modified version is as below:

(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 ***not occur simultaneously*** *during peak solar* ***hours****. He also informed forum regarding possibility of LILO of the above line in future which will reduce the line length. Secondly, CTU representative informed that an additional corridor is being planned from Jalore S/s. So, in that condition, angular control will be much better in future.*

A.1.4 Forum approved the minutes with above correction.

A.1.5 DTL representative quoted the discussion held on agenda no. 8 in 62nd NRPC meeting and submitted following:

i. w.e.f. 01.04.2007, the Power purchase responsibility has been transferred from DTL to respective Discoms (BRPL, BYPL, and TPDDL). In 2009, SJVN raised some arrear bills of past period in reference to CERC order to all the beneficiaries including DTL.

ii. The issue has been deliberated between DTL and SJVN and it was decided that DTL will release Rs. 3.62 crore as Principal Outstanding to SJVNL. Further, LPSC at the rate of average of borrowing cost of the two companies will also be allowed. Both the utilities were required to take approval of its Board for the same.

iii. In above matter, DTL took approval of its board but SJVN did not take reciprocal approval of its board till date. SJVN informed in meeting dated 12.05.2022 that Sh. Ashok Kumar, Sr. AGM, SJVNL has been authorized to negotiate/finalize this

pending issue of payment by Director (Electrical) of SJVNL. SJVNL vide recent letter dated 06.01.2023 requested DTL to consider the outcome of meeting held on 12.05.2022 as final.

iv. DTL informed in the 62nd NRPC meeting that matter will be discussed with Finance Department of DTL for clearance of dues. SJVN was also asked 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.1.6 Forum observed that above submission of DTL has new facts which were not mentioned by DTL in 62nd NRPC meeting. Therefore, it may not be part of MoM of 62nd NRPC meeting. However, DTL was requested to submit an agenda in upcoming NRPC meeting, if deliberation is required.

A.2 Allocation of one 500 MVA, 400/220/33 KV ICT to Punjab in view of upcoming paddy season (Agenda by PSTCL)

A.2.1 AEE (SS), NRPC apprised the forum that PSTCL vide mail dtd. 20.02.2023 has submitted that 400 KV S/S PSTCL Nakodar has ICT capacity of 2X315 MVA, 400/220/33KV. One 315 MVA ICT, Make- Siemens, Sr. No- 1130049-04, YOM-2011 has got damaged on 06.02.2023 after operation of differential relay. Upon testing the charging current, turn ratio and SFRA, results were found not in order. The internal inspection was carried on 19.02.2023 by M/s Siemens and some wooden pieces along with carbon residue was detected on blue phase limb and they have concluded that exact cause and extent of damage can only be ascertained after shifting the ICT to their works.

A.2.2 He also apprised that in 47th NRPC meeting held on 11th December 2019 (**Annexure-I**), NRPC approved the procurement of five nos. 400/220/33 KV ICTs as cold regional spare transformers against agenda item No- B.4 submitted by PGCIL. It was also decided that,

i. The 3Ø-315MVA spare requirement will be met through proposed 3Ø-500 MVA transformer.

ii. The transformers would be kept as regional spares which could be used by any of the constituent in case of an emergency. The requirement of these transformers has been calculated considering the population of different transformers in different states.

iii. Further, it was also decided that NRPC Secretariat would be the authority responsible for deciding the deployment of cold spares in case of requirement of the states.

A.2.3 He also apprised that since 400 KV Nakodar is already N-1 non-compliant and both the ICTs remained fully loaded in the last two paddy seasons, therefore, it is requested by PSTCL to allocate one 500 MVA, 400/220/33 KV ICT to Punjab at the earliest to cope up with the upcoming paddy season.

A.2.4 SE (O), NRPC asked PGCIL to inform the forum regarding the present status of regional spare availability of transformers. To this, representative from PGCIL replied that three spare transformers are already provided to DTL and an additional one transformer is being provided to DTL Mundka sub-station (as discussed in Agenda 2 of 62nd NRPC meeting) in view of G-20 meeting. Also, a 250 MVA transformer is being provided to HVPNL.

A.2.5 PGCIL representative informed the forum that 01 no. 315 MVA ICT spare is available at Mandola sub-station and 01 no. 315 MVA ICT spare is available at Bhiwadi sub-station. However, at Bhiwadi, one existing transformer is in critical condition. He proposed to provide 01 no. 315 MVA ICT spare at available at Mandola sub-station to 400 KV S/S PSTCL, Nakodar.

A.2.6 PSTCL representative requested the forum to shift one 500 MVA, 400/220/33 KV ICT of Panchkula PG sub-station instead of 315 MVA ICT of Mandola sub-station. He highlighted that 500 MVA ICT will better cater the N-1 contingency issue at 400 KV sub-station Nakodar. He also submitted that the damaged 315 MVA ICT at Nakodar, when repaired will be given to PGCIL as regional spare.

A.2.7 MS, NRPC stated that in view of paddy demand of Punjab which comes in the month of June, the forum needs to help PSTCL by providing them one 500 MVA, 400/220/33 KV ICT of Panchkula PG sub-station. He added that the spare transformers which are provided to states to meet their contingency, are a temporary arrangement and the spare ICT should be returned back timely to PGCIL. He agreed with the reason given by PSTCL representative regarding N-1 contingency issue and the relief which the 500 MVA ICT will provide. However, he disagreed the submission of PSTCL representative of giving repaired 315 MVA ICT at Nakodar, to PGCIL as regional spare.

A.2.8 PGCIL representative, restrained of providing 500 MVA ICT to PSTCL, giving the reason that PGCIL has 9 nos. of 500 MVA transformers in Punjab and 25 nos. of 500 MVA transformers in Rajasthan and there is no spare for Rajasthan. Therefore, he desired to keep 1 no. 500 MVA ICT at Panchkula for handling any failure of 500 MVA ICT in the Rajasthan RE region. Accordingly, he requested for considering his proposal for providing 315 MVA ICT to PSTCL.

A.2.9 PSTCL representative asked PGCIL to provide 500 MVA ICT to PSTCL and requested that, if 500 MVA ICT is not possible, then 315 MVA ICT may be provided to PSTCL.

A.2.10 NRLDC was asked to offer comments on relief in loading at Nakodar after placement of 500 MVA transformer. GM, NRLDC stated that Nakodar is N-1 non-compliant. 500 MVA transformer may give some relief however, there may not be complete relief. He also stated that there may be a list of all spares transformers of region and their current location so that forum may be informed in advance while taking any decision.

A.2.11 MS, NRPC concluded the discussion asking PGCIL to provide one 500 MVA ICT available at Panchkula to 400 KV S/S Nakodar in view of N-1 contingency at 400 KV Nakodar S/S and high power demand during upcoming paddy season. However, if PGCIL feels that providing 500 MVA ICT is not feasible, then 315 MVA ICT from Mandola S/S may be provided to Nakodar S/S. He also instructed PSTCL to return back the spare transformer to POWERGRID once there damaged transformer get repaired.

A.2.12 Forum agreed on views of MS, NRPC.

A.2.13 PGCIL stated that they will take up the matter with their management and will intimate PSTCL and NRPC Sectt. in this regard.

A.3 Contribution from members of NRPC for FY 2022-23 (Agenda by NRPC Sectt.)

A.3.1 AEE (SS), NRPC apprised the forum that in view of the budget estimates approved by GoI for the financial year 2022-23 through NRPC fund and balance amount available in the NRPC Fund, the per member contribution for the year 2022-23 is proposed to be Rs.10.0 lakh. The same is required to be contributed by organizations who are members for FY 2022-23.

A.3.2 He also apprised that members may complete contribution activity by 31.03.2023. As already decided in earlier NRPC meeting, 1% simple interest per month on late payment shall be levied. NRPC Sectt. would issue demand letters by 28.02.2023 and interest for current FY 2022-23 would be applicable from 01.04.2023 onwards i.e. beyond 31.03.2023, 1% interest upto 30.04.2023 for April month, and so on. Payment made during any date of months after March 2023 would invite 1% interest per month starting from April 2023.

A.3.3 The forum approved the above proposal of contribution amount for the year 2022-23 as Rs.10.0 lakh and application of interest on late payment.

A.4 Budget for Provision of Phasor Measurement Units (PMUs) at POI in RE feeders in Rajasthan (Agenda by PGCIL)

A.4.1 AEE (SS), NRPC apprised the forum that POWERGRID, during 58th NRPC meeting (held on 30.09.2022) 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 62nd NRPC it was discussed that the report from WRPC for PMU and AUFLS

implementation is under approval and based on the outcome of the report, final decision shall be taken.

A.4.2 However, considering urgency expressed by NRLDC, forum had accorded the approval in 62nd NRPC meeting, 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.4.3 He also apprised that POWERGRID has proposed that actual expenditure on above work may be booked in one of the running project in Rajasthan Region under phase-II i.e. “Transmission System Strengthening Scheme for evacuation of Power from Solar Energy Zones in Rajasthan (8.1 GW) Under Phase-II – Part B1”.

A.4.4 MS, NRPC opined that PGCIL’s proposal of booking the cost in running project in Rajasthan Region under phase-II may be allowed. However, he asked POWERGRID to include the cost in any running communication scheme, if possible, as PMU work is more suitable in communication scheme.

A.4.5 Forum concurred on views of MS, NRPC and approved the proposal of POWERGRID for booking actual expenditure (tentatively Rs. 1.5 Crore) in one of the running project in Rajasthan Region under phase-II i.e. “Transmission System Strengthening Scheme for evacuation of Power from Solar Energy Zones in Rajasthan (8.1 GW) under Phase-II – Part B1” for installation of 8 nos. PMU at 220 KV bus of Fatehgarh-II, Bhadla, Bikaner, and Bhadla-II s/s of POWERGRID as approved in 62nd NRPC meeting.

A.5 OPGW installation on 400kV D/C Malerkotla – Kurukshetra line (Agenda by CTU)

A.5.1 AEE (SS), NRPC apprised the forum that in 62nd NRPC meeting, the installation of OPGW on 400kV D/C Malerkotla – Kurukshetra line (Owned by M/s Sekura) by M/s Sekura was deliberated and it was decided 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.5.2 However, CTU has mentioned that the project was earlier assigned to POWERGRID and POWERGRID, through affidavit to CERC under petition no. 94/MP/2021, has communicated their no objection for laying the OPGW on this line by M/s Sekura. CTU has mentioned that the concern raised in the petition filed by CTU would also be addressed if the OPGW is owned and maintained by M/s Sekura.

A.5.3 The concerns raised by M/s Sekura in the meeting (62nd NRPC) were replied by CTU vide email dated 03.02.2023 (**Annexure-II**).

A.5.4 CTU has proposed that -

i. M/s Sekura may install the 24F OPGW (approx. cost of Rs.7 Cr. for 140 Km) on the 400kV D/C Malerkotla – Kurukshetra line in live line conditions under RTM mode with completion schedule of 18 months from the date of allocation.

ii. The broad specifications of the project would be provided by CTU after approval of the same.

iii. Bays at Malerkotla and Kurukshetra belong to POWERGRID, the Scope of FOTE, approach cable etc. at these substations would be under the scope of POWERGRID under RTM mode.

A.5.5 CM, CTUIL emphasized that CTU has given its consent to M/s Sekura for OPGW installation under RTM mode. The estimated cost and the time schedule of the same is also provided. Since, the bays at Malerkotla and Kurukshetra belongs to POWERGRID, so POWERGRID should come up with communication equipment, approach cable, FOTE etc. and integrate the existing FOTE at Malerkotla and Kurukshetra for this purpose.

A.5.6 M/s Sekura confirmed the forum that they had received the reply of CTU wherein CTU had informed that 24F OPGW may be allowed for implementation under RTM. He further added that in continuation of their deliberation in 62nd NRPC meeting, M/s Sekura wish to implement 48F OPGW cable since there is hardly any marginal difference (10-12%) in cost of 24F and 48F. He stressed upon that 48F cable will provide an added capacity considering planning for future. He thus requested the forum to consider M/s Sekura's proposal of laying 48F cable.

A.5.7 MS, NRPC enquired M/s Sekura representative regarding the need to go for 48F since 24F is also sufficient considering the future planning.

A.5.8 CTU representative added that they go by the specifications that CTU had provided to all the TSPs and the actual requirement of grid management. So, if M/s Sekura wants to go beyond that for future prospects and with the same Right of Way (RoW), then as per the order of CERC, that for extra engagements of fibre ,M/s Sekura shall share 10% of the revenue whenever they will use it.

A.5.9 MS, NRPC stated that if M/s Sekura wish to lay 48F cable instead of 24F cable, the differential cost shall be beared by M/s Sekura. Also the added cost in laying 48F cable shall be absorbed by M/s Sekura. This is so as to prevent any extra burden on constituents.

A.5.10 M/s Sekura gave its consent to bear the differential cost.

A.5.11 MS, NRPC asked AEE (SS), NRPC to apprise Para 6 & Para 7 of CERC Record of Proceedings dated 25.06.2021 (**Annexure-III**). He then stated that as per the CERC order, CERC had nowhere mentioned NRPC Sectt. to intervene in the matter and issue is to be resolved bilaterally between CTU and STL amicably.

Para 6 & 7 of above RoP is reproduced as below:

Quote

6. The Commission observed that the issues raised by CTU in the instant matter may arise in case of other TBCB projects. Therefore, the Commission directed CTU to implead all the transmission licensees implementing transmission projects under the TBCB route as respondents so that all of them may be heard and suitable directions could be issued in one order instead of deciding the issues in multiple petitions. The Commission further directed the Petitioner to implead PGCIL as a party to the proceedings. The Commission also requested the learned senior counsel for STL to discuss with CTU and firm up the issues that may arise in installation of OPGW in place of earth wire in various TBCB projects for smooth and proper adjudication of the issues involved.

7. The learned counsel for the Petitioner submitted that the contract has been awarded and requested to allow CTU to install OPGW on the 400 kV Kurukshetra-Malerkotla Transmission Line in the meanwhile to avoid any delay. The Commission directed CTU to discuss with STL and work out an amicable solution, for which the learned senior counsel for STL also agreed.

Unquote

A.5.12 M/s Sekura apprised before the forum, the Para 3 & Para 5 CERC latest Record of Proceeding dated 10.03.2022 (**Annexure-IV**). The same is re-produced as below:

Quote

3. The Commission directed CTUIL 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 Commission further directed CTUIL to apprise the Commission once the proposal is finalized and the accordingly the petition will be listed for hearing.

5. The Commission further directed the Petitioner submit the following information on affidavit by 29.3.2022 with a copy to the Respondents, who may file their comments/reply by 10.4.2022.

a) List of transmission assets along with transmission licensee's name wherein this replacement of earth wire/ old OPGW is planned.

b) Any other issues being faced by CTU related to modifications required to be carried out in TBCB assets keeping in view the integrated nature of ISTS.

Unquote

A.5.13 MS, NRPC, after listening to CTU and M/s Sekura, opined that the matter is subjudice with Hon'ble CERC and the commission has directed 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. Therefore, CTU is requested to approach Hon'ble CERC for decision on the matter.

A.6 OPGW installation on existing 400 kV Kota – Merta line which is LILOed at Sri Cement & proposed to be LILOed at 765/400 kV Beawar (ISTS) S/S (Agenda by CTU)

A.6.1 AEE (SS), NRPC apprised the forum that OPGW installation on 400 KV Kota – Merta line (256kms.) along with terminal equipment was agreed in the 57th NRPC meeting. The line is LILOed at Sri Cement (Merchant Generator) and is also proposed to be LILOed at Beawar (New). However, the installation of OPGW on the Sri Cement LILO portion of the line was not agreed and NRPC was of the opinion that without decision of said LILO portion, there is no point in laying OPGW on main line. NRPC had further stated that decision regarding laying of OPGW in the Sri Cement LILO portion may be taken in the upcoming NRPC meetings after inputs received from Shree Cement.

A.6.2 The matter was taken up with Sri Cement and based on input received, CTU had informed that Sri Cement did not give the consent for doing OPGW work on LILO portion (**Annexure-V**).

A.6.3 The proposal was taken up in 11th NCT meeting, wherein NCT opined that implementation of OPGW while bypassing LILO at Shree Cement is not desirable.

A.6.4 Accordingly, CTU has proposed before the forum, to ask Shri Cement for laying OPGW on the LILO portion of the 400kV Kota – Merta line at Sri Cement.

A.6.5 CTU representative proposed the forum to explore the option of laying the OPGW cable by POWERGRID in case Sri Cement denies.

A.6.6 He stated that since Sri Cement is a merchant generator, they had given the reason that their data is flowing through PLCC and there is also no extra fund to update the

fibre optic link in the LILO portion. He also stated that CTU desire that the entire line should be covered with OPGW.

A.6.7 NRLDC representative stated that Sri Cement is connected in grid to Kota and Merta only and there is no other connectivity to Sri Cement.

A.6.8 MS, NRPC enquired from CTU whether it is mandatory for Sri Cement to go for OPGW.

A.6.9 CTU representative stated that PMU installation on both sides of 400 KV is mandatory. He also mentioned that PMU installation is not possible with PLCC.

A.6.10 Agreeing to him, MS, NRPC stated that since PMU installation is a mandate on 400 KV generator, the generator need to lay OPGW as a requirement for PMU installation.

A.6.11 Sri Cement representative opined that Sri Cement, being operated on imported coal, dispatches power only during peak power demand season (4-5 months). Therefore, laying the whole setup of OPGW will be an extra burden on their generator, looking the operational cost of coal and operational time period of the plant during the year.

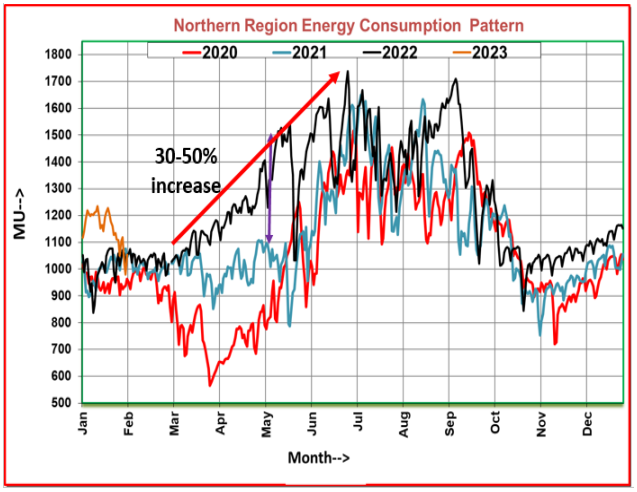
A.6.12 MS, NRPC stressed that since installation of PMU at 400 KV GS is a requirement of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 **(Annexure-VI),** Sri Cement need to adhere. He also denied CTU argument of implementation of OPGW while bypassing LILO at Shree Cement.

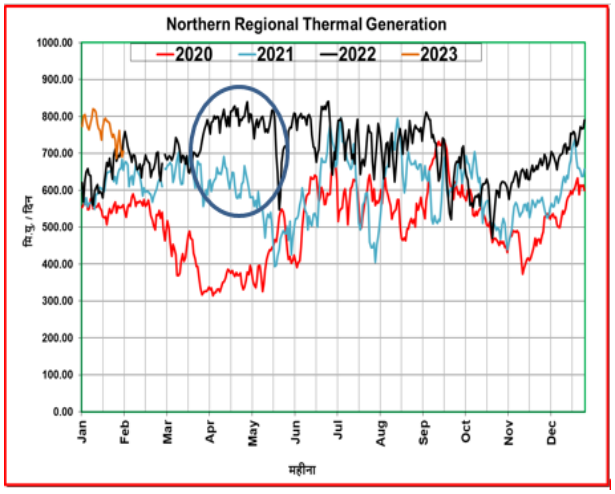
A.6.13 Sri Cement representative stated that they have complied all applicable regulations while commissioning of the plant. He desired to know whether above provisions for OPGW of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 is applicable to old plants also. He requested that he will discuss the matter internally in reference to above regulation and then may submit his views.

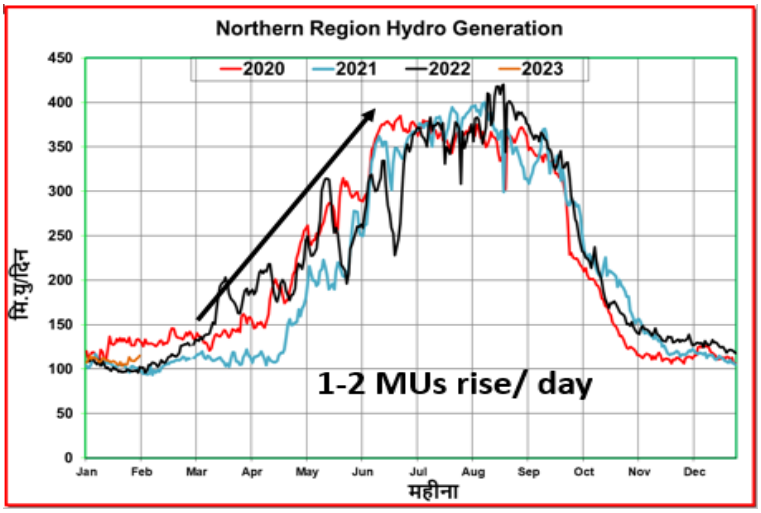
A.6.14 Forum decided to take up the matter in next NRPC meeting. CTU was requested to share all relevant regulations to M/s Sri Cement.

A.7 Summer Preparedness 2023 (Agenda by NRLDC)

A.7.1 NRLDC representative stated that demand of Northern Region starts increasing from March onwards every year as temperature starts to increase. With plots, it was mentioned that there is around 5-6 MUs rise/ day in regional energy consumption from March to July month.







The reservoir levels this year were also presented in the meeting. It was mentioned that reservoir levels are slightly higher this year at Bhakra, Chamera-I, Pong and RSD. The reservoir levels at Tehri and Koteshwar are lower than previous year.

Due to the scorching summers and heavy demand in the northern region, advance planning and actions are helpful for improved grid operation. Coupled with increased demand, high line and transformer loadings, particularly at the distribution level, and low voltages pose significant challenges to the safe and secure functioning of the grid.

To address the issues that are frequently faced during the summer and to ensure efficient grid functioning, following are few points were discussed and agreed in meeting and are required to be followed by all:

- Apart from portfolio management based on proper forecast, re-starting of units under reserve shutdown at state as well as Inter-state level through appropriate transactions is required.
- All generating stations were requested to take actions to ensure backing down as per the latest notified CEA regulations. This would ensure reserves in the system and also make us prepared for extreme situations.

- Sudden information of outage of thermal units on coal unavailability poses challenges to meet high demand. It was requested to update & share coal stock position of thermal plants at least a week in advance as agreed earlier in TCC/NRPC meeting in case of expected low stock.
- In case there is need to connect/ disconnect load due to transmission issues or any policy decision, it was suggested that such actions be carried out with subtle changes in load and large connection/disconnection of loads to be avoided.
- As requested in 204th OCC meeting, all utilities were requested again to ensure availability of Emergency Restoration System (ERS) for early restoration of supply. NRPC advised that each utility shall work on plan for tower repairing work before April.
- ***Latest status regarding availability of ERS to be shared by all transmission utilities. NRLDC representative stated that the ERS availability status may be included in follow up NRPC agenda points of OCC meeting agenda.***
- Northern region SPS document as latest updated by NRLDC is available @ https://nrldc.in/download/nr-sps-2023/?wpdmdl=12006. It was requested to go through the document and check for any misrepresentation/ missing information.
- All states were asked to confirm/check ADMS healthiness condition wherever it is implemented. Delhi and Rajasthan were asked to reply on mail with present ADMS implementation status.

JKPTCL representative confirmed that UFR setting has been increased by 0.2Hz as per decision of NPC. It was informed in the forum that UFR setting have been increased by 0.2Hz by all states.

As per data available at NRLDC, following lines (under NRLDC jurisdiction) were out on two or more occasions during last four years on tower collapse in NR:

- 400 kV Jaisalmer-Barmer (RS) Ckt-2
- 400 kV Jaisalmer-Barmer (RS) Ckt-1
- 400 kV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1
- 400 KV Daultabad-Dhanonda ckt-2
- 400 KV Daultabad-Dhanonda ckt-1
- 400 KV Bikaner(RS)-Deedwana(MTS) (RS) Ckt-1
- 400 kV Baghpat-Kaithal (PG) Ckt-2
- 400 kV Baghpat-Kaithal (PG) Ckt-1
- 400 KV Agra-Sikar 2

- 400 KV Agra-Sikar 1
- 220 KV Kishenpur(PG)-Ramban(PDD) (PDD)
- 220 KV Kishenpur(PG)-Mir Bazar(PDD) (PDD) Ckt-1
- 220 KV Gazipur(DTL)-Noida Sec62(UP) (UP) Ckt-1
- 220 kV Duni(RS)-Kota(PG) (RS) Ckt-1

It was suggested that extra precautions need to be taken care for important lines which have history of tripping during thunderstorm/ windstorm.

It was further discussed that:

1. NLDC has also published Quantum of Reserves in line with Detailed Procedure for Estimation of the Requirement of Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) at regional level. Same is attached as **Annexure-VII**
2. On 25.01.2023, Central Electricity Authority has recently notified regulations on Flexible operation of coal fired generating units. It is available at- https://cea.nic.in/wpcontent/uploads/notification/2023/01/Gazette_Flexible_operation-4.pdf
3. Draft Procedure for Tertiary Reserve Ancillary Services (TRAS) has been uploaded by NLDC in compliance to notification issued by Hon'ble CERC and would be effective from 01.04.2023 as per CERC (Ancillary Services) Regulations 2022. It is available at - https://posoco.in/wpcontent/uploads/2023/02/Consolidated_Draft_Detailed_Procedure_TRAS_Nodal_Agency_Stakeholder_Consultation_20Feb2023.pdf
4. Stakeholders were requested to provide comments, if any, on TRAS procedure by 03.03.2023 to NLDC/ NRLDC/NRPC.

A.7.2 To maintain the voltage profile of Grid within IEGC band during summer, following known actions were suggested:

1. Switching ON Capacitor/Switching OFF reactor as per system requirement.
2. Tap Optimization at 400/220kV by NRLDC and 220/132kV by respective state control area based on scatter plots of ICTs, offline studies, NRPC RE account etc.
3. Dynamic reactive support from Generator as per their capability curve.
4. SCADA Displays for better visualization during real-time

A.7.3 All state control area/Users shall ensure before start of summer that their protection and defense system are in working conditions and settings are as per the recommendations of NRPC. In addition, all states/user need to provide update for changes or modifications carried out if any. All utilities also need to ensure that SPS in their control area are healthy and in service condition. If required, mock testing of SPS may be carried out by all utilities.

A.7.4 NRLDC would present the status of mapping of ufr and df/dt in next OCC meeting based on data availability at NRLDC.

A.7.5 All were requested to ensure the telemetry of all analog & digital points of all stations at respective control centers. Large number of telemetry issues are also encountered with newly commissioned elements.

A.7.6 As discussed in 204th OCC meeting, and in the review meeting taken by Secretary (Power) on Coal Supply on 08.12.2022, it was directed that to ensure uninterrupted power supply, and no plant should be allowed planned outage during the peak demand period i.e. in April-May 2023 as the All India demand is likely to touch 230GW during this period.

A.7.7 Similar pattern was also observed last year and number of issues related to overdrawl by NR states were also observed in real-time operation. On several days, it was observed that frequency was below the IEGC band for most of the time. In order to maintain the Grid security during high demand periods, all SLDCs were requested to take proactive steps as follows:

1. Ensure that ADMS is in service and expedite its implementation if not commissioned.
2. Ensure healthiness and availability of AUFLS and df/dt load shedding.
3. Ensure revival of intra-state generators under economic shutdown/RSD
4. Ensure portfolio balancing through STOA/RTM market segments
5. Ensure no under injection by the generators from schedule
6. In case of inadequate margins in intrastate generators measures for emergency load regulation measures may be taken in interest of grid security.
7. Pursue generators to expedite revival of thermal units under forced outage wherever feasible.

A.7.8 In this case, the list of radial feeders becomes very important. Utilities have been requested number of times to update list of radial feeders which can be opened on the directions of NRLDC to regulate the demand. List of such radial feeders has been provided by respective utilities and is part of ‘Operating Procedure of Northern Region’. Latest list of radial feeders is also attached as **Annexure-VIII**.

A.7.9 The opening of feeders is generally an extreme step which shall be required in case of threat to grid security and non-adherence to RLDC instructions to manage overdrawl by SLDCs/ DISCOMs. In such a case, every utility needs to take actions to support RLDC by following their instructions including opening of feeders.

A.7.10 SLDCs were once again requested to verify that

1. list of feeders are actually radial in nature and are likely to provide the expected relief
2. such feeders are not part of any other scheme such as any SPS, UFR or df/dt actuated shedding

A.7.11 Telemetry is to be ensured for all such feeders for monitoring in real time by SLDC/ NRLDC.

A.7.12 States were also advised to take remedial measures for minimizing sustained over drawl at low frequencies as per the IEGC.

A.7.13 NRPC forum requested all utilities to take all necessary actions as discussed above.

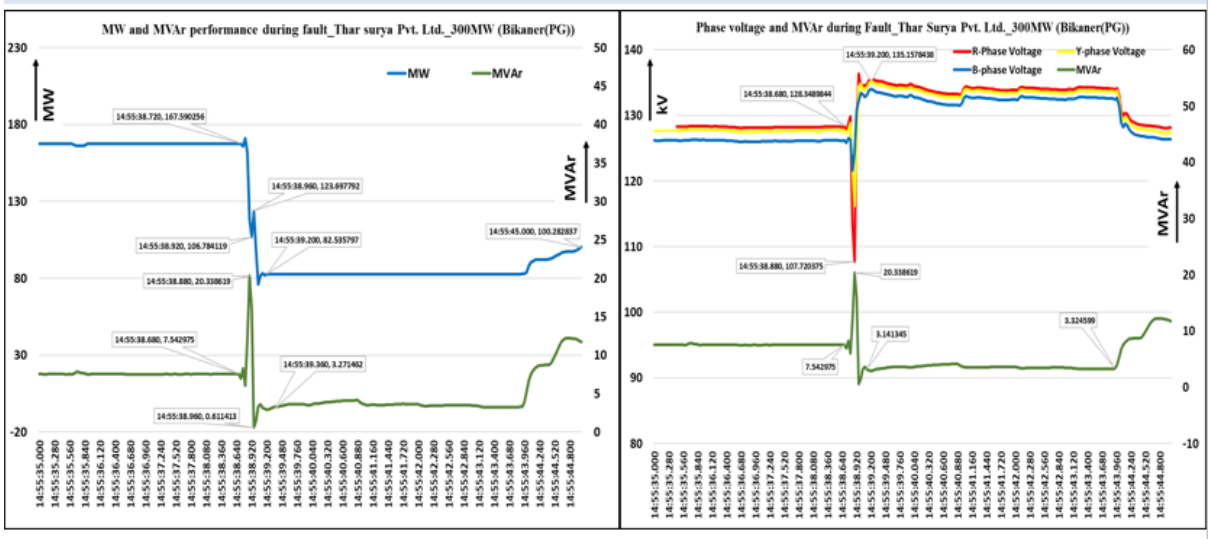
A.8 ISTS Connected RE plant performance in multiple tripping events on 14.01.2023 (Agenda by NRLDC)

A.8.1 As discussed in 62nd NRPC meeting, on 14th Jan 2023, number of transmission lines at 220kV & above voltage level tripped on faults due to kite thread. Few of the faults occurred in the transmission network near to RE complex in Rajasthan region. On these faults, during voltage dip, reduction in RE generation connected at ISTS RE pooling stations was observed which further recovered with the delay due to non-compliance of LVRT at few of the RE stations and led to the over voltage in system. Subsequent overvoltage led to the tripping of ISTS lines at RE pooling stations and 400 & 220 kV lines dedicated to RE stations on operation of over voltage protection. Total four (no.) incidents of reduction in RE generation occurred on 14th Jan 2023 at 12:06hrs, 13:03hrs, 14:55hrs & 15:18hrs. Out of these four incidents, significant reduction in RE generation occurred in last three incidents i.e. 4468MW at 15:18hrs, 3210MW at 14:55hrs & 2340MW at 13:03hrs. These three events have been analysed by NRLDC in detail with the help of PMU & SCADA data and details received from RE stations/ pooling stations.

A.8.2 The above issues have already been communicated with all ISTS RE developers vide NRLDC letter dated 15.02.2023 along with analysis done at NRLDC end (Annexure-III of agenda).

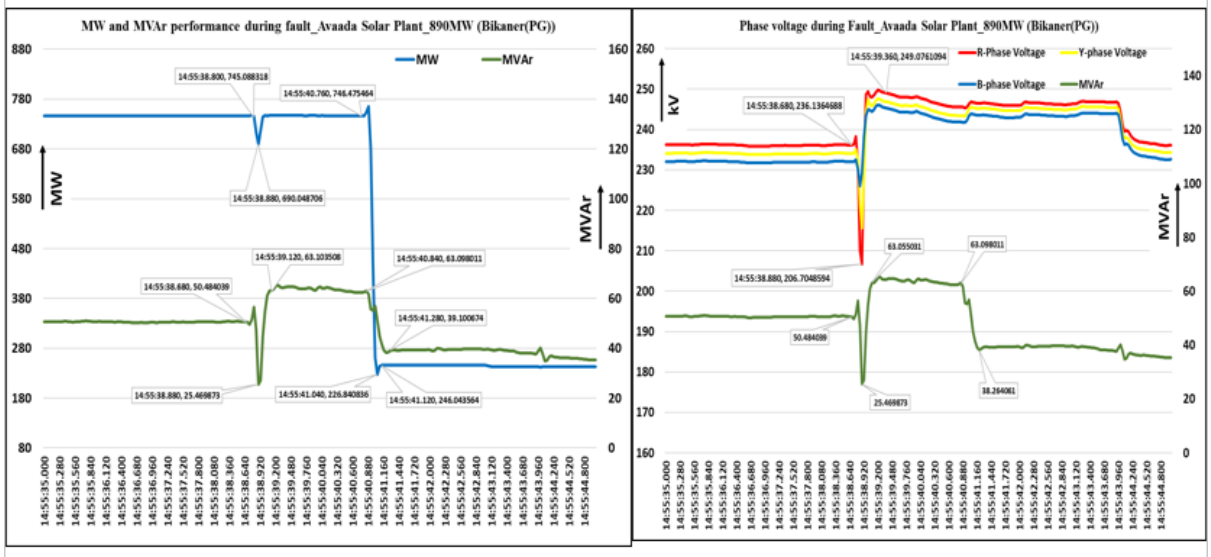
A.8.3 Sample plot of some of the plants were presented in the meeting:

Sample plant response of LVRT Non-compliant (Failed to recover generation in 1sec)



- Pre-fault voltage of 220kV Thar Surya-Bikaner (PG) at 220kV Thar Surya end was 1.01 pu, during fault voltage dip to 0.848pu, post-fault voltage was 1.064pu. **(Sharp reduction in active power with only dip of 15% voltage and failed to recover active power)**
- Pre-fault generation was 167MW, post-fault generation was 82MW, (LVRT Non-Compliant in recovering 90% of pre-fault active power (MW).

Sample plant response of reduction of active power in high voltage (despite no HVRT condition at POI)



- Pre-fault voltage of 400kV Avaada-Bikaner (PG) line at 400kV Avaada end was 1.022 pu, during fault voltage dip to 0.895pu, post-fault voltage was1.078pu.
- After successful recovery, generation reduced from 746MW to 246MW in next 2 sec despite voltage at POI was below 1.1pu. **No HVRT condition at POI but reduction of generation (due to probable inverters tripping/reduction of active power in High voltage)**

A.8.4 It is observed that out of 44, 25 RE plants are found LVRT/HVRT non-compliant w.r.t. recovery of active power after LVRT or reduction of active power in high voltage. Most of the RE plants were not able to support reactive power during fault (injection of MVAr) and after clearance of fault (absorption of MVAr in high voltage). RE station

wise status of LVRT/HVRT compliance and their behavior during all three incidents are enclosed in the report.

A.8.5 Apart from this, most of the RE stations have kept over voltage protection settings in their elements (lines, transformers etc.) just on the verge of upper limit of operating voltage range, hence implementation of uniform & desirable over voltage protection and disabling of undesired protection is recommended.

A.8.6 It was also highlighted by NRLDC representative that number of reactors have to be opened gradually as the solar generation starts to pick up during morning hours. These reactors also need to be brought in service during evening when solar generation starts reducing. These reactors are being opened based on solar generation trend from 07:30 hrs to 10:30 hrs. If there is some change in solar generation due to cloud cover or any other reason reactor opening has to be changed accordingly. It was suggested that transmission licensees act on the instructions of NRLDC in quick time as the generation scenario and voltages in solar complexes changes very fast.

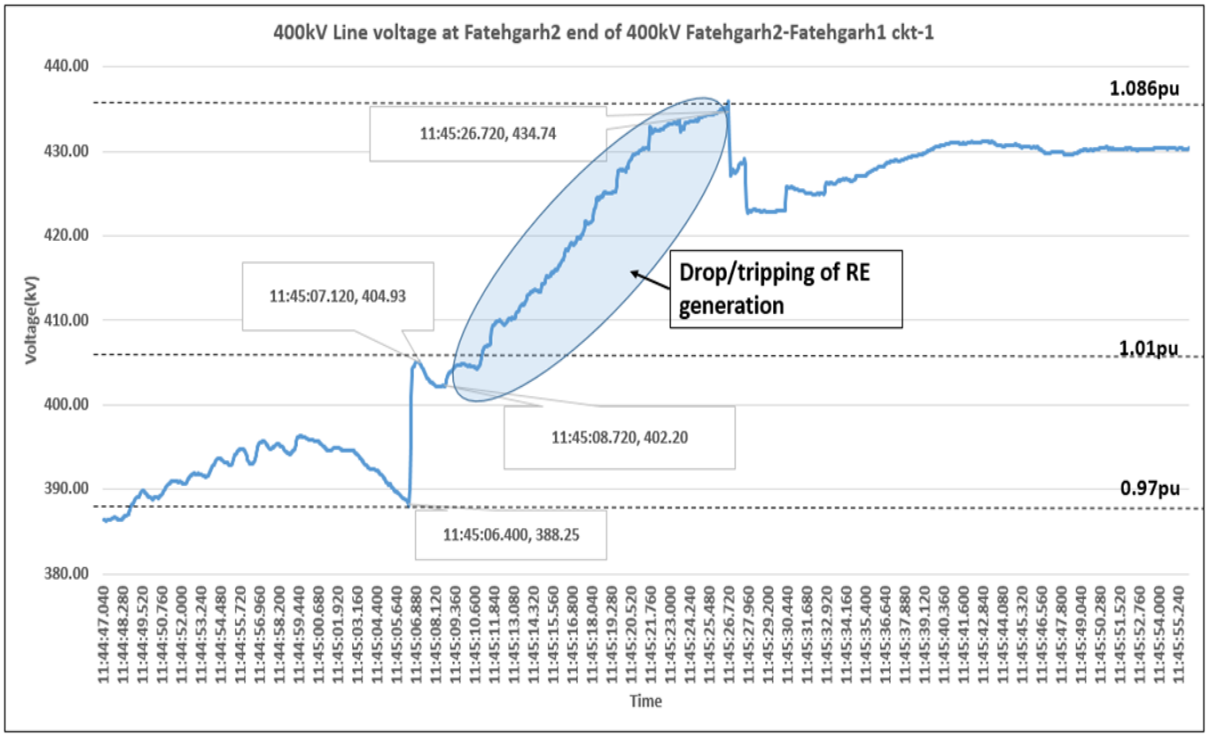
Reactors for reactive power management

		765 KV Level		400 KV Level		
S.N	Station	Bus Reactors	Line Reactors	Bus Reactors	Line Reactors	Total MVAR
1	Fatehgarh II (PG)	2*240 MVAR	4*240 MVAR	1*125 MVAR		1565
2	Bhadla 2(PG)	2*240 MVAR	4*240 MVAR	1*125 MVAR		1565
3	Bhadla (PG)	1*240 MVAR	2*240 MVAR	1*125 MVAR		845
4	Bikaner(PG)	1*330 MVAR	8*240 MVAR	1*125 MVAR		2375
5	Ajmer (PG)	1*240 MVAR	(2*240+2*330)MVAR	1*125 MVAR		1505
6	Khetri (PG)	2*240 MVAR	2*240 MVAR	1*125 MVAR		1085
7	Phagi (RS)	2*240 MVAR				480
8	Moga (PG)	2*240 MVAR				480
7	Bhadla RS			1*125 MVAR	4*50 MVAR	325
8	Bikaner RS			(1*125+1*50) MVAR	1*50 MVAR	225
9	Barmer RS			1*125 MVAR		125
10	Jaisalmer RS			1*125 MVAR		125
11	Akal RS			(1*125+1*50) MVAR	1*125 MVAR	300
12	Ramgarh RS			1*125 MVAR	2*50 MVAR	225
13	Jodhpur PG				3*50 MVAR	150
14	Kankani RS			1*80 MVAR	2*50 MVAR	180
15	Merta RS			(1*125+2*50) MVAR		225
16	Deedwana RS			1*50 MVAR		50
17	Kankroli PG			(1*125+1*50) MVAR	3*50 MVAR	325
18	Bhinmal PG			1*80 MVAR	1*50 MVAR	130
	Sum	3210	5940	2210	925	12285
	Opened and closed on daily basis					
	Opened and closed as per grid requirement					

A.8.7 It was informed that on 9th Feb 2023:

1. At 11:45hrs, line reactor at Bhadla end of 765kV Bhadla-Bikaner ckt-1 opened. As per PMU at Fatehgarh2(PG), voltage increased from 745kV to 775kV with the opening of line reactor.

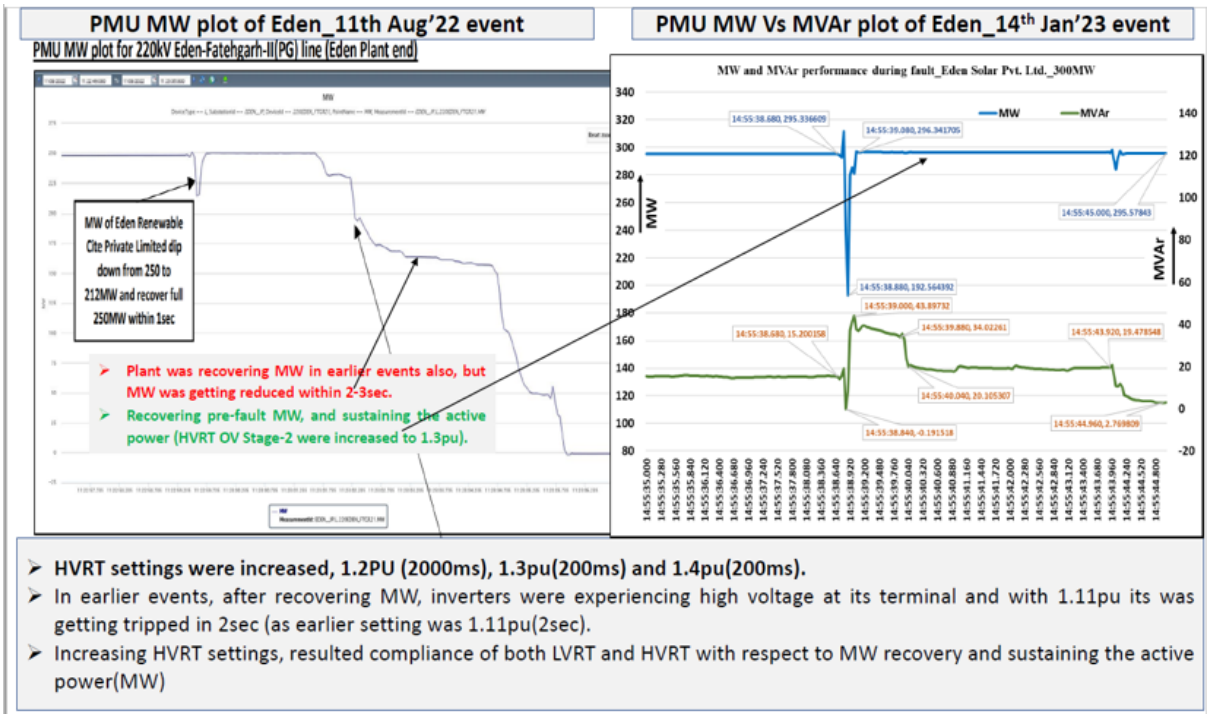
2. At the same time, reduction in RE generation connected at ISTS RE pooling stations occurred which led to further increase in voltage followed by further reduction in RE generation.
3. As per SCADA, total reduction in RE generation of approx. 4590MW is observed.
4. Due to significant reduction of RE generation, further over voltage occurred in transmission network at ISTS RE pooling stations. On this over voltage 765kV Bhadla2-Ajmer ckt-1, 765kV Bhadla2-Bikaner ckt-1 & 765kV Bhadla-Fatehgarh2 ckt-1 tripped on over voltage protection operation.



A.8.8 NRLDC representative stated that there is active power reduction in HVRT mode. Reduction of active power in HVRT leads to high voltage which results in further reduction of RE generation as more inverters enter HVRT mode ultimately resulting in significant high voltage and causing multiple elements tripping. Clarification by CEA has already been issued dated 6th Jan'23 and all RE plants need to adhere by these regulations.

A.8.9 MS, NRPC expressed concern on the same and stated that such non-compliance by RE generators is serious issue. By opening of one reactor, there is only slight rise in voltage and if the RE generators are tripping or reducing their generation even when voltage is not that high, then it is big challenge to system operators in grid management. It was mentioned that letters should be issued to RE generators in case of non-compliance with last date for ensuring compliance.

A.8.10 It was also brought out to the knowledge of forum that some of the solar developers have increased their inverter LVRT/HVRT setting after discussion with inverter OEMs. For one such plant Eden (300MW), improvement in plant performance with changes settings as presented in the meeting is shown below:



A.8.11 ED NRLDC stated that all compliances are to be met by plants at POI as per CEA regulations. Since there is always going to be slight voltage difference between POI voltage and inverter terminal voltage, the same should have been taken care at the plant design stage itself. The measure of increasing inverter setting for LVRT/HVRT could only be seen as temporary solution as suggested by NRLDC.

A.8.12 Line and transformer setting which are part of plant also need to be such that they are coordinated in such a manner that the plant should not be LVRT/HVRT non-compliant due to line/ transformer tripping internal to plant.

A.8.13 It was discussed that NRLDC, NLDC and CTUIL are regularly highlighting the issues with RE developers. As per directions of Hon'ble Minister of Power and New & Renewable Energy, CTUIL has issued letters to all RE developers stating that they need to comply with all regulations within 45 days. Communication from CTUIL is attached as **Annexure-IX.**

A.8.14 MS, NRPC stated that meetings were also organized by NRLDC with inverter and PPC OEMs last year which has already brought out lot of measures that could be taken by RE plants for better performance.

A.8.15 NRLDC representative stated that there is also observance of Low frequency oscillations (LFO) in solar complex of Northern Region as below:

1. Voltage oscillations in RE complex of NR, (frequent oscillations observed since mid of December'22 and being observed presently on daily basis). (Sometimes in other regions as well).
2. No triggering event (reactor switching, line charging etc.)
3. Majorly observed in Voltage and MVAR of plant
4. LFO with frequency of 2-3Hz and 0.03-0.08Hz
5. Random large dips in voltage (0.069Hz)

Oscillation Freq	Dominant Mode	Voltage oscillation magnitude (220kV line)
2-3 Hz	2.8 Hz	0.01-0.015 p.u. (2-4kV)
0.03-0.08Hz	0.04 Hz	0.1 p.u. (20-22kV)
0.069 Hz	0.069 Hz	0.15p.u. (30-35kV)

A.8.16 MS NRPC representative stated that, in meeting taken by Chairperson, CEA, POWERGRID had also stated that OLTC based reactor could also prove useful in this solar complex. CTUIL was asked to explore the possibility of utility of OLTC based reactor and accordingly if required same may be proposed in NR-ISTS RE complex.

A.8.17 Few other suggestions for future were also suggested by NRLDC representative:

1. The oscillations in the RE complex are primarily attributable to integration of significant RE generation in a weak network. System strengthening (low SCR issue) needs to be taken care of during the planning stage.
2. During high solar generation hours, a high value of angular separation (~35 deg) is observed between RE pooling station and stations near load centers. May be addressed during the planning stage itself by:

    a) Using high SIL lines for long evacuation paths
    b) Providing load anchoring in the vicinity of large RE complexes
    c) Sizing of Bus Reactors shall be as per the fault level of the system so that transient voltage rise/fall during switching of reactors is not abnormally high/low to trigger HVRT/LVRT operation

3. Non-availability of adequate dynamic reactive power compensation at system level. Timely planning and implementation of adequate dynamic reactive power compensation (STATCOMs) along with POD is required.
4. For Transmission utilities

a) Shorter response time for execution of code by utilities
b) Actions by utilities for early restoration after tripping

5. Long term measures:

a) Visibility of state RE complex via PMU to be expedited
b) Black start resources or Grid Forming inverters to be planned

A.8.18 POWERGRID representative stated that STATCOM at Bhadla-II is expected to be charged by March 2023. STATCOMs at Fatehgarh-II and Bikaner-II are expected by April 2023.

A.8.19 NRPC forum expressed concern and agreed that non-compliance by RE generators is serious matter and needs to be taken on priority by all utilities.

A.8.20 Further, NRLDC representative presented the minutes of meeting of discussions taken by NRLDC with RE developers and forecast service providers for improving forecast. It was informed that NRLDC had conducted meetings with various RE developers such as Adani, Avaada, Azure and Renew along with their forecast service providers such as Enercast, Energy Meteo, Climate Connect and Manikaran.

A.8.21 In these meetings, NRLDC suggested improvement areas as follows:

1. NRLDC stressed upon technological improvement in terms of high resolution modelling which takes care of local conditions, improvement in algorithms at each level and taking up with weather service providers at the backend to improve their forecasting.

2. LTA revision facilities may be used to the extent possible during night hours too. Plants need to forecast more accurately in case of STOA/PX schedules.

3. Overscheduling during start and end of the solar hours in normal days also may be avoided.

4. Faster variations in solar generation are being observed during foggy or cloudy conditions due to faster variation in GHI. RE plants were suggested to keep the rate of change of power output restricted up to 10% of the actual power generation.

5. Forecast Service Providers need to be timely informed by RE developers about the ground realities including operational aspects such as tripping of inverters, available AC/DC capacity and weather conditions etc.

6. Experienced manpower should be deployed in night shifts for timely revision in schedules according to weather conditions.

A.8.22 MoM is attached as **Annexure-X**.

A.8.23 NRPC forum appreciated the efforts of NRLDC and asked RE developers to take up the matter with their forecast service providers.

A.9 Integration of PMU installed under Smart Transmission Network & Asset Management System (STNAMS) (Agenda by NRLDC)

A.9.1 NRLDC representative stated that in reference to the discussion in 62nd NRPC meeting held on 31.01.2023, where representative of RRVPNL informed that around 8 PMU out of total 25 PMUs under STNAMS project has been commissioned and data of same is updating at RRVPNL STNAMS control centre. It was also informed that there is a provision to integrate new Phasor data concentrator (PDC) with existing PDC installed at Rajasthan SLDC.

A.9.2 During the meeting, RRVPNL representative was requested to expedite the PMU data for better visibility of Rajasthan area as it is very important from grid operation point of view considering recent events in Renewable pocket.

A.9.3 In this regard NRLDC has also requested RRVPNL and SLDC to expedite the integration process vide letter NRLDC/SCADA/2023 dated 14.02.2023. (Annexure-IV of agenda)

A.9.4 In view of the above, it was requested to advise the concern to integrate the PMU data reporting at STNAMS control centre with Rajasthan SLDC PDC for onward transmission of data to NRLDC.

A.9.5 RRVPNL representative stated PMU has started reporting at their control centre. However further integration with Rajasthan SLDC PDC is not done since cybersecurity audit of STNAMS system is pending. They are taking up with concerned for completion of cyber security audit. After resolution of the issue, the data would be shared with SLDC and NRLDC.

A.9.6 ED NRLDC stated that audits are always required to be carried out in time bound manner to check our system for vulnerabilities & threats and suggested RVPN to expedite their actions.

A.9.7 NRPC forum advised RVPN to expedite PMU data sharing with SLDC and NRLDC.

A.10 Inaccurate/non-availability of Voltage data from Critical 400/765kV Sub-stations from Rajasthan (Agenda by NRLDC)

A.10.1 NRLDC representative stated that voltage telemetry from critical 400/765 kV Sub-stations from Rajasthan area is not-available or inaccurate. RVPN was requested to take up for resolution of voltage telemetry from stations mentioned below at the earliest:

S.No	Station	Remark
1.	Anta	400 Bus1 and 765KV Bus 2 Telemetry not available
2.	Babai	400 Bus1 Telemetry not available
3.	Bikaner	400 Bus1 Telemetry not available
4.	Heerapura	Telemetry not available
5.	Kankani	400 Bus2 Telemetry not available
6.	Suratgarh	Around 15 kV difference in Bus-1 & Bus-2 Voltage
7.	Alwar	400 Bus1 & Bus2 telemetry not available

A.10.2 Rajasthan SLDC representative stated that AMC is pending at these substations and the same is being taken up with concerned team of RVPN.

A.10.3 NRLDC representative stated that already 3 months has passed since the issue was first communicated to SLDC Rajasthan and still actions are pending at SLDC end.

A.10.4 RVPN was advised to take measures to ensure accurate telemetry of all transmission elements under their control area. It was also stated that it is big challenge to issue outage codes in case of non-availability of data.

A.10.5 MS, NRPC also expressed concern on the same and stated that letter would be written from NRPC side to RVPN as grid management is not possible without availability of real-time data and asked RVPN to resolve the telemetry issue at the earliest.

A.10.6 NRPC forum advised RVPN to take necessary actions for ensuring voltage telemetry of these stations in expeditious manner.

*****

Annexure-I

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 (47 वीं)/2019/
No. NRPC/ Comml/ 209/ RPC (47th)/2019/ 1-48

दिनाँक : 01st जनवरी, 2020
Dated: 01st January, 2020

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य
Members of NRPC/TCC

विषय: उत्तर क्षेत्रीय विद्युत समिति की 47 वीं तथा तकनीकी समंवय उप-समिति की 44 वीं बैठक कार्यवृत्त ।

Subject: 47th meeting of Northern Regional Power Committee and 44th meeting of TCC – Minutes.

महोदय / Sir,

उत्तरी क्षेत्रीय विद्युत समिति की 47वीं बैठक दिनांक 11 दिसंबर, 2019 को तथा तकनीकी समंवय उप-समिति की 44वीं बैठक दिनांक 10 दिसंबर, 2019 जैसलमेर, राजस्थान में आयोजित की गयी थी । इन बैठकों के कार्यवृत उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट पर उपलब्ध है ।

The 47th meeting of Northern Regional Power Committee was held on 11th December, 2019 and 44th meeting of TCC was held on 10th December, 2019 at Jaisalmer, Rajasthan. The minutes of the meetings are available on Northern Regional Power Committee website.

भवदीय/Yours faithfully,

(आर. पी. प्रधान)
(R. P. Pradhan)
अधीक्षण अभियंता (वा.) और
सदस्य सचिव (प्रभारी)
Superintending Engineer(C.) and
Member Secretary (I/C)

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली- 110016 फोन:011-26513265 फेक्स: 011-26865206 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 Fax: 011-26865206 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

need attention of SCADA / communication personnels. NRPC agreed to the proposal of Haryana and advised NRPC Sectt. to follow-up the cyber security issue in TeST sub-committee meetings in place of OCC.

B.3.7 PTCUL representative stated that they were not aware of any meeting being held at the ministry level. NRPC advised NRPC Sectt. to bring the same to the notice of CISO, MoP.

B.3.8 NRPC approved the deliberations held in TCC.

B.4 Cold Spare transformer requirement for Northern Region (Agenda by POWERGRID)

TCC Deliberations

B.4.1 MS, NRPC stated that CERC had set up a Committee on dated 15.03.2018 consisting of representatives from CERC, CEA, NLDC & POWERGRID under the Chairmanship of the Chief (Engineering) of the CERC to assess the requirement of regional spares including bus reactors, line reactors, ICTs, etc.

B.4.2 As per CERC Committee recommendation, POWERGRID has proposed following spares transformers for Northern Region:

MVA rating and phase	Voltage rating	Qty. required as per POWERGRID norms	Available regional spare	Qty. proposed for procurement	Spare requirement location
1Ø-500MVA	765/400	4	3	1	Rajasthan
1Ø-333MVA	765/400	2	1	1	UP
3Ø-500MVA	400/220	5	0	5	Delhi, Rajasthan, Haryana, UP & Punjab
3Ø-315MVA	400/220	9	6	0**	
1Ø-105MVA	400/220	3	0	3	Himachal, J&K & UP
3Ø-200MVA	220/132	1	0	1	UP
3Ø-100MVA	220/132	1	0	1	Uttarakhand
Total		**25**	**10**	**12**	

***The 3Ø-315MVA spare requirement will be met through proposed 3Ø-500MVA transformer*.

B.4.3 POWERGRID representative stated that the aforementioned transformer would be kept as regional spare which could be used by any of the constituent in case of an emergency. The requirement of these transformers has been calculated considering the population

of different transformers in different states.

B.4.4 Punjab representative stated that the tariff for the aforementioned transformers shall be shared by all the state transmission licensee until charging. In case of its usage by any of the state transmission licensee, the charges would be levied only on that state transmission licensee and same shouldn't be levied on other states. Further, if any of the state decides to procure the said regional spare at the depreciated cost, the same may be allowed and the tariff burden from other states shall be reduced accordingly.

B.4.5 Further, it was also decided that NRPC Sectt would be the authority responsible for deciding the deployment of cold spares in case of requirement of the states.

B.4.6 TCC agreed for the procurement of the following 7 Nos. of 3-ϕ transformers as Regional cold spare transformer out of 12 Nos. proposed by POWERGRID:

MVA rating and phase	**Voltage rating**	**Qty. required as per norms**	**Available regional Spare**	**Qty. proposed for procurement**	**Spare requirement location**
3Ø-500MVA	400/220	5	0	5	Delhi, Rajasthan, Haryana, UP & Punjab
3Ø-315MVA	400/220	9	6	0**	-
3Ø-200MVA	220/132	1	0	1	UP
3Ø-160MVA	220/132	1	0	1	Uttarakhand
Total		**16**	**6**	**7**	

***The 3Ø-315MVA spare requirement will be met through proposed 3Ø-500MVA transformer*.**

For procurement of 5 Nos. of 1-ϕ transformers difficulties on account of impedance mismatch was highlighted as constraint.

B.4.7 Further, on the request of Uttarakhand the rating of 220/132 kV 3- Ø 100 MVA transformer was changed to 160 MVA.

NRPC Deliberations

B.4.8 NRPC approved the aformentinoed 7 number of 3- Ø transformer.

Tej Prakash Verma {तेजप्रकाश वर्मा}

From: Tej Prakash Verma {तेजप्रकाश वर्मा}
Sent: 03 February 2023 12:07
To: 'neeraj.verma@sekura.in'
Cc: P C Garg {पी.सी. गर्ग}; Ashok Pal {अशोक पाल}; H S Kaushal {एच.एस. कौशल}; Kalpana Shukla {कल्पना शुक्ला}
Subject: Reply to the M/s Secura letter dtd. 23.01.2023

Dear Sir,

This is with reference to your letter ref. NR3IB,REG.EXM.044.00.23012023 dtd. 23.01.23 regarding which suggestions were sought from CTU, our observations on the same are given below:

1. OPGW installation on 400kV D/c Kurukeshetra – Markota (140 kms.)

   To be deliberated in RPC and after seeking the views of RPC, CTU shall put up the proposal for NCT meeting for approval inline with MoP guidelines dtd. 09.03.2022. After approval OPGW work shall be allocated to M/s Sekura on RTM basis. M/s Sekura to implement the OPGW work in line with the broad specifications being provided by CTU in such cases.

2. OPGW installation on 400kV D/c Malerkotla – Amritsar line (150 kms.)

   M/s Sekura shall need to submit the proposal with proper technical justification to CTU during the communication planning meeting convened by CTU or TeST meeting by NRPC for further approvals.

Thanks & Regards,

T P Verma,
Chief Manager (Comm),
Central Transmission Utility of India Ltd.,
1th Floor, Saudamini,
Plot No.-2, Sector-29,
Gurgaon (Haryana) – 122001.
Phone No.- +91-124-2822154.
Mo. +91-9650598191

CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. : **94/MP/2021**

Subject : Petition under Section 79(1)(f) of the Electricity Act, 2003 read with Regulation 111 of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 seeking directions for installation of optical ground wire on the 400 kV Kurukshetra-Malerkotla Transmission Line established under the Northern Region System Strengthening Scheme XXXI(b).

Date of Hearing : 25.6.2021

Coram : Shri P. K. Pujari, Chairperson
Shri I. S. Jha, Member
Shri Pravas Kumar Singh, Member

Petitioner **:** Central Transmission Utility (CTU)

Respondents : Sekura NRSS XXXI(B) Transmission Ltd.(STL)

Parties present : Shri M. G. Ramachandran, Senior Advocate, STL
Ms. Suparana Srivastava, Advocate, CTU
Shri Tushar Mathur, Advocate, PGCIL
Ms. Soumya Singh, Advocate, PGCIL
Shri Shubham Arya, Advocate, NETCL
Shri Neeraj Verma, STL
Shri Vijyanand Semletty, STL
Shri Mohd. Shahzeb, PGCIL

Record of Proceedings

The matter was called out for virtual hearing.

2. Learned counsel for the Petitioner submitted that the instant petition has been filed for directions to Sekura NRSS XXXI(B) Transmission Limited (STL) for installation of optical ground wire (OPGW) in place of the existing earth wire on the 400 kV Kurukshetra-Malerkotla Transmission Line established under the Northern Region System Strengthening Scheme XXXI(b) (NRSSS). The Petitioner being the CTU has been designated as the nodal agency for planning and coordination for development of communication system for ISTS under the Central Electricity Regulatory Commission (Communication System for Inter-State Transmission of Electricity) Regulations, 2017. Installation of OPGW in place of the existing earth wires is necessary to strengthen the communication network. The scheme for installation of OPGW was discussed and approved in various TCC and NRPC meetings and the Petitioner is thus under a regulatory mandate to implement the communication system in integration with transmission and generation projects. Based on the consensus in the meetings and in discharge of its statutory functions,

the Petitioner entered into a contract, after an open tender, on 31.1.2019 for implementation of OPGW in place of existing earth wire.

3. Learned counsel for the Petitioner submitted that STL has developed the Kurukshetra-Malerkotla D/C line and 400 kV ISTS Malerkotla-Amritsar D/C line through TBCB route as part of the transmission scheme under the NRSSS. The Petitioner approached STL for installation of OPGW on the 400 kV D/C Kurukshetra-Malerkotla Transmission Line owned by STL. However, STL raised the issue of ownership of OPGW, indemnification of STL towards outrage/ tripping during the installation of OPGW and return of the earth wire replaced by OPGW and has declined permission for installation of OPGW on the said line. Accordingly, she requested to adjudicate the issues raised by STL and issue directions to STL to permit the Petitioner to install OPGW.

4. The learned senior counsel appearing on behalf of STL submitted that there is no objection for installation of OPGW on the subject transmission lines. However, issues are with regard to the ownership of the newly installed OPGW, tariff payable to STL after the replacement of earth wire with OPGW and treatment of the replaced earth wire. He submitted that these issues have to be settled as it has bearing on its revenue and the licence issue to STL. Relying on Motihari-Dharbhanga project, he submitted that in case of TBCB projects, OPGW is owned by TBCB project. However, in the instant case, it is not clear as to with whom the ownership of OPGW will vest.

5. The Commission after hearing the parties admitted the instant petition.

6. The Commission observed that the issues raised by CTU in the instant matter may arise in case of other TBCB projects. Therefore, the Commission directed CTU to implead all the transmission licensees implementing transmission projects under the TBCB route as respondents so that all of them may be heard and suitable directions could be issued in one order instead of deciding the issues in multiple petitions. The Commission further directed the Petitioner to implead PGCIL as a party to the proceedings. The Commission also requested the learned senior counsel for STL to discuss with CTU and firm up the issues that may arise in installation of OPGW in place of earth wire in various TBCB projects for smooth and proper adjudication of the issues involved.

7. The learned counsel for the Petitioner submitted that the contract has been awarded and requested to allow CTU to install OPGW on the 400 kV Kurukshetra-Malerkotla Transmission Line in the meanwhile to avoid any delay. The Commission directed CTU to discuss with STL and work out an amicable solution, for which the learned senior counsel for STL also agreed.

8. The Petition shall be listed for hearing in due course for which a separate notice will be issued.

By order of the Commission

sd/-
(V. Sreenivas)
Deputy Chief (Law)

CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. : **94/MP/2021**

Subject : Petition under Section 79(1)(f) of the Electricity Act, 2003 read with Regulation 111 of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 seeking directions for installation of optical ground wire on the 400 kV Kurukshetra-Malerkotla Transmission Line established under the Northern Region System Strengthening Scheme XXXI(b).

Date of Hearing : 10.3.2022

Coram : Shri P. K. Pujari, Chairperson
Shri I. S. Jha, Member
Shri A.K Goyal, Member
Shri P.K Singh, Member

Petitioner : Central Transmission Utility of India Ltd. (CTUIL)

Respondents : Sekura NRSS XXXI(B) Transmission Ltd.(NTL)

Parties present : Shri M. G. Ramachandran, Senior Advocate, SECI
Ms. Suparana Srivastava, Advocate, CTUIL
Shri Tushar Mathur, Advocate, CTUIL
Ms. Soumya Singh, Advocate, CTUIL
Shri Shubham Arya, Advocate, NTL
Ms. Poorva Saigal Advocate, NTL
Shri Ravi Nair Advocate, NTL
Ms. Shikha Sood Advocate, NTL
Shri Arijit Maitra, Advocate, R-7 to 12
Shri Neeraj Verma, NTL
Shri Vijyanand Semletty, NTL
Shri Vivek Karthikeyan, NTL
Shri Prateek Rai, NTL
Shri Mohd. Shahzeb, CTUIL
Shri A.P. Gangadharan, CTUIL
Shri Vishal Singh, CTUIL

Record of Proceedings

The matter was called out for virtual hearing

2. The learned counsel for CTUIL submitted that pursuant to the directions of the Commission vide Record of Proceeding (RoP) dated 25.6.2021, the Petitioner has

impleaded all the transmission licensees implementing transmission projects under the TBCB route as Respondents in the instant petition and has accordingly filed amended 'memo of parties' dated 8.3.2022. She further submitted that the Minutes of Meeting dated 14.7.2021 between CTUIL, NTL and PGCIL regarding installation of OPGW on 400 kV Kurukshetra-Malerkotla Transmission Line by PGCIL has also been placed on record. There are divergent opinions with respect to implementation, ownership, maintenance and operation of OPGW between the transmission licensee and CTUIL and therefore more deliberations may be required for reconciliation on the issues.

3. The Commission directed CTUIL 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 Commission further directed CTUIL to apprise the Commission once the proposal is finalized and the accordingly the petition will be listed for hearing.

4. Shri Arijit Maitra, Advocate, appearing on behalf of some of the respondents submitted that his clients have not been impleaded as party by CTUIL. In response, the learned counsel for CTUIL clarified that the parties represented by him have been impleaded as Respondent No. 7 to 12 in the instant petition. The Commission directed the transmission licensee to approach CTUIL if they have not been impleaded as respondents.

5. The Commission further directed the Petitioner submit the following information on affidavit by 29.3.2022 with a copy to the Respondents, who may file their comments/reply by 10.4.2022.

a) List of transmission assets along with transmission licensee's name wherein this replacement of earth wire/ old OPGW is planned.

b) Any other issues being faced by CTU related to modifications required to be carried out in TBCB assets keeping in view the integrated nature of ISTS.

6. The Petition shall be listed for hearing in due course for which a separate notice will be issued.

By order of the Commission

sd/-
(V. Sreenivas)
Joint Chief (Legal)

Annexure-V

Tej Prakash Verma {तेजप्रकाश वर्मा}

From: Tej Prakash Verma {तेजप्रकाश वर्मा}
Sent: 21 December 2022 12:58
To: ms-nrpc@nic.in
Cc: Ashok Pal {अशोक पाल}; H S Kaushal {एच.एस. कौशल}; 'Reeturaj Pandey'; 'kaushik.panditrao@gov.in'
Subject: FW: Reply from Shri Cement for OPGW implementation on LILO portion
Attachments: Connectivity Agreement.pdf; Connectivity Approval.pdf; System architecture.pdf

Dear Sir,

Please find attached the trailing mail for your kind information please regarding reply of Shri Cement on the implementation of OPGW on LILO portion.

Thanks & Regards,

T P Verma,
Chief Manager (Comm),
Central Transmission Utility of India Ltd.,
1th Floor, Saudamini,
Plot No.-2, Sector-29,
Gurgaon (Haryana) – 122001.
Phone No.- +91-124-2822154.
Mo. +91-9650598191

From: Amarjit Singh <Amarjit.Singh@shreecement.com>
Sent: 20 September 2022 04:55 PM
To: Tej Prakash Verma {तेजप्रकाश वर्मा} <tejprakash@powergrid.in>
Cc: Shyam Sunder Khandelwal <Shyam.Khandelwal@shreecement.com>
Subject: RE: Additional Agenda and Meeting link of 57th NRPC meeting - reg.

Sh. Verma ji,

With reference to your queries raised in the trailing mail, our pointwise reply is as under:

1. Documents establishing Connectivity of 300MW Thermal Power Plant of M/s Shree Cement Limited, namely the letter from Executive Director (SEF, CE & IT), PowerGrid Corporation of India Limited (PGCIL), No. C/ENG/SEF/N/00/Shree Cement dated 30.11.2010 providing the details of connection to the inter-state transmission and the Connectivity Agreement dated 30.12.2010 are attached herewith as **Annexure-1** and **Annexure-2** respectively for your kind perusal.

2. The ownership of 28Kms of 400KV LILO of Kota-Merta line lies with M/s Shree Cement Limited. The same can be establish from the above two referred documents.

3. Presently, we are using a combination of PLCC and OFC for transfer of our data to NRLDC. We are transferring data from ABB server to Kota line PLC in IEC 101 Protocol. At 400Kv GSS PGCIL Kota, the data from PLCC is then transferred to OFC through a convertor for onward transmission to NRLDC. System architecture for the same is attached as **Annexure-3.**

4. As has been submitted, we are not having any long-term tie-up and are operating plant on short-term/merchant basis. Furthermore, it is submitted that the present communication system is operating flawlessly to the satisfaction of all the concerned parties. In view of the above facts, we would submit that the present system should be allowed as to be continued.Moreover, the option of OPGW is an expensive proposition that could be avoided in view of the existing system working satisfactorily.

Submitted for your kind perusal.

Regards
Amarjit Singh
Joint Vice President
M/s Shree Cement Limited
M- 9116102490

From: Tej Prakash Verma {तेजप्रकाश वर्मा}
Sent: 19 September 2022 12:06
To: Amarjit Singh
Subject: Fwd: Additional Agenda and Meeting link of 57th NRPC meeting - reg.

Sent from my iPhone

Begin forwarded message:

> **From:** Tej Prakash Verma {तेजप्रकाश वर्मा} <tejprakash@powergrid.in>
> **Date:** 16 September 2022 at 12:25:00 PM IST
> **To:** amarjit.singh@shreecement.com
> **Cc:** "H S Kaushal {एच.एस. कौशल}" <hsk@powergrid.in>, "Shiv Kumar Gupta {एस.के. गुप्ता}" <shivkumar@powergrid.in>
> **Subject: RE: Additional Agenda and Meeting link of 57th NRPC meeting - reg.**
>
> Sir,
>
> This is with reference to trailing mail, please provide the reply to the queries, so that agenda can be finalised as per the inputs.

Thanks & Regards,

T P Verma,
Chief Manager (Comm),
Central Transmission Utility of India Ltd.,
1th Floor, Saudamini,
Plot No.-2, Sector-29,
Gurgaon (Haryana) – 122001.
Phone No.- +91-124-2822154.
Mo. +91-9650598191

From: Tej Prakash Verma {तेजप्रकाश वर्मा}
Sent: 12 September 2022 04:47 PM
To: 'amarjit.singh@shreecement.com' <amarjit.singh@shreecement.com>
Cc: H S Kaushal {एच.एस. कौशल} <hsk@powergrid.in>; Shiv Kumar Gupta {एस.के. गुप्ता} <shivkumar@powergrid.in>
Subject: RE: Additional Agenda and Meeting link of 57th NRPC meeting - reg.

Dear Sir,

This is with reference to agenda item A.2 of the 57th NRPC meeting held on 31st Aug'22 on virtual mode. During the meeting certain queries were raised my various members. It is requested that reply to the following queries may be provided so that modified agenda may be in the next NRPC meeting for OPGW installation on 400kV Kota-Merta line:

1. Details of original and present connectivity granted with ISTS of Shri Cement (LTA/MTOA/Short Term)
2. Ownership of LILO portion of Kota-Merta line upto Shri Cement
3. Present data communication arrangement of Shri Cement up to NRLDC
4. Feasibility of OPGW installation on the LILO portion by Shri Cement in case main line OPGW on Kota- Merta is covered on ULDC Communication scheme

Thanks & Regards,

T P Verma,
Chief Manager (Comm),
Central Transmission Utility of India Ltd.,
1th Floor, Saudamini,
Plot No.-2, Sector-29,
Gurgaon (Haryana) – 122001.
Phone No.- +91-124-2822154.
Mo. +91-9650598191

From: Tej Prakash Verma {तेजप्रकाश वर्मा}
Sent: 30 August 2022 08:21 PM

To: 'amarjit.singh@shreecement.com' <amarjit.singh@shreecement.com>
Cc: H S Kaushal {एच.एस. कौशल} <hsk@powergrid.in>; Shiv Kumar Gupta {एस.के. गुप्ता} shivkumar@powergrid.in; 'ms-nrpc@nic.in' ms-nrpc@nic.in
Subject: FW: Additional Agenda and Meeting link of 57th NRPC meeting - reg.

Dear Sir,

As discussed, meeting link for tomorrow 57th NRPC is given below alongwith agenda, kindly make it convenient to attend the same.

Thanks & Regards,

T P Verma,
Chief Manager (Comm),
Central Transmission Utility of India Ltd.,
1th Floor, Saudamini,
Plot No.-2, Sector-29,
Gurgaon (Haryana) – 122001.
Phone No.- +91-124-2822154.
Mo. +91-9650598191

From: Kaushik Panditrao <kaushik.panditrao@gov.in>
Sent: 29 August 2022 17:31
To: Chairman and Managing Director; md ptcul; md@ptcul.org; kamal kant; Director project; sldc1@rediffmail.com; sldcuttrakhand@gmail.com; se scada; md@upcl.org; md@upptcl.org; system uppcl; cgm to; director op; ashulko@hotmail.com; cepmcuppcl@gmail.com; ce-sldc@pstcl.org; ce-tl@pstcl.org; cepprpspcl@gmail.com; cmd@hpseb.in; pcshimla2003@gmail.com; md@hpptcl.in; mdhpsldc@gmail.com; sehpsldc@gmail.com; cecnsjmu@gmail.com; jkpdd9@gmail.com; Power Development Department J and K; apc chandigarh; seelecty@gmail.com; sldcharyanacr@gmail.com; Chief Engineer SO Commercial; Superintending Engineer SLDC OP; Mohammad Shayin; dtldata@gmail.com; ppclcommercial@gmail.com; dtldata@yahoo.co.in; shrivastava dtl; ipgclcommercial@gmail.com; se ldrvpnl; se ldrvpnl; montg rvun; se prot jpr; dir tech; shishodia sona; cmd rvpn; virendrakumar@nhpc.nic.in; ykchaubey@nhpc.nic.in; ckmondol@ntpc.co.in; spkesarwani@ntpc.co.in; gmcsosjvn@gmail.com; Commercial and System Operations SJVN; Romesh Kapoor, 00196 GM, C&SO; thdc commercial; Neeraj Verma Rishikesh THDC PAID; nvermathdc@gmail.com; Commercial Department; Ashok Pal {अशोक पाल}; sksrivastava@npcil.co.in; rubysrivastava@npcil.co.in; hopmeja@ntpc.co.in; munplcomml@gmail.com; amit hooda01; bbmbcomml@gmail.com; SANJAY SIDANA; Ruchi Sharma; Vipin Gupta; karunakar jha; agarwal anurag; jyotiprakash panda; pranabkumar sharma; arun tholia; manoj taunk; TSPL PPA; ansar ltp; Pinaki Mukherjee; Kumar Rajesh; sanjay bhargava; cegmcea1@gmail.com; cenpccea@gmail.com; lalit wasan; yogesh gupta; directorprojects@dhbvn.org.in; ssarwate@npcil.co.in; jksldc1@gmail.com; Kashish Bhambhani {कशिश भम्भानी}; P C Garg {पी.सी. गर्ग}; alok kumar; directorsldc@upsldc.org; Member, GOnD , CEA; Sanjay Srivastava; Harminder Singh; yogesh prakash; rk porwal; R K Tyagi {आर.के. त्यागी}; jayadeb nanda; uday trivedi; rajeshsharma@nhpc.nic.in; hod-om-co@nhpc.nic.in; Hirday tomar
Cc: NARESH BHANDARI; Mr. SAUMITRA MAZUMDAR; Vikrant Singh Dhillon; Reeturaj Pandey; Praveen;

Vipul Kumar; Omkishor; Pradeep Kumar; Rajat Dixit
Subject: Fwd: Additional Agenda and Meeting link of 57th NRPC meeting - reg.

महोदय,

Please find attached Additional Agenda for 57th NRPC meeting scheduled to be held on **31st August, 2022 at 11:00 hrs**.

सादर,
कौशिक पंडितराव,
सहायक कार्यपालक अभियंता,
उत्तर क्षेत्रीय विद्युत् समिति,
नई दिल्ली - 110016

From: "Kaushik Panditrao" <kaushik.panditrao@gov.in>
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Cc: "NARESH BHANDARI" <ms-nrpc@nic.in>, "Mr. SAUMITRA MAZUMDAR" <seo-nrpc@nic.in>, "Vikrant Singh Dhillon" <vikrant.dhillon@gov.in>, "Reeturaj Pandey" <pandeyr.cea@gov.in>, "Praveen" <praveen.cea@gov.in>, "Vipul Kumar" <vipul.cea@gov.in>, "Omkishor" <omkishor.sahu@gov.in>, "Pradeep Kumar" <pradeep.cea@gov.in>, "Rajat Dixit" <dixit.rajat@gov.in>
Sent: Friday, August 26, 2022 4:29:04 PM
Subject: Agenda and Meeting link of 57th NRPC meeting - reg.

महोदय/महोदया,
Please find attached Agenda and meeting link of 57th NRPC meeting scheduled to be held on **31st August, 2022 at 11:00 hrs**.
57th NRPC meeting
Hosted by NRPC

https://nrpc.webex.com/nrpc/j.php?MTID=m908d200b1edbe07afbdb810755c2eb02
Wednesday, Aug 31, 2022 11:00 am | 8 hours | (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Meeting number: 2516 840 3019
Password: 3QExeAaCM35 (37393222 from video systems)

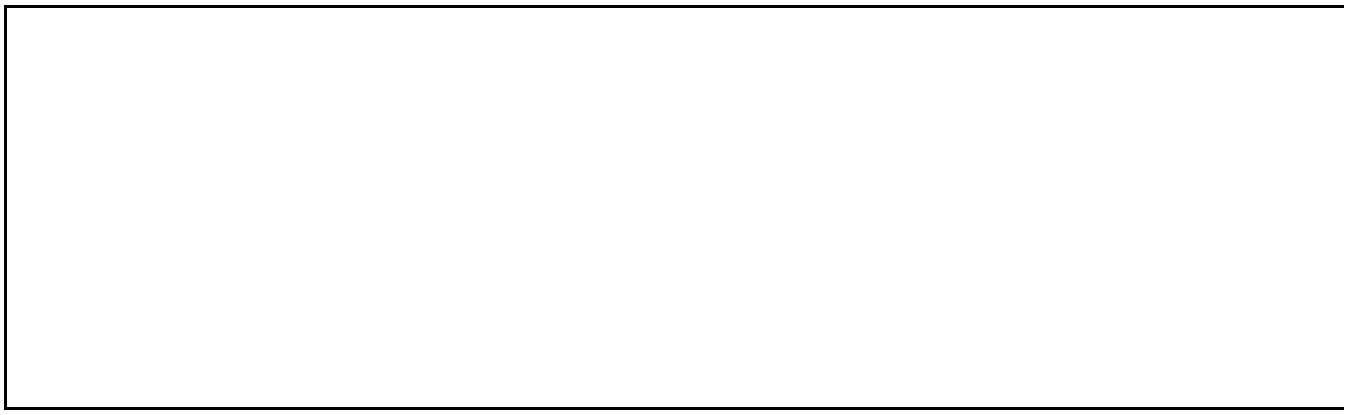
Join by video system
Dial 25168403019@nrpc.webex.com
You can also dial 210.4.202.4 and enter your meeting number.

Join by phone
+65-6670-9679 Singapore Toll

Access code: 251 684 03019

सादर,
कौशिक पंडितराव,
सहायक कार्यपालक अभियंता,

उत्तर क्षेत्रीय विद्युत् समिति,
नई दिल्ली - 110016



SCHEDULE-V.

(4) Disturbance Recorders, Event Loggers and Time Synchronization Equipment**.** —

(a) Each line or transformer or reactor or any other bay shall be provided with facility for disturbance recording, event logging and Time Synchronizing Equipment.

(b) Each line shall be provided with facility for distance to fault locator.

(c) All Disturbance Recording system shall have minimum recording time of 3 seconds (0.5 seconds for pre-fault and 2.5 seconds for post fault).

(d) Time Synchronizing Equipment complete with antenna, all cables and processing equipment shall be provided to receive synchronizing pulse through Global Positioning System or Indian Regional Navigation Satellite System Navic compatible for synchronization of event logger, disturbance recorder, Phasor Measurement Units, and Supervisory Control and Data Acquisition System or Substation Automation System.

(5) Optical Ground Wire and Power Line Carrier Communication**.** —

(a) Optical Ground Wire along with necessary terminal equipment shall be provided on transmission lines of voltage rating of 110 kV and above for speech transmission, line protection, and data channels.

(b) The primary path for tele-protection shall be on point-to-point Optical Ground Wire and alternative path shall be either on Power Line Carrier Communication or predefined physically diversified Optical Ground Wire paths.

(c) For reliable communication below 110 kV level the Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020 shall be used.

(d) The protection system for 400kV and higher voltage transmission line and the line compensating equipment shall have one hundred percent back up communication channels i.e. two channels for tele-protection in addition to one channel for speech plus data for each direction:

Provided that, for 220 kV, 132 kV, 110 kV and 66 kV lines, the channel for speech plus data can also be used for tele-protection.

(e) The generating company and the transmission licensee or transmission licensees at both end of substation or switchyard shall coordinate with each other and ensure the compatibility of Optical Ground Wire and Power Line Carrier Communication equipment at their respective ends.

(6) Phasor Measurement Units **.** —

(a) Synchrophasor measurement using Phasor Measurement Units along with fibre optic connectivity, Global Positioning System Receiver and communication equipment shall be provided for monitoring the entire interconnected grid on real time basis at substations of 400 kV and above voltage level, switchyard of generating stations at 220 kV and above voltage level, Alternating Current side of converter bays of High Voltage Direct Current stations and pooling point of renewable energy generating stations of fifty mega watt and more and Battery Energy Storage System of fifty mega watt and more.

(b) Phasor Measurement Units shall comply with IS 60255-118-1-2018.

(c) The dispersedly located Phasor Measurement Units shall communicate with Phasor Data Concentrators installed at certain strategic locations at State, Regional and National level.

49. Salient Technical Particulars/ Requirements of High Voltage Direct Current Terminals Stations. —

(1) The provisions given at Regulations 43, 44, 45, 46, 47, and 48 shall also be applicable for the Alternating Current equipment installed in the High Voltage Direct Current terminal station to be developed for bulk power transfer over long distances or asynchronous connections (back to back) between areas operating with different frequency regimes.

(2) The High Voltage Direct Current station shall be designed and constructed to give a life of not less than thirty-five years.

(3) The interfacing with the Direct Current line (overhead or cable), existing Alternating Current network, Telecommunication network, and Load dispatch center shall be properly planned and designed.

(4) The ratio of fault level in MVA at any of the convertor station (for conventional current source type), to the power flow on the High Voltage Direct Current bipole shall not be less than three under any of the load-generation scenarios.

(5) Technical details of High Voltage Direct Current terminals or stations for Line Commuted Converter based technology and Voltage Source Converter based technology are given in **SCHEDULE-VI**.

ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(पूर्ववर्ती पावर सिस्टम ऑपरेशन कार्पोरेशन लिमिटेड)
GRID CONTROLLER OF INDIA LIMITED
(Formerly known as Power System Operation Corporation Limited)

CIN: U40105DL2009GOI188682 | राष्ट्रीय भार प्रेषण केंद्र: प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली – 110016
National Load Dispatch Centre: First Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi – 110016

दिनांक : 30th January 2023

सेवा मे,

All SLDCs/RLDCs/RPCs

विषय: Publishing of Quantum of Reserves in line with Detailed Procedure For Estimation of the Requirement of Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) at regional level

संदर्भ: **1.** Central Electricity Regulatory Commission (Ancillary Services) Regulations, 2022

2. Detailed Procedure for Estimation of the Requirement of Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) at Regional Level, as approved by CERC vide letter no. No.RA-14026(11)/3/2019-CERC dated 02nd Dec 2022

महोदय,

CERC (Ancillary Services) Regulations, 2022 was notified on 31st January, 2022. As per the gazette notification of Hon'ble Commission dated 31st October, 2022, the provisions of the estimation of Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) of these regulations have come into force with effect from 05th December 2022. In line with above regulations, Grid India submitted interim detailed procedure to CERC and same was approved by CERC vide letter dated 2nd Dec 2022 (available at https://posoco.in/download/detailed-procedure-for-estimation-of-the-requirement-of-secondary-reserve-ancillary-service-sras-and-tertiary-reserve-ancillary-service-tras-at-regional-level/?wpdmdl=49385).

Accordingly, the reserve requirement is assessed in accordance with approved procedures and declared as follows:

(a) The reference contingency for the All India has been considered as 4500 MW.
(b) Data has been received from Assam, Chhattisgarh, UT Daman Diu, UT Dadra Nagar Haveli, Gujarat, Goa and Madhya Pradesh.
(c) The secondary reserve requirement is estimated to be 11,052 MW and the tertiary reserve requirement is estimated to be 16,681 MW for the Quarter 1 of FY 2023-24 (April-Jun). This needs to be validated with the data provided by the States.
(d) As per Section 8.5 of the approved procedure for estimation of Secondary Reserve *"The all-India total of positive (and negative) secondary reserves capacity requirement on regional basis shall be equal to the reference contingency or secondary reserve capacity*

requirement as computed above, whichever is higher." In this regard, CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 have come into force from 5th Dec 2022. The behavior of control areas is expected to be different post implementation of these regulations in addition to the other factors. Under these circumstances, a conservative scaling of estimated quantum of secondary reserve has been carried out. Accordingly, lower value of Reference Contingency has been considered for calculations. However, the same is an estimate which is subject to revision as need arises.

(e) Consequentially, the secondary and tertiary reserve requirement is estimated as 4500 MW and 10130 MW respectively for Quarter 1 of FY 2023-24 (April-Jun). The details are enclosed as per Formats RAS3, RAS5 and RAS7.

सधन्यवाद,

भवदीय

कार्यपालक निदेशक

प्रतिलिपि : Secretary, CERC

GRID CONTROLLER OF INDIA LIMITED

(Formerly known as Power System Operation Corporation Limited)

Format – RAS3

Reference contingency for Indian Power System

Date of Issue: 25 January 2023	**Revision No.**	**0**
Applicable for Financial Year 2023-24		
Reference Contingency for generation loss (MW)	**4500**	
Reference Contingency for load loss (MW)	**4500**	

GRID CONTROLLER OF INDIA LIMITED

(Formerly known as Power System Operation Corporation Limited)

Format RAS5

Quarter-Ahead SRAS and TRAS Reserve requirement for Quarter 1 (April - June) of Year 2023-24 (Scaled for reference contigency of 4500 MW)																
State/UT	Actual 99 Percentile Negative ACE (MW)	Actual 99 Percentile Positive ACE (MW)	Scaled 99 Percentile Negative ACE (MW) {a}	Scaled 99 Percentile Positive ACE (MW) {b}	Max. Demand met {c}	Internal Gen. at the time of max demand {d}	Drawl from ISTS {e=c-d}	State Internal Generation/ State Maximum Demand {f=d/c}	State drawl from ISTS/ State Maximum Demand {g=e/c}	Secondary Reserves in ISGS {h=a*g}	Secondary Reserves at Regional Level {sum of reserves in all states of the region as given in "h"}	Secondary Reserves within state {i=a*f}	Tertiary Reserves in ISGS {j = h}	Tertiary Reserves within state {k = i}	Largest Unit Size of internal generation (l)	Total Tertiary Reserves within state {m=k + 0.5*l}
UT Chandigarh	54	70	14	17	409	0	409	0.00	1.00	14		0	14	0	0	0
Delhi	297	450	78	112	7800	952	6848	0.12	0.88	68		9	68	9	216	117
Haryana	624	706	163	177	12642	3178	9464	0.25	0.75	122		41	122	41	660	371
Himachal Pradesh	248	200	65	50	1749	972	777	0.56	0.44	29		36	29	36	100	86
UT Jammu & Kashmir	406	447	106	112	3683	1757	1926	0.48	0.52	56	576	51	56	51	150	126
Punjab	411	564	108	141	14286	5424	8862	0.38	0.62	67		41	67	41	700	391
Rajasthan	720	911	188	228	16131	11077	5054	0.69	0.31	59		129	59	129	660	459
Uttar Pradesh	821	889	215	222	26338	11435	14902	0.43	0.57	122		93	122	93	660	423
Uttarakhand	248	355	65	89	2439	951	1488	0.39	0.61	40		25	40	25	76	63
NR state Sum	3829	4592	1001	1148												2037
Northern Region	2459	3157	1001	1148												
Chhattisgarh	281	323	114	96	5403	2203	3200	0.41	0.59	67		46	67	46	500	296
UT Daman Diu	45	46	18	14	366	0	366	0.00	1.00	18		0	18	0	0	0
UT Dadra Nagar Haveli	95	69	39	21	958	0	958	0.00	1.00	39		0	39	0	0	0
Gujarat	834	806	337	239	21558	12835	8723	0.60	0.40	136	559	201	136	201	800	601
Goa	63	61	26	18	607	0	607	0.00	1.00	26		0	26	0	0	0
Madhya Pradesh	673	763	272	226	12644	6266	6378	0.50	0.50	137		135	137	135	660	465
Maharashtra	1276	935	516	278	31929	23586	8343	0.74	0.26	135		381	135	381	660	711
WR States Sum	3268	3002	1322	891												2073
Western Region	3247	2451	1322	891												
Andhra Pradesh	826	747	307	403	12294	6549	5745	0.53	0.47	143		164	143	164	800	564
Karnataka	696	721	259	389	14793	9388	5405	0.63	0.37	94		164	94	164	800	564
Kerala	181	168	67	90	4522	1630	2892	0.36	0.64	43	616	24	43	24	130	89
UT Puducherry	49	69	18	37	492	0	492	0.00	1.00	18		0	18	0	0	0
Tamil Nadu	862	1048	320	565	17636	5676	11960	0.32	0.68	217		103	217	103	600	403
Telangana	570	517	212	278	13503	7165	6338	0.53	0.47	99		112	99	112	800	512
SR State Sum	3184	3269	1183	1762												2132
Southern Region	2906	4845	1183	1762												
Bihar	349	507	136	133	6388	471	5917	0.07	0.93	126		10	126	10	250	135
DVC	530	336	207	88	4052	5111	-1058	1.26	-0.26	0		207	0	207	600	507
Jharkhand	192	264	75	69	1812	332	1480	0.18	0.82	61	398	14	61	14	210	119
Orissa	503	452	196	119	6444	3029	3415	0.47	0.53	104		92	104	92	600	392
Sikkim	44	37	17	10	111	0	111	0.00	1.00	17		0	17	0	0	0
West Bengal	501	439	195	115	9735	5270	4464	0.54	0.46	90		106	90	106	500	356
ER state Sum	2119	2035	827	535												1508
Eastern Region	2030	1472	827	535												
Arunanchal Pradesh	40	61	17	19	152	0	152	0.00	1.00	17		0	17	0	0	0
Assam	150	239	64	73	2059	224	1835	0.11	0.89	57		7	57	7	50	32
Manipur	28	38	12	12	203	0	203	0.00	1.00	12		0	12	0	0	0
Meghalaya	63	53	27	16	370	0	370	0.00	1.00	27	145	0	27	0	42	21
Mizoram	20	30	9	9	122	0	122	0.00	1.00	9		0	9	0	6	3
Nagaland	23	43	10	13	161	0	161	0.00	1.00	10		0	10	0	8	4
Tripura	66	72	28	22	309	161	148	0.52	0.48	14		15	14	15	21	25
NER State Sum	391	536	167	163												85
North-Eastern Region	410	448	167	163												
All India	11052	12374	4500	4500							2293	2207	2293	2207		7836
									Total Tertiary Reserves Requirement in India		10130					

Detailed Procedure for Estimation of the Requirement of Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS) at Regional Level

GRID CONTROLLER OF INDIA LIMITED

(Formerly known as Power System Operation Corporation Limited)

Format RAS7

	Quarter-Ahead (Apr 2023 - Jun 2023)					
	Secondary Reserves			Tertiary Reserves		
State/ Union Territory UT	Within in ISGS	Within state	Total	Within in ISGS	Within state	Total
UT of Chandigarh	14	0	14	14	0	14
Delhi	68	9	78	68	117	186
Haryana	122	41	163	122	371	493
Himachal Pradesh	29	36	65	29	86	115
UT of Jammu and Kashmir and UT of Ladakh*	56	51	106	56	126	181
Punjab	67	41	108	67	391	458
Rajasthan	59	129	188	59	459	518
Uttar Pradesh	122	93	215	122	423	545
Uttarakhand	40	25	65	40	63	103
Chhattisgarh	67	46	114	67	296	364
UT Daman and Diu#	18	0	18	18	0	18
UT Dadra and Nagar Haveli#	39	0	39	39	0	39
Gujarat	136	201	337	136	601	737
Goa	26	0	26	26	0	26
Madhya Pradesh	137	135	272	137	465	602
Maharashtra	135	381	516	135	711	846
Andhra Pradesh	143	164	307	143	564	707
Karnataka	94	164	259	94	564	659
Kerala	43	24	67	43	89	132
UT of Puducherry	18	0	18	18	0	18
Tamil Nadu	217	103	320	217	403	620
Telangana	99	112	212	99	512	612
Bihar	126	10	136	126	135	261
Damodar Valley Corporation	0	207	207	0	507	507
Jharkhand	61	14	75	61	119	180
Odisha	104	92	196	104	392	496
Sikkim	17	0	17	17	0	17
West Bengal	90	106	195	90	356	445
Arunanchal Pradesh	17	0	17	17	0	17
Assam	57	7	64	57	32	89
Manipur	12	0	12	12	0	12
Meghalaya	27	0	27	27	21	48
Mizoram	9	0	9	9	3	12
Nagaland	10	0	10	10	4	14
Tripura	14	15	28	14	25	39
Region-wise and All-India						
Northern Region	576	426	1001	576	2037	2612
Western Region	559	763	1322	559	2073	2632
Southern Region	616	567	1183	616	2132	2748
Eastern Region	398	428	827	398	1508	1907
North-Eastern Region	145	22	167	145	85	230
All India	2293	2207	4500	2293	7836	10130

Note:
* UT of Jammu and Kashmir and UT of Ladakh have been considered as single entity inline with data availability at NLDC.
# UT Daman and Diu & UT Dadra and Nagar Haveli have been considered as separate entities inline with data shared with NLDC.

Annexure-VIII

Revised list of schedule A&B feeders for physical regulation of supply in Haryana:

S.No.	Transmission element to be opened	Power supply interruption in	Approx Relief (MW)	Remarks
1	**Feeders in schedule A** Panipat: a) 33kV Panipat-Sewah b) 33kV Panipat-Untla c) 33kV Panipat-Israna d) 33kV Panipat-Narayana e) 33kV Panipat-Sanoli road Kurukshetra: a) 33kV Kurukshetra-Mathana b) 33kV Kurukshetra-Ajrana c) 33kV Kurukshetra-Kirmich d) 33kV Kurukshetra-REC d) 11kV Kurukshetra-Bahadurpura e) 11kV Kurukshetra-Pipli -2 Dhulkote: a) 66kV Dhulkote-Barnala b) 66kV Dhulkote-Babyal c) 66kV Dhulkote-Sadopur Narela: a) 132kV Kundli line emanating from Narela BBMB	Panipat , Kurukshetra, Dhulkote, Kundli (Sonipat)	200 MW (Approx.)	Radial Lines or fed radially **(These feeders were already included in schedule A&B)**
2	**Feeders in Schedule B** a) 220kV Sector-72 PG – Sector-33 ckt-1&2 b) 220kV Kaithal PG – Neemwala ckt-1&2	Kaithal, Gurugram,	180 MW (approx.)	Radial Lines **(Additional feeders included in Schedule-B now to achieve desired load relief)**

List of feeders for physical regulation in Supply

UP

S No	Name of Feeder	Affected area	Approx Load relief (MW)	Remarks
1	220kV Meerut-Gajraula	Gajraula	100	Radial
2	220kV Baghpat(PG)-Baghpat D/C	Baghpat	60	Radial
3	220kV Allahabad(PG)-Jhusi	Jhusi	200	Radial
4	220kV Sohawal(PG)-Barabanki D/C	Barabanki	120	Not Radial
5	220kV Mainpuri(PG)-Neemkarori D/C	Farukkhabad	120	Radial
6	220kV Gorakhpur(PG)-Gola D/C	Gorakhpur	80	Radial
7	132kV Ballia(PG)-Bansdeeh	Ballia	15	Radial
8	132kV Ballia(PG)-Sikandarpur	Ballia	30	Radial

50 no.s 132kV feeders can also be opened from SLDC and testing was also carried out few days back at SLDC level

Punjab

S No	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	132kV Jamalpur-Ghulal D/C	Ghulal	91	High loading during paddy
2	66kV Jamalpur-Chandigarh Road	Chandigarh Road	37	To be preferred
3	66kV Jamalpur-Sherpur	Ludhiana	13	-
4	220/132kV Sangrur ICT 1,2, 3	Shamsabad	166	High loading during paddy
5	220kV Amritsar-Naraingarh D/C	Amritsar adjoining area	100	To be preferred
6	220kV Patiala-Nabha D/C	Nabha	190	To be opened after discussion with SLDC
7	220kV Jalandhar-Kanjli D/C	Kapurthala	64	To be preferred

120 no.s 66kV feeders may be tripped from SLDC control room to control overdrawl (usuallywhen freq below 49.8Hz)

Rajasthan				
S. No.	Transmission line / Transformers to be opened	Power supply interruption	Approx load relief (MW)	Remark
1	220kV Anta-Lalsot	Lalsot	130	The load of 220 kV GSS Lalsot is normally fed from Anta radially. However If ring of 220kV Anta-Lalsot-Dausa is closed then SLDC will open 220 kV Dausa – Lalsot line immediately after physical regulation message received from NRLDC.
2	220 kV Bhinmal (PG) –Sayla Ckt-I & II	Sayla	40	However 220 kV GSS Sayla is also fed from 220 kV GSS Jalore. SLDC will open 220 kV Sayla – Jalore line immediately after physical regulation message received from NRLDC.
3	220 kV Bassi(PG) - Bagru line	Bagru	80	However 220 kV GSS Bagru is also fed from 220 kV GSS Phulera. SLDC will open 220 kV Bagru – Phulera line immediately after physical

				regulation message received from NRLDC.
4	220kV Bhiwadi(PG) -Khushkera 220kV Neemrana(PG)-Khushkera	Khushkhera & Kishangarh Bas	170	Limited alternate supply may be available. 220kV Alwar-K.G.Bas - Khushkhera line may get overloaded.
5	220/132 kV, 160 MVA Transformer at 220kV GSS Behror	Behror	80	SLDC will open 220/132kV transformer of 220kV GSS Behror immediately after physical regulation message received from NRLDC.

J&K

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	220kV Kishenpur-Baran D/C	Baran	200	Radial feeder
2	220kV New Wampoh-Mirbazar	Mirbazar	200	Radial feeder
3	132kV Gladni-Kalakote S/C	Jammu	80	Priority 1
4	Kashmir Bemina	Kashmir	50	
5	132kV Barn-KalakoteD/C	Jammu	80	Priority 2
6	132kV Zainakote - Pattan D/C	Kashmir	70	
220kV Samba-Hiranagar may not be opened as it also supplies to Railways				

Uttarakhand

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	132kV Pithoragarh(PG)-Pithoragarh	Pithoragarh	50	Radial feeder
2	220kV Sitarganj-Eldeco	Eldeco	40-60	Industrial load (only in case of extreme situations)

No control available from SLDC control room for physical regulation.
It was discussed that such feeders may be identified which are fed from two resources and will provide relief. Compiled list of such feeders after discussion at state level needs to be shared with NRLDC at the earliest. In case it is difficult to identify such feeders, contingency plan needsto be developed at SLDC level and shared with NRLDC.

Himachal Pradesh

SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks

1	66kV Bhakra-Rakkar	Rakkar/ Una	10-18	Area being fed from 66kV Rakkar (Una)
2	66kV Pong-Sansarpur	Sansarpur	2-5	Radial feeder
3	132kV Dehar-Kangoo	Kunihar/Shimla	80-140	Priority 1. 400/220kV DeharICT may overload
4	220kV Dehar-Kangoo			
5	220kV Nallagarh-Upernangal D/C	Baddi/ Nallagarh	180-315	Industrial load (only in case of extreme situations)
6	220kV Khodri-Majri D/C	Kala Amb/ Paonta Sahib/ Nahan	80-190	Limited supply may be available from Kunihar.Many essential loads, Oxygen plants, administrative buildings
7	132kV Kulhal-Giri			
8	66kV Parwanoo-Pinjore	Parwanoo	-	Generally kept open
9	33kV Ganguwal-Bilaspur	Bilaspur	6-8	-
Delhi				
SNo	Name of Feeder	Affected area	Approx Loadrelief (MW)	Remarks
1	220kV Mundka-Peeragarhi D/C	Peeragarhi	100-150	Radial feeder
2	220kV BTPS-Okhla D/C	Okhla	200-350	Radial feeder
3	33kV Delhi ckts 1,2,3,4feeders from Rohtak road (BBMB)	Rohtak Road	20-30	Radial feeder
4	220kV MaharaniBagh-Lodhi Road D/C	Lodi Road	200-300	May not be opened as VIP area
5	220kV Maharanibagh-Masjid Moth D/C	Masjid Moth		Radial feeder

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. No.: CTU/W/05/CEA-Tech Std

Date: 02/02/2023

As per Distribution List

Sub: Compliance of various provisions in the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended by RE Generators - reg.

Dear Sir,

We write with reference to the requirement of various compliances by RE generators at the interconnection point of ISTS grid as per provisions in the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended. As per CEA technical standards, RE generators have to ensure Power quality (harmonic content, DC injection, flicker), Reactive Capability (0.95lag to 0.95lead at the POI), Frequency response & operational capability within specified frequency /voltage band, Voltage Ride through capabilities (LVRT & HVRT), Ramping capability & Active power control set point etc. In this regard, it may be noted that the RE developers have also submitted undertaking to CTUIL towards fulfillment of terms and conditions as specified in the CEA technical standards before its connectivity to ISTS grid.

However, it has been observed that in real time operation, some of the RE Generators are not complying to subject CEA Technical Standards. The details in this regard is as below:

a) Non-compliances by RE generators as reported by GRID-INDIA (erstwhile POSOCO)

1) LVRT and HVRT capabilities of RE plants in line with CEA technical standards (Amendment), 2019, Part-II, clause B2, Sub-clause (3) & (7):

LVRT: As per LVRT requirement, the supply of reactive power shall be given first priority during voltage dip conditions. However, following non-compliances has been observed resulting in Generation loss:

(i) It has been observed that during the faults in the vicinity of RE complex, RE plants are failing to support required MVAR during LVRT conditions. The requisite reactive power injection is very less during fault conditions.

(ii) After the clearance of fault, RE plant should recover its 90% pre-fault active power (MW) within 1 sec, but in majority of the cases, plants recovers their pre-fault active power with delayed time and in some cases, generators failed to revive to pre-fault active power level due to tripping of WTG/PV inverter.

(iii) RE Generators should support grid during LVRT conditions by way of injecting reactive power. However, it has been observed that RE Generators are absorbing reactive power during LVRT conditions thus aggravating the disturbance.

(iv) It has been observed in some of the cases that after clearance of fault, due to non-controllability of generator voltage, the resulting POI voltage rises above 1.1 pu driving the RE Generator into HVRT mode which results in generation loss as per time graded HVRT settings.

HVRT: As per HVRT requirement, RE Generator should remain connected as per time graded setting for different voltage level at POI. Various cases of RE generation tripping/generation reduction have been observed during HVRT event. It has been noted that loss of RE generation occurred even when voltage at Point of Interconnection (POI) was below 1.1 pu. This outage of solar/wind generation could be attributed as failure of HVRT capability of the PV inverters /WTG or tripping of lines/transformer connecting the plants to respective pooling station. Such behavior during transients are a cause of concern and may result in larger grid disturbances in the system. No reactive power absorption during HVRT by RE Generators and in some cases aggravating the high voltage by generators have been observed.

2) **Reactive power capability of RE plants in line with CEA technical standards (Amendment), 2019, Part-II, clause B2, Subclause (1):**

RE generators shall be capable of delivering/absorbing reactive power upto 0.95lag & 0.95lead at the POI in a way which is conducive for maintaining the ISTS voltage as close as possible to the nominal value. All RE generators should have the capability of providing Reactive power (MVAR) = at least 33% of rated Active power (MW) being injected by plant at POI (based on 0.95 power factor) in both lag & lead side. i.e. a 100MW plant should be capable of injecting and absorbing at least ~ 33 MVAr at POI and not at inverter terminal. However, it has been observed that many RE plants are not able to comply with above regulations.

3) **Other Non-compliances w.r.t. CEA technical standards:**

As per CEA technical standards, RE Plants have to meet requisite compliances at POI. However, it is found that majority of RE plants are keeping the defined settings at Generator Pooling Station terminal instead of POI. It is imperative that during the pre-commissioning phase, RE developers should effectively coordinate with OEMs and Transmission Licensees to ensure proper compliance at POI.

Further, as per clause B1, Sub-clause (4) of CEA technical standards, Measurement of harmonic content, DC injection and flicker shall be done at least once in a year in presence of the parties concerned and the indicative date for the same shall be mentioned in the connection agreement. However, it has been observed that many RE plants who have commissioned their full capacity for a period of more than one year have not complied with above regulations.

List of such RE Generators is attached as **Annexure-A**

b) **Non-adherence of undertaking given by RE Generators to CTU:**

RE Generators had submitted undertaking during the processing of Connection Offer (CON-5), in order to comply with all applicable provisions of CEA Technical Standards for Connectivity to Grid. However, adherence to the undertaking for CEA regulation compliance and action taken in this regard (i.e. submission of requisite documents including test reports/implementation of additional reactive compensation devices for meeting adequate reactive capability at POI) has not been submitted by RE Generators.

List of such RE Generators is attached as **Annexure-B.**

The above non-compliances are serious in nature and are a threat to grid security as evident in recent events of sudden RE Generation loss in Rajasthan due to non-compliance of requisite reactive power support under LVRT as well as HVRT.

In order to prevent recurrence of such events in future, the notice is being issued to RE developers who are non-compliant with above regulations. The RE Generators as per Annexure A & B are requested to provide documents demonstrating their compliance to CEA technical standards including Fault ride through/Power quality/Reactive power capability at POI as well as fulfillment of the commitment given in the undertakings within 45 days from issuance of this letter, failing which they shall be liable for action including disconnection from the ISTS grid. The list of documents to be provided is available in Working Group report uploaded on CTUIL website at:

www.ctuil.in >> Open Access >> Application portal >> Formats and agreement >> Report of Working Group.

Thanking you,

Yours faithfully,

Ashok Pal

(Ashok Pal)
Dy. COO

CC:

Chief Engineer (GM) Central Electricity Authority Sewa Bhawan, R K Puram New Delhi – 110 066	**Executive Director, NLDC** GRID-INDIA (erstwhile Power System Operation Corporation Ltd.) B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi -110016
Executive Director Northern Regional Load Despatch Centre 18-A, Qutab Institutional Area, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi– 110 016	**Executive Director** Western Regional Load Dispatch Centre F-3, Krantiveer Lakhuji Salve Marg, Santacruz Electronic Export Processing Zone, Andheri East, Mumbai, Maharashtra 400096
Executive Director Southern Regional Load Despatch Centre 29, Race Course Cross Road, Bangalore-Karnataka-560009	

Annexure-A (NR)

1. Shri J Venkata Kumar DGM **ABC Solar (India) Private Limited** **(300 MW solar plant connected at Bhadla-2 PS)** H.No 6-3-680/8/3, PMR Plaza, Plot No. 03 1st floor, Thakur Mansion lane, Somajiguda Hyderabad-500082 Ph: 8459123980 Email: venkatakumar.j@axisenergy.in sumank@brookfieldrenewable.in ksharma@brookfieldrenewable.in	2. Shri Shashank Gupta Head-New Project Development **Azure Power India Private Limited** **Azure Power Forty One Private Limited (300 MW at Bhalda)** **Azure Power Thirty Four Pvt. (200 MW plant at Bhadla)** **2x300 MW plant connected at Bikaner PS** Southern Park, 5th Floor,D-II, Saket Place, Saket, New Delhi -110017, India Ph.: 9654649000, 7893733300, 9911917083 Email: ists@azurepower.com ka.vishwanath@azurepower.com
3. Shri Rajesh Kumar Gupta DGM **Adani Renewable Energy Park Rajasthan Ltd.** **(1000 MW hybrid plant connected at Fatehgarh PS)** **Adani Hybrid Energy Jaisalmer Two Limited (AHEJ2)** **Adani Hybrid Energy Jaisalmer Three Limited (AHEJ3)** **Adani Hybrid Energy Jaisalmer One Limited (ADNHB** **SBSR Power Cleantech Eleven Pvt. Ltd** **SBE Renewables Private Limited** **SBE Renewables Ten Pvt. Ltd** 4th Floor- South Wing, Adani Corporate House, Shantigram, S G Highway, Ahmedabad- 382421, Gujarat, India. Ph.: 9099055681,9545554934 Email:rajesh.gupta@adani.com rajasr.acharya@adani.com mahendrasingh.dabi@adani.com	4. Shri Vivek Kodesia Head Business Development **Eden Renewable Cite Private Limited** Unit No. 236 B & C, First Floor, DLF South Court, Saket, Delhi-110017 Ph: 9717031091, 9958982823 Email: edenrenewablesindiallp@gmail.com vivek.kodesia@eden-re.com
5. Shri Yogesh Kumar Sanklecha General Manager - BD **Acme Solar Holdings Limited** **(300 MW solar plant connected at Bhadla-2 PS)** **ACME Chittorgarh Solar Energy Pvt. Ltd.** **(250 MW solar plant connected at Bhadla PS)** Plot No. 152, Sector-44, Gurgaon-122002, Haryana Ph.: 8744060601, 9654819869, 9911299514 Email: yogesh@acme.in apradhan@acme.in	6. Shri S S Mishra, AGM (PE-Solar) **NTPC Limited** **(NTPC Kolayat_1 250 MW palnt at Bhadla-2)** EOC Complex, A-8A, Sec-24, Noida, UP-201301 Mob: 9650997835, 9450962751, Email: ssmishra@ntpc.co.in amanna@ntpc.co.in;
7. Shri Angshuman Rudra Sr. Manager **Avaada Energy Private Limited** **(for 240, 300 & 350 MW solar power plant at Bikaner)** C-11, Sector 65, Noida - 201307 Uttar Pradesh Ph: 7835004673, Email: angshuman.rudra@avaada.com	8. Shri Saurabh Mehta **Mahindra Susten Private Limited** **(250 MW solar plant at Bhadla** **250 MW solar plant at Bhadla-2)** 7th Floor, WeWork, Raheja Platinum Sag Baug Road, off Andheri-Kurla Road Marol, Andheri East, Mumbai, Maharashtra-400059Mob: 9930674683, 7838568948 Email: mehta.saurabh2@mahindra.com; khaitan.rakesh@mahindra.com
9. Shri Rohit Chandak Director **Ayana Renewable Power Three Pvt. Ltd.** 3rd Floor, Sheraton Grand Hotel, Brigade Gateway, 26/1, Dr. Rajkumar Road, Malleswaram (West), Bangalore – 560055 Ph: 9971712520, 9972544774 Email: rohit@ayanapower.com renga@ayanapower.com	10. Shri Amit Kumar AVP **Renew Surya Roshni Private Limited** **(Renew Surya Ravi Private Limited Bikaner, Renew Sun Bright Private Limited (RSBPL), ReNew Solar Energy Jharkhand Three Pvt. Ltd, ReNew Solar Urja Private Limited, ReNew Sun Waves PrivateLimited, Fatehgarh-II,**

sharatranjan@ayanapower.com	Renew.Hub, Commercial Block-1, Zone-6, Golf Course Road, DLF City Phase V, Gurugram-122009, Haryana Ph: 9717196796, 9911917083, 9542388443, 8130108830, 7389909907 Email:- amit.kumar1@renewpower.in solarbidding.gm@renewpower.in k.vishwanath@renewpower.in rohit.singh@renewpower.in
11. Shri Santosh P Narayan Specialist – Project Development **Tata Power Green Energy Ltd. (225 MW solar plant at Bikaner)** **TPREL (Chhayan) (300 MW plant at Bhadla)** C/o The Tata Power Company Limited, Corporate center A, Sant Tukaram Road, Carnac Bunder, Mumbai- 400009, Maharashtra Ph.: 9223550695, 9769535856, 9223550695 Email: narayans@tatapower.com rohith@tatapower.com	12. Shri Balakishore Kollabathula Authorized Signatory **Avikiran Surya India Private Limited** **Shikhar Surya (One) Private Limited** **Thar Surya 1 Private Limited (300 MW plant at Bikaner)** 12th Floor, Cresent No. 1, Prestige Shantiniketan,Hoodi, Bengaluru, Karnataka-560048 Ph.: 9810279841, 7899730301 Email: balakishore.kollabathula@enel.com norberto.cuencacandel@enel.com
13. Shri Sudip Dutta **Essel Saurya Urja Company of Rajasthan Limited** **(300 MW solar plant connected at Bhadla PS)** G7, Ground Floor, Shree Mansion, Kamla Marg, C-Scheme, Jaipur, Rajasthan- 302001 Mob: 9650516244, 8888838900 Email: sudip.dutta@infra.esselgroup.com sundeep.rai@infra.esselgroup.com	14. Shri Bibhu Biswal Sr. Vice President **Saurya Urja Company of Rajasthan Ltd.** (For SB Energy Four Private Limted, 200 MW plant at Bhadla & Clean Solar Power (Bhadla) Pvt. Ltd 300 MW solar plant at Bhadla)

Annexure-B (NR)

1. Shri Sudip Dutta **Essel Saurya Urja Company of Rajasthan Limited** **(750 MW solar plant connected at Bhadla PS)** G7, Ground Floor, Shree Mansion, Kamla Marg, C-Scheme, Jaipur, Rajasthan- 302001 Mob: 9650516244, 8888838900 Email: sudip.dutta@infra.esselgroup.com sundeep.rai@infra.esselgroup.com	2. Shri Rajesh Kumar Gupta DGM **Adani Renewable Energy Park Rajasthan Ltd.** **(1000 MW Hybrid plant connected at Fatehgarh PS)** **Adani Renewable Energy Holding One Ltd.** **(390 MW Hybrid plant connected at Fatehgarh-II PS)** **SBSR Power Cleantech Eleven Pvt. Ltd** **(300 MW solar plant connected at Bikaner PS)** **Adani Green Energy Seven Limited** **(300 MW solar plant connected at Fatehgarh-II PS)** **Adani Green Energy Nine Limited** **(300 MW solar plant connected at Fatehgarh-II PS)** **SBE Renewables Ten Private Limited** **(450 MW solar plant connected at Fatehgarh-II PS)** **Adani Renewable Energy Holding One Ltd.** **(50 MW solar plant connected at Bhadla PS)** 4th Floor- South Wing, Adani Corporate House, Shantigram, S G Highway, Ahmedabad- 382421, Gujarat, India. Ph.: 9099055681,9545554934 Email: rajesh.gupta@adani.com mahendrasingh.dabi@adani.com
3. Shri Santosh P Narayan Specialist – Project Development **Tata Power Renewable Energy Ltd.** **(150 MW solar plant connected at Bhadla PS)** **Tata Power Green Energy Ltd.** **(225 MW Hybrid plant connected at Bikaner PS)** C/o The Tata Power Company Limited, Corporate center A, Sant Tukaram Road, Carnac Bunder, Mumbai- 400009, Maharashtra Ph.: 9223550695, 9769535856, 9223550695 Email: narayans@tatapower.com rohith@tatapower.com	4. Shri Sashank Gupta Head-New Project Development **Azure Power India Private Limited** **(130 MW solar plant connected at Bhadla PS)** **(300 MW Solar plant connected at Bikaner PS)** **(300 MW Solar plant connected at Bikaner PS)** **(250 MW solar plant connected at Bhadla PS)** **(300 MW solar plant connected at Bhadla PS)** **(50 MW solar plant connected at Bhadla PS)** Southern Park, 5th Floor,D-II, Saket Place, Saket, New Delhi -110017, India Ph.: 9654649000, 7893733300, 9911917083 Email: ists@azurepower.com
5. Shri Ashutosh Vyas Chief Manager- BD Solar Grid **Hero Solar Energy Private Limited** **(250 MW solar plant connected at Bhadla PS)** Plot no 201, First Floor, Okhla Industrial Estate Ph III, Delhi - 110020 Ph.: 9953314792, 7264851636 Email: ashutosh.vyas@herofutureenergies.com rahul.gupta@herofutureenergies.com	6. Shri Yogesh Kumar Sanklecha General Manager - BD **Acme Solar Holdings Limited** **(300 MW solar plant connected at Fatehgarh PS)** **(300 MW solar plant connected at Fatehgarh PS)** **(300 MW solar plant connected at Fatehgarh PS)** **(300 MW solar plant connected at Fatehgarh PS)** **(300 MW solar plant connected at Bhadla-II PS)** Plot No. 152, Sector-44, Gurgaon-122002, Haryana Ph.: 8744060601, 9654819869, 9911299514 Email: yogesh@acme.in apradhan@acme.in
7. Shri Amit Kumar AVP **ReNew Solar Energy (Jharkhand Four) Pvt. Ltd.** **(300 MW solar plant connected at Fatehgarh-II PS)** **(300 MW solar plant connected at Fatehgarh-II PS)** **(300 MW solar plant connected at Bikaner PS)** **ReNew Solar Energy (Jharkhand Three) Private Ltd.** **(300 MW solar plant connected at Fatehgarh-II PS)** **Renew Solar Urja Private Limited** **(150 MW solar plant connected at Fatehgarh-II PS)** Renew.Hub, Commercial Block-1, Zone-6, Golf Course Road, DLF City Phase V, Gurugram-122009, Haryana Ph: 9717196796, 9911917083, 9542388443, 8130108830, 7389909907 Email:- amit.kumar1@renewpower.in solarbidding.gm@renewpower.in k.vishwanath@renewpower.in	8. Shri Angshuman Rudra Sr. Manager **Avaada Energy Private Limited** **(350 MW solar plant connected at Bikaner PS)** **(300 MW solar plant connected at Bikaner PS)** **(320 MW solar plant connected at Bhadla-II PS)** **(240 MW solar plant connected at Bikaner PS)** C-11, Sector 65, Noida - 201307 Uttar Pradesh Ph: 7835004673, Email: angshuman.rudra@avaada.com

rohit.singh@renewpower.in	
9. Shri S S Mishra, AGM (PE-Solar) **NTPC Limited** **(90 MW solar plant connected at Fatehgarh-II PS)** **(250 MW solar plant connected at Bhadla-II PS)** **(300 MW solar plant connected at Bhadla-II PS)** **(300 MW solar plant connected at Bhadla-II PS)** **(150 MW solar plant connected at Fatehgarh-II PS)** **(20 MW floating solar plant connected at Auraiya PS)** EOC Complex, A-8A, Sec-24, Noida, UP-201301 Mob: 9650997835, 9450962751, Email: ssmishra@ntpc.co.in amanna@ntpc.co.in;	10. Shri Vivek Kodesia Head Business Development **Eden Renewable Passy Private Limited** **(300 MW solar plant connected at Fatehgarh-II PS)** Unit No. 236 B & C, First Floor, DLF South Court, Saket, Delhi-110017 Ph: 9717031091, 9958982823 Email: edenrenewablesindiallp@gmail.com vivek.kodesia@eden-re.com
11. Shri Balakishore Kollabathula Authorized Signatory **Avikiran Surya India Private Limited** **(300 MW solar plant connected at Bikaner PS)** Prestige Shantiniketan,Hoodi, Bengaluru, Karnataka-560048 Ph.: 9810279841, 7899730301 Email: balakishore.kollabathula@enel.com norberto.cuencacandel@enel.com	12. Shri S.Sri Murali Chief Operating Officer **ABC Solar (India) Private Limited** **(300 MW solar plant connected at Bhadla-II PS)** H.No.6-3-680/8/3, Plot No.3, PMR Plaza, 2nd Floor,Thakur Mansion Lane, Somajiguda,Hyderabad – 500082,Telangana, India Ph.: 9502212277, 8008749990 Email: powerapprovals@axisenergy.in rambabu.m@axisenergy.in
13. Shri Saurabh Mehta GM **Mahindra Susten Private Limited** **(250 MW solar plant connected at Bhadla PS)** **(250 MW solar plant connected at Bhadla-II PS)** 6th Floor, Embassy 247, LBS Road, Vikhroli West, Mumbai-400083 Email:mehta.saurabh2@mahindra.com; khaitan.rakesh@mahindra.com	14. Shri Lakshmi Narayanan B Authorized Signatory **Ayana Renewable Power One Private Limited** **(300 MW solar plant connected at Bikaner PS)** 3rd Floor, Sheraton Grand Hotel, Brigade Gateway, 26/1, Dr. Rajkumar Road, Malleswaram (West), Bangalore – 560055 Email: "rohit@ayanapower.com narayanan@ayanapower.com; sharatranjan@ayanapower.com

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली-110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN: U40105DL2009GOI188682 Website : www.nrldc.in E-mail : nrldc@grid-india.in Tel: 011 26519406, 26523869, Fax: 011 26852747

संदर्भः— एन आर एल डी सी/आर ई एम सी/अज्युर/फरवरी 23/03 दिनांक – 14/02/2023

प्रेषितीः प्रबंधक पीडी एंड कन्सट्रक्शन,
अज्युर पावर प्राईवेट लिमिटेड,
5वीं मंजिल, साउथर्न पार्क, डी–2, साकेत पेलेस,
साकेत नई दिल्ली – 110017।

संदर्भ : 1 – एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/01
2 – एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/02
3 – एन आर एल डी सी/आर ई एम सी/अज्युर/जनवरी 23/05

विषय :– विद्युत उत्पादन पूर्वानुमान एवं वास्तविक उत्पादन में अंतर के परिपेक्ष्य में की गई बैठक के संदर्भ में।

महोदय/महोदया,

जैसा कि हमें मालूम है कि विद्युत शक्ति तंत्र (Power System) में आवृति (frequency) का मान नियत रखने के लिए निरंतर वास्तविक उत्पादन को अनुसूचित (schedule) उत्पादन के अनुकूल/समान रखने पर बल दिया जाता है। इसके अंतरर्गत हाल ही में नवीकरणीय उर्जा स्त्रोतों के उत्पादन में अनुसूचित उत्पादन से भिन्नता पाए जाने पर इस परिपेक्ष्य में उत्तर क्षेत्रीय भार प्रेषण केंन्द्र, कटवारिया सराय, नई दिल्ली में आप व आपके विद्युत शक्ति पूर्वानुमान सेवा प्रदाता (Forecast Service Provider) के साथ दिनांक 02.02.2023 को प्रातः 10:00 पर बैठक की गई थी जिसकी कार्यवत्त इस परिपत्र के साथ संलग्न है।

सधन्यवाद।

भवदीय,

आलोक

(आलोक कुमार)
महाप्रबंधक(संचालन)

प्रतिलिपि :

1. सदस्य(ग्रिड ऑपरेशन एंड डिस्ट्रीब्युशन), केंन्द्रीय विद्युत प्राधिकरण, सेवा भवन, आर के पुरम, नई दिल्ली –110066।
2. सदस्य सचिव, एन आर पी सी, 18–ए एस.जे.एस.एस. मार्ग, कटवारिया सराय, नई दिल्ली।
3. अध्यक्ष एवं प्रबंधक निदेशक, ग्रिड इंडिया, बी–9 कुतुब इन्स्टीट्युशनल एरिया, नई दिल्ली–110016।
4. कार्यकारी निदेशक, एन,एल,डी,सी,,बी–9, कुतुब इन्स्टीट्यूशनल एरिया, नई दिल्ली–110016।
5. कार्यकारी निदेशक/मुख्य महा प्रबंधक(संचालन), उ.क्षे.भा.प्रे.के., 18–ए एस,जे,एस,एस, मार्ग, कटवारिया सराय, नई दिल्ली–110016।

Minutes of meeting with RE developers along with their FSPs regarding large variations in actual generation and schedule and Improvement in forecasting

A meeting was held on 01Feb2023 and 02Feb2023 with RE developers including Azure to address the large deviations from schedule due to inaccurate forecasting

The Deputy General Manager (SO), NRLDC welcomed representatives of Azure RE developer and forecast service provider (Energy Meteo) and all the participants.

NRLDC representative provided a brief overview of the Forecast and DSM regulations. He stressed that the primary objective of these regulations are to uphold grid discipline and security.

NRLDC representative mentioned that many communications, including phone calls and emails from the control room, were made from NRLDC officials to the officials of RE developers regarding such significant deviations.

The aggregated deviations at the NR ISTS RE level on January 7th and 9th, 2023 was displayed in the meeting. On these days, the deviations were approximately 3000 MW and 2700 MW respectively, by NR ISTS RE plants, resulting in a sustained low frequency that fell well below the IEGC band for several hours, touching even below 49.5 Hz and 49.47 Hz on January 7th and 9th, respectively. It was further informed that the UFR (Under Frequency Relay) also operated in December 2022, resulting in load shedding in various states, including Uttar Pradesh, Rajasthan and Haryana in the Northern region. The UFR is the last line of defence mechanism and has not been operated for several years.

NRLDC representative further, displayed the deviations of Azure plants at both aggregated and individual levels for January 7th and 9th, 2023. The mean absolute errors (MAE) and root mean square errors(RMSE) errors for these days were also presented in the meeting. Azure's aggregated deviation was upto 600MW and 550MW on January 7th and 9th, 2023, respectively.

Further, it was informed that all the Azure RE plants were generally payable for DSM on these dates.

NRLDC also demonstrated the consistency of forecasting errors and the order of deviations from the schedule by presenting the mean absolute errors and root mean square errors for the full day as well as solar hours for various revisions.

NRLDC representative also explained the poor utilization of the Long Term Access (LTA) revision provision available with RE plants. They emphasized the need to predict weather conditions, especially fog and clouds, to avoid large deviations from the schedule.

GM (SO), NRLDC expressed the need to address such problems by using better technology. He also inquired about whether the fog model used by the RE developers is based on satellite data or any other weather parameters.

CGM (SO), NRLDC emphasised that the LTA revision facility be utilized properly during his conversation.

FSPs and Developer side view in this regard:

FSPs and Azure Representatives told that the latency is there due to receiving of forecast, making decisions and submitting the schedule thereafter as per the LTA revision facility from 4th time block. The forecaster believes that allowing more revisions in each REMC revision or increasing the number of revisions overall would improve forecasting accuracy.

During the meeting, the participants shared their experience with fog forecasting and noted that the currently available technology is not highly effective at accurately predicting foggy conditions.

Azure representative also informed about the lack of weather stations and radars in the RE pocket that is affecting the accuracy of the forecast based on historical data.

According to Azure, the problem of forecasting is likely to be increased in upcoming cloudy weathers in comparison to these foggy conditions.

Azure representative also told that their RE plants are resorting to overschedule in case of uncertainty of generation to minimize the risk of DSM post implementation of new DSM regulations.

Forecaster representative shared the international practices to keep the QCA /aggregated scheduling to minimize the deviations and errors.

Forecaster told that there is still scope to improve the day ahead and Intraday forecast based on weather data and modelling it through AI. The limitations of using high temporal & spatial resolution and inclusion of various weather parameters is there as it creates latency. Also the some of the Azure plants are new, so the forecasting models are still to get the fine accuracy in the forecast.

After going through the discussions, GM(SO) NRLDC said that the sole purpose of this meeting is to improve forecasting so that the deviations from schedule can be minimised. This shall ensure reliable and secure operation of the grid. In the view of above, NRLDC suggested improvement areas as follows:

1. **GM(SO) NRLDC stressed upon technological improvement in terms of high resolution modeling which takes care of local conditions , improvement in algorithms at each level and taking up with weather service providers at the backend to improve their forecasting**.
2. LTA revision facilities may be used to the extent possible during night hours too. Plants need to forecast more accurately in case of STOA/PX schedules.
3. Overscheduling during start and end of the solar hours in normal days also may be avoided.
4. Faster variations in solar generation are being observed during foggy or cloudy conditions due to faster variation in GHI. **RE plants were suggested to keep the rate of change of power output restricted up to 10% of the actual power generation**.
5. Forecast Service Providers need to be timely informed by RE developers about the ground realities including operational aspects such as tripping of inverters, available AC/DC capacity and weather conditions etc.
6. Experienced manpower should be deployed in night shifts for timely revision in schedules according to weather conditions.

After having a detailed discussion and based on suggestions, RE developer Azure and Forecast Service Providers have submitted as follows:

From Energy Meteo

1. They are testing new weather models and are calculating their own WRF model in-house, which is optimised for fog and clouds. They are also exploring different new weather models with different spatial and temporal resolutions.
2. With the available park‘s data (and new collected parks‘data), they are re-training the forecast system in frequent intervals. As and when there are difficult weather situations, they also use them for forecast training.

3. With close co-ordination with site and latest park's real time data (for power and other parameters), their forecast system is making frequent power forecast revisions (in short intervals) and they are trying to capture instantaneous weather changes over parks.
4. They are in the process of testing of Sky Cam technology for capturing sudden instantaneous weather changes over the park.
5. For new parks which are slowly growing, they told that it is difficult to train the forecast as the parks features (behavior) are still not yet stable. As they are accumulating new and more data for such parks, their system will be able to train the models better and their accuracy will further improve.

FROM Azure

This is regarding based on discussion held on 02-02-2023 for maintaining the schedule and grid stability of ISTS projects installed in the state of Rajasthan. The following course of action they are taking for improvement in deviation & penalties of all projects (1457 MW)

1. Introduced the site intervention for punching the final schedule on REMC portal, once analysed the schedule from forecaster based on real site condition thereafter the final submission been done on portal for each time block.

2. Nos of Skycam cameras we have procured from Germany and installed at Azure Power Forty Three Pvt Ltd to capture the cloud movements & weather fluctuations and will be get into the functionality by end of February 2023.

3. Cloud sensors installed at Azure Power India Pvt ltd 200 MW & Azure Power Thirty Four Pvt Ltd, they are in discussion with OEM to determine and finalise the results/data for analysing the cloud movements, density & Velocity etc.

4. As suggested they are also looking to hire the forecaster other than Energy Meteo, who is having the 24X7 control room to assist the site-in-charge in case of deviation with in minimum time frame.

5. Also in process to connect with weather forecaster like Solcast, Spire, Skymet etc. to provide the data related to irradiance, cloud movement, sand storm and it would be beneficial during the foggy & rainy condition.

6. They are also analyzing the 15 minutes interval of data from the forecaster for better accuracy and capture all the uncertainty and looking forward to implement the experience in fluctuating weather.

They are continuously exploring the other methods/innovation to minimize the variation for the grid stability and will intimate good office time to time.

Attendee from Azure Side:

1. Gautham Jha, Manager(Operation), from Azure Power
2. Vidit Khandelwal, Forecaster, from Energy Meteo

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18 ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली-110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN: U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel: 011 26519406, 26523869, Fax: 011 26852747

संदर्भ:– **एन आर एल डी सी/आर ई एम सी/रिन्यु पावर/फरवरी 23/04** दिनांक – 14/02/2023

प्रेषिती: मुख्य, ओएंडएम,

रिन्यु पावर, कॉमर्शियल ब्लॉक–1,

जोन 6, गोल्फ कोर्स रोड, डी.एल.एफ. सिटी फेज़ – 5,

गुडगॉव–122009, हरियाणा।

संदर्भ : 1 – **एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/01**

2 – **एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/02**

3 – **एन आर एल डी सी/आर ई एम सी/रिन्यु पावर/जनवरी 23/06**

विषय :– विद्युत उत्पादन पूर्वानुमान एवं वास्तविक उत्पादन में अंतर के परिपेक्ष्य में की गई बैठक के संदर्भ में।

महोदय/महोदया,

जैसा कि हमें मालूम है कि विद्युत शक्ति तंत्र (Power System) में आवृति (frequency) का मान नियत रखने के लिए निरंतर वास्तविक उत्पादन को अनुसूचित (schedule) उत्पादन के अनुकूल/समान रखने पर बल दिया जाता है। इसके अंतरर्गत हाल ही में नवीकरणीय उर्जा स्त्रोतों के उत्पादन में अनुसूचित उत्पादन से भिन्नता पाए जाने पर इस परिपेक्ष्य में उत्तर क्षेत्रीय भार प्रेषण केन्द्र, कटवारिया सराय, नई दिल्ली में आप व आपके विद्युत शक्ति पूर्वानुमान सेवा प्रदाता (Forecast Service Provider) के साथ दिनांक 02.02.2023 को सांय 02:30 पर बैठक की गई थी जिसकी कार्यवत्त इस परिपत्र के साथ संलग्न है।

सधन्यवाद।

भवदीय,

आलोक

(आलोक कुमार)
महाप्रबंधक(संचालन)

प्रतिलिपि :

1. सदस्य(ग्रिड ऑपरेशन एंड डिस्ट्रीब्युशन), केन्द्रीय विद्युत प्राधिकरण, सेवा भवन, आर के पुरम, नई दिल्ली –110066।
2. सदस्य सचिव, एन आर पी सी, 18–ए एस.जे.एस.एस. मार्ग, कटवारिया सराय, नई दिल्ली।
3. अध्यक्ष एवं प्रबंधक निदेशक, ग्रिड इंडिया, बी–9 कुतुब इन्स्टीट्युशनल एरिया, नई दिल्ली–110016।
4. कार्यकारी निदेशक, एन,एल,डी,सी,,बी–9, कुतुब इन्स्टीट्यूशनल एरिया, नई दिल्ली–110016।
5. कार्यकारी निदेशक/मुख्य महा प्रबंधक(संचालन), उ.क्षे.भा.प्रे.के., 18–ए एस,जे,एस,एस, मार्ग, कटवारिया सराय, नई दिल्ली–110016।

Minutes of meeting with RE developers along with their FSPs regarding large variations in actual generation and schedule and Improvement in forecasting

A meeting was held on 01Feb2023 and 02Feb2023 with RE developers including Renew to address the large deviations from schedule due to inaccurate forecasting

GM (SO), NRLDC welcomed representatives from Renew, a renewable energy (RE) developer and their forecast service providers (Climate Connect and Manikaran) and all the participants.

NRLDC representative provided a brief overview of the Forecast and DSM regulations. He stressed that, the primary objective of these regulations is to uphold grid discipline and security.

NRLDC representative mentioned that many communications, including phone calls and emails from the control room, were made from NRLDC officials to the officials of RE developers regarding significant deviations.

The aggregated deviations at the NR ISTS RE level on January 7th and 9th, 2023 was displayed in the meeting. On these days, the deviations were approximately 3000 MW and 2700 MW respectively, by NR ISTS RE plants, resulting in a sustained low frequency that fell well below the IEGC band for several hours, touching even below 49.5 Hz and 49.47 Hz on January 7th and 9th, respectively. It was further informed that the UFR (Under Frequency Relay) also operated in December 2022, resulting in load shedding in various states, including Uttar Pradesh, Rajasthan and Haryana in the Northern region. The UFR is the last line of defence mechanism and has not been operated for several years.

NRLDC representative further, displayed the deviations of Renew plants at both aggregated and individual levels for January 7th and 9th, 2023. The errors were quantified using mean absolute error (MAE) and root mean squared error (RMSE), and the Renew plants showed deviations of approximately 400 MW and 700 MW for January 7th and 9th, 2023, respectively.

Further, it was informed that all Renew RE plants were generally payable for DSM on these dates.

NRLDC representative also demonstrated the consistency of forecasting errors and the order of deviations from the schedule by presenting the mean absolute errors and root mean square errors for the full day as well as solar hours for various revisions.

NRLDC representative also explained the poor utilization of the Long Term Access (LTA) revision provision available with RE plants. He emphasized the need to predict weather conditions, especially fog and clouds, to avoid large deviations from the schedule.

GM (SO), NRLDC expressed the need to address such problems by using better technology. He also inquired about whether the fog model used by the RE developers is based on satellite data or any other weather parameters.

CGM (SO), NRLDC emphasised that the LTA revision facility be utilized properly during his conversation.

FSPs and Developer side view in this regard:

FSPs and Renew told that the latency is there due to receiving of forecast, making decisions and submitting the schedule thereafter as per the LTA revision facility from 4th time block. The forecaster believes that allowing more revisions in each REMC revision or increasing the number of revisions overall would improve forecasting accuracy.

During the meeting, the participants shared their experience with fog forecasting and noted that the currently available technology is not highly effective at accurately predicting foggy conditions.

According to climate connect, the tropical regions are more prone to weather changes like Monsoon, precipitation, Movement of Clouds, local winds, Humidity, storms in compare to the subtropical regions.

Predicting wind speed for a short time scale like 2-3 hours is challenging because many other local phenomena are also adding to the variability in the wind.

Renew representative also added the lack of weather stations, radars, historical data and research in this area. Renew representative addressed the need of R&D towards the better forecasting by collaboration with IMD, ISRO, RE Plants and Grid-India in terms of improvement towards satellite technology, computational power of weather data, site experience and the Grid experience.

Renew representative also told that their RE plants are resorting to overschedule in case of uncertainty of generation to minimize the risk of DSM post implementation of new DSM regulations.

Forecaster representative shared the international practices to keep the QCA /aggregated scheduling to minimize the deviations and errors.

Forecaster told that there is still scope to improve the day ahead and Intraday forecast based on weather data and modelling it through AI. The limitations of using high temporal & spatial resolution and inclusion of various weather parameters is there as it creates latency. Also the some of the Renew plants are new, so the forecasting models are still to get the fine accuracy in the forecast.

Forecasters told that Global forecasters are having persistency in errors due to lack of real time observations and forecasters need to down scale them.

They believe that IMD is having the capability to provide the forecast with better resolution (temporal and Spatial).

After going through the discussions, GM(SO) NRLDC said that the sole purpose of this meeting is to improve forecasting so that the deviations from schedule can be minimised. This shall ensure reliable and secure operation of the grid. In the view of above, NRLDC suggested improvement areas as follows:

1. **GM(SO) NRLDC stressed upon technological improvement in terms of high resolution modeling which takes care of local conditions , improvement in algorithms at each level and taking up with weather service providers at the backend to improve their forecasting**.
2. LTA revision facilities may be used to the extent possible during night hours too. Plants need to forecast more accurately in case of STOA/PX schedules.
3. Overscheduling during start and end of the solar hours in normal days also may be avoided.
4. Faster variations in solar generation are being observed during foggy or cloudy conditions due to faster variation in GHI. **RE plants were suggested to keep the rate of change of power output restricted up to 10% of the actual power generation**.
5. Forecast Service Providers need to be timely informed by RE developers about the ground realities including operational aspects such as tripping of inverters, available AC/DC capacity and weather conditions etc.
6. Experienced manpower should be deployed in night shifts for timely revision in schedules according to weather conditions.

After having a detailed discussion and based on suggestions, RE developer Renew and Forecast Service Providers have submitted as follows:

From Manikaran

Present Fog Forecasting System:

They are using a Machine Learning based forecasting model that uses historical and forecasted weather data along with available ground weather/power data from different locations, to model and predict the future fog events. Presently the model has been optimized over various states of India spread across different geographical locations. The model is quite robust and forecast around 80 percent of the foggy events occurred accurately during the winter season of 2022-23.

Way Forward:

Some of the key areas for future work include:

1. Data integration and analysis: Improved data collection, integration, and analysis are essential to improving the accuracy of fog forecasting models.
2. Advanced machine learning techniques: The application of advanced machine learning techniques, such as deep learning, reinforcement learning, and generative adversarial networks, can help to improve the accuracy of fog forecasting models to go beyond 90 percent.
3. High-resolution modeling: The development of high-resolution models, which take into account local conditions and meteorological phenomena, can provide more accurate forecasts for specific regions.
4. Improved weather observations: Better weather observations, such as those from advanced radar and satellite systems, can provide more accurate data for fog forecasting models.

Overall, they are looking forward to optimize advance machine learning model with real time input from satellite/radar data, which will further pushed the bar beyond expectations and help us achieve a higher level of accuracy.

Operations:

1. Manikaran Operation team has formed close monitoring group with site team for real time input of weather changes in Schedules to better react to real time changes in case the weather forecasts are contradictory.
2. Manikaran has increased man power by 20% in Operation team and deploying senior team in the early generation hours to better interpret the incoming data and make changes if necessary to counter the effects of fog.

From Climate Connect

Steps taken for improvement:

1. Cloud tracking algorithms for predicting the cloud movement and cloud density to look into the overall impact of the clouds on solar generation.
2. Biases corrections methods to improve the accuracy of the forecast.
3. Approaches like inverse weighted methods to improve the accuracy of point forecasts.
4. Inclusion of more accurate weather forecaster for solar/wind sites.
5. Development of In-house Numerical weather prediction and AI/ML based models.

Attendance Sheet(02.02.2023)							
Meeting regarding forecasting with RE plants (Renew)							
NRLDC							
S.NO.	Attendee Name	Designation	Department	Organization	Email	Phone No.	Sign
1	Lav kumar Khandelwal	AM, SO	NRLD	Grid-India	luvkumar@grid-india.in	8209193752	[illegible]
2	Kamaldeep	C.M. SO	SO	Grid India	Kamaldeep@posoco.in	9971700422	Kamaldeep
3	P. P. Chand	DGM(SO)	SO	Grid-India	pomprakash@grid-india.in	[illegible]	[illegible]
4	आलोक कुमार	महाप्रबंधक	सिस्टम ऑपरेशन	ग्रिड इंडिया	alok.kumar@grid-india.in	9999039321	alok आलोक
5	Anisha Chopra	C.M. SO	SO	" "	anisu.chopra@grid-india.in	9650094534	[illegible]
6	Manish Tyagi	Senior Manager	Regulatory	Renew Power	manish.tyagi@renewpower.in	9871144602	[illegible]
7	Sandeep Mehra	AVP, CCD	OFSC	Climate Connect	sandeep.mehra@climateconnect.digital	9990218???	[illegible]
8	Dr Ram Ratan	S. Manager	Meteorology	Climate Connect	ram.ratan@climateconnect.digital	9986838842	[illegible]
9							
10	Mohit Singh	AGM/Business Head	BD	Climate Connect	mohit.singh@climateconnect.digital	8882370972	[illegible]
11	BRAJESH KUMAR	GM-Operations	Asset Management	ReNew Power	BRAJESH.KUMAR@RENEWPOWER.IN	9599554567	[illegible]
12							
13							
14	ARSH KHANNA	Dy. Manager	Engineering	Renew Power	arsh.khanna@renewpower.in	9923841557	[illegible]
15	Ganesh Kumbhe	General Manager	F&S	ReNew Power	ganesh@renewpower.in	9821031190	[illegible]
16	Ritu Kaira	Sr. Engineer	F&S	ReNew Power	ritu.kaira@renewpower.in	7838958791	[illegible]
17	Neelabhra Paul	President	F&S	Manikaran Analytics	neel.paul@manikaranpowerltd.in	9599184357	[illegible]
18	Harsh Sharma	Sr Manager	F&S	MAL	Harsh.Sharma@manikarananalytics.in	8586055290	[illegible]
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ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[Formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केन्द्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली-110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel: 011 26519406, 26523869, Fax: 011 26852747

संदर्भः— एन आर एल डी सी/आर ई एम सी/ए जी ई एन एल/फरवरी 23/01 दिनांक — 14/02/2023

प्रेषितीः प्रमुख, उत्तर क्षैत्र, अदानी पावन लिमिटेड,
नेशनल काउंसिल ऑफ वाईएमसीए ऑफ इंडिया बिल्डिग,
भारत युवक भवन 1, जय सिंह रोड,
गेट नम्बर–5 नई दिल्ली–110001

संदर्भ : 1 — एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/01
2 — एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/02
3 — एन आर एल डी सी/आर ई एम सी/ए जी ई एन एल/जनवरी 23/03

विषय :– विद्युत उत्पादन पूर्वानुमान एवं वास्तविक उत्पादन में अंतर के परिपेक्ष्य में की गई बैठक के संदर्भ में।

महोदय/महोदया,

जैसा कि हमें मालूम है कि विद्युत शक्ति तंत्र (Power System) में आवृति (frequency) का मान नियत रखने के लिए निरंतर वास्तविक उत्पादन को अनुसूचित (schedule) उत्पादन के अनुकूल/समान रखने पर बल दिया जाता है। इसके अंतरर्गत हाल ही में नवीकरणीय उर्जा स्त्रोतों के उत्पादन में अनुसूचित उत्पादन से भिन्नता पाए जाने पर इस परिपेक्ष्य में उत्तर क्षेत्रीय भार प्रेषण केंन्द्र, कटवारिया सराय, नई दिल्ली में आप व आपके विद्युत शक्ति पूर्वानुमान सेवा प्रदाता (Forecast Service Provider) के साथ दिनांक 01.02.2023 को प्रातः 10:00 पर बैठक की गई थी जिसकी कार्यवत्त इस परिपत्र के साथ संलग्न है।

सधन्यवाद।

भवदीय,

आलोक

(आलोक कुमार)
महाप्रबंधक(संचालन)

प्रतिलिपि :

1. सदस्य(ग्रिड ऑपरेशन एंड डिस्ट्रीब्युशन), केंन्द्रीय विद्युत प्राधिकरण, सेवा भवन, आर के पुरम, नई दिल्ली –110066।
2. सदस्य सचिव, एन आर पी सी, 18–ए एस.जे.एस.एस. मार्ग, कटवारिया सराय, नई दिल्ली।
3. अध्यक्ष एवं प्रबंधक निदेशक, ग्रिड इंडिया, बी–9 कुतुब इन्स्टीट्युशनल एरिया, नई दिल्ली–110016।
4. कार्यकारी निदेशक, एन,एल,डी,सी,,बी–9, कुतुब इन्स्टीट्यूशनल एरिया, नई दिल्ली–110016।
5. कार्यकारी निदेशक/मुख्य महा प्रबंधक(संचालन), उ.क्षै.भा.प्रे.के., 18–ए एस,जे.एस,एस, मार्ग, कटवारिया सराय, नई दिल्ली–110016।

Minutes of meeting with RE developers along with their Forcast Service Providers (FSPs) regarding large variations in actual generation and schedule and Improvement in forecasting

A meeting was held on 01Feb2023 and 02Feb2023 with RE developers including Adani to address the large deviations from schedule due to inaccurate forecasting.

ED, NRLDC welcomed representatives of Adani RE developer and their forecast service providers (Enercast, Energy Meteo and Manikaran) and all the participants.

ED, NRLDC addressed the issue of inaccurate forecasts, particularly during foggy and cloudy days. He said that, It has been observed that such weather conditions are most prevalent during the months of December-January and July-August. He also emphasized that overscheduling should be avoided in the event of fog and cloud forecasts, and that the revision facility should be utilized promptly.

He also inquired about the measures taken by the RE developers to enhance their forecasting algorithms and incorporate diverse weather parameters from various sources.

He expressed concern about the significant deviations of up to 4000-5000 MW at the NR ISTS RE plant's aggregated level and also said that the system lacks sufficient reserves to manage such significant deviations.

In conclusion, he emphasized the importance of taking proactive corrective actions to improve the situation, as the problem could exacerbate with the addition of more renewables to the grid in the near future. He further emphasized the need to improve coordination among site personnel to avoid unnecessary delays and urged plants to remain attentive as well vigilant during weather conditions such as fog and cloudiness. In this regard, instructions from NRLDC need to be promptly implemented.

NRLDC representative provided a brief overview of the Forecast and DSM regulations. He stressed that the primary objective of these regulations are to uphold grid discipline and security.

NRLDC representative mentioned that many communications, including phone calls and emails from the control room, were made from NRLDC officials to the officials of RE developers regarding such significant deviations.

The aggregated deviations at the NR ISTS RE level on January 7th and 9th, 2023 was displayed in the meeting. On these days, the deviations were approximately 3000 MW and 2700 MW respectively, by NR ISTS RE plants, resulting in a sustained low frequency that fell well below the IEGC band for several hours, touching even below 49.5 Hz and 49.47 Hz on January 7th and 9th, respectively. It was further informed that the UFR (Under Frequency Relay) also operated in December 2022, resulting in load shedding in various states, including Uttar Pradesh, Rajasthan and Haryana in the Northern region. The UFR is the last line of defence mechanism and has not been operated for several years.

NRLDC representative further, displayed the deviations of Adani plants at both aggregated and individual levels for January 7th and 9th, 2023. The mean absolute errors (MAE) and root mean square errors(RMSE) errors for these days were also presented in the meeting. Adani's aggregated deviation was up to 600 MW and 800 MW on January 7th and 9th, respectively.

Further, it was informed that all the Adani RE plants were generally payable for DSM on these dates.

NRLDC also demonstrated the consistency of forecasting errors and the order of deviations from the schedule by presenting the mean absolute errors and root mean square errors for the full day as well as solar hours for various revisions.

NRLDC representative also explained the poor utilization of the Long Term Access (LTA) revision provision available with RE plants. He emphasized the need to predict weather conditions, especially fog and clouds, to avoid large deviations from the schedule.

GM (SO), NRLDC expressed the need to address such problems by using better technology. He also inquired about whether the fog model used by the RE developers is based on satellite data or any other weather parameters.

CGM (SO), NRLDC emphasised that the LTA revision facility be utilized properly during his conversation.

FSPs and Developer side constraints in this regard:

FSPs and Adani Representatives told that the latency is there due to receiving of forecast, making decisions and submitting the schedule thereafter as per the LTA revision facility from 4th time block. The forecaster believes that allowing more revisions in each REMC revision or increasing the number of revisions overall would improve forecasting accuracy.

During the meeting, the participants shared their experience with fog forecasting and noted that the currently available technology is not highly effective at accurately predicting foggy conditions.

Adani representative also informed about the lack of weather stations and radars in the RE pocket that is affecting the accuracy of the forecast.

Adani representative also told that their RE plants are resorting to overschedule in case of uncertainty of generation to minimize the risk of DSM post implementation of new DSM regulations.

Forecaster representative shared the international practices to keep the QCA /aggregated scheduling to minimize the deviations and errors.

The Forecaster Service Providers told that there is still scope to improve the Day ahead and Intraday forecast based on weather data and modelling it through AI. The limitations of using high temporal & spatial resolution and inclusion of various weather parameters is there as it creates latency. Also the some of the Adani plants are new, so the forecasting models are still to get the fine accuracy in the forecast.

After going through the discussions, GM(SO) NRLDC said that the sole purpose of this meeting is to improve forecasting so that the deviations from schedule can be minimised. This shall ensure reliable and secure operation of the grid. In the view of above, NRLDC suggested improvement areas as follows:

1. **GM(SO) NRLDC stressed upon technological improvement in terms of high resolution modeling which takes care of local conditions , improvement in algorithms at each level and taking up with weather service providers at the backend to improve their forecasting** .
2. LTA revision facilities may be used to the extent possible during night hours too. Plants need to forecast more accurately in case of STOA/PX schedules.
3. Overscheduling during start and end of the solar hours in normal days also may be avoided.
4. Faster variations in solar generation are being observed during foggy or cloudy conditions due to faster variation in GHI. **RE plants were suggested to keep the rate of change of power output restricted up to 10% of the actual power generation**.
5. Forecast Service Providers need to be timely informed by RE developers about the ground realities including operational aspects such as tripping of inverters, available AC/DC capacity and weather conditions etc.
6. Experienced manpower should be deployed in night shifts for timely revision in schedules according to weather conditions.

After having a detailed discussion and based on suggestions, RE developer Adani and Forecast Service Providers have submitted as follows:

From Manikaran

Present Fog Forecasting System:

They are using a Machine Learning based forecasting model that uses historical and forecasted weather data along with available ground weather/power data from different locations, to model and predict the future fog events. Presently the model has been optimized over various states of India spread across different geographical locations. The model is quite robust and forecasted around 80 percent of the foggy events accurately during the winter season of 2022-23.

Way Forward:

Some of the key areas for future work include:

1. Data integration and analysis: Improved data collection, integration, and analysis are essential to improving the accuracy of fog forecasting models.
2. Advanced machine learning techniques: The application of advanced machine learning techniques, such as deep learning, reinforcement learning, and generative adversarial networks, can help to improve the accuracy of fog forecasting models to go beyond 90 percent.
3. High-resolution modeling: The development of high-resolution models, which take into account local conditions and meteorological phenomena, can provide more accurate forecasts for specific regions.
4. Improved weather observations: Better weather observations, such as those from advanced radar and satellite systems, can provide more accurate data for fog forecasting models.

Overall, they are looking forward to optimize advance machine learning model with real time input from satellite/radar data, which will further pushed the bar beyond expectations and help us achieve a higher level of accuracy.

Operations:

1. Manikaran Operation team has formed close monitoring group with site team for real time input of weather changes in schedules to better react to real time changes in case the weather forecasts are contradictory.
2. Manikaran has increased man power by 20% in Operation team and deploying senior team in the early generation hours to better interpret the incoming data and make changes if necessary to counter the effects of fog.

From Energy Meteo

1. They are testing new weather models and are calculating their own WRF model in-house, which is optimised for fog and clouds. They are also exploring different new weather models with different spatial and temporal resolutions.
2. With the available park‘s data (and new collected parks‘data), they are re-training the forecast system in frequent intervals. As and when there are difficult weather situations, they also use them for forecast training.
3. With close co-ordination with site and latest park‘s real time data (for power and other parameters), their forecast system is making frequent power forecast revisions (in short intervals) and they are trying to capture instantaneous weather changes over parks.
4. They are in the process of testing of Sky Cam technology for capturing sudden instantaneous weather changes over the park.

5. For new parks which are slowly growing, they told that it is difficult to train the forecast as the parks features (behavior) are still not yet stable. As they are accumulating new and more data for such parks, their system will be able to train the models better and their accuracy will further improve.

From Enercast

Actions taken for Fog and Cloud

1. Based on the inputs from site conditions, same are superimposed with model output manually for foggy conditions
2. Weather input like Humidity, Air temperature and Dew point temperature considered from different weather models.
3. Frequent input from site like fog presence were also considered during scheduling.

Actions Planned

1. Use of weather inputs like Humidity, Air temperature and Dew point temperature from different weather models will be used for understanding their effect on generation.
2. Mathematical modeling: consider effect of fog while creating forecast e.g.(as the night hours ambient temp. is going below the dew point, the fog is being cleared during high humidity periods).

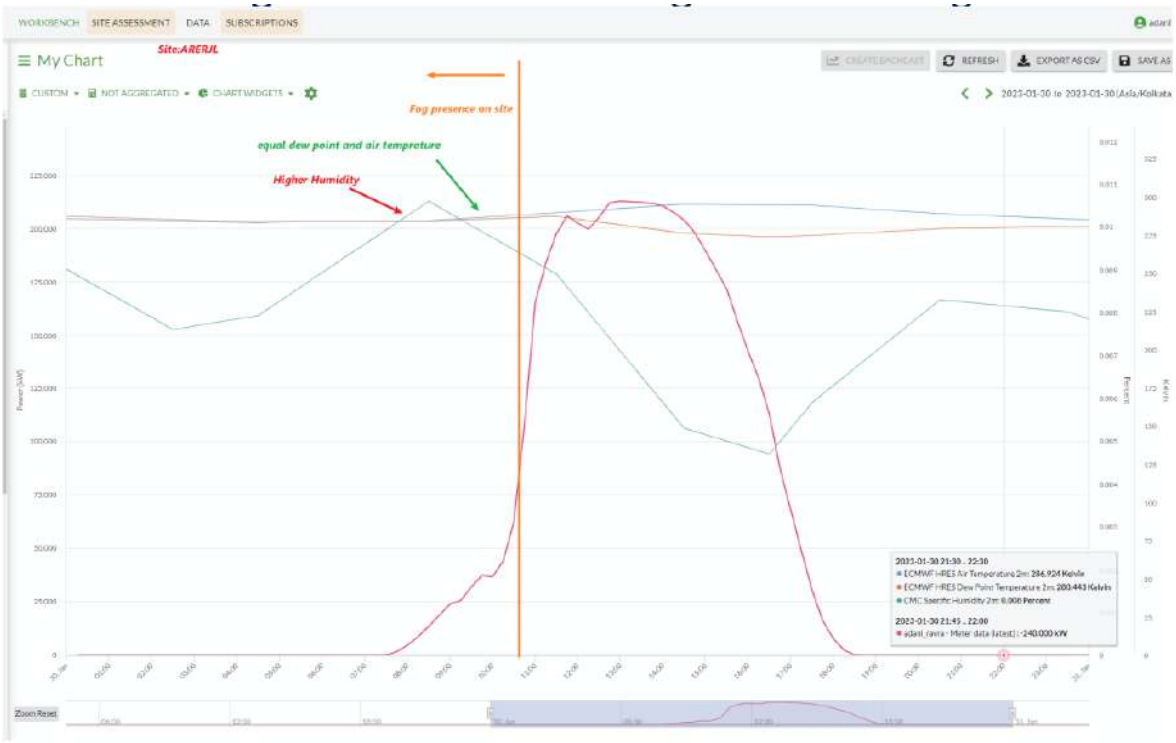

Image: ARERJL site generation with different weather inputs on 2023-01-30

From RE Developer Adani

1. **MoU signed with IITM-Pune for high resolution weather data for solar and wind.**
2. **Discussions on-going with IMD for collaboration on fog forecasting.**
3. **Doing evaluations of forecast providers specifically for cloud monitoring.**
4. **Developing in-house model for fog prediction.**

Attendance Sheet(01.02.2023)

Meeting regarding forecasting with RE plants (ADANI)

NRLDC

S.NO.	Attendee Name	Designation	Department	Organization	Email	Phone No.	Sign
1	BARJIT DAS	DIRECTOR	FORECASTING	ENERCAST	barjit.das@		
2	VINIT KANDOAL	SALES Consultant.	Forecasting	GmBH	enercast.de	9870264718	[signature]
3		Energy meteo		Energy Meteo GmBH	indian-operations@	8826135851	[signature]
4					Energy meteo.com		
5	Harsh Sharma	Sr manager	Forecasting	Manikaran	harsh.sharma@	8586055490	[signature]
6					manikaranalytics.in		
7	Neelabhra Paul	President	E&S	Manikaran	neel.paul@	9599184354	[signature]
8				Analytics Ltd	manikaranpowerltd.in		
9	Saurabh Suryavanshi	Manager	E&S	enercast GmbH	Saurabh.suryavanshi@enercast.de	9860463000	[signature]
10	Narendranath Ojha	Asst. Manager	BD	Adani	narendranath.ojha@adani.com	9939870629	[signature]
11	Abhinav Saxena	DGM Technology	Technology	Adani	abhinav.saxena@adani.com	6359956484	[signature]
12	Rakesh Dash	Head-ENOC	Operation	Adani	rakesh.dash@adani.com	6358936981	[signature]
13	Dhaval Trivedi	AGM-ERCG	Commercial	AGEL	dhaval.trivedi@adani.com	9099938184	[signature]
14	SAMEER GANJU	V.P		ADANI	SAMEERGANJU@ADANI.com	8860550077	[signature]
15	Anisha Chopra	Chief Mgr.	System operation	GRID-INDIA	ANISHA.CHOPRA@	9650094534	[signature]
16					GRID-INDIA.in		
17	शशांक रस्तोगी	मुख्य प्रबंधक	प्रणाली प्रचालन	ग्रिड-इंडिया	shashank@grid-india	9599491243	[signature]
18	कमलदीप	उप प्रबंधक	SO	ग्रिड इंडिया	kamaldeep@posoco.in .com	9971960422	[signature]
19	लव कुमार श्रीवास्तव	सहायक प्रबंधक	SO	ग्रिड इंडिया	luvkumar@grid-india.in	8209193352	[signature]
20	सतीश कुमार	अभियंता	प्र. प्र.	ग्रिड इंडिया	SATISH KUMAR@GRID-INDIA		[signature]
21	आलोक कुमार	महाप्रबंधक	प्रणाली प्रचालन	ग्रिड इंडिया	alokkumar@Grid-india.in	9999039321	[signature]
22							
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ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
भारत सरकार का उद्यम
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[Formerly Power System Operation Corporation Limited (POSOCO)]
उत्तर क्षेत्रीय भार प्रेषण केंद्र / Northern Regional Load Despatch Centre
कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली–110016
Office : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi-110016
CIN : U40105DL2009GOI188682, Website : www.nrldc.in, E-mail : nrldc@grid-india.in, Tel: 011 26519406, 26523869, Fax: 011 26852747

संदर्भः– एन आर एल डी सी/आर ई एम सी/अवाडा/फरवरी 23/02 दिनांक – 14/02/2023

प्रेषितीः महाप्रबंधक(अभियांत्रिकी)
अवाडा एनर्जी
सी–11, सेक्टर–65, गौतम बुध नगर,
नोएडा, यूपी–201301।

संदर्भ : 1 – एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/01
2 – एन आर एल डी सी/आर ई एम सी/एनआर आईएसटीएस आरई/जनवरी 23/02
3 – एन आर एल डी सी/आर ई एम सी/अवाडा/जनवरी 23/04

विषय :– विद्युत उत्पादन पूर्वानुमान एवं वास्तविक उत्पादन में अंतर के परिपेक्ष्य में की गई बैठक के संदर्भ में।

महोदय/महोदया,

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सधन्यवाद।

भवदीय,

आलोक
(आलोक कुमार)
महाप्रबंधक(संचालन)

प्रतिलिपि :

1. सदस्य(ग्रिड ऑपरेशन एंड डिस्ट्रीब्युशन), केंन्द्रीय विद्युत प्राधिकरण, सेवा भवन, आर के पुरम, नई दिल्ली –110066।
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Minutes of meeting with RE developers along with their FSPs regarding large variations in actual generation and schedule and Improvement in forecasting

A meeting was held on 01Feb2023 and 02Feb2023 with RE developers including AVADA to address the large deviations from schedule due to inaccurate forecasting

GM (SO), NRLDC welcomed representatives from Avaada, a renewable energy (RE) developer and their forecast service providers (Enercast and Energy Meteo) and all the participants.

NRLDC representative provided a brief overview of the Forecast and DSM regulations. He stressed that, the primary objective of these regulations are to uphold grid discipline and security. The regulations ensure that a plant's generation does not deviate from the schedule and adheres to it.

NRLDC representative mentioned that many communications, including phone calls and emails from the control room, were made from NRLDC officials to the officials of RE developers regarding significant deviations.

The aggregated deviations at the NR ISTS RE level on January 7th and 9th, 2023 was displayed in the meeting. On these days, the deviations were approximately 3000 MW and 2700 MW respectively, by NR ISTS RE plants, resulting in a sustained low frequency that fell well below the IEGC band for several hours, touching even below 49.5 Hz and 49.47 Hz on January 7th and 9th, respectively. It was further informed that the UFR (Under Frequency Relay) also operated in December 2022, resulting in load shedding in various states, including Uttar Pradesh, Rajasthan and Haryana in the Northern region. The UFR is the last line of defence mechanism and has not been operated for several years.

NRLDC representative further, displayed the deviations of Avaada plants at both aggregated and individual levels for January 7th and 9th, 2023. The errors were quantified using mean absolute error (MAE) and root mean squared error (RMSE), and the Avaada plants showed deviations of approximately 700 MW and 500 MW for January 7th and 9th, 2023, respectively.

Additionally, it was explained that all Avaada RE plants were generally payable for DSM on these dates.

NRLDC representative also demonstrated the consistency of forecasting errors and the order of deviations from the schedule by presenting the mean absolute errors and root mean square errors for the full day as well as solar hours for various revisions.

NRLDC representative also explained the poor utilization of the Long Term Access (LTA) revision provision available with RE plants. He emphasized the need to predict weather conditions, especially fog and clouds, to avoid large deviations from the schedule.

GM (SO), NRLDC expressed the need to address this problem by using technology. He also inquired about whether the fog model used by the RE developers is based on satellite or any other weather source.

CGM (SO), NRLDC emphasised that the LTA revision facility be utilized properly during his conversation.

FSPs and Developer side view in this regard:

FSPs and Avaada Representatives told that the latency is there due to receiving of forecast, making decisions and submitting the schedule thereafter as per the LTA revision facility from 4^{th} time block. The FSPs believe that allowing more revisions in each REMC revision or increasing the number of revisions overall would improve forecasting accuracy.

During the meeting, the participants shared their experience with fog forecasting and noted that the currently available technology is not highly effective at accurately predicting foggy conditions.

Avaada representative also informed about the lack of weather stations and radars in the RE pocket that is affecting the accuracy of the forecast.

Avaada representative also told that their RE plants are resorting to overschedule in case of uncertainty of generation to minimize the risk of DSM post implementation of new DSM regulations.

Forecaster representative shared the international practices to keep the QCA /aggregated scheduling to minimize the deviations and errors.

The Forecast Service Providers told that there is still scope to improve the day ahead and Intraday forecast based on weather data and modelling it through AI. The limitations of using high temporal & spatial resolution and inclusion of various weather parameters is there as it creates latency. Also the some of the Avaada plants are new, so the forecasting models are still to get the fine accuracy in the forecast.

After going through the discussions, GM(SO) NRLDC said that the sole purpose of this meeting is to improve forecasting so that the deviations from schedule can be minimised. This shall ensure reliable and secure operation of the grid. In the view of above, NRLDC suggested improvement areas as follows:

1. **GM(SO) NRLDC stressed upon technological improvement in terms of high resolution modeling which takes care of local conditions , improvement in algorithms at each level and taking up with weather service providers at the backend to improve their forecasting**.
2. LTA revision facilities may be used to the extent possible during night hours too. Plants need to forecast more accurately in case of STOA/PX schedules.
3. Overscheduling during start and end of the solar hours in normal days also may be avoided.
4. Faster variations in solar generation are being observed during foggy or cloudy conditions due to faster variation in GHI. **RE plants were suggested to keep the rate of change of power output restricted up to 10% of the actual power generation**.
5. Forecast Service Providers need to be timely informed by RE developers about the ground realities including operational aspects such as tripping of inverters, available AC/DC capacity and weather conditions etc.
6. Experienced manpower should be deployed in night shifts for timely revision in schedules according to weather conditions.

After having a detailed discussion and based on suggestions, RE developer Avaada and Forecast Service Providers have submitted as follows:

From Energy Meteo

1. They are testing new weather models and are calculating their own WRF model in-house, which is optimised for fog and clouds. They are also exploring different new weather models with different spatial and temporal resolutions.
2. With the available park‘s data (and new collected parks‘data), they are re-training the forecast system in frequent intervals. As and when there are difficult weather situations, they also use them for forecast training.
3. With close co-ordination with site and latest park‘s real time data (for power and other parameters), their forecast system is making frequent power forecast revisions (in short intervals) and they are trying to capture instantaneous weather changes over parks.
4. They are in the process of testing of Sky Cam technology for capturing sudden instantaneous weather changes over the park.
5. For new parks which are slowly growing, they told that it is difficult to train the forecast as the parks features (behavior) are still not yet stable. As they are accumulating new and more data for such parks, their system will be able to train the models better and their accuracy will further improve.

From Enercast

Actions taken for Fog and Cloud

1. Based on the inputs from site conditions, same are superimposed with model output manually for foggy conditions
2. Weather input like Humidity, Air temperature and Dew point temperature considered from different weather models.
3. Frequent input from site like fog presence were also considered during scheduling.

Actions Planned

1. Use of weather inputs like Humidity, Air temperature and Dew point temperature from different weather models will be used for understanding their effect on generation.
2. Mathematical modeling: consider effect of fog while creating forecast e.g.(as the night hours ambient temp is going below the dew point, the fog is being cleared during high humidity periods).

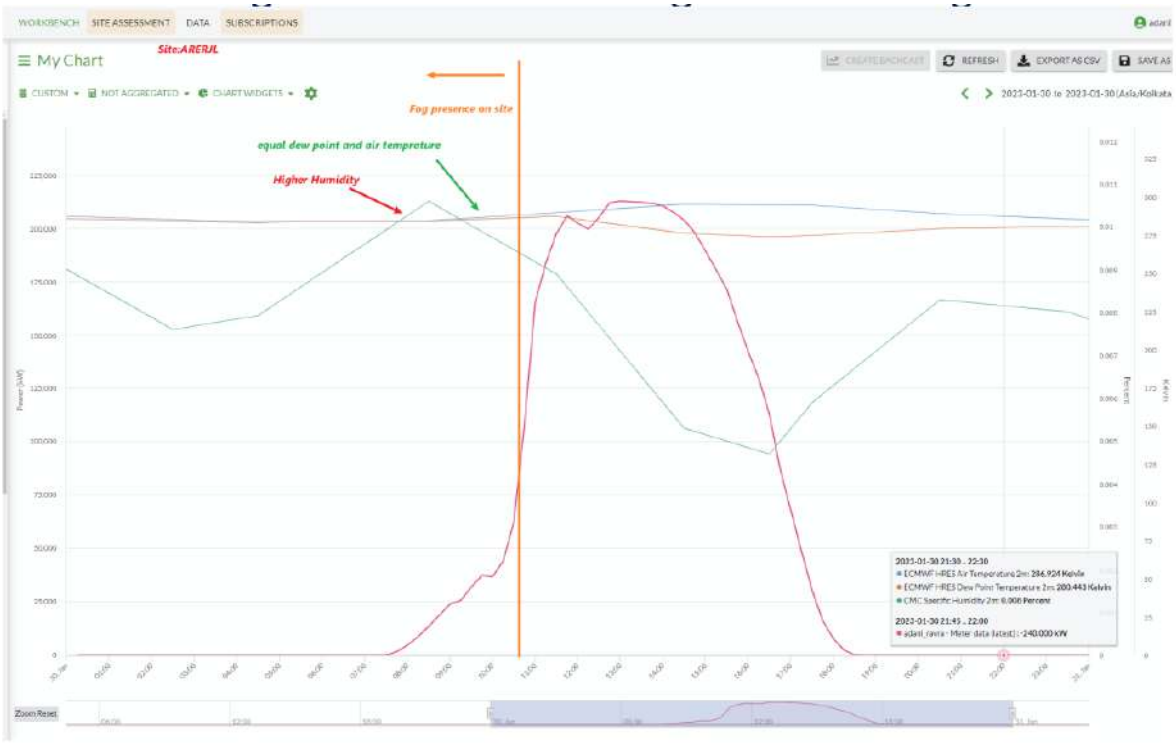
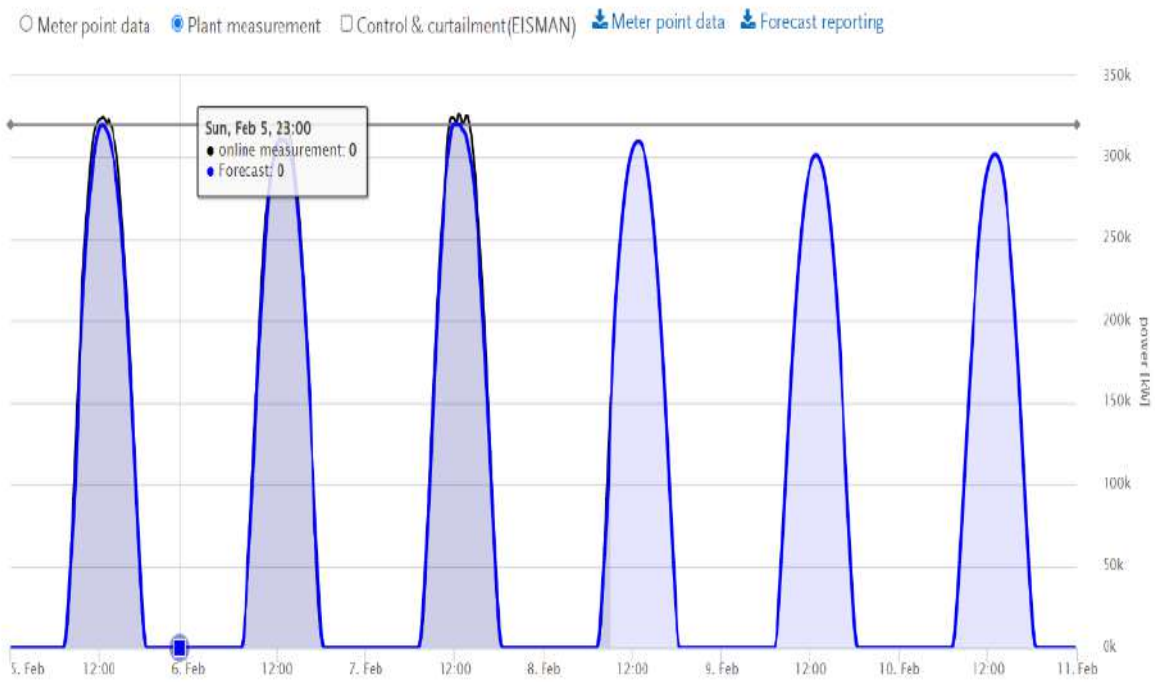


Image: ARERJL site generation with different weather inputs on 2023-01-30

From Avaada

1. Real time monitoring of Actual and Forecast data.



2. Forecasting agencies to provide the accurate day Ahead Forecast such that there shall be less requirement of intraday revision.
3. Started to revise schedule or generation in line with schedule, in case if deviation is more or less than 10% to support the grid. (Optimal use of Intraday Revisions)
4. Started using multiple source of weather forecast to predict the weather.
5. Started site location manual intervention, in case of major change in weather forecast & actual site conditions.
6. Started using IMD's Satellite images to predict the condition of FOG. (Continuous observation).
7. Asked forecasting agencies to get weather forecast of smaller areas & smaller time interval.
8. Forecasting will improve as their algorithm of reading & processing of historical data to understand behavior of particular plant improves for better forecasting.

Attendance Sheet(01.02.2023)							
Meeting regarding forecasting with RE plants (Avaada) Evening Session							
NRLDC							
S.NO.	Attendee Name	Designation	Department	Organization	Email	Phone No.	Sign
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30	2. Dhiren Bhatt	Manager	O&M	AVAADA	dhiren.bhatt@avaada.com	9974692279	
31	Tushar Srivastava	Deputy Manager	O & M.	AVAADA.	tushar.srivastava@avaada.com	9140026405	
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