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 (49वीं)/2021/ 8225-8319 दिनाँक : 07 सितम्बर, 2021
No. NRPC/ Comml/ 209/ RPC (49th)/2021/ Dated: 07 September, 2021

सेवा में / To,

उ.क्षे.वि.स. और तकनीकी समन्वय समिति के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC and TCC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 49वीं तथा तकनीकी समंवय उप-समिति की 47वीं बैठक की कार्यसूची ।

Subject: 49th meeting of Northern Regional Power Committee and 47th meeting of TCC– Agenda.

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 49वीं बैठक दिनांक 27 सितम्बर, 2021 को 1100 बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की जाएगी । उ.क्षे.वि.स. की बैठक से पहले तकनीकी समन्वय उप-समिति की 47वीं बैठक दिनांक 23 व 24 सितम्बर, 2021 को 1100 बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित होगी । बैठकों की कार्यसूची संलग्न है। बैठक का लिंक एंव पासवर्ड नियत समय पर ईमेल द्वारा उपलब्ध करा दिया जायेगा ।

The 49th meeting of Northern Regional Power Committee (NRPC) will be held at 1100 Hrs on 27th September, 2021 via video conferencing. NRPC meeting shall be preceded by 47th meeting of Technical Coordination Sub-committee (TCC) at 1100 Hrs on 23rd and 24th September, 2021 via video conferencing. Agenda for the meetings is attached herewith. The link and password for joining the meeting would be send in due course of time to the respective email-ids

भवदीय
Yours faithfully,

न० भंडारी

(नरेश भंडारी) 07/9/21
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

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41. Station Director, Rosa Power Supply Company Ltd., (Fax-05842-300003)
42. Director and head regulatory and POWER Sale, JSW Energy Ltd., New Delhi (Fax- 48178740)
43. COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 07925557176)
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47. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
48. Representative of Prayagraj Power Generation Co. Ltd.
49. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
50. Representative of TPDDL (Delhi Private Discom)

Special Invitee:

i. Member Secretary, WRPC, Mumbai-400 093.
ii. Member Secretary, SRPC, Bangalore-560 009
iii. Member Secretary, ERPC, Kolkata-700 033.
iv. Member Secretary, NERPC, Shillong-793 003.

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49. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
50. Representative of TPDDL (Delhi Private Discom)
51. CEO, Meja Urja Nigam (P) Limited, Prayagraj

Content

उत्तर क्षेत्रीय विद्युत समिति
NORTHERN REGIONAL POWER COMMITTEE

AGENDA
FOR
47th MEETING OF TECHNICAL COORDINATION SUB-COMMITTEE
&
49th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of TCC meeting: 11:00 Hrs. on 23.09.2021 & 24.09.2021

Time & Date of NRPC meeting: 11.00 Hrs. on 27.09.2021

Venue: Via Video Conferencing

Confirmation of Minutes (TCC)

A.1 Minutes of 45thmeeting of TCC and Special (46th) TCC meeting

Minutes of the 45th meeting of TCC held on 27th and 28th August 2020, were circulated vide letter dated 20th November 2020.

Minutes of Special (46th) meeting of TCC held on 15th June 2021, were circulated vide letter dated 25th June 2021.

No comment has been received so far on the minutes issued.

Members may kindly confirm the minutes.

Confirmation of Minutes (NRPC)

A.2 Minutes of 48thmeeting of NRPC

Minutes of the 48th meeting of NRPC held on 02nd September 2020, were circulated vide letter dated 20th November 2020.

No comment has been received so far on the minutes issued.

Members may kindly confirm the minutes.

B. OPERATIONAL ISSUES

B.1 System Study for Capacitor Requirement in NR for the year 2019-20

B.1.1 In the 38th TCC & 41st NRPC meeting, it was decided to conduct a capacitor requirement study of NR at the 11/33 kV level from CPRI to obtain the true requirement of capacitor for FY 2019-20.

B.1.2 In the 42nd NRPC meeting, approval was given to the Techno-Commercial offer of CPRI of Rs. 32 Lakh (excluding taxes) for conducting the capacitor study and the format for data submission was shared amongst the members.

B.1.3 After protracted follow-ups with states, sub-transmission level data was received from all states except Uttarakhand and J&K by October 2019. However, a non-convergence issue in the modeled network was encountered by CPRI as the received data for the downstream network was considered as radial in nature and without having interconnections. State representatives also mentioned that modeling the DISCOM level network with all inter-connections would be a huge task and realistic results may not be guaranteed even after the convergence.

B.1.4 OCC in its 168th meeting expressed concern over the delay in execution of the study. It was decided in the meeting to formulate a Sub-Group, comprising of representatives from SLDCs of NR, NRLDC, and NRPC Secretariat to look into the reasons for the extraordinary delay in the execution of the project. OCC forum was of the view that the Sub-Group should also explore whether an alternate approach of maintaining a power factor greater than 0.9 may be adopted rather than going for the entire capacitor requirement study as numerous issues were being faced during the modeling of the network by CPRI.

B.1.5 In the 45th TCC/ 48th NRPC meeting, it was decided that the study report for 2019-20 along with the guidelines for finding the capacitor requirement at 11/33 kV level in NR would be submitted by CPRI. In the meeting, the CPRI representative stated that as there were diversified network configurations at the level of DISCOMs, the guidelines to be provided would be generalized and may also include some empirical formula along with examples that may guide the DISCOMs for finding out the capacitor requirement.

B.1.6 Based on the above deliberation, CPRI submitted the system study report and which was circulated among all the SLDCs and STUs vide e-mail dated 02.11.2020.

B.1.7 Thereafter, based on the preliminary comments, CPRI submitted the revised report on 24.02.2021, which was shared with the constituent states. The recommended capacitor compensation, additionally required as per the report was 352MVAr. The report brought out the additional requirement of 137MVar and 215MVar compensation for Punjab and J&K respectively. Moreover, an empirical relationship for capacitor requirement against voltage profile at 11

kV, based on two configurations was worked out in the report. The report was then examined by the Sub-Group and its comments were submitted to CPRI.

B.1.8 In 185th OCC, MS, NRPC expressed concern over inordinate delay in finalizing the report. The forum decided that issues highlighted by the sub-group in the report and clarifications/comments thereon of CPRI need to be converged at the earliest and thus a video-conferencing meeting may be held between the sub-group and CPRI for resolution of issues and enabling report finalization.

B.1.9 The matter was reviewed in the meeting held under the chairmanship of MS, NRPC on 06.08.2021. It was attended by the members of the Sub-Group (constituted for studying the CPRI report), CPRI representatives, and officials from NRPC Sectt & NRLDC.

B.1.10 In the meeting, comments of the Sub-Group on the latest version of the CPRI report were deliberated in detail. After weighing the merits of the original & revised reports, the following was decided:

- The first Report submitted by CPRI in September 2020 shall be considered as the reference report. CPRI confirmed that the base-case of 11.07.2018 at 00:45 hrs. received from NRPC Sectt has been used for preparing September 2020 report.
- Comments from all utilities and NRLDC on September 2020 report must be submitted to NRPC Sectt, latest by 24.08.2021.
- NRPC Sectt, after examination, shall share with CPRI the compiled comments of the utilities and NRLDC, latest by 31.08.2021.
- Thereafter, CPRI shall submit its reply on the compiled comments sent by NRPC Sectt, latest by 15.09.2021.

B.1.11 Base case file (11.07.2018 00:45 hrs) and CPRI September 2020 report has been emailed to all sub-group members on 10.08.2021 requesting to submit comments/observations thereon latest by 24.08.2021 as per decision of the meeting dt. 06.08.2021. Till 27.08.2021, comments of Punjab, Himanchal Pradesh and Rajasthan have been received by NRPC Sectt.

TCC/ NRPC may kindly deliberate.

B.2 NR Islanding Schemes

B.2.1 Hon'ble Minister of State (IC) for Power and New & Renewable Energy chaired a meeting on 28.12.2020 to review Islanding Schemes in the country. During the meeting, the following action points, inter-alia, emerged:

i. Islanding Schemes shall be designed for all major cities of the country. If there is a need to establish a power plant in/around such a city for the purpose, the proposal for the same may be submitted

for consideration by the Ministry. The possibility of the installation of a storage system at such a location may also be explored.

ii. All the strategic and essential loads should be covered in the Islanding Scheme. For the finalization of strategic loads, the Ministry of Defence may also be consulted.

iii. Generating stations, which are spatially nearby the strategic and essential loads, shall be given priority in designing the Islanding Schemes.

iv. All concerned entities to ensure the functionality of AUFLS and df/DT relays at all points of time

B.2.2 Thereafter, series of meetings were held amongst NR constituents during Apr-Aug'21 to review the existing Islanding Schemes and expedite the implementation of newly proposed Schemes. In the intervening period, several review meetings were also taken by Secretary (Power), MoP. A special TCC meeting for NR was also convened on 15.06.2021, wherein the following was decided:

a. Delhi: SCADA display work shall be done on a priority basis and Delhi SLDC / DTL shall endeavor to complete the work by 31st July 2021. Further, Delhi SLDC was requested to provide updates on Delhi Islanding Scheme to NRPC on fortnightly basis.

b. Punjab: Punjab SLDC shall submit status on the newly proposed Islanding Schemes (Nabha Power Rajpura IS, RSD IS and Talwandi Sabo IS) to NRPC Sectt on monthly basis.

c. Uttar Pradesh: UP SLDC may conduct the required study for freezing the generator and corresponding critical loads for Islanding Schemes (Lucknow-Unchahar IS and Agra-Lalitpur IS) within its control area. The tentative timeline for implementing the schemes may be submitted by UP SLDC within a week.

d. Jammu & Kashmir: For Jammu-Salal IS, J&K representative may consult Delhi DISCOMs (TPDDL / BRPL / BYPL) as they are preparing DPR for load shedding at 11kV or OEMs of R-APDRP project in J&K. Further, J&K to explore the possibility to club the implementation of its Islanding Scheme with the existing R-APDRP projects and in this regard, a request may be made to MoP.

e. Ladakh: After the submission of feeder-wise data of load centers (Kargil and Ladakh) and historical generation data of Chutak and Nimmo Bazgo HEPs, a preliminary study may be done by NRLDC.

f. Himachal Pradesh: HP SLDC to firm up all schemes (Chamba-Chamera IS, Kangra-Chamba-Bairasuil IS and Kullu-Dehar IS) and submit the outcome of studies by 31st July 2021.

g. Rajasthan: Rajasthan SLDC to put the process for Jodhpur-Barmer-

Rajwest Islanding Scheme on the fast track and get it implemented before 15 months. Also, Rajasthan SLDC may take up with the state regulator for must-run status for the proposed generators for two schemes and submit the Suratgarh study data to NRPC Sectt / NRLDC by 31st July 2021.

h. Uttarakhand: Uttarakhand SLDC to submit concrete timelines for implementing Dehradun Islanding Scheme to NRPC Sectt within a month.

i. Haryana: The generation pattern of Yamunanagar TPS may be examined by Haryana SLDC. In case, its availability is at least 70%, then the same may be considered for Islanding Scheme. Confirmation in this regard along with supporting data may be submitted by Haryana SLDC to NRPC Sectt in a week.

B.2.3 A meeting was conducted on 29.07.2021, under the chairmanship of Member (GO&D), CEA for reviewing the Islanding Schemes, in which the following was decided:

a. BYPL to submit their proposal regarding revised critical load to DERC at the earliest.

b. Delhi SLDC may seek assistance for a systematic study of the scheme with a revised quantum of critical load from CEA/CTU if required.

c. Delhi SLDC to take up the matter urgently with DERC for getting the must-run status of Dadri-II and APCPL Jhajjar for a conclusive approach

d. Implementation of Delhi IS with revised critical load may be expedited.

e. Review the Delhi Islanding Scheme on fortnightly basis.

f. SOP format (enclosed as *Annexure-B.2*) to be circulated amongst states/utilities so that status of the healthiness of relays, communication channel, and other equipment of operational Islanding Schemes are submitted to RPC on monthly basis.

g. Setting up a separate display of Islanding Schemes on SCADA of respective states LDCs and RLDCs for real-time monitoring of participating generators & critical loads.

h. Explore the possibility of utilizing the PSDF fund for Islanding Schemes.

B.2.4 The status of follow-up actions taken on the decisions of the above meetings is as under:

- Delhi: Delhi SLDC has confirmed on 29.07.2021 that the work of preparing separate SCADA displays for the Delhi Islanding Scheme

is complete. DTL has submitted format-III & V data for SOP on 16.08.2021. The submission of the scheme's status updates on a fortnightly basis is pending.

- Punjab: Submission of monthly status for under-implementation schemes is pending.
- Uttar Pradesh: UPSLDC has intimated on 24.08.2021 that they have developed separate SCADA displays for Lucknow-Unchahar IS and NAPS IS. NRLDC has prepared a simulation model for Agra-Lalitpur IS by incorporating dynamic data of Lalitpur TPS. UP SLDC has been requested to perform islanding studies over the submitted model. The submission of tentative timelines for implementing the Lucknow-Unchahar scheme is pending. In respect of NAPS IS, UPSLDC has mentioned that healthiness certifications for UFR would be submitted by NPCIL, and details of communication channels may be given by NRLDC. NAPS IS data, as per SOP format has been submitted by UPPTCL/NAPS. The submission of healthiness certification for NAPS IS is pending.
- Jammu & Kashmir: Submission of updated status from J&K is pending.
- Ladakh: The outcome of the preliminary study on Chutak-Nimmo Bazgo IS is pending.
- Himachal Pradesh: Outcome of studies on Chamba-Chamera IS, Kangra-Chamba-Bairasuil IS and Kullu-Dehar IS along with submission of implementation timelines are pending.
- Rajasthan: Rajasthan has confirmed that there is no need for taking must-run status for Rajwest and Suratgarh generators as both are adequately scheduled. Rajasthan SLDC has submitted UFR and communication healthiness self-certification report on 16.08.2021 along with SOP data. The status of two newly proposed schemes (Jodhpur-Barmer-Rajwest IS and Suratgarh IS) needs to be updated by Rajasthan SLDC.
- Uttarakhand: Submission of timelines for implementing the Dehradun Islanding Scheme is pending.
- Haryana: Haryana SLDC have confirmed that they have analyzed the scheduling pattern of Yamunanagar TPS for previous years and it comes as low as 41% and 60% in 2019-20 and 2020-21 respectively, which is far less than the 70% limit, as decided in Special TCC meeting date 15.06.2021.

B.2.5 In the review meeting date 19.08.2021, taken by Secretary (Power), it has been decided that separate SCADA display for all implemented Islanding Schemes shall be prepared and MIS report regarding the status of all

Islanding Schemes shall be submitted on monthly basis to the Ministry.

Members may kindly deliberate.

B.3 Revised Under Frequency Relay based automatic load shedding scheme

B.3.1 In the 2nd meeting of the National Power Committee (NPC), held on 16.07.2013, the issue of revision of UFR based scheme (AUFLS) was deliberated and it was decided to adopt a four-stage automatic load shedding scheme for the NEW grid. In the said meeting, NPC decided to get the AUFLS scheme implemented with 4 stages of frequency viz. 49.2, 49.0, 48.8 & 48.6 Hz in all the regions.

B.3.2 Subsequently, in the 26th TCC/29th NRPC meetings held on 12th& 13th Sep 2013, the four-staged AUFLS scheme along with the stage-wise quantum of load shedding was deliberated and later implemented in NR.

B.3.3 In the 10th NPC meeting, held on 09.04.2021, it has been decided that the AUFLS scheme (with 4 stages) viz. 49.4, 49.2, 49.0 & 48.8 Hz with an existing quantum of load shedding shall be implemented in all the Regions. The quantum of load shedding would be reviewed based on the recommendation of the Sub-Committee to study the AUFLS scheme.

B.3.4 In compliance with the NPC decision, NR states/constituents are required to raise the AUFR settings by 0.2 Hz. The quantum of load shedding at four stages can be worked out and implemented after the receipt of the recommendation of the Sub-Committee of NPC.

Members may kindly deliberate.

B.4 Deemed Availability for shifting of towers to facilitate construction of projects of national interest

B.4.1 In the 118th OCC meeting, held on 15.12.2015, a request was made by POWERGRID for considering line outages availed for diversion works/facilitation of the construction of the projects of NHAI/DFCC/DMRC/UPEDC and Railways as deemed available for calculation of Transmission System Availability (MoM attached as Annexure-B.4.1). In the said meeting, the following decision taken in the 123rd TCC meeting of NREB, held on 17.05.2002, was reiterated:

> "The Committee decided that the outage period would be considered as non-available while calculating the availability of PGCIL transmission elements. PGCIL should recover all charges on account of such outages, only from the concerned agencies and there should not be any financial repercussions on the States."

B.4.2 Further, Appendix-II of CERC (Terms and Conditions of Tariff) Regulations, 2019 stipulates that transmission element may be considered deemed available under the following conditions:

i. Shut down availed for maintenance of another transmission scheme or construction of new element or renovation/up-gradation/additional capitalization in an existing system approved by the Commission. If the other transmission scheme belongs to the transmission licensee, the Member- Secretary, RPC may restrict the deemed availability period to that considered reasonable by him for the work involved….

ii. Switching off of a transmission line to restrict over-voltage and manual tripping of switched reactors as per the directions of concerned RLDC.

B.4.3 NRPC Sectt has been certifying the availability of transmission lines as per the above decision and regulation provisions.

B.4.4 Member (PS), CEA vide note dt. 17.08.2021 (attached as Annexure-B.4.2) has forwarded the details of the meeting held on 11.08.2021 under the chairmanship of Secretary, Power, wherein the following decisions have been taken:

I. In the case of NHAI projects, RPC Sectt would provide deemed availability certificates for the shutdown period availed by the transmission licensee for shifting their transmission lines, provided that transmission customers are not affected by the shutdown of these lines. Shutdown charges should be computed by CEA as per the standard norms and would be included in the cost estimate to be provided to NHAI for shifting of lines.

II. CERC has also been requested to suitably modify their regulations so that RPC Sectt can issue deemed availability certificates for the shutdown period availed by transmission licensees for shifting of their lines in NHAI projects, provided that transmission customers are not affected by the shutdown of the line.

III. CEA shall standardize the shutdown period required for such shifting works, so that deemed availability period is not utilized for anything other than the intended purpose.

IV. The shutdown period required for such shifting works shall be standardized.

Members may kindly deliberate.

B.5 Review of SPS for Jhakri-Karcham complex

B.5.1 On the request of Sorang HEP for re-connectivity of its 400kV switchyard with KarchamWangtoo – Adbullahpur 400kV line, it was decided in the

181st OCC meeting to review the SPS logic as network configuration of the area had significantly changed.

B.5.2 In the 183rd OCC meeting, it was deliberated that SPS in the Karcham-Jhakri-Rampur complex was revised after the charging of Gumma (HP) substation for evacuation of Sawara Kuddu plant and with the proposed additional 100MW injection by Sorang in the complex, revision of SPS is needed. The modified SPS logic (attached as Annexure-B.5.1) was discussed and approved in the 183rdOCC meeting.

B.5.3 Himachal Sorang Power Pvt Ltd vide letter date 26.08.2021 (Annexure-B.5.2) have intimated that they have implemented SPS at Sorang HEP as per the directions and proposed scheme of NRPC. The scheme is implemented successfully and supporting events of testing with logic from 07.08.2021 onwards at Sorang HEP is active.

Members may kindly deliberate.

B.6 Schemes agreed in the 2nd Northern Regional Power Committee (Transmission Planning) meeting held on 01.09.2020 (Agenda by CTU)

Following schemes were agreed in the 2nd NRPC (Transmission Planning) meeting held on 01.09.2020:

B.6.1 Implementation of 400/132kV transformer at Kishtwar Pooling Station

B.6.1.1 2x200MVA, 400/132kV ICT along with associated bays at Kishtwar Pooling Station (GIS)

B.6.1.2 4 nos. of 132kV line bays (GIS) at Kishtwar PS

Timeframe: Matching timeframe of Kishtwar PS i.e. 01.04.2025

The above works have been agreed for implementation under ISTS as system strengthening and to be combined with “Transmission System for Evacuation of power from Pakaldul HEP in Chenab Valley HEPs -Connectivity System” for implementation purposes.

Transmission System for Evacuation of power from Pakaldul HEP in Chenab Valley HEPs -Connectivity System has already been agreed in 48th Northern Region Power Committee (NRPC) meeting held on 02.09.2020.

Members may kindly deliberate.

B.6.2 Grant of 400kV bays to RE generators at Bhadla-II PS, Fatehgarh-II, & Fatehgarh-III (erstwhile Ramgarh-II) PS under ISTS (Agenda by CTU)

B.6.2.1 5 nos. of 400 kV bays (Bhadla II- 3 nos., Fatehgarh-II - 1 no. & Fathegarh-III-1 no.) for implementation under ISTS has been agreed with the following details:

Sr. No.	Application No.	PS	Applicant	400kV Bays	Connectivity Start Date as per Intimation
1	1200002340	Bhadla-II	NTPC Ltd.	1	01.09.2021
2	1200002401	Bhadla-II	Azure Power India Pvt. Ltd.	1	07.04.2021
3	1200002428	Bhadla-II	Adani Renewable Energy Holding Four Ltd. (Erstwhile Adani Green)	1	31.01.2022
4	1200002400	Fatehgarh-II	Azure Power India Pvt. Ltd.	1	07.04.2024
5	1200002402	Fatehgarh-III	Azure Power India Pvt. Ltd.	1	07.04.2025

B.6.2.2 Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II was agreed to 46th NRPC meeting held on 24.09.2019.

Members may kindly deliberate.

B.6.3 2 nos. of 765kV GIS line bays modules at Aligarh S/s (Agenda by CTU)

B.6.3.1. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II was agreed to 46th NRPC meeting held on 24.09.2019.

B.6.3.2. The scheme also included Sikar-II – Aligarh 765kV D/c line along with 765kV line bays & line reactors at each end.

B.6.3.3. 2 nos. of 765kV GIS line bay modules are already available at Aligarh S/s. The available GIS line bay modules at Aligarh S/s have been agreed to be utilized for termination of Sikar-II – Aligarh 765kV D/c line and the provision for 2 nos. of bays at Aligarh S/s has been deleted from the earlier scope.

Members may deliberate.

B.6.4 Additional 80 MVAR, 765kV Spare Reactor at Bhadla-II S/s (Agenda by CTU)

B.6.4.1. Fatehgarh II – Bhadla II 765kV D/C (2nd) line along with 2x240 MVAr switchable line Reactors at both ends have been envisaged without additional spare reactor under Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan

(8.1 GW) under Phase-II.

B.6.4.2. The above scheme has already been agreed 46th NRPC meeting held on 24.09.2019.

B.6.4.3. To avoid complex layout constraints, an additional 1x80 MVAR, 765kV Spare Reactor at Bhadla-II S/s as a strengthening scheme was agreed in the 2nd meeting of NRPCTP date 01.09.2020.is proposed. This spare reactor can be utilized for 240 MVAR line reactors on each circuit of Bhadla-II – Sikar-II 765kV 2xD/c line at Bhadla-II end.

Members may kindly deliberate.

B.6.5 Additional 1x500 MVA, 400/220kV ICT (8th) at Bhadla Pooling Station (Agenda by CTU)

B.6.5.1. 4x500MVA, 400/220kV ICTs are existing at Bhadla (PG) S/s. Further, 3 nos. of 500 MVA ICTs are under various stages of implementation.

B.6.5.2. 3530MW LTA has already been granted to RE developers at Bhadla (PG) S/s against the planned transformation capacity of 3500MVA. Therefore, an additional 1x500 MVA, 400/220kV ICT (8th) at Bhadla Pooling Station as a strengthening scheme for meeting the n-1 criteria has been agreed in the 2nd meeting of NRPCTP date 01.09.2020.

Members may kindly deliberate.

B.6.6 1x80MVAr switchable Line reactor on each circuit at Khetri end of Bikaner-II – Khetri 400 kV 2xD/c Line (Agenda by CTU)

B.6.6.1. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II was agreed to 46th NRPC meeting held on 24.09.2019. The scheme also includes:

i. Establishment of 400/220 kV, 6x500 MVA Pooling Station at Bikaner–II PS with suitable bus sectionalisation at 400 kV and 220 kV level and with 420kV (2x125 MVAR) bus reactor

ii. Bikaner-II PS – Khetri 400 kV 2xD/c line (Twin HTLS* on M/c Tower)

iii. 1x80MVAr switchable Line reactor on each circuit at Khetri end of Bikaner-II – Khetri 400 kV 2xD/c Line

iv. 4 no. of 400 kV line bays at Khetri for Bikaner–II PS – Khetri 400kV 2xD/c line

v. Khetri- Bhiwadi 400 kV D/c line (Twin HTLS)

vi. 2 no. of 400 kV line bays at Khetri for Khetri - Bhiwadi 400kV D/c line

vii. 2 no of 400 kV(GIS) line bays at Bhiwadi for Khetri- Bhiwadi 400

kV D/c line

viii. STATCOM at Bikaner–II S/s

B.6.6.2. However, due to space constraints at Khetri S/s, it was agreed in the 2nd NRPCTP meeting that in place of 1x80MVAr switchable Line reactor on each circuit at Khetri end of Bikaner-II – Khetri 400 kV 2xD/c Line, 1x80MVAr fixed-line reactors would be installed.

Members may kindly deliberate.

B.7 Schemes agreed in the 3rd Northern Regional Power Committee (Transmission Planning) meeting held on 19.02.2021 (Agenda by CTU)

Following schemes were agreed in the 3rd NRPC (Transmission Planning) meeting held on 19.02.2021:

B.7.1 Transmission System requirement for additional 20GW REZ in Northern Region (Phase-III)

B.7.1.1 To facilitate integration & evacuation of potential Solar Energy Zones in Rajasthan (17 GW) in various complexes such as Bhadla (4.6GW), Fatehgarh (7.6GW) & Bikaner (4.8 GW), and Inter-state transmission system is already being implemented in two phases (Ph-1-8.9 GW; Ph-2:8.1 GW). The scheme is under various stages of implementation.

B.7.1.2 SECI indicated the renewable potential of additional 20 GW REZ (Fatehgarh: 9.1GW, Bhadla: 8GW, Ramgarh: 2.9GW) in Rajasthan. To integrate and evacuate power from the above additional potential of renewable energy zones (20 GW) in Rajasthan over and above 17 GW Solar Energy Zones (SEZ), transmission alternatives (EHVAC as well as Hybrid – EHVAC+HVDC) were evolved and deliberated in the 2nd meeting of NRPC(TP) held on 01.09.2020.

B.7.1.3 In the meeting, it was decided that all the constituents would send their comments/suggestions, and accordingly the same would be incorporated in the studies and would be deliberated in the next NRPC(TP) meeting. Subsequently, based on the load flow studies related observations received from POSOCO, Punjab, Haryana, Rajasthan, and UP, revised system studies for 20 GW RE potential were carried out and two alternatives were proposed in the 3rd NRPC-TP meeting held on 19.02.2021.

B.7.1.4 The above-evolved transmission alternatives were discussed with stakeholders, modified based on their inputs/comments/suggestions, and deliberated & agreed upon in the 3rd NRPC-TP meeting.

B.7.1.5 Based on the discussions, a hybrid (EHVAC & HVDC) transmission system was agreed for evacuation of power from additional 20 GW REZ in Rajasthan (Phase-III). The proposed transmission system includes the following elements:

i. Establishment of 5x500 MVA 400/220 kV pooling station at Fatehgarh-4 along with 2x125 MVAr Bus Reactor

ii. Establishment of 2x1500 MVA 765/400kV & 10x500 MVA 400/220 kV pooling station at Bhadla-3 along with 2x330 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus Reactor

iii. Establishment of 3x1500 MVA 765/400kV & 2x500 MVA 400/220 kV pooling station at Ramgarh along with 2x240 MVAr (765kV) Bus Reactor & 2x125 MVAr (420kV) Bus reactor

iv. Fatehgarh-2 – Bhadla-3 400kV D/c line (Quad) along with 50 MVAr Switchable line reactor for each circuit at both ends of Fatehgarh 2- Bhadla-3 400kV D/c line (200 km)

v. Fatehgarh-4- Fatehgarh-3 400 kV 2xD/c twin HLTS line (50 km)

vi. Fatehgarh 3- Bhadla-3 400kV D/c line(Quad) along with 50 MVAr Switchable line reactor for each circuit at both ends of Fatehgarh 3- Bhadla-3 400kV D/c line (200 km)

vii. Ramgarh – Bhadla-3 765kV D/c line (180 km) along with 240 MVAr Switchable line reactor at each circuit at Ramgarh end of Ramgarh – Bhadla-3 765kV D/c line

viii. Bhadla-3 – Sikar-2 765 kV D/c line (380 km) along with 330 MVAr Switchable line reactor for each circuit at each end of Bhadla-3 – Sikar-2 765 kV D/c line

ix. Sikar-2 – Khetri 765 kV D/c line (90 Km)

x. Sikar-2 – Narela 765 kV D/c line (260 Km) along with 240 MVAr Switchable line reactor for each circuit at each end of Sikar-2 – Narela 765 kV D/c line

xi. Augmentation of 1x1500 MVA ICT (3rd), 765/400kV ICT at Jhatikara Substation (Bamnoli/Dwarka section)

xii. Augmentation with 400/220kV, 1x500MVA Transformer (10th) at Fatehgarh-2 PS

xiii. Augmentation with 765/400kV, 1x1500MVA Transformer (5th) at Bhadla-2 PS

xiv. Augmentation with 765/400kV, 1x1500MVA Transformer (3rd) at Bikaner (PG)

xv. Jhatikara – Dwarka 400kV D/c line (Quad) (20km)

xvi. Establishment of 6x1500 MVA 765/400kV & 5x500 MVA 400/220 kV pooling station at Fatehgarh-3 (new section) (In addition to 4x500 MVA ICT proposed under Rajasthan SEZ Ph-II-of Section-1) along with 2x330 MVAr,765kV & 2x125 MVAr, 420kV Bus Reactors

xvii. Augmentation of 1x500 MVA ICT (5th), 400/220kV ICT at Fatehgarh-3 Substation (section-1)

xviii. Establishment of 2x1500MVA 765/400kV Substation at a

suitable location near Beawar along with 2x330 MVAr, 765 kV Bus Reactor & 2x125 MVAr, 420 kVBus Reactor

xix. Fatehgarh-3– Beawar 765 kV 2xD/c (350 km) along with 330 MVAr Switchable line reactor for each circuit at each end of Fatehgarh-3– Beawar 765 kV D/c line

xx. LILO of both circuit of Ajmer-Chittorgarh 765 kV D/c at Beawar (45 km)

xxi. LILO of 400kV Kota –Merta line at Beawar (20 km)

xxii. Establishment of 2x1500 MVA 765/400kV substation at a suitable location near Dausa along with 2x330 MVAr 765 kV Bus Reactor & 2x125 MVAr, 420 kVBus Reactor

xxiii. Beawar – Dausa 765 kV D/c line (240 km) along with 240 MVAr Switchable line reactor for each circuit at each end

xxiv. LILO of both circuits of Jaipur(Phagi)-Gwalior 765 kV D/c at Dausa (40km) along with 240 MVAr Switchable line reactor for each circuit at Dausa end of Dausa – Gwalior 765 kV D/c line

xxv. LILO of both circuits of Agra – Jaipur(south) 400kV D/c at Dausa (30km) along with 50 MVAr Switchable line reactor for each circuit at Dausa end of Dausa – Agra 400kV D/c line

xxvi. 6000MW, ±800KV HVDC terminal at Bhadla-3 substation

xxvii. 6000MW, ±800KV HVDC terminal station at a suitable location near Fatehpur (UP)

xxviii. Establishment of 5x1500MVA, 765/400KV ICT at pooling station at a suitable location near Fatehpur along with 2x330MVAr (765kV) bus reactor

xxix. ±800KV HVDC line (Hexa lapwing) between Bhadla-3 & Fatehpur (950km)

xxx. LILO of both ckts of 765kV Varanasi – Kanpur (GIS) D/c at Fatehpur(30km)

xxxi. Augmentation of 1x1500MVA ICT at 765/400kV Kanpur(GIS) substation

xxxii. STATCOM:

- Fatehgarh – 3 S/s:STATCOM: ± 600 MVAr(two sets of ±300 MVAr), 4x125 MVAr MSC, 2x125 MVAr MSR
- Ramgarh S/s:STATCOM: ± 600 MVAr(two sets of ±300 MVAr), 4x125 MVAr MSC, 2x125 MVAr MSR

xxxiii. Provision for suitable space for future scope at various substations

xxxiv. Provision of spare single phase 765/400kV, 500 MVA transformers and spare 765 kV single phase 80 MVAR/110 MVAR reactor at Bhadla-3, Ramgarh, Dausa, Fatehgarh-3 (new section), Fatehpur and Beawar substation.

Members may kindly deliberate.

B.7.2 Creation of 400/220 kV, 2x315 MVA S/S at Siot (earlierAkhnoor/Rajouri) as ISTS (Agenda by CTU)

B.7.2.1 The following proposal for the creation of Siot S/s was agreed in the 3rd meeting NRPC-TP:

B.4.2.1.1 Creation of 400/220 kV, 2x315 MVA S/S at Siot (AIS) under ISTS as a system strengthening scheme with the following scope of works:

- (Establishment of 2x315 MVA (or 2x500 MVA if possible), 400/220kV Siot S/s with 1x125 MVAR, 420 kV bus reactor, 4 nos. of 400kV line bays, and 6 nos. of 220kV line bays
- LILO of both circuits of 400 kV D/c Amargarh (Kunzer)-Samba line at 400/220 kV Siot S/s

The timeline for the implementation of the above transmission works is to be considered as of March 2024.

B.4.2.1.2 Steps to mitigate the issue of low voltages in J&K would be taken up by the power department of J & K.

B.4.2.1.3 JKPDD to complete their downstream network for drawl as per the timeline of the establishment of Siot S/s i.e. Mar'24.

Members may kindly deliberate.

B.7.3 Handing over of 400 kV D/c Khandukhal-Rampura line and 220 kV D/c Mori-Dehradun line of PTCUL under UITP scheme (deemed ISTS) to Central Sector (Agenda by CTU)

B.7.3.1 Certain deemed Inter-State Transmission System (deemed ISTS) elements of UITP (Uttarakhand Integrated Transmission Project), where PTCUL had not been able to achieve the targeted timeline (deadlines) includes 400 kV D/C Srinagar (Khandukhal) – Kashipur (Rampura)Transmission line which was required to evacuate power from upcoming projects in the Alaknanda basin and the 220 kV D/C Mori-Dehradun line which was proposed to evacuate power from proposed generators in Yamuna basin.

B.7.3.2 Construction of these lines had not been taken up by M/s PTCUL so far and recently M/s PTCUL vide letter dated12.01.2021 has conveyed that the Board of Directors of PTCUL had accorded approval for handing over of construction of 400 kV Khandukhal-Rampura Transmission Line to Central Sector.

B.7.3.3 In the 3rd NRPC-TP meeting, the following was agreed upon:

- Implementation of 400 kV D/c Khandukhal(Srinagar)-Rampura

(Kashipur) line to be taken up under central sector as an ISTS scheme with the matching time frame of commissioning of Vishnugad Pipalkoti HEP of THDC i.e June 2023 or Tapovan Vishnugad HEP of NTPC whichever is earlier.

- Implementation of 220 kV D/c Mori-Dehradun line may be considered in the future under the central sector with the materialization of projects other than Naitwar Mori in the Yamuna basin.

Members may deliberate.

B.7.4 Transmission Scheme for evacuation of power from hydro projects in Yamuna Basin (Agenda by CTU)

B.7.4.1 For evacuation of power from hydro projects viz., Naitwar Mori(60MW), ArokotTuni (72 MW), HanolTuni (45 MW), Mori Hanol (63 MW), and JakholSakari(44 MW) in Yamuna Basin of Uttarakhand, a 220kV D/C Twin Zebra Mori - Dehradun (Vyasi) Transmission Line (116 km approx) along with Mori substation was planned under UITP scheme and the line was to be implemented by PTCUL under UITP scheme approved by CERC as deemed ISTS scheme. PTCUL had not started the work for 220kV D/C Twin Zebra Mori - Dehradun (Vyasi) Transmission Line and requested to take up the above line under the central sector.

B.7.4.2 As per deliberations in the 3rd NRPC-TP meeting, the following alternative scheme was agreed for evacuation of power from the Naitwar Mori hydro project (60 MW) of SJVN

I. Creation of 220kV Pooling station near Snail with LILO of both circuits of Snail–Hatkoti 220kV D/c line, 6 nos. of 220kV line bays, 50 MVAR bus reactor along with reactor bay.

II. SJVN to construct 220 kV, Naitwar Mori, to Hatkoti/Snail PS D/c line and the 220 kV Pooling Station near Snail S/S as a dedicated system.

III. CTU to revoke connectivity granted for Naitwar Mori hydro project (60 MW) and SJVN to apply for connectivity to HPPTCL.

IV. CTU to revise the LTA granted for Naitwar Mori hydro project (60 MW)

Members may kindly deliberate.

B.7.5 Reconductoring of a portion of Dulhasti-Kishtwar- Kishenpur 400 kV (Quad) S/c (Agenda by CTU)

B.7.5.1 In the 1st NRPC (TP) meeting held on 24.01.2020, a comprehensive system for connectivity was agreed for evacuation of power from Pakaldul (1000MW), Kiru (624 MW), and Kwar (540 MW) HEPs of

CVPPL. It was also agreed that the above projects would be connected to a common pooling station through a 400kV dedicated transmission line to be implemented by the developer of these projects. Further, the establishment of a common pooling station at Kishtwar by LILO of one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung) was also agreed to be implemented under ISTS to provide connectivity to the above projects.

B.7.5.2 For connectivity of Pakaldul HEP (1000 MW), LILO of one circuit of Dulhasti - Kishenpur 400 kV line (quad) has been agreed at Kishtwar Pooling station. As the location of proposed Kishtwar S/s is above Ratle location and towards Dulhasti, a portion of Dulhasti-Ratle LILO tap Point of Dulhasti- Kishenpur 400 kV line (approx. 13 km) implemented through twin moose conductor, there would be power transfer limitation from Pakaldul (1000 MW) HEP. Accordingly, reconductoring of the above twin moose section is proposed to be carried out with a quad moose conductor.

B.7.5.3 As per deliberation in the 3rd NRPC-TP meeting, the following was agreed as a system strengthening scheme:

- Reconductoring of Dulhasti-Ratle LILO tap Point of Dulhasti - Kishenpur 400kV line (approx. 13 km) implemented through twin moose conductor with Quad moose conductor in matching time frame of Pakaldul HEP generation.
- Termination of 400kV Kishtwar- Kishenpur 400kV S/c (Quad) line (second ckt) [LTA system of Pakaldul HEP] in bus reactor bay (125 MAVAR) because of unavailability of the spare bay as well as space for new diameter in 400 Kv switchyard for Kishenpur substation and conversion of bus reactor to switchable line reactor at Kishenpur S/s

Members may kindly deliberate.

B.7.6 Grant of 400kV & 220kV bays to RE generators at Fatehgarh-3 (erstwhile Ramgarh 2) PS under ISTS (Agenda by CTU)

B.7.6.1 The establishment of 4x500MVA, 400/220kV Ramgarh-II Pooling Station was agreed in the 5th meeting of NRSCT held on 13.09.2019 under “Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II – Part A". The Transmission scheme is currently under bidding through TBCB.

B.7.6.2 At Fatehgarh –III PS implementation of 7 nos. of 220kV bays are currently under bidding (Phase-II-Part A scheme) and all the above bays have already been allocated to RE generators. Space provision for future 15 nos. of 220kV bays and 10 nos. of 400kV bays has also

been kept at Fatehgarh-3 (erstwhile Ramgarh-II).

B.7.6.3 6 nos. of 220kV bays and 3 nos. of 400kV bays along with bus extension of 220 kV & 400kV bus as well as bus sectionaliser arrangement between both the levels i.e 400 kV new section and 220 kV new section with under implementation section at Fatehgarh-3 PS to be implemented under ISTS was agreed in the 3rd NRPC-TP meeting:

S. No.	Applicant	Applications No.	Stage-II Connectivity Sought (MW)/Date	Connectivity Point	Agreed for grant*/Granted bays for providing Connectivity
1	Adani Green Energy Four Limited	1200002683	1500/ 30-06-2022	Fatehgarh-III	400kV-1 no. 220kV-2*nos. (*1 no. of 220kV bay is part of 7 nos. of 220kV bays, currently under bidding at Fatehgarh-III PS)
2	IB VOGT SOLAR SEVEN PRIVATE LIMITED	1200002700	300/ 05-04-2022	Fatehgarh-III	220kV-1 no.
3	ABC Renewable Energy Private Limited	1200002699	400/ 31-01-2022	Fatehgarh-III	220kV-1 no.
4	ReNew Surya Jyoti Private Limited	1200002746	210/ 31-03-2022	Fatehgarh-III	220kV-1 no. (This bay shall also be utilized for providing connectivity to ReNew Surya Pratap Private Limited Application No. 1200002778 - 210MW))
5	Azure Power India Pvt. Ltd.	1200002812	500/ 19-01-2024	Fatehgarh-III	400kV-1 no. (This bay shall also be utilized for providing connectivity to another Azure Power India Pvt. Ltd. (Application No. - 1200002813- 500MW))
6	Azure Power India Pvt. Ltd.	1200002814	500/ 19-01-2025	Fatehgarh-III	400kV-1 no. (This bay shall also be utilized for providing connectivity to another Azure Power India Pvt. Ltd. (Application No. - 1200002815- 500MW))
7	XL Xergi Power Pvt. Ltd.	1200002847	400/ 31-05-2022	Fatehgarh-III	220kV-1 no.
8	Energizent Power Pvt Ltd	1200002907	125/31-08-22	Fatehgarh-III	220kV-1 no*.

Members may kindly deliberate.

B.7.7 Establishment of 400/220kV Nange Pooling Station for proposed SJVN Hydro Power Plant Luhri Stage-I, II & Sunni Dam (Agenda by CTU)

B.7.7.1 In the 2nd NRSCT meeting held on 13.11.2018, the transmission system for connectivity to Luhri-I (210 MW), Luhri-II (172 MW) & Sunni Dam (382 MW) HEP were agreed. However, the transformation capacity of 400/220 kV Nange Pooling Station (315 MVA) has been missed inadvertently in the minutes of the 2nd NRSCT meeting. Accordingly, it was later proposed that transformation capacity at 400/220 kV Nange Pooling Station (2x315 MVA) may be included.

B.7.7.2 In the 3rd NRPC TP meeting, it was also opined that considering the transportation constraints, single-phase units for transformers may be considered. It was agreed that the following transmission system may be taken up for implementation with the time frame of Luhri-I HEP (April 2025):

- Establishment of 7x105MVA (single-phase units, 400/220kV Nange GIS Pooling Station (tentatively Identified near Luhri Stage-II HEP)
- Nange GIS Pooling Station – Koldam 400kV D/c line along with associated bays at both ends (GIS bays at Koldam)
- 125 MVAR Bus Reactor at Nange GIS PS.

The above transmission system would also be utilized for connectivity of Sunni Dam and Luhri-II HEPs of M/s SJVN.

Members may kindly deliberate.

B.7.8 Increasing capacity of 400kV Sohawal PG Substation (Agenda by CTU)

B.7.8.1 As per deliberation in the 3rd NRPC-TP meeting 1x500 MVA, 400/220 kV ICT augmentation (3rd) at Sohawal (PG) under system strengthening was agreed.

Members may kindly deliberate.

B.7.9 One no. of 220kV Line bay at Chamera Pool for 2nd ckt stringing of 220kV Karian to Chamera transmission line (Agenda by CTU)

B.7.9.1 To strengthen the intra-state transmission system especially to meet the requirement during the winter season when the generation is low and demand peaks in the Chamba district, HPPTCL has planned an Intrastate transmission system comprising 2nd ckt stringing of 220kV Karian to Chamera transmission line.

As per deliberations held in the 3rd NRPC-TP meeting, the following Transmission element was approved under ISTS:

- One no. of 220kV bay at Chamera Pool for 2nd circuit stringing

of 220kV Karian to Chamera transmission line.

Members may kindly deliberate.

B.8 Proposed Evacuation Plan (Transmission System) for Shahpur Kandi Power Project (SKPP). (*agenda by PSTCL)*

B.8.1 The upcoming Hydel Project of PSPCL namely the Shahpur Kandi Power Project is under execution and expected to be commissioned by August 2024. Detail of generation of the project is as under: -

Sr.No.	Name of project	Generation capacity	Voltage Level
1.	Shahpur Kandi Power House-I	3x33 MW	220 KV
2.	Shahpur Kandi Power House-II	3x33 MW	220 KV
		8 MW	66KV

B.8.2 Out of maximum generation 226.6 MW to be generated at SKPP (corresponding to an installed capacity of 206 MW with 10% overload design), 8.8 MW shall be evacuated at 66 kV level and 217.8 MW shall be evacuated at 220 kV level. It has been further notified by Punjab State Power Corporation Limited (PSPCL) that as per bilateral agreement between states of Punjab and J&K, 20% power generated at bus bar of RSD and SKPP project is to be transmitted to J&K through the existing 220 kV line from SKPP PH-I to 220 kV substation Hiranagar (J&K) and that J&K state has right to refuse the 20% share from SKPP. So, the generation breakup to be evacuated is tabulated below:

Sr. no.	Project	Installed Capacity with 10% overloaded design (MW)	Maximum generation being/ to be evacuated at 220 KV (MW)	Remarks
1	RSD	600+(10% OF 600)= 660	660	
2	SKPP	206+(10% of 206)= 226.6	217.6	Out of the Maximum generation of 226.6 MW to be generated at SKPP8.8 MW shall be evacuated

				at 66 KV

B.8.3 The proposed evacuation plan has been discussed with CEA, Chief Engineer (PSPA-1) in the meeting held on 23.06.2021 through video conferencing (MOM attached as Annexure B.8). The agreed evacuation system for Shahpur Kandi Hydro Power Project of PSPCL (3X33 MW SKPP PH-I & 3X33 MW + 1X 8 MW SKPP PH-II) is as under:

i. RSD –SKPP PH-I 220 KV D/C line (existing)

ii. LILO of 1 circuit (out of existing 4 circuits) of RSD- Sarna 220 kV line at SKPP PH-I (3X 33 MW) and SKPP PH-II (3X33+ 8 MW)

iii. Implementation of SKPP PH-II to Sarna 220kV line formed after LILO mentioned at Sr. no. ii) with HTLS conductor of 1200 AMP rating.

iv. The above system is to be taken up by PSTCL as Inter-State Transmission System in the matching time frame of the commissioning of the Shahpur Kandi Hydro Power Project.

B.8.4 This project is on the evacuation of power from the upcoming generating station expected to be commissioned by August 2024, the works of transmission system must be started immediately so that expected delay in completion of the erection of transmission lines due to ROW issues may not cause a mismatch with the commencement of generation.

B.9 Emergent enhancement of ATC/TTC for Punjab due to unprecedented load growth of summer (*agenda by PSTCL)*

B.9.1 Unrestricted demand of the state during the current paddy season has been intimated as 15500 MW by the distribution licensee i.e. PSPCL. However, Punjab can meet about 13500 MW of load in solar hours with an existing ATC limit of 6800 MW with full IPPs generation at 400 kV/220kV/132 kV generating nodes. Therefore, to meet the state demand, the ATC limit is required to be increased to at least 9000 MW (for paddy 2022). PSPCL has informed that there will be no significant addition of generation within the State is likely in the coming year. The state of Punjab has to deal with a peculiar load profile wherein demand is nearly 2 times during Paddy season June-September than that in the rest of the year. Therefore, it would not be a viable option to enter into long/Medium-term arrangements at the cost of surrendering power and paying fixed charges in the lean season apart from applicable transmission charges. Hence, to meet the increasing power demand enhanced ATC/TTC is the only solution.

B.9.2 In light of the above, load flow studies have been carried out (As per the report indicated vide Annexure-B.9) and it is proposed to plan the following Transmission Works for enhancing ATC/TTC limits to 10,000/10,600MW (considering 1000 MW annual load growth for FY

2022-23): -

Following works are required to be executed at PGCIL Sub-Stations.

Sr. No.	Name of the Sub-Stations	Description of Works	Timeline for completion
1.	400kV PGCIL Ludhiana	Augmentation of 1 no.315 MVA, 400/220 kV T/F to 500 MVA.	May 2022
2.	400kV PGCIL Patiala	Augmentation of 1 no.315 MVA, 400/220 kV T/F to 500 MVA.	May 2023

Following works are required to be executed at PSTCL Sub-Stations.

Sr. No.	Name of the Sub-Stations	Description of Works	Timeline for completion
1	400kV Dhanansu	Installation of addl. 500 MVA, 400/220 KV T/F	May 2023
2	400kV Dhanansu	LILO of 400 KV Nakodar-Kurukshetra line at 400 KV Dhanansu	May 2023

B.9.3 It is pertinent to mention that after the withdrawal of COVID -19 restrictions the overall demand of the country has gone all-time high. General consumption in the state of Punjab has increased unprecedentedly so the works listed above need to be approved to meet the power supply-demand of the state in the coming season.
Members may deliberate.

B.10 Laying of 400 kV OPGW links on Transmission lines (*agenda by PSTCL*)

B.10.1 PSTCL needs the erection of OPGW on 2 no. 400 kV Transmission lines totaling 149 Kms. approx. These links will help achieve redundancy of important 400 kV Sub-stations through path divergent routes, which is also recommended by Standing Committee on Communication System Planning in Power Sector (SCCSPPS) (Annexure-A). PSTCL had proposed for execution of this requirement by PGCIL through the inclusion of these links in Package-I(a) (Annexure-B) or any other suitable project of PGCIL. The concerned 400 kV Lines are the following-

i. 400 kV D/C line from 400kV S/s Muktsar to 400 kV S/s Makhu
ii. 400 kV D/C line from 400kV S/s Makhu to 400 kV S/s Nakodar

B.10.2 The matter was deliberated during the 18th meeting of the TeST subcommittee of NRPC recently held on 10-08-2021.

Members may deliberate.

B.11 Incorporation of left out OPGW links of HPSEBL in ULDC Package (*agenda by HPSEBL*)

B.11.1 Under packages-V around 361KM OPGW has been laid on HPSEBL Transmission lines and under package-1(a) laying of about 543KM OPGW is in progress on various transmission lines of HPSEBL through PGCIL. In addition to this PGCIL is in the process of laying OPGW under Reliable Communication Scheme package-B. In the 18th TeST sub-committee meeting of NRPC held on dated 10.08.2021, under agenda item 2.4 HPSEBL requested PGCIL to include the following transmission line for laying of OPGW to establish connectivity as a redundant path for data reporting at SLDC/ALDC control center Shimla.

Sr. No.	Name of Link	Voltage Level	OPGW	Route Length (In KM)
1.	Bassi-Hamirpur (Anu)	132kV	24F OPGW	50

B.11.2 The TeST sub-committee of NRPC has approved the inclusion of this line for laying OPGW under Reliable Communication Scheme package-B. The NRPC and TCC are requested to approve inclusion and laying of OPGW (24F) on 50KM 132kV Bassi-Hamirpur (Anu) as approved by the TeST sub-committee, please.

Members may deliberate.

B.12 Revision of Technical specification of Power Transformer in HVPNL as per CEA standard specifications (*agenda by HVPNL*)

B.12.1 Standard Specifications of Technical Parameters for Transformers and Reactors 66kV and above voltage Class has been approved by the Ministry of Power.

B.12.2 A memorandum, in this regard, is enclosed as Annexure B.12 for uniform implementation of availability of vendors for supply of power transformers in the Northern constituents states.

Members may deliberate.

B.13 Frequent opening of Lines due to High Voltage (*agenda by POWERGRID*)

B.13.1 Frequent switching is being done for 765kV & 400kV POWERGRID lines

by NRLDC for voltage regulation. The details of some lines are given below:

Sl. No.	Description of Line	No. of operation during last one year
1	765KV-KANPUR-ALIGARH-1	192
2	765KV-FATEHPUR-AGRA-1	118
3	765KV-FATEHPUR-AGRA-2	111
4	400KV-AGRA-BHIWADI-2	105
5	400KV-AGRA-BHIWADI-2	105
6	765KV MEERUT-MOGA	744
7	400KV AMRITSAR-BANALA	200
8	400KV NAPTHA JHAKRI	326

B.13.2 As per IEGC Regulation, Section-5(OPERATING CODE), 5.2(s) & CEA (Grid Standards) Regulations 3.1(b) -The grid voltage will remain within operating range: 728-800 kV (765 kV) and 380-420 kV (400 kV). Many times 765 kV Lines are charged, as per instruction of NRLDC, at 780-790 kV and opened at 791-810 kV which is more than the nominal voltage and very near to maximum voltage which increases the switching operation of CBs during high voltage conditions. The frequent switching of transmission lines causes stress on Circuit breakers and other equipment, leading to premature aging of the equipment.

B.13.3 IEGC provides the mechanism for the control of VAR injection/drawl by regional entities as a method of voltage control. Further, Para 9.9.1 of the Enquiry Committee report of Grid Disturbance-2012 also emphasizes the need for reactive power absorption by the generating units. Implementation of the above mechanisms shall reduce the requirement of transmission line switching for voltage control. Therefore, the opening of high voltage lines is to be used as a last resort and adequate reactive power planning is to be ensured.

Members may kindly deliberate.

B.14 Non-Auto mode on 400 kV Banala-Amritsar for live line OPGW installation (*agenda by POWERGRID*)

B.14.1 OPGW installation work on 400KV Amritsar Banala Line is being executed by POWERGRID under the ULDC scheme. The installation is being carried out live line with Non-Auto Recloser mode on the lines thus ensuring availability of the line.

B.14.2 The work was started in Dec 2020 but progress has been hampered due to COVID restriction. Work again resumed after relaxation of restriction due to COVID-19 in April’2021. Mobilization of 10 gangs was done to complete the work expeditiously and complete it at the earliest. The work was carried out till May and half of June month this year. In July month,

work could not be executed due to non-approval of Non-Auto mode on the line.

B.14.3 The Non-auto mode is denied on the line since the last three OCCs citing a high hydro generation in the Parbati complex. All the mobilized gangs are sitting idle. There is a commercial loss in mobilization and demobilization of gangs. Due to denial of non-auto mode permission of the line, it not only leading to commercial loss but also delaying commissioning of OPGW links which act as the backbone for Grid operation.

B.14.4 Maximum power available at 400KV Bus at Banala (from NHPC Parbati and HPSEBL Sainj HEPs) is about 700MW and four no. 400KV Circuits are available for evacuation of this power. Even a single circuit can evacuate this power from Banala.

B.14.5 The request is being done for allowing Non-Auto mode on 400 kV Banala-Amritsar for live line, no shut down is needed. Moreover, in case of tripping of the line, while laying OPGW, the same can be restored within a half-hour. There will be no constraint for evacuation of power at any time.

B.14.6 Because of the above, it is requested to allow Non-Auto mode on 400 kV Banal-Amritsar for live line OPGW installation and to complete the above work.

B.15 Power supply position of Northern region (Agenda by NRLDC)

B.15.1 Since the previous (45thTCC & 48th NRPC) held in Aug'2020, over the past one year, the Northern region attained new heights in terms of demand met, energy consumption, the addition of RES capacity and renewable energy generation, peak demand met & energy consumption of individual states, new transmission element, and thrust on Islanding schemes, etc. All the achievements, reliability, and protection-related issues experienced during this period and other concerns have been discussed in regular OCC and PSC meetings of NRPC. Major achievements & issues are presented below for kind information of TCC / Board members and further deliberations

Winter 2020-21 (Oct'20-Feb'21)

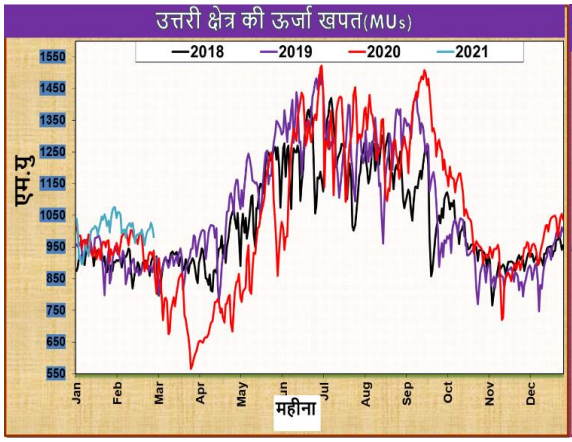
B.15.2 Power supply position:

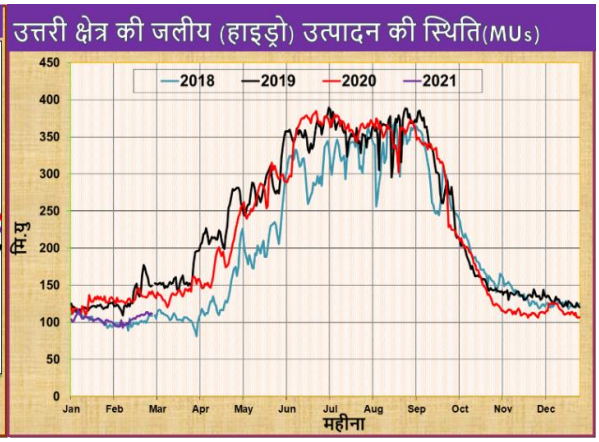
During the winter of Oct'20-Feb'21, maximum demand met by Northern Region was of the order of 48 to 57 GW while energy consumption was in the range of ~ 900-1060 MU/day. The frequency profile of the National Grid was as follows:

Duration	Oct	Nov	Dec	Jan	Feb
	2020	2020	2020	2021	2021
<49.9 Hz(%)	3.91	4.46	4.79	4.86	7.12
49.90-50.05 Hz(%)	81.88	79.81	75.72	76.1	76.27

50.05-50.10 Hz(%)	12.82	13.82	16.42	15.82	14.1

A comparison of regional energy consumption and regional hydro generation during the past four years is depicted below:





State	Record maximum demand met in MW (During Oct'20-Feb'21)	Date	Record maximum energy consumption in MU (During Oct'20-Feb'21)	Date
Rajasthan	14441	10th Feb	NA	
Uttarakhand	2372	22nd Jan	NA	
Himachal	1931	23rd Jan	34.11	13th Jan
Jammu &	2680	20th Jan	55.30	16th Jan

B.15.3 Load-Generation portfolio management:

During winter, there were many instances of large frequency excursion, underdraw from the grid, etc. As per various regulations of CERC, all the users of the grid must strive for minimizing real-time imbalance and maintain their generation/drawl from the grid close to their respective schedules. It needs to be appreciated that for maintaining the above, proper load/generation planning beforehand is very important. Load forecasting including ramping of load from off-peak hours to peak and back to off-peak, generation planning, etc. on daily basis is important and it has been emphasized numerous times in OCC/TCC meetings. Despite all the efforts, frequency excursion, underdrawal/deviations from schedule, etc. were observed and same were reported by NRLDC vide its letters NRLDC/SO-I/151 dated 19th Oct,20, NRLDC/SO-1/151 dated 12th Dec'20, wherein action plan to minimize such instances were also suggested as follows:

i) Staggering of load connection or disconnection at hourly boundaries of load changeover within the limits specified in IEGC

ii) Flexing of Internal generation& its co-ordination with state hydro generation

iii) Synchronization of generating units at hourly boundaries may be delayed till the frequency stabilizes

iv) Meticulous load forecasting

v) Portfolio management

B.15.4 <u>High Voltage</u>

High voltages are more prevalent during winter due to less demand, low loading of long EHV lines & long UG cables, inadequate dynamic reactive support by Generators, etc. High voltage problem is more prevalent in Punjab, Haryana, Delhi, some pockets of Uttar Pradesh, Hydro stations in Himachal Pradesh. As per the NRPC Reactive energy account, Delhi & Punjab were payable to the regional reactive pool account during the winter period indicating that these states need to plan for adequate reactive power compensation so that export of reactive power from STU to ISTS at more than 103% of nominal bus voltage is avoided to the extent possible.

i) Reactor planning by DTL to contain high voltage in Delhi control area

DTL proposal for installation of reactors was discussed & approved in 37th TCC and 40th NRPC meeting held in February 2018. DTL identified 6 substations of 220 kV and one 400kV substation Mundka for installation of shunt reactors which was scheduled for commissioning by Dec'19. However, as per the latest information, the reactors are yet to be commissioned.

Delhi SLDC may please update the following:

- Status of the progress of DMRC reactors
- Analysis of the available data to identify whether reactive power injection is primarily at DISCOM level or 400kV level
- Plan made for high voltage management during winter 2020-21.

ii) Synchronous condenser Operation of Hydro & Gas units

In previous OCC/TCC meetings, it was stressed that to contain high voltage during winter nights, when all the reactive resources are exhausted, synchronous condenser operation of non-running/idle hydro & gas units can provide MVAr support during such lean load hours, which would definitely help the grid to control the high voltage. Last winter, only Tehri units could be operated in synchronous condenser mode for 14.25 hours. It was urged that more and more units should volunteer for trial tests for condenser mode operation so that such units can operate during hours of need and help control the high voltage situation. Condenser mode of operation during last winter is given below:

S. No	Generator	Installed capacity			Units operational in synchronous condenser mode	No. of units operated/operational in Synchronous condenser simultaneously				Remarks
		No. of units	Rating (MW)	Total (MW)	No. of units	Units	Capacity (MW)	MVAR absorption	Last operated (date)	
1	Pong	6	66	396	6	3	198		On daily basis	In winter 2020-21, Pong couldn't run as synchronous mode
2	Larji	3	42	126	1	1	42			Trial run of one unit has been done (Some issues in MVAr absorption upto some limit only), however, larji has not operated in synchronous condenser mode yet
3	Tehri	4	250	1000	2	2	500		08-12-2019	Tehri units operated for 14.25 hrs, details of Tehri operation in 2020-21 is enclosed in Annexure-B.15.1
4	Chamera -2	3	100	300	1	1	100		Trial run in 2018-19	Not operated as synchronous condenser mode during winter 2020-21

In the 179th OCC meeting, the NTPC representative confirmed that the facility of condenser mode of operation at Koldam HEP is not available. ALAKNANDA HYDROPOWER COMPANY LTD. confirmed vide its letter Ref: AHPCL: SHEP/Syn. Cond./UPSLDC/2020/02 dated 14th Oct 2020 that Srinagar Hydro Electric Plant does not have provision for Synchronous Condenser mode operation of Generators since its inception. In 139th OCC MoM, NTPC informed that due to clutch arrangement issue the gas stations Anta, Auraiya, Dadri, Bawana are not capable of running in Condenser mode. In 142nd OCC (MoM), Uttarakhand confirmed that no gas unit can run in condenser mode. Shravanti expressed its inability to operate in condenser mode.

In the 164th OCC meeting and then 175th OCC, the following were discussed:

- NHPC representative informed that synchronous condenser operation facility is not available at any of the stations other than Chamera-II HEP (MoM of 42nd TCC & 45th NRPC meeting).
- Rajasthan representative informed that no hydro units can run in synchronous condenser mode. Though, in 175th OCC, Rajasthan asked to take up the matter once again including possibility and cost estimates as done by Punjab

- Punjab representative informed that OeM suggested some improvement in RSD to run the unit in synchronous condenser mode. The order has been placed and status, as given in 175th OCC, is as:

  1. Material of magnetic float level indicator has already been received and is likely to commission within this lean season

  2. Case of procurement of hp air compressor is currently under process

- Uttar Pradesh confirmed that no provision of condenser operation in the present setup of HEPs. UP asked to take up the matter once again including possibility and cost estimates as done by Punjab.
- Uttarakhand representative informed that Gamma infra cannot run in synchronous condenser mode.
- HP-SLDC representative agreed to inform the date within 15 days.
- BBMB representative informed that Pong HEP can run as and when required (However, during winter 2020-21, pong couldn't operate, BBMB may please update). No problem in running it in synchronous condenser mode.
- MS, NRPC suggested taking up the matter with Hon'ble commission for ISGS generating plant given tariff determination and consideration of synchronous condenser mode for grid security. NRPC Sectt. shall share the compiled information with the Hon'ble Commission.

In the 176thOCC meeting, the UP representative informed that Vishnuprayag has stated that they would not be able to operate in synchronous condenser mode even after modifications. HP representative informed that Larji can run in synchronous condenser mode but, trips frequently during the operation and hence OEM has been asked to look into the issue.

In view of the above, the following hydro stations are identified and proposed for synchronous condenser operation during the upcoming winter (in 176thOCC meeting):

1. Pong HEP
2. Tehri HEP
3. KarchamWangtoo HEP
4. Baspa HEP
5. Larji HEP
6. Chamera-II

Members may please discuss and suggest further

iii) MVAr absorption by Generators

As we all are well aware that any generator (Thermal, hydro, gas, renewables) connected to the grid can provide active as well as reactive power as per its capability curve. As per various CEA/CERC regulations, generating plants connected to the grid should provide reactive support as per its capability curve. During winter, especially at the night, due to less demand, many thermal plants operate below their rated active power and can extend appreciable dynamic reactive support during these hours. Such dynamic support would help to contain the high voltage in the grid to a large extent during that time. NRLDC is continuously reporting the reactive power performance by major generators in monthly OCC meetings wherein it has been observed that:

a. The telemetry of MVAr (together with its polarity) of many units seems inconsistent/intermittent.
b. Telemetry of voltage at various buses seems unreliable
c. MVAr support is not satisfactory as per the capability curves.
d. Reactive power capability testing should be planned on priority for those units whose performance is not satisfactory.

Performance of major generators in Northern region for Dec'20-Jan'21 is enclosed as Annexure B.15.2.

iv) Tripping of ICTs on over flux (Major tripping in Punjab control area)

During winter high voltage scenarios, it has been observed that number of ICTs trip on over flux. Last winter, during Oct'20-Nov'20, nine nos (9) of ICTs tripping instances were reported in the Punjab control area (At Dhuri & Rajpura). Punjab SLDC was requested to coordinate with PSTCL for review of over flux setting to avoid any mal-operation/undesirable tripping.

v) Tripping during dense fog

Delhi SLDC had reported four incidents wherein ~ 25 to 30 nos of 220kv lines tripped during dense fog (7th,12th,13th Dec 2020, 13th & 20th Feb. 2021). On 13th & 20th Feb. 2021, the blackout of CCGT Bawana was reported due to an outage of 220kV lines. Large chunks of load were also affected (1500 MW to 2300 MW) during such tripping. Delhi SLDC may plan for the upcoming winter to avoid such tripping during fog. Preventive measures taken may kindly be shared with NRPC & NRLDC.

vi) Tap optimization:

ICT Tap optimization at 400kV level is being done by NRLDC as per requirement based on a simulation study, examining the scatter plots of HV and LV side voltages obtained from SCADA, NRPC reactive energy account, etc. It has been emphasized in every OCC/TCC meeting that states should also study and change their ICT taps as per the grid requirement at 220kV and below.

B.15.5 Low voltages and N-1 non-compliance in Rajasthan control area

Winter months are associated with a high-demand period in the Rajasthan state control area. High loading of 765/400kV ICTs leading to non-compliance to (n-1) security was observed at Phagi, as well as for 400/220kV ICTs at Jodhpur, Merta, and Chittorgarh ICTs were reported & discussed in 178 OCC meetings. Rajasthan SLDC was asked to manage the loadings of ICTs so that they remain within N-1 contingency limits. Still, loadings beyond N-1 security limits were observed during winter months and the same was reported by NRLDC in monthly OCC meetings also. Apart from this, the drawl of the Rajasthan state control area also deviated heavily from the schedule on a number of occasions. Since load, as well as renewable generation forecasting, is a crucial activity for proper load-generation balance management of RE rich states, forecast must be more accurate and all the efforts should be made in this direction.

Low voltages in some of the pockets in the Rajasthan control area were also reported i.e. Alwar, Hindaun, RE pooling station, etc.

B.15.6 Opening/hand-tripping of transmission elements without NRLDC coordination/ permission

The issue of switching several grid elements without taking code from NRLDC has been discussed and reported in OCC/TCC meetings. it was also discussed and reported in175th and 178th OCC meeting and communicated vide letters NRLDC/SO-I/ dated. 27.10.2020, NRLDC/SO-I/151/1088-1090 dated. 10.12.2020 and NRLDC/SO-I/151/1134-1136 dated. 07.01.2021.

It may be noted that switching of any grid element shall be carried out in coordination with SLDC and RLDC unless in case of a specific emergency as elaborated in IEGC clause 5.2. However, after analyzing the list of the transmission elements which had been hand-tripped, it has been found that many a time unilateral hand-tripping could have been avoided.

The unilateral switching operation of Grid elements by transmission licensees without proper coordination/intimation may lead to any disturbance/ cascade tripping in the transmission network and in such a case the concerned transmission licensee/constituent shall be solely responsible for the same. All NR constituents are requested to avoid unilateral switching operation of Grid elements in the future in the interest of smooth and reliable Grid operation.

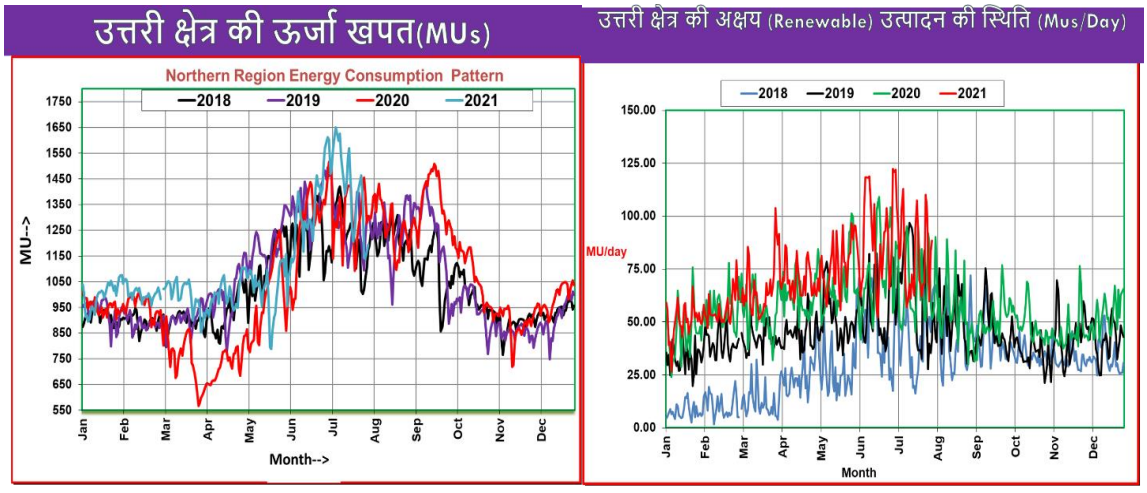
Summer& Monsoon 2021-22 (Mar'21-15th Aug'21)

B.15.7 Power supply position:

The northern region recorded new heights of demand/generation during this monsoon-2021. With continuous efforts from all stakeholders of NR,

the Northern region could meet a maximum demand of 73 GW on 8th July 2021 (74 GW on 18th Aug 2021, 1227 hrs), and also recorded a maximum energy consumption of 1650MU in a day, Solar generation of 7590 MW on 18th August 2021. Further states like Punjab, Haryana, Rajasthan, Uttar-Pradesh also set a new record in demand met / consumption as tabulated below:

State	Maximum demand met (MW)	Date	Record Maximum demand (in MW)	Date	Maximum energy consumption	Date	Previous Maximum energy consumption (MU)	Date
Punjab	13431	01.07.21 at 13:15 Hrs	13633	01.07.19, 1200 hrs	306.09	01.07.21	302.37	25.06.21
Haryana	12120	07.07.21 at 14:45 Hrs	11383	30.06.21, 00:45hrs	266.15	07.07.21	251.68	30.06.21
Rajasthan	13974	10.07.21 at 09:45 Hrs	14441	10.02.21, 0845 hrs	298.86	08.07.21	281.44	30.06.21
Uttar Pradesh	24795	16.07.21 at 23:00 Hrs	24574	30.06.21 को 22:00 hrs	514.49	07.07.21	485.57	30.06.21
Uttarakhand	2269	02.07.21 at 14:00 Hrs	2372	22.01.21 08:00hrs	49.68	10.07.21	48.56	29.06.19
Chandigarh	426	08.07.21 at 15:00 Hrs	380	02.07.19 15:00 hrs	8.41	08.07.21	7.5	30.06.21
NR	72935	08.07.21 at 01:00 Hrs	72255	30.06.21, 22:15hrs	1650.07	07.07.21	1594.09	30.06.21



Frequency profile of Summer/Monsoons is as follows:

Month	f < 49.9 Hz	49.9 Hz≤ f ≤ 50.05Hz	f > 50.05 Hz
April-21	7.96%	75.06%	16.98%
May-21	6.63%	74.49%	18.88%
June-21	5.58%	74.81%	19.61%
July-21	5.35%	75.09%	19.48%

B.15.8 Grid Indiscipline: Low-frequency Grid operation, Overdrawal/Deviation from the schedule, Large Frequency excursion at hourly boundaries

Persistent low-frequency grid operation was observed during evening peak hours since 03/08/2021. Frequency was below the IEGC specified band for a significant duration, particularly during evening peak hours. It is pertinent to mention that all spinning reserves available in NR ISGS were exploited during evening peak hours including Gas-fired stations on RLNG and Liquid fuel. Even after exhausting all available spinning reserves grid frequency touched ~49.7 Hz on daily basis. (NRLDC reported all constituents as well as to NRPC to vide letter NRLDC/SO-I/151 dated 9th Aug 2021, 26th Jul 21, 13th Jul '21). In these low-frequency durations, some of the NR beneficiaries were overdrawing from the grid. Such low-frequency grid operation especially during peak demand hours reduces the reliability & security of the grid. Any generation reduction due to tripping of generating units/ sudden outage of large generation may lead to a serious threat to grid security.

Therefore, It is once again requested to follow requisite measures as already discussed and agreed in various previous OCC/TCC meetings e.g. Meticulous load forecasting, operational planning, staggering of load connection/disconnection, Maintain adequate spinning reserves, portfolio management, managing real-time imbalances, etc.

B.15.9 Observance of N-1 non-compliant loading of ICTs :

Many 400/220kv ICTS in Punjab, Haryana, Rajasthan, Delhi, and Uttar Pradesh are not meeting the (n-1) security standards during high demand periods. These are mentioned briefly in Annexure-B.15.3.

B.15.10 Tripping in Delhi control area during Jun & July (High demand period)–

On 9th July 2021 10:24 Hrs, 220kV side Y-ph bushing of 400/220kV 315MVA ICT-1 at Bamnoli got blast, which resulted in tripping of 400/220kV 315MVA ICT-1, 400/220kV 500MVA ICT 2, 400/220kV 500MVA ICT 3 & 400/220kV 315MVA ICT 4 at Bamnoli(DV) and all 220kV lines. About 950 MW load was interrupted

On the same day, 400/220 kV 315 MVA ICT 1 at Mundka (DV) tripped at 21:56Hrs on mal-operation of Buchloz relay operation. At 21:59 Hrs, 400/220 kV 315 MVA ICT 3 & ICT 4 both tripped on back up over current protection operation at 220kV side. Due to the tripping of ICTs, around 600MW load was lost. As discussed in the 185th OCC meeting, due to radial feeding of load from most of the stations, reliability reduces and the requirement of SPS may be explored by Delhi SLDC to avoid complete load loss as was seen in few events in July 2021. With SPS, loss of power supply to critical loads such as DMRC may be avoided.

B.15.11 N-1 non-compliance at RE stations –

At major RE pooling stations e.g. Akal (Wind pooling station of Rajasthan), Bhadla (Rajasthan), Bhadla (Powergrid) ICTs are N-1 non-compliant. Any single outage of ICT may lead to loss of total Renewable energy pooling at that station. NRLDC has continuously raising N-1 non-compliance of ICTs in monthly OCC meetings, quarterly feedback to CEA/CTU, other forum, etc. It is requested to plan some SPS to avoid total outage on account of any single ICT tripping to the possible extent.

The total capacity of 400/220kV ICTS at Bhadla pooling station (PGCIL) is 5X500MVA. As of 23rd Aug 2021, connectivity (220kV side) of 2280 MW RE capacity has already been registered at NRLDC. SPS for Bhadla (PG) has already been designed and approved in the RPC forum. However, the SPS at Bhadla for preventing cascaded tripping of all ICTs is yet to be implemented. In monthly OCC meetings, concern has been raised over the slow progress and POWERGRID has been requested to expedite the work in view of increasing solar generation and the importance of SPS in the complex.

Rajasthan may also plan SPS for Bhadla (Raj) & Akal to prevent any cascade tripping of ICTs or undesirable loss of RE generation due to single ICT tripping.

B.16 Congestion management- Computation& Monitoring of ATC/TTC by State control area (Agenda by NRLDC)

B.16.1 Significant progress has been achieved in this area as most of the states in coordination with NRLDC are now actively involved in assessing and declaring their respective state import capabilities. Uttar Pradesh & Punjab are pioneering in computing their transfer capability and uploading the ATC details on their SLDC website. Rajasthan, Delhi & Himachal Pradesh are also regularly exchanging the base case files &their import capability with NRLDC. Recently, Himachal Pradesh has also started declaring it ATC and uploading it on its website.

B.16.2 All SLDCs are requested to compute their respective TTC & ATC on regular basis as per the procedure developed in accordance with CERC Regulations on Real-Time Congestion Management issued in 2010 and make the figures available in respective websites together with assumptions and limiting constraints and revise the same whenever system conditions change.

B.16.3 Members may kindly discuss.

B.17 Low Voltage Ride Through (LVRT) capability of Renewable generators (Agenda by NRLDC)

B.17.1 Two grid events occurred in Akal S/Stn, Jaisalmer region of Rajasthan

STU system on 11-June-21 and 20-July-21 in which large wind and solar generation got disconnected due to fault in EHV system, indicating non-compliance of LVRT. This issue especially considering Rajasthan SLDC was also discussed in the 45th TCC and 48th NRPC meeting held in Aug/Sep 2020. In view of the possibility of outage of large RE on LVRT / HVRT, during 184th OCC held in June 2021 Rajasthan SLDC was requested to share actions taken by them for compliance of decisions of 45thTCC and 48thNRPC meeting. It was also stressed that a certificate may be obtained from wind generators that turbine is LVRT compliant as per regulatory requirements. SLDC-Rajasthan constituted a meeting with wind developers/ OEM in July 2021 wherein the total non-LVRT compliant commissioned capacity status shown was around 1600MW. Renewable generators were asked to share SCADA data of RE pooling stations to access non-functioning of LVRT / LVRT non-compliant wind generators at the time of loss of generation, wind turbine model wise LVRT / HVRT compliance certificate along with LVRT / HVRT setting.

B.17.2 Members may discuss and suggest.

B.18 Issues related to Power System Operation of J&K/Ladakh (Agenda by NRLDC)

UT Of J&K

B.18.1 Kashmir Valley interconnection with the grid: The Kashmir valley is connected to the rest of the grid by following three paths

i. 400kV Kishenpur-New Wanpoh four Ckts
   a. 400 kV New Wanpoh –Wagoora D/C
   b. 220 kV New Wanpoh-Mirbazar D/C (Second circuit is yet to be commissioned)
ii. 220kV Kishenpur-Mirbazar D/C (One Circuit is LILOED at Ramban)
   a. 220 kV Mirbazar-Pampore D/C
   b. 220 kV Kishenpur-Ramban Ckt is out on tower collapse since 31st March 2020
iii. 400 kV Samba-Amargarh D/C

B.18.2 In order to make connectivity more reliable and for secure power supply to the valley, commissioning of the second circuit of 220 kV New Wanpoh-Mirbazar and restoration of 220 kV Kishenpur-Ramban may be expedited.

B.18.3 400/220 kV 2*315 MVA ICTs have been commissioned at the New Wanpoh sub-station, however only one out of six (6) bays has been utilized till date.

B.18.4 Work for intra-state transmission projects is being executed in J&K under Prime Minister Development Package-2015 need to be expedited. Plan already formulated for 3095MW demand by 2022 and to facilitate

evacuation of power from upcoming generation projects proposed to be commissioned during this period. List of transmission projects and its status is attached as Annexure B.18. Commissioning of these transmission elements would help in relieving the loading of highly loaded 220 kV and underlying network during winters.

B.18.5 Two stages (450 MW each) of Baglihar HEP (900 MW) operate on two different buses and are being evacuated through two 400 kV lines connected to two different buses operating in disconnected manner. As a result, although each line has capacity to evacuate power from both stages, under outage of one line, there is loss of one stage generation i.e 450 MW. UT-J&K shall expedite the coupling of two buses of Baghlihar stage-1 & 2 to minimize the probability of generation loss.

B.18.6 Most of the 220 kV voltage level Substations of PDD-J&K, are being operated with only one Main and transfer bus scheme instead of double main transfer (DMT) bus as per CEA planning criteria and therefore bus shutdown requires shutdown of entire station which affects reliability of power supply.

B.18.7 220 kV Kishenpur-Ramban ckt-1 is under outage on tower collapse from 31st Mar 2020. It has resulted in loss of reliability of 220 kV Ramban area as it is being fed from only one source through 220 kV Mirbazar-Ramban ckt.

B.18.8 Mapping and status of UFR and df/dt in J&K control area: Despite continuous follow up in various OCC and TCC meeting, current status of UFR and df/dt implementation in J&K control area is yet to be received. As per UFR and df/dt details available on NRPC website, J&K total target for UFR is 336 MW and df/dt is 270 MW.

B.18.9 Mock black start exercises enhance our system resilience and train our manpower for restoration of the grid in case of grid failure. Mock black start exercise of URI-I & URI-II HEP, Lower Jhelum HEP is yet to be conducted.

<u>UT of Ladakh</u>

B.18.10 Establishment of SLDC (State Load Dispatch Centre) for UT-Ladakh: There is need for establishment of SLDC Control Room (manned 24x7 by trained grid operators) in the UT of Ladakh.

B.18.11 Regulatory Commission: Joint Electricity Regulatory Commission for both the UTs may be established.

B.18.12 Scheduling of Power to UT-Ladakh: Provision for new Entity configuration is available in existing Web Based Energy Scheduling (WBES) software. Hence it will be implemented at NRLDC as and when a date is finalized for consideration of Ladakh as a separate entity for scheduling.

B.18.13 Network constraint: With commissioning of 220kV Ziankote-Alusteng line

power requirement of Ladakh can be met through 220kV Ziankote-Alusteng-Drass-Kargil-Leh line. Since Ladakh is connected to rest of the grid through a single 220 kV line, any tripping in Ziankote-Alusteng-Drass-Kargil section leads to isolation of Ladakh along with Chutak and Nimmo Bazgo power stations. Problem is more severe during winter months when Ladakh requires more power from J&K due to less hydro generation and increased chances of separation due to line tripping on heavy snowfall in the area.

B.18.14 Allocation of power from Central Generating Stations to Ladakh: At present Chutak and Nimmo Bazgo(NHPC) are embedded entities and power is consumed locally. In view of reorganization, a decision is to be taken on allocation only to Ladakh or both the UTs. In addition, power may be allocated to Ladakh by Ministry of Power (MOP) from other power stations in Northern Region to meet deficit in the UT of Ladakh

B.18.15 There is no dedicated voice communication between UT-Ladakh and NRLDC.

Other Issues common to both (UT of J&K/Ladakh)

B.18.16 Adequate capacitors shall be planned and installed to improve the voltage profile of grid as well as to minimize the payable reactive charges.

B.18.17 Tree/vegetation cutting may be carried out before onset of winters to minimize tripping even in case of early snowfall.

B.18.18 TTC/ATC is not being calculated by UT-J&K/Ladakh, same may be calculated in coordination with NRLDC to identify the major constraints in the system and way to mitigate that

B.18.19 Delayed clearance of fault captured in most of the grid events in UT-J&K/Ladakh control area. Availability of automatic DR (disturbance recorder) and station event logger needs to be ensured for all the 220 kV and above stations. Healthiness of protection system also to be checked on regular basis.

B.18.20 Availability of complete protection scheme including carrier protection to be ensured before first time charging of a new element

B.18.21 ADMS (Automatic demand management scheme) may be implemented at the earliest.

B.18.22 Data for monthly PoC case to calculate transmission losses and charges to be shared with NRLDC/NLDC.

B.18.23 J&K and Ladakh U/T representatives may please share update on the above mentioned issues.

B.18.24 Members may please discuss

B.19 Frequent tripping/Forced outage of HVDC Champa-Kurukshetra (Agenda by NRLDC)

B.19.1 Total 24 number tripping of HVDC Kurukshetra pole occurred including 12 number of multiple pole tripping during Oct'20-Jul'21. During 182nd OCC Meeting held in Apr'21, NRLDC representative stated that HVDC Champa-Kurukshetra is an important 2*3000MW capacity link between NR and WR and its frequent tripping has been observed in each month due to one or another reason such as mal-operation/sensitive protection setting in the HVDC control either at Champa or at Kurukshetra end. The HVDC link has been used to transfer upto 4500MW power from WR to NR and in future, utilisation at rated capacity may be required on regular basis during high demand periods of NR. Frequent outage of this link during summer months/ peak demand period of Northern Region may adversely impact the reliability and security of the grid. Total 7 number of tripping of 800kV HVDC Kurukshetra Pole occurred in Jun—Jul'21 itself including 4 multiple pole tripping. Issues related to HVDC Champa-Kurukshetra needs to be attended on top priority considering the reliability and security of the grid. PGCIL may kindly share in detail actions taken so far as well as yet to be taken, to ensure stable operation of this important HVDC link.

B.19.2 Member may please like to discuss.

B.20 Grid Events in Northern Region during Sep'20-Jul'21 (Agenda by NRLDC)

B.20.1 A total 229 number of CEA standard based Grid Events occurred in Northern Region in Sep'20 to Jul'21 period. Monthly GD/GI summary is given below:

Month	Event Category		Event Share (in %)	Fault duration > 100ms/160ms
	GD	GI		
Sep'20	9	12	9%	43%
Oct'19	11	14	11%	36%
Nov'20	8	9	7%	24%
Dec'20	6	8	6%	29%
Jan'21	10	10	9%	25%
Feb'21	14	4	8%	39%
Mar'21	10	10	9%	20%
Apr'21	8	10	8%	22%
May'21	13	13	11%	31%
Jun'21	14	10	10%	50%
Jul'21	20	6	11%	42%
Total	123	106	9%	34%
GD as % of total		54%	Fault duration > 100ms/160ms for almost every third event	
GI as % of total		46%		

B.20.2 These tripping events have been discussed in various OCC, PSC and other special meetings.

B.20.3 It is for kind information to members, that NRLDC has successfully implemented the web portal for online submission of tripping related information.

B.20.4 Despite of continuous discussion in various OCC, PSC and TCC meetings reporting from constituents is not satisfactory as detailed report , root cause analysis and remedial action taken/ to be taken are not shared with NRPC/NRLDC.

B.20.5 Members may like to discuss.

B.21 Frequent multiple tripping in J&K(UT) control area (Agenda by NRLDC)

B.21.1 Frequent event of multiple elements tripping has been observed in J&K(UT) control area majorly at 400/220kV Amargarh (PG) S/s, 220kV Ziankote (J&K) S/s, 400/220kV Wagoora (PG) S/s, 400/220kV Kishenpur (PG) S/s, 220kV Salal (PG) S/s. Total of 18 number of Grid events occurred in J&K(UT) control area during Sep'20-Jul'21. Almost in all events delayed clearance of fault is observed with maximum delayed clearance of 2200ms during 27th May'21 Grid event. Further in the absence of support documents such as DR, EL etc. proper analysis could not be done in most of the cases. In view of the above, a letter dated 03rd Jun'21 has been sent to JKPTCL from NRLDC for vigilant and corrective actions. During 184th OCC meeting held in Jun'21 NRLDC representative emphasized that such delayed clearance of fault and tripping of multiple elements is a matter of serious concern for reliability and security of the gird. Two grid events occurred in Jul'21 and one on 9th Aug'21. Hence, utilities are requested that grid events in J&K(UT) control area may be analyzed in detail and shortcomings in the operation of protection system as well as root cause of tripping may be immediately resolved.

B.21.2 During such contingencies, the non-availability of real time data from the J&K region is also a serious hindrance in system operation

B.21.3 Member may like to discuss.

B.22 Load crash event during Thunderstorm/Dust storm (Agenda by NRLDC)

B.22.1 High frequency for considerable time was experienced in the grid during these events due to heavy under drawl by states. Large number of tripping incidents observed during these events. Several actions including warning/alert messages were issued to NRLDC/SLDC Control Centers. The generation of ISGS thermal stations was backed down. Instructions were issued for backing down of generation in state generating station. During 184th OCC meeting held in June 2021, NRLDC representative suggested that Standard Operating Procedure may be developed by SLDCs so that in case of such load crash events actions are taken in accordance with SOP.

B.22.2 It was observed that during weather-initiated load throw off, some generating units under state control area are ramped down upto only 70-75% of their capacity. It has been previously deliberated in several OCC/TCC/NRPC meetings that states shall ensure that generators are backed down upto 55% or 60% (if some design issue). SLDCs were also advised to approach SERC in this regard.

B.22.3 Summary of load crash events during Thunderstorm/Dust storm are as follows:

S. No	Date of Event	Load crash in GW	400 & above voltages level elements tripped / manually opened	Remark
1	16th Apr 21	5 GW in 4hrs	25	Delayed back down of generation was observed in Haryana and Punjab.
2	06th May 21	7 GW in 2hrs 45min	15	
3	01st Jun 21	18 GW in 6hrs 33min	80	Delayed back down of generation was observed in Haryana and Punjab.
4	10th Jun 21	6 GW in 5hrs 21min	22	

B.22.4 Member may like to discuss.

B.23 Automatic Generation control (AGC) (Trial run of 24x7 continuous operation of Automatic Generation Control (AGC) from 20nd July 2021) (Agenda by NRLDC)

B.23.1 Trial run of 24x7 continuous operation of Automatic Generation Control (AGC) of identified regional entity generators has commenced from 20th July 2021. AGC will help in automatic and efficient frequency control. Depending upon ACE of each region, continuous signals for frequency control and / or area interchange control will be sent every few seconds from NLDC to different interstate generating stations situated pan India.

B.23.2 The following activities have been undertaken by NLDC during this period.

- First cut standard operating guidelines have also been drafted (evolved) for power plants and NLDC. It is enclosed as Annexure B.23.
- Weekly MWh accounts have been prepared and submitted to RLDCs/RPCs.
- Several associated processes have been streamlined.

- System response and power plant response were practically analyzed. As there are fewer up reserves, AGC was mainly contributing towards regulation down during this month. A maximum of -1250 MW (down) and 850 MW (up) was despatched by AGC on the available generators.
- Hydro generators had to be operated under a narrow margin as there was spillage reported. Daily operating schedule is being provided by NHPC.
- NTPC has requested operating AGC around a 5% band of ULSP for optimizing coal mills.
- 30000 MWh net energy down was given by AGC between 14th June to 11th July 2021 (during the three hours operation), which includes 5000 MWh up and 35000 MWh down-regulation.
- Two workshops conducted on the topic of AGC . Gradually operating procedures for RLDCs would be evolved.

B.23.3 For kind information to members

B.24 Important regulatory / regulatory related change (Agenda by NRLDC)

B.24.1 Sharing of transmission charges & losses regulation, 2020:

The Sharing Regulations 2020 have already come into force with effect from 1st November 2020 vide CERC notification dated 8th August 2020. NLDC, being an implementing agency, had published the procedures for computation and sharing of ISTS charges and losses on POSOCO website on 15th September 2020 which is also available at the web link https://posoco.in/final-procedures-for-implementation-of-sharing-regulations-2020/.

B.24.2 Pilot project on 5-minutes scheduling, metering and settlement in Tehri HEP w.e.f. 27/11/2020

In compliance to Hon'ble Commission Suo-moto order dated 16th July 2018 in Petition No. 07/SM/2018 (Suo-Motu), regarding Pilot Project on 05-Minute Scheduling, Metering, Accounting and Settlement for Thermal/Hydro generators, NRLDC has started 5-minutes scheduling of Tehri HEP w.e.f. 27/11/2020. SEMs with 5-minute interval recording feature have been installed at Tehri HEP for facilitating pilot/mock-drill on 5-minutes scheduling, metering and settlement. 5 & 15-minutes metering data is already being shared with NRLDC by Tehri HEP on a weekly basis. The 5 minute-wise schedule of Tehri was prepared and communicated to Tehri by NRLDC on day ahead basis and same day basis, factoring the machine availability and energy declared by Tehri.

B.24.3 Implementation of Regulation 7(10)(b) as amended vide DSM Fifth Amendment Regulations:

The Commission vide Order dated 29.05.2020 in Suo Motu Petition No 11/SM/2020 deferred the date of implementation of Regulation 7(10)(b) as amended vide DSM Fifth Amendment Regulations to 1.12.2020. The relevant clause is quoted below:-

"For the period from 01.04.2020: If the sustained deviation from schedule continues in one direction (positive or negative) for 6 time blocks, the regional entity (buyer or seller), shall correct its position, by making the sign of its deviation from schedule changed or by remaining in the range of +/- 20 MW with reference to its schedule, at least once, latest by 7th time block such range being a subset of volume limit as specified under Regulations 7(1) & 7(2) of these Regulations."

Same is in force w.e.f. 01.12.2020.

B.24.4 For kind information to members

B.25 Performance of Grid connected RE plants (Agenda by NRLDC)

B.25.1 In view of India's target of achieving 175GW renewable capacity by 2022, the commissioning of RE plants has picked up pace in last several months. The RES generators have to submit the detail data for modelling and study purpose as per NLDC procedure and available at NRLDC website. In addition, RE plants data should be comply to various CERC & CEA regulations.

B.25.2 As RE plants are submitting the data when they are already in a position to commence generation, checking of modelling & other related data is a challenging task. Data (Static, dynamic model, temperature based graph, LVRT/HVRT, capability curve, reactive power capability, droop, etc) validation is quite tough as, field-tested data is not available. While analysing the Capability curve of some of the Plants at point of interconnection (POI) using PSSE model/case, it has been observed in most of the cases that plant won't be able to deliver required MVAR when generating at its rated MW capacity. It has also been observed that temperature plays an important role in influencing the reactive capability of PV based RE generation. For a given reference inverter temperature , de-rating curve is presented below.

B.25.3 Capability curve of a sample Plant is shown below.

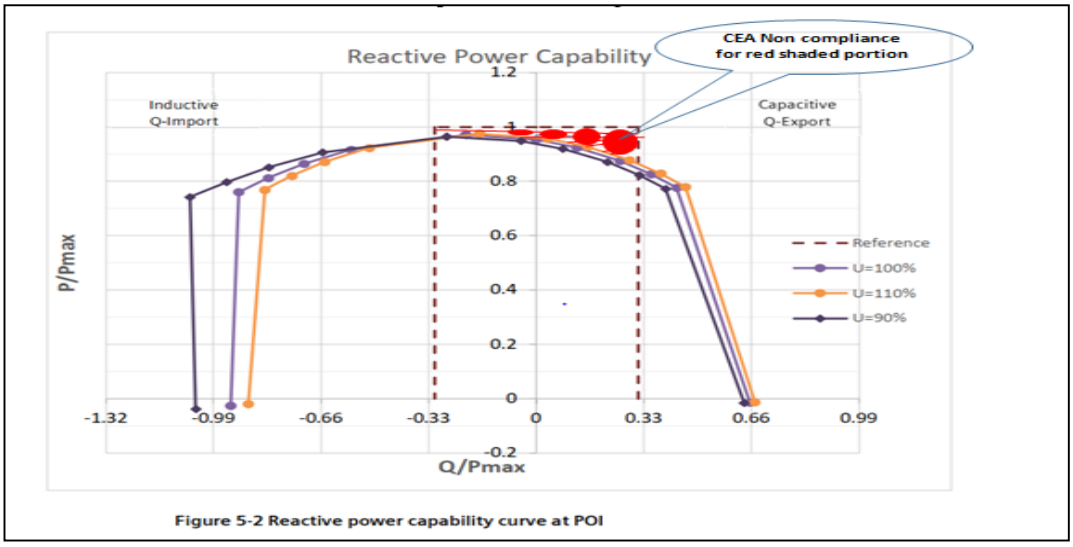
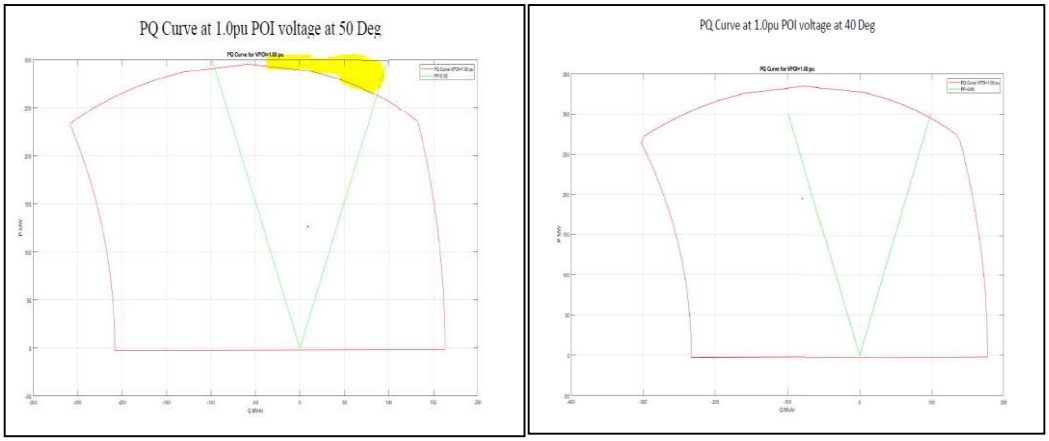
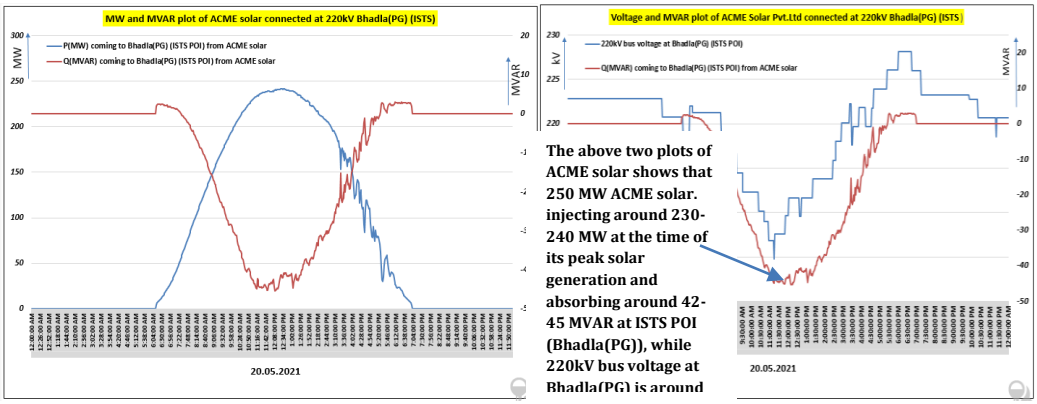


Figure 5-2 Reactive power capability curve at POI

B.25.4 Reactive power capability curve of 300 MW plant shows how it is meeting CEA compliance at 40◦C but not meeting CEA compliance at 50◦C



B.25.5 RE plants have a common characteristic that if they generate their maximum power (MW) they need sufficient amount of reactive power for their inverter and other connected equipment. RE plants generally operate in Power factor control mode in order to comply with CEA regulations and to maintain the power factor within the limits of 0.95 lagging to 0.95 leading at POI. To maintain this power factor range, RE plants need extra MVAr during rated MW generation that is being absorbed from the grid by the RE plant at POI. Examples from Real time operation is demonstrated for solar generators connected at Bhadla(PG) (Acme solar) and Wind generators at Akal.



B.25.6 Considering above following is being proposed for discussion:

- As per CEA regulations and grid requirements, it is required that plant should not be a liability to grid, and just inject quality power of having pf (0.95lag<pf<0.95 lead) at POI. For maintaining this power factor, plant has to see its own requirement of capacitive/inductive compensation as all the elements (Transformer, cable, dedicated 220kV line connecting the plant to ISTS pooling) are owned by plant and dedicatedly used by plant to inject their own power to grid. If Plant active power is getting limited to meet the requirements at POI, capacitor bank or other reactive support devices can be installed for required compensation.
- Plant to operate in Voltage control mode, such that voltage at ISTS POI should not degrade.

B.25.7 For kind information to members

B.26 Important order on RE curtailment (Agenda by NRLDC)

B.26.1 In recent order of APTEL in petition APL 197 of 2019 NSEFI Vs TN, APTEL directed following in regards of RE curtailment:

I. For Future, any curtailment of Renewable Energy shall not be considered as meant for grid security if the backing down instruction were given under following conditions:
   a. System Frequency is in the band of 49.90Hz-50.05Hz
   b. Voltages level is between: 380kV to 420kV for 400kV systems & 198kV to 245kV for 220kV systems
   c. No network over loading issues or transmission constraints
   d. Margins are available for backing down from conventional energy sources
   e. State is overdrawing from the grid or State is drawing from grid on short-term basis from Power Exchange or other sources simultaneously backing down power from intrastate conventional or non-conventional sources.

II. As a deterrent, the curtailment of Renewable Energy for the reasons other than grid security shall be compensated at PPA tariff in future. The

compensation shall be based on the methodology adopted in the POSOCO report. POSOCO is directed to keep the report on its website.

III. The State Load Dispatch Centre (SLDC) shall submit a monthly report to the State Commission with detailed reasons for any backing down instructions issued to solar power plants.

IV. The above guiding factors stipulated by us would apply till such time the Forum of Regulators or the Central Government formulates guidelines in relation to curtailment of renewable energy.

B.26.2 For kind information to members

B.27 Constitution of a Steering Committee to monitor and implementing a Pilot Project on Battery Energy Storage System (BESS) and other activities (Agenda by NRLDC- for information)

B.27.1 Ministry of Power (MoP) decided to take up a Pilot Project on Battery Energy Storage System (BESS) for Hybrid usages like ancillary services, ramp up and ramp down, meeting peaking requirement, RE balancing needs, deferment of the transmission system and optimum utilization of the existing transmission systems etc. In this direction, MoP office order vide No.23/16/2020-R&R-(Part 1) dated 16th July 2021 formulated Steering Committee to monitor and implementing a Pilot Project on Battery Energy Storage System (BESS) and other activities.

B.27.2 The composition of the Steering Committee shall be as follows:

i. Member (GO&D), CEA …….....Chairman
ii. Representative from CERC ……..……..Member
iii. CMD, POSOCO…….. ……..…….....Member
iv. COO, CTU …….....Member
v. Director, SECI…….. ……..…….....Member
vi. Director(SO), POSOCO……..……...Member Convenor

B.27.3 The Terms of Reference (TOR) for the Committee shall be as follows:

i. Formulation of Guidelines and Detailed Project Report (DPR) to take up the Pilot Project on Battery Energy Storage System (BESS), having the capacity of 1000 MW or more, which inter alia covering overall plan, different roles and responsibilities, various activities and resources required for implementing the project.
ii. Monitoring the implementation of the project i.e Conducting the bidding to commissioning the Project and ensuring adherence to the tentative timelines as approved by Hon'ble Minister.
iii. Stay informed of the project's activities, progress, and outcomes etc.
iv. Suggest plans for replication with modification, if required, for capacities to beadded based on the pilot project.

B.27.4 Furthermore, data monitoring of BESS station at Rohini (Delhi) of 10 MW has been started at NRLDC.

B.27.5 For kind information to members

B.28 Primary Frequency response test in Northern region (Agenda by NRLDC)

B.28.1 Regulation 2017, 5.2 (g) of IEGC (Fifth Amendment), with regard to generator governor response, stipulates that 'provided that periodic checkups by third party should be conducted at regular intervals once in two year through independent agencies selected by RLDC or SLDC as the case may be…….'.

B.28.2 In compliance to above, POSOCO has taken actions as listed below:

i. NLDC on behalf of RLDCs formulated a procedure for testing primary frequency response test of regional entity generators and shared the details with generators.
ii. The modus-operandi in this regard was also intimated to Hon'ble commission on 12th Oct 2018.
iii. A meeting with all generators at NLDC, POSOCO was organized to discuss the important clauses of Request for proposal (RFP).
iv. RfP was reviewed and shared with all the five agencies selected during EoI stage. Based on that third parties M/S SOLVINA and SIEMENS were awarded the work of testing generator PFR
v. As on (31st Jul 2021), M/s Solvina has performed PFR testing of twenty seven units (27) at nine (9) nos of plants in Northern region. List is enclosed as Annexure B.28.

B.28.3 In case test results of some of the units are found to indicate unsatisfactory response, the owners of such units would have to take necessary corrective action for ensuring satisfactory primary frequency response.

B.28.4 For kind information to members

B.29 Facilitation of Renewable generator (RE) integration to Grid (Agenda by NRLDC)

B.29.1 As we, are aware, Govt. of India has envisioned integration of 175 GW RE capacity by 2022. Consequently, Renewable energy power plants are being commissioned for connecting to ISTS at very fast pace. Integration of large scale RE with grid is a challenging task. Hon'ble commission and CEA has come up with various provisions to facilitate the RE integration with grid ensuring safety and reliability of grid. In this direction, NLDC, POSOCO has also formulated a procedure for registration and first time charging of RE plants, for which they are required to submit requisite data details regarding simulation study. The procedure & other details for registration and first time charging is available on each RLDC website. RLDCs are continuously interacting with RE plants for any issues

regarding registration and FTC.

B.29.2 Compliance to the regulations: All the transmission licensee/Regional entity/RE & other shall comply to the regulation & their amendments mentioned below)

i. Central Electricity Authority (Technical Standards for Connectivity to the Grid Regulations, 2007
ii. Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010
iii. Central Electricity Authority (Measures Relating to Safety & Electric Supply) Regulations,2010
iv. Central Electricity Regulatory Commission (Communication System forInter-State Transmission of Electricity) Regulations,2017
v. Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006
vi. Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in Inter-State Transmissionand related matters) Regulations,2009
vii. Central Electricity Regulatory Commission (Fees and Charges for Regional Load Despatch Centres) Regulations, 2019
viii. Any other regulations and standards specified from time to time

B.29.3 Other than, the documents mentioned above following documents needs to be submitted to RLDCs-

- CTU charging instructions to be provided which shall clearly have mentioned about
- the assumption made in the studies for ex. Whether it is anti-theft, charging or complete line is going to be charged, status of parallel line etc.
- Details of approval of the transmission scheme from the Standing Committee / CTU and approval for changes in the approved scheme, if any.
- Availability of line reactors with the switchable or non-switchable status as per approved scheme.
- CEA approval for energization as per Central Electricity Authority (Measures Relating to Safety & Electric Supply) Regulations,2010
- PTCC clearance certificate
- Technical parameters of the power system element required for network modelling shall be made available by CTU/STU
- In case of HVDC transmission elements all desired modelling data, operational
- documents and telemetered data to be provided as per the procedure of integration of HVDC transmission elements.

- In case of STATCOM/SVC all technical details to be provided as per procedure of STATCOM/SVC.
- Short Circuit Testing of power transformers at National High Power Test Laboratory Pvt. Ltd.(NHPTL) is allowed as per the CERC approved procedure of testing Status of PMU installation

B.29.4 As of now (25th Aug 2021), total twenty two (22) no's of RE plants (3695 MW) has been connected to the grid at ISTS in Northern region.

B.29.5 State/SLDC are also requested to facilitate RE integration at intra-state system ensuring all the CEA/CERC/SERC compliances before final approval. SLDCs may also refer NLDC procedure for RE registration and first time charging of RE plant.

B.29.6 A meeting chaired by Hon'ble Minister (MNRE & Power) was held on 2nd August, 2021 to discuss modalities of 100 GW capacity addition by 15th August, 2021. To facilitate smooth integration of RE with grid covering all CEA/CERC compliances, NRLDC, POSOCO is processing the request of registration and first time charging (FTC) as per procedure laid down by NLDC. The procedure is available on NRLDC website with all the check list so that RE generator can prepare the requisite details & data well in advance

B.29.7 With cooperation from all stakeholders, Northern region was able to commission the plants, which were planned to be added before 15th August 2021. Three (3) nos of RE stations comprising of 725 MW were commissioned and charged during 2nd to 15th August 2021. NRLDC would like to thank all stakeholders for their cooperation, which made sure that India was able to achieve 100GW renewable capacity (excluding large hydro) before 15th August 2021.

B.29.8 Members may please suggest

B.30 Winter Preparedness (Agenda by NRLDC)

B.30.1 Challenges experienced during winter in Northern region, which is likely to start from mid of October till February end, are well known. During winter, demand of most of the states start decreasing, hydro generation get depleted due to limited inflow of water (most of the hydro stations of NR are snow fed) , inclement weather such as dense fog etc. pose challenges for day to day grid operation. All the issues encountered so far during winter are discussed in regular monthly OCC meetings for necessary action plan. Agreed action plans for major issues are reiterated below:

i. As off-peak to peak demand ratio of NR fall to around 0.5 to 0.6 during winter, morning and evening load ramp is quite steep together with limited hydro resources etc. SLDCs and generators are advised the following:
   - Strictly maintain the drawal/generation as per the schedule

- Portfolio management as per load forecast especially during high ramp up and ramp down periods.
- Load forecasting based on historical data, weather data, festival/special days trend, nature of load assessment (resistive/reactive/industrial/agriculture/domestic), ramping of load, load growth viz. month wise/annual etc. should be considered. Apart from this, generation planning is also equally important especially with the in-surge of renewable integration with the grid, generation resources should be optimally planned, taking care to maintain adequate reserves. With increasing complexity, users may develop in house or use third party Software tools for precision of load forecasting & generation planning for daily basis, which can further go for hourly basis also.
- Forecast of demand ramp has also become important and so SLDCs are advised to forecast load ramping so that commensurate ramping of generation can also be planned.
- Minimize generation to technical minimum as per IEGC guidelines /CERC directions during low demand.
- Co-ordination of ramping of generation during morning & evening peak ramping
- Optimum utilization of Hydro resources for meeting peak hour demand.

ii. High Voltage

- Ensuring to switch off capacitors & switch on reactors.
- Ensuring healthiness of all commissioned reactors in the system
- Monitoring of reactive power through SCADA displays.
- Reactive power support (absorption) by generating stations as per the capability curve.
- Synchronous condenser operation especially of hydro units during night hours for dynamic voltage support. Some of the generators have already been tested (Tehri, Chamera, Pong etc.) and shall be available for condenser mode of operation as and when required. States/SLDCs are also advised to explore synchronous condenser operation of Hydro & Gas units in their state control area.
- ICT Tap Optimization at 400kV & above is carried out by NRLDC. Same exercise need to be carried out by SLDCs at 220kV & below levels.
- Opening of EHV lines based on expected voltage reduction and also considering security & reliability of system

- Exploring reactive support possible from grid connected invertor based devices, especially during no generation period.

iii. EHV line trip during fog/Smog
- Progress on cleaning replacement of porcelain insulator with polymer insulator to be monitored. Last year many EHV lines tripped during fog in Punjab area too. Priority wise cleaning& replacement may be carried out

iv. Load crash due to inclement weather
- Weather forecast site (Weather portal for power sector) (Both SLDC, STU, transmission licensee) to be closely followed
- ERS procurement (STU, transmission licensee)

B.31 PTCUL Telemetry Issues: Following Telemetry Issues from PTCUL are pending since long (Agenda by NRLDC)

Non-availability of Real-Time data from PTCUL

B.31.1 As per details submitted by PTCUL out of 51 Sub-Station/Generating Stations data from only 28 Sub-stations are integrated at SLDC. List of Sub-stations/Generating-Stations not integrated with PTCUL SCADA is given in Annexure- B.31.1. The same issue was also informed to PTCUL vide letter (Ref: - NRLDC/SL-II/2019-20) dated: - 05.03.20.

B.31.2 In addition to the above it is to inform that many feeders are not integrated even at the locations where RTUs are installed. Detailed issues are given in Annexure-B.31.2. PTCUL is requested to please arrange for the telemetry at the earliest and submit the time line for integration to NRLDC.

B.31.3 In addition, Digital Status is very important for smooth monitoring of the grid. Non-availability of digital status also leads to incorrect results from State Estimator and other Power System applications. It is requested to please arrange for improvement in digital status.

ICCP integration between PTCUL and Backup NRLDC

B.31.4 During SCADA upgradation at NRLDC, Backup NRLDC at Kolkata was also established. As per system architecture, all states shall be connected through ICCP to main and Backup NRLDC. It is to inform that PTCUL is yet to be connected to Backup NRLDC. It is requested to please take up with OEM for ICCP integration with Backup NRLDC.

B.31.5 The above issues were also discussed in Special Meeting with PTCUL on 07th July 2020 conducted by NRPC, 45th TCC/48th NRPC Meeting . During the meeting Director Operations PTCUL confirmed that they will expedite the process of RTU installation first and assured RTU

replacement shall be completed in 6 months.This is to inform that there is negligible improvement in telemetry from PTCUL. The matter was also discussed during special meeting held on 17th Dec 2020 conducted by NRLDC.

B.31.6 Issue of non-availability of data was also discussed in 18th TeST Meeting where in representative from PTCUL informed that the issue of RTU replacement is still in tendering stage and can be resolved after execution of RTU project only. It may be noted non-availability of data is creating difficulty in monitoring of Uttarakhand generation, drawal in real-time. Further it is difficult to monitor grid with poor visibility and sometimes it hampers decision making in real-time.

B.31.7 Further issue of ICCP integration of ICCP integration with Backup NRLDC was also discussed in 18th TeST Meeting and there was no update from PTCUL regarding the same. It may be noted that during operation of Backup Control centre, data of PTCUL is not available at Backup NRLDC . Also, NRLDC data will not be available at PTCUL. Matter is really critical and PTCUL is requested to please expedite the process of Integrate of ICCP integration with Backup NRLDC.

B.31.8 PTCUL is requested to expedite the process of RTU replacement & ICCP Integration.

B.31.9 PTCUL may update.

B.32 Non-availability of Reliable / Redundant Communication System for PTCUL, SLDC (Agenda by NRLDC)

B.32.1 SLDC Uttarakhand is connected to NRLDC through radial network from Roorkee- Dehradun and all services like ICCP, PMU/PDC and VOIP are working on this. Any issue in link leads to outage of Voice and Data communication between SLDC Uttarakhand and NRLDC. Matter of reliable communication to NRLDC was also discussed in Special Meeting with PTCUL on 07th July 2020 conducted by NRPC, 45th TCC/48th NRPC Meeting where PTCUL/POWERGRID assured that reliable communication link would be available in 6 months. However, redundant link is yet to be established and PTCUL is working on single link only.

B.32.2 Issue of non-availability of data was also discussed in 18th TeST Meeting where in representative from PTCUL informed that the issue of redundant communication will be solved by establishment of OPGW between Majra and Dehradun PG and said work is proposed in tender along with RTU replacement. PTCUL is requested to please expedite the process of Tendering.

B.32.3 PTCUL may update.

B.33 J&K Telemetry Issues (Agenda by NRLDC)

B.33.1 Reliability and accuracy of SCADA data and its associated communication system is essential for monitoring and coordinating operations of a large electricity grid. It helps in visualization and management of the critical grid element failure/grid incident in real time and minimizes the possibility of any untoward incidences/disturbances. Network applications in Energy management system (EMS) such as State Estimator (SE), Real Time Contingency Analysis (RTCA) also necessitate reliable and accurate real time analog and digital data. Data communication has to be made through redundant and alternate path communication channel.

B.33.2 Real-Time data availability from Jammu and Kashmir is very poor. There is zero visibility of data in J&K stations. With poor monitoring of data, it is very difficult to monitor grid in efficient manner.

B.33.3 The matter has been discussed in various TCC and TeST Meetings but there is no improvement of the same.

B.33.4 Brief details are as follows:

- Under SCADA upgrade project 66 RTUs were installed by M/s Siemens at all 400KV / 220 KV and 132 KV sub-stations/generating Stations of J&K PDD.
- RTUs were not integrated with Control centre due to non-availability of communication network.
- RTUs were tested locally and commissioned without data availability at Control Centre.
- Due to Non availability of data, JK PDD is not able to monitor its drawal from grid and its generation. It is dependent of Central sector data for monitoring of drawal.

B.33.5 Matter was also discussed in Special Meeting with J&K on 28.07.2020 where in Representative of J&K informed that they have given consultancy work to POWERGRID for installation of OPGW in J&K. However, due to funding issue OPGW work has been stalled by POWERGRID. According to J&K almost 95% of the work is complete and once funding issue is resolved Non-availability of telemetry issue will be resolved.

B.33.6 Matter was also discussed in 18th TeST Meeting where representative of J&K informed that they have released partial payment of 9 crore to POWERGRID in March 2021 and during meeting with POWERGRID in March it was agreed that POWERGRID would restore/commission some links on priority basis. However, there is no improvement in this regard and requested POWERGRID to expedite the process.

B.33.7 J&K / PGCIL to update the status and share timelines for restoration of

the data.

B.34 Non-Availability / Reliability of Telemetry (Agenda by NRLDC)

B.34.1 In order to have proper visualization and Situational awareness to control room operator for ensuring reliable grid operation, uninterrupted availability of telemetry is essential. It is essential to ensure 100% availability of the data from all the Sub-stations. However, it is seen that data is highly intermittent even for some of the 400kV/ 765kV Sub-stations.

B.34.2 The non-availability of various 400 KV / 765 stations was calculated for the month of June 2021. The list of stations where data availability is less than 95% is given below.

Central Sector	UPPTCL	RRVPNL	DTL	PTCUL	HVPNL	HPSEBL
Shree Cement	Parichha	Heerapura	CCGTB	Srinagar	Nuhiyawali	WANGTU
Bairaisuil	Noida Sec-148	Alwar			Kirori	
AD Hydro	Rosa	Anta				
Karcham Wangtoo	Muradnagar	Bhainsara				
Parbati-2	Meja	Hindaun				
Parbati-3	Bara	Rajwest,Kalisindh, SSCTPS				

*Intermittency based on June’2021-monthly data availability

B.34.3 Further, for reliable telemetry of data, dual communication channel shall be established between Sub-stations/SLDC . However, it is learnt that many stations are reporting to SLDC through single channel leads to non-availability of data of many sub-stations. Recent issue of approach cable damage at Harduanganj has lead to non-availability of data of many sub-stations to NRLDC since 11th Aug 2021. As per CERC communication regulation it is required that data shall be available to control centre with dual channel and availability of data with redundant channel shall be 100%.

B.34.4 In this regard all constituents are requested to ensure that all sub-stations shall be connected to control centre with dual communication and in this regard all are requested to please list of sub-stations along with channel details whether updating on single channel/dual channel to NRPC/NRLDC.

Telemetry of digital status

B.34.5 The importance of correct Digital telemetry was discussed in all the TeST sub-committee meeting and it is observed that there is no improvement in this regard. It is was decided in previous TeST Sub-committee meeting that the constituent will furnish the availability status of 220 kV and above stations and improvement there off.

B.34.6 Availability of digital status based on snapshot of 2nd Aug 2021 (1100 hrs)

is given below:

	Total	Available	Not Available	% Availability
PGCIL	3468	3359	109	96.86%
UPPTCL	2377	1563	814	65.76%
RRVPNL	2021	1449	572	71.70%
PSTCL	868	586	282	67.51%
HVPNL	769	642	127	83.49%
JKPDD	156	7	149	4.49%
PTCUL	174	124	50	71.26%
HPSEBL	156	125	31	80.13%
BBMB	261	233	28	89.27%
DTL	617	531	86	86.06%

B.34.7 Matter has been taken up with various constituents through letter / meetings for improvement of telemetry. It is requested to please takeup for improvement of telemetry for better system visualization and grid Operation. The matter was also discussed in 18th TeST Meeting wherein representative from SLDCs informed that they have been taking up the telemetry issue with transmission wing for improvement of telemetry. All concerned are requested to please take up the issues on priority.

B.34.8 Member may like to discuss the issues and resolution target for restoration of reliability.

B.35 Establishment of dedicated backup Control Centers for SLDC (Agenda by NRLDC)

B.35.1 In SCADA upgrade/replacement project under ULDC Phase-II concept of backup control centres was introduced. Under this project backup Control centres of RLDC/SLDCs were established in Northern Region. However, NRLDC /UPPTCL/Jammu and Kashmir has dedicated backup control centres. Whereas other SLDCs are backup of each other as given below:

S.No	Main SLDC	Backup SLDC
1.	Delhi	Rajasthan
2.	Rajasthan	Delhi
3.	Haryana	HPPTCL
4.	HPPTCL	Haryana
5.	BBMB	PSTCL
6.	PSTCL	BBMB

B.35.2 There are many constraints in the configuration above:-

- Database modelling of one SLDC has to be done by other SLDC, but due to dependency on other SLDC database modelling work is delayed leading to non-synchronization of data between Main and backup Control center.

- RTU reporting monitoring of one SLDC has to be done by other SLDC, which is not being done.
- Multisite configuration couldn't to be properly configured due to such arrangements.

B.35.3 Keeping in view of the above constraints it is essential that separate dedicated backup control centres should be established by States and periodic testing and monitoring of backup control centres could be done by respective SLDC representative only.

B.35.4 Till date testing of backup control center of SLDCs apart from UP and JK could be done due to constraints given above.

B.35.5 Members may like to discuss.

C. COMMERCIAL ISSUES

C.1 Default in payment of outstanding dues and surcharge by beneficiaries

C.1.1 The details of outstanding dues are as under:

THDC (as on 05.08.2021)

DISCOMs	Principal Outstanding (Rs. in Cr.)	Late Payment Surcharge (Rs. in Cr.)	Overdue amount including LPS (Rs. in Cr.)
BRPL, Delhi	160.01	1.94	161.95
BYPL, Delhi	89.09	134.67	221.76
PDD & JKPCL, J&K	299.57	53.46	353.03
UPPCL, UP	392.28	4.56	396.84

C.1.2 As on 05.08.2021, an overdue amount including LPS of approx. Rs. 1136 Cr. is due for payment. THDCIL has been vigorously pursuing with all the beneficiaries for expeditious payment. Despite vigorous follow up, some beneficiaries, namely BRPL & BYPL, Delhi (Delhi DISCOMs), PDD & JKPCL (J&K DISCOMs) & UPPCL (UP DISCOM) have still to liquidate old their outstanding dues.

C.1.3 The amount is quite substantial and crucial. Due to scarce availability of funds with us, THDC is compelled to avail borrowings to meet their day to day working capital needs, for servicing long-term debts and adversely affecting their ongoing works. Thus, immediate payment is very much crucial for sustenance of THDCIL.

C.1.4 All the above DISCOMs are requested to liquidate their above outstanding dues immediately.

SJVNL (as on 10.07.2020)

C.1.5 Total amount due from JKPCL is Rs 616.34 Crores (inclusive of LPS) towards energy supplied from NJHPS and RHPS.

C.1.6 The JKPCL may be pursued to liquidate their outstanding on priority as it is seriously affecting the cash flow of SJVN and would also hamper the MOU targets assigned by MOP, GOI.

POWERGRID (as on 03.07.2020)

(in Crores)

Sl.No.	DIC	Total dues	Dues > 45days
1	Jammu and Kashmir	1261.70	1126.33
2	UP	1069.76	344.91
3	Punjab	405.38	109.77
4	KSK Mahanadi (UP)	60.47	60.47
5	Himachal Pradesh	143.64	49.54
6	BYPL	125.51	47.04
7	UPPTCL	44.53	43.97
8	MB Power	44.48	34.79

Sl.No.	DIC	Total dues	Dues > 45days
9	NDMC	28.34	21.05
10	TRN Energy (UP)	20.68	20.68
11	JDVVN	121.16	13.88
12	AVVN	98.27	8.93
13	JVVN	134.76	2.19
14	Haryana	172.92	1.41
15	BRPL	136.87	0.00
16	TPDDL	56.66	0.00
17	Chandigarh	9.60	0.00
18	Uttrakhand	43.39	0.00
19	Noida Power Company	6.05	0.00
20	Northern Indian Railway	2.27	0.00
TOTAL		3986.44	1884.96

C.1.7 The concerned utilities may liquidate the outstanding dues on priority and update the status.

C.2 Opening of Letter of Credit

THDC

C.2.1 Despite various requests and reminders, J&K has not opened Letter of Credit for Financial Year 2021-22 till date. Therefore, it is requested to open the LC amounting to Rs. 16.34 Cr. on priority.

SJVN

C.2.2 As per mutually signed Power Purchase Agreement and order dated 28.06.2019 issued by Ministry of Power, Beneficiary is to submit a confirmed, revolving, irrevocable Letter of Credit in favour of SJVN for an amount equivalent to 105% of average monthly billing of preceding 12 months with appropriate bank as mutually acceptable to parties. The LC shall be kept valid at all the time during the validity of the Power Purchase Agreement. In spite of repeated reminders, Power Development Department of J&K had not renewed their Letter of Credit after 13.11.2019 for power supplied from NJHPS and RHPS. As such Power Development Department of J&K may be advised to submit Letter of Credit in favour of SJVN.

C.3 Consent for purchase of Power (Agenda by SJVN)

Luhri Hydro Electric Project Stage-I (LHEP Stagei-I), 210 MW in Himachal Pradesh

C.3.1 SJVN Ltd., is executing the works of Luhri Hydro Electric Project Stage-I (LHEP Stage-I), 210 MW on the river Satluj in the downstream of Rampur HPS in the state of Himachal Pradesh.

C.3.2 Luhri Hydro Electric Project Stage-I is a run–of- river with limited pondage type scheme and is designed to generate Annually 758.18 MUs in 90 % dependable year. The construction activities of the project are in full swing

and the commissioning of the project is expected in May, 2025.

C.3.3 As per the condition of Memorandum of Understanding (MoU), 13% of the net energy shall be given to Government of Himachal Pradesh (GoHP) free of cost. Further, SJVN would be in a position to offer the balance power being generated from project to interested states / UTs as per the prevalent policies of Govt. of India issued from time to time.

C.3.4 Further, it is to bring to your notice that MoP, GoI has issued order dtd. 29.01.21 regarding Renewable Purchase Obligation (RPO) wherein Large Hydro Power (>25 MW) declared as Renewable Energy Source and Hydro Purchase Obligation (HPO) as a separate entity within Non – Solar RPO.

C.3.5 SJVN is in a position to offer power from Luhri Hydro Electric Project Stage-I under HPO benefits as notified by MoP, GoI after its commissioning. The levelized tariff of the generated power is Rs 5.84 per Kwh, calculated based on the project completion cost.

C.3.6 It is, therefore, requested to please convey the consent of constituent members for purchase of power through PPA / HPO, indicating the quantum of power required from this Hydro project so that Power Purchase Agreement (PPA) can be signed accordingly. Further, in case beneficiaries are not intended to give consent for purchase of power at the levelized tariff, SJVN requests the beneficiaries to suggest the maximum rates which may be paid by them for purchase of power from the Project.

Dhaulasidh Hydro Electric Project (DSHEP), 66 MW in Himachal Pradesh

C.3.7 SJVN Ltd., is executing the works of Dhaulasidh Hydro Electric Project (DSHEP), 66 MW on the river Beas in district Hamirpur in the state of Himachal Pradesh.

C.3.8 Dhaulasidh Hydro Electric Project is a run–of- river with limited pondage type scheme and is designed to generate Annually 303.86 MUs in 90 % dependable year. The Main Packages i.e. Civil & Hydro Mechanical packages has already been awarded and construction activities of the project has been started and the commissioning of the project is expected in June, 2026.

C.3.9 As per the condition of Memorandum of Understanding (MoU), 13% of the net energy shall be given to Government of Himachal Pradesh (GoHP) free of cost. Further, SJVN would be in a position to offer the balance power being generated from project to interested states / UTs as per the prevalent policies of Govt. of India issued from time to time.

C.3.10 Further, it is to bring to your notice that MoP, GoI has issued order dtd. 29.01.21 regarding Renewable Purchase Obligation (RPO) wherein Large Hydro Power (>25 MW) declared as Renewable Energy Source and Hydro Purchase Obligation (HPO) as a separate entity within Non – Solar RPO.

C.3.11 SJVN is in a position to offer power from Dhaulasidh Hydro Electric Project under HPO benefits as notified by MoP, GoI after its commissioning. The

levelized tariff of the generated power is Rs 5.86 per Kwh, calculated based on the project completion cost.

C.3.12 It is, therefore, requested to please convey the consent of constituent members for purchase of power through PPA / HPO, indicating the quantum of power required from this Hydro project so that Power Purchase Agreement (PPA) can be signed accordingly. Further, in case beneficiaries are not intended to give consent for purchase of power at the levelized tariff, SJVN requests the beneficiaries to suggest the maximum rates which may be paid by them for purchase of power from the Project.

Naitwar Mori Hydro Electric Project (NMHEP), 60 MW (2X30 MW) in Uttarakhand

C.3.13 SJVN Ltd., is executing the works of Naitwar Mori Hydro Electric Power Project (NMHEP) (2X30 MW) on the river Tons (a tributary of river Yamuna) in district Uttarkashi in the state of Uttarakhand.

C.3.14 Naitwar Mori HEP is a run–of- river type scheme and is designed to generate Annually 215.57 MUs in 90 % dependable year. The construction activities of the project are in full swing and the commissioning of the project is expected in April, 2022.

C.3.15 As per the condition of Memorandum of Understanding (MoU), 12% of the net energy shall be given to Government of Uttarakhand (GoUK) free of cost. Further, SJVN would be in a position to offer the balance power being generated from project to interested states / UTs as per the prevalent policies of Govt. of India issued from time to time.

C.3.16 Further, it is to bring to your notice that MoP, GoI has issued order dtd. 29.01.21 regarding Renewable Purchase Obligation (RPO) wherein Large Hydro Power (>25 MW) declared as Renewable Energy Source and Hydro Purchase Obligation (HPO) as a separate entity within Non – Solar RPO.

C.3.17 SJVN is in a position to offer power from Naitwar Mori HEP under HPO benefits as notified by MoP, GoI after its commissioning.

C.3.18 It is, therefore, requested to please convey the consent of constituent members for purchase of power under HPO obligations as introduced by MoP, indicating the quantum of power required from this Hydro project. Further, in case beneficiaries are not intended to give consent for purchase of power, SJVN requests the beneficiaries to suggest the maximum rates which may be paid by them for purchase of power from the Project.

Solar Power Projects under Central Public Sector Undertaking (CPSU) Scheme

C.3.19 With regard to Govt. of India’s target of 450 Gigawatt (GW) RE capacity by 2030, SJVN is exploring various possibilities to set up Renewable Power

Projects through participation in Competitive Bidding Process. Presently, IREDA has invited proposals for setting up of Grid Connected Solar PV projects anywhere in India on “Build Own Operate” (B-O-O) basis for an aggregate capacity of 5,000 MW under CPSU Scheme Phase-II (Tranche-III).

C.3.20 Brief Details of CPSU Scheme are as following:

- Eligible Organizations: Government Producers (PSUs/ Govt. Orgns.) which are under administrative control or have 50% shareholding of Central / State Govt.
- Usage of solar power: Power produced by the Government Producers can be used for self-use or use by Government/ Government entities, either directly or through DISCOMS on payment of mutually agreed usage charges of not more than Rs 2.45 /unit, which shall be exclusive of any other third party charges like wheeling and transmission charges and losses, point of connection charges and losses, cross-subsidy surcharge, State Load Dispatch Centre (SLDC)/ Regional Load Dispatch Centre (RLDC) charges, etc. as may be applicable.
- Project Competition Period- 36 months from the date of issuance of LoA.

C.3.21 For the same, SJVN offers 850 MW of Power to DISCOMS from the Solar Power Projects (PAN India) to be developed under this scheme at the rate of Rs. 2.45/kWh at Ex- Busbar.

C.3.22 NRPC members are requested to deliberate and offer their consent to participate in above CPSU Scheme.

C.4 Proof of export for the purpose of giving input tax credit under GST for electricity export

C.4.1 A meeting was held under the chairmanship of Joint Secretary (Transmission), MoP on 06.08.2021 to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export. The minutes of the meeting are attached as Annexure C.4.

C.4.2 After detailed deliberations, the following decisions were taken in the meeting:

i. Name of generating company and its GST number & address shall be included in the certificate/statement to be issued by the RPC Secretariat for the purpose of giving input tax credit to exporting generating station.

ii. The format shall be issued on monthly basis along with REA and uploaded on websites of RPC Secretariats, where from D/d Revenue as well as eligible generator can download the same.

iii. The modified format for sharing the relevant information with GST council for the purpose of granting input tax credit to the exporting generator was placed in the Annexure of the MoM of the said meeting.

iv. CEA shall instruct RPC Secretariats to incorporate necessary provisions in

the REA issued by them.

C.4.3 In line with the decision taken in the said meeting, all generators using imported fuel and exporting power outside the country may provide details mentioned at S.No.1 to 6 of Annexure II of the MoM, by the last date of the month so that required format may be issued by NRPC Secretariat along with monthly REAs.

Members may discuss.

C.5 Diversion of 01 No. 250 MVA Transformer from Moga(POWERGRID) to Nawada (HVPNL) (Agenda by POWERGRID)

C.5.1 Due to failure of one no. 400/20KV ICT at Nawada substation of HVPNL and on their request, POWERGRID diverted 1 no. 250MVA 400/200KV spare ICT from Moga substation to Nawada (HVPNL) substation in March'2016 as per deliberation held in NRPC. This ICT is in service since May'2016.

C.5.2 The said 250MVA ICT (DOCO: 01.03.2000) was to be used as spare after its replacement.

C.5.3 For use by HVPNL at their Nawada substation, an amount of Rs. 4.11 Lakhs / month was worked out based on unclaimed depreciation of the said ICT as hiring charges.

C.5.4 As this ICT is in service at Nawada substation, POWERGRID has raised the hiring charges for this ICT w.e.f. 20/03/2016. Vide last Invoice dt. 03/07/2021 an amount for Rs. 3.078 Cr. upto 30th June'2021 is pending on M/s HVPNL. However, M/s HVPNL has not yet released any payment in this regard.

C.5.5 During discussion with HVPNL officials, HVPNL opined that the matter regarding hiring charges shall be finalized in association with NRPC. Accordingly, this agenda was brought by POWERGRID in 43rd commercial meeting on 13th April'2021 and a bilateral meeting was arranged among HVPNL, POWERGRID and NRPC on 08th July'2021. But same could not be concluded as M/s HVPNL representative was not available in the said meeting. We request NRPC to impress upon HVPNL for release of pending payment.

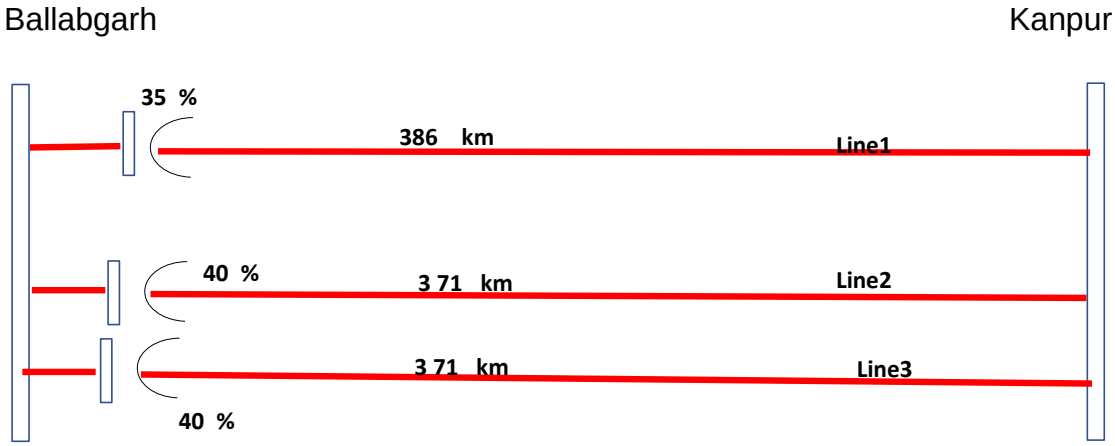
C.6 FSC Refurbishment at Kanpur Ballabhgarh 400 kV Line-1 (Agenda by POWERGRID)

C.6.1 In the late 1990s, the power from Singrauli and Rihand were pooled at Kanpur station. Beyond Kanpur, there were two major lines for evacuation of power viz. Kanpur- Agra 400 kV line and Kanpur-Ballabhgarh 400 kV line. As Agra was feeding power to both Ballabhgarh and Jaipur, Kanpur-Agra line was getting heavily loaded. To relieve the loading on Kanpur-Agra 400 kV line and to have a more balanced loading, series compensation (35%) was installed on Kanpur-Ballabhgarh 400 kV line. The transmission asset was put into commercial operation on 01.07.2002 by POWERGRID.

C.6.2 In due course, considering load growth of Western UP, Delhi NCR and its adjacent areas, transmission network has been strengthened around these areas with multiple lines including 765 kV network, HVDC injection at Agra, and Kanpur- Ballabhgarh D/c line (with FSC) which has significantly relieved loading on Kanpur- Ballabhgarh S/C line.

C.6.3 At present, there are three 400 kV lines from Kanpur to Ballabhgarh

- Kanpur-Ballabhgarh 400 kV S/c Line (386 km) (35% FSC)-Line1-Twin Moose
- Kanpur-Ballabhgarh 400 kV D/c Line (371 km) (40% FSC)- Line 2&3 Twin Moose.



C.6.4 Fixed Series Compensation project (FACTS) at Ballabhgarh was first of its kind in India. It was a developmental project & commissioned by M/s BHEL in year 2002. The Electronic devices for Control and Protection installed in Fixed Series Compensator (FSCs) at Ballabhgarh are of old generation for which spares and service support is no more available. Lot of problems are being faced in Control & protection system, Bypass circuit breaker etc at Ballabhgarh and BHEL is not able to provide the spare and service support for this FSC due to obsolescence of technology.

C.6.5 Therefore, the refurbishment of BHEL make FSC was planned. Accordingly, POWERGRID has approached CERC during truing up petition of transmission tariff in respect of FSC at Ballabhgarh S/S for tariff block 2019-24. CERC directed POWERGRID to approach concerned RPC and CTU for reviewing the requirement of FSC.

C.6.6 As per the direction of CERC, POWERGRID approached CTU vide letter dated 06-07-2021. CEA, CTU and other stakeholders had a meeting on 03-08-2021 on the issue (Copy of MOM attached). After deliberations, following was agreed; -

"There is no requirement of refurbishment of FSC at Kanpur-Ballabhgarh Line-1".

C.6.7 Considering the life of asset, balance unrecovered Depreciation (up to 90%) for this FSC is about Rs. 2.0 Crores as on 31.03.2021. If the FSC in Line-1 is

being de-capitalized due to no utility in present network condition, the balance unrecovered depreciation may be reimbursed.

C.7 Utilization of FSC installed at Muradnagar substation (UPPTCL) in 400 kV Panki- Muradnagar line (UPPTCL) or feasibility of shifting at any other location (Agenda by POWERGRID)

C.7.1 Fixed Series Compensation of 40% was installed by POWERGRID in 400 kV Panki (UPPTCL)-Muradnagar S/c Line (396 km Twin Moose) at Muradnagar station end and the same was commissioned on 01.02.2004.

C.7.2 Subsequently, LILO of Panki – Muradnagar line at Aligarh (UPPTCL) was approved in 26th SCPSPNR meeting held on 13th October 2008, as part of "Evacuation System for Parichha TPS Extn". The LILO was subsequently commissioned in October 2015 by UPPTCL.

C.7.3 After LILO, the length of lines are as given below:

- Panki-Aligarh 400 kV S/c line (285 km)
- Aligarh-Muradnagar 400 kV S/c line (177 km) with FSC (due to reduction in line length the % compensation increases to 90%)

C.7.4 Based on the system condition, FSC was kept out of service by System Operator since Oct'15.

C.7.5 POWERGRID has approached CERC with true up petition in respect of FSC at Muradnagar S/S for tariff block 2019-24. Since the FSC is out of service, CERC has directed POWERGRID to approach concerned RPC and CTU for feasibility of shifting/using the FSC.

C.7.6 As per the direction of CERC, POWERGRID approached CTU vide letter dated 09-07-2021. CEA, CTU and other stakeholders had a meeting on 03-08-2021 on the issue (Copy attached). During the meeting, CTUIL stated that in case of shifting the FSC to any new location, short circuit level of new substation where FSC would be shifted should match with design short circuit level of Panki /Muradnagar substation at the time of FSC planning and the length of line where the FSC would be shifted should approximately match with the original length of the line where FSC is to be installed. After deliberations, following was agreed:

i) FSC installed at Muradnagar substation (UPPTCL) in 400 kV Panki-Muradnagar line (UPPTCL) has no utilization in the present scenario. However, views of NRPC also need to be taken in this regard.

ii) POWERGRID to carry out cost benefit analysis, comparing the remaining life of the FSC alongwith the cost of shifting the FSC and installation of the same at any new location versus cost of installation of a new FSC at the new location. In case, relocation of the FSC is not feasible or is not found to be economically viable, POWERGRID is to approach CERC regarding tariff issues for remaining life of the asset.

C.7.7 Considering the remaining life of the equipment and cost involved in

relocation as well as technical challenges as brought out by CTUIL above, prima facie it may not be prudent to relocate it in another location. However, the matter regarding its utilization else-where and cost benefit analysis shall be worked out in consultation with CTU. In case, this installation is to be de-capitalized, the balance unrecovered depreciation which works out to Rs. 4.66 Cr may please be reimbursed.

C.8 Status of Regulatory Accounts (Agenda by NRLDC)

DSM Charges

C.8.1 Deviation Pool Account Fund of NR is being maintained & operated by NRLDC, in accordance with the CERC Regulations. As per Regulations 10 (1) of "Deviation Charges Related matters" the payment of charges for Deviation shall have a high priority and the concerned constituents shall pay the indicated amounts within 10 days of issue of statement of Charges for Deviation including Additional Charges for Deviation by the Secretariat of the respective Regional Power Committee in to the "Regional Deviation Pool Account Fund" of the concern region.

C.8.2 DSM Charges payable to pool as on 04th Aug 2021 considering Week no-16 (12-07-2021 to 18-07-2021) is indicated here in below: -

All figures in Rs. Lakhs

S. No	Constituents	Outstanding Amount
1	JAMMU AND KASHMIR	3323.59

C.8.3 No payments were received from JKPCL against Deviation Charges since 05-05-2021.

C.8.4 NRLDC is continuously pursuing & sending regular correspondence to JKPCL for settlement of the outstanding so as to disburse to the receivable entities. Further, JKPCL is requested to make the payments regularly as per the Regulation in order to avoid any further delay payment interest liability.

C.8.5 Members may please deliberate.

Reactive Energy charges

C.8.6 Reactive Energy Charges status as on 04th Aug 2021 considering Week no-16 (12-07-2021 to 18-07-2021) is indicated here in below: -

All figures in Rs. Lakhs

S. No	Constituents	Outstanding Amount
1	JAMMU & KASHMIR	1522.68

C.8.7 No payments were received from JKPCL against Reactive Energy Charges since 05-05-2021.

C.8.8 NRLDC is continuously pursuing & sending regular correspondence to JKPCL for settlement of the outstanding so as to disburse to the receivable entities. Further, JKPCL is requested to make the payments regularly as per the Regulation in order to avoid any further delay payment interest liability.

C.8.9 Members may please deliberate.

Congestion Charges

C.8.10 Congestion charge statement is being issued by NRPC. The amount received in the congestion charges account was disbursed to the receivable parties.

C.8.11 Outstanding amount against the entities payable to pool as on 04th Aug 2021 is indicated here

All Figures in Rs

SL. No.	Constituents	Total Outstanding (DPI FY 18-19)	Remarks
1	Jammu & Kashmir	1,73,127	Last Payment received on 17-10-2020
2	SJVNL	1,101	

C.8.12 NRLDC is continuously pursuing & sending regular correspondence to JKPCL for settlement of the outstanding.

C.8.13 JKPCL & SJVNL are requested to clear the outstanding.

C.8.14 Members may please deliberate.

C.9 Reconciliation of Charges (Agenda by NRLDC)

Pool Accounts

C.9.1 A separate web portal poolar.nrldc.in has been created in house for reconciliation of pool accounts (Deviation Charges and Reactive Energy Charges) and all the entities were provided with Username & Password to access the web portal to reconcile the accounts.

C.9.2 Monthly reconciliation statement of the pool accounts is being published through the web portal since April 2020. Reconciliation statement for the month of June 2021 has been uploaded in the portal on 09-07-2021.

C.9.3 Deviation charges reconciliation of Chandigarh, NFL, Azure Power, Azure Power 43, Azure Power 34, JKPCL , NHPC, Uttar Pradesh , Uttarakhand, Railways , Haryana, Delhi, & Punjab are yet to be received.

C.9.4 Reactive Energy charges reconciliation of Chandigarh, JKPCL , Uttarakhand, Uttar Pradesh, Delhi & Punjab are yet to be received.

C.9.5 All Members of these Pool Accounts are once again requested to reconcile the statement on monthly basis.

C.9.6 Above entities are requested to verify the Reconciliation statements through web portal. In case of non -receipt of any communication within one week from the meeting, it will be presumed that statement stands reconciled.

NRLDC Fees and Charges

C.9.7 NRLDC vide letter dated 30/07/2021 has sent the reconciliation statements of NRLDC Fee and Charges for the quarter -1, 2021-22 to all the users. The users were requested to send the duly signed and verified copy of reconciliation statement as a token of acceptance by 23-08-2021.

C.9.8 NRLDC Fees and Charges reconciliation of ADHPL, Koteshwer HEP, Tehri HEP, UP Seller (MUNL), ACME Chittorgarh Solar Energy Pvt, Delhi (TPDDL), NTPC (NR 20 stations), AZURE POWER INDIA Pvt. Ltd., Bhadla (SPD), Azure Power Forty Three Private Limited, and PGCIL (NRTS, and HVDC's stations), & NRSS 31 B Transmission Limited are received.

C.9.9 Entities (except above mentioned) are requested to verify the Reconciliation statements and send the duly signed copy as a normal practice. In case non receipt of any communication within one week from the meeting, it will be presumed that statement stands reconciled.

STOA (Short Term Open Access) Charges disbursement.

C.9.10 NRLDC has sent the reconciliation statement of open access disbursement for the Quarter-1 of financial year 2021-22 on 27th July 2021. STOA charges reconciliation statement of Indian Energy Exchange and Telangana State (STU) are received for the Quarter-1 of financial year 2021-22.

C.9.11 Applicants are requested to verify the Reconciliation statements and send the duly signed copy as a normal practice. In case non receipt of any communication within one week from the meeting it will be presumed that statement stands reconciled.

C.10 Status of NRLDC Fee & Charges (Agenda by NRLDC)

C.10.1 NRLDC is issuing the monthly RLDC Fees and Charges bill in line with the CERC RLDC Fees and Charges Regulation 2019. The bills are being mailed to all users on the day of billing and soft copies of bills are also available to the link "https://nrldc.in/commercial/bill-details/".

C.10.2 Status of outstanding as on 09.08.2021 against NRLDC Fee & Charges considering the bill of May-2021 (due date for which is 16.07.2020) is shown here in below:

Sl.No.	Entities	Amount Outstanding in Rs.	Outstanding from more than 90 Days (Principal)	Remarks
1	JKPCL/PDD J&K	93,61,507/-	72,95,165	August -20 to May-2021 Outstanding along with Surcharge

				outstanding up to 30.06.2021
2	Delhi (NDMC)	2,58,081	1,84,893	Dec-2020, to May-2021 outstanding along with Surcharge outstanding up to 30.06.2021

C.10.3 It is requested to the above users mention in above table to clear the outstanding at the earliest.

C.11 Scheduling, accounting and other treatment of the legacy shared projects in Northern Region (Agenda by NRLDC)

Sl. No.	Plant Name	State in which Plant is embedded	State whose entities have share in the plant	Share in %	Share in MW	Transaction ID for Schedule in Inter-state	Category
1	Bawana	Delhi	Haryana	10	137	SH-07	Scheduled under proper Open Access (CTU) Including Tr. Charges Including RLDC Fee & Charges Schedule changes are done ex-ante as per the IEGC
	Bawana	Delhi	Punjab	10	137	SH-06	
	CLP-Jhajjar	Haryana	Delhi	10	124	LT-05	
2	Rihand hydro	UP	MP	13.75	41.25	LT-01	Considered under deemed LTA. (without formal LTA/MTOA issuance by CTU) Tr. charges considered RLDC Fee & Charges not considered. Schedule changes are done ex-ante as per the IEGC
	Matatila	UP	MP	45	13.75	LT-02	
3	Vishnu Prayag	UP	Uttarakhand	12	60	SH-01	Considered under deemed LTA. (without formal LTA/MTOA issuance by CTU) Tr. Charges not considered RLDC Fee & Charges not considered.
	Alaknanda	UP	Uttarakhand	12	40	LT-38	
	Rajghat	MP	UP	25	11.25	LT-13	

							Schedule changes are done ex-ante as per the IEGC
4	Khara	UP	HP	20	14.4	SH-02	Considered under deemed LTA. (without formal LTA/MTOA issuance by CTU) Tr. Charges not considered RLDC Fee & Charges not considered. Schedule of these transactions are changed post-facto based on actual generation as per legacy.
	RSD	Punjab	HP		22	SH-04	
	Chibro	Uttarakhand	HP	25	60	SH-05	
	Khodri	Uttarakhand	HP	25	30		
	Dhalipur	Uttarakhand	HP	25	12.75		
	Dhakrani	Uttarakhand	HP	25	8.43		
	Kulhal	Uttarakhand	HP	20	6		

C.11.1 The schedule of the above interstate share from some intrastate generators was being carried out through contracts created in NRLDC WBES and punching access has been assigned to host state SLDC. The above issue was deliberated in 40th Commercial Committee meeting of NRPC held on 12th Sep 2019 at NRPC, New Delhi.

C.11.2 Vide MOM Dated: 01-10-2019, the Sub-committee concluded that the matter may be discussed in detail in upcoming NRPC meeting for taking final view in the matter.

C.11.3 The issue was also deliberated in 43rd TCC/ 46th NRPC meeting held on 23rd & 24th Sep 2019 at Kovalam, Thiruvananthapuram.

C.11.4 In the above meeting NRLDC proposed that since there were many differences in scheduling of some of these legacy transactions. It was important that uniformity in accordance to prevailing scheduling norms/regulations is brought at the earliest and therefore following could be considered:

i. All these transactions wherein specific LTA has not been granted shall be either considered under deemed LTA or specific LTA may be granted by the CTU.

ii. The transactions shall be subjected to transmission charges as well as RLDC fee and charges.

iii. Revisions in schedules of these transactions should be done ex-ante as applicable to any other transactions under the respective category.

iv. Post-facto revisions of some of these transactions which happening today shall be stopped.

C.11.5 Further intimated that, non-access of these transactions put additional burden on other utilities in PoC charges. Himachal Pradesh requested for

some time to discuss the matter in detail at their office and then they would be in a position to render their views.

C.11.6 Vide MOM Dt: 14th October 2019, It was decided that the issue may be discussed in separate meeting amongst concerned states. The outcome of the meeting would be placed before next TCC meeting.

C.11.7 Accordingly, a special meeting was called by NRPC to discuss the above issue on 14th October 2019 at NRPC, New Delhi.

C.11.8 Vide MOM Dt: 22nd October 2019 Deliberations made and the conclusions arrived, are as under:

i. Cat-1: The transactions under Category I are in accordance with the existing CERC Rules & Regulations and is considered as reference.

ii. Cat-2: It was noted that Transmission charges billing is already considered by WRPC on approved access of MP. Transaction from Rihand (UP) and Matatila (UP) HEPs, are included in approved access.

WRLDC has already considered these transactions in RLDC fee and charges bills of MP. All participants including SLDC, UP agreed that RLDC Fee & Charges should be applicable on Rihand Hydro and Matatila (UP) Plant for deemed LTA with MP, in accordance with CERC Regulations.

Hence, NRLDC may consider these transactions also for RLDC fee and charges billing from prospective date as per decision in the upcoming RPC meeting.

NRLDC proposed that in line with the present practice of raising the F&C Bills to other States, NRLDC F&C bills shall be raised to UP (UPPCL, UP seller's etc.) through UP SLDC. Regarding scheduling of these transactions,

NRLDC informed that scheduling window has been created in the WBES software and the schedule as entered by UP, SLDC is being considered and no role has to be played by NRLDC in this regard. It was suggested that, UP SLDC and MP SLDC may mutually discuss for real time scheduling of Rihand Hydro and Matatila (UP) HEP to avoid any mismatch in the schedule entered by MP and UP. UP SLDC agreed that they will coordinate with MP, SLDC and they will share web scheduling portal with login id/ password with MP, SLDC to resolve this issue.

iii. Cat-3: NRLDC informed that both Alaknanda and Vishnu Prayag generating stations were located physically in Uttarakhand but electrically in Uttar Pradesh. Uttarakhand was receiving free power from these plants, but not paying any transmission charges or RLDC fees and charges.

It was agreed (including UP and Uttrakhand SLDC) that the POC Transmission Charges and NRLDC Fee & Charges should be applicable for these deemed L TA transactions, in accordance with CERC Regulations.

iv. Cat 4: HP stated that HP has been drawing power from most of their projects through their dedicated lines. NRLDC pointed out that these lines have been considered as deemed ISTS based on application made by HP and since

HP is recovering charges of these lines through PoC, these transactions involve use of (deemed) ISTS network and hence, share of HP from these projects should be added to their approved access for levying transmission charges.

It was agreed that there should not be any post-facto adjustment and only ex-ante scheduling should be done, POC transmission charges as well as NRLDC Fee & Charges should be applicable for these deemed L TA transactions also, in line with CERC Regulations.

C.11.9 During the meeting it was agreed that the decisions taken in this meeting would be placed before TCC/NRPC in the next meeting and will be implemented from a prospective date based on the decision of NRPC.

C.11.10 The issue was deliberated in the in 45th TCC/48th NRPC meeting held on 2nd Sep 2020, where in it was advised by the members to convene a separate meeting again with the concerned states to finalize the scheduling philosophy and treatment of Transmission Charges and RLDC fees and charges.

C.11.11 The issue was also deliberated in the in 43rd Commercial sub-committee meeting, where All utilities were urged to submit their observations/objections with regard to treatment of Category 2, 3 and 4 projects similar to Category 1 projects which would be placed before TCC/NRPC for discussion and approval.

C.11.12 Members may please deliberate

C.12 STATUS of AMR Integration work (Agenda by NRLDC)

C.12.1 LOA for installation and commissioning of AMR system for Northern Region was awarded by POWERGRID to M/s Kalkitech in February 2012. The issues related to AMR are regularly being updated in every OCC Meeting and Commercial Sub-committee meeting of NRPC.

C.12.2 However out of 301 DCU locations (1914 meters), only around 230 nos. of DCU locations (1400 meters) i.e. around 73 % data is being used from AMR system for preparation of regional energy account.

C.12.3 Details of IEM integrated with AMR system are given below:

S.No.	Total No of IEM				No of IEM integrated with AMR				No of IEM to be integrated with AMR			
1	L&T	Elster	Secure	EDMI	L&T	Elster	Secure	EDMI	L&T	Elster	Secure	EDMI
2	1631	586	23	15	1536	378	0	0	95	208	23	15
	2255				1914				341			

C.12.4 It is also observed that numerous number of new renewable projects are being integrated at POWERGRID Pooling S/S, However IEM data from these Pooling S/S are received manually and not integrated with present AMR system.

C.12.5 M/s POWERGRID may please coordinate with M/s Kalkitech and ensure that meter data from all sites are regularly provided to NRLDC by Tuesday noon.

C.12.6 As informed by M/s Kalkitech, AMR communications through optical fibre link at 120 locations of POWERGRID and other utilities have been configured. Details of IEM integrated over fibre optic link are as below:

IEM integrated over Fibre optic				
L&T	Elster	Secure	EDMI	Total
947	366	0	0	1313

C.12.7 POWERGRID/CTU may like to apprise the present status and expected date by which integration of all meters will be completed.

C.13 Issues related with Interface Energy Meter/DCD (Agenda by NRLDC)

Status regarding procurement of DCD/Meters:

C.13.1 As per requirement assessed by NRLDC around 521 meters and 127 DCD will be required for next 2-3 years. Same was discussed in the 43rd Commercial Sub-Committee Meeting held on 13.04.2021 and the sub-committee stated that since bifurcation of functions of CTU and PGCIL is still under deliberation, PGCIL may coordinate with CTU for procurement of Meters/DCDs or procure them on behalf of CTU to avoid any issues regarding first time charging in the future.

C.13.2 CTU/POWERGRID may update the latest status of DCD/meters.

Replacement/Rectification of IEM meters/DCD:

C.13.3 POWERGRID/CTU may please update the status for rectification/replacement of Interface Energy Meter and DCD as per attachment Annexure-C.13.1 .

Nomination of nodal officer for issues related with Interface Energy Metering and DCD:

C.13.4 It is requested to all utilities to share the details of Nodal Officers in the attached format-Annexure-C.13.2 for coordination of meter related issues.

Delay in receipt of Interface Energy Meter data at NRLDC:

C.13.5 All concerned may please be advised to transmit IEM data every week to NRLDC by Tuesday noon in line with IEGC provision. It may be noted that data received after Tuesday may delay in timely processing of meter data and energy accounting. For the reference, details of IEM whose data for the week 19/07/21 to 25/07/21 were not received by Tuesday (27/07/21) are attached at Annexure-C.13.3.

C.13.6 Members may kindly note.

D. ITEMS FOR NRPC

D.1 Reimbursement of Expenditure of NRPC Sectt. for FY 2021-22 by the members of NRPC

D.1.1 Keeping in view the budget estimates approved by GoI for the financial year 2021-22 through NRPC fund and balance amount available in the NRPC Fund, the per member contribution for the year 2021-22 is proposed to be Rs.10.0 Lakh.

D.1.2 Members may kindly approve for remitting the above annual contribution.

D.2 Reimbursement of Expenditure of NRPC Sectt. by the members of NRPC for the previous years

D.2.1 For reimbursing NRPC expenditure to GoI and meeting the expenditure for meetings at Secretariat and other expenditure as approved by Chairperson, NRPC, constituent members are to pay annual contribution as decided in NRPC meetings from time to-time.

D.2.2 The contribution (as on 26.08.2021) from following members is still awaited:

Sl.	Constituent Member	Amount
	FY 2020-21	
1	Delhi Transco Ltd	600000.00
2	J & K State Power Development Corp. Ltd.	600000.00
3	Everest Power P Ltd.Gurgaon	600000.00
4	Uttar Haryana Bijli Vitaran Nigam Ltd.	600000.00
	TOTAL	2400000.00
	FY 2019-20	
1	Power Development Department,	1000000.00
2	J & K State Power Development Corp. Ltd.	1000000.00
3	Bajaj Energy Pvt Ltd.	1000000.00
	TOTAL	3000000.00
	FY 2018-19	
1	J & K State Power Development Corp. Ltd.	1000000.00
2	Manikaran Power	1000000.00
	TOTAL	2000000.00
	FY 2015-16	
1	J&K State Power Development Corp. Ltd., Shrinagar	1100000.00
	TOTAL	1100000.00
	FY 2014-15	
1	J&K State Power Development Corp. Ltd., Shrinagar	1100000.00
2	Bajaj Energy Pvt. Ltd., Noida	1100000.00
	TOTAL	2200000.00
	GRAND TOTAL	10700000.00

D.3 Membership in NRPC for Rotational Members

D.3.1 Government of India, Ministry of Power under the provision of Section 2, Subsection 55 of the Electricity Act 2003 had established the Northern Regional Power Committee in place of erstwhile Northern Regional Electricity Board vide its resolution dated 25.05.2005

D.3.2 The resolution and its subsequent amendments provide for representation by rotation for DISCOMs, Generating companies and Traders as given below:

- From each state, one of the State-owned distribution companies as nominated by the State Government.
- One distribution company by alphabetical rotation out of the private distribution companies functioning in the region is to be represented in NRPC.
- A representative of the generating companies (other than central generating companies or State Government owned generating companies) having power plants in the region with installed capacity of 1000 MW or below by rotation.
- A representative of the electricity traders operating in the region by rotation.

D.3.3 During the 25th NRPC meeting held on 24.02.2012, it was decided that NRPC Sectt. should finalize the representation of State-owned distribution companies by rotation based on the list of State-owned distribution companies and its representation in the previous years.

D.3.4 As per the decision in the 25th NRPC meeting held on 24.02.2012 the membership of State-owned distribution companies for the year 2021-22 will be as follows:

Haryana: Dakshin Haryana Bijli Vitaran Nigam Ltd.

Rajasthan: Jaipur Vidyut Vitran Nigam Ltd.

Uttar Pradesh: Madhyanchal Vidyut Vitaran Nigam Ltd.

D.3.5 In respect of private distribution companies in Northern Region, there are three major distribution companies namely BSES Rajdhani Power Ltd, BSES Yamuna Power Ltd and Tata Delhi Power Distribution Co. Ltd mainly operating in Delhi. According to the rotation followed in previous years and alphabetical order, Tata Delhi Power Distribution Co. Ltd may be considered for membership under this category during year 2021-22.

D.3.6 A representation of the generating companies (other than central generating companies or State Government owned generating companies) having power plants in the region with installed capacity of 1000 MW or below is to be made by alphabetical rotation. Based on the list of such generating companies operating in the Northern Region and alphabetical order followed in the past, this year it is the turn of Greenko Budhil Hydro Power Private Limited during the year 2021-22.

D.4 Verification of NRPC Fund Account

D.4.1 As per the Bye-laws for NRPC Fund the "NRPC Fund" account was required to be audited annually for each financial year. Accordingly, the NRPC fund account for financial years 2019-20 and 2020-21 was audited by the officers nominated by Chairperson, NRPC.

D.4.2 Audit of NRPC Fund account was also carried out through the Chartered Accountant appointed with the approval of Chairperson, NRPC. The statement of audited accounts of NRPC Fund for the Financial Years2019-20 and 2020-21 duly audited by the Chartered Accountant is enclosed in the agenda at Annexure-D.4.

D.4.3 Members may approve the statement of audited accounts of "NRPC – Fund" for the Financial Years 2019-20 and 2020-21.

D.5 Verification of Regional Board Fund

D.5.1 As per Bye-laws for Regional Board Fund (RBF), the account for each financial year was required to be audited annually by the officers nominated by Chairperson, NRPC.

D.5.2 The auditing of expenditure of RBF account for the years2019-20 and 2020-21 was carried out by the officers nominated by Chairperson, NRPC and statement is placed in the agenda at Annexure-D.5.

D.5.3 Members may approve the statement

D.6 HOSTING OF NEXT MEETINGS OF NRPC / TCC

The next meetings of TCC (48th) & NRPC (50th), which would be due in early next year are to be hosted by PTCUL. PTCUL was to host current meetings but due to lockdown on account COVID-19, the meetings are being held through VC.

Draft Standard Operating Procedure for Islanding Schemes

1. Design Protocol

i. As per Clause 10 of the Central Electricity Authority (Grid Standards), Regulations, 2010:

*"Islanding Schemes.- (1) The **Regional Power Committees** shall prepare Islanding schemes for separation of systems with a view to save healthy system from total collapse in case of grid disturbance. (2) The Entities shall ensure proper implementation of the Schemes referred to in subregulation (1)."*

ii. As per Indian Electricity Grid code amended from time to time, all regional constituents shall ensure that the islanding schemes are always functional.

iii. Islanding Schemes may be designed:

- for survival of some predefined generations and loads at the time of grid disturbance to avoid total blackout and quicker restoration of failed grid.
- for major cities having loads of VIP areas, Defence, Space, Airport, Metro, ports and important industries etc.

iv. Ministry of Defence(MoD) may be consulted to include their defense loads in such Islanding schemes. In case MoD requests any of their locations for which Islanding schemes is to be designed, the same would be considered. Only those defence establishments may be included in the Islanding Schemes for which MoD is agreed. The Ministry of Defence/Dept. of Military Affairs shall furnish information regarding their requirements as per format given at **Annexure I**. All the existing islanding scheme may be reviewed to include the Defence load in the scheme. Defence load of small capacity (upto 2 MW) not falling under any major cities may be continued with their arrangement of backup supply.

v. The Essential loads falling under an Islanding schemes may be taken under consideration while designing Islanding schemes. Generally the essential loads are classified into two categories (i) Super critical Load and (ii) Critical loads. The super Critical load may cover the loads of Defence area, Raj Bhawan, Parliament house, residence of VIPs, Metro rails etc. The Critical loads may consist of loads of hospitals, Airport, Railways, Important Industries etc falling under the area covered in Islanding schemes. The critical and super critical load of the major city may be considered in consultation with the DISCOMs/SLDC and MoD.

vi. If there is need to establish a power plant in/around such a city for the purpose, the proposal may be submitted for consideration of the concerned State /Utility under intimation to MoP. Possibility of installation of storage system at such location may also be explored. This provision may be suitably qualified for extremely sensitive loads only.

vii. Islanding Schemes are to be formed with anticipated load-generation balance and with tripping of predetermined feeders/ ICTs/ generators. In every islanding scheme, adequate automated mechanism should be implemented for achieving load generation balance in the islanded sub-system.

viii. Islanding schemes should not be taken as a system for continued supply to important loads. Necessary arrangement for emergency supply to important critical loads must be made separately.

ix. Studies are to be carried out for verifying the operation of the Islanded system.

x. The cyber security in the power system for Islanding schemes must be in accordance with the guidelines issued by Government of India.

2. Monitoring of Vital Parameters

i. Since formation of Island can take place at any time, monitoring of the following vital parameters, which have a significant role in on successful Island formation, is of paramount interest:

   a. Anticipated/ actual Generation within the electrical boundary of the Island.

   b. Anticipated/ actual Load within the electrical boundary of the Island.

   c. Voltage, Frequency & Power Flows along the peripheral lines which are required to be tripped to form the Island.

ii. Above parameters are to be monitored in real-time basis in the Control Room/ Despatch Centre (i.e Sub SLDCs/SLDC/RLDC/NLDC) of the area by creating a dedicated page specific to the Islanding Scheme in the SCADA display. To accomplish this, provision should also be made, if required, for installing adequate measuring instruments (like PMU) at suitable locations within the Island.

iii. The data in the formats at Annexures –II (Format I) may be submitted by RLDC/SLDCs to RPCs on monthly basis to certify the healthiness of communication system for monitoring the vital parameters of Islanding Schemes.

3. Certification of Healthiness of Islanding Scheme:

i. Since healthiness of an integrated system depends on the healthiness of its constituting components, healthiness of Islanding Scheme has to be ascertained/ ensured by seeking monthly certificate for healthiness of batteries, installed at all Substations located within the electrical boundary of the Islanding Scheme.The idea is since these battery banks provide power supply to Relays, RTUs and PLCC equipment, healthiness of the former is critical to operation of the latter when called for.

ii. It is to confirm the healthiness of islanding schemes by participating Generators as well as concerned transmission utilities for their respective portion in the monthly OCC meeting.

iii. The data in the formats at **Annexures –II** (Format II to IV) may be submitted by Generators/Transmission utilities/Discoms etc to RPCs on monthly basis to certify the healthiness of Islanding Schemes.

4. Role and Responsibility and Coordination Activities:

i. The Role and Responsibility of the Organizations / Officers/Officials in designing and operating the Islanding Schemes is defined at Annexure-III.

ii. This is proposed to be achieved by having a Nodal Officer for each participating Utility in the Island [i.e., those who own assets (Generating stations, substations, transmission lines, distribution lines, etc.) within the Island], and a Chief Nodal Officer from the concerned Despatch/ Control Centre. The Chief Nodal Officer from LDC and Utility-specific Nodal Officers ensure free flow of information among them w.r.t. Islanding Scheme Operational status, and ensure correct & prompt communication between the SCADA Control Centre and various stations (Generating Stations/ Substations). There will be a coordination officer in each region from each RLDCs.

iii. An updated list of contact details of all Nodal Officers as mentioned above shall be maintained with LDC & all Utilities involved. The Details of officials as mentioned above may be obtained in the in the Format V of Annexures –II:

5. Sensitization and Training of Officers involved:

i. Even though chances of Island formation in a strongly integrated grid are remote, since the Islanding schemes are designed to protect major critical loads/ sensitive generation in the unfortunate event of failing of all other defence mechanisms, The Nodal Officers & concerned field staff associated with O& M of various stations (generating stations as well as substations) within the electrical boundary of the Island should be sufficiently sensitized about the colossal loss of those critical assets on account of Island failure, and consequent disruption to various sectors & businesses.

ii. To ensure this, apart from conducting periodic orientation training programmes, the concerned Officers/ staff should also be involved in the activities concerning management of grid under stressed conditions, SCADA control, communication upkeep, and in the activities relating to audit/ inspection of critical loads & sensitive stations within the Island.

iii. The Officials and Officers in the Generating Station/Substation/Utilities / LDC/ RLDC / RPCs would be sensitized about the (concerned) Islanding Scheme. They also to be trained to handle the Critical and Emergency Load Management in the system.

iv. Training shall be focused on individual Islanding Schemes and integration of Islanding schemes with rest of the grid until restoration of normalcy to the regional grid.

v. All the concerned utilities shall organise periodic training program for the nodal officers and concerned field officers. The training programs shall be in consultation and coordination with the RPCs. The training and sensitization program may be conducted once in six months.

6. Periodic Inspection/ Audit of Essential Components:

Inspection/ audit of all essential components as given below shall be carried out regularly (by third party) and inspection/Audit report may be submitted to respective RPCs:

i. Under Frequency Relays (UFR) on Island forming elements (Lines & ICTs) – Quarterly.
ii. Associated communication equipment at all stations within Island - Bi-monthly.
iii. Associated DC supply for Control panel & communication system-Bi- monthly.

7. Review Plan of Islanding Schemes:

i. Considering the fact that Network Changes (additions/ deletions/ reconfigurations of transmission elements & generators) in an evolving grid such as Indian electrical grid are unavoidable/ inevitable, it is but necessary to review the Islanding scheme operation w.r.t. prevailing grid conditions at regular intervals, and incorporate requisite changes so as to make them reliable & dependable.

ii. In such review, all details as used in the existing scheme have to be re-collected including the new changes for studying the modifications to be carried out in the In-service Island. These details, among others, include participating generators, anticipated generation, participating loads, anticipated load, elements (lines and/ or ICT's) to be tripped to form the modified Island, geographical map & SLD of the modified Island, AUFR load relief, df/dt load relief, pumped loads details, etc. Using these details, system studies also need to be carried out to verify stability (including voltage profile & line loadings profile) of the modified Island.

iii. It is recommended to carry out above review of the In-Service Islanding scheme once in six months by all concerned utilities. However, the review may also be carried out as soon as any network change, which may affect the operation of the Islanding Scheme, comes to notice.

8. Identification of Short-comings & Remedial action:

Based on the shortcomings noticed as a result of the activities performed in monitoring of vital parameters of the Island, ascertaining healthiness of Island, carrying out periodic inspection/ audit of essential components of the Island, prompt remedial action shall be taken to redress the observed deficiencies. The period of redressal from the instant of noticing shortcomings shall be at most one week/ fortnight. The compliance report may be submitted to RPCs in this regard.

9. Post Islanding survival:

In every islanding scheme, adequate automated mechanism should be implemented for achieving load generation balance in the islanded sub-system. Also, for frequency control of islanded subsystem there should be generating units in the island on restricted/ free governor mode of operation. Also, load connection/ disconnection should be possible remotely from the dispatch centre of the islanded sub-system. Health of all facilities in the islanding scheme should be closely monitored so as keep necessary electrical, mechanical, electronics and communication systems in good health all the time.

10. SOP Template for Islanding Schemes is at Annexure-IV

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Annexure –I

MINISTRY OF POWER
CENTRAL ELECTRICITY AUTHORITY

Details of information to be furnished by Defence installations for the purpose of designing the Electrical Islanding schemes:

Item No.	Description	Details
1	**Basic Details:**	
1.1	Service: Army/Navy/Airforce/MES etc.	
1.2	Name of the Establishment	
1.3	Location (State, District, Taluk & Village)	
1.4	Name of the nearest City & Distance from it	
2.	**Power Supply Details:**	
2.1	Name of the DISCOM (Power Supply Distribution Company) from which supply is being availed:	
2.2	Name of the DISCOM Substation from which supply is being availed:	
2.3	Number of incoming lines/feeders of supply and Voltage level	
3	**Load Details:**	
3.1	Contracted Capacity in kVA/MVA	
3.2	Maximum Demand in kVA/ MVA	
3.3	Connected Load in kW/MW	
3.4	Critical Load(kW/MW)/ Non Critical Load(kw/MW)	
3.5	Any other information on Load details	
4	**Backup Power Supply:**	

4.1	Details of DG sets: (Number of DG sets & their Rating in kVA/MVA & No. of hours they can run/sustain)	
4.2	Battery Banks/ UPS Rating:	
4.3	In-house Solar Generation in kW/MW	
4.4	Captive Generation, if any, in kW/ MW	
5	**Specific Requirement from Ministry of Power, CEA/RPCs, NLDC, RLDC, ST, SLDC and Discoms wrt uninterrupted power supply to Defence installation**	
6	**Other Relevant Information, if any**	

***

Annexure-II

Formats for collection of information regarding Islanding Schemes:

a. Format - I for RLDC/SLDCs

S.NO	Name of Islanding Scheme	Healthiness of Communication channel

b. Format - II for Generating Station

S.NO	Name of Islanding Scheme	Healthiness of Islanding Relay	Healthiness of Communication channel

c. Format - III for Transmission Utility/ DISCOMs

S.NO	Name of Islanding Scheme	Elements considered for tripping to from Island	For communication based tripping logic of feeders	For UFR based tripping logic of feeders	
			Healthiness of Communication channel	Healthiness of PT Fuse and status of DC supply to UFR relay*	Healthiness of Relay#

* Where dedicated UFR relay have been installed for tripping of the feeders under islanding scheme

Where UFR function have been enabled within backup protection relay of the line

d. Format - IV for collecting Relay details of the Islanding scheme.

The following format may be used to get Relay details of the Islanding scheme:

S.NO	Description	UFRs-for load relief (A)	df/dt -for load relief (B)	Relay for Island creation(C)
1	Relay location (S/s name)			
2	Relay make & model			

3	Frequency setting of the relay (at which load shedding is envisaged)			
4	Feeder name (voltage level and source-destination name) signalled by the Islanding Relay for separation /load shedding/separation from outside grid			
5	Quantum of load relief due to tripping of feeder (as per state's peak of previous year)			
6	Quantum of load (Min, Avg, Max in MW) on the feeder (as per state's peak of previous year)			

e. Format - V for Contact details of all Nodal Officers

Utility Name &Location	Name	Designation	Organization	Email ID	Mobile No.

***

Annexure –III

Roles and Responsibilities of Officers involved in Islanding Schemes:

1.	**RPCs**	i. In comply with CEA(Grid Standards) 2010 and its amendments, MS, RPCs shall be responsible for preparation of Islanding Schemes. The designing/ implementation and Review of Islanding Scheme may be discussed in appropriate Committee/Sub-Committee of RPCs or a separate Sub-group may be formed. ii. MS, RPC may Nominate Officer at the level of Superintending Engineer for Coordinating the Islanding Schemes in the Region. iii. MS, RPCs shall be responsible for periodic review of the Islanding Schemes to accommodate the network changes, load generation balance or constraints, if any. iv. MS, RPC shall be responsible for third party audit of the components of an Islanding Scheme.
2.	**RLDCs**	i. There shall be a nodal officer at the level of General Manager & above appointed by the appropriate Authority of the RLDC. Nodal officer of RLDCs may act as Coordinating Nodal officer. ii. The Nodal officer of RLDCs shall coordinate the Chief Nodal officers of SLDCs in their respective regions. iii. Coordinating Nodal Officer shall ensure monitoring of the vital parameters of operational/implemented Islanding Schemes in their region, which have a significant role in successful Island formation at their SCADA system. iv. To ensure proper monitoring, measuring instruments (like PMUs etc.) and communication systems may be recommended by Co coordinating nodal officer to the concerned utility. v. Coordinating Nodal officers shall monitor and ensure the healthiness of the components involved in the Islanding Scheme like SCADA system, communication channel etc. at their end. vi. Coordinating Nodal officer shall conduct monthly self-certification of healthiness of the communication systems at their end and communicate it to the concerned RPCs in the format prescribed in the SOP. vii. Coordinating Nodal officer shall ensure follow-up of the recommendation of the third party Audit conducted by RPCs in a time bound manner.
3.	**Nodal officer of LDCs**	i. There shall be a nodal officer at the level of Chief Engineer & above for all Islanding Schemes in the respective state appointed by the appropriate Authority of the LDCs. ii. Nodal officer of LDCs shall act as Chief Nodal officers for nodal officers of DISCOMs, TRANSCOS & GENCOs of the

			state and shall ensure proper communication among all the nodal officers.
		iii.	The Chief Nodal officer shall coordinate and responsible for implementation of newly designed Islanding Schemes in coordinated manner with all utilities involved.
		iv.	Chief Nodal officer is responsible for collection of data from the concerned utilities and submission the same to committee for study purpose in respect of existing/new IS for review/design purpose.
		v.	Chief Nodal Officer shall ensure monitoring of the vital parameters of operational/implemented Islanding Schemes in the state, which have a significant role in successful Island formation.
		vi.	To ensure proper monitoring, measuring instruments (like PMUs etc.) and communication system etc. may be recommended by nodal officer to the concerned utility
		vii.	Chief Nodal officers shall ensure the healthiness of the components involved in the Islanding Scheme like SCADA system, communication channel etc. at their end.
		viii.	Chief Nodal officer shall conduct monthly self-certification of healthiness of the components at their end involved in the Islanding scheme and communicate it to the concerned RPC in the format prescribed in the SOP.
		ix.	Chief Nodal officer shall ensure follow-up of the recommendation of the third party Audit conducted by RPC in a time bound manner.
4.	**Nodal officer of Participating GENCOs**	i.	There shall be a nodal officer at the level of General Manager / Chief Engineer & above for Islanding Schemes appointed by the appropriate Authority of the Generation Company.
		ii.	Nodal officers shall be responsible for the implementation of newly designed Islanding Schemes for Genco's part and submission of data to Study committee wrt Islanding scheme.
		iii.	Nodal officer is responsible for submission of data for Genco part to committee for study in respect of existing/new IS for review/design purpose.
		iv.	Nodal officers shall ensure the healthiness of the components involved in the operational Islanding Scheme like Generating Units, Substations /Switch yards, Relays, communication channel etc. at their end.
		v.	Nodal officer shall conduct monthly self-certification of healthiness the components at their end involved in the Islanding scheme and communicate it to the concerned RPCs in the format prescribed in the SOP.
		vi.	Nodal officer shall ensure follow-up of the recommendation of the third party Audit conducted by RPCs in a time bound manner.

5.	**Nodal officer of STUs/PGCIL**	i. There shall be a nodal officer at the level of General Manager / Chief Engineer & above for all the Islanding Schemes appointed by the appropriate Authority of the Transmission Company. ii. Nodal officers shall be responsible for the implementation of newly designed Islanding Schemes at transmission part. iii. Nodal officer is responsible for submission of data to committee for study in respect of existing/new IS for review/design purpose for Transmission part . iv. Nodal officers shall ensure the healthiness of their components involved in the operational Islanding Scheme like Substations, Transmission Lines, Relays, communication channel etc. at their end. v. Nodal officer shall conduct monthly self-certification of healthiness of the components at their end involved in the Islanding scheme and communicate it to the concerned RPC in the format prescribed in the SOP. vi. Nodal officer shall ensure follow-up of the recommendation of the third party Audit conducted by RPC in a time bound manner.
6.	**Nodal officer of DISCOMs**	i. There shall be a nodal officer at the level of General Manager /Chief Engineer & above for each Islanding Schemes appointed by the appropriate Authority of the Distribution Company. ii. Nodal officer shall be responsible for identification of essential loads and defence load for the Islanding Scheme. iii. Nodal officers shall be responsible for the implementation of newly designed Islanding Schemes at their end. iv. Nodal officer is responsible for submission of data for their part to committee for study in respect of existing/new IS for review/design purpose. v. Nodal officers shall ensure the healthiness of the components involved in the Islanding Scheme like Feeders, Relays, communication channel etc. at their end. vi. Nodal officer shall conduct monthly self-certification of healthiness of the components involved in the Islanding scheme at their end and communicate it to the concerned RPC in the format prescribed in the SOP. vii. Nodal officer shall ensure follow-up of the recommendation of the third party Audit conducted by RPC in a time bound manner.

***

Annexure-IV

SOP Template for Islanding Schemes:

1. Purpose
2. Design
    i. Generation
        a. Coal
        b. Gas
        c. Nuclear
        d. Hydro
        e. Solar
        f. Wind
        g. Total generation
        h. PLF or availability /scheduling
        i. Generation considered
        j. Generators on prolonged outage
        k. Probability of the anticipated generation
        l. Pumped storage?
        m. ISGS
        n. SGS
        o. IPP/MPP
    ii. Load
        a. Drinking water
        b. Irrigation
        c. Agriculture
        d. Industrial
        e. Commercial
        f. Domestic
        g. Hospital
        h. Railways/Metro
        i. Defence
        j. Lift Irrigation System/Scheme
    iii. Load relief
        a. df/dt-I
        b. df/dt-II
        c. AUFR-I
        d. AUFR-II
        e. AUFR-III
        f. AUFR-IV
    iv. Transmission lines in the islanded area
        a. 765 kV
        b. 400 kV
        c. 220/230 kV
        d. 132/110 kV
        e. 66 kV

f. 11/22/33 kV
g. Inter regional lines
h. Inter-state lines
i. Intra-state lines o Substations in the area
j. CTU
k. STU
l. ISTS

v. Transmission lines that get disconnected on operation of df/dt and AUF relays
- 220/230 kV
- 132/110 kV
- 66 kV
- 11/22/33 kV

vi. Transmission lines to be tripped for forming Island
a. 765 kV
b. 400 kV
c. 220/230 kV
d. 132/110 kV
e. 66 kV
f. 11/22/33 kV

vii. Name of the cities covered
a. 10 million
b. 1 million
c. Defence locations

viii. Diagrams
a. SLD map of the island
b. Geographical map of the island with boundary
c. Major cities/critical loads/defence loads marked
d. Substations marked

3. SCADA mapping
Island generation and island loads on the SCADA display

4. Constraints
a. Generation limits
b. Line loading limits
c. ICT loading limits o Frequency set points
d. df/dt-I
e. df/dt-II
f. AUFR-I
g. AUFR-II
h. AUFR-III
i. AUFR-IV
j. LIS relief frequency
k. RE generation disconnection frequency
l. Islanding frequency

5. Controlling generation in islanded area

a. AGC
b. RGMO/FGMO

i. Controlling load in islanded area
   a. Automatic
   b. Flow based
   c. Voltage based
   d. Frequency based
   e. Manual

ii. Validation check list
   - Generation > Load?
   - Non-Hydro only islanding?
   - Less number of disconnecting lines?
   - All disconnecting lines with AUFR?
   - RE-solar/wind excluded?
   - LIS loads excluded?
   - LF studies for islanded area, converging?
   - In the converged LF studies, line loadings profile & voltage profile are within permissible limits?
   - All critical load/defence loads included?
   - Critical/defence loads are not part of SPS, df/dt or AUFR schemes?
   - Islanding frequency - (47.9 Hz)?
   - Adequate margin between lower frequency of IEGC band and first stage AUFR?
   - Adequate margin between islanding frequency and AUFR last stage?
   - Scheme was discussed & approved in OCC/ PCC?
   - Scheme approved in RPC?

50.20		
50.10		
50.05		
50.00		IEGC band
49.90		
49.80		
49.70		Urgent load Mgt.
49.60		
49.50		

49.40		Emergency Load Mgt.
49.30		
49.20		
49.10		
49.00		UFR load shedding
48.90		
48.80		
48.70		
48.60		
48.50		
48.40		
48.30		
48.20		
48.10		
48.00		
47.90		Islanding Frequency
47.80		

*** *Above values are subject to change as per newly adopted frequency settings in NPC*

6. Operation
   i. Successful
      - Generation in the islanded area
      - Load in the islanded area
      - Date & time island formation
      - Date & time of island closed/shutdown
      - Frequency of the islanded area
      - Voltage profile of the buses
      - Flows/ Loadings on critical lines
      - Duration of island survival
      - Whether anticipated generation was there?
      - Whether anticipated load was there?

- All the lines were disconnected as per the plan?
- Reason for islanding success
- Any measures to further improve

ii. Failure

a. Generation in the islanded area
b. Load in the islanded area
c. Date & time island formation
d. Date & time of island closed/shutdown
e. Duration of island survival
f. Whether anticipated generation was there?
g. Whether anticipated load was there?
h. All the lines were disconnected as per the plan?
i. Reason for islanding failure
j. Remedial measures

7. Review plan
   i. Island formed and approved date
   ii. Change in generation
      - Addition
      - Deletion
      - Alteration
   iii. Change in load
      a. Addition
      b. Deletion
      c. Alteration
   iv. Change of the lines to be disconnected
   v. Any new lines to be included for disconnecting
   vi. Requirement of additional df/dt & AUFR relays

8. Nodal officers of Islanding Scheme
   i. RLDC
   ii. SLDC
   iii. STU
   iv. SGS
   v. ISGS
   vi. ISTS (SR-I, SR-II)

9. Sensitization Training of nodal officers
   i. Training by RLDC
   ii. Training by NPTI/PSTI
   iii. Training by SLDC
   iv. SRPC special meetings

10. Periodic Inspection of Essential components of Islanding Scheme
   i. Inspection of UF relays of disconnecting lines
   ii. Ensuring adequate relief under df/dt and AUFR stages

iii. Ensuring relays for disconnecting RE sources
iv. Ensuring relays for disconnecting LIS
v. Ensuring critical/defence loads are not under df/dt & AUFR stages
vi. Monitoring the anticipated generation and load in the islanded area

11. Mock drill

i. Mock drill to follow any major or near miss incidents
ii. Frequent heavy over drawl by states
iii. Frequent Very low frequency of operation
iv. Before peak period of the region
v. Before peak period of the state
vi. Loss of many lines due to cyclone/weather
vii. Loss of generating plants due to cyclone/weather
viii. RE is highest and entirely absorbed by states

12. Certifications of healthiness of IS

i. Batteries
ii. Relays
iii. Lines within the islanded area

13. Identifications of short comings

14. Further updations.

*****

Annexure-B

1) **Name of the Islanding Scheme (better available):** Narora Atomic Power Station (NAPS) Islanding Scheme

2) **Brief Working/design of the above Islanding Scheme (with SLD and other details**

NAPS have two units of 220MW each. The islanding scheme is devised to save the operating unit(s) of NAPS during grid collapse situation. Operating logic for the islanding scheme is as under:

a) When One unit is under operation

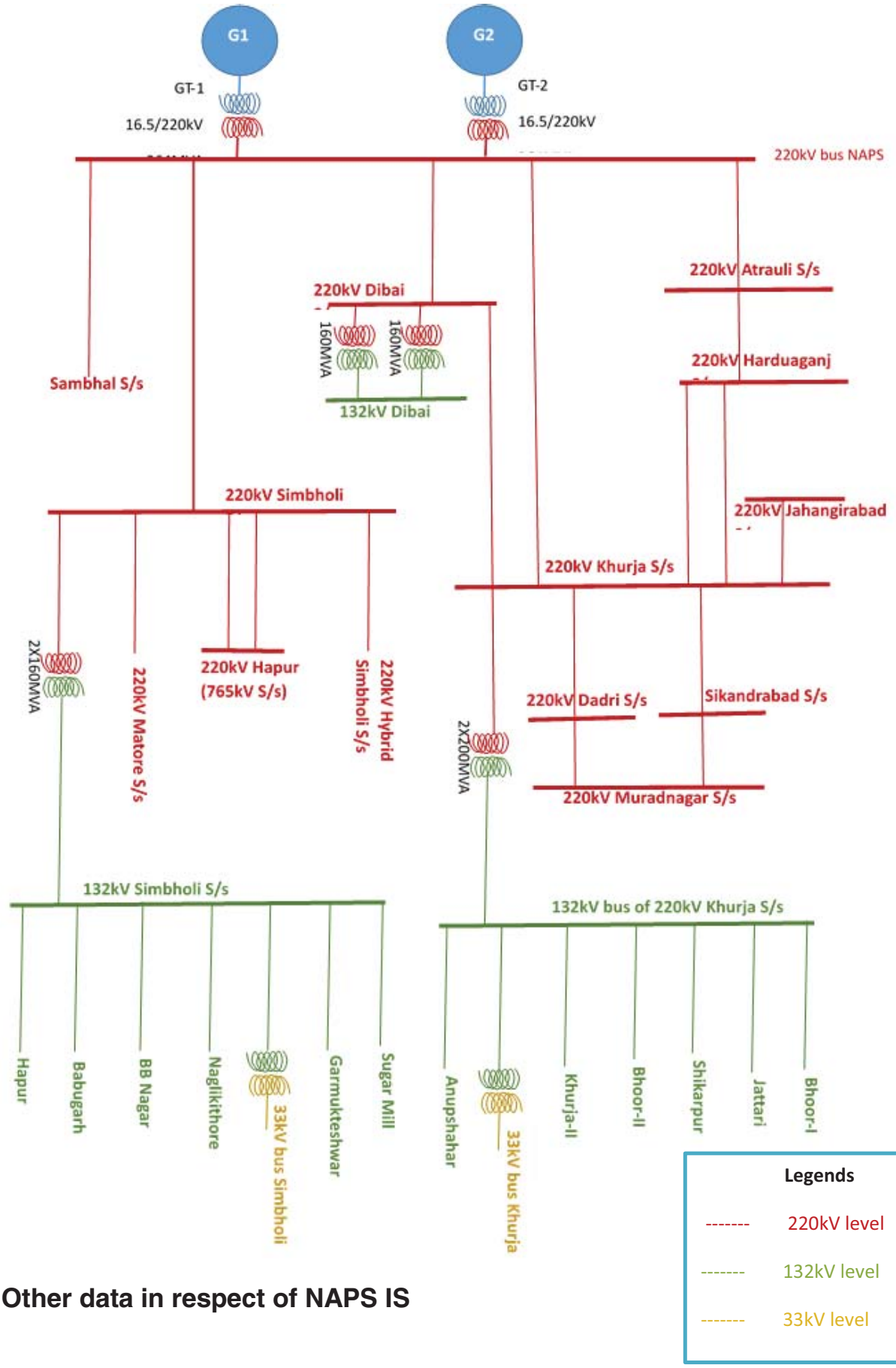
- At 48Hz - Low frequency alarm appears in main control room.
- At 47.9Hz - Four nos. of 220kV feeders are tripped to form NAPS island (feeders are NAPS-Sambhal, NAPS-Atrauli, NAPS-Khurja and NAPS-Dibai). Island load is in the range of 70-90MW of Simbholi S/s and 25MW station load.
- Frequency further falls to 47.5Hz - All five outgoing lines from NAPS 220kV bus are tripped after 1 sec delay. Station Unit Transformer CBs are tripped after 3 sec delay. Generator Transformer CB are tripped after 5 sec delay. Unit comes on house load.

b) When both units are under operation

- At 48Hz - Low frequency alarm appears in main control room.
- At 47.9Hz - Two nos. of 220kV feeders are tripped to form NAPS island (feeders are NAPS-Sambhal and NAPS-Atrauli). Island load is in the range of 150-280MW of Simbholi S/s, Khurja S/s and Dibai S/s and 40MW station load.

In case, frequency further falls to 47.5Hz - All five outgoing lines from NAPS 220kV bus are tripped after 1 sec delay. Station Unit Transformer CBs are tripped after 3 sec delay. Generator Transformer CB are tripped after 5 sec delay. Units come on house load.

SLD for NAPS Islanding scheme is as under:



3) Other data in respect of NAPS IS

i. **Format (I)** for Generating Station

Sl. No.	Name of Islanding Scheme	Element considered for tripping to form Island	Healthiness of Islanding Relay	Healthiness of Communication channel
1.	NAPS Islanding Scheme	220kV NAPS-Sambhal	Self-certification to be given by NAPS on monthly basis	Self-certification to be given by NAPS on monthly basis
		220 kV NAPS-Atrauli	-do-	-do-
		220kV NAPS –Khurja	-do-	-do-
		220kV NAPS-Dibai	-do-	-do-

ii. **Format (II)** for Transmission Utility/Discoms

Sl. No.	Name of Islanding Scheme	Element considered for tripping to form Island	For communication-based tripping logic of feeders	For UFR based tripping logic of feeders	
			Healthiness of Communication channel	Healthiness of PT Fuse and status of DC supply to UFR relay	Healthiness of Relay
1.	NAPS Islanding Scheme	220kV Simbholi-Matore	Self-certification to be given by UPPTCL on monthly basis	Self-certification to be given by UPPTCL on monthly basis	Self-certification to be given by UPPTCL on monthly basis
		220kV Simbholi – Hapur (765kV) S/S-CKT-1&2	-do-	-do-	-do-
		220kV Simbholi-Hapur Hydrid	-do-	-do-	-do-
		132kV Simbholi-Hapur	-do-	-do-	-do-
		132kV Simbholi-Babu Garh	-do-	-do-	-do-
		132kV Simbholi-BB Nagar	-do-	-do-	-do-
		132kV Simbholi-Naglikithore	-do-	-do-	-do-
		ICT-I (160 MvA) at Dibai	-do-	-do-	-do-
		ICT-II (160 MvA) at Dibai	-do-	-do-	-do-
		220kV Khurja-Harduaganj (Double CKT)	-do-	-do-	-do-
		220kV Khurja-Dadri	-do-	-do-	-do-
		220kV Khurja-Sikandrabad	-do-	-do-	-do-
		220kV Khurja-Jahangirabad	-do-	-do-	-do-

iii. **Format (III)**: Relay details of the Islanding scheme

Sl. No.	Description	UFRs (for load relief)	df/dt (for load relief)	Relay for Island creation
1	Relay location (S/s name)	-	-	NAPS, Dibai
2	Relay make & model	-	-	ABB RXFE-4, Alstom MFVUM-12
3	Frequency setting of the relay (at which load shedding is envisaged)	-	-	47.9 Hz
4	Feeder name (voltage level and source-destination name) signaled by the Islanding Relay for separation /load shedding/separation from outside grid	-	-	(i) 220kV NAPS-SAMBHAL (ii) 220 kV NAPS-Atrauli (iii) 220kV NAPS –Khurja (iv) 220kV NAPS-Dibai (v) ICT-I (160 MvA) at Dibai (vi) ICT-II (160 MvA) at Dibai
5	Quantum of load relief due to tripping of feeder (as per state's peak of previous year)	-	-	UFR or df/dt load relief is not configured in NAPS IS.
6	Quantum of islanding load (Min, Avg, Max in MW) on the feeder (as per state's last peak)	-	-	Summer min: 108MW Summer avg: 278MW Summer max: 359MW

Sl. No.	Description	UFRs (for load relief)	df/dt (for load relief)	Relay for Island creation
1	Relay location (S/s name)	-	-	Simbholi
2	Relay make & model	-	-	Alstom MFVUM-12
3	Frequency setting of the relay (at which load shedding is envisaged)	-	-	47.9 Hz

4	Feeder name (voltage level and source-destination name) signaled by the Islanding Relay for separation /load shedding/separation from outside grid	-	-	(i) 220kV Simbholi-Matore (ii) 220kV Simbholi – Hapur (765kV) S/S-CKT-1&2 (iii) 220kV Simbholi-Hapur Hydrid (iv) 132kV Simbholi-Hapur (v) 132kV Simbholi-Babu Garh (vi) 132kV Simbholi- BB Nagar (vii) 132kV Simbholi-Naglikithore
5	Quantum of load relief due to tripping of feeder (as per state's peak of previous year)	-	-	UFR or df/dt load relief is not configured in NAPS IS.
6	Quantum of islanding load (Min, Avg, Max in MW) on the feeder (as per state's last peak)	-	-	Summer min: 82MW Summer avg: 110MW Summer max: 149MW

Sl. No.	**Description**	**UFRs (for load relief)**	**df/dt (for load relief)**	**Relay for Island creation**
1	Relay location (S/s name)	-	-	Khurja
2	Relay make & model	-	-	Alstom MFVUM-12
3	Frequency setting of the relay (at which load shedding is envisaged)	-	-	47.9 Hz
4	Feeder name (voltage level and source-destination name) signaled by the Islanding Relay for separation /load shedding/separation from outside grid	-	-	(i) 220kV Khurja-Harduaganj (Double ckt) (ii) 220kV Khurja-Dadri (iii) 220kV Khurja-Sikandrabad (iv) 220kV Khurja-Jahangirabad

5	Quantum of load relief due to tripping of feeder (as per state's peak of previous year)	-	-	UFR or df/dt load relief is not configured in NAPS IS.
6	Quantum of islanding load (Min, Avg, Max in MW) on the feeder (as per state's last peak)	-	-	Summer min: 26MW Summer avg: 168MW Summer max: 210MW

iv. **Format IV Contact details of nodal officers**

Location	Officer	Email ID	Contact No.
NAPS	Sh. H.S. Singh, (STE-E&I), NAPS Ms. Arpita Chakravorty, (TE-E)	hssingh@npcil.co.in achakravorty@npcil.co.in	9412768059 9412768143
Simbholi	Sh. Indrajeet Singh, SDO, Transmission, UPPTCL Sh. Sagar Kumar, AE T&C, UPPTCL	ijsingh1980@gmail.com aetnchpr@gmail.com	9412749987 7290097560
Dibai	Sh. Mohit Kumar Singh, SDO(T), UPPTCL Sh. Anuj Kumar, AE(T&C), UPPTCL	mohit3008.biet@gmail.com	7983710548
Khurja	Sh. Mahendra Kumar, SDO(T), UPPTCL Sh. Anuj Kumar, AE(T&C), UPPTCL	-	7983944373
Matore	-	-	-
Hapur 765kV	Sh. Aman Kumar, Manager, WUPPTCL Sh. Sunil Aneja, Testing Incharge, WUPPTCL	amankumar.wupptcl@gmail.com sunilaneja.wupptcl@gmail.com	9559437270 9355669863
Hapur 220kV Hybrid	Sh. Aman Kumar, Manager, WUPPTCL Sh. Sunil Aneja, Testing	amankumar.wupptcl@gmail.com sunilaneja.wupptcl@gmail.com	9559437270 9355669863

Location	Officer	Email ID	Contact No.
	Incharge, WUPPTCL		
Harduaganj	Sh. H.S. Singh, (STE-E&I), NAPS	hssingh@npcil.co.in	9412768059
Dadri	Sh. Devendra Kumar Gupta, SDO(T), UPPTCL Sh. Vipin Kumar, AE(T&C), UPPTCL	sdotrnoid3@gmail.com eetncnoida@upptcl.org	7290059691, 7290059711
Sikandrabad	Sh. Amrish Kumar, SDO(T), UPPTCL Sh. Anuj Kumar, AE(T&C), UPPTCL	ae15062012khj@gmail.com	9412227558
Jahangirabad	Sh. Mahendra Kumar, SDO(T), UPPTCL Sh. Anuj Kumar, AE(T&C), UPPTCL	-	9412749904

Annexure C

Information needed for Islanding Scheme

1) Name of the Islanding Scheme (better available) : Islanding of CESC Generation System
2) Brief Working/design of the above Islanding Scheme **(Annexure C2)**
3) Other Data Required in respect of the above IS (Logic Diagram attached at **Annexure C3**)

i. Format (I)

Format (I) for Generating Station			
S.NO	**Name of Islanding Scheme**	**Healthiness of Islanding Relay**	**Healthiness of Communication channel**
1	CESC GS IS	Healthy	Healthy

ii. Format (II)

Format (II) for Transmission Utility/Discoms					
S.NO	**Name of Islanding Scheme**	**Name of Feeders considered for tripping to form Island**	**For communication based tripping logic of feeders**	**For UFR based tripping logic of feeders**	
			Healthiness of Communication channel	**Healthiness of PT Fuse and status of DC supply to UFR relay***	**Healthiness of Relay#**
1	CESC Generation System Islanding Scheme	(i) EMSS: 132 kV BC1 // 132 kV WBSETCL KASBA F1, F2 & F3. (ii) SRS & BGSS:132 kV WBSETCL HWH F1 at SRS and F2 & F3 at BGSS// 132 kV WBSETCL HWH F1, BGSS F2/2A & F3 at SRS	(i) Not Applicable for EMSS (ii)Communication channel between SRS & BGSS monitored by Line Differential Relay at SRS	Healthiness of PT Fuse and status of DC supply to UFR relay monitored locally and also from remote.	Healthiness of Splitting Relay also monitored from local as well as from remote

iii. **Format (III)** :

Format (III) : Relay details of the Islanding scheme				
S.NO	**Description**	**(A) UFRs (for load relief)**	**(B) df/dt(for load relief)**	**(C) Relay for Island creation**
1	Relay location (S/s name)	SRS, ECAL S/S, JAD S/S, TRS, PLN S/S, MAJ S/S,BBD BAG S/S	Not Applicable	
2	Relay make & model	Siemens make 7SJ62 & 7RW60 Alstom Make Micom P923&MFVUM ABB Make FCX	Not Applicable	Siemens/7SJ62
3	Frequency setting of the relay (at which load shedding is envisaged)	47.8 Hz (SRS), 47.7 Hz (ECAL), 47.6 Hz (TRS), 47.5 Hz (PLN), 47.4 Hz(MAJ), 47.3 Hz (BBD BAG)	Not Applicable	
4	Feeder name (voltage level and source-destination name) signalled by the Islanding Relay for separation /load shedding/separation from outside grid	**33kV Feeders** **SRS:**F.Elgin T1// Barisha T2, F. GRSE // Taratala (W) T2, Southern T3, Kidderpore GIS. **ECAL**: 75 MVA T1 & T2 **JAD:** F. DhakuriaT2 // Ballygunge T2, Sirity GIS, Tollygunge T1, Jadavpore GIS, **TRS:** F. Patulia 1, Patulia 2, Panihati GIS, Barrackpore T1 **PARK LANE**: 50 MVA T1 & 75 MVA T2 **MAJERHAT:** F. Majerhat T1 & T2, Alipore T1 & T2. **BBD BAG:** F. Jackson Lane T1,	Not Applicable	

		F.Strand South GIS, F.Hare St. GIS, F.BBD Bag T1 & T2		
5	Quantum of load relief due to tripping of feeder (as per state's peak of previous year)	65 MW (SRS), 70 MW (ECAL), 60 MW (JAD), 35 MW (TRS), 65 MW (PLN), 55 MW (MAJ), 50 MW (BBD BAG) **Total : 400 MW**	Not Applicable	
6	Quantum of load (Min, Avg, Max in MW) on the feeder (as per state's peak of previous year)	**Min. Load:** 35 MW (SRS), 45 MW (ECAL), 30 MW (JAD), 20 MW (TRS), 40 MW (PLN), 30 MW (MAJ), 25 MW (BBD BAG) **Total : 225 MW** **Avg. Load**: 55 MW (SRS), 60 MW (ECAL), 45 MW (JAD), 20 MW (TRS), 50 MW (PLN), 40 MW (MAJ), 35 MW (BBD BAG) **Total : 305 MW** **Max. Load**: 65 MW (SRS), 70 MW (ECAL), 60 MW (JAD), 35 MW (TRS), 65 MW (PLN), 55 MW (MAJ), 50 MW (BBD BAG) **Total : 400 MW**	Not Applicable	

Annexure C

iv. Format IV

Format IV :Contact details of all Nodal Officers					
S/s Name	**Name**	**Designation**	**Organization**	**Email ID**	**Mobile No.**
-	Mr. Koushik Banerjee	Dy. General Manager	CESC Ltd.	koushik.banerjee @rpsg.in	9007015362
-	Mr.Arghya Ghoshal	Sr. Manager.	CESC Ltd.	arghya.ghosal @rpsg.in	9831003281

Annexure-C2

CESC Generation System Islanding Scheme

The network of CESC is embedded within WBSETCL system and is connected with the Grid at 132 kV Voltage Level either at Eastern Metropolitan Substation (EMSS) via WBSETCL Kasba Substation or at Southern Receiving Station (SRS) & Botanical Garden Substation (BGSS) via WBSETCL Howrah Substation.

CESC System gets islanded from the Grid under the following conditions: -

- U/F (47.8 Hz for 0.5 secs.)
- O/F (52.3 Hz for 0.5 secs.)
- During any fault/disturbance occurring outside CESC network, the islanding scheme gets activated immediately and depending on the fault criticality/system condition, CESC generation system gets isolated from the Grid by the operation of the selected circuit breakers through Split Relay (Logic Diagram enclosed) under the following conditions.

Dir. O/C:

Stage 1: 500A, Time delay-0.3sec.

Stage 2: 800A, Time delay-0.15 sec.

Dir. E/F:

Stage 1: 250A, Time delay-0.4sec.

Stage 2: 500A, Time delay-0.15 sec.

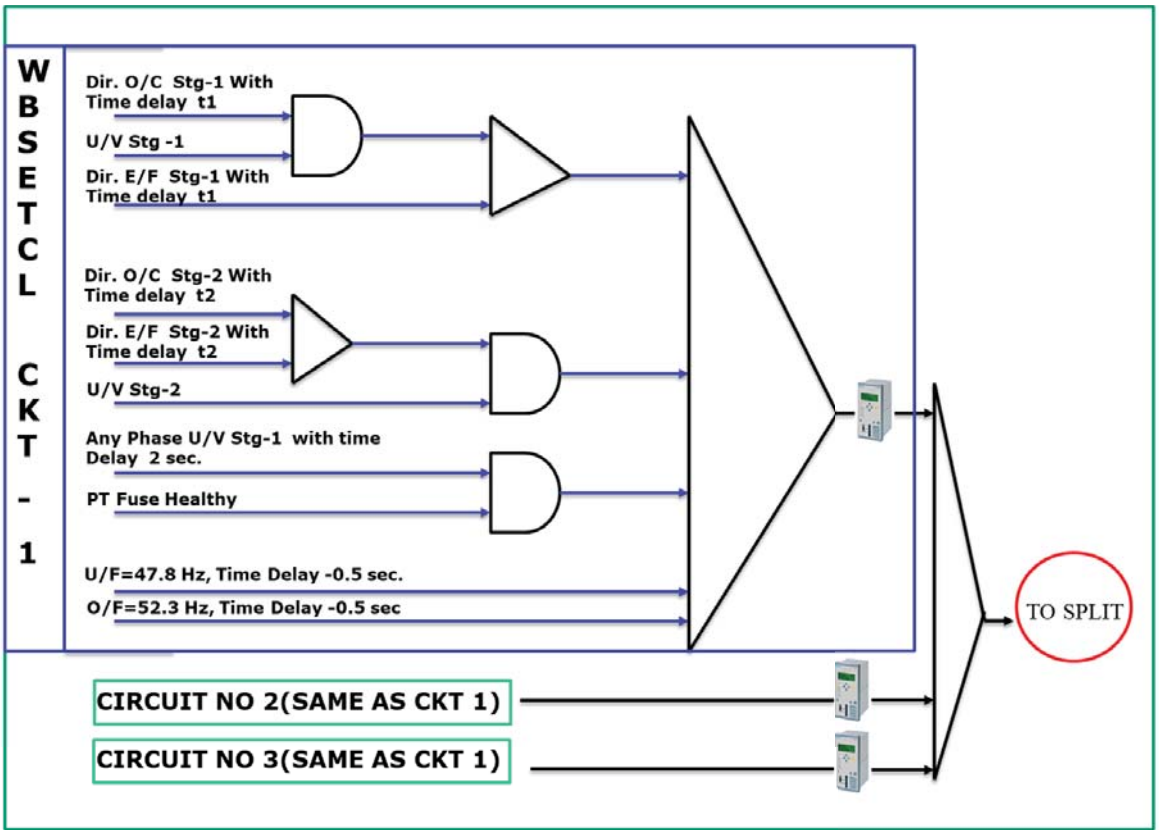
U/V with PT fuse fail Blocking:

Stage1: 83%, Time delay-0.3sec.

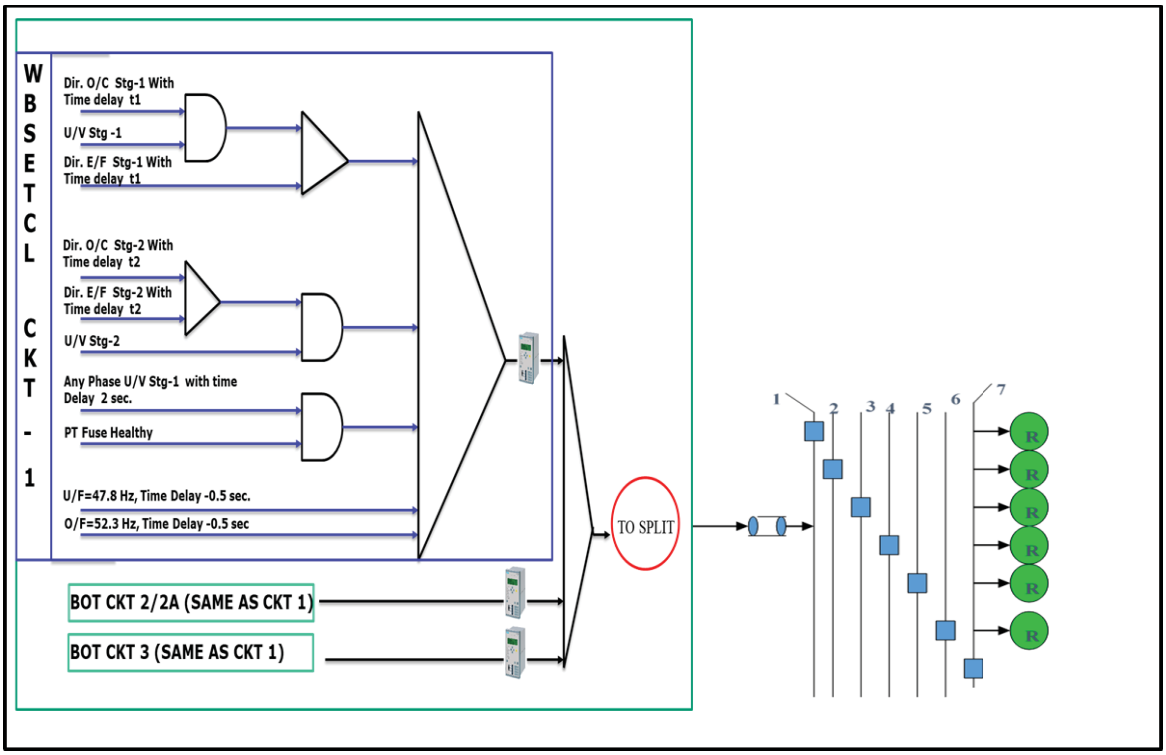
Stage2: 70%, Time delay-0.15 sec.

Selection of Circuit Breakers for tripping during System islanding is done dynamically so that after System islanding, load generation balance is maintained in islanded system.

Logic Diagram for EMSS:

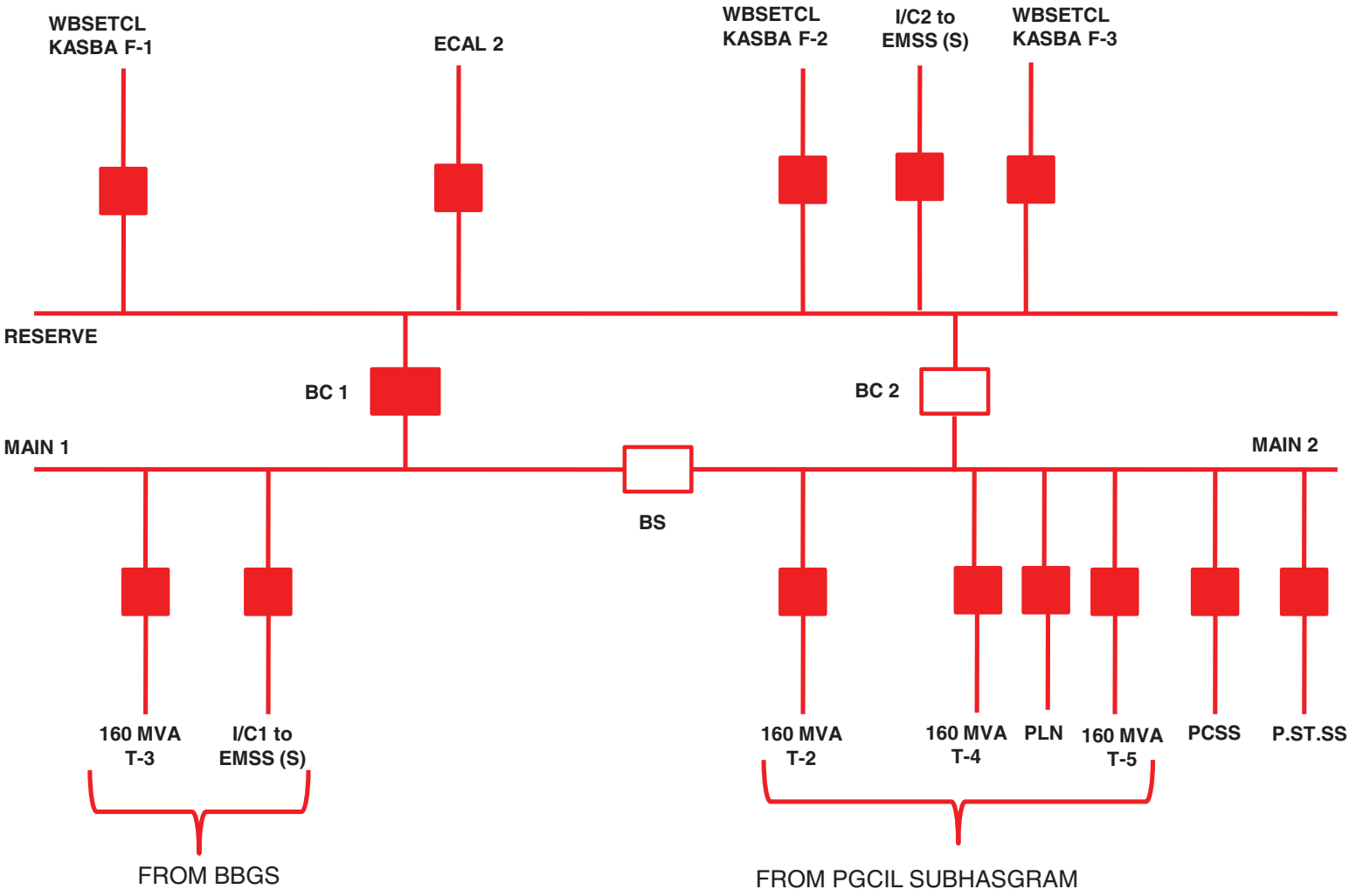


Logic Diagram for SRS:

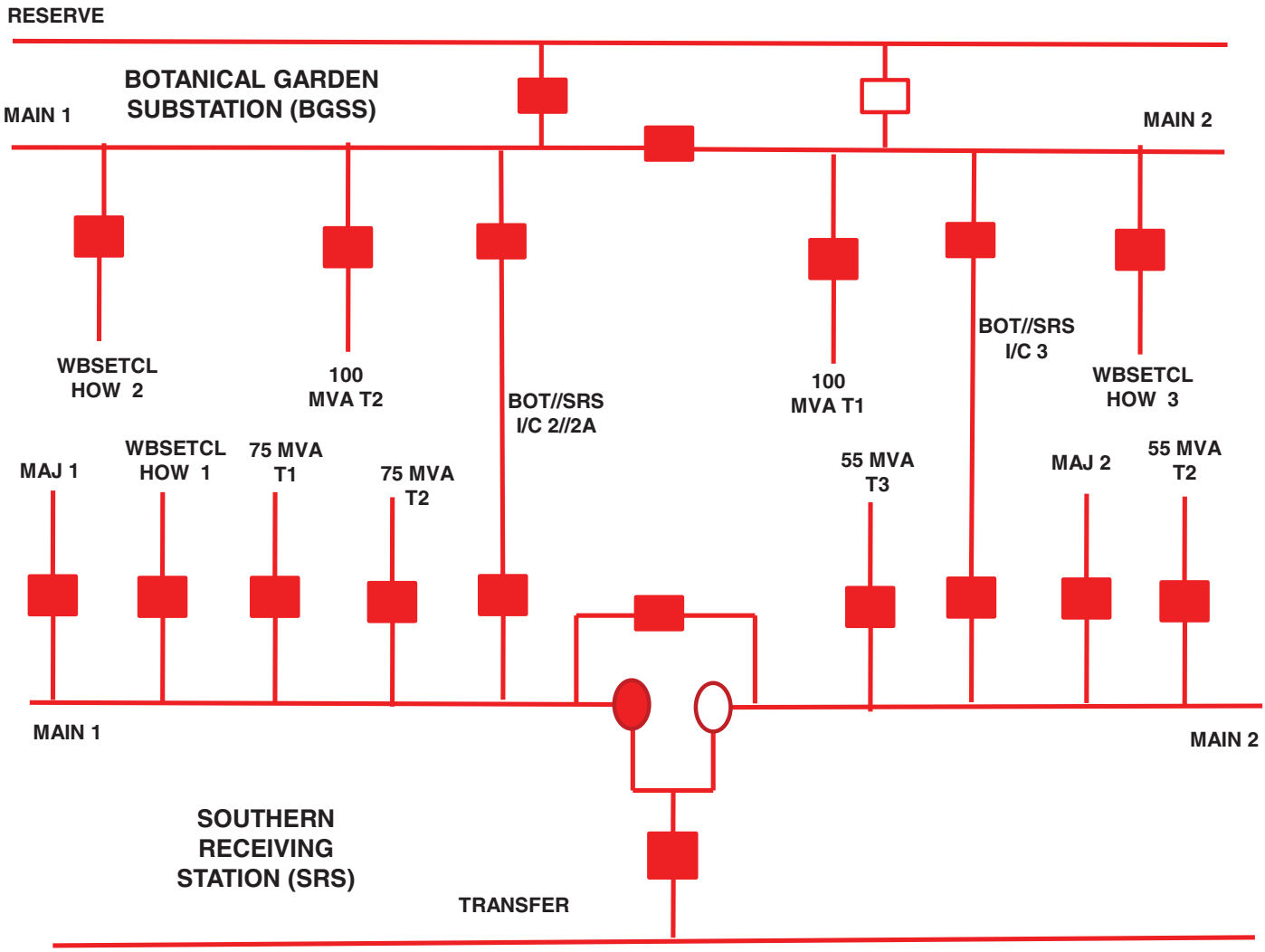


Annexure-C3

Eastern Metropolitan Substation (EMSS) : 132 KV NETWORK DISPOSITION



BGSS AND SRS: 132 KV FEEDER DISPOSITION



AA16. Mock Black start exercise

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

He presented the list of stations where mock exercise had been conducted and schedule for 2015-16.

Representative of NTPC stated that mock exercise for black start of Koldam HEP would be completed as per schedule on 15th December 2015.

In the deliberations, it was expressed that mock exercise for black start of Uri-I scheduled on 8th January 2016 might be preponed to December 2015 as the station is crucial for Jammu & Kashmir in winter months. NHPC and NRLDC agreed to explore the possibility.

Representative of NTPC stated that mock exercise for Auraiya had been completed and report had been sent to NRLDC. Representative of NRLDC requested NTPC to resend the report.

Representative of NRLDC stated that none of the SLDCs informed them regarding mock exercise for black start conducted in their control area. SLDCs were requested to conduct the mock exercise and send the report to NRLDC/NRPC.

Minutes of Table Agenda for 118th OCC Meeting

T 1. Availability for plan ned outage of PO WERGRID lines for dive rsion to fac ilitate construction of the projects of NHAI/DFCC/DMRC/UPEDC and Railways

EE, NRPC stated that POWERGRID had raised the issue for considering the outage of POWERGRID lines availed for diversion, to facilitate construction of the projects of NHAI/DFCC/DMRC/UPEDC and Railways, as deemed available for the purpose of calculation of Transmission System Availability. Certified Transmission availability for a month (TAFM) is considered for recovery of fixed charges and incentive for a transmission licensee.

He added that in accordance with Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014.Transmission system availability factor (TAFM) for a calendar month is to be certified by the Member Secretary, Regional Power Committee.

Para 5 and 6 of procedure described in Appendix-III of the said Regulations, describing conditions for consideration of outages as deemed available and where outage time of should be excluded from the total time of the element under period of consideration are reproduced below:

"5. The transmission elements under outage due to following reasons shall be deemed to be available:

i. Shut down availed for maintenance or construction of elements of another transmission scheme. If the other transmission scheme belongs to the transmission licensee, the Member-Secretary, RPC may restrict the deemed availability period to that considered reasonable by him for the work involved.

ii. Switching off of a transmission line to restrict over voltage and manual tripping of switched reactors as per the directions of RLDC."

6. Outage time of transmission elements for the following contingencies shall be excluded from the total time of the element under period of consideration.

i. Outage of elements due to acts of God and force majeure events beyond the control of the transmission licensee. However, onus of satisfying the Member Secretary, RPC that element outage was due to aforesaid events and not due to design failure shall rest with the transmission licensee. A reasonable restoration time for the element shall be considered in accordance with Central Electricity Regulatory Commission (Standard of Performance of inter-State transmission licensees) Regulations, 2012 as amended from time to time and any additional time taken by the transmission licensee for restoration of the element beyond the reasonable time shall be treated as outage time attributable to the transmission licensee. Circuits restored through ERS (Emergency Restoration System) shall be considered as available.

ii. Outage caused by grid incident/disturbance not attributable to the transmission licensee, e.g. faults in substation or bays owned by other agency causing outage of the transmission licensee"s elements, and tripping of lines, ICTs, HVDC, etc. due to grid disturbance. However, if the element is not restored on receipt of direction from RLDC while normalizing the system following grid incident/disturbance within reasonable time, the element will be considered not available for the period of outage after issuance of RLDC"s direction for restoration.

Members were requested to give their opinion for consideration by Member Secretary, NRPC while certifying the TAFM.

Representative of HPSEBL stated that onus should be passed on to the organization for whom shut down of POWERGRID elements is being availed. Beneficiaries should not share the loss on account on others. POWERGRID should incorporate the charges for consequential losses due to loss in incentive in their agreement with these utilities/organizations. Representative of Haryana SLDC also stated that financial loss due to reduced availability should be recovered from the agency for which diversion is being done.

Other members such as UP SLDC and TPDDL also supported views expressed by HPSEBL and Haryana SLDC.

Representative of POWERGRID stated that they had approached Central Electricity Authority (CEA) for clarification and CEA clearly stated in their reply that certification of deemed availability for these reasons is well within regulations.

Representative of Rosa Power stated that CEA might be concurring with POWERGRID's views but in case of variation in interpretation of regulations of CERC can only be interpreted by CERC.

Representative of POWERGRID stated that these projects are very much important in the national perspective. He added that non-certification of these outages as deemed available causes loss on account of incentive and their entire performance being based on the availability figures goes down. Less availability impacts on licensee's reputation.

EE, NRPC stated that POWERGRID had brought the issue of certification of transmission elements as deemed available for Shifting of Lucknow-Moradabad & Moradabad-Muradnagar 400kV lines for construction of Bypass on NH-24 of NHAI and

Diversion of Agra-Ballabgarh & Agra-Bassi 400kV lines for the construction of new BG rail track from Agra to Etah of Indian Railways in 123rd meeting of TCC held on 17thMay 2002, wherein following was decided:

"The Committee decided that the outage period would be considered as non-available while calculating the availability of PGCIL transmission elements. PGCIL should recover all charges on account of such outages, only from the concerned agencies and there should not be any financial repercussions on the States."

Representatives of all states endorsed the decision taken by 123rd TCC meeting of NREB and decided that same decision could be continued.

Representative of POWERGRID requested that Member Secretary, NRPC may certify technical availability figures also showing their performance. Member Secretary agreed to look into its feasibility.

Central Electricity Authority
Office of Member (Power System)

F.No.6/M(PS)/Misc/2021

17 August 2021

A meeting was taken by Secretary (Power) on 11th August 2021, wherein, issues raised by MoRTH regarding deemed availability charges pertaining to the Shifting of EHV Transmission Line/Towers at the alignment of under construction Highways of NHAI was discussed in detail (Copy of the MoM is enclosed) and it was decided as under:

1. In case of NHAI project, RPC Secretariat would provide the deemed availability certificate for shutdown period availed by the transmission licensees for shifting their lines provided that the transmission customers are not affected by the shutdown of the lines. The shutdown charges should be computed by CEA as per the standard norms and would be included in the cost estimate to be provided to NHAI for shifting the lines.

2. CERC has also been requested to suitably modify the Resolution so that RPC Secretariat can issue deemed availability certificate for shutdown period availed by the transmission licensees for shifting their lines in NHAI project provided the transmission customers are not affected by the shutdown.

3. CEA shall standardize the shutdown period required for such shifting works so that the deemed availability certificate is not utilized for other than the intended purpose.

From above, it may be seen that a clear direction has been given to the RPC Secretariat for providing deemed availability certificate for shutdown period availed by the transmission licensees for shifting their lines provided that the

transmission customers are not affected by the shutdown of the lines. It has also been directed to standardize the shutdown period required for such shifting works. As such, you are requested to kindly direct the RPCs to take necessary action in this regard immediately.

(Goutam Roy)
Member (PS)
14 August 2021

Member (GO & D)

Copy to: CE(PSPA-1), CEA

In remark CE/GM

M discuss

19/08/21

ग्रिड प्रबंधन प्रभाग, के.वि.प्रा.
आवती सं...185.....
दिनांक 19/8/2021

Office of Member (Power System)
आवती सं. Dy. No. 360
दिनांक Date 19/8/2021

No. 2/7/2017-Trans-Pt(1)
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi-110001
****

Dated- 16th August, 2021

OFFICE MEMORANDUM

Subject: **Minutes of the meeting taken by Secretary (Power) to discuss the issue of Supervision charges, Shutdown charges and preparation of estimates for shifting of power lines by private transmission companies- reg.**

The undersigned is directed to forward herewith the minutes of the meeting taken by Secretary (Power) to discuss the issue of Supervision charges, Shutdown charges and preparation of estimates for shifting of power lines by private transmission companies, on 11.08.2021 for information and further necessary action.

Encl: as stated.

(Goutam Ghosh)
Director (Trans)

To

1. Secretary(MoRTH), GoI, New Delhi.
2. Chairperson, CEA, New Delhi.
3. Chairman, NHAI, New Delhi.
4. CMD, PGCIL, Gurugram.
5. CMD, POSOCO, New Delhi.
6. COO, CTUIL, Gurugram.
7. DG, EPTA, New Delhi

Copy to: Sr. PPS/PPS/PS to Secretary(Power)/ AS(Trans)/ JS(Trans)/ Director(Trans), MoP.

Minutes of the meeting taken by Secretary (Power) to discuss the issue of Supervision charges, Shutdown charges and preparation of estimates for shifting of power lines by private transmission companies, on 11.08.2021.

A meeting was held under the Chairmanship of Secretary (Power) on 11.08.2021 to discuss the issues raised by Secretary, Ministry of Road Transport and Highways (MoRTH) vide his DO letter dated 02.08.2021 and by CMD, PGCIL related to supervision charges, cost estimates and shutdown charges levied by transmission licensees for shifting of transmission lines for NHAI projects. List of participants is attached at **Annexure – I**.

2. At the outset, Secretary (Power) welcomed all the participants and requested CEA to start the discussions. Representative of CEA made a presentation (copy at **Annexure-II**) highlighting the issues raised in the DO letter of Secretary, MoRTH and comments/status on these issues. Discussion/ decisions taken in the meeting are as under:

3. Supervision Charges:

3.1 It has been mentioned in the MoRTH's letter that private Transmission licensees levy Supervision Charges @15% of total Project Cost irrespective of the implementing agency. MoRTH requested to rationalize the supervision charges for private transmission developers in line with supervision charges levied by POWERGRID for shifting of transmission lines in NHAI projects.

3.2 It was noted that the supervision charges levied by POWERGRID are as below:-

NHAI Projects	Shifting works by concessionaire of NHAI	Shifting works by POWERGRID
Under Bharatmala Pariyojana	2.5%	2.5%
Other Projects of NHAI	2.5%	15%

3.3 It was generally agreed by private transmission developers to levy supervision charges in line with above supervision charges levied by POWERGRID for shifting of transmission lines for NHAI projects.

3.4 Representative of Torrent Power submitted that NHAI levies higher charges from private transmission licensees for crossing of National Highways compared to the charges levied from POWERGRID.

3.5 Member(Projects), NHAI submitted that this policy of NHAI was general in nature and not specific to transmission developers.

3.6 After detailed deliberations, it was decided that-

i. Private transmission developers would levy supervision charges for shifting of transmission lines for NHAI projects in line with supervision charges levied by POWERGRID (para 3.2), subject to the condition that NHAI shall not differentiate between private and public transmission developers in respect of charges levied

by them for crossing of National Highways by transmission lines.

ii. Based on decisions taken in the meeting, CEA shall issue Guidelines on Supervision charges to be levied by all transmission licensees for shifting of transmission line in case of NHAI projects.

4. Cost Estimates:

4.1 In the MoRTH letter dated 02.08.2021, it was pointed out that cost estimates submitted by private transmission developers for shifting works are on higher side and requested that CEA should vet these estimates in time bound manner (within 7 days)

4.2 It was informed by CEA that-

a) Cost Estimates for shifting of transmission line include (i) Supply Cost, (ii) Erection Cost, (iii) Uninstallation Charges, (iv) RoW charges, (v) Availability Charges, & (vi) Other Charges like Contingency, Administrative etc.

b) Cost estimates are based on BoQ of items/material/services

c) Generally both NHAI and Transmission licensees carry out survey and work out the route alignment and accordingly BoQ prepared.

d) Before vetting the Cost estimates, CEA examines the technical aspects including BoQ.

e) For examination of the cost estimates, POWERGRID's schedule of rates used on cost of items/services.

f) Cost estimates in respect of Right of Way/Crop/Tree compensation charges depend on several factors which varies from location to location and these charges are considered as per actual.

g) Normally CEA takes 30 working days to vet the cost estimates, provided the BoQ has been vetted by NHAI.

4.3 On the issue of using Schedule of Rate (SoR) of POWERGRID for vetting of cost estimates, CMD, POWERGRID informed that SoR is applicable for large volume of works, and should not be used for estimation of cost for shifting of lines, which is a small volume work. He informed that actual cost of shifting may be taken from POWERGRID on annual basis and it may be appropriately escalated (to reflect price increase in next one year) to vet the cost estimates. Representative of IndiGrid endorsed the views of POWERGRID.

4.4 After detailed deliberations, it was decided that-

i. CEA shall build and maintain a database in the beginning of every year, with the help of POWERGRID that will include rates for various items to be used in shifting of transmission line; and update it quarterly, with the help of change in indices and actual cost incurred in shifting of various lines.

ii. CEA shall vet the cost estimates within 15 days, after vetting of BoQ by NHAI.

5. Shutdown charges:

5.1 Secretary, MoRTH in his DO letter mentioned that shutdown charges are levied on MoRTH agencies for shifting of transmission lines. Till last year, the charges were about @ 2% of estimated costs, and now it has increased to about Rs 5 cr to 7 cr in some estimates. MoRTH requested MoP to give deemed availability certificate for waiving of these charges.

5.2 Representative of CEA informed that

i. CERC (Terms and Conditions of Tariff) Regulations, 2019 provide that the transmission elements under outage only due to following reasons shall be deemed to be available: "Shut down availed for maintenance of another transmission scheme or construction of new element or renovation/upgradation/ additional capitalization in existing system approved by the Commission".

ii. Presently Regional Power Committees (RPCs) do not provide deemed availability in cases of outages of transmission lines for construction of projects of NHAI/ Railways etc.

5.3 It was noted that generally customers of transmission lines are not affected by shutdown of a particular transmission line during the period of shifting of utilities, because of redundancy in the power system. Therefore, it was suggested that in case of projects of national importance (NHAI projects), deemed availability may be given for the shutdown period availed by transmission licensees for shifting of their transmission lines, provided that transmission customers are not affected by the shutdown. It was also suggested that there is need for standardization of shutdown period, so that deemed availability period is not utilized for other than intended purposes.

5.4 After detailed deliberations, it was decided that

i. In case of NHAI projects, RPC Secretariat would provide deemed availability certificate for the shutdown period availed by transmission licensees for shifting of their transmission lines, provided that transmission customers are not affected by the shutdown of the line. Shutdown charges would be computed by CEA as per standard norms and would be included in the cost estimates to be provided to NHAI for shifting of lines.

ii. Decision at para 5.4(i) will be immediately implemented. CERC shall also be requested to suitably modify their Regulations, so that RPC Secretariat can issue deemed availability certificate for the shutdown period availed by transmission licensees for shifting of their transmission lines in NHAI projects, provided that transmission customers are not affected by the shutdown of the line.

iii. CEA shall standardize the shutdown period required for such shifting works, so that deemed availability period is not utilized for other than intended purposes.

5.5 A provision may be added in the Standard RfP for TBCB projects that the developer shall abide by the Guidelines of CEA w.r.t. shifting of transmission lines for NHAI projects and other projects notified by Ministry of Power.

6. CEA will issue formal guidelines in accordance with decisions taken in this meeting.

7. DG, EPTA suggested that a separate meeting may also be organized to resolve similar issues with Railways. EPTA was requested to send the details to Ministry of Power in this regard.

8. The meeting ended with thanks to chair.

*****

Annexure-I
F. No. 2/7/2017-Trans-Pt(1)

Date/Time of the meeting: 11.08.2021 at 1.00 pm
Venue: MS Teams Platform

Subject: Minutes of the meeting taken by Secretary (Power) to discuss the issue of Supervision charges, Shutdown charges and preparation of estimates for shifting of power lines by private transmission companies- reg.

List of Participants

Ministry of Power

1. Shri Alok Kumar, Secretary - in the chair
2. Shri Vivek Kumar Dewangan, Additional Secretary(Trans)
3. Shri Mritunjay Kumar Narayan, Joint Secretary (Trans)
4. Shri Goutam Ghosh, Director (Trans)
5. Shri Bihari Lal, Under Secretary(Trans)

Central Electricity Authority

6. Shri Goutam Roy, Member(PS)
7. Shri Ishan Sharan, CE
8. Smt. Manjari Chaturvedi, Director

NHAI

9. Shri Manoj Kumar, Member(Projects)

PGCIL

10. Shri K Sreekant, CMD
11. Smt. Seema Gupta, Director(Operations)
12. Shri Shyam Kumar, GM
13. Shri Ajit Kumar Bishnoi

POSOCO

14. Shri KVS Baba, CMD
15. Shri Debasis De, ED(NLDC)

CTUIL

16. Shri Subir Sen, COO
17. Shri Ashok Pal, ED

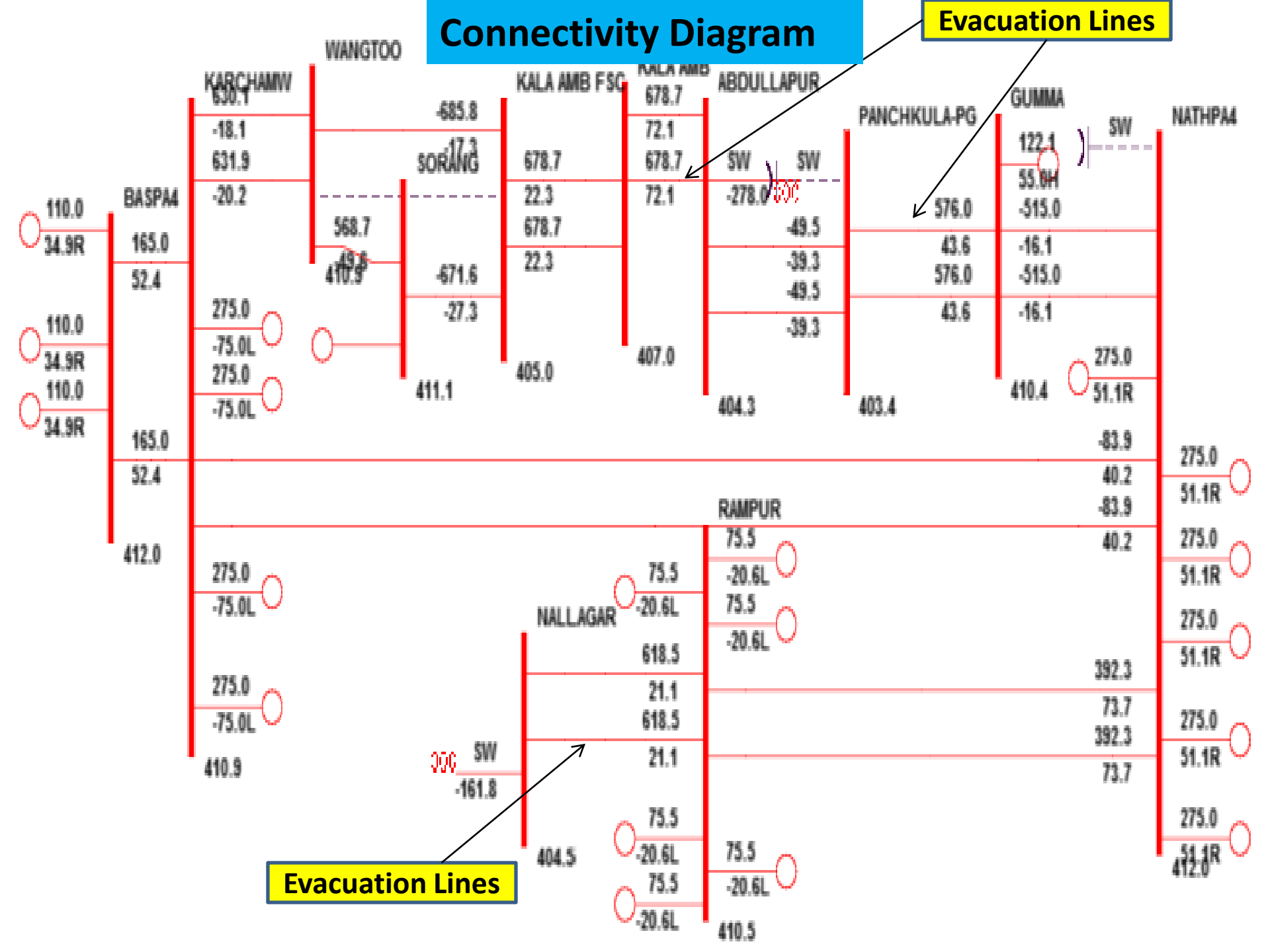
Representatives from EPTA

18. Shri Vijay Chhibber, DG
19. Shri Rohit Gera, Sterlite Power
20. Shri Harsh Shah, Indigrid
21. Shri Nihar Raj, Adani Power
22. Shri L N Mishra, Torrent Power
23. Shri TAN Reddy, Sterlite Power

*****

SPS review of Jhakri-Karcham Complex

11.05.2021


Connectivity Diagram
Evacuation Lines
Evacuation Lines
WANGTOO
KARCHAMW
KALA AMB FSC
ABDULLAPUR
PANCHKULA-PG
GUMMA
NATHPA4
BASPA4
SORANG
RAMPUR
NALLAGAR
630.1
-18.1
631.9
-20.2
-685.8
17.3
568.7
49.6
410.9
678.7
22.3
678.7
22.3
678.7
72.1
678.7
72.1
SW
-278.0
SW
-49.5
-39.3
-49.5
-39.3
576.0
43.6
576.0
43.6
122.1
55.8H
-515.0
-16.1
-515.0
-16.1
SW
-671.6
-27.3
411.1
405.0
407.0
404.3
403.4
410.4
110.0
34.9R
110.0
34.9R
110.0
34.9R
165.0
52.4
165.0
52.4
412.0
275.0
-75.0L
275.0
-75.0L
275.0
-75.0L
275.0
-75.0L
410.9
275.0
51.1R
-83.9
40.2
-83.9
40.2
275.0
51.1R
275.0
51.1R
275.0
51.1R
275.0
51.1R
275.0
51.1R
412.0
75.5
-20.6L
75.5
-20.6L
75.5
-20.6L
75.5
-20.6L
75.5
-20.6L
75.5
-20.6L
618.5
21.1
618.5
21.1
392.3
73.7
392.3
73.7
SW
-161.8
404.5
410.5

Basecase Assumptions

- All India Aug’2021 Peak basecase considered
- Peak hydro i.e. 110% capacity considered
- Punjab Load: 10.7GW
- Haryana Load: 9.5GW
- HP Load: 1.35GW
- Total NR Load: 62.8GW

Existing SPS in complex: After Gumma revision

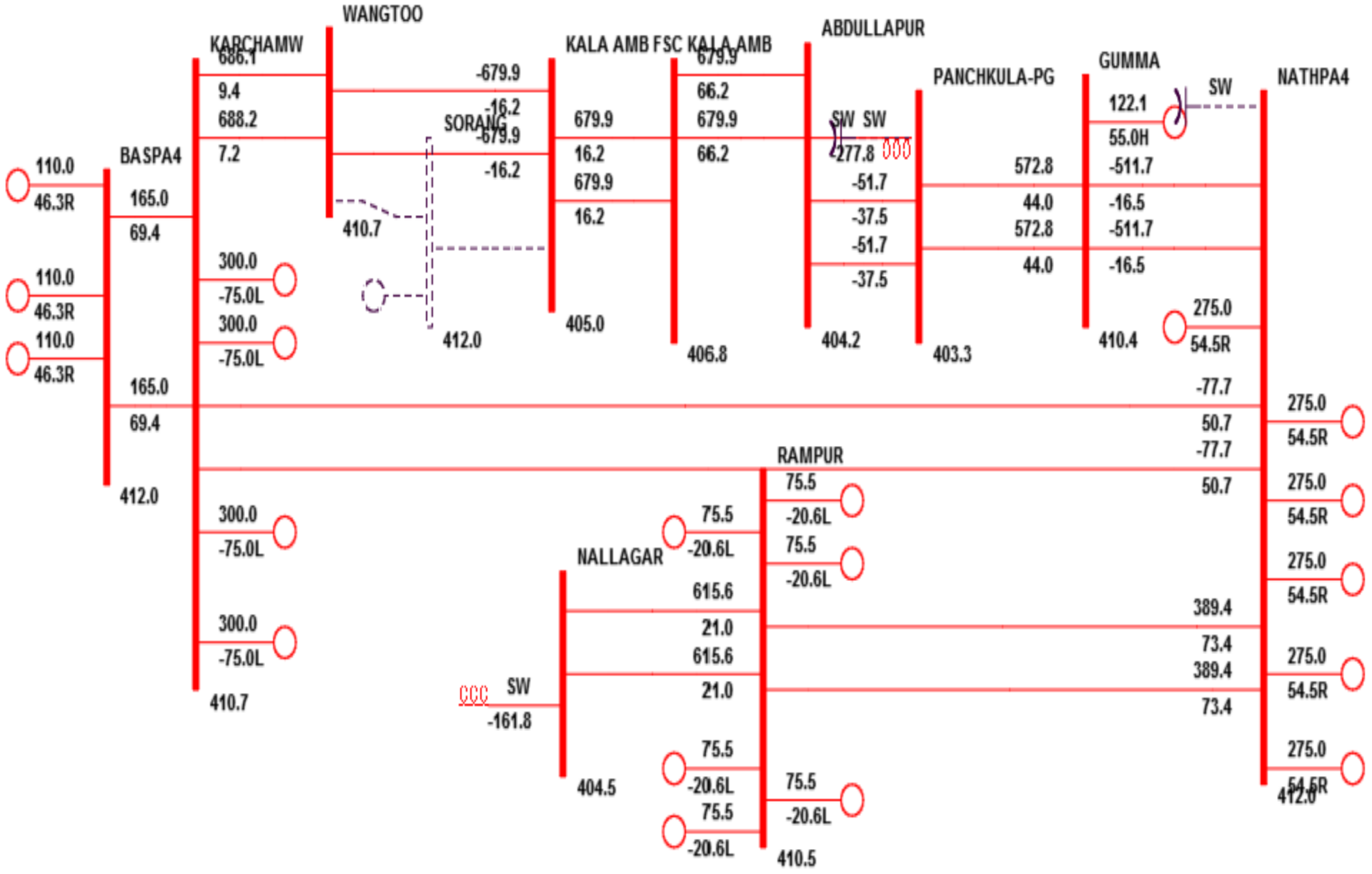
Case	Contingency	Action
Case-1	Load on any of the lines at Jhakri, Rampur or Gumma towards Nalagarh or Panchkula exceeds 850 MW	Trip 1 unit of Karcham HPS, 1 unit of Jhakri HPS, 1unit of Rampur HPS Trip and 1 unit of Sawra-Kuddu HPS
Case-2	400 kV bus voltage at Karcham drops below 395 kV	Trip 2 units of Karcham HPS
Case-3	Any two outgoing lines of Jhakri (Jhakri-Rampur or Jhakri-Gumma) or Rampur HPS (Rampur-Nalagarh D/C) or Gumma (Gumma-Panchkula) trip except in case of tripping of one ckt of 400 kV Jhakri-Gumma and one ckt of Gumma-Panchkula ckt or one ckt of Jhakri-Rampur and one ckt of Rampur-Nalagarh ckt	Trip 2 units of Jhakri, 2 units of Rampur HPS, 2 units of Karcham
Case-4	Both 400 kV Karcham Wangtoo-Abdullapur lines at Karcham trip	Trip 2 units of Karcham HPS
Case-5	Power Flow of any outgoing line of Rampur or Jhakri or Gumma Substation exceed by 800MW	Initiate the Alarm to the operators at Jhakri, Rampur &Karcham and Sawra Kuddu HEP
Case-6	400 kV Wangtoo (HP)-Kala Amb (PG) D/C tripped or 400 kV Kala Amb (PG)-Abdullapur D/C tripped	Trip 2 units of Karcham HPS

Proposed SPS in complex: After Sorang revision

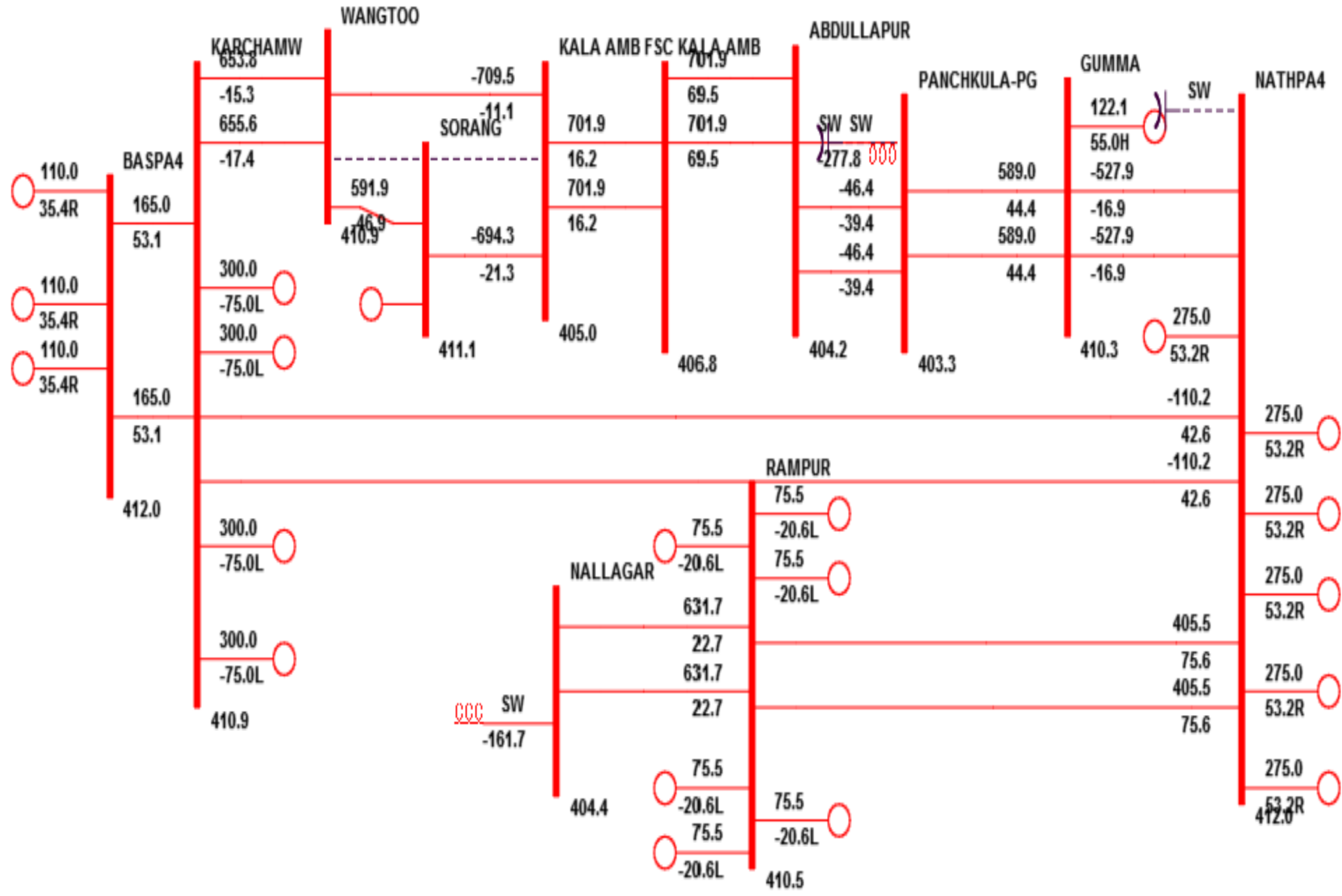
Case	Contingency	Action
Case-1	Load on any of the lines at Jhakri, Rampur or Gumma towards Nalagarh or Panchkula exceeds 850 MW	Trip 1 unit of Karcham HPS, 1 unit of Jhakri HPS, 1unit of Rampur HPS Trip and 1 unit of Sawra-Kuddu HPS, **1 unit at Sorang**
Case-2	400 kV bus voltage at Karcham drops below 395 kV	Trip 2 units of Karcham HPS
Case-3	Any two outgoing lines of Jhakri (Jhakri-Rampur or Jhakri-Gumma) or Rampur HPS (Rampur-Nalagarh D/C) or Gumma (Gumma-Panchkula) trip except in case of tripping of one ckt of 400 kV Jhakri-Gumma and one ckt of Gumma-Panchkula ckt or one ckt of Jhakri-Rampur and one ckt of Rampur-Nalagarh ckt	Trip 2 units of Jhakri, 2 units of Rampur HPS, 2 units of Karcham
Case-4	Both 400 kV Karcham Wangtoo-Abdullapur lines at Karcham trip **(may be renamed as Karcham Wangtoo –Wangtoo (HP) lines)** **Or** **400kV Wangtoo(HP)-Kala Amb and 400kV Wangtoo-SorangHEP tripped**	Trip 2 units of Karcham HPS
Case-5	Power Flow of any outgoing line of Rampur or Jhakri or Gumma Substation exceed by 800MW	Initiate the Alarm to the operators at Jhakri, Rampur &Karcham and Sawra Kuddu HEP and **Sorang HEP**
Case-6 (net effect similar to case-4)	400 kV Kala Amb (PG)-Abdullapur D/C tripped **Or** **400kV Wangtoo(HP)-Kala Amb and 400kV Sorang-Kala Amb HEP tripped**	Trip 2 units of Karcham HPS and **1 unit at Sorang**

In case 6, only two triple snowbird lines are available for power evacuation. Assuming S/D or tripping (N-1 contingency of one of the ckts), the safe power allowed is 2 units at Karcham, 3 units at Baspa and 2 units at Sorang i.e. Existing SPS.

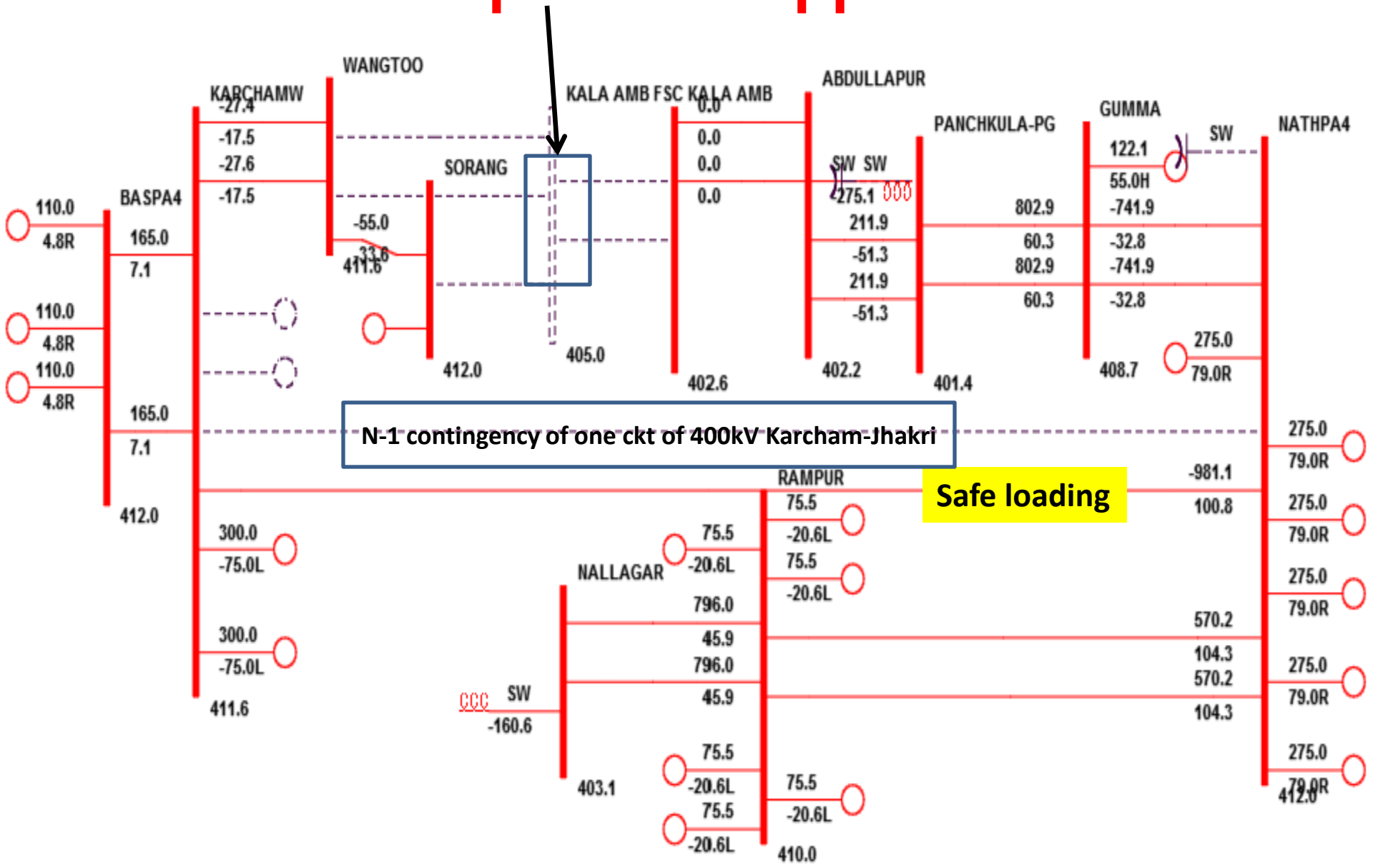
Loadings for present scenario



Loadings after LILO at Sorang



Case-6: 400 kV Kala Amb (PG)-Abdullapur D/C tripped



Observations:

- The major issue seems to be disruption of Karcham Wangtoo- Wangtoo(HP)-Sorang-Kala Amb- Abdullapur link i.e. Outage of this double circuit path.

- Under outage of this link, only two triple snowbird lines (400kV Karcham-Jhakri line) are available. Moreover, loading on lines from Rampur/Jhakri are more than 850MW. Therefore, tripping of two units at Karcham and one unit at Sorang is required.

HIMACHAL SORANG POWER PRIVATE LIMITED
CIN: U40108HP2004PTC030554

Green Energy-Clean Energy

August 26, 2021

To
The Superintending Engineer (Operations)
Northern Regional Power Committee
18A, Qutab Institutional Area, Shaheed Jeet Singh Marg,
Katwaria Sarai, New Delhi 110 016

Sub: SPS Implementation at 100 MW Sorang HEP
Ref: 183rd OCC Meeting

Respected Sir,

This has reference to the subject matter wherein NRPC proposed the SPS Scheme to be implemented at Sorang HEP, in this regard we would like to inform you that we have implemented SPS at Sorang HEP as per the directions and proposed scheme of NRPC for implementing the SPS system at Sorang HEP.

The scheme is implemented successfully and supporting events of testing with logics from 07.08.2021 onwards at Sorang HEP is now active as per the compliance.

This is for your kind perusal and approval.

Thanking you
Sincerely yours

Authorised Signatory

Himachal Sorang Power Pvt. Ltd.

16311/2021

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन-I प्रभाग

Power System Planning & Appraisal-I Division

सेवा में / **To,**

1. COO (CTUIL), Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001
2. Director (System Operation), POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi- 110010
3. Director (Technical), Punjab State Transmission Corporation Limited (PSTCL) Head Office, The Mall, Patiala- 147001
4. Managing Director, PSPCL, PSEB Head Office, The Mall, Patiala- 147001

विषय /**Subject:** Minutes of the meeting held on 23.06.2021 through video conferencing to discuss transmission system for evacuation of power from 206 MW Shahpur Kandi Power Project.

Madam/Sir,

Please find enclosed the minutes of the meeting held on 23.06.2021 through video conferencing to discuss transmission system for evacuation of power from 206 MW Shahpur Kandi Hydro Power Project.

भवदीय / Yours faithfully,

Signature Not Verified
Digitally signed by MANJARI CHATURVEDI
Date: 2021.07.01 18:18:50 IST

(मंजरी चतुर्वेदी/Manjari Chaturvedi)

निदेशक/Director

I/16311/2021

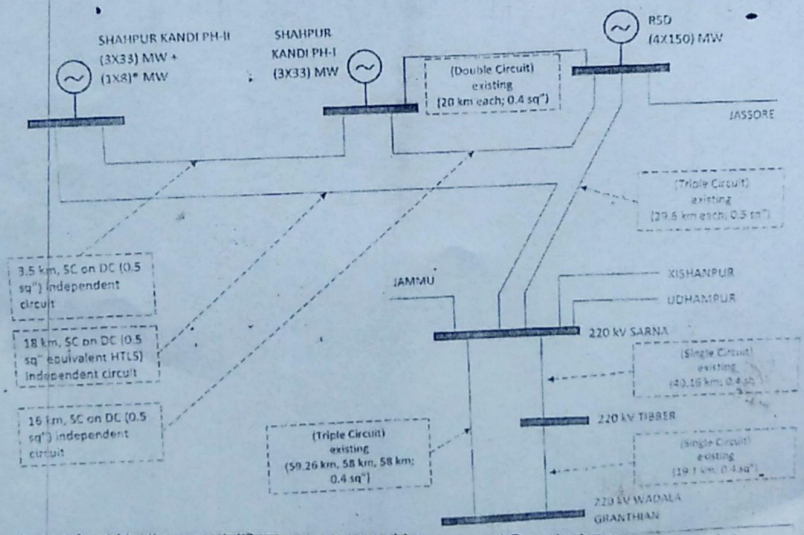
Minutes of the meeting held on 23.06.2021 through video conferencing to discuss transmission system for evacuation of power from 206 MW Shahpur Kandi Power Project.

List of participants is enclosed at **Annex-I**.

1. Chief Engineer (PSPA-1), CEA welcomed the participants to the meeting and requested PSTCL to brief the agenda of the meeting.

2. PSTCL stated that Shahpur Kandi Hydro Power Project (SKPP) (3x33 MW SKPP Ph-I & 3x33 MW + 1x8 MW SKPP Ph-II) is under implementation by PSPCL. The electro-mechanical (E&M) work of SKPP was awarded to BHEL on 29.01.2014. The project was to be completed in 29.07.2017. However, the work of main dam of SKPP had been stopped on 30.08.14 due to some dispute between Punjab and J&K, when only less than 10% work of construction of main dam had been completed. In view of this, PSPCL had put on hold all the Electro-Mechanical works awarded to BHEL till resolution of dispute with J&K Govt. and resumption of construction activities of main dam. Later on, a bilateral agreement had been signed by Chief Secretaries of Punjab and J&K at Srinagar on 08.09.2018 resolving therein all pending issues and the project is now targeted to be commissioned by August, 2024.

3. PSTCL further stated that as per bilateral agreement between states of Punjab and J&K, 20% power generated at bus-bar of SKPP is to be transmitted to J&K and that J&K state has the right to refuse the 20% share from SKPP. PSTCL further stated that out of the total installed capacity of 206 MW of SKPP, 198 MW (33x6 MW) shall be evacuated at 220 kV level and balance 8 MW shall be evacuated at 66 kV level. System studies have been carried out with the following proposed evacuation system for Shahpur Kandi Power Project:
   (i) Ranjit Sagar Dam (RSD) - Shahpur Kandi Power Project Ph-I 220 kV D/c line (existing)
   (ii) LILO of 1 circuit (out of existing 4 circuit) of RSD- Sarna 220 kV 2x D/c line at SKPP Ph- I (33x3 MW) and SKPP Ph-II (33x3 +8 MW).



From the system studies, above system has been found to be adequate for evacuation of power from SKPP, however, under N-1 contingency, SKPP PH-II to Sarna 220 kV line formed after LILO (as mentioned at S.No. (ii) above) gets overloaded and therefore it is proposed to implement that section with HTLS conductor (of approx. 1200 Amp rating) instead of conventional ACSR conductor.

4. POSOCO and CTU also confirmed the PSTCL's observation of overloading of SKPP PH-II to Sarna 220 kV line under N-1 contingency.

5. CE(PSPA-I), CEA, stated that earlier PSTCL had intimated the time frame of commissioning of the hydro project as April, 2022, which has now been revised as August, 2024. Therefore, it is suggested that the execution of the evacuation system should be taken up in the matching time fame of commissioning of Shahpur Kandi Hydro Power Project.

6. After deliberations, following was agreed as evacuation system for Shahpur Kandi Hydro Power Project of PSPCL (3x33 MW SKPP Ph-I & 3x33 MW + 1x8 MW SKPP Ph-II):
   (i) RSD- SKPP Ph-I 220 kV D/c line (existing)
   (ii) LILO of 1 circuit (out of existing 4 circuit) of RSD- Sarna 220 kV line at SKPP Ph- I (33x3 MW) and SKPP Ph-II (33x3 +8 MW).
   (iii) Implementation of SKPP PH-II to Sarna 220 kV line formed after LILO mentioned at S.No. (ii) with HTLS conductor (of approx. 1200 Amp rating).
   (iv) The above system to be taken up by PSTCL as Intra-State transmission system in the matching time frame of commissioning of Shahpur Khandi Hydro Power Project.
7. It was also decided that the above system would be taken up in the next meeting of NRPC(TP) for ratification.

Meeting ended with the thanks to the chair.

Annexure I

List of participants

S.No.	Name (Smt/Shri/Ms)	Designation
CEA		
1	Ishan Sharan	Chief Engineer
2	Manjari Chaturvedi	Director
3	Nitin Deswal	Asst. Director
4	Kanhaiya Singh Kushwaha	Asst. Director
CTUIL		
5	Sandeep Kumawat	Chief Manager
6.	Narendra Sathwik	Deputy Manager
POSOCO/NRLDC		
7	Surajeet Banerjee	CGM, NRLDC
8	Alok Kumar	GM, NRLDC
PSTCL		
9	Sanjeev Gupta	CE
10	Mohit Walia	SE
11	Nitin Kumar	AEE
PSPCL		
12	Rashpal	ASE

Annexure B.9

(3)

Subject: **Interim Report by a committee constituted by O/O No. SPL-1 dated 21.07.2021 by the O/o ASE/Tech. to Director/Technical, PSTCL, Patiala, to study and present a proposal for the enhancement of ATC/ TTC limit of Punjab.**

Vide their letters no SPL-1 dated 20-07-2021 and 6041/47 dated 26-07-2021, PSPCL has intimated that no addition in state generation is expected in the coming years. Accordingly, to cater the demand of the state, around 9000MW of ATC limit is required for summer/paddy 2022. Further, during the meeting held on 20-07-2021, PSPCL has requested to enhance the capacity of Dhanansu ICTs from 2 X 315MVA to 2 X 500MVA.

The matter was deliberated by the committee constituted vide O/O No. SPL-1 dated 21.07.2021 by the O/o ASE/Tech. to Director/Technical, PSTCL, Patiala, to study and present a proposal for the enhancement of ATC/ TTC limit of Punjab.

Keeping in view the PSPCL request of 9000 MW of ATC in summer/paddy 2022 and the load growth of around 1000MW for 2022-23, studies have been carried out for 10000/10600MW ATC/TTC limit.

The load flow studies were carried out with the following assumptions:

1. State generation : 6400 MW (approx.)
2. Upcoming network:
   a. 500 MVA, 400/220 kV ICT (3rd) at 400 kV Rajpura has been considered.
   b. Augmentation of 315 MVA, 400/220 kV ICTs to 500 MVA at 400 kV Nakodar has been considered.
   c. 2 X 315 MVA and additional 500 MVA, 400/220 kV ICT at 400 kV Dhanansu have been considered (because of N-1 non compliance of 2 X 315 MVA ICTs, which are already approved).
   d. 500 MVA, 400/220 kV ICT (3rd) at 400 kV Makhu has been considered.
   e. 400 kV Behman Jassa Singh (with installed capacity of 2X500 MVA ICTs) has been considered.
   f. HTLS conductors at 220 kV Rajpura – Gobindgarh and 400 kV Jalandhar (PG) – Kartarpur have been considered.
   g. 3rd ICT (already approved for 2025-26) at 400 kV Patran has been disabled in the system file because of 2020-23 scenario being studied.
   h. 400 kV Bus splitting at 765 kV Moga (PG) considered.

It has been observed that augmentation of 1 No. 400/220KV ICT at PGCIL Ludhiana (PG) (from 315MVA to 500MVA) along with commissioning of 2 X 315 MVA ICTs at 400 kV Dhanansu are required for Paddy 2022. For Paddy 2023, augmentation of 1 No. ICT at 400 kV Patiala (PG) (from 315MVA to 500MVA) is also required along with additional 500 MVA ICT at 400 kV Dhanansu as 2 X 315MVA 400/220KV ICTs at Dhanansu have been found N-1 non-compliant in that scenario. LILO of 400 kV Nakodar – Kurukshetra line at 400 kV Dhanansu matching with commissioning of additional 500 MVA ICT is required as well.

Detailed studies/remedial measures for other transmission elements shall be submitted within 15 days.

3/8/21
ASE/SLDC(Pb.)

3/8/21
ASE/P&OS

3/8/21
SE Planning
PSTCL

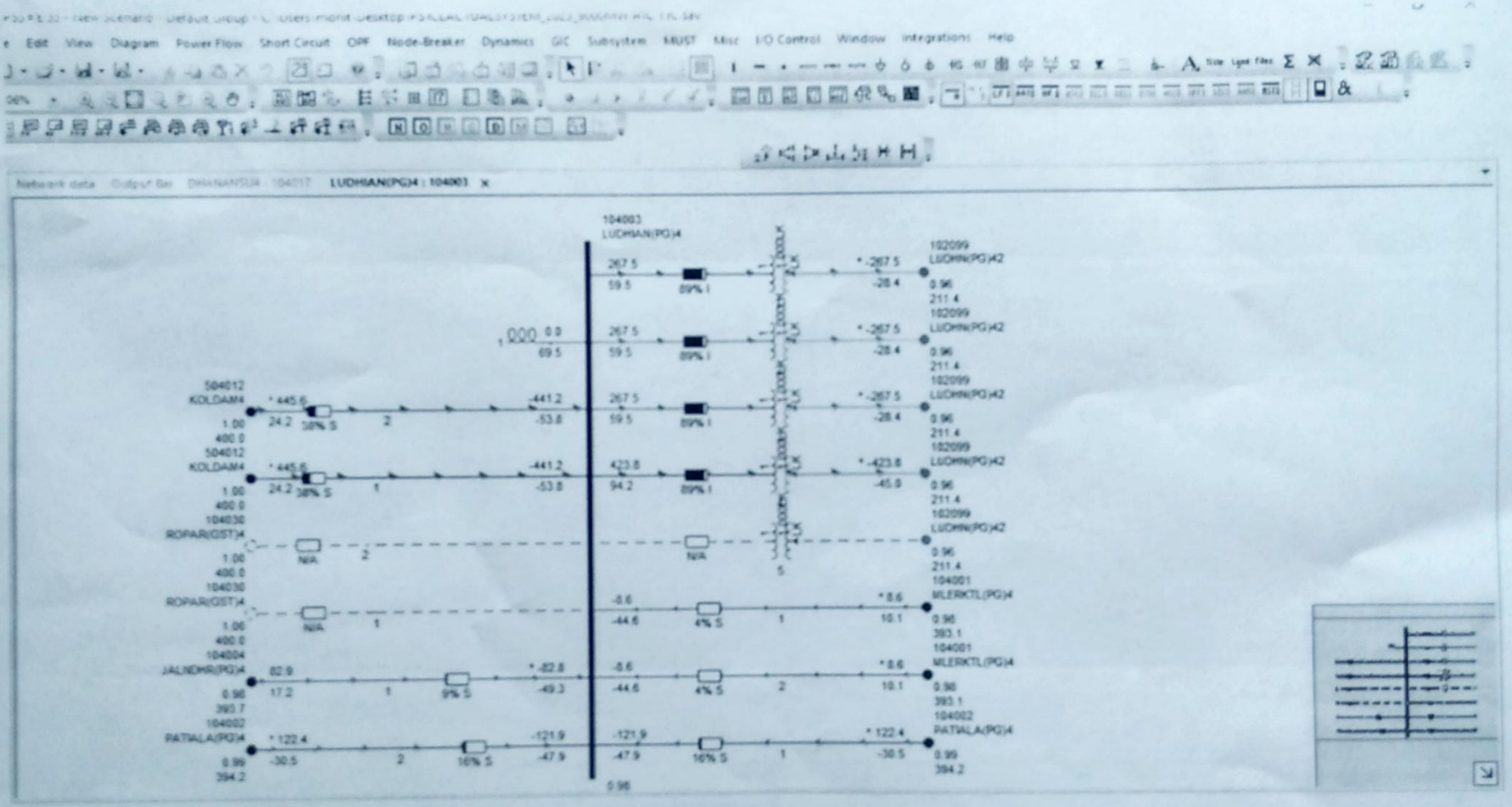
Output Bar x

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS(R)E WED, AUG 04 2021 15:20
PUNJAB POWER SYTEM ACTUAL2012-13

AREA TOTALS
IN MW/MVAR

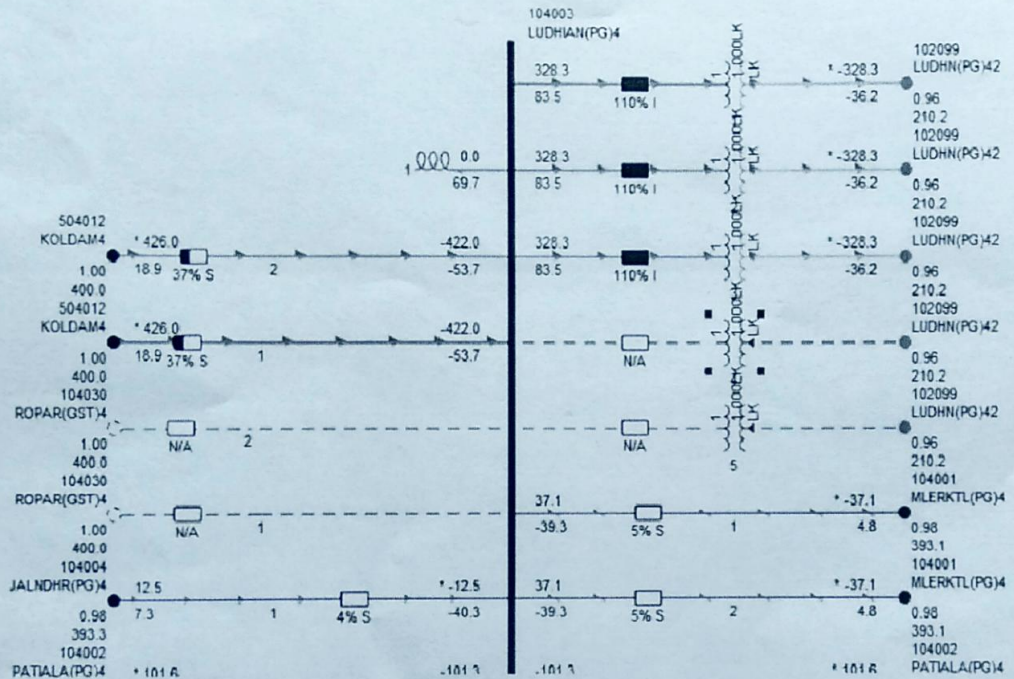
X-- AREA --X	FROM GENE-RATION	FROM IND GENERATN	TO IND MOTORS	TO LOAD	TO BUS SHUNT	TO GNE BUS DEVICES	TO LINE SHUNT	TO XFRMR MAGNE-TIZING	FROM CHARGING	TO LOSSES	-NET INTERCHANGE- TO TIE LINES	TO TIES + LOADS	DESIRED NET INT
1	6417.4	0.0	0.0	16800.0	0.0	0.0	0.0	0.0	0.0	217.9	-10600.5	-10600.5	0.0
PUNJAB	2195.9	0.0	0.0	5521.9	-2575.1	0.0	1244.7	-0.0	6284.2	4078.0	210.7	210.7	
COLUMN	6417.4	0.0	0.0	16800.0	0.0	0.0	0.0	0.0	0.0	217.9	-10600.5	-10600.5	0.0
TOTALS	2195.9	0.0	0.0	5521.9	-2575.1	0.0	1244.7	0.0	6284.2	4078.0	210.7	210.7	

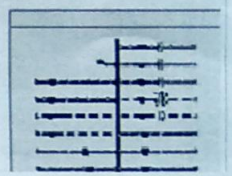
Loading of PGCIL Ludhiana ICTs under Normal conditions



Loading PGCIL Ludhiana ICTs Under N-1 conditions

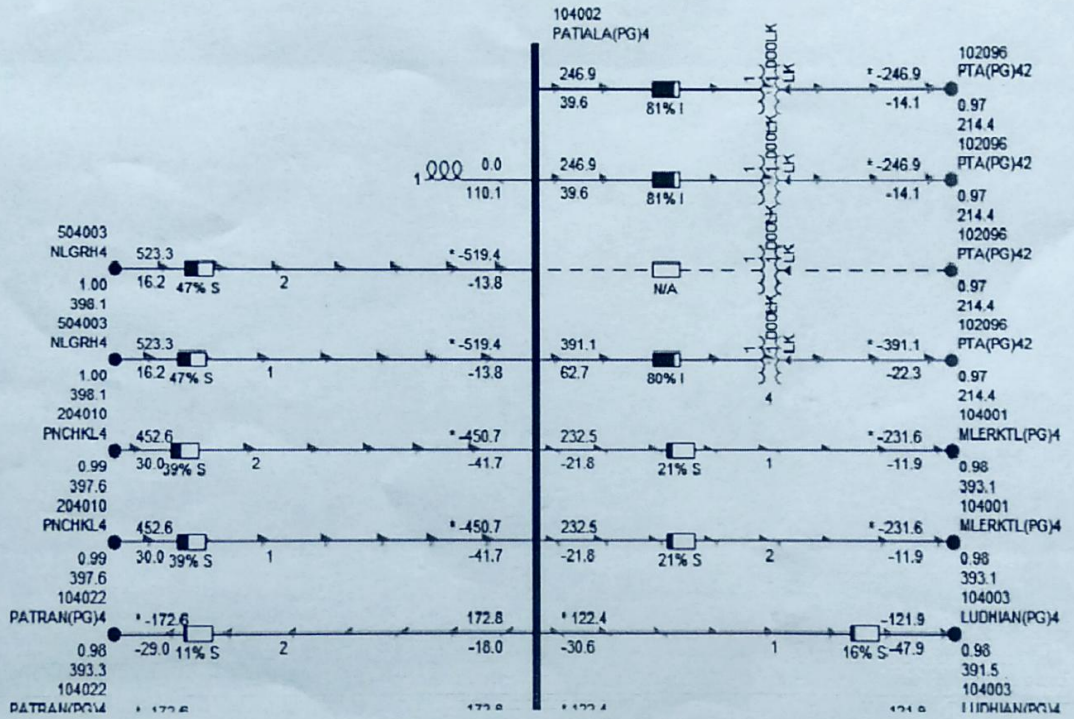
LUDHIAN(PG)4 : 104003 ×





Network data Output Bar DHANANSU4 : 104017 **PATIALA(PG)4 : 104002** ×

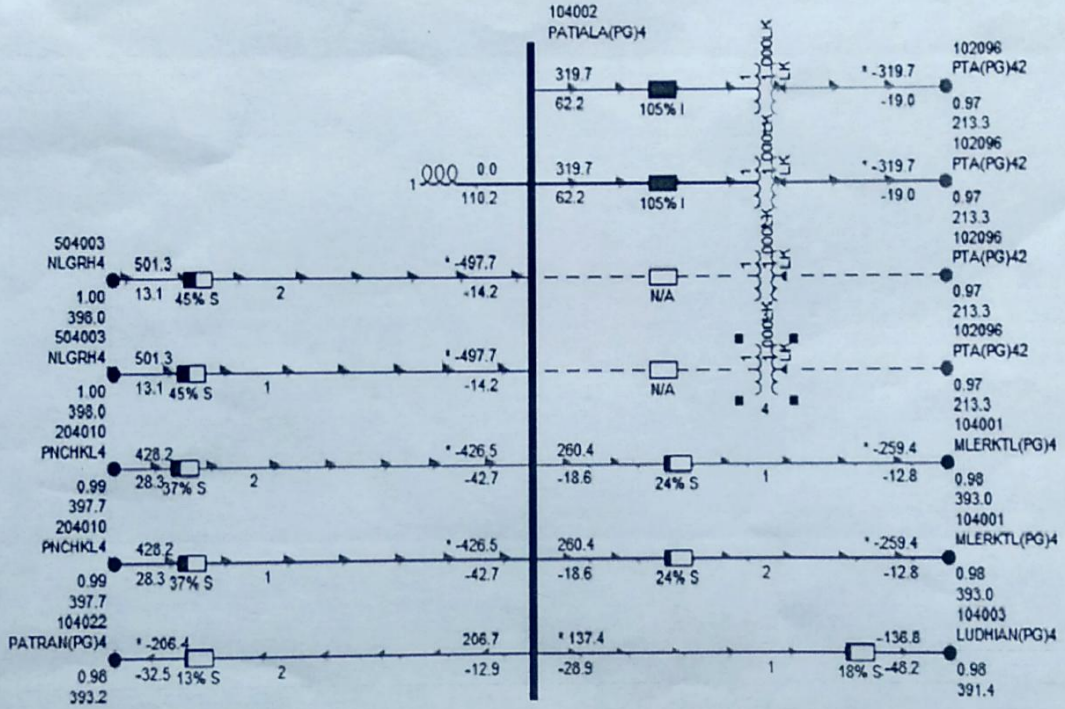
400 kV Patiala- Normal loading ATC/TTC 10000/10600MW



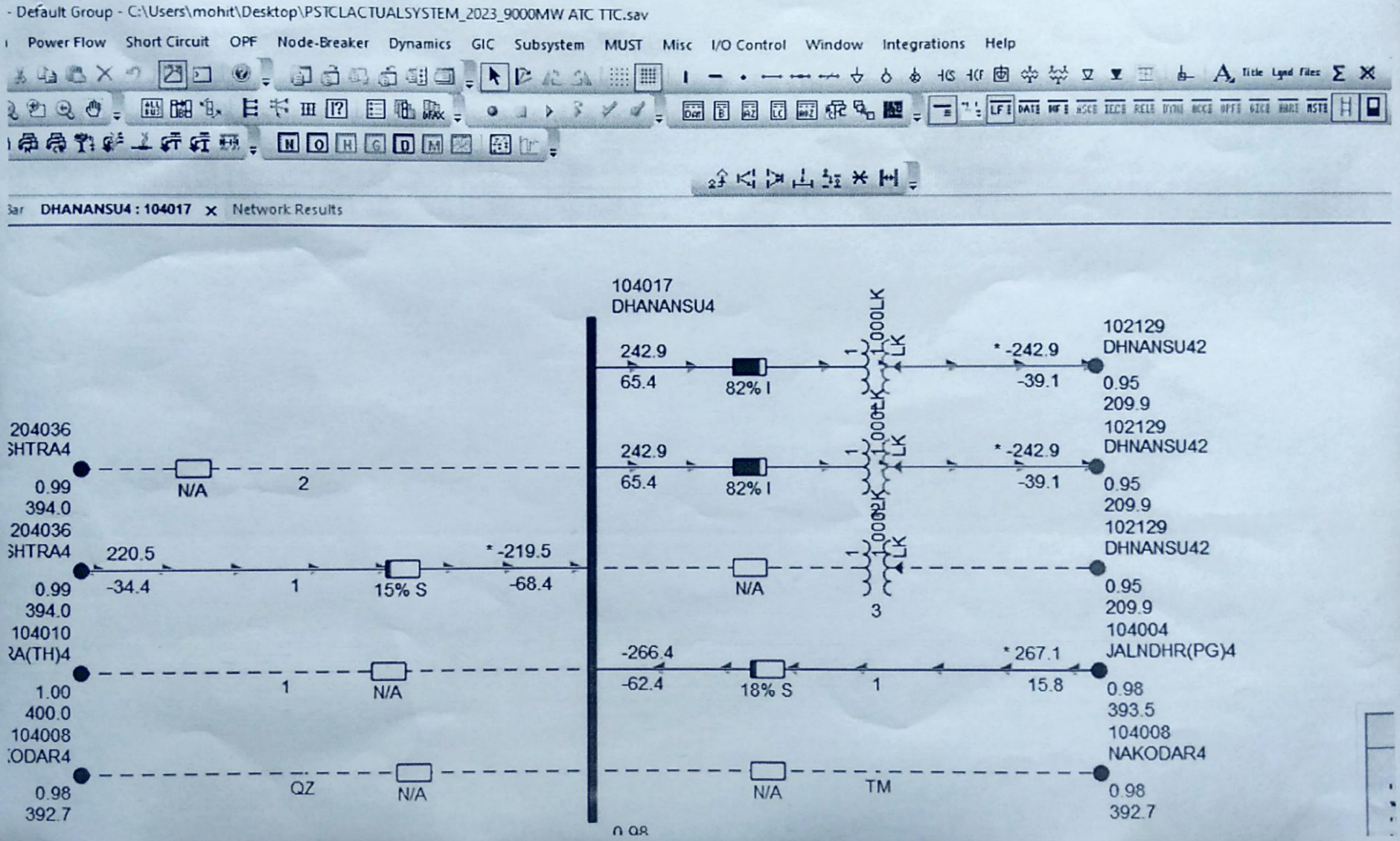
400kV Patiala-(N-1) Condition (ATC/TTC 10000/10600MW

Network data | Output Bar | DHANANSU4 : 104017 | PATIALA(PG)4 : 104002 ×

Network Tree

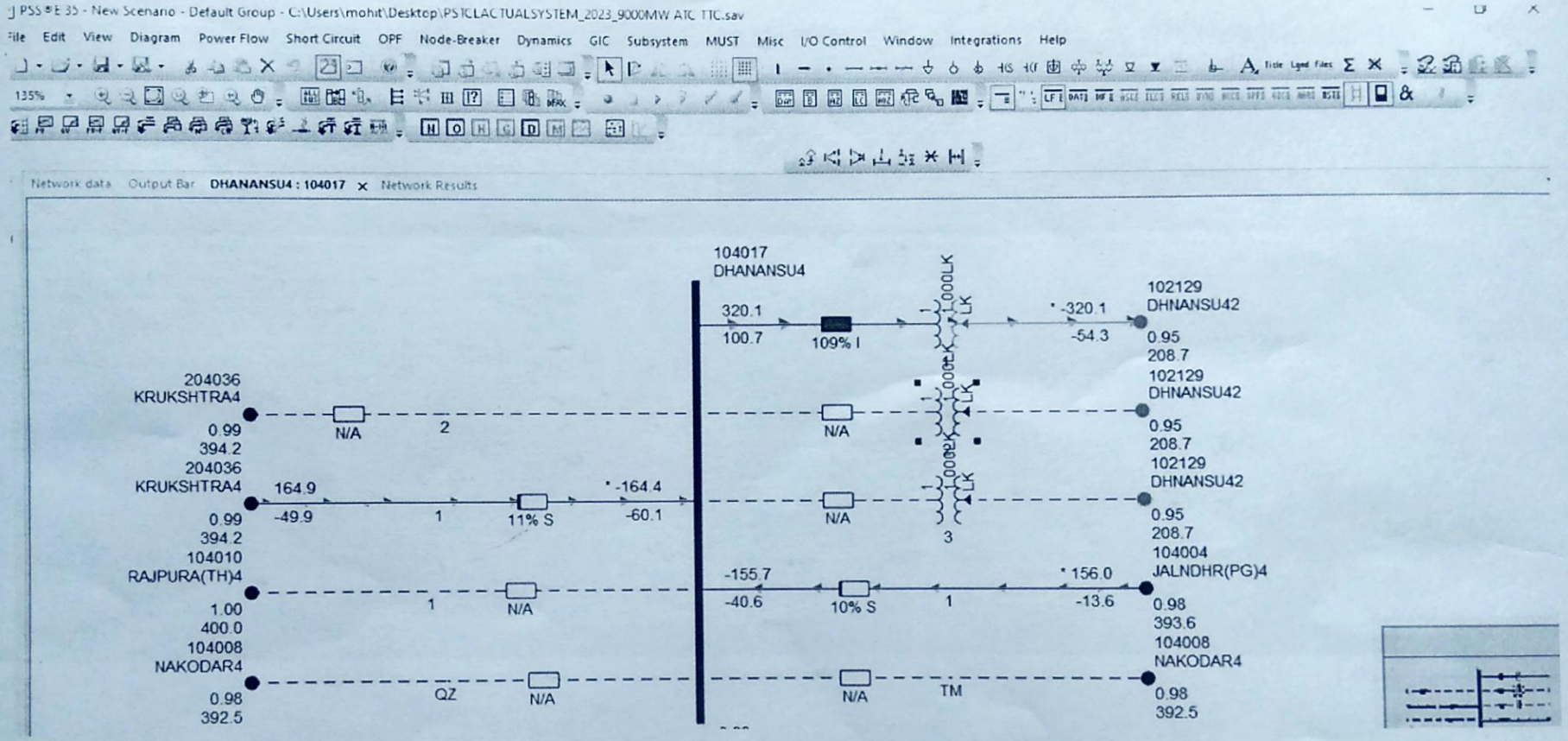


400 KV Dhanansu (2x315 MVA- NORMAL CONDITION)



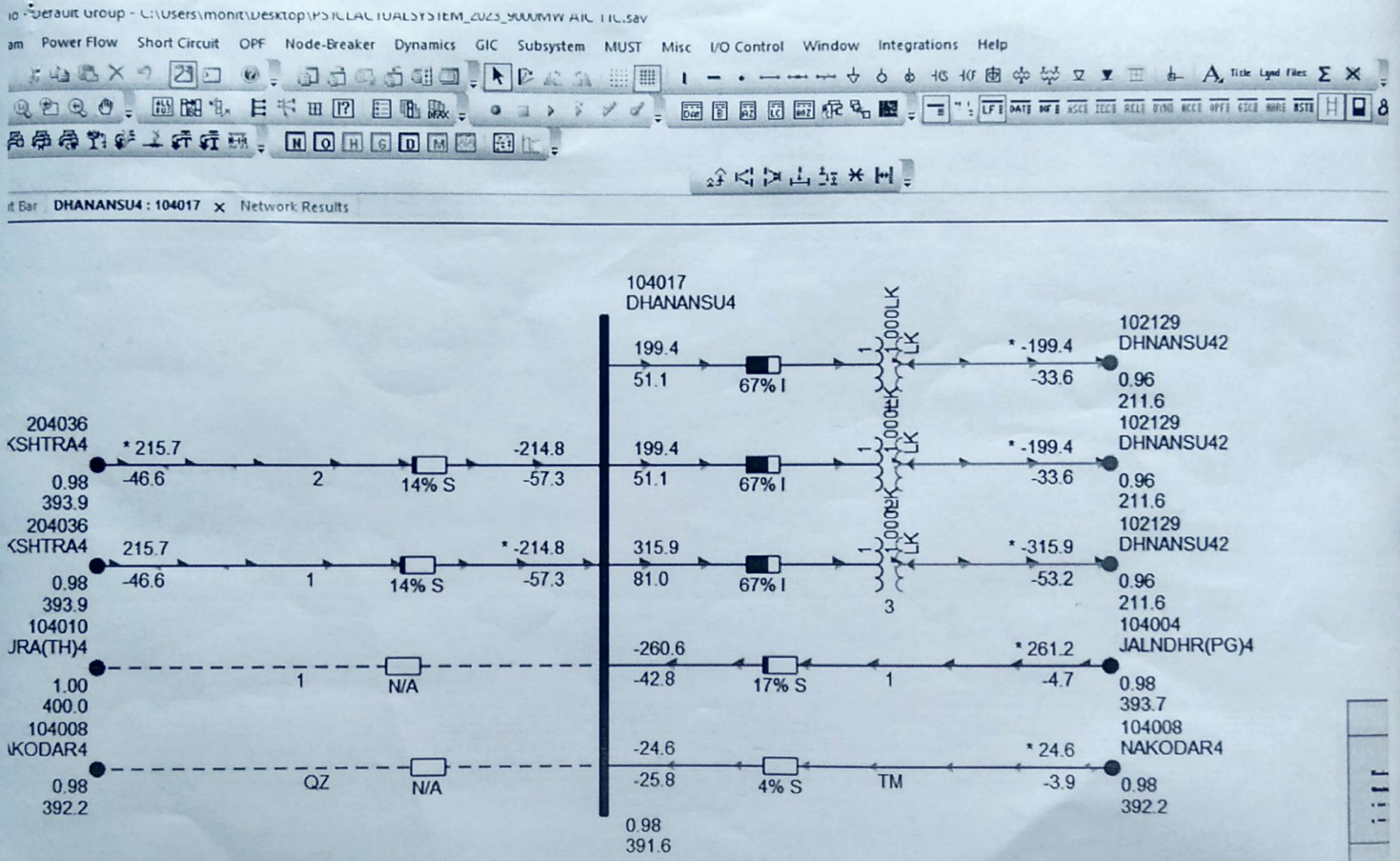
400 KV Dhanansu (2x315 MVA- N-1 Condition)

ATC/TTC 10000/10600 MW



400 kv Dhanansu (2x315 MVA+ 1x500 MVA)- Normal condition

ATC/TTC 10000/10600 MW



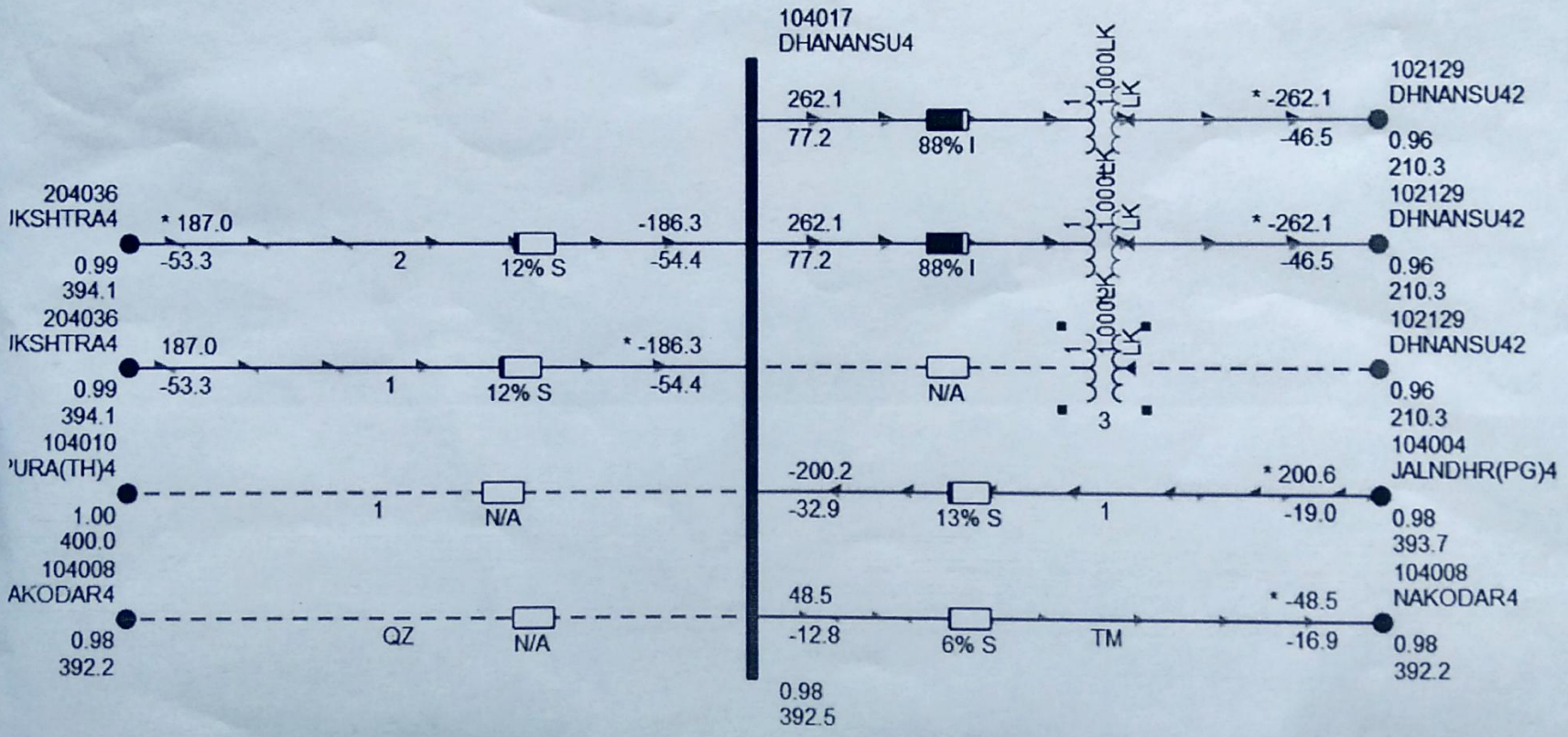
400 KV Dhanansu (2x315 MVA +1X500MVA)- N-1 CONDITION

ATC/TTC 10000/10600 MW

rio Default Group - C:\Users\mohit\Desktop\PSTCLACTUALSYSTEM_2023_9000MW ATC TTC.sav

ram Power Flow Short Circuit OPF Node-Breaker Dynamics GIC Subsystem MUST Misc I/O Control Window Integrations Help

ut Bar **DHANANSU4 : 104017** × Network Results



Bus # 104017

MEMORANDUM FOR THE CONSIDERATION OF NRPC CONSTITUENTS

Sub: Adoption of "Standard Specifications and Technical Parameters for Transformers (66 kV and above)" issued by CEA- Uniform Implementation by the NRPC Constituents.

1. CEA vide e-mail dated 02.02.2021 intimated that "Standard Specifications of Technical Parameters for Transformers and Reactors 66 kV and above voltage Class" has been approved by the Member Power System, CEA and Chairman of the Committee. CEA vide e-mail dated 29.04.2021 conveyed that specifications has also been approved by the Ministry of Power.

2. CEA vide above Standard Specifications has revised the specifications in respect of the Power Transformers for which the below mentioned rating commensurate with HVPNL rating:-

Sr.no.	Rating o transformer
1.	315MVA 400/220kV
2.	160MVA 220/132kV
3.	160MVA 220/66 KV
4.	100MVA 220/33 KV
5.	50MVA 132/33 KV
6.	31.5MVA 66/11 KV

The technical specifications of following rating of Power transformers have not been standardized by CEA and is being used by HVPNL-

Sr. No.	Rating not specified in CEA standard specifications
1	100MVA 220/132kV
2	100MVA 220/66 KV
3	20MVA 132/11 KV
4	25 MVA, 66/33 KV

3. A general comparison of major parameters of existing Technical Specifications vis. A vis. CEA Specifications are as under:-

a) Transformer Losses

Transformer Rating	Max. Losses in standard specification of CEA (in KW)				Max. Losses as per HVPNL Technical specification (in KW)		
	No Load Losses	Load Loss at rated current and at 75deg C for HV and IV windings	I2R Loss at rated current and at 75deg C for HV and LV windings	Auxiliary Losses	No Load Losses	Load Losses	Auxiliary Losses
400/220 kV 315 MVA	75	440	330	10	86	482	16
220/132 kV 160 MVA	30	200	145	6	40	220	8.5
220/66 kV 160 MVA	60	320	265	8	70	300	8.5
220/33 kV 100 MVA	43	245	200	5	50	200	7
132/33kV 50 MVA	25	125	105	3	25	110	2.5
66/11kV 31.5 MVA	18	110	93.5	--	15	85	2

b). The OLTC & Step range of Power Transformers:-

Rating	MVA	Tap changer as per standard specification of CEA		As per HVPNL Technical specification Provision of OLTC & its variation
		Provision of OLTC	Variation of OLTC steps	
400/220KV	315MVA	On common end of series winding for 400 KV side voltage variation.	10% to -10% in 1.25% steps	On 220 KV side 10% to -10% in 1.25% steps
220/132kV	160	OLTC ON 132 kV line end	–5% to +15% in steps of 1.25% for132 kV variation	ON 132kV SIDE -5% TO +15% IN STEPS OF 1.25% EACH
220/132kV	100	T/F rating is not specified in standard specification for transformer of CEA		
220/66kV	160	OLTC at Neutral end of HV	–15% to +5% in steps of 1.25% for HV variation	ON NEUTRAL END OF HV SIDE +10% TO -10% IN STEPS OF 1.25% EACH
220/66kV	100	T/F rating is not specified in standard specification for transformer of CEA		
220/33kV	100	OLTC on HV neutral end	-15% to +5% in steps of 1.25% for HV variation	
132/33kV	50	OLTC on HV neutral end	-15% to +5% in steps of 1.25% for HV variation	On load tapings at neutral end of HV side for variation +5% to -15% in steps of 1.25% each
132/11kV	20	T/F rating is not specified in standard specification for transformer of CEA		On load tapings at neutral end of HV side for variation +5% to -15% in steps of 1.25% each
66/11kV	31.5	OLTC On HV neutral end	–5% to +15% of HV variation in the step of 1.25%	

c). Percentage impedance of Power Transformers:-

Rating	MVA	% Impedance at 75 Deg C	
		as per standard specification of CEA	As per HVPNL Technical specification
		HV-LV (MIN)	AT HIGHEST MVA
		Principal Tap	12.5 (**Principal Tap**)
220/132kV	160	12.5	
220/132kV	100	T/F rating is not specified in standard specification for transformer of CEA	
220/66kV	160	15.0	
220/66kV	100	T/F rating is not specified in standard specification for transformer of CEA	
220/33kV	100	15.0	
132/33kV	50	12.5	10
132/11kV	20	T/F rating is not specified in standard specification for transformer of CEA	
66/11kV	31.5	10	

d) Comparison of Short circuit test of Power Transformers:-

As per latest HVPNL Tech Specification	As per CEA Standard Specification
The transformers shall be designed to have short circuit rating of **five seconds** as per IS: 2026. The thermal ability to withstand short circuit shall be judged by calculation to be supplied above in the tender. SHORT CIRCUIT TEST: Short circuit test in accordance with latest IS-2026 Part (5) clause 4.2, IEC-60076-5 and CEA regulation-2010 (CEA regulation no. 10(3)(g), 34(4)(k), 43(2)(a)(vi)) shall be got conducted on one of the units **of each voltage and capacity** at any test Agencies where facilities exist in the presence of Purchaser's representative. However, in case of those manufacturers who have already got short circuit test in accordance with Cl. 4.2 of IS-2026 Part(5) or latest edition conducted **during the last 7 years on same design and capacity of the Transformer, fresh short circuit test is not required to be conducted**. The bidder in such a case shall submit the copy of type test report along with the bid. If this test is not conducted by the firm earlier, then charges for this test shall be borne by the bidder	The transformer and all its accessories including bushing/built in CTs etc. shall be designed to withstand the thermal and mechanical effects of any external short circuit to earth and of short circuits at the terminals of any winding without damage. The transformer shall be designed to withstand the thermal stress due **to short circuit for a duration of 2 seconds** and the same shall be verified during design review. However, generator transformer and associated auxiliary transformer shall be designed to withstand the thermal stress due to short circuit for a duration of 3 seconds. DYNAMIC SHORT CIRCUIT TEST REQUIREMENT AND VALIDITY The transformer, the design of which is **similar to the offered transformer**, should have been successfully tested for short circuit withstand capability as per IS 2026 Part-5 in line with the requirement of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations. The criteria for similar transformer is specified in Annexure-J. The relevant Test Report/certificate shall be enclosed along with bid. Further, design review of offered transformer shall be carried out based on the design of reference transformer, which has already been subjected to Short circuit tests in lieu of repetition of Short circuit tests. In case, manufacturer has not conducted short circuit test earlier, the same shall be carried out on offered transformer. A format (forms part of Annexure-J) filled with data of a typical sample case has been prepared for reference and guidance of utility to compare a Short Circuit tested transformer with the offered transformer in order to verify the similarity criteria as per AnnexureJ. Annexure J: CRITERIA FOR SELECTION OF SIMILAR REFERENCE TRANSFORMER FOR DYNAMIC SHORT CIRCUIT WITHSTAND TEST A transformer is considered similar to another transformer taken as a reference if it has the following characteristics in common with the latter. ¬ Same type of operation, for example generator step-up unit, distribution, interconnection transformer; ¬ Same conceptual design, for example dry type, oil-immersed type, core type with concentric windings, sandwich type, shell type, circular coils, non-circular coils. ¬ Same arrangement and geometrical sequence of the main windings. ¬ Same type of winding conductors, for example aluminium, aluminium alloy, annealed or work-hardened copper, metal foil, wire, flat conductor, continuously transposed conductors and epoxy bonding, if used. ¬ Same type of main windings, for example helical-, disc-, layer-type, pancake coils. ¬ Absorbed power at short circuit (rated power/per unit short-circuit impedance) between 70% and 130% of that relating to the reference transformer. ¬ Axial forces and winding stresses occurring at short circuit not exceeding 120 % of those relating to the reference transformer. ¬ Same manufacturing processes. ¬ Same clamping and winding support arrangement.

e) Short circuit level of the HV & LV system:-

Sr. No.	Voltage level	As per CEA regulation Short time current rating (sym, rms, 3 phase fault)	As per HVPNL Technical short time withstand current (kA rms)
1	765kV system	63kA (SC for 2 sec.)	--
2	400kV system	63kA (SC for 2 sec.)	40 kA (SC for 5 Sec.)
3	220kV system	50 kA (SC for 2 sec.)	40 kA (SC for 5 Sec.)
4	132kV system	40 kA (SC for 2 sec.)	31.5 kA (SC for 5 Sec.)
5	66kV system	31.5 kA (SC for 2 sec.)	31.5 kA (SC for 5 Sec.)
6	33kV & 11kV system	--	31.5 kA (SC for 5 Sec.)

4. An abstract of total vendor registered with HVPNL and having short circuit test is tabulated below:-

Sr.no.	Rating of Power T/F	Total registered vendors	vendor with type test (short circuit) of HVPNL specifications
1	160 MVA 220/132 kV	6	1
2	160 MVA 220/66 kV	6	2
3	100 MVA 220/132 kV	6	1
4	100 MVA 220/66 kV	7	1
5	100 MVA 220/33 kV	7	2
6	40/50 MVA 132/33 KV	8	4
7	16/20 MVA 132/11 KV	9	4
8	25/31.5MVA, 66/11kV	9	4

5. HVPNL is facing a lot of problem for procuring various rating of Power Transformers 220/132 KV & 220/66 KV voltage class. HVPNL intends to procure Power transformers for its requirement of various capital works and ongoing works for the below mentioned rating:-

Sr.no.	Rating of Power T/F
1	160 MVA 220/132 kV
2	160 MVA 220/66 kV
3	100 MVA 220/132 kV
4	100 MVA 220/66 kV
5	100 MVA 220/33 kV
6	40/50 MVA 132/33 KV
7	16/20 MVA 132/11 KV
8	25/31.5MVA, 66/11kV

In view of the above, following needs to be deliberated in the NRPC meeting for uniform implementation of availability of vendors for supply of power transformers in the Northern States:-

i) To get information regarding member states of Northern Region who have already adopted or likely to adopt the standard specifications of the CEA to perform the unison in near future.

ii) If already adopted, the vendors who are supplying power transformers to respective states and the same be shared with the other constituent states.

iii) The specifications of other ratings of transformer of which CEA has not standardized may be shared among the other utilities along with the list of existing vendors, so as to have unison and resort to better competition & participation.

iv) Any other measures that can help market building vis-à-vis transformers.

Chief Engineer/ PD&C
HVPNL, Panchkula

Annexure B.15.1

Format: Details of Synchronous Condenser operation (To be submitted by Generator)

S. No.	Name of the Plant	Unit No.	Date of operation	NRLDC Code for start of synchronous condensor mode of operation	Time of Synchronous condensor mode of operation		NRLDC Code for stopping of synchronous condensor mode of operation	MW Quantum during operation		MVAr Quantum during operation		Remarks
					From	To		Maximum (MW)	Minimum (MW)	Maximum (MVAr)	Minimum (Mvar)	
1	Tehri HEP	1	16.11.2020	M-34	12.40	13.30	M-36	-25	-5	103.28	-114.53	Machine stopped after successful completion of exercise
2		1	17.11.2020	3598	1.30	4.30	3611	-28	-6	10	-99	Machine stopped after successful completion of exercise
3		2	17.11.2020	3724	13.00			0	0	0	0	Unit tripped on reverse power 32G as water could not be depressed
4		3	18.11.2020	3911	12.25			0	0	0	0	Unit tripped on reverse power 32G as water could not be depressed
5		2	24.11.2020	5105	1.30	4:30	5113	-26	-5	-6	-104	Machine stopped after successful completion of exercise
6		2	25.11.2020	5334	1.30	1:40		0	0	0	0	Machine could not be operated in SC mode
7		1	25.11.2020	5334	1.45	4:30	5342	-28	-6	-5	-100	Machine stopped after successful completion of exercise
8		3	26.11.2020	5639	1.30	4:30	5650	-25	-6	-92	-106.8	Machine stopped after successful completion of exercise
9		1	27.11.2020	5873	3.00	4:10	5875	-26	-5	75	-114	Machine stopped after successful completion of exercise

Generation: +ve
Absorbtion: -ve

Total Hours machine run in Sync condenser mode	**14.25hrs**
Total MVAr-Hours absorption	**1370.221**

ANNEXURE-B.15.2

MVAR performance of generators (9th Dec'20 – 8th Jan'21)										
Sl. No.	Station	Unit No.	Fuel Type	Installed Capacity (MW)	MVAR absorption capacity (MVAR)	MVAR generation capacity (MVAR)	Geographical location	MVAR performance (-) Absorption (+) Generation	Voltage absorption above (in KV)	Remarks
A. NTPC Ltd										
1	Dadri NCTPS	1	Thermal	210	-63	126	Delhi-NCR	-	-	MVAr generation not suitable
		2		210	-63	126		-		
		3		210	-63	126		-		
		4		210	-63	126		-		
2	Dadri NCTPP	1	Thermal	490	-147	294	Delhi-NCR	-80 to 100	415	
		2		490	-147	294		-150 to 150		
3	Koldam	1	Hydro	200	-60	120	Himachal Pradesh	-40 to 10		
		2		200	-60	120		-40 to 10		
		3		200	-60	120		-40 to 10		
		4		200	-60	120		-40 to 10		
4	Rihand TPS	1	Thermal	500	-150	300	Uttar Pradesh	-90 to 10	400	Different response from different units
		2		500	-150	300		-80 to 30		
		3		500	-150	300		-80 to 20		
		4		500	-150	300		-90 to 20		
5	Singrauli STPS	1	Thermal	200	-60	120	Uttar Pradesh	-30 to 5	400	
		2		200	-60	120		-15 to 15		
		3		200	-60	120		-30 to 5		
		4		200	-60	120		-30 to 10		
		5		200	-60	120		-25 to 0		
		6		500	-150	300		-80 to 5		
		7		500	-150	300		-70 to 0		
6	Unchahar - I,II & II TPS	1	Thermal	210	-63	126	Uttar Pradesh	-40 to 40		Different response from different units
		2		210	-63	126		-20 to 40		
		1	Thermal	210	-63	126	Uttar Pradesh	-20 to 60		
		2		210	-63	126		-10 to 60		
		1	Thermal	210	-63	126	Uttar Pradesh	-30 to 60		
B. Adani Power										
1	Kawai	1	Thermal	660	-198	396	Rajasthan	-90 to 70	405	
		2		660	-198	396		-110 to 60		
C. ARAVALI POWER COMPANY PVT. LTD. (APCPL-A joint venture of NTPC,IPGCL & HPGCL)										
1	Jhajjar (IGSTPS)	1	Thermal	500	-150	300	Haryana	-30 to 100	418	Can absorb more MVAR as per data
		2		500	-150	300		-70 to 120		
		3		500	-150	300		-		

ANNEXURE-B.15.2

D. Lalitpur Termal Power Generation (Bajaj Hindustan Limited)										
1	Lalitpur TPS	1	Thermal	660	-198	396	Uttar Pradesh	-80 to 80	775	Can absorb more MVAR as per data
		2		660	-198	396		-80 to 120		
		3		660	-198	396		-70 to 90		
E. Haryana										
1	Mahatama Gandhi STPS CLP Jhajjar	1	Thermal	660	-198	396	Haryana	-150 to 60	412	Can absorb more MVAR as per data
		2		660	-198	396		-150 to 60		
2	Khedar (Rajiv Gandhi STPS)	1	Thermal	600	-180	360	Haryana	-150 to 100	410	
		2		600	-180	360		_		
F. Indraprastha Power Generation Corporation ltd (IPPGCL)/ Pragati Power Corporation Ltd (PPCL)										
1	Bawana CCGT	GT#1	Gas	216	-150	180	Delhi-NCR	-30 to 60	420	High voltage set point
		GT#2		216	-150	180		_		
		GT#3		216	-150	180		-40 to 40		
		GT#4		216	-150	180		-50 to 50		
		ST#1		253.6	-150	180		-20 to 80		
		ST#2		253.6	-150	180		-40 to 60		
G. Jindal South West Energy (JSW Energy)										
1	Karcham Wangtoo	1	Hydro	250	-200	150	Himachal Pradesh	-100 to 60	415	High voltage set point
		2		250	-200	150		-		
		3		250	-200	150		-60 to 40		
		4		250	-200	150		-60 to 40		
H. M/S Lanco Anpara Power Private Ltd (A SPV formed by M/s Lanco Kondapalli Power Private ltd)										
1	Anpara-C	1	Thermal	600	-180	360	Uttar Pradesh	-120 to 60	765	
		2		600	-180	360		-120 to 60		
I. L&T Power Development Limited (A wholly owned subsidiary of L&T)										
1	Rajpura TPS	1	Thermal	700	-210	420	Punjab	-50 to 210	405 (if MVAR sign reversal considered)	Data needs check
		2	Thermal	700	-210	420		-50 to 210		
J. Prayagraj Power Generation (JAYPEE group)										
1	Bara	1	Thermal	660	-198	396	Uttar Pradesh		data suspected	Data needs check
2	Bara	2	Thermal	660	-198	396	Uttar Pradesh			
3	Bara	3	Thermal	660	-198	396	Uttar Pradesh			

ANNEXURE-B.15.2

K. Rajasthan Rajya Vidyut Utapadan Nigam Ltd (RRVUNL)										
1	Chhabra Stage-I	1	Thermal	250	-75	150	Rajasthan,	-50 to 20	408	can provide more support for better voltage profile at Hindaun and Alwar
		2		250	-75	150	Baran	-30 to 20		
2	Chhabra Stage-2	3	Thermal	250	-75	150	Rajasthan,	-		
		4		250	-75	150	Baran	-		
3	Chhabra Supercritical	1	Thermal	660	-198	396	Rajasthan,	-30 to 150	412	Data needs check
		2	Thermal	660	-198	396	Baran	-40 to 140		
7	Kalisindh	1	Thermal	600	-180	360	Rajasthan	-150 to 100	400	Data needs check
		2		600	-180	360		-150 to 0		
L. SJVN Ltd										
1	Nathpa-Jhakri	1	Hydro	250	-200	150	Himachal Pradesh	-60 to 30	408	Data needs check
		2		250	-200	150		-60 to 30		
		3		250	-200	150		-60 to 0		
		4		250	-200	150		-60 to 30		
		5		250	-200	150		-60 to 30		
		6		250	-200	150		-40 to 30		
M. Talwandi Sabo Power Limited (TSPL) (Sterlite Energy Limited)										
1	Talwandi Saboo	1	Thermal	660	-198	396	Punjab	-50 to 230	410 (if MVAR sign reversal considered)	Data needs check
		2		660	-198	396		-		
		3		660	-198	396		-		
N. THDC										
1	Tehri	1	Hydro	250	-150	150	Uttarakhand	0 to 100	408	Data needs check
		2		250	-150	150		-10 to 60		
		3		250	-150	150		-20 to 80		
		4		250	-150	150		0 to 90		
2	Koteshwar	1	Hydro	100	-80	60	Uttarakhand	80 to 100		Data needs check
		2		100	-80	60		60 to 100		
		3		100	-80	60		-		
		4		100	-80	60		-		

Annexure B.15.3

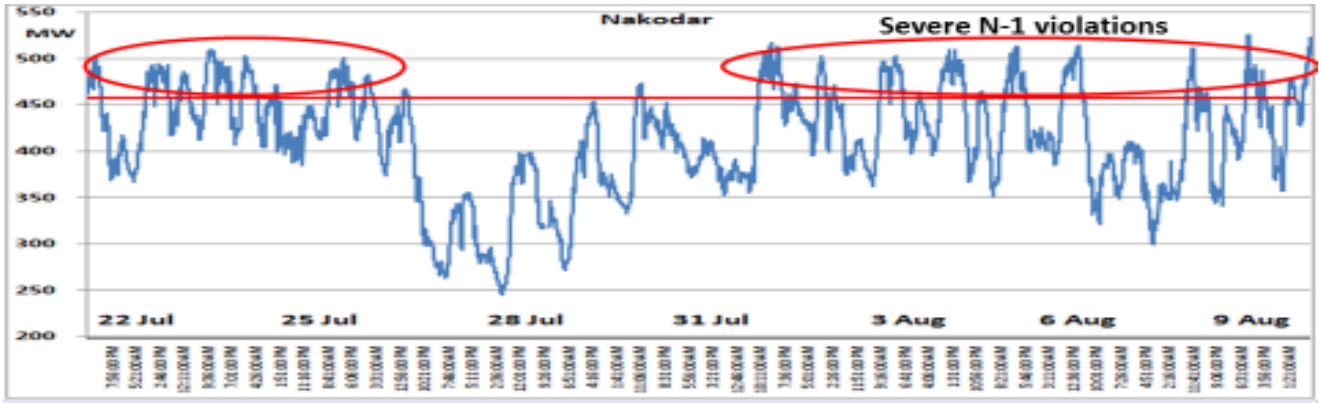
N-1 Non-compliance of ICTs

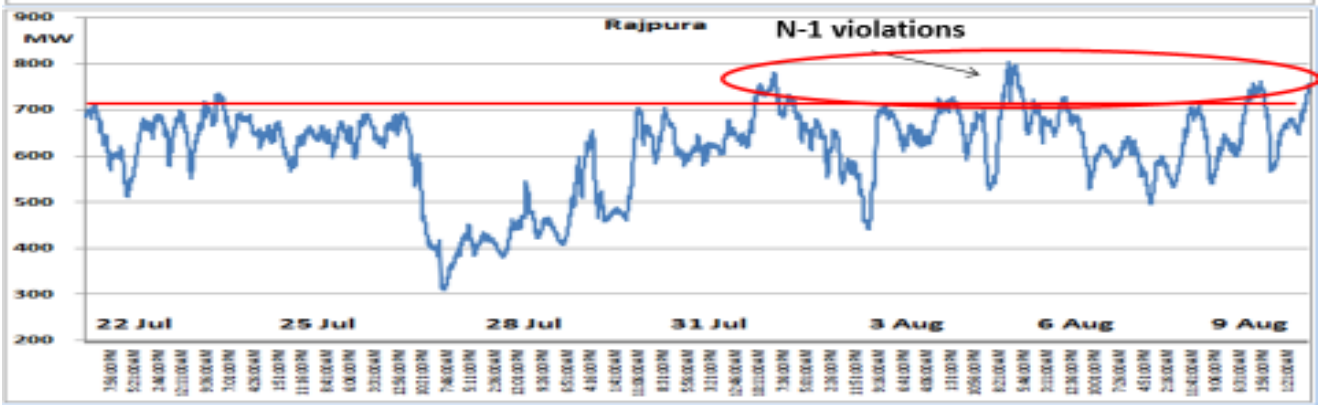
Haryana					
Sl No.	**Name of Substation**	**ICTs Capacity (MVA)**	**Owner**	**Control Area**	**N-1 Loading limit(MW)**
1	Deepalpur	2*315	HVPNL	Haryana	360
2	Panipat BBMB	3*150+500	BBMB		526
3	Kurukshetra(PG)	2*500	PGCIL		700
4	Sonepat	2*315	PGCIL		450
Punjab					
Sl No.	**Name of Substation**	**ICTs Capacity (MVA)**	**Owner**	**Control Area**	**N-1 Loading limit(MW)**
1	Rajpura	2*500	PSTCL	Punjab	710
2	Nakodar	2*315	PSTCL		460
3	Makhu	2*315	PSTCL		480
4	Moga	2*500+1*250+1*315	PGCIL		1220
5	Ludhiana	3*315+1*500	PGCIL		1110
6	Amritsar	2*315+2*500	PGCIL		1250
Rajasthan					
Sl No.	**Name of Substation**	**ICTs Capacity (MVA)**	**Owner**	**Control Area**	**N-1 Loading limit(MW)**
1	Chittorgarh	2*315	RRVPNL	Rajasthan	345
2	Jodhpur	2*315	RRVPNL		433
3	Phagi	2*1500	RRVPNL		1948
4	Merta	2*315	RRVPNL		390
UP					
Sl No.	**Name of Substation**	**ICTs Capacity (MVA)**	**Owner**	**Control Area**	**N-1 Loading limit(MW)**
1	Azamgarh	2*500	UPPTCL	UP	500
2	Sarnath	3*315+1*500	UPPTCL		1010
3	Agra UP	2*500+1*315	UUPTCL		965
4	Mau	3*200	UPPTCL		382
5	Obra	2*315+1*240	UPPTCL		617
6	Allahabad	3*315	PGCIL		778
7	Lucknow(PG)	2*500	PGCIL		645
8	Sohawal(PG)	2*315	PGCIL		410
Delhi					
Sl No.	**Name of Substation**	**ICTs Capacity (MVA)**	**Owner**	**Control Area**	**N-1 Loading limit(MW)**
1	Bamnoli	2*315+2*500	DTL	Delhi	1150
2	Mundka	3*315	DTL		685
3	Harshvihar	3*315	DTL		630
4	Maharanibagh	2*315+2*500	PGCIL		1220
5	Tuglakabad	4*500	PGCIL		1530

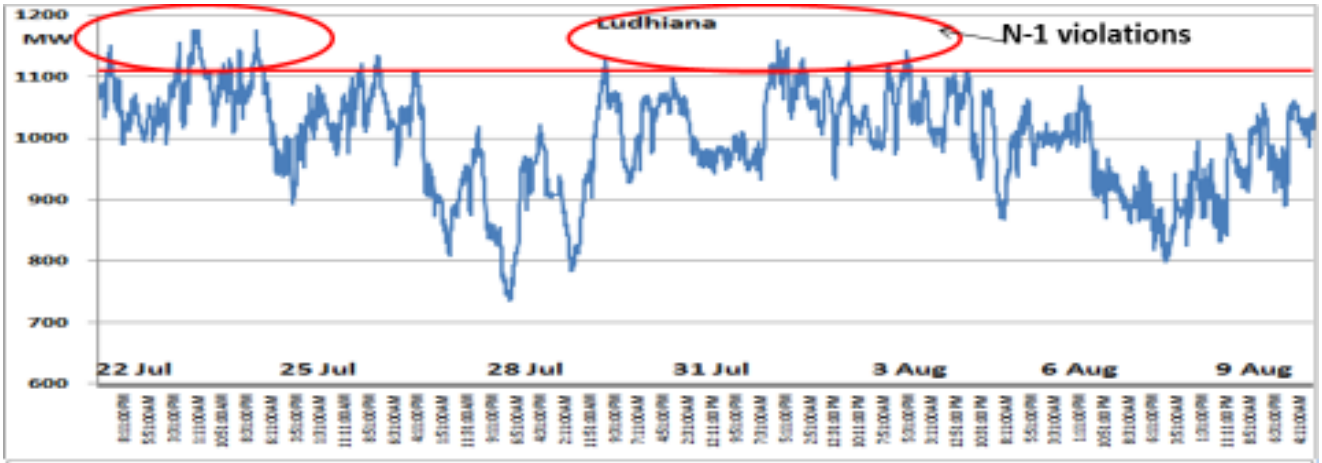
*N-1 loading limit is evaluated considering tripping of largest ICT for respective Nodes

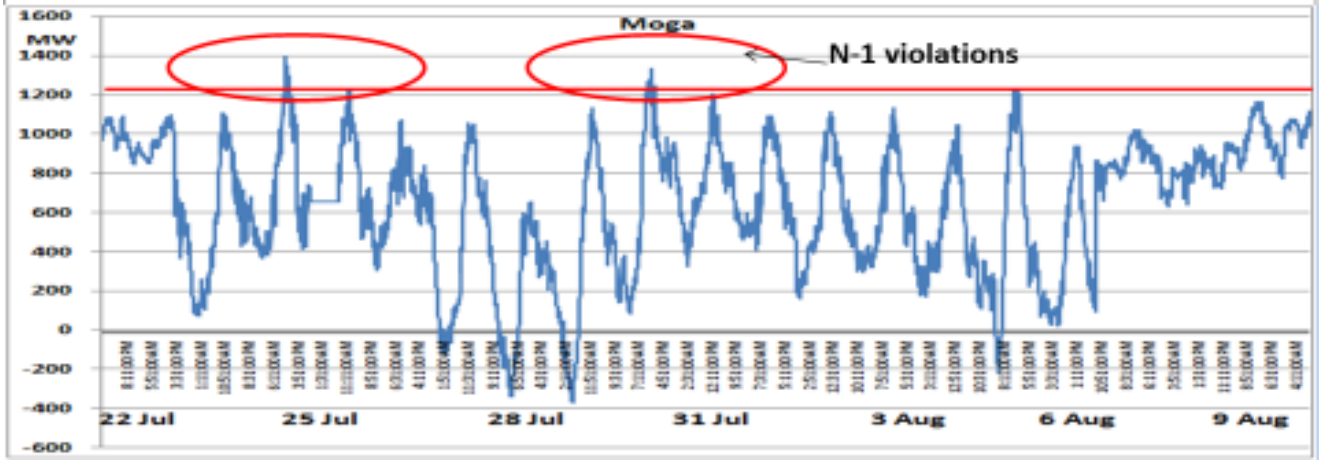
ANNEXURE-III

N-1 Non-compliance of ICTs



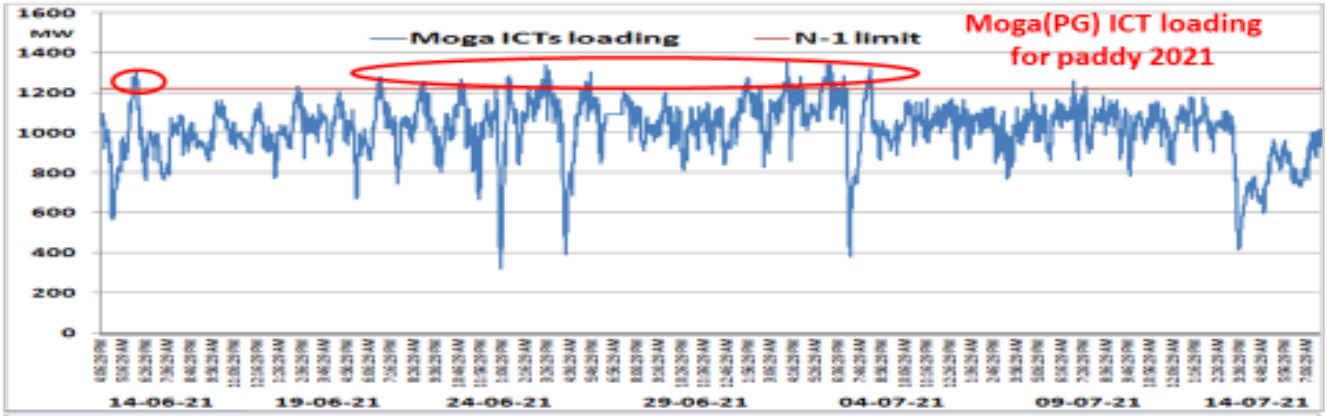


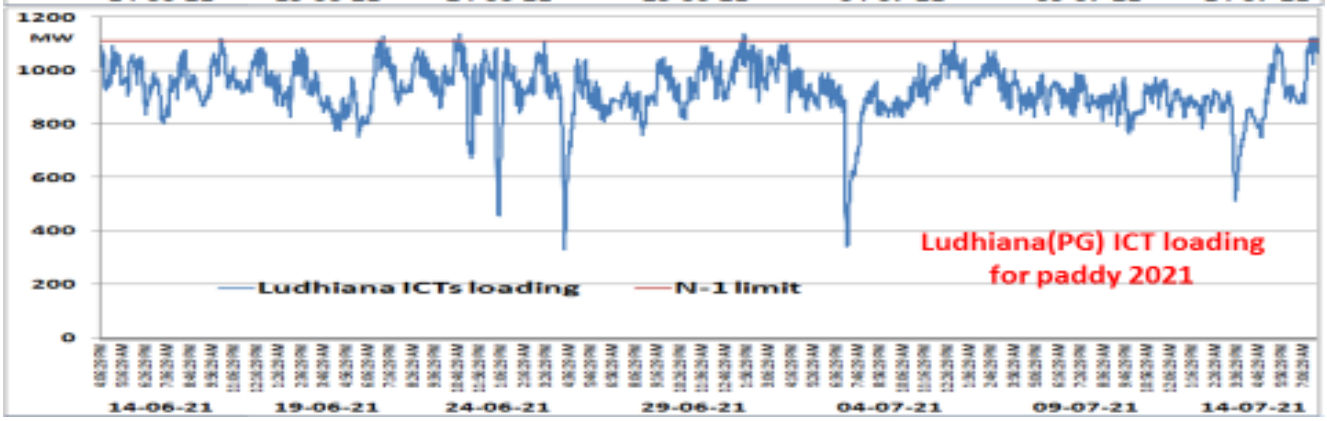


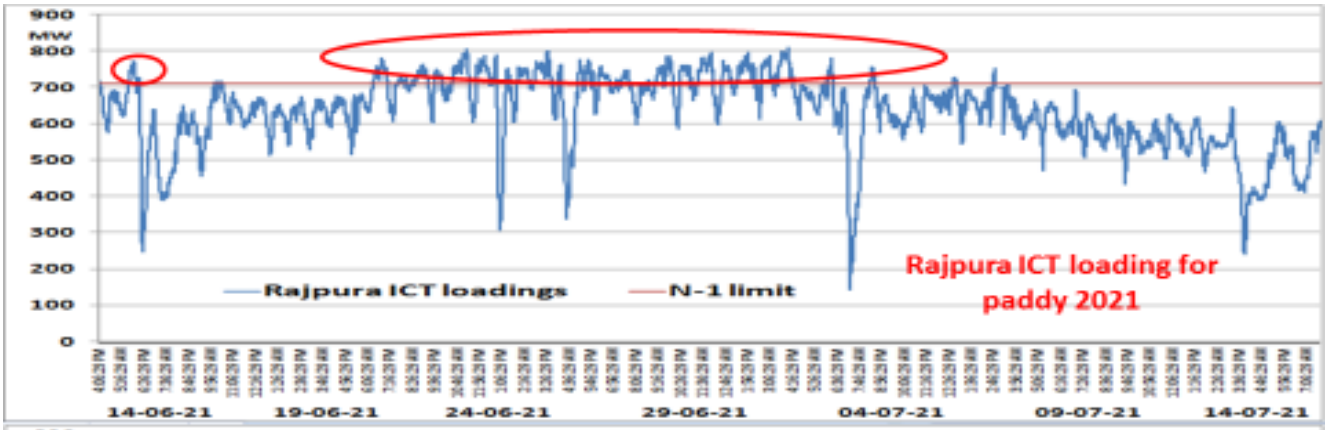


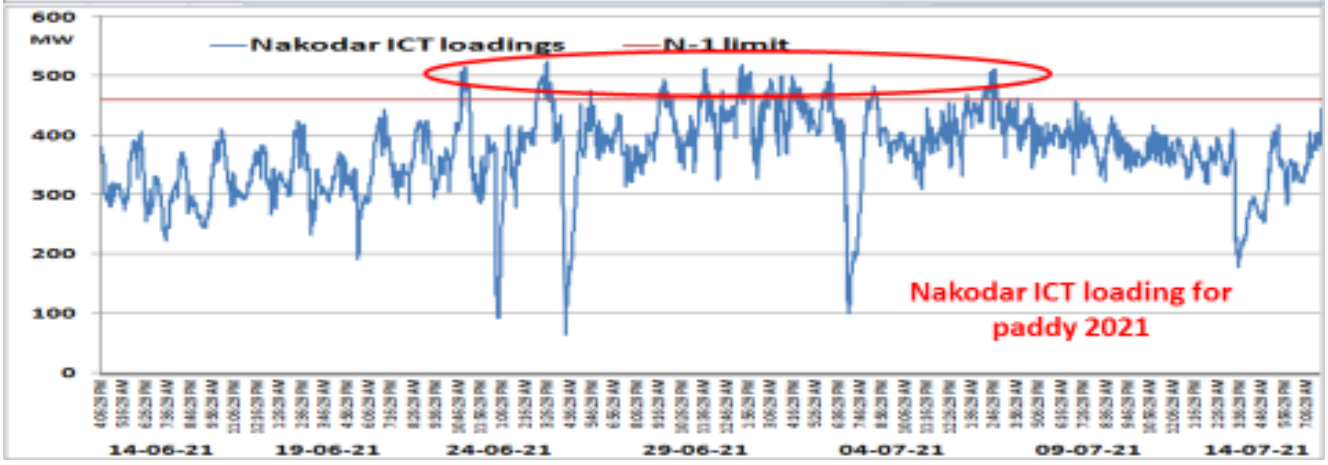
ANNEXURE-III

N-1 Non-compliance of ICTs

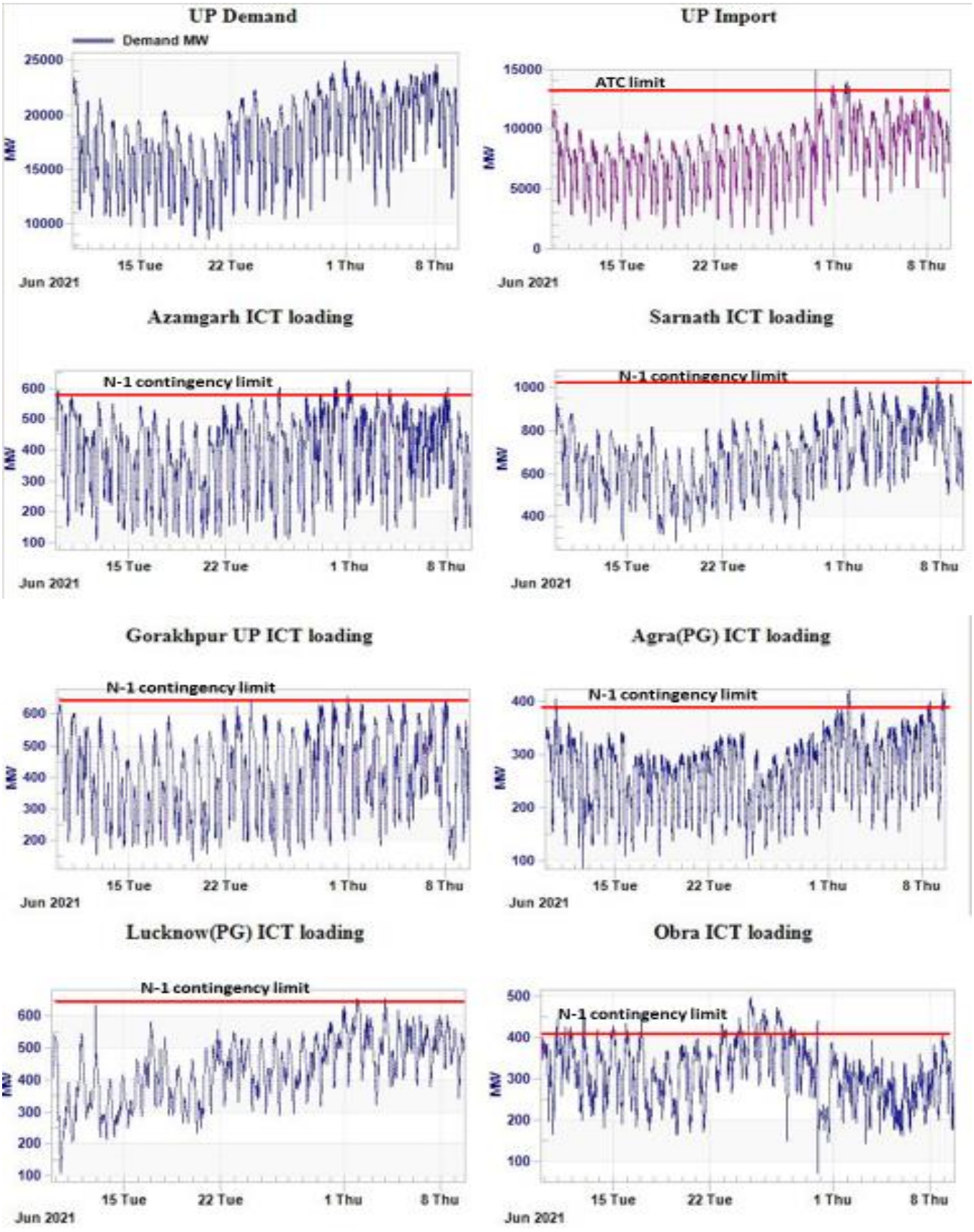






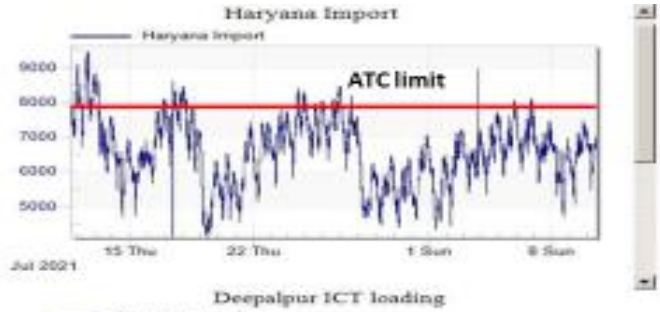


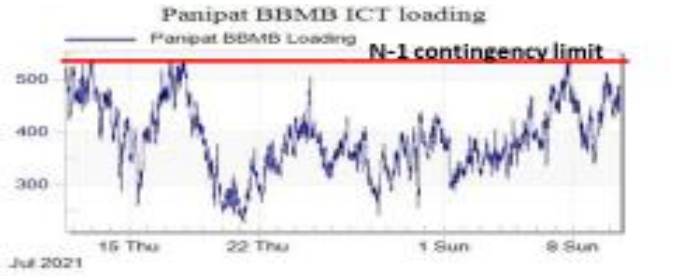
N-1 Non-compliance of ICTs

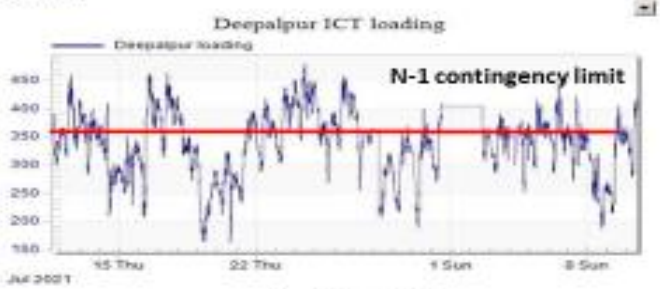


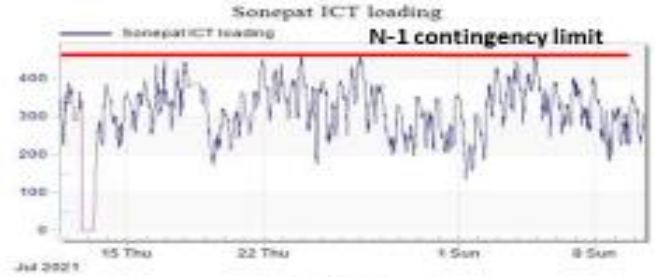
ANNEXURE-III

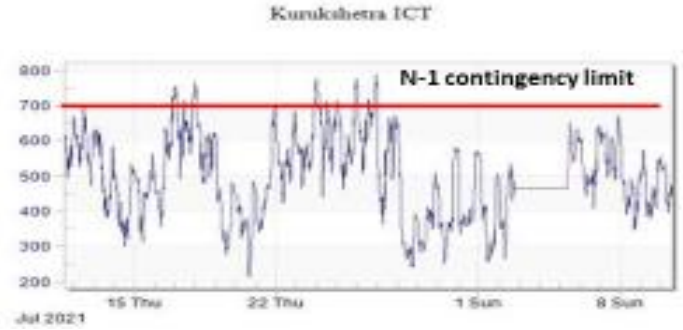
N-1 Non-compliance of ICTs

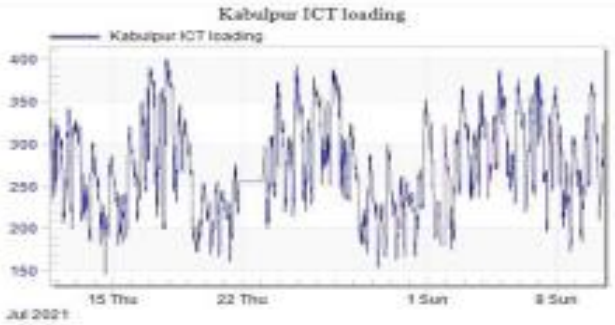


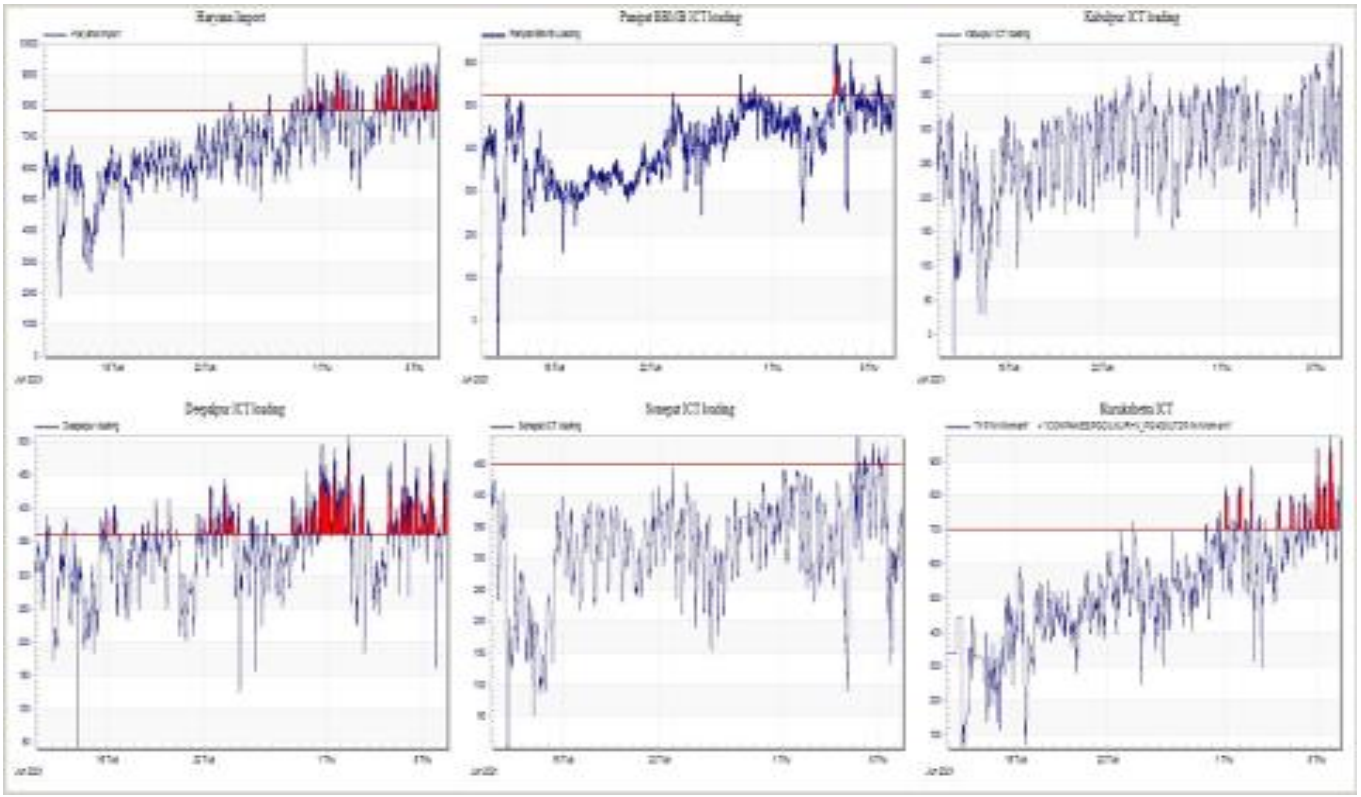








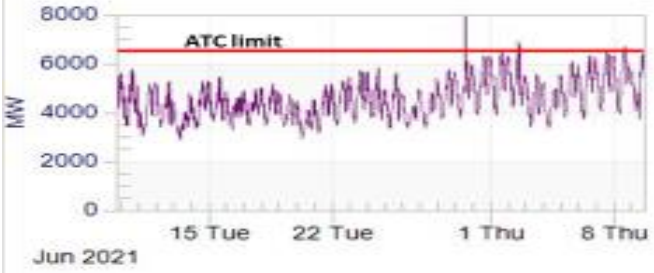




ANNEXURE-III

N-1 Non-compliance of ICTs

Delhi Import



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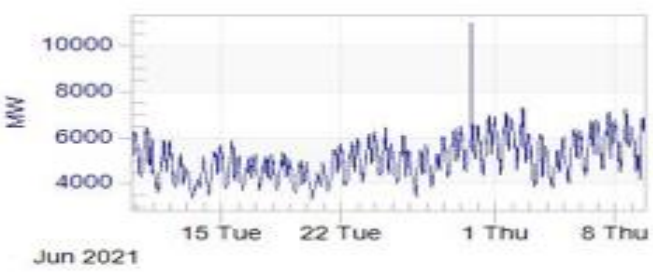

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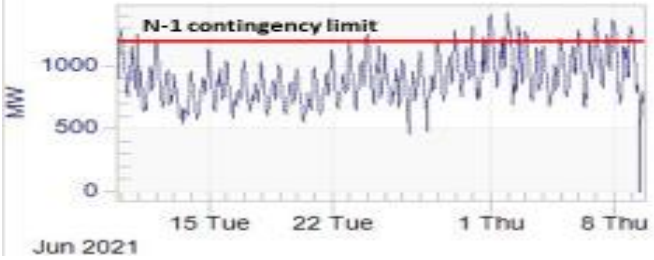

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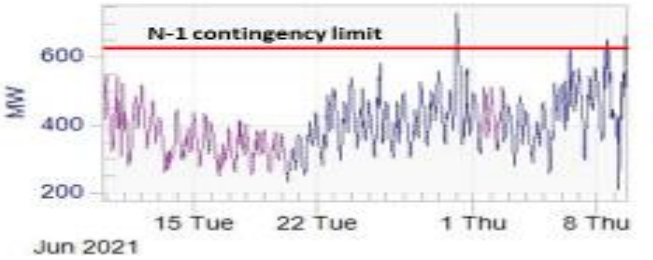
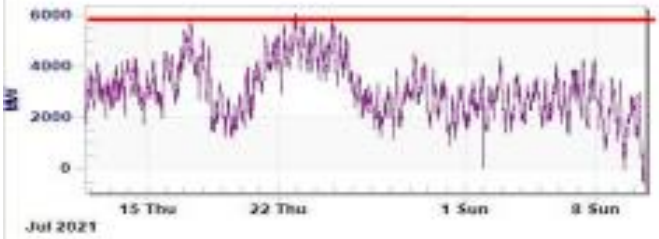


Rajasthan import



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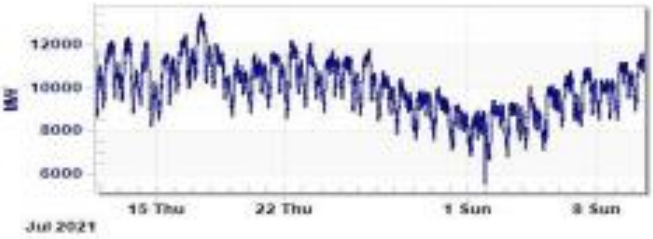

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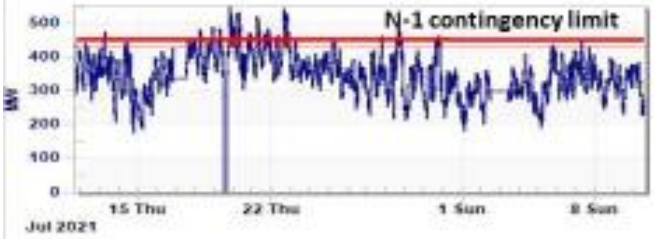

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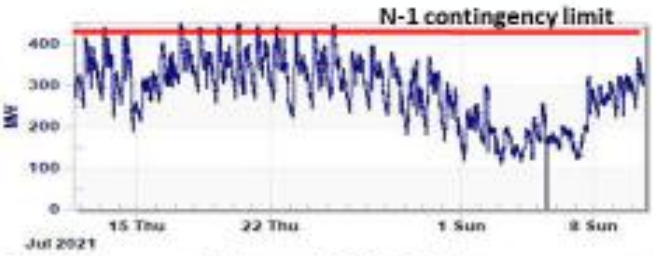

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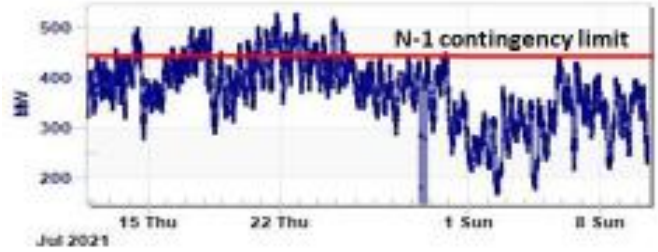

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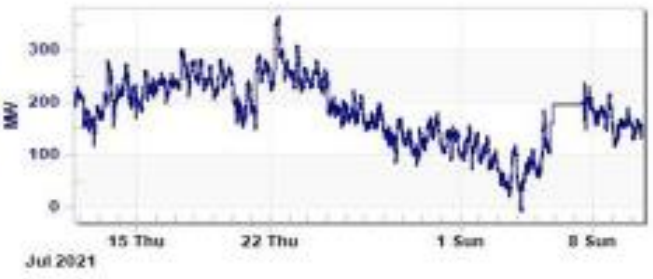


Annexure B.18

Transmission lines planned under PMDC-2015:

S. No.	Transmission Line	Ckt Type	Voltage (in kV)	Length (ckt km)	Region	Status
1	LILO of Canal - Miran Sahib at Chatha	D/C	132	16	Jammu	Work not started.
2	Hiranagar - Kathua line (Reconductoring)	D/C	132	152	Jammu	Work not started.
3	LILO of Hiranagar - Bishnah at Samba [Jatwal] Grid station	D/C	220	12	Jammu	LILO of Ckt-1 with creation of Hiranagar-Samba[Jatwal][PG] -2 and Bishnah-Samba[Jatwal][PG]-1 completed and energised.
4	Samba (JKPDD) – Samba [Jatwal] (PGCIL)	D/C	220	22	Jammu	Both Ckts completed and energised.
5	LILO of Hiranagar - Gladni at Chowadhi	S/C	220	16	Jammu	At present the Line is Samab[Jatwal](PG)-Gladni but work for LILO at Chowdhi has not started.
6	LILO of Thein - Hiranagar at Kathua-II (Ghatti)	D/C	220	12	Jammu	LILO of both ckts completed and and energised.
7	LILO of Barn - Kishanpur at Nagrota	S/C	220	10	Jammu	Work not started.
8	Extension of Mirbazar - Alusteng line upto New Wanpoh	D/C	220	12	Kashmir	Both Ckts extended upto Mirbazar and energised.
9	LILO of Budgam - Bemina at Tengpora (Power Cable)	D/C	132	8	Kashmir	
10	LILO of one ckt. Alusteng - New Wanpoh at Tailbal	D/C	220	7	Kashmir	
11	LILO of Wagoora - Mirbazar line at Lassipora	D/C	220	12	Kashmir	LILO completed and energised.
12	LILO of Zainkote - Delina at Kunzar (Sterlite S/S)	D/C	220	20	Kashmir	LILO completed and energised.
13	New Wanpoh - Mir Bazar line	D/C	220	10	Kashmir	Completed and energised.
14	Replacement of Conductor in Pampore–Cheshmashahi	D/C	132	28	Kashmir	
15	Waganpora - Khanyar (Cable)	D/C	132	10	Kashmir	
16	Kargil - Padum (Zanaskar) line	S/C	220	207	Kargil	
17	Phyang (PGCIL) - Diskit (Nubrai) line	S/C	220	100	Leh	

MVA capacity planned under PMDC-2015

S. No.	Transmission Line	Voltage Ratio	MVA	Region	
1	Chatha Grid S/S	132/33	100	Jammu	
2	Janipur (Aug) S/S	132/66/33	50	Jammu	Completed and energised.
3	Kathua (Aug) (50-20) S/S	132/66/33	30	Jammu	Completed and energised.
4	Miran Sahib (Aug) (50-20)x2	132/66/33	30x2	Jammu	Completed and energised.
5	Pounichak (Aug) S/S	132/66/33	50	Jammu	Completed and energised.
6	Sidhra (Aug) (2x50-2x20)	132/66/33	60	Jammu	Completed and energised.
7	Chowadhi S/S	220/33	160	Jammu	--
8	Kathua-II (Ghatti) S/S	220/66	160	Jammu	Completed and energised.
9	Samba S/S	220/66	160	Jammu	Completed and energised.
10	Nagrota S/S	220/33	2*50	Jammu	--
11	Bemina (Aug(200-150)	132/33	50	Kashmir	
12	Chadoora (Aug) (100-50)	132/33	50	Kashmir	
13	Cheshmashahi (Aug) (140-105)	132/33	35	Kashmir	Completed and energised.
14	Khrew (Aug) (150-100)	132/33	50	Kashmir	Completed and energised.
15	Tengpora (GIS)	132/33	150	Kashmir	
16	Zainakote (Aug) (125-75)	132/33	50	Kashmir	
17	BatporaTailbal (GIS)	220/33	160	Kashmir	
18	Khanyar (GIS)	132/33	100	Kashmir	
19	Lassipora (GIS)	220/33	160	Kashmir	U/P
20	Bay at Kargil	220/66	0	Kargil	
21	Padum S/S	220/33	1*50	Kargil	
22	Bay at Phyang	220/33	0	Leh	
23	Diskit (Nubra)	220/33	1*50	Leh	

National Load Despatch Centre
Power System Operation Corporation Limited

Operations Guideline for Coal Based Power Plants under AGC

Revision 1, Issued: 20 July 2021

This document provides the standard operating procedures to be followed during the continuous operation of the power plants under Automatic Generation Control (AGC) and attempts to answer the frequently asked questions.

Revision History

Rev-0 : Original document – 08 July 2021

Rev-1: Formula elaborated at FAQ-6 Performance Calculation. Improved the document format – 20 July 2021

Contents

1. Controls Available with the Power Plant during AGC

User data entry of the below parameters is available for all the power plants under AGC. This data is received directly by NLDC from the power plants. Data can be entered through the relevant field in the user interface of the Remote Terminal Unit (RTU) or Digital Control System (DCS). These below five signals are the "controls" available with the power plant during AGC operation.

1.1. Unit Load Set Point (ULSP) or the Base Point in MW

It is the unit-wise manual entry done by the plant shift engineer/operator in the digital control system (DCS) of the generating unit. ULSP is an ex-generating unit value entered by the power plant shift engineer in the DCS for each time block calculated by adding auxiliary power consumption of the unit to the ex-bus schedule provided by the RLDC. Note that the ex-bus schedule is provided for the total power plant by the RLDC; this is distributed in between the on bar generating units by the plant operator considering on-site constraints. To be entered for each individual unit.

1.2. Cap_Max in MW

It is the ex-generating unit capability to be updated by the power plant operator by distributing the ex-bus declared capability amongst the on-bar generating units and adding the respective auxiliary consumption. This shall be entered by the power plant operator in the DCS / HMI. To be entered for each individual unit.

1.3. Cap_Min in MW

It is the minimum limit to be entered by the power plant operator in the DCS / HMI. To be entered for each individual unit.

Note: Cap_Max and Cap_Min values summed up for the total plant are used by the AGC software at NLDC to limit the final AGC Set Point before sending to the power plant. Cap_Max and Cap_Min are manually entered values (as decided during the October 2019 meetings with thermal power plants).

1.4. Distribution Factor

It is the fraction by which the power plant operator divides the AGC regulation signal (Delta P = Plant AGC Set Point – Plant ULSP) in between the generating units. This signal is available in the user interface of the AGC remote terminal unit (RTU). The sum of all distribution factors of generating units in a power plant must be 1 (this feature can be automated or kept as manual entry).

1.5. AGC Local/Remote

The manual choice to take the unit into local or remote is with the power plant shift engineer through DCS. A suitable user interface has been developed by the instrumentation team at every power plant for taking units into Local/Remote. This is a single-point digital signal (0 – Local, 1- Remote). "Remote" means unit Delta P shall be added to ULSP before processing the signal for maximum and minimum limits and further sending it to master control. Thus, if a unit is in Remote, it is ready to accept and respond to AGC signals. "Local" means unit Delta P shall not be added to ULSP. This choice can be because of onsite problems, non-readiness to accept AGC signals, prolonged communication failure, etc.

2. Activity list for different use cases

All the above five controls have to be used to run AGC during continuous operation. Below are the typical use cases/scenarios and action items during the same.

2.1. To take a generating unit into Remote

a. Make Distribution Factor = 0 for the units which are in Local.
b. Make sure to distribute Distribution Factor on the units under Remote. Ensure that the sum is 1.
c. Check if Cap_Max and Cap_Min are entered as desired.
d. Exchange code with NLDC (codebook format in Annexure-I). Maintain separate AGC codebook.
e. Always ensure that the ULSP value is in between Cap_Max and Cap_Min.

2.2.To take a generating unit into Local

a. Exchange code with NLDC (codebook format in Annexure-I). Maintain separate AGC code book.
    - If the reason is a planned one, inform in advance
    - If the reason is emergency, inform post facto
    - If the reason is automatic local, then inform post facto
b. Make Distribution Factor = 0 for the units which are in Local.
c. Make sure to re-distribute Distribution Factor on the remaining units under Remote. Ensure that the sum is 1.

2.3.When a generating unit trips or is taken under shutdown, and the unit has been under Remote

a. Exchange code with NLDC for taking the unit into Local.
    - If the reason is a planned one, inform in advance
    - If the reason is emergency, inform post facto
b. Make Distribution Factor=0 for units which are in Local. Make sure to re-distribute Distribution Factor on the remaining units under Remote. Ensure that the sum is 1. For example, if the DF is 0.2 each for 5 units under Remote, and the fifth unit tripped, then DF will be 0 for the fifth unit and will be 0.25 for the remaining four units.
c. Make Cap_Max=0
d. Make Cap_Min=0
e. Make ULSP=0
f. Make sure that the CB status is being telemetered correctly as "Open =1"

2.4.There are three generating units; the first unit is off bar (RSD), the second unit is in Remote, and the third unit is in Local (for PG tests)

a. Distribution Factor = 0 for first and third units
b. Distribution Factor = 1 for second unit
c. Make Cap_Max=0 for off bar unit (only for first unit)
d. Make Cap_Min=0 for off bar unit (only for first unit)

e. Make ULSP = 0 for off bar unit (only for first unit)
f. Must telemeter Cap_Max, Cap_Min, and ULSP for the second and third units

2.5. What to do after detecting Communication Failure / Communication Fluctuation.

a. Inform NLDC for follow-up. Note that communication is provided by a third party (CTUIL/PGCIL) and not NLDC.
b. Observe that DeltaP automatically becomes zero
c. In case communication failure persists and/fluctuating, exchange code with NLDC and take units into Local.
d. After communication disruption is verified as rectified, then exchange code with NLDC and take units into Remote.

3. Important Notes

1. Based on feedback from power plants, for the next three months, the following limits shall be enforced on DeltaP per unit by NLDC.
    a. 25 MW per unit for 500 MW units,
    b. 35 MW per unit for 660 MW units,
    c. 10 MW per unit for 210 MW units,
    d. 50 MW per unit for 800 MW and above units

    If any power plant can contribute more MW or less MW per unit in AGC, same may be informed to NLDC in advance. Note that contributing more MW in AGC will help the grid and will also incentivize the power plant.

2. **Power plants shall not place any limits on DeltaP per unit at their end**. Note that imposing any limits on DeltaP will adversely impact power plant performance metrics during post-dispatch evaluation. Restriction on DeltaP can also cause ramp violations during ULSP changes by the power plant.

3. Power plants may change Cap_Max only during periods when there is a change in conditions leading to derating or reduction in Declared Capability like tripping of coal mills, etc.

4. Power plants may change Cap_Min only during periods when there is a change in conditions leading to unstable operation at Technical Minimum or similar cases.

5. If any special limits other than Cap_Max or Cap_Min have to be placed by the power plants or if the power plant is unable to change Cap_Max or Cap_Min from their end, the same can be conveyed to NLDC over code exchange. NLDC shall honour the new max or min limits.

6. Always ensure that the ULSP value is in between Cap_Max and Cap_Min.

4. Frequently Asked Questions

4.1. Will AGC overload the plant beyond full load?

Ans: No. When the plant is running at full load (Cap_Max), only down regulation is possible. In case of coal mill tripping, decrease Cap_Max.

4.2.Will AGC overload the plant below technical minimum?

Ans: No. When the plant is running at technical minimum (Cap_Min), only up regulation is possible. In case of any stability issues, increase Cap_Min.

4.3.Why is the DeltaP positive when the frequency is higher than 50 Hz?

Ans: AGC is secondary frequency control and is inherently a slow control in which the AGC Set Point changes direction only with the plant-defined ramp rate. Also, AGC software at NLDC uses a PID controller which results in a Smoothened Area Control Error (Smooth ACE), which acts as an input to AGC, instead of ACE. Whereas ACE and frequency change their direction instantaneously, Smoothed ACE is the output of the PID controller and carries the accumulated integral error. This results in a definite time lag (few minutes) between the change of direction of Smooth ACE and direction of frequency. Although PID controller adds time lag, it is necessary to cover the steady state error of frequency and it also prevents random changes to Set Point. Correct procedure for analysis would be to plot the data over a period of time when the AGC has been in Remote, rather than looking at instantaneous values of frequency and DeltaP.

4.4.Is Ramp Rate factored by AGC?

Ans: Yes. Ramp Rate as declared in the Ancillary Services Format AS-III is used by the AGC software. That Ramp Rate divided by number of units is entered for every on-bar unit. Say X MW/min is the ramp rate of the power plant. AGC Set Point gets updated every 4 seconds with an incremental ramp of (X*4/60) MW. For example, a 500 MW unit has a ramp rate of 5 MW/min, then the AGC Set Point can only move every 4 seconds with an incremental ramp of 0.33 MW. Both Up and Down Ramp Rates are considered.

4.5.When should the MWh account be sent?

Ans: Send MWh account on every Monday for the previous week from Monday to Sunday. Use only NLDC specified format.

4.6.How to measure power plant performance in AGC?

Ans: Make a time series plot of AGC Set Point, Actual MW and ULSP for a day. When the power plant is in Remote, the Actual MW should follow AGC Set Point for best performance. Performance metric is measured by plotting Output versus Input. All the values are available at gross level (ex-power plant). Use 5 minutes average MW data for the periods when the units are on bar and in Remote. Consider CB and Remote status signals in calculations. Map CB ON as 1 (Note that as CB is a double point signal, it ON value will be 2. Map the same to 1). Similarly, Map CB OFF as 0. Local Remote status (LR) is a single point signal. Map Local as 0 and Remote as 1. For 'n' units,

- Output = $\sum_{i=1}^{n}((Actual\ MW_n - ULSP_n - RGMO_n) * CB_n * LR_n)$

- Input = $\sum_{i=1}^{n}((DeltaP_n) * CB_n * LR_n)$
- Plot a scatter plot of output vs input.
- 288 data points per plant for one week would appear on the scatter plot.
- Add a Trend Line (Y=mX) to the plot with Intercept=0. Display equation on chart.
- Check the value of 'm' in Y=mX. Ideal performance would be Y=X.
- Say the equation is Y=0.8X, then consider the performance is 80%.

4.7. In post-despatch calculations by commercial teams, (Avg RLDC Schedule MW + Avg AGC MW) > DC onbar MW (or) In post-despatch calculations by commercial teams, (Avg RLDC Schedule MW + Avg AGC MW) < Technical Minimum MW (or) There is ramp rate violation in Average MW data.

Ans: Gross AGC Set Point always stays in between Cap_Max and Cap_Min. Avg AGC MW is calculated by subtracting the normative auxiliary consumption from the gross Avg AGC DeltaP MW, which can be positive or negative. If this number is added to the Avg RLDC Schedule MW, then this number might exceed DC on bar MW or might become less than Technical Minimum MW. This exceedance in calculation happens **not because AGC has violated limits**, but because of the regular dispatch process. ULSP entry is a manual entry by the power plant shift engineers. (Average ULSP MW – NAC) is never exactly equal to the Average RLDC Schedule MW for the 15-minute time block. As AGC uses ULSP every 4 seconds as its base for providing the Set Point, AGC might utilize any margin actually present between ULSP and Cap_Max in the real time. Since there is **no physical limit violation by the AGC Set Point MW** at any time, this exceedance in average calculation can be ignored unless the difference is very large.

4.8. Will there be a ramp rate violation when the power plant changes ULSP?

Ans: **No.** There will not be any ramp rate violation by AGC when the power plant changes ULSP. Only DeltaP = (AGC Set Point – ULSP) value becomes large till the time AGC Set Point reaches the ULSP slowly. Ramp Rate as declared in the Ancillary Services Format AS-III is used by the AGC software. That Ramp Rate divided by number of units is entered for every on-bar unit. Say X MW/min is the ramp rate of the power plant. AGC Set Point gets updated every 4 seconds with an incremental ramp of (X*4/60) MW. For example, a 500 MW unit has a ramp rate of 5 MW/min, the AGC Set Point can only move every 4 seconds with an incremental ramp of 0.33 MW. AGC Set Point for the plant moves in the direction of ULSP, depending on the grid frequency and participation factor (decided by AGC software based on normalized ramp and variable cost) of the plant. Note that as DeltaP value becomes large during this process, there should not be any panic or limits on DeltaP, as mentioned at several places in this brochure. Restriction on DeltaP can cause ramp violations during ULSP changes by the power plant.

National Load Despatch Centre
Power System Operation Corporation Limited

AGC Operations Guideline for NLDC Control Room

Revision 0, Issued: 19 July 2021

Revision History
Rev-0 : Original document – 19 July 2021

This document provides the standard operating procedures to be followed during the continuous operation of the power plants under Automatic Generation Control (AGC) and attempts to answer the frequently asked questions

Login Credentials
Username: agc_adm (through agc_adm change of AGC parameters is possible)
Username: nldc_adm (only monitoring is possible)
Domain: PCC

Contents

List of Figures

1. Activity list for different use cases

1.1. To take a generating unit into Remote (Thermal / Gas)

a. Make Control Mode = External
b. Make Regulation Mode = Reg
c. Make Setpoint = ULSP / Basepoint
    - OpenAGC →select Region → Unit Detail → select Plant → Telemetery → Right click Set Point → Open point dialog → Enter ULSP value → Execute
d. Always ensure that the ULSP, Cap_Max, Cap_Min and Distribution Factor are updating correctly for the power plant (for both on-bar and off-bar units).
    - For on-bar units
        - Ensure ULSP is between plant In-effect Regulating Limit Max and Min.
            - OpenAGC → select Region → Unit Detail → select Plant → Limits → In-effect Regulating Limit
            - Refer Figure 1
        - Sum of Distribution Factor is 1
            - SCADA Applications → OpenFep → Input Point Configuration → Select Plant → Analog Values
            - Refer Figure 2
    - For off-bar units
        - ULSP, Cap_Max, Cap_Min and Distribution Factor should be zero.
            - SCADA Applications → OpenFep → Input Point Configuration → Select Plant → Analog Values
            - Refer Figure 2
    - For units which are in local but on-bar
        - ULSP, Cap_Max, Cap_Min should be updating correctly
        - Distribution Factor should be zero
            - SCADA Applications → OpenFep → Input Point Configuration → Select Plant → Analog Values
            - Refer Figure 2
e. Exchange code with power plant

To follow-up with Power Plant

- Make Distribution Factor = 0 for the units which are in Local.
- Make sure to distribute Distribution Factor on the units under Remote. Ensure that the sum is 1.
- Check if Cap_Max and Cap_Min are entered as desired.
- Exchange code with NLDC (codebook format in Annexure-I). Maintain separate AGC codebook.
- Always ensure that the ULSP value is in between Cap_Max and Cap_Min.

Figure 1: Limits on Set Point in AGC Software

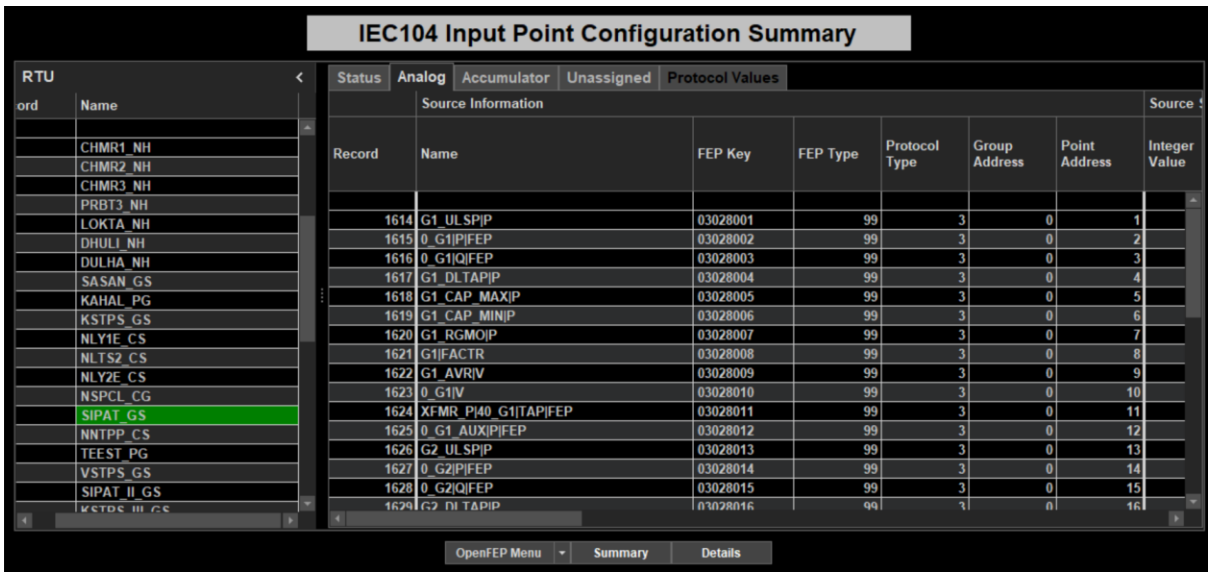


Figure 2: Telemetered values from plant in OpenFEP

1.2. To take a generating unit into Remote (Hydro)

a. Make Control Mode = External
b. Make Regulation Mode = Reg
c. Make Setpoint = ULSP / Basepoint
   - OpenAGC →select Region → Unit Detail → select Plant → Telemetery → Right click Set Point → Open point dialog → Enter ULSP value → Execute
   - Refer Figure 3 and Figure 4
d. Check for limits requested by the hydro plant (through Control Room email or telephonic request).
   - Update Dispatch Entered Limit as per the limits desired by the hydro plant.
     - OpenAGC → select Region → Unit Detail → select Plant → Limits
     - Refer Figure 2
   - Tick Dispatch Entered Limit to be included in In-effect Regulating Limit.
e. Exchange code with power plant.

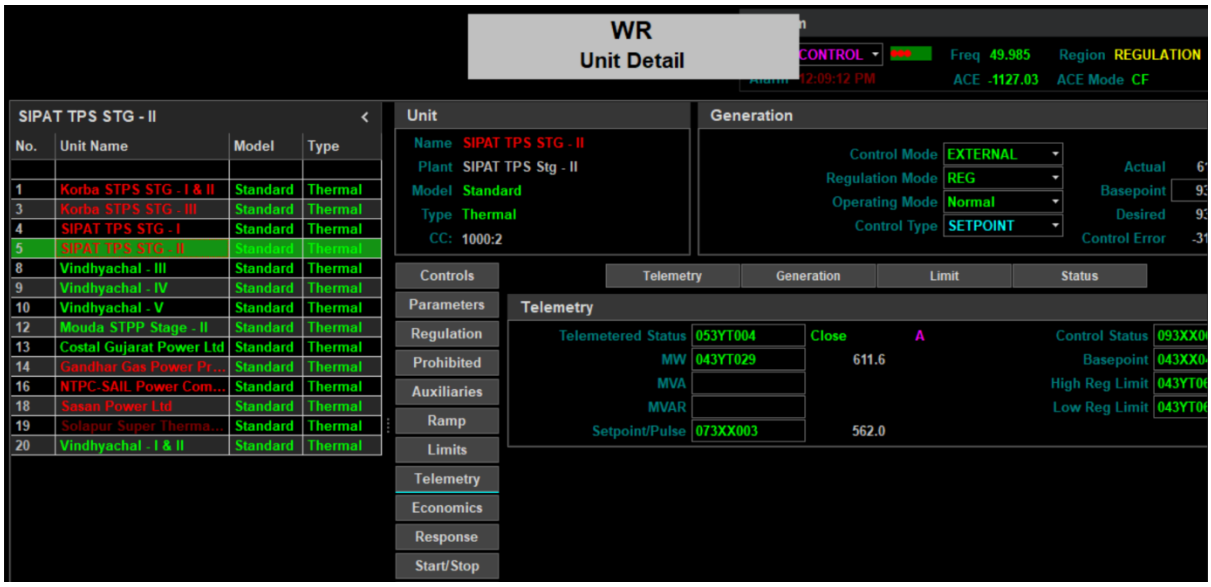


Figure 3: Set Point Display in OpenAGC

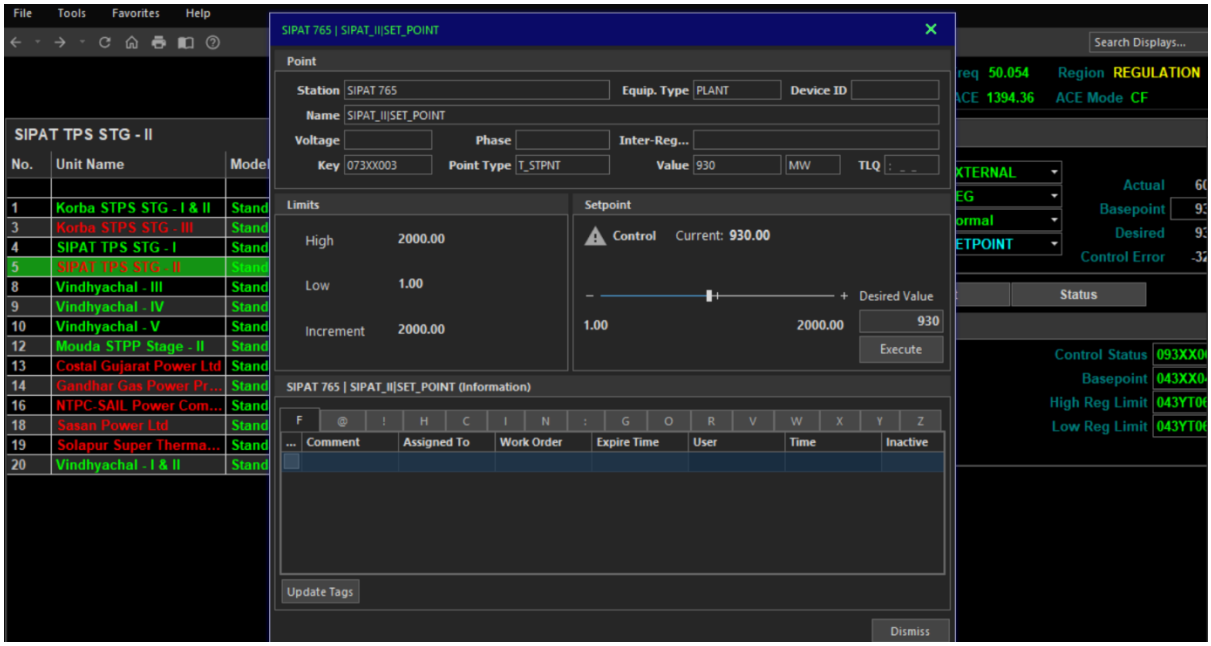


Figure 4: To edit Set Point and making equal to ULSP

1.3. To take a generating unit into Local (Thermal / Gas)

a. Exchange code with the power plant. Enter remarks in the codebook.

To follow up with Power Plant

a. Exchange code with NLDC.
   - If the reason is a planned one, inform in advance
   - If the reason is emergency, inform post facto
   - If the reason is automatic local, then inform post facto

b. Make Distribution Factor = 0 for the units which are in Local.

c. Make sure to re-distribute Distribution Factor on the remaining units under Remote. Ensure that the sum is 1.

1.4. To take a generating unit into Local (Hydro)

a. Exchange code with the power plant.
b. Check if Dispatch Entered is ticked for in-effect regulating limit.
    - If yes, untick Dispatch Entered for in-effect regulating limit. Reason: to keep prepared for taking the unit into remote the next time and avoid stale values.

1.5. To maintain System AGC Mode in "Control"

Always maintain AGC system mode in "Control" for every Region. This mode will automatically move to "Suspend" or "Monitor" when the frequency data or tie line data or ACE data becomes suspect. As there is a lot of redundancy built in with the frequency data, it would be a rare case that this mode is not in "Control".

If the mode moves out of Control to Monitor or Suspend, then

- Observe that DeltaP of all the plants in the region automatically becomes zero. All the plants receive AGC Suspend signal and Plant Control mode changes from "External" to "Off" or "Manual" mode.
- Try to bring the System AGC Mode to "Control" by clicking the button.
- Inform SCADA team and AGC team immediately.
- Once "Control" mode is restored
    - For every plant, bring Plant Control Mode from "Off" or "Manual" to "External"
        - Before bringing to External mode,
        - Make Setpoint = ULSP / Basepoint
            - OpenAGC →select Region → Unit Detail → select Plant → Telemetery → Right click Set Point → Open point dialog → Enter ULSP value → Execute
            - Refer Figure 3 and Figure 4

1.6. To detect Communication Failure / Fluctuation

Plant / Unit Control Mode changed from "External" to "Manual"
RTU Link Status appears "Fail"
Appearance of # values in Telemetry tab
Both Channels appear failed or are fluctuating

- SCADA Applications > OpenFEP > Channel Configuration
- Refer Figure 5

Complaint from the power plant regarding frequent DeltaP becoming zero.
Hydro plant complains of AGC Setpoint remaining in the forbidden zone

For more details, please see **Annexure-I.**

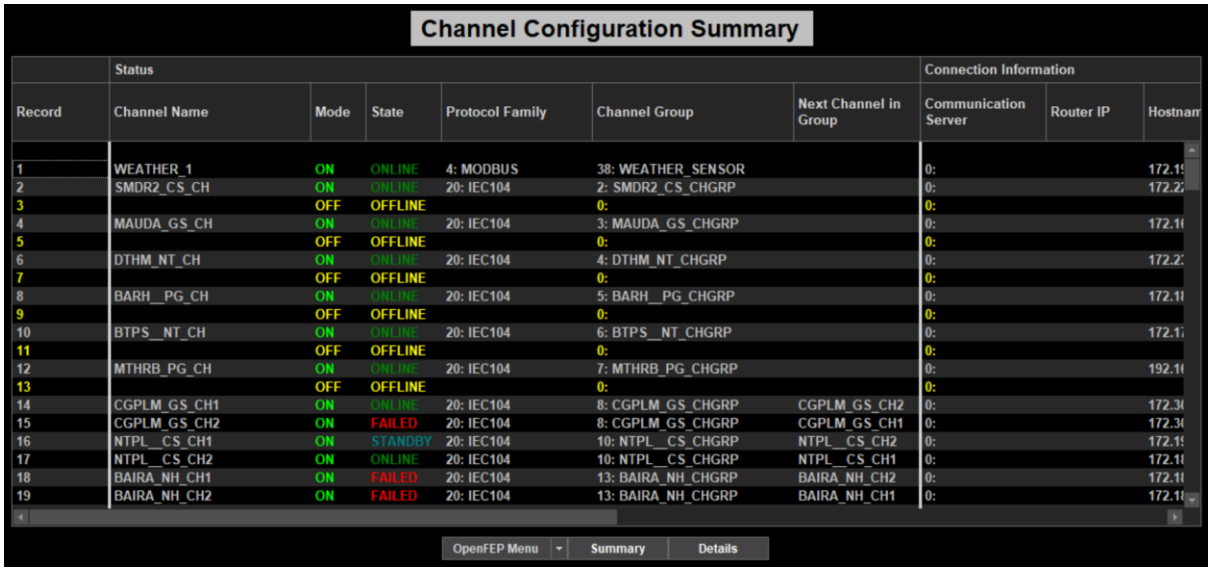


Figure 5: Dual Communication Channel Monitor

1.7. Action after detecting Communication Failure / Communication Fluctuation

a. Inform SCADA team and send a message in AGC communication WhatsApp group for PGCIL-ULDC.
b. In case communication failure persists and/fluctuating, exchange code with the power plant and take units into Local.
c. After communication disruption is verified as rectified, then exchange code with the power plants and take units into Remote.

1.8. To maintain ICCP Status "Online"

ICCP status is maintained by the SCADA team. It should be always "Online".

If the mode moves out of Online to Offline, then

- Inform SCADA team and AGC team immediately.
- Observe that DeltaP of all the plants in the region automatically becomes zero. All the plants receive AGC Suspend signal and Plant Control mode changes from "External" to "Off" or "Manual" mode.
- Try to bring the System AGC Mode to "Control" by clicking the button.
- Once Control mode is restored, for every plant, bring Plant Control Mode from "Off" or "Manual" to "External"
    - Before bringing to External mode, Make Setpoint = ULSP / Basepoint
    - OpenAGC →select Region → Unit Detail → select Plant → Telemetery → Right click Set Point → Open point dialog → Enter ULSP value → Execute
    - Refer Figure 3 and Figure 4

1.9. What to do if a hydro plant complains of AGC Setpoint remaining in the forbidden zone?

a. Check if the communication between plant and NLDC is healthy. If not, take units into local.

b. Check if the setter feedback of the plant is reporting correctly at NLDC. If not, inform plant to rectify setter feedback and take units into local.
    - OpenAGC →select Region → Unit Detail → select Plant → Controls → Setter Feedback
        - Refer Figure 6
    - SCADA Applications → OpenFEP → Input Point Configuration → Select Plant → Analog Values → Setter Feedback
        - Refer Figure 2
c. If setter feedback and communication both are healthy, inform AGC team and take units into local.
d. Refer **Annexure-II** for more details.

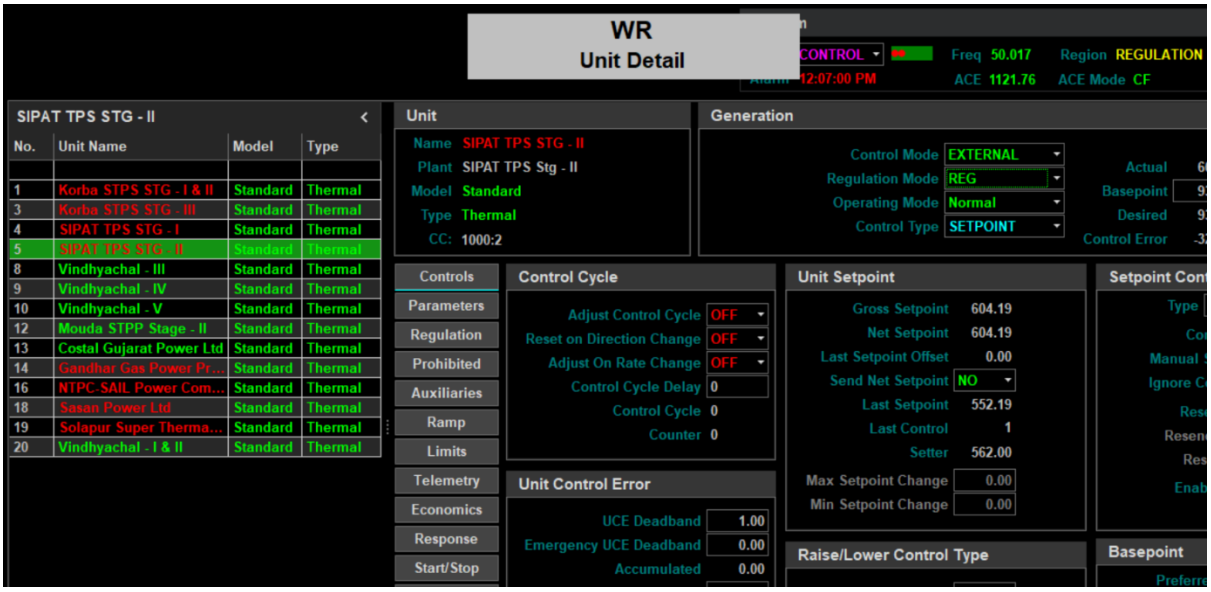


Figure 6: Setter Feedback display

1.10. What to do if a thermal power plant complains of getting AGC Setpoint beyond its Cap_Max and Cap_Min values?

- Confirm with the power plants if their SOP was followed correctly. Refer Power plant SOP.
- Check if the plant is sending correct ULSP, Cap_Max and Cap_Min for all the units (These parameters should be zero for off-bar units, as discussed in use case-1).
    - SCADA Applications → OpenFEP → Input Point Configuration → Select Plant → Analog Values
    - Refer Figure 2
- If not, take units in local and inform plant to telemeter correct values.
    - After plant rectifies the values, take units in remote.
    - If the problem persists, inform AGC team.

1.11. What to do if a plant asks NLDC to restrict AGC Setpoint up to a certain value?

a. Ask plant to check and revise their Cap_Max or Cap_Min value, as desired by the plant. Refer Power plant SOP.
b. Check if the reason for the request is related to incorrect technical minimum value / incorrect plant maximum value in NLDC AGC software.
    - OpenAGC → Unit Details → Select Unit → Limits → In-effect Regulating Limit
    - Refer Figure 1
    - For more details on Limits, see **Annexure-II**
    - Inform AGC team.
c. If immediate changes by the plant is not possible, request a mail from the plant and make the following changes,
    - Enter desired value in the Dispatch Entered limit
    - Tick Dispatch Entered at In-effect Regulating Limit to implement the required change.
d. Remember to revert back the changes once the restriction by the plant is removed. Maintain these changes clearly in the codebook.

1.12. Power plant going out of limits and blinking red

AGC software alarms when the ULSP or Actual MW of the power plant is not in between the In-effect Regulating Limit Max and Min by throwing an alarm and by blinking red.

- Check with the plant if it is sending correct ULSP, Cap_Max and Cap_Min for all the units (These parameters should be zero for off-bar units, as discussed in use case-1).
    - SCADA Applications → OpenFEP → Input Point Configuration → Select Plant → Analog Values
    - Refer Figure 2
- If not, take units in local and inform plant to telemeter correct values.
    - After plant rectifies the values, take units in remote.
    - If the problem persists, inform AGC team.

2. Important Notes

2.1. Based on feedback from power plants, for the next three months, the following limits shall be enforced on DeltaP per unit by NLDC.

25 MW per unit for 500 MW units,

35 MW per unit for 660 MW units,

10 MW per unit for 210 MW units,

50 MW per unit for 800 MW and above units

If any power plant can contribute more MW or less MW per unit in AGC, same may be informed to NLDC in advance. Note that contributing more MW in AGC will help the grid and will also incentivize the power plant.

2.2. Power plants shall not place any limits on DeltaP per unit at their end. Note that imposing any limits on DeltaP will adversely impact power plant performance metrics during post-dispatch evaluation. Restriction on DeltaP can also cause ramp violations during ULSP changes by the power plant.

2.3. Power plants may change Cap_Max only during periods when there is a change in conditions leading to derating or reduction in Declared Capability like tripping of coal mills, etc.

2.4. Power plants may change Cap_Min only during periods when there is a change in conditions leading to unstable operation at Technical Minimum or similar cases.

2.5. If any special limits other than Cap_Max or Cap_Min have to be placed by the power plants or if the power plant is unable to change Cap_Max or Cap_Min from their end, the same can be conveyed to NLDC over code exchange. NLDC shall honour the new max or min limits.

2.6. Always ensure that the ULSP value is in between Cap_Max and Cap_Min.

3. Frequently Asked Questions

3.1. Some values are updating with a # symbol. What does # symbol signify?

Ans: # is a tag which signifies that the value is not updating. This happens when the communication between the plant and NLDC is not healthy.

3.2. Will AGC overload the plant beyond full load?

Ans: No. When the plant is running at full load (Cap_Max), only down regulation is possible. In case of coal mill tripping, ask the plant to decrease Cap_Max.

3.3. Will AGC bring the plant generation below technical minimum?

Ans: No. When the plant is running at technical minimum (Cap_Min), only up regulation is possible. In case of any stability issues, ask the plant to increase Cap_Min.

3.4. Why is the DeltaP positive when the frequency is higher than 50 Hz?

Ans: AGC is secondary frequency control and is inherently a slow control in which the AGC Set Point changes direction only with the plant-defined ramp rate. Also, AGC software at NLDC uses a PID controller which results in a Smoothened Area Control Error (Smooth ACE), which acts as an input to AGC, instead of ACE. Whereas ACE and frequency change their direction instantaneously, Smoothed ACE is the output of the PID controller and carries the accumulated integral error. This results in a definite time lag (few minutes) between the change of direction of Smooth ACE and direction of frequency. Although PID controller adds time lag, it is necessary to cover the steady state error of frequency and it also prevents random changes to Set Point. Correct procedure for analysis would be to plot the data over a period of time when the AGC has been in Remote, rather than looking at instantaneous values of frequency and DeltaP.

3.5. Is Ramp Rate factored by AGC?

Ans: Yes. Ramp Rate as declared in the Ancillary Services Format AS-III is used by the AGC software. That Ramp Rate divided by number of units is entered for every on-bar unit. Say X MW/min is the ramp rate of the power plant. AGC Set Point gets updated every 4 seconds with an incremental ramp of (X*4/60) MW. For example, a 500 MW unit has a ramp rate of 5 MW/min, then the AGC Set Point can only move every 4 seconds with an incremental ramp of 0.33 MW. Both Up and Down Ramp Rates are considered.

3.6. When should the MWh account be sent?

Ans: Send MWh account on every Monday for the previous week from Monday to Sunday. Use only NLDC specified format.

3.7. How to measure power plant performance in AGC?

Ans: Make a time series plot of AGC Set Point, Actual MW and ULSP for a day. When the power plant is in Remote, the Actual MW should follow AGC Set Point for best performance. Performance metric is measured by plotting Output versus Input. All the values are available

at gross level (ex-power plant). Use 5 minutes average MW data for the periods when the units are on bar and in Remote. Consider CB and Remote status signals in calculations. Map CB ON as 1 (Note that as CB is a double point signal, it ON value will be 2. Map the same to 1). Similarly, Map CB OFF as 0. Local Remote status (LR) is a single point signal. Map Local as 0 and Remote as 1. For 'n' units,

- Output = $\sum_{i=1}^{n}((Actual\ MW_n - ULSP_n - RGMO_n) * CB_n * LR_n)$
- Input = $\sum_{i=1}^{n}((DeltaP_n) * CB_n * LR_n)$
- Plot a scatter plot of output vs input.
- 288 data points per plant for one week would appear on the scatter plot.
- Add a Trend Line (Y=mX) to the plot with Intercept=0. Display equation on chart.
- Check the value of 'm' in Y=mX. Ideal performance would be Y=X.
- Say the equation is Y=0.8X, then consider the performance is 80%.

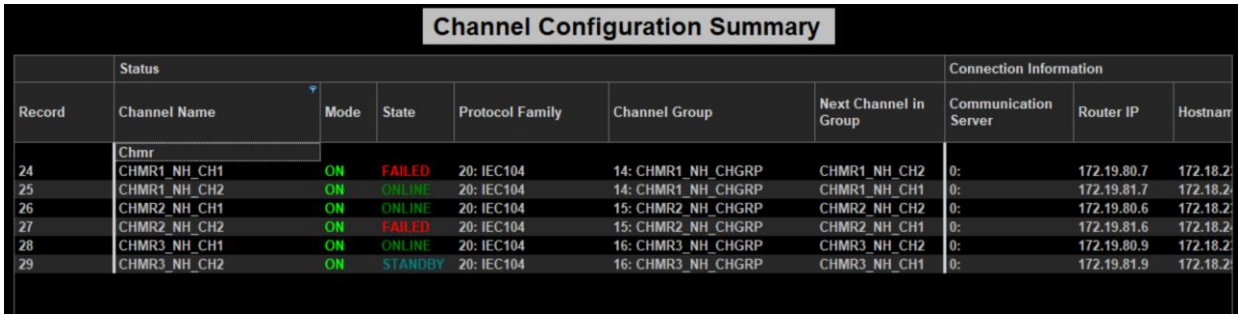
3.8. Will there be a ramp rate violation when the power plant changes ULSP?

Ans: **No.** There will not be any ramp rate violation by AGC when the power plant changes ULSP. Only DeltaP = (AGC Set Point – ULSP) value becomes large till the time AGC Set Point reaches the ULSP slowly. Ramp Rate as declared in the Ancillary Services Format AS-III is used by the AGC software. That Ramp Rate divided by number of units is entered for every on-bar unit. Say X MW/min is the ramp rate of the power plant. AGC Set Point gets updated every 4 seconds with an incremental ramp of (X*4/60) MW. For example, a 500 MW unit has a ramp rate of 5 MW/min, the AGC Set Point can only move every 4 seconds with an incremental ramp of 0.33 MW. AGC Set Point for the plant moves in the direction of ULSP, depending on the grid frequency and participation factor (decided by AGC software based on normalized ramp and variable cost) of the plant. Note that as DeltaP value becomes large during this process, there should not be any panic or limits on DeltaP, as mentioned at several places in this brochure. Restriction on DeltaP can cause ramp violations during ULSP changes by the power plant.

Annexure-I: Identification of Communication Failure for AGC

For identifying healthy communication between power plant and NLDC, operator should ensure:

1. Any one of the two-communication channel between the power plant and the NLDC should be online and stable (there should not be any fluctuations in the channel which would render AGC to suspend). Operator can check this status in the channel configuration (Path: SCADA Applications > OpenFEP > Channel Configuration)



Channel Configuration Summary

	Status						Connection Information		
Record	Channel Name	Mode	State	Protocol Family	Channel Group	Next Channel in Group	Communication Server	Router IP	Hostnam
	Chmr								
24	CHMR1_NH_CH1	ON	FAILED	20: IEC104	14: CHMR1_NH_CHGRP	CHMR1_NH_CH2	0:	172.19.80.7	172.18.2
25	CHMR1_NH_CH2	ON	ONLINE	20: IEC104	14: CHMR1_NH_CHGRP	CHMR1_NH_CH1	0:	172.19.81.7	172.18.2
26	CHMR2_NH_CH1	ON	ONLINE	20: IEC104	15: CHMR2_NH_CHGRP	CHMR2_NH_CH2	0:	172.19.80.6	172.18.2
27	CHMR2_NH_CH2	ON	FAILED	20: IEC104	15: CHMR2_NH_CHGRP	CHMR2_NH_CH1	0:	172.19.81.6	172.18.2
28	CHMR3_NH_CH1	ON	ONLINE	20: IEC104	16: CHMR3_NH_CHGRP	CHMR3_NH_CH2	0:	172.19.80.9	172.18.2
29	CHMR3_NH_CH2	ON	STANDBY	20: IEC104	16: CHMR3_NH_CHGRP	CHMR3_NH_CH1	0:	172.19.81.9	172.18.2

Figure 7: Dual channel for communication

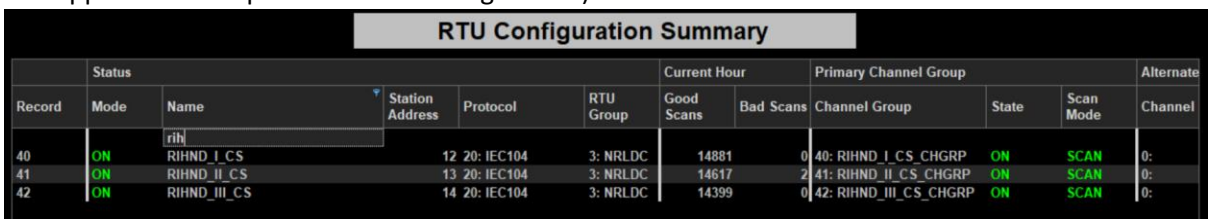
In the figure above, Chamera-1, Chamera-2 and Chamera-3, all three are having healthy communication. For Chamera-1, channel-1 is failed but channel-2 is healthy and stable, for Chamera-2, channel-2 is failed but channel-1 is healthy and stable and for Chamera-3, both the channels are healthy and stable.

Note: If the operator observes any of the following, then the communication between the NLDC and power plant shall be considered unhealthy.

i. Both channel-1 and channel-2 are failed
ii. None of the channel is stable (channel is fluctuating between ONLINE and FAILED).

Action by Operator: Inform SCADA team and send a message in AGC communication whatsapp group for PGCIL.

2. RTU of the power plant concerned should be in **"ON"** state and **"SCAN"** mode for healthy communication. Operator can check this status in the RTU configuration (Path: SCADA Applications > OpenFEP > RTU Configuration).



RTU Configuration Summary

	Status					Current Hour		Primary Channel Group			Alternate
Record	Mode	Name	Station Address	Protocol	RTU Group	Good Scans	Bad Scans	Channel Group	State	Scan Mode	Channel
		rih									
40	ON	RIHND_I_CS	12	20: IEC104	3: NRLDC	14881	0	40: RIHND_I_CS_CHGRP	ON	SCAN	0:
41	ON	RIHND_II_CS	13	20: IEC104	3: NRLDC	14617	2	41: RIHND_II_CS_CHGRP	ON	SCAN	0:
42	ON	RIHND_III_CS	14	20: IEC104	3: NRLDC	14399	0	42: RIHND_III_CS_CHGRP	ON	SCAN	0:

Figure 8: RTU Status of every power plant

Note: If the operator observes any of the following combination of states;

ON and INIT

FAIL and INIT

OFF and OFF

FAIL and SCAN

then the communication between the NLDC and power plant shall be considered unhealthy.

Action by Operator: Inform SCADA team and send a message in AGC communication whatsapp group for PGCIL.

3. All the values in the Telemetry tab should be of good quality (values updating with # denotes bad quality). Operator can check this status in the region wise Unit Detail (Path: EMS Applications > OpenAGC > Select Region > Unit Detail > Select Plant > Telemetry).
4. Setpoint is updating with # quality.
   Action by Operator: Inform SCADA team and send a message in AGC communication WhatsApp group for PGCIL.

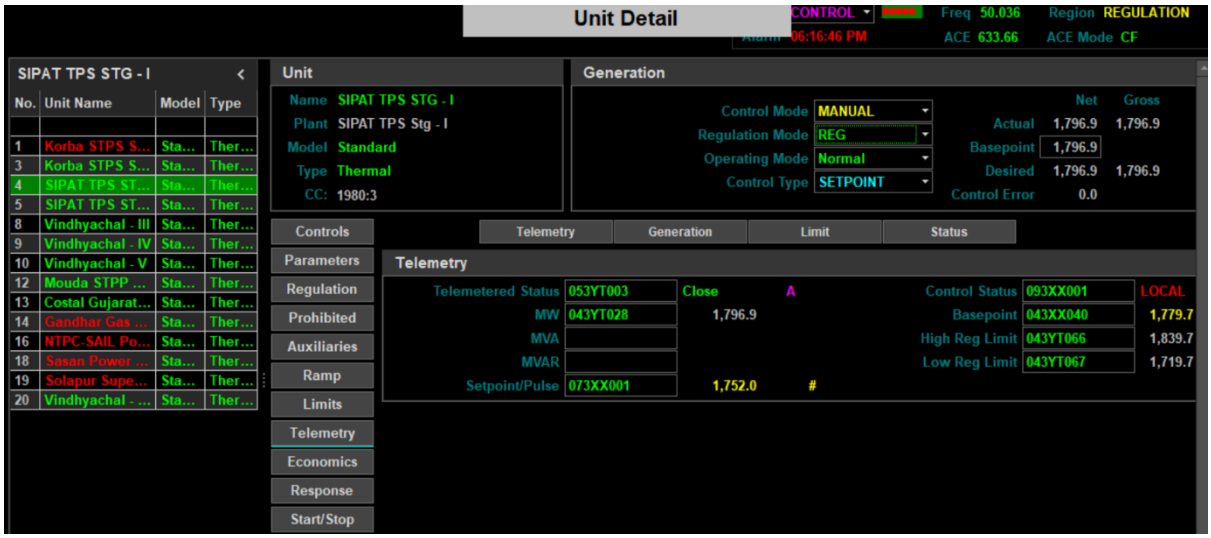


Figure 9: Suspect (#) quality signal example

All the values in the telemetry tab are updating with # quality. The communication between the NLDC and power plant shall be considered unhealthy.

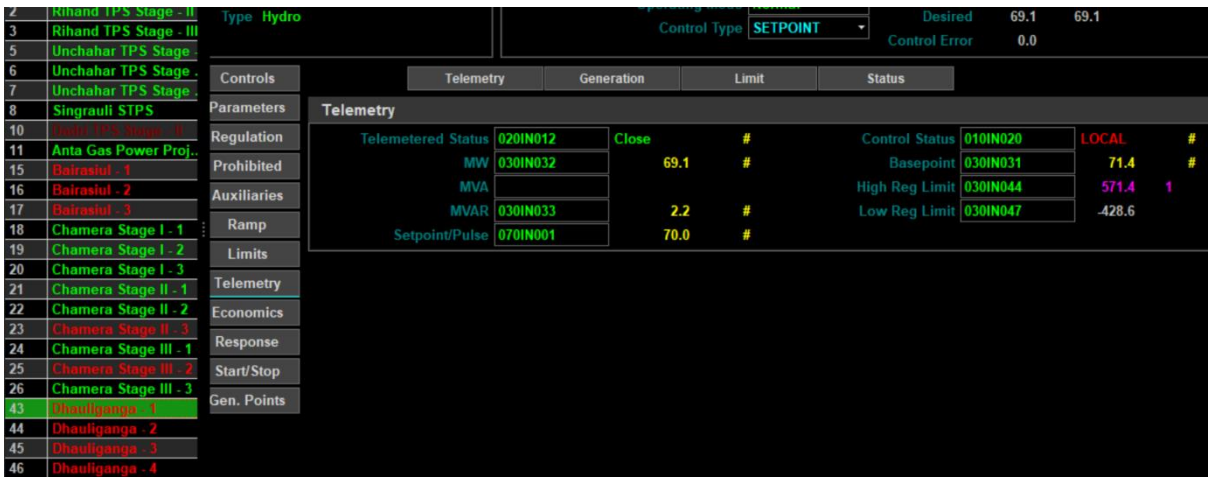


Figure 10: Suspect quality (#) signal example

Annexure-II: Note on AGC Software Limits

AGC Software uses different limits while generating the plant Set Point. AGC Set Point always remains between the maximum and minimum limits available in the software.

1) Capacity Max
   This limit is the summation of the telemetered maximum value from the power plant for each unit. This limit is ideally the summation of the Dconbar value for each unit at the gross level.

2) Capacity Min
   This limit is the summation of the telemetered minimum value from the power plant for each unit. This limit is ideally the summation of the Technical Minimum value for each unit at the gross level.

3) Regulating Max
   This limit is the summation of ULSP+OFFSET for each unit. OFFSET is entered manually for each unit in the NLDC AGC software at Open AGC → ABT. OFFSET is typically 25 MW per unit for a 500 MW machine. Refer Important Notes above. This allows NLDC to restrict DeltaP.

4) Regulating Min
   This limit is the summation of ULSP-OFFSET for each unit. OFFSET is entered manually for each unit in the NLDC AGC software at Open AGC → ABT. Refer Important Notes above. This allows NLDC to restrict DeltaP.

5) External1 Max
   This limit is obtained by considering the gross Name Plate rating and the CB status. This limit is the maximum nameplate allowed value obtained after adding the name plate ratings of all the on-bar units of the plant.

6) External1 Min
   This limit is obtained by considering the 55% of the gross Name Plate rating and the CB status. This limit is the minimum allowed value obtained after adding the 55% of the name plate ratings of all the on-bar units of the plant.

7) Dispatch Entered Max
   This limit is manually entered maximum limit for the total plant (and unit wise for hydro). Depending on requests from power plants (particularly hydro), this limit may be used.

8) Dispatch Entered Min
   This limit is manually entered minimum limit for the total plant (and unit wise for hydro). Depending on requests from power plants (particularly hydro), this limit may be used.

9) **In-effect Regulating Max**

In-effect Regulating Max is the lowest value amongst all the limits.

In-effect Regulating Max = min (Capacity Max, Regulating Max, External1 Max, Dispatch Entered Max)

10) **In-effect Regulating Min**

In-effect Regulating Min is the highest value amongst all the limits.

In-effect Regulating Min = max (Capacity Min, Regulating Min, External1 Min, Dispatch Entered Min)

i. Limits and Prohibited Zones for Hydro Power Plants

- P1 is the minimum value for the hydro power plant
- P2 – P3 is the forbidden zone / cavitation zone for all the Francis turbine based hydro power plants
- P4 is the Maximum value (for hydro this value can be the overload value)
- P2 and P3 are entered at OpenAGC → Select Region → Unit Detail → Select Plant → Prohibited (refer Figure 7)
- AGC Set Point crosses the prohibited zone with the defined ramp rate.
- Zone Count Limit is the waiting time of the AGC software for deciding whether to enter the prohibited zone, based on ACE, direction of ACE, and Actual MW. Presently this time is 5 cycles = 20 seconds. This allows AGC software to respond only for sustained ACE changes and not for momentary changes.
- Cycle Time is the minimum time in seconds for which the AGC software waits before crossing the forbidden zone for the second time, after having crossed the zone earlier. Presently this time is set as 300 seconds. This feature will avoid frequent travel through the vibration zone for the plant.

Figure 11: Hydro unit forbidden zones

Annexure B.28

Status of PFR testing in NR (As on 13-08-2021)				Observations
S.No.	Plant	Entity	No. of Units	
1	Chamera-1	NHPC	2	Normal but mechanical backlash observed which delayed overall PFR time
2	Chamera-3	NHPC	2	Normal, but response is sluggish and slow
3	Koteswar	THDC	4	Response is normal but, for smaller frequency steps, response is sluggish in unit 1
4	Karcham Wangtoo	JSW	4	Normal response from all the units
5	Nathpa Jhakri	SJVNL	5	Reports not received yet
6	Rampur	SJVNL	3	Reports not received yet
7	Dadri Thermal Stage 1	NTPC	4	Reports not received yet
8	Dadri Thermal Stage 2	NTPC	1	Reports not received yet
9	Dadri GPS	NTPC	2	Reports not received yet

Annexure-B.31.1

Sl. No	Name	Voltag	Type	RTU/SAS	Integrattion Stat
1	ALMORA	132	SUB-STN	NO	NA
2	BAJPUR	132	SUB-STN	NO	NA
3	BHAGWANPUR	132	SUB-STN	NO	NA
4	BHOWALI	132	SUB-STN	NO	NA
5	BHUPATWALA	132	SUB-STN	NO	NA
6	BINDAL	132	SUB-STN	NO	NA
7	CHAMBA	220	SUB-STN	Yes	YES
8	CHIBRO-H	220	GEN-STN	Yes	YES
9	CHILLA-H	132	GEN-STN	Yes	YES
10	CHURDIYALA	132	SUB-STN	NO	NA
11	DHAKRANI-H	132	GEN-STN	Yes	YES
12	DHALIPUR-H	132	GEN-STN	Yes	YES
13	GAMMA GEN-T	220	GEN-STN	Yes	YES
14	IIP HARAWALA	220	SUB-STN	Yes	NO
15	JASPUR	132	SUB-STN	NO	NA
16	JAWALAPUR	132	SUB-STN	NO	NA
17	JHAJRA, DEHRADUN	220	SUB-STN	Yes	YES
18	KAMALWAGANJA, HALDWANI	220	SUB-STN	NO	NA
19	KASHIPUR 400KV	400	SUB-STN	Yes	YES
20	KASHIPUR 132KV	132	SUB-STN	Yes	YES
21	KATHGODAM	132	SUB-STN	NO	NA
22	KHATIMA-H	132	GEN-STN	Yes	YES
23	KHODRI-H	220	GEN-STN	Yes	YES
24	KICHA	132	SUB-STN	Yes	YES
25	KOTDWAR	132	SUB-STN	NO	NA
26	KULAHAL-H	132	GEN-STN	Yes	YES
27	LAKSAR	132	SUB-STN	Yes	YES
28	MAHUAKHERAGANJ	220	SUB-STN	Yes	YES
29	MAJRA, DEHRADUN	132	SUB-STN	NO	NA
30	MANERIBHALI-II-H	220	GEN-STN	Yes	YES
31	MANERIBHALI-I-H	220	GEN-STN	Yes	YES
32	MOHAMADPUR-H	33	GEN-STN	NO	NA
33	MANGLORE	132	SUB-STN	Yes	YES
34	PANT NAGAR	220	SUB-STN	Yes	YES
35	PATHARI-H	33	GEN-STN	NO	NA
36	PIRANKALIYAR	220	SUB-STN	Yes	YES
37	PITHORAGARH	132	SUB-STN	Yes	YES
38	PURKUL	132	SUB-STN	NO	NA
39	RAMGANGA-H	132	GEN-STN	NO	NA
40	RISHIKESH-I	400	SUB-STN	Yes	YES
41	RISHIKESH-II	220	SUB-STN	Yes	YES
42	RAMNAGAR	132	SUB-STN	NO	NA
43	ROORKEE	220	SUB-STN	Yes	YES
44	RUDRAPUR	132	SUB-STN	NO	NA
45	HARIDWAR(SIDCUL)	220	SUB-STN	Yes	YES
46	SITARGANJ	132	SUB-STN	Yes	YES
47	SARAVANTI INFRA -T	220	GEN-STN	Yes	YES
48	SATPULI	132	SUB-STN	NO	NA
49	SIMLI	132	SUB-STN	NO	NA
50	SRINAGAR-I	400	SUB-STN	Yes	YES
51	SRINAGAR-II	132	SUB-STN	NO	YES

Annexure-B.31.2

Station Name	Non available Analog data	Non available Digital data
Bhagwanpur	All	All
Chamba	All	All
Chhibro	Available	Line Isolator
Chilla	Bus 1 Frequency	Isolator Bus Coupler
Dhakrani	All	All
Dhalipur	All	All
Gamma	Bus 1 Voltage (data wrong)	Available
Jhajra	ICT 2 132 KV side - P, Q	All isolator data wrong (All open)
	132 KV Mazra - Q	some CB data wrong (analog flow is there but CB open)
	132 KV both buses- Freq	
	132 KV both buses- Voltage value wrong (0 KV)	
Kashipur 132	132 KV Bazpur, KVS IGL P, Q	All
	132/33 KV ICT 1,2,3 both sides P , Q	
Kashipur 400	400 KV Nehtaur Q	
	400 KV Bus 2 Frequency	400 KV CB Main bay Moradabad, Nehtaur, Bareilly-I, ICT-I, ICT-II
	220 KV Mahuakheraganj P, Q	400 KV CB all tie bay
	220 KV Sravanti P, Q	400 KV Bus and other Isolator Main bay Roorkee-I, Nehtaur, Bareilly-I, ICT-I, ICT-II
	220 KV Bus 2 and 3 Voltage and Frequency	220 KV CB ICT-II, Mahuakheraganj, Sravanti, TBC, Pantnagar-II
	132 KV Bazpur P, Q	220 KV Isolator Sravanti, Mahuakheraganj Bay
		220 KV Line Isolator ICT-I, II, Pantnagar-I (wrong status)
		132 KV CB Bazpur
		132 KV Line Isolator all(wrong status)
Khatima	All	All
Khodri	220 KV Rishikesh, Dhakrani P, Q	All CB and Isolator (wrong ststus)
	220 KV Bus 1 Frequency	
Kicha	ICT 3 P, Q	All CB
		Isolator Richa, Sitarganj, ICT 1, 2, 3
		Isolator CPP, Rudrapur (wrong status)
Kulhal	Mazra 1, II P, Q	CB Mazra 1, Giri, Unit 1,2,3
	Bus 1 Frequency	CB Dhalipur (wrong Status)
		All Bus Isolator (wrong Status)
Laksar	All	All
Mahuakheraganj	132 KV Bus 2 Voltage and Frequency	220 KV CB Gamma, MBC, ICT 2
	33 KV Bus 1 Voltage and Frequency	220 KV Bus 3 isolator Sravanti
		132 KV Line Isolator Kashipur 132
Manerbhali 1	Unit 3 P	CB Unit 1,2,3, ICT 1,2
	Bus 2 Frequency	Isolator ICT 2
	ICT 2 P, Q	All other Isolator (wrong status)
Manerbhali 2	Unit 1, 3 P, Q	All
Manglore	All	All
Mazra	All	All

Pantnagar	220 KV Bus 1 Voltage and Frequency	All (wrong and suspected)
	220 KV Bus 2 Voltage	
	220 KV side ICT 5, 6 P, Q	
	132 KV Bus 1 Voltage and Frequency	
	132 KV Rudrapur, Kathgodam P, Q	
Pirankaliyar	All	All
Pithoragarh	Bus voltage and Frequency	
	Almora, ICT 1,2,3 P Q	All
Rishikesh 220	220 KV Sidkul, khodri, Manerbhali 2, ICT 1,2 P, Q	220 KV CB Manerbhali 2, ICT 1,2
	132 KV ICT 1,2,3, Srinagar P,Q	220 KV all Isolator Manerbhali 2
		220 KV all Line Isolator
		132 KV all CB
		132 KV all line Isolator
Rishikesh 400	220 KV Voltage and Frequency	400 KV CB TBC
		400 KV Line isolator Nehtaur, Rishikesh
		220 KV Line isolator ICT 1,2
Roorkee	220 KV Bus 1 Voltage and Frequency	132 KV CB ICT3,4, Sidkul, BHGPR
	220 KV Bus 2 Voltage	132 KV isolator ICT 4
	220 KV ICT 1,2 P,Q	
	132 KV All	
Sidcul	All	All
Sitarganj	Bus Voltage and Frequency	
	Kicha, khatima, ICT1,2 P, Q	CB feeder 1, Pilibhit, Khatima, ICT 1,2, Sitarganj 2
		Isolator ICT1,2
Srinagar		Line Isolator ICT1,2,3,4 Both sides

Annexure C.4

No. 14/1/2017-Trans-Pt(2)
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi-110001
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Dated, 10th August, 2021

OFFICE MEMORANDUM

Sub: Minutes of the meeting taken by Joint Secretary (Trans), MoP to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export- reg.

The undersigned is directed to forward herewith the minutes of the meeting taken by Joint Secretary (Trans), MoP to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export on 06.08.2021 for information and further necessary action.

Encl: as stated.

10/8/2021.
(Bihari Lal)
Under Secretary (Trans)

To

1. Chairperson, CEA, New Delhi.
2. Principal Commissioner (GST-I), GST Policy Wing, CBIC, D.o Revenue, M/o Finance, New Delhi.

Copy to: PPS/PS to JS(Trans)/ Director(Trans), MoP.

Minutes of the meeting taken by Joint Secretary (Trans), MoP to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export, on 06.08.2021.

A meeting was held under the chairmanship of Joint Secretary (Transmission), MoP on 06.08.2021 to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export. List of participants is attached at **Annexure – I**.

2. At the outset, following background of the meeting was noted:-

i) Based on request received from Department of Revenue (DoR), MoP vide letter dated 24.03.2020 informed that Regional Energy Account (REA) prepared by Regional Power Committee (RPC) secretariat provides energy scheduled under each contract from a particular generating station situated in their region. Thus, this scheduled energy as available in REA can be used for proof of export of sale. It was also suggested by MoP that input tax credit may be provided on the proportion of "export scheduled energy" to "total scheduled energy" of a particular generating station. Further, since REA is prepared by RPC Secretariat as per extant Regulation of CERC, it was informed to DoR that there is no requirement for further verification or authentication of REA.

ii) GST council, D/o Revenue vide email in June 2021 sought further clarifications related to using REA as proof of export for giving input tax credit under GST.

iii) Comments received from CEA on the issues raised by GST Council along with draft template for certifying the energy amount eligible for input tax credit was circulated as agenda for the meeting.

3. Against this back-ground, deliberations were held in the meeting on the clarifications sought by GST Council. During deliberations, following points emerged:-

(i) For the purpose of electricity generation and drawal, scheduled energy is treated as deemed produced/ delivered. Any deviation from schedule energy is treated under the provisions of CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2014. Therefore, Schedule Energy as reflected in the REA can be considered for giving input tax credit to the exporting generator under GST.

(ii) Input tax credit may be provided in the proportion of "export scheduled energy" to "total scheduled energy" of a particular generating station. As REA does not clearly bring out this information, CEA in consultation with RPC Secretariat prepared a format for sharing the above information with GST council.

iii) As all the energy settlement based on REA are on monthly basis, the last date of the month in which energy has been exported may be considered as date of export in case of electricity export.

iv) Representative of GST Policy Wing, D/o Revenue suggested to include GSTIN number of individual generator exporting power may be included in the format. It was noted that the GSTIN number can be collected by the RPC Secretariat from the exporting generator and the same may be reflected in the certificate/statement to be provided by RPC Secretariats.

v) Representative of GST Policy Wing stated that input tax credit on GST is calculated on the basis of value of export (in Rs.) rather than in terms of units of electricity exported. She suggested that rate per unit and total value of electricity exported (in Rs.) may also be included in the draft format. Representative of CEA informed that electricity rate is privy to generator & buyer and rate at which electricity sold is not readily available with RPC Secretariat. In view of above, it would not be possible to indicate value of export in the format.

vi) Representative of GST Council suggested that the certificate/statement may be uploaded on the website by the RPC Secretariat, so that the same can be downloaded by them from web-sites of RPC Secretariat.

4. After detailed deliberations, following decisions were taken:

(i) Name of generating company and its GST number & address shall be included in the certificate/statement to be issued by the RPC Secretariat for the purpose of giving input tax credit to exporting generating station.

(ii) The format shall be issued on monthly basis along with REA and uploaded on websites of RPC Secretariats, where from D/o Revenue as well as eligible generator can download the same.

(iii) The modified format for sharing the relevant information with GST council for the purpose of granting input tax credit to the exporting generator is placed at **Annexure-II**.

(iv) CEA shall instruct the RPC Secretariats to incorporate necessary provisions in the REA issued by them.

7. The meeting ended with thanks to chair.

***

Annexure-I
F.No. 14/1/2017-Trans-Pt(2)

Date/Time of the meeting: 06.08.2021 at 4.00 pm
Venue: MS Teams Platform

Subject: Meeting taken by Joint Secretary (Trans), MoP to discuss the proof of export for the purpose of giving input tax credit under GST for electricity export.

List of Participants

Ministry of Power

1. Shri Mritunjay Kumar Narayan, Joint Secretary (Trans)- in the chair
2. Shri Goutam Ghosh, Director (Trans)
3. Shri Bihari Lal, Under Secretary(Trans)

Central Electricity Authority

4. Shri Pradeep Jindal, Ch. Engineer(PSPA-II)
5. Shri BS Bairwa, Director

GST Policy Wing, D/o Revenue, M/o Finance

6. Smt. Rajani Sharma, Dy. Commissioner

*****

Annex-II

Statement of Scheduled Energy for exported electricity by Generation Plants (using fuel except nuclear, gas, domestic linkage coal, mix fuel) for claiming Input Tax Credit

1. Month in which electricity was exported : *(mmm/yyyy)*
2. Name of Generating Station and Location : *(insert name of Generating Station, District, State)*
3. Name of Company : *(insert name of Company)*
4. GSTIN of Company : *(insert GSTIN of Company)*
5. Installed capacity of Generating Station (in MW) : *(insert installed capacity figure in MW)*
6. Connection point, state and region : *(specify 'STU/ISTS' –insert name of sub-station), state, region*
7. **Details of the Scheduled Energy during the month:**

Domestic	
Name of Domestic Entity	**Scheduled Energy in (MU)**
(buyer entity1)	*de1*
(buyer entity2)	*de2*
(PX)	*de3*
--	--
(buyer entityN)	*deN*
Subtotal Domestic Sale (A)	***sum of (de1+de2+.....+deN)***
Cross Border	
Name of cross border country with exporting entity	**Scheduled Energy in (MU)**
Country 1_entity1	*ee1*
Country 2_entity2	*ee2*
--	--
Country N_entity3	*eeN*
Subtotal Export (B)	***sum of (ee1+ee2+....+eeN)***
Total Scheduled Energy of Generating Station (C=A+B)	***(insert sum of subtotal-A and subtotal-B)***

Note : As per Complementary Commercial Mechanism under section 6.1 (d) of CERC (Indian Electricity Grid Code) Regulations, 2010; beneficiaries shall pay energy charges for the scheduled dispatch, in accordance with the relevant contracts /orders of CERC.

Annexure-C.13.1

List of faulty Interface Energy Meter as on 04.08.21 in Northern Region					
S.No	**Serial No**	**Type**	**Feeder name**	**Region**	**Remarks**
1	NR-4523-A	M	220kV Gazipur (DTL) at Sec-20 Noida-UPPCL	NR-1	Faulty
2	NP-5183-A	M	220kV Gazipur(DTL) at Sec-62 Noida-UPPCL	NR-1	Faulty
3	NR-4600-A	M	400 kV ICT-2 at Prithala-Sterlite	NR-1	Read less
4	NP-6622-A	M	220kV feeder from Dadri Gas to Thermal	NR-1	Read abrupt
5	NR-3368-A	M	220kV Kishenpur-1 at Salal HPS	NR-2	Faulty
6	NP-1377-A	M	66 kV PACL at Bhakra Left Bank	NR-2	Faulty
7	NP-1383-A	S	ICT(66 kV) at Bhakra Left Bank	NR-2	Faulty
8	NP-1628-A	M	GT-9(220 kV) at Bhakra Right Bank	NR-2	Faulty
9	NP-1387-A	M	GT-1(132 kV) at Ganguwal HPS	NR-2	Faulty
10	NP-1673-A	M	GT-2(220 kV) at Pong HPS	NR-2	Faulty
11	NP-5440-A	M	GT-3(132 kV) at Kotla HPS	NR-2	Faulty
12	NP-1335-A	S	220/132kV ICT-3(132kV) at Hissar-BBMB	NR-2	Faulty
13	NR-3651-A	M	220kV Bhiwani(HVPN)-1 at Bhiwani-BBMB	NR-2	Faulty
14	NP-1433-A	S	220/132kV ICT-2(132kV) at Kurukshetra-BBMB	NR-2	Faulty
15	NR-3234-A	S	220kV Dhulkote-2 at Panipat-BBMB	NR-2	Faulty
16	NEW METER	S	220kV Sangrur-1 at Jamalpur-BBMB	NR-2	

17	NP-6962-A	M	400 kV Abdullapur-PG at Dipalpur-HVPNL	NR-2	Time drift >1day
18	NR-3642-A	S	20kV Chirawa at Hissar-BBMB	NR-2	Read abrupt
19	NP-1829-A	M	132 kV Bassi-2 at Shanan-PSEB	NR-2	Time drift more than 12 hrs
20	NP-1588-A	S	220 kV Jallandhar(PG)-1 at Kartarpur-PSEB	NR-2	Time drift
21	NP-6621-A	M	GT-1 (220kV) at NAPS	NR-3	Faulty
22	NP-9889-A	M	400kV Allahabad- 2 at Singrauli STPS(NP-1553-A changed)_#Singrauli STPS	NR-3	Data not getting converted
23	NP-9888-A	M	33KV Singrauli STPS at Singrauli Hydro (NR-4493-A changed)_#Singrauli Solar	NR-3	Data not getting converted
24	NP-1311-A	C	220kV Swaimadhopur at Anta CCPP	NR-3	Faulty
25	NP-1286-A	M	132kV Morwa at Bina-UPPCL	NR-3	Faulty
26	NP-1792-A	M	132kV Thakurdwara/Moradabad at Mahuakheraganj(pre Kashipur)-UPCL	NR-3	Faulty
27	NP-1788-A	M	132kV Nehtaur-1 at Laksar-UPCL	NR-3	Faulty
28	NP-8206-A	M	220kV Tanakpur-1 at CB Gunj-UPPCL	NR-3	Faulty
29	NP-8056-A	M	220kV NAPS at Simbhauli-UPPCL	NR-3	Faulty
30	NP-1760-A	M	220kV Baikanthpur(Bareilly) at Pantnagar-UPCL	NR-3	Faulty
31	NP-7722-A	M	220kV CBGunj-1 at Tanakpur HPS	NR-3	Faulty

DCD requirement at Various Substations in Norther-Region

S.No	Name of the Substation	No of DCD	Region
1	400 kv Dhanonda-HVPNL	1	NR-2
2	Bhakra-Left BBMB	1	NR-2
3	220 kv Anta-NTPC	1	NR-3
4	220 kV MIA-RVPNL	1	NR-1
5	400 kV Ratangarh-RVPNL	1	NR-1
6	132 Kv Amarpura-Tehdi-RVPNL	1	NR-1
7	220 kv Swaimadhopur-RVPNL	1	NR-1
8	400 KV Amener-RVPNL	1	NR-1
9	400 KVMerta-RVPNL	1	NR-1
10	220 KV Chirawa-RVPNL	1	NR-1
11	400 kv Babai-RVPNL	1	NR-1
12	220 KV Khetri-RVPNL	1	NR-1
13	400 KV Chittoragarh-RVPNL	1	NR-1
14	220 KV Chittoragarh-RVPNL	1	NR-1
15	220 KV Bhilwara-RVPNL	1	NR-1
16	765 kv Phagi-RVPNL	1	NR-1
17	220 Kv Bagru-RVPNL	1	NR-1
18	220 Kv Dausa-RVPNL	1	NR-1
19	220 Kv Lalsot-RVPNL	1	NR-1
	Total DCD required	19	

Annexure-C.13.2

Details of nodal officer for issues related with Interface Energy Metering and DCD:				
Sl. No	Name of Nodal officer	Postal Address	E mail Address	Contact No
1.				
2.				

Annexure-C.13.3

Details of Interface Energy Meters whose data for the week of 190721-250721 were not received by Tuesday (27.07.21)

Sl.No	Utilty Name /Responsibility	Sub-Stn/Gen Stn.Name	Installed on Feeder	Loc. Code	Meter No
1	NTPC	Singrauli STPS_#Singrauli STPS	400kV Allahabad- 2	SI-04	NP-9889-A
2	NTPC	Singrauli STPS_#Singrauli STPS	GT-3 (400kV)	SI-23	NP-1547-A
3	NTPC	Singrauli STPS_#Singrauli STPS	GT-7 (400kV)	SI-27	NP-1550-A
4	NTPC	Singrauli Hydro	33KV Singrauli STPS	SI-36	NP-9888-A
5	NTPC	Rihand STPS_#Rihand STPS	132 kV V'chal/Singrauli	RI-05	NP-1283-A
6	NTPC	Auraiya CCPP	220kV Phaphund (Railways)-1	AU-09	NP-1768-A
7	NTPC	Anta CCPP	220kV Swaimadhopur	AN-11	NP-1311-A
8	NTPC	Dadri-NTPC	ICT-1 (400kV)	DA-01	NP-1195-A
9	NTPC	Dadri-NTPC	ICT-2 (400kV)	DA-02	NP-1200-A
10	NTPC	Dadri-NTPC	ICT-3 (400kV)	DA-03	NP-6795-A
11	NTPC	Dadri-NTPC	ICT-4 (400kV)	DA-04	NP-1194-A
12	NTPC	Dadri-NTPC	ICT-5 (400kV)	DA-10	NP-3059-A
13	NTPC	Dadri-NTPC	GT-5-Stage-2 (400kV)	DA-52	NP-1177-A
14	NTPC	Dadri-NTPC	GT-5-Stage-2 (400kV)	DA-53	NP-1176-A
15	NTPC	Dadri-NTPC	GT-6-Stage-2 (400kV)	DA-54	NP-8227-A
16	NTPC	Dadri-NTPC	GT-6-Stage-2 (400kV)	DA-55	NP-6623-A
17	NTPC	Dadri GPS	220kV Railways-1	DA-07	NP-1297-A
18	NTPC	Dadri GPS	220kV Railways-2	DA-08	NP-1872-A
19	NTPC	Dadri-NTPC	ICT-1 (220kV)	DA-21	NP-1199-A
20	NTPC	Dadri-NTPC	ICT-2 (220kV)	DA-22	NP-1196-A
21	NTPC	Dadri-NTPC	ICT-3 (220kV)	DA-23	NP-1197-A
22	NTPC	Dadri-NTPC	ICT-4 (220kV)	DA-24	NP-1198-A
23	NTPC	Dadri-NTPC	400Kv Harsh Vihar(Loni)-1	DL-75	NP-8079-A
24	NTPC	Dadri-NTPC	400kV Harsh Vihar(Loni)-1	DL-76	NP-8081-A
25	NTPC	Dadri-NTPC	400kV Harsh Vihar(Loni)-2	DL-77	NP-8080-A
26	NTPC	Dadri-NTPC	400kV Harsh Vihar(Loni)-2	DL-78	NP-8082-A
27	NTPC	Dadri-NTPC	400kV HVDC-1	DA-31	NP-8224-A
28	NTPC	Dadri-NTPC	400kV HVDC-2	DA-32	NP-1771-A
29	NTPC	Dadri-NTPC	400kV Greater Noida	DA-33	NP-1185-A
30	NTPC	Dadri-NTPC	400kV Maharanibagh	DA-34	NP-1184-A
31	NTPC	Dadri-NTPC	400kV Mandaula-1	DA-35	NP-1189-A

32	NTPC	Dadri-NTPC	400kV Mandaula-2	DA-36	NP-1188-A
33	NTPC	Dadri-NTPC	400kV Muradnagar	DA-37	NP-8225-A
34	NTPC	Dadri-NTPC	400kV Panipat-1	DA-38	NP-1187-A
35	NTPC	Dadri-NTPC	400kV Malerkotla	DA-39	NP-1186-A
36	NTPC	Dadri-NTPC	400kV Panipat-2	DA-40	NP-1725-A
37	NTPC	Dadri-NTPC	(Orig No.01955922) ICT-1 (400kV) side	DA-41	NT-0001-A
38	NTPC	Dadri-NTPC	(Orig No.01955923) ICT-2 (400kV) side	DA-42	NT-0002-A
39	NTPC	Dadri-NTPC	(Orig No.01955842) ICT-3 (400kV) side	DA-43	NT-0003-A
40	NTPC	Dadri-NTPC	(Orig No.01955892) ICT-4 (400kV) side	DA-44	NT-0004-A
41	NTPC	Dadri-NTPC	(Orig No.01955844) 400kV Mandola-1	DA-45	NT-0005-A
42	NTPC	Dadri-NTPC	(Orig No.01955850) 400kV Mandola-2	DA-46	NT-0006-A
43	NTPC	Dadri-NTPC	(Orig No.01955851) 400kV Greater Noida	DA-47	NT-0007-A
44	NTPC	Dadri-NTPC	(Orig No.01955852) 400kV Maharanibagh	DA-48	NP-8226-A
45	NTPC	Dadri-NTPC	(Orig No.01955847) 400kV Muradnagar	DA-49	NT-0009-A
46	NTPC	Dadri-NTPC	(Orig No.01955846) 400kV Panipat	DA-50	NT-0010-A
47	NTPC	Dadri-NTPC	(Orig No.01955848) 400kV Malerkotla	DA-51	NT-0011-A
48	NTPC	Dadri Solar-NTPC	33 Kv Side ICT-1 (33kV/220kV)	DA-11	NP-8228-A
49	NTPC	Dadri Solar-NTPC	220 Kv Side ICT-1 (33kV/220kV)	DA-12	NP-5408-A
50	NTPC	Dadri-NTPC(from Gas)	6.6kV HVDC-2(aux)	DA-56	NP-1193-A
51	NTPC	Tanda Stage-2	ICT-1 (400 kV)	TA-01	NR-4365-A
52	NTPC	Tanda Stage-2	ICT-1 (220 kV)	TA-02	NR-4363-A
53	NTPC	Tanda Stage-2	ICT-2 (400 kV)	TA-03	NR-4366-A
54	NTPC	Tanda Stage-2	ICT-2 (220 kV)	TA-04	NR-4364-A
55	NTPC	Tanda Stage-2	400 kV Azamgarh	TA-05	NR-3797-A
56	NTPC	Tanda Stage-2	400 kV Azamgarh	TA-06	NR-3796-A
57	NTPC	Tanda Stage-2	400 kV Sultanpur	TA-07	NR-4367-A
58	NTPC	Tanda Stage-2	400 kV Sultanpur	TA-08	NR-3794-A
59	NTPC	Tanda Stage-2	400 kV Basti-1	TA-09	NR-4362-A
60	NTPC	Tanda Stage-2	400 kV Basti-1	TA-10	NR-3792-A
61	NTPC	Tanda Stage-2	400 kV Basti-2	TA-11	NR-4372-A
62	NTPC	Tanda Stage-2	400 kV Basti-2	TA-12	NR-3708-A
63	NTPC	Tanda Stage-2	HV Side of GT-5	TA-13	NR-4368-A
64	NTPC	Tanda Stage-2	HV Side of GT-6	TA-14	NR-4369-A
65	NTPC	Tanda Stage-2	400 KV Side of ST-3	TA-15	NR-3793-A
66	NTPC	Tanda Stage-2	400 KV Side of ST-4	TA-16	NR-4371-A

67	NHPC	Bairasiul HPS (NP-1851-A rep on 08.01.21)	220kV Jessore	BS-12	NS-1005-A
68	NHPC	Bairasiul HPS	Genr-3 (11kV)	BS-23	NP-1965-B
69	NHPC	Salal HPS	220kV Kishenpur-1	SL-03	NR-3368-A
70	NHPC	Tanakpur HPS	220kV CBGunj-1	TP-01	NP-7722-A
71	NHPC	Chamera-3 HPS	220kV Chamba-PG-2	CM-31	NR-3409-A
72	NHPC	Uri HPS	400kV Amargarh-1	UR-01	NP-1519-A
73	NHPC	Uri HPS	400kV Amargarh-2	UR-02	NP-1840-A
74	NHPC	Uri HPS	400kV Amargarh-1	UR-11	NP-1752-A
75	NHPC	Uri HPS	400kV Amargarh-2	UR-12	NP-1600-A
76	NHPC	Uri HPS	400kV URI-II	UR-03	NP-1841-A
77	NHPC	Uri HPS	Genr-1 (13.8kV)	UR-21	NP-1980-B
78	NHPC	Uri HPS	Genr-2 (13.8kV)	UR-22	NP-1981-B
79	NHPC	Uri-II HPS	400kV Genr-4	UR-28	NR-3257-A
80	NHPC	Parbati-II HPS	Genr-3 (400kV)	PT-21	NR-3466-A
81	NHPC	Parbati-II HPS	Genr-4 (400kV)	PT-22	NR-3451-A
82	NHPC	Dhauliganga HPS	GT-1 (220kV)	DG-01	NP-8169-A
83	NHPC	Dhauliganga HPS	GT-2 (220kV)	DG-02	NP-8005-A
84	NHPC	Dhauliganga HPS	GT-3 (220kV)	DG-03	NP-8168-A
85	NHPC	Dhauliganga HPS	GT-4 (220kV)	DG-04	NP-8006-A
86	NHPC	Dhauliganga HPS	220 kV Pithoragargh PG	DG-21	NP-8279-A
87	NHPC	Dhauliganga HPS	220 kV Pithoragargh PG	DG-23	NP-8280-A
88	NHPC	Dhauliganga HPS	220 kV Baikanthpur(Bareilly)-2	DG-22	NP-8281-A
89	NHPC	Dhauliganga HPS	220 kV Baikanthpur(Bareilly)-2	DG-24	NP-8282-A
90	NHPC	SEWA-II	33 kV SEWA-III(J&K PDD)	SW-25	NP-8584-A
91	NAPS	RAPS-A	132kV Gandhi Sagar	RA-06	NP-1069-B
92	THDC	NAPS	GT-1 (220kV)	NA-01	NP-6621-A
93	THDC	Tehri-THDC	GT-3 (400kV)	TE-23	NP-9962-A
94	BBMB	KOTESSHWAR POOLING(PG)	400 KV ICT-3	PG-55	NP-3634-A
95	BBMB	Bhakra Left Bank	GT-3(220 kV)	BH-03	NP-1374-A
96	BBMB	Bhakra Left Bank	GT-3(220 kV)	BH-33	NP-3094-A
97	BBMB	Bhakra Left Bank	66 kV NFF-2	BH-10	NP-1849-A
98	BBMB	Bhakra Left Bank	66 kV PACL	BH-11	NP-1377-A
99	BBMB	Bhakra Left Bank	ICT(66 kV)	BH-08	NP-1383-A
100	BBMB	Bhakra Right Bank	GT-9(220 kV)	BH-18	NP-1628-A
101	BBMB	Ganguwal HPS	GT-1(132 kV)	GW-01	NP-1387-A
102	BBMB	Pong HPS	GT-2(220 kV)	PN-02	NP-1673-A
103	BBMB	Pong HPS	66 kV Talwara	PN-09	NR-3233-A
104	BBMB	Panipat-BBMB	220kV Panipat(T)-1	BB-01	NP-7134-A
105	BBMB	Panipat-BBMB	220kV Panipat(T)-2	BB-02	NP-7076-A
106	BBMB	Panipat-BBMB	220kV Panipat(T)-3	BB-03	NR-3226-A
107	BBMB	Panipat-BBMB	220kV Panipat(T)-4	BB-04	NP-7079-A

108	BBMB	Panipat-BBMB	220/132kV T/F-1(220 kV)	BB-05	NR-3294-A
109	BBMB	Panipat-BBMB	220/132kV T/F-2(220 kV)	BB-06	NP-6583-A
110	BBMB	Panipat-BBMB	220/33kV T/F-1 (220 kV)	BB-07	NR-3271-A
111	BBMB	Panipat-BBMB	220/33kV T/F-2 (220 kV)	BB-08	NP-1416-A
112	BBMB	Panipat-BBMB	ICT-1(220 kV)	BB-09	NP-1417-A
113	BBMB	Panipat-BBMB	ICT-2 (220 kV)	BB-10	NP-8813-A
114	BBMB	Panipat-BBMB	ICT-1(400 kV)	BB-70	NR-3230-A
115	BBMB	Panipat-BBMB	ICT-2 (400 kV)	BB-71	NR-3262-A
116	BBMB	Panipat-BBMB	220kV Charkhi Dadri	BB-11	NS-1009-A
117	BBMB	Panipat-BBMB	220kV Dhulkote-1	BB-12	NP-8222-A
118	BBMB	Panipat-BBMB	220kV Dhulkote-2	BB-13	NR-3234-A
119	BBMB	Panipat-BBMB	220kV Kurukshetra	BB-14	NS-1008-A
120	BBMB	Panipat-BBMB	220kV Narela-1	DL-53	NP-1423-A
121	BBMB	Panipat-BBMB	220kV Narela-2	DL-54	NR-3458-A
122	BBMB	Panipat-BBMB	220kV Narela-3	DL-55	NS-1007-A
123	BBMB	Panipat-BBMB	220kV Chajpur(HVPN)-1	BB-76	NP-8835-A
124	BBMB	Panipat-BBMB	220kV Chajpur(HVPN)-2	BB-77	NP-8836-A
125	BBMB	Panipat-BBMB	400kV Panchkula(PG)	BB-78	NP-8223-A
126	BBMB	Hissar-BBMB	220/132kV ICT-3(132kV)	BB-22	NP-1335-A
127	BBMB	Bhiwani-BBMB	220kV Bhiwani(HVPN)-1	BB-44	NR-3651-A
128	BBMB	Kurukshetra-BBMB	220/132kV ICT-2(132kV)	BB-61	NP-1433-A
129	BBMB	Rohtak Road-BBMB	66kV Gurgaon-1	HR-05	NP-1224-A
130	BBMB	Rohtak Road-BBMB	66kV Gurgaon-2	HR-06	NP-5013-A
131	BBMB	Rohtak Road-BBMB	66kV Gurgaon-1	HR-09	NP-8238-A
132	BBMB	Rohtak Road-BBMB	66kV Gurgaon-2	HR-10	NP-5195-A
133	BBMB	Rohtak Road-BBMB	33kV Bahadurgarh	HR-12	NR-3914-A
134	BBMB	Jalandhar-BBMB	220/132kV ICT-2 (220kV)	PU-70	NP-1653-A
135	BBMB	Jalandhar-BBMB	220kV Pong-2	PU-20	NP-5464-A
136	BBMB	Sangrur-BBMB	220/66kV ICT-2(66kV)	PU-26	NP-8846-A
137	BBMB	Kishangarh Chandigarh-BBMB	66kV Pinjore-1	CH-19	NP-1426-A
138	BBMB	IT Park Chandigarh-BBMB	66kV Pinjore-2/Mansadevi	CH-20	NP-1427-A
139	UP	Laxmi Sugar Mill-UPCL	132kV Saharanpur-1	UA-54	NP-1789-A
140	UP	Bhagwanpur-UPCL	132kV AmbalaRD(Pilakni)	UA-41	NP-1791-A
141	UP	Laksar-UPCL	132kV Nehtaur-1	UA-44	NP-1788-A
142	UP	Manglore-UPCL	132kV Kirtarpur	UA-42	NP-1782-A
143	UP	Kalagarh-UPCL	132kV Afzalgarh	UA-36	NP-1751-A
144	UP	Kalagarh-UPCL	132kV Sherkot	UA-37	NP-1584-A
145	UP	Mahuakheraganj-UPCL	132kV Thakurdwara/Moradabad	UA-38	NP-1792-A
146	UP	Sahibabad-UPPCL	220kV Gazipur-DTL	UP-02	NR-4527-A
147	UP	Sec-38 Noida-UPPCL	220kV Noida Sec-20	UP-04	NP-1136-A
148	UP	Sec-20 Noida-UPPCL	220kV Gazipur (DTL)	UQ-65	NR-4523-A
149	UP	Sec-38 Noida-UPPCL	220kV BTPS (DTL)	UQ-66	NP-5187-A

150	UP	Sec-62 Noida-UPPCL	220kV Gazipur(DTL)	UQ-26	NP-5183-A
151	UP	Gagalheri -UPPCL	132kV Roorkee-1(Lx.Mill)	UP-12	NP-1897-A
152	UP	AmbalaRD-UPPCL	132kV Baghwanpur	UQ-28	NP-1898-A
153	UP	Pilibhit-UPPCL	132kV Khatima	UP-14	NR-4545-A
154	UP	Sherkot-UPPCL	132kV Kalagarh	UQ-17	NP-1797-A
155	UP	Chandak-UPPCL	132kV LakSar	UP-22	NP-1794-A
156	UP	Anpara-UPPCL	132kV Morwa	UP-32	NP-1532-A
157	UP	Bina-UPPCL	132kV Morwa	UP-33	NP-1286-A
158	UP	220kV Bachhrawan -UPPCL	220kV Raebarely	UP-59	NP-1271-A
159	UP	220kV Raniya-UPPCL	220kV Kanpur	UP-60	NP-1239-A
160	UP	Chandauli-UPPCL	132kV Karamnasa	UP-46	NP-1292-A
161	UP	Basti-UPPCL	400 kV Lucknow	UQ-72	NR-4300-A
162	UP	NAGARUNTARI(JSEB)	132kV Rihand HPS-UPPCL	BI-66	ER-1385-A
163	Rajasthan	RPSHEP-RVPNL	132 kV Gandhi Sagar	RJ-21	NP-1072-B
164	Rajasthan	Bhilwara-RVPNL	220kV TBC	RJ-27	NP-1058-B
165	Rajasthan	Sawaimadhopur-RVPNL	132kV aux. B/C	RJ-35	NP-1064-B
166	Rajasthan	Bikaner(RVPNL)	400 kV Sikar-PG-I	RH-15	NR-4535-A
167	Rajasthan	Ajmer-RVPNL	400 kV Ajmer(PG)-I	RH-17	NR-4476-A
168	Rajasthan	Ajmer-RVPNL	400 kV Ajmer(PG)-II	RH-18	NR-4478-A
169	Rajasthan	Barmer-RRVPNL	400 kV Bhinmal-1	RH-26	NR-3697-A
170	Rajasthan	Barmer-RRVPNL	400 kV Bhinmal-2	RH-27	NR-3592-A
171	PGCIL	Ajmer-PG	765 kV Chittorgarh(PG)-II	NB-02	NR-4474-A
172	PGCIL	Kanpur(GIS)PG	765 kV Varanasi-I	NY-18	NR-3729-A
173	PGCIL	Kanpur(GIS)PG	765 kV Jhatikra	NY-20	NR-3730-A
174	PGCIL	Fatehpur-PG	400/220 kV ICT-3(400 kV)	PG-76	NR-3728-A
175	PGCIL	Fatehpur_PG	400KV Mainpuri-PG-2	NS-36	NR-4404-A
176	PGCIL	Vindyachal HVDC-PG	400 kV Block-2 (NR)	NR-12	NP-6596-A
177	PGCIL	Agra-PG	400 kV Agra UPPCL-1	UP-74	NP-1208-A
178	PGCIL	Jhatikra-PG	400 kV PG Mundka-1	NS-46	NP-7695-A
179	PGCIL	Panchkula-PG	400 kV Abdullapur-PG-1	NS-05	NR-3295-A
180	PGCIL	Sikar-PG	ICT-1 (400 kV)	RT-01	NR-4570-A
181	PGCIL	Sikar-PG	ICT-1 (220 kV)	RT-02	NR-3975-A
182	PGCIL	Sikar-PG	ICT-2 (400 kV)	RJ-48	NS-1132-A
183	PGCIL	Sikar-PG	ICT-2 (220 kV)	RJ-49	NR-3814-A
184	PGCIL	Sikar-PG	ICT-3 (400 kV)	RT-13	NR-3759-A
185	PGCIL	Sikar-PG	ICT-3 (220 kV)	RT-14	NR-3724-A
186	PGCIL	Sikar-PG	400 kV Ratangarh(RVPNL)-I	NU-18	NR-3976-A
187	PGCIL	Sikar-PG	400 kV Ratangarh(RVPNL)-II	NU-19	NR-3977-A
188	PGCIL	Sikar-PG	400 kV Bikaner(RVPNL)-I	NY-90	NR-3756-A
189	PGCIL	Sikar-PG	400 kV Bikaner(RVPNL)-II	NY-91	NS-1130-A
190	PGCIL	Sikar-PG	400 kV Bassi-I	NY-55	NR-3753-A
191	PGCIL	Sikar-PG	400 kV Bassi-II	NY-56	NR-4392-A
192	PGCIL	Sikar-PG	400 kV Babai (RRVPNL)-I	NY-92	NS-1131-A

193	PGCIL	Sikar-PG	400 kV Neemrana-II	NY-93	NR-4541-A
194	PGCIL	Kishenpur-PG	220 kV Sarna-1	NR-31	NP-1750-A
195	PGCIL	Kishenpur-PG	220 kV Sarna-2	NR-32	NP-1749-A
196	PGCIL	Kishenpur-PG	220 kV Ramban	NR-29	NP-1748-A
197	PGCIL	Kishenpur-PG	220 kV Mirbazar	NR-30	NP-5479-A
198	PGCIL	Kishenpur-PG	800 kV Moga-1 (400kV)	NR-41	NR-3323-A
199	PGCIL	Kishenpur-PG	800 kV Moga-2 (400kV)	NR-42	NP-1882-A
200	PGCIL	Kishenpur-PG	400 kV New Wanpoh(PG)-1	NG-04	NP-3163-A
201	PGCIL	Kishenpur-PG	400 kV New Wanpoh(PG)-2	NG-05	NP-3166-A
202	PGCIL	Kishenpur-PG	400 kV New Wanpoh(PG)-3	NY-36	NR-3414-A
203	PGCIL	Kishenpur-PG	400 kV New Wanpoh(PG)-4	NY-37	NR-3415-A
204	PGCIL	Kishenpur-PG	400 kV Dulhasti-1	NG-08	NP-6040-A
205	PGCIL	Kishenpur-PG	400 kV Dulhasti-2	NB-13	NP-8531-A
206	PGCIL	Kishenpur-PG	220 kV Barn-1	JK-28	NP-3159-A
207	PGCIL	Kishenpur-PG	220 kV Barn-2	JK-29	NP-3157-A
208	PGCIL	Kishenpur-PG	400 kV Baglihar-1	JK-32	NP-5483-A
209	PGCIL	Kishenpur-PG	400 kV Baglihar-2	JK-33	NR-3340-A
210	PGCIL	Kishenpur-PG	220 kV Udhampur-1	NG-88	NP-8519-A
211	PGCIL	Kishenpur-PG	220 kV Udhampur-2	NG-89	NP-8533-A
212	PGCIL	Kishenpur-PG	ICT-1 (400 kV)	NS-62	NP-8532-A
213	PGCIL	Kishenpur-PG	ICT-2 (400 kV)	NS-63	NP-6584-A
214	PGCIL	Kishenpur-PG	ICT-3 (400 kV)	PJ-27	NP-8520-A
215	PGCIL	Kishenpur-PG	400 kV Samba-1	NS-74	NP-1668-A
216	PGCIL	Kishenpur-PG	400 kV Samba-2	NS-75	NP-3106-A
217	PGCIL	Jallandhar-PG	220 kV Nehrian-1	NR-43	NR-3207-A
218	PGCIL	Jallandhar-PG	220 kV Nehrian-2	NR-44	NR-3208-A
219	PGCIL	Jallandhar-PG	220 kV Kartarpur-1	NR-47	NR-3215-A
220	PGCIL	Jallandhar-PG	220 kV Kartarpur-2	NR-48	NR-3302-A
221	PGCIL	Jallandhar-PG	220 kV Dasuya-1	NR-45	NR-3213-A
222	PGCIL	Jallandhar-PG	220 kV Dasuya-2	NR-46	NR-3219-A
223	PGCIL	Jallandhar-PG	220 kV Kanjal-1	NS-18	NR-3218-A
224	PGCIL	Jallandhar-PG	220 kV Kanjal-2	NS-51	NR-3216-A
225	PGCIL	Jallandhar-PG	400 kV Moga-1	NR-49	NR-3485-A
226	PGCIL	Jallandhar-PG	400 kV Moga-2	NR-50	NR-3479-A
227	PGCIL	Jallandhar-PG	400 kV Amritsar-1	NR-80	NR-3222-A
228	PGCIL	Jallandhar-PG	400 kV Ludhiana	NG-33	NR-3460-A
229	PGCIL	Jallandhar-PG	400 kV Hamirpur-PG	NY-52	NR-3227-A
230	PGCIL	Jallandhar-PG	400 kV Chamba-PG-1	NS-70	NR-3486-A
231	PGCIL	Jallandhar-PG	400 kV Chamba-PG-2	NS-71	NR-3478-A
232	PGCIL	Jallandhar-PG	400 kV Kurukshetra-PG	NU-56	NR-3452-A
233	PGCIL	Jallandhar-PG	400 kV Nakodar-PSEB	NU-57	NR-3221-A

234	PGCIL	Jallandhar-PG	220 kV ICT-3	NY-21	NR-3217-A
235	PGCIL	Jallandhar-PG	220 kV ICT-2	NK-05	NR-3296-A
236	PGCIL	Jallandhar-PG	220 kV ICT-1	NK-06	NR-3506-A
237	PGCIL	Meerut-PG	ICT-4 (400 kV)	NU-06	NP-8151-A
238	PGCIL	Meerut-PG	400 kV Mandaula-4	NS-49	NP-7754-A
239	PGCIL	Meerut-PG	400 kV Mandaula-3	NS-68	NP-8154-A
240	PGCIL	Meerut-PG	400 kV Bareilly-1	NS-69	NP-3027-A
241	PGCIL	Meerut-PG	400 kV Bareilly-2	NS-50	NP-7774-A
242	PGCIL	Meerut-PG	765 kV KOTESHWAR POOLING(PG)-1	NR-81	NP-6802-A
243	PGCIL	Meerut-PG	765 kV KOTESHWAR POOLING(PG)-2	NR-82	NP-6803-A
244	PGCIL	Meerut-PG	765 kV Gr Noida-WUPPTCL	NS-80	NP-8215-A
245	PGCIL	Meerut-PG	765KV/400kV (HV Side)ICT-1	NS-81	NP-7713-A
246	PGCIL	Meerut-PG	765KV/400kV (HV Side)ICT-2	NS-82	NP-7751-A
247	PGCIL	Meerut-PG	765KV/400kV (HV Side)ICT-3	NL-83	NP-8020-A
248	PGCIL	Meerut-PG	765KV Bhiwani (PG)	PJ-25	NP-8049-A
249	PGCIL	Lucknow-PG	400kV Gorakhpur-3	NG-61	NP-6591-A
250	PGCIL	Mainpuri-PG	ICT-2 (400 kV)	UP-77	NR-4488-A
251	PGCIL	Mainpuri-PG	ICT-1 (220 kV)	UP-78	NR-4492-A
252	PGCIL	Mainpuri-PG	ICT-2 (220 kV)	UP-79	NR-3748-A
253	PGCIL	Mainpuri-PG	ICT-3 (400 kV)	NY-82	NR-4489-A
254	PGCIL	Mainpuri-PG	ICT-3 (220 kV)	NY-83	NR-4491-A
255	PGCIL	Mainpuri-PG	400 kV Ballabgarh-1	NR-72	NR-4466-A
256	PGCIL	Mainpuri-PG	400 kV Ballabgarh-2	NR-73	NR-3747-A
257	PGCIL	Mainpuri-PG	220 kV Mainpuri-1(UP)	UQ-05	NR-4469-A
258	PGCIL	Mainpuri-PG	220 kV Mainpuri-2(UP)	UQ-06	NR-4410-A
259	PGCIL	Mainpuri-PG	220 kV Harduaganj(UP)	UQ-07	NR-4458-A
260	PGCIL	Mainpuri-PG	220 kV Firojabad(UP)	UQ-08	NR-3746-A
261	PGCIL	Mainpuri-PG	220 kV Neebkrori(UP)-I	UQ-60	NR-4605-A
262	PGCIL	Mainpuri-PG	220 kV Neebkrori(UP)-2	UQ-61	NR-4418-A
263	PGCIL	Mainpuri-PG	400 kV Mainpuri(UP)-I	UQ-43	NR-4468-A
264	PGCIL	Mainpuri-PG	400 kV mainpuri(UP)-II	UQ-44	NR-4463-A
265	PGCIL	Amritsar-PG	ICT-4 (400 kV)	PG-61	NR-3278-A
266	PGCIL	Amritsar-PG	ICT-4 (220 kV)	PG-62	NR-3382-A
267	PGCIL	Bahadurgarh-PG	400 kV Kabulpur(HVPN)	HR-60	NR-3622-A
268	PGCIL	Banala PG	400 kV Koldam	NU-21	NR-3375-A
269	PGCIL	Jind(PG)	220 KV ICT-1	HY-56	NR-3593-A
270	PGCIL	Baghpat PG	400 kV Kaithal-I	NU-69	NP-4339-A
271	PGCIL	Samba-PG	ICT-1 (400 kV)	NY-04	NR-3488-A
272	PGCIL	Samba-PG	ICT-2 (400 kV)	NY-05	NS-1027-A
273	PGCIL	Samba-PG	ICT-1 (220 kV)	NY-06	NR-3508-A

274	PGCIL	Samba-PG	ICT-2 (220 kV)	NY-07	NR-3509-A
275	PGCIL	Samba-PG	ICT-3 (400 kV)	NY-34	NR-3490-A
276	PGCIL	Samba-PG	ICT-3 (220 kV)	NY-35	NS-1025-A
277	PGCIL	Samba-PG	400 kV Kishenpur-I	NY-08	NS-1029-A
278	PGCIL	Samba-PG	400 kV Kishenpur-II	NY-09	NR-3276-A
279	PGCIL	Samba-PG	400 kV Jalandhar-I	NY-38	NS-1060-A
280	PGCIL	Samba-PG	400 kV Jalandhar-II	NY-39	NR-3406-A
281	PGCIL	Samba-PG	400 kV Amargarh-I	NB-41	NS-1028-A
282	PGCIL	Samba-PG	400 kV Amargarh-II	NB-42	NR-3265-A
283	PGCIL	Dehradun-PG	ICT-1 (220 kV)	NY-45	NR-4518-A
284	Sterlite	Amargarh-Sterlite	400 kV Wagoora-2	NB-28	NR-3261-A
285	Sterlite	Prithala-Sterlite	33kV Tertiary	GP-15	NR-4391-A
286	Sterlite	Sohna-Sterlite	33kV Tertiary	GP-23	NR-3769-A
287	Delhi	Bawana-DTL	ICT-1 (400 kV)	DL-11	NP-1169-A
288	Delhi	Bawana-DTL	ICT-2 (400 kV)	DL-13	NP-8197-A
289	Delhi	Bawana-DTL	ICT-1 (220 kV)	DL-12	NP-1740-A
290	Delhi	Bawana-DTL	ICT-2 (220 kV)	DL-14	NP-1178-A
291	Delhi	BTPS	220kV Noida Sec-38	DL-32	NP-5175-A
292	Delhi	BTPS	220kV Ballabgarh-2	DL-34	NP-5348-A
293	Delhi	BTPS	220kV TBC	DL-35	NP-1124-A
294	Haryana	Hissar IA-1-HVPN	220 kV Hissar(BBMB)	HR-28	NR-3830-A
295	Haryana	Bhiwani-HVPN	220 kV Bhiwani -2	HR-30	NP-1339-A
296	Haryana	Dipalpur-HVPNL	400 kV Abdullapur-PG	HY-17	NP-6962-A
297	Haryana	Daultabad - HVPNL	400kV Gurgaon(PG)-II	HV-01	NP-7714-A
298	Haryana	Dhanonda(HVPN)	400 kV Neemrana(PG)-1	HY-53	NR-3931-A
299	Haryana	Dhanonda(HVPN)	400 kV Neemrana(PG)-2	HY-54	NR-3826-A
300	Haryana	Nawada-HVPN	ICT-1 (400 kV)	HY-26	NP-7749-A
301	Haryana	Chajpur-HVPN	220kV Panipat(BBMB)-I	HY-35	NP-7048-A
302	Haryana	Chajpur-HVPN	220kV Panipat(BBMB)-II	HY-36	NP-8544-A
303	HP	Paddhar-HPSEB	33 kV Shanan	HP-36	NP-1603-A
304	HP	Gumma-HPPTCL	400 KV Panchkula-I	HP-70	NR-3494-A
305	HP	Gumma-HPPTCL	400 kV Jhakri-I	HP-72	NR-3491-A
306	HP	Kala Amb	400 KV Abdullapur-I	HP-55	NR-3396-A
307	HP	Kala Amb	400 KV Abdullapur-II	HP-56	NR-3399-A
308	HP	Kala Amb	400 KV Wangtoo-I	HP-57	NR-3400-A
309	HP	Kala Amb	400 KV Wangtoo-II	HP-58	NR-3402-A
310	HP	Kala Amb	400 KV ICT-I	HP-59	NR-3392-A
311	HP	Kala Amb	400 KV ICT-II	HP-60	NR-3401-A
312	JK&LL	Pampore-PDD	ICT-2 (132 kV)	JK-04	NP-1842-A
313	JK&LL	Pampore-PDD	ICT-3 (132 kV)	JK-26	NP-3171-A
314	JK&LL	Udhampur-PDD	ICT-1 (220 kV)	JK-11	NP-1860-A
315	JK&LL	Udhampur-PDD	ICT-2 (220 kV)	JK-13	NP-1862-A
316	JK&LL	Udhampur-PDD	ICT-1 (132 kV)	JK-12	NP-3161-A
317	JK&LL	Udhampur-PDD	ICT-2 (132 kV)	JK-14	NP-1863-A

318	JK&LL	Udhampur-PDD	220 kV Sarna	PU-35	NP-8534-A
319	JK&LL	Hiranagar-PDD	ICT-1 (132 kV)	JK-22	NP-1852-A
320	JK&LL	Hiranagar-PDD	ICT-2,200MVA (220 kV)	JK-23	NP-1884-A
321	JK&LL	Hiranagar-PDD	220 kV Sarna	PU-36	NP-1883-A
322	JK&LL	Hiranagar-PDD	220 kV RSHEP-1	JK-15	NR-3455-A
323	JK&LL	Hiranagar-PDD	220 kV RSHEP-2	JK-16	NR-3453-A
324	JK&LL	Amargarh-PDD	220 kV Kishenganga-1	JK-44	NR-3531-A
325	JK&LL	Amargarh-PDD	220 kV Kishenganga-2	JK-45	NR-3530-A
326	JK&LL	Baglihar	400 kV Kishenpur-PG-1	JK-34	NR-8535-A
327	JK&LL	Baglihar	400 kV Kishenpur-PG-2	JK-35	NP-5478-A
328	JK&LL	Alusteng	220 kV Drass	JK-48	NR-3291-A
329	Punjab	Ranjitsagar HPS-PSEB	220 kV Hiranagar-1	PU-78	NP-1816-A
330	Punjab	Ranjitsagar HPS-PSEB	220 kV Hiranagar-2	PU-79	NP-1817-A
331	Uttrakhand	Dhalipur HPS-UPCL	132kV Kulhal	UA-08	NP-8295-A
332	Uttrakhand	Dhalipur HPS-UPCL	132kV Dhakrani	UA-09	NP-1723-A
333	Uttrakhand	Dhalipur HPS-UPCL	132kV Dehradun	UA-10	NP-1724-A
334	Uttrakhand	Khodri HPS-UPCL	Genr-1(11kV)	UA-19	NR-4705-B
335	Uttrakhand	Khodri HPS-UPCL	Genr-2(11kV)	UA-20	NP-7784-B
336	Uttrakhand	Khodri HPS-UPCL	Genr-3(11kV)	UA-21	NP-7781-B
337	Uttrakhand	Khodri HPS-UPCL	Genr-4(11kV)	UA-22	NP-1043-B
338	Uttrakhand	Khodri HPS-UPCL	220kV Sarsawan	UA-23	NP-1822-A
339	Uttrakhand	Khodri HPS-UPCL	220kV Saharanpur	UA-24	NP-1823-A
340	Uttrakhand	Khodri HPS-UPCL	220kV Majri-1	UA-25	NP-1715-A
341	Uttrakhand	Khodri HPS-UPCL	220kV Majri-2	UA-26	NP-1160-A
342	ER	Biharsharif-ER	400 kV Sasaram-1	ER-01	ER-1940-A
343	ER	Biharsharif-ER	400 kV Sasaram-2	ER-02	NP-6062-A
344	ER	Biharsharif-ER	400 kV Varanasi-1	ER-25	ER-1884-A
345	ER	Biharsharif-ER	400 kV Varanasi-2	ER-32	ER-1938-A
346	ER	Biharsharif-ER	400 kV Ballia-1	ER-22	NP-6061-A
347	ER	Biharsharif-ER	400 kV Ballia-2	ER-23	ER-1936-A
348	ER	Karamnasa-ER	132 kV Sahupuri-2	ER-03	NP-6018-B
349	ER	Karamnasa-ER	132 kV Chandauli	ER-04	NP-6017-B
350	ER	NPGC(BSPTCL)-ER	132 kV Rihand HPS	ER-05	ER-1287-A
351	ER	Garwa-ER	132 kV Rihand HPS	ER-06	NP-6113-A
352	ER	Muzaffarpur PG-ER	400 kV Gorakhpur-1	ER-18	NP-5074-A
353	ER	Muzaffarpur PG-ER	400 kV Gorakhpur-2	ER-19	NP-9981-A
354	ER	Patna PG-ER	400 kV Balia-1	ER-20	ER-1886-A
355	ER	Patna PG-ER	400 kV Balia-2	ER-21	ER-1885-A
356	ER	Patna PG-ER	400 kV Balia-3	ER-26	NP-7684-A
357	ER	Patna PG-ER	400 kV Balia-4	ER-27	NP-8634-A
358	ER	Barh(NTPC)-ER	400 kV Gorakhpur-1	ER-35	NP-8647-A
359	ER	Barh(NTPC)-ER	400 kV Gorakhpur-1	ER-36	NP-8648-A
360	ER	Barh(NTPC)-ER	400 kV Gorakhpur-2	ER-37	NP-8649-A
361	ER	Barh(NTPC)-ER	400 kV Gorakhpur-2	ER-38	NP-8650-A

362	ER	Motihari(DMTCL)-ER	400 kV Gorakhpur-2	ER-47	ER-1863-A
363	ER	Motihari(DMTCL)-ER	400 kV Gorakhpur-1	ER-48	ER-1165-A
364	ER	DALTONGANJ(PG)-ER	400 kV SASARAM(PG)-1	ER-49	ER-1195-A
365	ER	DALTONGANJ(PG)-ER	400 kV SASARAM(PG)-2	ER-50	ER-1192-A
366	ER	Sasaram-PG	400 kV Sarnath	NR-67	NP-6101-A
367	ER	Sasaram-PG	400 kV Allahabad	NR-68	NP-6091-A
368	ER	Sasaram-PG	400 kV Biharsarif-1	ER-08	NP-6514-A
369	ER	Sasaram-PG	400 kV Biharsarif-2	ER-09	NP-6515-A
370	ER	Sasaram-PG	400 kV Biharsarif-3	ER-24	NP-7414-A
371	ER	Sasaram-PG	400 kV Nabinagar-I	ER-40	NP-8699-A
372	ER	Sasaram-PG	400 kV Nabinagar-II	ER-41	ER-1212-A
373	ER	Sasaram-PG	ICT-1 (400kV)	ER-10	NP-6513-A
374	ER	Sasaram-PG	ICT-2 (400kV)	ER-11	ER-1399-A
375	ER	Sasaram-PG	ICT-2 (220 kV)	ER-53	ER-1318-A
376	ER	Sasaram-PG	220 kV Dehri	ER-12	NP-6093-A
377	ER	Sasaram-PG	220 kV Sahupuri	ER-13	NP-6092-A
378	ER	Sasaram-PG	765 kV Fatehpur(PG)	ER-28	NP-3844-A
379	ER	Sasaram-PG	765 kV ICT-1 (765 kV/400 kV)	ER-29	ER-1253-A
380	ER	Sasaram-PG	400 kV ICT-1 (765 kV/400 kV)	ER-30	ER-1398-A
381	ER	Sasaram-PG	400 kV Sarnath	ER-42	NP-7468-A
382	ER	Sasaram-PG	400 kV DALTAONGANJ(PG)-1	ER-51	ER-1217-A
383	ER	Sasaram-PG	400 kV DALTAONGANJ(PG)-2	ER-52	ER-1218-A
384	ER	NABI NAGAR	400 KV SASARAM(PG)-1(MAIN)	ER-54	ER-1421-A
385	ER	KV NABI NAGAR	400 SASARAM(PG)-2(MAIN)	ER-55	ER-1830-A
386	ER	Gaya-PG(ER)	765 kV Varanasi-PG-I(NR)	ER-17	ER-1932-A
387	ER	Gaya-PG(ER)	765 kV Varanasi-PG-II(NR)	ER-39	NP-8659-A
388	ER	Gaya-PG(ER)	765 kV Balia-PG(NR)	ER-34	NP-8633-A
389	NER	ALIPURDUAR AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-III	ER-43	ER-1473-A
390	NER	ALIPURDUAR AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-III	ER-44	ER-1474-A
391	NER	ALIPURDUAR AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-IV	ER-45	ER-1074-A
392	NER	ALIPURDUAR AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-IV	ER-46	ER-1075-A
393	NER	BNC AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-I	NE-03	NP-9061-A
394	NER	BNC AC	400/132/33 kV ICT-I	NE-04	NP-9089-A
395	NER	BNC AC	400kV AC SIDE OF Conv. Trf.of HVDC-Pole-II	NE-06	NP-5798-A
396	WR	Gandhi Sagar-WR	132 kV R.P. Sagar feeder	WR-10	NP-2437-A

397	WR	Gandhi Sagar-WR	132 kV RAPS-A feeder	WR-11	NP-2384-A
398	WR	Rajghat-WR	132 kV Lalitpur	WR-19	NP-2717-A
399	WR	Morwa	132 kV Anpara	WR-32	NP-2940-A
400	WR	Morwa	132 kV Bina	WR-33	NP-2941-A
401	WR	Korba STPS	400 kV Vindhyachal line-1	KO-16	NP-2465-A

AJAY AGARWAL & CO.
CHARTERED ACCOUNTANTS

1/42, LALITA PARK,
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Off.:+91-11-45874598
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Email: ak8481@yahoo.com

AUDITORS'S REPORT

We have audited the accompanying receipts & payments account of NRPC Fund for the year ended 31st March 2020.

The receipts and payments statement gives true and fair view of the operations of the Fund for the year ended 31st March 2020 and is in agreement with the bank statements & records maintained by the fund management.

For M/s Ajay Agarwal & Co.
Chartered Accountants

AJAY AGARWAL & CO. M No 84812 FRN 005974N DELHI Chartered Accountants

(CA Ajay Kumar Agarwal)
Partner
M.No.- 084812
UDIN: 21084812AAAAOH8929

Dated: 30.06.2021
Place: New Delhi

CONSOLIDATED RECEIPT AND PAYMENTS STATEMENT OF N.R.P.C. FUND FOR THE YEAR 2019-20

Sl No.	Receipts during the year 2019-20	Amount (in Rs.)	Sl No.	Expenditure during the year 2019-20	Amount (in Rs.)
1	Opening Balance	13718126.65	1	Refund to Govt against the Expenditure incurred by NRPC (DDO,NRPC)	43023929.00
2	Contribution for the year 2017-18	7000000.00	2	Training Expenses	2697563.00
3	Contribution for the year 2018-19	20000000.00	3	Transfer to R.B Fund	1000000.00
4	Contribution for the year 2019-20	35000000.00	4	Outsourcing Staff	732237.00
5	Interest	998984.00	5	Leasing of Vehicles	171354.00
			6	Petrol for Vehicles	38896.00
			7	AMC of software	1530030.00
			8	Auditor Fees	25960.00
			9	Bank Charges	208.86
			10	Miscellaneous	29692.00
			11	TDS	243982.00
			12	GST	59741.00
			13	Closing Balance	27163517.79
	Total	**76717110.65**		**Total**	**76717110.65**

PREPARED BY

VIMAL KUMAR
Acctts. Assistant

Dated: 30-06-2021

VERIFIED BY

Nodal Officer

VANDITA SHARMA
Nodal Officer
N.R.P.C., Fund

As per our report on even date attached
For M/s Ajay Agarwal & Co.
Chartered Accountants

CA Ajay Kumar Agarwal
Partner
M.No. : 084812
UDIN: 21084812AAAAOH8929

AJAY AGARWAL & CO. * Chartered Accountants * M No 84812 FRN 005972N DELHI

CONSOLIDATED RECEIPTS AND PAYMENTS STATEMENT OF N.R.P.C. FUND FOR THE YEAR 2019-20

Sl No.	Receipts during the year 2019-20	Amount (in Rs.)	Sl No.	Payments during the year 2019-20	Amount (in Rs.)
1	Opening Balance	13718126.65	1	Refund to Govt. against the Expenditure incurred by NRPC (DDO,NRPC)	43023929.00
2	Contribution for the year 2017-18	7000000.00	2	Training Expenses	2697563.00
3	Contribution for the year 2018-19	20000000.00	3	Transfer to R.B.Fund	1000000.00
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5	Interest	998984.00	5	Leaseing of Vehicles	171354.00
			6	Petrol for Vehicles	38896.00
			7	AMC of software	1530030.00
			8	Auditor Fees	25960.00
			9	Bank Charges	208.86
			10	Miscellaneous	29692.00
			11	TDS	243982.00
			12	GST	59741.00
			13	**Closing Balance**	27163517.79
	Total	**76717110.65**		**Total**	**76717110.65**

PREPARED BY

VIMAL KUMAR
Acctts. Assistant

VERIFIED BY

Nodal Officer

VANDITA SHARMA
Nodal Officer
N.R.P.C., Fund

Assistant Manager F&A ,
NRLDC- POSOCO

SE, NRPC

सौमित्र मजूमदार/SAUMITRA MAZUMDAR
अधीक्षण अभियन्ता/Superintending Engineer
उ.क्षे.वि.स./N.R.P.C.
विद्युत मंत्रालय/Ministry of Power
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi

AJAY AGARWAL & CO.
CHARTERED ACCOUNTANTS

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Mobile:+91-9811006446
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AUDITORS'S REPORT

We have audited the accompanying receipts & payments account of NRPC Fund for the year ended 31st March 2021.

The receipts and payments statement gives true and fair view of the operations of the Fund for the year ended 31st March 2021 and is in agreement with the bank statements & records maintained by the fund management.

For M/s Ajay Agarwal & Co.
Chartered Accountants

AJAY AGARWAL & CO. M. No. 84812 FRN 005972N DELHI Chartered Accountants

(CA Ajay Kumar Agarwal)
Partner
M.No.- 084812
UDIN: 21084812AAAAOI4692

Nodal Officer
N.R.P.C. Fund

Dated: 30.06.2021
Place: New Delhi

CONSOLIDATED RECEIPT AND PAYMENTS STATEMENT OF N.R.P.C. FUND FOR THE YEAR 2020-21

Sl No.	Receipt during the year 2020-21	Amount (in Rs.)	Sl No.	Expenditure during the year 2020-21	Amount (in Rs.)
1	Opening Balance	27163517 79	1	Refund to Govt against the Expenditure incurred by NRPC (DDO,NRPC)	29490827 00
2	Contribution for the year 2012-13	1000000 00	2	Training Expenses	1621270 00
3	Contribution for the year 2014-15	1100000 00	3	Outsourcing Staff	700282 00
4	Contribution for the year 2016-17	1400000 00	4	Leasing of Vehicles	345644.00
5	Contribution for the year 2017-18	1000000 00	5	Petrol for Vehicles	25623.00
6	Contribution for the year 2018-19	2000000 00	6	AMC of software	608165 00
7	Contribution for the year 2019-20	4000000 00	7	Bank Charges	52 90
8	Contribution for the year 2020-21	15000000 00	8	TDS	395612 00
9	Interest	753727 00	9	GST	90399 00
			10	Closing Balance	20139369 89
	Total	**53417244.79**		**Total**	**53417244.79**

PREPARED BY

VIMAL KUMAR
Acctts. Assistant

Dated: 30-06-2021

VERIFIED BY

Nodal Officer
VANDITA SHARMA
Nodal Officer
N.R.P.C., Fund

As per our report on even date attached
For M/s Ajay Agarwal & Co.
Chartered Accountants

CA Ajay Kumar Agarwal
Partner
M.No. : 084812
UDIN: 21084812AAAAOI4692

AJAY AGARWAL & CO
M No 84812
FRN 00597 /N
DELHI
Chartered Accountants

CONSOLIDATED RECEIPTS AND PAYMENTS STATEMENT OF N.R.P.C. FUND FOR THE YEAR 2020-21

Sl No.	Receipts during the year 2020-21	Amount (in Rs.)	Sl No.	Payments during the year 2020-21	Amount (in Rs.)
1	Opening Balance	27163517.79	1	Refund to Govt. against the Expenditure incurred by NRPC (DDO,NRPC)	29490827.00
2	Contribution for the year 2012-13	1000000.00	2	Training Expenses	1621270.00
3	Contribution for the year 2014-15	1100000.00	3	Outsourcing Staff	700282.00
4	Contribution for the year 2016-17	1400000.00	4	Leaseing of Vehicles	345644.00
5	Contribution for the year 2017-18	1000000.00	5	Petrol for Vehicles	25623.00
6	Contribution for the year 2018-19	2000000.00	6	AMC of software	608165.00
7	Contribution for the year 2019-20	4000000.00	7	Bank Charges	52.90
8	Contribution for the year 2020-21	15000000.00	8	TDS	395612.00
9	Interest	753727.00	9	GST	90399.00
			10	**Closing Balance**	20139369.89
	Total	**53417244.79**		**Total**	**53417244.79**

PREPARED BY

VIMAL KUMAR
Acctts. Assistant

VERIFIED BY

Nodal Officer

VANDITA SHARMA
Nodal Officer
N.R.P.C., Fund

Assistant Manager F&A, NRLDC-POSOCO

SE, NRPC

SAUMITRA MAZUMDAR
Superintending Engineer
N.R.P.C.
Ministry of Power
Govt. of India
New Delhi

Annexure D.5

Audited Statement of "Regional Board Fund" account for F.Y. 2019-20 (01.04.2019 to 31.03.2020)

Sl. No.	Receipts	Amount (Rs.)	Sl. No.	Payments	Amount (Rs.)
1	Opening balance as on 01.04.2019:-		1	Meeting expenses	698174.00
	(a) Bank	156538.11			
	(b) Imprest	10372.00	2	Bank charges	250.00
2	Amount received from NRPC Fund	1000000.00	3	Closing balance as on 31.03.2020:-	
				(a) Bank	468590.11
3	Bank Interest	10376.00		(b) Imprest	10272.00
	TOTAL	**1177286.11**		**TOTAL**	**1177286.11**

Prepared by

(Vandita Sharma)
Designated Officer "RBF"

Audited and verified as per records.

SE, NRPC

सौमित्र मजूमदार/SAUMITRA MAZUMDAR
अधीक्षण अभियन्ता/Superintending Engineer
उ.क्षे.वि.स./N.R.P.C.
विद्युत मंत्रालय/Ministry of Power
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi

(Chirag Kalra)
(NRLDC) - POSOCO

Audited Statement of "Regional Board Fund" account for F.Y. 2020-21 (01.04.2020 to 31.03.2021)

Sl. No.	Receipts	Amount (Rs.)	Sl. No.	Payments	Amount (Rs.)
1	Opening balance as on 01.04.2020:-		1	Meeting expenses	110577.00
	(a) Bank	468590.11			
	(b) Imprest	10272.00	2	Bank charges	0.00
2	Amount received from NRPC Fund	0.00	3	Closing balance as on 31.03.2021:-	
				(a) Bank	361808.11
3	Bank Interest	11608.00		(b) Imprest	18085.00
	TOTAL	**490470.11**		**TOTAL**	**490470.11**

Prepared by

(Vandita Sharma)
Designated Officer "RBF"

Audited and verified as per records.

SE, NRPC

सौमित्र मजूमदार/SAUMITRA MAZUMDAR
अधीक्षण अभियन्ता/Superintending Engineer
उ.क्षे.वि.स./N.R.P.C.
विद्युत मंत्रालय/Ministry of Power
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi

(Chirag Kalra)
(NRLDC) - POSOCO