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

दिनांक: 30 जुलाई, 2024

सेवा में/To,
एनआरपीसी एवं टीसीसी के सभी सदस्य एवं विशेष आमंत्रित (संलग्न सूचीनुसार)
Members of NRPC & TCC & Special Invitees (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की **74** वीं और तकनीकी समन्वय समिति **(टीसीसी)** की **50** वीं बैठक का कार्यवृत।

Subject: MoM of 74th Northern Regional Power Committee (NRPC) & 50th Technical Co-ordination Committee (TCC)-reg

महोदय/महोदया,

तकनीकी समन्वयन समिति (टीसीसी) की 50 वीं बैठक दिनाँक 28.06.2024 (सुबह 10:00 बजे) एवं उत्तर क्षेत्रीय विद्युत समिति की 74 वीं बैठक दिनांक 29.06.2024 (सुबह 10:00 बजे) को रायपुर, छत्तीसगढ़ में आयोजित की गयी थी। बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

50th meeting of Technical Co-ordination Committee (TCC) was held on 28.06.2024 (10:00 AM) and 74th meeting of Northern Regional Power Committee (NRPC) was held on 29.06.2024 (10:0 AM) at Raipur, Chhattisgarh. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully

Signed by Vijay Kumar Singh
Date: 30-07-2024 17:36:19

(वी.के. सिंह)
(V.K. Singh)
सदस्य सचिव
Member Secretary

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली-110016 फोन: 011-26513265 ई-मेल: ms-nrpc@nic.in वेबसाइट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

प्रतिलिपि: Chairperson, NRPC & MD, HPPTCL (md.tcl@hpmail.in)

सत्यमेव जयते

उत्तर क्षेत्रीय विद्युत समिति

NORTHERN REGIONAL POWER COMMITTEE

Minutes of

The 50th meeting of Technical Coordination Committee &

The 74th meeting of

Northern Regional Power Committee

Date: 28th & 29th March 2024

Time: 10:00 AM

Venue: Raipur, Chhattisgarh

Contents

MINUTES

OF

50th MEETING OF TECHNICAL COORDINATION SUB-COMMITTEE

&

74th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of TCC meeting: 10:00 Hrs. on 28.06.2024

Time & Date of NRPC meeting: 10.00 Hrs. on 29.06.2024

Proceedings of 50th TCC Meeting

1. Adani Power Limited official welcomed and greeted Chairperson TCC & Director Operation HPSEBL, Member Secretary NRPC, COO Adani Power and dignitaries from all States and UT of Northern Region, CPSUs, Private Power Generators, TRANSCOs, DISCOMs and Traders for attending the 50th TCC meeting.
2. AVP, Adani Power Limited welcomed all delegates on behalf of Adani group and Adani Power Limited Kawai for attending 50th TCC meeting at Raipur and thanked NRPC Secretariat for providing the opportunity of hosting 50th TCC meeting. He appreciated that the NRPC forum is the best platform for taking up the deliberation and arriving on fruitful conclusion on various issues of power producers and consumers. He iterated that input of this forum will add the value to overall development of power sector in northern region and across the country.
3. Member Secretary, NRPC welcomed all the participants and thanked Adani Power Limited (APL) and congratulated APL official for making wonderful arrangement for meeting. He also thanked Chairperson, TCC for chairing this TCC meeting. He highlighted that NRPC Secretariat has been given a lot of responsibilities under various CERC Regulations; however, all decisions are taken with consensus. He thanked all stakeholders for their support for smooth functioning of Northern Region be it Outage planning, LGBR, Certification of availability, issuance of various energy accounting etc.

   NRPC Secretariat has been discharging its duties for facilitating utilities of Northern Region. Recently, Ministry of Power has notified Amendment to the LPS Rules 2022, mandating all generating stations to offer their Un-Requisitioned Surplus Power in various electricity markets, which will help bridge the load-generation gap.

He mentioned that our economy is growing which is envisaging huge power demand growth. He informed that peak demand has crossed 91,000 MW in northern region and urged all utilities to gear up to meet the upcoming challenges. Further, he addressed about the tripping of all 4 poles of Champ-Kurukshetra HVDC link on 17.6.2024 leading to huge load reduction of around 16.3 GW. He stressed about ensuring availability and healthiness of required protection system. Several trippings of transmission elements occur due to protection mal function and requested all entities to do audit of protection system as per IEGC 2023.

4. Chairperson, TCC welcomed all the participants and congratulated APL officials for meticulous planning and nice arrangements for the meeting. He appreciated that TCC is a platform where decisions are taken based on technical analysis and consensus having the representation from all stakeholders of power sector in northern region.

   He highlighted that power sector has transformed with the rapid pace wherein solar energy capacity has increased by 30 times in the last 9 years. Green energy corridors and renewable energy management centres facilitate the integration of large scale energy capacity. Efficient capacity addition requires support from the government through various schemes and reforms. These are proceeding surely in right direction. Government policy and regulatory reforms have successfully attracted investment in power transmission.

   Due to increased demand and change in technology, role of power sector officials has increased immensely therefore coordination among various agencies of power sector is prerequisite for smooth and timely execution of projects. Further, he congratulated Member Secretary, NRPC for efficiently implementing the rules and regulations/technical standard notified by MoP, CERC and CEA. He thanked APL officials for hosting and excellent arrangements for the meeting.

5. Thereafter, agenda for the 50th TCC Meeting were presented & deliberated. The list of participants is attached as **Annexure-P.**

Proceedings of 74th NRPC Meeting

1. COO, Adani Power Limited welcomed all the delegates. He expressed his sincere gratitude to NRPC for providing an excellent opportunity for hosting NRPC meeting. He mentioned that Adani group has decades long track record of industry best practices, growth and national

footprint majorly centred around infrastructure with the vision of growth with goodness. Group has integrated independent business models. Group has made its significant presence in Resources, Logistics, Energy sector, Mines, SEZ, Shipping port operation, Coal, Gas, Solar, Manufacturing, cement and complete value chain of Thermal and Renewable Power Generation, Transmission and Distribution.

Adani group ventured into the power business in the year 2006 starting with the initial plan of a 330 megawatt unit. Adani power currently has an installed capacity of 15,250 megawatt making it the largest private power producers in India. Today Adani Power Limited operates 8 thermal power plants in the country spread across states like Gujarat, Maharashtra, Rajasthan, Karnataka, Madhya Pradesh, Chhattisgarh and Jharkhand. Recently Adani commissioned 1600 MW(2x800) Godda, Jharkhand which provide electricity to Bangladesh, is an important milestone in Indo-Bangladesh relationship. At Mahan, Madhya Pradesh execution of 1600MW (2x 800) has already commenced under Phase 2. Further Adani Power Limited has a pipeline of 4800 megawatt projects.

Adani power is fully committed to reduce its carbon footprint through adoption of latest technologies and proactive measures across our business value chain in future. In furtherance of this vision APL partnered with IHI and KOWA Japan for a green ammonia combustion pilot project at Mundra plant which will reduce Co2 emission as a part of the project the Mundra plant which is India's largest private sector power plant and will burn up to 20% of green ammonia to co fire with the coal. Recently a key technological milestone has been achieved in simulating the Mundra plant boiler for combustion of green ammonia of IHI Japan plant. Adani group has always tried to have a collaborative approach towards conducting our business and committed to follow the same in the platform.

Further, he highlighted that NRPC plays a vital role in terms of coordinating between so many stakeholders, Government as well as private and ensuring smooth operations of the grid. With more solar and wind generation integration into the grid, flexible operation of thermal power plants is not far. NRPC will play crucial role in grid stability with uncertainty of solar and wind power feeding into the grid. Recently new regulations of Indian electricity grid code IEGC 2023 were made effective and there are teething issues in implementation of these regulations but same are being sorted out in a coordinated manner. He also appreciated that NRPC is having great role here for effective condition in setting out these issues and doing the same in excellent manner. Subsequently, he on behalf of Adani Power again thanked delegates.

2. Member Secretary, NRPC thanked Adani power limited management and the whole team making all necessary arrangements for hosting this 74th NRPC meeting. He highlighted the detailed discussion held in 50th TCC meeting and conclusions.

   He mentioned that with the growth of country, there is more and more power demand and capacity is being added in the northern region and other regions also. Government of India has huge target of 500GW RE capacity by 2030, so with more RE capacity addition, balancing of capacity is also a challenge for which STATCOM and Synchronous Condenser are required. He informed the forum that a Committee under Chairmanship of Member Secretary, NRPC has already been set up for installation of the synchronous condenser and will recommend to set up a synchronous condenser most probably initially in the Rajasthan area.

   Further, he highlighted that as per the IEGC regulation, audit of the protection settings and communication system is mandated and all the utilities are requested to regularly conduct audit of the protection system and keep all the protective devices in healthy conditions.

   He also highlighted the works completed in NRPC premises. He raised the concern of shortage of Manpower at NRPC Secretariat and requested all states/CPSUs to depute their 1-2 official(s) at NRPC Secretariat. Lastly, he again thanked APL for all arrangements for the meeting.

3. Chairperson, NRPC & MD, HPPTCL thanked Adani Power Limited for hosting meeting and giving conducive environment for discussion. He highlighted that detailed deliberation held in last day will help out to resolve the issues.

   He emphasized on balancing of power due to huge RE injection. Therefore, more inertia is required to be added in the grid. Hydro Power Plants play vital role in addition of inertia.

   He concerned about the dual transmission charges to be paid by state generators for its power evacuation out of the state while CPSUs are paying only single transmission charges due to its connectivity at ISTS network. Due to this dual charges, ultimate burden in going to end consumers of that state. He put up this issue for resolution by taking steps for recommendations in changing the regulations through this forum.

   He appreciated the fruitful deliberations held in the NRPC meetings and urged members to contribute to this forum for decision on agenda. Lastly, he thanked APL for whole arrangements.

4. Member (GO&D), CEA welcomed all delegates from various utilities. He mentioned that now focus is more on strengthening our downstream system (distribution system) and in this

context CEA is working year wise plan on a distribution perspective based on furnished information by the states in the prescribed formats.

Further, he conveyed about the RDSS scheme which is up to March 2026.So, he requested all the states to expedite scheme related aspects such completion of ongoing projects and proposal for new projects. He addressed that CEA has been bringing out the generation reports which is important from the planning point of view. He requested all to ensure timely filing of online generation data.

He appreciated that country had a phenomenal demand growth particularly in northern region as all India demand growth has been driven by northern region in particular during last 3 months. He thanked everybody for managing the system even with such phenomenal growth and also extended compliments to GRID-INDIA for its great job.

He emphasized on ensuring the connectivity regulations at the time allowing connectivity. He opined that it is high time to think about the peak load management as day by day demand of country is breaking the records. He stressed to put our planned maintenance in a manner that we are able to do the same in the off peak months. It should always be tried not to defer the planned maintenance because it all leads to forced outage and availability of plant reduces.

5. Thereafter, agenda for the 74th NRPC Meeting were presented & deliberated. The list of participants is attached as **Annexure-Q.**

A.1 Approval of MoM of the 49th TCC meeting

A.1.1 EE (P), NRPC apprised that the minutes of the 49th TCC meeting (held on 29.03.2024) were issued vide letter dtd. 19.04.2023. Comments received from members on minutes of 49th TCC meeting, were discussed in 73rd NRPC meeting (held on 21.05.2024) and accordingly minutes of 49th TCC meeting were amended and confirmed in 73rd NRPC meeting.

Decision of forum:

TCC and NRPC members noted the same**.**

A.2 Status of action taken on decisions of 73rd NRPC meeting (agenda by NRPC Secretariat) (agenda by NRPC Secretariat)

TCC Deliberation

A.2.1 MS, NRPC conveyed that the agenda has been taken to track the status of action taken as per decision of last meeting. Accordingly, issues may be resolved at the earliest.

A.2.2 Concerned utilities submitted the status of action taken.

NRPC Deliberation

A.2.3 Forum noted the action taken status reported by concerned utilities and requested utilities to expedite the actions.

Decision of Forum

Concerned utilities submitted the status of action taken and the same has been complied as ***Annexure- I****.*

A.3 Procedure for approval of Protection Settings by NRPC (agenda by NRPC Secretariat)

TCC Deliberation

A.3.1 EE (P), NRPC apprised that as per clause 14 (2) of IEGC 2023:

All users connected to the grid shall:

I. obtain approval of the concerned RPC for i) any revision in settings, and (ii) implementation of new protection system;

II. intimate to the concerned RPC about the changes implemented in protection system or protection settings within a fortnight of such changes;

A.3.2 Accordingly, in 49th PSC meeting (held on 25.01.2024), procedure for approval of protection settings was deliberated and approved.

A.3.3 Further, the agenda was again discussed in 50th PSC meeting (held on 29.04.2024), wherein the procedure was revised (attached as **Annexure-II**).

A.3.4 CGM, NRLDC raised concerns regarding the approved procedure and desired to get it deliberated again in the upcoming PSC meeting.

A.3.5 Adani representative highlighted that as per IEGC 2023 interpretation, there is need to take approval from RPC for any revision or change in the protection settings for grid connected elements. However, for any new element going to be connected, FTC is required without the approval from RPC to avoid the delay caused in multi-layer approval.

A.3.6 BBMB representative highlighted that some cases require protection settings changes all of sudden. Implementation may get delayed if the approval of changes in settings is sought.

A.3.7 Forum suggested to review the procedure for approval of Protection Settings in the upcoming PSC meeting.

NRPC Deliberation

A.3.8 Forum was in consonance of the deliberation held in TCC meeting.

Decision of Forum

Forum advised to deliberate the procedure for approval of Protection Settings in the upcoming PSC meeting and after finalization, the same may be put up for approval of NRPC Forum accordingly.

A.4 Standard Operating Procedure (SOP) for Communication audit of Substations (agenda by NRPC secretariat)

TCC Deliberation

A.4.1 EE (C) apprised that in compliance to Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017, a procedure has been finalised in 14th NPC meeting, held on 3rd February, 2024. This SOP is finalized to maintain uniformity across all regions.

A.4.2 As per Regulation 10 of the Regulations, RPC shall conduct annual audit of the communication system annually as per the procedure finalized in the forum of the concerned RPC. It also mandates that RPC Secretariat shall issue necessary instructions to all stakeholders to comply with the audit requirements within the time stipulated by the RPC Secretariat based on the audit report. An Annual Report on the audit carried out by respective RPC is to be submitted to the Commission within one month of closing of the financial year.

A.4.3 As per SOP, communication audit shall be conducted in two phases: Scrutiny of documents and Physical verification.

A.4.4 Following are pre-requisites for carrying out communication audit:

a) Each User/entity, using inter-state transmission or the intra-state transmission incidental to inter-state, shall submit the detailed report of respective year to RPC Secretariat and RLDC, as per prescribed format on yearly basis by April end.
b) In respect of intra-state users/entities, SLDC shall submit detailed reports yearly by the April end of the respective year, to RPC Secretariat and RLDC.
c) Outage report of all the channels (including Network Management System, PLCC etc.) report for a month shall be submitted by the Users/entities to RLDC and

respective SLDCs, on monthly basis, by 7th day of the next month. RLDC and SLDCs after verifying the NMS data shall submit report to RPC Secretariat by 15th day.

d) All users/entities and Control Centers shall get the third-party cyber security audits done from a Cert-in certified vendor in compliance of CEA (Cyber Security in Power Sector) and submit detailed report of the Cyber Security Audit by 15th April for the previous financial Year.

A.4.5 A communication sub audit group comprising one member each from RPC secretariat, RLDC, POWERGRID and One of the respective Region SLDCs is to be formed.

A.4.6 Based on recommendations of communication audit sub group after scrutiny of documents, an audit plan shall be prepared by NRPC and audit team shall be constituted for physical inspection.

A.4.7 Further, SOP enclosed as **Annexure-III** for information and compliance was presented and discussed.

A.4.8 SGM, CTU requested to include RLA of OPGW as part of audit as agreed in 25th TeST sub-Committee meeting held on 26.06.2024. It will help out to finalize the requirement for OPGW replacement.

A.4.9 DGM, NRLDC requested to include more members in the audit Sub-Group considering the huge volume of paperwork involved in first phase of audit. Forum agreed on the same.

A.4.10 EE (C), NRPC suggested to have a workshop with all stakeholders in NR to give a detailed idea regarding the same. Forum was also of the same view.

A.4.11 In line with discussion Forum adopted the approved SOP and requested NRLDC to hold a joint workshop with all stakeholders of NR on the SOP for detailed understanding of audit process as well as CEA and CERC communication regulations. CEA will also be requested to jointly host the workshop.

NRPC Deliberation

A.4.12 Forum agreed upon the deliberation held in TCC meeting and adopted the approved SOP. A workshop as decided in the TCC meeting may be conducted at the earliest in July/August, 2024.

Decision of Forum

i. *Forum adopted the approved SOP. NRPC secretariat and NRLDC will hold a joint workshop in July/August, 2024 with all stakeholders of NR on the SOP for detailed understanding of audit process as well as CEA and CERC communication regulations. CEA will also be requested to jointly host the workshop.*

ii. *Forum directed utilities to do compliance of the SOP.*

A.5 Standard Operating Procedure (SOP) for Communication System Outage Planning (agenda by NRPC secretariat)

TCC Deliberation

A.5.1 EE (C), NRPC apprised that Regulation 7.3 of Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 provides that:

"The RPC Secretariat shall be responsible for outage planning for communication system in its region. RPC Secretariat shall process outage planning such that uninterrupted communication system is ensured."

A.5.2 Regulation 10 of Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020 provides that:

"10. Outage Planning: Monthly outage shall be planned and got approved by the owner of communication equipment in the concerned regional power committee, as per detailed procedure finalized by the respective regional power committee."

A.5.3 In compliance of above and in order to maintain uniformity across all regions, a Standard Operating Procedure (SOP) for Communication System Outage Planning has been finalized in 14th NPC meeting, held on 3rd February, 2024.

A.5.4 As per SOP, a Communication System Outage Planning Sub-Group/ TeST Sub Committee shall be formed in each region constituting the members from all the entities connected to ISTS including all CGS, ISGS, REGs/SPPDs/SPDs, STUs, SLDCs etc., of the respective Region, RLDC/Grid-India, PGCIL, CTUIL, Private Transmission licensees in respective region & RPC secretariat. The Sub-Group / Sub Committee may co-opt any other member from any organization for facilitating the activities of the Sub-Group / Sub Committee.

A.5.5 Communication System Outage Planning will be limited to the following systems:

i. ISTS Communication System including ISGS

ii. Intra-state Communication System being utilized for ISTS Communication

iii. ICCP links between Main & Backup RLDCs, Main & Backup SLDCs & Main & Backup NLDCs.

iv. Inter-regional AGC links

v. Any other system agreed by the Sub-Group.

A.5.6 A web Portal named as "Communication System Outage Planning Portal" shall be developed by respective RLDC or a module shall be provided in the U-NMS. Log in credentials shall be provided to all the ISTS connected entities/concerned entities

A.5.7 Entities/Users/Owners shall apply for outage of communication links/equipment through web portal by 7th/ 8th of every month. NRPC Secretariat shall circulate the list of outage proposals by 15th of every month. Communication System Outage Planning (CSOP) meeting shall be conducted during 3rd week of every month. Approved outages shall be published on NRPC website within 3 days from date of CSOP meeting. Communication outage shall be availed as per procedure mentioned in SOP. There is also provision of availing emergency outage in approved SOP.

A.5.8 Outage of the approved communication links and equipment shall be availed by the respective owner /entities after confirming the same with RLDC on D-3 basis.

A.5.9 Further, SOP enclosed as **Annexure-IV** was presented and discussed.

A.5.10 DGM, NRLDC conveyed that planned outage of communication system will lead to rerouting the traffic of communication data. Further, he addressed that as per CEA regulation, only 48 Hours outages shall be allowed in one year for a communication equipment. By this. It will be easy to have an account/record of all outages period and future planning may be done accordingly. As per CERC regulation, availability of communication equipment is also to be assessed.

A.5.11 NRLDC opined that all communication assets are mapped in U-NMS which is already operational. It will be prudent to utilise this capability for outage planning rather than developing a new portal afresh. MS, NRPC appreciated the same to use the existing system is better way.

A.5.12 EE (C), NRPC conveyed that in UNMS, all communication assets are mapped. Hence with some modification or advancement, the outage planning may be done through UNMS itself.

A.5.13 Accordingly, outage planning shall be carried out through UNMS.

A.5.14 MS, WRPC queried CTUIL to confirm the capability of availing the outage planning facilities in UNMS as WRPC has started the tendering process for implementation the communication outage portal. MS, NRPC also requested CTUIL to confirm the same.

A.5.15 It was mentioned that CTUIL may take the specification of web-based outage planning portal from WRPC and SRPC for the development of the same in UNMS.

A.5.16 In view of above discussion, Forum requested CTUIL to confirm about development of such capabilities in U-NMS on a web-based portal. After finalisation of above issues, a joint-workshop will be held with all stakeholders by NRPC secretariat, NRLDC and CTUIL.

NRPC Deliberation

A.5.17 MS, NRPC highlighted that communication outage portal should be the same for all regions as outage procedure is same for all regions. In view of above, CTUIL may refer the specifications of WRPC and SRPC. Although, cyber security issues arising while mapping the information available on isolated UNMS system to web-based outage planning portal may be addressed.

A.5.18 Forum was in consonance of the deliberation held in TCC meeting and adopted the approved SOP.

Decision of Forum

a. Forum requested CTUIL to confirm within 10 days whether outage planning *capability can be developed in U-NMS through a web-based portal.*

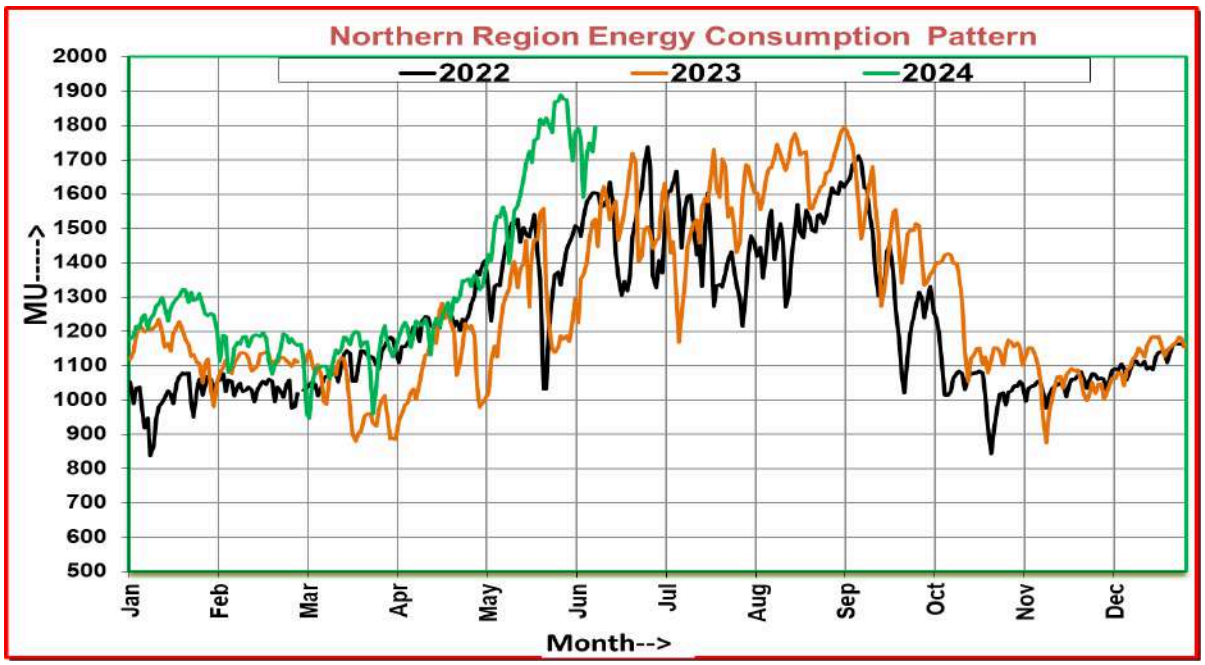
b. After finalisation of above issues, a joint-workshop will be held with all stakeholders by NRPC secretariat, NRLDC and CTUIL.

A.6 Actions for improvement in grid operation (State wise) (agenda by NRLDC)

TCC Deliberation

A.6.1 NRLDC representative mentioned that as mentioned by Member Secretary, NRPC in his opening remarks, most of the NR states record their maximum demand met and maximum energy consumption during summer/monsoon months. Some of the states have already met their all-time maximum demand and energy consumption during May-Jun this year.

A.6.2 With the increase in temperature and humidity, demand of Northern Region starts increasing. This year already average Northern region energy consumption has been higher by 12%, 30% & 24% in April, May & June respectively compared to previous year. With this growth, this year maximum demand met and energy consumption of Northern region is expected to break many previous records.



A.6.3 It was mentioned that during the upcoming high demand season, the transmission system would remain heavily loaded. Accordingly, all SLDCs were asked to ensure that loading of ICTs and lines in their control area are below their N-1 contingency limits. While requisitioning power from various sources, states should take care to limit their scheduled drawl as well as actual drawl in real time within the Available Transfer Capability (ATC) limits assessed by SLDC and NRLDC. SLDCs also need to ensure that their drawl from grid remains within these limits during real-time operation. In the past, it has been observed that some states such as UP, Haryana and Rajasthan have drawn power beyond their ATC limits as assessed by SLDCs and NRLDC. Further, all SLDCs need to make sure that loading of 220kV and below voltage level intrastate lines remain within safe limits during the high demand season.

A.6.4 GRID-INDIA is also taking up with power exchanges to configure each state as separate bid area. In communication to power exchanges, it has been mentioned that for effective implementation of GNA/T-GNA and administration of the market, it is essential to configure each state/union territory as a bid area. A combination of states (e.g., S1S2-S3) may also need to be structured as bid areas. Provisions have been made in NOAR so that each state can be configured as a separate bid area in case congestion is observed in the import/export.

A.6.5 Transmission constraints observed in the grid during high demand period are regularly being highlighted in OCC meetings. Same is also being submitted to CTUIL and CEA through quarterly operational feedback. Recently, a meeting was convened on 29.05.2024 under the chairmanship of Chairperson, CEA between CEA, CTUIL and GRID-INDIA to discuss the

TTC/ATC and transmission constraints of states/UTs. In the meeting it was discussed that these constraints are regularly discussed in RPC forum, however, appropriate action is not being taken by the States/UTs in this regard. Implementation of several planned intra-state transmission systems have been delayed by respective states/UTs, resulting in constraints in the intra-state network. Minutes of meeting is attached as **Annexure- V.**

A.6.6 NR met its maximum recorded demand of 91.2 GW on 19.06.2024 and maximum ever energy consumption of 1990 Mus on 18.06.2024.

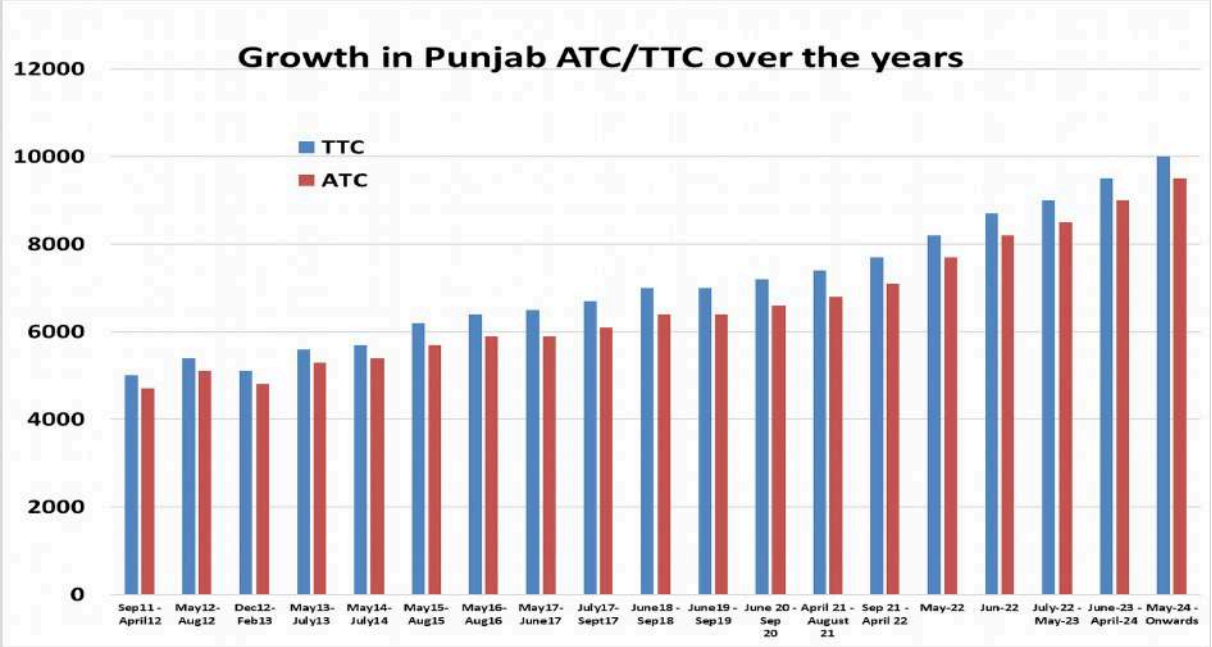
A.6.7 NRLDC representative highlighted the significant increase in demand this year as 20-30% increase in demand was observed. This was also much higher than CEA's Load Generation Balance forecast of 86.6GW.

A.6.8 UP SLDC representative stated that maximum demand of state remained high for significant duration compared to short duration as seen in previous years. There has been considerable improvement in transmission and distribution infrastructure in the state.

A.6.9 NRLDC informed that they are also taking up with power exchanges and CERC to configure each state as separate bid area. Presently, in NR only Punjab is configured as separate bid area. In future, it is possible that each state is configured as separate bid area and the drawl of state would be restricted to their ATC/TTC from scheduling portal itself.

A.6.10 Members discussed that major advantage with separate bid area creation is that this would expedite transmission system augmentation and help states draw power without major transmission constraints

A.6.11 NRLDC representative highlighted that Punjab was formed as separate bid area in Sep 2011. Due to separate bid-area creation pro-active approach was seen from Punjab SLDC/ PSTCL side and as a result there has been significant enhancement of Punjab ATC/TTC over the years



A.6.12 In the meeting held on 29.5.2024 under the chairmanship of Chairperson, CEA to discuss the TTC/ATC and transmission constraints of states/UTs, it was discussed that planning/implementation of transmission system at intrastate level is getting delayed and it was discussed that utilities need to expedite their actions for avoiding transmission issues**.**

A.6.13 NRLDC representative highlighted that it is appreciable that now all the NR states except Chandigarh U/T have started assessing import transfer capability of their control area and sharing the same with NRLDC/ NRPC.

A.6.14 State-wise actions as highlighted by NRLDC that are required to avoid transmission related issues that were encountered during high demand season and would help in meeting higher demand in Northern region along with TCC/NRPC deliberations are listed below:

Punjab:

- Expediting ICT Capacity augmentation at Nakodar from 315MVA to 500MVA
- Expediting commissioning of 2nd 400/220kV ICT at Dhanansu Substation
- Expediting ICT Capacity augmentation at 400/220kV Patran
- Commissioning of 400/220kV 2*500 MVA ICTs at new 400kV S/S Ropar with grid connectivity at 400kV
- Minimising outages of Talwandi Saboo thermal generating units

TCC deliberations:

Following timelines were provided by Punjab SLDC/PSTCL:

- Time line provided for Nakodar ICT augmentation as July,20 24 end
- Time line provided for new Dhanansu ICT as Sept., 2024 end
- Time line provided for new Patran ICT as Sept., 2024 end
- Time line provided for new Ropar substation as 1st week of July'24

A.6.15 NRLDC representative stated that minimising outages of Talwandi Saboo thermal generating units (3 events of unit outage this year also since 31st May) is also required. Talwandi Saboo thermal generating unit outage is also linked with revision of ATC/TTC and also reduces the maximum demand Punjab state can meet.

A.6.16 TCC forum asked PSTCL to expedite commissioning of above transmission elements & also take up for minimising outages of Talwandi Saboo thermal units to enhance their ATC/TTC limit during this paddy season

Haryana:

- Plan to mitigate severe N-1 non-compliance issue at 400/220kV Deepalpur and Panipat(BBMB). ICT commissioning at 400/220kV Deepalpur is not progressing. Capacity augmentation at Panipat(BBMB) also not being planned (drawl by both Delhi and Haryana)
- Managing N-1 non-compliance being observed in real-time at 400/220kV Kabulpur, Hisar ICTs.
- Reconductoring of 220kV Hisar (PG) - Hisar (IA) to be expedited by POWERGRID.
- Measures to control high loading of 220kV Sonepat-Mohana D/C
- N-1 non-compliance of 765/400KV Bhiwani ICTs

TCC deliberations:

- NRLDC representative enquired status of new ICT at Deepalpur which was approved in 4th NRPCTP held on 05.10.2021. HVPNL stated that new ICT at Deepalpur could not be implemented by HVPNL as S/s was commissioned under PPP model. TCC expressed concern on the same.

- HVPN stated that a SPS is already installed at 400kV Deepalpur providing relief at the time of overloading. Further the connectivity of 220kV Sonipat (PG) to Deepalpur through 220kV Sonipat(PG) - Rai - RGEC - Deepalpur D/Ckt has been executed/commissioned, which is providing relief to loading of 400/220kV 315 MVA ICTs of 400kV S/Stn Deepalpur.
- Regarding management of N-1 non-compliance being observed in real-time at 400/220kV Kabulpur, Hisar ICTs, he stated that augmentation of 132kV S/stn. Kalanaur to 220kV S/stn. Kalanaur has been proposed and approved by UHBVNL and in process of approval from HVPNL and CEA. Further, new 400kV S/stn. at Matanahail (Jhajjar District) is also proposed to mitigate the constraint.
- Regarding control of high loading of 220kV Sonepat-Mohana D/C, he mentioned that Forest clearance of 1 no. Tower of 220kV Mohana-Samalkha (LILO at 400kV Sonipat) is yet to be received. Line is likely to be commissioned by December-2024.
- BBMB representative informed that 450MVA ICT (1-phase units) will be replaced by 500MVA ICT (3-phase unit). Further, there is requirement of additional 500MVA ICT. NRLDC representative requested BBMB to take necessary approval from CEA-PSPA I so that there are no issues during First Time Charging of ICT. Also, it was requested to implement ICT capacity augmentation in expeditious manner.
- POWERGRID representative informed that they are implementing reconductoring of 220kV Hisar(PG)-Hisar(IA) line which is expected to be completed by Jul'25. CTUIL asked HVPN to take care of terminal equipment rating at Hisar (IA) end so that same is completed in commensurate time frame. HVPNL representative assured that terminal equipment at Hisar (IA) end is of adequate rating.
- It was highlighted from NRLDC side that 765/400kV Bhiwani ICTs is getting overloaded with flow from 765kV side to 400kV side during high solar hours and from 400kV side to 765kV side during load-crash in Haryana. POWERGRID informed ICT augmentation at 765/400kV Bhiwani ICTs is expected by May'25.
- NRLDC representative asked Haryana SLDC to maintain their drawl from the grid within the ATC/TTC limits assessed by SLDC and NRLDC.

A.6.17 TCC forum asked utilities to expedite commissioning of above transmission elements to enhance ATC/TTC limit of Haryana and also asked utilities to plan capacity augmentation at:

- 400/220kV Kabulpur (HVPN)
- 400/220kV Hissar (POWERGRID)

Rajasthan:

- Expediting ICT augmentation at almost all 400/220kV RVPN substations such as Ajmer, Merta, Chittorgarh, Jodhpur, Bikaner, Hindaun, Bhilwara, Heerapura, Suratgarh etc. which are loaded well above their N-1 contingency limits.

Measures required for:

- High MVAr drawl observed by intra-state network of Rajasthan at number of substations
- Poor power factor at various 400/220kV substations such as Bikaner, Kankani, Barmer, Jodhpur, Merta etc. (power factor of 0.55 observed at 400/220kV Bikaner on 4th June 2024)
- Voltages at all RE stations & nearby substations such as Akal, Ramgarh, Jaisalmer, Bhadla(RJ), Bikaner(RJ), Jodhpur, Kankani, Heerapura, Bhinmal, Merta etc. are low and fluctuating
- Persistent issue of high loading of 400kV Bhadla(RJ)-Bikaner(RJ) D/C (loading restriction due to poor condition of line)
- Severe low voltages in Hindaun & Alwar area and RE rich Western Rajasthan substations

TCC deliberations:

Rajasthan:

- TCC forum discussed that almost all 400/220kV ICTs in RVPN control area are n-1 non-compliant. SPS has been implemented as temporary measure. TCC expressed concern on the state of intra-state transmission system in RVPN control area.
- NRLDC representative mentioned that critically poor power factor is seen at various 400/220kV substations such as Bikaner, Kankani, Barmer, Jodhpur, Merta etc. (power factor of 0.55 observed at 400/220kV Bikaner on 4th June) especially during day-time.

- Rajasthan SLDC representative informed that order for 10 no. new ICTs have been placed recently. First ICT is expected at Jaisalmer-II in Apr'25. All others are expected by Sep'25. Proposal for additional ICTs at 5 new locations is under preparation.
- TCC forum asked RVPN to expedite their works on the issue of high loading of 400kV Bhadla(RJ)-Bikaner(RJ) D/C (loading restriction due to poor condition of line).
- Severe low voltage in Hindaun/Alwar area (voltages reaching 310-315kV) was discussed. It was highlighted that Dholpur gas generation is not being scheduled by DISCOM. 400/220 kV Dholpur S/s was approved by CEA on 27th Jan 2023. TCC asked RVPN to expedite their works for 400/220 kV Dholpur S/s.
- RVPN representative informed that due to non-availability of PSDF funding, RVPN would be implementing capacitor banks with their own funds. Proposal is under internal approval.
- NRLDC representative requested to prioritize capacitor implementation at stations having critically low voltages in RVPN control area.

A.6.18 TCC forum asked RVPN to expedite commissioning of above transmission elements to enhance ATC/TTC limit of Rajasthan and resolve low voltage issues.

Uttar Pradesh:

- Managing loading within n-1 contingency limits at 400/220 Agra (PG), Allahabad (PG), Lucknow(PG), Gorakhpur (UP) where loading is crossing N-1 limits.
- Although SPS implemented at number of 400/220kV substations such as Azamgarh, Obra, Sarnath, Nehtaur, Gorakhpur etc. Plan to enhance capacity may also be taken up as per forecasted load growth.
- POWERGRID to expedite commissioning of new ICT at 400/220kV Allahabad.

TCC deliberations:

- POWERGRID representative informed ICT augmentation at 400/220kV Allahabad is expected by Feb'25
- CTUIL was asked to take up ICT augmentation at 400/220kV Agra(PG).

- For 400/220kV Lucknow (PG) ICT augmentation, confirmation from UPPTCL to be provided as Mohanlalganj has also been commissioned near Lucknow, commissioning of 220kV lines is pending.
- UPPTCL agreed to study requirement of ICT augmentation at 400/220kV Obra and 400/220kV Lucknow(PG) and revert before next NRPC meeting

A.6.19 TCC forum asked all utilities to expedite commissioning of above transmission elements to enhance ATC/TTC limit of UP.

Delhi:

- After bus -split due to high fault level at Bawana, 2*315 MVA ICTs are N-1 non-compliant. Approved ICT augmentation capacity to be expedited by DTL & POWERGRID respectively.
- New ICT/ Capacity augmentation at 400/220kV Mundka to be planned by DTL as loading being observed beyond N-1 contingency limits. Although SPS has been implemented as temporary measure.
- Expediting award/commissioning of 400/220kV Gopalpur and Tikri Khurd by DTL.

TCC deliberations:

- POWERGRID representative informed Narela S/s is expected to be commissioned by Sep 2024, one ICT augmentation at Bawana would be completed by Sep’25
- DTL was not available to provide update on extremely delayed Gopalpur and Tikri Khurd S/s. TCC expressed concern as these substations and associated lines would be necessary to tap RE power to be pushed to 765/400 Narela ISTS substation
- NRLDC and CTUIL representatives stated that transmission network augmentation of DTL, as planned, is not progressing at all and expressed serious concerns on power flow constraints and radialisation thereof as well as severe low voltages encountered during June’2024.
- NRLDC representative asked POWERGRID to expedite ICT augmentation at Jhatikara as ICTs are not N-1 compliant and feeding approx. half of load of Delhi state.

- NRLDC representative asked Delhi SLDC to maintain their drawl from the grid within the ATC/TTC limits assessed by SLDC and NRLDC.

A.6.20 TCC forum asked all utilities to expedite commissioning of above transmission elements to enhance ATC/TTC limit of Delhi.

Uttarakhand:

- Although, SPS implemented at 400/220kV Kashipur (PTCUL), additional ICT to be commissioned as per anticipated load growth and to improve reliability. PTCUL has submitted that bids are not being received for above ICT.
- To manage high loading of 220kV CBGanj-Pantnagar and 220kV Roorkee-Roorkee lines, additional connectivity/ conductor upgradation to be planned by PTCUL.
- Status of 400kV Landhora S/S which is under planning to be furnished

TCC deliberations:

- PTCUL representative mentioned that they are not receiving bids for Kashipur ICT. TCC forum asked PTCUL to consult POWERGRID to resolve bidding related issues for new 400/220kV ICT at Kashipur as POWERGRID generally procures equipment in bulk quantities

- PTCUL representative informed that 400/220kV Landhora substation is dropped as no bids were received due to topographical issues at site. DPR Approval request has been sent for Kohana substation near Muzaffarnagar and Roorkee to higher management

- NRLDC representative highlighted severe low voltages observed in PTCUL grid due to high demand and less intrastate hydro generation. High MVAr drawl from Grid was also highlighted.

- It was requested from NRLDC side that UPCL may implement recently approved capacitor bank (Rs 59 Cr) through their own fund instead of PSDF fund as the same may be delayed.

- MS NRPC stated that UPCL/PTCUL may also take up with state govt. for capacitor implementation through state fund.

A.6.21 TCC forum asked PTCUL to expedite commissioning of above transmission elements to enhance ATC/TTC limit of Uttarakhand and improve grid voltages.

Himachal Pradesh (constraints observed during winter):

- New ICT/ Capacity augmentation to be studied and proposed by HPPTCL/ PSTCL at 400/220kV Nallagarh. New lines or additional supply may be provided.
- Frequent event related to multiple element outages at 220/132kV Kunihar (HPPTCL). Substation maintenance and protection related issues need to be resolved.

TCC deliberations:

- POWERGRID representative informed that new Nallagarh ICT is already awarded and expected to be commissioned by Jun'25
- NRLDC representative informed multiple tripping events were noticed at 220/132kV Kunihar effecting major portion of HP load in last 6 months.
- HP SLDC representative informed that CBIP has been engaged for carrying out third party protection audit of 220/132kV Kunihar substation. It is expected to be carried out within next one month.
- NRLDC representative requested that HPPTCL may also carry out internal protection audit till third part protection audit is carried out,

A.6.22 TCC forum asked HP to also carry out internal audit till the time external audit is carried out

J&K and Ladakh U/T (constraints observed during winter):

- Capacity augmentation at 400/220kV Amargarh to be expedited. CTU informed that ICT is under implementation by NTL/IndiGrid with Jan'25 schedule (best effort Oct'24) .
- Additional planned 220kV and low voltage lines to be expedited to manage drawl from Amargarh.
- Actions to manage severe low voltages in J&K control area. SVC at New Wanpoh is being fully utilised (no margin for dynamic support) and outage of SVC leads to very low voltages in valley.

TCC deliberations:

- NRLDC representative expressed concern on low voltages, poor power factor in J&K and reactive energy charges payable by state. As per information available, under RDSS scheme around 1000MVAr capacitor were to be commissioned, of which around 300-400MVar have been commissioned.

- JKPTCL representative informed that internal Committee has been formed to assess MVAR compensation requirement in J&K grid at 33kV level. Additional 220kV lines from Amargarh are under implementation for additional power drawl. Kunzher (160MVA) substation is also planned to cater more load in J&K.

- NRLDC representative expressed concern regarding connectivity of Ladakh valley through single 220kV line

- CTUIL representative stated that with Pang HVDC system, separate connectivity to Ladakh valley would also be available.

A.6.23 TCC forum asked utilities to expedite commissioning of above transmission elements to enhance ATC/TTC limit of J&K and resolve low voltage issues.

A.6.24 NRLDC representative also highlighted various N-1 violations as being observed in the grid. Presentation as delivered from NRLDC side is attached as **Annexure-VI**.

A.6.25 Several STUs such as UP and Rajasthan also expressed concern that DISCOMs are not actively participating in NRPC forum and the low voltage measures being taken from DISCOM side are not being discussed.

A.6.26 TCC forum asked all states to take up the matter with their SERC.

A.6.27 MS NRPC stated that separate subgroup forum may also formed with DISCOMs at NRPC level. Same is also being discussed at CEA level.

A.6.28 Further, NRLDC representative added that apart from above, following are some of the key actions that were agreed in last OCC meeting for ensuring safe and secure grid operation during summer 2024. It was requested that all concerned may be advised to adhere to these measures for safe and secure grid operation:

- Apart from GNA/Market arrangements based on forecast, other short term arrangements should also be planned for real time imbalances. For example, ensuring adequate margin while scheduling own thermal generation, units on bar, maintenance of reserves, technical minimum operation of thermal units in case of load crash, tie up with neighbour states or hydro rich states and utilization of real-time market etc. to bridge the load-generation gap in real time.
- Regular monitoring of weather websites for weather forecast information and plan load generation balance accordingly. In case of forecasted thunderstorm or wind storm, generation may be timely backed down so as to avoid any under drawl, high frequency operation of the grid and wastage of precious fuel.

- In view of high/increasing demand & transmission constraints (if any) in importing the power or in case of any contingency in the system, states to maximize their internal generation to avoid low frequency/low voltage operation or other related issues.
- SLDCs to arrange for display window at their control centers so that system operators readily know quantum of reserve available and hence better real-time actions can be taken.
- Some states continue to connect/ disconnect large quantum of load at hourly boundaries resulting in frequency spikes and instantaneous over voltages. Such actions to be avoided especially during high demand season.
- States to take actions to ensure backing down of thermal generation as per latest regulations issued by CEA regarding thermal plants flexible operation. Non-action by intrastate generators leads to under drawl from grid in case of thunderstorms/ load crash.
- Utilities to update & share coal stock position of thermal plants at least a week in advance as agreed earlier in TCC/NRPC meeting, especially in case of anticipation of low coal stock.
- Take all necessary precautions to avoid any issues arising due to low voltages during summer months.
- All state control area/Users shall ensure that their protection and defense system are in working conditions and settings are as per the recommendations of NRPC. It is also suggested to carry out mock testing exercise of important SPS in Northern region including under state control area.
- All utilities to ensure the telemetry of all analog & digital points of all stations at respective control centers.

A.6.29 All concerned agreed to adhere to these measures in real-time grid operation.

NRPC Deliberation

A.6.30 NRPC forum noted the deliberation held in TCC meeting and Forum was in consonance of the same.

A.6.31 Member (GO&D), CEA appreciated the efforts from NRLDC & GRID-INDIA side in coordinating the grid operation and meeting maximum demand of NR of 91.2GW and All India demand of 250GW.

A.6.32 NRPC forum noted the same and appreciated the efforts from Punjab side for enhancing ATC/TTC of the state. All other states were also asked to have proactive approach in transmission system augmentation.

A.6.33 Member (GO&D), CEA stated that they have received request for additional allocation by Punjab, however, till transmission (ICT) augmentation is completed, same may not be possible.

A.6.34 POWERGRID representative expressed concern that transformers taken on loan from DTL have not been returned from DTL side.

A.6.35 NRPC forum discussed that all ISTS licensees and STUs need to submit list of lines having terminal equipment of lower rating compared to conductor to CTUIL/NRLDC/NRPC.

A.6.36 NRPC forum also discussed that all utilities need to carry out internal as well as third party protection audits as per IEGC. Same needs to be strictly followed by all utilities and should be thoroughly discussed at Protection Sub-committee level.

A.6.37 NRPC asked utilities to expedite commissioning of transmission elements to enhance ATC/TTC limit of each state and resolve low voltage issues. All concerned officials to be advised to expedite above actions for meeting higher demand during this and next high demand season with minimal transmission related issues.

Decision of Forum

Forum requested all concerned utilities to expedite the pending matters and adhere strictly to the timelines proposed by them.

A.7 Integration of Schedule/DC values of State Generator in SCADA System (agenda by NRLDC)

TCC Deliberation

A.7.1 NRLDC representative apprised that in high-demand period there is requirement of monitoring Declared Capacity & Schedule of all Generating Stations so that reserves can be monitored for real-time grid operation. Schedule & DC of Central sector is being integrated with NRLDC SCADA system and same is being monitored by Control Room.

A.7.2 However, DC & Schedule of Rajasthan, Uttarakhand and J&K State generator is not integrated with their SCADA system. It was requested that all states take up for integration of state generator in their SCADA system for further integration with NRLDC.

A.7.3 Issue was discussed in 23rd TeST Meeting held on 21.09.2023 & 24th Test Meeting held on 09.02.2024. Present integration from J&K, Uttarakhand and Rajasthan is still pending. Considering high-demand crunch period, it is very critical to monitor all the generators and corresponding reserves. In this regard, it was requested for integration of Schedule / DC of generators in SCADA.

A.7.4 Issue was also discussed in 73rd NRPC Meeting held on 21.05.2024 where Rajasthan SLDC representative stated that the work is being carried out in association with L&T and would be completed within next one-two week. Uttarakhand SLDC representative stated that DC declaration portal is under M/S Secure and SCADA system under M/S GE compatibility issues are being noticed. The work would possibly be completed after SCADA upgradation system. NRLDC representative requested Uttarakhand SLDC to take up the matter with Secure and GE and resolve the issue.

A.7.5 Grid-India representative informed about requirement of DC/Schedule values is essential for monitoring reserves in real-time. It was further requested all states to expedite the integration work.

A.7.6 Timelines as given by states in meeting is given below:

S.No.	State	Status	Timelines
1	Punjab	Available	Script Automation shall be done within month
2	Haryana	Available	Script Automation shall be done within month
3	Uttarakhand	Not Available	Integration work is in process , will be done within month
4	Rajasthan	Not Available	Would be completed in 7 days
5	Jammu & Kashmir	Not Available	J &K will discuss and revert back

NRPC Deliberation

A.7.7 Forum noted the same

Decision of Forum

All states were requested to expedite the integration work.

A.8 J&K Telemetry Issues (agenda by NRLDC)

TCC Deliberation

A.8.1 NRLDC representative apprised that 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.

A.8.2 Real-Time data availability from Jammu and Kashmir is very poor. There is zero visibility of data in J&K stations at J&K and NRLDC. With poor monitoring of data, it is very difficult to monitor grid in efficient manner.

A.8.3 He added that the matter has been discussed in various TCC and TeST Meetings but there is no improvement of the same.

Brief details are as follows:

- Under SCADA upgrade project M/s Siemens at all 400KV / 220 KV and 132 KV sub stations/generating Stations of J&K PDD installed 66 RTUs.
- 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.
- 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.
- Further, it was informed that payment issues were resolved and many communication links were commissioned and pending link would be commissioned by December 2022.
- Matter was also discussed in 47th TCC-49th NRPC Meeting, J&K confirmed that they will resolve the issues mutually with POWERGRID so that data starts reporting to SLDC/ NRLDC.
- During 19th TeST Meeting dated 07.03.2022, J & K representative informed that by 31st December 2022 all 70 RTUs will be integrated with SLDC.

- During 20th TeST Meeting held on 09.09.2022 it was discussed that J&K informed that although some of the links have been commissioned but data reporting is yet to start due to disconnection of CT/PT cables at site / other integration issues of the RTU. Further it was informed that they are in process of rectification of RTU issues and joint visit is planned with M/s Siemens.
- During 64th NRPC Meeting held on 24th March 2023 it was informed that joint visit could not be conducted and after discussions it was decided that a joint meeting shall be conducted comprising members from Siemens, POWERGRID, J&K and NRLDC to resolve the RTU integration issues.
- During 68th NRPC Meeting held on 18th Aug 2023, representative from J&K informed that there is no improvement in regard to telemetry and they are taking up with POWERGRID and Siemens.
- Issue was also discussed in 23rd TeST Meeting on 21st Sep 2023 and Special Meeting with J&K on 12th Oct 2023 where in J&K confirmed they will start the process of RTU integration with the support of Vendor. However, till date there is no improvement in data reporting from J&K Sub-stations.
- Issue was also discussed in 24th TeST Meeting on 08th Feb 2024 but till date there is no improvement of telemetry from J&K.

A.8.4 NRLDC representative appraised the forum regarding non-availability of telemetry from J & K Sub-stations which is a big challenge during real-time grid operation.

A.8.5 NRLDC representative requested J&K to take-up with OEM for integration of RTUs where communication link has been made available. Further, commissioning of pending links may be expedited.

A.8.6 J&K representative informed that they are in discussion with OEM i.e. M/s Siemens for integration of RTUs. Further, they are arranging fund of approx. 34crore, so that communication links can be commissioned.

A.8.7 TCC forum asked J&K to expedite the integration works for RTU & commissioning of balance OPGW links.

NRPC Deliberation

A.8.8 Forum noted the discussion held in the TCC meeting and concurred the same.

Decision of Forum

Forum requested J&K to expedite the integration works for RTU & commissioning of balance OPGW links.

A.9 Non-Availability / Reliability of Telemetry from RRVPNL sub-Stations (agenda by NRLDC)

TCC Deliberation

A.9.1 NRLDC representative apprised that SCADA data is very important. Decisions in real-time are taken by Real-time engineers of NRLDC based on real-time data available to Control room. There is requirement of good quality input data for smooth grid monitoring & Control. Further, good telemetry is also essential of running of State Estimator/Energy Management System (EMS).

A.9.2 Since proper telemetry is not available from many RRVPNL substations, it has impact on successful running of state estimator. Correct telemetry is essential for running State Estimator/ Contingency Analysis in EMS, Better SE output will aid in situational awareness of the system operators of NRLDC.

A.9.3 Telemetry from many Rajasthan Stations is not reliable. Details of stations where telemetry data is not reliable is given in **Annexure- VII.**

A.9.4 RRVPNL/Rajasthan SLDC was requested for resolution of the issue at the earliest.

A.9.5 Matter was also discussed in 24th TeST Meeting held on 09th Feb 2024, where representative from Rajasthan SLDC informed that they have already taken up matter with STU. However, resolution is still pending from STU.

A.9.6 NRLDC representative informed that telemetry issues from many Rajasthan Stations is pending since long. This is a big challenge during real-time grid operation as Rajasthan state also has significant amount of RE generation connected to state network.

A.9.7 He added that Digital/Analog Data from many bays are not updating.

A.9.8 % Availability of Analog /Digital Points at 12:00 hrs of 27th June 2024 was presented:

- Analog → 85.5%
- Digital (CB) → 62.8%

A.9.9 Rajasthan STU representative informed that non-availability of data is mainly due to old SAS / obsolete RTUs and lack of support from OEM.

A.9.10 He further informed that they have finalized estimate of upgradation 22 SAS stations (2 no.- 765kV, 8 no.- 400kV, 5 no- 220 kV, 7 no. 132kV) and it is expected that NIT shall be floated by August 2024.

A.9.11 Further, they are in the process of replacement of 132 number of obsolete RTUs and estimate has been finalized and its NIT is also likely to be floated by August 2024.

A.9.12 TCC forum asked Rajasthan to expedite the process.

NRPC Deliberation

A.9.13 Forum noted the discussion held in the TCC meeting and concurred the same.

Decision of Forum

Forum requested Rajasthan to expedite resolution of telemetry issues.

A.10 Availability certification of force majeure events beyond the control of the transmission licensee for month of May 2024 (agenda by NRPC Secretariat)

TCC Deliberation

A.10.1 EE (P), NRPC apprised that following outage of POWERGRID is under consideration:

Sr. no	Line	Outage from	Outage upto	Reason
1	400kV Kishenpur – New Wanpoh-III	25.4.24 21:20 Hrs.	14.6.24 19:29 Hrs.	Massive landslides and sinking of major chunk of land in village Parnaut in Ramban Gool very near to Line corridor followed by collapse of 03 No towers (Tower Loc No 225,225 &227) and damage to tower No 228.

A.10.2 A team comprising of officials from NRPC, CEA, and CPRI visited the location on 30.04.2024 and based on their photographs and inputs, availability was considered under forced majeure events beyond the control of the transmission licensee while certifying availability certificate for month of Apr 2024 as the duration was below 01 month.

A.10.3 As the outage is going beyond one month, approval of NRPC forum is required for consideration under forced majeure as per Appendix-IV of CERC (Terms & Conditions of Tariff) Regulation 2024, mentioned below:

5.For the following contingencies, the outage period of transmission elements, as certified by the Member Secretary, RPC, shall be excluded from the total time of the element under the period of consideration for the following contingencies:

i) Outage of elements due to force majeure events beyond the control of the transmission licensee. However, whether the same outage is due to force majeure (not design failure) will be verified by the Member Secretary, RPC. A reasonable restoration time for the element shall be considered by the Member Secretary, RPC, 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. Member Secretary, RPC may consult the transmission licensee or any expert for estimation of reasonable restoration time. Circuits restored through ERS (Emergency Restoration System) shall be considered as available;

ii)……..

iii) The outage period which can be excluded for the purpose of sub-clause (i) and (ii) of this clause shall be declared as under:

i. Maximum up to one month by the Member Secretary, RPC;

ii. Beyond one month and up to three months after the decision at RPC;

iii. Beyond three months by the Commission for which the transmission license shall approach the Commission along with reasons and steps taken to mitigate the outage and restoration timeline

A.10.4 Accordingly, this proposal has been submitted for allowing above outage under forced majeure.

A.10.5 Sr. GM, POWERGRID briefed the case through a presentation attached as **Annexure- VIII.**

A.10.6 He mentioned that there was land sliding event at Ramban on 25.4.2024 that led to collapse of three towers (Tower Loc No 225, 226 & 227), nearby houses and road damages, JKPTCL substation damage and presented the attached photographs in the presentation.

A.10.7 Later, he conveyed that challenges faced during restoration of 400kV Kishenpur – New Wanpoh-III & IV on ERS (emergency restoration system).

A.10.8 MS, NRPC observed that conditions seem to be more critical to restore the system based on devastation caused. He requested all members to put their views on the same.

A.10.9 JKPTCL representative highlighted that the POWERGRID restored the important link for Jammu and Kashmir in tough conditions. Therefore, the proposal of POWERGRID may be considered. He requested forum to arrange the permanent restoration of the same.

A.10.10 MS, NRPC conveyed that availability may be granted to POWERGRID due to natural calamity. The availability may be revised based on the Standing Committee report of CEA.

A.10.11 Representative from HP STU, UPPTCL were also of the view that deemed availability may be allowed to POWERGRID. These are the appreciable efforts of transmission licensee.

A.10.12 AEE (P), NRPC conveyed to go through the Central Electricity Regulatory Commission (Standards of Performance of inter-State transmission licensees) Regulations, 2012.

A.10.13 Subsequently, it was presented that as per the said regulation, the restoration time for tower after collapse by Emergency Restoration System (ERS) shall not exceed 12 days.

A.10.14 However, Forum was of view that based on tough hilly terrain after landslide, it is genuine to take such time to restore the lines on ERS. Forum decided to allow the above outage under forced majeure including the outages of 400kV Kishenpur – New Wanpoh-I for 4 days, Baglihar- New wanpoh-1 for 4 days and 400kV Kishenpur-New Wanpoh –IV for 18 days.

NRPC Deliberation

A.10.15 Members appreciated the efforts of POWERGRID to restore the system in such challenging conditions.

A.10.16 MS, NRPC conveyed that Standing Committee of CEA visits the site in such cases and submits the report.

A.10.17 Forum concurred the deliberation held in the TCC meeting.

Decision of Forum

After deliberation, forum decided the followings:

i. *Collapse of 3 towers in 400kV Kishenpur-New Wanpoh line on 25.4.2024 was considered as force majeure due to land sinking in the area.*

ii. *Accordingly, following outages were considered under force majeure:*

- *400kV Kishenpur-New Wanpoh –IV for period from 25.04.2024 to 13.5.2024;* ***18 days (i.e. 425:54 hrs)***
- *400kV Kishenpur-New Wanpoh –III for period from 25.04.2024 to 14.6.2024;* ***50 days (i.e. 1198:09 hrs)***
- *400kV Kishenpur-New Wanpoh –I from 26.04.2024 to 30.04.2024;* ***4 days*** *(i.e.* ***98:47 hrs****)*
- *400 kV Baglihar- New wanpoh-1 from 26.04.2024 to 30.04.2024;* ***4 days*** *(i.e.* ***99:07 hrs****)*

iii. *In case CEA Standing Committee report proves design failure, the above outages will be attributed to licensee accordingly.*

A.11 Tapping Tertiary of 765/400/33 kV ICT -2 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Sub-Station (agenda by POWERGRID)

TCC Deliberation

A.11.1 EE (P), NRPC apprised that the 765/400/132kV HVAC & ±500kV HVDC Ballia Substation is one of the important UHV sub-station of POWERGRID which connects NR and ER region. Due to presence of ±500 kV 2500 MW Ballia-Bhiwadi HVDC Bipole system, the reliable auxiliary power requirement is very essential.

A.11.2 Presently two auxiliary supplies have been provisioned at Ballia for HVDC and HVAC system. One is from tertiary of 200 MVA,400/132 KV ICT and another is UPPTCL feeder at 33 KV Levels.

A.11.3 400/132/33 KV, 200 MVA ICT is feeding 02 no. 132 KV Transmission Lines of UPPTCL connected to UPPTCL Sub-Station. In past, approximately 673 no. of faults were detected in UPPTCL lines from August'23 to Oct'23. Considering large number of faults fed by this Transformer in past, the life of this ICT and its reliability has been seriously affected. After deliberation in 213th OCC meeting, UPPTCL has taken corrective measures and fault detection came down up to 200 no. in last 04 months, which is also a big number.

A.11.4 33kV auxiliary supply from dedicated UPPCL feeder is also not reliable and sometimes it fails 3-4 times in a month and outage duration in number of cases is more than 12 Hrs. Due to frequent breakdowns of UPPCL supply, the auxiliary Power Supply changeover occurs multiple times and leads more stress on HVDC equipment like CB, Valve cooling pumps and UPS by-pass operation which is undesirable.

A.11.5 Generally, to avoid this situation, HVDC stations have provision for auxiliary supply from tertiary of the two independent ICTs and dedicated feeders from generating plants. In case of Ballia, same is not available.

A.11.6 Now, the Tertiary supply from 765kV ICT is necessitated for reliable sources to HVDC and HVAC Auxiliary Power Supply. Same was also discussed in 213th & 215th OCC meeting and a Committee was formed to review the need of additional source of Auxiliary Power connectivity from tertiary of 765/400/33 KV ICT-2 for reliable auxiliary supply to HVDC Ballia Sub-Station. 5 CEA-GO-17-14(13)/1/2023-NRPC I/40976/2024

A.11.7 Accordingly, a meeting on Tapping Tertiary of 765/400/33 kV ICT -2 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Sub-Station was held on 29.04.24 on virtual mode. The meeting was chaired by GM, NRLDC and attended by POWERGRID, CTUIL & UPPTCL representatives.

A.11.8 Based on the brief discussion held during the meeting and in light of attached MoM (**Annexure-IX**), Committee recommended that additional source of Auxiliary Power connectivity from tertiary of 765/400/33 KV ICT-2 is required for reliable auxiliary supply to

HVDC Ballia Sub-Station and can be approved with approximate cost estimate of Rs.1.25 Cr under ADD-Cap.

A.11.9 POWERGRID representative submitted that the matter was already discussed in 220th OCC meeting held on 19.06.24 and forum agreed for connectivity of additional source of Auxiliary Power from tertiary of 765/400/33 KV ICT-2 in view to reliable auxiliary supply to HVDC Ballia Sub-Station and POWERGRID submitted the above proposal with approximate cost estimate of Rs.1.25 Cr under ADD-Cap.

A.11.10 MS, NRPC highlighted that the considering the importance of HVDC Ballia Sub-Station, Forum may approve the connectivity of additional source of Auxiliary Power from tertiary of 765/400/33 KV ICT-2.

A.11.11 Forum agreed on the proposal of POWERGRID.

NRPC Deliberation

Forum concurred the discussion held in the TCC meeting and approved the proposal of POWERGRID on technical ground.

Decision of Forum

In line with decision of 220th OCC, Forum accorded technical approval for tapping tertiary of 765/400/33kV ICT -2 for reliable auxiliary power supply to ±500kV HVDC Ballia Sub-Station.

A.12 Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation (agenda by POWERGRID)

TCC Deliberation

A.12.1 POWERGRID apprised that Maharanibagh GIS Substation, a critical component of Delhi's power infrastructure, faces operational challenges due to its Double Main Bus Bar setup, leading to frequent and prolonged shutdowns for maintenance.

A.12.2 In the past four years, the 400 kV GIS at Maharanibagh Substation has undergone three complete shutdowns, each lasting 5-14 days, to resolve defects occurring between the circuit breaker compartment and the Bus Bar. In February 2018, the complete substation was in shutdown for 14 days continuously.

A.12.3 In August 2023, an issue observed in gas-tight insulator inside the 400 kV Bus Bar-2, near Hyosung GIS Bay – 407 (Transformer-4), necessitating a 4-day shutdown of both 400 kV Bus Bars. This led to a complete interruption of power flow from the 400 kV side.

A.12.4 Recent incidents, as mentioned above, highlight the urgent need for a sustainable solution to ensure uninterrupted power supply. To address this, a proposal for a 400 kV Bus Bar splitting arrangement between ABB and Hyosung GIS has been put forward. This arrangement aims to mitigate the risk of complete station shutdowns by allowing the disconnection of faulty segments while maintaining continuous power flow through the healthy side of the Bus Bar.

A.12.5 Technical feasibility has been assessed, and the financial implications, is approximately 8.7 Cr (Expenditure booking under Add Cap block 2024-2029).

A.12.6 The agenda was discussed in 219th OCC held on 15.05.2024, wherein, MS NRPC suggested to constitute a Committee comprising members from NRLDC, CTU, DTL, HVPNL and UPPCL under chairmanship of Superintending Engineer (Operation), NRPC to visit 400/220 kV Maharanibagh Substation and submit report. Extracts of minutes are attached as **Annexure-X.**

A.12.7 Subsequently, nominations were sought by NRPC secretariat vide letter dated 17.5.2024 (**Annexure-XI**) for constitution of Committee.

A.12.8 Accordingly, constituted Committee visited Maharanibagh substation on 12.06.2024 and the same was discussed in the 220th OCC held on 19.06.2024, the proposal was further agreed by OCC forum.

A.12.9 In view of above, Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation was put up for approval of NRPC forum under ADD-CAP by POWERGRID.

A.12.10 MS, NRPC emphasized that wherever betterment of system is required, it should be done appropriately.

A.12.11 Forum agreed on the proposal of POWERGRID.

NRPC Deliberation

A.12.12 MS, NRPC asked the timelines for commissioning of the above bus split arrangement. POWERGRID representative replied that it would take 18 months after bidding.

A.12.13 Forum was in consonance of deliberation held in the TCC meeting and approved the proposal of POWERGRID on technical ground.

Decision of Forum

Forum accorded technical approval for the Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

A.13 Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part1 :4 GW) [Sirohi/Nagaur] Complex (agenda by CTUIL)

TCC Deliberation

A.13.1 CTUIIL representative apprised that System Study for evolution of the proposal was discussed and agreed in the 30th CMETS-NR meeting held on 18.06.24 (Minutes of meeting are attached as **Annexure-XII**).

A.13.2 He informed that the estimated cost is Rs. 5525 Cr. In which, NR Portion is about Rs 3400 Cr. and WR Portion is about Rs 2125 Cr.

A.13.3 The detailed scheme for transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex is attached as **Annexure-XIII. CTUIL** has briefed about various transmission elements as per the attached scheme.

A.13.4 CTUIL highlighted that above scheme also comprises 765kV NR-WR inter regional line which will strengthen the NR- WR inter regional capacity as well as facilitate the evacuation of RE power.

A.13.5 CTUIL informed that after approval from NRPC, agenda will be put up for approval of WRPC forum.

NRPC Deliberation

A.13.6 Forum was also of the same view of TCC deliberation and approved the proposal of CTUIL.

Decision of Forum

Forum technically approved the proposal of CTUIL for scope under Northern region and scheme may further be taken to NCT forum along with WRPC approval for its scope.

A.14 Optic Fiber connectivity for New Building of NLDC located at "Grand Rue" Ayur Vigyan Nagar, August Kranti Marg, New Delhi (agenda by CTUIL)

TCC Deliberation

A.14.1 EE (C), NRPC apprised that Grid-India vide their letter dated 25.04.24 (copy attached at **Annexure-XIV**) has requested CTU for planning of fiber optic connectivity to their new building of National Load Dispatch Centre (NLDC) located at “Grand Rue” Ayur Vigyan Nagar, August Kranti Marg, New Delhi. Accordingly, a meeting was convened by CTU on 06.05.2024 to understand the actual requirement of Grid-India for connectivity of new building (MoM attached at **Annexure-XV**).

A.14.2 During the meeting, Grid-India stated that they are planning to start NLDC operations from the new building at August Kranti Marg by 31st Oct' 2024. In this regard dedicated and redundant Optical Fibre connectivity from ULDC network is required for successful operation of NLDC from new Building. Further, they also mentioned that additional links of POWERTEL may also be required for redundancy of the communication network to NLDC.

A.14.3 In the meeting, POWERGRID informed that temporary connectivity can be provided by utilisation of POWERTEL fibres (third party leased fibres) at STM 4/16 level which are running near the new building as interim arrangement. POWERGRID further informed that for new POWERTEL links, commercial obligation shall be as per existing norms (i.e. from O&M budget).

A.14.4 For the permanent arrangement of NLDC fibre optic connectivity, POWERGRID proposed following paths of underground fiber for providing ample redundancy:

a) NLDC/NRLDC Building at Katwaria Sarai - NLDC New Building, August Kranti Marg - 9 Kms
b) Maharani Bagh (ULDC) - NLDC New Building, August Kranti Marg - 12 Kms
c) Tughlakabad via Okhla - NLDC New Building at August Kranti Marg - 14 Kms

In Totality: 35 kms of UGFO

A.14.5 POWERGRID further stated that it will be beneficial to install 48 Fibre cable instead of 24 fibre cable as cost difference in 24F and 48F cable is nominal in comparison with cost of ROW charges (of CPWD/NDMC) and installation cost. CTU suggested that in place of 48F UGFO cable, 2 nos. of 24F UGFO cable can be installed in redundant separate cable trenches to avoid disconnection in case of frequent construction/digging work by other agencies. 2X24F UGFO cable was agreed in the meeting.

A.14.6 In addition to above, POWERGRID informed that 3 nos of communication equipment along with 2 nos of 48V DCPS may also be required for redundancy of equipment and input DC POWER supply.

A.14.7 POWERGRID informed that Cost Estimate for the above work (35 Kms UGFO, 3 nos of communication equipment and 2 nos of 48V DCPS) is Rs. 7 Crs. for 24F arrangement and 8 Cr for 2x24f fibre arrangement respectively. With time schedule of 12 months from the date of allocation.

A.14.8 Details of proposed scheme is given at **Annexure-XVI**.

A.14.9 The matter was further discussed in the 25th TeST meeting of NRPC held on 25.06.2024

where it was deliberated and decided that in place of 2x24F UGFO, 1x48F UGFO may be installed in a single trench to optimize the cost. Further it was decided that existing UGFO of DTL can be utilized between Tughlakabad -Masjid Mod by sharing of 12 no. of fibers. The revised requirement of UGFO considering the same is given below:

i) NLDC/NRLDC Building at Katwaria Sarai - NLDC New Building, August Kranti Marg - 9 Kms
ii) Maharani Bagh (ULDC) - NLDC New Building, August Kranti Marg - 12 Kms
iii) Tughlakabad - Masjid Mod DTL station (via sharing of fibers from DTL UGFO network)
iv) Masjid Mod DTL station - NLDC New Building at August Kranti Marg – 5Kms.

A.14.10 In totality POWERGRID would lay approx. 26 kms of UGFO for all above three nos. of OFC connectivity for which cost comes to Rs 6.13 Crore.

A.14.11 However, there was no representative in TCC meeting from DTL to confirm the same. Therefore, the forum suggested to go through the original proposed route of 35kM with 1x48 UGFO in single trench. Based on above discussion, the scheme is attached as **Annexure-XVII.**

NRPC Deliberation

Forum was in consonance of deliberation held in the TCC meeting and approved the scope of the scheme mentioned in the **Annexure- XVII.**

***Decision of Forum*:**

*Forum technically approved the supply and installation of (1X48F) Underground Optical Fibre for **35 Kms** in single trench including RoW charges, 3 no. of FOTE and 2 no. of 48V DCPS. Route of UGFO will be as per point A.14.4 above.*

A.15 Delay in Finalization of First Time Charging case of 220/132/33 kV 160/200 MVA AIS Andheri Sub-Station of HPPTCL (agenda by HPPTCL)

TCC Deliberation

A.15.1 HPPTCL representative apprised that in order to meet up the growing industrial and domestic demand of the area and also to provide the additional source of supply at existing 132/33/11

kV Sub-Station of HPSEBL at Kala Amb, it was decided in the 31st meeting of Standing Committee on the Power System Planning of Northern Region held on 02.01.2013 that 400/220 kV Sub-Station at Kala Amb shall be established under ISTS and further works of 220/132 kV may be carried out by the Himachal Pradesh State Electricity Board (HPSEBL)

A.15.2 M/S PKATL (Power Grid Kala Amb Transmission Ltd) a subsidiary of PGCIL was selected as the Transmission Service Provider based on the international tariff based competitive bidding to execute transmission System for "Northern Region System Strengthening Scheme, NRSS-XXXI (Part-A)" on Build, Own, Operate and Maintain (BOOM) basis and to provide transmission service to the Long Term Transmission Customers of the Project comprising of the following elements:

Establishment of a 7 x 105 MVA (1- ph.), 400/220 kV GIS Sub-station at Kala Amb along with LILO of both circuits of Karcham Wangtoo-Abdullapur 400 kV D/C (Quad Moose) line at Kala Amb (on multi Ckt towers) and 40% Series Compensation on 400 kV Karcham Wangtoo – Kala Amb quad D/C line at Kala Amb ends.

A.15.3 The 400/220kV Sub-Station at Araindwala was commissioned by M/S PKATL on 12.07. 2017. Due to non- commissioning of 220/132kV Sub-Station at Kala Amb, heavy penalty of approximately 5.06 Crore per month was imposed by CERC (Central Electricity Regulatory Commission) on HPSEBL since July, 2017 as downstream system was not ready to evacuate power.

A.15.4 Aggrieved by it, HPSEBL filed a Petition against the order of CERC with a plea to Hold and declare that the HPSEBL is not entitled to the recovery of the entire Yearly Transmission Charges (YTC) from the scheduled date of commissioning of the subject transmission system and further Hold and direct that the HPSEBL is entitled to the recovery of the YTC from the Scheduled Date of commissioning of the subject transmission system only under the POC mechanism under the Sharing Regulations of the Commission;

A.15.5 CERC Vide its order dated 18th of September 2018 ordered that NRSSTL is entitled to recover the Monthly Transmission Charges from HPSEBL and HPSEBL is liable to pay about 84.5% of the charges on bilateral basis till the commissioning of the downstream asset, while the balance 15.5% would be included in the Point of Connection (PoC) Charges as per the Sharing Regulations of the Central Commission.

A.15.6 Again, HPSEBL filed an appeal 343 of 2018 against the CERC order dated 18th of September 2018 before APPELLATE TRIBUNAL FOR ELECTRICITY AT NEW DELHI. APTEL vide its order dated 09.05.2022 allowed the appeal of HPSEBL and the impugned order dated 18/09/2018 passed by the Central Commission was set aside. The Central Commission was

directed to pass a fresh and reasonable order expeditiously, but not later than three months from the date of this judgement.

A.15.7 Accordingly, the Commission in its order dated 30th June 2023 directed that the transmission charges of (i) LILO of both circuits of Karcham Wangtoo Abdullapur 400 kV D/C (Quad Moose) line at Kala Amb (on multi Ckt towers); (ii) Establishment of a 7 x 105 MVA (1-ph.), 400/220 kV GIS Substation at Kala Amb and (iii) FSC (40% Series Compensation- 400 kV Karcham- Kala Amb quad D/C line at Kala Amb ends) shall be serviced with effect from the date of their commercial operation through the PoC mechanism of the Sharing Regulations, 2010 and in terms of Regulations 5 to 8 of the Sharing Regulations, 2020 with effect from 1.11.2020. CTUIL was directed to implement the order accordingly within one month from the date of issue.

A.15.8 Rs 345 Cr approximately (paid to PGCIL) have been adjusted by HPSEBL in the bills payable to PGCIL.

A.15.9 It is clear from above that HP had to fight a long legal battle to secure justice.

Delay details of the case:

A.15.10 As per the Indian Electricity Grid Code 2023 notification dated 29.05.2023 vide Chapter-3-Connection Code clause 9 i.e. “In case of intra-State transmission system getting connected to inter-State transmission system, Connectivity Agreement shall be signed between intra-State transmission licensee, CTU and inter-State transmission licensee after the award of the project and before physical connection to ISTS.

A.15.11 Accordingly, HPPTCL applied to CTUIL for approval of Connection details through NSWS portal on 02.01.2024 (**Annexure-XVIII**). Subsequently, after about one month of submissions, CTUIL team shared their observations with HPPTCL on 31.01.2024, which were attended to on 03.02.2024. After protracted pursuance, approved draft of Connection Agreement was received on 28.02.2024.

A.15.12 It is worth mentioning here that Application for approval of technical connection data from CTUIL was uploaded on 02/01/2024 but the approval of the same along with draft agreement was received on 28.02.2024.

A.15.13 It is pertinent to mention here that the final draft agreement was received on 28.02.2024 but it could be signed only on 27.03.2024 that too after protracted follow up with M/S PKATL (Power Grid Kala Amb Transmission Ltd) a subsidiary of PGCIL **(Annexure-XIX).**

A.15.14 Hence total time taken from submission of data to signing of agreement is around 3 months which could have been curtailed.

A.15.15 It is further pertinent to mention here that a considerable time was taken in signing of Connection Agreement in case of 33/220 KV S/Stn Prini as well as 220/132/33 KV S/ Stn Majra too. It is understood that such a long time was taken as these cases were the first ones to be charged after implementation of IEGC 2023. But the same seems to be unjustified in case of Kala Amb as all the procedures as per latest regulations were in place.

A.15.16 The final charging code was issued by NRLDC on 29.05.2024 after a period of approximately 5 months.

A.15.17 It is highlighted here that HPPTCL through its vendor M/S TBEA facilitated M/S PKATL in certain compliances for which services of engineers from Hitachi and M/S Siemens India were taken through M/S TBEA. A few of them are highlighted as under

- Diff block for all relay through Siemens BCU.
- Goosing for Auto Reclose signal in Siemens BCU.
- Prepare 3-phase fault signal logic in Siemens BCU new signal Added in BCU.
- Bus-bar Goose signal for Auto reclose through BCU.
- Signal addition as per COE and NTAMC requirements of all relay 204 and 205 and validation up to local SAS and RTAMC.
- Restrain mode for all relay (As per COE observation and additional requirements of PGCIL)
- Unrestrained mode for all relay. (As per COE observation and additional requirements of PGCIL)
- DR signals as per COE clearance under POWERGRID COE supervision at that time of working.
- Some texts of signals are corrected.
- PLCC panel wiring and testing with ABB engineer.
- PLCC card frequency change as per PGCIL team direction.
- Hard wiring from BCU to Main-1 and Main-2 relay as per COE team requirements.

A.15.18 In addition to above, it is submitted that, during visit of Hitachi/Siemens Relay engineer, the M/S PKATL team was engaged in the erection/Charging of 400 kV and did not depute their team for testing of Differential Relay installed at their end which delayed the testing of Differential Relay.

A.15.19 Further, the PKATL 400/220 KVS/Stn was commissioned in July 2017 and the land for HPPTCL was finalized in 2018 at a distance of 2.5kms. As per record of discussions in the third meeting of Sub Group of NRCE for preparation of Reliability Standards for protection system and Communication System held on 20/01/2017, it has been clearly mentioned that

for very short lines (less than 30 Kms), line differential Protection with distance protection as back up (Built-in main relay or stand-alone) shall be provided mandatorily as Main-1. PGCIL well aware of this fact, in 2018, should have provided differential Relay well in time which was not done. The same was, later on, provided by HPPTCL in January 2024. Configuration of Differential Relay with BCU at Power Grid end was also facilitated by HPPTCL in March 2024.

A.15.20 Further, he submitted that it is obvious from the above that M/S PKATL was not ready for charging of the 220/132kV Sub-Station at Kala Amb (HPPTCL) through 220 KV DC line from 400/220 KV S/Stn PKATL to 220/132 KV/33 KV Andheri S/Stn (HPPTCL) till March 2024 whereas they started collecting charges from HPSEBL w.e.f July 2017. The period of 3 months w.e.f 02/01/2024 to 28/03/2024 for formalizing and signing a Connection Agreement is also a matter of concern which needs to be discussed for avoiding such delays in future.

A.15.21 HPPTCL representative stressed that STU was penalized on its delayed part. However, there is need to sensitize other licensees also to avoid the delays. He requested all to work in tandem and cooperation to streamline the activities.

A.15.22 CGM, NRLDC highlighted that FTC can be allowed only after scrutiny of all submitted documents. Therefore, utilities should always try to send the appropriate documents in one go to avoid any delays.

A.15.23 GM, CTUIL mentioned that it has been observed that utilities are submitting the data only 1-2 months ahead of anticipated FTC/commissioning. As per IEGC, CTU needs to look into all sets of documents before giving connectivity to the applicant. There was resubmission of documents in this case by STU as earlier submitted details were not appropriate as per CEA regulations. That back-and-forth flow of data might have taken additional processing time .He highlighted that proper scrutiny of all documents is necessary, otherwise it may cause operational concern to GRID-INDIA as well to utility. CTU also requested that utilities should submit the documents for connection details well in advance (min 6-8 months) to avoid last minute issues.

A.15.24 EE (SS), HVPNL raised the concern regarding imposing of very high liability on STUs for delay in commission of their 220kV Transmission line emanating from 220kV Bays of ISTS Substations. He added that 220kV Bays at ISTS substations are generally commissioned on time by the respective TSPs in RTM/TBCB. However, the construction of 220kV transmission line faces a lot of issues such as RoW problem, forest clearances, line crossing, crop compensation, agitation by resident of areas etc. which lead to unnecessary delay in construction of lines.

A.15.25 Further, he highlighted that there are number of such cases in Haryana, Punjab Uttar Pradesh, Rajasthan, Himachal Pradesh and even PGCIL/CTUIL is facing such issues in construction/execution of transmission line. It was emphasized that the monthly liability for non-commissioning of 220kV STU lines is very high as compared to cost of construction of their 220kV Bays and requested to take up the matter to Hon'ble CERC to review the very high liability charges for delay in commissioning of down line system by STUs so that financial burden on STUs/ consumers of electricity could be avoided.

A.15.26 MS, NRPC emphasized that utilities may adhere to the timelines for submission of documents. CTUIL and GRID-INDIA may follow their procedure for proper scrutiny.

NRPC Deliberation

A.15.27 MD, HPPTCL and Chairperson, NRPC stressed that all utilities should always try to avoid such delay. All stakeholders need to perform the works in coordinated way.

A.15.28 Member (GO&D), CEA also highlighted that all regulations must be complied at the time of connectivity. It is imperative to take time in scrutiny of all documents by NRLDC and CTUIL.

A.15.29 CGM, NRLDC conveyed that NRLDC has been performing the duties as per defined guideline.

A.15.30 Sr.GM, CTUIL mentioned that the various communications aspects are required to be followed by utilities as cyber security has become major issue to be taken care.

A.15.31 Forum concurred the deliberation held in the TCC meeting.

Decision of Forum

All stakeholders were advised to adhere to timelines of their approval procedure and try to avoid any delay during grid connectivity and first-time energization/charging.

A.16 Declaration of 400/220/66kV Pooling Sub-Station Wangtoo of HPPTCL as integral part of ISTS system (agenda by HPPTCL)

TCC Deliberation

A.16.1 HPPTCL representative apprised that Hon'ble CERC, under Regulation 93 of the CERC (Terms and Conditions of Tariff) Regulations, 2024, has specified the procedure to be followed for certification of intra-state transmission systems as ISTS Systems that are being

developed or that have already been developed by state transmission licensee and are carrying interstate power.

A.16.2 In the LTA meeting held on 29.12.2010 while discussing Connectivity and Long Term Access (LTA) to Himachal Pradesh Power Corporation Limited (HPPCL), for connectivity and transfer of 195 MW power from Kashang HEP and 450 MW power from Shongtong Karcham HEP it was agreed as under:

"It is proposed to establish a 400kV substation at Sherpa colony by LILO of one circuit of Karcham Wangtoo – Abdullapur 400 kV D/c (quad) line, matching with generation schedule (March'15). The works of establishing 400kV Sherpa colony substation and providing connectivity from the generation project by 400kV D/C can be carried out by CTU / transmission licensee as per provisions of the CERC regulations. With the commissioning of Sherpa colony, power from Kashang, in accordance with CEA master plan, would be pooled at Sherpa colony by LILO of Kashang-Bhabha-Kunihar 220kV line and establishment of transformation capacity of 2x500 MVA. The works (LILO and its bays and provision of ICT & associated bays) would be carried out as a depository work on behalf of HPPCL/HPPTCL".

A.16.3 As such the 400 kV Pooling Station/Switching station to integrate with existing ISTS system i.e., Karcham Wangtoo-Abdullapur and evacuate power of Shongtong Karcham HEP (450 MW) was to be planned by CTUIL under ISTS.

A.16.4 HPPTCL had proposed for approval of DPR from CEA for 400/220 kV Substation at Wangtoo with interlinking 400 kV line with proposed 400 kV Switching/ Pooling Station at Wangtoo/ Sherpa Colony wherein CEA vide letter dated 06.04.2011 advised to revise the scope of works to avoid 2 Nos. 400kV GIS sub-stations within the proximity of 1 km by HPPTCL as well as CTUIL.

A.16.5 CEA vide letter dated 14.03.2012 approved the revised DPR of the Subject Asset with future scope of 4 No. 400 kV bays for D/C line from Shongtong Karcham HEP and downstream 400 kV line towards Panchkula in future (which is to be evacuated under ISTS).

A.16.6 HPPTCL has accordingly constructed 400/220/66 kV, 2X315 MVA Substation with a capital cost of INR 405 Crores. As per CEA Master Plan and approval of DPRs the space has been kept for 4 No. of 400 kV bays to ensure seamless integration of upcoming ISTS system.

A.16.7 Hon'ble HPERC vide Order dated 28.09.2022 had approved the Capital Cost and determined the tariff from COD to FY 2023-24 for 400/220/66kV Pooling Station at Wangtoo. In said Tariff Order, under Section 4.8.7 Hon'ble HPERC had also directed HPPTCL to approach Hon'ble CERC for appropriate recovery of transmission charges through POC mechanism in

line with CERC (Sharing of InterState Transmission charges and losses) Regulations,2020. In compliance to Hon'ble HPERC directions, HPPTCL vide Affidavit dated 07.01.2023 has filed Petition bearing No. 38/MP/2023 on subject matter.

A.16.8 In light of the above facts and circumstances, it is evident that establishment of the Subject Asset by HPPTCL has facilitated integration of ISTS power with existing ISTS infrastructure i.e., 400 kV Karcham Wangtoo - Abdullapur line. The subsequent system is also being developed incidental to this 400 kV Substation by CTUIL due to severe ROW constraints, land availability issue in the narrow valley and master plan framed by CEA for Satluj Basin. The same has been reiterated by CTUIL in 18th Consultation Meeting. The relevant extract is reproduced as follows-

"……Further HPPTCL informed that they have already filed a petition in Hon'ble CERC for declaring Wangtoo 400/220 kV S/s as an ISTS asset, as it is envisaging the ISTS power of regional entities. Further, many of the hydro projects in Satluj basin area may seek connectivity through ISTS for which above proposed system incl. Wangtoo S/s shall be utilized. In view of this, it was agreed that as the 400 kV side of Wangtoo S/s shall be used for evacuation of power under ISTS, accordingly, HPPTCL may take up the matter with CERC for urgent hearing……."

A.16.9 The Transmission system approved for Shongtong HEP and Tidong HEP and notified on recommendation of NCT (National Committee on Transmission) in Gazette dated-13.04.2023 is as follows

Phase-I with Tidong HEP [Schedule: 01st July 2026]

i) Establishment of 2x315 MVA (7x105 MVA 1-ph units including a spare unit) at 400/220 kV GIS Pooling Station at Jhangi

ii) 420 kV Bus reactor -1 No. (4x 41.66 MVA 1-ph units including one spare unit) at Jhangi

iii) 400 kV Jhangi PS – Wangtoo (Quad) D/c line (Line capacity shall be 2500 MVA per circuit at Nominal voltage)

iv) 400 kV bays (GIS) at Wangtoo for termination of 400kV Jhangi PS – Wangtoo D/c line

Phase-II with Shongtong HEP [Schedule: 31st July, 2026]

v) LILO of one circuit of Jhangi PS – Wangtoo (HPPTCL) 400 kV D/c (Quad) line[$] at generation switchyard of Shongtong HEP: LILO route length- 1 km (2 ckm)

vi) Panchkula- Point PW** 400 kV D/c line (Twin HTLS*,) along with 80 MVAr switchable line reactor at Panchkula end on each circuit – 90 km & Point PW** - Wangtoo (HPPTCL) 400 kV D/c line (Quad AL 59/Quad ACSR Moose/Quad AAAC) - 85 km

vii) 400 kV Line bays- 4 Nos. (2 Nos.GIS bays at Wangtoo and 2 Nos.AIS bays at Panchkula) for termination of 400kV Wangtoo (HPPTCL) - Panchkula (PG) D/c line

***** Point PW : First point of 2000 m altitude of Panchkula-Wangtoo line from Panchkula end***

$ Line capacity shall be 2500 MVA per circuit at nominal voltage

**** with minimum capacity of 2100 MVA on each circuit at nominal voltage and Min. 8 Diameter of 31.77 mm for HTLS conductor***

A.16.10 In the facts and circumstances mentioned above STU is of firm view that the subject asset needs to be declared as an ISTS to be included in the ISTS pool. NRPC is requested to validate the key role being played by 400/220/66 kV Wangtoo substation to integrate the upcoming and existing ISTS system in the upper Satluj valley and thereby ensuring high reliability of ISTS system and declare the said item integral part of ISTS system.

A.16.11 MS, NRPC mentioned that a separate meeting was held 03.05.2024 to discuss the nature of Dedicated/ISTS/Not ISTS status. In the meeting, it was gathered that CEA may devise a uniform philosophy for the same along with definition of various related terms mentioned in the clause. Further, as per the CERC Tariff Regulation (2024-29), CEA will certify the same. HPPTCL was suggested to take up this matter with CEA.

NRPC Deliberation

A.16.12 MS, NRPC conveyed that CEA has to prepare the guidelines in this regard as per the CERC Tariff Regulation (2024-29). However, the same is yet to be started. Therefore, a separate letter will be sent to Chairperson, CEA from NRPC to direct the concern divisions in this matter and get it expedited.

A.16.13 Member (GO&D), CEA was also of the same view and suggested that the deliberation of this meeting may be quoted in the letter.

A.16.14 Chairperson, NRPC and HPPTCL emphasized that after finalization of the modalities by CEA, such issues should be resolved immediately and no need to place this agenda again.

A.16.15 Further, SE, Rajasthan SLDC informed that the huge RE power evacuate from the Intra state transmission lines out of the Rajasthan state. However, the deemed ISTS declaration is not being given for these lines now. Forum suggested Rajasthan SLDC to write the letter to CEA in this matter.

A.16.16 Forum was in line with TCC discussion.

Decision of Forum

i) As per CERC Tariff Regulation (2024-29), forum conveyed HPPTCL to approach CEA for the deemed ISTS status.

ii) CEA may devise a uniform philosophy for certification of the same along with definition of various related terms mentioned in the clause 93 of CERC Tariff Regulation (2024-29)

A.17 Shifting of NTPC Rihand stage-III generating station to northern region and opening of 400 kV Singrauli-Anpara line (agenda by NRLDC)

TCC Deliberation

A.17.1 NRLDC representative apprised that as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP) held on 24.1.2020, 400 kV Singrauli – Anpara has to be opened to control the high fault levels in Anpara – Singrauli – Rihand complex.

A.17.2 Extract from the MoM are shown below:

A.17.3 The

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tic line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

agenda was then discussed in 210, 211 & 212 NR-OCC meetings. In 212 OCC meeting, NRLDC representative requested UP SLDC to provide their comments after discussion with stakeholders. UP SLDC representative stated that based on above study and concerns raised by Executive

Engineer Anpara BTPS vide Letter no 373 EMD-III/BTPS/SLDC dated 11.09.2023 following are the recommendations: -

1. 400 kV Anpara-Singrauli line should remain in services and flow on HVDC Vindhyachal BTB should be from NR-WR until 2X1000 MVA ICTs at Obra C and revised SPS for Anpara Complex is commissioned.
2. In case of single contingency that is tripping of either 765 kV Anpara C-Unnao OR 765 kV Anpara D-Obra C-Unnao line, 400 KV Anpara –Singrauli line should be connected (in case it is opened) as a standard operating procedure and flow on HVDC Vindhyachal BTB should be from NR to WR.
3. 400kV Singrauli-Anpara may be kept antitheft charged/ charged from one end.

A.17.4 He added that no comment was received from POWERGRID, CTUIL or NTPC, accordingly it was agreed that as requested by UP, 400 kV Anpara-Singrauli line should remain in service till commissioning of 2X1000 MVA ICTs at Obra C and revised SPS for Anpara Complex is commissioned. Thereafter, the line may be opened after discussion at OCC level.

A.17.5 At the time of discussion in 212 OCC meeting held in October 2023, NR import had reduced considerably and it was informed that 2X1000 MVA ICTs at Obra C would also be commissioned shortly. Therefore, opening of 400kV Anpara-Singrauli was linked with commissioning of 2X1000 MVA ICTs at Obra C as winter was approaching and fog related tripping were also suspected.

A.17.6 Subsequently, the matter was also discussed in first meeting of Standing Committee on Short Term & Perspective Power System Planning- Northern Region (SCSTPPSP-NR) held on 14.03.2024 at NRPC, New Delhi. In the meeting, it was recorded that

"During the meeting, UPPTCL representative informed that the 765/400 kV ICTs at Obra C are expected to be charged this summer (one in April and another in June) along with associated 400 kV lines from Obra C. This is expected to provide relief in the complex"

A.17.7 However, due to delay in commissioning of 765/400kV ICTs at Obra C and violations of WR-NR ATC/TTC limits, the agenda for opening of 400 kV Anpara-Singrauli line needs to be deliberated again.

A.17.8 With opening of 400kV Singrauli-Anpara line, following relief in 3-ph fault levels would be achieved:

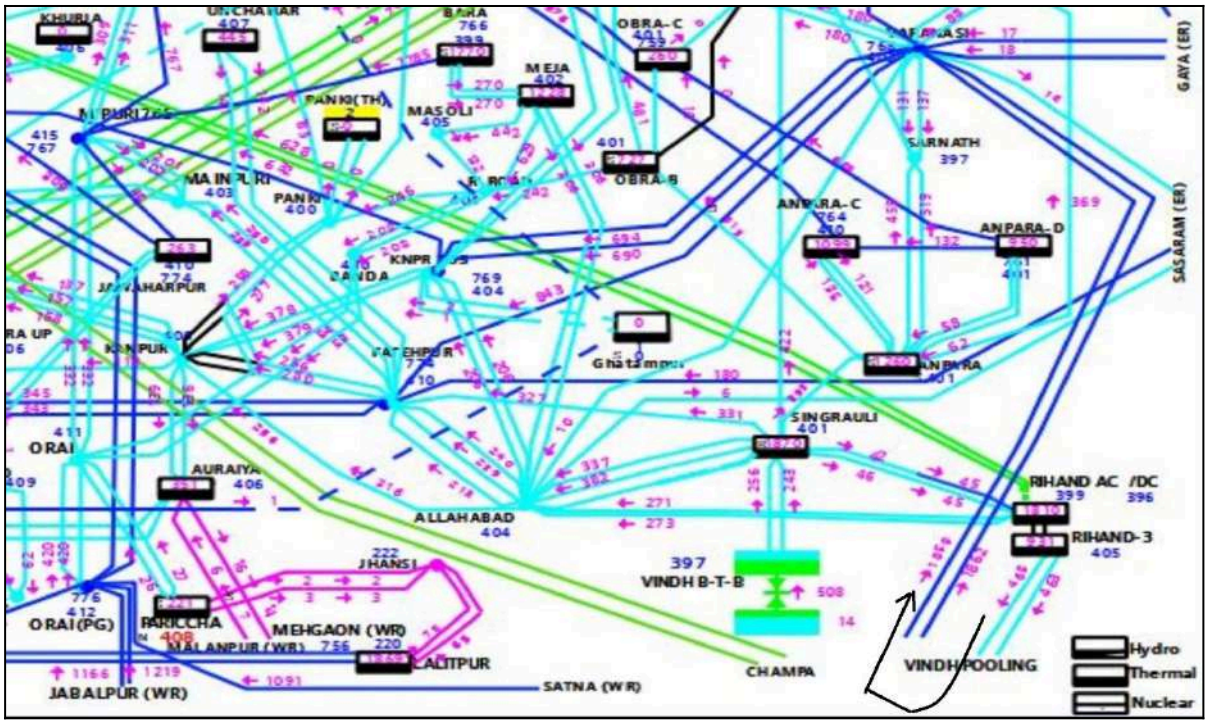
- 400kV Singrauli by 16kA (below 40kA)
- 400kV Anpara by 14kA (below 40kA)
- 400kV Anpara C by 13kA (below 40kA)
- 400kV Anpara D by 11kA (below 40kA)
- 400kV Rihand by 5kA (below 40kA)

A.17.9 Opening of 400kV Anpara-Singrauli would also facilitate shifting of Rihand-III generation to NR and disconnection from Vindhyachal Pool in WR. Therefore, power of Rihand-III generators which is getting evacuated through Vindhyachal and again being pooled to NR through 765kV Vindhyachal-Varanasi D/C line would directly be evacuated to NR from Rihand. This shall help NR to import more power from WR-NR path and violations of WR-NR ATC and NR simultaneous import ATC could be minimised.

A.17.10 Transmission System associated with Rihand-III (1000MW) generation projects of NTPC were approved in 29th WR-SCM on 10.09.2009. Approved transmission system of Rihand-III was planned towards WR side by 400kV Rihand-III – Vindhyachal D/C lines. However, as the line commissioning was delayed and HVDC Champa-Kurukshetra bipole was not commissioned, for the benefit of NR states it was agreed that Rihand-III may be evacuated directly through NR Grid till commissioning of HVDC Champa-Kurukshetra bipole. Same was also discussed in 31st TCC & 35th NRPC Meetings held on 8th and 9th July, 2015.

A.17.11 After operation of HVDC Champa-Kurukshetra bipole since Sep 2017, Rihand-III was shifted to its original planned transmission system in November 2017 and its generation is getting evacuated through WR since then.

A.17.12 No major issues were observed in NR import till previous year as HVDC Champa-Kurukhsetra bipoles were commissioned, subsequently, 765kV Vindhyachal-Varanasi D/C lines were also commissioned to increase transfer capability limits from WR to NR.



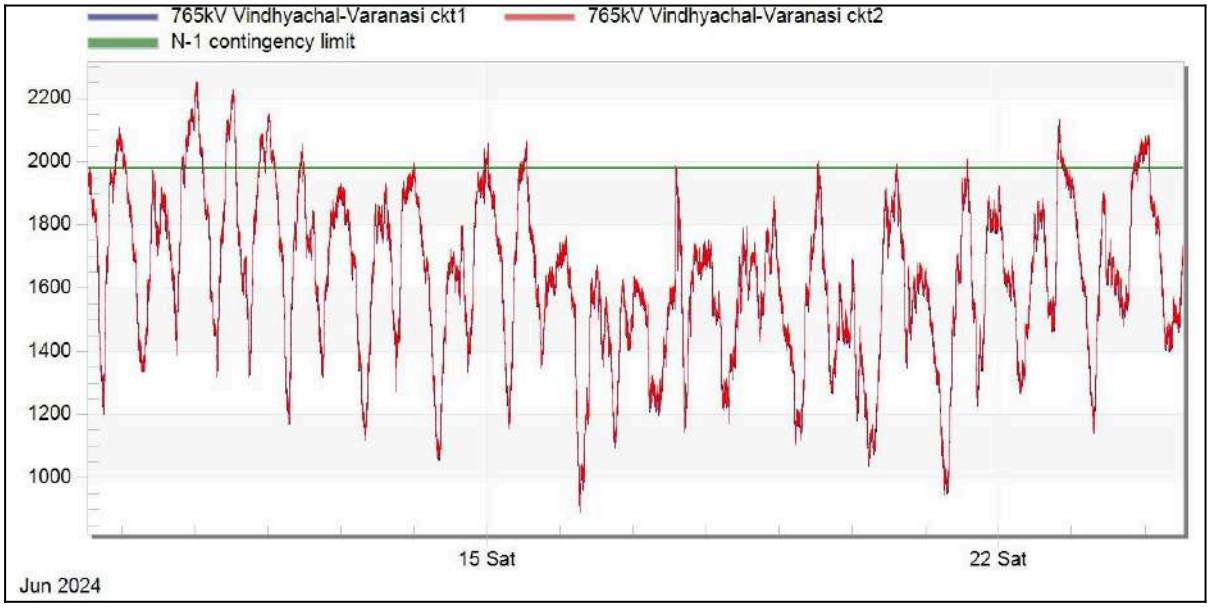
Network diagram showing power of Rihand-III evacuated to Vindhyachal Pool and again flowing to NR through 765kV Vindhyachal-Varanasi D/C lines

A.17.13 Since last year, Northern Region (NR) is experiencing a significant increase in power demand, particularly during non-solar hours in summer months. The Northern Regional import from neighboring regions (WR and ER) has also increased and the transfer capability limit (TTC/ATC) between the Western Region (WR) and Northern Region (NR) is getting breached on regular basis.

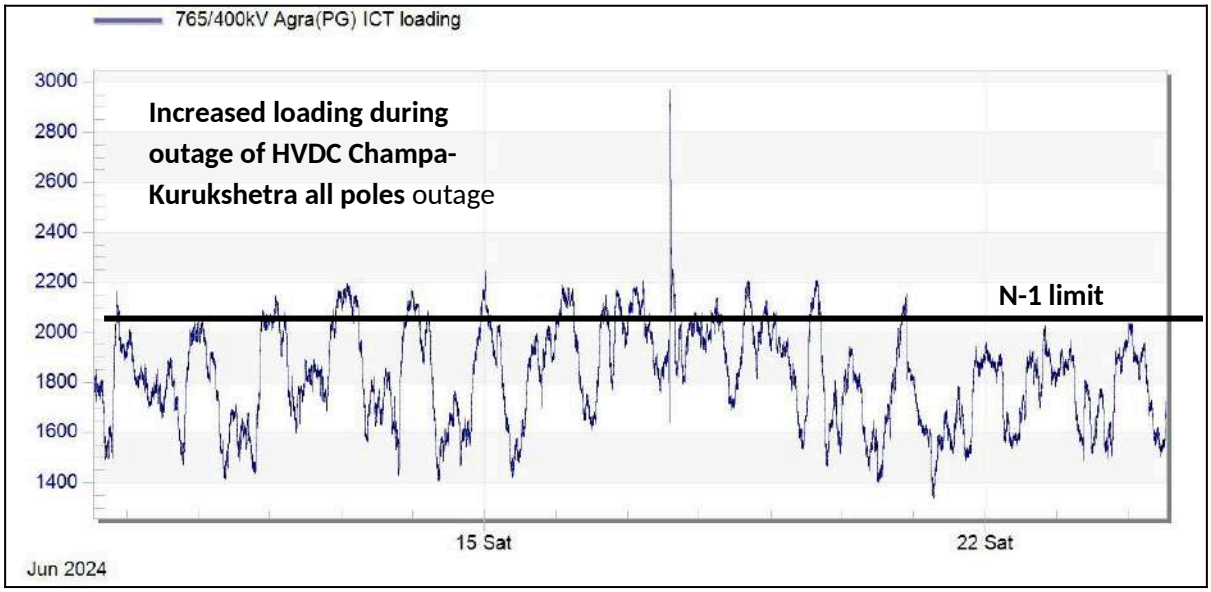
A.17.14 The loading on the 765 kV Vindhyachal-Varanasi D/C remains on the higher side (N-1 non-compliance also observed on few occasions) for significant period of the time. The high loading on the 765 kV Vindhyachal-Varanasi D/C is currently one of the limiting factors in facilitating further transfer of power from WR to NR apart from N-1 contingency of 765/400kV Agra (PG) ICTs.

A.17.15 He submitted that violation of WR-NR ATC and request to remain within schedule has also been communicated from NRLDC side to NR states in real-time through mail as well as through written communication. Communication sent from NRLDC side in this regard to all NR states is attached as **Annexure-XX**.

A.17.16 He also added that violations of import transfer capability limits are also being highlighted by NLDC in real-time and congestion warning messages are also being issued in real-time. One such message is attached as **Annexure-XXI**.

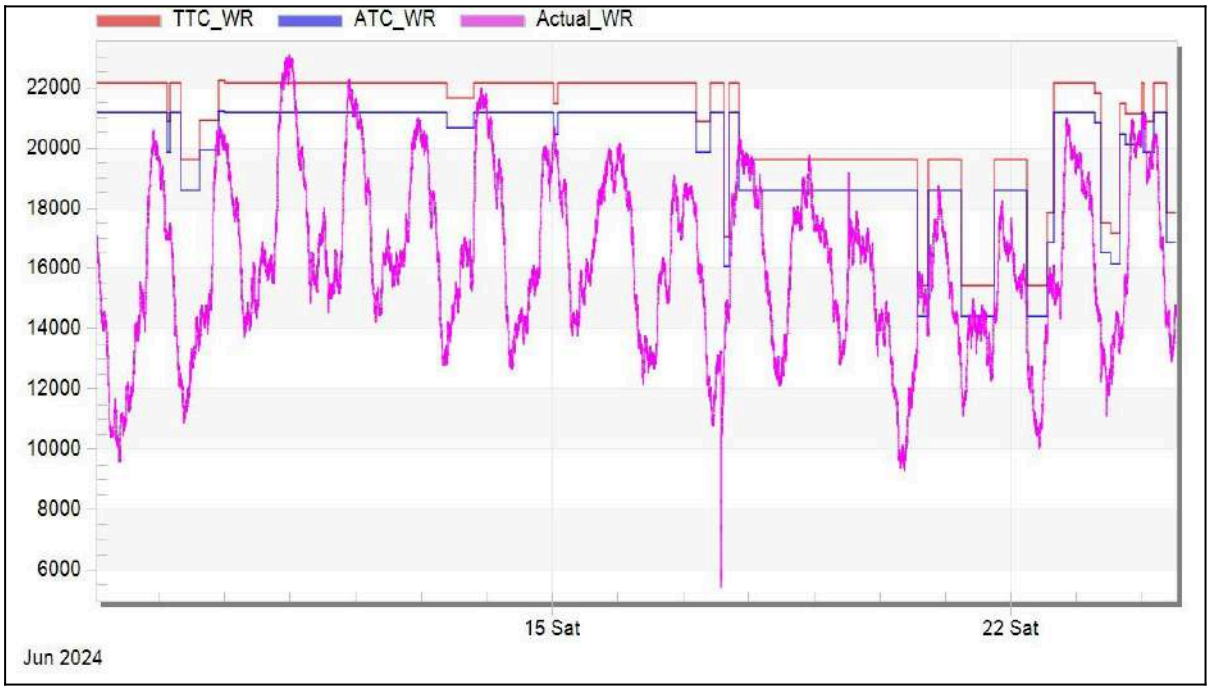


High loading, beyond N-1 limits of 765kV Vindhyachal-Varanasi D/C lines for 09-24 June 2024



High loading, beyond N-1 limits of 765/400kV 2*1500MVA Agra(PG) ICTs for 09-24 June 2024

A.17.17 WR-NR ATC violations in real-time would lead to situation wherein NR states would not be able to draw further power from Western region and as a result, may need to resort to overdrawl or load shedding incase internal generation in NR is not available.



Violations of WR-NR ATC/TTC for 09-24 June 2024

A.17.18 At present, Rihand stage-III generating station (2x500 MW) is evacuated through Western Region via 400 KV Rihand stage-III- Vindhyachal PS D/C. Further, the station is disconnected from NR by

keeping the bus coupler between Rihand-III and Rihand- I &II open. Shifting of Rihand stage-III generating station (2x500 MW) to NR by closing the bus coupler between Rihand-III and Rihand-I & II and disconnecting Rihand-III from WR by opening 400 kV Rihand stage-III - Vindhyachal PS D/C as an interim measure is proposed.

A.17.19 As per the system studies carried out by NRLDC and NLDC, the system is n-1 secure with the above reconfiguration. The fault levels in the generation complex are also within the breaking capacity of switchgear. There would be a relief of ~250 MW in loading of each circuit of 765 kV Vindhyachal - Varanasi D/C and the increment in WR-NR TTC/ATC after the implementation of proposed rearrangement is expected to be of the order of ~1300 MW.

Sl No	Corridor	Time	Current Declared TTC	Simulated Revised Figures			Limiting Constraints
				TTC	RM	ATC	
1	NR Import	09:00-16:00	19050	**19300**	1400	17900	1. N-1 contingency of one ckt of 765 kV Vindhyanchal-Varanasi will overload the other circuit 2. N-1 contingency of one ckt of 2*1500 MVA 765/400 kV ICTs at Agra-PG will overload the remaining ICT
		other than 09:00-16:00	25500	**25750**	1400	24350	
2	WR -> NR	09:00-16:00	17850	**19150**	1000	18150	
		other than 09:00-16:00	22150	**23450**	1000	22450	
3	ER -> NR	09:00-16:00	6350	**6350**	400	5950	
		other than 09:00-16:00	6350	**6350**	400	5950	

A.17.20 Accordingly, an urgent meeting was convened on 14.06.2024 between NRLDC, NLDC, UP SLDC, UPPTCL, UPRVUN, NTPC to discuss the opening of 400kV Singrauli-Anpara line and subsequently connecting Rihand-III to Northern region.

A.17.21 In the meeting, it was agreed that:

1. Opening of 400kV Singrauli-Anpara line as per the decision taken in 1st NRPCTP meeting (to control high fault levels in the complex) was agreed. The above issue would also be discussed in upcoming 220 NR-OCC meeting scheduled on 19.06.2024 for any other inputs/ comments from the stakeholders. After discussion at NR-OCC level, 400 kV Singrauli-Anpara line shall be opened.

2. The agenda regarding shifting of Rihand stage-III to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III- Vindhyachal PS-D/C shall be

discussed in 220th NR-OCC as well as next WR-OCC meeting. Subsequently, the same shall be implemented.

3. Instructions will be issued to NRLDC, UP SLDC, UPPTCL, Anpara TPS, POWERGRID and NTPC to take 400kV Singrauli-Anpara in service on priority basis in case of any grid requirements.

A.17.22 Communication sent from NLDC side in this regard to NRPC as well as WRPC along with Minutes of meeting held on 14.06.2024 is attached as **Annexure-XXII.**

A.17.23 He mentioned that to implement the decision of 1st NRPCTP and to enhance WR-NR ATC/TTC limits during the ongoing high demand season, NRPC forum was requested to approve:

- Opening of 400kV Singrauli-Anpara line as per decision of 1NRPCTP
- Connecting Rihand-III to Northern region and disconnecting 400kV Rihand III-Vindhyachal D/C lines

A.17.24 ATC/TTC limits are getting violated during high import of NR from WR

A.17.25 NR states welcomed the proposal as it would increase ATC/TTC of WR-NR by 1300MW. This would help meet high demand during this high demand season, silt outage etc.

A.17.26 UPSLDC and UPRVUN representatives expressed concern regarding possibility of major grid event in case of multiple element outage (N-2/N-3) in UP Control area and requested that opening of 400kV Singrauli-Anpara line and shifting of Rihand-III to NR may be done after commissioning of one 765/400kV ICT at Obra and implementation of revised SPS in Anpara complex.

A.17.27 UPSLDC representative stated that one ICT at Obra is expected in Jul’24 and another ICT is expected at Obra in Dec’24.

A.17.28 NRLDC representative stated that commissioning of Obra ICT is getting delayed and in OCC meeting held on 20.06.2024, timeline of 27th June was provided by UP. Again timeline is being revised from UP side.

A.17.29 NRLDC representative stated that with the proposed arrangement reliability of 400kV Rihand-III would increase, as presently only two lines are available and with proposed arrangement, additional connectivity would be available for Rihand-III.

A.17.30 NRLDC representative stated for any exigency, 400kV Singrauli-Anpara shall be kept charged from one end and would be synchronized in min. possible time in case of requirement

A.17.31 NTPC representative expressed concern on readiness of team at Rihand and asked some time for ensuring healthiness of bus coupler at Rihand which is to be connected to Rihand-I/Rihand-II and Rihand-III and also stated it would increase stress on Stage-1 & 2 switchyard equipment

A.17.32 NRLDC representative stated element healthiness need to be ensured by asset owner and also that system would be N-1 compliant and benefit NR states. Rearrangement may be reviewed in case of major issues after high demand season of NR.

A.17.33 MS WRPC stated no issues from WR side.

A.17.34 TCC forum agreed that separate meeting would be called in first week of July with all stakeholders including CEA-PSPA I. Based on discussion in meeting, further action would be taken. No further discussion in OCC/NRPC forum required for shifting of Rihand-III to NR and opening of 400kV Singrauli-Anpara line after online meeting.

NRPC Deliberation

A.17.35 Member (GO&D) stated that the proposal is appreciable as it is beneficial to NR states and all utilities need to think for the benefit of all stakeholders. However, concerns raised from UPLDC and NTPC also need to be addressed.

A.17.36 Forum agreed with deliberations of TCC.

Decision of Forum

Forum recommended to convene a meeting under chairmanship of MS NRPC in the above matter and the decision of the same would be considered as decision of NRPC.

A.18 Approval of Draft SOP regarding Procurement & Installation of ISTS Interface Energy Meter (IEM) (agenda by CTUIL)

TCC Deliberation

A.18.1 EE (C), NRPC apprised that as per CEA metering regulations, 2006 and its amendments thereafter, all interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU. As per IEGC, 2023, CTU shall be responsible for procurement and installation of Interface Energy Meters and responsible for replacement of faulty meters.

A.18.2 In line with the above and to maintain uniformity at PAN India, a draft 'SOP regarding Procurement & Installation of ISTS Interface Energy Meter (IEM)' has been prepared by CTUIL and was floated on CTUIL website on 2nd May 2024 for stakeholder comments/feedback and comments were invited till 31st May 2024.

A.18.3 CTUIL representative informed that comments from BBMB, SRLDC, SRPC, SLDC JSEB, Ranchi and POWERGRID were received through mail. (Attached as **Annexure-XXIII**)

A.18.4 After incorporation of comments as suitable, the draft SOP has been finalized and put up for discussion and approval. (Attached as **Annexure-XXIV)**

A.18.5 ED (O&M), NHPC raised concern that timeline mentioned in the SOP is of long duration and there is no provision for late installation of meter by POWERGRID.

A.18.6 POWERGRID representative requested CTUIL to develop a web portal for managing metering installation request where manual intervention can be avoided and timelines can be optimized further.

A.18.7 MS, NRPC appreciated the above suggestion of POWERGRID.

A.18.8 POWERGRID highlighted about the long pending dues regarding payment of installed meters. Forum suggested POWERGRID to bring the matter in upcoming NRPC meeting.

NRPC Deliberation

A.18.9 COO, CTUIL conveyed all utilities to provide assistance to the POWERGRID for meter installation and highlighted that POWERGRID will also charge the amount appropriately. Citing the significant financial implication of incorrect meter data in various energy accounts, he apprised that meter installation and replacement concerns will be amply addressed through this procedure and utilities will be able to ensure furnishing the correct meter data.

A.18.10 Member (GO&D), CEA advised the utilities that they should try to resolve such issues of payment of meter replacement mutually.

A.18.11 MS, WRPC asked CTUIL to put up this agenda in the WRPC meeting also. Member (GO&D), CEA added that CTUIL may put up the same agenda in other regions also and/or NPC.

A.18.12 Forum agreed with the decision taken in the TCC meeting and directed to proceed ahead with the implementation of SOP in the Northern region.

Decision of Forum

Forum decided that Utilities may again submit comment, if any, within one week to CTU and CTU may incorporate the same and finalise SOP without any need of further approval from NRPC forum.

A.19 Supply & Installation of AMR Compatible ISTS Interface Energy Meters along with AMR (Automatic Meter Reading) System under the scheme "5 min Interface Energy Meter along with AMR system"-For all five regions as PAN India level (agenda by CTUIL)

TCC Deliberation

A.19.1 EE (C), NRPC apprised that a Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes:

- All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations).
- Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose

A.19.2 In view of the above for making the system future ready for 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling, Accounting, Metering & Settlement; JC TS is being adopted for the above-mentioned project proposal as following:

S. No.	Items	Details
1.	Name of Scheme	Supply and installation of AMR compatible 5 min Interface Energy Meter along with AMR Systems- For all five regions NER, ER, NR, WR & SR.as PAN India.
2.	Scope of the scheme	1. Supply of AMR compatible 5 min Interface Energy Meters for all ISTS metering points of All five regions, 2. Installation of new AMR compatible IEMs by replacing existing meters in case of existing points and for newly added metering points. (Replacement work & New Installation work) 3. Supply and installation of AMR systems in dual LAN configuration at central location along with DCU, Ethernet Switch and other accessories at substation end and AMR software along with servers, consoles, historian software, database, printer, firewall, furniture, etc. at RLDC end to receive 5 min load profile data in auto mode. 4. Provision of streaming online instantaneous MW data at a user configurable rate (minimum 1 min) via AMR system for viewing purpose. 5. AMC includes Operations & Maintenance work (including data processing & report generation from

S. No.	Items	Details
		AMR) for complete AMR system for 7 years. 6. On line Data storage of Raw Data & processed data for three years. The complete scope of IEM & AMR scheme shall be broadly in line with the Technical Specification (Section 1 & 2 of Part 1) circulated by NPC Division, CEA vide letter dtd. 6th July 2022. *Note: MDP system which is also part of the above TS mentioned shall be implemented by respective RLDC and would match the timeline schedule with IEM & AMR project.*
3.	Conceptual Architecture of AMR connectivity of ISTS Meters	**Annexure-XXV**
4.	Objective / Justification	For Indian Power system, commercial settlements of energy generation and consumption are being computed through Availability Based Tariff (ABT) and Deviation Settlement Mechanism (DSM) which are in vogue for energy accounting. Availability Based Tariff was implemented in India in 2002/2003 considering the settlement period as 15-min. Government of India (GoI) has set a Renewable Energy (RE) target of 500 GW by 2030. In the last few years approximately since a decade, the need for implementing 5-minute meters along with AMR system for regional energy accounting and settlement at the Inter State level has been discussed and deliberated in various apex level forums & Committees. A PAN India pilot project on 5-minute metering was implemented as per the directive from Hon'ble CERC in 2018. A report on the pilot project covering implementation aspects, challenges and suggested way forward has been submitted by POSOCO for perusal of the Hon'ble Commission This issue was discussed in OCC/TCC/RPC meetings at regional level and it was discussed to replace the existing SEMs (15-min Block) with AMR compatible Interface

S. No.	Items	Details
		Energy Meters (5-min Block) and implementation of Automated Meter Reading (AMR) and Meter Data Processing (MDP) system for efficient and faster accounting. Moreover, there is a need expressed by States to get streaming online instantaneous MW data at a user configurable rate (minimum 1 min) at SLDCs via AMR system for viewing purpose to manage their drawl. A Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has been prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes: • All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations). • Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose only. CTUIL sent a letter dtd. 27.06.2023 to CERC (attached as **Annexure-XXVI**) stating that nodal agency for AMR system implementation may be identified. CTUIL also informed NPC division, CEA vide letter dtd. 24.07.2023 (attached as **Annexure-XXVII**) that JC TS calls for 5 min Time block recording by ISTS IEMs whereas as per CEA metering regulation it is 15 min time block. In this regard, Grid-India NLDC specified to NPC, CEA that 5-minute time block could be considered for procurement of new ISTS IEM, AMR & MDP (attached as **Annexure-XXVIII**). Subsequently NPC CEA, coordinated a joint meeting (mail attached as **Annexure-XXIX**) amongst the stakeholders comprising of CERC, Grid India (NLDC, RLDCs) & CTUIL, chaired by CEA Regulatory division dated 18th August'23 to check the feasibility for amendment of the CEA metering regulation in line with the ongoing developments and requirements of 5 min time block recording in IEMs.

S. No.	Items	Details
		In view of the above-mentioned system requirement of 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling, Accounting, Metering & Settlement; JC TS is being adopted for the above-mentioned project proposal.
5.	Deliberations in RPCs	The scheme was discussed in all the RPCs and the status is as below: Scheme is approved in SRPC if 50% fund is available from PSDF(July'23). Scheme is in principle approved in NERPC (June'23) and WRPC (Feb'2023) as well. Funding status to be updated to the forums. For NRPC- In 72nd NRPC meeting, CTU was advised to refer the case to NPC subgroup of communication to review the technical specifications in consultation with states. For ERPC- A special meeting was proposed in 47th TCC-Nov'22 meeting to deliberate the project in detail in line with the life of the existing AMR system, which is going to be ended on 31st March 2026. Project Cost was informed to all RPCs during Year 2022/23.
6.	Estimated DPR Cost	Rs. 444.87 Cr. excluding AMC & Rs 152.62 Cr. for 7 years AMC *Costing to be updated considering latest no. of meters and locations at the time of tendering.
7.	Implementation timeframe	Approx. 24 months from gazette Notification.
8.	Implementation Mode	To be deliberated

A.19.3 Grant from PSDF for the FY 24-25 is not available as per MoP order. Accordingly, the **funding** was also to be **deliberated**. Earlier 90% of the project cost was allocated for grant.

A.19.4 Implementation **mode** for the project was also to be **deliberated** by the forum before approval.

A.19.5 In the 72nd NRPC meeting, CTU was advised to take-up the matter to NPC subgroup of communication to review the technical specifications in view of the requirements of some states for integrating 1 minute MW data with SLDC. (Attached as **Annexure-XXX**).

a. CTU took up the above issue with NPC Secretariat.

b. In the process, inputs from Grid-India were received. (Attached as **Annexure-XXXI)**. Grid-India highlighted that the interface energy meter data is primarily required for deviation accounting at the inter-state level in line with the prevailing CERC regulations. Any State specific requirement may be considered based on the feasibility study and without compromising the relevant standards and regulatory provisions.

c. CTU endorsed the above views of Grid-India regarding meter data and its flow as per CEA Metering Regulations & CERC Grid code and other relevant regulations and Technical Specification of IEM finalized by JC.

Subsequently, the issue was also deliberated in a meeting with NRPC secretariat, NPC, CTU, NLDC and NRLDC wherein:

a. Extract from the approved JC Technical Specification (TS) for ISTS Metering System were presented as follows:

"Utilities take decisions for their drawal management, based upon real-time MW SCADA data which generally leads to increased DSM penalty, which is computed subsequently from weekly Interface Energy Meters (IEM) energy data

In view of the new DSM regulation and its amendments, which are more stringent, there is a need expressed by States to get streaming online instantaneous MW data at a user configurable rate (minimum 1 min) at SLDCs via AMR system. This instantaneous MW data is only for the purpose of taking actions/decisions in real time for grid monitoring & discipline."

b. Thus, it was agreed that the inclusion of above provision in TS reflected/confirmed that views of various stakeholders were deliberated by JC while finalizing TS.

c. It was also agreed that the present JC TS would facilitate compliance to the provisions of the CEA metering regulation which mandates that the data shall be communicated to RLDCs using secured and dedicated communication system. The same is quoted below.

"(b) The metered data shall be communicated to the respective Load Despatch Centre by using a secured and dedicated communication system".

d. NRLDC informed that AMR based metering system has become an immediate need of the sector and hence should be implemented at the earliest.

e. CTU informed that the AMR metering agenda is being taken up in all the RPCs so that the scheme is taken up in implementation at the earliest after approval of NCT. Further, 1-minute MW IEM data is already envisaged to be provided to SLDCs to take real-time operational decisions to minimize DSM penalty.

f. In view of the fact that TS for the scheme was finalized by the Joint Committee after taking views from all the stakeholders and the scheme needs to be approved & implemented without any further delay, the review of TS was not recommended at this stage. It was also agreed that any new state specific requirements, the one put up before the forum in 72nd NRPC meeting, will lead to further delay without serving any valuable purpose defined in CEA metering regulations.

A.19.6 The scheme has been approved in SRPC, WRPC and NER OCC (Attached as **Annexure-XXXII).** After approval from rest of the RPCs, the scheme shall be further taken up to NCT for final approval for implementation. The proposed scheme may be approved by NRPC for implementation on pan-India basis.

A.19.7 In view of above, CTUIL proposed that the AMR scheme may be approved.

A.19.8 MS, NRPC conveyed CTUIL may proceed ahead to get the approval of same from other remaining RPCs.

NRPC Deliberation

A.19.9 Member (GO&D), CEA highlighted current metering regulations provides to install IEMS capable of recording active energy data in a 15-minute time-block. Since, the proposed IEMs are capable of recording active energy reading in a 5 minutes time-block and data will be further converted to 15-minutes time-block, CEA metering regulations does not need any amendment to implement this scheme.

A.19.10 Further, it was gathered that since funds are not available in PSDF, mode of funding and implementation mode may be discussed in the NCT meeting.

A.19.11 Forum was in consonance with the deliberation held in the TCC meeting.

Decision of Forum

A.19.12 *Forum approved the scheme of Supply & Installation of AMR Compatible 5 min ISTS Interface Energy Meters along with AMR (Automatic Meter Reading) System with mode of funding and implementation mode to be deliberated in the NCT meeting.*

B.1 Approval of MoM of the 73rd NRPC meeting

B.1.1 EE (P), NRPC apprised that the minutes of the 73rd NRPC meeting (held on 21.05.2024) was issued vide letter dtd. 10.06.2024. No Comments have been received.

Decision of NRPC Forum

Forum approved the issued MoM.

B.2 Approval of decisions of TCC meeting held on 28.06.2024

Deliberation has already been added along with deliberation of agenda of TCC meeting.

B.3 Status of Outstanding Contribution for FY 2024-25 (Agenda by NRPC Secretariat)

B.3.1 EE (P), NRPC apprised that Demand Letter for contribution towards NRPC fund for the year 2024-25 was sent on 10.04.2024 to all the constituent members. It was also mentioned that beyond 30th June, 1 % simple interest shall be levied as per the decision of NRPC Forum. Accordingly, NRPC Secretariat has received contributions from some organizations.

B.3.2 It is informed that till 30th June, payment has not been received from 4 constituent members only. Details of organizations from which payment has not been received is mentioned below:

S. No.	Name of Constituent	Period (FY)	Contribution amount
1	Talwandi Sabo Power Ltd.	2024-25	12,00,000
2	UT of Ladakh	2024-25	12,00,000
3	UT of Chandigarh	2024-25	12,00,000
4	Fatehgarh Bhadla Transmission Limited	2024-25	12,00,000

B.3.3 It was requested to pay the contribution amount at the earliest and payment after 30th June should be made along with penalty i.e. simple interest of 1 % per month.

B.3.4 The constituent members whose payment have already been made, were told to share the transaction details for reconciliation at NRPC.

Decision of NRPC Forum

Forum noted the information and requested concerned to pay the contribution amount at the earliest and payment after 30th June should be made along with penalty i.e. simple interest of 1 % per month.

B.4 Pending Outstanding contributions by J&K (agenda by NRPC Secretariat)

B.4.1 MS, NRPC apprised that NRPC Secretariat receives contribution from constituent members annually in NRPC fund for functioning of its office. Accordingly, payment of contribution amount is done against demand letter issued by NRPC.

B.4.2 JKSPDCL and JKPDD/JKPCL were both member of NRPC from FY 2014-15 to FY 2021-22. JKSPDCL and JKPDD/JKPCL had outstanding contribution to NRPC fund, of Rs 32 lakhs (FY 2014-15, FY 2015-16 & FY 2018-19) and 22.9 lakhs (FY 2019-2020, FY 2021-22) respectively. Thus, a total of 54.9 lakhs including interest amount was pending from J&K.

B.4.3 In this regard, pending payment status was also discussed in various NRPC meetings and several reminders and D.O. letters were also communicated by NRPC Secretariat.

B.4.4 Further, he informed that both JKSPDD/JKPCL and JKSPDCL have cleared their outstanding dues (excluding interest amount).

B.4.5 JKSPDD/JKPCL has made payment of contribution amount of Rs 20 Lakhs on 11.03.2024 but it has not paid the penalty interest amount. This matter was subsequently discussed in the 72nd NRPC meeting wherein the forum decided to waive off the interest amount of JKSPDD/JKPCL.

B.4.6 JKSPDCL has also made contribution amount of Rs 32 Lakhs on 22.05.2024. It had no penalty interest amount pending.

B.4.7 In view of the above, it was addressed that both the members from J&K have paid their long outstanding dues.

Decision of NRPC Forum

Forum noted the information and appreciated efforts of MS, NRPC for closing long pending issue.

B.5 Hiring of Manpower in NRPC secretariat through GeM Portal under Manpower Outsourcing Services - Minimum Wages Contract for various categories (Agenda by NRPC Secretariat)

B.5.1 MS, NRPC apprised that at present, 14 nos. of manpower are employed in NRPC secretariat which are hired through GeM contract GEMC-511687763578746 for Manpower Outsourcing Services - Minimum wages at a cost of Rs. 44,97,717.83/- for one year under following categories as below:

Sr. No.	Category	No. of Manpower	Skill level
1	Sweeper	6	Unskilled

2	Mali/Gardner	1	Semi-skilled
3	Watch and Ward	4	Skilled
4	Data Entry Operator	2	Skilled
5	Electrician	1	Skilled

Table -1

B.5.2 He added that current GeM contract GEMC-511687763578746 for Manpower outsourcing services under Minimum wages is expiring on 10.08.2024 and therefore fresh bid for Manpower Outsourcing Services - Minimum Wages Contract needs to be floated on GeM Portal for continuing the above services requirement in NRPC Office/Colony Complex.

B.5.3 Apart from existing manpower, NRPC Secretariat needs to hire some additional manpower for reviving of office canteen as per the current requirement. NRPC secretariat hosts various full day meetings in its Conference Room. Lunch is arranged in the meetings by NRPC secretariat with the help of existing manpower. NRPC secretariat intends to build in-house capability for arranging lunch for the meetings as canteen food is more hygienic and cost effective. Accordingly, it is proposed to hire one cook and one helper for the office canteen for making it fully functional and fulfilling present requirements.

Further, presently maintenance works is being done through Civil ARMO contract for NRPC colony and NRPC office, which is also due expire soon. NRPC secretariat intends to hire one Plumber & one Carpenter and get the maintenance works done in place of ARMO contract for various repair and maintenance needs in NRPC Colony & Office.

B.5.4 Accordingly, Additional manpower requirement tabulated as under was presented-

Sr. No.	Category	No. of Manpower	Skill level
1	Cook	1	Skilled
2	Canteen Helper	1	Unskilled
3	Plumber	1	Skilled
4	Carpenter	1	Skilled

Table -2

B.5.5 Subsequently, followings were proposed by NRPC Secretariat-

i) It was proposed that fresh bid may be floated through Gem portal considering total manpower requirement of 18(14+4) as given in Table 1&2 above for one year to ensure continuity of above services in the NRPC Secretariat.

ii) While preparing the fresh bid latest minimum wage as notified by Govt of NCT Delhi effective from 01.04.2024 (or as per latest rate) shall be considered.

iii) The provision for bonus payment to the Contract Employees as per Labour Act/GoI rule shall be considered.

iv) Tentative, financial implication shall be about Rs 62 lakhs (Approx). NRPC Secretariat shall take fresh approval after finalization of bid, once L1 bidder is decided through Gem Portal.

B.5.6 Further, Forum was requested to approve the above proposal so that bidding process through Gem Portal is initiated and manpower is placed before expiring of present Contract.

Decision of Forum

Forum approved the above proposals of NRPC Secretariat.

B.6 Hosting of next physical TCC & NRPC meeting (agenda by NRPC Secretariat)

B.6.1 It was deliberated that next physical TCC & NRPC meeting may be hosted in the month of September/October 2024.

B.6.2 The roster for hosting of meetings attached as **Annexure- XXXIII** was presented and Lanco Anpara Power Limited and Apraava Jhajjar were asked about the hosting of the next physical TCC and NRPC meeting.

B.6.3 Lanco Anpara Power Limited representative conveyed that due to take over of the Lanco Anpara Power Limited by other company, conditions are not conducive for them to host the meeting as of now.

B.6.4 It was decided to approach NTPC Vidyut Vyapar Nigam Ltd for hosting next physical meeting.

B.6.5 There was no representative from NTPC Vidyut Vyapar Nigam Ltd. However, NTPC representative conveyed that the consent will be informed to NRPC Secretariat after discussing with authorities of NVVN.

Decision of Forum

NVVN will intimate its consent to NRPC Secretariat for hosting next physical meeting in September/October 2024.

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NRPC Members for FY 2024-25

S. No.	NRPC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Member (GO&D), CEA	member.god@cea.nic.in
2	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Member (PS), CEA	memberpscea@nic.in
3	CTUIL	Central Transmission Utility	Chief Operating Officer	pcgarg@powergrid.in
4	PGCIL	Central Government owned Transmission Company	Director (Operations)	tyagir@powergrid.in
5	NLDC	National Load Despatch Centre	Executive Director	scsaxena@grid-india.in
6	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
7	NTPC	Central Generating Company	Director (Finance)	jaikumar@ntpc.co.in
8	BBMB		Chairman	cman@bbmb.nic.in
9	THDC		CGM (EM-Design)	rrsemwal@thdc.co.in
10	SJVN		CMD	sectt.cmd@sjvn.nic.in
11	NHPC		Director (Technical)	rajkumar0610.rkc@gmail.com
12	NPCIL		Director (Finance)	df@npcil.co.in
13	Delhi SLDC	State Load Despatch Centre	General Manager	gmsldc@delhisldc.org
14	Haryana SLDC		Chief Engineer (SO&C)	cesocomml@hvpn.org.in
15	Rajasthan SLDC		Chief Engineer (LD)	ce.ld@rvpn.co.in
16	Uttar Pradesh SLDC		Director	directorsldc@upsldc.org
17	Uttarakhand SLDC		Chief Engineer	anupam_singh@ptcul.org
18	Punjab SLDC		Chief Engineer	ce-sldc@punjabsldc.org
19	Himachal Pradesh SLDC		Managing Director	mdhpsldc@gmail.com
20	DTL	State Transmission Utility	CMD	cmd@dtl.gov.in
21	HVPNL		Managing Director	md@hvpn.org.in
22	RRVPNL		CMD	cmd.rvpn@rvpn.co.in
23	UPPTCL		Managing Director	md@upptcl.org
24	PTCUL		Managing Director	md@ptcul.org
25	PSTCL		CMD	cmd@pstcl.org
26	HPPTCL		Managing Director	md.tcl@hpmail.in
27	IPGCL	State Generating Company	Managing Director	md.ipgpp@nic.in
28	HPGCL		Managing Director	md@hpgcl.org.in
29	RRVUNL		CMD	cmd@rrvun.com
30	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
31	UJVNL		Managing Director	mdujvnl@ujvnl.com
32	HPPCL		Managing Director	md@hppcl.in
33	PSPCL	State Generating Company & State owned Distribution Company	CMD	cmd-pspcl@pspcl.in
34	UHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)	Managing Director	md@uhbvn.org.in
35	Jodhpur Vidyut Vitran Nigam Ltd.		Managing Director	md.jdvvnl@rajasthan.gov.in
36	Paschimanchal Vidyut Vitaran Nigam Ltd.		Managing Director	md@pvvnl.org
37	UPCL		Managing Director	md@upcl.org
38	HPSEB		Managing Director	md@hpseb.in
39	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head (Commercial & Regulatory)	sanjay.bhargava@tatapower.com
40	Aravali Power Company Pvt. Ltd		CEO	brahmajig@ntpc.co.in
41	Apraava Energy Private Limited		CEO	niraj.gupta@apraava.com
42	Talwandi Sabo Power Ltd.		COO	Vibhav.Agarwal@vedanta.co.in
43	Nabha Power Limited		CEO	sk.narang@larsentoubro.com
44	Lanco Anpara Power Ltd		President	sudheer.kothapalli@meilanparapower.com
45	Rosa Power Supply Company Ltd		Station Director	Hirday.tomar@relianceada.com
46	Lalitpur Power Generation Company Ltd		Managing Director	vksbankoti@bajajenergy.com
47	MEJA Urja Nigam Ltd.		CEO	hopmeja@ntpc.co.in
48	Adani Power Rajasthan Limited		COO, Thermal, O&M	jayadeb.nanda@adani.com
49	JSW Energy Ltd. (KWHEP)		Head Regulatory & Power Sales	jyotiprakash.panda@jsw.in
50	TATA POWER RENEWABLE	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)	Zonal Head	dhmahabale@tatapower.com
51	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.	Chief Engineer, JKSPDCL/JKPDD	cejkpcl2@gmail.com/sojpdd@gmail.com
52	UT of Ladakh		Chief Engineer, LPDD	cepdladakh@gmail.com
53	UT of Chandigarh		Executive Engineer, EWEDC	elop2-chd@nic.in
54	NPCL	Private Distribution Company in region (alphabetical rotaional basis)	Head-Commercial	ssrivastava@noidapower.com
55	Fatehgarh Bhadla Transmission Limited	Private transmission licensee (nominated by cetral govt.)	AVP-O&M	nitesh.ranjan@adani.com
56	NTPC Vidyut Vyapar Nigam Ltd.	Electricity Trader (nominated by central govt.)	CEO	ceonvvn@ntpc.co.in

List of addressee (via mail)

TCC Members for FY 2024-25

S. No.	TCC Member	Category	Nominated/ Notified/Delegated Member	E-mail
1	Director (Operation), HPSEBL	Chairperson, TCC		manojupretisolan@gmail.com
2	Member (GO&D), CEA	Member (Grid Operation & Distribution), Central Electricity Authority (CEA)	Chief engineer(GM Division)	cegm-cea@gov.in
3	Member (PS), CEA	Nodal Agency appointed by the Government of India for coordinating cross-border power transactions	Chief Engineer, PSPA-I Division	i.sharan@nic.in
4	CTUIL	Central Transmission Utility	Dy Chief Operating Officer	ashok@powergrid.in
5	PGCIL	Central Government owned Transmission Company	ED, NR-I	akmishra2@powergrid.in
6	NLDC	National Load Despatch Centre		nomination awaited
7	NRLDC	Northern Regional Load Despatch Centre	Executive Director	nroy@grid-india.in
8	NTPC	Central Generating Company	Regional ED, NR	rednr@ntpc.co.in
9	BBMB		Member (Power)	mp@bbmb.nic.in
10	THDC		GM (EMD)	neerajverma@thdc.co.in
11	SJVN		Director (Projects)	de.sectt@sjvn.nic.in
12	NHPC		ED (O&M)	hod-om-co@nhpc.nic.in
13	NPCIL		Outstanding Scientist & ED (commercial)	nrchoudhary@npcil.co.in
14	Delhi SLDC	State Load Despatch Centre		nomination awaited
15	Haryana SLDC		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
16	Rajasthan SLDC			nomination awaited
17	Uttar Pradesh SLDC		Chief Engineer (PSO)/Chief Engineer (C&S)	cepso@upsldc.org
18	Uttarakhand SLDC			nomination awaited
19	Punjab SLDC		Chief Engineer	ce-sldc@pstcl.org
20	Himachal Pradesh SLDC			nomination awaited
21	DTL	State Transmission Utility	Director (Operation)	dir.opr@dtl.gov.in
22	HVPNL		Chief Engineer/SO & Comml.	cesocomml@hvpn.org.in
23	RRVPNL		Chief Engineer (PP&D)	ce.ppm@rvpn.co.in
24	UPPTCL		Director (Planning & Commercial)	director_comm@upptcl.org
25	PTCUL		Chief Engineer	ce_oandmk@ptcul.org
26	PSTCL		Director / Technical	dir-tech@pstcl.org
27	HPPTCL		GM (C&D)	gmcd.tcl@hpmail.in
28	IPGCL	State Generating Company	Director(Tech.)	corporate.ppcl@gmail.com
29	HPGCL		Director/Technical	dirtech@hpgcl.org.in
30	RRVUNL		Dy. Chief Engineer	dyce.elect.katpp@rrvun.com
31	UPRVUNL		Director (Technical)	director.technical@uprvunl.org
32	UJVNL		General Manager	kkjaiswal99@gmail.com
33	HPPCL		Director (Electrical) General Manager(Electrical)	dir_elect@hppcl.in gm_elect@hppcl.in
34	PSPCL	State Generating Company & State owned Distribution Company		nomination awaited
35	UHBVN	State owned Distribution Company (alphabetical rotaional basis/nominated by state govt.)		nomination awaited
36	Jodhpur Vidyut Vitran Nigam Ltd.			nomination awaited
37	Paschimanchal Vidyut Vitaran Nigam Ltd.			nomination awaited
38	UPCL		Director (P)	dpupcl29@gmail.com
39	HPSEB			nomination awaited
40	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Head – Commercial & Regulatory	Sanjay.bhargava@tatapower.com
41	Aravali Power Company Pvt. Ltd		CEO	brahmajig@ntpc.co.in
42	Apraava Energy Private Limited			nomination awaited
43	Talwandi Sabo Power Ltd.		Dy. Head O&M	ravinder.thakur@vedanta.co.in
44	Nabha Power Limited			nomination awaited
45	Lanco Anpara Power Ltd			nomination awaited
46	Rosa Power Supply Company Ltd		VP-Technical Services	Niranjan.Jena@relianceada.com
47	Lalitpur Power Generation Company Ltd		President	rnbedi.ltp@lpgcl.com
48	MEJA Urja Nigam Ltd.		GM (O&M)	piyushkumar@ntpc.co.in
49	Adani Power Rajasthan Limited		AVP	Manoj.taunk@adani.com
50	JSW Energy Ltd. (KWHEP)		Head of Plant	kaushik.maulik@jsw.in
51	TATA POWER RENEWABLE	IPP having less than 1000 MW installed capacity (alphabetical rotaional basis)		nomination awaited
52	UT of J&K	From each of the Union Territories in the region, a representative nominated by the administration of the Union Territory concerned out of the entities engaged in generation/ transmission/ distribution of electricity in the Union Territory.		nomination awaited
53	UT of Ladakh			nomination awaited
54	UT of Chandigarh			nomination awaited
55	NPCL	Private Distribution Company in region (alphabetical rotaional basis)		nomination awaited
56	Fatehgarh Transmission Limited	Private transmission licensee (nominated by cetral govt.)		nomination awaited
57	NTPC Vidyut Vyapar Nigam Ltd.	Electricity Trader (nominated by central govt.)		nomination awaited

Special Invitees:

1. Smt. Nandita Gorlosa, Chairman, NERPC & Hon'ble Power Minister, Govt. of Assam, Block D, Ground Floor, Janata Bhawan, Dispur, Assam, 781006 [Email: nanditagorlosa77@gmail.com], Telephone no: (0361) – 2237032(O)
2. Shri Gaurav Gupta, Chairperson, SRPC & Managing Director, Karnataka Power Corporation Limited & ACS Energy Department GoK, 240, 2nd floor Vikasa Soudha, Bengaluru, Karnataka 560001. [Email: prs.energy@gmail.com ; acs@karnataka.gov.in] Tel -08022252373
3. Shri Vishal Kumar Dev, IAS, Chairman, ERPC, Principal Secretary to Govt., Department of Energy, Govt. of Odisha, Bhubaneswar. [Email-chairman@gridco.co.in] Tel -06742540098
4. Shri P. Dayanand Chairman CSPTCL & Chairman, WRPC, Office of Chairman, Vidyut Seva Bhavan, Danganiya, Raipur 492 013 (C.G.) [Email: chairmancspc@gmail.com] Tel. 0771 2574000
5. Smt. Rishika Saran, Member Secretary, NPC, Sewa Bhawan, R. K. Puram, New Delhi-66 [Email-cenpc-cea@gov.in]
6. Shri Deepak Kumar, Member Secretary, WRPC, Plot No- F-3, MIDC Area, Marol, Opp. SEEPZ, Central Road, Andheri (East), Mumbai-40093. [email: ms-wrpc@nic.in] Tel - 02228221636
7. Shri Asit Singh, Member Secretary, SRPC, No.29, Race Course Cross Road, Bengaluru-560009. [Email: mssrpc-ka@nic.in] Tel -08022287205/9449047107
8. Shri N.S. Mondal, Member Secretary, ERPC,14,Golf Club Road, ERPC Building, Tollygunje,Kolkata-700033. [Email: mserpc-power@nic.in]- Tel 03324239651/9958389967
9. Shri K B Jagtap, Member Secretary, NERPC, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006. [Email: ms-nerpc@gov.in] Tel -03642534077/ 8652776033

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Annexure-P

Attendance 50th TCC meeting of NRPC Date: 28.06.2024				
S.No.	**Name**	**Designation**	**Organization Name**	**Email address**
1	Manoj Upreti	Chairman, TCC / Director-Operation, HPSEB	HPSEB	
2	Anil Gautam	GM Projects	HPPTCL	anil1266gautam@gmail.com
3	Deepak Kumar	Member Secretary, WRPC	WRPC	ms-wrpc@nic.in
4	V K Singh	MS	NRPC	vksinghcea@gmail.com
5	D.K. Meena	SE		dharmendra.cea@gov.in
6	Anzum Parwej	SE		sec-nrpc@nic.in
7	Reeturaj Pandey	EE		pandeyr.cea@gov.in
8	Praveen Jangra	EE		praveen.cea@gov.in
9	Vipul Kumar	AEE		vipul.cea@gov.in
10	Lokesh Agrawal	AEE		lokesh.cea@gov.in
11	Omprakash Rajput	AE		omprakashrajput.cea@gov.in
12	Jyotiprakash Panda	VP, Head Regulatory & Power Sales	JSW Energy Limited	jyotiprakash.panda@jsw.in
13	Kaushik Maulik	Head of Plant	JSW Energy Limited	kaushik.maulik@jsw.in
14	Prashant Jain	AGM	APCPL	
15	S K Das	Director(Planning & Commercial)	Upptcl	director_comm@upptcl.org
16	Satyendra Kumar	SE(TP&PSS)	Upptcl	setppss@upptcl.org
17	Er. Deshraj	Director (Electrical)	HPPCL	dir_elect@hppcl.in
18	Er. Rohit Sharda	GM (Electrical)	HPPCL	gm_elect@hppcl.in
19	Sh. Devendra Shringi	Chairman & MD	RVUNL	cmd@rrvun.com
20	K K Jaiswal	GM (Commercial)	UJVNL	kkjaiswal99@gmail.com
21	Arun Tholia	Executive Director	Lanco Anpara	arun.tholia@meilanparapower.com
22	Kashish Bhambhani	General Manager (North)	CTU	kashish@powergrid.in
23	Sandeep Kumawat	DGM	CTU	sandeepk@powergrid.in
24	Atul Kumar Agarwal	Chief GM	CTU	atul_ag@powergrid.in
25	Sangita Sarkar	CM	CTU	jana.sangita@powergrid.in
26	R N Bedi	President O&M	LPGCL	rnbedi.ltp@lpgcl.com

27	S Adhikari	Executive Director (O&M)	NHPC	sadhikari@nhpc.nic.in
28	Amitabh Jha	General Manager, Director (Tech) Sectt.	NHPC	amitabhjha@nhpc.nic.in
29	Rajeev Ranjan	General Senior Manager (C)	NHPC	rranjan2@nhpc.nic.in
30	Vijay Kumar	Gr. Senior Manager (E)	NHPC	vijayk@nhpc.nic.in
31	Narendra Kumar Ojha	Manager	Adani Group	narendran.ojha@adani.com
32	Manish Karna	Vice President	Adani Group	manish.karna@adani.com
33	Rajeev kumar	Senior DGM	POWERGRID , NR1	rajivkumar@powergrid.in
34	Er. Harpreet Singh Manocha	CE/System Operation	BBMB	ceso@bbmb.nic.in
35	Er. Inderjit Singh Bajwa	Director/P&C	BBMB	dirpc@bbmb.nic.in
36	Er. Ruchi Sharma	Director/Power Regulation,	BBMB	dirpr@bbmb.nic.in
37	Er. Sanjay Sidana	Dy. Director/Commercial	BBMB	dydcom@bbmb.nic.in
38	Er. Mohit Kumar Walia	Dy. Chief Engineer / SLDC Operation	Punjab SLDC	se-sldcop@pstcl.org
39	A J SIDDIQUI	CE PSO	UPSLDC LTD	CEPSO@UPSLDC.ORG
40	AMIT NARAYAN	SE SCADA	UPSLDC LTD	SESCADAIT@UPSLDC.ORG
41	Anish Garg	GM	Delhi SLDC	garganish@gmail.com
42	H S Kaushal	Sr. GM	CTUIL	hsk@powergrid.in
43	Sanjay Bhargava	Head Commercial and Regulatory	PPGCL	sanjay bhargava@tatapower.com
44	Nitesh Ranjan	Head O&M Substations	FBTL	nitesh.ranjan@adani.com
45	Abhishek Kukreja	Lead O&M	FBTL	abhishek.kukreja@adani.com
46	Amit Kumar Singh	SE (SLDC)	Uttarakhand SLDC	se_sldc@ptcul.org
47	A K SINGH	DGM RTAMC	POWERGRID, NR3	ashishkumarsingh@powergrid.in
48	shailendra singh panwar	DGM	THDC	
49	Dalbir singh	SE JKPTCL Kashmir	JKPTCL	sejkptcl@gmail.com
50	Somara Lakra	CGM	NRLDC	
51	Ankur Gulati	DGM	NRLDC	ankurgulati@grid-india.in
52	Gaurav Malviya	Manager	NRLDC	
53	Pankaj saxena	SESTU	Upptcl	smart.saxena@gmail.com
54	Ashok Kumar	General Manager	SJVN	ashok179@hotmail.com
55	Aman Katoch	General Manager	SJVN	amankatoch72@gmail.com

56	Er.G.S.Budiyal	Director (operations) PTCUL	PTCUL	director.op@ptcul.org
57	Er. Rajan Gupta	Chief Engineer, JKPTCL, Jammu	JKPTCL	sojpdd@gmail.com
58	Shafat Ahmed Wani	Sr GM	POWERGRID NR2	ahmed.shafat@powergrid.in
59	Vivek Sundariyal	DGM	POWERGRID NR2	viveks@powergrid.in
60	D K Sharma	Chief Engineer	UPRVUNL	cgm.to@uprvunl.org
61	Suneel Kumar	Executive Engineer	UPRVUNL	suneelppmm@gmail.com
62	Er Manoj K Vats	Director Technical	HVPNL	directortechnical@hvpn.org.in
63	Deepak Sarit	EE/ SS	HVPNL	xenssplg@hvpn.org.in
64	Rohtas	SE STU	HVPNL	sestu@hvpn.org.in
65	Vibhay Kumar	Executive Director (AM)	POWERGRID, Corporate C	vibhay@powergrid.in
66	Brij Lal Thakur	Managing Director	HPSLDC	mdhpsldc@gmail.com
67	Rohit Kumar	Assistant Engineer	HPSLDC	choudhary.rohit2012@gmail.com
68	Smt. Sona Shishodia	Superintending Engineer	SLDC Rajasthan	se.sold@rvpn.co.in
69	kamal Patidar	Executive Engineer	SLDC Rajasthan	se.ldrvpnl@rvpn.co.in
70	Sanjay Mathur	Executive Engineer	RVPN	mathur.sanjay@rvpn.co.in
71	Deepak Gupta	Deputy Chief Engineer/ ISB2	PSPCL	seisb2pspcl@gmail.com
72	Shashi Saini	Sr. Manager	Apraava Energy Pvt. Ltd. Jhajjar, Haryana	shashi.saini@apraava.com
73	Parimal Piyush	AGM	NTPC	parimalpiyush@ntpc.co.in
74	J.K. Malhotra	AGM	NTPC	jitendramalhotra@ntpc.co.in
75	Jayadeb Nanda	COO	Adani Power Limited	
76	Manoj Taunk	AVP	Adani Power Limited	manoj.taunk@adani.com
77	Raguvendra Singh Dewra	Sr. Manager	Adani Power Limited	
78	Chandra Prakash Bhararіya	Manager	Adani Power Limited	
79	Avinash Darur	Sr. Manager	Adani Power Limited	
80	Indrajeet Prajapati	Sr. Manager	Adani Power Limited	
81	Mayur Sinh Guhel	Sr. Manager	Adani Power Limited	
82	Ankit Rabadia	Sr. Manager	Adani Power Limited	
83	Prashant purshotaman	Manager	Adani Power Limited	

Annexure-Q

Attendance 74th NRPC meeting Date: 29.06.2024				
S.No.	**Name**	**Designation**	**Organization Name**	**Email address**
1	Rajiv Sood	Chairman, NRPC / (MD, HPPTCL)	HPPTCL	rajivsoodhp@gmail.com
2	Manoj Upreti	Chairman, TCC / Director-Operation, HPSEB	HPSEB	
3	Hemant Jain	Member (GO&D)	CEA	member.god@cea.nic.in
4	Anil Gautam	GM Projects	HPPTCL	anil1266gautam@gmail.com
5	Deepak Kumar	Member Secretary, WRPC	WRPC	ms-wrpc@nic.in
6	V K Singh	MS	NRPC	vksinghcea@gmail.com
7	D.K. Meena	SE		dharmendra.cea@gov.in
8	Anzum Parwej	SE		sec-nrpc@nic.in
9	Reeturaj Pandey	EE		pandeyr.cea@gov.in
10	Praveen Jangra	EE		praveen.cea@gov.in
11	Vipul Kumar	AEE		vipul.cea@gov.in
12	Lokesh Agrawal	AEE		lokesh.cea@gov.in
13	Omprakash Rajput	AE		omprakashrajput.cea@gov.in
14	Jyotiprakash Panda	VP, Head Regulatory & Power Sales	JSW Energy Limited	jyotiprakash.panda@jsw.in
15	Kaushik Maulik	Head of Plant	JSW Energy Limited	kaushik.maulik@jsw.in
16	Prashant Jain	AGM	APCPL	
17	S K Das	Director(Planning & Commercial)	Upptcl	director_comm@upptcl.org
18	Satyendra Kumar	SE(TP&PSS)	Upptcl	setppss@upptcl.org
19	Er. Deshraj	Director (Electrical)	HPPCL	dir_elect@hppcl.in
20	Er. Rohit Sharda	GM (Electrical)	HPPCL	gm_elect@hppcl.in
21	Sh. Devendra Shringi	Chairman & MD	RVUNL	cmd@rrvun.com
22	K K Jaiswal	GM (Commercial)	UJVNL	kkjaiswal99@gmail.com
23	A K singh	Station Head	Lanco Anpara	anandkumar.singh@meilanparapower.com
24	Arun Tholia	Executive Director	Lanco Anpara	arun.tholia@meilanparapower.com.
25	P C Garg	COO	CTU	pcgarg@powergrid.in
26	Kashish Bhambhani	General Manager (North)	CTU	kashish@powergrid.in

27	Sandeep Kumawat	DGM	CTU	sandeepk@powergrid.in
28	Atul Kumar Agarwal	Chief GM	CTU	atul_ag@powergrid.in
29	Sangita Sarkar	CM	CTU	jana.sangita@powergrid.in
30	R N Bedi	President O&M	LPGCL	rnbedi.ltp@lpgcl.com
31	R K Chaudhary	Director (Technical & Projects)	NHPC	rkchaudhary@nhpc.nic.in
32	S Adhikari	Executive Director (O&M)	NHPC	sadhikari@nhpc.nic.in
33	Amitabh Jha	General Manager, Director (Tech) Sec	NHPC	amitabhjha@nhpc.nic.in
34	Rajeev Ranjan	General Senior Manager (C)	NHPC	rranjan2@nhpc.nic.in
35	Vijay Kumar	Gr. Senior Manager (E)	NHPC	vijayk@nhpc.nic.in
36	Narendra Kumar Ojha	Manager	Adani Group	narendran.ojha@adani.com
37	Manish Karna	Vice President	Adani Group	manish.karna@adani.com
38	Rajeev kumar	Senior DGM	POWERGRID , NR1	rajivkumar@powergrid.in
39	Er. Harpreet Singh Manocha	CE/System Operation	BBMB	ceso@bbmb.nic.in
40	Er. Inderjit Singh Bajwa	Director/P&C	BBMB	dirpc@bbmb.nic.in
41	Er. Ruchi Sharma	Director/Power Regulation,	BBMB	dirpr@bbmb.nic.in
42	Er. Sanjay Sidana	Dy. Director/Commercial	BBMB	dydcom@bbmb.nic.in
43	Er. Mohit Kumar Walia	Dy. Chief Engineer / SLDC Operation	Punjab SLDC	se-sldcop@pstcl.org
44	A J SIDDIQUI	CE PSO	UPSLDC LTD	CEPSO@UPSLDC.ORG
45	AMIT NARAYAN	SE SCADA	UPSLDC LTD	SESCADAIT@UPSLDC.ORG
46	Anish Garg	GM	Delhi SLDC	garganish@gmail.com
47	H S Kaushal	Sr. GM	CTUIL	hsk@powergrid.in
48	Sanjay Bhargava	Head Commercial and Regulatory	PPGCL	sanjay bhargava@tatapower.com
49	Nitesh Ranjan	Head O&M Substations	FBTL	nitesh.ranjan@adani.com
50	Abhishek Kukreja	Lead O&M	FBTL	abhishek.kukreja@adani.com
51	Amit Kumar Singh	SE (SLDC)	Uttarakhand SLDC	se_sldc@ptcul.org
52	A K SINGH	DGM RTAMC	POWERGRID, NR3	ashishkumarsingh@powergrid.in
53	shailendra singh panwar	DGM	THDC	

54	Dalbir singh	SE JKPTCL Kashmir	JKPTCL	sejkptcl@gmail.com
55	Somara Lakra	CGM	NRLDC	
56	Ankur Gulati	DGM	NRLDC	ankurgulati@grid-india.in
57	Gaurav Malviya	Manager	NRLDC	
58	Pankaj saxena	SESTU	Upptcl	smart.saxena@gmail.com
59	Ashok Kumar	General Manager	SJVN	ashok179@hotmail.com
60	Aman Katoch	General Manager	SJVN	amankatoch72@gmail.com
61	Er.G.S.Budiyal	Director (operations) PTCUL	PTCUL	director.op@ptcul.org
62	Er. Rajan Gupta	Chief Engineer, JKPTCL, Jammu	JKPTCL	sojpdd@gmail.com
63	Shafat Ahmed Wani	Sr GM	POWERGRID NR2	ahmed.shafat@powergrid.in
64	Vivek Sundariyal	DGM	POWERGRID NR2	viveks@powergrid.in
65	D K Sharma	Chief Engineer	UPRVUNL	cgm.to@uprvunl.org
66	Suneel Kumar	Executive Engineer	UPRVUNL	suneelppmm@gmail.com
67	Er Manoj K Vats	Director Technical	HVPNL	directortechnical@hvpn.org.in
68	Deepak Sarit	EE/ SS	HVPNL	xenssplg@hvpn.org.in
69	Rohtas	SE STU	HVPNL	sestu@hvpn.org.in
70	Vibhay Kumar	Executive Director (AM)	POWERGRID, Corporate Ce	vibhay@powergrid.in
71	Brij Lal Thakur	Managing Director	HPSLDC	mdhpsldc@gmail.com
72	Rohit Kumar	Assistant Engineer	HPSLDC	choudhary.rohit2012@gmail.com
73	Smt. Sona Shishodia	Superintending Engineer	SLDC Rajasthan	se.sold@rvpn.co.in
74	kamal Patidar	Executive Engineer	SLDC Rajasthan	se.ldrvpnl@rvpn.co.in
75	Sanjay Mathur	Executive Engineer	RVPN	mathur.sanjay@rvpn.co.in
76	Rahul Shukla	Chief Manager(SO)	NLDC-Grid India	rahulshukla@grid-india.in
77	Deepak Gupta	Deputy Chief Engineer/ ISB2	PSPCL	seisb2pspcl@gmail.com
78	Shashi Saini	Sr. Manager	Apraava Energy Pvt. Ltd. Jhajjar, Haryana	shashi.saini@apraava.com
79	Parimal Piyush	AGM	NTPC	parimalpiyush@ntpc.co.in
80	J.K. Malhotra	AGM	NTPC	jitendramalhotra@ntpc.co.in
81	Jayadeb Nanda	COO	Adani Power Limited	
82	Manoj Taunk	AVP	Adani Power Limited	manoj.taunk@adani.com
83	Raguvendra Singh Dewra	Sr. Manager	Adani Power Limited	
84	Chandra Prakash Bhargava	Manager	Adani Power Limited	
85	Avinash Darur	Sr. Manager	Adani Power Limited	
86	Indrajeet Prajapati	Sr. Manager	Adani Power Limited	
87	Mayur Sinh Guhel	Sr. Manager	Adani Power Limited	
88	Ankit Rabadia	Sr. Manager	Adani Power Limited	
89	Prashant purshotaman	Manager	Adani Power Limited	

Status of action taken on decision 73rd NRPC meeting

S.N.	Agenda	Decision of 73rd NRPC	Status of action taken
A.3	Non-payment of Outstanding dues by PSPCL against Energy Supplied from RHPS & NJHPS (agenda by SJVN)	*Forum decided that SJVN and PSPCL* may come to NRPC Secretariat along-with supporting documents and calculation sheets of their claims.	SJVN vide mail dated 10.6.2024 proposed PSPCL to have meeting at NRPC Secretariat. PSPCL has mailed the name of officers to attend the meeting. A meeting is scheduled at NRPC Secretariat in the 2nd week of July, 2024.
A.4	Non-Opening of Letter of Credit by JKPCL (formally PDD, J & K) for power supplied from NJHPS & RHPS (agenda by SJVN)	Forum requested J&K to expedite the process of opening of Letter of Credit for NJSPS & RHPS.	J&K representative informed that matter has been pending with finance department for approval. Forum again requested J&K expedite the process of opening of Letter of Credit for NJSPS & RHPS.
A.7	Shifting of agricultural loads from non-solar hours to solar hours (agenda by NRLDC)	All states/UT were requested to initiate the actions to adhere to the Government of India directives for compliances. All states were requested to	PSPCL has submitted that PSPCL is continuously trying to shift Agriculture load in solar hours as per mandate of GoI, CEA. With these efforts in

		regularly provide update regarding shifting of agricultural load to daytime in OCC forum.	May-2024 month, around 1962 MW (15%) more peak demand has been met than originally anticipated. Rajasthan SLDC representative informed that the letters have been sent to DISCOMs to shift the load in night hours. Follow-up is being taken with them. UPSLDC representative conveyed that 90% agricultural loads remain in day time.
A.9	Integration of Schedule/DC values of State Generator in SCADA System (agenda by NRLDC)	Forum asked J&K, Uttarakhand and Rajasthan to expedite integration of DC & schedule of state generator in their SCADA system for further integration with NRLDC.	NRLDC has taken as agenda.
A.10	Non-availability of Telemetry & forecasting	Forum requested all concerned to please	NRLDC has taken agenda.

	of intra-state RE Generators (agenda by NRLDC)	take up for integration of telemetry of RE generators and forecast at SLDC end and further sharing with NRLDC.	
A.14	To accord approval to connect 220Kv BBMB Samaypur Ckt-1 to 220Kv FGPP Ckt.-1 directly instead of existing LILO arrangement of 220Kv BBMB Samaypur-FGPP Ckt-1 at 220Kv S/Stn. Sector-58, Faridabad by making flying jumpers as per site feasibility as a stop-gap arrangement till restoration work is completed at 220v GIS Sub-station sector-58, Faridabad (agenda by HVPN)	Forum deferred the agenda & decided that NRPC Secretariate shall conduct separate meeting with all concern to address the issue.	Meeting held on 03.06.2024 (11:00 AM) having members from PSPA-1, NRLDC, CTUIL, POWERGRID_NR-1, NTPC, BBMB, HVPN, Haryana SLDC. Issue was resolved and confirmed by HVPNL officers.
B.2	Hiring of Office Assistants through GeM (agenda by NRPC Secretariat)	Forum approved the hiring of 02 No. of Graduate level person as Office Assistant and requested constituent members to deploy their officials to NRPC Secretariat for smooth functioning of NRPC.	Hiring through Gem Portal is under process.

Status of action taken on decision 73rd NRPC meeting

B.3	Force closure of Manpower Outsourcing Services-Minimum wage contract (Agenda by NRPC Secretariat)	Forum approved the above proposal of NRPC Secretariat	Salary of April,24 paid by the Contractor after two weeks. Late payment penalty imposed as per the provision of contract while making reimbursement of April,24 Salary bill. Salary for May'24 has been paid by contractor on time. Reimbursement also done by NRPC Secretariat. Foreclosure of the contract is put on hold. Fresh contract proposal is under process as present contract expiring on 12.08.24.

Procedure for Approval of Protection Settings in Northern Region

(Finalized in 50th PSC meeting held on 29.04.2024)

1. ISTS users shall submit proposal for new/revised protection settings to NRLDC and similarly non-ISTS users shall submit to concerned SLDCs in the prescribed formats (of NRLDC/SLDC) in 2 weeks advance.
2. Further, NRLDC/SLDC (as the case may be) will scrutinize the proposal and any deficiency/additional data may be asked by NRLDC/NLDC. If required, NRLDC/SLDC may convene a meeting/interaction with stakeholders.
3. After scrutiny, NRLDC/SLDC will convey to user within 10 days (after receiving proposal) the accepted settings for implementation at site.
4. After implementation of approved settings, stakeholder will intimate to NRPC Secretariat via e-mail at seo-nrpc@nic.in within a fortnight.
5. NRLDC/SLDCs shall place all accepted settings as agenda in upcoming PSC meeting for final approval of forum.

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Standard Operating Procedure (SOP) for Communication audit of Substations

1. This procedure has been prepared in compliance to Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017. As per clause 10 of the Regulation, RPC shall conduct annual audit of the communication system annually as per the procedure finalized in the forum of the concerned RPC. However, this SOP for communication audit of substations is finalized to maintain uniformity at the national level. It also mandates that RPC Secretariat shall issue necessary instructions to all stakeholders to comply with the audit requirements within the time stipulated by the RPC Secretariat based on the audit report. An Annual Report on the audit carried out by respective RPC is to be submitted to the Commission within one month of closing of the financial year.
2. The Audit would be conducted in two phases. In first phase scrutiny of the reports, documents etc. In the second phase physical verification shall be carried out.
3. Each User/entity, using inter-state transmission or the intra-state transmission incidental to inter-state, shall submit the detailed report to RPC Secretariat and RLDC, as per prescribed format on yearly basis. The detailed report shall be submitted by the April end of the respective year. This report shall be considered as self-certificate regarding availability and healthiness of the Communication system of respective user/entity.
4. In respect of intra-state users/entities, SLDC shall submit detailed reports yearly by the April end of the respective year, to RPC Secretariat and RLDC.
5. Outage report of all the channels (including Network Management System, PLCC etc.) report for a month shall be submitted by the Users/entities to RLDC and respective SLDCs, on monthly basis, by 7th day of the next month. RLDC and SLDCs after verifying the NMS data shall submit report to RPC Secretariat by 15th day.
6. All users/entities and Control Centers shall get the third-party cyber security audits done from a Cert-in certified vendor in compliance of CEA (Cyber Security in Power Sector) Guidelines,2021. The detailed report of the Cyber Security Audit shall be submitted by 15th April for the previous financial Year.
7. RPC Secretariat may ask any other information required for Audit of the communication system in addition to these periodic reports.

Phase-I Audit: Scrutiny of the Information

8. A Communication System Audit Sub-Group comprising one member each from RPC, RLDC, PowerGrid and One of the respective Region SLDCs shall be constituted by RPC Secretariat with the approval of Member Secretary, RPC. The sub-group may co-opt any other member from any organization for facilitating the activities of the sub-group. Further, consultation from CEA may be taken, if required. The Audit team shall be formed excluding the member for the Organization/Utility whose system is to be audited.
9. The Communication System Audit Sub-group shall scrutinize the information received in RPC Secretariat. The Sub-group may also ask any additional information necessary for its activities. All the users/entities, RLDC, SLDCs shall provide the information to the subgroup on priority within the stipulated time period.
10. The sub-group shall also identify the nodes for physical inspection based on the criticality of the node in view of performance of the communication network or based on the deficiencies observed in the communication system.
11. The Audit would include but not limited to following aspects:
    a. Availability of communication channels. The outage reason needs to be clearly specified whether it is on account of the concerned entity or on account of any other entity, force majeure etc. The list of communication channels would be finalized by Communication System Sub Group in consultation with other stakeholders.
    b. Availability of terminal equipment. The outage reason needs to be clearly specified whether it is on account of the concerned entity or on account of any other entity, force majeure etc. The list of terminal equipment would be finalized by Communication System Sub Group. Part outage like failure of specific cards etc. would also be furnished along-with reasons.
    c. Availability of Auxiliary System e.g. Battery Charger, Battery bank, sufficient cooling equipment etc.
    d. Compliance of CERC and CEA Regulations and the procedures under these Regulations.
    e. Completion of periodic testing of the communication system in accordance with procedure for maintenance and testing prepared by CTU.
    f. Audit of all newly commissioned communication equipment within six months of its commissioning.
    g. Completion of 3rd party Cyber Security Audits.
    h. Network traffic w.r.t capacity.
    i. Spare availability, replenishment etc.
    j. Any other parameters as agreed by the Communication Sub Group.

Phase-II Audit: Physical Verification

12. Based on the Recommendations of the Communication System Audit Sub-group, Audit team shall be constituted and the physical inspection Audit plan shall be prepared by RPC Secretariat.
13. Audit team shall be formed on regional basis.
14. Audit shall be carried out in a planned manner as included in this document by a team of three members. The audit team shall comprise of one representative from the RPC Secretariat, one representative from RLDC and one representative from any of the Utilities or SLDCs of respective Region. The Audit team shall be formed excluding the member for the Organization/Utility whose system is to be Audited. The Audit team may co-opt any other member from any organization for facilitating the activities of the committee.
15. Once the plan is finalized, minimum 3 days advance notice shall be served to the concerned Auditee entity intimating the detailed plan so that availability of required testing equipment and the required documents is ensured by Auditee entity and is made available to the Audit team during the site visit.
16. Member Secretary, RPC in consultation with the Communication System Audit SubGroup may decide on any additional nodes/locations for physical inspection if a location is very critical in view of performance of the communication network at any time of the year.
17. The Scope of the physical verification shall include but not limited to the following:
    a. Available communication Network for its redundancy
    b. Availability of channel redundancy for all the functions for which it is configured.
    c. Communication equipment (hardware and software configuration) of all the nodes including repeater stations for its recommended performance.
    d. Documentation of the configuration of the respective site and its updation.
    e. Fibre layout / usage of fibre / Availability of dark fibre and its healthiness.
    f. Cable Schedule and identification / tagging.
    g. Healthiness of Auxiliary supply including the healthiness of Battery backup.
    h. Healthiness of Earthing / Earth protection for communication system.
    i. Availability of sufficient cooling equipment at the User's premises to maintain the stipulated temperature for the communication equipment.
    j. Optical power level
    k. Alternate modes of communication for speech

18. The format for collecting the details of Communication channels/links and Equipment is at **Annexure-I** and the same shall be furnished by the Auditee entity.

19. Communication Audit Checklist points are given in **Annexure-II** and the same are to be thoroughly verified by the Audit team.
20. Expenses towards Lodging, Boarding & Transportation (Excluding Air/Train Fair) between various places within the jurisdiction of Auditee entity shall be borne by respective Auditee entity. The Coordinating Officer(s) from the Auditee Utilities identified for each Team is (are) responsible for facilitating them to all the Members of respective Team.
21. Audit team shall submit report including recommendations for action on deficiencies, if any, found during the inspection, within 15 days from the date of inspection to Member Secretary, RPC. After approval of MS, RPC, the report would be communicated to the Auditee entity for compliance.

Audit Compliance Monitoring

22. Communication System Audit Sub-group would monitor the compliance of audit observations as applicable. Non-compliance of Audit Recommendations, if any, shall be put up to TCC and RPC.
23. The Annual Audit Report would be reviewed by a Communication System Sub Group at RPCs level. After considering the observations of Sub Group, RPC Secretariat shall issue necessary instructions to all stakeholders to comply with the audit requirements within the time stipulated by the RPC Secretariat based on the audit report. An Annual Report on the audit carried out by RPC would be submitted to the Commission within one month of closing of the financial year.

***

REGIONAL COMMUNICATION AUDIT REPORT			
General Information:			
1	**Substation Name**		
2	**SS Voltage level**		
3	**Date of commissioning of the substation**	**dd/mm/yyyy**	
4	**Region & State / Auditee**		
5	**Audit Date**		
6	**Name of the Utility which owns the SS**		
Details of Audit Team Members :			
Sl	**Name**	**Designation**	**Organization**
1			
2			
3			
4			
Attached Documents, if any			
Sl	**Name of the document**		**Original / Signed / Copy**
1			
2			
3			
4			
5			
6			
7			

Communication Channels and Equipment Audit Format

(A) List of channels in usage for data (64 kbps, 104, PMU, VC, 101) / Voice / Protection circuits / others:

Sl	Description (64 kbps, 104, PMU, VC, 101) / Voice / Protection circuits / Others)	Source	Destination	Channel Routing	Ownership details of terminal equipment / Links
1					
2					
3					
4					
5					
6					
7					
8					

(B) List of terminal communication equipments:

Sl	Name of Station	Equipment Type (SDH / PDH / Radio / VSAT / EPABX)	Make / Model	Ownership
1				
2				
3				
4				
5				

(C) Communication System Details:

I. SDH Equipment

(1) Card Details:

Slot No	IP Address & Path / Direction Name	Card Details	Place a mark if on usage, else Write as "Spare"	Whether Card is healthy/ Faulty? (H/ F)	Cards Redundancy available (Y/N)	Power Supply card/ Optical card (Y/N)	MSP configured (Y/N)	Action Plan for faulty cards	Other Information, if any
1									
2									
3									
And so on									

(2) Whether equipment is time synchronized: Yes / No
If Yes, then how:

(3) Failures during last FY / since last Audit :

Particulars	Number of failures of Card / Power Supply	Reason for failures	Measures taken for rectification
Card		**(i)** **(ii)** **(iii)**	**(i)** **(ii)** **(iii)**
Power Supply		**(i)** **(ii)** **(iii)**	**(i)** **(ii)** **(iii)**

(4) Configuration of the Node:

Name of Equipment	Number of Nodes	Number of directions	Name of Directions	Number of links down, with details	Details of corrective action, if any, taken

(5) Preventive maintenance schedule and its compliance:

Date of Last Preventive maintenance	Maintenance carried out as per schedule? (Yes / No)	Whether all the defects have been attended? (Yes / No) Give details

II. PDH Equipment

(1) Card Details:

Slot No	IP Address & Path / Direction Name	Card Details	Place a mark if on usage, else Write as "Spare"	Whether Card is healthy/ Faulty? (H/ F)	Cards Redundancy available (Y/N)	Power Supply card/ Optical card (Y/N)	MSP configured (Y/N)	Action Plan for faulty cards	Other Information, if any
1									
2									
3									
And so on									

(2) Whether equipment is time synchronized: Yes / No
If Yes, then how:

(3) Failures during last Fin. year / since last Audit :

Particulars	Number of failures of Card / Power Supply	Reason for failures	Measures taken for rectification
Card		**(i)** **(ii)** **(iii)**	**(i)** **(ii)** **(iii)**
Power Supply		**(i)** **(ii)** **(iii)**	**(i)** **(ii)** **(iii)**

(4) Configuration of the Node:

Name of Equipment	Number of Nodes	Number of directions	Name of Directions	Number of links down, with details	Details of corrective action, if any, taken

(5) Preventive maintenance schedule and its compliance:

Date of Last Preventive maintenance	Maintenance carried out as per schedule? (Yes / No)	Whether all the defects have been attended? (Yes / No) Give details

III. OPGW / Optical Fibre Details

Number of Directions	Name of Direction	No. of Pairs	No. of Fibers used	No. of spare & healthy Fibers	Unarmored cable laid within PVC/Hume duct pipe?	Fibre Count in OPGW? Whether matching with Approach cable to FODP?	Overall Optical Fibre Path Attenuation (dB/km)	Power Received	Conformation to Compliance of CEA Standards

IV. Healthiness of Auxiliary System:

(1) Details of 2 independent Power Sources:

Source	Commissioning Date	Battery Back up (Hour)	Battery capacity (AH)	Supply Voltage (V)	Healthiness of Battery (Yes / No)	Make of Charger	Charger Capacity (A)	Periodicity of Maintenance Schedule	Date of Last 2 Actual Maintenance	Remarks
1										
2										

(2) Conformation to Compliance of CEA Standards:

V. Healthiness of Earthing of each equipment:

Sl	Equipment	Status on Healthiness of Earthing

VI. Details of Voice communication available between Sub-station and Control Centre:

Sl	Voice communication (Sub-station - Control Centre)	Status on Healthiness of Voice communication	Healthiness of air-conditioning of communication room as per OEM recommendation

VII. PLCC Details:

Number of Panels	Make and Model	Direction	Frequency (Tx & Rx) KHz	Status on Healthiness	Last preventive maintenance		Details of defects, if any, attended	Status of Availability of Spares	Conformation to Compliance of CEA Standards
					Schedule	Actual			

VIII. Radio Communication Details:

Number of Equipment	Make and Model	Status on Healthiness	Last preventive maintenance		Details of defects, if any, attended	Status of Availability of Spares	Conformation to Compliance of CEA Standards
			Schedule	Actual			

IX. Data Retention : (i) Earliest Date of availability of data :
(ii) Historical data availability :___ days.

X. Control Command Delay : (i) Time delay in seconds from Control Centre for SCADA :___ Seconds
(ii) Time delay in seconds from Control Centre for WAMS :___ Seconds

XI. Wide Band Network : (i) Absolute channel delay in protection applications :_____ ms
(ii) Channel delay asymmetry in protection applications :_____ ms
(iii) Switching Time delay to alternate path/route during failure of one path :_____ ms

XII. Status of integration with U-NMS or state NMS:

XIII. Any other information :

Audit Team Member NRPC Secretariat

Audit Team Member Co-Ordinator

Audit Team Member PGCIL (Internal / External)

Audit Team Member State (Internal / External)

Communication Audit Checklist (Annexure-II)

Sl	Check list points	Expected	Actual	Reference
1.	Whether OPGW is terminated properly. Down lead shall be fixed property in sufficient locations. Metallic part shall be connected to earth mat riser.			
2.	1. Distinct approach cable shall be laid a. Protection & Communication b. Fibers for commercial applications 2. Item no 1 cable shall be terminated in communication room FODP 3. One number FODP panel shall be 4. available in communication room			
3.	Fiber Identification shall be done in FODP properly			
4.	Whether End to end tests were carried out during installation and records are available (both Optical Power Source/ receiver test and OTDR Test results			
5.	Whether patch chords 1. Cross labelled (source/ receive) 2. Tx – Rx Marking 3. Mechanical protection is provided for patch chords laid between panels			
6.	Whether separate room for communication is available with following: - 1. Air conditioning with standby A/C Unit 2. AC Distribution board with ELCB 3. Single point earthing bar which shall be connected to substation Earth mat			
7.	Two sets of 48 V (Positive Earthed) DC System shall be available with 1. Common DC Distribution board/ Panels with incoming MCB, coupler MCB, out doing MCBs etc. 2. Minimum 200 Ah (2 sets of battery) VRLA batteries are preferred to keep chargers and battery in communication room. 3. Battery Charger shall be Thryristorised/ SMPS			
8.	Battery Charger alarms / measurements shall be made available to SAS (if available) It can be achieved through MOD bus or connecting analogue/ digital signals to Common BCU of SAS.			

Sl	Check list points	Expected	Actual	Reference
	If such system is not available major alarms shall be alarmed in common substation annunciator.			
9.	2 nos of substation Data (From RTU or SAS Gateway) shall route in different roots to Main and Standby Load Dispatch centres			
10.	Kindly assure proper protection is available for AC Distribution (ELCB, MCB, Backup fuse),			
11.	Aux Transformer neutral Earthing shall be connected to Stations earth mat (Aux. Transformers shall be installed in yard earth mat area only)			
12.	Whether DG sets with AMF panels are provided for Aux AC Supply			
13.	Whether 2 nos. 11 kV (or 33kV) supplies are available for Each station aux Transformer			

Final Standard Operating Procedure (SoP) for Communication System Outage Planning

1. As per the following CEA and CERC Regulations, the Communication Outage for the Region shall be carried out by RPC Secretariat:

a) Regulation 7.3 of Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017 stipulates as below:

Quote:

7.3 Role of National Power Committee (NPC) and Regional Power Committee (RPC):

……

(iv) The RPC Secretariat shall be responsible for outage planning for communication system in its region. RPC Secretariat shall process outage planning such that uninterrupted communication system is ensured.

……

Unquote

b) Regulation 10 Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020 notified on 27.02.2020 envisages as below:

Quote:

10. Outage Planning: Monthly outage shall be planned and got approved by the owner of communication equipment in the concerned regional power committee, as per detailed procedure finalized by the respective regional power committee.

Unquote

2. A Communication System Outage Planning Sub-Group/ TeST Sub Committee shall be formed in each region constituting the members from all the entities connected to ISTS including all CGS, ISGS, REGs/SPPDs/SPDs, STUs, SLDCs etc., of the respective Region, RLDC/Grid-India, PGCIL, CTUIL, Private Transmission licensees in respective region & RPC secretariat. The sub-group/ Sub Committee may co-opt any other member from any organization for facilitating the activities of the sub-group/ Sub Committee.

3. Communication System Outage Planning will be limited to the following systems:

(i) ISTS Communication System including ISGS

(ii) Intra-state Communication System being utilized for ISTS Communication

(iii) ICCP links between Main & Backup RLDCs, Main & Backup SLDCs & Main & Backup NLDCs.

(iv) Inter-regional AGC links.

(v) Any other system agreed by the sub-group.

4. Communication Equipment/link within the scope of the Procedure would include :

   (i) Optic Fibre links
   (ii) Any other link being used for ISTS communication
   (iii) ICCP links between Main & Backup RLDCs, Main & Backup SLDCs & Main & Backup NLDC
   (iv) VC links between LDCs
   (v) Inter-regional AGC links
   (vi) SPS Links
   (vii) Tele-Protection
   (viii) AMR
   (ix) PMU
   (x) SDH & PDH
   (xi) DCPC
   (xii) RTU & its CMU cards
   (xiii) DTPCs
   (xiv) Battery Banks and Charging Equipment
   (xv) EPABX
   (xvi) Any other equipment/link agreed by the sub-group

5. A Web Portal named as "Communication System Outage Planning Portal" shall be developed by respective RLDCs or a module shall be provided in the U-NMS. Log-in credentials shall be provided to all the ISTS connected entities/concerned entities.

6. Entities/Users/Owners shall add their communication links and the equipment to the Web Portal as soon as they are commissioned. The same has to be furnished to RPC Secretariat /RLDCs.

7. Entities/Users/Owners of the communication equipment shall upload the outage proposals of communication links and the equipment (in the prescribed format only) to be availed during subsequent month by 7th/8th of every month in the Web Portal.

8. RPC Secretariat consolidates the list of outage proposals received from various Entities/Users/Owners of the communication links and equipment by downloading from the Web portal and circulate the same among all the respective region entities by 15th of every month. Communication outages affecting other regions would be coordinated by respective RLDC through NLDC.

9. Communication System Outage Planning (CSOP) meeting shall be conducted during the third week of every month normally (preferably through VC) to discuss and approve the proposed outages of communication links and equipment.

10. The approved outages of Communication links and equipment in the CSOP meeting shall be published in the RPC website and respective RPCs Communication Outage Portal within 3 days from the date of CSOP meeting.

11. Outage of the approved communication links and equipment shall be availed by the respective owner /entities after confirming the same with RLDC on D-3 basis.

12. In case of any emergency outage requirement of communication links and equipment, Entities/Users/Owners may directly apply to respective RLDC with intimation to respective RPCs on D-2 basis. Confirmation of approval/rejection will be provided on D-1 basis by RLDCs in consultation with respective RPCs considering 24hrs processing window.

13. Entities/Users/Owners shall take the code from the respective RLDC before availing the planned outage of the communication links & equipment and before restoration of the same.

14. Entities/Users/Owners of the communication links and equipment shall submit the deviation report for the approved outages (approved dates & approved period) availed during the previous month and the report on planned / forced / other outage of communication links / equipment by 10th of the month to RPC Secretariat as per the format at **Annexure-I** .

15. In the monthly CSOP meetings, communication links and equipment whose outage duration (Planned / Forced / Others) more than 48 hours for the last 12 months of rolling period shall be deliberated for the measures to be taken in future for the better outage management. The date deviations and non-availing the outages that were approved in the previous CSOP meetings shall also be deliberated in the CSOP meetings.

***

Annexure: DCOA-I

Outage Deviation Report : List of outages of Communication Links, availed / deviated during the month of

mmm-yyyy

Dated : **dd-mm-yyyy**

A **Details of Communication Links (Point to Point) availed :**

SL	Name of Requesting Agency	Description of Link	Source	Destination	Channel Routing	Ownership	Reason for availing outage with the details of equipment attended	Approved Start Date : Time [dd-mm-yyyy hh:mm]	Approved End Date : Time [dd-mm-yyyy hh:mm]	Approved Outage Hours	Outage availed Start Date : Time [dd-mm-yyyy hh:mm]	Outage availed End Date : Time [dd-mm-yyyy hh:mm]	Total hours of outage availed now	Deviation ? (Y/N)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	**Example**	Back up Control Center (BCC) : Data	KAYATHAR 230 kV SS	MADURAI LDC	Data will be availble through the alternate route - 230 KV Kayathar-TTPS-TTN Auto-400 KV Kayathar-BCC/Madurai	TANTRANSCO	Shifting of FODB panel at Kayathar 230 KV SS	10-Mar-2021 09:00	10-Mar-2021 18:00	**09:00**	10-Mar-2021 14:07	10-Mar-2021 17:30	**03:23**	**N**

Annexure: DCOA-II

Outage Deviation Report : List of outages of Communication Equipment availed / deviated during the month of

mmm-yyyy

Dated : **dd-mm-yyyy**

B Details of Communication Equipment availed :

SL	Name of Requesting Agency	Name of the communication equipment	Location of the Equipment / Name of Station	Name of the Link/Channel/Path / directions affected	Alternate Channel/Path available ? (Furnish details)	Ownership	Reason for availing outage with the details of faults	Approved Start Date : Time [dd-mm-yyyy hh:mm]	Approved End Date : Time [dd-mm-yyyy hh:mm]	Approved Outage Hours	Outage availed Start Date : Time [dd-mm-yyyy hh:mm]	Outage availed End Date : Time [dd-mm-yyyy hh:mm]	Total hours of outage availed now	Deviation ? (Y/N)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	**Example**	DC Charger -2, Amararaja, 48v,200A	Edamon	Nil	Nil	KSEBL	Monthly maintenance. No interruption as alternate chargers available	16-Mar-21, 11:00	16-Mar-21, 16:00	**05:00**	16-Mar-21, 10:30	16-Mar-21, 16:00	**05:30**	**Y**

~~Annexure-VI~~
Annexure-V

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,

i. CMD, Grid-India, B-9, Qutub Institutionl Area, Katwaria Sarai, New Delhi – 110016
ii. COO, CTUIL, Saudamini, Plot No. 2, Sector-29, Gurgaon – 122001

विषय / Subject: Minutes of meeting held on 29.05.2024 to discuss the TTC/ATC and transmission constraints of states/UTs – reg

महोदया /महोदय,

A meeting was held on 29.05.2024 amongst CEA, CTUIL & GRID-INDIA under the Chairmanship of Chairperson, Central Electricity Authority, to discuss the TTC/ATC and transmission constraints of states/UTs.

The minutes of the meetings are attached herewith. This issues with the approval of Chairperson, CEA.

भवदीय / Yours faithfully,
Signed by Vikas Sachan
Date: 10-06-2024 12:23:26

(विकास सचान / Vikas Sachan)
उप निदेशक / Deputy Director

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफैक्स: 011-26102045 ईमेल: cea-pspa1@gov.in वेबसाइट: www.cea.nic.in
Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telefax: 011-26102045 email: cea-pspa1@gov.in Website: www.cea.nic.in

Minutes of meeting held on 29.05.2024 to discuss the TTC/ATC and transmission constraints of states/UTs

1. A meeting was held on 29.05.2024 amongst CEA, CTUIL & GRID-INDIA under the Chairmanship of Chairperson, CEA, to discuss the TTC/ATC and transmission constraints of states/UTs. The list of the participants is attached as **Annexure-I**.
2. Grid-India and CTUIL has made a presentation highlighting the transmission constraints region-wise/state-wise in meeting.
3. After the detailed deliberations, following was agreed:

   (i) Operational constraints in the grid are being highlighted regularly by Grid-India. Implementation of new transmission system generally takes about three years, considering 24 months of construction time and about 12 months for stakeholders consultation, approval of the scheme by NCT, bidding of the scheme etc. Augmentation of ICTs takes about 18-24 months. It was decided that a working level group under Grid-India with representatives from CEA and CTUIL would be constituted to study the operational constraints likely to arise in future (2-3 years ahead) and plan the transmission system to resolve the same. Thereafter the planned transmission system would be taken up for stakeholders' consultation and approval. The group shall meet at least once every month. CEA and CTUIL would be furnishing nominations to Grid-India for constitution of the group.

   (ii) Grid-India informed that the Champa - Kurukshetra HVDC line trips frequently. Chairperson, CEA, suggested that letter should be written by Power System Engineering & Technology Development (PSE&TD) Division, CEA, highlighting the matter to POWERGRID (TSP) and GE (OEM) along with a copy to Secretary, CERC. Grid-India to provide relevant material/inputs to CEA in this regard.

   (iii) Grid-India further informed that various issues are being faced in reversal of power on the Mundra – Mohindergarh HVDC line, operated by Adani Transmission Limited. It was decided that PSE&TD Division, CEA, would take up the matter with TSP and CTUIL for analysis of the same. Remedial action for reversal of power on the HVDC line to be intimated to Adani Transmission Ltd. alongwith a copy to CERC.

(iv) Constraints in intra-state transmission system was also discussed. It was informed that these constraints are regularly discussed in RPC forum, however, appropriate action is not being taken by the States/UTs in this regard. Implementation of several planned intra-state transmission systems have been delayed by respective states/UTs, resulting in constraints in the intra-state network. Chairperson, CEA, suggested that letter would be written by him to the Energy Secretary of respective states/UTs highlighting the issue. Grid-India, CTUIL and RPCs to provide relevant state-wise inputs in this regard.

(v) CTUIL informed that based on the request of Southern Region constituents in SRPC meeting, joint study meeting had been held to identify additional inter-regional corridors between NEW Grid and SR Grid. Three additional inter-regional links were studied out of which two links have been agreed in the joint study meeting viz. Parli (WR) - Bidar (SR) 765 kV D/c line and Angul/Goplapur (ER) - Srikakulam (SR) 765 kV D/c line. CTUIL further informed that looking into the GNA requirement of Southern Region constituents, existing inter-regional links are adequate and additional inter-regional corridors are not required. Therefore, these additional inter-regional links would be put-up to forthcoming SRPC meeting for further deliberations. Further, if Southern Region constituents want to draw more power from NEW grid, they must increase their GNA requirements.

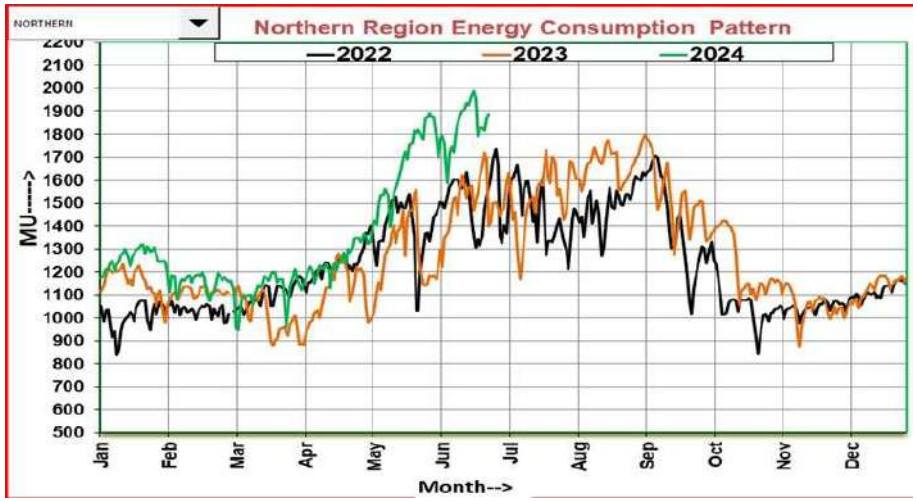
****

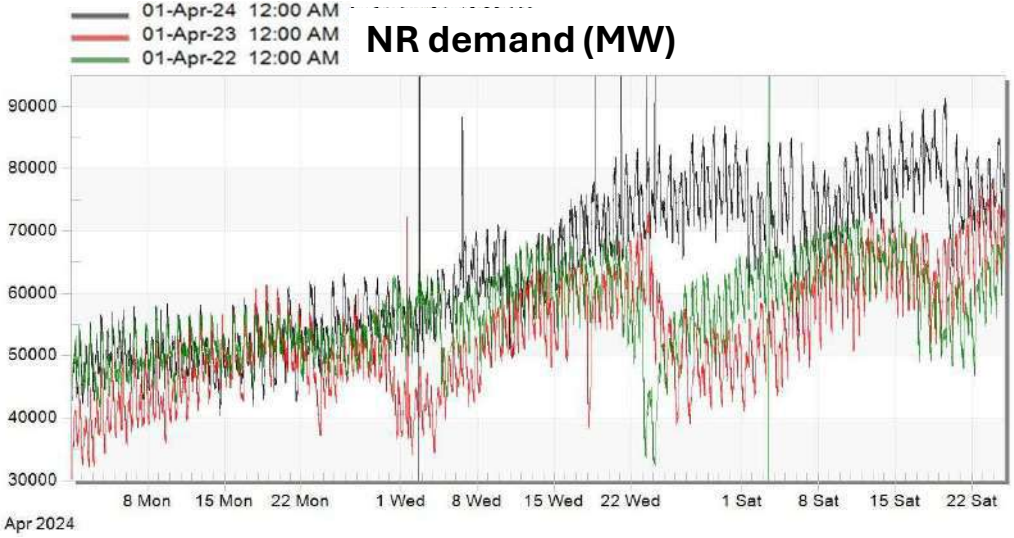
Annex-I

List of participants of meeting held on 29.05.2024 to discuss the TTC/ATC and transmission constraints of states/UTs

S. No.	Name of the participants (Shri)	Organization
1.	Ghanshyam Prasad, Chairperson	CEA
2.	Ashok Kumar Rajput, Member (Power Systems)	CEA
3.	Ishan Sharan, Chief Engineer (PSPA-I)	CEA
4.	B. Lee Lyngkhoi, Chief Engineer (GM)	CEA
5.	B. S. Bairwa, Chief Engineer (PSPA-II)	CEA
6.	Ashok Pal, Dy. COO	CTUIL
7.	Partha Sarathi Das, Sr. GM	CTUIL
8.	Anil Kumar Meena, GM	CTUIL
9.	Sandeep Kumawat, Chief Manager	CTUIL
10.	S. R. Narasimhan, CMD	Grid-India
11.	Vivek Pandey, Sr. GM	Grid-India
12.	Priyam Jain, Chief Manager	Grid-India

A.6 Actions for improvement in grid operation (State wise)





- Very high demand in Northern region during May-June 2024 during this year
- Number of records broken
- **Avg. energy consumption higher by (YoY)**
  12% in April
  30% in May
  24% in June
- CEA 2024-25 LGBR Forecast:

Peak demand (MW) forecast 2024-25

Region/ State/ UTs	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
Chandigarh	288	361	428	391	457	444
Delhi	6,324	7,344	8,109	8,160	7,475	7,423
Haryana	10,598	11,388	14,573	14,547	14,066	14,164
Himachal Pradesh	1,900	1,788	1,842	1,865	1,879	1,918
Jammu & Kashmir	3,169	3,069	3,121	3,115	3,269	3,485
Punjab	8,935	12,557	16,378	16,265	16,686	16,357
Rajasthan	14,994	17,952	17,238	15,504	19,342	17,878
Uttar Pradesh	25,379	28,291	29,853	30,581	31,585	31,917
Uttarakhand	2,470	2,497	2,752	2,493	2,544	2,515
Northern Region	**67,648**	**77,992**	**86,623**	**86,392**	**90,612**	**89,659**

- Implementation of GNA regime w.e.f. 01.10.2023

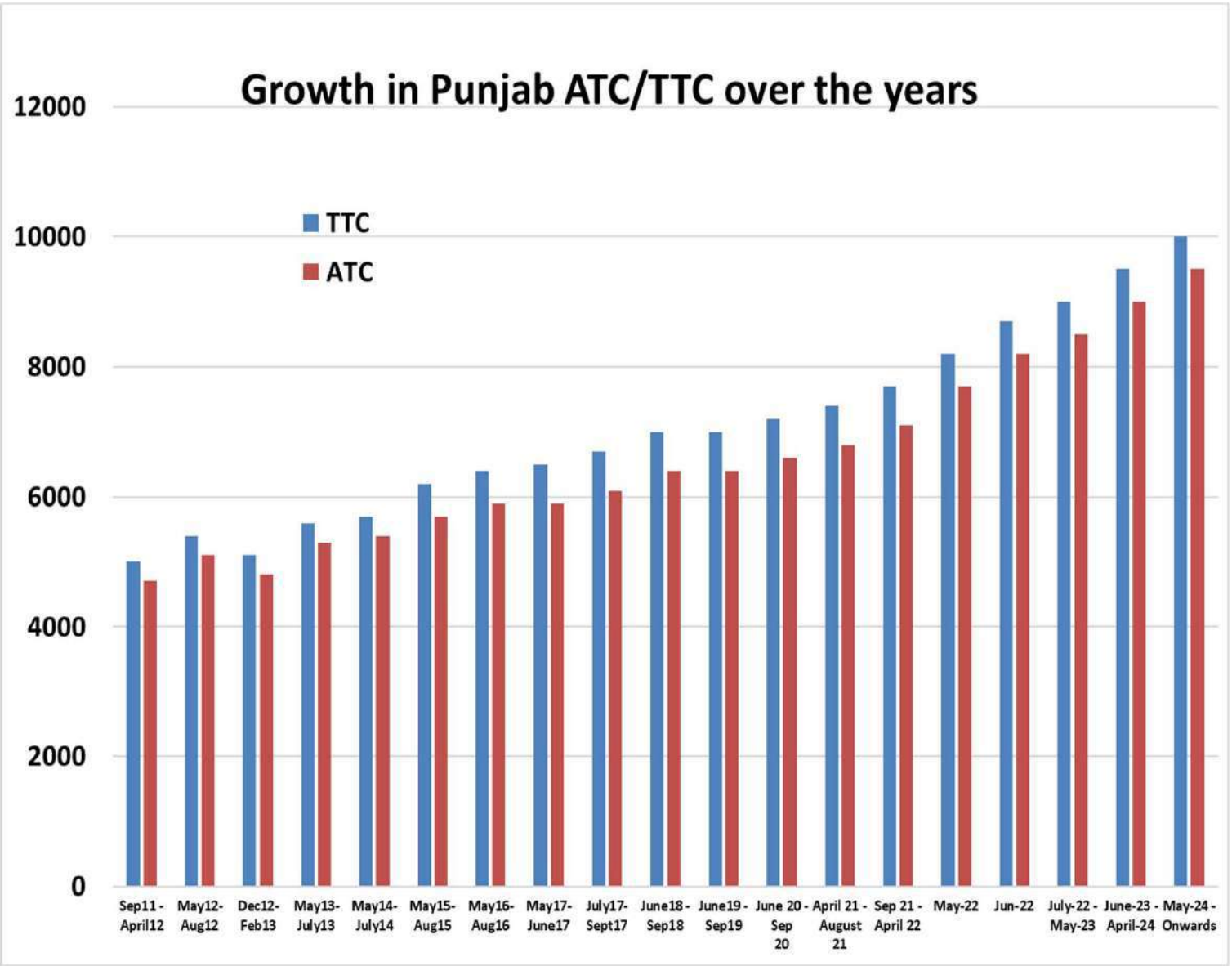
- Beneficial to configure each state/union territory as a bid area. Presently, only Punjab is configured as separate bid area.

- Provisions in NOAR so that each state can be configured as a separate bid area

- Major advantage is that this would expedite transmission system augmentation and help states draw power without major transmission constraints

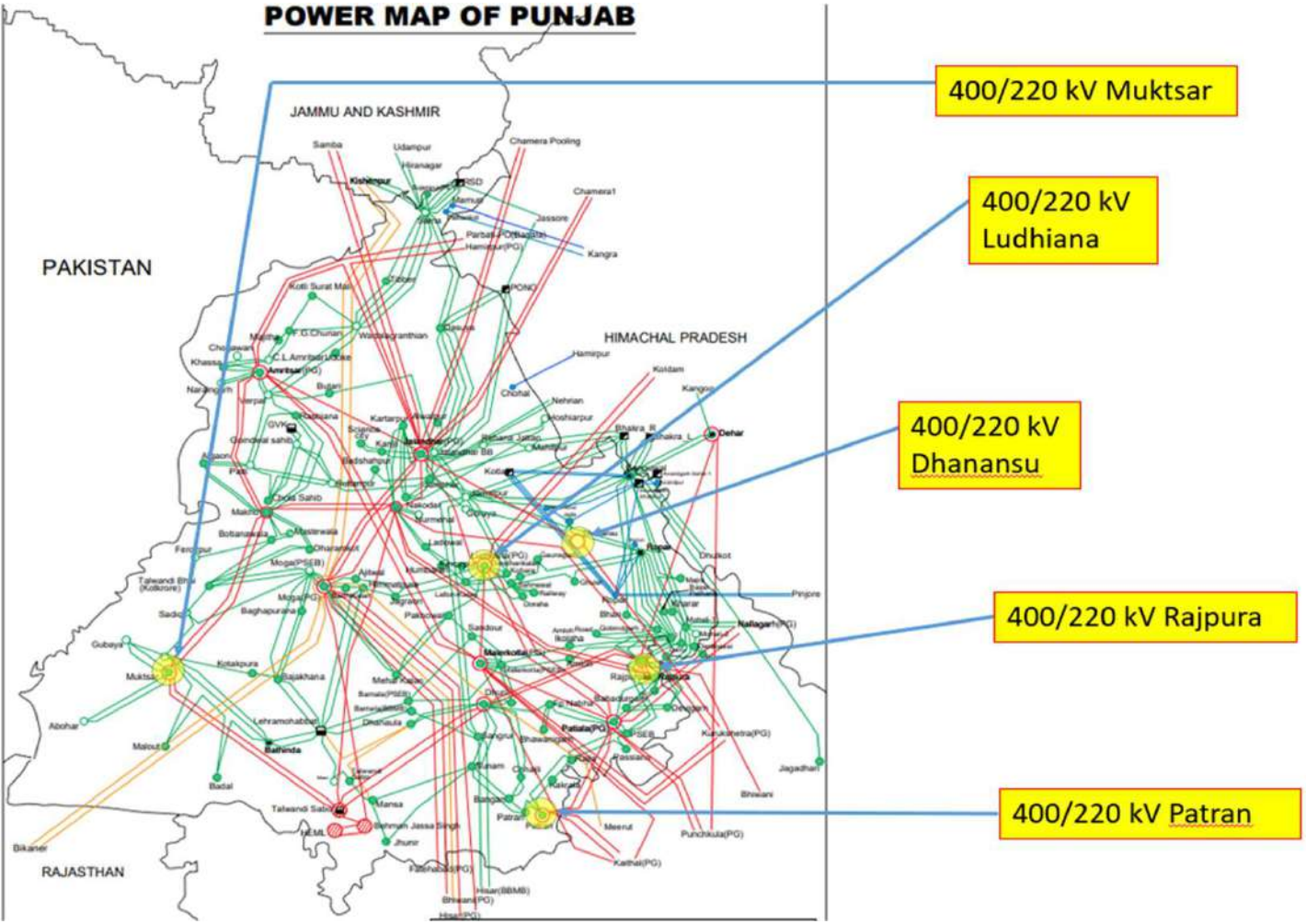
- Meeting was convened on 29.05.2024 under the chairmanship of Chairperson, CEA between CEA, CTUIL and GRID-INDIA to discuss the TTC/ATC and transmission constraints of states/UTs

- In the meeting, it was discussed that planning/implementation of transmission system at intrastate level getting delayed



- **Punjab was formed as separate bid area in Sep 2011**
- **Significant enhancement of Punjab ATC/TTC over the years**
- **Due to separate bid-area creation pro-active approach seen from Punjab SLDC/ PSTCL side**
- **All NR states except Chandigarh U/T have started assessing import transfer capability of their control area and sharing the same with NRLDC/ NRPC**

Punjab:



Need to expedite:

- 315MVA to 500MVA at Nakodar

- 2nd ICT at Dhanansu

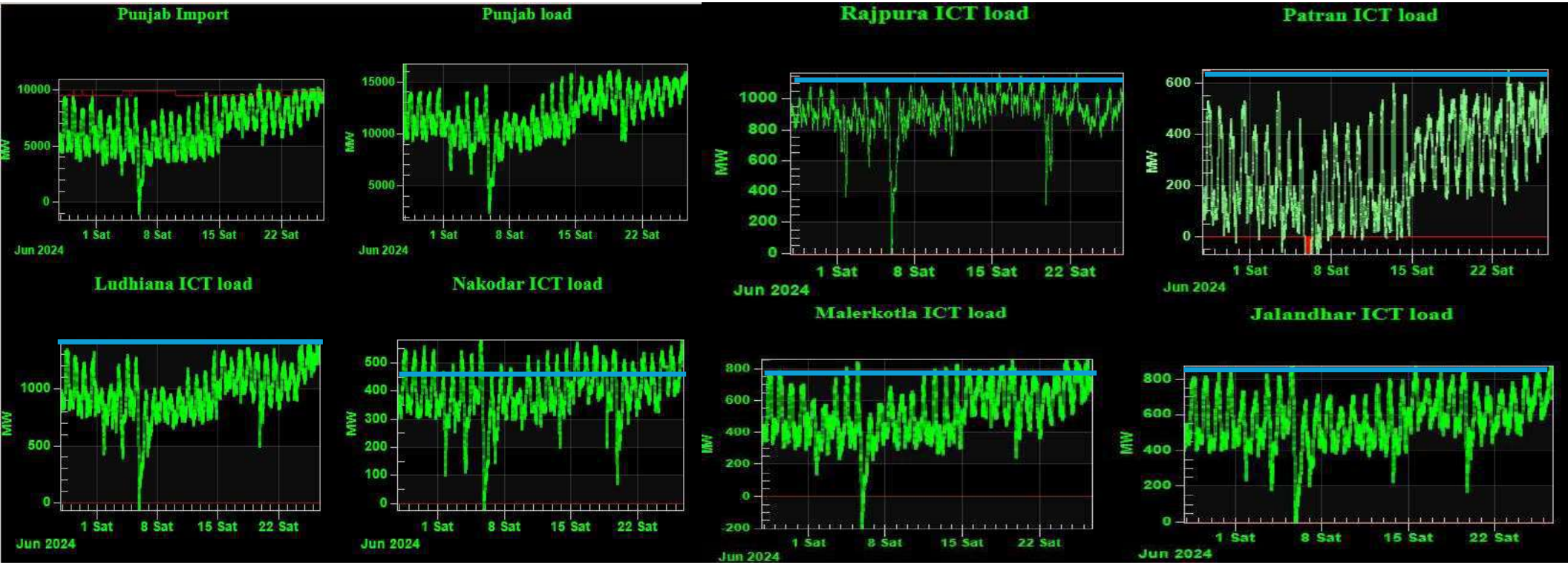
(both above elements were committed to be commissioned by May'24 in 1st SCSTPPSP-NR held on 14.03.2024)

- 3rd ICT at Patran (approved in 11th CMETS held on 30.09.2022)

- 400/220kV 2*500 MVA ICTs at new 400kV S/S Ropar with grid connectivity at 400kV

Minimising outages of Talwandi Saboo thermal generating units

Constraints observed in Punjab during high demand season



Loading close to N-1 contingency limits at number of substations

Haryana :

Approved in 4th NRPCTP held on 05.10.2021

Space constraint

Agreed in 20th CMETS of NR held on 30.06.2023

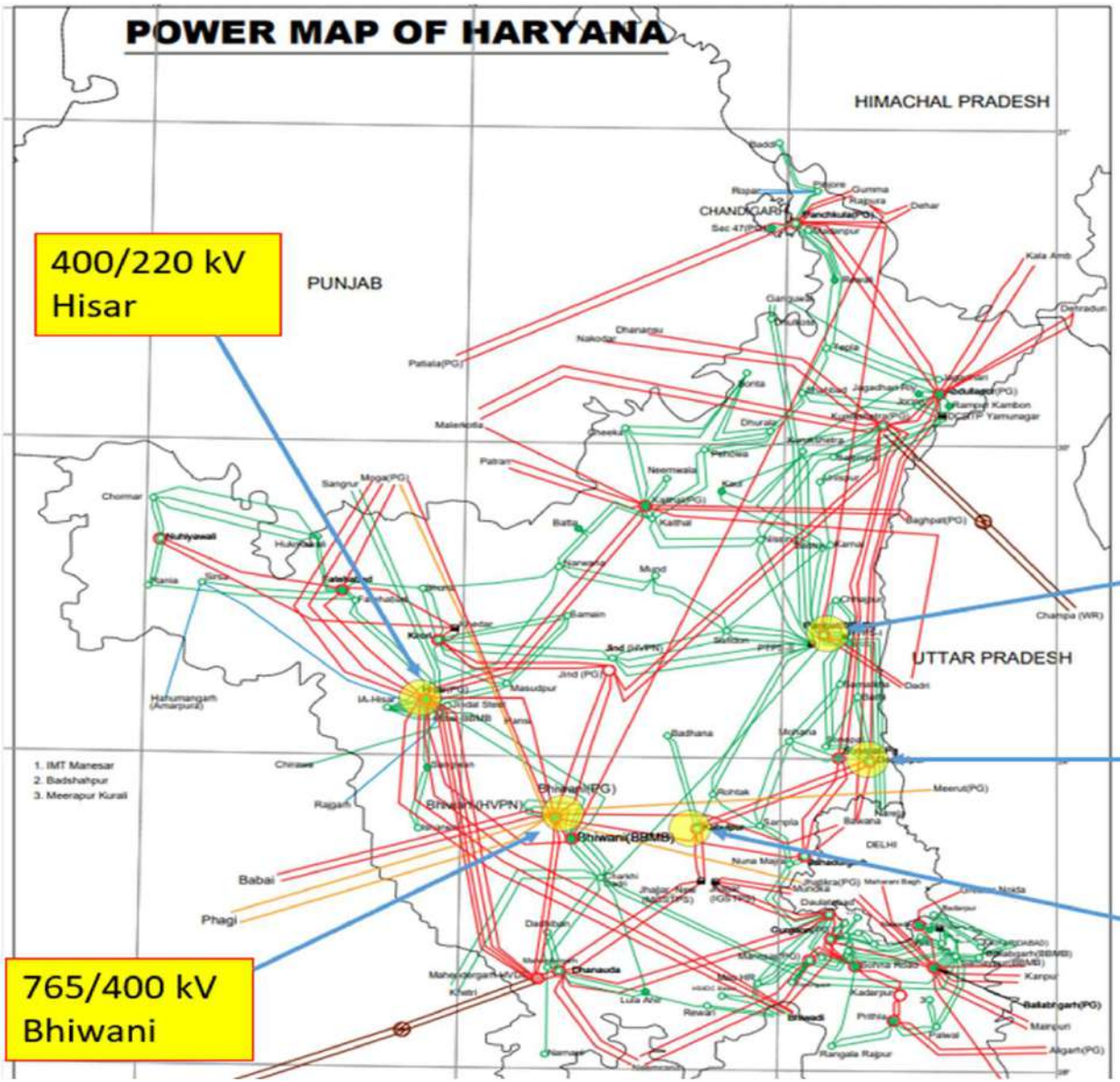
1	2	3	4	5	6
N-1 non-compliance issue at 400/220kV Deepalpur	N-1 non-compliance issue at Panipat(BBMB)	N-1 non-compliance at Kabulpur	N-1 non-compliance at Hisar(PG)	Reconductoring of 220kV Hisar (PG) - Hisar (IA) to be expedited by POWERGRID.	Measures to control high loading of 220kV Sonepat-Mohana D/C

Persisting since last 3-4 years

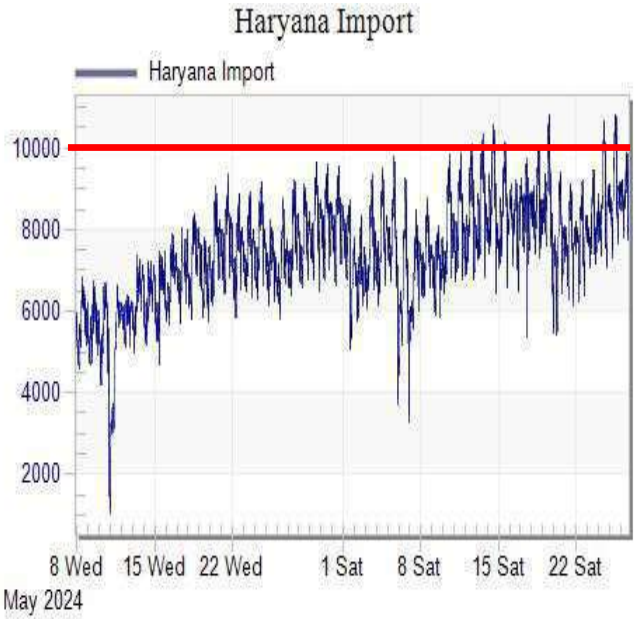
Action awaited

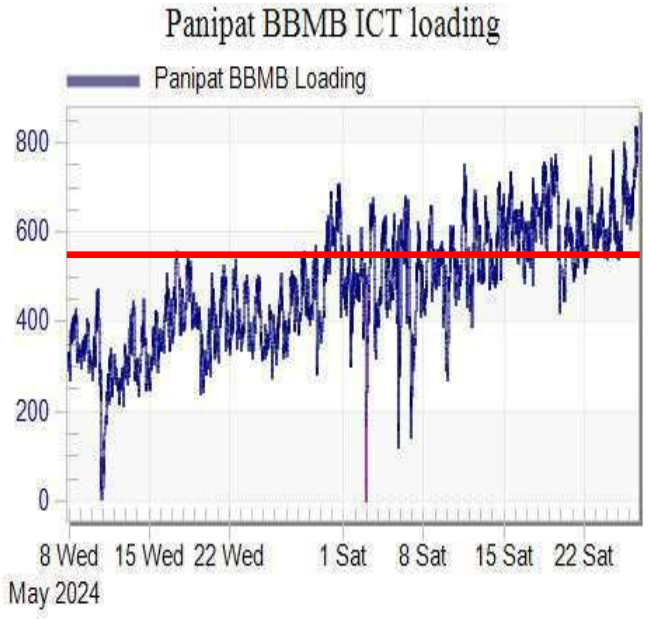
New issue

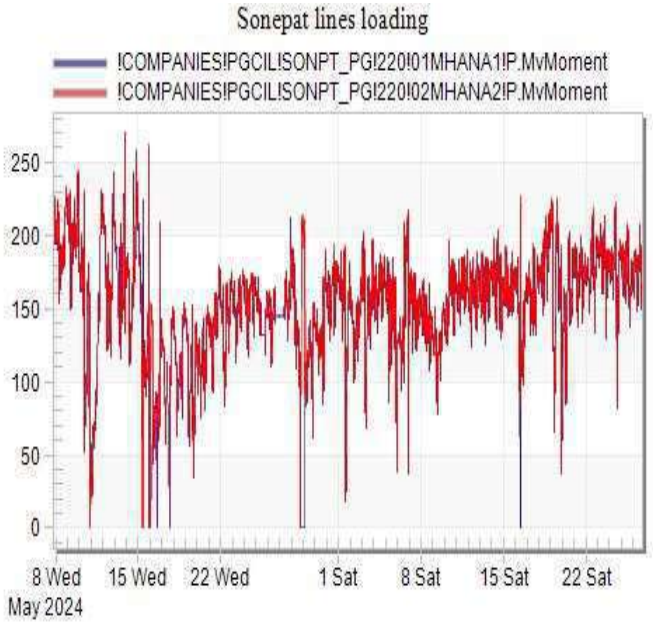
Action planned


POWER MAP OF HARYANA
HIMACHAL PRADESH
PUNJAB
UTTAR PRADESH
CHANDIGARH
DELHI
400/220 kV Hisar
400/220 kV Panipat
400/220 kV Deepalpur
400/220 kV Kabulpur
765/400 kV Bhiwani
1. IMT Manesar
2. Badshahpur
3. Meerapur Kurali

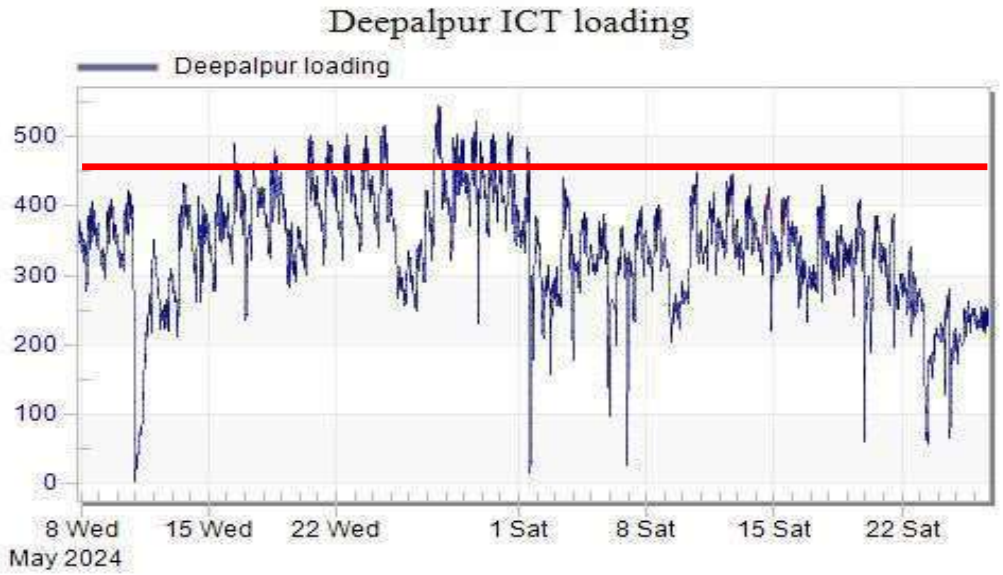
Constraints observed in Haryana during high demand season

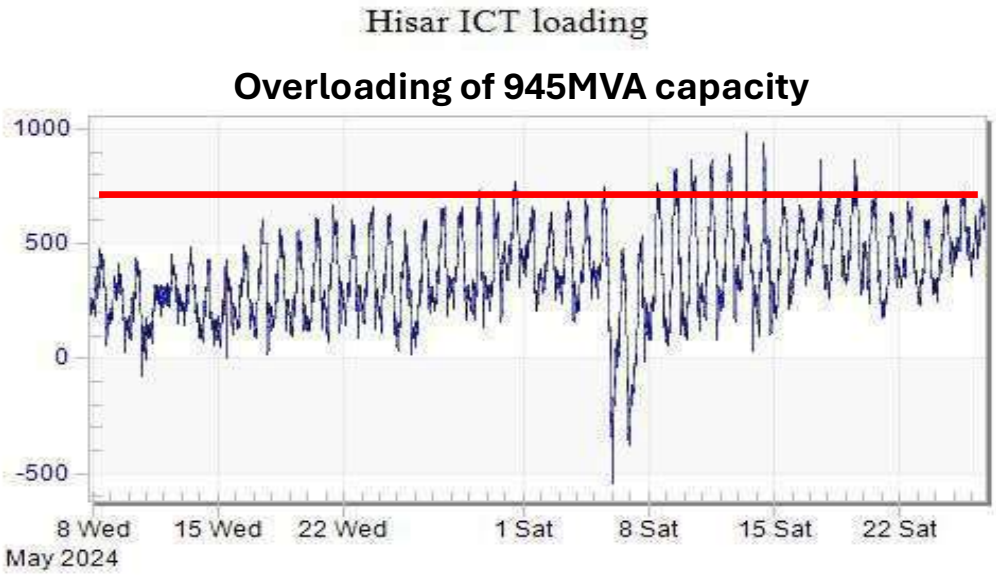




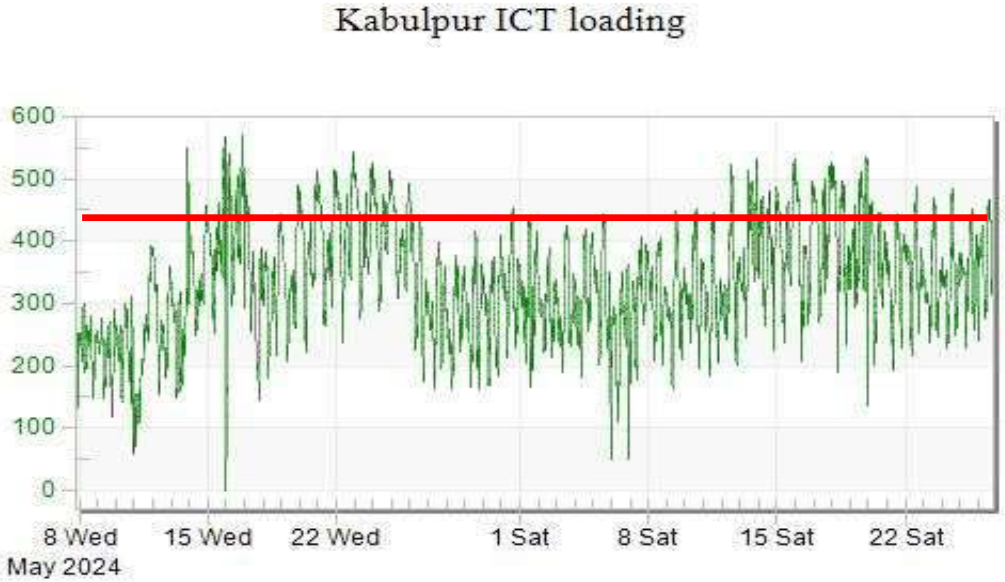


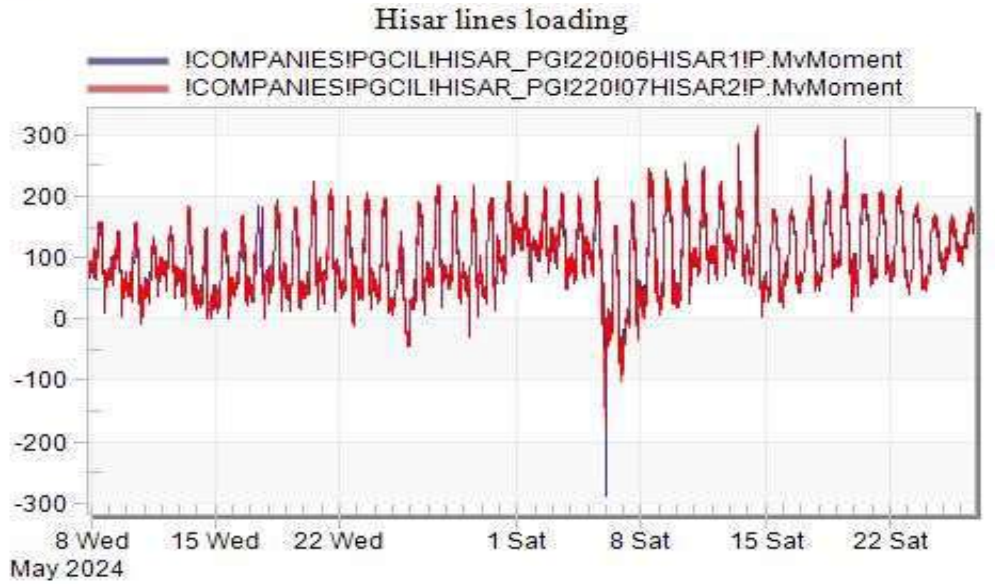
Haryana drawl beyond ATC/TTC limits



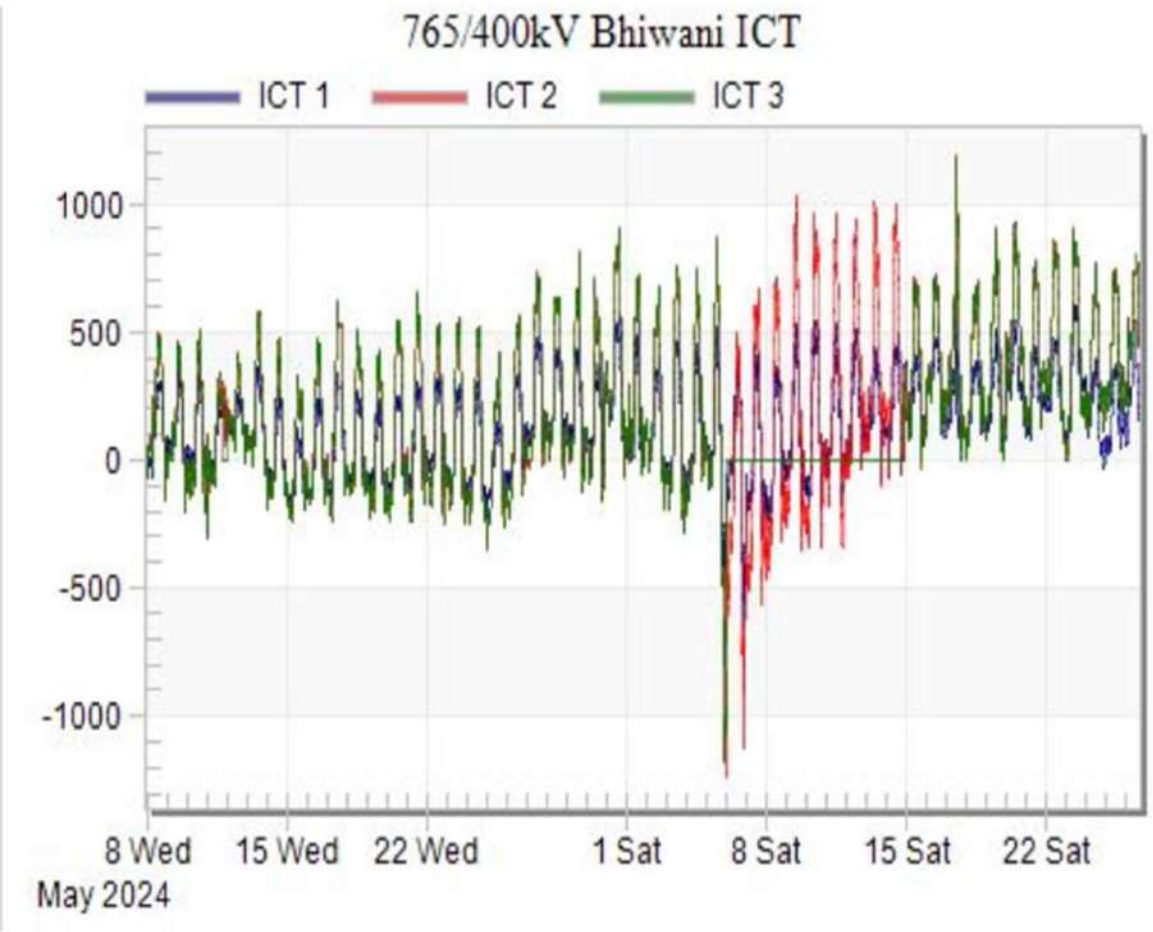


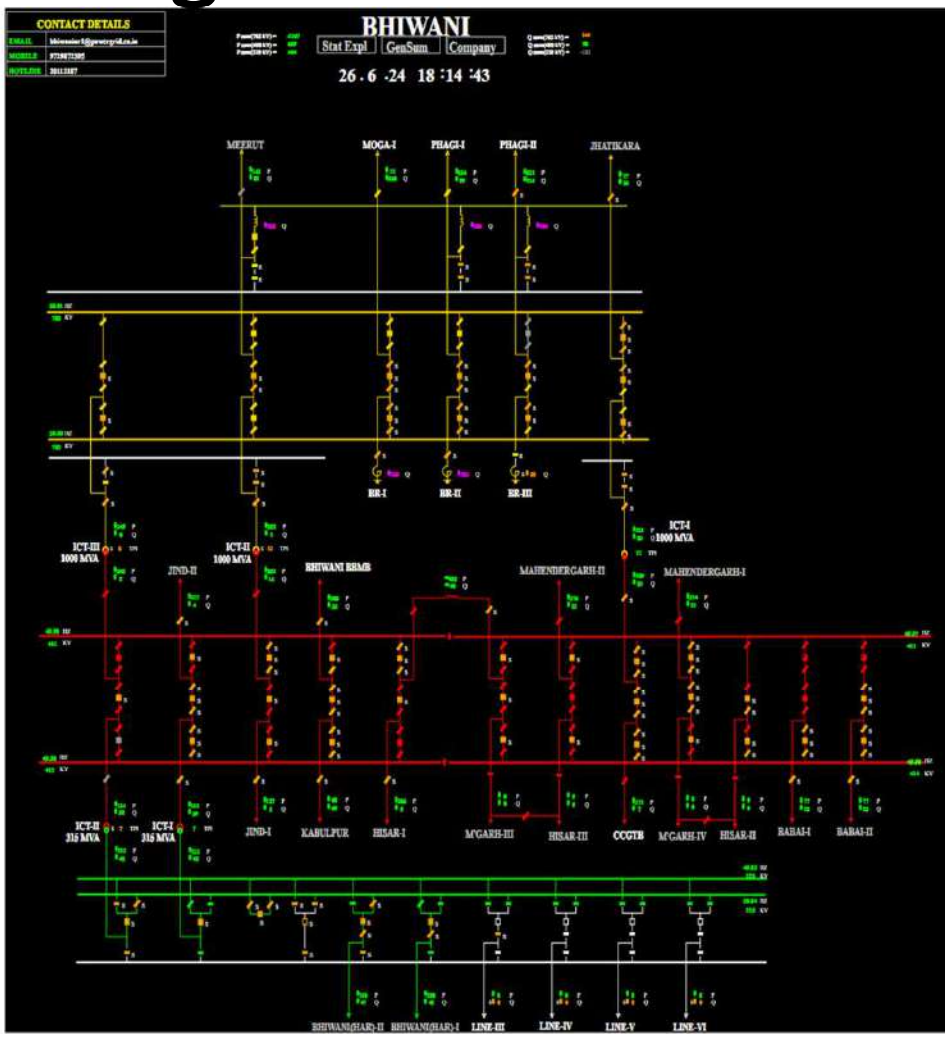
Overloading of 945MVA capacity





1000MVA ICTs at Bhiwani getting overloaded





Rajasthan:

Almost all 400/220kV RVPN substations such as Ajmer, Merta, Chittorgarh, Jodhpur, Bikaner, Hindaun, Bhilwara, Heerapura, Suratgarh etc. are loaded well above their N-1 contingency limits

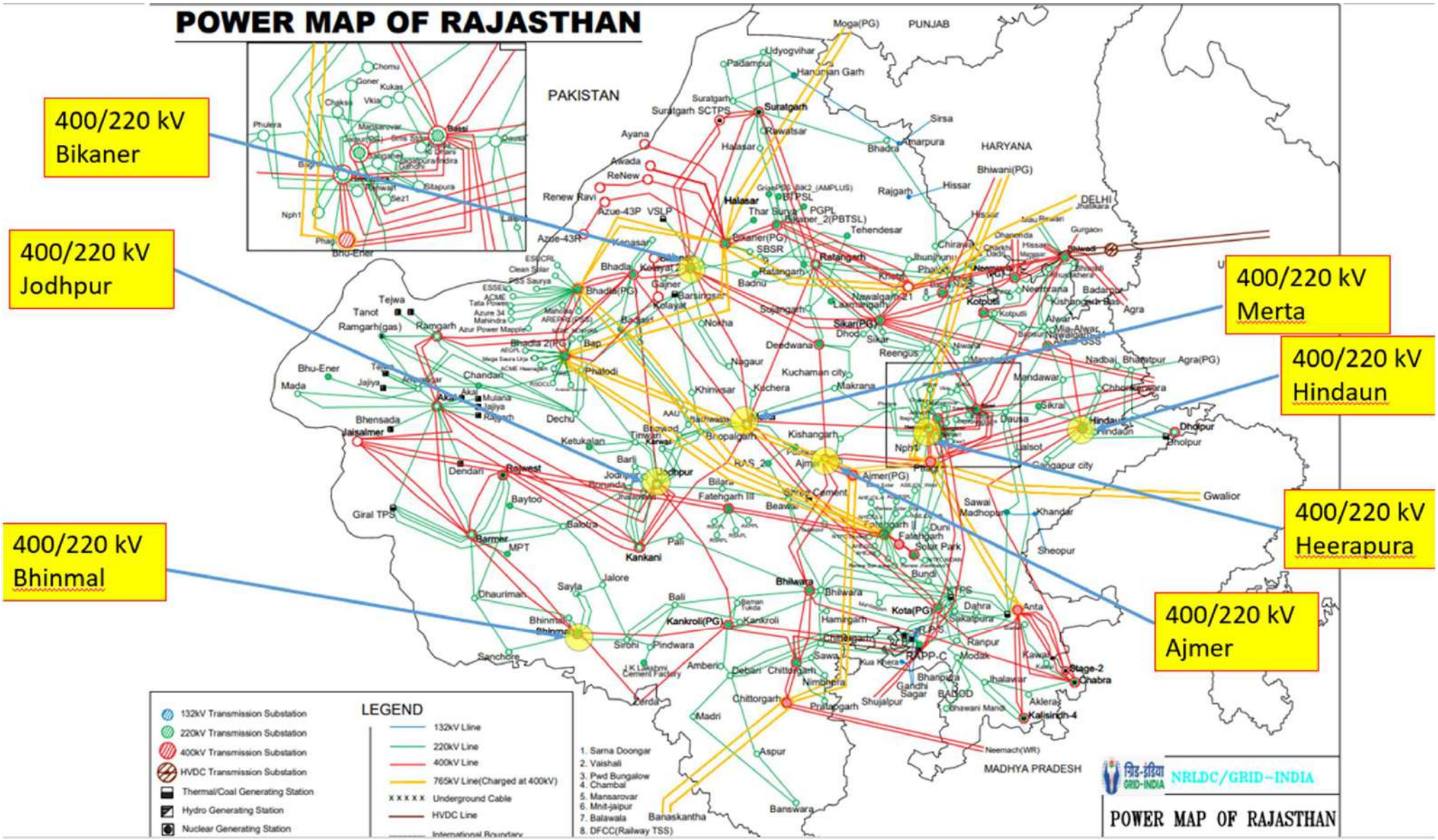
High MVAr drawal observed by intra-state network of Rajasthan at number of substations

Poor power factor at various 400/220kV substations such as Bikaner, Kankani, Barmer, Jodhpur, Merta etc.

Low Voltages at all RE stations & nearby substations such as Akal, Ramgarh, Jaisalmer, Bhadla(RJ), Bikaner(RJ), Jodhpur, Kankani, Heerapura, Bhinmal, Merta etc. during high solar and high wind

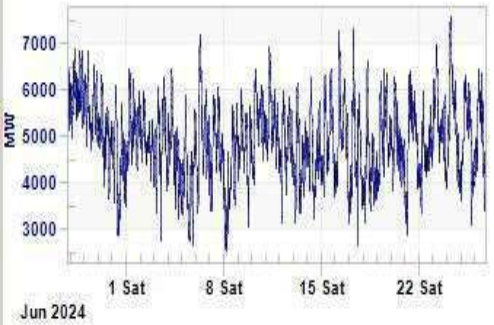
Issue of high loading of 400kV Bhadla(RJ)-Bikaner(RJ) D/C (loading restriction due to poor condition of line)

Severe low voltages in Hindaun & Alwar area (400/220 kV Dholpur S/s approved by CEA on 27th Jan 2023). Gas generation at Dholpur not in service

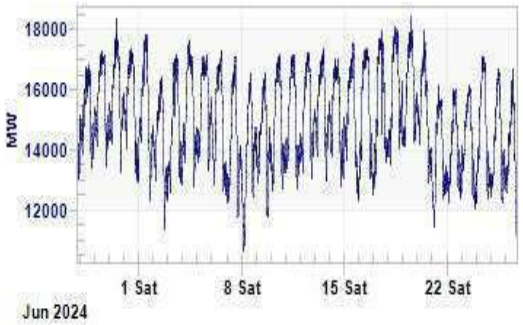

POWER MAP OF RAJASTHAN
400/220 kV Bikaner
400/220 kV Jodhpur
400/220 kV Bhinmal
400/220 kV Merta
400/220 kV Hindaun
400/220 kV Heerapura
400/220 kV Ajmer
PAKISTAN
PUNJAB
HARYANA
DELHI
MADHYA PRADESH
LEGEND
132kV Transmission Substation
220kV Transmission Substation
400kV Transmission Substation
HVDC Transmission Substation
Thermal/Coal Generating Station
Hydro Generating Station
Nuclear Generating Station
132kV Line
220kV Line
400kV Line
765kV Line(Charged at 400kV)
Underground Cable
HVDC Line
1. Sarna Doongar
2. Vaishali
3. Pwd Bungalow
4. Chambal
5. Mansarovar
6. Mnit-jaipur
7. Balawala
8. DFCC(Railway TSS)
NRLDC/GRID-INDIA
POWER MAP OF RAJASTHAN

Constraints observed in Rajasthan during high demand season

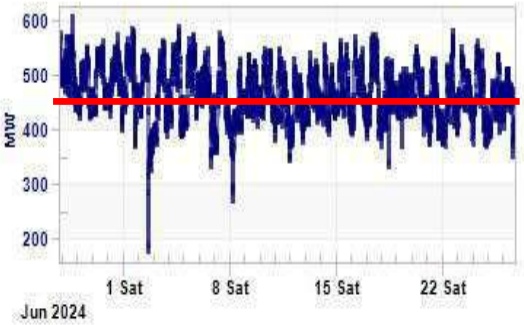
Rajasthan import



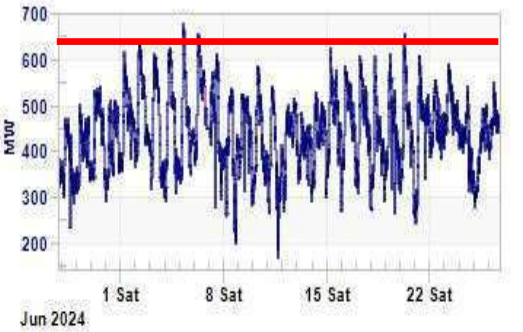
Rajasthan Load



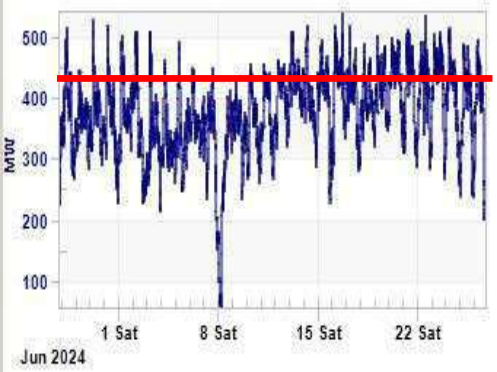
Ajmer ICT loading



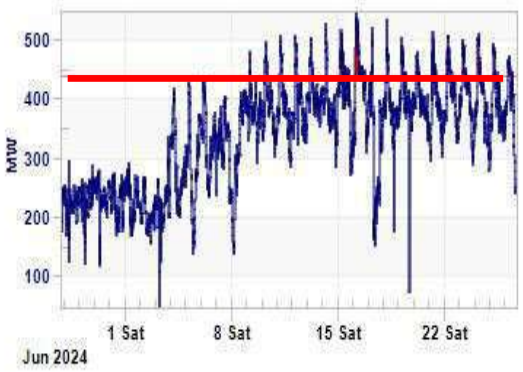
Chittorgarh ICT loading



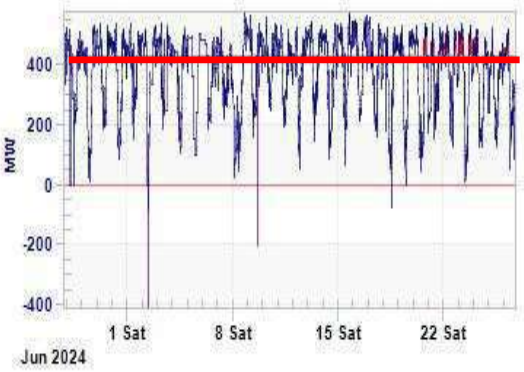
Jodhpur ICT loading



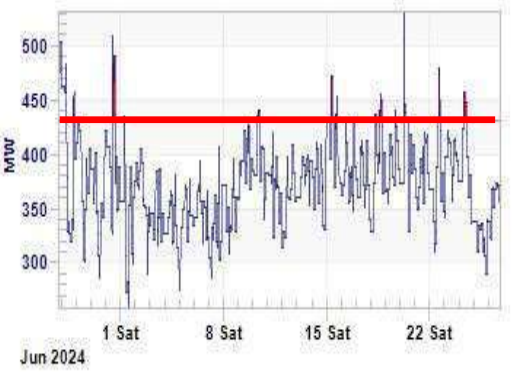
Merta ICT loading



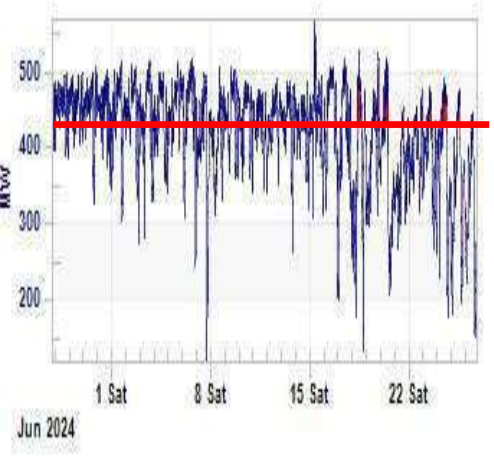
Bikaner ICT loading



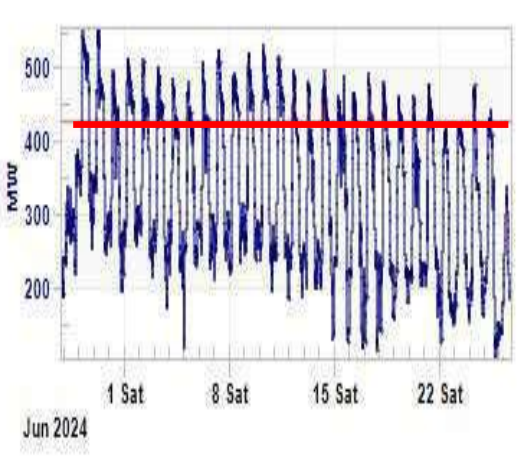
Bhilwara ICT loading



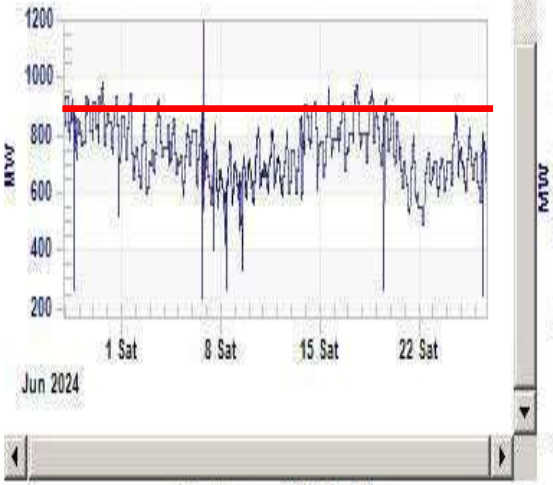
Hindaun ICT loading



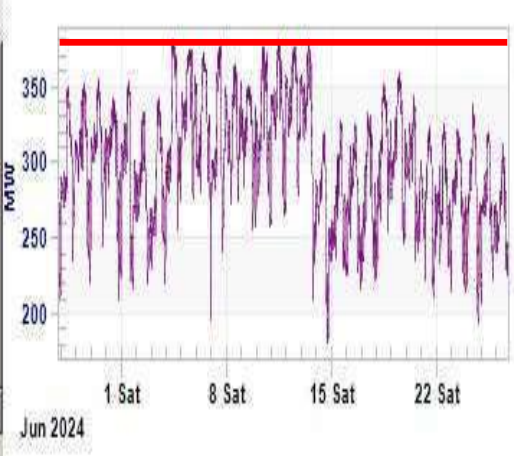
Bhinmal ICT loading



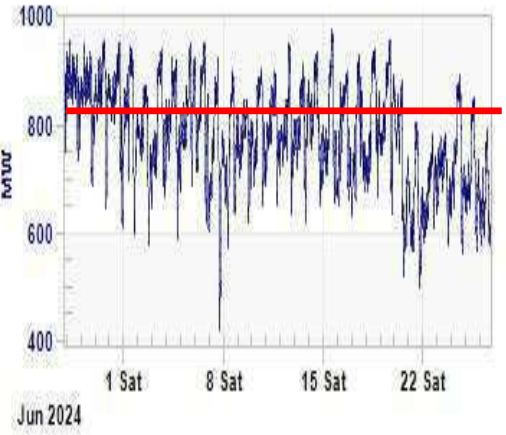
Heerapura ICT loading



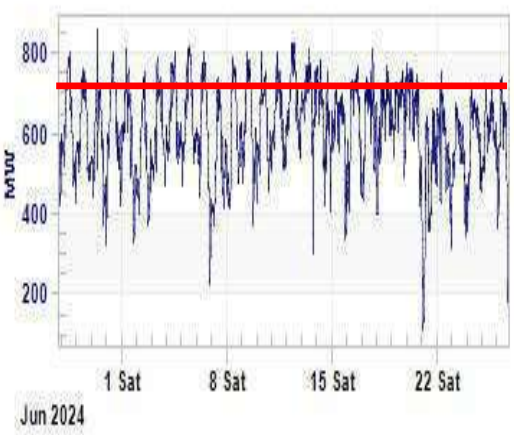
Kotputli ICT loading



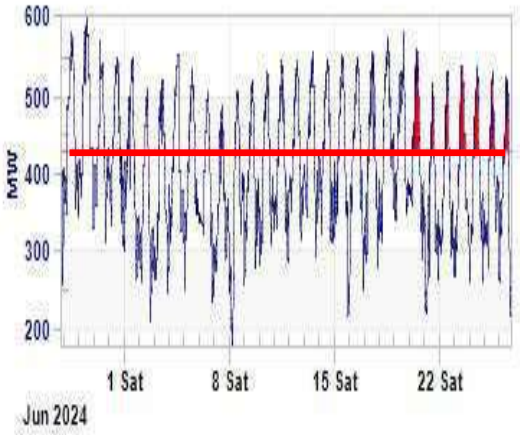
Bassi ICT loading



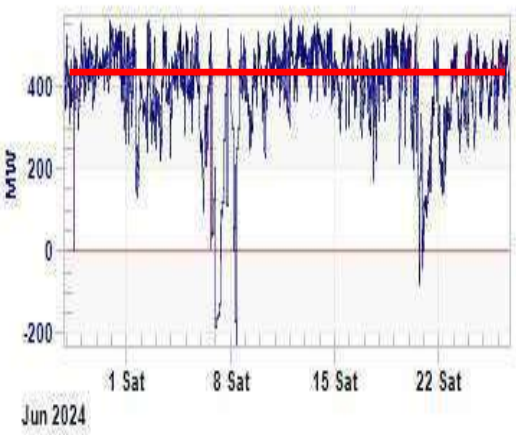
Ratangarh ICT loading

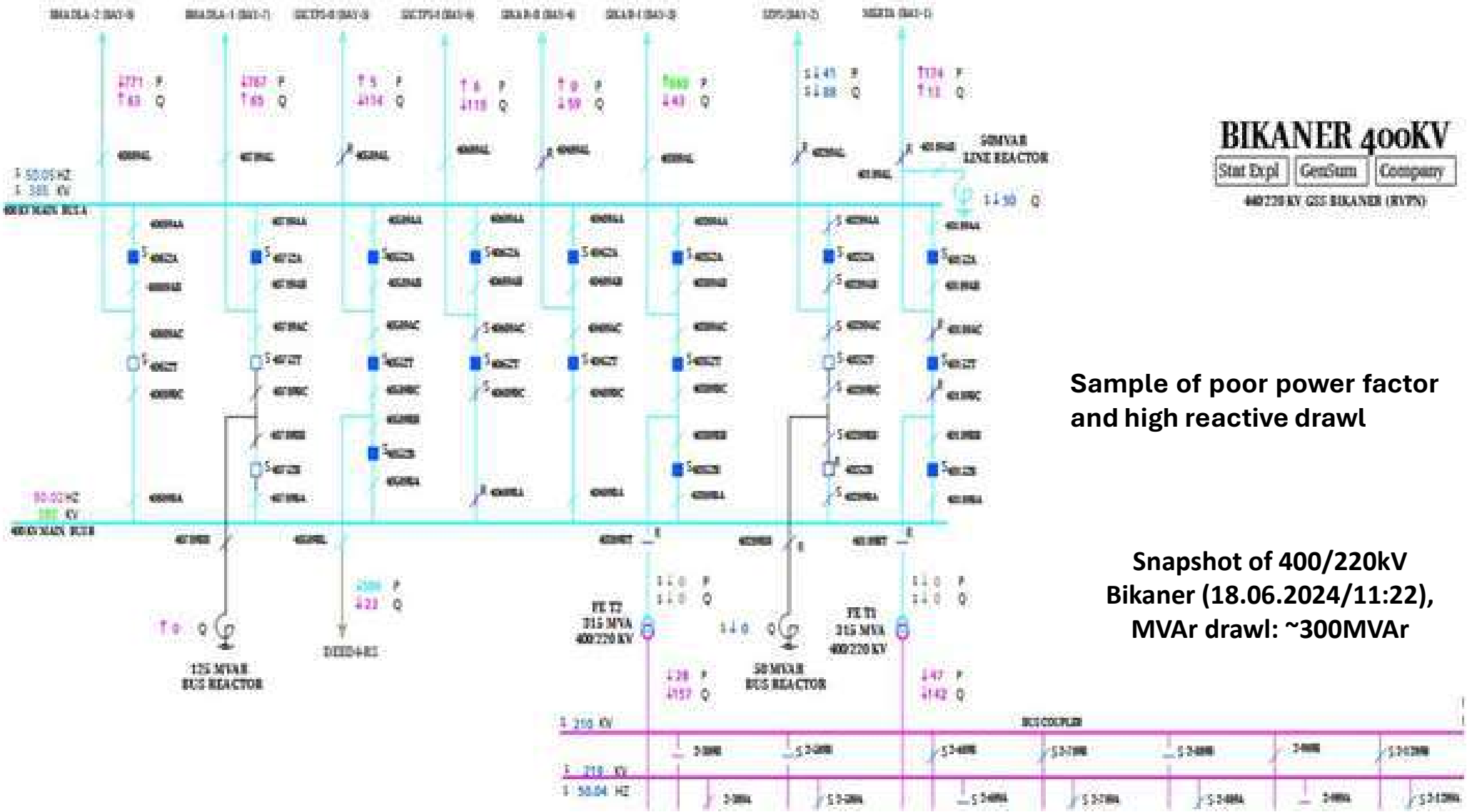


Deedwana ICT loading



Suratgarh ICT loading





Sample of poor power factor and high reactive drawl

Snapshot of 400/220kV Bikaner (18.06.2024/11:22), MVAr drawl: ~300MVAr

Uttar Pradesh:

1

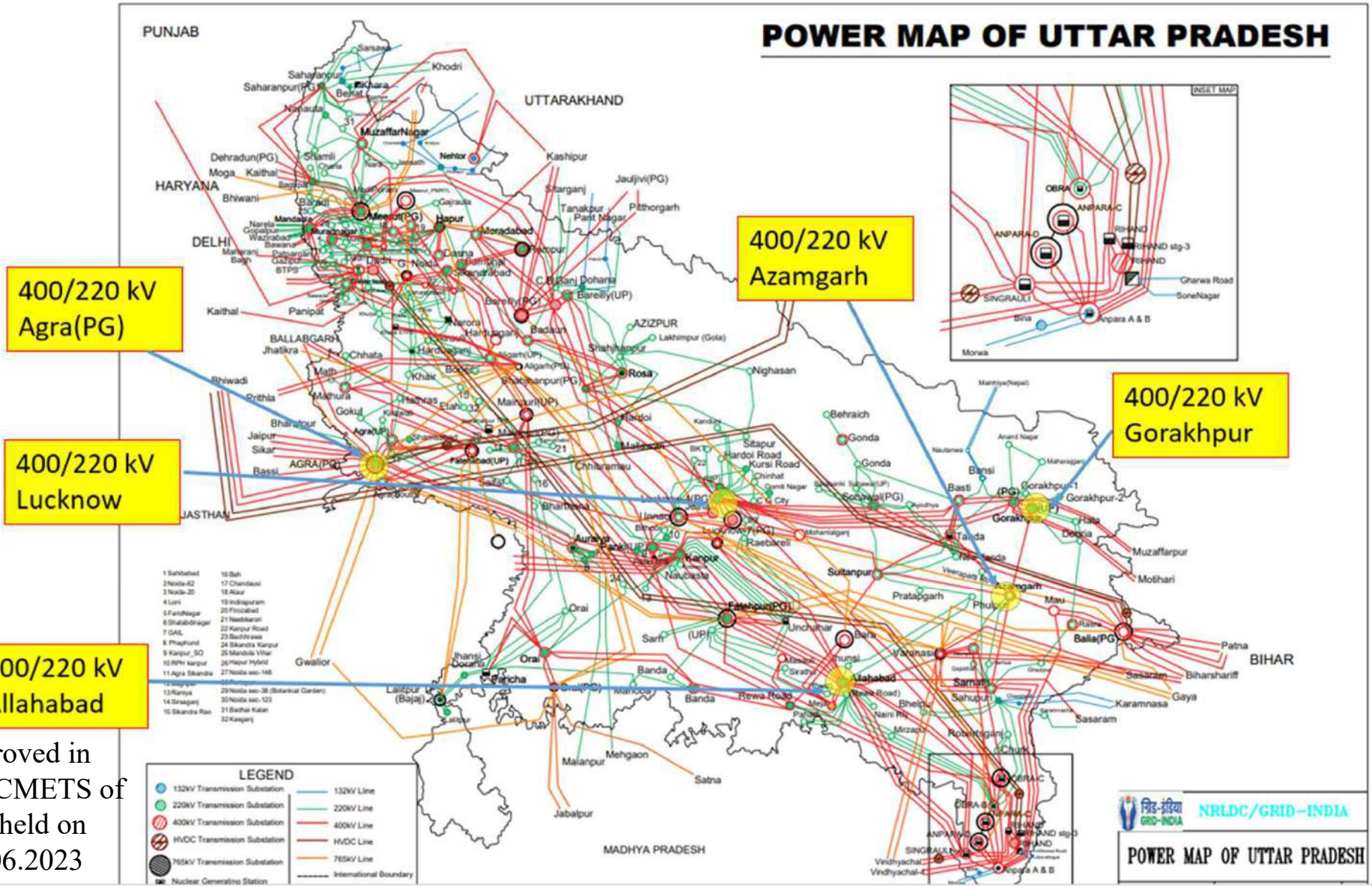
Managing loading within n-1 contingency limits at 400/220 Agra (PG), Allahabad (PG), Lucknow(PG), Gorakhpur (UP) where loading is crossing N-1 limits

2

Although SPS implemented at number of 400/220kV substations such as Azamgarh, Obra, Sarnath, Nehtaur, Gorakhpur etc. Plan to enhance capacity may also be taken up as per forecasted load growth.

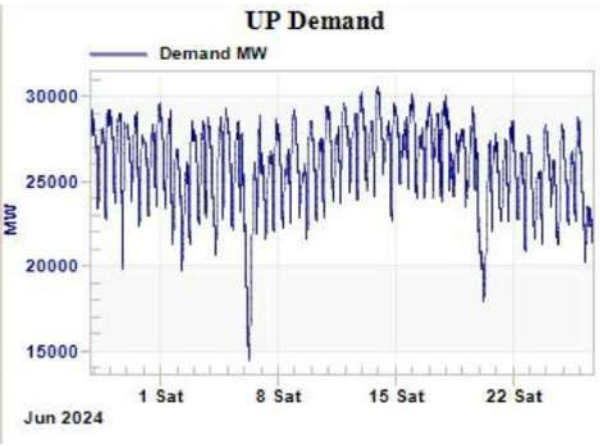
3

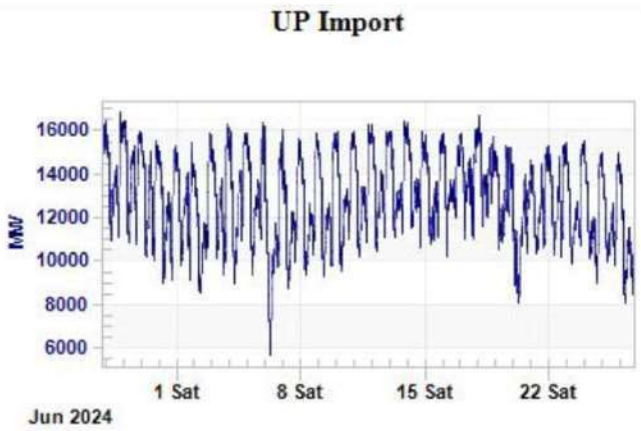
POWERGRID to expedite commissioning of new ICT at 400/220kV Allahabad

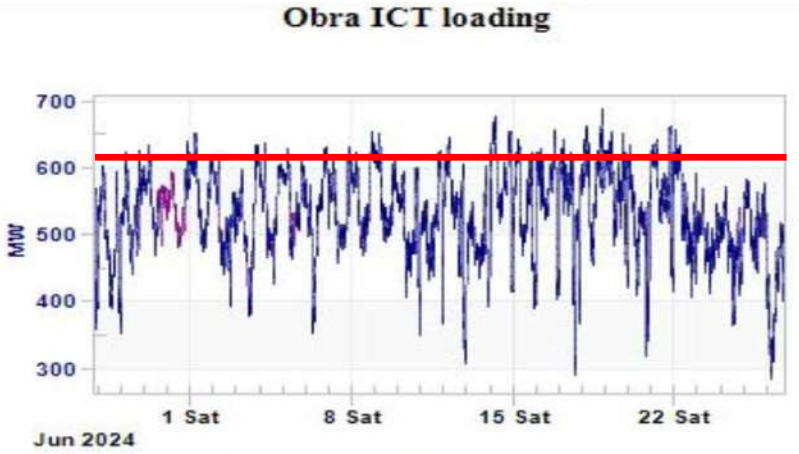


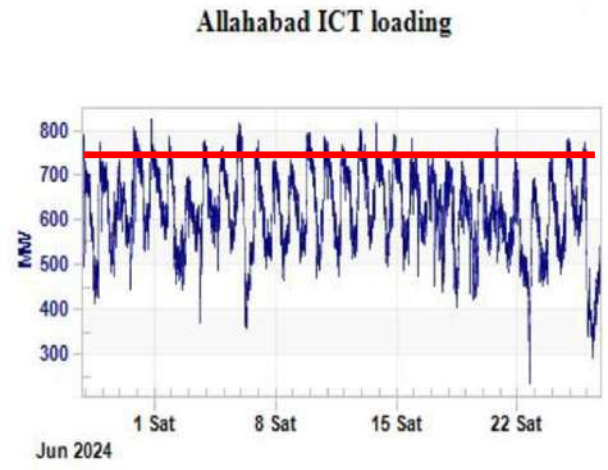
approved in 20th CMETS of NR held on 30.06.2023

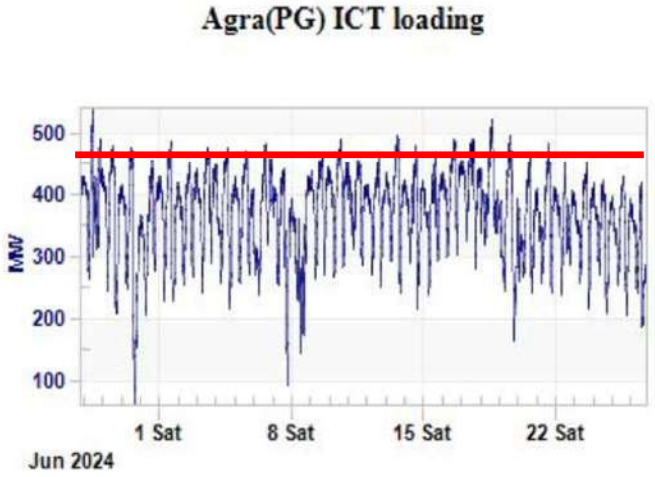
Constraints observed in UP during high demand season

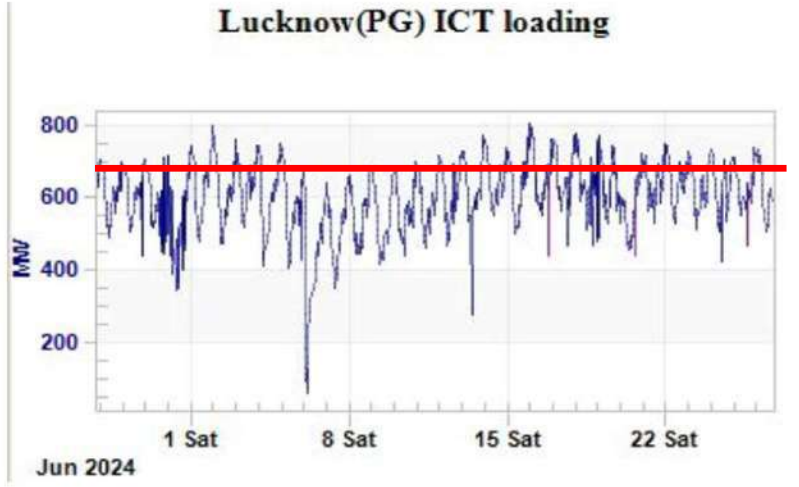




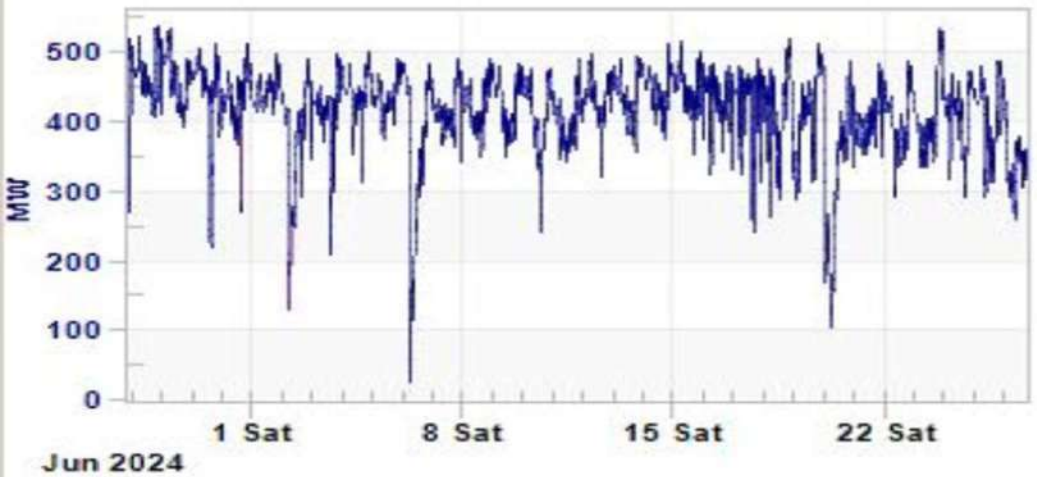




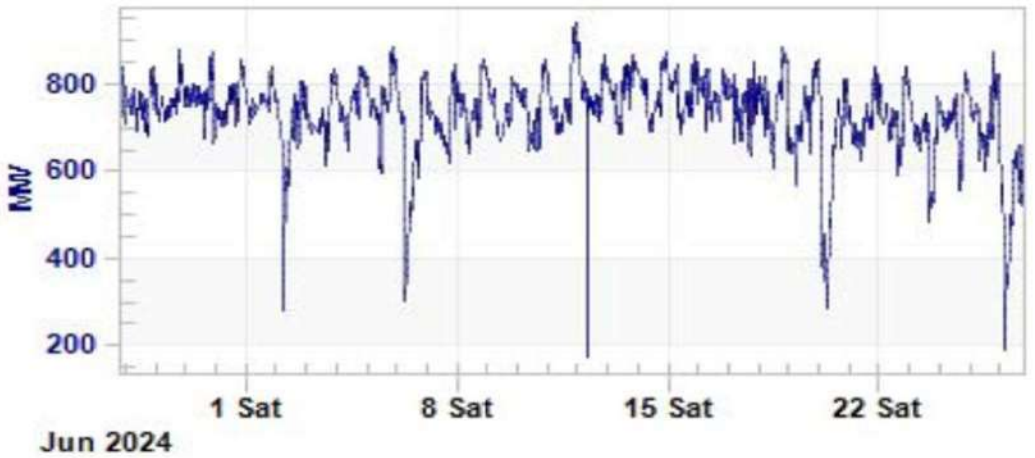




Azamgarh ICT loading



Sarnath ICT loading



Delhi:

1

After bus -split due to high fault level at Bawana, 2*315 MVA ICTs are N-1 non-compliant

Capacity augmentation approved by CEA

2

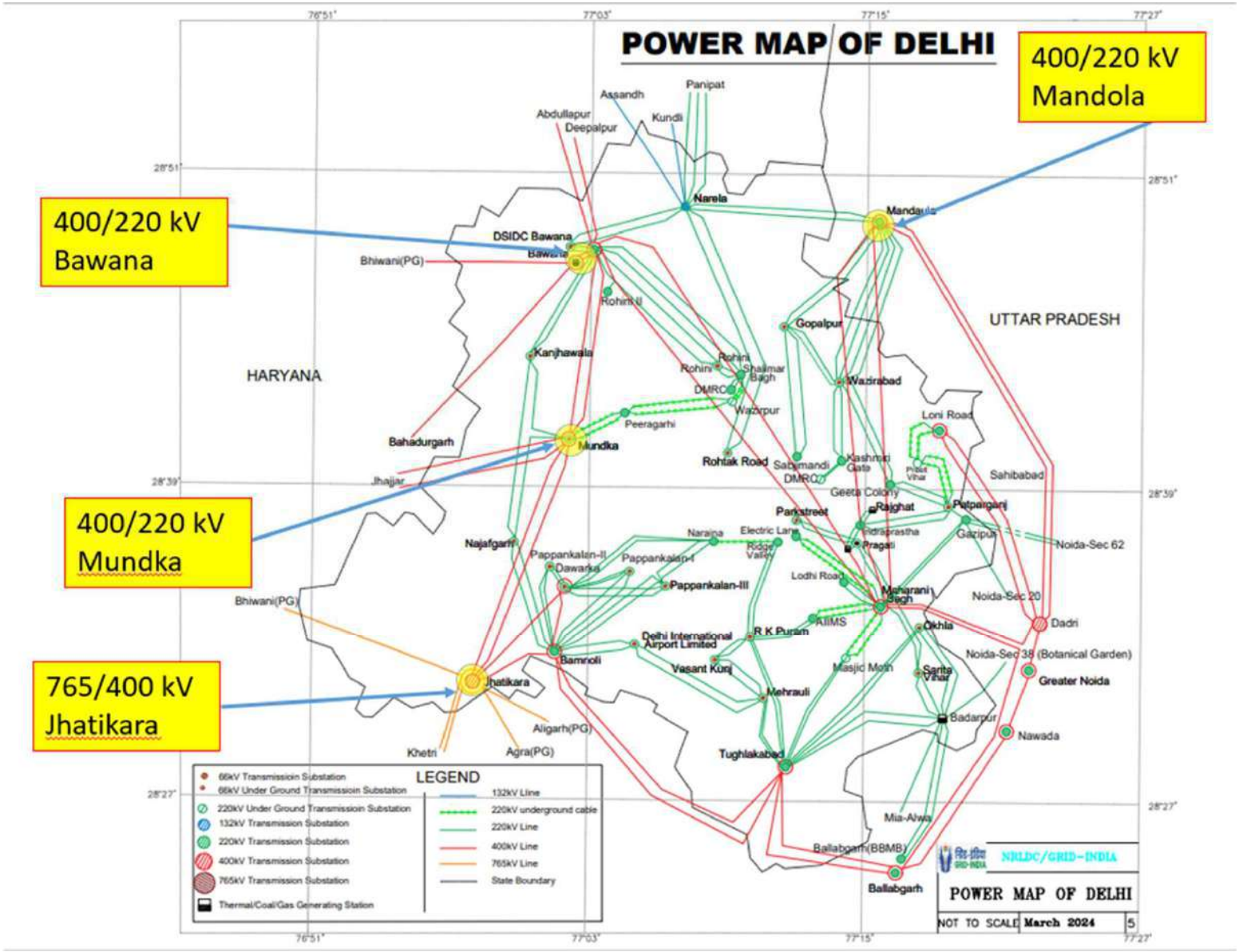
New ICT/ Capacity augmentation at 400/220kV Mundka to be planned

3

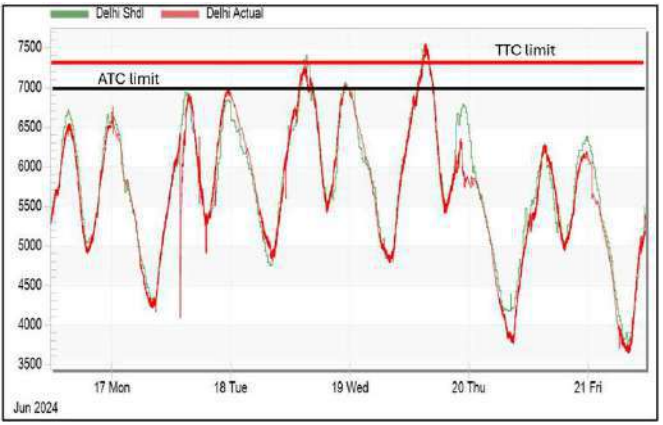
Expediting commissioning of 400/220kV Gopalpur and Tikri Khurd

4

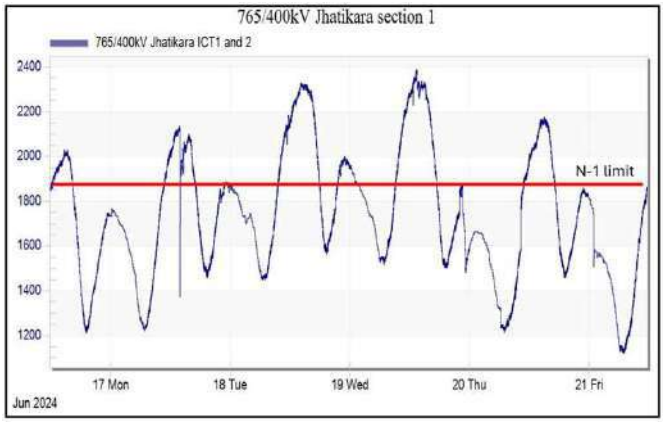
DTL transmission system to be timely augmented to be able to draw power from 765/400kV Narela S/s


POWER MAP OF DELHI
400/220 kV Mandola
400/220 kV Bawana
400/220 kV Mundka
765/400 kV Jhatikara
HARYANA
UTTAR PRADESH
Panipat
Assandh
Abdullapur
Deepalpur
Kundli
Narela
Mandola
DSIDC Bawana
Bawana
Bhiwani(PG)
Rohini-II
Kanjhawala
Gopalpur
Rohini
Shalimar Bagh
DMRC
Wazirabad
Wazirpur
Peeragarhi
Loni Road
Bahadurgarh
Mundka
Rohtak Road
Sabzimandi
DMRC
Kashmiri Gate
Pratap Vihar
Sahibabad
Jhajjar
Geeta Colony
Parkstreet
Rajghat
Patparganj
Najafgarh
Naraina
Electric Lane
Indraprastha
Gazipur
Noida-Sec 62
Pragati
Pappankalan-II
Pappankalan-I
Dawarka
Ridge Valley
Lodhi Road
Pappankalan-III
Maharani Bagh
Noida-Sec 20
Bhiwani(PG)
AIIMS
Okhla
Dadri
R K Puram
Delhi International Airport Limited
Bamnoli
Noida-Sec 38 (Botanical Garden)
Vasant Kunj
Masjid Moth
Sarita Vihar
Greater Noida
Jhatikara
Mehrauli
Badarpur
Aligarh(PG)
Nawada
Khetri
Agra(PG)
Tughlakabad
Mia-Alwa
Ballabgarh(BBMB)
Ballabgarh
LEGEND
66kV Transmission Substation
66kV Under Ground Transmission Substation
220kV Under Ground Transmission Substation
132kV Transmission Substation
220kV Transmission Substation
400kV Transmission Substation
765kV Transmission Substation
Thermal/Coal/Gas Generating Station
132kV Line
220kV underground cable
220kV Line
400kV Line
765kV Line
State Boundary
NRLDC/GRID-INDIA
POWER MAP OF DELHI
NOT TO SCALE
March 2024
5
76°51'
77°03'
77°15'
77°27'
28°51'
28°39'
28°27'

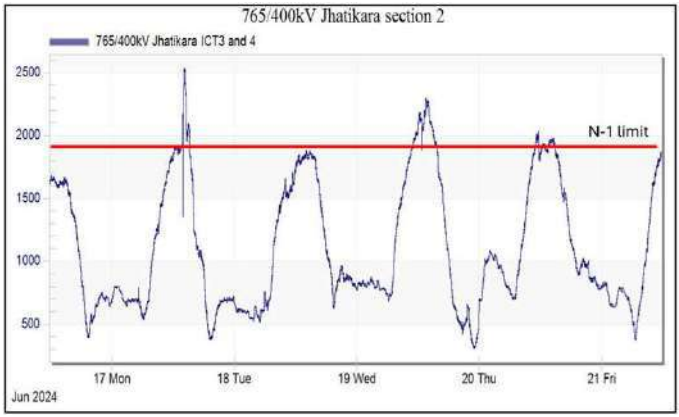
Constraints observed in Delhi during high demand season



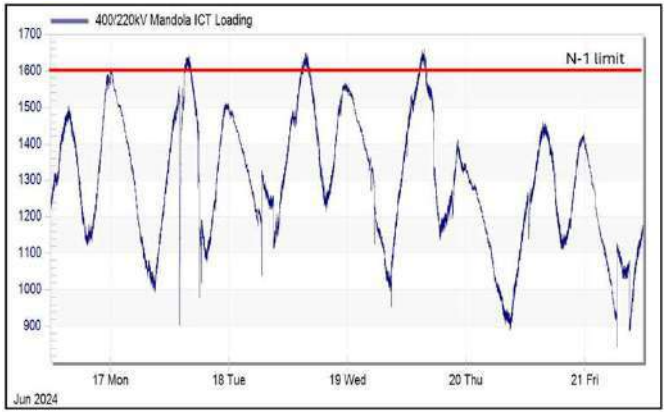
Delhi Schedule as well as actual crossing ATC/TTC limits



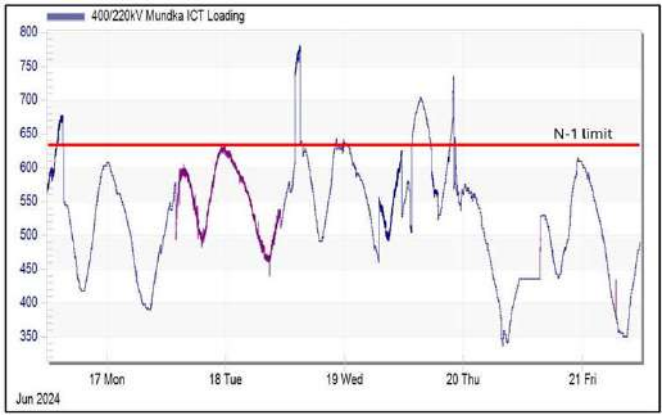
N-1 non-compliance of 765/400kV Jhatikara ICT 1 & 2



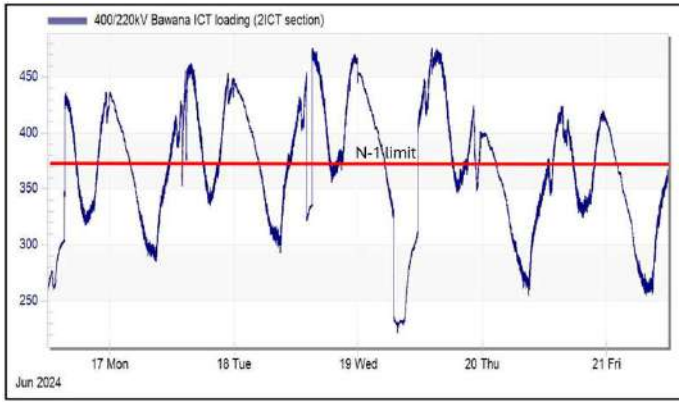
N-1 non-compliance of 765/400kV Jhatikara ICT 3 & 4



N-1 non-compliance of 400/220kV Mandola ICT 1,2,3 & 4



N-1 non-compliance of 400/220kV Mundka ICT 1,2 & 3 (SPS implemented)



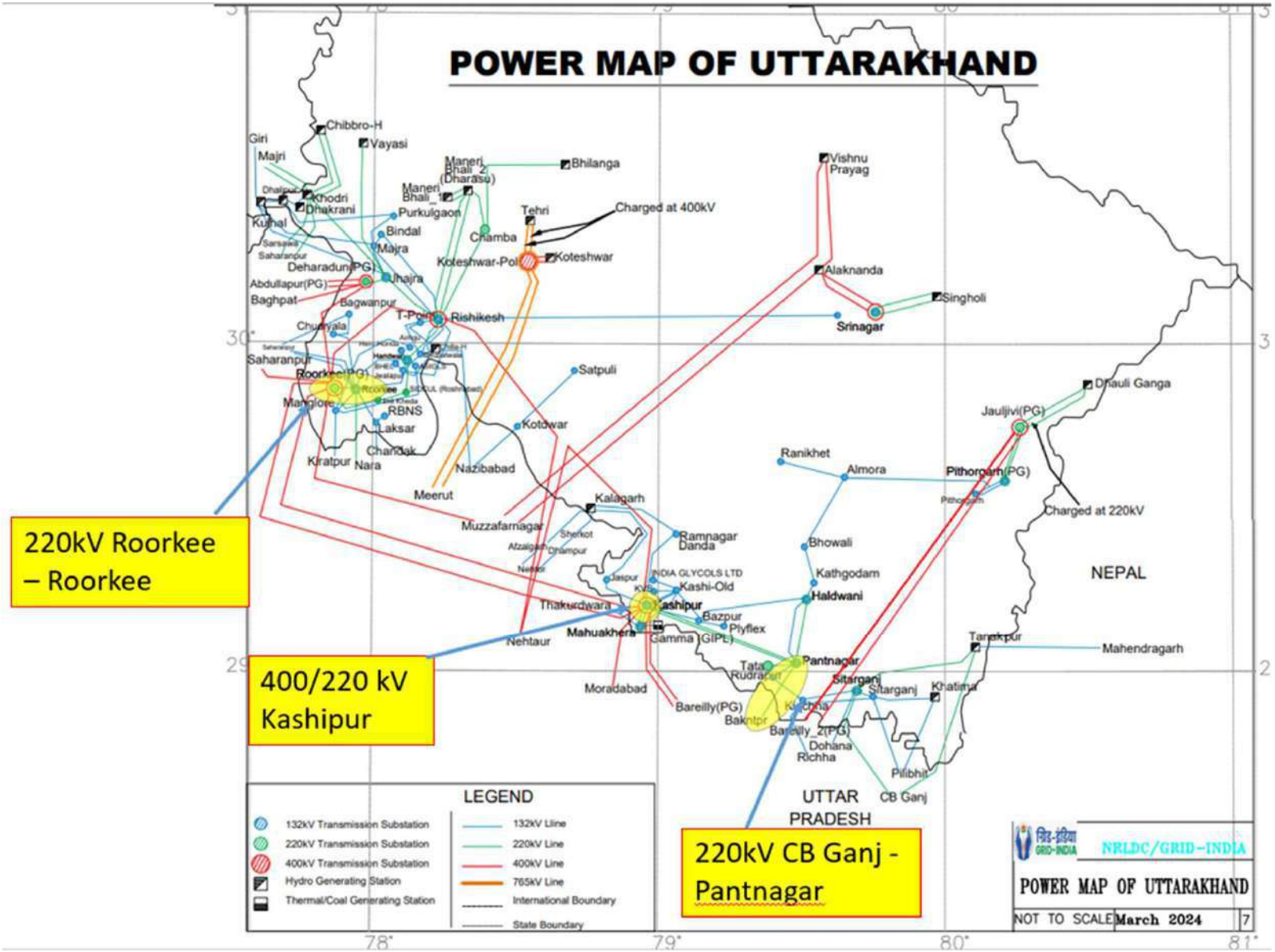
N-1 non-compliance of 400/220kV Bawana ICT 2 & 3 (SPS implemented)

Uttarakhand:

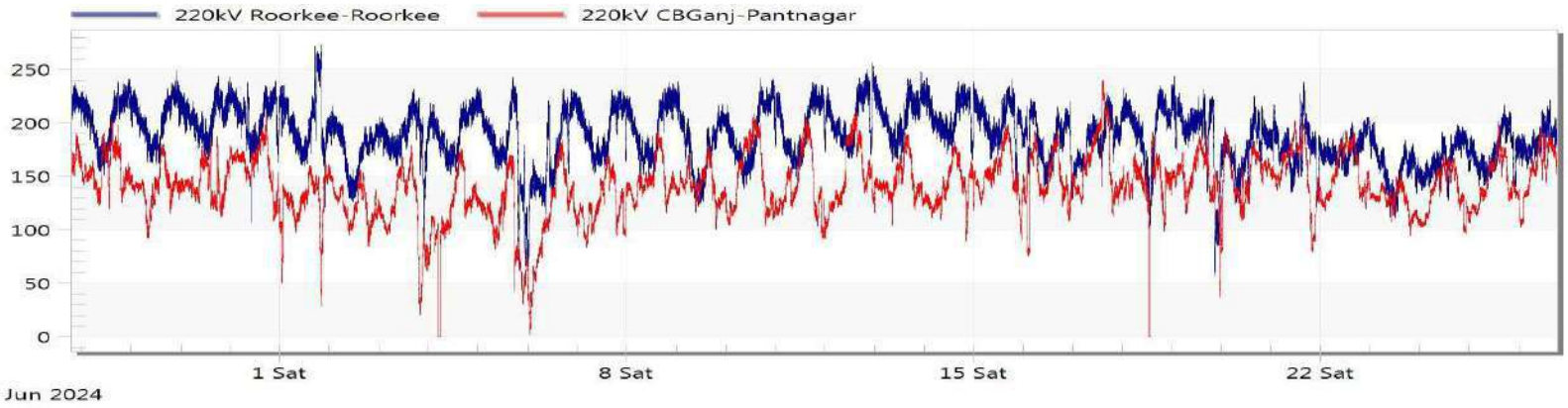
1. Violations at 400/220kV Kashipur in case gas generation is not available
2. High loading of 220kV CBGanj-Pantnagar and 220kV Roorkee-Roorkee lines
3. Very low voltages being observed in intrastate network of PTCUL. NRPC approved capacitor commissioning to be expedited
4. Status of 400kV Landhora S/S which is under planning to be furnished

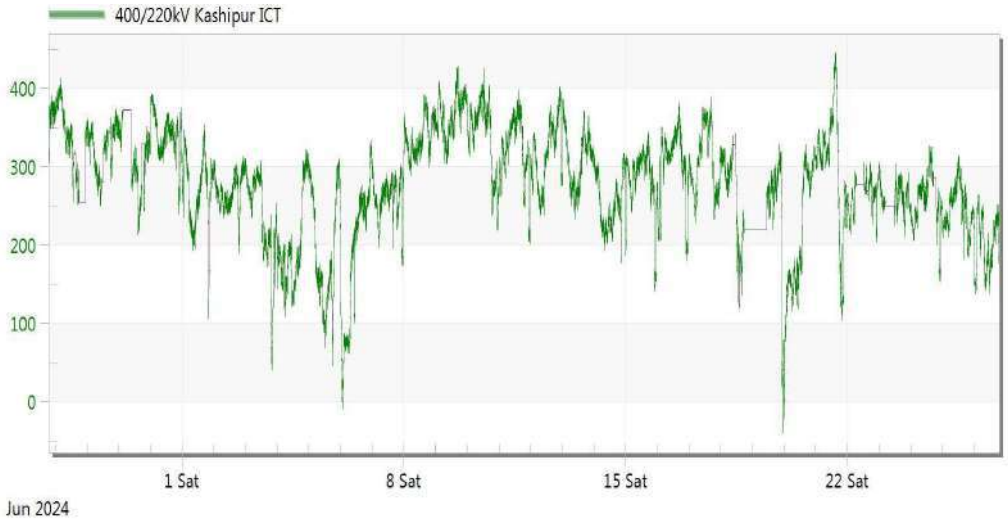
Bid related issues for new ICT?

Requests also being received from HPPTCL side for improving voltages at 220kV Majri(HP)


POWER MAP OF UTTARAKHAND
220kV Roorkee – Roorkee
400/220 kV Kashipur
220kV CB Ganj - Pantnagar
Chibbro-H
Vayasi
Giri
Majri
Maneri Bhali_2 (Dharasu)
Bhilanga
Vishnu Prayag
Khodri
Dhakrani
Purkulgaon
Tehri
Charged at 400kV
Kuthal
Bindal
Majra
Chamba
Koteshwar-Pol
Koteshwar
Deharadun(PG)
Uhajra
Alaknanda
Abdullapur(PG)
Baghpat
Bagwanpur
Singholi
T-Point
Rishikesh
Srinagar
Chunnyala
Saharanpur
Roorkee(PG)
Satpuli
Dhauli Ganga
Jauljivi(PG)
Manglore
RBNS
Laksar
Kotdwar
Ranikhet
Almora
Pithoragarh(PG)
Kiratpur
Nara
Chandak
Nazibabad
Meerut
Charged at 220kV
Kalagarh
Muzzafarnagar
Ramnagar Danda
Bhowali
Kathgodam
NEPAL
Kashi-Old
Haldwani
Thakurdwara
Bazpur
Piyflex
Nehtaur
Mahuakhera
Gamma (GIPL)
Tanakpur
Mahendragarh
Pantnagar
Tata Rudrapur
Sitarganj
Khatima
Moradabad
Bareilly(PG)
Bareilly_2(PG)
Dohana
Richha
Pilibhit
UTTAR PRADESH
CB Ganj
LEGEND
132kV Transmission Substation
220kV Transmission Substation
400kV Transmission Substation
Hydro Generating Station
Thermal/Coal Generating Station
132kV Line
220kV Line
400kV Line
765kV Line
International Boundary
State Boundary
NRLDC/GRID-INDIA
POWER MAP OF UTTARAKHAND
NOT TO SCALE
March 2024
7

Constraints observed in Uttarakhand during high demand season





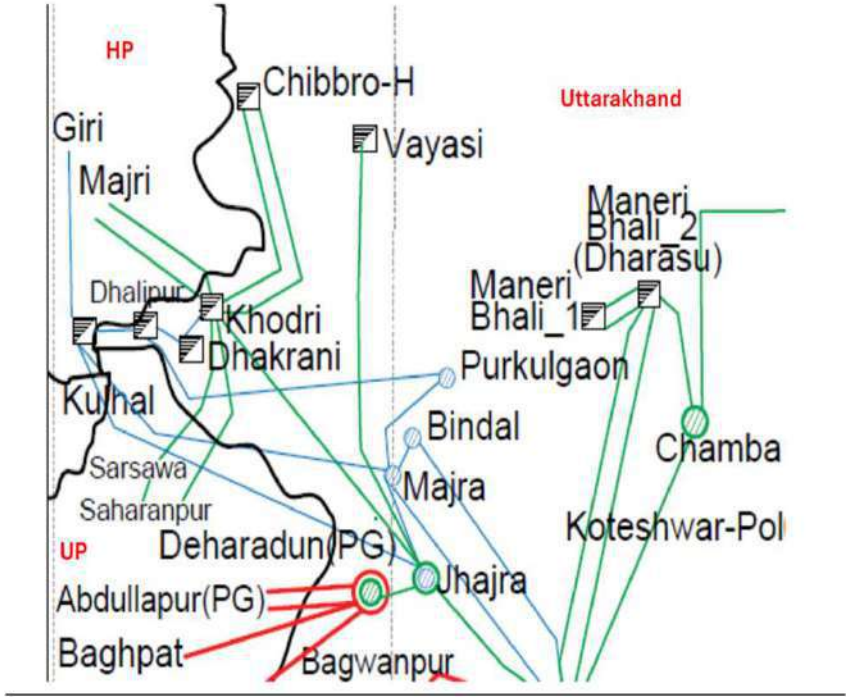
Reason for low voltages:

- High reactive power requirement from load side due to weather conditions
- Minimal hydro generation and limited localised VAR support from Uttarakhand state hydro generators (hydro being scheduled for peaking due to limited water).

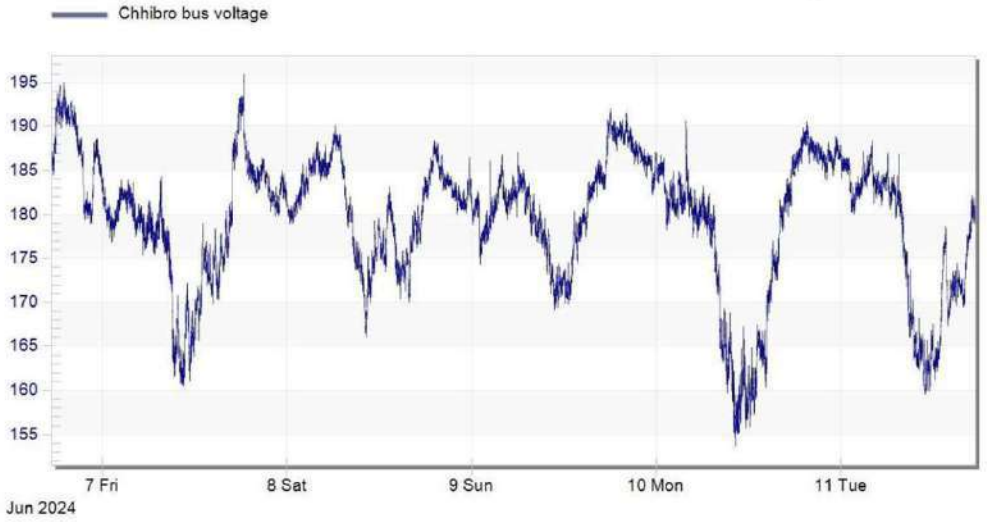
Temporary solution: Tap of 400/220kV Dehradun ICTs would be increased by 2 steps (11 from 9b)

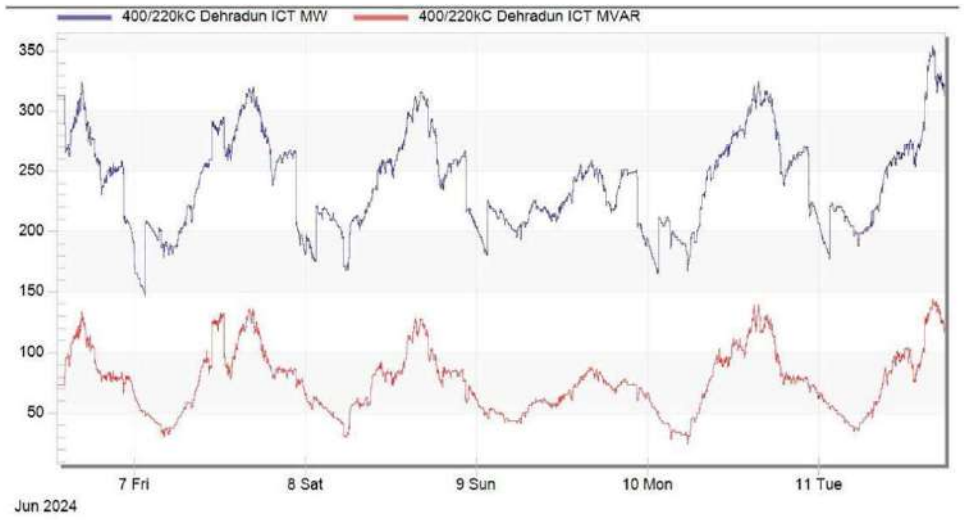
- Long term: Recently, in 71 NRPC meeting held on 29.01.2024, capacitors at 62 no.s 33/11 kV Substations in Uttarakhand. (Rs. 58.99 Cr.)were approved (through PSDF funding).
- Plan from UPCL side, no plan from PTCUL side. Same needs to be expedited.

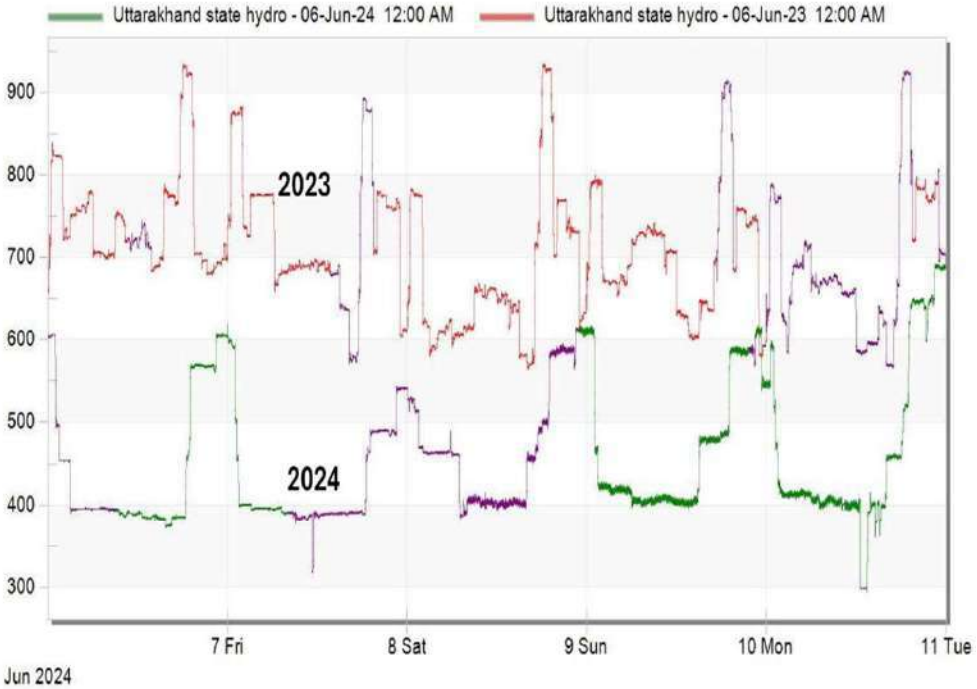
Power map of the area



Voltage profile of 220kV Chhibro for last few days







Himachal Pradesh : (Major constraints observed during winter)

1

New ICT/ Capacity augmentation to be studied and proposed by HPPTCL/ PSTCL at 400/220kV Nallagarh

2

Frequent event related to multiple element outages at 220/132kV Kunihar. Substation maintenance and protection related issues need to be resolved

Tripping events involving 220/132kV Kunihar S/s

MoM of 50th PSC meeting held on 29.04.2024

PSC forum deliberated that in view of multiple incidents of grid events in this complex, a committee may be constituted for third party protection audit of Kunihar, Baddi complex. HP may also proceed with the process of third-party protection audit and shall share the report of the audit. HP was also requested to plan for suitable SPS scheme in this complex to avoid complete outage of the complex during contingency.

J&K and Ladakh U/T : (Major constraints observed during winter)

1

Capacity augmentation at 400/220kV Amargarh to be expedited

NRSSXXIX implementing the same.

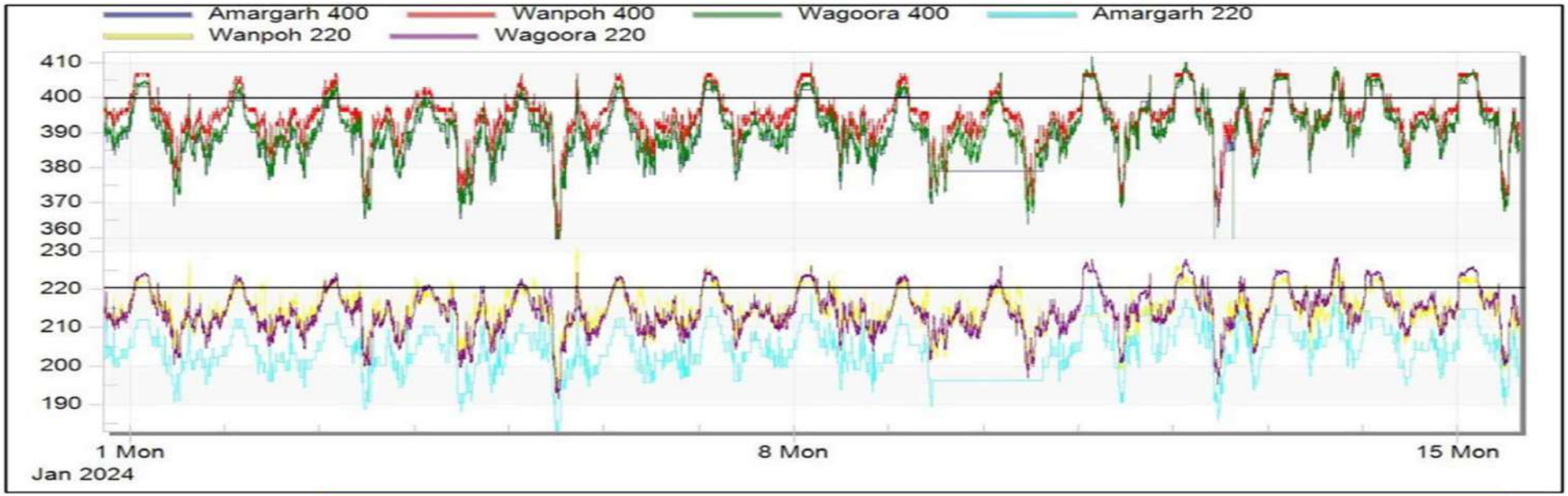
2

Additional planned 220kV and low voltage lines to be expedited to manage drawl from Amargarh

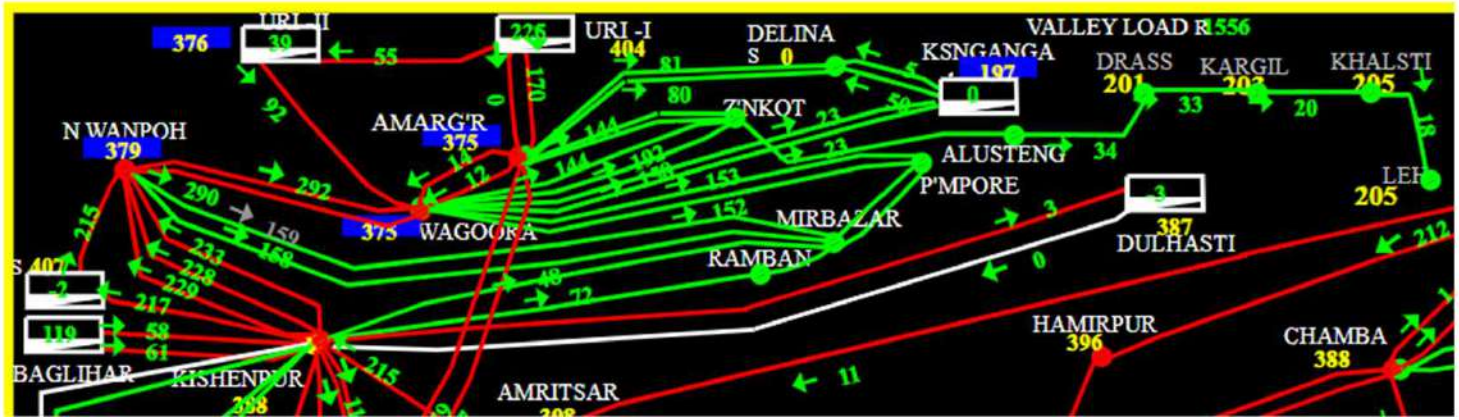
3

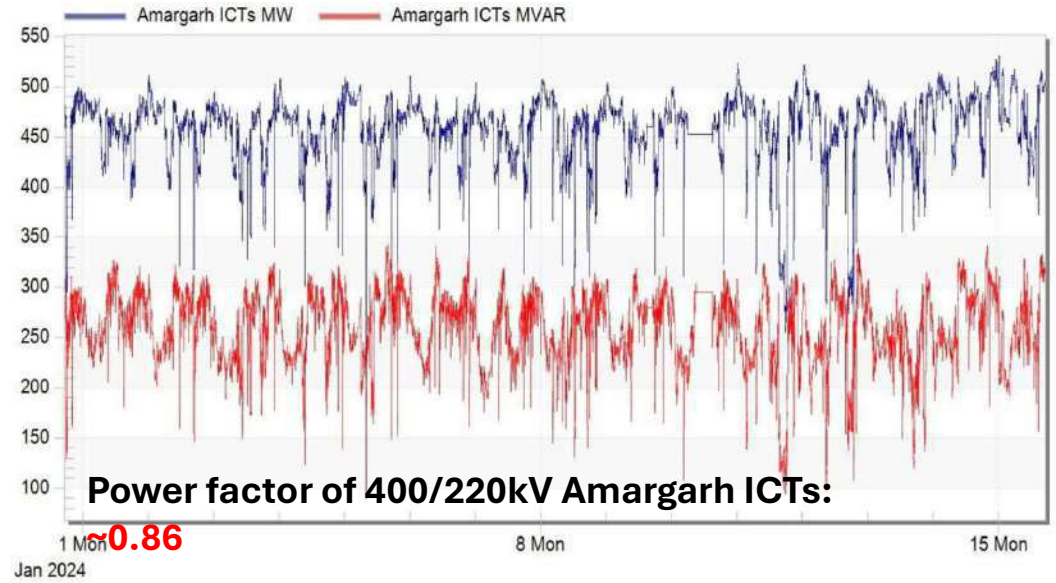
Actions to manage severe low voltages in J&K control area. SVC at New Wanpoh is being fully utilised (no margin for dynamic support). Reactive energy charges also payable

Low voltage related issues in J&K control area

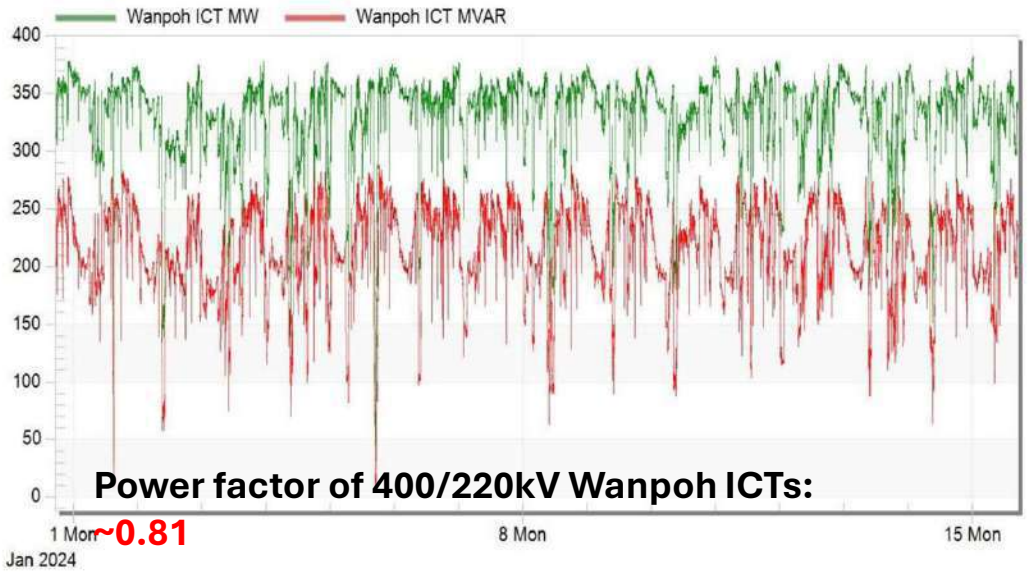


Grid Snapshot Of Jan 2024

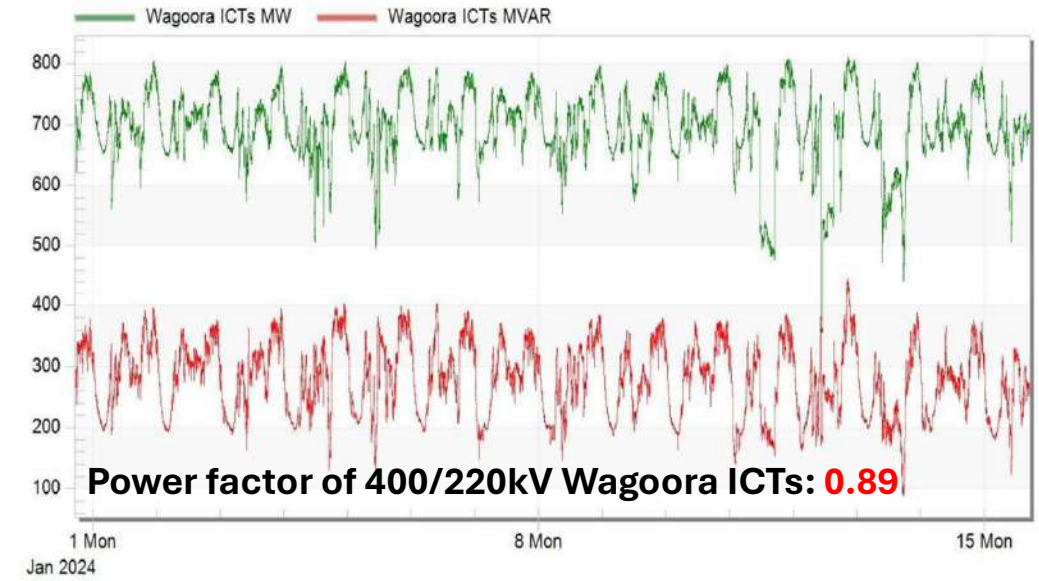




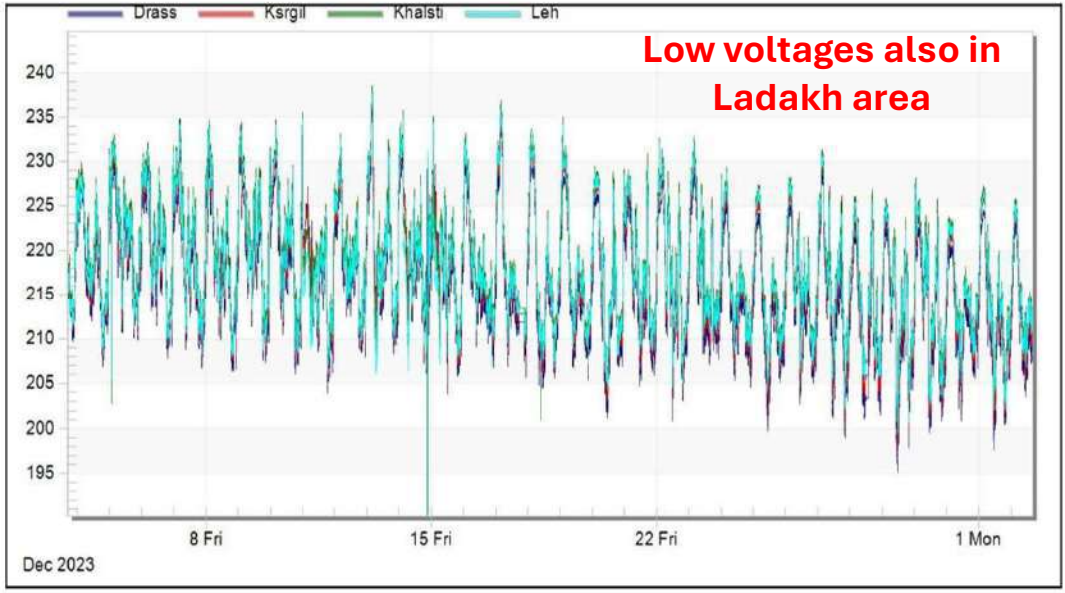
Power factor of 400/220kV Amargarh ICTs: ~0.86



Power factor of 400/220kV Wanpoh ICTs: ~0.81



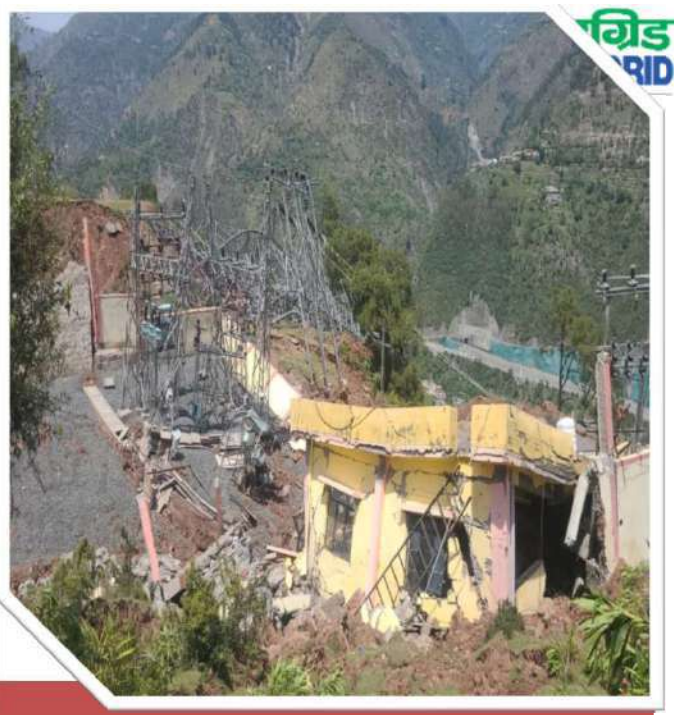
Power factor of 400/220kV Wagoora ICTs: 0.89



Low voltages also in Ladakh area

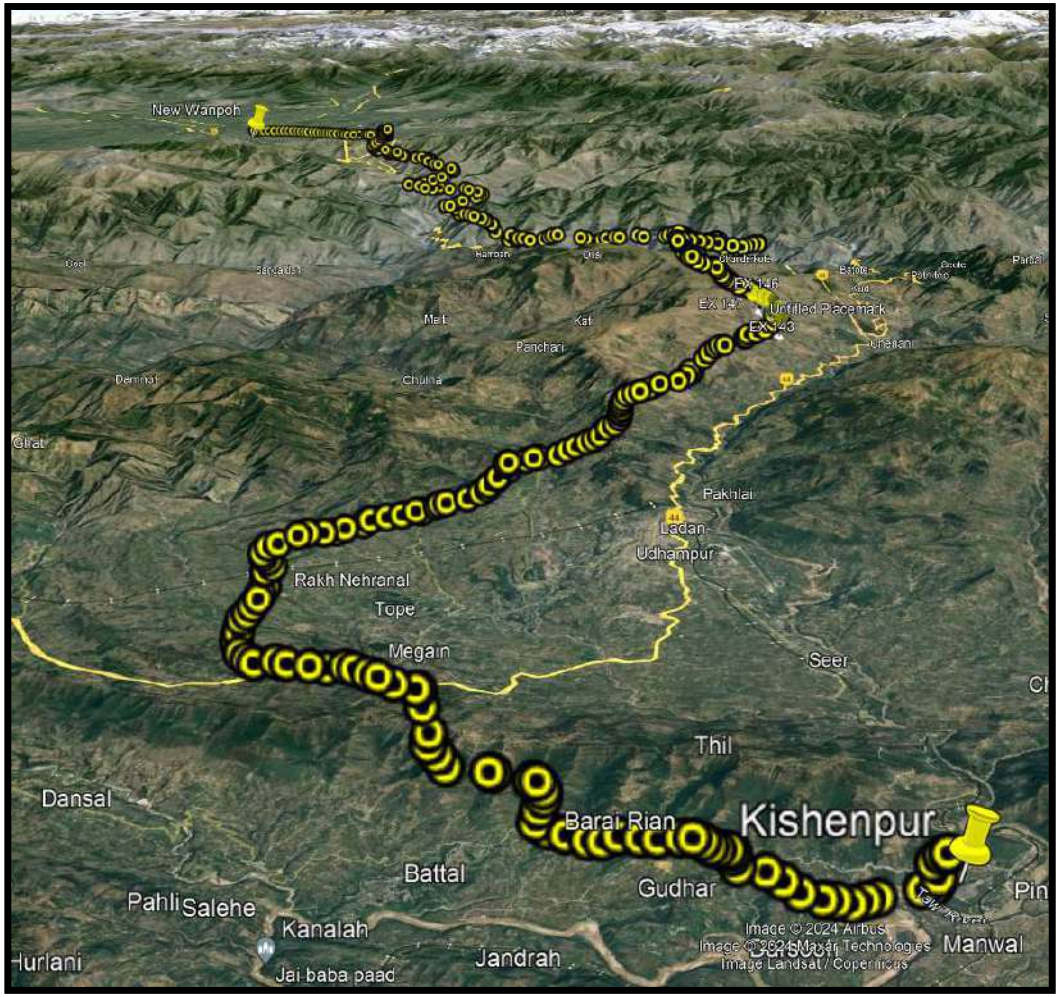
STATION	DIGITAL	ANALOG
AAU	LINE ISO	1. BUS V AND FREQ
		2. ICT P AND Q
ADANI KAWAI	ALL ISO	
AJMER 220	ISO	ALL ANALOG VALUE
AKAL	CB AND ISO	BUS VOLTAGE
		BR Q
		JODHPUR LINE P AND Q
ALWAR 400	OK	OK
AMARSAGAR 220	ISO AND CB	ICT HV SIDE ANALOG
BARMER	RAJWEST DIA DIGITAL	ICT HV SIDE ANALOG
BARSINSAR		BUS VOLATGE
BADDISID		BUS VOLATGE
BABAI 400		BUS2 V AND FREQ
		ICT ANALOG
BHILWARA		COMPLETE DATA
BHAINSARA 400		BUS V AND FREQ
	BARMER LINE DATA	BARMER LINE DATA
BHINMAL 220		ANALOG DATA
BIKANER 400	ISO	ICT HV SIDE
BHADLA	ALL DATA	ALL DATA
BHOPALGARH	ALL DATA	ALL DATA
CHIRAWA	ALL DATA	ALL DATA
CHITTORGARH 220	ALL DATA	ALL DATA
CHITTORGARH 400		ICT DATA HV AND LV
CHABBRA 400	DIGITAL DATA	ANALOG DATA
DHOLPUR 220	ALL DATA	ALL DATA
DUNI 220	ALL DATA	ALL DATA
HERAPURA 400	ALL DATA	ALL DATA
HINDAUN 400		ICT HV SIDE DATA
KAWAI 220		ICT ANALOG
KANKANI	ALL DATA	ALL DATA
KANKROLI 220		ANALOG DATA
PHAGI 765		LR Q VALUE
RAMGARH 400		ICT 1 ANALOG VALUE

		BUS 1 V AND FREQ
RATANGARH 400		ICT VALUE
		BUS1 FREQ
RATANGARH 220	ISO	
SRI GANGANAGAR		ICT DATA
PRATAPGARH	ISO	
FALODI	ALL DATA	ALL DATA



TOWER COLLASPE IN 400 KV D/C KISHENPUR –NEW WANPOH III & IV LINE DUE TO MASSIVE LAND SINKING/SLIDING

Background



- The 400 kV D/C Kishenpur-New Wanpoh 3&4 transmission line was commissioned on July 29, 2017.
- This transmission line is an important link connecting National Grid to the Kashmir valley.
- This transmission line traverses through tough Hilly terrains of Ramban and Banihal from 400/220 KV Kishenpur to 400/220 KV New Wanpoh Sub-station.
- The towers of this line were designed for basic wind speed of 39 m/s corresponding to Wind Zone-2 as per IS 802-1995.
- The towers were designed in vertical configuration with Double Circuit Twin ACSR MOOSE Conductor.

Landsliding event at Ramban on 25.04.24

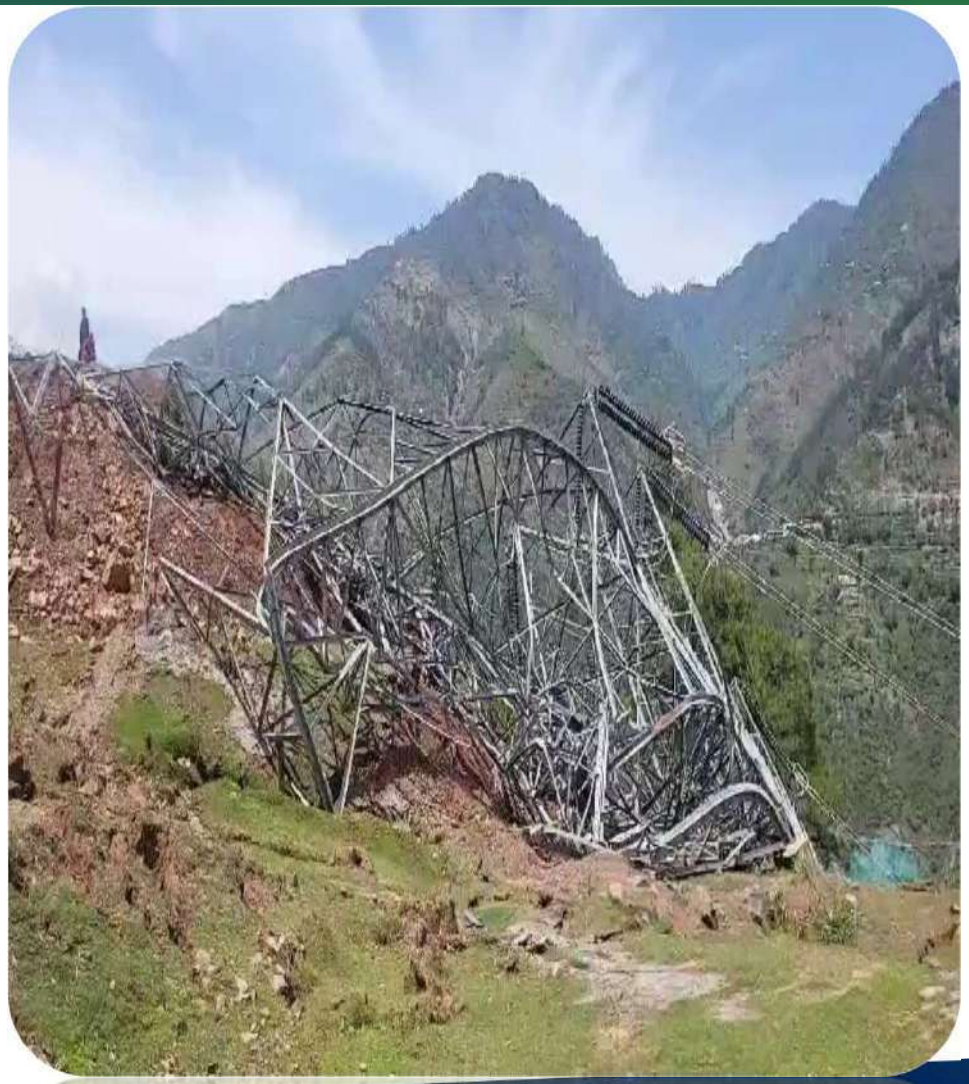
- During evening of 25.04.2024, an incident of unprecedented scale of land sliding/ hill sinking occurred in the Village Parnote, Distt. Ramban.

- Local land owners reported massive soil sinking (upto the level of 10-12 mtrs) at Parnote village. It was also learnt that tower nos 225 & 226 of 400 kV D/C Kishenpur Wanpoh III & IV are in the vicinity of the affected area.

- As a safety precaution, shutdown of 400 kV D/C Kishenpur Wanpoh III & IV was taken on directions of the District Admin.

- The landsliding continues and caused settlement in tower nos 225 & 226 which led to snapping of conductors in span 225-226 during night hours as observed by POWERGRID team.

Damages caused by Landslide on 26.04.24



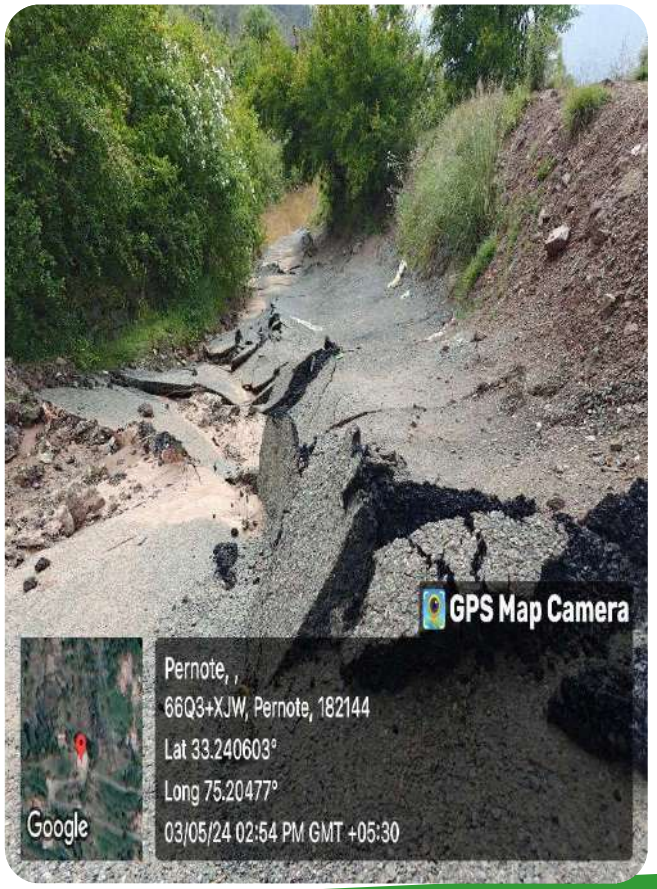
Three 400 kV towers collapsed

Around 60 houses and roads damaged

JKPTCL Kanga S/S damaged

Damages caused by Landslide on 26.04.24

Damaged connecting road



Media Coverage

दैनिक जागरण

www.jagran.com

अमेठी से ही उतरेंगे राहुल, रायबरेली से प्रियंका 5

मोदी सरकार ने सिर्फ के हित में काम किया है : जेपी नड्डा 5

संपादकीय

रामबन में धंस रही जमीन, पूरा क्षेत्र रेड जोन घोषित, 100 परिवार शिफ्ट

भूविज्ञानियों ने लिए मिट्टी के नमूने अधिकारी टेंट लगा गांव में डटे

प्रारंभिक जांच में ऊंचे स्पीड ब्रेकर

एसआइ व जेई घोट

चुके डीएसपी प्रशांत

झंकार

सप्तरंग

रविवार विशेष

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TUE TIMES OF INDIA

Landslide damages roads and houses in Jammu and Kashmir's Ramban

TIMESOFINDIACOM | Apr 27, 2024, 03.41 PM IST

RAMBAN: Pernote village located approximately six kilometres from Ramban town in Jammu and Kashmir is witnessing heavy damage to roads, houses and power towersdue to continuous landslides.

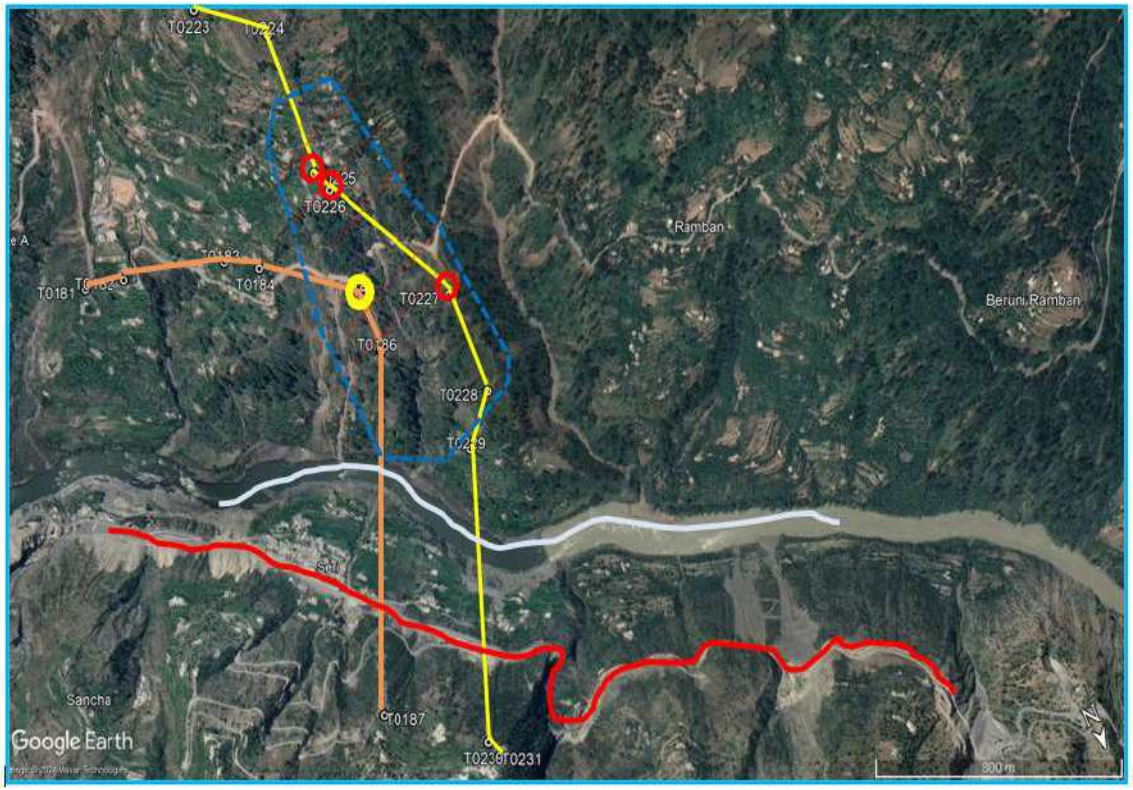
The affected residents have been relocated to the Panchayat Ghar and other safe locations where the administration is providing them with medical care and food. The authorities are closely monitoring the situation and remain on high alert

Varunjeet Charak, ADC Ramban said,'Around 50-55familieshave been affected. And all the houses within one kilometre of range have been damaged. Some are fully damaged, whilesome are partially damaged. The familieshave been rescued'.

Charak also mentioned the involvement of NDRF, SDRF, and local NGOs in the rescue operation. He further highlighted the destruction of three power towers and the disruption of agricultural activities in the area.

The administration had initially set up temporary tents for the affected families but heavy rains have damaged these tents, prompting the authorities to relocatethe familiesto alternative accommodations.Charak emphasized that only experts from theGeology department can provide insights into the reasons behind the recurring landslidesin this specificarea.

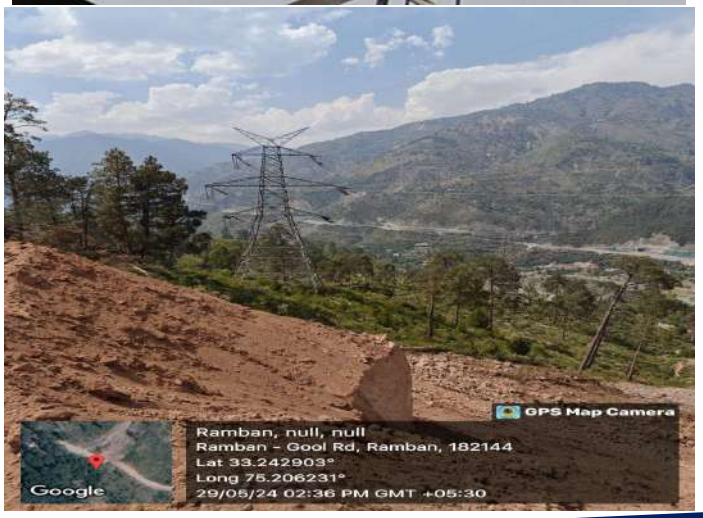
Area under the effect of Land subsidence



	Circuit III & IV		Collapsed Towers
	Circuit I & II		Towers under risk
	NH 244		Subsidence effect
	Chenab River Crossing		Residential areas damaged

Proximity of Kishenpur-New Wanpoh-I & Baglihar-Wanpoh line

Due to proximity of landsliding near Kishenpur-Wanpoh-1& Baglihar- Wanpoh Line, the said line was taken under S/D from 26.04.24 to 30.04.24 on the direction of Distt. Admin as safety measure.



Latest Incident of landsliding on 08.05.24

तापमान (8 मई) 38.6° अधिकतम 21.1° न्यूनतम | सूर्य अस्त (आज) 07:19 उदय (कल) 05:38 | आर्द्रता 39% 27% अधिकतम न्यूनतम

जम्मू कश्मीर जागरण

परनोत गांव में सर्वे, लोग अभी न रहें और न करें कृषि

राष्ट्रीय आपदा प्रबंधन प्राधिकरण के विशेषज्ञों ने जमीन धंसने को बताया प्राकृतिक आपदा प्रभावित हिस्से का किया निरीक्षण

अमित गाही • जागरण

ऊधमपुर : रामबन जिले के परनोत गांव में जमीन धंसने का कारण झरनों के इधर-ऊधर बह रहे पानी का दबाव नहीं झेल पाना प्रमुख है। यहां पानी के कई झरने है और चिकनी मिट्टी होने के कारण पानी कई जगह छोटे जलाशय की तरह जमा हो जाता है। इस पानी के निकास का कोई रास्ता भी नहीं है। इस कारण पानी पहाड़ों के अंदर रिसता रहता है जिससे जमीन धंसने की आशंका बढ़ जाती है। यही कारण रहा परनोत में जमीन धंसी और दरारें आई। दिल्ली से आए राष्ट्रीय आपदा प्रबंधन प्राधिकरण (एनडीएमए) के विशेषज्ञों ने प्रभावित हिस्सों का सर्वे कर इस घटना को प्राकृतिक आपदा बताया। उन्होंने जमीन, मकान व सड़क और कई जगहों से मिट्टी के सैंपल जांच के लिए एकत्रित किए। विशेषज्ञों ने प्रभावित क्षेत्र को सुरक्षित घोषित न किए जाने तक कृषि व रहने और आवाजाही के उद्देश्य से प्रवेश न करने की सलाह दी है। बता दें कि गांव में करीब पांच किमी क्षेत्र आपदा से प्रभावित हुआ।

टीम का नेतृत्व कर रहे मुख्य विज्ञानी प्रो. डीपी कानूनगो ने बताया कि यहां पर जांच के लिए आई समिति सर्वेक्षण के बाद

रामबन के परनोत गांव का सर्वे करने के बाद मुख्य विज्ञानी प्रो. डीपी कानूनगो व उनकी टीम के सदस्य जमीन धंसने की जानकारी देते हुए • जागरण

इलाके के सतत विकास के लिए मंत्रालय को रिपोर्ट सौंपेगी, जिसमें प्राकृतिक आपदा की प्रकृति, मिट्टी के बहाव से भविष्य में होने वाले नुकसान को रोकने के लिए बरती जाने वाली सावधानियों का प्रस्ताव देगी। प्रो. कानूनगो ने कहा कि यह किसी प्रकार के मानवीय दखल अथवा निर्माण से नहीं, बल्कि प्राकृतिक कारणों से आई आपदा है। पूरे इलाके में केवल 28 परिवार रहते थे। कई बार बड़े शहरों में तीन से पांच हजार मकान होने पर मकान का लोड अधिक होने की संभावना होती है। परनोत में ऐसी कोई स्थिति नहीं है। जमीनी मिट्टी और पानी के स्रोत इसकी

- परनोत में हैं काफी झरने, निकास प्रबंधन की सख्त जरूरत
- टीम ने कई जगहों से मिट्टी के सैंपल के लिए किए एकत्रित
- समिति सर्वेक्षण सतत विकास के लिए मंत्रालय को रिपोर्ट सौंपेगी

मुख्य वजह हैं। सड़क और निर्माण विकास के लिए बेहद जरूरी है। उन्होंने निर्माण के दौरान हिल स्लोप मैनेजमेंट को शामिल कर काम करने का सुझाव दिया। उन्होंने परनोत में ड्रेनेज सिस्टम में सुधार करने की जरूरत बताया। अभी भी इन झरनों का पानी ढलान पर बह रहा है। इसे चैनलाइज करने की जरूरत है। जिसके बाद तुरंत तो नहीं मगर भविष्य में खतरा टलने के बाद यहां कृषि और बागबानी की जा सकती है। मगर ऐसा केवल खतरा पूरी तरह से टलने के बाद हो सकता है। अभी खतरा पूरी तरह टला नहीं है, इसलिए प्रभावित हिस्से में किसी प्रकार की आवाजाही न करें।

भूस्खलन से प्रभावित इलाके का जायजा लेते राष्ट्रीय आपदा प्रबंधन प्राधिकरण की टीम • जागरण

विशेषज्ञों ने दूसरे दिन दिनभर प्रभावित क्षेत्र का किया सर्वे, सावधानी बरतने का देगी प्रस्ताव

केंद्र सरकार के गृह मंत्रालय द्वारा प्रतिनियुक्त राष्ट्रीय आपदा प्रबंधन प्राधिकरण (एनडीएमए) के विशेषज्ञों की टीम गत मंगलवार शाम रामबन पहुंची। चीफ साइंटिस्ट (सेंट्रल बिल्डिंग रिसर्च इंस्टीट्यूट-सीबीआरआइ) डीपी कानूनगो के नेतृत्व में आई टीम में सीनियर कंसल्टेंट (लैंडस्लाइड एंड एवलांच, एनएडीएम) दिपाली जिंदल, सीनियर कंसल्टेंट (अर्थक्वेक रिस्क मिटिगेशन) एनडीएमए रानू चौहान, सीनियर कंसल्टेंट (रिकवरी एंड कंसल्टेशन) यूएनडीपी विवेक व नेशनल इंस्टीट्यूट आफ डिजास्टर मैनेजमेंट डा. रविंद्र सिंह शामिल थे। विशेषज्ञों ने बुधवार को भी जमीन धंसने से प्रभावित क्षेत्रों का दौरा किया। प्रो कानूनगो ने बताया कि यहां पर जांच के लिए आई समिति सर्वेक्षण के बाद इस क्षेत्र के सतत विकास के लिए मंत्रालय को रिपोर्ट सौंपेगी, जिसमें आपदा की प्रकृति, मिट्टी के बहाव से भविष्य में होने वाले नुकसान को रोकने के लिए बरती जाने वाली सावधानियों का प्रस्ताव देगी। क्षेत्र में भविष्य में आवास और कृषि गतिविधियों की व्यवहार्यता को लेकर मूल्यांकन किया जाएगा। उसके बाद स्पष्ट होगा कि इस जगह पर आवास व कृषि की व्यवहार्यता संभव है या नहीं। डीएसईओ गणेश कुमार के अलावा प्रशासन के कई अधिकारियों के अलावा पुलिस भी सहयोग के लिए साथ थे।

Latest Incident of landsliding on 20.06.24

परनोत में भू-धंसाव से रामबन-गूल मार्ग फिर बंद

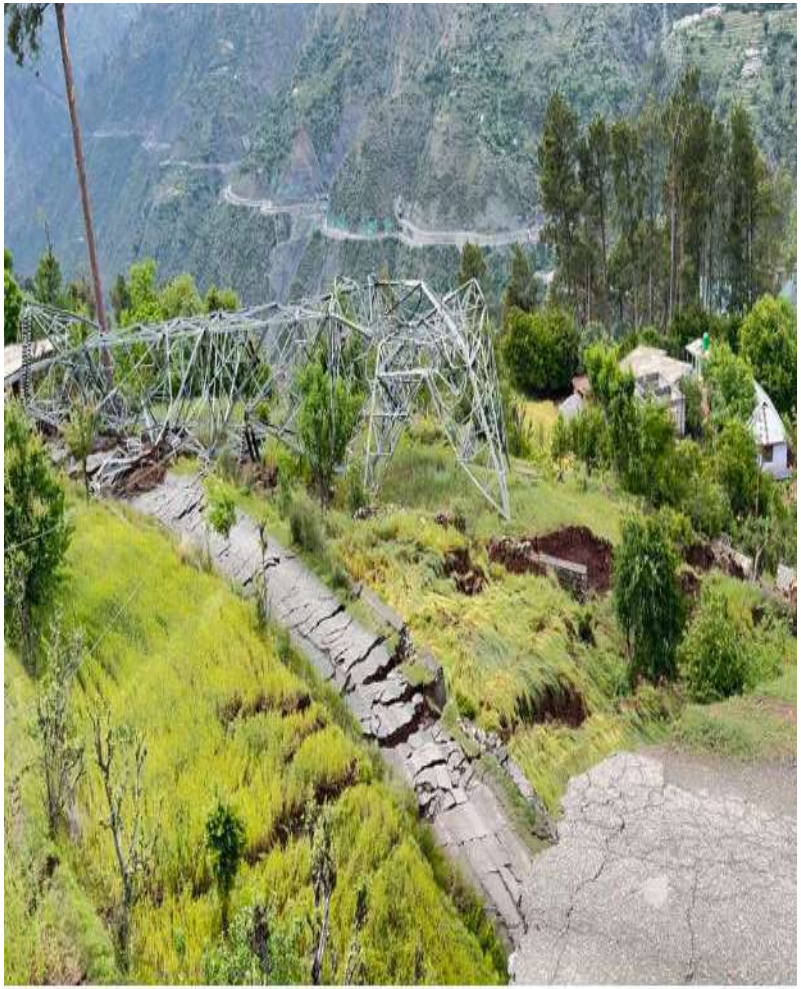
रामबन। रामबन से पांच किलोमीटर दूर परनोत में ताजा भू-धंसाव के बाद रामबन-गूल मार्ग फिर अवरुद्ध हो गया है। इस कारण गांधरी ब्लॉक और गूल के कई क्षेत्रों का सड़क संपर्क से फिर से कट गया है।

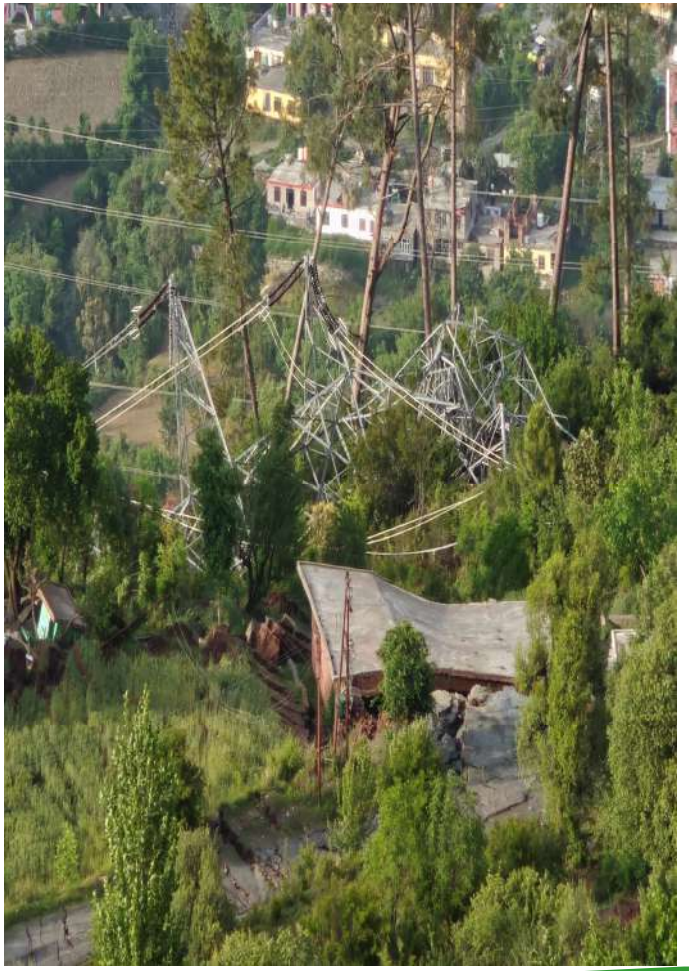
इससे पहले 25 अप्रैल को भू-धंसाव के बाद रामबन-गूल मार्ग अवरुद्ध हो गया था। हालांकि, 28 मई को जीआरईएफ द्वारा हल्के यात्री वाहनों के लिए मार्ग को अस्थायी रूप से खोल दिया गया था। लेकिन मंगलवार को फिर से भू-धंसाव शुरू हो गया, जिसके बाद मार्ग पर यातायात को रोक दिया गया है। डीसी बशीर उल हक चौधरी ने इसकी पुष्टि की है। उन्होंने सभी की सुरक्षा के लिए अगली सूचना तक इस क्षेत्र में यात्रा या पैदल चलने से बचने, अपडेट रहने और सुरक्षा की सलाह दी है। 7 मई को राष्ट्रीय आपदा प्रबंधन प्राधिकरण (एनडीएमए) के विशेषज्ञों की एक टीम ने परनोत का दौरा कर सर्वे किया था। मुख्य वैज्ञानिक प्रो. डीपी कानूनगो ने बताया, समिति ने सर्वेक्षण के बाद क्षेत्र के सतत विकास के लिए मंत्रालय को रिपोर्ट सौंपी है। प्राकृतिक आपदा की प्रकृति पर जोर देते उन्होंने भविष्य में मिट्टी के बहाव से होने वाले नुकसान को रोकने के लिए सावधानियां बरतने का प्रस्ताव दिया है। संवाद

आंधी से पांच खंभे गिरे, कठुआ ... कई गांवों की बिजली गुल

Condition of terrain near collapsed tower

Photos of collapsed towers





Photos of collapsed towers

Photos of collapsed towers

CHALLENGES FACED DURING RESTORATION WORKS

Restoration Challenges

- Immediately after above tower collapse incident, POWERGRID initiated tower restoration activities on war footing.

- In spite adverse weather conditions and damaged approach roads, all required manpower and other resources were mobilized in shortest possible time.

- Despite the adverse terrain conditions, displaced soil strata and movement hindrances, POWERGRID was able to identify some relatively stable points in the vicinity of damaged towers for temporary restoration using ERS towers.

Restoration Challenges

- During initial survey for ERS installation on 29/30th April 2024, only handful of pre-eminent relatively stable spots were found near the affected area.

- Using these relative stable spots, ERS for only 1 circuit could be installed.

- Considering the importance of this line, it was decided to go ahead with restoration of CKT-IV using above identified spots.

Restoration Challenges

- POWERGRID approached Geological Survey of India, Jammu for providing assistance in determining the stable spots for temporary and permanent restoration of above line.

- GSI agreed to provide the required assistance and due to involvement of its team in other on-going projects, GSI proposed the site visit on 7th May 2024.

- Due to continuous outage of both 400 kV Kishenpur Wanpoh III & IV and given the experience of time that GSI takes for visits due to their own engagement, POWERGRID was left with no option but to initiate the process for ERS tower erection on 29.04.2024 for restoration of Circuit IV considering the criticality of this line for smooth power transfer to Kashmir Valley.

Restoration Challenges – GSI observtions

- During GSI officials visit at site from 7th to 10th May 2024, the proposed ERS towers spottings were also examined by them.

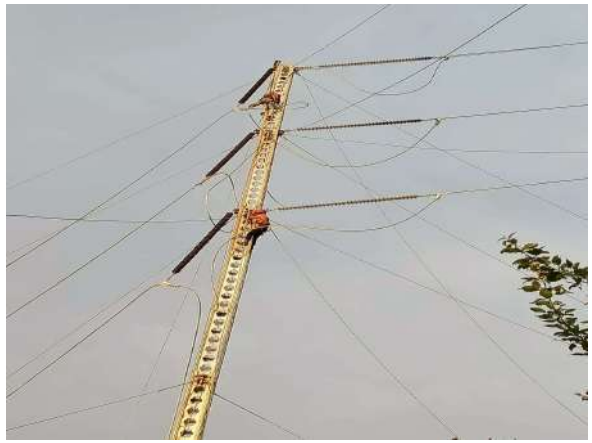
- As per GSI observations the identified spots for ERS installation for CKT-IV are not fully stable and requires some additional measures.

- As no option left, it was decided to utilize these available points for ERS installation with suitable measures such as providing additional redundant anchoring arrangement.

Restoration of CKT-IV on 13.05.2024

- Despite the major challenges like cordoning off the affected area by NDRF teams, damaged approach roads, persistent rainfall, limited area for ERS spotting etc., POWERGRID took up the ERS restoration works on war footing basis and successfully charged Circuit IV of the affected transmission line on 13.05.2024 (**18 days since the line went out of service on 25.04.2024**).

- It is pertinent to mention that as an additional precautionary measure, multiple anchoring arrangements were provided for ERS towers (Circuit IV) for providing necessary support and stability.



CHALLENGES FACED DURING ERS INSTALLATION FOR CKT-III

Restoration Challenges for CKT-III on ERS

- As detailed earlier, only handful of pre-eminent relatively stable spots were available initially which were utilized for installation of ERS for CKT-IV.

- Subsequently after installation of ERS for CKT-IV, detailed survey for another sets of stable spots was taken up from 14.05.24 for CKT-III.

- However, it has been observed that the identified spots for installation of ERS (CKT-III) were having land cracks/ subsidence of soil due to recent rainfall.

- The survey team continued to find new spots in nearby area. However, majority of the identified spots were found unstable/ settled during observation period.

Restoration Challenges for CKT-III on ERS

- Damaged terrain and space constraints for installation of ERS for CKT-III

Terrain conditions during survey of ERS-III

Restoration Challenges for CKT-III on ERS

- Finally, the spots finalized by survey team on 24th and 25th May 2024 were found relatively stable after keeping them under observation till 27th May 2024.

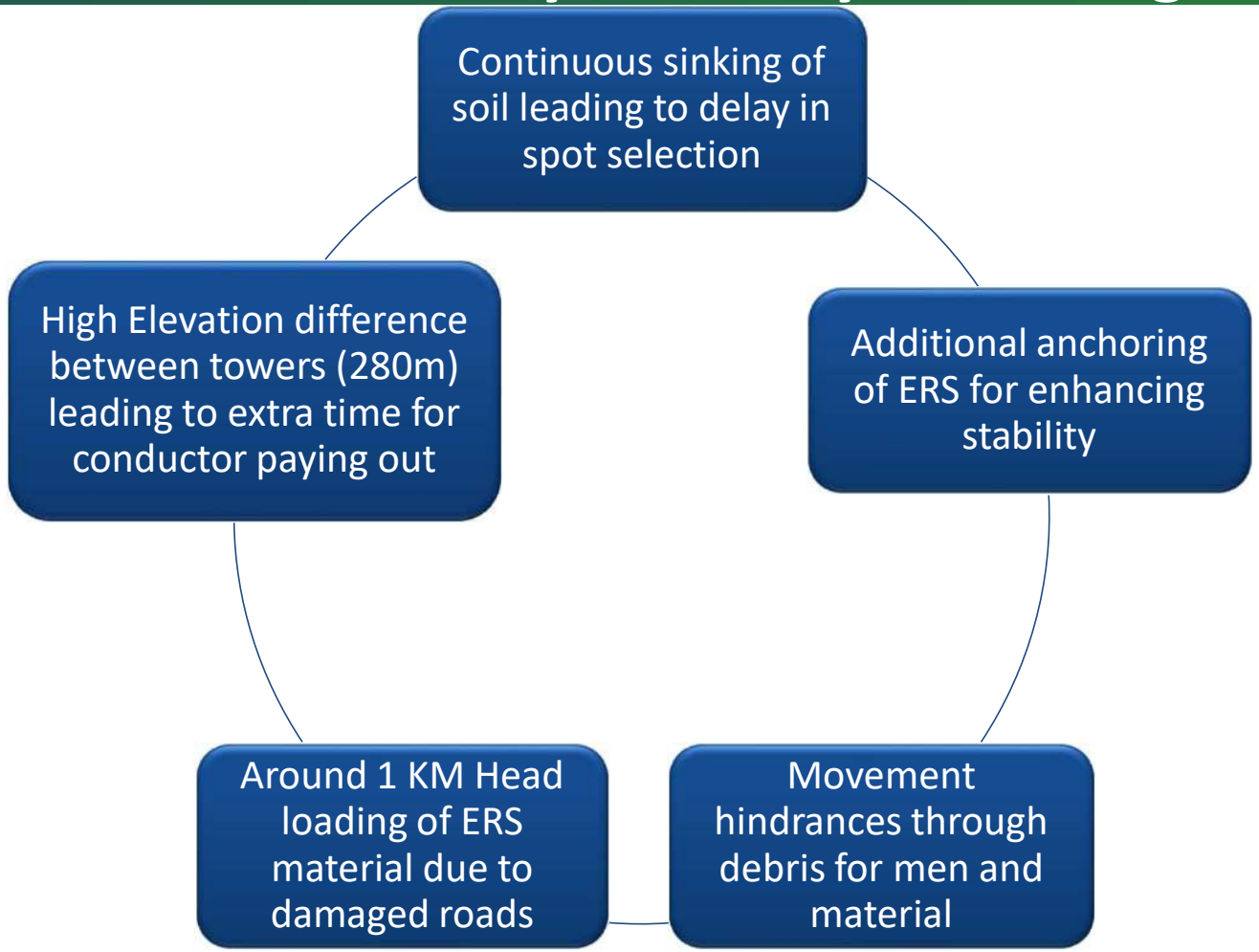
- Parallelly, ERS expert team finalized the anchoring arrangement for above ERS spots and ERS installation work commenced from 29.05.24.

- As a precautionary measure, additional guying arrangement for strengthening of anchoring system was provided at each ERS tower leading to additional time for ERS erection.

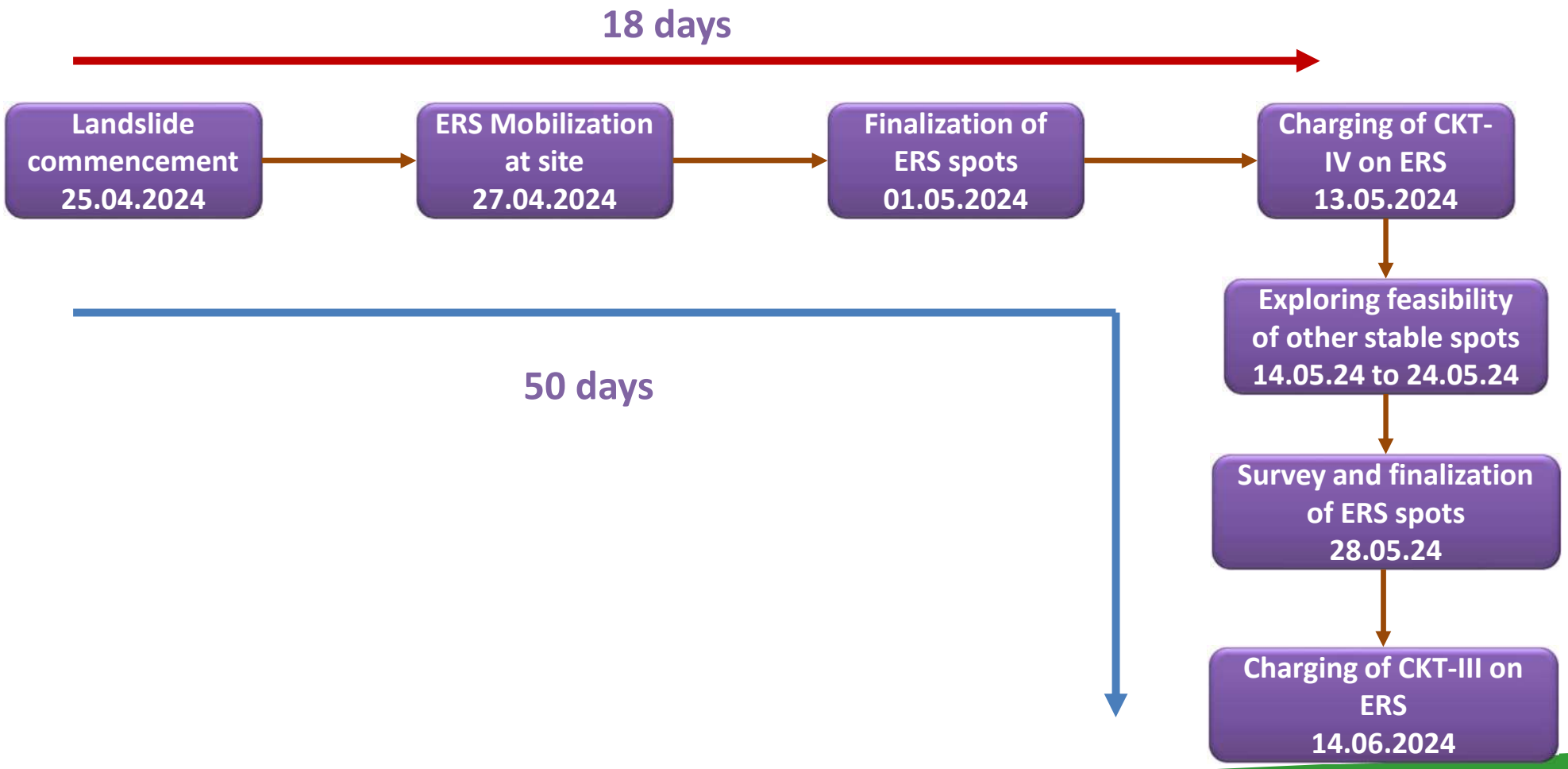
- Further, due to collapsed trees in corridor and movement constraints through sunken soil, the work was delayed be few days.

- Subsequently, Circuit III was charged on ERS towers on 14.06.2024 (**50 days since the circuit went out of service on 25.04.2024**).

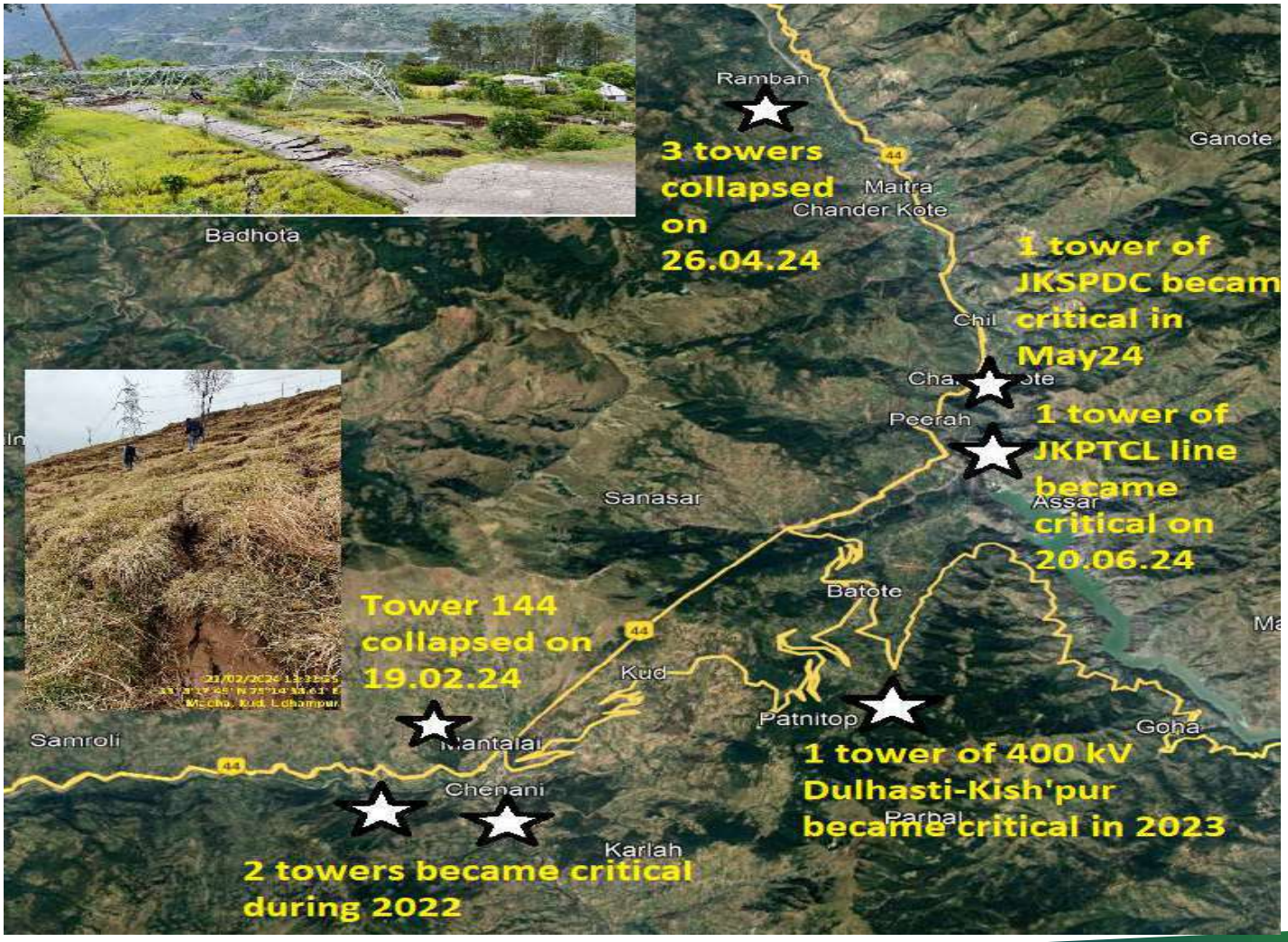
Summary for delay for taking CKT-III on ERS



Timeline for restoration works



Recent incidents of landsliding/ sinking near Ramban



Major landsliding/ hill sinking incidents occurred in past 2 years:

a) **Tower collapse in 400 kV Kishenpur New Wanpoh line near Chenani**

b) **2 towers of 400 kV Dulhasti – Kishenpur line became critical during 2022 near Chenani**

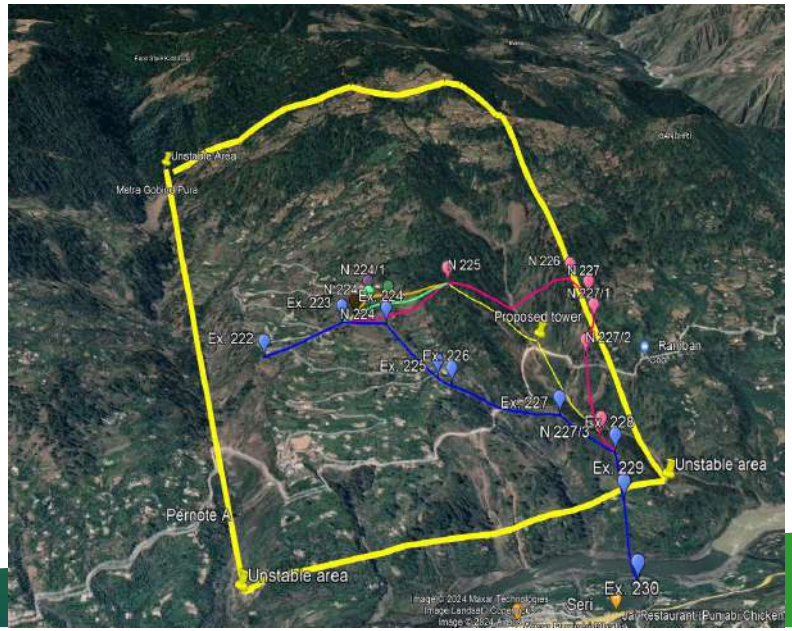
c) **1 tower of 400 kV Dulhasti – Kishenpur line became critical during 2023 near Patnitop**

d) **1 tower of JKPTCL became critical on 20.06.24 near Peerah**

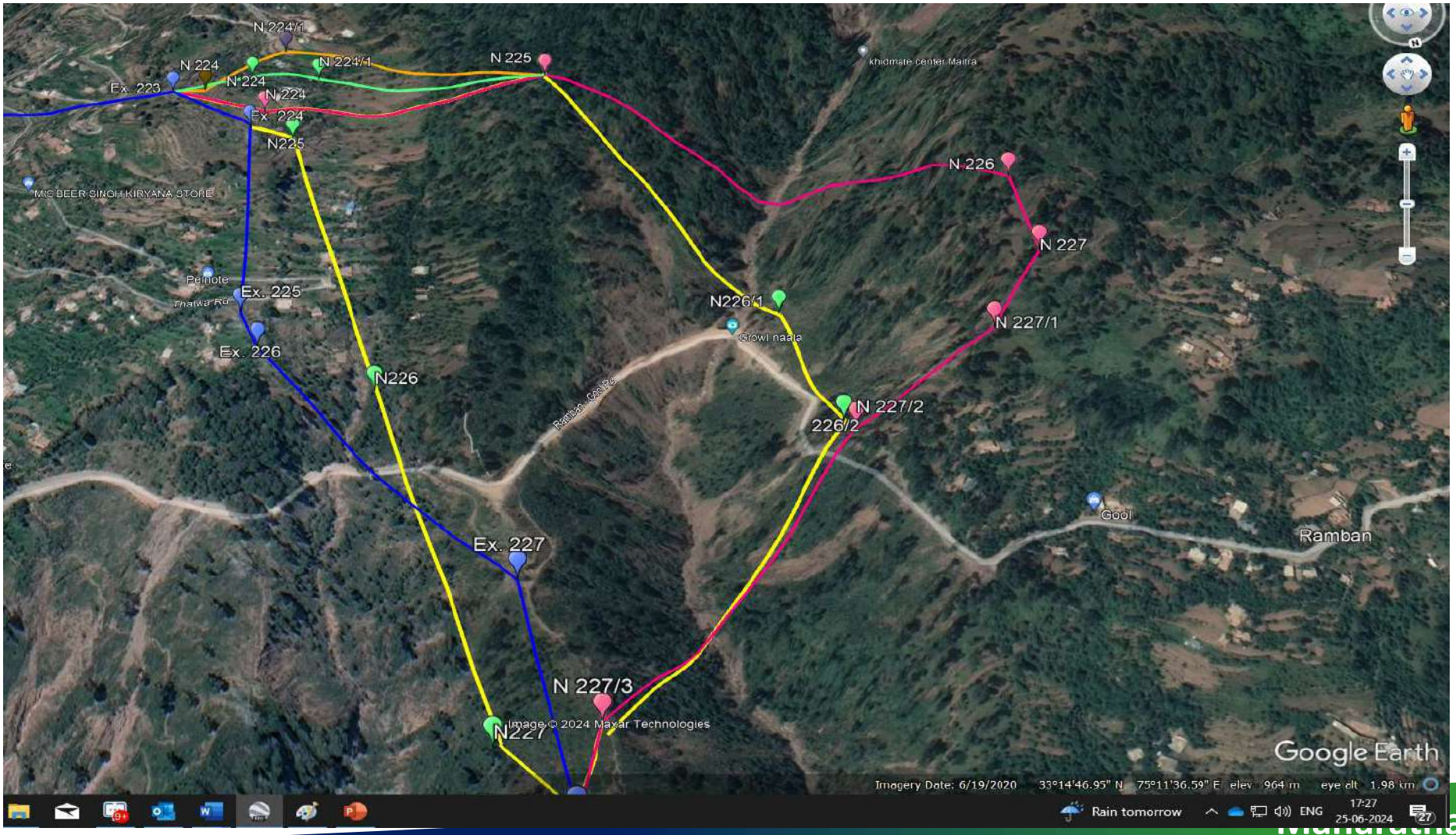
e) **1 Tower of JKSPDC became critical on 04.05.24 near Peerah**

Permanent Restoration Plan

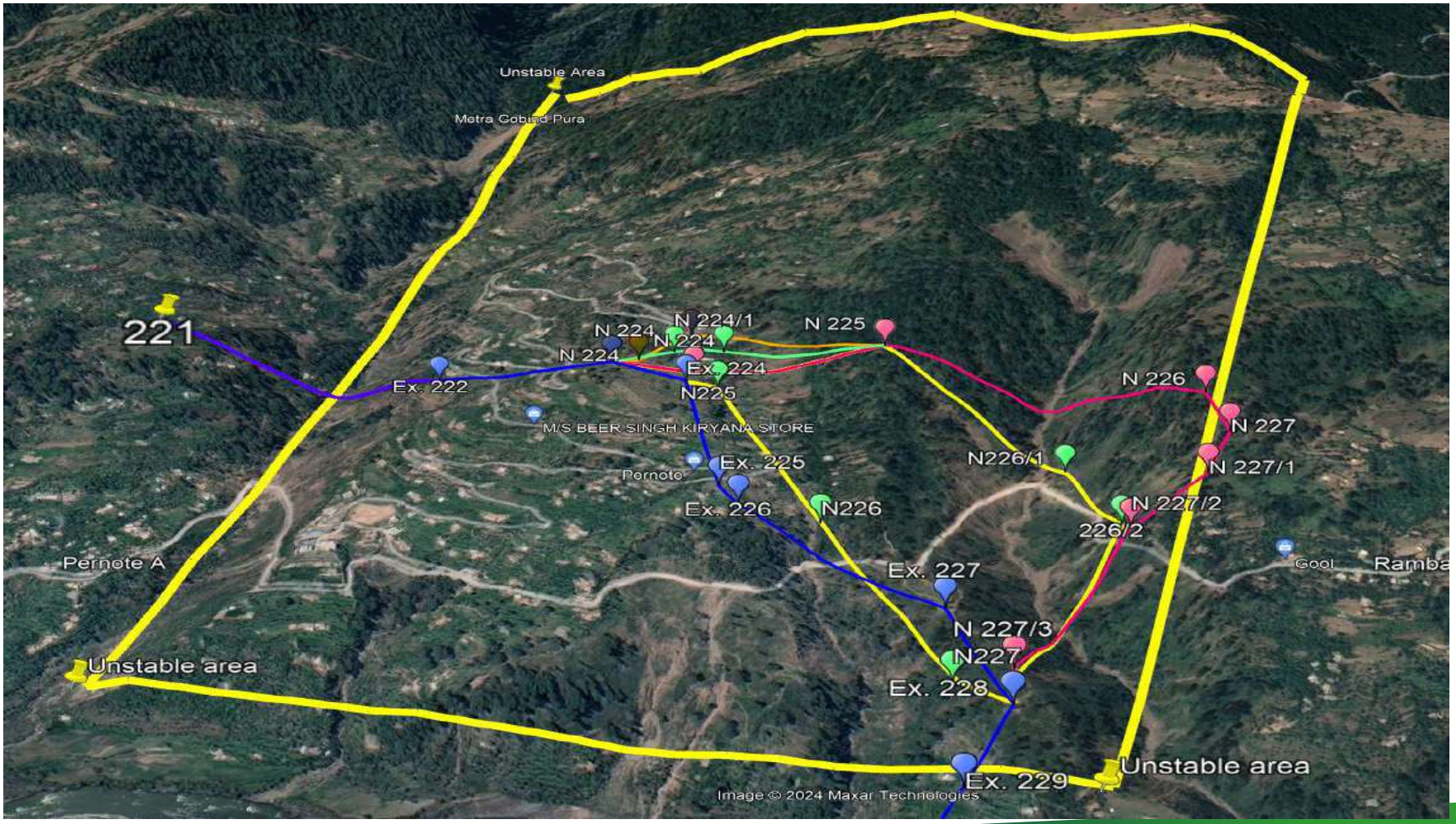
- For taking up the permanent restoration of this line, a total of three numbers of alternate line routes were explored after detailed survey at site which are bypassing the affected landslide stretch
- Geological Survey India was requested for assessment of stability of selected spots in above routes.
- GSI representatives visited the site from 7th to 10th May 2024 and collected the required information from site.
- As per the report shared by GSI on 30.05.2024, maximum proposed tower spots were rejected citing likelihood of unstable area.
- GSI further informed that a total of 5.5 sq. km area has been identified unstable and detailed geographical study of the same is under progress.
- Based on above, route finalization is under progress and permanent restoration may take another 5-6 months.



Permanent Restoration Plan



Permanent Restoration Plan



POWERGRID's Plea

- As per the evidences gathered from site, it is clear that the said tower collapses have occurred owing to massive landsliding in Ramban area which was a force majeure situation and was beyond the control of POWERGRID.

- As per para 5, Appendix-II of CERC tariff regulation for the year, outage of elements due to acts of God and force majeure events beyond the control of the transmission licensee may be considered as deemed after consideration by Member Secretary, RPC.

- Considering the importance of 400 KV D/C Kishenpur-New Wanpoh transmission line, POWERGRID took every possible measure on war footing for restoration of line in shortest possible period despite of external interferences.

- Therefore, it is humbly requested that the outage to be taken for restoration of 400 KV D/C Kishenpur-New Wanpoh transmission lines as per following details may be considered as force majeure event and the same may kindly be considered as deemed available:
  - **Kishenpur -New Wanpoh Ckt IV - 25.04.24 to 13.05.24 (18 days)**
  - **Kishenpur -New Wanpoh Ckt III - 25.04.24 to 14.06.24 (50 days)**
  - **Kishenpur -New Wanpoh Ckt I – 26.04.24 to 30.04.24 (4 days)**
  - **Baglihar -New Wanpoh Ckt – 26.04.24 to 30.04.24 (4 days)**

THANK YOU

Annexure-IX

Minutes of meeting regarding *Tapping Tertiary of 765/400/33 kV ICT -2 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Sub-Station (Agenda by POWERGRID, NR3)*

As per discussion held in 215 OCC meeting held on 12.01.2024, a committee was formed under the chairmanship of General Manager (System Operation), NRLDC to examine the requirement of additional Auxiliary Power Supply to ±500kV HVDC Ballia Substation. Subsequently, nominations were sought from POWERGRID, UPPTCL and CTUIL for formation of committee.

The meeting on Tapping Tertiary of 765/400/33 kV ICT -2 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Sub-Station was held on 29.04.24 in virtual mode. The meeting was chaired by GM, NRLDC and attended by POWERGRID, CTUIL & UPPTCL representatives.

Following was discussed in the meeting:

1. In the meeting, POWERGRID, NR-3 representative highlighted that above issue was already discussed in 213th OCC meeting and apprised that currently two auxiliary supplies have been provisioned at Ballia for HVDC and HVAC system. One is from tertiary of 200 MVA,400/132 KV ICT and another is UPPCL feeder at 33 KV Levels.

2. Brief history of Ballia S/s such as plan for 400kV and subsequent upgradation to 765kV was presented by POWERGRID. Detailed presentation as shared by POWERGRID representative during the meeting is attached as Annexure-I.

3. It was mentioned by POWERGRID NR-3 that 400/132/33 KV, 200 MVA ICT is feeding 02 nos. 132 KV Transmission Lines of UPPTCL connected to UPPTCL Sub-Station. Earlier in past, approx 673 no. of faults were detected in UPPTCL lines from August'23 to Oct'23. Considering large number of faults fed by this Transformer in past, the life of this ICT and its reliability has been seriously affected. After deliberation in 213th OCC meeting, UPPTCL has taken corrective measures and fault detection came down upto 200 nos. in last 04 months, which is also a big number.

4. Moreover, POWERGRID NR-3 also apprised that the 33kV auxiliary supply from dedicated UPPCL feeder is also not reliable and sometimes it fails 3-4 times in a month and outage duration in number of cases is more than 12 Hrs. Due to frequent breakdowns of UPPCL supply, the auxiliary Power Supply changeover occurs multiple times and leads to more stress on HVDC equipments like CB, Valve cooling pumps and UPS by-pass operation which is undesirable.

5. POWERGRID representative stated that they have already communicated number of times with UPPTCL and UPPCL to take actions to improve reliability of feeders which are being used for auxiliary supply at HVDC Ballia. However, even after repeated requests, the reliability remains poor. Communications sent from POWERGRID side as shared with committee is attached as Annexure-II.

पंकज शर्मा / PANKAJ SHARMA
महाप्रबंधक (परि.प्र.) / Chief G.M. (AM)
पावरग्रिड कॉर्पोरेशन ऑफ इण्डिया लि.
POWERGRID CORPORATION OF INDIA LTD.
उत्तरी क्षेत्रीय मुख्यालय/Northern Region-III R.H.Q.
लखनऊ (उ.प्र.) / Lucknow (U.P.)-226002

Executive Engineer
Electricity Transmission Division
Ballia

6. GM, NRLDC asked UPPTCL to brief the reason for frequent fault detection in both of the 132 KV lines. UPPTCL representative apprised that fault in their underlying system is being sensed by the relays at POWERGRID end and actual tripping is not occurring.

7. POWERGRID representative stated that 400/132kV single ICT at Ballia has fed number of faults in 132kV through its lifetime. With feeding these many faults, the reliability of 400/132kV ICT is reduced and the ICT is kept under observation as per POWERGRID practice. In case the ICT gets out, there will be no supply at 132kV to UPPTCL and only other auxiliary source for HVDC would be 33kV supply from DISCOM which is also not reliable.

8. GM NRLDC enquired UPPTCL representative about the actions being taken at their end for improving reliability of auxiliary supply to Ballia HVDC. UPPTCL representative stated that instructions have been given to transmission as well as distribution team to improve maintenance for the said lines. However, maintenance of 33kV lines is under jurisdiction of DISCOM. Even with all possible efforts, 33kV lines may trip and remain under long outage. Further, he added that fault in their underlying system is a general phenomenon and could not be avoided as 33kV feeders are passing close to road and also have trees nearby. He added that higher number of tripping during Aug23-Dec23 could be due to rains and wind during monsoon season. During last 4 months, may be due to less storms/rains less number of tripping were reported.

9. CTUIL representative stated that HVDC Ballia is very important element of NR Grid and 02 nos. reliable sources for auxiliary supply must be ensured as per the CEA (Technical standards for connectivity to the Grid) Regulation .

10. Thereafter, POWERGRID NR-3 appraised the detail of auxiliary supply arrangement at all other POWERGRID's HVDC Stations on PAN India basis and stated that most of the HVDC stations are having more than 02 nos. reliable independent sources for auxiliary supply with at least 02 nos. from tertiary of ICTs located in POWERGRID substation.

11. NRLDC representative enquired as CEA standards specify for two reliable auxiliary source of supply, so in case HVDC Ballia is provided with two separate auxiliary supply source by the means of 765/400kV ICT and 400/132kV ICT tertiaries then whether, POWERGRID requires 33kV supply from UP DISCOM.

12. POWERGRID representative stated that they do not require 33kV supply from UP DISCOM for substation auxiliary, but it is required for providing supply to colony in Ballia S/s premises. As the present auxiliary arrangement already has provision for 33kV supply from UP DISCOM, the same would not be dismantled.

13. POWERGRID representative stated that HVDC system is different from normal HVAC substation. In case of HVDC system, if there is any delay in changeover due to any reason, the HVDC auxiliary and HVDC system will trip. In case of normal HVAC

21/2/24

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Electricity Transmission Division
Ballia

substation, the supply on DG set can be relied however for HVDC system, DG set cannot be relied as by the time DG set is operational, HVDC auxiliaries may trip.

14. NRLDC representative stated that Ballia-Bhiwadi HVDC is very important link for grid operation. With commissioning of RE generation in Western Rajasthan, presently flow is from Bhiwadi to Ballia. In future, there may be requirement of operating the Ballia-Bhiwadi HVDC from Ballia to Bhiwadi during evening hours and operating from Bhiwadi to Ballia during solar generation period.

15. POWERGRID representative proposed that-

    Additional Source of Auxiliary Power connectivity from tertiary of 765/400/33 kV ICT-2 for Reliable Auxiliary Supply to ±500kV HVDC Ballia Substation with approx. cost estimate of Rs 1.25 Cr may be considered under ADDCAP. Breakup as shared by POWERGRID is attached as Annexure-III.

16. GM, NRLDC asked POWERGRID, NR3 to submit the supporting documents regarding provision of 02 nos. dedicated source from ICT tertiary at other POWERGRID HVDC Stations. Further, they also asked to submit break-up of cost estimate for implementation of above work and copy of previous letters to UPPTCL for intimation of such faults/breakdown.

Analysis by Committee:

a) For all HVDC substations of POWERGRID.across the country which do not have any generating unit connected, two auxiliary sources have been provided from two ICTs located within the premises of POWERGRID S/s.

b) For new HVDC proposed i.e. Bhadla3-Fatehpur HVDC and recently charged Raigarh-Pugalur HVDC, auxiliary supply have been provided from two ICTs located within the premises. Relevant extract of RfP document is attached as Annexure-IV.

c) It is clear from the discussion held in meeting and previous experience that supply from state DISCOM is not reliable and would not be reliable in future also, accordingly 33kV supply from UP DISCOM can not be considered as reliable source.

d) POWERGRID has mentioned that HVDC system is different from normal HVAC substation. In case of HVDC system, if there is any delay in changeover due to any reason, the HVDC auxiliary and HVDC system will trip.

e) 400/132kV ICT at Ballia has fed many faults in 132kV network in case of faults in UPPTCL system accordingly, ICT may become out at any point of time, therefore that source is also not reliable. In case new auxiliary is approved for Ballia S/s, till the

पंकज शर्मा / PANKAJ SHARMA
मुख्य महाप्रबन्धक (परि.प्र.) / Chief G.M. (AM)
पावर ग्रिड कॉर्पोरेशन ऑफ इण्डिया लि
POWER GRID CORPORATION OF INDIA LTD
उत्तरी क्षेत्र-IIIक्षेत्रीय मुख्यालयNorthern Region-III R.H.Q
लखनऊ (उ0प्र0) / Lucknow (U.P.)-226002

Executive Engineer
Electricity Transmission Division
Ballia

implementation of that auxiliary scheme, the condition of 400/132kV ICT would further deteriorate.

f) HVDC Ballia is very important element of NR Grid and 02 nos. reliable sources for auxiliary supply need to be ensured as per the CEA standards.

g) Since the proposal by POWERGRID will lead to ADDCAP of 1.25 Cr, the matter may be deliberated at OCC forum and subsequently at NRPC level before submission from POWERGRID side to CERC.

Recommendation:

On the basis of supporting documents and as per prevailing practice in other HVDC stations, proposal of POWERGRID NR3 can be considered and same was agreed by all the representatives from NRLDC, POWERGRID, CTUIL and UPPTCL.

However, final approval shall be issued after deliberation and consent by OCC and then NRPC forum. Additional issues such as installation of meters etc. shall also be taken care by POWERGRID in consultation with respective utility after approval is accorded from NRPC forum.

(SUNIL AHARWAL)

(NRLDC)

RAKESH KUMAR

(CTUIL)

RAKESH KUMAR
Chief Manager
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A Wholly Owned Subsidiary of
Power Grid Corporation of India Ltd)
(A Government of India Enterprises)
Plot No.-2, Sector-29, Gurgaon- 122 001 (Haryana)

(UPPTCL)

Executive Engineer
Electricity Transmission Division
Ballia

(POWERGRID)

पंकज शर्मा / PANKAJ SHARMA
मुख्य महाप्रबंधक (परि.प्र.) / Chief G.M. (AM)
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लखनऊ (उ0प्र0) / Lucknow (U.P.)-226002

Participant list:

S. No.	Name	Organisation	Designation
1	Sunil Kumar Aharwal	NRLDC	General Manager
2	Gaurav Malviya	NRLDC	Manager
3	Ajit Kumar Yadav	NRLDC	Deputy Manager
4	Rakesh Kumar	CTUIL	Chief Manager
5	Pankaj Sharma	POWERGRID	Chief General Manager
6	Gunjan Agrawal	POWERGRID	
7	TP Verma	POWERGRID	
8	AK Singh	POWERGRID	
9	CB Pal	UPPTCL	Superintending Engineer - Retired
10	Ashok	UPPTCL	Executive Engineer

(SUNIL AHARWAL)
NRLDC.

PANKAJ SHARMA
Chief G.M. (AM)
POWER GRID CORPORATION OF INDIA LTD
Northern Region-III R.H.Q.
Lucknow (U.P.)-226002

Tapping Tertiary of 765/400/33 kV ICT -2 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Sub-Station & 765/400/132 KV Ballia HVAC Sub-station.

➢ ***Gist of Balia HVDC & HVDC substations :***

- *500kV Ballia – Bhiwadi HVDC Bi-pole with 2500MW power transfer capacity.*

- *765kV Elements*
  - ❖ *3 Nos of 765kV Circuits (Inter & Intra regional connectivity)*
  - ❖ *2 Nos. of 765/400kV ICTs*
  - ❖ *2 Nos. of 765kv Bus Reactors*

- *400kV Elements*
  - ❖ *10 Nos of 400kV Circuits (Inter & Intra regional connectivity)*
  - ❖ *1 Nos. of 400/132kV ICTs*
  - ❖ *4 Nos. of 400kv Bus Reactors*

- *132kV Elements*
  - ❖ *2 Nos of 132kV Transmission lines (UPPTCL feeders) connected with 200 MVA, 400/132/33kV ICT -1.*

➢ *Successful operation of HVDC auxiliary system such as Thyristor cooling water pump, Tap changer of Convertor transformer etc are wholly dependent on uninterrupted Auxiliary power supply.*

Connectivity of Auxiliary Sources at Ballia HVDC & HVAC Substations

Year 2007

- *400kV Ballia Substation commissioned*
- *Auxiliary source : Only one dedicated 33kV Feeder from UPPTCL S/s.*

Year 2010

- *+/- 500kV HVDC Ballia – Bhiwadi Bi-Pole commissioned*
- *Second Auxiliary sources from 200MVA ,400/132/33kV ICT -1 Tertiary*

Year 2012

- *765kV Ballia Substation was commissioned along with 02 Nos - 765/400/33kV ICTs.*

- ***Presently Auxiliary AC supply of Ballia HVDC & HVAC system are operated and maintained with support of 02 sources:***

  1. From Tertiary of 200MVA ,400/132kV ICT-1 at Balia

  2. 33kV Dedicated feeder from 132/33kV Simrli Jamalpur (UPPTCL) substation.

Constraints in Reliable dual source of Auxiliary supply at Ballia HVDC & HVAC :

1. Tertiary supply connected through 400/132kV ICT 1 at Ballia - Protective relay senses frequent faults in associated 132kV lines.

2. Frequent interruptions in 33kV dedicated UPPTCL feeder.

Operational issues due to Auxiliary supply at Ballia HVDC & HVAC

- *Both supplies are always on load condition to HVDC LVAC buses of Pole- 1 and Pole-2 and Bus Coupler under open condition. This provision is standard for HVDC Auxiliary supply to prevent dead bus condition during changeover in case of any one supply fails.*

- *There were frequent faults in 02 Nos 132 KV transmission lines connected with 400/132/33kV ICT at Ballia and it affects reliability of the ICT. Earlier total 673 line faults were detected in 132kV UPPTCL Lines from August'23 to October'23 and same was discussed and deliberation in 214th OCC meeting. After remedial action, total 200 faults have been detected in last 04 months which is also a big number and same needs to be rectified.*

- *Apart of above frequent faults in 132 KV Lines, frequent breakdown of 33KV UPPTCL feeder has also been noticed and during breakdown of 33 KV UPPTCL feeders,the Auxiliary Power supply changeover occurs multiple times which is undesirable in view of frequent MV/LT CB operation, Valve Cooling Pump changeovers & UPS bypass operation etc.*
- *Detail of frequent fault detection and tripping of 33 KV UPPTCL feeders are tabulated below-*

- ***Fault sensed by 400/132kV ICT at Ballia due to frequent line faults (Period : Jan 24 to Apr 24)***

Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackı
11-01-2	11:28:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-01-2	19:59:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-01-2	20:05:43	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-01-2	20:06:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-01-2	20:10:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
12-01-2	15:49:52	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
12-01-2	16:12:4E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-01-2	07:20:17	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-01-2	13:09:42	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-01-2	07:20:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-01-2	15:47:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
18-01-2	08:58:3(	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
19-01-2	19:58:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-01-2	07:00:03	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-01-2	07:19:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-01-2	08:46:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-01-2	13:21:4E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-01-2	15:24:03	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-01-2	21:38:3E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-01-2	06:46:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-01-2	07:21:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-01-2	07:30:33	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
24-01-2	11:15:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-01-2	06:42:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-01-2	06:45:47	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-01-2	06:54:01	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-01-2	13:06:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-01-2	03:12:51	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-01-2	03:33:5(	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-01-2	08:30:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-01-2	13:32:24	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
30-01-2	15:11:28	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
30-01-2	16:25:01	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
30-01-2	17:13:53	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackı
31-01-2	16:49:3(	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-02-2	08:11:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	06:25:51	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	06:39:23	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	10:25:43	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	10:31:3E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	11:01:46	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	12:25:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-02-2	16:20:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-02-2	03:54:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-02-2	03:54:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-02-2	09:57:4E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
06-02-2	10:30:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
07-02-2	10:40:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-02-2	12:26:51	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-02-2	12:28:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-02-2	12:37:32	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-02-2	14:27:34	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
09-02-2	08:29:4E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
12-02-2	12:20:17	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-02-2	06:20:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-02-2	06:23:12	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-02-2	06:32:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-02-2	06:43:14	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-02-2	05:28:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-02-2	06:19:12	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-02-2	23:46:3E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
15-02-2	07:19:5E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-02-2	07:25:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
18-02-2	12:37:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
18-02-2	15:33:1E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-02-2	03:19:53	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-02-2	03:47:0E	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-02-2	14:51:44	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

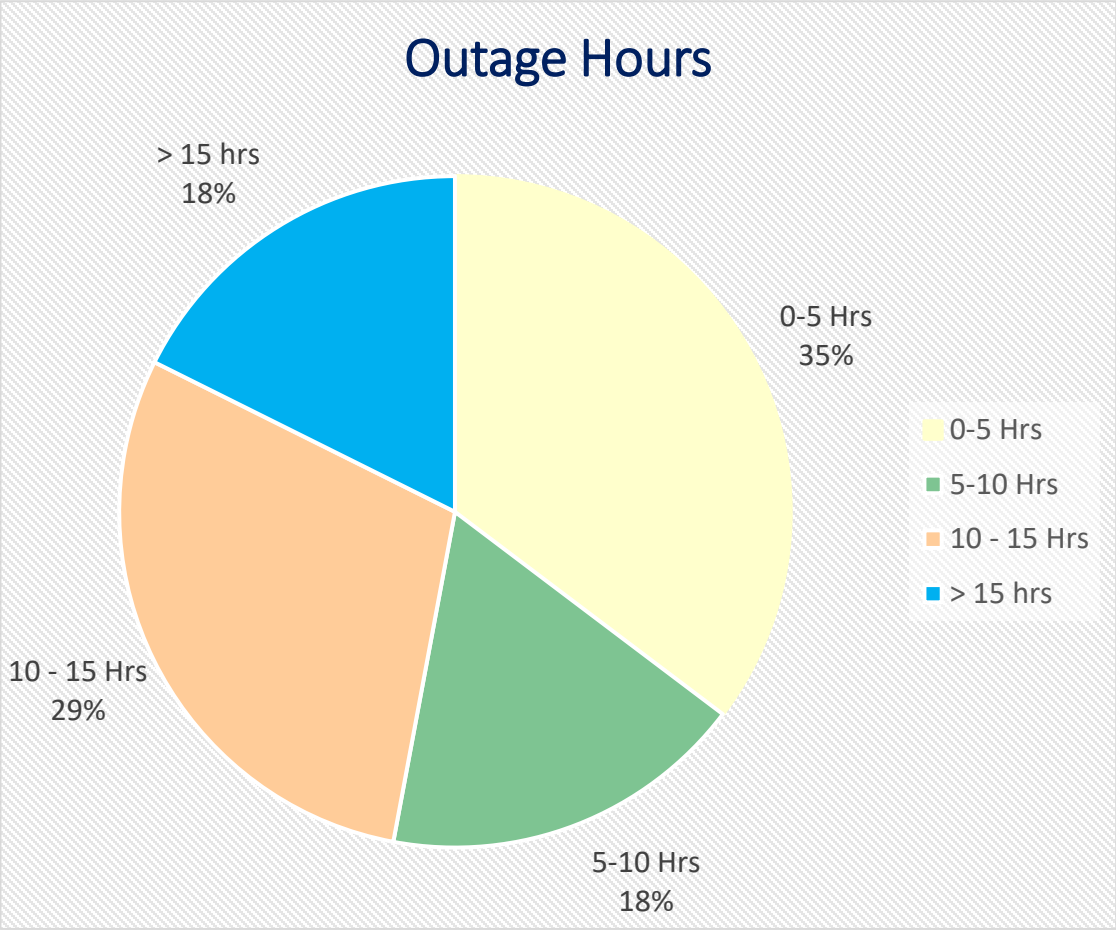
Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackr
22-02-2	03:19:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-02-2	08:04:37	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-02-2	16:43:56	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-02-2	07:49:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-02-2	09:09:42	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
26-02-2	09:35:50	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
26-02-2	12:15:08	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-02-2	07:37:14	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-02-2	11:57:04	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-02-2	13:12:12	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-02-2	13:14:06	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-02-2	08:09:38	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-02-2	13:19:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-02-2	15:59:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-03-2	07:51:29	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	07:26:32	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	07:32:47	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	07:38:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	07:53:12	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	10:05:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-03-2	14:20:49	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-03-2	03:30:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
03-03-2	14:25:14	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
04-03-2	14:08:44	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
04-03-2	15:06:10	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
07-03-2	13:30:24	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-03-2	04:20:00	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-03-2	10:30:44	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
09-03-2	08:55:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
10-03-2	17:33:06	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-03-2	05:59:04	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-03-2	09:10:11	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-03-2	17:37:03	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-03-2	08:10:37	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackr
14-03-2	11:07:29	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
15-03-2	21:40:56	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-03-2	05:53:28	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-03-2	07:46:42	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-03-2	08:17:01	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-03-2	09:46:49	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-03-2	12:36:25	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
18-03-2	02:34:04	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
19-03-2	07:45:27	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
19-03-2	08:44:54	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
19-03-2	11:04:16	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	07:54:44	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	08:05:39	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	09:15:13	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	09:22:50	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	09:29:57	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	09:46:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	13:10:49	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	13:27:25	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	13:57:39	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	15:01:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	16:16:45	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	18:42:07	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	18:48:11	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
20-03-2	19:09:47	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-03-2	02:46:30	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-03-2	02:52:31	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-03-2	12:27:46	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
21-03-2	13:01:39	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
22-03-2	05:46:28	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-03-2	07:43:38	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-03-2	09:05:29	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-03-2	09:09:34	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
23-03-2	13:53:37	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackr
23-03-2	16:58:41	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
24-03-2	09:29:54	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
24-03-2	13:59:59	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
24-03-2	16:55:40	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
25-03-2	07:56:07	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
26-03-2	14:28:08	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-03-2	07:21:33	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
27-03-2	08:32:37	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-03-2	10:36:43	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
28-03-2	17:36:18	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-03-2	10:49:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-03-2	14:01:33	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
29-03-2	16:48:16	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
30-03-2	08:31:17	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
31-03-2	10:25:57	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
31-03-2	13:08:01	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	10:52:17	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	11:07:49	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	11:35:10	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	12:47:24	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	12:57:30	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	12:58:08	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:01:16	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:02:10	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:17:54	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:39:36	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:40:51	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	13:40:52	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	14:22:58	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	14:45:16	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	14:47:24	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	15:02:26	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
01-04-2	17:22:35	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
02-04-2	06:49:40	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

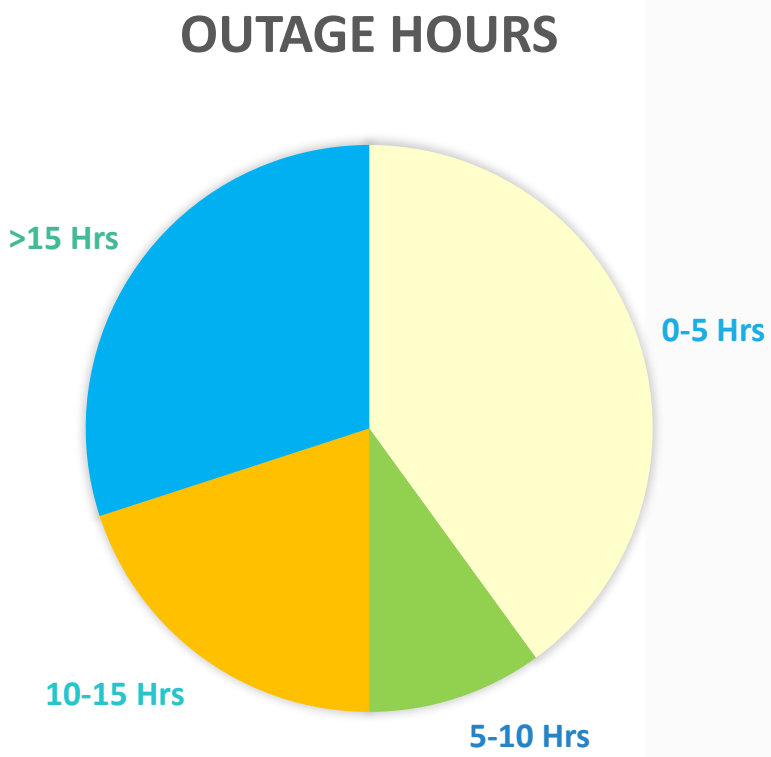
Date	Time	Locati	Volta	Bay/D	Devic	Information Text	Value	Ackr
04-04-2	10:05:53	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-04-2	05:39:28	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-04-2	07:11:49	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-04-2	08:56:56	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
05-04-2	11:10:48	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
06-04-2	06:17:35	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
06-04-2	11:38:09	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-04-2	13:50:05	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-04-2	14:55:14	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-04-2	17:39:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-04-2	20:12:48	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
08-04-2	20:40:53	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
10-04-2	05:31:26	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
10-04-2	06:05:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
10-04-2	10:17:26	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-04-2	05:58:58	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-04-2	07:36:06	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-04-2	11:23:27	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-04-2	16:46:37	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
11-04-2	21:33:47	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-04-2	07:08:50	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-04-2	16:20:01	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
13-04-2	18:27:53	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-04-2	07:13:23	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
14-04-2	13:36:39	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-04-2	11:29:42	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-04-2	12:02:47	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-04-2	15:23:12	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
16-04-2	15:41:21	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	
17-04-2	10:55:14	KIOSI	132	BAY 1	7SJ62	Total.Pickup	RAISEI	

- ***Auxiliary Supply – 33kV UPPTCL feeder Interruption details***



33KV UPPCL TRIPPING DETAILS			
Time of Tripping		Line taken into service	
DATE	TIME	DATE	TIME
01.05.2023	20:05	02.05.2023	10:44
07.05.2023	19:40	08.05.2023	12:09
20.05.2023	11:43	20.05.2023	17:59
06.06.2023	23:59	07.06.2023	09:32
10.06.2023	16:14	10.06.2023	17:45
19.06.2023	06:20	19.06.2023	09:37
15.07.2023	14:18	15.07.2023	14:43
07.08.2023	03:29	07.08.2023	15:58
09.08.2023	06:17	09.08.2023	10:10
13.08.2023	08:53	13.08.2023	10:30
17.08.2023	19:58	18.08.2023	13:19
22.08.2023	22:40	23.08.2023	11:58
30.08.2023	18:46	01.09.2023	16:42
03.09.2023	09:35	03.09.2023	16:25
08.09.2023	09:51	09.09.2023	16:15
09.09.2023	20:54	21.09.2023	10:33
26.09.2023	13:09	26.09.2023	15:32
16.10.2023	22:02	17.10.2023	10:39
16.11.2023	23:24	18.11.2023	13:10
19.11.2023	20:19	20.11.2023	16:57

- ***Auxiliary Supply – 33kV UPPTCL feeder Interruption details (Jan 24 – April 24)***

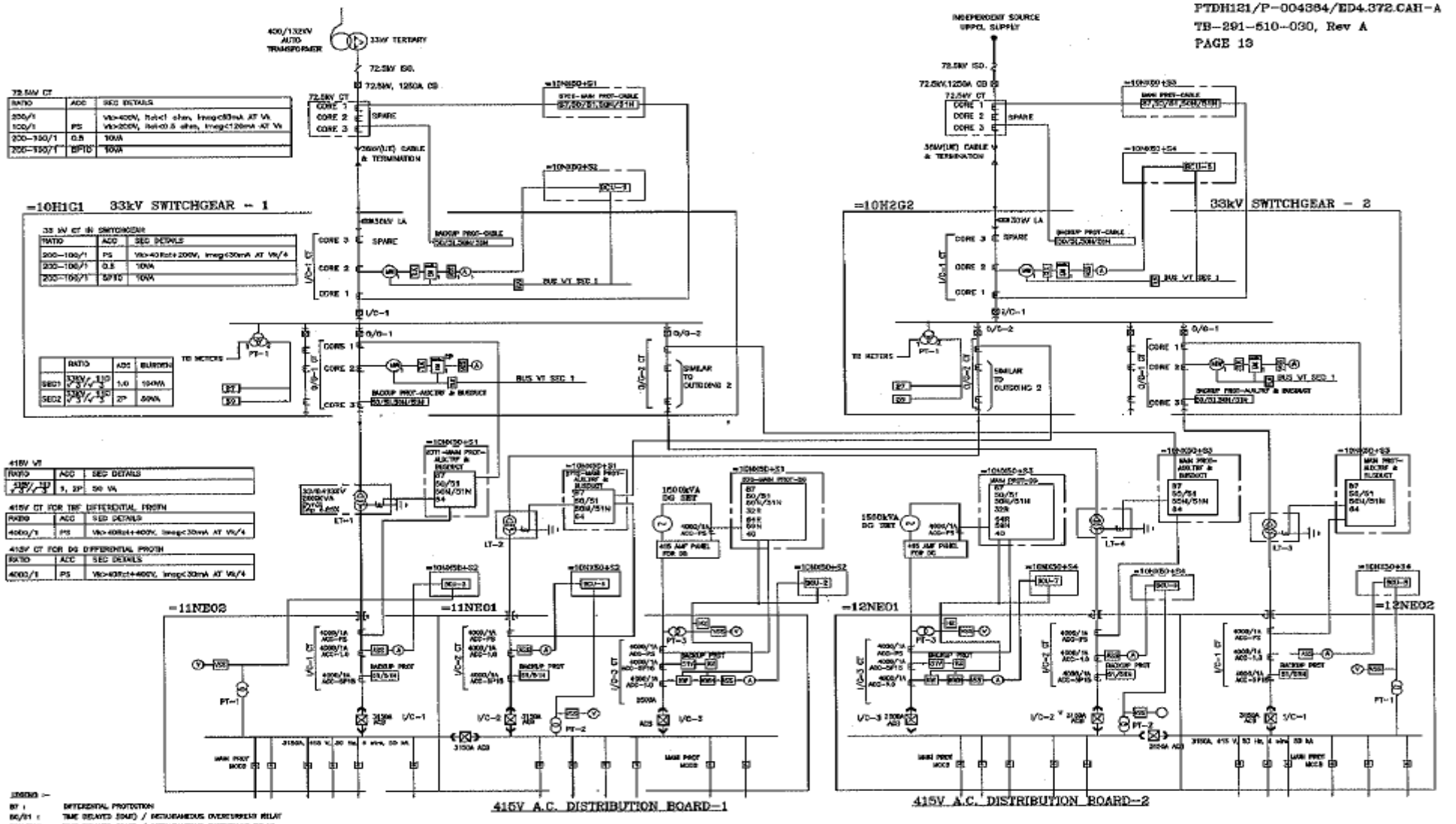


33KV UPPCL TRIPPING TIME			
TRIPPING TIME		RESTORATION TIME	
Date	Time	Date	Time
06-02-24	14:58:13	06-02-24	17:28:35
08-02-24	06:30:58	08-02-24	17:26:16
09-02-24	06:24:49	10-02-24	09:59:11
21-02-24	03:07:16	21-02-24	16:46:53
22-02-24	17:46:34	27-02-24	15:44:56
19-03-24	03:34:49	19-03-24	12:24:28
20-03-24	09:58:00	20-03-24	12:25:56
15-04-24	12:21:30	16-04-24	11:49:50
16-04-24	11:51:00	16-04-24	12:53:40
17-04-24	08:51:30	17-04-24	11:55:10

Availability of Reliable Dual source Auxiliary(HT Feeders) Connectivity in Various HVDC S/S

Substation / Region	Source I	Source II	Others
Champa (WR-1)	765/400/33KV ICT 1 Tertiary	765/400/33KV ICT 4 Tertiary	
Kurushektra(NR1-)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	State 11kV Feeder for Construction purpose
Raigarh(WR-1)	765/400/33KV ICT 1 Tertiary	765/400/33KV ICT 2 Tertiary	State 11kV Feeder
Pugalur(SR-2)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	State 11kV Feeder for Colony
Thrissur (SR-2)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	
Bhadrawati (WR-2)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	
Vizag (SR-1)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	State 33 kV Feeder
Bhiwadi (NR-1)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	State 33 kV Feeder for Colony
Agra HVDC(NR-3)	765/400/33KV ICT 1 Tertiary	400/220/33KV ICT 1 Tertiary	
Agra HVAC(NR-3)	765/400/33KV ICT 2 Tertiary		State 33 kV Feeder
BiswanathCharili(NER)	400/132/33KV ICT 1 Tertiary	400/132/33KV ICT 2 Tertiary	
Alipurduar(ER)	400/132/33KV ICT 1 Tertiary	400/132/33KV ICT 2 Tertiary	
Rihand (NR-3)	Rihand(NTPC) Stage 1	Rihand(NTPC) Stage 2	Rihand(NTPC) Stage 5
Dadri (NR-1)	Dadri(NTPC) Stage 1	Dadri(NTPC) Stage 2	
Talcher (ER)	Talcher Stage 2	Talcher Stage 3	Talcher Stage 4
Kolar (SR-2)	400/220/33KV ICT 1 Tertiary	400/220/33KV ICT 2 Tertiary	State 66 kV Feeder

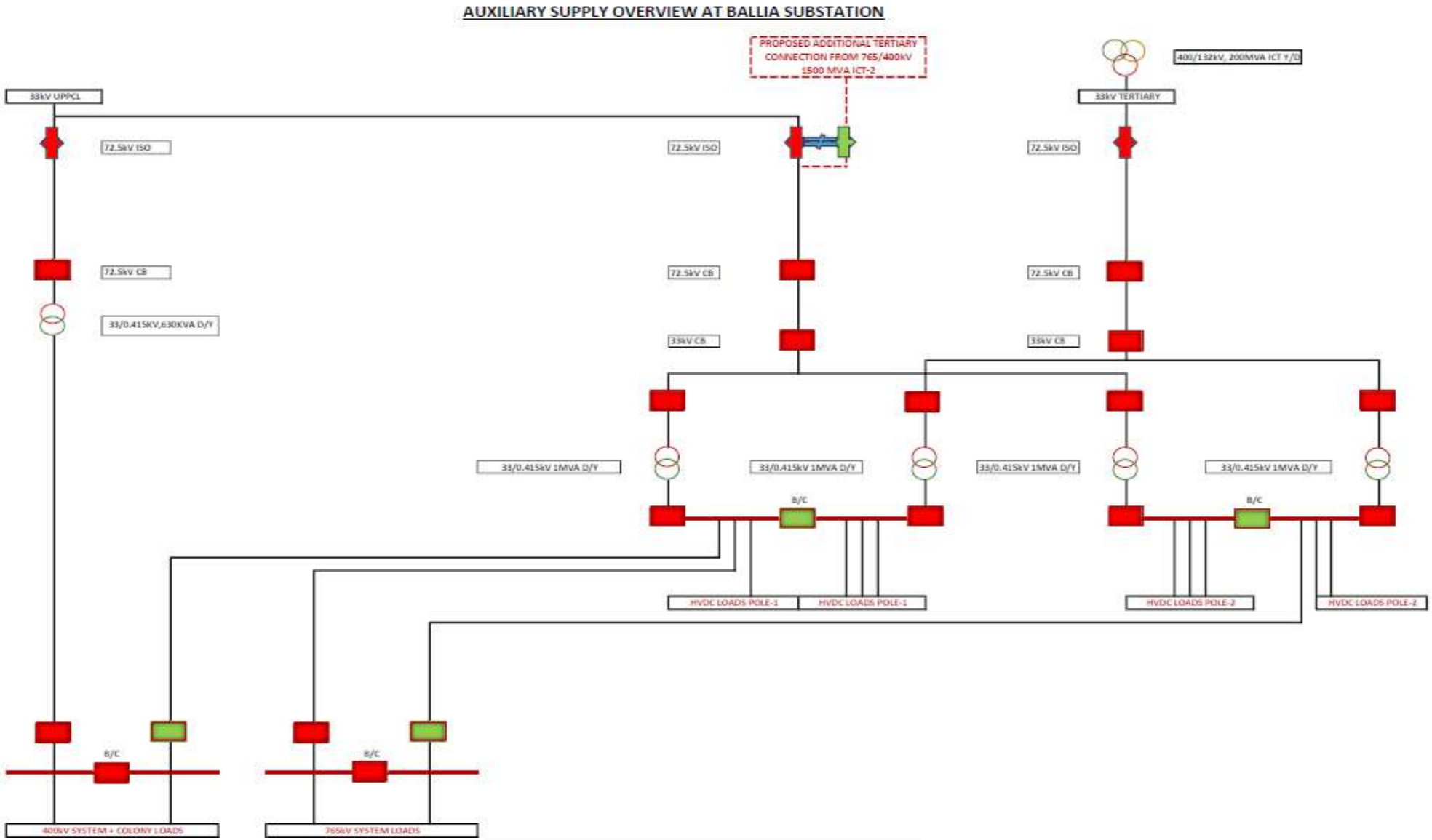
EXISTING 33KV INTERCONNECTION SCHEME



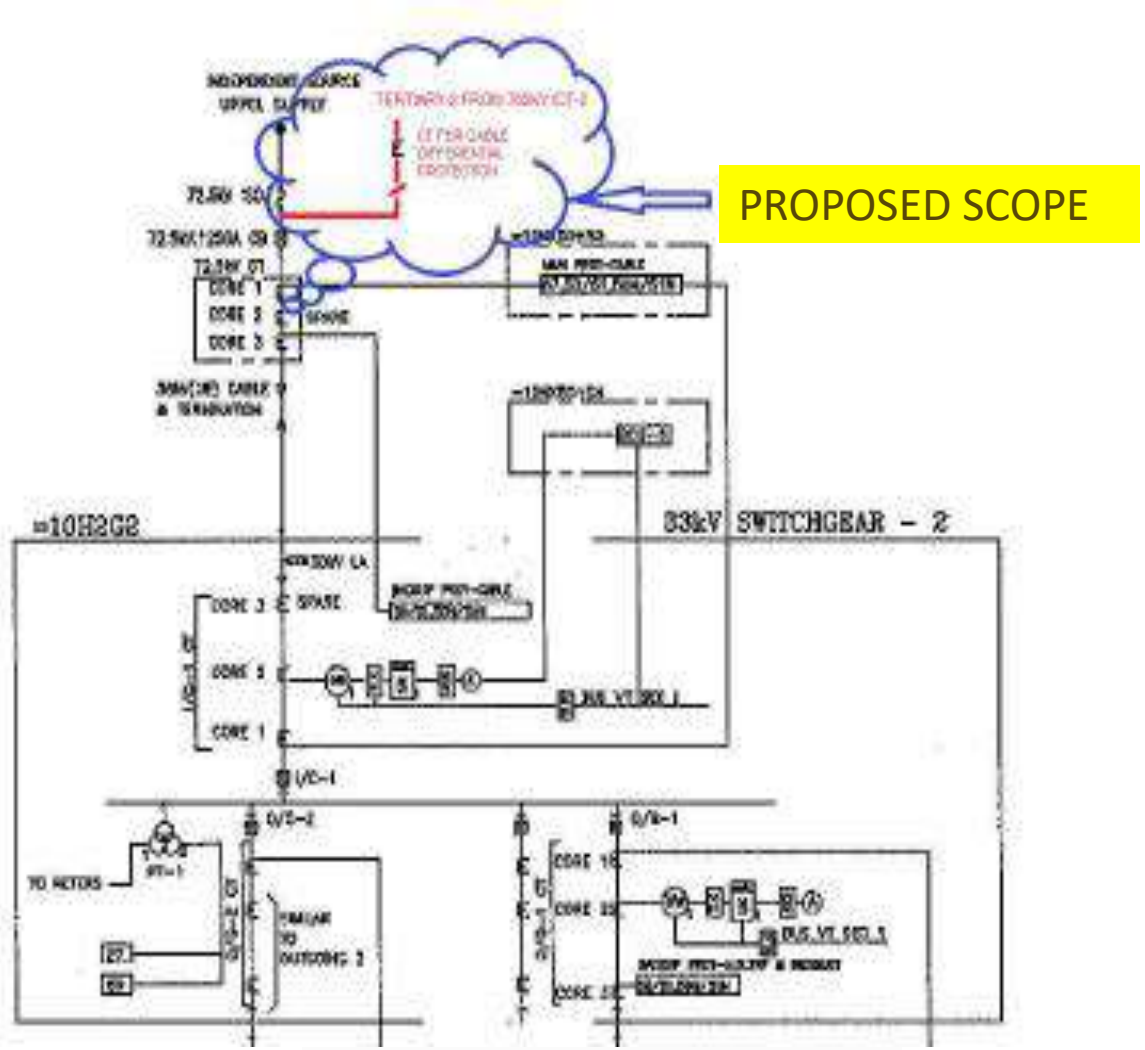
ONLY TYPICAL OUTGOING FEEDERS SHOWN FOR CLARITY

FIGURE 1 – KEY DIAGRAM OF AUXILIARY AC SYSTEM AT BALLIA

PROPOSED AUXILIARY CONNECTION AT BALLIA



PROPOSED 33KV INTERCONNECTION SCHEME



Proposal for Reliable dual source of Auxiliary supply at Balia HVDC & HVAC

- *To ensure reliability of auxiliary system for Balia HVDC & HVAC substation and as mentioned above in other HVDC stations which has provision for reliable dual sources of auxiliary supply from tertiary of the two independent ICTs or dedicated feeders from generating plants/State feeder as per site feasibility.*
- *Separate connection from Tertiary supply of 765/400/33kV ICT-2 is necessitated for reliable sources to HVDC and HVAC Auxiliary Power Supply in view of Non reliability of existing source.*

In view of above facts, POWEGRID proposes that –Optional Source connectivity from tertiary of 765/400/33 kV ICT-2 in addition to the existing UPPTCL Supply(33kV feeder) & 200MVA 400/132kV ICT Tertiary for Reliable Auxiliary Supply to ±500kV HVDC Ballia Substation with approx. cost estimate of Rs 1.25 Cr may be considered under ADDCAP.

पावरग्रिड POWERGRID

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

कार्यालय/साइट: 765/400 /132 के.वी. एचवीएसी & ±500 के.वी. एचवीडीसी बलिया उपकेंद्र, इब्राहिमपट्टी, बलिया (उ.प्र.)-221716
Office/Site: 765/400/132kV HVAC & ±500 kV HVDC Ballia Substation, Ibrahimpatti, Ballia (U.P.)- 221716

Ref. No.: NR3/BAL/HVDC/132 kV/UPPCL/03 **Date**: 17.04.2024

URGENT

To,

Executive Engineer,
ETD, UPPTCL (I/C Sikandarpur)
Ballia (UP)

Sub: Frequent Fault Current being fed through 132 kV S/C Sikanderpur (UPPCL) Transmission Line from our 200 MVA, 400/132/33 kV Transformer installed at POWERGRID Ibrahimpatti, Ballia Substation.

Our Ref.: Our Letter NR3/BAL/HVDC/132 kV/UPPCL dated 01/09/2022

Dear Sir,

It is to once again inform you that the numerous fault current pickups are still being detected at POWERGRID Ballia end in 132 kV S/C Sikanderpur Transmission Line (Owned by UPPCL). The matter is of deep concern that our 400/132kV 200MVA BHEL ICT is still feeding fault currents because of downstream faults in your network. We have analyzed fault pickups data from 11th Jan 2024 to 17th Apr 2024 and found a total of 200 faults pickups means approximately 50 Faults per month, which shows there is no reduction of the number of faults from our earlier communication. Since the fault currents are being fed from our 200 MVA, 400/132/33 kV Transformer, therefore life expectancy of the transformer is being compromised.

It is therefore once again requested that kindly take appropriate action so that such a serious issue may be resolved on urgency basis.

The matter may please be treated as most urgent.

Thanking you.

Yours truly,

17/04/24

(T.P.Verma)
Sr. DGM (Substation)

टी॰ पी॰ वर्मा/T.P. VERMA
उप महाप्रबंधक/Dy. General Manager
पावर ग्रिड कॉर्पोरेशन ऑफ़ इंडिया लिमिटेड
POWER GRID CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम/A Govt. of India Enterprise)
765/400/132kV/+500kV HVDC Ballia SS
Ibrahimpatti, Ballia-221716 (U.P.)

CC:

1. CGM (AM), RHQ, NR-3, Lucknow for kind information please.
2. Sr. GM Ballia Substation for kind information please.
3. GM (AM), RHQ, NR-3, Lucknow for kind information please.

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

कार्यालय/साइट: 765/400 /132 के.वी. एचवीएसी & ±500 के.वी. एचवीडीसी बलिया उपकेंद्र, इब्राहिमपट्टी, बलिया (उ.प्र.)-221716
Office/Site: 765/400/132kV HVAC & ±500 kV HVDC Ballia Substation, Ibrahimpatti, Ballia (U.P.)- 221716

Ref. No.: NR3/BAL/HVDC/132 kV/UPPCL/02 **Date**: 22.02.2024

URGENT

To,

Executive Engineer,
EEE, UPPCL (Semari Jamalpur)
Ballia

Ref.: Our Letter Ref. NR3/BAL/HVDC/33 KV/UPPCL/01 dated 01.12.2023

Sub: **Frequent interruptions in 33 kV UPPCL Feeder**.

Dear Sir,

As intimated vide above referred letter that we are facing frequent interruptions in the 33 kV dedicated supply from 132/33 kV Simri Jamalpur UPPPCL Substation due to which operation of 2500MW HVDC Ballia-Bhiwadi Line has become very difficult. This power supply is being used to feed power to HVDC auxiliary system such as thyristor cooling water pump, tap changer of converter transformer etc. The successful operation of any HVDC system is totally dependent on successful operation of auxiliary systems which in turn require uninterrupted auxiliary power supply.

However, POWERGRID Ballia Substation is still facing frequent interruptions on 33kV dedicated UPPCL feeder.

It is therefore requested that kindly review & resolve the frequent interruptions in 33kV UPPCL feeder. Also, details of rectification as carried out may also be forwarded to us.

The matter must be treated as most urgent.

Thanking you.

Yours truly,

22/02/24

(T.P.Verma)
Sr. DGM (Substation)

टी॰ पी॰ वर्मा/ T. P. VERMA
उप महाप्रबंधक/Dy. General Manager
पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड
POWER GRID CORPORATION OF INDIA LIMITED
(भारत सरकार का उद्यम/A Govt. of India Enterprise)
765/400/132kV/±500kV HVDC Ballia SS
Ibrahimpatti, Ballia-221716 (U.P.)

CC: 1. CGM (AM), RHQ, NR-3, Lucknow for kind information please.
2. Sr. GM (AM), RHQ, NR-3, Lucknow for kind information please.
3. Sr. GM Ballia Substation for kind information please.

All Prices are in Indian Rupees.

SI. No.	Item Description	Unit	Qty.	Supply Rate	Supply Amount	Remarks
1	2	3	4			
EX-WORKS SUPPLY CHARGES						
A	**SUPPLY PART :**					
1	72.5kV class, 1250A, 31.5kA Circuit Breaker (3-ph) with support structure.	Nos.	1	5,09,766.00	5,09,766.00	SOR June-23
2	72.5kV class, 100A, 31.5KA, with 120% extended rating Current Transformer (1-ph) as per Technical specification.	Nos.	6	2,14,664.00	12,87,984.00	SOR June-23
3	72.5kV class, Voltage Transformer (1-ph).	Nos.	3	1,11,760.00	3,35,280.00	SOR June-23
4	72.5kV class, 1250A, 31.5kA Isolator (3-ph)-HDB including support insulator without Earthswitch	Set	2	1,87,257.00	3,74,514.00	SOR June-23
5	Standard pipe structures for 72.5kV CT (1-phase)	Nos.	6	17,994.00	1,07,964.00	SOR June-23
6	Standard pipe structures for 72.5kV CVT (1-phase)	Nos.	3	17,994.00	53,982.00	SOR June-23
7	Standard pipe structures for 72.5kV Isolator (3-phase)	Nos.	2	1,02,006.00	2,04,012.00	SOR June-23
8	Standard pipe structures for 72.5kV for BPI (height 5.8m) excluding Wave Trap	Nos.	15	16,172.00	2,42,580.00	SOR June-23
9	Standard pipe structures for 72.5kV for BPI (height 4.4m) excluding Wave Trap	Nos.	3	16,172.00	48,516.00	SOR June-23
10	72.5kV BPI of height 770mm (1-phase)	Nos.	18	5,224.00	94,032.00	SOR June-23
11	28 mm Dia Foundation bolts including nuts, check nuts and washers for lattice and pipe structures.	Nos.	84	725.00	60,900.00	SOR June-23
12	33kV 1Cx**185sqmm** XLPE AL Armoured Cable alongwith Accessoried as per Technical Specification	KM	1.8	5,95,339.00	10,71,610.20	**As per SAP PO 5100046160**
13	33KV XLPE Cable Termination Equipment along with structure and Accessories for Outdoor termination (one set consists of complete requirement for one bay)	SET	1.0	1,14,197.00	1,14,197.00	SOR June-23
14	Power Cable-4C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0.2	94,901.00	18,980.20	SOR June-23
15	Power Cable-2C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0.2	71,277.00	14,255.40	SOR June-23
16	Contol Cable (PVC)Copper 1.1kV grade - 14C x 2.5 sqmm	KM	2.0	4,10,957.00	8,21,914.00	SOR June-23
17	Contol Cable (PVC)Copper 1.1kV grade - 10C x 2.5 sqmm	KM	2.0	2,45,319.00	4,90,638.00	SOR June-23

SI. No.	Item Description	Unit	Qty.	Supply Rate	Supply Amount	Remarks
18	Contol Cable (PVC)Copper 1.1kV grade - 5C x 2.5 sqmm	KM	1.0	1,33,662.00	1,33,662.00	SOR June-23
19	Control & Relay Panel with Cable Differential Protection, Triple Instantaneous Over Current relay with Adjusted Definite Mean Time, Instantaneous Earth Fault Relay with Adjusted Definite Mean Time, Master Trip relay. / Control, Relay & Protection Panel for 33 kV Transformer (-with Automation in existing SCADA)	Set	1	5,10,694.00	5,10,694.00	SOR June-23
20	Erection Hardware for the 72.2kV Equipment for Tertiary loading as per Technical Spectification (Insulator String, Disc Insulator, Hardware, Conductor, AL Tube, Busbar Materials, Cable Trays, Ba MB, Clamps, Spacers, Connectors including Equipment Connector, Junction Boxes, Earthwire, Earthing Material Risers, Auxiliary Earth Mat (Excluding Main Earthmat) burried Cable Trenches, pipe equipment, & Lighting, all Accessories etc.)	Set	1	6,44,012.00	6,44,012.00	SOR June-23
21	33kV 1Cx185 sqmm XLPE Power straight through Cable Jointing Kit (Raychem/3M Kit)	Nos.	2	4,850.00	9,700.00	Offer dated 19.06.23 at Annexure-3F
22	33KV Heat shrinkable Bus Bar insulation Tube for ACSR Moose conductor-dia 31.77mm (Raychem/3M Kit)	Meter	20	2,655.00	53,100.00	Offer dated 19.06.23 at Annexure-3F
23	33KV Heat shrinkable Bus bar insulation sleeve for 3 Inch IPS Tube - (Raychem/3M Kit)	Meter	80	6,880.00	5,50,400.00	Offer dated 19.06.23 at Annexure-3F
24	33kV Heat shrinkable Tape for Isolator, CT, VT, All Connectors, Corona bell etc (Raychem/3M kit), 1M-1EA	Meter	50	3,515.00	1,75,750.00	Offer dated 19.06.23 at Annexure-3F
B	**MANDATORY SPARES**					
25	One piece of all Clamps and connectors	Set	1	32,200.60	32,200.60	10% Cost of Erection Hardware
26	72.5kV CB 1250A, 31.5kA CB-1 Pole	No	1	3,91,216.00	3,91,216.00	SOR June-23
27	72.5kV class, 100A, 31.5kA, with 120% extended rating Current Transformer (1-ph) with 2 core-100/1 and One Core 50/1	Nos	1	1,43,233.00	1,43,233.00	SOR June-23
28	72.5kV class, Voltage Transformer (1-ph).	Nos	1	1,33,501.00	1,33,501.00	SOR June-23

SI. No.	Item Description	Unit	Qty.	Supply Rate	Supply Amount	Remarks
29	One Pole of 72.5kV class, 1250A, 31.5kA Isolator (3-ph)-HDB including support insulator without Earthswitch	Nos	1	1,43,604.00	1,43,604.00	SOR June-23
30	72.5kV BPI of height 770mm (1-phase)	Nos	1	5,224.00	5,224.00	SOR June-23
	TOTAL				87,77,421.40	

BOQ Cum Cost Estimate for Shifting of UPPCL Auxiliary Supply to Tertiary Bus of 765/400 kV ICT-1 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Substation

Estimated Cost (F&I)

Annexure-3B

All Prices are in Indian Rupees.

SI. No.	Item Description	Unit	Qty.	Unit Freight, In –transit Insurance & loading Charges	Total Freight, In –transit Insurance & loading Charges	Remarks
1	2	3	4	5	6 = 4 x 5	
F&I Portion FOR Supply of Materials to POWERGRID, Ballia Sub-Station						
A	**SUPPLY PART :**					
1	72.5kV class, 1250A, 31.5kA Circuit Breaker (3-ph) with support structure.	Nos.	1	20391	20390.64	
2	72.5kV class, 100A, 31.5KA, with 120% extended rating Current Transformer (1-ph) as per Technical specification.	Nos.	6	8587	51519.36	
3	72.5kV class, Voltage Transformer (1-ph).	Nos.	3	4470	13411.2	
4	72.5kV class, 1250A, 31.5kA Isolator (3-ph)-HDB including support insulator without Earthswitch	Set	2	7490	14980.56	
5	Standard pipe structures for 72.5kV CT (1-phase)	Nos.	6	720	4318.56	
6	Standard pipe structures for 72.5kV CVT (1-phase)	Nos.	3	720	2159.28	
7	Standard pipe structures for 72.5kV Isolator (3-phase)	Nos.	2	4080	8160.48	
8	Standard pipe structures for 72.5kV for BPI (height 5.8m) excluding Wave Trap	Nos.	15	647	9703.2	
9	Standard pipe structures for 72.5kV for BPI (height 4.4m) excluding Wave Trap	Nos.	3	647	1940.64	
10	72.5kV BPI of height 770mm (1-phase)	Nos.	18	209	3761.28	
11	28 mm Dia Foundation bolts including nuts, check nuts and washers for lattice and pipe structures.	Nos.	84	29	2436	
12	33kV 1Cx185 sqmm XLPE AL Armoured Cable alongwith Accessoried as per Technical Spectification	KM	2	23814	42864.408	
13	33KV XLPE Cable Termination Equipment along with structure and Accessories for Outdoor termination (one set consists of complete requirement for one bay)	SET	1	4568	4567.88	

SI. No.	Item Description	Unit	Qty.	Unit Freight, In –transit Insurance & loading Charges	Total Freight, In –transit Insurance & loading Charges	Remarks
14	Power Cable-4C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0	3796	759.208	
15	Power Cable-2C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0	2851	570.216	
16	Contol Cable (PVC)Copper 1.1kV grade - 14C x 2.5 sqmm	KM	2	16438	32876.56	
17	Contol Cable (PVC)Copper 1.1kV grade - 10C x 2.5 sqmm	KM	2	9813	19625.52	
18	Contol Cable (PVC)Copper 1.1kV grade - 5C x 2.5 sqmm	KM	1	5346	5346.48	
19	Control & Relay Panel with Cable Differential Protection, Triple Instantaneous Over Current relay with Adjusted Definite Mean Time, Instantaneous Earth Fault Relay with Adjusted Definite Mean Time, Master Trip relay. / Control, Relay & Protection Panel for 33 kV Transformer (-with Automation in existing SCADA)	Set	1	20428	20427.76	
20	Erection Hardware for the 72.2kV Equipment for Tertiary loading as per Technical Spectification (Insulator String, Disc Insulator, Hardware, Conductor, AL Tube, Busbar Materials, Cable Trays, Ba MB, Clamps, Spacers, Connectors including Equipment Connector, Junction Boxes, Earthwire, Earthing Material Risers, Auxiliary Earth Mat (Excluding Main Earthmat) burried Cable Trenches, pipe equipment, & Lighting, all Accessories etc.)	Set	1	25760	25760.48	
21	33kV 1Cx185 sqmm XLPE Power straight through Cable Jointing Kit (Raychem/3M Kit)	Nos.	2	300	600	Offer dated 19.06.23 at Annexure-3F
22	33KV Heat shrinkable Bus Bar insulation Tube for ACSR Moose conductor-dia 31.77mm (Raychem/3M Kit)	Meter	20	30	600	Offer dated 19.06.23 at Annexure-3F
23	33KV Heat shrinkable Bus bar insulation sleeve for 3 Inch IPS Tube - (Raychem/3M Kit)	Meter	80	30	2400	Offer dated 19.06.23 at Annexure-3F
24	33kV Heat shrinkable Tape for Isolator, CT, VT, All Connectors, Corona bell etc (Raychem/3M kit)	Meter	50	30	1500	Offer dated 19.06.23 at Annexure-3F

SI. No.	Item Description	Unit	Qty.	Unit Freight, In –transit Insurance & loading Charges	Total Freight, In –transit Insurance & loading Charges	Remarks	
	MANDATORY SPARES						
25	One piece of all Clamps and connectors	Set	1	1288	1288.024		
26	72.5kV CB 1250A, 31.5kA CB-1 Pole	No	1	15649	15648.64		
27	72.5kV class, 100A, 31.5kA, with 120% extended rating Current Transformer (1-ph) with 2 core-100/1 and One Core 50/1	Nos	1	5729	5729.32		
28	72.5kV class, Voltage Transformer (1-ph).	Nos	1	5340	5340.04		
29	One Pole of 72.5kV class, 1250A, 31.5kA Isolator (3-ph)-HDB including support insulator without Earthswitch	Nos	1	5744	5744.16		
30	72.5kV BPI of height 770mm (1-phase)	Nos	1	209	208.96		33959.1
	TOTAL				**324638.856**		

BOQ Cum Cost Estimate for Shifting of UPPCL Auxiliary Supply to Tertiary Bus of 765/400 kV ICT-1 for Reliable Auxiliary Power Supply to ±500kV HVDC Ballia Substation

Estimated Cost (Service)

Annexure-3C

All Prices are in Indian Rupees.

Sl. No.	Item Description	Unit	Qty.	Rate	Amout	Remarks
1	3	4	5	6	7	
	ERECTION & CIVIL PORTION					
	Erection Charges					
1	72.5kV class, 1250A, 31.5kA Circuit Breaker (3-ph) with support structure.	Nos.	1	7,843.00	7,843.00	SOR June-23
2	72.5kV class, 100A, 31.5KA, with 120% extended rating Current Transformer (1-ph) as per Technical specification.	Nos.	6	5,377.00	32,262.00	SOR June-23
3	72.5kV class, Voltage Transformer (1-ph).	Nos.	3	1,192.00	3,576.00	SOR June-23
4	72.5kV class, 1250A, 31.5kA Isolator (3-ph)-HDB including support insulator without Earthswitch	Set	2	6,984.00	13,968.00	SOR June-23
5	Standard pipe structures for 72.5kV CT (1-phase)	Nos.	6	1,053.00	6,318.00	SOR June-23
6	Standard pipe structures for 72.5kV CVT (1-phase)	Nos.	3	1,053.00	3,159.00	SOR June-23
7	Standard pipe structures for 72.5kV Isolator (3-phase)	Nos.	2	5,946.00	11,892.00	SOR June-23
8	Standard pipe structures for 72.5kV for BPI (height 5.8m) excluding Wave Trap	Nos.	15	848.00	12,720.00	SOR June-23
9	Standard pipe structures for 72.5kV for BPI (height 4.4m) excluding Wave Trap	Nos.	3	848.00	2,544.00	SOR June-23
10	72.5kV BPI of height 770mm (1-phase)	Nos.	18	1,592.00	28,656.00	SOR June-23
11	28 mm Dia Foundation bolts including nuts, check nuts and washers for lattice and pipe structures.	Nos.	84	404.00	33,936.00	SOR June-23
12	33kV 1Cx185 sqmm XLPE AL Armoured Cable alongwith Accessoried as per Technical Spectification	KM	1.8	2,59,712.00	4,67,481.60	SOR June-23

SI. No.	Item Description	Unit	Qty.	Rate	Amout	Remarks
13	33KV XLPE Cable Termination Equipment along with structure and Accessories for Outdoor termination (one set consists of complete requirement for one bay)	SET	1	10,694.00	10,694.00	SOR June-23
14	Power Cable-4C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0.2	26,430.00	5,286.00	SOR June-23
15	Power Cable-2C x 6 sqmm Aluminium PVC (1.1kV Grade)	KM	0.2	26,430.00	5,286.00	SOR June-23
16	Contol Cable (PVC)Copper 1.1kV grade - 14C x 2.5 sqmm	KM	2	43,459.00	86,918.00	SOR June-23
17	Contol Cable (PVC)Copper 1.1kV grade - 10C x 2.5 sqmm	KM	2	38,243.00	76,486.00	SOR June-23
18	Contol Cable (PVC)Copper 1.1kV grade - 5C x 2.5 sqmm	KM	1	31,291.00	31,291.00	SOR June-23
19	Control & Relay Panel with Cable Differential Protection, Triple Instantaneous Over Current relay with Adjusted Definite Mean Time, Instantaneous Earth Fault Relay with Adjusted Definite Mean Time, Master Trip relay. / Control, Relay & Protection Panel for 33 kV Transformer (-with Automation in existing SCADA)	Set	1	9,762.00	9,762.00	SOR June-23
20	Erection Hardware for the 72.2kV Equipment for Tertiary loading as per Technical Spectification (Insulator String, Disc Insulator, Hardware, Conductor, AL Tube, Busbar Materials, Cable Trays, Ba MB, Clamps, Spacers, Connectors including Equipment Connector, Junction Boxes, Earthwire, Earthing Material Risers, Auxiliary Earth Mat (Excluding Main Earthmat) burried Cable Trenches, pipe equipment, & Lighting, all Accessories etc.)	Set	1	72,219.00	72,219.00	SOR June-23

Sl. No.	Item Description	Unit	Qty.	Rate	Amout	Remarks
21	33kV 1Cx185 sqmm XLPE Power straight through Cable Jointing Kit (Raychem/3M Kit)	Nos.	2	590.00	1,180.00	Offer dated 19.06.23
22	33KV Heat shrinkable Bus Bar insulation Tube for ACSR Moose conductor-dia 31.77mm (Raychem/3M Kit)	Meter	20	590.00	11,800.00	Offer dated 19.06.23
23	33KV Heat shrinkable Bus bar insulation sleeve for 3 Inch IPS Tube - (Raychem/3M Kit)	Meter	80	590.00	47,200.00	Offer dated 19.06.23
24	33kV Heat shrinkable Tape for Isolator, CT, VT, All Connectors, Corona bell etc (Raychem/3M kit)	Meter	50	590.00	29,500.00	Offer dated 19.06.23
B	**Civil works**					
25	Excavation of all kind of soil including rock for all leads and lifts, Backfilling, disposal of surplus earth within lead of 2KM as per technical Specification. The surplus earth shall be roughly graded.	CUM	80.73	253.00	20,424.69	SOR June-23
26	Providing and laying in position cement concrete of specified grade including the cost of centering and shuttering - All work up to plinth level : 1:4:8 (1 Cement : 4 coarse sand (zone-III) : 8 graded stone	CUM	2.577	4,017.00	10,353.32	SOR June-23
27	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering- all work upto plinth level ; 1:5:10 (01 cement: 5 coarse sand (Zone-III): 10 graded stone aggregates 40mm nominal size) and applying cement slurry in the ratio of (1 cement : 6 fine aggregates) with cement consumption for slurry 150kg for every 100sqm as per POWERGRID Norms.	CUM	20.522	3,531.00	72,464.06	SOR June-23

SI. No.	Item Description	Unit	Qty.	Rate	Amout	Remarks
28	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level :1:1.5:3 (1 cement : 1.5 coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size)	CUM	13.025	6,727.00	87,620.86	SOR June-23
29	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.Thermo-Mechanically Treated bars. (Chairs, OverLap, wastages, etc. deemed to be included & shall not measured)	MT	0.775	74,937.00	58,043.39	SOR June-23
30	RCC Culvert and Cable Trench Crossing including Supplying and Laying of Hume Pipe 300mm Dia of Grade NP-3 excluding Concrete	RM	30.00	2,363.00	70,890.00	SOR June-23
31	Removing,cleaning and washing of existing stones and respreading of stones in switchyard excluding PCC.	SQM	271.25	100.00	27,125.00	SOR June-23
32	Supplying & spreading of 40mm single sized stone chips to the 100mm thickness over switchyard surface including transportation, loading, unloading and stacking	CUM	13.56	1,947.00	26,406.19	SOR June-23
33	Antiweed Treatment	SQM	187.50	20.00	3,750.00	SOR June-23
34	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of	CUM	4.125	2,196.00	9,058.50	SOR June-23
35	Demolishing cement concrete (PCC) manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in - charge:Nominal concrete 1:5:10 or leaner mix (i/c equivalent design mix	CUM	18.750	354.00	6,637.50	SOR June-23
36	Burried Cable Trenches for Aux Power Arrangement	M	600.000	1,424.00	8,54,400.00	SOR June-23
	Total				**22,59,151.10**	

Annexure-3D

SUMMARY OF TAXES & DUTIES APPLICABLE ON GOODS		
Sl. No.	**Item Nos.**	**Total Price (INR)**
1	**TOTAL GST ON GOODS**	
	Total GST for Supply of Goods (inter-alia including Type Test Charges) between the Contractor and the Employer which are not included in the Ex-works price.	**15,79,935.85**
2	**TOTAL GST ON SERVICES**	
	Total GST for Service Charges, if, any between the Contractor and the Employer which are not included in the Service Charges	**4,06,647.20**
	GRAND TOTAL [1+2]	**19,86,583.05**

Annexure-3E

(GRAND SUMMARY)		
Sl. No.	**Description**	**Total Price (INR)**
1	**TOTAL SCHEDULE NO. 1**	**87,77,421.40**
	Ex-works price of Plant and Equipment including Type Test Charges	
2	**TOTAL SCHEDULE NO. 2**	**3,24,638.86**
	Local Transportation, In-transit Insurance, loading and unloading	
3	**TOTAL SCHEDULE NO. 3**	**22,59,151.10**
	Service (Installation & commissioning) Charges	
5	**TOTAL [1+2+3]**	**1,13,61,211.36**
	Total Charges excluding GST (Supply and Service Only)	
6	**TOTAL SCHEDULE NO. 4**	**19,86,583.05**
	Taxes and Duties	
7	**GRAND TOTAL [1+2+3+4-5]**	**1,33,47,794.41**

Sl. No.	Item Description	Parameters
16.	HVDC control system*	Main + hot standby
17.	HVDC protection system*	Duplicated Protection
18.	Auxiliary supply source	Supply sources tapped from 33 kV side of 2 nos. of 400/33 kV transformer (50 MVA) at Bhadla HVDC and 33 kV tertiary of 2 Nos. 765/400/33 kV ICT at Fatehpur. Each auxiliary power shall be fetched from both separate sources of the 33 kV auxiliary supply in station
19.	DC Harmonic filter	Minimum One DC filter for each pole at each HVDC terminal station
20.	AC Network Impedance	Relevant CIGRE/IEC document shall be used for the Network harmonic impedance together with information in PSSE network files provided by CTU.
21.	Negative sequence voltage (fundamental frequency)	1% for Design of equipment 1.5% for rating of equipment
22.	HVDC line online fault locator for pole lines	One No. per pole at each terminal station [when not integrated with Control & Protection System]
23.	HVDC paralleling and de-paralleling switch	As per Requirement
24.	Smoothing reactor on DC bus	As per requirement but not less than 33% of total milli Henry (mH) required for each pole, shall be provided on DC pole bus
25.	Blocking filter	As per requirement
26.	Reliability and Availability Design Targets	As per Table 10
27.	Station Loss evaluation criteria	Methodology as per IEC 61803 and Target figures stated in Table 10
28.	System Grounding	Solidly grounded

*TSP can provide integrated Control and Protection system as well, meeting functional requirements.

The criteria for the design and control of the network shall be as follows:

- 400 kV AC bus voltages shall normally be within ±5.0% of nominal voltage (400 kV). Bus voltages outside this range may occur from time to time and may exist for long

in the switchyard from entering the valve hall and overstressing the thyristor valves. It decreases the incident of commutation failures by limiting the rate of change of current caused by rapid voltage changes. It is also being considered to provide smoothing reactor in the neutral bus to optimize the cost of the project. Smoothing reactor will be of air core type.

10.2.9 TELECOMMUNICATION

The proper and smooth operation of the HVDC system shall depend on a highly reliable and effective telecommunication system between the two terminals. For this purpose, necessary telecommunication equipment, through Fibre Optic communication network shall be provided between the converter stations. This shall be achieved by installing optical ground wire(OPGW) with 24 fibres on one of the peaks of the 800 kV HVDC line and repeater station. Repeater station shall be preferably located in the substation en route to HVDC line. The fibre optic communication channels shall be used for both data and speech between the converter stations. The backup to this Fiber Optic link shall be provided with F.O Network being developed for AC substations in WR & SR.

10.2.10DEDICATED METALLIC RETURN

Additional third conductor shall be used as return path between HVDC converters. The necessary DC switchgear arrangement required for establishing the return path shall be part of HVDC terminal. The conductor shall be laid on the same tower on which the pole conductors are installed with due consideration to electrical clearances (ROW), current rating etc.

10.2.11 AUXILIARY ELECTRICAL & MECHANICAL SYSTEM

A HVDC station requires a very reliable auxiliary power supply for smooth operation. For the Pugalur terminal, the auxiliary power requirement is proposed to be met from the two 400/110/33kV, 200 MVA transformers to be procured as part of Scheme 1 scope. For Raigarh station, the auxiliary power shall be taken at 33kV from the tertiary of two 765 kV ICT's existing at Raigarh. Back up auxiliary power for both terminals shall be available from suitably rated DG sets.

Other systems such as Control room Air conditioning, Fire fighting, illumination system, Oil handling, AC and DC auxiliary power supplies, station grounding, Public address and internal communication system, etc. shall be suitably provided as is mandatory in all HVDC Installation. An independent VESDA (or equivalent) System shall be installed in each valve hall for early detection of incipient fire/smoke. In addition, UV sensors to detect electrical arcs shall also be installed within the valve hall. A fully computerized and automatic Building Management System (BMS) shall control the operation of the mechanical systems serving the valve hall and service building and other systems.. Bore-well water is proposed to be used to meet the water requirements of the project.

10.2.12 CREEPAGE DISTANCES AND ELECTRIC FIELD

The creepage distances being specified for the HVDC system are as follows:

Annexure-X

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

विषय: उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 219वीं बैठक का कार्यवृत |

Subject: Minutes of the 219th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 219वीं बैठक दिनांक 15.05.2024 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट http://164.100.60.165 पर उपलब्ध है। यदि कार्यवृत पर कोई टिप्पणी हो तो कार्यवृत जारी करने के एक सप्ताह के अन्दर इस कार्यालय को भेजें |

The 219th meeting of the Operation Co-ordination Sub-Committee (OCC) of NRPC was held on 15.05.2024. The Minutes of this meeting has been uploaded on the NRPC website http://164.100.60.165. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्नक:यथोपरि।

Signed by Omkishor
Date: 28-05-2024 17:32:36

(ओमकिशोर)
कार्यपालक अभियंता (प्रचालन)

सेवा में,

उ.क्षे.वि.स. के प्रचालन समन्वय उप-समिति के सभी सदस्य

A.11.5. OCC forum agreed with proposed revision in SPS. Further, with regard to NRLDC comments on implemented logic which decides priority in Nehtaur SPS and time delay to be kept, agenda may be brought by UPSLDC in next OCC meeting.

A.12. Table Agenda 2: Request to consider Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation (Agenda by Powergrid NR-1)

A.12.1 EE(O), NRPC apprised forum that Powergrid NR-1 is facing operational challenges at Maharanibagh GIS Substation due to its Double Main Bus Bar setup, leading to frequent and prolonged shutdowns for maintenance.

A.12.2 Further he mentioned that in the past four years, the 400 kV GIS at Maharanibagh Substation has undergone three complete shutdowns, each lasting 5-14 days, to resolve defects occurring between the circuit breaker compartment and the Bus Bar. In February 2018, the complete substation was in shutdown for 14 days continuously. In August 2023, an issue observed in gas-tight insulator inside the 400 kV Bus Bar-2, near Hyosung GIS Bay – 407 (Transformer-4), necessitating a 4-day shutdown of both 400 kV Bus Bars. This led to a complete interruption of power flow from the 400 kV side.

A.12.3 To address this, Powergrid NR-1 has proposed for a 400 kV Bus Bar splitting arrangement between ABB and Hyosung GIS. This arrangement aims to mitigate the risk of complete station shutdowns by allowing the disconnection of faulty segments while maintaining continuous power flow through the healthy side of the Bus Bar.

A.12.4 Further, CGM Powergrid mentioned that Technical feasibility has been assessed, and the financial implications, is approximately 8.7 Cr(Expenditure booking under Add Cap block 2024-2029).

A.12.5 In the meeting, Powergrid NR-1 representative presented the bus split arrangement at 400/220 kV Maharanibagh Substation to the forum.

A.12.6 MS, NRPC suggested that a committee of members from NRLDC, CTU, DTL, HVPN and UPPTCL may be constituted under chairmanship of Superintending Engineer (Operation), NRPC that would visit 400/220 kV Maharanibagh Substation and submit its report before the next OCC meeting regarding the need to consider the Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

A.13. Table Agenda 3: Low voltage at RVPN's 220 kV GSSs in the vicinity of 400 kV GSS Bhinmal (PG) - (Agenda by RVPN)

A.13.1. RVPN vide mail dated 13.05.2024 has intimated that to control High loading of 400kV Bhinmal-Zerda line, following scheme was approved in 53rd NRPC

Annexure-XI

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

सेवा में/ To,

1. Chief General Manager (SO), NRLDC [Email: somara.lakra@grid-india.in]
2. General Manager (CTU) [Email: kashish@powergrid.in]
3. AGM DTL [Email: bl.gujar@dtl.gov.in]
4. Chief Engineer UPPTCL [Email: director_op@upptcl.org]
5. Chief Engineer HVPN [Email: cetspkl@hvpn.org.in]

Sub: Nomination for the Committee to visit 400/220 kV Maharanibagh Substation regarding Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

महोदय,

Reference is invited to discussion held in the 219th OCC meeting (held on 15th May, 2024) on the agenda item of Powergrid NR-1 "to consider Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation" (detailed agenda attached as Annexure) wherein, it was decided that a committee may be formed under chairmanship of Superintending Engineer (Operation), NRPC and having members from NRLDC, CTU, DTL, HVPN and UPPTCL. The committee would visit 400/220 kV Maharanibagh Substation and submit its report before the next OCC meeting regarding the need to consider the Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

In view of the above, NRLDC, CTU, DTL, HVPN and UPPTCL are requested to send the nomination of the officer(s) at seo-nrpc@nic.in in the format as below-

S. No.	Name (Sh./Ms./Mrs.)	Designation	Organization	Contact no.	Email address

This issues with the approval of Member Secretary, NRPC.

Signed by Dharmendra Kumar Meena
Date: 17-05-2024 10:06:20

Encls: As above

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

Copy to: CGM, Powergrid NR-1

Annexure

Ref: -N1/AM/ **Date: - 10st May'2024**

To,
SE (Operation)
Northern Regional Power Committee,
18-A, Qutab Institutional Area,
Katwaria Sarai, New Delhi-110 016

Subject- Regarding Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

Dear Sir,

Maharanibagh GIS Substation is an integral part of Delhi's main ring infrastructure and plays a pivotal role in ensuring the uninterrupted supply of power to the region, boasting an impressive installed capacity of 1630 MVA.

Currently, the substation comprises 12 bays of 400 kV and 09 bays of 220 kV, accommodating a total of 04 transformers, including 2 units of 500 MVA and 2 units of 315 MVA, along with a Bus Reactor of 125 MVAR and 06 transmission lines of 400 kV. Commissioned in 2007 under the High-Capacity East – North Inter Connector-II project, the substation has evolved over the years to meet the escalating power demands of the region, with additional transformers and bays being added in 2010 to address increased power requirements.

However, despite its critical role, the Maharanibagh Substation faces operational challenges, particularly due to its Double Main (DM) Bus Bar arrangement in both the 400 kV and 220 kV GIS. This arrangement, while efficient under normal circumstances, poses significant drawbacks, particularly in the event of any issue arising between the Circuit Breaker and Bus Bar compartments. Such issues have necessitated several complete shutdowns of the 400 kV GIS over the past four years, with each shutdown lasting between 5 to 14 days, thereby disrupting power supply and reducing the substation's reliability and availability.

To address these challenges, we propose the implementation of an off-load 400 kV Bus Bar splitting arrangement between ABB and Hyosung GIS, specifically between bays 405 & 406. This arrangement would allow for the disconnection or splitting of the Bus Bar, ensuring continuous power flow through the healthy side and minimizing disruptions to service. Each side of the bus splitter will be equipped with 02 transformers and at least 02 lines, thereby ensuring continued power supply, even though at a reduced capacity, during maintenance or fault rectification activities.

केन्द्रीय कार्यालय : "सौदामिनी" प्लॉट सं. 2, सैक्टर–29, गुरुग्राम–122001, (हरियाणा), दूरभाष : 0124–2571700–719
Corporate Office : "Saudamini", Plot No. 2, Sector-29, Gurugram-122001, (Haryana) Tel. : 0124-2571700-719
पंजीकृत कार्यालय : बी–9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली–110016 011-26560112, 26564812, 26564812, 26564892, सीआईएन : L40101DL1989GOI038121
Registered Office : B-9, Qutab Institution Area, Katwaria Sarai, New Delhi-110016. Tel.: 011-26560112, 26564812, 26564812, 26564892, CIN : L40101DL1989GOI038121
Website : www.powergridindia.com

Technical feasibility of Off-load 400 kV Bus Split arrangement has been assessed, and the financial implications, is approximately 8.7 Cr (Expenditure booking under Add Cap block 2024-2029).

Considering the significant benefits that this arrangement would bring, including system improvement and increased grid reliability, it is requested to kindly look into the proposal for Off-load 400 kV Bus Split arrangement at 400/220 kV Maharanibagh Substation.

Thanking you.

Yours sincerely,

(Vishal Roy)
Sr. DGM (RTAMC, NR-1)

Copy: -

i) MS (NRPC) (For kind information please.)

ii) CGM-AM , NR-1

iii) CGM, NRLDC

केन्द्रीय कार्यालय : "सौदामिनी" प्लॉट सं. 2, सैक्टर–29, गुरुग्राम–122001, (हरियाणा), दूरभाष : 0124–2571700–719
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सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref: CTU/N/00/CMETS_NR/30

Date: 24-06-2024

As per distribution list

Subject: 30th Consultation Meeting for Evolving Transmission Schemes in Northern Region-Minutes of Meeting

Dear Sir/Ma'am,

Please find enclosed the minutes of the 30th Consultation Meeting for Evolving Transmission Schemes in Northern Region held on 18th June, 2024 (Tuesday) through virtual mode.

The minutes are also available at CTU website (www.ctuil.in)

Thanking you,

Yours faithfully,

24/06/24

(Kashish Bhambhani)
General Manager (CTU)

Distribution List:

Chief Engineer (PSP&A – I) Central Electricity Authority Sewa Bhawan, R.K.Puram, New Delhi-110 066	**Member Secretary** Northern Regional Power Committee 18A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi – 110 016
Director (Power System) Solar Energy Corporation of India Ltd. D-3, 1st Floor, A wing, Religare Building, District Centre, Saket, New Delhi-110017	**Director** Ministry of New and Renewable Energy, Block 14, CGO Complex, Lodhi Road, New Delhi-110003
Director (SO) Grid Controller of India Limited (erstwhile Power System Operation Corporation Ltd.) 9th Floor, IFCI Towers, 61, Nehru Place, New Delhi-110 016	**Executive Director** Northern Regional Load Despatch Centre 18-A, Qutab Institutional Area, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi– 110 016
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Member (Power) Bhakra Beas Management Board Sector-19 B, Madhya Marg, Chandigarh - 160019	**Superintending Engineer (Operation)** Electricity Circle, 5th Floor, UT Secretariat, Sector-9 D, Chandigarh - 161009
Director (Operations) Delhi Transco Ltd. Shakti Sadan, Kotla Road, New Delhi-110 002	**Director (Technical)** Haryana Vidyut Prasaran Nigam Ltd. Shakti Bhawan, Sector-6, Panchkula-134109, Haryana
Executive Director (AM) POWERGRID Saudamini, Plot No.2, Power Grid Corporation Of India Limited, Near, August Kranti Marg, Sector 29, Gurugram, Haryana 122001	

Minutes of 30th Consultation Meeting for Evolving Transmission Schemes in Northern Region held on 18.06.2024

The 30th Consultation Meeting for Evolving Transmission Schemes in the Northern Region (CMETS-NR) was held through VC on 18.06.2024. List of participants is enclosed at **Annexure-A.**

It was informed that the Minutes of the 29th CMETS-NR meeting held on 17/05/2024 were issued vide letter dated 21/05/2024. No comments were received on the minutes, accordingly, minutes were confirmed as circulated.

A. Network Expansion Scheme

A.1 Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex, Transmission scheme

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

Details of schemes approved/Under Planning scheme as part of above is as under:

S.No	Transmission Scheme	RE Potential	Status
A	**Under Bidding/ Approved**		
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW) Bikaner-II : 3.7GW Bikaner-III: 4GW	Awarded
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	5.5GW (Solar) Fatehgarh-IV: 4 GW Barmer-I: 1.5 GW	Under Bidding
3	Rajasthan REZ Ph-IV (Part-3 :6GW) (Bikaner Complex)	6 GW (Solar) Bikaner-IV:6GW	Under Bidding

S.No	Transmission Scheme	RE Potential	Status
B	**Planned/Under Planning**		
1	Rajasthan REZ Ph-IV (Part-4 :3.5GW) (Jaisalmer/Barmer Complex)	3.5 GW (Solar) Fatehgarh-IV: 1 GW Barmer-I: 2.5 GW	**Recently approved in NCT**
2	Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)	6 GW (Solar) Barmer-II : 6GW	**Timeframe : 2029 (HVDC)**
3	Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)	6 GW (Solar) Bhadla-IV: 2 GW Bikaner-V: 4 GW*	
4	**Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)**	**4 GW (Solar)** **Sirohi: 2 GW** **Nagaur: 2 GW**	**Present proposal** **Timeframe : 2027 (EHVAC)**

To evolve the transmission scheme, studies are carried out in two timeframes:

1) **Phase-1 (2027) for 4GW:** Transmission scheme for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)
2) **Phase-2 (2029) for 12GW :** Transmission scheme for Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex) & Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)

It was stated that a Joint study meeting was held on 09.05.24 with stakeholders in NR to deliberate & finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex, Transmission scheme for Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex) & Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex). As part of Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur], following ISTS scheme was proposed in the Joint study meeting

Immediate Evacuation of Power from Sirohi PS (2GW)

- 5x500MVA, 400/220kV ICTs at Sirohi S/s along with transformer bays

Common Evacuation of Power from Sirohi PS (2GW) & Merta-II PS (2GW)

NR-WR Inter regional corridor

- Sirohi – Mandsaur PS 765KV D/c line (~ 320kms) along with 240 MVAr switchable line reactor at Sirohi S/s end and 330 MVAr switchable line reactor at Mandsaur PS end for each circuit of Sirohi – Mandsaur PS 765KV D/c line

Western region

- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765kV D/c line

In the above Joint study meeting, Grid-India observations on proposed transmission schemes as well as on All India Study files (2027 & 2029 time frame) were deliberated and same was also communicated by Grid-India vide their mail dated 09.05.24 (Copy of Grid-India observations are enclosed in **Annexure-1)**. Major observations on 2027 timeframe files are as under

1) LGB of All India file – Higher demand considered in NR,WR & ER region, Merit order of thermal generating units
2) Blocking of Reactive support from units with no generation
3) High loading and low voltages in the ER grid in solar peak hours
4) N-1 non compliance of ICTs in Rajasthan (Intra state and Inter state)
5) N-1 non compliance of ICTs in Western region
6) Critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal in real time
7) Off loading of 765kV Ghiror – Aligarh D/c line
8) Critical loading and higher angular separation (>20 degree) under N-1 contingency in few EHVAC lines in NR as well as Low SCR of Sirohi PS
9) Very low voltages at various nodes in the system including in NR RE Complex
10) Provide Study cases for other scenarios (other than solar maximized scenario)

In the above Joint study meeting, it was decided that comprehensive schemes discussed may be segregated in two phases (Phase-1: Transmission scheme for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex) & Phase-2: Transmission scheme for Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex) & Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex).

In Phase-1, PSS/E files shall be modified w.r.t discussion and comments received from Grid-India on 2027 time frame study files. Revised PSS/E files will be circulated to NR stakeholders for finalization of proposed scheme in next Joint study/CMETS-NR meeting

(Jun'24). After finalization of Phase-1 scheme i.e. Transmission scheme for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex), PSS/E files shall be modified for 2029 time frame w.r.t discussion and other observations/comments received from Grid-India on 2029 timeframe study files and subsequently proposal for Rajasthan REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW)) scheme (Ph-2) will be taken up in Joint meeting/CMETS-NR meeting for stakeholders consultation.

Accordingly as part of Phase-1, revised PSS/E files for solar maximized scenario (SC-4 & 7) along with Scenario 8 (evening peak) & Scenario 9 (night off peak) files for 2027 time frame along with reply to Grid-India observations on 2027 timeframe files was sent on 04.06.24 to all stakeholders (Copy of CTU reply is enclosed in **Annexure-2**).

Subsequently, Grid India vide their mail dated 13.06.24 sent observations on revised PSS/E files (Copy of Grid-India observations enclosed in **Annexure-3**). In the CMETS-NR meeting, CEA agreed to the proposed transmission scheme. Grid-India stated that they do not have any specific comment on proposed transmission scheme, however their observation on other issues on 2027 timeframe files are as under:

a) Higher demand considered in WR & ER region
b) High loading in EHVAC lines in ER and in WR-ER in solar peak hours
c) N-1 non compliance of ICTs in Rajasthan (Intra state and Inter state)
d) Dynamic simulation studies incl. inertia studies for various contingency scenarios
e) Critical loading and higher angular separation (>20 degree) under N-1/N-1-1 contingency of 765kV Bikaner-Moga D/c line as well as Low SCR of Sirohi PS

It was deliberated in CMETS-NR meeting that Transmission planning is carried out for peak load scenario. In view of that CTU analyze the historical data (Feb'23 to Feb'24) for solar maximized time and it is observed that load growth of more than 7 % is observed in winter solar peak hours in All India & most of the regions. Green Hydrogen and bulk consumer load is considered over and above to EPS demand in planning studies .

For high loading in EHVAC lines in ER, Grid-India stated that 400 kV Farakka – Kahalgaon D/c & 400 kV New Ranchi – PPSP D/c is overloaded in real time also. In view of RE addition in NR and WR and backing down of thermal units in ER, critical loading is observed in ER and WR-ER corridors in planning studies. In view of that strengthening is being taken up on priority with progressive addition of solar generation in next 2-3 years so that schemes in ER are available for absorption of RE power in Eastern region.

In the meeting, CTU stated that Reconductoring of some of the lines i.e. 400kV Farakka – Kahalgaon and 400kV Talcher – Meramundali is recently agreed in CMETS-ER meeting with a completion schedule of 18 months from allocation. In real time, loading of 400 kV New Ranchi – PPSP D/c is in order as line rating was considered lower, however in planning studies loadings are higher. Reconductoring of Ranchi New – New PPSP 400kV D/c line and any other augmentation in ISTS and commensurate STU network would be identified based on the joint study meeting scheduled next month with WBSETCL. Reconductoring of 400kV Farakka – Sagardighi and 400kV Rourkela – Chaibasa 400kV D/c line would be taken up for discussion in CMETS-ER meeting (Jul'24). An additional corridor from WR

to ER needs to be envisaged for relieve the loading around Ranchi area considering LGB of 2027 and 2029 timeframe and change in power flow pattern due to envisaged Green hydrogen load. Augmentation of ICTs in WBSETCL, DVC & Odisha area have been already informed to respective STUs in various CMETS-ER meetings and joint meetings. Matter will be further emphasized to STUs/DVC to take up augmentation of ICTs within time.

It was also decided that due to huge power flow in solar peak hours from NR-ER and WR-ER, and thermal backdown in ER, there may be other system strengthening requirement within ER incl. requirement discussed above. Such transmission strengthening requirements will be planned shortly and taken up for stakeholder consultation based on study results under various scenarios.

For intra state ICT overloading in Rajasthan, RVPN stated that for Hindaun ICT work awarded in Mar'24 (24 months schedule) and for Chittorgarh, Heerapura and Deedwana ICTs proposal is in process. CTU requested RVPN to expediate the approval of augmentation of ICTs so that same is available in 2027 timeframe.

CTU stated that Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand. Implementation of ICTs may take less time (18 months from approval) as compared to transmission schemes for RE evacuation (30 months from approval). It was stated that necessary augmentation (Kota and Bhinmal ICT) will be carried out in ISTS in consultation with stakeholders once space availability from TSP for Bhinmal and real time loading data from NRLDC is received for implementation in 2027 timeframe or earlier. NRLDC agreed for the same

For dynamic simulation studies and stability studies, CTU stated presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation with IIT Mumbai is also under progress. In view of that, Dynamic simulation studies for planning scenario may take some time.

In 30th CMETS-NR meeting, CTU requested that Grid-India may also share present time frame converged dynamic file which will help to resolve convergence issues in dynamics file for 2027 timeframe w.r.t Generator models (conventional/RE) used by Grid-India. In the CMETS-NR meeting Grid-India stated that they are also facing convergence issues for present timeframe file and prepared dynamics file with some assumptions. They also shared some dynamic data with CTU in the past but only dynamic data will not help to resolve convergence issue. However for preparation for planning stage dynamic file, CTU and Grid-India can work together to prepare load flow first w.r.t dynamics file and subsequent Dynamic data file (Dyr) shall be prepared with help of models available with Grid-India.

CTU also stated that considering the severe convergence issues in dynamics file, it will be converged on truncated network specific to RE pockets in Rajasthan rather than to converge the file on All India level. NRLDC stated that for transient studies, truncated network modelling will be sufficient.

Further, in the meeting CTU stated that to resolve the issue of higher angular separation (>20 degree) under N-1/N-1-1 contingency of 765kV Bikaner-Moga D/c line, suitable strengthening scheme is already under planning. As part of above scheme LILO of 765kV

Bikaner -Moga line is envisaged which will reduce the angular separation (<30 degree). The above scheme will be taken up in Jul'24 meeting.

Regarding observation for Inertia response of units, NRLDC stated that it may be checked in dynamics file once prepared for critical contingencies i.e. outage of large generation say 5-10GW in RE pockets. In the above condition, inertial response of generation units, Grid frequency variation, df/dt, synchronous condenser response may be analyzed. Same was agreed.

For low SCR at Sirohi PS(4.2), CTU stated that no additional connectivity will be granted beyond 2 GW at 220kV level of Sirohi PS with proposed system (400/220kV ICTs at Sirohi PS+765kV Sirohi - Mandsaur). With growing interconnection and planned network in future, SCR at Sirohi may increase

Copy of CTU reply as well as gist of detailed deliberations held in present CMETS-NR meeting on all other Grid-India observation is enclosed in **Annexure-4.** Result of system studies (after minor modifications suggested by Grid-India in PSS/E file as well as deliberation held in CMETS-NR meeting) enclosed in **Exhibit-I**

Grid-India also enquired about space for STATCOM at Sirohi PS. CTU stated that 765/400kV Sirohi S/s are under bidding and to be implemented as part of Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part 2: 5.5 GW) (Jaisalmer/Barmer Complex).CTU stated that provision of space was kept at Sirohi PS for installation of STATCOM in future based on requirement.

Further, it was stated that CTUIL has received applications of connectivity of 5150 MW from Pumped Storage Projects from Greenko & Avaada near Robertganj in Sonbhadra District Uttar Pradesh. In view of the above, proposed ISTS transmission system for evacuation of power from PSP projects is planned and incorporated in 2027 timeframe files. Details of broad scheme is as under:

- Establishment of 5x1500 MVA 765/400 kV Robertsganj PS near Robertsganj area in Sonbhadra distt. (Uttar Pradesh) along with 2x240 MVAr 765 kV & 2x125 MVAr 400 kV bus reactors
- LILO of both circuits of 765 kV Varanasi- Gaya 2xS/c line at Robertsganj PS(~50 km)
- Establishment of 765kV Prayagraj S/s near Prayagraj (UP) along with 2x240 MVAr 765 kV & 2x125 MVAr 400 kV bus reactors
- LILO of 765 kV Fatehpur-Varanasi S/c line at Prayagraj PS(~30 km)
- LILO of 765 kV Fatehpur-Sasaram S/c line at Prayagraj PS(~30 km)
- Robertsganj PS – Prayagraj S/s 765 kV D/c line (~200 km) along with 240 MVAr line reactor at both ends of each circuit of Robertsganj PS – Prayagraj S/s 765 kV D/c line

Additionally to resolve critical loading of 765kV Vindhyachal-Varanasi D/c line as well as for evacuation of PSP projects in UP (as indicated above), following ISTS scheme is proposed and incorporated in PSS/E files :

- 765kV Vindhyachal Pool - Prayagraj D/c line (about 218kms) along with 240MVAr line reactor (switchable) at Prayagraj end on each ckt of 765kV Vindhyachal Pool - Prayagraj D/c line

- Bypassing of both ckts of 765kV Sasan – Vindhyachal Pool 2xS/c line at Vindhyachal Pool and connecting it with 765kV Vindhyachal Pool - Prayagraj D/c line, thus forming 765kV Sasan - Prayagraj D/c line

The above transmission schemes i.e. transmission scheme for evacuation of power from PSP plants as well as transmission scheme to resolve critical loading of 765kV Vindhyachal-Varanasi D/c line will be taken up in separate joint study meeting/ next CMETS-NR meeting for stakeholder consultation.

No other comments were received from Stakeholders on proposed scheme. Considering receipt of connectivity application of new RE generators in Sirohi & Nagaur/Merta complexes & based on discussion, following connectivity transmission scheme is agreed as part of Rajasthan REZ Ph-V (Part-1 :4 GW) scheme:

1. **Transmission system for immediate Evacuation of Power from Sirohi S/s (2GW)**
   - 5x500MVA, 400/220kV ICTs at Sirohi S/s along with associated transformer bays
   - 6 nos. 220kV line bays at Sirohi S/s for RE interconnection
   - 220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s

2. **Transmission system for immediate Evacuation of Power from Merta-II S/s (2GW*)**
   - 3x500MVA, 400/220kV ICTs at Merta-II S/s along with associated transformer bays
   - 4 nos. 220kV line bays at Merta-II S/s for RE interconnection
   - 220 kV Sectionalizer bay (1 set) along with 220 kV BC (1 No.) bay and 220 kV TBC (1 No.) bay at Merta-II S/s

3. **Transmission system for Common Evacuation of Power from Sirohi PS (2GW) & Merta-II PS (2GW*)**

a) NR-WR Inter regional corridor

- Sirohi – Mandsaur PS 765KV D/c line (~ 320kms) along with 240 MVAr switchable line reactor at Sirohi S/s end 330MVAr switchable line reactor at Mandsaur PS end for each circuit of Sirohi – Mandsaur PS 765KV D/c line

b) Western region

- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765kV D/c line

***Transmission scheme for immediate evacuation of 1GW RE from Merta-II S/s to facilitate connectivity to RE generation developers was deliberated and approved in 19th NCT meeting held on 29.04.24**

A.2 Revision of Transmission system for evacuation of power from Luhri Stage-I HEP

It was stated that Transmission system for evacuation of power from Luhri Stage-I HEP was discussed and agreed in the 8th NCT meeting held on 25.03.2022. Subsequently, in the 14th NCT meeting held on 09.06.2023, it was decided that the timeframe of the above transmission scheme would be revised to 31st August 2026. The above transmission scheme was notified in Gazette dated 02.06.2022 and RECPDCL was appointed as the BPC of the transmission scheme. The transmission scheme is currently under bidding.

During the course of bidding, the logistics issues in transportation of large size equipment was highlighted by bidders. Regarding this matter, multiple meetings were held.

Recently, in the meeting taken by Addl. Secretary (Trans), MoP on 07.06.2024 to discuss the Logistics issues in the ongoing bidding of Luhri Stage -I HEP Transmission scheme, SJVN suggested to shift the location of Nange (ISTS) Pooling Station (presently proposed at Ogli village) to a suitable location near Koldam area adjacent to National Highway (NH) in order to remove the hurdles associated with transportation of heavy equipment to the proposed location of pooling station and accordingly, SJVN would bring 220 kV dedicated line from Luhri-I & Sunni Dam to the new ISTS Pooling station near Koldam. Further, SJVN has informed that that the new location of ISTS Pooling station would be about 6-7 kms (BEE length) from Koldam HEP switchyard as per initial survey. After deliberations, it was decided to include SJVN proposal as an agenda item in the 20th NCT meeting.

CEA vide mail dated 13.06.24 to CTUIL requested to review the transmission scheme considering the change/modification proposed by SJVNL. Further, details of modified scheme along with cost estimates may kindly be furnished by 18.06.2024 as the scheme has to be deliberated in the NCT meeting on 21.06.2024.

In view of revised location of Pooling station (near Koldam), CTU vide mail dated 14.06.2024 to all stakeholders informed that the new pooling station is now proposed to be established near Koldam(about 6-7 km) instead of Nange. Due to this, the length of the 400 kV New Pooling Station-Ropar line has reduced to about 70 km (from earlier expected 120 km(approx)). This has led to the overcompensation of 400 kV New Pooling Station-Ropar line (~95%) considering 50 MVAr line reactor at Ropar end. In view of the above, CTU in their mail (14.06.24) sought stakeholders views on deletion of 50 MVAr line reactor at Ropar S/s due to reduced line length. (70 km), however, views were awaited therefore discussion was decided to be taken up in this CMETS-NR meeting.

In the meeting, PSTCL stated that due to reduction in line length, line reactor deletion at Ropar end may be required, however they will re-confirm the decision with management discussion. CTU stated that proposal is to be discussed in next NCT meeting for which they need to provide inputs to CEA by today evening. In view of that till management decision received from PSTCL end, PSTCL confirmation for deletion of line reactor in this CMETS-NR meeting shall prevail. CEA and Grid-India also agreed for deletion of 50 MVAr line reactor at Ropar end.

CTU enquired PSTCL for any provision of bus reactor at 400/220kV Ropar S/s. PSTCL stated that they have not yet planned any bus reactor at Ropar S/s due to 50MVAr proposed line reactor at Ropar end. CTU stated that PSTCL may plan bus reactors (preferably

125 MVAr) on all 400kV existing and planned STU substations incl. Ropar S/s subject to space availability as part of intra state schemes for better voltage regulation specially in winter night off peak scenario.

After deliberations, deletion of 50 MVAr line reactor at Ropar due to over compensation(~95%) was agreed in transmission scheme for evacuation of power from Luhri Stage-I HEP.

Accordingly, the proposed revised scheme for evacuation of power from Luhri Stage-I is as below:

Sl. No.	Earlier Scope of Transmission Scheme	Revised Scope of Transmission Scheme
1	Establishment of 7x105 MVA, 400/220kV **Nange GIS Pooling Station** along with 125 MVAR (420kV) Bus Reactor at Nange (GIS) PS(1-Ph units along with one spare unit) • 315MVA, 400/220kV ICT: 2 nos.(7x105 MVA including 1 spare ICT) • 400kV ICT bays: 2 nos. • 220kV ICT bays: 2 nos. • 400 kV, 125 MVAr Bus Reactor # – 1 no. • 400 kV Bus Reactor bay- 1 no. • 400 kV Line Bays- 2 nos. Future provisions: Space for • 400/220kV ICTs (315 MVA with single phase units) along with associated bays: 3 nos. • 400 kV line bays along with switchable line reactor: 3 nos. • 220 kV line bays: 10 nos. • 220kV bus sectionalizer: 1 set	Establishment of 7x105 MVA, 400/220kV **Pooling Station near Koldam** (**GIS)** along with 125 MVAR (420kV) Bus Reactor (1-Ph units along with one spare unit) • 315MVA, 400/220kV ICT: 2 nos. (7x105 MVA including 1 spare ICT) • 400kV ICT bays: 2 nos. • 220kV ICT bays: 2 nos. • 400 kV, 125 MVAr Bus Reactor # – 1 no. • 400 kV Bus Reactor bay- 1 no. • 400 kV Line Bays- 2 nos. Future provisions: Space for • 400/220kV ICTs (315 MVA with single phase units) along with associated bays: 3 nos. • 400 kV line bays along with switchable line reactor: 3 nos. • 220 kV line bays: 10 nos. • 220kV bus sectionalizer: 1 set
2	**Nange (GIS) Pooling Station** – Koldam 400 kV D/C line (Triple snowbird) (only one circuit is to be terminated at Koldam while second circuit would be connected to bypassed circuit of Koldam – Ropar/Ludhiana 400kV D/C line)**-40 km**	**Pooling Station near Koldam** (**GIS)**– Koldam (NTPC) 400 kV D/C line (Triple snowbird) (only one circuit is to be terminated at Koldam(NTPC) while second circuit would be connected to bypassed circuit of Koldam(NTPC) – Ropar/Ludhiana 400kV D/C line) **– 7 km**
3	1 no. of 400kV line bay at Koldam S/S for termination of **Nange (GIS) Pooling Station** – Koldam 400 kV line along with 125 MVAR	1 no. of 400kV line bay at Koldam S/s for termination of **Pooling Station near Koldam** (**GIS)**– Koldam(NTPC) 400 kV

Sl. No.	Earlier Scope of Transmission Scheme	Revised Scope of Transmission Scheme
	(420kV) Bus Reactor at Koldam S/s (1-Ph units along with one spare unit) • 400 kV Line Bay- 1 no. • 400 kV, 125 MVAr Bus Reactor# - 1 no. • 400 kV, 125 MVAr Bus Reactor# - 1 no. (to be terminated in existing line bay at Koldam, which would be available due to bypassing of one circuit of Koldam – Ropar/Ludhiana 400 kV D/c line at Koldam S/s)	line along with 125 MVAR (420kV) Bus Reactor at Koldam(NTPC) S/s (1-Ph units along with one spare unit) • 400 kV Line Bay- 1 no. • 400 kV, 125 MVAr Bus Reactor# - 1 no. (to be terminated in existing line bay at Koldam(NTPC), which would be available due to bypassing of one circuit of Koldam – Ropar/Ludhiana 400 kV D/c line at Koldam(NTPC) S/s)
4	Bypassing one ckt of Koldam – Ropar/Ludhiana 400kV D/C line (Triple snowbird) at Koldam and connecting it with one of the circuit of **Nange**-Koldam 400kV D/C line (Triple snowbird), thus forming **Nange**- Ropar/ Ludhiana one line (Triple snowbird)	Bypassing one ckt of Koldam(NTPC) – Ropar/Ludhiana 400kV D/C line (Triple snowbird) at Koldam(NTPC) and connecting it with one of the circuit of **Pooling Station near Koldam** (**GIS)**– Koldam(NTPC) 400kV D/c line (Triple snowbird), thus forming **Pooling Station near Koldam** – Ropar/ Ludhiana one line (Triple snowbird)
5	1x50 MVAR switchable line reactor at Ropar end of Nange-Ropar/ Ludhiana 400kV line • 400 kV, 50MVAr Line Reactor- 1 no. • 400 kV Reactor Bay- 1 no	**--- TO BE DELETED ---** **Deleted as the line length is reduced to about 70 km resulting into reactive overcompensation (~95%).**

Note:

(i) NTPC to provide space for 400 kV line bays and Bus Reactor at Koldam(NTPC) s/s.

(ii) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.

(iii) #125MVAR bus reactor at New Pooling Station and Koldam(NTPC) s/s shall consist of 3x41.67 MVAR single phase units and 1x41.67MVAR as spare unit.

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Annexure-A

List of Participants of 30th Consultation meeting for Evolving Transmission Schemes in NR held on 18.06.2024

CEA

Shri Nitin Deswal	Deputy Director

Grid India

Shri Priyam Jain	Ch. Manager
Shri Gaurav Malviya	Manager
Shri Raj Kishan	Asst. Manager

SECI

Shri R.K.Agarwal	Consultant

CTU

Shri V Thiagarajan	Sr. GM (CTU)
Shri Kashish Bhambhani	GM (CTUIL)
Shri Sandeep Kumawat	DGM (CTU)
Shri R Narendra Sathvik	Ch. Manager (CTU)
Shri Pratyush Singh	Ch. Manager (CTU)
Shri Yatin Sharma	Manager (CTU)
Shri Anupam Kumar	Manager (CTU)
Shri Madhusudan Meena	Engineer (CTU)

Powergrid	
Shri Rohit Kumar Jain	DGM
HVPNL	
Shri Sanjay Verma	SE Planning
RVPNL	
Shri Dr. Om Prakash Mahela	XEN(PP&D)
PSTCL	
Smt. Ranjana	AEN
UPPTCL	
Shri. Satendra Kumar	SE
PTCUL	
Shri. Ashok Kumar	EE
Shri Lalit Kumar	SE

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

1. Schemes proposed for:

a) Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)
b) Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)
c) Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

S.No	Transmission Scheme	RE Potential	Status
A	**Under Bidding/ Approved**		
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW) Bikaner-II : 3.7GW Bikaner-III: 4GW	Awarded
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	5.5GW (Solar) Fatehgarh-IV: 4 GW Barmer-I: 1.5 GW	Under Bidding
3	Rajasthan REZ Ph-IV (Part-3 :6GW) (Bikaner Complex)	6 GW (Solar) Bikaner-IV:6GW	Under Bidding (Recently approved in NCT
B	**Planned/Under Planning**		
1	Rajasthan REZ Ph-IV (Part-4 :3.5GW) (Jaisalmer/Barmer Complex)	3.5 GW (Solar) Fatehgarh-IV: 1 GW Barmer-I: 2.5 GW	**Recently approved in NCT**
2	Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)	6 GW (Solar) Barmer-II : 6GW	**Timeframe : 2029 (HVDC)**
3	Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)	6 GW (Solar) Bhadla-IV: 2 GW Bikaner-V: 4 GW*	
4	**Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)**	**4 GW (Solar)** **Sirohi: 2 GW** **Nagaur: 2 GW**	**Present proposal** **Timeframe : 2027 (EHVAC)**

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

2. Inputs on AC Scheme proposed for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

Proposed System (Timeframe – 2027):

- 5x500MVA, 400/220kV ICTs at Sirohi S/s along with transformer bays
- Sirohi – Mandsaur PS 765KV D/c line (~ 320 kms) along with 330 MVAr switchable line reactor for each circuit at each end of Sirohi – Mandsaur PS 765KV D/c line
- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765kV D/c line

a) Load-Generation Balance and IR Flows

S. No.	Region	Load (MW)	Generation (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)
1	NR	78239	109488	31249	97898	59664
2	WR	98877	92846	-6030	89547	72184
3	SR	78984	94860	15876	80864	62000
4	ER	29496	14828	-14668	37265	20000
5	NER	2941	2654	-287	4855	2000
6	All India	288536	314676	x	277201	216185

S. No.	State	Load (MW)	Generation (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)
1	Rajasthan	19376	81119	31249	21175	17000

i. Demand considered at all India level as well as in some of the regions in Feb 2027 period is even more than the peak demand of the year 2026-27 as per 20th EPS report.

ii. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in NR, WR, ER, and at all India level is on the higher side. Same may be reviewed.

iii. Solar and Thermal Generation

- ~190000 MW solar generation considered in service at all India level
- ~62000 MW solar generation is in service in Rajasthan

- ~22000 MW RE generation in Khavda complex has been considered in the case

- Thermal generation has been uniformly backed down to 55% (especially in NR and WR) at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level.

- Some of the thermal generating stations (like Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

- Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

iv. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

v. There is significant amount of power flow towards eastern region during solar hours resulting in very high loading and low voltages in the ER grid. It is suggested that system augmentation in ER may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

The details of N-1 non-compliance, high line loading, and low voltages are provided in subsequent sections.

b) Network Loadings

i. With the proposed scheme, there is improvement in loading of 400 kV RAPP – Shujalpur D/C.

ii. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.)

iii. In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)

iv. Critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal is already observed in real-time during solar hours. These elements are severely loaded in the base case also (2027 timeframe).

Details of Lines and ICTs loaded around/more than the N-1 loading limit in NR, WR & ER are given in **Annexure – 1.**

v. 765 kV Ghiror – Aligarh is completely off-loaded (5 MW loading in each ckt)

vi. 765 kV Aligarh – G.Noida touches 2800 MW (Scenario – 7) & 3400 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur

vii. Angular difference between 765 kV Bikaner and 765 kV Moga touches 26° under N-1

viii. RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

ix. Angular Separation:

Scenario	765 kV Sirohi – Mandsaur D/C Line	765 kV Sirohi – Risabhdeo D/C	765 kV Neemuch – Khandwa D/C
Base Case	14.4° (1746 MW)	9.5° (1744 MW)	7.3° (1230 MW)
Under N-1 Contingency	17.5° (2100 MW)	12.4° (2254 MW)	9.3° (1581 MW)
Under N-1-1 Contingency	22.3°	17.9°	13.2°

c) Voltages

i. Very low voltages have been experienced at various nodes in the system including in NR RE Complex.

ii. The voltages under N-1 condition (depleted network conditions) will further dip.

765 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
SIWANI	765	147880	0.94	719
NORTH CHN	765	548008	0.95	730
NCTPS-STG3	765	548013	0.95	730
MADHUGIRI	765	528001	0.95	730
ETPSREP7	765	548124	0.95	730
TIRUVLM	765	548087	0.95	730
ARIYALUR7	765	548127	0.95	730
BIKANER-IV	765	167000	0.96	736
MOGA-PG	765	137703	0.96	738
SIKAR	765	167497	0.97	740
BHADLA-2	765	167498	0.97	743

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
BIKANER-NW	765	167458	0.97	745
NARELA	765	157001	0.97	745
KHETRI	765	167774	0.97	746
MUL	765	358129	0.97	746
JHATI-PG	765	157708	0.98	746
KURAWAR-7	765	368086	0.98	747
KURN4_7	765	508887	0.98	747
KURNOOL-III	765	508049	0.98	748
MAHESHWARAM	765	518051	0.98	749
BHIWN-PG	765	147704	0.98	749

400 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
YELAHNKA	400	524084	0.93	373
DHANLLI	400	524025	0.93	374
JEY-BOL_FSC	400	424005	0.94	374
HDURGA	400	524102	0.94	374
PEENYA4	400	524169	0.94	374
MYSORE4	400	524010	0.94	374
NELMANG4	400	524007	0.94	375
BIDADI	400	524077	0.94	375
PULNTOPE4	400	544125	0.94	375
MANALI4	400	544040	0.94	376
KORATUR4	400	544035	0.94	376
THERVOI4	400	544126	0.94	376
HOODI4	400	524005	0.94	377
SMNH	400	524001	0.94	377
TARAMANI4	400	544015	0.94	377
MYLSNDRA	400	524035	0.94	377
MADHUGI4	400	524098	0.94	377
KADAKOLA	400	524106	0.94	377
GUINDY4	400	544133	0.94	378
KOYAMBEDU4	400	544019	0.95	378
SHOLNGNR	400	544091	0.95	378
MUL	400	354129	0.95	378
FSC-4	400	504999	0.95	379
FSC-3	400	504998	0.95	379
SIWANI	400	144880	0.95	379
DOMSANDRA	400	524171	0.95	379
MALEKTT	400	544086	0.95	379
SVCHTRM	400	544090	0.95	379
SPBUDUR4	400	544002	0.95	379
ALMATI4	400	544022	0.95	380
CHENN-EX	400	544000	0.95	380

d) Short Circuit Ratio

Bus/Station	Connected RE Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Sirohi	2000 MW	8418 MVA	**4.2**
220 kV Merta – II	1000 MW	5734 MVA	5.7
400 kV Merta - II	1000 MW	20226 MVA	20.2

e) Dynamic Simulation Studies – With more than 62,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

f) Study cases for other scenarios – The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

3. Inputs on proposed Transmission Schemes for:

3.1: Rajasthan REZ Ph-IV (Part-5: 6GW) (Barmer Complex)
3.2: Rajasthan REZ Ph-IV (Part-6: 6GW) (Bhadla/Bikaner Complex)

Proposed Transmission scheme for Rajasthan REZ Ph-IV (Part-5: 6GW) (Barmer Complex) - (Timeframe – 2029)

- Establishment of 400/220kV, 6x500MVA S/s at suitable location near Barmer (Barmer-II Substation) along with 2x125 MVAr bus reactor
- LILO of both ckts of 400kV Fatehgarh-IV PS - Barmer-I PS at Barmer-II PS
- Establishment of 6000 MW, ± 800 kV Barmer-II (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near Barmer-II substation
- Establishment of 6000 MW, ± 800 kV South Kalamb S/s (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near South of Kalamb
- Establishment 2x1500MVA, 765/400kV Substation near South of Kalamb with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor
- LILO of Pune-III – Boisar-II 765kV D/c line at South Kalamb with associated bays at South Kalamb S/s
- ±800 kV HVDC line between Barmer-II (HVDC) & South Kalamb (HVDC) (with Dedicated Metallic Return) (1000kms)

Proposed Transmission scheme for Rajasthan REZ Ph-IV (Part-6: 6GW) (Bhadla/Bikaner Complex) - (Timeframe – 2029)

- Establishment of 765/400kV, 4x1500 MVA S/s & 400/220kV, 2x500MVA pooling station at suitable location near Bikaner (Bikaner-V PS)
- LILO of both ckts of 400kV Bikaner-II PS- Khetri D/c line at Bikaner-V PS (20km)
- Establishment of 765/400kV, 3x1500 MVA S/s & 400/220kV 3x500MVA pooling station at suitable location near Bhadla (Bhadla-IV PS) along with 2x125 MVAr & 2x240 MVAr bus reactor
- Bhadla-IV PS – Bikaner-V 765KV D/c line (~ 150kms) along with 240 MVAr switchable line reactor
- for each circuit at Bhadla-IV PS end of Bhadla-IV PS – Bikaner-V PS 765kV D/c line
- Bhadla-IV PS – Bhadla-III PS 400kV D/c line (Quad) (~30kms)

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

- Establishment of 6000 MW, ± 800 kV Bikaner-V (HVDC) [LCC] terminal station (4x1500 MW) at suitable location near Bikaner

- Establishment of 6000 MW, ±800 kV Begunia (HVDC) [LCC] terminal station (4x1500 MW) at
- Begunia (Distt. Khordha), Orissa

- ±800 kV HVDC line between Bikaner-V (HVDC) & Begunia (HVDC) (with Dedicated Metallic
- Return) - 1900 km

- Establishment of 765/400kV, 5x1500 MVA S/s substation station at Begunia along with 2x125
- MVAr & 2x240 MVAr bus reactor

- Begunia - Paradeep (ISTS)* 765kV D/c line along with associated bays at both ends

- Begunia – Gopalpur (ISTS)# 765kV D/c line along with associated bays at both ends (150km)
- along wih 240MVAr switchable line reactor for each circuit at Begunia end of Begunia –Gopalpur
- (ISTS) 765kV D/c line

- Begunia – Khuntuni (OPTCL)@ 765kV D/c line

a) Load-Generation Balance

S. No.	Region	Load	Generation	IR Exchange	20th EPS Peak Load in 2028-29	Average Demand Met in Solar Hours in Feb 2024
1	NR	85756	129923	44167	109714	59664
2	WR	109083	107587	-1496	100246	72184
3	SR	81317	103944	22627	91285	62000
4	ER	43981	19628	-24352	42546	20000
5	NER	2869	2655	-214	5481	2000
6	All India	323005	363737	x	313098	216185

S. No.	State	Load	Generation	IR Exchange	20th EPS Peak Load in 2028-29	Average Demand Met in Solar Hours in Feb 2024
1	Rajasthan	21377	96462	75086	23590	17000
2	Odisha	21379	8599	-12780	8514	4300

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

i. Demand considered at all India level as well as in some of the regions in Feb 2029 period is even more than the peak demand of the year 2028-29 as per 20th EPS report.

ii. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in WR, ER, and at all India level is on the higher side. Same may be reviewed.

iii. In the 20th EPS report, following is also mentioned:

"Factors like reduction in transmission & distribution losses, energy efficiency improvement measures, ***production of green hydrogen, penetration of electric vehicles****, roof-top solar, solar pumps etc. have appropriately been factored in the electricity demand forecast."*

Therefore, the increase in demand due to green hydrogen load has already been captured in the 20th EPS figures.

iv. Solar and Thermal Generation

- ~225408 MW solar generation considered in service at all India level
- ~89510 MW solar generation is in service in Rajasthan
- ~42000 MW solar generation in Gujarat and ~24500 MW Khavda complex has been considered in the case

- Thermal generation has been uniformly (especially in NR and WR) backed down to 55% at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level.

- Some of the thermal generating stations (like Chandrapur, Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

- Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

v. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2028-29, preferably the one coming out of production cost modelling studies.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

b) Network Loading

i. Barmer II – South Kalamb HVDC Link

- N-1 criteria is not satisfied for 400/220 kV ICTs at Barmer – II: 3000 MVA Transformation capacity for 3000 MW RE generation
- No filter arrangement modelled at HVDC terminal at Barmer - II
- On the outage of a 3000 MW Bipole of HVDC Barmer – II – South Kalamb, the loading of 765/400 kV ICTs at Barmer – I is seen to be N-1 non-compliant
- Three bus sections have been created at 400 kV Muradabad/South Kalamb station. Following issues are observed in the base case.
    - 2x1500 MVA ICTs at Section – 3 are loaded up to N-1 limit. Loading after N-1: 1490 MVA (Scenario – 4) & 1460 MVA (Scenario – 7).
- On the outage of a 1500 MW monopole of HVDC Barmer – II – South Kalamb, the loading of lines and ICTs around Barmer – II is seen to be N-1 compliant

ii. Bikaner V – Begunia HVDC Link

- N-1 compliance not satisfied for 400/220 kV ICTs at Bikaner – V: 2000 MVA Transformation capacity for 2000 MW RE generation
- STATCOM with 9999 MVA capacity connected to Bikaner – V station as filter arrangement
- On the outage of a 1500 MW monopole or 3000 MW Bipole of HVDC Bikaner – V – Begunia, the loading of lines and ICTs around Bikaner – V/Bhadla - IV is seen to be N-1 compliant
- 765/400 kV ICTs at Gopalpur are loaded up to the full rating and are N-1 non-compliant in the base case itself for the considered bulk load

iii. Highly Loaded Lines/ICTs

- Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota - PG).
- In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)
- Presently, critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal are already observed in real-time. These elements are severely loaded in the base case also (2028-29 timeframe).

Details of Lines and ICTs loaded around/more than the N-1 loading limit in NR, WR & ER are given in Annexure – 2.

iv. Other Comments

- 765 kV Narela ISTS – Meerut loaded beyond 2600 MW in base case. Loading exceeds 3100 MW under the outage of 765 kV Moga – Meerut etc.
- 765 kV Aligarh – G.Noida touches 3200 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur.
- RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

c) Voltages

i. Very low voltages have been experienced at various nodes in the system including in NR RE complex and ER load centres.
ii. The voltages under N-1 condition (depleted network conditions) will further dip.
iii. No reactive power consumption considered for bulk loads considered at Paradeep & Goplapur station.
   a. With 0.95 lag power factor voltages of 400 kV Gopalpur, 400 kV Paradeep – ISTS and STU stations go below 0.9 pu in steady state. 765 kV level voltage of Paradeep – ISTS & Goplapur – ISTS go below 710 kV. ***This is the case when a dynamic FACTS device of the capacity of 9999 MVA is connected at Begunia – HVDC as filter arrangement.***
   b. ***When a 50% fixed shunt is connected at 400 kV Begunia HVDC (in place of 9999 MVA STATCOM) and with 0.95 pf operation of bulk loads at Paradeep and Gopalpur, voltage collapse is seen in the complex.***

765 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
MANGALORE	765	528045	0.95	729
BARMER1	765	167883	0.96	738
SIROHI	765	167492	0.97	742
LALITPUR	765	177710	0.97	742
TALBEHAT	765	177715	0.97	744
TUTICORIN	765	548098	0.97	746
PARADEEP	765	428017	0.98	746
KISHENPUR	765	117706	0.98	748
GOPALPUR	765	428020	0.98	748
DUBURI_765	765	428024	0.98	748
FATEHG-4	765	167482	0.98	750

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

400 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
BARMER-II	400	164885	0.94	378
MANGALORE	400	524045	0.94	375
TUTICORIN	400	544098	0.95	382
JEY-BOL_FSC	400	424005	0.93	374
MUL	400	354129	0.95	381

d) Short Circuit Ratio (SCR)

Bus/Station	Connected RE/LCC HVDC Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Barmer - II	3000 MW RE	11906 MVA	**3.96**
400 kV Barmer - II	6000 MW RE + 6000 MW LCC HVDC	23606 MVA	**3.93** **1.97*** (*Considering the requirement of system strength for both LCC HVDC and RE plant)
220 kV Bikaner - V	2000 MW RE	9470 MVA	**4.7**
400 kV Bikaner – V	4000 MW RE + 6000 MW LCC HVDC	23152 MVA	5.7 **2.3*** (*Considering the requirement of system strength for both LCC HVDC and RE plant)
220 kV Bhadla - IV	1000 MW RE	7956 MVA	7.9
400 kV Bhadla - IV	2000 MW RE	23586 MVA	11.8
400 kV Begunia HVDC	6000 MW LCC HVDC	27867 MVA	4.5

e) HVDC Schemes

02 nos. 6000 MW LCC based HVDCs have been proposed for evacuation of bulk power from Rajasthan.

±800 kV, 6000 MW HVDC Barmer-II - South Kalamb – 1000 kMs
±800 kV, 6000 MW HVDC Bikaner-V - Begunia – 1900 kMs

i. The rationale for terminating these HVDCs in WR (Maharashtra) and ER (Odisha) may be provided.

Further, as highlighted in section (a) on Load-Generation Balance, the LGB of the case is subject to change with the proposed corrections which may lead to requirement of new transmission lines in other locations than the one currently proposed.

The production cost modelling studies duly factor in the RRO targets for each states, RE integration targets, flexibility requirements, merit order etc. Therefore, it is suggested that the study scenario may be finalized based on the output of the production cost modelling studies for the same timeframe. This LGB will itself indicate the paths/corridors along with the system augmentation is required.

ii. The overload capability and reverse power capability of both the HVDCs has not been defined and kept open. As HVDC are planned for bulk evacuation of RE power, the outage of single or both poles of the HVDC may lead to curtailment in RE generation. This curtailment may be avoided/minimized by specifying the continuous and transient **ambient temperature-based overload capability** for the proposed HVDCs.

Similar reverse power capability may also be specified for the proposed HVDCs.

iii. With the proposed HVDCs, there will 03 nos. 6000 MW HVDC terminals in Rajasthan in close vicinity. The system strength of the Rajasthan RE complex is already on the lower side. With a large number of power electronic controllers (RE + HVDCs) in close proximity, there is a very high probability of controller interactions in the complex. Such interactions are already being observed in the Rajasthan RE complex with ~20 GW of RE capacity at present.

It is suggested that controller interaction studies (screening and if required detailed) may be carried out (using generic models for future capacities) to identify the potential interaction issues in the complex.

iv. The feature of power oscillation damping is also important for LCC based HVDC and shall be suitably added in specifications. The provision of tuning of POD based on measurement data may also be specified.

v. At least one VSC based HVDC may be planned in the complex keeping in view the black start requirements. The VSC based HVDC would also provide steady state and dynamic reactive power support.

vi. Filter sizing becomes important with low SCR at converter stations. Keeping in view the low SCR/fault level, it is proposed that the filter sizing shall be granular to avoid wide voltage variations during switching.

f) Name of New Substations – It is requested to assign unique name for envisaged RE pooling stations. As several pooling substations with identical names but different numerical suffixes have been planned in the same district along with multiple

interconnections, there is a chance of miscommunication during real-time operation among multiple constituents. For clarity of operation and ensuring that names of different substations are easily distinguished from each other, it is suggested that after finalization of the exact location, the ISTS substations are uniquely named as per the geographical name of the nearest location like village or taluk.

g) **Dynamic Simulation Studies –** With more than 89,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

h) **Study cases for other scenarios –** The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Annexure - 1

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MVA	RATING IN MVA	PERCENT LOADING
199	TARAPR-3&4	21	374017	TAPS4	400.00*	1	417.3	635	65.7
199	TARAPR-3&4	21	374017	TAPS4	400.00*	2	417.4	635	65.7
12944	KANDAL	400.00*	26456	CHIMANGAON13	132	1	79.9	111	72
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	1	331.4	315	105.2
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	2	331.4	315	105.2
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	3	331.4	315	105.2
162093	DEEDWANA-42	220	164415	DEEDWANA	400.00*	1	235.5	315	74.8
162093	DEEDWANA-42	220	164415	DEEDWANA	400.00*	2	235.5	315	74.8
162207	HINDAU-4	220	164409	HINDAU-4	400.00*	1	326	315	103.5
162207	HINDAU-4	220	164409	HINDAU-4	400.00*	2	326	315	103.5
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	1	288.9	315	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	2	229.3	250	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	3	229.3	250	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	4	229.3	250	91.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	1	292.1	315	92.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	2	292.1	315	92.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	3	292.1	315	92.7
162271	CHABRA-2	220	164411	CHABRA-4	400.00*	1	253.2	315	80.4
162283	BASSI	220	164431	BASSI	400.00*	1	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	2	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	3	403.6	500	80.7
162300	KALISIND	220	164412	KALISI-4	400.00*	2	566.8	500	113.4
162329	AJMER42	220	164416	AJMER	400.00*	1	243.6	315	77.3
162329	AJMER42	220	164416	AJMER	400.00*	2	243.6	315	77.3
162914	BHINM-PG	220	164405	BHINMAL	400.00*	1	806.4	945	85.3
162919	KOTA	220.00*	164420	KOTA	400	1	310.3	315	98.5
162919	KOTA	220.00*	164420	KOTA	400	2	310.3	315	98.5
164404	BHADLA	400.00*	164456	BIKANE-4	400	1	1146.4	1714	66.9
164404	BHADLA	400.00*	164456	BIKANE-4	400	2	1146.4	1714	66.9
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	1	665.7	857	77.7
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	2	665.7	857	77.7
164429	CHIT-NEW	400	164492	SIROHI	400.00*	1	656.6	850	77.2
164429	CHIT-NEW	400	164492	SIROHI	400.00*	2	656.6	850	77.2
174445	MUZAFRN4	400	174905	MEERUT	400.00*	1	580.6	857	67.8
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	1	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	2	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	3	226.8	315	72
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	1	208	315	66
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	2	158.4	240	66
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	1	347.3	500	69.5
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	2	347.3	500	69.5
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	3	347.2	500	69.4

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MVA	RATING IN MVA	PERCENT LOADING
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	1	230	315	73
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	2	230	315	73
354022	HAZIRA4	400.00*	354290	SOUTH OLPAD	400	1	964.7	857	112.6
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	2	987.7	1500	65.8
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	3	987.7	1500	65.8
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	1	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	2	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	3	70.4	100	70.4
362003	INDORE-42	220	364001	INDORE-4	400.00*	1	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	2	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	3	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	4	262.3	315	83.3
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	1	262.1	315	83.2
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	2	262.1	315	83.2
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	1	440.3	500	88.1
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	2	440.3	500	88.1
364023	INDORE-74	400.00*	368023	INDORE-7	765	2	1506	1500	100.4
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	1	267.3	315	84.9
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	2	267.3	315	84.9
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	1	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	2	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	3	330	500	66
374008	DHULE4	400.00*	374011	BABLESWAR	400	2	668.7	857	78
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	1	943.9	852	110.8
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	2	943.9	852	110.8
442012	KTPS220	220	444012	KOLAGHAT	400.00*	1	281	315	89.2
442012	KTPS220	220	444012	KOLAGHAT	400.00*	2	281	315	89.2
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	1	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	2	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	3	283.5	315	90
442685	JEERAT	220	444008	JEERAT	400.00*	1	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	2	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	3	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	4	242.9	315	77.1
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	1	657.5	850	77.3
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	2	657.5	850	77.3
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	1	881.1	1093	80.6
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	2	881.1	1093	80.6
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	1	379.2	500	75.8
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	2	379.2	500	75.8
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	1	237.4	315	75.4
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	2	237.4	315	75.4

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Annexure – 2

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MW	RATING IN MVA	PERCENT LOADING
199	TARAPR-3&4	21	374017	TAPS4	400.00*	1	417.3	635	65.7
199	TARAPR-3&4	21	374017	TAPS4	400.00*	2	417.4	635	65.7
12944	KANDAL	400.00*	26456	CHIMANGAON13	132	1	79.9	111	72
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**1**	**331.4**	**315**	**105.2**
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**2**	**331.4**	**315**	**105.2**
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**3**	**331.4**	**315**	**105.2**
162093	**DEEDWANA-42**	**220**	**164415**	**DEEDWANA**	**400.00***	**1**	**235.5**	**315**	**74.8**
162093	**DEEDWANA-42**	**220**	**164415**	**DEEDWANA**	**400.00***	**2**	**235.5**	**315**	**74.8**
162207	**HINDAU-4**	**220**	**164409**	**HINDAU-4**	**400.00***	**1**	**326**	**315**	**103.5**
162207	**HINDAU-4**	**220**	**164409**	**HINDAU-4**	**400.00***	**2**	**326**	**315**	**103.5**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**1**	**288.9**	**315**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**2**	**229.3**	**250**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**3**	**229.3**	**250**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**4**	**229.3**	**250**	**91.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**1**	**292.1**	**315**	**92.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**2**	**292.1**	**315**	**92.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**3**	**292.1**	**315**	**92.7**
162271	CHABRA-2	220	164411	CHABRA-4	400.00*	1	253.2	315	80.4
162283	BASSI	220	164431	BASSI	400.00*	1	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	2	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	3	403.6	500	80.7
162300	**KALISIND**	**220**	**164412**	**KALISI-4**	**400.00***	**2**	**566.8**	**500**	**113.4**
162329	AJMER42	220	164416	AJMER	400.00*	1	243.6	315	77.3
162329	AJMER42	220	164416	AJMER	400.00*	2	243.6	315	77.3
162914	**BHINM-PG**	**220**	**164405**	**BHINMAL**	**400.00***	**1**	**806.4**	**945**	**85.3**
162919	**KOTA**	**220.00***	**164420**	**KOTA**	**400**	**1**	**310.3**	**315**	**98.5**
162919	**KOTA**	**220.00***	**164420**	**KOTA**	**400**	**2**	**310.3**	**315**	**98.5**
164404	BHADLA	400.00*	164456	BIKANE-4	400	1	1146.4	1714	66.9
164404	BHADLA	400.00*	164456	BIKANE-4	400	2	1146.4	1714	66.9
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	1	665.7	857	77.7
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	2	665.7	857	77.7
164429	CHIT-NEW	400	164492	SIROHI	400.00*	1	656.6	850	77.2
164429	CHIT-NEW	400	164492	SIROHI	400.00*	2	656.6	850	77.2
174445	MUZAFRN4	400	174905	MEERUT	400.00*	1	580.6	857	67.8
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	1	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	2	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	3	226.8	315	72
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	1	208	315	66
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	2	158.4	240	66
352022	**HAZIRA2**	**220**	**354022**	**HAZIRA4**	**400.00***	**1**	**347.3**	**500**	**69.5**
352022	**HAZIRA2**	**220**	**354022**	**HAZIRA4**	**400.00***	**2**	**347.3**	**500**	**69.5**

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MW	RATING IN MVA	PERCENT LOADING
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	3	347.2	500	69.4
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	1	230	315	73
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	2	230	315	73
354022	HAZIRA4	400.00*	354290	SOUTH OLPAD	400	1	964.7	857	112.6
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	2	987.7	1500	65.8
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	3	987.7	1500	65.8
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	1	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	2	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	3	70.4	100	70.4
362003	INDORE-42	220	364001	INDORE-4	400.00*	1	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	2	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	3	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	4	262.3	315	83.3
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	1	262.1	315	83.2
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	2	262.1	315	83.2
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	1	440.3	500	88.1
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	2	440.3	500	88.1
364023	INDORE-74	400.00*	368023	INDORE-7	765	2	1506	1500	100.4
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	1	267.3	315	84.9
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	2	267.3	315	84.9
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	1	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	2	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	3	330	500	66
374008	DHULE4	400.00*	374011	BABLESWAR	400	2	668.7	857	78
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	1	943.9	852	110.8
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	2	943.9	852	110.8
442012	KTPS220	220	444012	KOLAGHAT	400.00*	1	281	315	89.2
442012	KTPS220	220	444012	KOLAGHAT	400.00*	2	281	315	89.2
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	1	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	2	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	3	283.5	315	90
442685	JEERAT	220	444008	JEERAT	400.00*	1	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	2	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	3	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	4	242.9	315	77.1
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	1	657.5	850	77.3
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	2	657.5	850	77.3
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	1	881.1	1093	80.6
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	2	881.1	1093	80.6
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	1	379.2	500	75.8
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	2	379.2	500	75.8
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	1	237.4	315	75.4
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	2	237.4	315	75.4

NRLDC Inputs on Joint study meeting for Transmission system for evacuation of RE power from Rajasthan (REZ Ph-V (Part-1 : 4 GW), REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW))

SCENARIO 2028-2029

1. SCR of following Station are below 5 considering Xsource of IBRs as 999pu :

Bus	Name	Generation connected	Fault MVA	SCR
163482	[FATEHG4-SPL	3480	12172.67	3.50
162885	[BARMER-II HV	3000	11803.85	3.93
162883	[BARMER-I	4000	16338.1	4.08
162495	[BIKANER-2	4460	18780.77	4.21
162399	[ESSEL	750	3174.92	4.23
162492	[SIROHI	2000	9235.59	4.62
162002	[BIKANER-V	2000	9805.4	4.90

- *HVDC Barmer-II – South Kalamb(1000km), HVDC Bikaner-V – Begunia (1900km) are proposed as a LCC. Low SCR at Barmer-II and Bikaner-V may not be suitable for LCC HVDC. Either additional connectivity/Synchronous Condensor may be thought of in above station to improve SCR (minimum 5) or VSC HVDC in place of LCC HVDC may be considered.*

2. Buses with high angular difference >20 degree under N-0/N-1

From	To	Ang. Diff (N-0)	Ang. Diff (N-1)
164774 Khetri	164495 Bikaner-2	23	25
164404 Bhadla	164456 Bikaner-4	19	24.2
167497 Sikar New	167484 Bhadla-3	16.8	21.2
167458 Bikaner-NW	137703 Moga	20.2	25
164404 Bhadla	164400 Merta	22.2	25.5
167080 NeemR(NEW)	167505 Bikaner-3	18.3	22.2

- *As per CEA TPC 3.14.12, Stability studies may be carried out for the above lines.*

3. Many thermal plants are observed to be **switched off during Solar time** and **Switched on (close to rated IC) during evening hours**. The philosophy may be reviewed/confirmed else sufficient BESS/Energy storage capacity may be thought off to absorb the excess RE generation during day time. Some plants in NR are listed below:

Plant/Unit (MW)	Solar Peak(MW)	Evening peak(MW)
Kalisindh (2 X 600)	0	1020
Chabra SC Unit# 6 (660)	0	560
Kanpur Unit #1 (600)	0	560
Lalitpur (3 X 660)	0	1120
Ghatampur Unit#3 (660)	0	560
Obra Unit#3,4,5 (600)	0	540
Unchahar Unit#4,5 (420)	0	170
Ropar Unit#2,3,4 (630)	0	540

4. Approx 4000 MW Solar generation in Rajasthan State control area is not being dispatched in solar peak case. Rajasthan solar dispatched is ~8000 WM against ~12000MW Installed intrastate Solar capacity in Basecase.
5. No of ICTs at 164505 Bikaner-3 may be checked: 1 X 6000MVA + 5 X 1500 MVA

NRLDC Inputs on Joint study meeting for Transmission system for evacuation of RE power from Rajasthan (REZ Ph-V (Part-1 : 4 GW), REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW))

6. Giral plant is observed to be running. May be rectified.

7. At 164001 Bikaner-V, STATCOM is considered in service with Shunt Max capacity of 9999 MVA and Bridge Max capacity of 9999 MW. After taking out the STATCOM, voltage is dipping from 400 kV to 378kV.

Grid-India (NLDC/NRLDC) observations on Joint study meeting held on 09.05.24 to deliberate & finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex

1. Demand considered at all India level as well as in some of the regions in Feb 2027 period is even more than the peak demand of the year 2026-27 as per 20th EPS report. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in NR, WR, ER, and at all India level is on the higher side. Same may be reviewed.

CTU reply :

S.No	Region	Demand considered in PSSE files (GW)	Peak demand in Feb'24 (in Winter Solar peak hours) (GW)	Anticipated Peak demand in Feb'27 (in Winter Solar peak hours) (@7% CAGR) (GW)	Demand considered in Revised PSSE files (in Winter Solar peak hours) (GW)
1	NR	78.2	63.8	78.2	79.5
2	WR	98.8 (Considering additional load of GH/BKC-8.2GW)	73.3	89.8	99.8 (Considering additional load of GH/BKC-8.2GW)
3	ER	29.5 (considering additional load of GH-3GW, BKC:0.3GW)	22.1	27.1	29.6 (considering additional load of GH/BKC-3.3GW)
	All India	288.5	220.7	270.3	291.7 (considering additional load of GH/BKC -13GW)

**** GH – Green Hydrogen, BKC – Bulk Consumer***

From the historical data (Feb'23 to Feb'24) analysis, load growth of about 7 % is observed in winter solar peak hours in All India & most of the regions. Based on extrapolation of above load growth, expected load of Feb'27 (in winter solar peak hours) is indicated on the table above which is considered in PSS/E file. Further additional demand from Green Hydrogen, Bulk consumer is also considered the studies (included in total demand figure).

- Green hydrogen / Bulk loads considered in ER are as under
  - 1500MW: Paradeep,
  - 1500MW: Gopalpur,
  - 180MW: Vedanta & 100MW: IPCL
- Major Bulk loads/ Green hydrogen considered in WR are as under
  - 4500MW: MUL Gujarat (including 1500MW Green Hydrogen)
  - 3700MW: Jamnagar/Jam Khambaliya Complex

2. Thermal generation has been uniformly backed down to 55% (especially in NR and WR) at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level. some of the thermal generating stations (like Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

CTU reply – In revised files, merit order dispatch is being followed up to an extent and incorporated in revised PSS/E files. Dispatch of Cheaper thermal generating stations in Singrauli and Rihand complex kept higher to match LGB. .

Dispatches of major thermal generating stations of states such as Vadinar, Khaparkheda, Tiroda-APL, Chandrapur have been changed to 40%. Further, generation with very low dispatches has also been switched off.

3. Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case

CTU reply - Incorporated (all such units are now kept off)

4. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

CTU reply – Modified PSSE files are enclosed. It is observed that with above modifications in LGB, there will be no impact on the proposed transmission scheme for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex.

5. There is significant amount of power flow towards eastern region during solar hours resulting in very high loading and low voltages in the ER grid. It is suggested that system augmentation in ER may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

CTU reply - Reconductoring of 400kV Farakka – Kahalgaon & Talcher – Meramundali 400kV D/c lines in under advance stage of stakeholder consultation. Other system, if required in ISTS would be taken up on priority

6. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.

CTU reply – Most of the ICTs i.e. Deedwana, Hindaun, Heerapura, Chittorgarh are getting overloaded in planning studies due to the increase in load of Rajasthan. Some of the ICTs are even critically loaded in present time frame and issue of high loading is deliberated in various OCC/NRPC meetings. In above meetings, RVPN is already requested to carry out 400/220kV ICT augmentation works or feeder reconfiguration to relive ICT loadings.

Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand.

Above ICT loading will be reviewed in consultation with NRLDC w.r.t real time loading and Grid-India operational feedback report and necessary augmentation will be carried out in ISTS, if required, as per the present practice.

7. In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)

CTU reply – In Jamnagar Complex, applications from bulk consumer to the tune of about 1800MW has been received, whereas in PSSE file load of 3700MW has been considered. Accordingly, ICT augmentation would be taken up with receipt of further applications.

Augmentation of Transformation capacity at 765/400kV Indore S/s by 1x1500MVA ICT (3rd) [terminated on 400kV Bus section A with Indore & Khandwa 400kV D/c lines] has been agreed in CMETS-WR & is presently under implementation. On other section, under contingency of any line, sectionaliser can be closed to reduce loading on 765/400kV ICT. To resolve issue of overloading at Mandsaur,1X500MVA,400/220kV ICT (3rd) at Mandsaur S/s has been planned & is being implemented by MPPTCL. Establishment of 400/220kV Hazira-II (GIS) S/s through Installation of 1x500MVA, 400/220kV ICT has been agreed for drawl of power at Hazira in WR-CMETS meeting to reduce overloading on Hazira S/s. ICT augmentation or shifting of proposed Data Centres load at Navi Mumbai is being taken up with MSETCL.

8. Critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal is already observed in real-time during solar hours. These elements are severely loaded in the base case also (2027 timeframe)

CTU reply – Reconductoring of 400kV Farakka – Kahalgaon D/c line in under active stages of discussion.

New generation are expected in Purulia area viz. Raghunathpur (2x660MW) and DTPS-Waria (1x800MW). With this, the loading on Ranchi – New Purulia is expected to be relieved. Nevertheless, analysis of loading on Ranchi – New Purulia 400kV D/c line would be taken up for discussion in future.

9. 765 kV Ghiror – Aligarh is completely off-loaded (5 MW loading in each ckt)

CTU reply - 765 kV Ghiror – Aligarh D/c line is formed through LILO of existing 765V Aligarh-Orai D/c line at Ghiror S/s for optimal utilization of above line in solar maximized scenario. It is to be mention that 765kV Ghiror and Aligarh both are the major substations for dispersal of RE power towards load centers in UP. In view of huge RE injection each at 765kV Aligarh & 765kV Ghiror S/s, 765 kV Ghiror – Aligarh line gets off-loaded. However in other than solar maximized scenario, line loading is more than loading in solar maximized scenario In future studies and schemes, efforts to be made for optimal utilization of Aligarh-Ghiror section.

10. 765 kV Aligarh – G.Noida touches 2800 MW (Scenario – 7) & 3400 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur

11. **CTU reply –** In the planning studies, maximum loading of 3500MW is considered on 765kv D/c lines in N-1 contingency in case other parameters i.e. angular separation, bus voltages are withing stipulated limit as per transmission planning criteria. In 765kV Aligarh – G.Noida line, angular separation is within limit and voltages are is in order on N-1 contingency of 765 kV Aligarh – Kanpur

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12. Angular difference between 765 kV Bikaner and 765 kV Moga touches 26° under N-1 (NLDC). Additionally, some Buses i.e. 400kV Bikaner-II – Khetri, 765kV Bhadla-III-Sikar-II, 765kV Bikaner-III-Neemrana-2 have angular difference >20 degree under N-0/N-1 (NRLDC)

    CTU reply – The loading of 765 kV Bikaner and 765 kV Moga will gradually increase in next 3 years in planning studies due to increasing RE injection at Bikaner. Stability studies shall be carried out for 765kV Bikaner-Moga D/c line and 400kV Bikaner-II – Khetri D/c line for 2027 timeframe, once dynamics file is prepared. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress.

    Angular separation of 765kV Bhadla-III-Sikar-II & 765kV Bikaner-III-Neemrana-2 is below 20 degree in N-1 contingency in 2027 timeframe files (angular separation >20 degree in N-1 contingency in 2029 timeframe files for which Stability studies shall be carried out once dynamics file is prepared)

13. RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

    CTU reply - Incorporated.

14. Very low voltages have been experienced at various nodes in the system including in NR RE Complex. ii. The voltages under N-1 condition (depleted network conditions) will further dip.

    CTU reply – In revised PSSE files most of the bus voltage are within limits of 0.97-1.03 pu on all 400kV and 765kV buses in NR considering switching on/off of bus and line reactors (switchable) wherever required.

15. Low SCR of Sirohi PS (4.2)

    CTU reply – Short circuit Ratio of 400kV and 220kV of Sirohi PS is about 8.7 and 4.2 respectively. No additional connectivity will be granted beyond 2 GW at 220kV level of Sirohi PS with proposed system (400/220kV ICTs at Sirohi PS+765kV Sirohi-Mandsaur). With growing interconnection and planned network in future, SCR at Sirohi may increase.

16. Dynamic Simulation Studies – With more than 62,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

CTU reply – Comment is pertaining to 2029 timeframe files, however dynamics file is under preparation. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress

17. Study cases for other scenarios – The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

    CTU reply – As per the comments, Scenario 8 (evening peak) & Scenario 9 (night off peak) along with revised solar maximized scenario (SC-4& 7) files is attached.

18. Giral plant is observed to be running. May be rectified (NRLDC).

    CTU reply – Giral plant is now kept off

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

1. Schemes proposed for:

a) Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

S.No	Transmission Scheme	RE Potential	Status
A	**Under Bidding/ Approved**		
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW) Bikaner-II : 3.7GW Bikaner-III: 4GW	Awarded
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	5.5GW (Solar) Fatehgarh-IV: 4 GW Barmer-I: 1.5 GW	Under Bidding
3	Rajasthan REZ Ph-IV (Part-3 :6GW) (Bikaner Complex)	6 GW (Solar) Bikaner-IV:6GW	Under Bidding (Recently approved in NCT
B	**Planned/Under Planning**		
1	Rajasthan REZ Ph-IV (Part-4 :3.5GW) (Jaisalmer/Barmer Complex)	3.5 GW (Solar) Fatehgarh-IV: 1 GW Barmer-I: 2.5 GW	**Recently approved in NCT**
2	Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)	6 GW (Solar) Barmer-II : 6GW	**Timeframe : 2029 (HVDC)**
3	Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)	6 GW (Solar) Bhadla-IV: 2 GW Bikaner-V: 4 GW*	
4	**Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)**	**4 GW (Solar)** **Sirohi: 2 GW** **Nagaur: 2 GW**	**Present proposal** **Timeframe : 2027 (EHVAC)**

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

2. Inputs on AC Scheme proposed for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

Proposed System (Timeframe – 2027):

- 5x500MVA, 400/220kV ICTs at Sirohi S/s along with transformer bays
- Sirohi – Mandsaur PS 765KV D/c line (~ 320 kms) along with 330 MVAr switchable line reactor for each circuit at each end of Sirohi – Mandsaur PS 765KV D/c line
- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765 kV D/c line

a) Load-Generation Balance and IR Flows (Feb 2027 scenario)

S. No.	Region	Load (MW)	Gen. (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)	Peak Demand met in Feb 2024 (MW)	Peak Demand met in Feb 2023 (MW)
1	NR	79604	109895	30291	97898	59664	63791	59366
2	WR	99798	99386	-412	89547	72184	74167	76524
3	SR	79758	94860	15102	80864	62000	65591	60906
4	ER	29644	14828	-14816	37265	20000	23531	22325
5	NER	2974	2654	-320	4855	2000	2822	2849
6	All India	291780	321625	x	277201	216185	221989	211325

S. No.	State	Load (MW)	Gen. (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)	Peak Demand met in Feb 2024 (MW)	Peak Demand met in Feb 2023 (MW)
1	Rajasthan	19593	80348	60755	21175	17000	18058	16959

i. It has been mentioned that CAGR of 7% has been considered on the peak demand met by respective states in Feb 2024 at regional and all India level. Over this, green hydrogen load of 13 GW has been considered in ER (3.3 GW) and WR (8.2 GW).

ii. The peak and average (in solar hours) demand met during Feb'23 and Feb'24 solar hours has been provided for reference. It appears that the CAGR of 7% considered at regional and all India level is on the higher side. Same may be reviewed.

The all India demand considered in Feb 2027 is even more than the EPS peak demand for 2026-27 + 13 GW green hydrogen load.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

iii. Solar and Thermal Generation

- ~192724 MW solar generation considered in service at all India level
- ~72500 MW solar generation is in service in Rajasthan
- ~27770 MW solar generation is in service in Rajasthan
- ~19100 MW solar generation in Khavda complex has been considered in the case

- Still some machines (bus - 424027) with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

- In the revised case also, some of the thermal generating stations (like 412001, 362014 etc.) are running below 40% tech min level also. Same may be clarified.

- Further, the swing bus generation (Farakka) is negative – (-) 2500 MW which would further increase the demand by around 5000 MW.

- The thermal generation has been backed down to 40%, 45% and 55% level. The tech min level considered in the case may be mentioned. Though, it is mentioned that merit order has been considered, but cheaper thermal generating stations like Singrauli and Rihand are running at only 65-70% level. Dispatch in Yadadri etc. is around 85%.

iv. With above-mentioned corrections in demand and generation, the LGB of the study case will change. This might result in changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

The details of N-1 non-compliance, high line loading, and low voltages are provided in subsequent sections.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

b) Network Loadings

i. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.)

CTUIL Response –

Most of the ICTs i.e. Deedwana, Hindaun, Heerapura, Chittorgarh are getting overloaded in planning studies due to the increase in load of Rajasthan. Some of the ICTs are even critically loaded in present time frame and issue of high loading is deliberated in various OCC/NRPC meetings. In above meetings, RVPN is already requested to carry out 400/220kV ICT augmentation works or feeder reconfiguration to relive ICT loadings.

Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand.

Above ICT loading will be reviewed in consultation with NRLDC w.r.t real time loading and Grid- India operational feedback report and necessary augmentation will be carried out in ISTS, if required, as per the present practice.

Grid-India Response

RVPNL may also be invited in the meeting and necessary augmentation required at intra-state level may also be planned at this stage.

For augmentation required at ISTS level, the planning may be carried out at this stage only.

ii. Many lines in ER and WR-ER boundary are critically loaded in solar peak case:

- 400 kV Farakka – Kahalgaon D/C,
- 400 kV New Ranchi – PPSP D/C
- 400 kV Ranchi – Sipat D/C
- 765 kV Dharamjaigarh – New Ranchi D/C
- 400 kV Rourkela – Chaibasa D/C
- 400 kV Gaya – Maithon D/C
- ICTs in West Bengal (Kolaghat, Chanditala) and DVC (Mejia-B, Durgapur)

CTUIL Response - Re-conductoring of 400 kV Farakka – Kahalgaon & Talcher – Meramundali 400 kV D/c lines in under advance stage of stakeholder consultation. Other system, if required in ISTS would be taken up on priority.

Grid-India Response: There is significant amount of power flow towards eastern region during solar hours resulting in very high loading in the ER grid. The issue is also being faced in the current scenario during solar hours. It is suggested that system augmentation in ER in a holistic manner may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

v. Angular Separation:

Scenario	765 kV Sirohi – Mandsaur D/C Line	765 kV Sirohi – Risabhdeo D/C	765 kV Neemuch – Khandwa D/C	765 kV Bikaner – Moga D/C	765 kV Bikaner – Khetri D/C
Base Case	14.4° (1746 MW)	9.5° (1744 MW)	7.3° (1230 MW)	18.2° (1914 MW)	18.2° (2425 MW)
Under N-1 Contingency	17.5° (2100 MW)	12.4° (2254 MW)	9.3° (1581 MW)	24.4° (2526 MW)	20° (2995 MW)
Under N-1-1 Contingency	22.3°	17.9°	13.2°	42.45°	25.1°

vi. HVDC Balia – Bhiwadi is running from Balia to Bhiwadi in evening peak scenario while the direction is Bhiwadi to Balia in solar peak case. The daily reversal of HVDC may also be highlighted in the scheme as reluctance is faced from asset owners regarding frequent reversal in HVDC direction.

The details of other highly loaded elements have already been shared earlier.

c) Voltages

i. It has been observed that SLRs of various 765 kV lines have been opened in the solar peak case to maintain the voltages. These SLRs have been taken back in service in the off-peak case to avoid high voltages in the system.

However, in real-time, reluctance is faced from transmission licensees regarding switching of these SLRs. Even resistance is being faced in case of frequent switching of bus reactors.

Daily operation of SLRs to control the voltage may be mentioned explicitly in the schemes as well as included in the RfP also.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

d) Short Circuit Ratio

Bus/Station	Connected RE Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Sirohi	2000 MW	8413 MVA	**4.2**
220 kV Merta – II	1000 MW	5734 MVA	5.7
400 kV Merta - II	1000 MW	20302 MVA	20.3

This SCR is considering the optimistic scenario that RE plants will provide 1 p.u. short circuit contribution. However, the plants are providing the same in real-time. Same may be considered while computing the SCR.

e) Dynamic Simulation Studies

With more than 72,500 MW solar generation in Rajasthan in close vicinity by Feb 2027, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

CTU reply – Comment is pertaining to 2029 timeframe files, however dynamics file is under preparation. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress.

Grid-India response – At present, even after than 15 GW RE at ISTS level in Rajasthan, the dynamic simulation studies have not been carried out. Keeping in view the multiple generation loss events in Rajasthan RE complex, it is once again requested that the studies may be carried out at the time of proposing the evacuation scheme.

f) Other Inputs:

i. In addition to merit order dispatch, inertia would also be a deciding factor for a unit to remain switch on or off. Same may also be factored in.

ii. Wherever long lines are getting planned like in this case 765 kV Sirohi-Mandsaur (320 Km), the range of line length may be provided as it is possible that route length may increase during commissioning phase.

iii. Intra-state network wherever connected or proposed to be connected may be specified. All such long HVDCs and AC lines will impact Rajasthan ATC/TTC.

iv. **Name of New Substations** – It is requested to assign unique name for envisaged RE pooling stations. As several pooling substations with identical names but different numerical suffixes have been planned in the same district along with multiple interconnections, there is a chance of miscommunication during real-time operation among multiple constituents. For clarity of operation and ensuring that names of different substations are easily distinguished from each other, it is suggested that after finalization of the exact location, the ISTS substations are uniquely named as per the geographical name of the nearest location like village or taluk.

CTU reply on Grid-India (NLDC/NRLDC) observations (13.06.24) on PSS/E files (2027) for Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex

A. It has been mentioned that CAGR of 7% has been considered on the peak demand met by respective states in Feb 2024 at regional and all India level. Over this, green hydrogen load of 13 GW has been considered in ER (3.3 GW) and WR (8.2 GW).

The peak and average (in solar hours) demand met during Feb'23 and Feb'24 solar hours has been provided for reference. It appears that the CAGR of 7% considered at regional and all India level is on the higher side. Same may be reviewed. The all India demand considered in Feb 2027 is even more than the EPS peak demand for 2026-27 + 13 GW green hydrogen load.

CTU reply :

In the meeting CTU stated that Transmission planning is carried out for peak load scenario. Considering this CTU analyzed the peak demand historical data (Feb'23 to Feb'24) for solar maximized period from which it is observed that load growth is more than 7% in winter solar peak hours in All India & most of the regions. Green Hydrogen and bulk consumer load is considered over and above to EPS demand in planning studies as EPS did not factor in such emerging loads.

S.No	Region	Peak demand in Feb'24 (in Winter Solar peak hours) (GW)	Peak demand in Feb'23 (in Winter Solar peak hours) (GW)	Growth rate (%)	Anticipated Peak demand in Feb'27 (in Winter Solar peak hours) (@7% CAGR) (GW)	Demand considered in Revised PSSE files (in Winter Solar peak hours) (GW)
1	**NR**	63.8	59.4	7.4	78.2	79.5
2	**WR**	73.3	68.7	6.7	89.8	100.5 (Considering additional load of GH/BKC-8.2GW)
3	**ER**	22.1	21.7	2	27.1	29.6 (considering additional load of GH/BKC-3.3GW)
	All India	220.7	200.6	10	270.3	295.5 (considering additional load of GH/BKC -13GW)

In view of that demand considered in the studies solar maximized scenario (Feb'27) as above is in order.

B. Still some machines (bus - 424027) with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

CTU Reply: Bus no 424027 corresponding to Vendata (4x600MW) generation in ER. Out of 4 units, one unit is for dedicated supply to OPTCL through Vedanta – Lapanga / Meramundali 400kV D/c line. The other 3 units are CPP units which are for dedicated supply to their smelter load. Therefore, these three units have been considered as ON with zero dispatch from these 3 units.

However, as decided in the meeting, a bulk load of smelter plant 1500MW (non scalable) has been added at the load bus and dispatch of 3x600MW plant has been set as 3x500MW.

C. In the revised case also, some of the thermal generating stations (like 412001, 362014 etc.) are running below 40% tech min level also. Same may be clarified.

CTU Reply : Incorporated

D. Further, the swing bus generation (Farakka) is negative – (-) 2500 MW which would further increase the demand by around 5000 MW.

CTU Reply: Modifications incorporated (Revised study plots with above modifications is enclosed)

E. The thermal generation has been backed down to 40%, 45% and 55% level. The tech min level considered in the case may be mentioned. Though it is mentioned that merit order has been considered, but cheaper thermal generating stations like Singrauli and Rihand are running at only 65-70% level. Dispatch in Yadadri etc. is around 85%.

CTU Reply: Merit order dispatch is being followed up to an extent and incorporated in revised PSS/E files. Dispatch of Cheaper thermal generating stations in Singrauli and Rihand complex is already kept higher as compared to other machines.

F. With above-mentioned corrections in demand and generation, the LGB of the study case will change. This might result in changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

CTU Reply: With these modifications in WR/ER LGB and other modifications in ER/WR regions, there is no impact on the proposed transmission scheme for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex.

In the meeting, CTU reiterated that the proposed scheme is an Inter regional corridor (765kV Sirohi-Mandsaur D/c) which would relieve the loading of various other WR-NR Inter regional corridors i.e. 400kV RAPP-Shujalpur D/c, 400kV Zerda-Kankroli D/c, 765kV Sirohi-Rishabdeo D/c highlighted in review meetings of MOP as well as in CMETS-NR meetings.

G. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.)

RVPNL may also be invited in the meeting and necessary augmentation required at intra-state level may also be planned at this stage. For augmentation required at ISTS level, the planning may be carried out at this stage only.

CTU Reply:. For intra state ICT overloading in Rajasthan, RVPN stated that for Hindaun ICT work awarded in Mar'24 (24 months schedule) and for Chittorgarh, Heerapura and Deedwana ICTs proposal is in process. CTU requested RVPN to expediate the approval of augmentation of ICTs so that same is available in 2027 timeframe.

CTU stated that Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand. Implementation of ICTs may take less time (18 months from approval) as compared to transmission schemes for RE evacuation (30 months from approval). It was stated that necessary augmentation (Kota and Bhinmal ICT) will be carried out in ISTS in consultation with stakeholders once space availability from TSP for Bhinmal and real time loading data from NRLDC is received for implementation in 2027 timeframe or earlier. NRLDC agreed for the same

H. Many lines in ER and WR-ER boundary are critically loaded in solar peak case:

- 400 kV Farakka – Kahalgaon D/C,
- 400 kV New Ranchi – PPSP D/C
- 400 kV Ranchi – Sipat D/C
- 765 kV Dharamjaigarh – New Ranchi D/C
- 400 kV Rourkela – Chaibasa D/C
- 400 kV Gaya – Maithon D/C
- ICTs in West Bengal (Kolaghat, Chanditala) and DVC (Mejia-B, Durgapur)

There is significant amount of power flow towards eastern region during solar hours resulting in very high loading in the ER grid. The issue is also being faced in the current scenario during solar hours. It is suggested that system augmentation in ER in a holistic manner may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

CTU Reply:. In the meeting, Grid-India stated that 400 kV Farakka – Kahalgaon D/c & 400 kV New Ranchi – PPSP D/c is overloaded in real time also. In view of RE addition in NR and WR and backing down of thermal units in ER, critical loading is observed in ER and WR-ER corridors in planning studies. In view of that strengthening is being taken up on priority with progressive addition of solar generation in next 2-3 years so that schemes in ER are available for absorption of RE power in Eastern region.

In the meeting, CTU stated that Reconductoring of some of the lines i.e. 400kV Farakka – Kahalgaon and 400kV Talcher – Meramundali is recently agreed in CMETS-ER meeting with a completion schedule of 18 months from allocation.

In real time, loading of 400 kV New Ranchi – PPSP D/c is in order as line rating was considered lower, however in planning studies loadings are higher. Reconductoring of Ranchi New – New PPSP 400kV D/c line and any other augmentation in ISTS and commensurate STU network would be identified based on the joint study meeting scheduled next month with WBSETCL. Reconductoring of 400kV Farakka – Sagardighi and 400kV Rourkela – Chaibasa 400kV D/c line would be taken up for discussion in CMETS-ER meeting (Jul'24). An additional corridor from WR to ER needs to be envisaged for relieve the loading around Ranchi area considering LGB of 2027 and 2029 timeframe and change in power flow pattern due to envisaged Green hydrogen load. Augmentation of ICTs in WBSETCL, DVC & Odisha area have been already informed to respective STUs in various CMETS-ER meetings and joint meetings. Matter will be further emphasized to STUs/DVC to take up augmentation of ICTs within time.

It was also decided that due to huge power flow in solar peak hours from NR-ER and WR-ER, and thermal backdown in ER, there may be other system strengthening requirement within ER

incl. requirement discussed above. Such transmission strengthening requirements will be planned shortly and taken up for stakeholder consultation based on study results under various scenarios.

I. HVDC Balia – Bhiwadi is running from Balia to Bhiwadi in evening peak scenario while the direction is Bhiwadi to Balia in solar peak case. The daily reversal of HVDC may also be highlighted in the scheme as reluctance is faced from asset owners regarding frequent reversal in HVDC direction.

CTU Reply: In all planning studies, Bhiwadi is running from Balia to Bhiwadi in evening peak scenario while the direction is Bhiwadi to Balia in solar peak case.

CTU stated that they have already informed POWERGRID on above issue faced by Grid-India. In the meeting, POWERGRID stated that reversal is being carried out whenever required without any reluctance, however during reversal operation, filters switching operation is being carried out each time which may create switching surges on filters and CBs despite that no reluctance is being offered, however reversal may be carried out in an optimal manner.

Grid-India (NLDC) stated that in case reluctance comes in future for reversal of Balia-Bhiwadi HVDC, Grid constraint may arise in RE power evacuation. In Planning, it is to be mentioned that reversal will be carried out on daily basis as part of scheme to sensitize the TSP in case any reluctance faced during reversal operation in future.

NRLDC stated that at present daily reversal is not required, however reversal requirement may be on daily basis in future and therefore TSP should take up the matter with OEM for reversal operation of HVDC on daily basis, in case of any constraints.

CTU stated that Power reversal on Balia – Bhiwadi HVDC line from Bhiwadi to Balia was approved as part of scheme “Transmission System Strengthening for potential solar energy zones Phase - II(8.1GW)” considering reversal of HVDC in solar peak hour for evacuation of Ph-II RE power from Rajasthan. Therefore, basic premise for scheme was for reversal of power from Bhiwadi to Balia in peak RE period which was known by the TSP.

CTU emphasized that reversal of Balia-Bhiwadi HVDC is required in solar peak hours (Bhiwadi to Balia) and it will be continued in solar peak hours throughout the life of this HVDC. In view of that, if required POWERGRID may discuss the matter with OEM for constraint in daily reversal, if any. Accordingly, POWERGRID may take up the matter in consultation with CTU and Grid-India for deliberation in OCC/NRPC forum. POWERGRID agreed for the same.

J. It has been observed that SLRs of various 765 kV lines have been opened in the solar peak case to maintain the voltages. These SLRs have been taken back in service in the off-peak case to avoid high voltages in the system. However, in real-time, reluctance is faced from transmission licensees regarding switching of these SLRs. Even resistance is being faced in case of frequent switching of bus reactors. Daily operation of SLRs to control the voltage may be mentioned explicitly in the schemes as well as included in the RfP also.

CTU Reply: CTU vide mail 17.06.24 enquired TSPs for reasoning and justification on above issue faced by Grid-India during line reactor switching and frequent switching of bus reactors in real time.

In the 30th CMETS-NR meeting POWERGRID informed that switching of line/bus reactor is being carried out whenever required, However constraint of bus/line Reactor switching may come in case of GIS S/s. POWERGRID also stated that there may be some delay involved during line reactor switching due to large no. operations at a time due to manual operation involvement, NGR bypassing, checking the healthiness of equipment, CB and isolator operation etc. It is also seen that frequent operation of CBs for reactors switching cause gas formation due to switching surges.

Grid-India (NLDC) stated that in planning studies line reactor switching is envisaged to control the voltage, however in operation if any reluctance faced during line reactor switching, additional reactive comnpensatation is required to control the voltages. In view of that reactor switching requirement shall be clearly stipulated in RfP document. Based on their operational experience, line reactors should be designed for 2 switching operations in a day, however for bus reactor they will check the requirement based on operational experience. NRLDC also stated that in case of delay in implementation of total transmission system for RE evacuation, overall more nos. of reactor switching operations are required, however on daily basis 2 nos. of switching operations is sufficient.

CTU also stated that in planning studies, they have also considered 2 nos. of operation for bus and line reactor switching. CTU also stated that the issue was also highlighted earlier in the Joint study meeting held on 28.12.23 and 09.01.24 as part of Transmission scheme for Rajasthan REZ Ph-IV (Part-3) scheme. In the above Joint study meeting, CEA stated that line reactor switching in RE pockets is in general operational requirement and need not to be specific for one scheme and should be carried out in real time as per Grid requirement. It was also stated that whenever such line reactor switching issue is raised by TSP in future, it should come with proper reasoning & justification from TSP side.

In view of that it was concluded that a 2 nos. of line reactor switching operations is required and matter will be referred to CTU-Engg for inclusion of reactor switching as part of new RfP/TS document. Meanwhile, NLDC will analyze the operational data for bus reactor switching and inform the same to CTU.

K. Low SCR of Sirohi PS (4.2)

CTU reply – Short circuit Ratio of 400kV and 220kV of Sirohi PS is about 8.7 and 4.2 respectively. For low SCR at Sirohi PS(4.2), CTU stated that no additional connectivity will be granted beyond 2 GW at 220kV level of Sirohi PS with proposed system (400/220kV ICTs at Sirohi PS+765kV Sirohi - Mandsaur). With growing interconnection and planned network in future, SCR at Sirohi may increase.

Transmission scheme is already under planning for RE evacuation from Sirohi/Jalore/Sanchore complex and taken up for stakeholder consultation in next 1-2 months.

L. At present, even after than 15 GW RE at ISTS level in Rajasthan, the dynamic simulation studies have not been carried out. Keeping in view the multiple generation loss events in Rajasthan RE complex, it is once again requested that the studies may be carried out at the time of proposing the evacuation scheme.

M. Angular difference between 765 kV Bikaner and 765 kV Moga touches 26° under N-1 and 42.4 degree under N-1-1.

N. In addition to merit order dispatch, inertia would also be a deciding factor for a unit to remain switch on or off. Same may also be factored in.

CTU Reply: For dynamic simulation studies and stability studies, CTU stated presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation with IIT Mumbai is also under progress. In view of that, Dynamic simulation studies for planning scenario may take some time.

In 30th CMETS-NR meeting, CTU requested that Grid-India may also share present time frame converged dynamic file which will help to resolve convergence issues in dynamics file for 2027 timeframe w.r.t Generator models (conventional/RE) used by Grid-India. In the CMETS-NR meeting Grid-India stated that they are also facing convergence issues for present timeframe file and prepared dynamics file with some assumptions. They also shared some dynamic data with CTU in the past but only dynamic data will not help to resolve convergence issue. However for preparation for planning stage dynamic file, CTU and Grid-India can work together to prepare load flow first w.r.t dynamics file and subsequent Dynamic data file (Dyr) shall be prepared with help of models available with Grid-India.

CTU also stated that considering the severe convergence issues in dynamics file, it will be converged on truncated network specific to RE pockets in Rajasthan rather than to converge the file on All India level. NRLDC stated that for transient studies, truncated network modelling will be sufficient.

Further, in the meeting CTU stated that to resolve the issue of higher angular separation (>20 degree) under N-1/N-1-1 contingency of 765kV Bikaner-Moga D/c line, suitable strengthening scheme is already under planning. As part of above scheme LILO of 765kV Bikaner -Moga line is envisaged which will reduce the angular separation (<30 degree). The above scheme will be taken up in Jul'24 meeting.

Regarding observation for Inertia response of units, NRLDC stated that it may be checked in dynamics file once prepared for critical contingencies i.e. outage of large generation say 5-10GW in RE pockets. In the above condition, inertial response of generation units, Grid frequency variation, df/dt, synchronous condenser response may be analyzed. Same was agreed.

O. Wherever long lines are getting planned like in this case 765 kV Sirohi-Mandsaur (~320 Km), the range of line length may be provided as it is possible that route length may increase during commissioning phase.

CTU Reply: BEE length of the 765 kV Sirohi-Mandsaur D/c Line is about 265kms (line length would be about 320kms considering 20% on BEE length) considering Substation location for Sirohi and Mandsaur which is already finalized with boundary limits.

Line Lengths of all the transmission lines in proposed scheme will be reviewed in Gati Shakti portal in due course time and in case of any change, impact of same will be checked in studies w.r.t angular separation and voltage limits. Accordingly, requirement of change in reactive comnpensatation will also be reviewed, if needed.

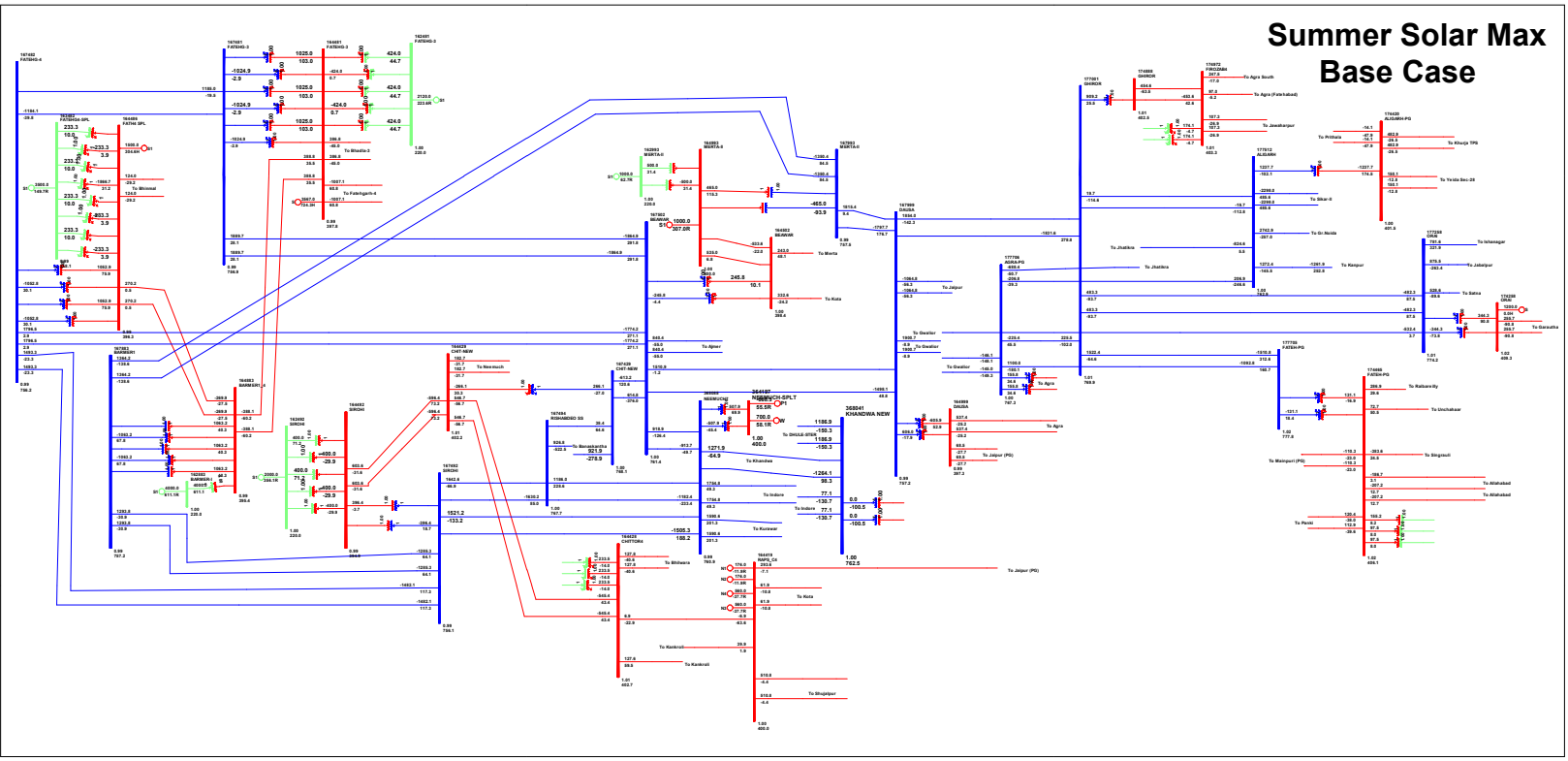
P. Intra-state network wherever connected or proposed to be connected may be specified. All such long HVDCs and AC lines will impact Rajasthan ATC/TTC.

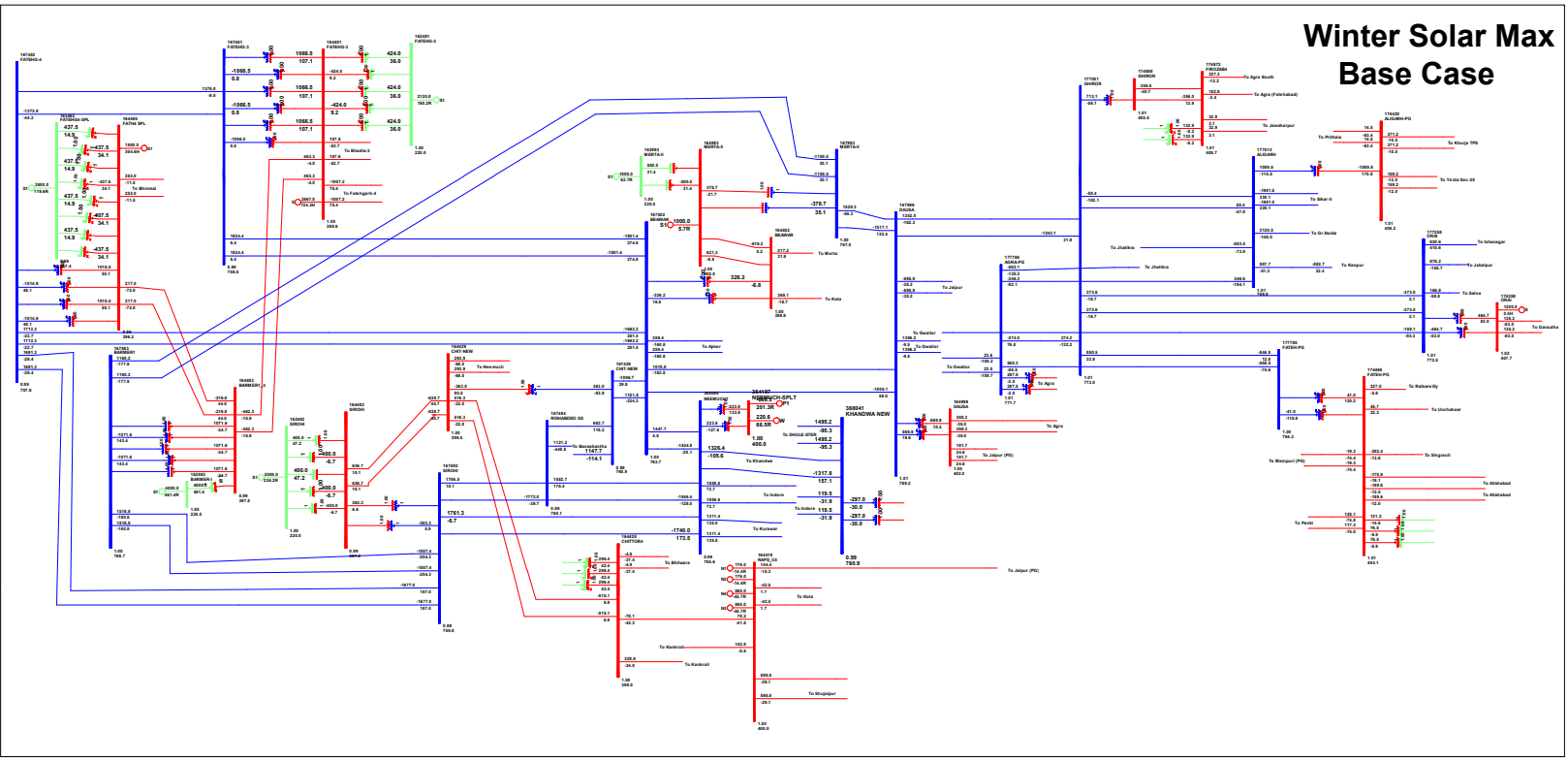
CTU Reply: No interconnection is being planned from intra state network of RVPN as part of proposed scheme or earlier agreed transmission schemes i.e. Rajasthan REZ Ph-IV/V for RE evacuation

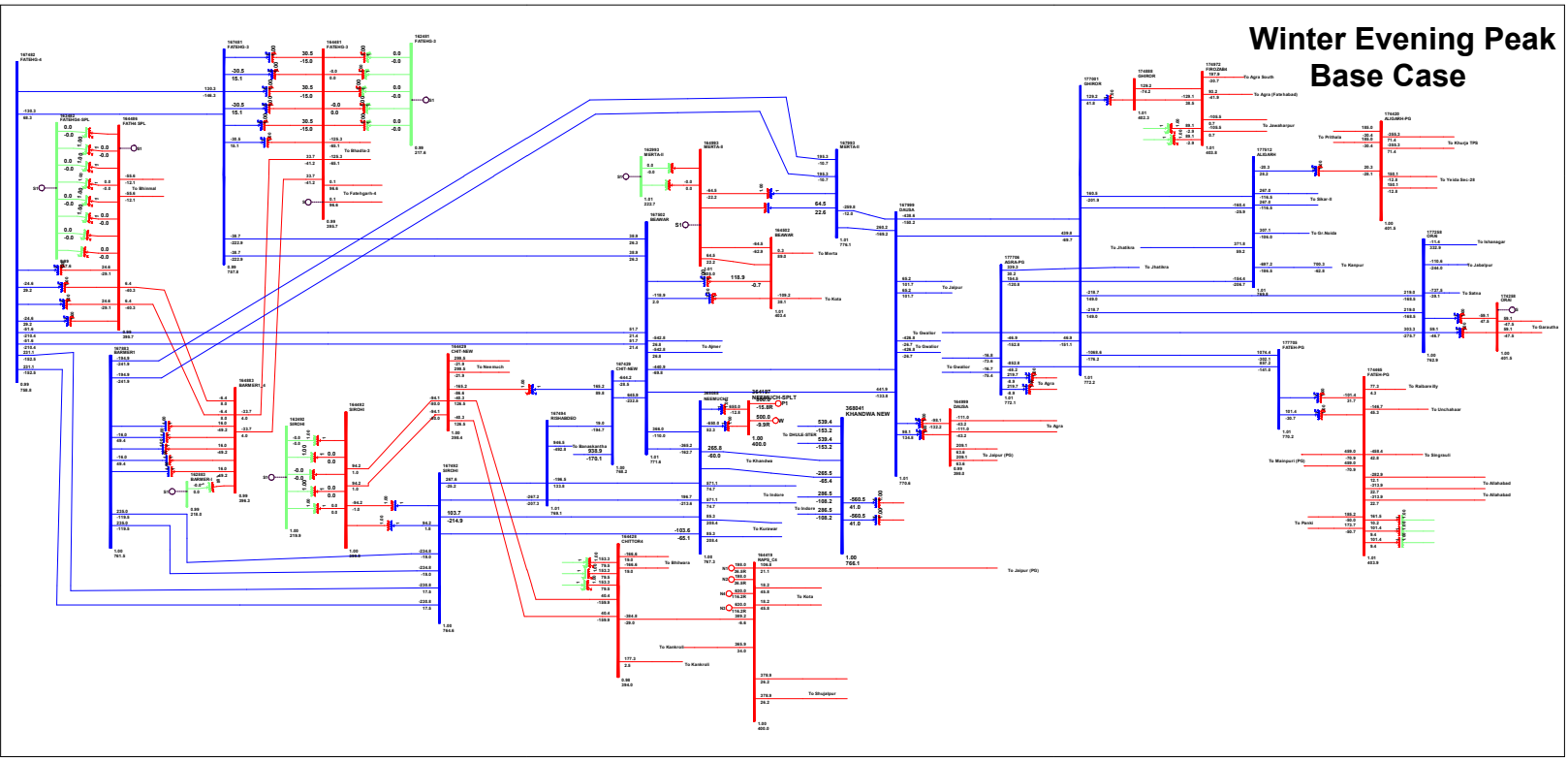
Q. Name of New Substations – It is requested to assign unique name for envisaged RE pooling stations. As several pooling substations with identical names but different numerical suffixes have been planned in the same district along with multiple interconnections, there is a chance of miscommunication during real-time operation among multiple constituents. For clarity of operation and ensuring that names of different substations are easily distinguished from each other, it is suggested that after finalization of the exact location, the ISTS substations are uniquely named as per the geographical name of the nearest location like village or taluk.

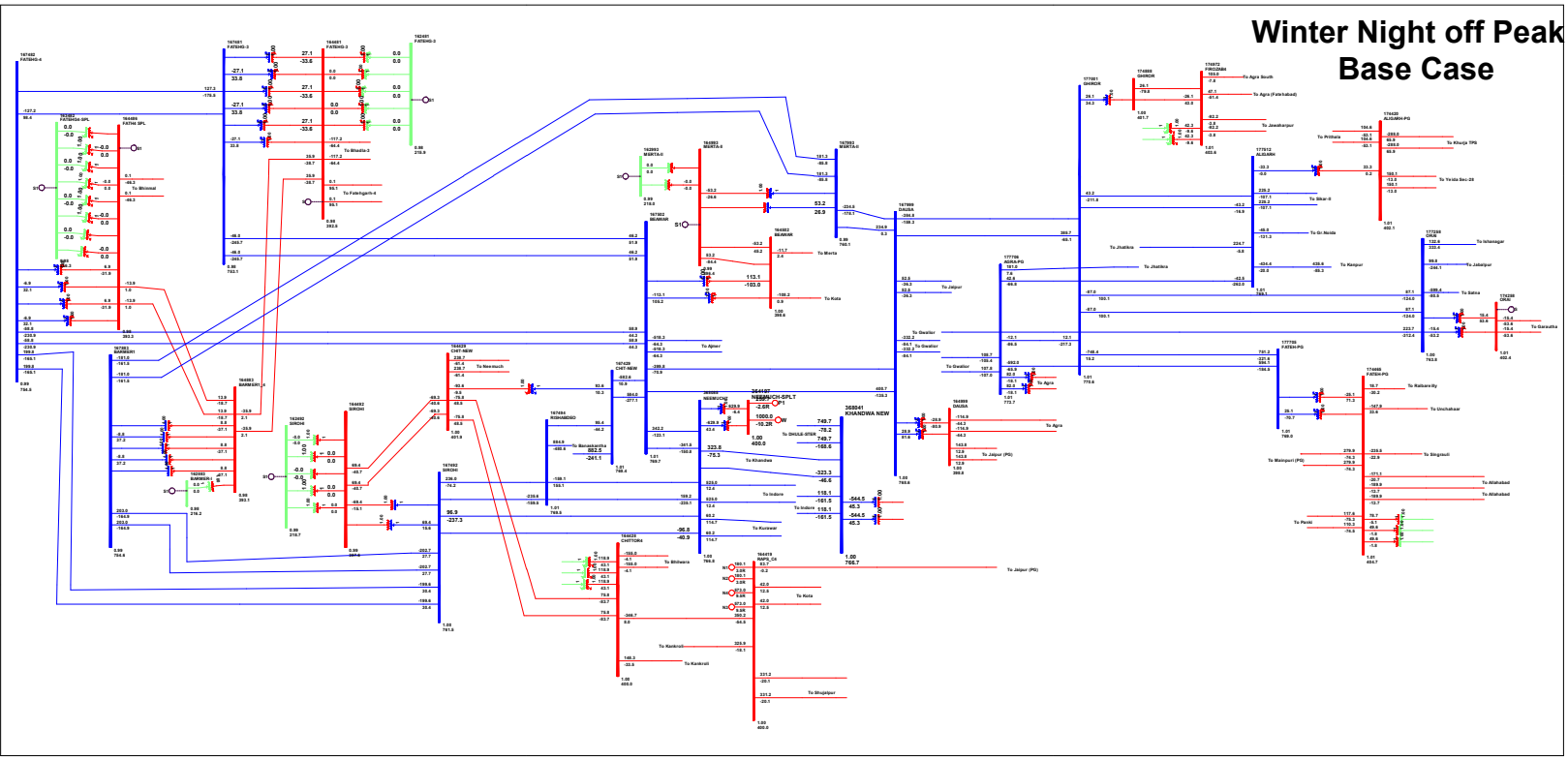
CTU reply: The issue has been highlighted many a times at OCC/RPC level. CTU vide mail 17.06.24 again requested to TSPs that being owner of the substations, renaming of Pooling Stations may be carried out. In the meeting, CTU stated that naming convention should be unique for every pooling station in RE complex in combination of existing name along with village/taluk name. POWERGRID stated that they will revert on the same with resolution.

Exhibit-I




Winter Solar Max
Base Case


Winter Evening Peak
Base Case


Winter Night off Peak
Base Case

Enclosure-I

Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex

S. No.	Items	Details
1.	Name of Scheme	**Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex**
2.	Scope of the scheme	**Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex, Transmission scheme** **1. Transmission system for immediate Evacuation of Power from Sirohi S/s (2GW)** • 5x500MVA, 400/220kV ICTs at Sirohi S/s along with associated transformer bays • 6 nos. 220kV line bays at Sirohi S/s for RE interconnection • 220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s **2. Transmission system for immediate Evacuation of Power from Merta-II S/s (2GW*)** • 3x500MVA, 400/220kV ICTs at Merta-II S/s along with associated transformer bays • 4 nos. 220kV line bays at Merta-II S/s for RE interconnection • 220 kV Sectionalizer bay (1 set) along with 220 kV BC (1 No.) bay and 220 kV TBC (1 No.) bay at Merta-II S/s **3. Transmission system for Common Evacuation of Power from Sirohi PS (2GW) & Merta-II PS (2GW*)** **a) NR-WR Inter regional corridor** • Sirohi – Mandsaur PS 765KV D/c line (~ 320kms) along with 240 MVAr switchable line reactor at Sirohi S/s end 330MVAr switchable line reactor at Mandsaur PS end for each circuit of Sirohi – Mandsaur PS 765KV D/c line **b) Western region** • Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765kV D/c line ***Transmission scheme for immediate evacuation of 1GW RE from Merta-II S/s to facilitate connectivity to RE generation developers was deliberated and approved in 19th NCT meeting held on 29.04.24**
3.	Depiction of the scheme on Transmission Grid Map	Attached at **Exhibit-I**
4.	Upstream/downstream system associated with the scheme	765/400kV Sirohi & 765/400kV Mandsaur PS are under bidding, to be implemented as part of Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part 2: 5.5 GW)

S. No.	Items	Details
		(Jaisalmer/Barmer Complex). 765/400KV Sirohi S/s is being interconnected to Fatehgarh-IV PS (Sec-2), Barmer-I PS, Rishabdeo S/s at 765kV level. At 400kv level Sirohi S/s is being interconnected to Chittorgarh(PG) S/s. 765/400kV Mandsaur PS is being interconnected to Indore (PG), Beawar S/s, Rishabdeo S/s and Kurawar S/s at 765kv level. At 400kV level various RE generators are proposed to be interconnected for injection from Mandsaur PS. 765/400kV Khandwa (New) S/s is existing substation of M/s Sterlite which is interconnected to Indore (PG) and Dhule (Sterlite) at 765kV level and Khargone S/s at 400kV level.
5.	**Objective / Justification**	1. The present scheme comprises Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex. 2. A Joint study meeting was held on 09.05.24 with stakeholders in NR to deliberate & finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex, Transmission scheme for Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex) & Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex). 3. In the above Joint study meeting, Grid-India observations on proposed transmission schemes as well as on All India Study files (2027 & 2029 time frame) were deliberated and same was also communicated by Grid-India vide their mail dated 09.05.24 (Copy of Grid-India observations are enclosed in **Annexure-1**) 4. In the above Joint study meeting, it was decided that comprehensive schemes discussed may be segregated in two phases (Phase-1: Transmission scheme for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex) & Phase-2: Transmission scheme for Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex) & Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex). 5. In Phase-1, PSS/E files shall be modified w.r.t discussion and comments received from Grid-India on 2027 time frame study files. Revised PSS/E files will be circulated to NR stakeholders for finalization of proposed scheme in next Joint study/CMETS-NR meeting (Jun'24). After finalization of Phase-1 scheme i.e. Transmission scheme for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex), PSS/E files shall be modified for 2029 time frame w.r.t discussion and other observations/comments received from Grid-India on 2029 timeframe study files and subsequently proposal for Rajasthan REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW)) scheme (Ph-2) will be taken up in Joint meeting/CMETS-NR meeting for stakeholders consultation. 6. Accordingly as part of Phase-1, revised PSS/E files for solar maximized scenario (SC-4 & 7) along with Scenario 8 (evening peak) & Scenario 9 (night off peak) files for 2027 time frame along with reply to Grid-India observations on 2027 timeframe files was sent on 04.06.24 to all stakeholders (Copy of CTU reply is enclosed in **Annexure-2**). Result of system studies enclosed in **Exhibit-II**. Subsequently, Grid India vide their mail

S. No.	Items	Details
		dated 13.06.24 sent observations on revised PSS/E files (Copy of Grid-India observations enclosed in **Annexure-3**) which were deliberated in 30th CMETS-NR meeting held on 18.06.24. In the meeting, CEA agreed for the proposal. Major Grid-India observations on 2027 timeframe files are as under a) Higher demand considered in WR & ER region b) High loading in EHVAC lines in ER and in WR-ER in solar peak hours c) N-1 non compliance of ICTs in Rajasthan (Intra state and Inter state) d) Dynamic simulation studies incl. inertia studies for various contingency scenarios e) Critical loading and higher angular separation (>20 degree) under N-1/N-1-1 contingency of 765kV Bikaner-Moga D/c line as well as Low SCR of Sirohi PS 7. It was deliberated in CMETS-NR meeting that Transmission planning is carried out for peak load scenario. In view of that, it is observed that load growth of more than 7 % is observed in winter solar peak hours in All India & most of the regions. Green Hydrogen and bulk consumer load is considered over and above to EPS demand in planning studies. 8. For high loading in EHVAC lines in ER, it was stated that reconductoring of some of the lines i.e. 400kV Farakka – Kahalgaon and 400kV Talcher – Meramundali is recently agreed in CMETS-ER meeting. Reconductoring of Ranchi New – New PPSP 400kV D/c line and any other augmentation in ISTS and commensurate STU network would be identified based on the joint study meeting scheduled in next month with WBSETCL. Reconductoring of 400kV Farakka – Sagardighi and 400kV Rourkela – Chaibasa 400kV D/c line would be taken up for discussion in CMETS-ER meeting (Jul'24). Additional corridor from WR to ER needs to be envisaged for relieve the loading around Ranchi area. Augmentation of ICTs in WBSETCL, DVC & Odisha area have been informed to respective STUs in various CMETS-ER meetings. 9. For intra state ICT overloading in Rajasthan, RVPN stated that for Hindaun ICT work awarded in Mar'24 (24 months schedule) and for Chittorgarh, Heerapura and Deedwana ICTs proposal is in process. CTU stated that necessary augmentation (Kota and Bhinmal ICT) will be carried out in ISTS in consultation with stakeholders consultation once space availability from TSP for Bhinmal and real time loading data from NRLDC is received for implementation in 2027 timeframe or earlier. NRLDC agreed for the same 10. For dynamic simulation studies and stability studies, CTU stated presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress. In view of that, Dynamic simulation studies for planning scenario may take some time. CTU also requested that Grid-India may also share present time frame converged dynamic file which will help to resolve convergence issues in dynamics file for 2027 timeframe w.r.t

S. No.	Items	Details
		Generator models (conventional/RE) used by Grid-India. In reply Grid-India stated that they are also facing convergence issues for present timeframe file and prepared dynamics file with some assumptions. They also shared some models with CTU in past. However for preparation for planning stage dynamic file, CTU and Grid-India can work together to prepare load flow first w.r.t dynamics file and subsequent Dynamic data file (Dyr) shall be prepared with help of models available with Grid-India. 11. CTU stated that to resolve the issue of higher angular separation (>20 degree) under N-1/N-1-1 contingency of 765kV Bikaner-Moga D/c line, suitable strengthening scheme is already under planning. As part of above scheme LILO of 765kV Bikaner -Moga line is envisaged which will reduce the angular separation (<30 degree). The above scheme will be taken up in Jul'24 meeting. 12. For low SCR at Sirohi PS(4.2), CTU stated that no additional connectivity will be granted beyond 2 GW at 220kV level of Sirohi PS with proposed system (400/220kV ICTs at Sirohi PS+765kV Sirohi - Mandsaur). With growing interconnection and planned network in future, SCR at Sirohi may increase. 13. Considering receipt of connectivity application of new RE generators in Sirohi & Nagaur/Merta complexes, connectivity transmission scheme (as per S.No.2) was agreed in 30th CMETS-NR meeting for evacuation of power from Sirohi/Nagaur Complex as part of Rajasthan REZ Ph-V (Part-1 :4 GW) scheme.
6.	**Estimated Cost**	**Rs. 5525 Cr.** **NR Portion : Rs 3400 Cr** **WR Portion : Rs 2125 Cr**
7.	**Need of phasing, if any**	Not Applicable
8.	**Implementation timeframe**	24 months from allocation of project
9.	**System Study for evolution of the proposal**	Studies discussed and agreed in following meeting • 30th CMETS-NR meeting held on 18.06.24 (Minutes of meeting awaited) Load flow results is attached at **Exhibit-II**

Exhibit-I

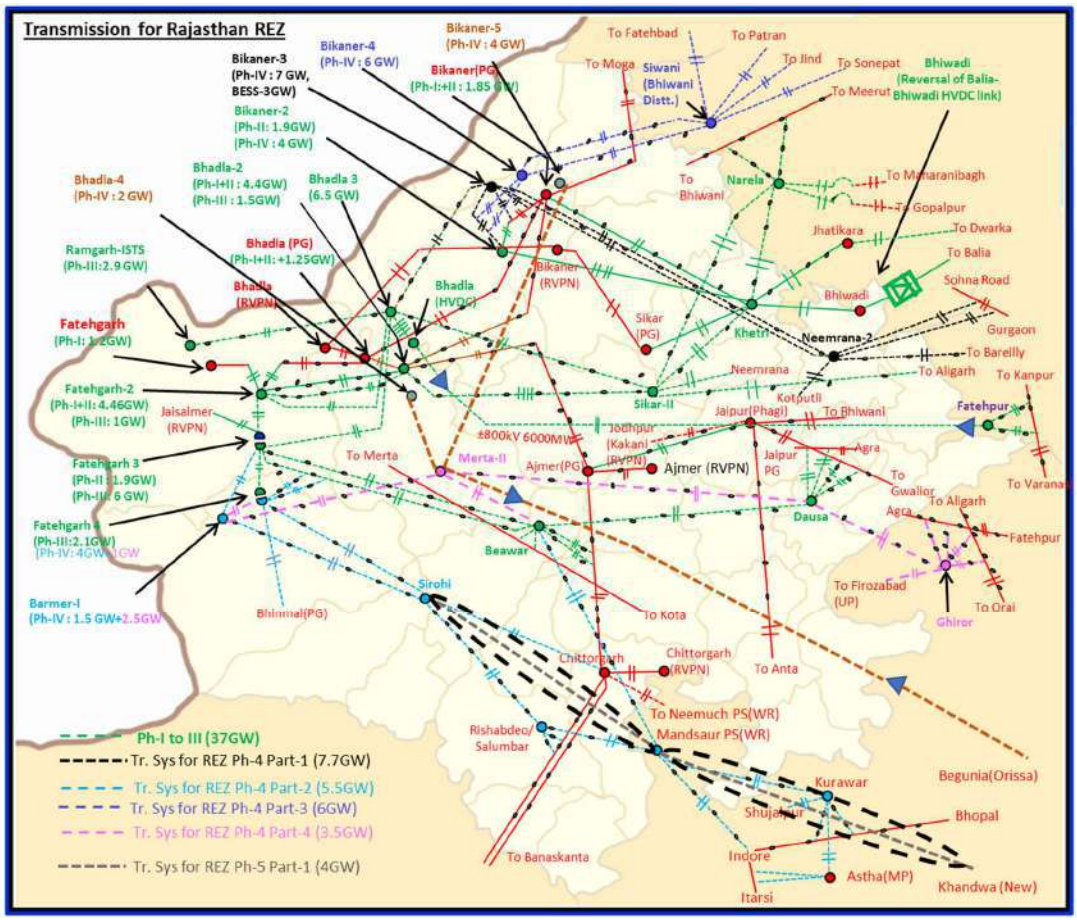


Fig-1 : Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW)

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

1. Schemes proposed for:

a) Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)
b) Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)
c) Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

S.No	Transmission Scheme	RE Potential	Status
A	**Under Bidding/ Approved**		
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW) Bikaner-II : 3.7GW Bikaner-III: 4GW	Awarded
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	5.5GW (Solar) Fatehgarh-IV: 4 GW Barmer-I: 1.5 GW	Under Bidding
3	Rajasthan REZ Ph-IV (Part-3 :6GW) (Bikaner Complex)	6 GW (Solar) Bikaner-IV:6GW	Under Bidding (Recently approved in NCT
B	**Planned/Under Planning**		
1	Rajasthan REZ Ph-IV (Part-4 :3.5GW) (Jaisalmer/Barmer Complex)	3.5 GW (Solar) Fatehgarh-IV: 1 GW Barmer-I: 2.5 GW	**Recently approved in NCT**
2	Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)	6 GW (Solar) Barmer-II : 6GW	**Timeframe : 2029 (HVDC)**
3	Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)	6 GW (Solar) Bhadla-IV: 2 GW Bikaner-V: 4 GW*	
4	**Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)**	**4 GW (Solar)** **Sirohi: 2 GW** **Nagaur: 2 GW**	**Present proposal** **Timeframe : 2027 (EHVAC)**

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

2. Inputs on AC Scheme proposed for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

Proposed System (Timeframe – 2027):

- 5x500MVA, 400/220kV ICTs at Sirohi S/s along with transformer bays
- Sirohi – Mandsaur PS 765KV D/c line (~ 320 kms) along with 330 MVAr switchable line reactor for each circuit at each end of Sirohi – Mandsaur PS 765KV D/c line
- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765kV D/c line

a) Load-Generation Balance and IR Flows

S. No.	Region	Load (MW)	Generation (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)
1	NR	78239	109488	31249	97898	59664
2	WR	98877	92846	-6030	89547	72184
3	SR	78984	94860	15876	80864	62000
4	ER	29496	14828	-14668	37265	20000
5	NER	2941	2654	-287	4855	2000
6	All India	288536	314676	x	277201	216185

S. No.	State	Load (MW)	Generation (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)
1	Rajasthan	19376	81119	31249	21175	17000

i. Demand considered at all India level as well as in some of the regions in Feb 2027 period is even more than the peak demand of the year 2026-27 as per 20th EPS report.

ii. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in NR, WR, ER, and at all India level is on the higher side. Same may be reviewed.

iii. Solar and Thermal Generation

- ~190000 MW solar generation considered in service at all India level
- ~62000 MW solar generation is in service in Rajasthan

- ~22000 MW RE generation in Khavda complex has been considered in the case

- Thermal generation has been uniformly backed down to 55% (especially in NR and WR) at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level.

- Some of the thermal generating stations (like Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

- Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

iv. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

v. There is significant amount of power flow towards eastern region during solar hours resulting in very high loading and low voltages in the ER grid. It is suggested that system augmentation in ER may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

The details of N-1 non-compliance, high line loading, and low voltages are provided in subsequent sections.

b) Network Loadings

i. With the proposed scheme, there is improvement in loading of 400 kV RAPP – Shujalpur D/C.

ii. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.)

iii. In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)

iv. Critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal is already observed in real-time during solar hours. These elements are severely loaded in the base case also (2027 timeframe).

Details of Lines and ICTs loaded around/more than the N-1 loading limit in NR, WR & ER are given in **Annexure – 1.**

v. 765 kV Ghiror – Aligarh is completely off-loaded (5 MW loading in each ckt)

vi. 765 kV Aligarh – G.Noida touches 2800 MW (Scenario – 7) & 3400 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur

vii. Angular difference between 765 kV Bikaner and 765 kV Moga touches 26° under N-1

viii. RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

ix. Angular Separation:

Scenario	765 kV Sirohi – Mandsaur D/C Line	765 kV Sirohi – Risabhdeo D/C	765 kV Neemuch – Khandwa D/C
Base Case	14.4° (1746 MW)	9.5° (1744 MW)	7.3° (1230 MW)
Under N-1 Contingency	17.5° (2100 MW)	12.4° (2254 MW)	9.3° (1581 MW)
Under N-1-1 Contingency	22.3°	17.9°	13.2°

c) Voltages

i. Very low voltages have been experienced at various nodes in the system including in NR RE Complex.

ii. The voltages under N-1 condition (depleted network conditions) will further dip.

765 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
SIWANI	765	147880	0.94	719
NORTH CHN	765	548008	0.95	730
NCTPS-STG3	765	548013	0.95	730
MADHUGIRI	765	528001	0.95	730
ETPSREP7	765	548124	0.95	730
TIRUVLM	765	548087	0.95	730
ARIYALUR7	765	548127	0.95	730
BIKANER-IV	765	167000	0.96	736
MOGA-PG	765	137703	0.96	738
SIKAR	765	167497	0.97	740
BHADLA-2	765	167498	0.97	743

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
BIKANER-NW	765	167458	0.97	745
NARELA	765	157001	0.97	745
KHETRI	765	167774	0.97	746
MUL	765	358129	0.97	746
JHATI-PG	765	157708	0.98	746
KURAWAR-7	765	368086	0.98	747
KURN4_7	765	508887	0.98	747
KURNOOL-III	765	508049	0.98	748
MAHESHWARAM	765	518051	0.98	749
BHIWN-PG	765	147704	0.98	749

400 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
YELAHNKA	400	524084	0.93	373
DHANLLI	400	524025	0.93	374
JEY-BOL_FSC	400	424005	0.94	374
HDURGA	400	524102	0.94	374
PEENYA4	400	524169	0.94	374
MYSORE4	400	524010	0.94	374
NELMANG4	400	524007	0.94	375
BIDADI	400	524077	0.94	375
PULNTOPE4	400	544125	0.94	375
MANALI4	400	544040	0.94	376
KORATUR4	400	544035	0.94	376
THERVOI4	400	544126	0.94	376
HOODI4	400	524005	0.94	377
SMNH	400	524001	0.94	377
TARAMANI4	400	544015	0.94	377
MYLSNDRA	400	524035	0.94	377
MADHUGI4	400	524098	0.94	377
KADAKOLA	400	524106	0.94	377
GUINDY4	400	544133	0.94	378
KOYAMBEDU4	400	544019	0.95	378
SHOLNGNR	400	544091	0.95	378
MUL	400	354129	0.95	378
FSC-4	400	504999	0.95	379
FSC-3	400	504998	0.95	379
SIWANI	400	144880	0.95	379
DOMSANDRA	400	524171	0.95	379
MALEKTT	400	544086	0.95	379
SVCHTRM	400	544090	0.95	379
SPBUDUR4	400	544002	0.95	379
ALMATI4	400	544022	0.95	380
CHENN-EX	400	544000	0.95	380

d) Short Circuit Ratio

Bus/Station	Connected RE Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Sirohi	2000 MW	8418 MVA	**4.2**
220 kV Merta – II	1000 MW	5734 MVA	5.7
400 kV Merta - II	1000 MW	20226 MVA	20.2

e) Dynamic Simulation Studies – With more than 62,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

f) Study cases for other scenarios – The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

3. Inputs on proposed Transmission Schemes for:

3.1: Rajasthan REZ Ph-IV (Part-5: 6GW) (Barmer Complex)
3.2: Rajasthan REZ Ph-IV (Part-6: 6GW) (Bhadla/Bikaner Complex)

Proposed Transmission scheme for Rajasthan REZ Ph-IV (Part-5: 6GW) (Barmer Complex) - (Timeframe – 2029)

- Establishment of 400/220kV, 6x500MVA S/s at suitable location near Barmer (Barmer-II Substation) along with 2x125 MVAr bus reactor
- LILO of both ckts of 400kV Fatehgarh-IV PS - Barmer-I PS at Barmer-II PS
- Establishment of 6000 MW, ± 800 kV Barmer-II (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near Barmer-II substation
- Establishment of 6000 MW, ± 800 kV South Kalamb S/s (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near South of Kalamb
- Establishment 2x1500MVA, 765/400kV Substation near South of Kalamb with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor
- LILO of Pune-III – Boisar-II 765kV D/c line at South Kalamb with associated bays at South Kalamb S/s
- ±800 kV HVDC line between Barmer-II (HVDC) & South Kalamb (HVDC) (with Dedicated Metallic Return) (1000kms)

Proposed Transmission scheme for Rajasthan REZ Ph-IV (Part-6: 6GW) (Bhadla/Bikaner Complex) - (Timeframe – 2029)

- Establishment of 765/400kV, 4x1500 MVA S/s & 400/220kV, 2x500MVA pooling station at suitable location near Bikaner (Bikaner-V PS)
- LILO of both ckts of 400kV Bikaner-II PS- Khetri D/c line at Bikaner-V PS (20km)
- Establishment of 765/400kV, 3x1500 MVA S/s & 400/220kV 3x500MVA pooling station at suitable location near Bhadla (Bhadla-IV PS) along with 2x125 MVAr & 2x240 MVAr bus reactor
- Bhadla-IV PS – Bikaner-V 765KV D/c line (~ 150kms) along with 240 MVAr switchable line reactor
- for each circuit at Bhadla-IV PS end of Bhadla-IV PS – Bikaner-V PS 765kV D/c line
- Bhadla-IV PS – Bhadla-III PS 400kV D/c line (Quad) (~30kms)

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

- Establishment of 6000 MW, ± 800 kV Bikaner-V (HVDC) [LCC] terminal station (4x1500 MW) at suitable location near Bikaner

- Establishment of 6000 MW, ±800 kV Begunia (HVDC) [LCC] terminal station (4x1500 MW) at
- Begunia (Distt. Khordha), Orissa

- ±800 kV HVDC line between Bikaner-V (HVDC) & Begunia (HVDC) (with Dedicated Metallic
- Return) - 1900 km

- Establishment of 765/400kV, 5x1500 MVA S/s substation station at Begunia along with 2x125
- MVAr & 2x240 MVAr bus reactor

- Begunia - Paradeep (ISTS)* 765kV D/c line along with associated bays at both ends

- Begunia – Gopalpur (ISTS)# 765kV D/c line along with associated bays at both ends (150km)
- along wih 240MVAr switchable line reactor for each circuit at Begunia end of Begunia –Gopalpur
- (ISTS) 765kV D/c line

- Begunia – Khuntuni (OPTCL)@ 765kV D/c line

a) Load-Generation Balance

S. No.	Region	Load	Generation	IR Exchange	20th EPS Peak Load in 2028-29	Average Demand Met in Solar Hours in Feb 2024
1	NR	85756	129923	44167	109714	59664
2	WR	109083	107587	-1496	100246	72184
3	SR	81317	103944	22627	91285	62000
4	ER	43981	19628	-24352	42546	20000
5	NER	2869	2655	-214	5481	2000
6	All India	323005	363737	x	313098	216185

S. No.	State	Load	Generation	IR Exchange	20th EPS Peak Load in 2028-29	Average Demand Met in Solar Hours in Feb 2024
1	Rajasthan	21377	96462	75086	23590	17000
2	Odisha	21379	8599	-12780	8514	4300

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

i. Demand considered at all India level as well as in some of the regions in Feb 2029 period is even more than the peak demand of the year 2028-29 as per 20th EPS report.

ii. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in WR, ER, and at all India level is on the higher side. Same may be reviewed.

iii. In the 20th EPS report, following is also mentioned:

"Factors like reduction in transmission & distribution losses, energy efficiency improvement measures, ***production of green hydrogen, penetration of electric vehicles****, roof-top solar, solar pumps etc. have appropriately been factored in the electricity demand forecast."*

Therefore, the increase in demand due to green hydrogen load has already been captured in the 20th EPS figures.

iv. Solar and Thermal Generation

- ~225408 MW solar generation considered in service at all India level
- ~89510 MW solar generation is in service in Rajasthan
- ~42000 MW solar generation in Gujarat and ~24500 MW Khavda complex has been considered in the case

- Thermal generation has been uniformly (especially in NR and WR) backed down to 55% at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level.

- Some of the thermal generating stations (like Chandrapur, Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

- Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

v. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2028-29, preferably the one coming out of production cost modelling studies.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

b) Network Loading

i. Barmer II – South Kalamb HVDC Link

- N-1 criteria is not satisfied for 400/220 kV ICTs at Barmer – II: 3000 MVA Transformation capacity for 3000 MW RE generation
- No filter arrangement modelled at HVDC terminal at Barmer - II
- On the outage of a 3000 MW Bipole of HVDC Barmer – II – South Kalamb, the loading of 765/400 kV ICTs at Barmer – I is seen to be N-1 non-compliant
- Three bus sections have been created at 400 kV Muradabad/South Kalamb station. Following issues are observed in the base case.
    - 2x1500 MVA ICTs at Section – 3 are loaded up to N-1 limit. Loading after N-1: 1490 MVA (Scenario – 4) & 1460 MVA (Scenario – 7).
- On the outage of a 1500 MW monopole of HVDC Barmer – II – South Kalamb, the loading of lines and ICTs around Barmer – II is seen to be N-1 compliant

ii. Bikaner V – Begunia HVDC Link

- N-1 compliance not satisfied for 400/220 kV ICTs at Bikaner – V: 2000 MVA Transformation capacity for 2000 MW RE generation
- STATCOM with 9999 MVA capacity connected to Bikaner – V station as filter arrangement
- On the outage of a 1500 MW monopole or 3000 MW Bipole of HVDC Bikaner – V – Begunia, the loading of lines and ICTs around Bikaner – V/Bhadla - IV is seen to be N-1 compliant
- 765/400 kV ICTs at Gopalpur are loaded up to the full rating and are N-1 non-compliant in the base case itself for the considered bulk load

iii. Highly Loaded Lines/ICTs

- Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota - PG).
- In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)
- Presently, critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal are already observed in real-time. These elements are severely loaded in the base case also (2028-29 timeframe).

Details of Lines and ICTs loaded around/more than the N-1 loading limit in NR, WR & ER are given in Annexure – 2.

iv. Other Comments

- 765 kV Narela ISTS – Meerut loaded beyond 2600 MW in base case. Loading exceeds 3100 MW under the outage of 765 kV Moga – Meerut etc.
- 765 kV Aligarh – G.Noida touches 3200 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur.
- RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

c) Voltages

i. Very low voltages have been experienced at various nodes in the system including in NR RE complex and ER load centres.
ii. The voltages under N-1 condition (depleted network conditions) will further dip.
iii. No reactive power consumption considered for bulk loads considered at Paradeep & Goplapur station.
   a. With 0.95 lag power factor voltages of 400 kV Gopalpur, 400 kV Paradeep – ISTS and STU stations go below 0.9 pu in steady state. 765 kV level voltage of Paradeep – ISTS & Goplapur – ISTS go below 710 kV. ***This is the case when a dynamic FACTS device of the capacity of 9999 MVA is connected at Begunia – HVDC as filter arrangement.***
   b. ***When a 50% fixed shunt is connected at 400 kV Begunia HVDC (in place of 9999 MVA STATCOM) and with 0.95 pf operation of bulk loads at Paradeep and Gopalpur, voltage collapse is seen in the complex.***

765 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
MANGALORE	765	528045	0.95	729
BARMER1	765	167883	0.96	738
SIROHI	765	167492	0.97	742
LALITPUR	765	177710	0.97	742
TALBEHAT	765	177715	0.97	744
TUTICORIN	765	548098	0.97	746
PARADEEP	765	428017	0.98	746
KISHENPUR	765	117706	0.98	748
GOPALPUR	765	428020	0.98	748
DUBURI_765	765	428024	0.98	748
FATEHG-4	765	167482	0.98	750

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

400 kV Level

Name	Base kV	Bus No.	Voltage (p.u.)	Voltage (kV)
BARMER-II	400	164885	0.94	378
MANGALORE	400	524045	0.94	375
TUTICORIN	400	544098	0.95	382
JEY-BOL_FSC	400	424005	0.93	374
MUL	400	354129	0.95	381

d) Short Circuit Ratio (SCR)

Bus/Station	Connected RE/LCC HVDC Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Barmer - II	3000 MW RE	11906 MVA	**3.96**
400 kV Barmer - II	6000 MW RE + 6000 MW LCC HVDC	23606 MVA	**3.93** **1.97*** (*Considering the requirement of system strength for both LCC HVDC and RE plant)
220 kV Bikaner - V	2000 MW RE	9470 MVA	**4.7**
400 kV Bikaner – V	4000 MW RE + 6000 MW LCC HVDC	23152 MVA	5.7 **2.3*** (*Considering the requirement of system strength for both LCC HVDC and RE plant)
220 kV Bhadla - IV	1000 MW RE	7956 MVA	7.9
400 kV Bhadla - IV	2000 MW RE	23586 MVA	11.8
400 kV Begunia HVDC	6000 MW LCC HVDC	27867 MVA	4.5

e) HVDC Schemes

02 nos. 6000 MW LCC based HVDCs have been proposed for evacuation of bulk power from Rajasthan.

±800 kV, 6000 MW HVDC Barmer-II - South Kalamb – 1000 kMs
±800 kV, 6000 MW HVDC Bikaner-V - Begunia – 1900 kMs

i. The rationale for terminating these HVDCs in WR (Maharashtra) and ER (Odisha) may be provided.

Further, as highlighted in section (a) on Load-Generation Balance, the LGB of the case is subject to change with the proposed corrections which may lead to requirement of new transmission lines in other locations than the one currently proposed.

The production cost modelling studies duly factor in the RRO targets for each states, RE integration targets, flexibility requirements, merit order etc. Therefore, it is suggested that the study scenario may be finalized based on the output of the production cost modelling studies for the same timeframe. This LGB will itself indicate the paths/corridors along with the system augmentation is required.

ii. The overload capability and reverse power capability of both the HVDCs has not been defined and kept open. As HVDC are planned for bulk evacuation of RE power, the outage of single or both poles of the HVDC may lead to curtailment in RE generation. This curtailment may be avoided/minimized by specifying the continuous and transient **ambient temperature-based overload capability** for the proposed HVDCs.

Similar reverse power capability may also be specified for the proposed HVDCs.

iii. With the proposed HVDCs, there will 03 nos. 6000 MW HVDC terminals in Rajasthan in close vicinity. The system strength of the Rajasthan RE complex is already on the lower side. With a large number of power electronic controllers (RE + HVDCs) in close proximity, there is a very high probability of controller interactions in the complex. Such interactions are already being observed in the Rajasthan RE complex with ~20 GW of RE capacity at present.

It is suggested that controller interaction studies (screening and if required detailed) may be carried out (using generic models for future capacities) to identify the potential interaction issues in the complex.

iv. The feature of power oscillation damping is also important for LCC based HVDC and shall be suitably added in specifications. The provision of tuning of POD based on measurement data may also be specified.

v. At least one VSC based HVDC may be planned in the complex keeping in view the black start requirements. The VSC based HVDC would also provide steady state and dynamic reactive power support.

vi. Filter sizing becomes important with low SCR at converter stations. Keeping in view the low SCR/fault level, it is proposed that the filter sizing shall be granular to avoid wide voltage variations during switching.

f) Name of New Substations – It is requested to assign unique name for envisaged RE pooling stations. As several pooling substations with identical names but different numerical suffixes have been planned in the same district along with multiple

interconnections, there is a chance of miscommunication during real-time operation among multiple constituents. For clarity of operation and ensuring that names of different substations are easily distinguished from each other, it is suggested that after finalization of the exact location, the ISTS substations are uniquely named as per the geographical name of the nearest location like village or taluk.

g) **Dynamic Simulation Studies –** With more than 89,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

h) **Study cases for other scenarios –** The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Annexure - 1

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MVA	RATING IN MVA	PERCENT LOADING
199	TARAPR-3&4	21	374017	TAPS4	400.00*	1	417.3	635	65.7
199	TARAPR-3&4	21	374017	TAPS4	400.00*	2	417.4	635	65.7
12944	KANDAL	400.00*	26456	CHIMANGAON13	132	1	79.9	111	72
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	1	331.4	315	105.2
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	2	331.4	315	105.2
112235	KISHENPUR	220.00*	114422	KISHENPUR	400	3	331.4	315	105.2
162093	DEEDWANA-42	220	164415	DEEDWANA	400.00*	1	235.5	315	74.8
162093	DEEDWANA-42	220	164415	DEEDWANA	400.00*	2	235.5	315	74.8
162207	HINDAU-4	220	164409	HINDAU-4	400.00*	1	326	315	103.5
162207	HINDAU-4	220	164409	HINDAU-4	400.00*	2	326	315	103.5
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	1	288.9	315	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	2	229.3	250	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	3	229.3	250	91.7
162211	HIRAPURA	220	164406	HERAPU-4	400.00*	4	229.3	250	91.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	1	292.1	315	92.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	2	292.1	315	92.7
162228	CHITTOR-42	220	164428	CHITTOR4	400.00*	3	292.1	315	92.7
162271	CHABRA-2	220	164411	CHABRA-4	400.00*	1	253.2	315	80.4
162283	BASSI	220	164431	BASSI	400.00*	1	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	2	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	3	403.6	500	80.7
162300	KALISIND	220	164412	KALISI-4	400.00*	2	566.8	500	113.4
162329	AJMER42	220	164416	AJMER	400.00*	1	243.6	315	77.3
162329	AJMER42	220	164416	AJMER	400.00*	2	243.6	315	77.3
162914	BHINM-PG	220	164405	BHINMAL	400.00*	1	806.4	945	85.3
162919	KOTA	220.00*	164420	KOTA	400	1	310.3	315	98.5
162919	KOTA	220.00*	164420	KOTA	400	2	310.3	315	98.5
164404	BHADLA	400.00*	164456	BIKANE-4	400	1	1146.4	1714	66.9
164404	BHADLA	400.00*	164456	BIKANE-4	400	2	1146.4	1714	66.9
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	1	665.7	857	77.7
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	2	665.7	857	77.7
164429	CHIT-NEW	400	164492	SIROHI	400.00*	1	656.6	850	77.2
164429	CHIT-NEW	400	164492	SIROHI	400.00*	2	656.6	850	77.2
174445	MUZAFRN4	400	174905	MEERUT	400.00*	1	580.6	857	67.8
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	1	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	2	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	3	226.8	315	72
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	1	208	315	66
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	2	158.4	240	66
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	1	347.3	500	69.5
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	2	347.3	500	69.5
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	3	347.2	500	69.4

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MVA	RATING IN MVA	PERCENT LOADING
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	1	230	315	73
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	2	230	315	73
354022	HAZIRA4	400.00*	354290	SOUTH OLPAD	400	1	964.7	857	112.6
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	2	987.7	1500	65.8
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	3	987.7	1500	65.8
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	1	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	2	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	3	70.4	100	70.4
362003	INDORE-42	220	364001	INDORE-4	400.00*	1	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	2	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	3	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	4	262.3	315	83.3
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	1	262.1	315	83.2
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	2	262.1	315	83.2
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	1	440.3	500	88.1
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	2	440.3	500	88.1
364023	INDORE-74	400.00*	368023	INDORE-7	765	2	1506	1500	100.4
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	1	267.3	315	84.9
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	2	267.3	315	84.9
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	1	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	2	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	3	330	500	66
374008	DHULE4	400.00*	374011	BABLESWAR	400	2	668.7	857	78
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	1	943.9	852	110.8
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	2	943.9	852	110.8
442012	KTPS220	220	444012	KOLAGHAT	400.00*	1	281	315	89.2
442012	KTPS220	220	444012	KOLAGHAT	400.00*	2	281	315	89.2
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	1	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	2	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	3	283.5	315	90
442685	JEERAT	220	444008	JEERAT	400.00*	1	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	2	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	3	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	4	242.9	315	77.1
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	1	657.5	850	77.3
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	2	657.5	850	77.3
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	1	881.1	1093	80.6
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	2	881.1	1093	80.6
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	1	379.2	500	75.8
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	2	379.2	500	75.8
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	1	237.4	315	75.4
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	2	237.4	315	75.4

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

Annexure – 2

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MW	RATING IN MVA	PERCENT LOADING
199	TARAPR-3&4	21	374017	TAPS4	400.00*	1	417.3	635	65.7
199	TARAPR-3&4	21	374017	TAPS4	400.00*	2	417.4	635	65.7
12944	KANDAL	400.00*	26456	CHIMANGAON13	132	1	79.9	111	72
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**1**	**331.4**	**315**	**105.2**
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**2**	**331.4**	**315**	**105.2**
112235	**KISHENPUR**	**220.00***	**114422**	**KISHENPUR**	**400**	**3**	**331.4**	**315**	**105.2**
162093	**DEEDWANA-42**	**220**	**164415**	**DEEDWANA**	**400.00***	**1**	**235.5**	**315**	**74.8**
162093	**DEEDWANA-42**	**220**	**164415**	**DEEDWANA**	**400.00***	**2**	**235.5**	**315**	**74.8**
162207	**HINDAU-4**	**220**	**164409**	**HINDAU-4**	**400.00***	**1**	**326**	**315**	**103.5**
162207	**HINDAU-4**	**220**	**164409**	**HINDAU-4**	**400.00***	**2**	**326**	**315**	**103.5**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**1**	**288.9**	**315**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**2**	**229.3**	**250**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**3**	**229.3**	**250**	**91.7**
162211	**HIRAPURA**	**220**	**164406**	**HERAPU-4**	**400.00***	**4**	**229.3**	**250**	**91.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**1**	**292.1**	**315**	**92.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**2**	**292.1**	**315**	**92.7**
162228	**CHITTOR-42**	**220**	**164428**	**CHITTOR4**	**400.00***	**3**	**292.1**	**315**	**92.7**
162271	CHABRA-2	220	164411	CHABRA-4	400.00*	1	253.2	315	80.4
162283	BASSI	220	164431	BASSI	400.00*	1	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	2	254.3	315	80.7
162283	BASSI	220	164431	BASSI	400.00*	3	403.6	500	80.7
162300	**KALISIND**	**220**	**164412**	**KALISI-4**	**400.00***	**2**	**566.8**	**500**	**113.4**
162329	AJMER42	220	164416	AJMER	400.00*	1	243.6	315	77.3
162329	AJMER42	220	164416	AJMER	400.00*	2	243.6	315	77.3
162914	**BHINM-PG**	**220**	**164405**	**BHINMAL**	**400.00***	**1**	**806.4**	**945**	**85.3**
162919	**KOTA**	**220.00***	**164420**	**KOTA**	**400**	**1**	**310.3**	**315**	**98.5**
162919	**KOTA**	**220.00***	**164420**	**KOTA**	**400**	**2**	**310.3**	**315**	**98.5**
164404	BHADLA	400.00*	164456	BIKANE-4	400	1	1146.4	1714	66.9
164404	BHADLA	400.00*	164456	BIKANE-4	400	2	1146.4	1714	66.9
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	1	665.7	857	77.7
164419	RAPS_C4	400.00*	364021	SHUJALPR-4	400	2	665.7	857	77.7
164429	CHIT-NEW	400	164492	SIROHI	400.00*	1	656.6	850	77.2
164429	CHIT-NEW	400	164492	SIROHI	400.00*	2	656.6	850	77.2
174445	MUZAFRN4	400	174905	MEERUT	400.00*	1	580.6	857	67.8
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	1	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	2	226.8	315	72
192221	KASHIPU2	220	194467	KASHIPU4	400.00*	3	226.8	315	72
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	1	208	315	66
192225	RISHIKE2	220	194426	RISHIKE4_PT	400.00*	2	158.4	240	66
352022	**HAZIRA2**	**220**	**354022**	**HAZIRA4**	**400.00***	**1**	**347.3**	**500**	**69.5**
352022	**HAZIRA2**	**220**	**354022**	**HAZIRA4**	**400.00***	**2**	**347.3**	**500**	**69.5**

NLDC Inputs on Rajasthan REZ Phase-IV and V Schemes

From Bus No	From Bus Name	From Bus Voltage	To Bus No	To Bus Name	To Bus Voltage	CKT	LOADING IN MW	RATING IN MVA	PERCENT LOADING
352022	HAZIRA2	220	354022	HAZIRA4	400.00*	3	347.2	500	69.4
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	1	230	315	73
352140	HALWAD NEW	220	354036	HALVAD NEW	400.00*	2	230	315	73
354022	HAZIRA4	400.00*	354290	SOUTH OLPAD	400	1	964.7	857	112.6
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	2	987.7	1500	65.8
354079	JAMNAGAR	400	358079	JAMNAGAR7	765.00*	3	987.7	1500	65.8
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	1	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	2	70.4	100	70.4
361336	KIRNAPUR-421	132	364049	KIRNAPUR	400.00*	3	70.4	100	70.4
362003	INDORE-42	220	364001	INDORE-4	400.00*	1	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	2	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	3	262.3	315	83.3
362003	INDORE-42	220	364001	INDORE-4	400.00*	4	262.3	315	83.3
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	1	262.1	315	83.2
362113	MANDSOUR-42	220	364039	MANDSAUR-4	400.00*	2	262.1	315	83.2
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	1	440.3	500	88.1
362189	DATIYA NEW2	220.00*	364189	DATIYA NEW4	400	2	440.3	500	88.1
364023	INDORE-74	400.00*	368023	INDORE-7	765	2	1506	1500	100.4
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	1	267.3	315	84.9
372365	NAVI-MUM220	220	374217	NAVI-MUM	400.00*	2	267.3	315	84.9
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	1	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	2	330	500	66
372460	VIKROLI220	220	374068	VIKROLI400	400.00*	3	330	500	66
374008	DHULE4	400.00*	374011	BABLESWAR	400	2	668.7	857	78
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	1	943.9	852	110.8
414010	KAHALGAON-B	400.00*	444019	FARAKKA	400	2	943.9	852	110.8
442012	KTPS220	220	444012	KOLAGHAT	400.00*	1	281	315	89.2
442012	KTPS220	220	444012	KOLAGHAT	400.00*	2	281	315	89.2
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	1	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	2	283.5	315	90
442015	CHANDITALA_N	220	444015	CHANDITALA_N	400.00*	3	283.5	315	90
442685	JEERAT	220	444008	JEERAT	400.00*	1	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	2	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	3	242.9	315	77.1
442685	JEERAT	220	444008	JEERAT	400.00*	4	242.9	315	77.1
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	1	657.5	850	77.3
444074	PPSP_NEW	400.00*	444075	PURULIAPS	400	2	657.5	850	77.3
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	1	881.1	1093	80.6
444074	PPSP_NEW	400	474047	RANCHI-NEW	400.00*	2	881.1	1093	80.6
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	1	379.2	500	75.8
452001	DURGAPUR TPS	220	454001	DURGAPUR TPS	400.00*	2	379.2	500	75.8
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	1	237.4	315	75.4
452002	MEJIA-B	220	454002	MEJIA-B	400.00*	2	237.4	315	75.4

NRLDC Inputs on Joint study meeting for Transmission system for evacuation of RE power from Rajasthan (REZ Ph-V (Part-1 : 4 GW), REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW))

SCENARIO 2028-2029

1. SCR of following Station are below 5 considering Xsource of IBRs as 999pu :

Bus	Name	Generation connected	Fault MVA	SCR
163482	[FATEHG4-SPL	3480	12172.67	3.50
162885	[BARMER-II HV	3000	11803.85	3.93
162883	[BARMER-I	4000	16338.1	4.08
162495	[BIKANER-2	4460	18780.77	4.21
162399	[ESSEL	750	3174.92	4.23
162492	[SIROHI	2000	9235.59	4.62
162002	[BIKANER-V	2000	9805.4	4.90

- *HVDC Barmer-II – South Kalamb(1000km), HVDC Bikaner-V – Begunia (1900km) are proposed as a LCC. Low SCR at Barmer-II and Bikaner-V may not be suitable for LCC HVDC. Either additional connectivity/Synchronous Condensor may be thought of in above station to improve SCR (minimum 5) or VSC HVDC in place of LCC HVDC may be considered.*

2. Buses with high angular difference >20 degree under N-0/N-1

From	To	Ang. Diff (N-0)	Ang. Diff (N-1)
164774 Khetri	164495 Bikaner-2	23	25
164404 Bhadla	164456 Bikaner-4	19	24.2
167497 Sikar New	167484 Bhadla-3	16.8	21.2
167458 Bikaner-NW	137703 Moga	20.2	25
164404 Bhadla	164400 Merta	22.2	25.5
167080 NeemR(NEW)	167505 Bikaner-3	18.3	22.2

- *As per CEA TPC 3.14.12, Stability studies may be carried out for the above lines.*

3. Many thermal plants are observed to be **switched off during Solar time** and **Switched on (close to rated IC) during evening hours**. The philosophy may be reviewed/confirmed else sufficient BESS/Energy storage capacity may be thought off to absorb the excess RE generation during day time. Some plants in NR are listed below:

Plant/Unit (MW)	Solar Peak(MW)	Evening peak(MW)
Kalisindh (2 X 600)	0	1020
Chabra SC Unit# 6 (660)	0	560
Kanpur Unit #1 (600)	0	560
Lalitpur (3 X 660)	0	1120
Ghatampur Unit#3 (660)	0	560
Obra Unit#3,4,5 (600)	0	540
Unchahar Unit#4,5 (420)	0	170
Ropar Unit#2,3,4 (630)	0	540

4. Approx 4000 MW Solar generation in Rajasthan State control area is not being dispatched in solar peak case. Rajasthan solar dispatched is ~8000 WM against ~12000MW Installed intrastate Solar capacity in Basecase.
5. No of ICTs at 164505 Bikaner-3 may be checked: 1 X 6000MVA + 5 X 1500 MVA

NRLDC Inputs on Joint study meeting for Transmission system for evacuation of RE power from Rajasthan (REZ Ph-V (Part-1 : 4 GW), REZ Ph-IV (Part-5 : 6GW) & REZ Ph-IV (Part-6 : 6GW))

6. Giral plant is observed to be running. May be rectified.

7. At 164001 Bikaner-V, STATCOM is considered in service with Shunt Max capacity of 9999 MVA and Bridge Max capacity of 9999 MW. After taking out the STATCOM, voltage is dipping from 400 kV to 378kV.

Grid-India (NLDC/NRLDC) observations on Joint study meeting held on 09.05.24 to deliberate & finalize the Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex

1. Demand considered at all India level as well as in some of the regions in Feb 2027 period is even more than the peak demand of the year 2026-27 as per 20th EPS report. The actual average demand met during Feb'24 solar hours has also been provided for reference. It appears that the growth demand considered in NR, WR, ER, and at all India level is on the higher side. Same may be reviewed.

CTU reply :

S.No	Region	Demand considered in PSSE files (GW)	Peak demand in Feb'24 (in Winter Solar peak hours) (GW)	Anticipated Peak demand in Feb'27 (in Winter Solar peak hours) (@7% CAGR) (GW)	Demand considered in Revised PSSE files (in Winter Solar peak hours) (GW)
1	NR	78.2	63.8	78.2	79.5
2	WR	98.8 (Considering additional load of GH/BKC-8.2GW)	73.3	89.8	99.8 (Considering additional load of GH/BKC-8.2GW)
3	ER	29.5 (considering additional load of GH-3GW, BKC:0.3GW)	22.1	27.1	29.6 (considering additional load of GH/BKC-3.3GW)
	All India	288.5	220.7	270.3	291.7 (considering additional load of GH/BKC -13GW)

**** GH – Green Hydrogen, BKC – Bulk Consumer***

From the historical data (Feb'23 to Feb'24) analysis, load growth of about 7 % is observed in winter solar peak hours in All India & most of the regions. Based on extrapolation of above load growth, expected load of Feb'27 (in winter solar peak hours) is indicated on the table above which is considered in PSS/E file. Further additional demand from Green Hydrogen, Bulk consumer is also considered the studies (included in total demand figure).

- Green hydrogen / Bulk loads considered in ER are as under
  - 1500MW: Paradeep,
  - 1500MW: Gopalpur,
  - 180MW: Vedanta & 100MW: IPCL
- Major Bulk loads/ Green hydrogen considered in WR are as under
  - 4500MW: MUL Gujarat (including 1500MW Green Hydrogen)
  - 3700MW: Jamnagar/Jam Khambaliya Complex

2. Thermal generation has been uniformly backed down to 55% (especially in NR and WR) at most of the stations. It is suggested that the generation may be scaled as per the merit order. Cheaper thermal generating stations like Singrauli and Rihand are also running at 55% level. some of the thermal generating stations (like Vadinar, Khaparkheda, Tiroda-APL etc.) are running below 40% tech min level also. Same may be clarified.

CTU reply – In revised files, merit order dispatch is being followed up to an extent and incorporated in revised PSS/E files. Dispatch of Cheaper thermal generating stations in Singrauli and Rihand complex kept higher to match LGB. .

Dispatches of major thermal generating stations of states such as Vadinar, Khaparkheda, Tiroda-APL, Chandrapur have been changed to 40%. Further, generation with very low dispatches has also been switched off.

3. Many units with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case

CTU reply - Incorporated (all such units are now kept off)

4. With above-mentioned corrections in demand and generation, the whole LGB of the study case will change. This might result in significant changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

CTU reply – Modified PSSE files are enclosed. It is observed that with above modifications in LGB, there will be no impact on the proposed transmission scheme for evacuation of power from Rajasthan REZ Ph-V (Part-1 :4 GW) [Sirohi/Nagaur] Complex.

5. There is significant amount of power flow towards eastern region during solar hours resulting in very high loading and low voltages in the ER grid. It is suggested that system augmentation in ER may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

CTU reply - Reconductoring of 400kV Farakka – Kahalgaon & Talcher – Meramundali 400kV D/c lines in under advance stage of stakeholder consultation. Other system, if required in ISTS would be taken up on priority

6. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.

CTU reply – Most of the ICTs i.e. Deedwana, Hindaun, Heerapura, Chittorgarh are getting overloaded in planning studies due to the increase in load of Rajasthan. Some of the ICTs are even critically loaded in present time frame and issue of high loading is deliberated in various OCC/NRPC meetings. In above meetings, RVPN is already requested to carry out 400/220kV ICT augmentation works or feeder reconfiguration to relive ICT loadings.

Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand.

Above ICT loading will be reviewed in consultation with NRLDC w.r.t real time loading and Grid-India operational feedback report and necessary augmentation will be carried out in ISTS, if required, as per the present practice.

7. In the base case, several ICTs in WR are violating N-1 criteria (765/400 kV Jamnagar - ISTS, 765/400 kV Indore – PG, 400/220 kV Mandsaur, 400/220 kV Hazira, 400/132 kV Kirnapur – MP, 400/220 kV Navi Mumbai etc.)

CTU reply – In Jamnagar Complex, applications from bulk consumer to the tune of about 1800MW has been received, whereas in PSSE file load of 3700MW has been considered. Accordingly, ICT augmentation would be taken up with receipt of further applications.

Augmentation of Transformation capacity at 765/400kV Indore S/s by 1x1500MVA ICT (3rd) [terminated on 400kV Bus section A with Indore & Khandwa 400kV D/c lines] has been agreed in CMETS-WR & is presently under implementation. On other section, under contingency of any line, sectionaliser can be closed to reduce loading on 765/400kV ICT. To resolve issue of overloading at Mandsaur,1X500MVA,400/220kV ICT (3rd) at Mandsaur S/s has been planned & is being implemented by MPPTCL. Establishment of 400/220kV Hazira-II (GIS) S/s through Installation of 1x500MVA, 400/220kV ICT has been agreed for drawl of power at Hazira in WR-CMETS meeting to reduce overloading on Hazira S/s. ICT augmentation or shifting of proposed Data Centres load at Navi Mumbai is being taken up with MSETCL.

8. Critical loading in 400 kV Farakka – Kahalgaon D/C, 400 kV New Ranchi – PPSP D/C and ICTs in West Bengal is already observed in real-time during solar hours. These elements are severely loaded in the base case also (2027 timeframe)

CTU reply – Reconductoring of 400kV Farakka – Kahalgaon D/c line in under active stages of discussion.

New generation are expected in Purulia area viz. Raghunathpur (2x660MW) and DTPS-Waria (1x800MW). With this, the loading on Ranchi – New Purulia is expected to be relieved. Nevertheless, analysis of loading on Ranchi – New Purulia 400kV D/c line would be taken up for discussion in future.

9. 765 kV Ghiror – Aligarh is completely off-loaded (5 MW loading in each ckt)

CTU reply - 765 kV Ghiror – Aligarh D/c line is formed through LILO of existing 765V Aligarh-Orai D/c line at Ghiror S/s for optimal utilization of above line in solar maximized scenario. It is to be mention that 765kV Ghiror and Aligarh both are the major substations for dispersal of RE power towards load centers in UP. In view of huge RE injection each at 765kV Aligarh & 765kV Ghiror S/s, 765 kV Ghiror – Aligarh line gets off-loaded. However in other than solar maximized scenario, line loading is more than loading in solar maximized scenario In future studies and schemes, efforts to be made for optimal utilization of Aligarh-Ghiror section.

10. 765 kV Aligarh – G.Noida touches 2800 MW (Scenario – 7) & 3400 MW (Scenario – 4) on N-1 of 765 kV Aligarh – Kanpur

11. **CTU reply –** In the planning studies, maximum loading of 3500MW is considered on 765kv D/c lines in N-1 contingency in case other parameters i.e. angular separation, bus voltages are withing stipulated limit as per transmission planning criteria. In 765kV Aligarh – G.Noida line, angular separation is within limit and voltages are is in order on N-1 contingency of 765 kV Aligarh – Kanpur

.

12. Angular difference between 765 kV Bikaner and 765 kV Moga touches 26° under N-1 (NLDC). Additionally, some Buses i.e. 400kV Bikaner-II – Khetri, 765kV Bhadla-III-Sikar-II, 765kV Bikaner-III-Neemrana-2 have angular difference >20 degree under N-0/N-1 (NRLDC)

    CTU reply – The loading of 765 kV Bikaner and 765 kV Moga will gradually increase in next 3 years in planning studies due to increasing RE injection at Bikaner. Stability studies shall be carried out for 765kV Bikaner-Moga D/c line and 400kV Bikaner-II – Khetri D/c line for 2027 timeframe, once dynamics file is prepared. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress.

    Angular separation of 765kV Bhadla-III-Sikar-II & 765kV Bikaner-III-Neemrana-2 is below 20 degree in N-1 contingency in 2027 timeframe files (angular separation >20 degree in N-1 contingency in 2029 timeframe files for which Stability studies shall be carried out once dynamics file is prepared)

13. RATE-2 limits of several lines are not available. The same may be corrected in the cases shared by CTUIL.

    CTU reply - Incorporated.

14. Very low voltages have been experienced at various nodes in the system including in NR RE Complex. ii. The voltages under N-1 condition (depleted network conditions) will further dip.

    CTU reply – In revised PSSE files most of the bus voltage are within limits of 0.97-1.03 pu on all 400kV and 765kV buses in NR considering switching on/off of bus and line reactors (switchable) wherever required.

15. Low SCR of Sirohi PS (4.2)

    CTU reply – Short circuit Ratio of 400kV and 220kV of Sirohi PS is about 8.7 and 4.2 respectively. No additional connectivity will be granted beyond 2 GW at 220kV level of Sirohi PS with proposed system (400/220kV ICTs at Sirohi PS+765kV Sirohi-Mandsaur). With growing interconnection and planned network in future, SCR at Sirohi may increase.

16. Dynamic Simulation Studies – With more than 62,000 MW solar generation and three HVDC terminals in Rajasthan in close vicinity, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

CTU reply – Comment is pertaining to 2029 timeframe files, however dynamics file is under preparation. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress

17. Study cases for other scenarios – The study cases for evening and solar peak scenario (Feb and June) have been shared. The study cases for balance 06 scenarios especially the off-peak cases may also be shared so that voltage related issues may also be examined in detail.

    CTU reply – As per the comments, Scenario 8 (evening peak) & Scenario 9 (night off peak) along with revised solar maximized scenario (SC-4& 7) files is attached.

18. Giral plant is observed to be running. May be rectified (NRLDC).

    CTU reply – Giral plant is now kept off

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

1. Schemes proposed for:

a) Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

S.No	Transmission Scheme	RE Potential	Status
A	**Under Bidding/ Approved**		
1	Rajasthan REZ Ph-IV (Part-1 :7.7GW) (Bikaner Complex)	14 GW (Solar 14GW, BESS:6GW) Bikaner-II : 3.7GW Bikaner-III: 4GW	Awarded
2	Rajasthan REZ Ph-IV (Part-2 :5.5GW) (Jaisalmer/Barmer Complex)	5.5GW (Solar) Fatehgarh-IV: 4 GW Barmer-I: 1.5 GW	Under Bidding
3	Rajasthan REZ Ph-IV (Part-3 :6GW) (Bikaner Complex)	6 GW (Solar) Bikaner-IV:6GW	Under Bidding (Recently approved in NCT
B	**Planned/Under Planning**		
1	Rajasthan REZ Ph-IV (Part-4 :3.5GW) (Jaisalmer/Barmer Complex)	3.5 GW (Solar) Fatehgarh-IV: 1 GW Barmer-I: 2.5 GW	**Recently approved in NCT**
2	Rajasthan REZ Ph-IV (Part-5 : 6GW) (Barmer Complex)	6 GW (Solar) Barmer-II : 6GW	**Timeframe : 2029 (HVDC)**
3	Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bhadla/Bikaner Complex)	6 GW (Solar) Bhadla-IV: 2 GW Bikaner-V: 4 GW*	
4	**Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)**	**4 GW (Solar)** **Sirohi: 2 GW** **Nagaur: 2 GW**	**Present proposal** **Timeframe : 2027 (EHVAC)**

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

2. Inputs on AC Scheme proposed for Rajasthan REZ Ph-V (Part-1: 4GW) (Sirohi/Nagaur Complex)

Proposed System (Timeframe – 2027):

- 5x500MVA, 400/220kV ICTs at Sirohi S/s along with transformer bays
- Sirohi – Mandsaur PS 765KV D/c line (~ 320 kms) along with 330 MVAr switchable line reactor for each circuit at each end of Sirohi – Mandsaur PS 765KV D/c line
- Mandsaur PS – Khandwa (New) 765kV D/c line (~230km.) along with 240MVAr switchable line reactor for each circuit at each end of Mandsaur PS – Khandwa (New) 765 kV D/c line

a) Load-Generation Balance and IR Flows (Feb 2027 scenario)

S. No.	Region	Load (MW)	Gen. (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)	Peak Demand met in Feb 2024 (MW)	Peak Demand met in Feb 2023 (MW)
1	NR	79604	109895	30291	97898	59664	63791	59366
2	WR	99798	99386	-412	89547	72184	74167	76524
3	SR	79758	94860	15102	80864	62000	65591	60906
4	ER	29644	14828	-14816	37265	20000	23531	22325
5	NER	2974	2654	-320	4855	2000	2822	2849
6	All India	291780	321625	x	277201	216185	221989	211325

S. No.	State	Load (MW)	Gen. (MW)	IR Exchange (MW)	20th EPS Peak Load in 2026-27 (MW)	Average Demand Met in Solar Hours in Feb 2024 (MW)	Peak Demand met in Feb 2024 (MW)	Peak Demand met in Feb 2023 (MW)
1	Rajasthan	19593	80348	60755	21175	17000	18058	16959

i. It has been mentioned that CAGR of 7% has been considered on the peak demand met by respective states in Feb 2024 at regional and all India level. Over this, green hydrogen load of 13 GW has been considered in ER (3.3 GW) and WR (8.2 GW).

ii. The peak and average (in solar hours) demand met during Feb'23 and Feb'24 solar hours has been provided for reference. It appears that the CAGR of 7% considered at regional and all India level is on the higher side. Same may be reviewed.

The all India demand considered in Feb 2027 is even more than the EPS peak demand for 2026-27 + 13 GW green hydrogen load.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

iii. Solar and Thermal Generation

- ~192724 MW solar generation considered in service at all India level
- ~72500 MW solar generation is in service in Rajasthan
- ~27770 MW solar generation is in service in Rajasthan
- ~19100 MW solar generation in Khavda complex has been considered in the case

- Still some machines (bus - 424027) with no active power generation (Pgen = 0) are kept on in the case. These units are also providing reactive power support in the study case. The voltages in the case, therefore, may not represent the actual scenario. Such units shall therefore be kept off in the case.

- In the revised case also, some of the thermal generating stations (like 412001, 362014 etc.) are running below 40% tech min level also. Same may be clarified.

- Further, the swing bus generation (Farakka) is negative – (-) 2500 MW which would further increase the demand by around 5000 MW.

- The thermal generation has been backed down to 40%, 45% and 55% level. The tech min level considered in the case may be mentioned. Though, it is mentioned that merit order has been considered, but cheaper thermal generating stations like Singrauli and Rihand are running at only 65-70% level. Dispatch in Yadadri etc. is around 85%.

iv. With above-mentioned corrections in demand and generation, the LGB of the study case will change. This might result in changes in network flows also. Therefore, it is suggested that the proposed system may be tested on realistic load-generation scenario for 2026-27, preferably the one coming out of production cost modelling studies.

The details of N-1 non-compliance, high line loading, and low voltages are provided in subsequent sections.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

b) Network Loadings

i. Several ICTs in Rajasthan are loaded much above the N-1 limit (Deedwana - PG, Hindaun, Hirapura, Chittorgarh, Kota – PG etc.)

CTUIL Response –

Most of the ICTs i.e. Deedwana, Hindaun, Heerapura, Chittorgarh are getting overloaded in planning studies due to the increase in load of Rajasthan. Some of the ICTs are even critically loaded in present time frame and issue of high loading is deliberated in various OCC/NRPC meetings. In above meetings, RVPN is already requested to carry out 400/220kV ICT augmentation works or feeder reconfiguration to relive ICT loadings.

Loading of 400/220kV Kota (PG) ICT is higher due to low dispatch of KTPS generation units. Loading of Bhinmal ICT is higher in Sc-7 due to increasing demand.

Above ICT loading will be reviewed in consultation with NRLDC w.r.t real time loading and Grid- India operational feedback report and necessary augmentation will be carried out in ISTS, if required, as per the present practice.

Grid-India Response

RVPNL may also be invited in the meeting and necessary augmentation required at intra-state level may also be planned at this stage.

For augmentation required at ISTS level, the planning may be carried out at this stage only.

ii. Many lines in ER and WR-ER boundary are critically loaded in solar peak case:

- 400 kV Farakka – Kahalgaon D/C,
- 400 kV New Ranchi – PPSP D/C
- 400 kV Ranchi – Sipat D/C
- 765 kV Dharamjaigarh – New Ranchi D/C
- 400 kV Rourkela – Chaibasa D/C
- 400 kV Gaya – Maithon D/C
- ICTs in West Bengal (Kolaghat, Chanditala) and DVC (Mejia-B, Durgapur)

CTUIL Response - Re-conductoring of 400 kV Farakka – Kahalgaon & Talcher – Meramundali 400 kV D/c lines in under advance stage of stakeholder consultation. Other system, if required in ISTS would be taken up on priority.

Grid-India Response: There is significant amount of power flow towards eastern region during solar hours resulting in very high loading in the ER grid. The issue is also being faced in the current scenario during solar hours. It is suggested that system augmentation in ER in a holistic manner may be taken up on priority so that the required system gets commissioned with the associated RE generation (2026-27 timeframe).

v. Angular Separation:

Scenario	765 kV Sirohi – Mandsaur D/C Line	765 kV Sirohi – Risabhdeo D/C	765 kV Neemuch – Khandwa D/C	765 kV Bikaner – Moga D/C	765 kV Bikaner – Khetri D/C
Base Case	14.4° (1746 MW)	9.5° (1744 MW)	7.3° (1230 MW)	18.2° (1914 MW)	18.2° (2425 MW)
Under N-1 Contingency	17.5° (2100 MW)	12.4° (2254 MW)	9.3° (1581 MW)	24.4° (2526 MW)	20° (2995 MW)
Under N-1-1 Contingency	22.3°	17.9°	13.2°	42.45°	25.1°

vi. HVDC Balia – Bhiwadi is running from Balia to Bhiwadi in evening peak scenario while the direction is Bhiwadi to Balia in solar peak case. The daily reversal of HVDC may also be highlighted in the scheme as reluctance is faced from asset owners regarding frequent reversal in HVDC direction.

The details of other highly loaded elements have already been shared earlier.

c) Voltages

i. It has been observed that SLRs of various 765 kV lines have been opened in the solar peak case to maintain the voltages. These SLRs have been taken back in service in the off-peak case to avoid high voltages in the system.

However, in real-time, reluctance is faced from transmission licensees regarding switching of these SLRs. Even resistance is being faced in case of frequent switching of bus reactors.

Daily operation of SLRs to control the voltage may be mentioned explicitly in the schemes as well as included in the RfP also.

NLDC Inputs on Revised Scheme for Rajasthan REZ Phase- V RE

d) Short Circuit Ratio

Bus/Station	Connected RE Capacity	Fault Level	SCR (Without Current Contribution of immediate RE to be Connected)
220 kV Sirohi	2000 MW	8413 MVA	**4.2**
220 kV Merta – II	1000 MW	5734 MVA	5.7
400 kV Merta - II	1000 MW	20302 MVA	20.3

This SCR is considering the optimistic scenario that RE plants will provide 1 p.u. short circuit contribution. However, the plants are providing the same in real-time. Same may be considered while computing the SCR.

e) Dynamic Simulation Studies

With more than 72,500 MW solar generation in Rajasthan in close vicinity by Feb 2027, it is important that stability aspects are also studied in detail at the planning stage. The generation is also getting evacuated through large EHV lines and hence, transient stability analysis also becomes important. Therefore, it is suggested that the results of the dynamic simulation studies may be shared.

CTU reply – Comment is pertaining to 2029 timeframe files, however dynamics file is under preparation. Presently there are convergence issues being faced in dynamic simulation for 2027 scenario for which consultation of IIT Mumbai is also under progress.

Grid-India response – At present, even after than 15 GW RE at ISTS level in Rajasthan, the dynamic simulation studies have not been carried out. Keeping in view the multiple generation loss events in Rajasthan RE complex, it is once again requested that the studies may be carried out at the time of proposing the evacuation scheme.

f) Other Inputs:

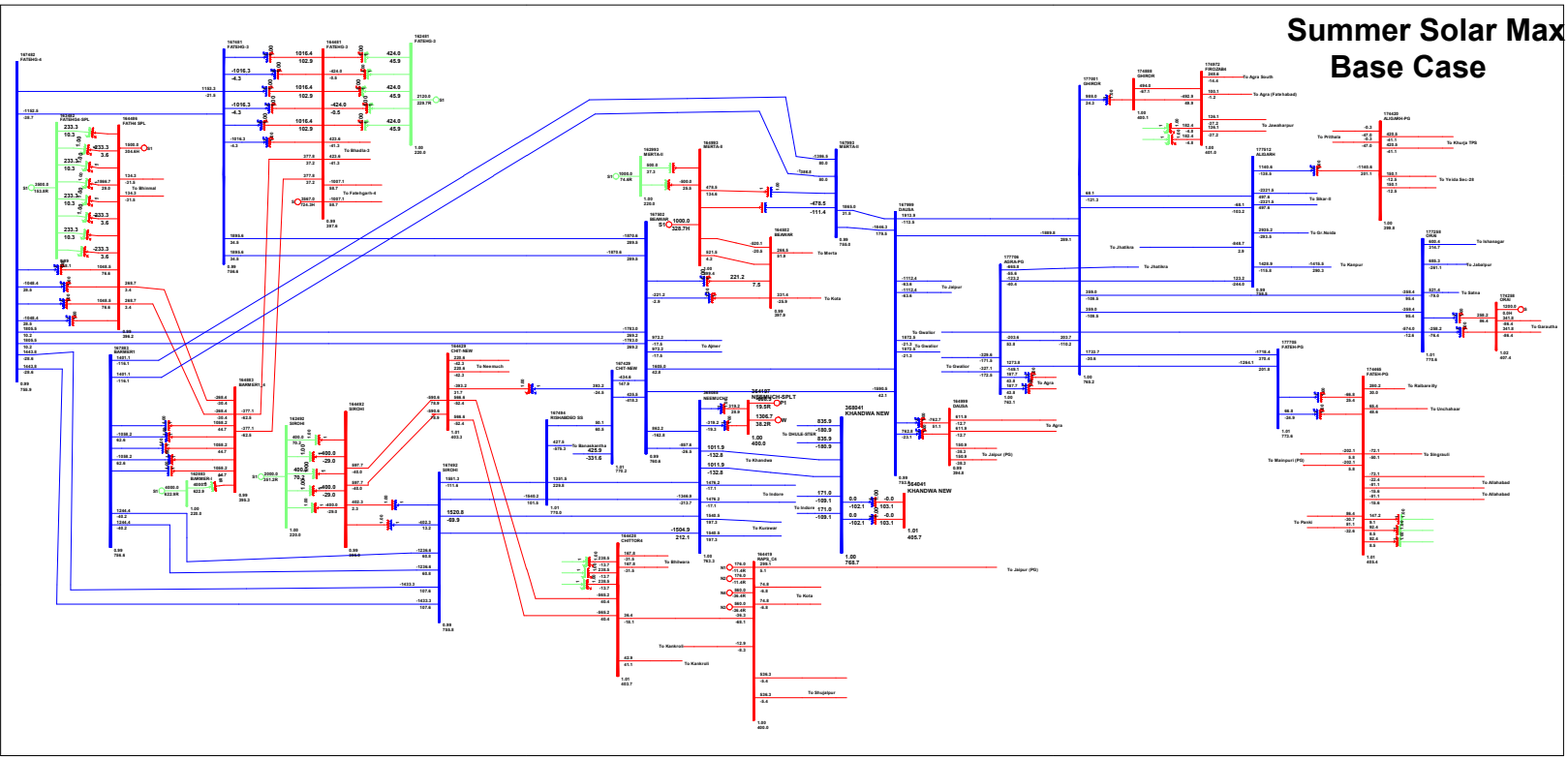
i. In addition to merit order dispatch, inertia would also be a deciding factor for a unit to remain switch on or off. Same may also be factored in.

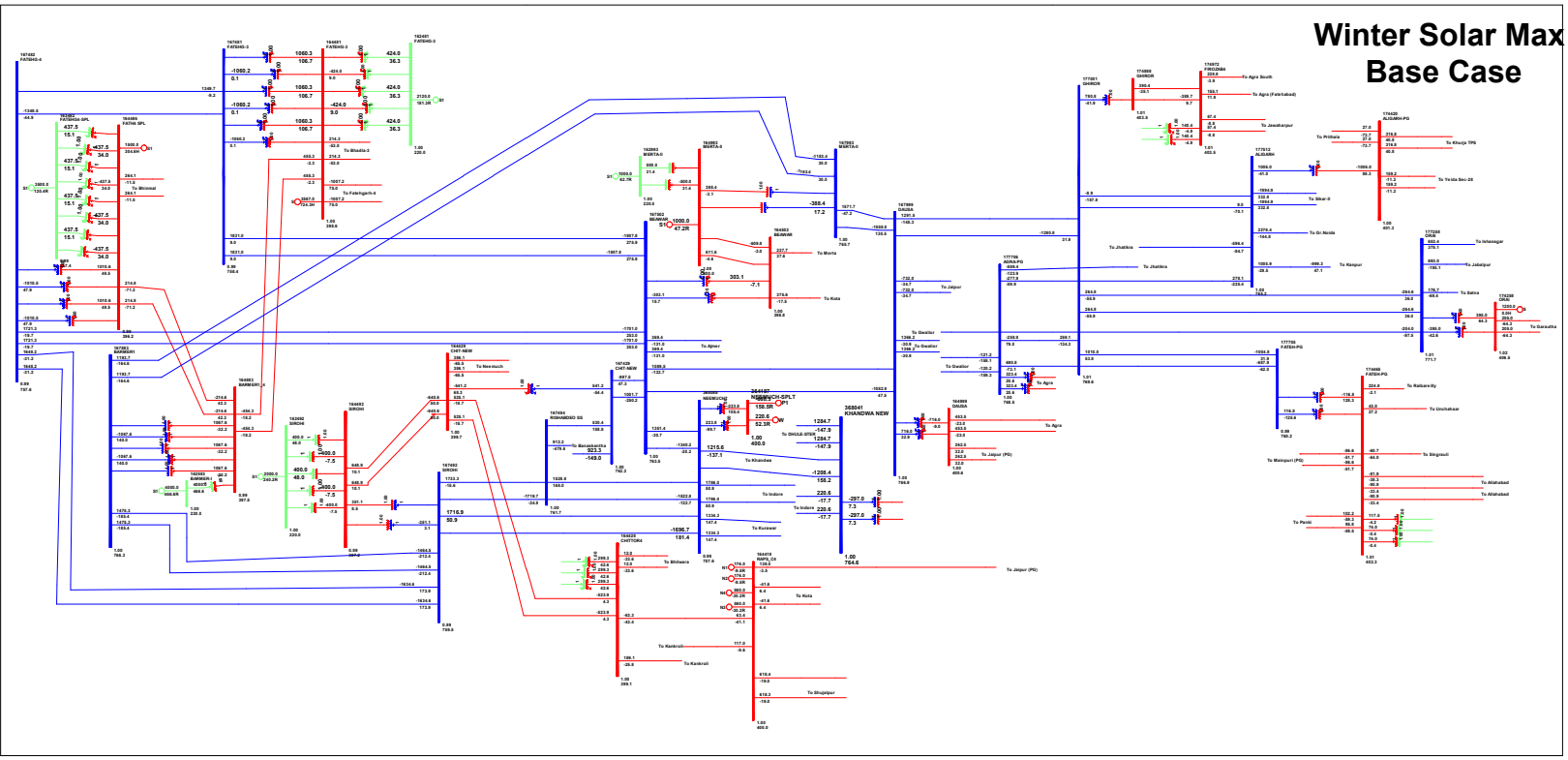
ii. Wherever long lines are getting planned like in this case 765 kV Sirohi-Mandsaur (320 Km), the range of line length may be provided as it is possible that route length may increase during commissioning phase.

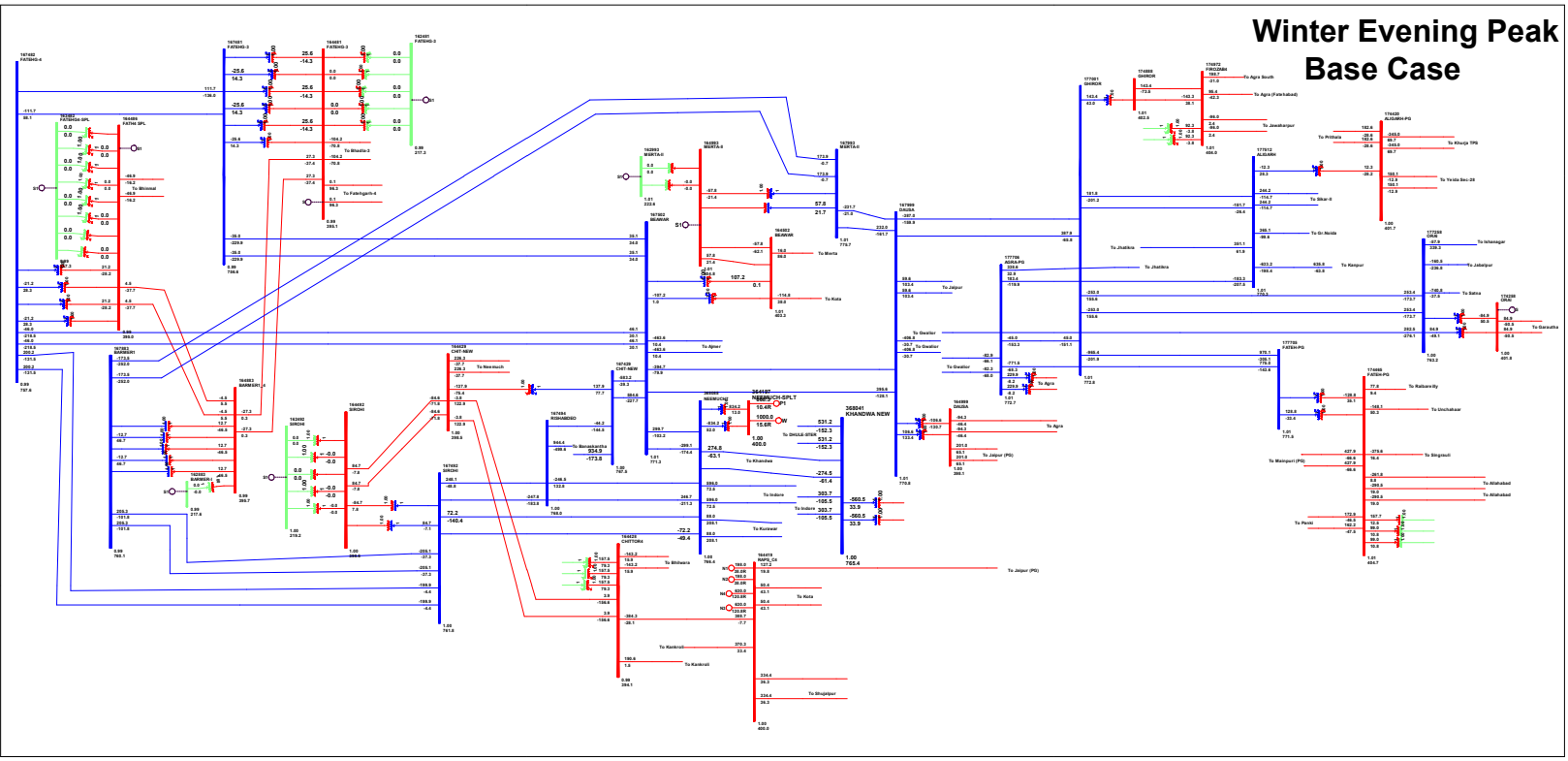
iii. Intra-state network wherever connected or proposed to be connected may be specified. All such long HVDCs and AC lines will impact Rajasthan ATC/TTC.

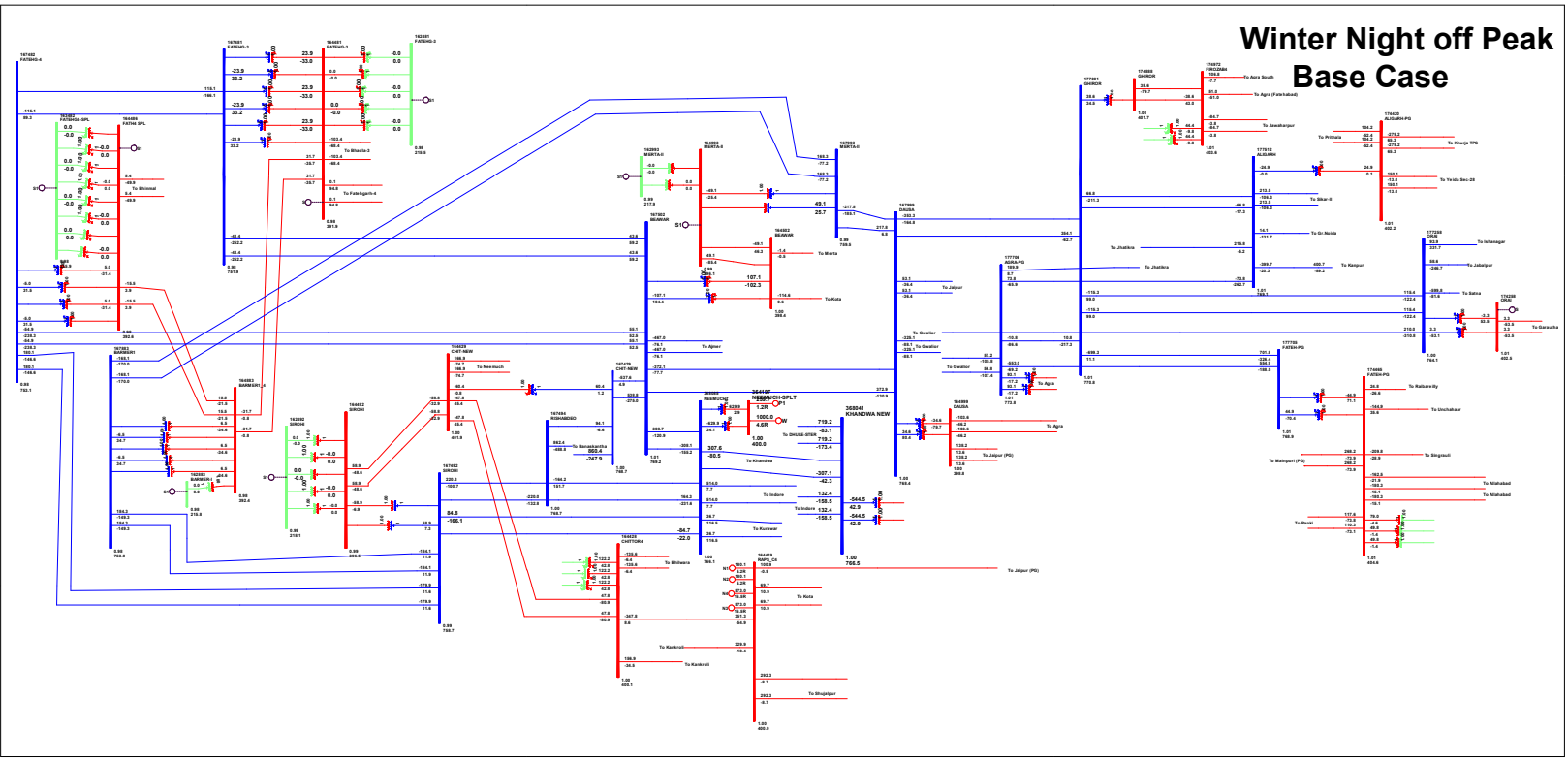
iv. **Name of New Substations** – It is requested to assign unique name for envisaged RE pooling stations. As several pooling substations with identical names but different numerical suffixes have been planned in the same district along with multiple interconnections, there is a chance of miscommunication during real-time operation among multiple constituents. For clarity of operation and ensuring that names of different substations are easily distinguished from each other, it is suggested that after finalization of the exact location, the ISTS substations are uniquely named as per the geographical name of the nearest location like village or taluk.

Exhibit-II




Winter Solar Max
Base Case


Winter Evening Peak
Base Case


Winter Night off Peak
Base Case

ग्रिड-इंडिया GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre

कार्यालय : बी-9, प्रथम एवं द्वितीय तल, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Office : 1st and 2nd Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.grid-india.in, E-mail : gridindiacc@grid-india.in, Tel.: 011- 42785855

Ref: NLDC/New_Building/OPGW_CTU/April'24/1 Dated:25th April'2024

To,

Chief Operating Officer,
CTUIL,
Sector– 29, Gurgaon – 122001
Haryana

Subject: Optical Fibre Connectivity at New Building of NLDC located at "Grand Rue" - Ayur Vigyan Nagar, August Kranti Marg, New Delhi

Dear Ma'am/Sir,

Presently, National Load Despatch Centre (NLDC) is being operated from 1st Floor of B-9, Katwaria Sarai, New Delhi. All the Operation Technology (OT) systems viz. NLDC SCADA, REMC, URTDSM & ERLDC Back-up SCADA system are installed and operational from Data Centre situated at B-9, Katwaria Sarai. All the dedicated LAN connectivity of OT system at NLDC with other RLDCs (for SCADA -ICCP and PDC connectivity, NTAMC, Power Plants (RTUs for AGC) etc, Voice Communication & Video conferencing facility, MPLS connectivity for WBES is being provided by POWERTEL and ULDC. ULDC Communication is also used for cross border Voice and Data communication with Nepal, Bhutan and Bangladesh.

Present OPGW Connectivity at NLDC are described below:

Sr. No.	Link Description	Remarks
1	POWERTEL	Being Used for NLDC SCADA , URTDSM & for OT
2	ULDC	Being Used for NLDC SCADA, REMC , URTDSM , VoIP & Video Conferencing

Details of links being used is given in Annex-I.

GRID-INDIA recently acquired premises located at "Grand Rue" - Ayur Vigyan Nagar, August Kranti Marg, New Delhi, and intends to shift Control centre functions to the new building. It is expected that NLDC operation shall start from December 2024 at its new building.

In view of this, it is requested to plan and provide following at "Grand Rue" - Ayur Vigyan Nagar, August Kranti Marg, New Delhi at the earliest.

1. POWERTEL links (with redundancy) being used for ULDC purpose
2. Redundant ULDC communication
3. Installation of Communication Equipment as per requirement
4. Supply and Installation of redundant DC Power Supply (DCPS) for Orange Exchange and Communication Equipments.

Since it is expected that that control room functions shall shift to new building by December 2024. It is requested to please advise the concerned to plan and implement redundant communication for NLDC control room operation at the new location at the earliest.

Yours Faithfully

(S C Saxena)
Executive Director, NLDC

CC:

1. **Executive Director, GA & C, POWERGRID**

Annexure-1

Sr.No.	Connectivity Purpose	Link Description	Bandwidth	Remarks
1	NLDC SCADA	POWERTEL Link 1	50 Mbps for All RLDCS	Used for NLDC SCADA. Each RLDC Link has 10 Mbps bandwidth.
2		POWERTEL Link 2	50 Mbps for All RLDCS	
3		ULDC Link 1	50 Mbps for All RLDCS	
4		ULDC Link 2	50 Mbps for All RLDCS	
5		ULDC Link for NR	10 Mbps	
6		ULDC Link for WR	10 Mbps	
7		POWERTEL Link for CERC	10 Mbps	
8		POWERTEL Link for NPMC	10 Mbps	
9		POWERTEL Link 1	100 Mbps Link	Used for Intersite Link Bewteen Main NLDC and Backup NLDC
10		POWERTEL Link 2	100 Mbps Link	
11		ULDC Link 1	100 Mbps Link	
12		ULDC Link 2	100 Mbps Link	
13		ULDC Link Backup SR	10 Mbps Link	Used for Main NLDC to Backup RLDCs ICCP connectivity
14		ULDC Link Backup NR	10 Mbps Link	
15		ULDC Link Backup WR	10 Mbps Link	
16		ULDC Link Backup NER	10 Mbps Link	
17		ULDC Link for BHUTAN	10 Mbps Link	International ICCP Connectivity
18		ULDC Link for NEPAL	10 Mbps Link	
19		AGC ULDC Link 1	1000 Mbps	Being used for AGC. Each Plant has two link with 10 Mbps Bandwidth. Total Plant presently 80 Plants. For future , link may be planned for 100 Plants.
20		AGC ULDC Link 2	1000 Mbps	
21	REMC	REMC ULDC Link 1	30 Mbps for All RLDCS	Used for REMC ICCP Connectivity
22		REMC ULDC Link 2	30 Mbps for All RLDCS	
23	Backup ERLDC	ULDC Link	150 Mbps	Used for Intersite Link Bewteen Main ERLDC and Backup ERLDC. 100 Mbps Link ; Each ER States 10 Mbps Link
24	URTDSM	ULDC Link NR	100 Mbps	Used for URTDSM
25		ULDC Link NTAMC	100 Mbps	
26		ULDC Link SR	100 Mbps	
27		ULDC Link ER	100 Mbps	
28		ULDC Main URTDSM to Backup URTDSM at Kolkata	100 Mbps	
29		POWERTEL LINK WR	100 Mbps	
30		POWERTEL Link NER	20 Mbps	
31		POWERTEL Link CEA	30 Mbps	
32	VoIP	ULDC NR Link	10 Mbps	Orange EPABX is being used for IP Phones and Intercoms.
33		All RLDCs Link with POWERTEL	40 Mbps	
34		ULDC Bhutan Link	10 Mbps	
35		ULDC Bangladesh Link	10 Mbps	
36		ULDC Nepal Link	10 Mbps	

Minutes of Meeting Regarding Optical fibre connectivity at New Building of NLDC located at "Grand Rue" New Delhi on 06th May 2024 in Virtual Mode

A meeting was convened on 06.05.2024 by CTU through virtual mode (MS-Teams Platform) in view of the letter dated 25.04.24 received from Grid-India (copy attached at ***Annexure-I***) regarding provision of fiber optic connectivity to the new building of NLDC located at "Grand Rue" New Delhi.

The list of participants is attached at ***Annexure-II***.

DGM (CTU) welcomed all the participants at the meeting and proceeded with the agenda.

Agenda of the Meeting

Planning for Optical Fibre Connectivity at the New Building of NLDC located at "Grand Rue" - Ayur Vigyan Nagar, August Kranti Marg, New Delhi from ULDC fiber network.

Deliberation:

CTU requested Grid-India to explain the requirement in view of fiber optic connectivity for New Building of NLDC located at "Grand Rue".

Grid-India Explained that they have purchased new building located at "Grand Rue" - Ayur Vigyan Nagar, August Kranti Marg, New Delhi and are planning to start NLDC operation by 31st Oct 2024. All IT and Operation Technology (OT) systems need to be shifted by 31st Oct' 2024.

In this regard there will be requirement of dedicated and redundant Optical Fibre connectivity to successfully start the NLDC control room for power system operations from the said Building. Further, additional links of POWERTEL may be required for the same.

CTU enquired that the Power system operation shall be performed only from the new building control centre or both control centres located at existing and new building.Grid-India stated that the existing communication system at NLDC building at Katwaria Sarai will be in service as ERLDC Backup will remain in existing Building at Katwaria Sarai. Further for smooth transition from old building to new building parallel operation will be done for NLDC for few months.

CTU requested POWERGRID to provide the interim connectivity, suitable fiber paths(main and redundant), requirement of Fiber Cables, FOTE etc. to provide connectivity to new building. POWERGRID informed that temporary connectivity can be provided by using connectivity of POWERTEL as POWERTEL fibre is running near the building and Optical Connectivity can be taken from POWERTEL at STM-16 level to provide the said connectivity. POWERGRID further informed that existing POWERTEL links shall be extended and their commercial treatment shall be done as per existing norms (from O&M budget).

POWERGRID stated that permanent connectivity of New Building needs to be done from ULDC network. POWERGRID suggested the following paths considering redundancy for fiber optic connectivity:

(a) NLDC/NRLDC at Katwaria Sarai ⇨ NLDC New Building, August Kranti Marg.
(b) Maharani Bagh (ULDC) ⇨ NLDC New Building, August Kranti Marg
(c) Tughlaqabad ⇨ Okhla ⇨ NLDC New Building, August Kranti Marg

POWERGRID stated that it will be beneficial to install 48 Fibre cable as cost difference in 24F and 48F cable is nominal in comparison with cost of ROW to avoid future RoW requirement. CTU suggested that in place of 48F UGFO cable, 2 nos. of 24F UGFO cable can be installed in redundant cable trenches to avoid disconnection in case of frequent construction/digging work by other agencies. The participants agreed for 2X24F UGFO cable option.

CTU requested POWERGRID to provide the BoQ and Cost estimate including RoW charges , FOTE , 2x24F UGFO Fibre cable, DCPS and other required hardware for the above paths to take up this agenda for RPC review on urgency bases as requested by Grid-Inida.

CTU requested POWERGRID to submit the detailed requirement and plan for connectivity of NLDC new building with tentative cost estimate by 14.05.24 so that agenda can be put up by CTU in upcoming NRPC for their views.

Detailed proposal shall consist of BoQ and cost estimate for all three paths as mentioned above

- Fibre Optic Terminal Equipment
- DC Power Supply System
- Fiber Optic Cable (2x24F)
- RoW charges involved
- Supply, Installation, Testing & Commissioning of FOTE, DCPS & OFC

Meeting ends with vote of thanks.

Annexure-II

List of Participants

S. No.	Name	Designation	E mail	Phone
CTUIL				
1.	Sh H S Kaushal	Sr. General Manage	hsk@powergrid.in	
2.	Sh. T P Verma	Dy. General Manage	tejprakash@powergrid.in	9650598191
3.	Sh. Prakhar Pathak	Engineer	Prakharpathak321@powergrid.in	8953109167
Grid-India				
3.	Shri Alok Kumar	Sr. General Manage		9999039321
4.	Shri Ankur Gulati	Dy. General Manage		9869080336
5.	Shri Deepak Kumar	Manager		
POWERGRID				
6.	Smt. Shyama Kumari	Sr. Dy. General Manager		9873918459
7.	Sh. Narendra Kumar Meena	Dy. General Manager		9810082410
8.	Sh. Sandeep Kumar Gupta	Chief Manager		8826094855

Scheme: Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi.

Annexure-XVI

S. No.	Items	Details
1.	Name of Scheme	Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi
2.	Scope of the scheme	Supply and installation of (2X24F) Underground Optical Fibre for 35 Kms including RoW charges, 3 no. of FOTE and 2 no. of 48V DCPS
3.	Depiction of the scheme on FO Map	N/A
4.	Objective / Justification	i. Grid-India vide their letter dated 25.04.24 (copy attached at **Annexure-XIV**) has request to CTU for planning of fiber optic connectivity to their new building of National Load Dispatch Centre (NLDC) located at "Grand Rue" Ayur Vigyan Nagar, August Kranti Marg, New Delhi. Accordingly, a meeting has been conveyed by CTU on 06.05.2024 to understand the actual requirement of Grid-India for connectivity of New building (MoM attached at **Annexure-XV**). ~~**ii.**~~ As per meeting held on 06.05.2024 among Grid-India, POWERGRID and CTU. Scheme was prepared based on the inputs from POWERGRID regarding requirement of UGFO, FOTE, RoW charges
5.	Estimated Cost &Funding	**Rs. 8 Cr.** (approx.)
6.	Implementation timeframe	12 months from the date of allocation
7.	Implementing Agency / Mode	**POWERGRID in RTM**
8.	Deliberations in different meetings	Meeting held among Grid-India, POWERGRID and CTU on 06.05.2024

Scheme: Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi.

S. No.	Items	Details
1.	Name of Scheme	Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi
2.	Scope of the scheme	Supply and installation of (1X48F) Underground Optical Fibre for **35Kms** including RoW charges, 3 no. of FOTE and 2 no. of 48V DCPS
3.	Depiction of the scheme on FO Map	N/A
4.	Objective / Justification	i. Grid-India vide their letter dated 25.04.24 (copy attached at **Annexure-XIV**) has request to CTU for planning of fiber optic connectivity to their new building of National Load Dispatch Centre (NLDC) located at "Grand Rue" Ayur Vigyan Nagar, August Kranti Marg, New Delhi. Accordingly, a meeting has been conveyed by CTU on 06.05.2024 to understand the actual requirement of Grid-India for connectivity of New building (MoM attached at **Annexure-XV**). **ii.** As per meeting held on 06.05.2024 among Grid-India, POWERGRID and CTU. Scheme was prepared based on the inputs from POWERGRID regarding requirement of UGFO, FOTE, RoW charges
5.	Estimated Cost &Funding	**Rs. 7.2 Cr.** (approx.)
6.	Implementation timeframe	12 months from the date of allocation
7.	Implementing Agency / Mode	**POWERGRID in RTM**
8.	Deliberations in different meetings	Meeting held among Grid-India, POWERGRID and CTU on 06.05.2024, 25th NRPC TeST meeting (Minutes are awaited)

Approval Name: **Application for submission of Technical Connection data for Connectivity Agreement_2**

SWS ID:	SW1149165101
Applied By:	Sahil Verma
Applied On:	02 Jan 2024 01:03:03 PM
Ministry Name:	Ministry of Power
Department Name:	Central Transmission Utility

Form Name

SUBMISSION OF TECHNICAL CONNECTION DATA TO BE FURNISHED TO CTU FOR SIGNING OF "CONNECTIVITY AGREEMENT"

Details of Applicant

Name of the Applicant Company	H. P. POWER TRANSMISSION CORPORATION LIMITED

Details of Grant of Connectivity

Connectivity Intimation No.	
Date	
Quantum for which connectivity is granted	
Substation at which connectivity granted	
State	Himachal Pradesh

Address of Correspondence

Address 1	HPPTCL HIMFED BHAWAN SHIMLA
Address 2	
Country	India
State	Himachal Pradesh

Primary Contact Details

Primary Contact Person	MANOJ

Designation of Primary Contact Person	General Manager
Primary Phone Number (Mobile)	+91 9418407222
Primary Email ID	ermanoj1@yahoo.com

Alternate Contact Details

Alternate Contact Person	PARDEEP SINGH
Designation of Alternate Contact Person	SENIOR MANAGER
Alternate Phone Number (mobile)	+91 8278715343
Alternate Email ID	SMKALAAMB.TCL@HPMAIL.IN

Status of Applicant Company Details

Status of Applicant Company	ISTS Licensee
Estimated time of Completion of Project	15/01/2024

Detail & Drawings: Details

Annexure-A: Bay allocation, Equipment ratings, Protection equipment, System recording, Site responsibility details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure - A (CON-5 details).docx

Detail & Drawings: Attachments

Annexure-A(I): Equipment Drawings for confirming the Ratings	
Annexure-A(II): Protection SLD containing protection details of the transmission system to be made	KALA AMB SLD.pdf
Annexure-A(III): CRP & scheme drawings containing protection of the transmission system	
Annexure-A(IV): PLCC/FOTE Drawings for the Transmission Lines under the Scheme	PLCC PKATL.pdf

Detail & Drawings: Maps and Diagram

Schedule-I: Survey of India Topo-sheet clearly making the location of the Proposed Site	220 kV HPPTCL Substation on TOPOSHEET 1.pdf

Schedule-II (A): Site plan (both pdf and autocad file) in appropriate scale indicating Generators, Transformer, Site building	Upload PDF & Cloud Link
Schedule-II (A): Upload PDF	Site Plan HPPTCL Andehri.pdf
Schedule-II (A): Cloud link for .dwg file (AUTOCAD) to be uploaded	https://drive.google.com/file/d/1IOVx_nUSeunVZHUMPIIcjOTxh9eHcZD_/view?usp=drive_link
Schedule-II (B): Site plan of the ISTS substation at which connectivity granted (Autocad 2000 & above versions)	Site Plan PKATL.pdf
Schedule-III (A): Electrical Single Line Diagram (SLD) (both pdf and autocad) of the proposed facility detailing all significant items of plant (Autocad 2000 & above versions)	Upload PDF & Cloud Link
Schedule-III (A): Upload PDF	KALA AMB SLD.pdf
Schedule-III (A): Cloud link for .dwg file (AUTOCAD) to be uploaded	https://drive.google.com/file/d/1Qs_ueFuEdZ5km-esDIFd8RpnS4dCEnHH/view?usp=drive_link
Schedule-III (B): Electrical Single Line Diagram (SLD) of ISTS substation at which connectivity granted	SLD Kala Amb GIS PGCIL.pdf
Annexure-C(V): General Arrangement (GA) drawing indicating proposed facility	General Arrangement HPPTCL.pdf
Annexure-C(IV): Sub-Station Automation System (SAS) ring diagram indicating interconnections of various IEDs/Engg PC/Gateway etc.	ARCHITECTURE SAS KALA AMB.PDF
PERT Chart: Program Evaluation Review Technique (PERT) of Project indicating major activities with their completion scheduled	PERT Chart.pdf

TECHNICAL DETAILS and STUDIES: Transmission Line Data

Annexure-C(I): Transmission Line Tower, Conductor & Earth-wire/OPGW Details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure(C-1).docx
Annexure-C(II): Schematic Drawing of DA/A Type Tower clearly indicating Position of Conductor and E/wire	
Annexure-C(III): Equivalent Resistance, Reactance and Susceptance (R,X and B) Parameters of Transmission Line (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure-C(III).doc

TECHNICAL DETAILS AND STUDIES: Communication Data

Annexure-D(I): Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of Generator (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure-D(I).doc
Annexure-D(II): Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of TSP (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure(D-II) Communication.docx
Annexure-D(III): Communication connectivity diagram	FOTE DRAWINNGS KALA AMB-ANDEHRI.pdf

TECHNICAL DETAILS AND STUDIES: Transformer Data

Schedule VII: Two winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Schedule_VIII_Two_Winding_Trans.doc
Schedule VIII: Three winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Schedule_VIII_Three_Winding_Trans.doc

TECHNICAL DETAILS AND STUDIES: Dynamic simulation data - RE Machines.

Schedule-XI(XIV): Transformer datasheet	

Declaration

I confirm that I am well aware of the relevant CERC/CEA Regulations and Detailed Procedure and all the details entered by me are in conformity with the Regulations. I submit that all the details given in the Application are true and correct and nothing material has been concealed thereof. I also submit that the documents attached are scanned/true copies of their respective originals. I hereby confirm that the above data submitted with the application are pertaining to connection sought for the ISTS. Further, any additional data sought for processing the application shall be furnished.	Accepted

Details of Documents Enclosed with the application

Annexure-A	Bay allocation, Equipment ratings, Protection equipment, System recording, Site responsibility details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)

Annexure-A(I)	Equipment Drawings for confirming the Ratings
Annexure-A(II)	Protection SLD containing protection details of the transmission system to be made
Annexure-A(III)	CRP & scheme drawings containing protection of the transmission system
Annexure-A(IV)	PLCC/FOTE Drawings for the Transmission Lines under the Scheme
Schedule-I	Survey of India Topo-sheet clearly making the location of the Proposed Site
Schedule-II (A)	Upload PDF
Schedule-II (B)	Site plan of the ISTS substation at which connectivity granted (Autocad 2000 & above versions)
Schedule-III (A)	Upload PDF
Schedule-III (B)	Electrical Single Line Diagram (SLD) of ISTS substation at which connectivity granted
Annexure-C(V)	General Arrangement (GA) drawing indicating proposed facility
Annexure-C(IV)	Sub-Station Automation System (SAS) ring diagram indicating interconnections of various IEDs/Engg PC/Gateway etc.
PERT Chart	Program Evaluation Review Technique (PERT) of Project indicating major activities with their completion scheduled
Annexure-C(I)	Transmission Line Tower, Conductor & Earth-wire/OPGW Details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Annexure-C(II)	Schematic Drawing of DA/A Type Tower clearly indicating Position of Conductor and E/wire
Annexure-C(III)	Equivalent Resistance, Reactance and Susceptance (R, X and B) Parameters of Transmission Line (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)

Annexure-D(I)	Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of Generator (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Annexure-D(II)	Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of TSP (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Annexure-D(III)	Communication connectivity diagram
Schedule VII	Two winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Schedule VIII	Three winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Schedule-XI(XIV)	Transformer datasheet

Signature Not Verified

Digitally Signed.
Name: KAMALJEET SINGH
Date: 02-Jan-2024 13:06:23

Annexure-XIX

सत्यमेव जयते

INDIA NON JUDICIAL

Government of Himachal Pradesh

₹100

e-Stamp

Certificate No.	:	IN-HP12415702670363W
Certificate Issued Date	:	26-Mar-2024 12:06 PM
Account Reference	:	SELFPRINT (PU)/ hp-self/ SHIMLA/ HP-SM
Unique Doc. Reference	:	SUBIN-HPHP-SELF21144962116186W
Purchased by	:	HARMANJEET SINGH
Description of Document	:	Article 5 Agreement or Memorandum of an Agreement
Property Description	:	CONNECTIVITY AGREEMENT BETWEEN CTUIL, HPPTCL AND PKATL
Consideration Price (Rs.)	:	100 (One Hundred only)
First Party	:	CTUIL
Second Party	:	HPPTCL AND PKATL
Stamp Duty Paid By	:	HPPTCL AND PKATL
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

₹100

SELF PRINTED CERTIFICATE TO BE VERIFIED BY THE RECIPIENT AT WWW.SHCILESTAMP.COM

IN-HP12415702670363W

Please write or type below this line

Connectivity Agreement-IEGC

Connectivity Agreement

THIS AGREEMENT is made on this the [..27th.....] day of [.....March..], 2024

AMONGST

[***Central Transmission Utility of India Limited***] (hereinafter called the "CTU") having its registered office at Plot No. 2, Sector 29, Gurugram 122001, Haryana, which expression shall

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

Statutory Alert:
1. The authenticity of this Stamp certificate should be verified at www.shcilestamp.com/ or using e-Stamp Mobile App of Stock Holding. Any discrepancy in the details on this Certificate and as available on the website / Mobile App renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate.
3. In case of any discrepancy please inform the Competent Authority.

Kala Amb Transmission Limited

Central Transmission Utility of India Ltd. Gurugram

unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns;

[*H.P. Power Transmission Corporation Limited having its registered office at* **Himfed Bhawan, Panjari, Shimla. H.P- 171005]** (herein after called "**the Applicant [STU/InSTL]**") which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns;

And

[POWERGRID Kala Amb Transmission Limited (PKATL) *having its registered office at* ***B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016]*** (herein after called ***"inter-State transmission licensee*** **[ISTL]**) which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors or permitted assigns;.

Applicant (STU/InsTL) and Inter-state Transmission Licensee are hereinafter collectively referred to as "Parties" and individually as "Party".

WHEREAS:

(A) The Applicant has applied to the CTU vide application no. **610900004** dated **02/01/2024** for connection of **[*220 kV Kala Amb (PKATL)-Andheri, Kala Amb (HPPTCL) D/C (Zebra) line on M/C Towers*]** facility to the Inter-State Transmission System (ISTS) network.

(B) The CTU has agreed to the connection of **[*220 kV Kala Amb (PKATL)-Andheri, Kala Amb (HPPTCL) D/C (Zebra) line on M/C Towers*]** Facility to transmit electricity as well as real time data telemetry to and from the Facility through the ISTS network.

(C) The inter-State transmission licensee/ State Transmission Utility/ intra-State transmission licensee is entering into this connectivity agreement with the ISTS licensee(s) to which it is getting connected and Central Transmission Utility, as provided for in Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 and Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022.

(D) The Parties have entered into this connectivity agreement to record the terms and conditions upon which the Parties will carry out their respective Connection Works specific to the scope mentioned herein, in accordance with the Connectivity Agreement. The responsibilities of the parties are defined accordingly in this Agreement.

(E) The parties shall separately take up modalities for implementation of the works on mutually agreed terms and conditions. The scope of works, time schedule for completion of works, including the timelines for the various milestones to be reached for completion of works (PERT chart), shall form an appendix to this agreement, and shall form the basis for evaluating if the works by the parties have been executed in time.

Penalties for non-completion of works in time by one party resulting in financial losses to the other party may be appropriately priced, as per mutual agreement, for indemnification of each other against losses incurred in this regard. Similarly, for the regular O&M of the connection equipment owned by the Applicants and located in the ISTL/STU/InSTL (as applicable) premises/switchyard, the parties shall separately take up the O&M agreement on mutually agreed terms and conditions.

HPPTCL, Tutikandi Shimla-5

(F) Further, a signed copy of the agreement along with all the Annexures, and amendments whenever made, shall be submitted to RLDC/NLDC by ***H.P. Power Transmission Corporation Limited***.

IT IS HEREBY AGREED as follows:

1. General Conditions for Connectivity

1.1 The Parties agree to the following General Conditions:

(a) The parties shall abide by all the applicable provisions of Electricity Act, 2003, Regulations/Detailed Procedures and Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 and Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022, in respect of procedure of grant of connectivity and other matters.

(b) The applicant and ISTL/STU/InSTL, as the case may be, shall be responsible for planning, design, construction, safe and reliable operation & maintenance of its own equipment in accordance with the Act/Regulations/Procedures, including but not limited to, Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007, Central Electricity Authority (Technical Standards for Construction of electrical plants and electric lines) Regulations, 2022, Central Electricity Authority (Grid Standards) Regulations, CERC Sharing Regulations, 2020, CERC Indian Electricity Grid Code (IEGC) Regulations, 2023 and its amendments thereof as well as other statutory provisions. In case of bay extensions, the applicant shall consider the existing station(s) as DCP at respective ends (as the case may be).

(c) The Applicant shall provide necessary facilities for voice & data communication for transfer of real time operational data from their station to Data Collection Point (DCP) of Inter-State transmission licensees as per IEGC Regulations, 2023. ISTL/ STU/InSTL (as applicable) shall provide access to Applicant's data transfer through communication network on mutually agreed terms. Additional communication system from DCP to the concerned RLDC shall be the responsibility of ISTL/STU/InSTL (as applicable); however, its cost shall be borne by the Applicant. The responsibility of data transfer shall be that of the Applicant.

(d) This agreement (Connectivity Agreement-IEGC) being in the nature of a technical agreement shall have no commercial implications/repercussion whatsoever coming out from the terms of this agreement and shall have no commercial bearing on CTUIL.

1.2 The following documents and their schedules which have been initialled by the parties and annexed herewith shall be deemed to form an integral part of this Agreement in the order of precedence listed below:-

(a) Additional information for signing Connectivity Agreement

(b) Connection details Letter ***(No. Ref: C/CTU/NR/HPPTCL/610900004 dated 28.02.24)***;

(c) This Agreement;

1.3 **Availability of Statutory/Regulatory Approval**

The applicant shall be responsible for obtaining the statutory clearances/approval including transmission licensee (if required) for carrying out the works requiring connection to the ISTS.

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

2 Agreement To Pay Charges And Costs

2.1 Agreement to additional costs

The applicant declares that it shall pay the cost towards modification/alterations to the infrastructure of ISTL/STU/InSTL (as applicable) for accommodating the proposed connection as specified in the letter of CTU furnishing connection details.

2.2 Agreement to pay for damages.

The applicant declares that it shall pay/ make good damages, if any, caused to the property of the ISTL/STU/InSTL (as applicable), which has been notified by the ISTL/STU/InSTL (as applicable), within reasonable time of its occurrence, during the course of control, operation and maintenance of the equipment.

2.3 Agreement to pay Charges for construction of Bays:

The Applicant will execute an agreement with ISTL/STU/InSTL (as applicable) for the erection of equipment of Applicant in the substation premises of the ISTL/STU/InSTL (as applicable) for construction of bays, if required. For this purpose, the applicant shall pay charges to the ISTL/STU/InSTL (as applicable) on mutually agreed terms.

2.4 Agreement to pay O&M Charges:

The Applicant shall pay O&M charges to the ISTL/STU/InSTL (as applicable) on mutually agreed terms for the bay equipment of Applicant being operated & maintained by the ISTL/STU/InSTL (as applicable) in their substation. These O&M charges will be governed from time to time as per mutually agreed terms.

3. Conditions Precedent to the implementation of the Commissioning Instructions

The applicant shall procure appropriate "Charging Instructions" prior to first charging of the equipment through the grid. The charging instructions shall be issued on confirmation from the Applicant (ISTL/STU/InSTL, as applicable) that:

(a) the Connection Works have been completed;

(b) the Applicant has complied with its all obligations as set out in the Connection details Letter;

(c) the Applicant has demonstrated the voice & data communication facilities to concerned RLDC;

(d) the Applicant have obtained necessary approvals like PTCC, clearance from Electrical Inspectorate of CEA etc. from competent authority;

(e) the Applicant have complied with its obligations under the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and its amendment thereof.

4. Metering

The applicant shall provide and maintain the Metering equipment, in accordance with the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 and IEGC regulation, 2023 and its amendment thereof.

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

POWERGRID Kala Amb Transmission Limited

Central Transmission Utility of India Ltd. Gurugram

5.1 Site Access

The Applicant shall also allow, on prior permission, site access to the ISTL/ STU/InSTL(as applicable) employees and/or authorized agents / invitees to carry out preliminary site investigation works, inspections etc. in the connection site of the Applicant, provided that a written request has been made giving reasonable advance notice. Further applicant shall also allow, on prior permission, site access to the CTU/CEA/RLDC employees and/or authorized agents / invitees.

5.2 Conditions of access

Site access for the Applicant (ISTL/STU/InSTL, as applicable) shall include the right to bring such vehicles, plant, machinery and construction materials as shall be reasonably necessary to carry out the functions in respect of which the permission of access is granted. Being a restricted area, any individual to whom access is given under the Agreement shall comply with all reasonable directions given by the Applicant (ISTL/STU/InSTL, as applicable) and its duly authorized employees and agents to safeguard the interest of safety and security requirements of personnel and equipment. All such access shall be exercisable without payment of any kind/monies.

6. Transfer Assignment and Pledge

The Applicant shall not transfer, assign or pledge its rights and obligations under this connection agreement to any other person/entity except as provided under the provisions of the CERC GNA Regulations.

7. Notice

All correspondence/notices required or referred to under this Agreement shall be in writing and signed by the respective authorized signatories of the parties mentioned herein, unless otherwise notified. Each such notice shall be deemed to have been duly given if delivered or served by Email/registered mail/speed post of the department of post with an acknowledgment due or by a courier agency with proof of delivery to other party (ies) as per authorization by parties.

The authorities of the parties who shall be responsible for the correspondence notices etc. in connection with this agreement shall be informed in advance.

8. Confidentiality

The parties shall keep in confidence any information obtained under this Connectivity Agreement and shall not divulge the same to any third party without the prior written consent of the other party, unless such information is

a) in the public domain,
b) already in the possession of the receiving party,
c) required by the Govt. Ministries/Agencies/Court of competent jurisdiction.

The information exchanged herein between the parties shall be used only for the purpose of, and in accordance with, this Agreement and for the purpose stated herein. This clause shall remain in force even after termination of Connectivity Agreement.

The Parties are aware that if any falsity / inaccuracy / incorrectness is detected at any stage, applicant shall be liable for rejection or revocation of connection to ISTS along with all associated consequences in this regard, including encashment of bank guarantee and any other suitable action deemed fit under the law

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

9. Indemnification:

This is agreed to by Applicant and Inter-State transmission licensee, signing this agreement to indemnify and hold CTU harmless at all time from and against any and all damages, losses, liabilities, obligations, penalties, cause of action, claims of any kind (including, without limitation, reasonable attorneys' fees and expenses) (collectively, "Losses"), suffered, inc urred or paid, directly, as a result of, in connection with or arising out of and relating to exercise of CTU's actions pursuant to and in accordance with this Agreement.

10. Governing Laws

The agreement shall be governed by Indian Laws and Rules made thereunder.

11. Amendment to The Connectivity Agreement

In case of Modification to point of connection like re-allocation of bays, upgradation of voltage level etc. by either of the parties, if mutually agreed, an amendment to the Connectivity Agreement shall be executed between the parties within 30 days of implementing such modification.

IN WITNESS WHEREOF the CTU and the Applicant (Bulk Consumer/ Distribution licensee/ISTL/ STU/InSTL, as applicable) have caused this Agreement to be executed by duly authorized representative on date above first herein written.

Signed for and on behalf of: -

[CTU Details]

V. THANGAVAYU
वरि. महाप्रबंधक / Sr. General Manager
CENTRAL TRANSMISSION UTILITY OF INDIA LTD
(A Wholly Owned Subsidiary of
Power Grid Corporation of India Limited)
(A Government of India Enterprise)
Saudamini, Plot No. 02, Sector-29, Gurugram-122 001

Witness Name: -
Vishwas Kanwar
DGM, CTUIL

Signed for and on behalf of: -

[Applicant (STU/InsTL) Details]

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

Witness Name: -
RAHUL SINGH
Assistant Engineer (Electrical)
H.P.P.T.C.L., PIU Kala-Amb,
Distt. Sirmour (H.P.)-173030

Signed for and on behalf of: -

[ISTL Details]

POWERGRID Kala Amb Transmission Limited
पीकेएटीएलPKATL

Witness Name: -
Vineet Kumar
DGM

Appendix

Time schedule for completion of works of STU/InSTL/ISTS Licensee/Applicant, including the timelines for the various milestones to be reached for completion of works (PERT chart)

Central Transmission Utility of India Ltd. Gurugram

POWERGRID Kala Amb Transmission Limited पीकेएटीएल/PKATL

General Manager (C&D)
HPPTCL, Tutikandi Shimla-5

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

Ref: C/CTU/NR/HPPTCL/610900004

Date: 29/02/2024

Shri Manoj
General Manager
H.P. Power Transmission Corporation Limited
Himfed Bhawan,
Shimla, H.P- 175105

Subject: Connection details (FORMAT-CONN-TD-4) for connection of 220 kV (Zebra) D/C line on M/C Towers from 400/220 kV Kala Amb Substation PKATL to 220/132/33 kV Andheri, Kala Amb Substation of HPPTCL in ISTS by H.P. Power Transmission Corporation Limited.

Dear Sir,

This is with reference to your application Id. 610900004 dated 02/01/2024 and subsequent correspondences furnishing additional details vide mails dated 02/01/2024 to 16/02/2024 for signing of connection agreement and seeking connectivity to the ISTS.

Based on the details provided by M/s H.P. Power Transmission Corporation Limited (HPPTCL), It is hereby permitted Connectivity to the grid as per the details given below:

Sl. No.	Item Description		Details
1.	Name of the Link (Sub-station/Line) at/for which connectivity granted	:	220 kV Kala Amb (PKATL)- Andheri, Kala Amb (HPPTCL) D/C (Zebra) line on M/C Towers
2.	Voltage level	:	220kV
3.	Type of Link	:	220 kV D/c line on M/c Tower (AC link)
4.	Reactive compensation to be provided	:	----
5.	Expected date of commercial operation	:	February'2024*
6.	Bay allocated in the switchyard of connectivity	:	[refer **Annexure-I**]
7.	Equipment to be provided in the allocated bay meeting the requirement of Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 which shall be compatible with the equipment installed at other end.	:	[refer **Annexure-II**]
8.	Protection Equipment to be provided shall be meeting the requirements of Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and shall be compatible & matching with the equipment installed at other end	:	[refer **Annexure-II**]

Sl. No.	Item Description		Details
9.	System recording & SCADA Equipment shall be meeting the technical standards as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and shall be compatible to facilitate exchange of data with the existing system installed in the ISTS network.	:	[refer Annexure-III(a) & III(b)]
10.	Details of the modification/ alteration to existing facilities for accommodating proposed connection and its estimated cost.	:	[refer Annexure-IV]
11.	Name of Communication Link for Data and Voice Communication	:	[refer Annexure-V]
12.	Communication equipment details upto ISTS Data Collection Point	:	[refer Annexure-V]
13.	Site responsibility schedule	:	[refer Annexure-VI]

* As informed by the applicant

All the equipment and systems to be provided by applicant shall have to conform to the technical standards as specified in the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 & Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations,2022 and CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 and amendments thereof.

The applicant will establish, test, commission and demonstrate the voice and data communication facilities with concerned LDC before test charging. At the connection point to the ISTS, cost of modifications if any, shall be borne by the applicant.

As per the CERC GNA Regulations 2022 and IEGC Regulations 2023, the applicant shall execute Connectivity Agreement (Connectivity Agreement-IEGC) among M/s H.P. Power Transmission Corporation Limited (HPPTCL), PKATL and CTUIL for which the applicant is requested to contact at following address:

Shri V. Thiagarajan
Sr. General Manager,
Central Transmission Utility of India Limited,
(Wholly Owned Subsidiary of Power Grid Corporation of India Limited)
Plot No.2, Sector-29, Gurugram
Haryana-122001

Thanking You

Yours faithfully,

28/2/2024
(K. K. Sarkar)
Senior General Manager

Copy to:

1. MD/CEO, (PKATL)

With respect to signing of "Connectivity Agreement (Connectivity Agreement-IEGC)*" among HPPTCL, PKATL and CTUIL.*

Annexure - I

Bay allocated in switchyard of connectivity

A. Sub-station (Intra-State TS) End details:

1.	**Name of substation and ownership:**	220/132/33kV AIS Andehri, Kala Amb of HPPTCL
2.	**Name of the bay and bay identification number:**	220kV Bay No. **204** and **205** for termination of Andehri, Kala Amb (HPPTCL) – Kala Amb (PKATL) 220kV D/c line on M/c tower

B. Sub-station (ISTS) End details:

1.	**Name of substation and ownership:**	400/220 kV GIS Kala Amb Substation of PKATL
2.	**Name of the bay and bay identification number:**	220kV Bay No. **204** and **205** for termination of Kala Amb (PKATL) – Andehri, Kala Amb (HPPTCL) 220kV D/c line on M/c tower

Annexure - II

Equipment to be provided in the allocated bay meeting the technical standards as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof

Bus Switching Scheme: (i) Double Main Bus Scheme at Andheri, Kala Amb end (HPPTCL)
(ii) Double Main Bus Scheme at Kala Amb end (PKATL)

Sl. No.	Name of Equipment	(Intra-State TS) Station end			(ISTS) Station end		
		Type	Nos	Ratings	Type	Nos	Ratings
1.	Circuit Breaker (3 phase)	AIS	2	220kV, 2000A, 40kA for 1 sec	GIS	2	220kV, 3000A, 40kA for 1 sec
2.	Disconnecting Switch	--	--	--	GIS	6	220kV, 3000A, 40kA for 1 sec
3.	Maintenance Earthing Switch	--	--	--	GIS	4	220kV, 3000A, 40kA for 1 sec
4.	High speed Earthing switch	--	--	--	GIS	2	220kV, 3000A, 40kA for 1 sec
5.	Isolator without Earth Switch (3 phase)	AIS	4	220kV, 2000A, 40kA for 1 sec	--	--	--
6.	Isolator with one Earth Switch (1 phase)	AIS	2	220kV, 2000A, 40kA for 1 sec	--	--	--
7.	CT (1 phase)	AIS	6	220 kV, 2000A, *Core details: - Core-1: 2000-1000/1A, CL: PS Core-2: 2000-1000/1A, CL: 0.2S, 15VA Core-3: 2000-1000/1A, CL: 5P15, 15VA Core-4: 2000-1000/1A, CL: PS Core-5: 2000-1000/1A, CL: PS*	GIS	6	220kV, 3000A, 40kA for 1 sec *Core details: - Core-1: 3000-1600-800/1A, CL: TPS Core-2: 3000-1600-800/1A, CL: TPS Core-3: 3000-1600-800/1A, CL:0.2S,20VA Spare Core details: - Core-1: 3000-1600-800/1A, CL: TPS Core-2: 3000-1600-800/1A, CL: TPS*
8.	Bus PT	AIS	6	220/√3-110/√3, 110/√3110/√3 *Core details: - Core-1: CL:3P, 50VA Core-2: CL:3P, 50VA*	GIS	6	220/√3-110/√3, 110/√3110/√3 *Core details: - Core-1: CL:3P, 50VA Core-2: CL:3P, 50VA*

Sl. No.	Name of Equipment	(Intra-State TS) Station end			(ISTS) Station end		
		Type	Nos	Ratings	Type	Nos	Ratings
				Core-3: CL:0.2, 50VA			*Core-3: CL:0.2, 50VA*
9.	CVT	AIS	6	220kV 220/√3-110/√3, 110/√3, 110/√3 *Core details: -* *Core-1:CL:0.2 ,50VA* *Core-2: CL:3P, 50VA* *Core-3: CL:3P, 50VA*	AIS	6	220kV 220/√3-110/√3, 110/√3, 110/√3 *Core details: -* *Core-1: CL:3P, 50VA* *Core-2: CL:3P, 50VA* *Core-3: CL:0.2, 50VA*
10.	Wave Trap	AIS	2	220kV, 1250A, 0.5mH	AIS	2	220kV, 1600A, 0.5mH
11.	Surge Arrester	AIS	6	198kV, 10kA, Class-3	AIS	6	198kV, 10kA, Class-3

Annexure – II

Protection Equipment to be provided by applicant shall be meeting the technical standards as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof and shall be compatible & matching with the equipment installed at other end.

1. **Name of Substation and Voltage level:**
   a. 220/132/33 kV Substation at Andheri, Kala Amb of M/s H.P. Power Transmission Corporation Limited, Voltage Level: 220/132/33kV
   b. 400/220kV GIS Substation at Kala Amb of M/s PKATL, Voltage Level: 400/220kV

2. **Name of the Lines**: 220 kV (ACSR Zebra) D/C line on M/C Towers from 400/220 kV Kala Amb Substation PKATL to 220/132/33 kV Andheri, Kala Amb Substation of HPPTCL

Details of Protection at Andheri, Kala Amb of M/s H.P. Power Transmission Corporation Limited:

Description	Protection type	Make	Model
Main-1 Protection	Differential Protection within built distance protection with tele protection through PLCC Channel	ABB	RED 670
Main-2 Protection		GE/Alstom	P546
BCU	Auto Reclose Function	ABB	REC 650

Details of Protection at Kala Amb GIS Substation of PKATL:

Description	Protection type	Make	Model
Main-1 Protection	Differential Protection within built distance protection with tele protection through PLCC Channel	ABB	RED 670
Main-2 Protection		GE/Alstom	P546
BCU	Auto Reclose Function	Siemens	6MD86

Annexure-III(a)

System Recording Equipment to be provided in the allocated bay meeting the technical standards as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof

Sl. No.	Name of Equipment	(Intra-State TS) Station end		ISTS-Station end	
		Nos.	Ratings	Nos.	Ratings
1.	Event Logger	-	Inbuilt feature of Relay/IED	-	Inbuilt feature of Relay/IED
2.	Disturbance recorder	-	Inbuilt feature of Relay/IED	-	Inbuilt feature of Relay/IED
3.	Fault locator	-	Inbuilt feature of Relay/IED	-	Inbuilt feature of Relay/IED
4.	PLCC details of transmission line	02	Make: ABB Model: ETL41+NSD50	02	Make: ABB Model: ETL41+NSD50
5.	FOTE details	01	Make: SIEMENS Model- NPT1200	01	Make: SIEMENS Model- NPT1200

Annexure-III (b)

Communication Equipment details up to ISTS Data Collection Point SCADA equipment shall be meeting the technical standards as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof and shall be compatible to facilitate exchange of data with the existing system installed in the ISTS network.

Sl.No	Name of Equipment	Nos.	Details
1	**Data Acquisition System** - Remote Terminal Unit/SAS/DAS Gateway	02	Gateway providing data on IEC 60870-5-104 protocol
2(a)	**Communication Equipment** SDH/MUX/Data & Voice card required if any at data collection point for Interim/ Permanent arrangement.	As per Details	**At 400/220kV Andheri, Kala-Amb (HPPTCL) S/s:** SDH equipment (min STM-4) along with necessary optical interface/s supporting MSP (Multiplex Section Protection 1+1) for 400/220kV Kala – Amb (PG) direction and tributary cards. **At 400/220kV Kala-Amb (PKATL) Substation:** SDH equipment (min STM-4) along with necessary optical interface/s supporting MSP (Multiplex Section Protection 1+1) for 400/220kV Kala – Amb (HPPTCL)) direction and Necessary optical interface for local patching and tributary cards.
2(b)	**Approach Cable & FODP**	As per Details	**At 400/220kV Andheri, Kala-Amb (HPPTCL) S/s:** FODP and Approach cable as per site condition **At 400/220kV Kala-Amb (PKATL) Substation:** FODP and Approach cable as per site condition.
3	**Cyber Security Requirement**	As per Details	Applicant to provide appropriate cyber security equipment to secure perimeter communication as per CEA (Cyber Security in Power Sector) Guidelines, 2021

CENTRAL TRANSMISSION UTILITY OF INDIA LTD.

Annexure-IV

Details of the modification/alteration to existing facilities for accommodating proposed connection and its estimated cost

-Nil-

Annexure-V

Communication Link details up to ISTS Data Collection Point

Requirement of Channels:

(1) 2 Nos Data Channel (600Baud) /64 Kbps or Ethernet channel for SAS / RTU
(2) 1 No Speech channel

*Data Collection Point for: 400/220kV Andheri, Kala Amb (HPPTCL) S/s

Data Collection Point (DCP): 400/220kV Kala Amb (PKATL) S/s

Wideband Link (Configuration of Data & Voice channel in wideband Link by regional ULDC team)
400/220kV Kala Amb (PG) - NRLDC, NEW Delhi

Note: * Data of Andheri, Kala-Amb (HPPTCL) shall route to HPPTCL SLDC through ISTS network.

CENTRAL TRANSMISSION UTILITY OF INDIA LTD. सीटीयू CTU

Annexure-VI

Site Responsibility Schedule

A. Principle & Procedure:

The responsibility of control, operation, maintenance & all matters pertaining to safety of equipments and apparatus at the connection point shall lie with the owner. For ease of day-to-day operation as a general practice O&M is carried out by the owner of the substation in whose premises the proposed bay is located for which a separate O&M contract is entered into based on mutually agreed terms and conditions.

B. List of equipment and their ownership at the connection point:

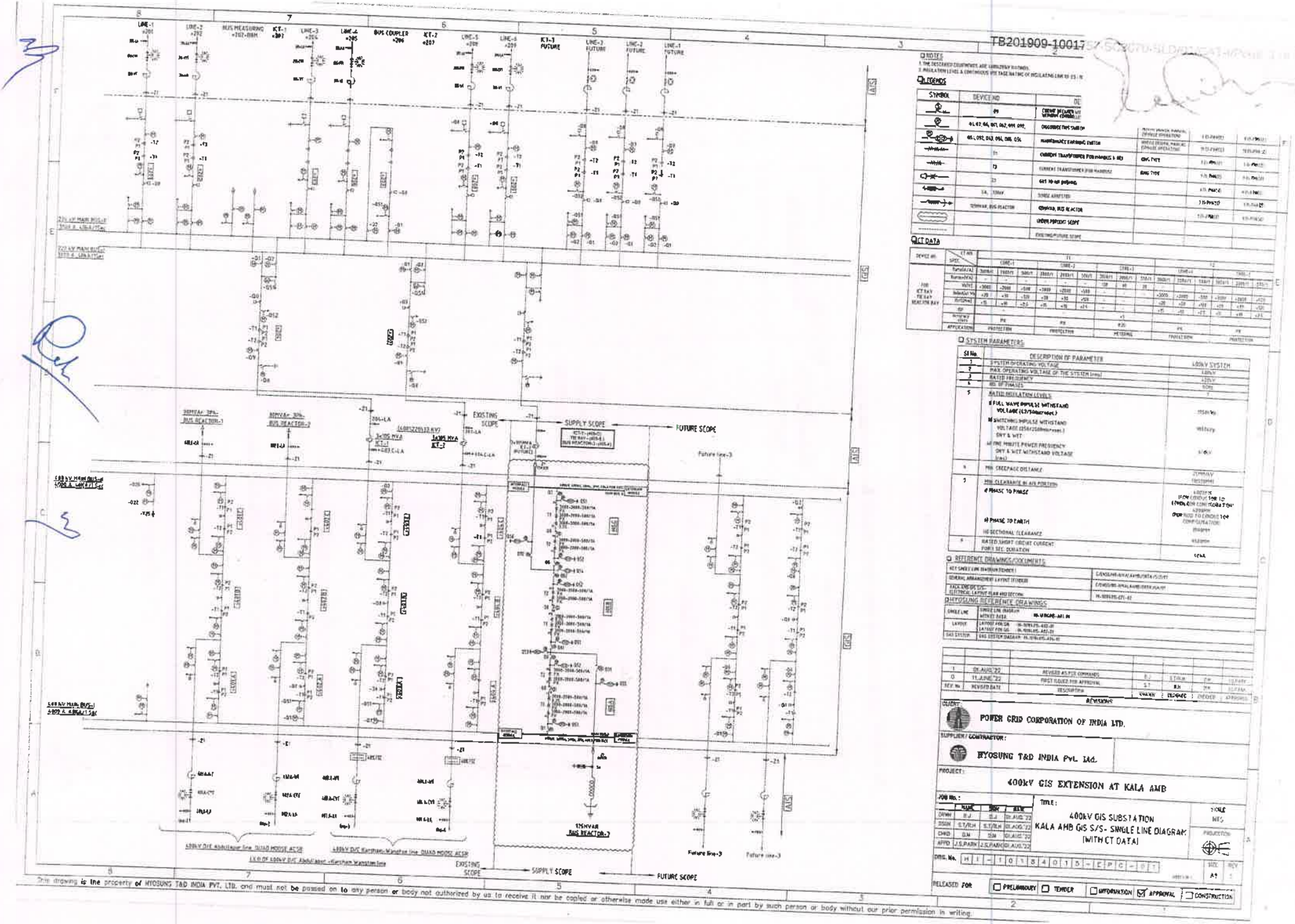
Sl. No.	Name of Equipment	Ownership	
		(Intra-State TS) Station end	ISTS- Station end
1.	Circuit Breaker (with PIR /CSD if required))	M/s H.P. Power Transmission Corporation Limited	M/s PKATL
2.	Isolator (with no. of Earth Switch as required)		
3.	Disconnecting Switch (For GIS)		
4.	Maintenance Earthing Switch (For GIS)		
5.	High speed Earthing switch (For GIS)		
6.	CT		
7.	Line CVT		
8.	Bus CVT		
9.	PT (Metering)		
10.	Wave trap		
11.	Surge Arrester		
12.	ICT		
13.	Line Reactor		

C. Site common Drawings:

a. Single Line Diagram (SLD) (Andheri Kala Amb s/s: Drawing No.- 1TEIE2101001XX, Rev. 01 & Kala Amb S/s: Drawing No.- TB201909-1001757-SC3070-SLD, Rev. 01)

b. General Arrangement Drawing (GA) (Drawing No.- 1TEIE2101002XX, Rev. 04 & SL/PQ-453/ELE/PLAN/002 Rev. 01) & Kala Amb S/s: Drawing No.- G71770-AD987-V160-F01)

CENTRAL TRANSMISSION UTILITY OF INDIA LTD.



NOTES

1. THE DESCRIBED EQUIPMENTS ARE EXCLUSIVELY RATINGS.
2. INSULATION LEVEL & CONTINUOUS VOLTAGE RATING OF INSULATING LINK TO BE

LEGENDS

SYMBOL	DEVICE NO	DE
	89	
	01,02,04,001,002,099,099,	
	05,092,093,094,098,094	
	71	
	72	
	33	
	34, 198kV	
	198kV BUS REACTOR	

CT DATA

DEVICE NO.	CT NOS	T1						T2					
	SPEC	LINE-1		LINE-2			LINE-3	LINE-4					LINE-5
FOR ICT BAY TIE BAY REACTOR BAY	Ratio(kV)	2000/1	1000/1	2000/1	1000/1	500/1	2000/1	2000/1	1000/1	2000/1	1000/1	500/1	2000/1
	Ratio(mVA)	-	-	-	-	-	-	-	-	-	-	-	-
	VA(V)	>3000	>2000	>500	>3000	>2000	>500	30	20	30	20	-	-
	Inductance(mH)	>20	>10	>500	>20	>10	>500	-	-	-	-	>3000	>2000
	Resistance(Ω)	<5	<3	<2.5	<5	<3	<2.5	-	-	-	-	<20	<10
	ISF	-										<7	<10
	Accuracy class	PS			PS			0.2S				PS	
	APPLICATION	PROTECTION			PROTECTION			METERING				PROTECTION	

SYSTEM PARAMETERS

Sl No.	DESCRIPTION OF PARAMETER	400kV SYSTEM
1	SYSTEM OPERATING VOLTAGE	400kV
2	MAX. OPERATING VOLTAGE OF THE SYSTEM (rms)	420kV
3	RATED FREQUENCY	50Hz
4	NO. OF PHASES	3
5	RATED INSULATION LEVELS	
	a) FULL WAVE IMPULSE WITHSTAND VOLTAGE (LI)/Chopped wave)	1550kVp
	b) SWITCHING IMPULSE WITHSTAND VOLTAGE (250/2500 wave) DRY & WET	1050kVp
	c) ONE MINUTE POWER FREQUENCY DRY & WET WITHSTAND VOLTAGE (rms)	630kV
6	MIN. CREEPAGE DISTANCE	10500mm (STANDARD)
7	MIN. CLEARANCE IN AIR BETWEEN	
	a) PHASE TO PHASE	4200mm (FOR CONDUCTOR TO EARTH CONFIGURATION) 4200mm (FOR ROD TO CONDUCTOR CONFIGURATION)
	b) PHASE TO EARTH	4000mm
	c) SECTIONAL CLEARANCE	4000mm
8	RATED SHORT CIRCUIT CURRENT FOR 1 SEC DURATION	63kA

REFERENCE DRAWINGS/DOCUMENTS

KEY SINGLE LINE DIAGRAM TENDER	CONSOLIDATED/KALA AMB/SLD/R1/
GENERAL ARRANGEMENT LAYOUT TENDER	CONSOLIDATED/KALA AMB/GEN PLAN/
KALA AMB GIS S/S ELECTRICAL LAYOUT PLAN AND SECTION	CONSOLIDATED/KALA AMB/GEN PLAN/

HYOSUNG REFERENCE DRAWINGS

SINGLE LINE	SINGLE LINE DIAGRAM WITH CT DATA	HI-400kV-A01-01
LAYOUT	LAYOUT FOR GA	HI-3096375-A02-01
	LAYOUT FOR GIS	HI-3096375-A02-02
GAS SYSTEM	GAS SYSTEM DIAGRAM	HI-3096375-A04-01

REV No.	REVISED DATE	DESCRIPTION	DRAWN	DESIGNED	CHECKED	APPROVED
1	05.AUG.'22	REVISED AS PER COMMENTS	BJ	S.T/R.H	S.T	S.T/R.H
0	11.JUNE.'22	FIRST ISSUE FOR APPROVAL	S.T	R.H	S.T	S.T/R.H

REVISIONS

CLIENT: POWER GRID CORPORATION OF INDIA LTD.

SUPPLIER / CONTRACTOR: HYOSUNG T&D INDIA Pvt. Ltd.

PROJECT: 400kV GIS EXTENSION AT KALA AMB

JOB NO. :	NAME	SIGN	DATE
DRWN	B.J	B.J	05.AUG.'22
DSGN	S.T/R.H	S.T/R.H	05.AUG.'22
CHKD	S.N	S.N	05.AUG.'22
APPD	J.S.PARK	J.S.PARK	05.AUG.'22

TITLE: 400kV GIS SUBSTATION KALA AMB GIS S/S- SINGLE LINE DIAGRAM [WITH CT DATA]

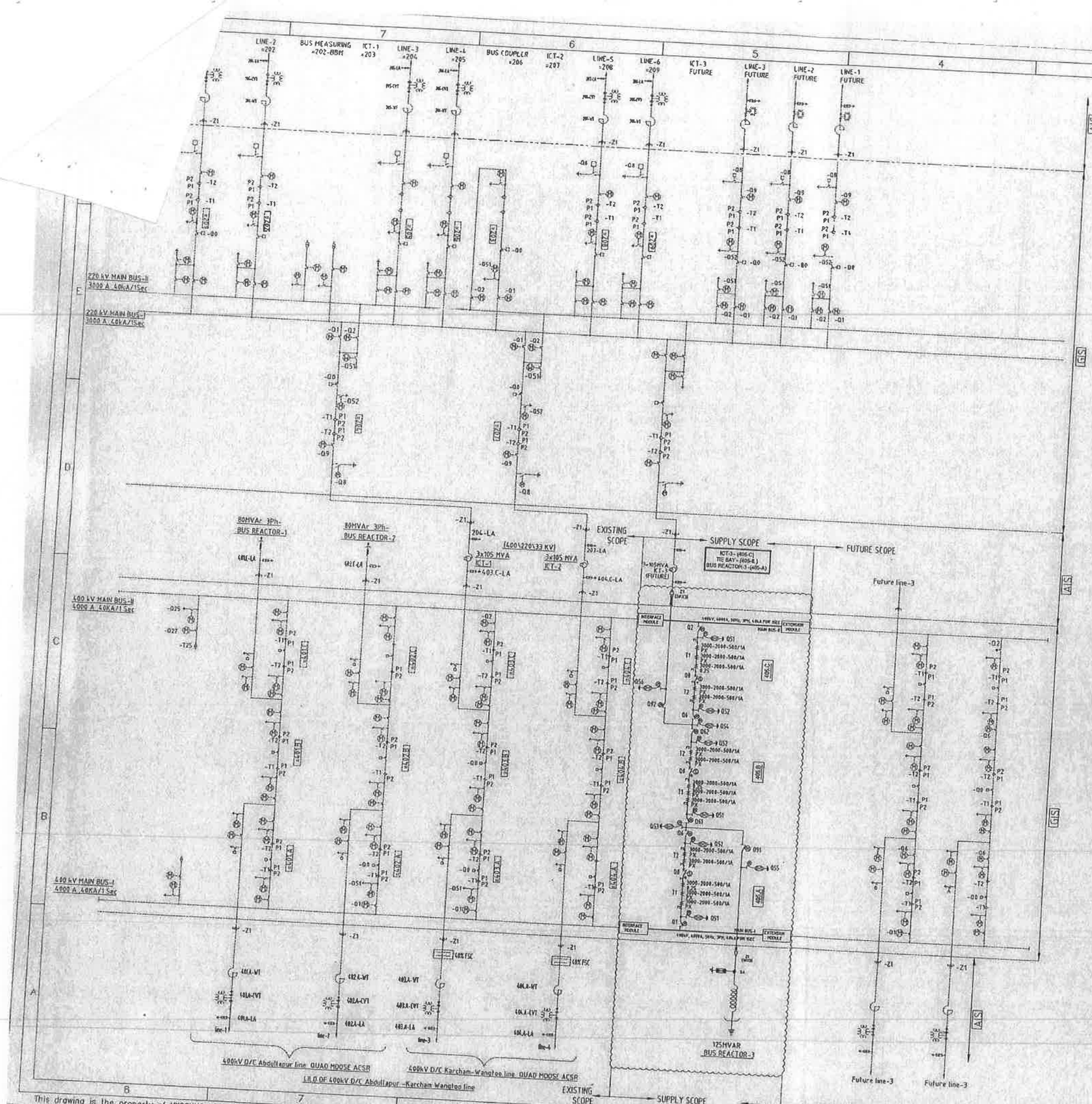
SCALE: NTS

PROJECTION:

DRG. No. HI-1015340154-EPC-01

SIZE: A3 REV: 1

RELEASED FOR: ☐ PRELIMINARY ☐ TENDER ☐ INFORMATION ☑ APPROVAL ☐ CONSTRUCTION



NOTES

1. THE DESCRIBED EQUIPMENTS ARE 400/420kV RATINGS.
2. INSULATION LEVEL & CONTINUOUS VOLTAGE RATING OF INSULATING LINE OF ES : K

LEGENDS

SYMBOL	DEVICE NO.	DESCRIPTION			
	86	CIRCUIT BREAKER WITH MOT/ CONTROLLED			
	01, 02, 06, 861, 862, 091, 092,	DISCONNECTING SWITCH			
	051, 052, 053, 054, 055, 056	MAINTENANCE EARTHING SWITCH	MOTOR DRIVEN, MANUAL (3PHASE OPERATION)	9 (3-PHASE)	8 (3-PHASE)
	71	CURRENT TRANSFORMER (FOR MAINBUS & TIE)	MOTOR DRIVEN, MANUAL (1PHASE OPERATION)	10 (3-PHASE)	10 (3-PHASE)
	T2	CURRENT TRANSFORMER (FOR MAINBUS)	RING TYPE	9 (3-PHASE)	9 (3-PHASE)
	21	GAS TO AIR BUSHING	RING TYPE	9 (3-PHASE)	9 (3-PHASE)
	SA, 396kV	SURGE ARRESTER		6 (3-PHASE)	6 (3-PHASE)
	125MVAR, BUS REACTOR	125MVAR, BUS REACTOR		3 (3-PHASE)	3 (3-PHASE)
		UNDER PERCENT SCOPE		1 (3-PHASE)	1 (3-PHASE)
		EXISTING/FUTURE SCOPE			

CT DATA

DEVICE NO.	CT NO. / SPEC.	T1									T2					
		CORE-1			CORE-2			CORE-3			CORE-1			CORE-2		
FOR ICT BAY TIE BAY REACTOR BAY	Ratio(A/A)	3000/1	2000/1	500/1	3000/1	2000/1	500/1	3000/1	2000/1	500/1	3000/1	2000/1	500/1	3000/1	2000/1	500/1
	Burden(VA)	-	-	-	-	-	-	150	80	30	-	-	-	-	-	-
	Vk(V)	>3000	>2000	>500	>3000	>2000	>500	-	-	-	>3000	>2000	>500	>3000	>2000	>500
	Im(mA)at Vk	<70	<30	<120	<20	<30	<120	-	-	-	<70	<30	<120	<20	<30	<120
	Ct/Ct(%)	±15	±10	±2.5	±15	±10	±2.5	-	-	-	±15	±10	±2.5	±15	±10	±2.5
	ISF	-			-											
	Accuracy class	PX			PX			0.5			PX			PX		
	APPLICATION	PROTECTION			PROTECTION			METERING			PROTECTION			PROTECTION		

SYSTEM PARAMETERS:

Sl.No.	DESCRIPTION OF PARAMETER	400kV SYSTEM
1	SYSTEM OPERATING VOLTAGE	400kV
2	MAX. OPERATING VOLTAGE OF THE SYSTEM (rms)	420kV
3	RATED FREQUENCY	50Hz
4	NO. OF PHASES	3
5	RATED INSULATION LEVELS:	
	i) FULL WAVE IMPULSE WITHSTAND VOLTAGE (1.2/50microsec.)	1550kVp
	ii) SWITCHING IMPULSE WITHSTAND VOLTAGE (250/2500microsec.) DRY & WET	1050kVp
	iii) ONE MINUTE POWER FREQUENCY DRY & WET WITHSTAND VOLTAGE (rms)	630kV
6	MIN. CREEPAGE DISTANCE	25MM/kV (10500MM)
7	MIN. CLEARANCE IN AIS PORTION:	
	i) PHASE TO PHASE	4000MM (FOR CONDUCTOR TO CONDUCTOR CONFIGURATION) 4200MM (FOR ROD TO CONDUCTOR CONFIGURATION)
	ii) PHASE TO EARTH	3500MM
	iii) SECTIONAL CLEARANCE	6500MM
8	RATED SHORT CIRCUIT CURRENT FOR 1 SEC. DURATION	40kA

REFERENCE DRAWINGS/DOCUMENTS:

KEY SINGLE LINE DIAGRAM (TENDER)	C/ENGG/NR-K/KALAAMB/TNTR/SLD/01
GENERAL ARRANGEMENT LAYOUT (TENDER)	C/ENGG/NR-K/KALAAMB/TNTR/GA/01
KALA AMB GIS S/S- ELECTRICAL LAYOUT PLAN AND SECTION	16-B18419-EPC-02

HYOSUNG REFERENCE DRAWINGS

SINGLE LINE	SINGLE LINE DIAGRAM WITH CT DATA	16-B18419-A01-01
LAYOUT	LAYOUT FOR GIS	16-B18419-A02-01
	LAYOUT FOR GIS	16-B18419-A02-02
GAS SYSTEM	GAS SYSTEM DIAGRAM	16-B18419-A06-01

REV. No	REVISED DATE	DESCRIPTION	DRAWN	DESIGNED	CHECKED	APPROVED
1	01.AUG.'22	REVISED AS PER COMMENTS	D.J	S.T/R.H	D.M	I.S.PARK
0	11.JUNE.'22	FIRST ISSUED FOR APPROVAL	S.T	R.H	D.M	I.S.PARK

REVISIONS

CLIENT: POWER GRID CORPORATION OF INDIA LTD.

SUPPLIER / CONTRACTOR: HYOSUNG T&D INDIA Pvt. Ltd.

PROJECT: 400kV GIS EXTENSION AT KALA AMB

	NAME	SIGN	DATE
DRWN	D.J	D.J	01.AUG.'22
DSGN	S.T/R.H	S.T/R.H	01.AUG.'22
CHKD	D.M	D.M	01.AUG.'22
APPD	J.S.PARK	J.S.PARK	01.AUG.'22

TITLE: 400kV GIS SUBSTATION KALA AMB GIS S/S- SINGLE LINE DIAGRAM (WITH CT DATA)

SCALE: NTS

PROJECTION

DRG. No. H I - 1 0 1 8 4 0 1 5 - E P C - 0 1

SHEET 1 OF 1

SIZE: A1 REV. 1

RELEASED FOR: ☐ PRELIMINARY ☐ TENDER ☐ INFORMATION ☑ APPROVAL ☐ CONSTRUCTION

NOTES:

1. THE ISOLATING WITH EARTH SWITCH LOCATION WITHOUT EARTH SWITCH AND LOADING ASSEMBLY MARKED WITH (*) ARE OPTIONAL IN NATURE SO EXCEPT THE SAME ARE REQUIRED IN THE DRAWINGS. ANY TO WHAT THE SAME DENOTES AS PER SCOPE OF SUPPLY.
2. 132KV MAKE TYPE AIR BREAK CONNECTOR, 2 LINE MAL.JI
3. STAND FOR ALL VCI, VAS, CB AND ISOLATOR ARE MAKE AS PER MAKE AS NORMALLY
4. QUANTITIES ARE TODAY AND ARE CONSIDERED AS PER TENDER SLD DATED 31 MAY'CL
5. STAND FOR ALL VCI, VAS, CB AND ISOLATOR ARE MAKE AS PER MAKE AS NORMALLY
6. HOWEVER IT IS TECHNICALLY ADJUSTED
7. CONSERVATION IS REQUIRED FOR TYP LINE FROM WHERE SUPPLY HAS TO BE TAKEN FOR STATION
8. DETAIL OF THE CHANGES WHICH IS INTENTIVE WILL BE FINALIZED AFTER DETAILED ENGINEERING FROM
9. QUANTITIES AND LOCATION FOR WHICH THEY SHALL BE FINALIZED AFTER DETAILED ENGINEERING FROM CUSTOMER END
10. THE 33KV BUS DOUBLED IS AVAILED WITH (*) ARE NOT SHOWN IN PRICE SCHEDULE

REFERENCE DRAWING No.	
1. TENDER SLD KALA AMB SUBSTATION	

REV.	DESCRIPTION	DATE	PAR.	DRN.	CHK.	APPR.
00	FOR APPROVAL	17/09/2021				
R1						
R2						
R3						
R4						

CLIENT:	HIMACHAL PRADESH POWER TRANSMISSION CO LTD (A UNIT OF GOVT. UNDERTAKING)
PROJECT:	220/132/33 KV SUBSTATION KALA AMB, DIST. SIRMOUR
TITLE:	SINGLE LINE DIAGRAM
DATE	17/09/2021
DRAWING No.	1TEEA2101001XX
SHEET No.	01 OF 01
REV.	R0

TEEA DESIGN

"TEEA Green Energy Park"
National Highway 6,
Ahlyagarm, Rajpura
Vadodara, Gujarat - 391440

SIZE-A2

SR NO	DESCRIPTION	220 kV				132 kV				33 kV				REMARKS	QTY.
		BAY-1	BAY-2	BAY-3	BAY-4	BAY-5	BAY-6	BAY-7	BAY-8	BAY-9	BAY-10	BAY-11	BAY-12		
1	MAIN BUSBAR	1 no 63 sq.mm Twin Moose ACSR				1 no 63 sq.mm Twin Moose ACSR				1 no 63 sq.mm Twin Moose ACSR					1 set
2	TAPE SENSOR	1 no 220kV Tape Sensor				1 no 132kV Tape Sensor				1 no 33kV Tape Sensor					1 set
3	CVT	3 no 220kV CVT				3 no 132kV CVT									3 set
4	LIGHTNING ARRESTOR	3 no 198kV 10kA				3 no 120kV 10kA				3 no 30kV 10kA					3 set
5	CURRENT TRANSFORMER	3 no 220kV 800-400/1-1A Core-1 PS Core-2 0.2S Core-3 5P20				3 no 132kV 800-400/1-1A Core-1 PS Core-2 0.2S Core-3 5P20				3 no 33kV 800-400/1-1A Core-1 PS Core-2 0.2S Core-3 5P20					3 set
6	WAVE TRAP	3 no 220kV 2000A 40kA													3 set
7	LINE/BUS ISOLATOR	1 no 220kV 2000A 50kA ES				1 no 132kV 2000A 50kA ES				1 no 33kV 2000A					4 set
8	ISOLATOR WITH ONE ES	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					5 set
9	ISOLATOR WITHOUT ES	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					3 set
10	ISOLATOR WITH TWO ES	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					1 set
11	GOOSE NECK	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					1 set
12	ISOLATOR WITH CB	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					1 set
13	ISOLATOR WITH CB	1 no 220kV 2000A				1 no 132kV 2000A				1 no 33kV 2000A					1 set
14	CHARGING BAY														

SCHEDULE OF EQUIPMENT	
11 KV	
SR NO	DESCRIPTION
1	11/0.433 kV 250 KVA STATION TRANSFORMER

LEGEND	REQUIRED QTY.
	1

1	2	3	4	5	6	7	8	9	10	11	12

1TEIEA2101001XX,R0

National Single Window System

Application Id

610900004

Approval Name: **Application for submission of Technical Connection data for Connectivity Agreement_2**

SWS ID:	SW1149165101
Applied By:	Sahil Verma
Applied On:	02 Jan 2024 01:03:03 PM
Ministry Name:	Ministry of Power
Department Name:	Central Transmission Utility

Form Name

SUBMISSION OF TECHNICAL CONNECTION DATA TO BE FURNISHED TO CTU FOR SIGNING OF "CONNECTIVITY AGREEMENT"

Details of Applicant

Name of the Applicant Company	H. P. POWER TRANSMISSION CORPORATION LIMITED

Details of Grant of Connectivity

Connectivity Intimation No.	
Date	
Quantum for which connectivity is granted	
Substation at which connectivity granted	
State	Himachal Pradesh

Address of Correspondence

Address 1	HPPTCL HIMFED BHAWAN SHIMLA
Address 2	
Country	India
State	Himachal Pradesh

Primary Contact Details

Primary Contact Person	MANOJ

Designation of **Primary Contact Person**	General Manager
Primary Phone Number (Mobile)	+91 9418407222
Primary Email ID	**ermanoj1@yahoo.com**

Alternate Contact Details

Alternate Contact Person	PARDEEP SINGH
Designation of Alternate Contact Person	SENIOR MANAGER
Alternate Phone Number (mobile)	+91 8278715343
Alternate Email ID	SMKALAAMB.TCL@HPMAIL.IN

Status of Applicant Company Details

Status of Applicant Company	ISTS Licensee
Estimated time of Completion of Project	15/01/2024

Detail & Drawings: Details

Annexure-A: Bay allocation, Equipment ratings, Protection equipment, System recording, Site responsibility details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure - A (CON-5 details).docx

Detail & Drawings: Attachments

Annexure-A(I): Equipment Drawings for confirming the Ratings	
Annexure-A(II): Protection SLD containing protection details of the transmission system to be made	KALA AMB SLD.pdf
Annexure-A(III): CRP & scheme drawings containing protection of the transmission system	
Annexure-A(IV): PLCC/FOTE Drawings for the Transmission Lines under the Scheme	PLCC PKATL.pdf

Detail & Drawings: Maps and Diagram

Schedule-I: Survey of India Topo-sheet clearly making the location of the Proposed Site	220 kV HPPTCL Substation on TOPOSHEET 1.pdf

Schedule-II (A): Site plan (both pdf and autocad file) in appropriate scale indicating Generators, Transformer, Site building	Upload PDF & Cloud Link
Schedule-II (A): Upload PDF	Site Plan HPPTCL Andehri.pdf
Schedule-II (A): Cloud link for .dwg file (AUTOCAD) to be uploaded	https://drive.google.com/file/d/1IOVx_nUSeunVZHUMPIIcjOTxh9eHcZD_/view?usp=drive_link
Schedule-II (B): Site plan of the ISTS substation at which connectivity granted (Autocad 2000 & above versions)	Site Plan PKATL.pdf
Schedule-III (A): Electrical Single Line Diagram (SLD) (both pdf and autocad) of the proposed facility detailing all significant items of plant (Autocad 2000 & above versions)	Upload PDF & Cloud Link
Schedule-III (A): Upload PDF	KALA AMB SLD.pdf
Schedule-III (A): Cloud link for .dwg file (AUTOCAD) to be uploaded	https://drive.google.com/file/d/1Qs_ueFuEdZ5km-esDIFd8RpnS4dCEnHH/view?usp=drive_link
Schedule-III (B): Electrical Single Line Diagram (SLD) of ISTS substation at which connectivity granted	SLD Kala Amb GIS PGCIL.pdf
Annexure-C(V): General Arrangement (GA) drawing indicating proposed facility	General Arrangement HPPTCL.pdf
Annexure-C(IV): Sub-Station Automation System (SAS) ring diagram indicating interconnections of various IEDs/Engg PC/Gateway etc.	ARCHITECTURE SAS KALA AMB.PDF
PERT Chart: Program Evaluation Review Technique (PERT) of Project indicating major activities with their completion scheduled	PERT Chart.pdf

TECHNICAL DETAILS and STUDIES: Transmission Line Data

Annexure-C(I): Transmission Line Tower, Conductor & Earth-wire/OPGW Details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure(C-1).docx
Annexure-C(II): Schematic Drawing of DA/A Type Tower clearly indicating Position of Conductor and E/wire	
Annexure-C(III): Equivalent Resistance, Reactance and Susceptance (R,X and B) Parameters of Transmission Line (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure-C(III).doc

TECHNICAL DETAILS AND STUDIES: Communication Data

Annexure-D(I): Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of Generator (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure-D(I).doc
Annexure-D(II): Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of TSP (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Annexure(D-II) Communication.docx
Annexure-D(III): Communication connectivity diagram	FOTE DRAWINNGS KALA AMB-ANDEHRI.pdf

TECHNICAL DETAILS AND STUDIES: Transformer Data

Schedule VII: Two winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Schedule_VIII_Two_Winding_Trans.doc
Schedule VIII: Three winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)	Schedule_VIII_Three_Winding_Trans.doc

TECHNICAL DETAILS AND STUDIES: Dynamic simulation data - RE Machines.

Schedule-XI(XIV): Transformer datasheet	

Declaration

I confirm that I am well aware of the relevant CERC/CEA Regulations and Detailed Procedure and all the details entered by me are in conformity with the Regulations. I submit that all the details given in the Application are true and correct and nothing material has been concealed thereof. I also submit that the documents attached are scanned/true copies of their respective originals. I hereby confirm that the above data submitted with the application are pertaining to connection sought for the ISTS. Further, any additional data sought for processing the application shall be furnished.	Accepted

Details of Documents Enclosed with the application

Annexure-A	Bay allocation, Equipment ratings, Protection equipment, System recording, Site responsibility details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)

Annexure-A(I)	Equipment Drawings for confirming the Ratings
Annexure-A(II)	Protection SLD containing protection details of the transmission system to be made
Annexure-A(III)	CRP & scheme drawings containing protection of the transmission system
Annexure-A(IV)	PLCC/FOTE Drawings for the Transmission Lines under the Scheme
Schedule-I	Survey of India Topo-sheet clearly making the location of the Proposed Site
Schedule-II (A)	Upload PDF
Schedule-II (B)	Site plan of the ISTS substation at which connectivity granted (Autocad 2000 & above versions)
Schedule-III (A)	Upload PDF
Schedule-III (B)	Electrical Single Line Diagram (SLD) of ISTS substation at which connectivity granted
Annexure-C(V)	General Arrangement (GA) drawing indicating proposed facility
Annexure-C(IV)	Sub-Station Automation System (SAS) ring diagram indicating interconnections of various IEDs/Engg PC/Gateway etc.
PERT Chart	Program Evaluation Review Technique (PERT) of Project indicating major activities with their completion scheduled
Annexure-C(I)	Transmission Line Tower, Conductor & Earth-wire/OPGW Details (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Annexure-C(II)	Schematic Drawing of DA/A Type Tower clearly indicating Position of Conductor and E/wire
Annexure-C(III)	Equivalent Resistance, Reactance and Susceptance (R, X and B) Parameters of Transmission Line (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)

Annexure-D(I)	Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of Generator (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Annexure-D(II)	**Details of communication system i.e. OPGW Cable, FOTE, FODP, Approach Cable, PMU etc. as per the format, in case of TSP (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)**
Annexure-D(III)	Communication connectivity diagram
Schedule VII	**Two winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)**
Schedule VIII	Three winding transformer data (Click on the icon to 1. Download the Template; 2. Fill it; then 3. Upload the File)
Schedule-XI(XIV)	**Transformer datasheet**

Validity unknown
Digitally Signed
Name: KAMAL JEET SINGH
Date: 02-Jan-2024 13:06:23

HPPTCL-PRJ0F9/5/2023-Project Cell-HPPTCL HQ

I/303450/2023

HPPTCL
Web: - www.hpptcl.com

H.P. POWER TRANSMISSION CORPORATION LTD.

(A State Govt. Undertaking)
Regd. Office: Himfed Bhawan, New ISBT Road, Panjari, Shimla-171005
Ph.: - 0177-2831283, 2831284 FAX: -0177-2831284
(CIN): U40101HP2008SGC030950
(GSTIN):02AACCH1548M1ZP

TO WHOM IT MAY CONCERN

Er. Manoj Kumar General Manager (Contracts & Design) HPPTCL is authorized to sign and execute connectivity agreements on behalf of HP Power Transmission Corporation Ltd. (STU-HP) in accordance with the GNA Regulations 2022 and IEGC Regulations 2023.

Director (Planning & Contracts)
HPPTCL, Shimla

ग्रिड-इंडिया GRID-INDIA

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

Ref: NRLDC/SO-II/TS-24/ 357-368 Date: 18-June-2024

To

As per distribution list.

Subject: Regarding continuous TTC-ATC violation during Night hours and very high import on Inter Regional lines.

Sir,

Northern Region demand has reached its all time high of 89.5 GW on 17.06.2024 and the Night time demand is also hovering in the range of 84-85 GW. Various states in the Northern Region have also recorded their highest demand met till date and power consumption even in hilly states are at a record high. The demand is expected to further increase in view of severe heat waves and continued dry spell. Further, the paddy crop load has commenced, and various NR states agriculture demand is also to be on the higher side driving further increase in consumption and putting further stress on power infrastructure of ISTS and state control area systems. Furthermore, IMD has forecasted severe heat waves at most places in the Northern Region and additionally warm night conditions at isolated places also.

The increase in demand has led to record drawl of power through the inter-regional lines. The IR lines on AC as well as HVDC have been importing huge amount of power. The import in WR-NR path particularly is being stretched to its limits. The import from Champa-Kurukshetra HVDC lines has been continuously maintained around its highest capability of 6000 MW. The import from 765 KV Vindhyachal-Varanasi D/C line has increased to the tune of 2200-2300 MW in each ckt. during this record high demand period and is not N-1 compliant. The increase in imports has led to continuous violation of WR-NR TTC in the Night hours (Approved TTC-ATC and actual drawl in WR-NR path is enclosed at Annexure-I).

Also, frequent trippings due to high WTI/OTI of ICTs, fire incidents, CT failures etc. has been reported recently in these extreme summer months. The ICTs at various ISTS and state-owned sub-stations have also been found to be N-1 non-compliant. Regular messages have been issued from Real time operators and deliberated in OCC meetings for sensitising on TTC-ATC violation and N-1 non-compliance of ICTs. States have also reported low voltages in their 220 KV and underlying network.

As you are aware the continuous violation of TTC-ATC is a threat to the grid security and there is ongoing risk of cascade trippings due to overload conditions of the Inter Regional transmission lines. To mitigate the same following measures are suggested:

I) Maintain drawl within the TTC-ATC limits as approved

II) Maximize internal generation of the running units and avoid partial outages

III) Expediting Revival of units under forced outages

IV) Staggering of agriculture loads and avoiding sudden increase in load

V) Utilising the gas plants presently under shutdown

VI) Tying up of power purchase within NR states

VII) Optimizing state control area hydro generation particularly in Night hours etc.

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

Please note that continuous WR-NR import TTC-ATC violation will lead to curtailment in the schedules of drawing states of the Northern Region which may lead to power shortages. Further, congestion charges may also be invoked for system reliability. Hence, states are requested to take measures as suggested above for maintaining NR drawl within TTC-ATC limits for safe and reliable grid operation.

Cooperation from all stakeholders is solicited.

Matter to be treated as urgent.

Thanking You.

Yours faithfully

(Sunil Kumar Agarwal)
General Manager (System Operation)

Distribution List:

Chief Engineer: SLDC-UP/Uttarakhand/Punjab/Haryana/Rajasthan/Delhi/J&K/Chandigarh

Copy for kind information:

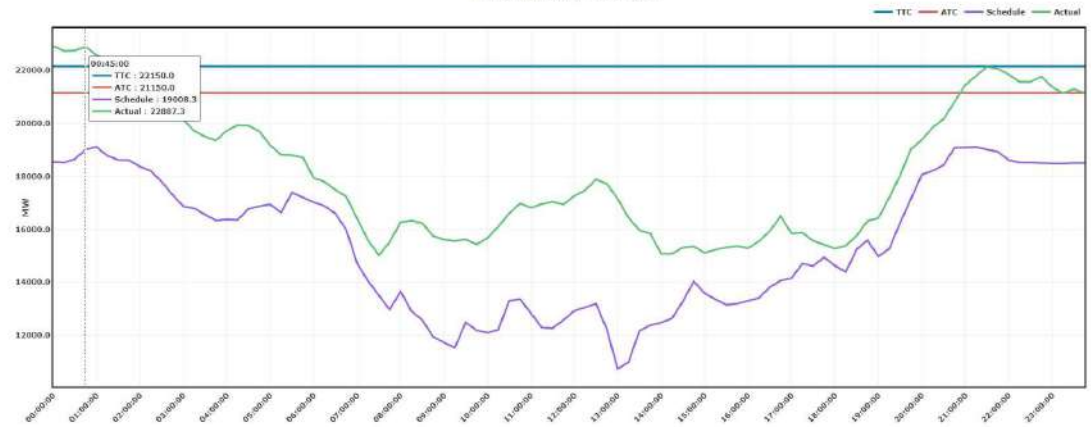
1. Member Secretary, NRPC, 18-A, SJSS Marg, Katwaria Sarai – 110016
2. Executive Director, NRLDC, GRID-INDIA, 18-A, SJSS Marg, Katwaria Sarai – 110016
3. Executive Director, NLDC, GRID-INDIA, B-9 (1st Floor), Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
4. CGM(System Operation), 18-A, SJSS Marg, Katwaria Sarai – 110016,NRLDC

Annexure-I

TTC-ATC(NR-WR)- 09-06-2024

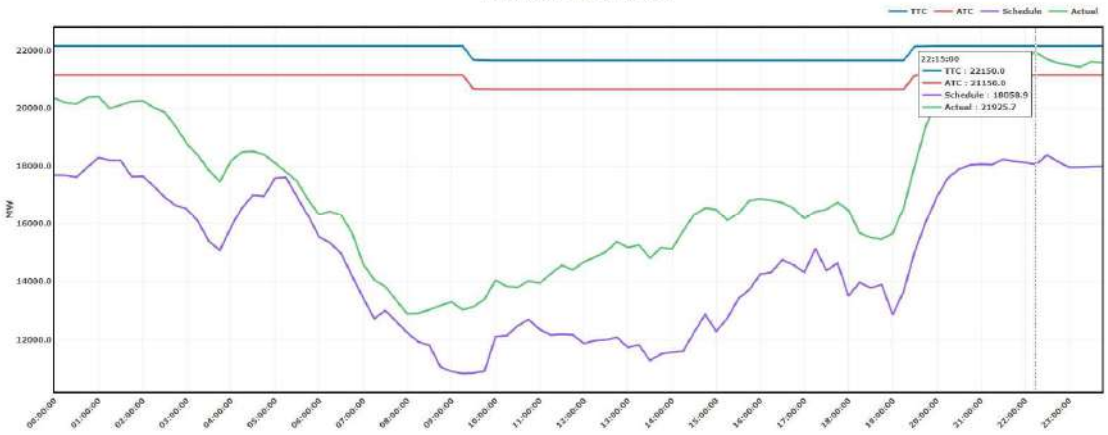
TTC-ATC(NR-WR)- 10-06-2024

TTC-ATC(NR-WR)- 11-06-2024



TTC-ATC(NR-WR)- 12-06-2024

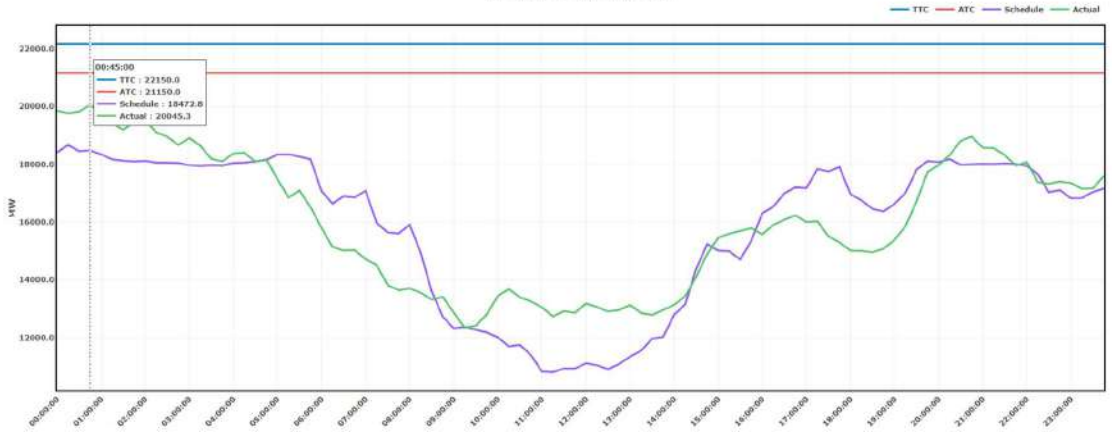
TTC-ATC(NR-WR)- 13-06-2024

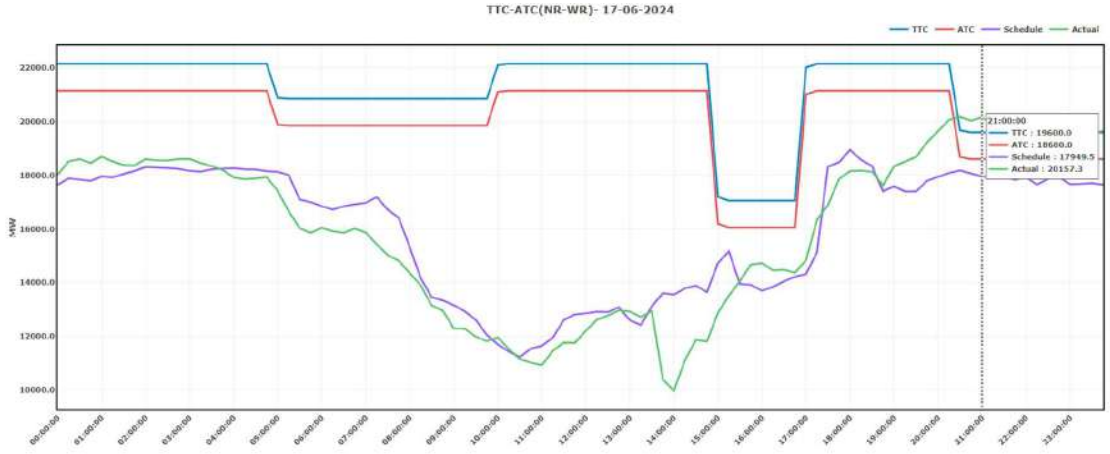


TTC-ATC(NR-WR)- 14-06-2024

TTC-ATC(NR-WR)- 15-06-2024

TTC-ATC(NR-WR)- 16-06-2024




TTC-ATC(NR-WR)- 17-06-2024
TTC
ATC
Schedule
Actual
MW
22000.0
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
21:00:00
TTC : 19600.0
ATC : 18680.0
Schedule : 17949.5
Actual : 20157.3

4

Annexure-XXI

163

प्रारूप III/Format III

राष्ट्रीय भार प्रेषण केंद्र / National Load Despatch Centre

नोटिस सं Notice No: NLDC/2024/06/08

तिथि Date 24/06/2024

जारी का समय Time of Issue: 01:04 hrs

सेवा में To

चेतावनी नोटिस
WARNING NOTICE

निम्नलिखित कॉरीडोर पर वास्तविक विद्युत प्रवाह उपलब्ध अंतरण क्षमता (एटीसी) से ऊपर है
The actual transfer of electricity on following corridors has crossed the ATC.

कॉरीडोर/नियंत्रण क्षेत्र Corridor/Control Area	ए टी सी (मेगावाट) ATC (MW)	वास्तविक प्रवाह (मेगावाट) Actual Flow (MW)
WR-NR	19850	20833
NR Import	22500	23172

प्रणाली तो अवमुक्त करने हेतु, संकुलित कॉरिडॉर के अनुप्रवाह स्थित निम्न क्षेत्रीय इकाईयों को सलाह दी जाती है कि वे अपनी निकासी कम करें/ अपना उत्पादन बढ़ाएँ:

The following regional entities, which are downstream of the congested corridor, are advised to reduce their drawal/increase their generation to decongest the system:

1. All Entities of NR which are over-drawing or under-injecting.

...

m.

प्रणाली तो अवमुक्त करने हेतु, संकुलित कॉरिडॉर के ऊध्र्वप्रवाह स्थित निम्न क्षेत्रीय इकाईयों को सलाह दी जाती है कि वे अपनी निकासी बढ़ाएँ/ अपना उत्पादन कम करें:

The following regional entities, which are ~~down~~UP stream of the congested corridor, are advised to increase their drawal/ reduce their generation to decongest the system:

1. All Entities of WR which are under-drawing or over-injecting.

...

n.

पाली प्रभारी प्रबन्धक / Shift Charge Manager

यह संकुलन प्रभार लागू किए जाने के पहले चेतावनी नोटिस हैं एवं के.वि.वि.आ. (वास्तविक समय प्रचालन में संकुलन अवमुक्ति के उपाय) विनियम, 2009 के अनुरूप निर्गत किया जा रहा है

This is a warning notice before levy of congestion charges and Issued in accordance with the Central Electricity Regulatory Commission (Measures to relieve congestion in real time operation) Regulations, 2009

ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre

आज़ादी का अमृत महोत्सव

कार्यालय : बी-9, प्रथम एवं द्वितीय तल, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Office : 1st and 2nd Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.grid-india.in, E-mail : gridindiacc@grid-india.in, Tel.: 011- 42785855

संदर्भ: NLDC/SO/NR/Import/Rihand-III/ **दिनांक:** 19th June 2024

To,

Member Secretary **Northern Regional Power Committee** 18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110 016	**Member Secretary** **Western Regional Power Committee** M.I.D.C. Central Road, Seepz, Andheri East, Mumbai, Maharashtra, 400093

विषय:– Shifting of NTPC Rihand stage-III generating station to northern region and opening of 400 kV Singrauli-Anpara line – Reg.

Sir,

The Northern Region (NR) is experiencing a significant increase in power demand, particularly during non-solar hours. The Northern Regional import from neighboring regions (WR and ER) has also increased and the transfer capability limit (TTC/ATC) between the Western Region (WR) and Northern Region (NR) is getting breached on regular basis.

The loading on the 765 kV Vindhyachal-Varanasi D/C remains on the higher side (N-1 non-compliance also observed on few occasions) for significant period of the time. The high loading on the 765 kV Vindhyachal-Varanasi D/C is currently one of the limiting factors in facilitating further transfer of power from WR to NR. The trend of WR-NR flow and loading of 765 kV Vindhyachal – Varanasi line over the last few days is attached at **Annexure-A.** The operation of 765 kV Vindhyachal-Varanasi-D/c at such high loadings and violation of import ATC of NR is a cause of concern. The situation is likely to aggravate further in July-September.

At present, Rihand stage-III generating station (2x500 MW) is evacuated through Western Region via 400 KV Rihand stage-III- Vindhyachal PS D/C. Further, the station is disconnected from NR by keeping the bus coupler between Rihand-III and Rihand- I &II open.

In order to relieve the loading of 765 kV Vindhyachal-Varanasi and facilitate higher import by NR in the upcoming high demand months, following network rearrangement is proposed:

- Shifting of Rihand stage-III generating station (2x500 MW) to NR by closing the bus coupler between Rihand-III and Rihand-I & II and disconnecting Rihand-III from WR by opening 400 kV Rihand stage-III - Vindhyachal PS D/C as an interim measure
- Opening of 400 kV Singrauli-Anpara S/C

Detailed proposal is enclosed at **Annexure-B.**

As per the system studies carried out by NRLDC and NLDC, the system is n-1 secure with the above reconfiguration. The fault levels in the generation complex are also within the breaking capacity of switchgear. There would be a relief of **~250 MW in loading of each circuit of 765 kV Vindhyachal - Varanasi D/C** and the increment in WR-NR TTC/ATC after the implementation of proposed rearrangement is expected to be of the order of **~1300 MW**.

It is also pertinent to mention here that the opening of 400 kV Singrauli – Anpara line (to control fault levels in the complex after commissioning of 765 kV Anpara D – Unnao line) is already agreed in the 1st NRPCTP meeting held on 24th Jan 2020. Relevant extract of the meeting minutes is provided at **Annexure-C.** The matter was discussed in the 212th OCC meeting of NRPC and also in a separate meeting with SLDC UP, NTPC and POWERGRID on 14th June 2024. Discussion summary is enclosed at **Annexure-D**.

It is requested to convene a special meeting of all the concerned stakeholders at respective RPC level to facilitate its implementation.

सधन्यवाद,

भवदीय,

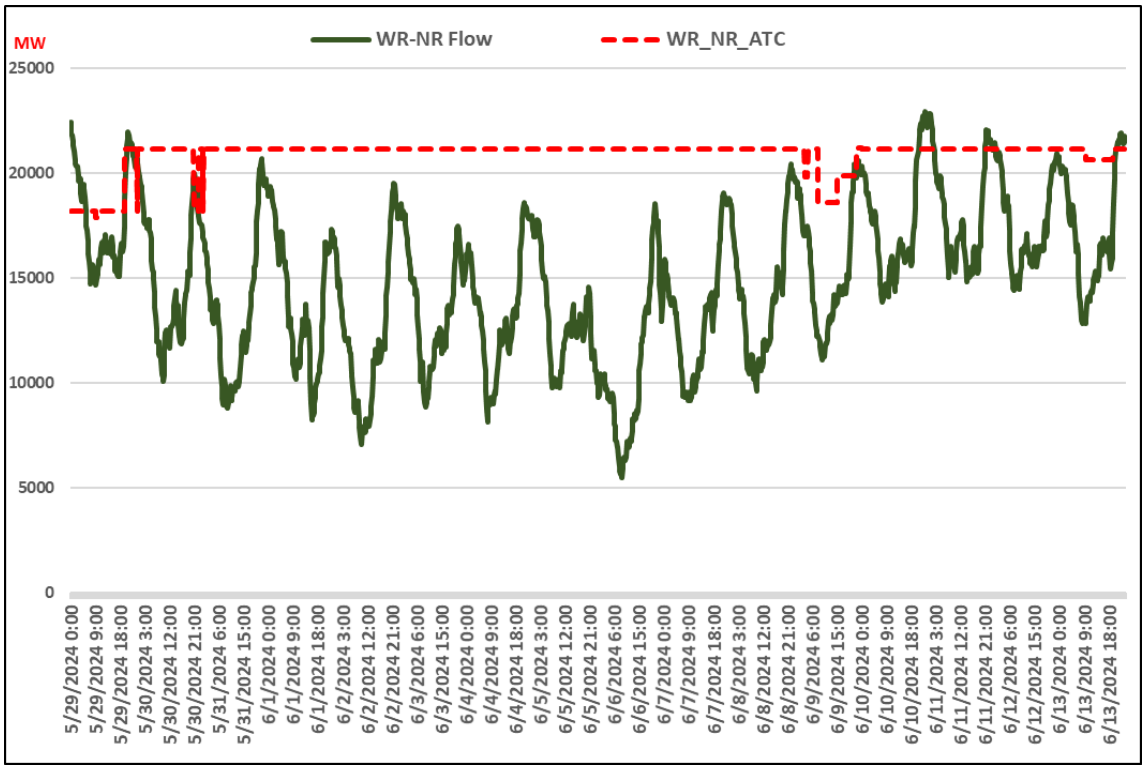
(विवेक पाण्डेय)
वरिष्ठ महाप्रबंधक (प्रणाली प्रचालन)

Encl: As above

Copy to:

1. Member (GO&D), CEA
2. Member (PS), CEA
3. CMD, Grid-India
4. Director (SO), Grid-India
5. COO, CTUIL
6. Executive Director, WRLDC / SRLDC/ERLDC/NERLDC / NRLDC

Annexure-A


MW
WR-NR Flow
WR_NR_ATC
25000
20000
15000
10000
5000
0
5/29/2024 0:00
5/29/2024 9:00
5/29/2024 18:00
5/30/2024 3:00
5/30/2024 12:00
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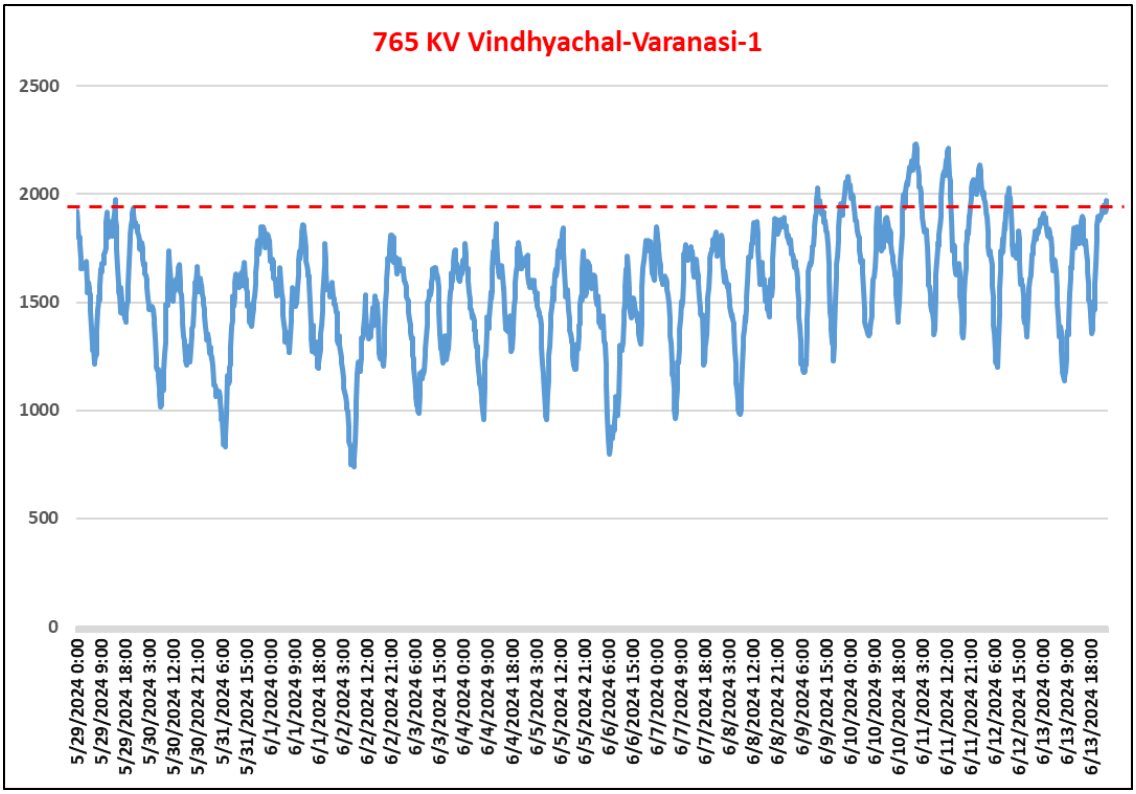
6/13/2024 18:00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6/11/2024 21:00
6/12/2024 6:00
6/12/2024 15:00
6/13/2024 0:00
6/13/2024 9:00
6/13/2024 18:00

Annexure-B

Detailed Proposal on shifting of Rihand Stage-III to Northern region & Opening of 400 KV Singrauli-Anpara-S/C

I. Background

- The Northern Region (NR) is experiencing a significant increase in power demand in ongoing summer season. The NR import is approaching ATC figure particularly during non-solar hours. High power imports is exceeding the transfer capability limit (TTC) between the Western Region (WR) and NR.
- The situation is further complicated by change in inter-regional power flow patterns. Due to changes in load profiles and high eastern region demand, the power supply from the Eastern Region (ER) to NR has decreased substantially during non-solar hours. Consequently, NR is importing heavily from the Western Region.
- NLDC has recently revised the WR-NR import TTC/ATC values. Even after increment of 2950 MW, the real time power flow in WR-NR is around ATC limit.
- NR demand is expected to be in upcoming days. During high NR import, all generation is maximized in NR. HVDC Champa-Kurukshetra is operated at its rated capacity i.e. 6000 MW.
- 765 KV Vindhyachal-Varanasi is one of the limiting constraints in WR-NR corridor. Due to high NR import, the loading on the 765 KV Vindhyachal-Varanasi-D/C remains very high and becomes N-1 non-compliant for significant period of time.
- A detailed analysis of the real-time loading trends is enclosed as Annexure-1.

II. Proposal for controlling the line loading of 765 KV Vindhyachal-Varanasi-D/C

N-1 limit of 765 KV Vindhyachal-Varanasi has been considered up to the maximum reliable value shared by the line owner. HVDCs are also operated to relieve loading on these lines. To relieve loading on 765 KV Vindhyachal-Varanasi-D/C and in order to facilitate higher power transfer from western region to the northern region, following steps are proposed

I. Opening of 400 KV Singrauli-Anpara-S/C.
II. Shifting of Rihand stage-III power station (2*500 MW) to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III-Vindhyachal PS-D/C.

- As per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara has to be opened to control the high fault levels in Anpara – Singrauli – Rihand complex.

Extract from the meeting are shown below:

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

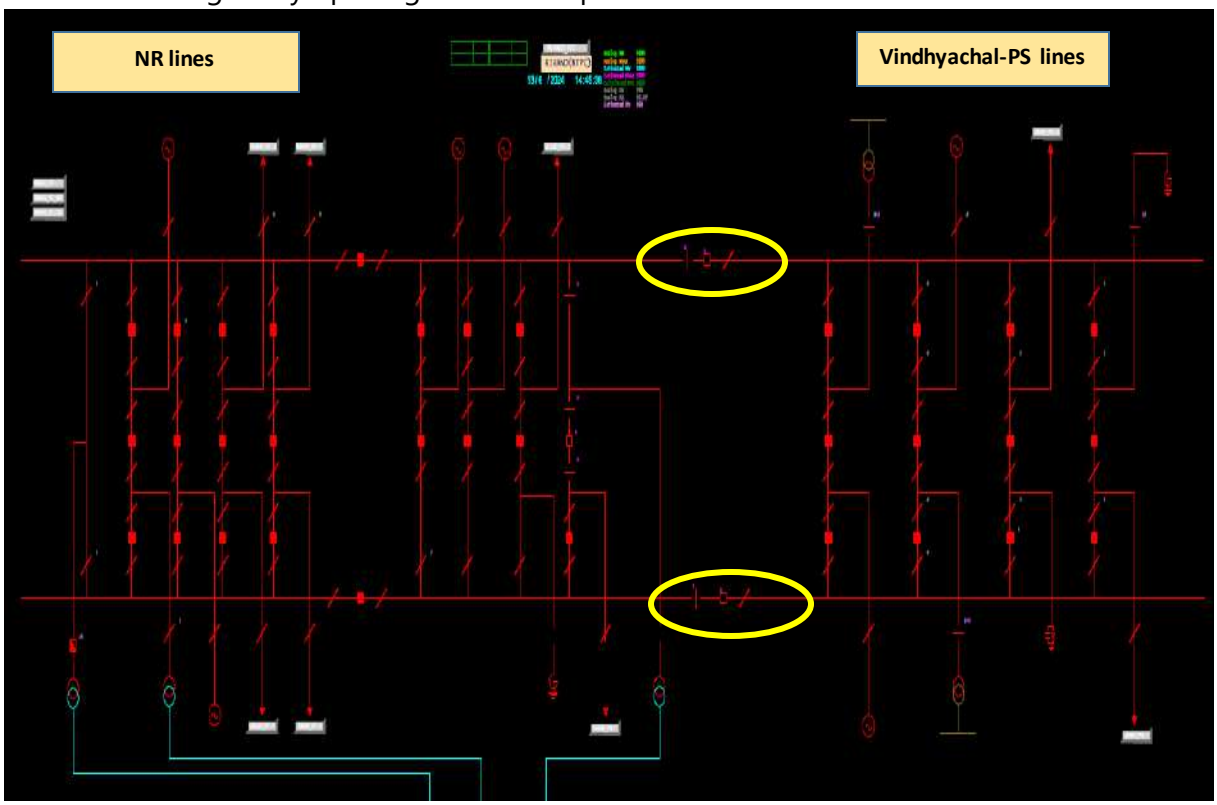
IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

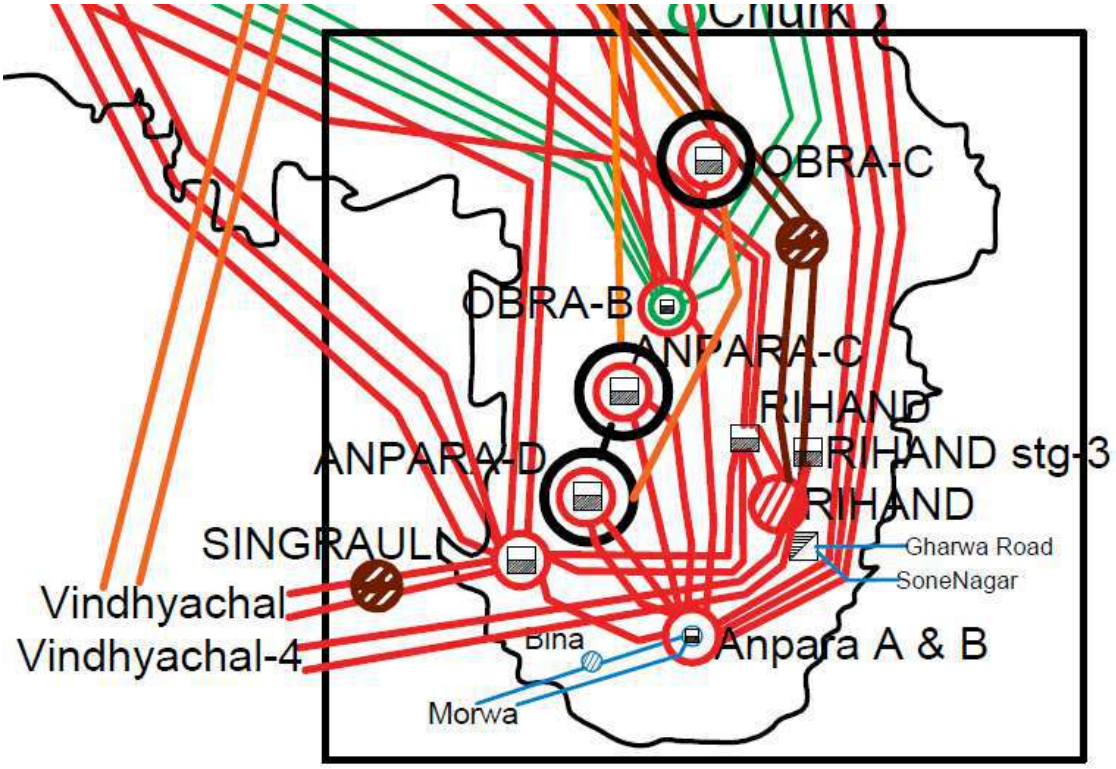
(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

- Currently, Rihand stage-III power station (2*500 MW) is connected to western region through 400 KV Rihand stage-III- Vindhyachal PS-D/C. The same is disconnected from the Northern region by opening the bus coupler shown below.



- Rihand stage-III power station (2*500 MW) would be shifted to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III- Vindhyachal PS-D/C.



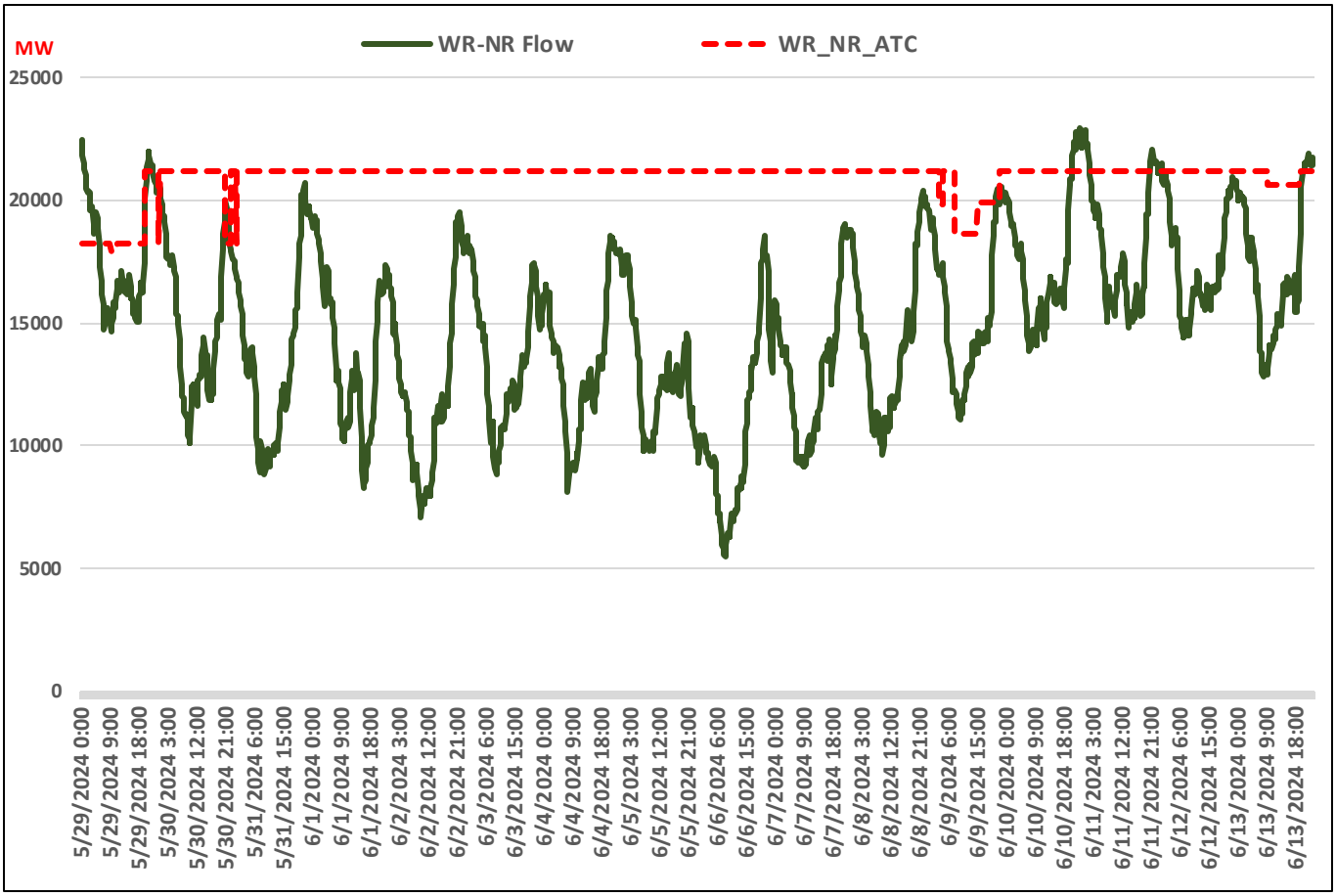
- With the above network configuration (both), significant relief in the loading on the stressed WR-NR transmission lines/ICTs observed. This relief would enhance the transfer capability of WR-NR corridor and would facilitate higher power transfer from WR to NR.

III. Benefits after network configuration as proposed above

1. **Reduced Loading and Flexible Operation**:
    a. Shifting the 1000 MW generation at Rihand Stage-III power station to NR would provide significant relief to the overloaded 765 kV Vindhyachal-Varanasi D/C line. It will result in >250 MW loading relief in each circuit of 765 kV Vindhyachal - Varanasi D/C.
    b. Relief in loading on the 400 kV Anpara-Obra line and
    c. Allow for flexible operation of the HVDC B2B Vindhyachal.
2. **Reduced Fault Level:** It will result in a reduction in the fault level of 400 kV Rihand and 400 kV Singrauli substations.
3. **Increment in WR-NR TTC/ATC figure by 1300 MW.**

It's important to note that implementing both the proposed re-arrangements is necessary to achieve the desired outcomes. This will alleviate the stress on the overloaded WR-NR corridor and significantly enhance transfer capability between the regions

Annexure-1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WR-NR Flow
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25000
20000
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5000
0
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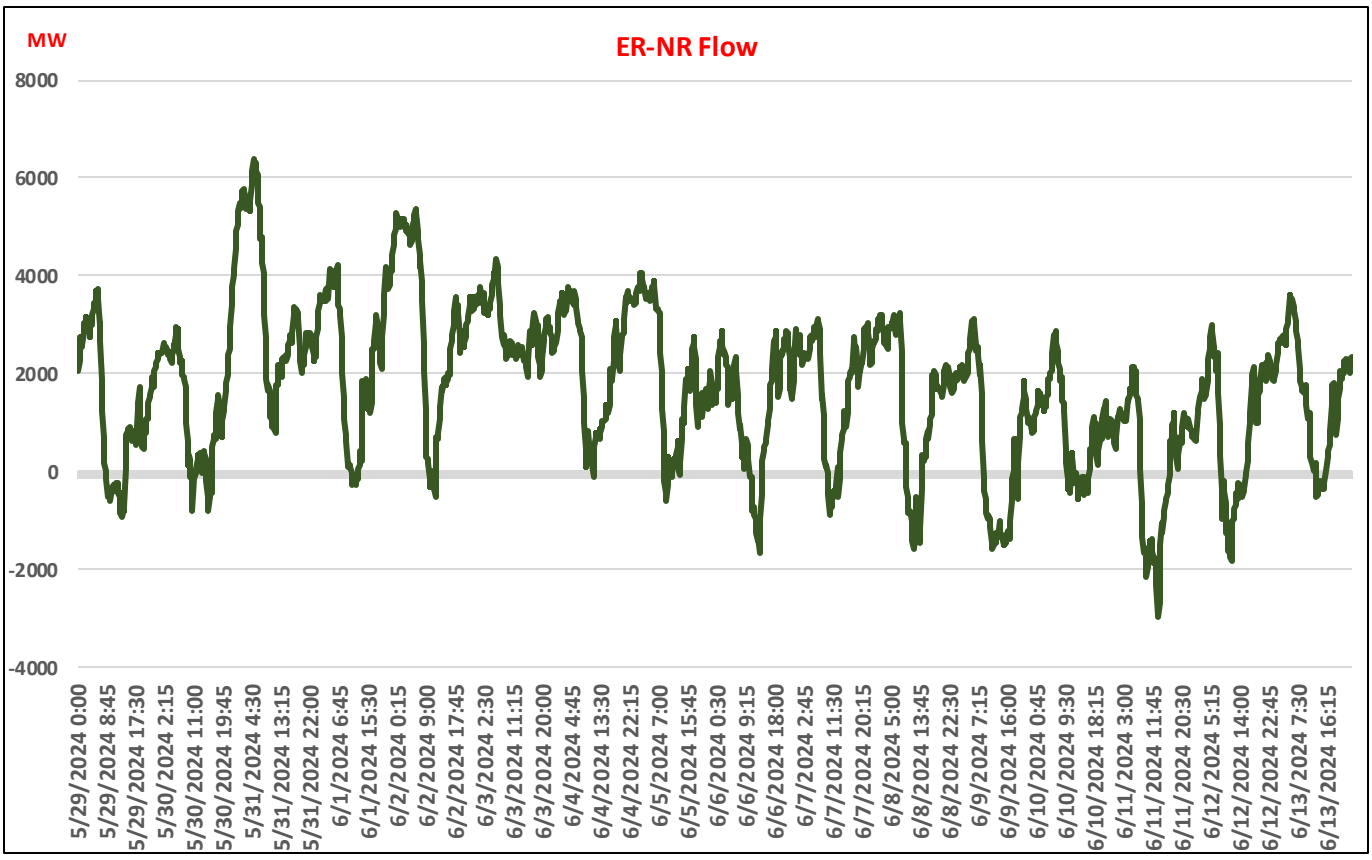
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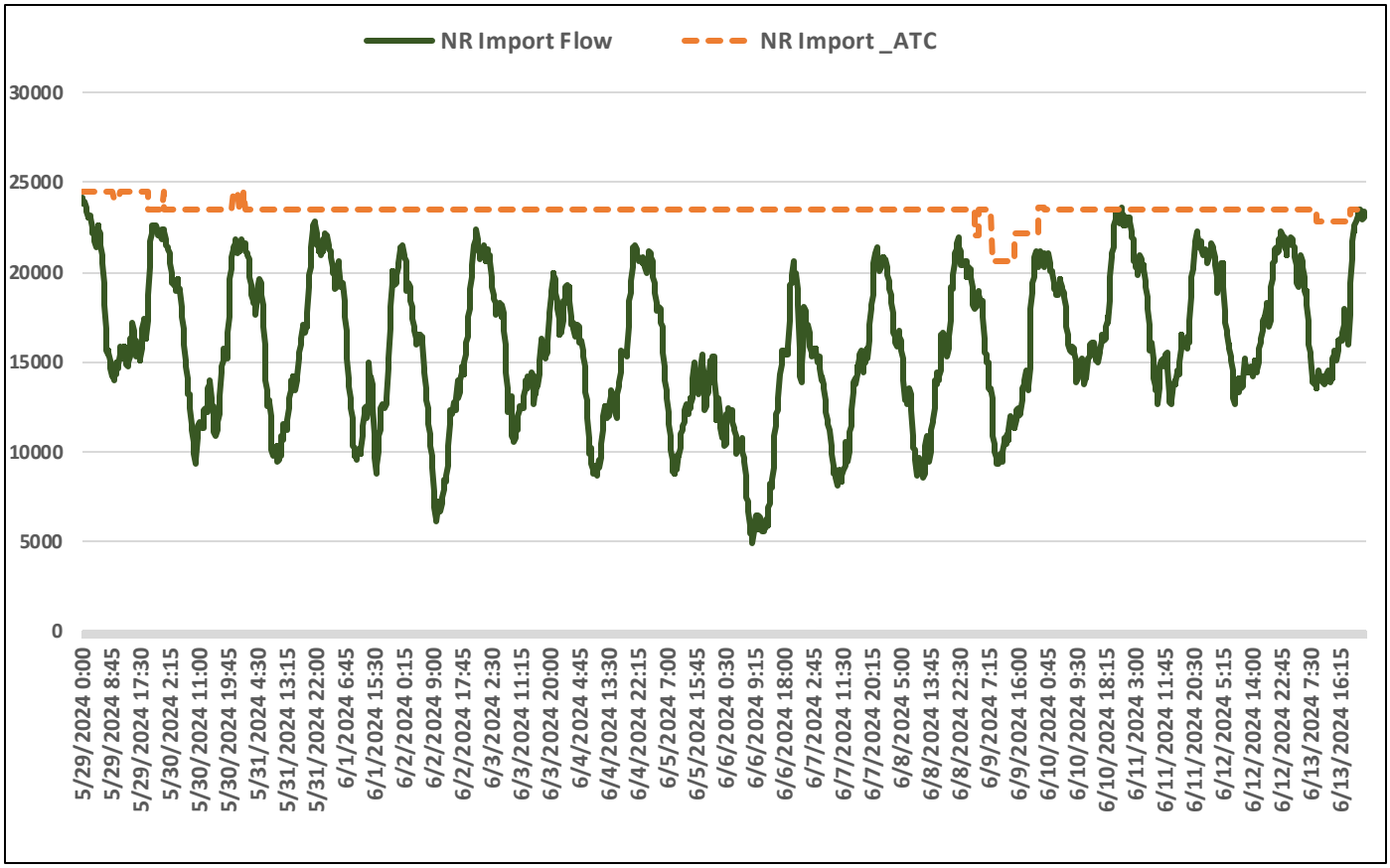
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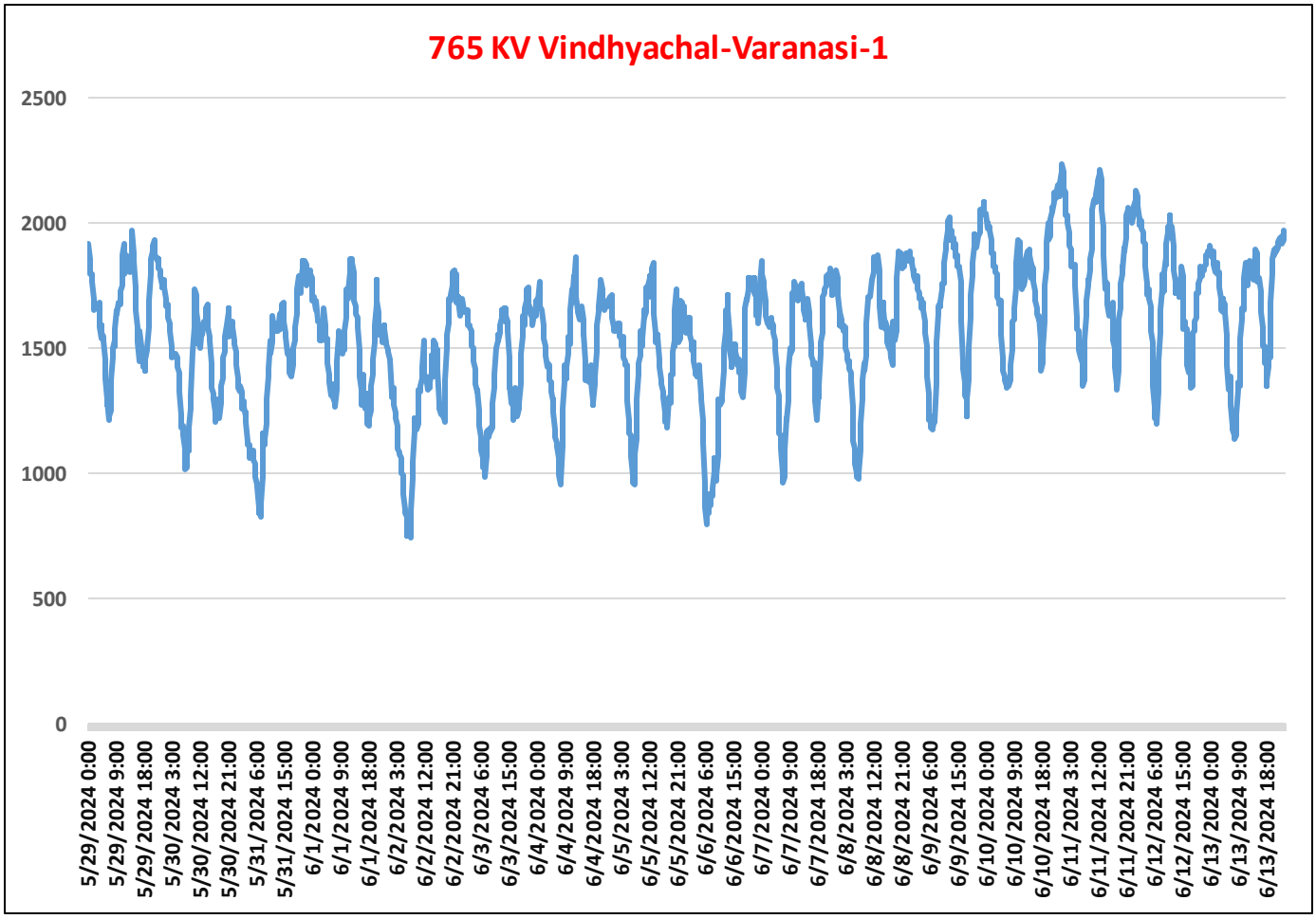
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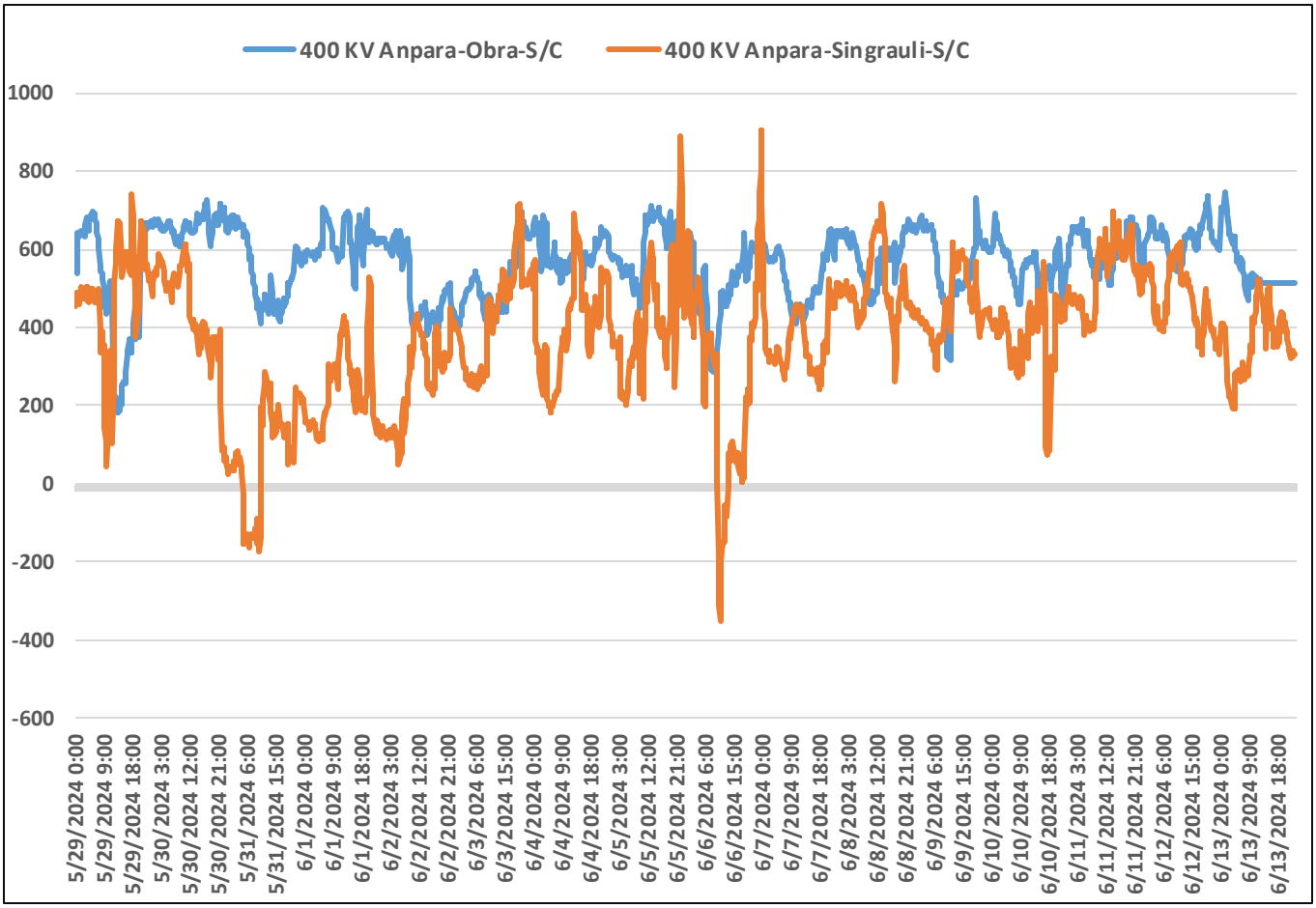
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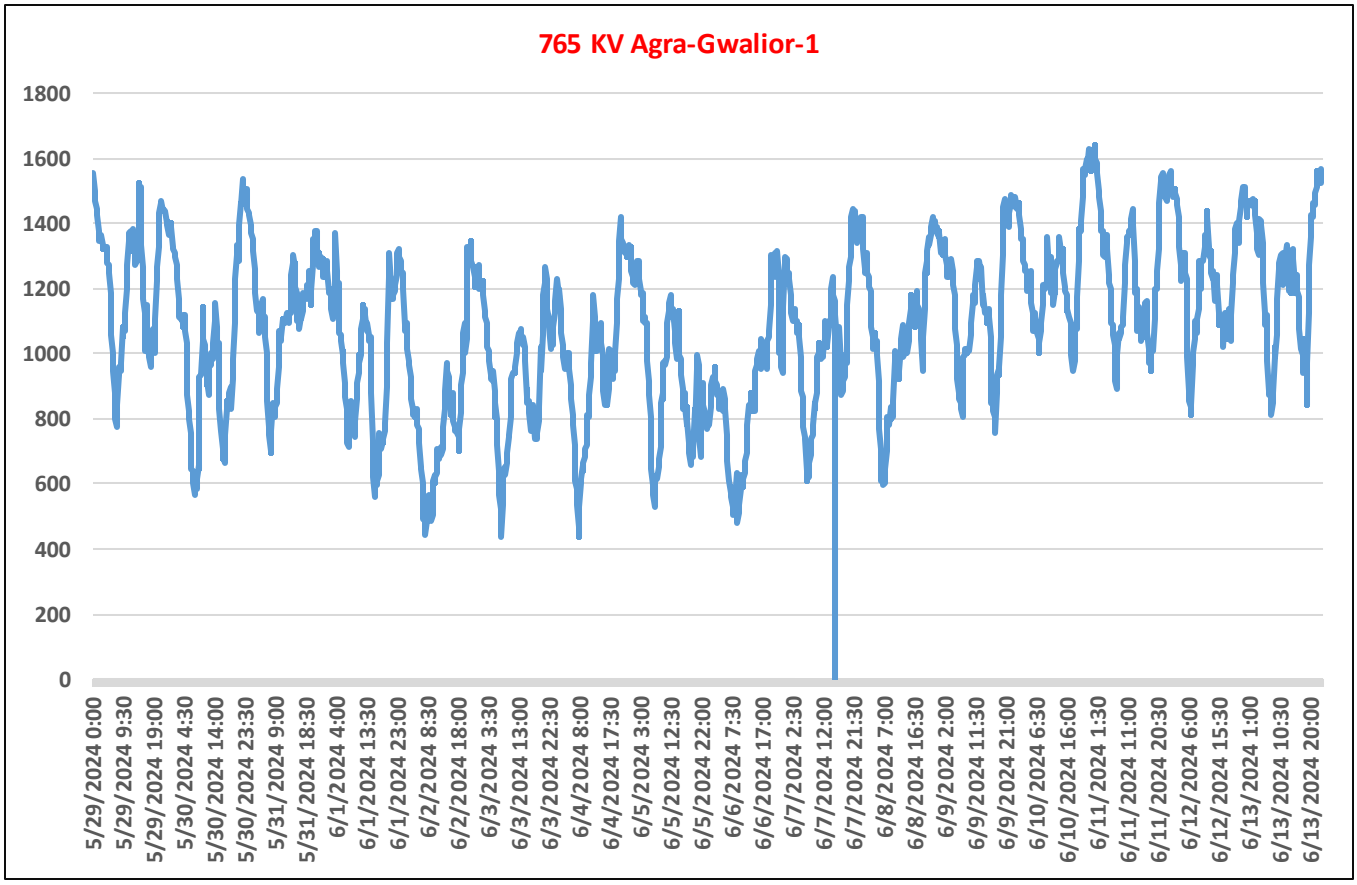
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Annexure-2

1. **Assumptions**

S. No.	Region	Demand	Generation
1	NR	80900	59200
2	WR	64000	90000
3	ER	30200	31600

S. No.	State	Demand
1	UP	29800
2	Punjab	11400
3	Rajasthan	15400
4	HP	1750
5	Uttrakhand	2350
6	J&K	3460
7	Haryana	10700
8	Delhi	7400

HVDC Set points

- Champa – Kurukshetra – 6000 MW
- Mundra – M'garh – 1750 MW
- Rihand – Dadri – 1500 MW
- Vindhyachal – blocked
- Bhiwadi-Balia-1200 MW
- APD – Agra – Blocked (both)
- Agra –BNC – 700 MW

2. Study Results

a.) The change in line loading with the proposed network configuration is as given below

From Bus		To Bus		Ckt ID	Base Case loading (MW)	Loading after Shifting Rihand-III to NR (in MW)	Loading after opening 400kV Anpara-Singrauli +Shifting Rihand-III to NR (in MW)
154057	[RIHAND-G 400.00]	324044	[RIHAND-III 400.00]	1	0	-892.4	-892.4
324033	[VINDHYACL-PS400.00]	324044	[RIHAND-III 400.00]	B1	-445.8	0	0
324033	[VINDHYACL-PS400.00]	324044	[RIHAND-III 400.00]	B2	-445.8	0	0
154014	[ANPARA4 400.00]	154056	[SINGRL4 400.00]	T1	-413.8	-781.4	0
154014	[ANPARA4 400.00]	154018	[OBRA4 400.00]	T1	667.6	770.5	510.9
154056	[SINGRL4 400.00]	154057	[RIHAND-G 400.00]	T2	-12.3	-361.5	-270.9
157010	[VARANASI-PG 765.00]	327007	[VINDHYACL-PS765.00]	H1	-2167.5	-1946	-1975
157010	[VARANASI-PG 765.00]	327007	[VINDHYACL-PS765.00]	H2	-2167.5	-1946	-1975
327002	[SATNA-PG 765.00]	327013	[ORAI 765.00]	B1	1162.6	1085.5	1072.4
157006	[FATEH-PG 765.00]	157010	[VARANASI-PG 765.00]	B1	-886.3	-815.1	768.5
154053	[ALLAHABA 400.00]	154056	[SINGRL4 400.00]	T2	-311.8	-381.8	-530
157018	[ALIGARH 765.00]	157019	[GNOIDA765.00]	H1	1599.7	1534.9	1529.9
154049	[FATEH-PG 400.00]	154056	[SINGRL4 400.00]	T1	-309	-372.7	495.1
157007	[AGRA-PG 765.00]	327003	[GWALIOR-PG 765.00]	B1	-1591.5	-1530	1527.2
154023	[MAU4 400.00]	154054	[BAL74-PG 400.00]	T1	-812	-751.1	836.4
327002	[SATNA-PG 765.00]	327003	[GWALIOR-PG 765.00]	B2	1111.7	1052	1046.7
327007	[VINDHYACL-PS765.00]	327008	[SASAN-UMPP_A765.00]	B2	-1701.2	-1644.4	-1649.6
154014	[ANPARA4 400.00]	154019	[SARNATH4 400.00]	T1	430.8	484.7	387.1
154015	[ANPARA4 400.00]	154023	[MAU4 400.00]	T1	307.4	352.5	276
157000	[ANPARAC 765.00]	157002	[UNNAO7 765.00]	B1	956.6	1009.5	891.4

b). The Fault level with the proposed network configuration is as given below

Sl. No	Substation	Base case		After opening 400kV Anpara-Singrauli		After Shifting Rihand-III to NR		After opening 400kV Anpara-Singrauli +Shifting Rihand-III to NR	
		Fault MVA	Fault current (kA)	Fault MVA	Fault current (kA)	Fault MVA	Fault current (kA)	Fault MVA	Fault current (kA)
1	400 KV Singrauli	32690	47	21916	32	34157	49	23369	34
2	400 KV RIHAND-1 & 2	22262	32	18991	27	25258	36	21989	32
3	400 KV Vindhyachal-PS	39166	57	39165	57	36386	53	36384	53
4	400 KV ANPARA	36287	52	26636	38	36676	53	26639	38
5	400 KV ANPARA C	35524	51	26315	38	35892	52	26318	38
6	400 KV ANPARA-D	32024	46	24471	35	32317	47	24474	35
7	765 KV ANPARA C	30521	23	27722	21	30623	23	27725	21
8	765 KV ANPARA-D	30485	23	27723	21	30586	23	27725	21
9	400 KV OBRA	20101	29	19029	27	20155	29	19034	27
10	765 KV OBRA_C	21322	16	20205	15	21364	16	20207	15

C. WR-NR/NR Import TTC/ATC has been reviewed and the proposed figures are tabulated below.

Sl No	Corridor	Current Declared TTC (MW)	Proposed Figures			Remarks	Limiting Constraints
			TTC	RM	ATC		
1	NR Import	24950	25200 **(+250)**	1400	23800	Obtained from simulation studies	1.N-1 contingency of one ckt of 765 kV Vindhyanchal-Varanasi will overload the other circuit. 2.N-1 contingency of one ckt of 2*1500 MVA 765/400 kV ICTs at Agra-PG will overload the remaining ICT
2	WR -> NR	22150	23450 **(+1300)**	1000	22450	Obtained from simulation studies	
3	ER -> NR	6700	6700	400	6300	The flow from ER to NR in simulation case is around 1700 MW which is in the range of power flow observed in real-time. However, the same may be kept unchanged considering the uncertainties observed in the LGB of Eastern region.	

Annexure-C

Relevant Extracts of 1st NRPCTP meeting held on 24th Jan 2020

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

Annexure-D

Record Notes of discussion held on 14.06.2024 to discuss opening of 400kV Singrauli-Anpara line

Background: Northern Region(NR) is experiencing severe heat wave conditions and maximum NR demand reached all time high of 87046 MW on 14th Jun 2024. On 13th Jun 2024, maximum NR import reached 24048 MW which is violation of present NR import ATC value of 23550 MW. 765 kV Vindhyachal-Varanasi-D/c is one of the high power corridors carrying power between western region to northern region. The loading on these lines is also one of the limiting constraints in import of power by NR. During periods of high NR import, when NR import crosses ATC limits, the flows on 765 kV Vindhyachal-Varanasi-D/c becomes non-compliant to N-1 reliability criteria. The operation of 765 kV Vindhyachal-Varanasi-D/c at such high loadings and breach of import ATC by NR is a cause of concern. NLDC/NRLDC/WRLDC have already taken all possible measures to enhance the reliability during high NR import. Based on previous years' data, it is observed that NR demand and maximum NR import is on rising trend during the period of June to September months. The possibility of increasing NR imports in coming days requires exploring other possible measures in advance. As per simulation studies carried out by NLDC/NRLDC, it was gathered that shifting of Rihand Stage-III generation from existing WR to NR is expected to enhance NR import capability and may be considered as one of the possible measures. This may be implemented as an interim measure to contain NR import during ongoing high demand period in NR. It was also gathered from study that the shifting of Rihand Stage-III from WR to NR is expected to increase the already high fault levels at generating stations of Rihand, Singrauli and Anpara. The fault levels at these generating stations are already on the higher side and to control the high fault level , planners had recommended opening of 400 kV Singrauli-Anpara line. As per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli-Anpara is to be opened and the matter has been discussed at various NRPC meetings and is pending for agreement of all the stakeholders. Therefore, an urgent meeting was convened on 14.06.2024 with participants from NRLDC, NLDC, UP SLDC, UPPTCL, UPRVUN, NTPC and POWERGRID to discuss on the proposal of:

1. Opening of 400 KV Singrauli-Anpara-S/C.

2. Subsequently, shifting of Rihand stage-III power station (2*500 MW) to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III- Vindhyachal PS-D/C

Discussion in the meeting:

1. NRLDC representative presented the congestion issues being observed in the grid during high import of power by Northern region from Western region. It was highlighted that Northern Region (NR) is experiencing a significant increase in power demand, particularly during non-solar hours. This high demand has led to a high power import scenario, where the transfer capability limit (TTC/ATC) between the Western Region (WR) and Northern Region (NR) is getting breached on regular basis. Due to the prevailing high NR import, the loading on the 765 KV Vindhyachal-Varanasi-D/C remains one the higher side (N-1 non-compliant) for significant period of the time. The high loading on the 765 KV Vindhyachal-Varanasi-D/C is the limiting factor in facilitating further transfer of power from WR to NR.

2. NRLDC representative further informed that as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara has to be opened to control the high fault levels in Anpara – Singrauli – Rihand complex. Extract from the NRPCTP meeting minutes as presented in the aforesaid meeting is shown below:

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

The issue was also discussed in 210, 211 & 212 NRPC OCC meetings. During 212 OCC meeting, it was agreed that as requested by UP, 400 kV Anpara-Singrauli line should remain in service till commissioning of 2X1000 MVA ICTs at Obra C and revised SPS for Anpara Complex is commissioned. Thereafter, the line may be opened after discussion at OCC level.

3. NRLDC representative added that at the time of discussion in 212 OCC meeting held in October 2023, NR import had reduced considerably and it was informed that 2 X 1000 MVA ICTs at Obra C would also be commissioned shortly. Therefore, opening of 400 kV Anpara-Singrauli was linked with commissioning of 2 X 1000 MVA ICTs at Obra C as winter was approaching and fog related tripping were also suspected.

   Subsequently, the matter was also discussed in first meeting of Standing Committee on Short Term & Perspective Power System Planning- Northern Region (SCSTPPSP-NR) held on 14.03.2024 at NRPC, New Delhi. In the meeting, it was recorded that

   "*During the meeting, UPPTCL representative informed that the 765/400 kV ICTs at Obra C are expected to be charged this summer (one in April and another in June) along with associated 400 kV lines from Obra C. This is expected to provide relief in the complex*"

   However, due to delay in commissioning of 765/400kV ICTs at Obra C, the agenda for opening of 400 kV Anpara-Singrauli line can be deliberated again. As this would be pre-requisite for implementation of the proposed remedial measures for high NR import.

   It was informed that with opening of 400kV Singrauli-Anpara line, following relief in 3-ph fault levels would be achieved:

   - 400kV Singrauli by 16kA (below 40kA)
   - 400kV Anpara by 14kA (below 40kA)
   - 400kV Anpara C by 13kA (below 40kA)
   - 400kV Anpara D by 11kA (below 40kA)
   - 400kV Rihand by 5kA (below 40kA)

Major study observations were also presented in the meeting:

- Opening of 400 kV Singrauli – Anpara will result in a reduction in the fault level in the complex
- Relieve the loading of 400 kV Anpara - Obra line
- Facilitate Flexible operation of HVDC B2B V'Chal
- Facilitate shifting of Rihand – III (1000 MW) generation NR which will result in **>250 MW** loading relief in each circuit of 765 kV Vindhyachal - Varanasi D/C. The relief in the loading of 765 kV V'chal – Varanasi D/C will relive the congestion in WR-NR corridor and facilitate high import of NR in the upcoming high demand/import period.

4. It was also mentioned that as per simulation studies done at NRLDC end, the system appears to be N-1 compliant even if the proposed rearrangement is carried out before the commissioning of 400 kV lines from Obra C and 765/400kV 2x1000 MVA ICTs at Obra-C. Moreover, it was proposed that 400 kV Anpara – Singrauli line may be kept charged from 400kV Anpara end and may be synchronized as per grid requirement in real-time. It was

also mentioned that relief of 60-70 MW is observed on 400kV Anpara-Obra line with commissioning of 765/400kV Obra-C ICTs and 400kV lines from ObraC.

Accordingly, following was proposed from GRID-INDIA side:

I. Opening of 400 KV Singrauli-Anpara-S/C as per the decision taken in 1st NRPCTP meeting at the earliest after deliberation in upcoming NRPC OCC meeting scheduled on 19.06.2024
II. Subsequently, shifting of Rihand stage-III power station (2*500 MW) to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III-Vindhyachal PS-D/C for high NR demand period.

5. NTPC Rihand representative highlighted grid event that took place in 2017, when there was complete station outage at Rihand TPS. It was also highlighted that with the proposed arrangement of shifting of Rihand-III to NR, availing shutdowns in the Rihand-SIngrauli complex becomes difficult. Further, as meeting has been arranged on short notice, NTPC Rihand would also consult NTPC-Engg team for their inputs.

   NRLDC representative stated that this agenda would also be discussed in upcoming NR-OCC meeting scheduled on 19.06.2024 and the inputs of NTPC-Engg team may be taken by that time. NRLDC representative also added that system would be N-1 compliant with proposed arrangements and shutdowns would be provided as per the grid condition.

6. NLDC representative stated that the 2017 generation loss event highlighted by NTPC is a rare event which occurred due to failure of multiple protection systems. Further, a committee was also constituted after the event and the measures suggested by the committee have been implemented to improve the system reliability in the complex. As of now Rihand III generation is being evacuated only through two lines After the proposed arrangement, the reliability of Rihand-III plant would also improve.

7. Anpara TPS representative stated that recently two 765kV lines tripped from Anpara to Unnao and under such case, 400kV lines from Anpara TPS got overloaded. Flow on 400kV Anpara-Obra crossed 900 MW when both 765kV lines tripped and 400kV Singrauli-Anpara was also in service.

   NRLDC representative stated that 400kV Singrauli-Anpara line shall be kept charged from one end and would be synchronized from other end in case of grid requirement under N-1-1 or N-2 contingency. Moreover, SPS has also been proposed from UP SLDC side to manage line loadings in case of double contingency. The proposal from UP SLDC would also be discussed in 220 NRPC OCC meeting scheduled on 19.06.2024.

8. POWERGRID representative stated that with this rearrangement fault levels in complex would get reduced. As the line would be out due to grid requirements, deemed availability needs to be provided.

   NRLDC representative stated that with this arrangement, loading of 400/220kV Allahabad(PG) ICTs will increase and accordingly SPS under discussion for 400/220kV

ICTs at Allahabad(PG) needs to be implemented at the earliest till new ICT is commissioned. Further, as 400kV Singrauli-Anpara would be kept charged from one end, deemed availability would be provided to POWERGRID.

9. Chief Engineer, UP SLDC stated that two events involving outage of two 765kV lines from Anpara to Unnao and three ICT outages at Unnao have been seen in the past. In such cases, Anpara generation evacuation would be under threat.

   NLDC representative stated that the concern of UP SLDC is understood, however ongoing high NR import conditions requires urgent attention as well as more alert and optimised approach in operational planning. The reliability of Anpara generation complex alongwith reliability of WR-NR inter-regional corridor has been analysed with proposed arrangements. It is suggested that during any contingency situation in Anpara generation complex, 400kV Singrauli-Anpara line can be closed based on the real time system conditions, this is expected to help in safe evacuation of Anpara generation. The line is suggested to be charged from one end for faster revival.

   NLDC representative shared that with collective coordinated measures from stakeholders, the suggested measures may be adopted. Under the given circumstances, the arrangement proposed by Grid India appears to be optimised solution.

10. UP SLDC representative stated that even if 400kV Singrauli-Anpara line is opened, no major issues are observed for N-1 contingency, however issues are observed for double contingency. It was informed that UP SLDC shall take up the matter for charging of 765/400kV Obra C ICT at the earliest with Obra C.

    Chief Engineer, UP SLDC stated that 400kV Singrauli-Anpara line may be opened after commissioning of 765/400kV ICT at Obra C. Moreover, 400kV Singrauli-Anpara line may be kept closed from 400kV Anpara end and may be synchronised at 400kV Singrauli end in case of requirement. Further, revised SPS for Anpara complex is also to be discussed in 220 OCC meeting scheduled on 19.06.2024 which will make system secure compliant for double contingencies.

It was deliberated that revised SPS proposed by UP SLDC also takes care of double contingencies. Accordingly, the apprehension of UP SLDC (overloading under N-2 contigency scenario) would also get addressed with implementation of revised SPS.

After detailed deliberations, following was agreed:

1. Opening of 400kV Singrauli-Anpara line as per the decision taken in 1st NRPCTP meeting (to control high fault levels in the complex) was agreed. The above issue would also be discussed in upcoming 220 NR-OCC meeting scheduled on 19.06.2024 for any other inputs/comments from the stakeholders. After discussion at NR-OCC level, 400 kV Singrauli-Anpara line shall be opened. **(Action Point: NRLDC)**

2. The agenda regarding shifting of Rihand stage-III to NR by closing the bus coupler and disconnecting from WR by opening 400 KV Rihand stage-III- Vindhyachal PS-D/C shall be discussed in 220 NR-OCC as well as next WRPC-OCC meeting. Subsequently, the same shall be implemented. **(Action Point: NRLDC/NLDC)**

3. NRLDC, UP SLDC, UPPTCL, Anpara TPS, POWERGRID and NTPC to be more vigilant on the network for smooth coordination during any contingency.

4. UP SLDC to take up with UP RVUNL to expedite early commissioning of 765/400 kV ICTs at Obra-C

(Action Point: UP SLDC)

5. Instructions will be issued to NRLDC, UP SLDC, UPPTCL, Anpara TPS, POWERGRID and NTPC to take 400kV Singrauli-Anpara in service on priority basis in case of any grid requirements. **(Action Point: UP SLDC/ POWERGRID)**

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Participant list:

S. No.	Name	Organisation
1	A J Siddique	UP SLDC
2	Mohsin Khan	UP SLDC
3	S K Sudhakar	NTPC
4	Ravi Kumar	NTPC
5	Abhishek Khanna	NTPC
6	Manoj Prasad	Anpara TPS
7	Bikas Kumar Jha	NRLDC
8	Kamaldeep	NRLDC
9	Gaurav Malviya	NRLDC
10	Akash Tomar	NRLDC
11	Vivek Pandey	NLDC
12	Rahul Shukla	NLDC
13	Priyam Jain	NLDC
14	Raj Kishan	NLDC
15	Gaurab Dash	NLDC
16	Superintending Engineer	UPPTCL
17	Gunjan Agrawal	POWERGRID
18	Ashish Kumar Singh	POWERGRID

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Comments of on Draft SOP for supply, installation & replacement of ISTS IEM as per IEGC 2023 and CEA Metering regulations 2006 and its amendment thereafter

Comments of BBMB are as under:

i) **CEA Metering Regulations** provide that all interface meters installed at the points of interconnection with Inter-State Transmission system (ISTS) for the purpose of electricity accounting and billing **shall be owned by CTU. As per IEGC 2023,** CTU is responsible for procurement & installation of Interface meters **at the cost of respective entity.** As the cost of SEM has to be borne by the respective entity as per IEGC 2023, the ownership status of newly installed/replaced SEMs may be clarified.

ii) Procurement/replacement of Data Collection Device (DCD), cable used for fetching/dumping SEM data etc. & Installation/up-dation of SEM Software at utility locations may also be covered in the SOP along with Special Energy Meters (SEMs)

iii) As per Clause 18 (b) of CEA Metering Regulations 2006, all interface meter shall be tested at least once in 5 years. Calibration of SEM is under whose scope (CTU or Respective Entity), please clarify.

iv) The details of the CTU Nodal officers along with PGCIL Nodal officers for the said purpose be made available to all entities.

Preliminary Feedback/comments of SRLDC on "Draft SOP for supply, installation & replacement of ISTS IEM as per IEGC 2023 and CEA metering regulations 2006 and its amendment thereafter"

A. Procedure for replacement of Faulty ISTS IEM/SEM

The timelines for replacement of Faulty meters can go to a maximum of 34 days for replacement as per the draft procedure. Accordingly, the timelines may be reduced.

- RLDC shall communicate the entity within **3 working days** from the detection of defective IEM/SEM.
- Within **3 working days** from receipt of above communication from RLDC, the Entity shall send a communication (through letter or e-mail) to CTUIL
- CTUIL shall advise POWERGRID to replace the defective IEM/SEM within **3 working days** from receipt of the said communication.

The information to be provided by entity to CTUIL, RLDC & RPC shall also mention the type of meter whether main, check or standby

B. Procedure for Installation of ISTS IEM/SEM for new systems

- Renewable Energy accounting would require measurement of non-ISTS points also apart from ISTS points in line with CEA Regulations and decisions/approval of RPC forum. Accordingly, the same may be suitably incorporated.
- The draft procedure mentions *"The Entity shall request for installation of new IEM/SEM to CTUIL along with the metering scheme issued by respective RLDC".* The metering approval is given by SRPC forum and not by SRLDC in southern region. It can be suitably modified.

C. Bulk Procurement of ISTS IEM/SEM

- The draft procedure mentions *"CTUIL/STU shall provide the details of ISTS projects coming up in the next 2 years to respective RLDC."* CTU/STU has to provide detailed SLD with clear description about bays and 220KV lines. A format can be mentioned for submission of data.
- Projected requirement towards replacement of defective IEM/SEM based on past 2-year trend is would be available with CTUIL as per the process flow envisaged in the procedure.

Others

- The Process of getting SEM calibration may also be covered
- The process of maintenance if any after warranty period may also be covered

A meeting may be called with the stakeholders for discussion and feedback for southern region constituents.

Stakeholders Comments on Draft SOP for supply, installation & replacement of ISTS IEM as per IEGC 2023 and CEA metering regulations 2006 and its amendment thereafter

Date: 30-04-2024

As per IEGC 2023, CTUIL shall be responsible for procurement & installation of Interface Energy Meters and replacement of faulty meters. Further as per CEA, all interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU.

Accordingly, CTUIL has prepared a draft SOP for supply, installation & replacement of ISTS IEM/SEMs which is put up for stakeholders' comments by 31st May, 2024 in compliance to IEGC 2023 and CEA metering regulations.

Stakeholders (Generators, Bulk consumers, STUs, RLDCs, SLDC and other ISTS users) may give their observations, if any, latest by 31.05.2024 at mail ids; rshakya@powergrid.in & tanay@powergrid.in

Standard Operating Procedure (SOP)

Procurement & Installation of ISTS Interface Energy Meter (IEM/SEM)

Introduction:

This Standard Operating Procedure (SOP) for Procurement and Installation of Interface Energy Meter (IEM/SEM) will be applicable only for the IEM/SEM falling under the purview of CTU as per the provisions under Regulations 49.12 (a) of CERC (Indian Electricity Grid Code), Regulations, 2023 and as per CEA (Installation and Operation of Meters) Regulations and amendments thereof. The Regulation 49.12(a) is re-produced below:

"*49.12* ***Energy Metering and Accounting:***

(a) The CTU shall be responsible for procurement and installation of Interface Energy Meters (IEM/SEM), at the cost of respective entity, at all the ISTS interface points, points of connections between the regional entities, cross border entities and other identified points for recording of actual active and reactive energy interchanged in each time-block through those points, and its operation and periodic calibration shall be done by the respective entity. CTU shall be responsible for replacement of faulty meters."

The objective of this procedure is to ensure timely installation of IEM/SEM in the new ISTS system and timely replacement of the defective IEM/SEM.

Presently, POWERGRID is an authorized agency for procurement of IEM/SEM, installation of new IEM/SEM and replacement of defective IEM/SEM. Any mention of POWERGRID in this procedure shall also mean any other agency authorized by CTUIL to carry to aforesaid functions. CTUIL may authorize any other agency to carry to aforesaid functions in future. Replacement/Installation of IEM/SEM shall mean all the activities including supply of new meter and its installation, testing and commissioning.

The complete cycle of installation/replacement of IEM/SEM has been divided in various steps as described in Part A & B. Since timely procurement and availability of sufficient no. IEM/SEM is the key ~~a~~ critical requirement, Part C of this procedure deals with timely estimation of requirement & procurement of IEM/SEM. Part D & Part E are for inventory management and maintenance respectively.

A. Procedure for replacement of Faulty ISTS IEM/SEM

1. Identification of faulty IEM/SEM and communication to CTU:

1.1 Any Entity who wants IEM/SEM replacement shall inform concerned RLDC about such requirement along-with reasons. RLDC also identify inconsistent SEM/IEM based on its observations on IEM/SEM data (received through AMR system or otherwise). The RLDC shall send a communication to the entity within 5 working days from the detection of inconsistent data or defective IEM/SEM.

1.2 Based on the inputs from respective RLDC ~~& its observations on the meter data (received through AMR system or otherwise)~~, the Entity in whose premises the said IEM/SEM for ISTS is installed, shall identify the defective IEM/SEM which requires replacement.

1.3 The Entity shall take immediate steps to get issues rectified within 7 working days from receipt of above communication from RLDC. If the issue is not rectified within 7 working days or if it is established that IEM/SEM is to be replaced the Entity shall send a communication (through letter or e-mail) to CTUIL requesting replacement of the defective IEM/SEM within next 5 working days. The said communication shall include the followings:

a. The location, serial no. and make of the defective IEM/SEM

b. The date of installation of the above IEM/SEM
c. The observations wrt the said defective IEM/SEM

A copy of this communication shall be sent to respective RLDC and regional nodal officer of POWERGRID. The contact details of POWERGRID Nodal officers shall be made available on CTUIL's website. The latest charges as received from POWERGRID would be made available on CTUIL's website for the following

a) Supply of only SEMs
b) Supply, installation and commissioning of SEMs at site
c) Commissioning certificate complying to CEA/CERC Regulations as required by Grid-India/SLDCs

1.4 In line with applicable Regulations, the replacement of IEM/SEM shall be on a chargeable basis as per the services availed. The Entity shall undertake in the said communication that they will make payment for supply & installation of the IEM/SEM having automatic remote meter reading facility as per the invoice raised by POWERGRID within 45 working days from the date of installation/replacement of IEM/SEM.

2. Communication to POWERGRID:

2.1 On receipt of the above communication from the Entity, CTUIL shall advise POWERGRID to replace the defective IEM/SEM within 5 working days from receipt of the said communication.
A copy of the advice shall also be sent to the respective Entity.

3. Replacement of Faulty IEM/SEM:

3.1 The POWERGRID shall raise the invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall replace the defective IEM/SEM within 8 ~~10~~ working days from date of issuance of invoice. POWERGRID shall inform CTUIL after replacement of the defective IEM/SEM.

3.2 After replacement of faulty IEM/SEM, the entity shall inform respective RLDC & CTUIL about the same with necessary details within 2 days. The verification testing with Grid-India/SLDC shall be ensured by the Entity.

3.3 The Entity shall make payment to POWERGRID within 45 working days from the date of replacement of IEM/SEM.

4. Payment and Warranty:

4.1 The payment towards supply & replacement of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) ~~working~~ days ~~from its~~, failing which late payment surcharge @ 0.04% of the invoice amount per day shall be payable for the delayed period.

4.2 IEM/SEM once replaced, shall be under ~~the~~ warranty as per OEM supply contract (which will be informed by POWERGRID to the Entity) which will be at least of 1 year from the date of installation. During this warranty period, the entity shall take up the matter pertaining to the replaced IEM/SEM directly with OEM/POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15 working days from the date of intimation by the entity.

B. Procedure for Installation of ISTS IEM/SEM for new systems

1. The Entity shall request for installation of new IEM/SEM to CTUIL along with the metering scheme issued by respective RLDC or the approved scheme by RPC, if any, (Suggestive format for metering scheme is attached with this SOP). Entity shall send

its request to CTUIL for supply, installation, commissioning and certification (as applicable) of IEM/SEM at least three months in advance.

2. CTUIL shall communicate, within 5 working days from receipt of communication from entity to POWERGRID for installation of new IEM/SEM.

3. The POWERGRID shall raise the invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall install the IEM/SEM within 8 ~~10~~ working days from date of issuance of invoice. POWERGRID shall inform CTUIL after installation of IEM/SEM.

4. After installation of IEM/SEM, the entity shall inform respective RLDC & CTUIL about the same with necessary details within 2 days. The verification testing with Grid-India/SLDC shall be ensured by the Entity.
5. The Entity shall make payment to POWERGRID within 45 ~~working~~ days from the date of installation of IEM/SEM.

6. Payment and Warranty:

   6.1 The payment towards supply & installation of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) ~~working~~ days ~~from its~~, failing which late payment surcharge @ 0.04% of the invoice amount per day shall be payable for the delayed period.

   6.2 IEM/SEM once installed, shall be under ~~the~~ warranty ~~as~~ as per OEM supply contract (which will be informed by POWERGRID to the Entity) which will be at least of 1 year from the date of installation. During this warranty period, the entity shall take up the matter pertainingto the installed IEM/SEM directly with OEM/POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15 working days from the date of intimation by the entity.

C. Bulk Procurement of ISTS IEM/SEM

1. By the end of September of each year, CTUIL/STU shall provide the details of ISTS projects coming up in the next 2 years to respective RLDC.

2. RLDC shall work out the metering scheme for total requirement of IEM/SEM under the following heads:

   i. For new ISTS system
   ii. Spares @10% of the IEM/SEM population in the region
   iii. Projected requirement towards replacement of defective IEM/SEM based on past 2-year trend.

   RLDC will get the total IEM/SEM quantity approved by respective RPCs and inform to CTUIL by November end.

3. On ~~receive~~ receipt of the IEM/SEM quantity from RLDCs, CTUIL shall aggregate the requirement on PAN India basis and issue procurement advice to POWERGRID by December end.

D. Inventory Management

Each month RLDC would furnish the report on SEM/IEMs working, suspect and defective to CTUIL. Each month Powergrid would furnish the status and details of spares to CTUIL. Based on the report CTUIL may issue suitable directions for diversion of spares from one region to another or initiate timely action for procurement of spares.

E. Maintenance

The operation, testing and maintenance of all types of meters shall be carried out by the generating company or the licensee, as the case may be.

AMC Procedure, if any, shall be followed.

Regarding stakeholder comments on draft SOP for supply, installation and replacement of ISTS IEM as per IEGC 2023 and CEA Metering Regulation 2006 (with amendments)

SLDC,JSEB Ranchi <sldcranchi@gmail.com>

Thu 30-05-2024 14:03

To:Rahul Kumar Shakya {} <rshakya@powergrid.in>;Tanay Jaiswal {Tanay Jaiswal} <tanay@powergrid.in>

Sir,
While going through draft SOP, it is requested to clarify on following points:

1.1 - What does Entity means in the draft SOP, it should be specified.

- Respective transmission licensees?
- STU?
- DISCOM?

1.2

-(b) At present the date of installation is available with POWERGRID, NO information is available with SLDC or respective transmission licensee, Guidelines may be issued that who will maintain the history.

1.3- One-time undertaking may be taken from the respective Entity (STU/Transmission licence/DISCOM). The draft of undertaking may also form a part of SOP.

Nodal officers may also be incorporated for each Entity.

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Regards,
State Load Despatch Centre (SLDC)
Jharkhand Urja Sancharan Nigam Limited, Ranchi
Mobile: (+91) 9431135537, 7781017818
Landline: 0651-3500920

Email: sldcranchi@gmail.com
sldcranchi.report@gmail.com

POWERGRID comments on draft 'SOP regarding Procurement & Installation of ISTS Interface Energy Meter (IEM)'- proposed by CTUIL

Following revisions are proposed in the draft Standard Operating Procedure (SOP) for Procurement & Installaton of ISTS Interface Energy Meter (IEM/SEM) shared by CTUIL.

2. Communication to POWERGRID:

Existing:

2.1 On receipt of the above communication from the Entity, CTUIL shall advise POWERGRID to replace the defective IEM/SEM within 5 working days from receipt of the said communication. A copy of the advice shall also be sent to the respective Entity.

Modified:

2.1 On receipt of the above communication from the Entity, CTUIL shall advise POWERGRID to replace the defective IEM/SEM within 5 working days from receipt of the said communication along with the undertaking form the entity for payment towards supply & installation of meter. A copy of the advice shall also be sent to the respective Entity.

3. Replacement of Faulty IEM/SEM:

Existing

3.1 The POWERGRID shall raise the proforma invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall replace the defective IEM/SEM within 10 working days from date of issuance of proforma invoice. POWERGRID shall inform CTUIL after replacement of the defective IEM/SEM.

3.2 After replacement of faulty IEM/SEM, the entity shall inform respective RLDC & CTUIL about the same.

3.3 The Entity shall make payment to POWERGRID within 45 working days from the date of replacement of IEM/SEM

Modified:

3.1 The POWERGRID shall raise the proforma invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall replace the defective IEM/SEM within 10 working days from date of issuance of proforma invoice. POWERGRID shall inform CTUIL after replacement of the defective IEM/SEM.

3.2 After replacement of faulty IEM/SEM, the entity shall inform respective RLDC & CTUIL about the same.

3.3 The Entity shall make payment to POWERGRID within 45 working days from the date of replacement of IEM/SEM

3.4 POWERGRID shall proceed with the replacement of new meters in an entity, only if the pending payment by the entity is not due for more than 60 days.

4. Payment and Warranty:

Existing:

4.1 The payment towards supply & replacement of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) working days from its, failing which late payment surcharge @ 0.04% of the proforma invoice amount per day shall be payable for the delayed period.

4.2 IEM/SEM once replaced, shall be under the warranty of 1 year from the date of installation. During this period, the entity shall take up the matter pertaining to the replaced IEM/SEM directly with POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15 working days from the date of intimation by the entity.

Modified:

4.1 The payment towards supply & replacement of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) working days from its, failing which late payment surcharge @ 0.04% of the proforma invoice amount per day shall be payable for the delayed period.

~~4.2 IEM/SEM once replaced, shall be under the warranty of 1 year from the date of installation. During this period, the entity shall take up the matter pertaining to the replaced IEM/SEM directly with POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15 working days from the date of intimation by the entity.~~ (This point needs to be deleted as the supplied LOA for meters are having warranty as per LOA date and issuing meter warranty to entity from the date of installation is not possible for POWERGRID).

B. Procedure for Installation of ISTS IEM/SEM for new systems

Existing:

3. The POWERGRID shall raise the proforma invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall install the IEM/SEM within 10 working days from date of issuance of proforma invoice. POWERGRID shall inform CTUIL after installation of IEM/SEM.

5. The Entity shall make payment to POWERGRID within 45 working days from the date of installation of IEM/SEM.

6. Payment and Warranty:

6.1 The payment towards supply & installation of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) working days from its, failing which late payment surcharge @ 0.04% of the proforma invoice amount per day shall be payable for the delayed period.

6.2 IEM/SEM once installed, shall be under the warranty of 1 year from the date of installation. During this period, the entity shall take up the matter pertaining to the installed IEM/SEM directly with POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15 working days from the date of intimation by the entity.

Modified:

3. The POWERGRID shall raise the proforma invoice on the Entity within 7 working days from the receipt of the advice from CTUIL and shall install the IEM/SEM within 10 working days from date of issuance of proforma invoice. POWERGRID shall inform CTUIL after installation of IEM/SEM.

5. The Entity shall make payment to POWERGRID within 45 working days from the date of receipt of proforma invoice.

6. Payment and Warranty:

6.1 The payment towards supply & installation of IEM/SEM by POWERGRID shall be made by entity within 45 (Forty-Five) working days from its, failing which late payment surcharge @ 0.04% of the proforma invoice amount per day shall be payable for the delayed period.

~~6.2 IEM/SEM once installed, shall be under the warranty of 1 year from the date of installation. During this period, the entity shall take up the matter pertaining to the installed IEM/SEM directly with POWERGRID's nodal officers with copy to CTUIL. POWERGRID's nodal officers shall arrange to replace such IEM/SEM within 15~~

~~working days from the date of intimation by the entity.~~ (This point needs to be deleted as the supplied LOA for meters are having warranty as per LOA date and issuing meter warranty to entity from the date of installation could not be possible. This clause may be removed as warranty is governed from date of supply of meters by vendor).

Standard Operating Procedure (SOP)

Procurement & Installation of ISTS Interface Energy Meter (IEM/SEM)

Introduction:

This Standard Operating Procedure (SOP) for Procurement and Installation of Interface Energy Meter (IEM/SEM) will be applicable only for the IEM/SEM falling under the purview of CTU as per the provisions under Regulations 49.12 (a) of CERC (Indian Electricity Grid Code), Regulations, 2023 and as per clause 6 (1)(a) of CEA (Installation and Operation of Meters) Regulations and amendments thereof. The Regulation 49.12(a) & 6 (1) is re-produced below:

"*49.12* ***Energy Metering and Accounting:***

(a) The CTU shall be responsible for procurement and installation of Interface EnergyMeters (IEM/SEM), at the cost of respective entity, at all the ISTS interface points, points of connections between the regional entities, cross border entities and other identified points for recording of actual active and reactive energy interchanged in each time-block through thosepoints, and its operation and periodic calibration shall be done by the respective entity. CTU shall be responsible for replacement of faulty meters."

"6. ***Ownership of meters-***

(1) ***Interface meters*** *(a) All interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU.*

The objective of this procedure is to ensure timely installation of IEM/SEM in the new ISTS system and timely replacement of the defective IEM/SEM by CTU or their authorized agency. The procedure also aims for timely payment by the respective entities to authorized agency of CTUIL against supply & installation of the IEM/SEM.

Presently, POWERGRID is the authorized agency for procurement of IEM/SEM, installation of new IEM/SEM and replacement of defective IEM/SEM. Any mention of POWERGRID in this procedure shall also mean any other agency authorized by CTUIL, if any, to carry out the aforesaid functions. CTUIL may authorize any other agency to carry out the aforesaid functions in future. Replacement/Installation of IEM/SEM shall mean all the activities including supply of new IEM/SEM, its installation, testing and commissioning.

The complete cycle of installation/replacement of IEM/SEM has been divided in various steps as described in Part A & B. Since timely procurement and availability of sufficient no. IEM/SEM is the key requirement, Part D of this procedure deals with timely estimation of requirement & procurement of IEM/SEM. Part C and Part E are for payment & warranty and inventory management respectively.

Applicability:

The procedure shall be applicable for the entities which are in the RLDCs control area and whose metering and energy accounting is done at the regional level. Thus, all Gencos including RE generators and all other utilities connected to ISTS Grid are the entities for the purpose of this procedure.

Effectiveness:

The date of effectiveness of this procedure shall be notified separately on CTUIL website.

A. Procedure for replacement of Faulty ISTS IEM/SEM

1. Identification of faulty IEM/SEM and communication to CTU:

1.1 Any Entity who wants IEM/SEM replacement shall inform concerned RLDC about such requirement along with the reasons thereof. RLDC also identify inconsistent SEM/IEM based on its observations on IEM/SEM data (received through AMR system or otherwise). The RLDC shall send a communication to the entity within 3 working days from the detection of inconsistent data or defective IEM/SEM.

1.2 The Entity shall take immediate steps to get all the issues rectified within 7 working days from receipt of above communication from RLDC. If the issue is not rectified within 7 working days or if it is established that IEM/SEM needs to be replaced, the Entity shall send a communication (through letter or e-mail) to CTUIL, within next 3 working days requesting replacement of the defective IEM/SEM. The said communication shall include the followings:

a. The location, serial no., make and model of the defective IEM/SEM along with accessories (required if any)
b. The date of installation of the above IEM/SEM
c. The observations w.r.t. the said defective IEM/SEM
d. Consent for payment, as per the provision of this procedure, towards supply and installation of IEM/SEM

A copy of this communication shall be sent to respective RLDC and regional nodal officer of POWERGRID. The contact details of POWERGRID Nodal officers shall be made available on CTUIL's website. The amount to be charged by POWERGRID towards Supply & Installation of the IEM/SEM shall be made available on CTUIL website.

1.3 In line with applicable Regulations, the replacement of IEM/SEM shall be on a chargeable basis. The Entity shall undertake in the said communication that they will make payment for supply & installation of the IEM/SEM, in accordance with the provisions of this procedure, as per the invoice raised by POWERGRID.

2. Communication to POWERGRID:

2.1 On receipt of the above communication from the Entity, CTUIL within 3 working days from receipt ofthe said communication, shall advise POWERGRID to replace the defective IEM/SEM. A copy of the advice shall also be sent to the respective Entity.

3. Replacement of Faulty IEM/SEM:

3.1 The POWERGRID shall raise the invoice on the concerned Entity within 7 working days from the receipt of the advice from CTUIL and shall replace the defective IEM/SEM within 8 working days from date of acceptance of invoice by the entities. POWERGRID shall inform CTUIL after replacement of the defective IEM/SEM.

3.2 After replacement of faulty IEM/SEM, the entity shall inform respective RLDC & CTUIL about the same with necessary details (Meter Sl.No, Make, Model, Date of replacement and meter location) within 2 days. The verification testing with respective RLDC shall be ensured by the Entity.

B. Procedure for Installation of ISTS IEM/SEM for new systems

1. The Entity shall request CTUIL for installation of new IEM/SEM along with the Metering Scheme Letter issued by respective RLDC in line with the scheme approved by RPC, if any. Entity shall make such request to CTUIL at least three months in advance of the anticipated COD of the new system.

2. On receipt of the above request from the Entity, CTUIL within 5 working days from receipt ofthe said request, shall advise POWERGRID to install the IEM/SEM in the new system as per the scheme suggested by RLDC. A copy of the advice shall also be sent to the respective Entity.

3. The entity shall approach POWERGRID along with the CTUIL letter regarding requirement of IEM/SEM along with required accessories, intimating the timeframe for IEM/SEM installation. Accordingly, POWERGRID shall raise the invoice on the Entity. The entity shall accept the invoice in next 7 days thereafter.

4. The entity shall approach POWERGRID regarding requirement of IEM/SEM and the accessories along with the CTUIL letter intimating the timeframe for IEM/SEM installation. Accordingly, POWERGRID shall raise the invoice on the Entity. The entity shall accept the invoice in next 7 days thereafter.

5. POWERGRID shall install IEM/SEM in the new system at least 15 days before anticipated COD of the new system. POWERGRID shall inform CTUIL after installation of the IEM/SEM in the new system.

6. After installation of IEM/SEM, the entity shall inform respective RLDC & CTUILabout the same with necessary details (Meter Sl.No, Make, Model, Date of replacement and meter location) within 2 days. The verification testing with RLDC shall be ensured by the Entity.

C. Payment and Warranty:

1. The Entity shall make payment to POWERGRID within 45 days from the date of replacement of IEM/SEM failing which the late payment surcharge @ 0.04% of the invoice amount per day shall be payable for the delayed period. In no case, the delayed period shall exceed 60 days. In case, any payment is pending even after 60 days from the date of last IEM/SEM replaced for the particular entity, no further supply/replacement of any IEM/SEM for that entity will be carried out. In such a case, the onus of continuing with the defective IEM/SEM shall solely be on the entity.

2. IEM/SEM once replaced, shall be under warranty for a period of 1 year from the date of installation. During this warranty period, the entity shall take up the matter directly with POWERGRID's nodal officers with a copy to CTUIL. POWERGRID's nodal officer shall arrange to replace such faulty IEM/SEM within 15 working days from the date of intimation by the entity.

D. Standardized charges for Supply, and Supply and Installation of IEM:

1. CTU, in consultation with POWERGRID, shall device region wise standardized rate for Supply, and Supply and Installation of IEM for each Financial Year.

E. Bulk Procurement of ISTS IEM/SEM

1. By the end of September of each year, CTUIL/STU shall provide the details of ISTS projects coming up in the next 2 years to respective RLDC.

2. RLDC shall work out the metering scheme for total requirement of IEM/SEM under the following heads:

   i. For new ISTS system
   ii. Spares @10% of the IEM/SEM population in the region
   iii. Projected requirement towards replacement of defective IEM/SEM based on past 2-year trend.

   RLDC will get the total IEM/SEM quantity approved by respective RPCs and inform to CTUIL by November end.

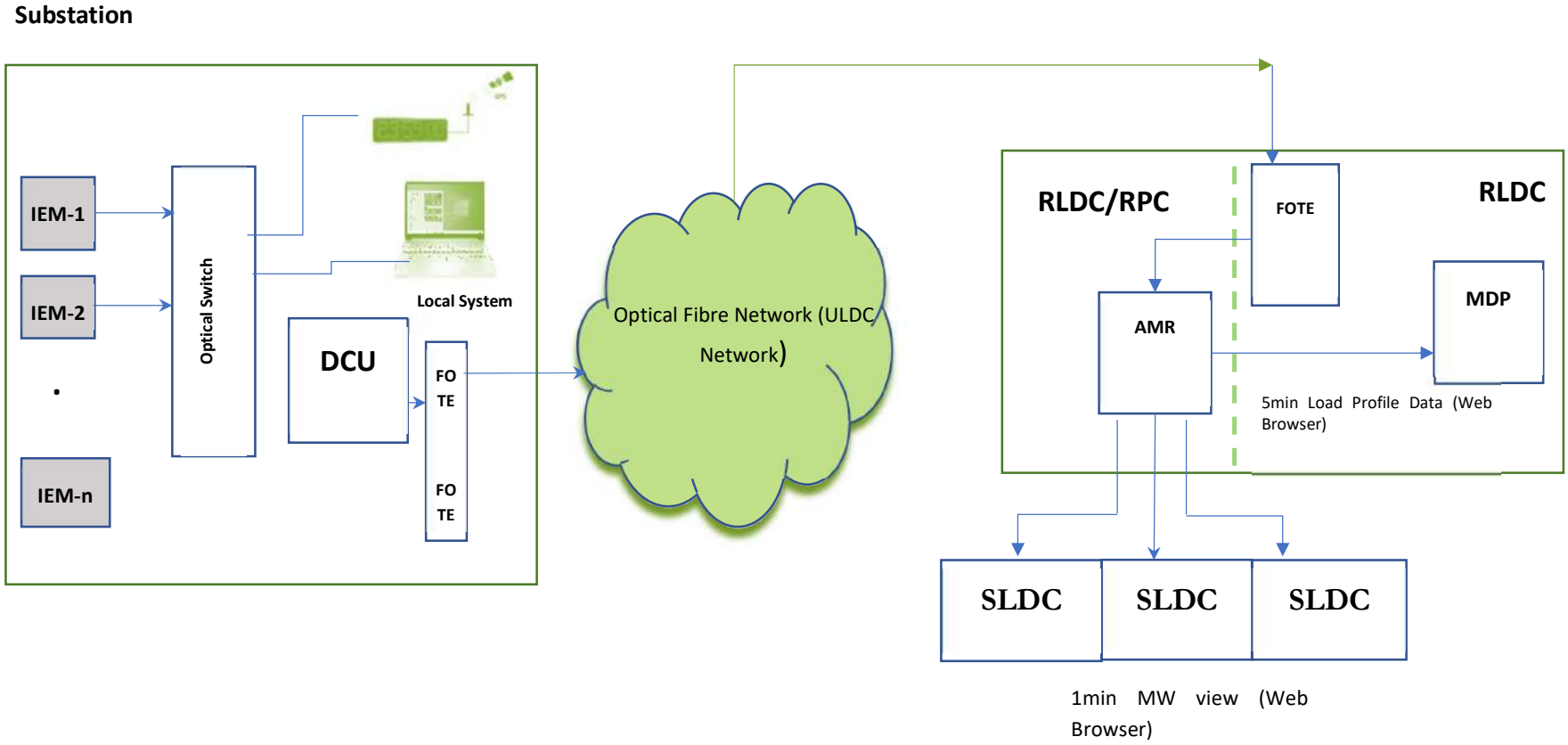
3. On receipt of the IEM/SEM quantity from RLDCs, CTUIL shall aggregate the requirement on PAN India basis and issue procurement advice to POWERGRID by December end.

F. Inventory Management

Each month RLDC would furnish the report on working, suspect and defective IEM/SEM in respective region to CTUIL. POWERGRID would furnish the region-wise numbers of the IEM/SEM available with them to CTUIL.
Based on this input CTUIL may issue suitable directions for diversion of spares from one region to another or initiate timely action for procurement of spares.

*****

Appendix-I


Substation
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IEM-2
IEM-n
Optical Switch
Local System
DCU
FO TE
FO TE
Optical Fibre Network (ULDC Network)
RLDC/RPC
FOTE
RLDC
AMR
MDP
5min Load Profile Data (Web Browser)
SLDC
SLDC
SLDC
1min MW view (Web Browser)

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

Ref: C/CTUIL/IEGC/2023/1

Dated: 27/06/2023

To,
The Secretary,
Central Electricity Regulatory Commission,
3rd Floor, Chandralok Building,
36, Janpath, New Delhi-110001.
Kind Attn.: Mr. H S Pruthi

Sub: Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 notified dtd. 29.05.2023

Dear Sir,

This is in reference to the **Clause no 49. 12: "Energy Metering and Accounting" of recently notified** Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 notified dtd. 29.05.2023. **In this regard, we would like to highlight some clauses of IEGC & CEA Metering regulation as follows:**

➢ **Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023**

- *Clause no 49.12.(b)*

The installation, operation, calibration and maintenance of Interface Energy Meters (IEMs) with automatic remote meter reading (AMR) facility shall be in accordance with the CEA Metering Regulations 2006.

- *Clause no 2. 2.(b)*

The concerned RLDC will be responsible for processing the interface meter data and computing the net injections at pooling station represented by each QCA or REGS or Lead Generator, as the case may be, ...

- *Clause no 49.12.(e)*

Entities in whose premises the IEMs are installed shall be responsible for ...(ii) taking weekly meter readings for the seven day period ending on the preceding Sunday 2400 hrs and transmitting them to the RLDC by Tuesday noon, in case such readings have not been transmitted through automatic remote meter reading (AMR) facility .."

➢ **Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019**

- *Clause no 4. (1).(a) -"(1) (a) all new Interface Meters and Energy Accounting and Audit Meters shall be of static type and shall have automatic remote meter reading facility."*

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

- *Clause no 14. (1). (a)*

"It shall be the responsibility of the Generating Company or the licensee, in whose premises the meter has been installed, to download the meter data, record the metered data and furnish such data to various agencies as per the procedure laid down by the Appropriate Commission".

In view of the above, following are our observations/suggestions:

➢ **Nodal agency for implementation of Automatic Meter Reading (AMR):**

Nodal agency for AMR (Automated Meter Reading) system implementation has not been addressed either in the CEA metering regulations or the notified IEGC 2023.

As per the regulations, the responsibility of recording, downloading, and sending meter data to RLDC is with the concerned agencies, in whose premises the meters are installed. And the responsibility of processing the meter data is with RLDC.

Automatic Meter reading (AMR) system is to perform the above tasks of acquiring meter data automatically from all ISTS IEMs and processing of such meter data to compute time block wise actual net injection and drawal of regional entities.

In view of above, RLDC(GRID-INDIA) may be assigned as nodal agency for finalization of metering scheme and for implementation of AMR system comprising of meter data acquisition and its processing to compute time block wise actual net injection and drawal of regional entities and cross border entities within their control area.

Accordingly following clauses may be considered for suitable inclusion in Grid Code or as appropriate.

- **RLDC shall be the nodal agency for implementation of Automatic Meter Reading (AMR) system.**
- **RLDC/SLDC shall finalize the metering scheme in line with Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 and its amendments thereafter and provide the same to concerned agencies (with an information to CTU) for installation.**

Thanking you,

Yours faithfully

Nutan Mishra

Sr. GM (UNMS & Metering)

Annexure-XXVII

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

Ref: C/CTUIL/Metering/NPC/2023/1 Dated: 24/07/2023

To,
The Member Secretary,
National Power Committee Division
Central Electricity Authority,
1st Floor, Wing-5, West Block-II,
R K Puram, New Delhi-66

Kind Attn.: Smt. Rishika Sharan.

Sub: Metering Regulatory Provisions in CEA & IEGC and Technical Specification by JC- NPC; Time block of ISTS Interface Energy meters reg.

Dear Madam,

This is in reference to the Time Block of ISTS Interface Energy Meters. In this regard we would like to bring to your kind notice that there is a mismatch between Metering Regulations and Technical Specification for ISTS Metering System prepared by Joint Committee (constituted in Nov'2020) under NPC.

- **CEA metering regulation 2019 amendment- Year 2019**

  As per CEA metering regulation 2019 amendment, the time block for recording of meter data by the ISTS meters is defined as 15 minutes as quoted below:

  Quote

  "Provided that the time block for recording of meter data by the meter shall be 15 minutes or as specified by the Central Commission."

  Unquote

- **Technical Specification by JC, NPC- July'2022**

  The Technical Specification finalized by JC, calls for 5 min time block configuration for all new ISTS IEMs quoted as below:

  Quote

  ." All the new IEMs shall be factory manufactured as 5 min Time Block and the AMR system shall collect 5 min Load Survey data from all interface points and share the same with MDP system. In case the MDP application chooses the settlement period to be 15 min, then the collected data of 5 min interval shall be converted to 15 min interval in MDP application software before sharing the data with RPC for energy accounting for all interface points."

  "All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system. AMR system shall share [. npc] file of 5 min Time Block data to POSOCO

through reliable communication. MDP at its end shall do the necessary computation to convert 5 min Time Block data to 15 min Time block data until complete replacement of 15 min existing IEMs with new 5 min IEM"
Unquote

- **Metering Regulations Provisions in IEGC 2023- Issued by CERC- May'2023**

Further as per recently issued IEGC 2023, monthly data asked from Solar plant generation, Wind plant generation in 15 min time block only. The mentioned formats are also in 15 min time block.

- **SRPC sub-committee deliberation, June 2023**

The Time Block for ISTS meters in light of issued IEGC was deliberated in 55th Meeting of Commercial Sub-Committee of SRPC and the same is as below:

"...and the forum clarified that as per TS of AMR SEMs should be capable of 5min recording but currently since scheduling and accounting is 15min, the same shall be set as default configuration is AMR SEMs."

Keeping in view aforesaid regulations and RPC deliberations, wherein the CEA Metering Regulations & CERC IEGC 2023 mentions regarding 15 Min Time block, and Technical Specification by JC mentions about 5 minute Time block and subsequent deliberation of SRPC CCM, you are requested to review and advise us expeditiously regarding the time block to be considered for procurement of new ISTS meters, AMR & MDP to be implemented region wise in PAN India basis.
Matter may be treated most urgent.

Thanking you,

Yours faithfully

24/7/23

Nutan Mishra
Sr. GM (UNMS & Metering)

Enclosure: Relevant clause of CEA Metering Regulation, IEGC 2023 & Technical Specification

CC:

1. Member (PS), CEA
2. Chief (Engg), CERC
3. MS, NRPC, ERPC, SRPC, NERPC & WRPC
4. ED, NLDC

Grid Controller of India Limited
(A Govt. of India Enterprise)
(Formerly Power System Operation Corporation Limited)
National Load Despatch Centre

Date:28.07.2023

Grid-India Inputs regarding the time block to be considered for procurement of new ISTS IEM, AMR & MDP to be implemented region wise in PAN India basis.

Ref: Email from NPC division of CEA dtd 25.07.2023

With reference to above, Input from Grid-India is as below:

1. **CERC** in Petition No. 07/SM/2018, in the matter of "Pilot Project on 05-Minute Scheduling, Metering, Accounting and Settlement for Thermal/Hydro, and on Hydro as Fast Response Ancillary Services (FRAS)", has given order on 16.07.2018**(Attached as Annexure-1).** Relevant part of the order is as follows:

Quote
……. All future procurements of Interface Energy Meters should ideally have recording at 5- min interval and frequency resolution of 0.01 Hz. They should be capable of recording Voltage and Reactive Energy at every 5-min and should have feature of auto-time synchronization through GPS…….
Unquote

2**. CEA** vide notification dated 23.12.2019 has notified Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019**(Attached as Annexure-2).** Relevant part of the Regulations is as follows
Quote

"under the Schedule Part II (Standards for interface meters), 1 b (viii),
…. Provided that the time block for recording of meter data by the meter shall be 15 minutes or **as specified by the Central Commission**."
Unquote

3. **NPC (CEA) Joint Committee** after due deliberation has finalised the "Technical Specification (TS) of Interface Energy Meters, Automatic Meter Reading system and Meter Data Processing system" and notified the same on 06.12.2022**(Attached as Annexure-3).** Relevant part of the provisions covered in the Technical Specifications is as follows:

Quote
"All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system. AMR system shall share [. npc] file of 5 min Time Block data to POSOCO through reliable communication. MDP at its end shall do the necessary computation to convert 5 min Time Block data to 15 min Time block data until complete replacement of 15 min existing IEMs with new 5 min IEMs."
Unquote

4. Group constituted by **Ministry of Power** for "Development of Electricity Market in India" proposed comprehensive solutions to address key issues, inter-alia, implementation of 5-minutes based metering, scheduling, dispatch, and settlement in May 2023. **(Attached as Annexure-4).**

In view of above, 5 minute time block could be considered for procurement of new ISTS IEM, AMR & MDP.

This in reference to the Time Block of ISTS Interface Energy Meters in which CTU has raised a problem of mismatch between CEA (Installation and Operation of Meters) regulations, 2019 and Technical Specification for ISTS Metering System prepared by Joint commission (Nov' 2020) under NPC. In light of this, **a meeting has been scheduled on 18 August 2023 at 11:00 AM in Room No: 628, 6th floor, Sewa Bhawan, Sector 1, R K Puram, New Delhi 110066.**

You are requested to nominate a person well versed with subject to attend the meeting. Further, documents related to above pertaining matter is attached for your reference.

Regards,
Vandana Singhal,
Chief Engineer(Distribution Policy and Regulatory Division),
Central Electricity Authority
Ph: 011-26732661
Fax: 011-26102793

From: "Vandana Singhal" <cedpr-cea@gov.in>
To: cenpccea@gmail.com, secy@cercin.gov.in, "Awdhesh Kumar Yadav" <chiefengg@cercind.gov.in>, cmd@grid-india.in
Sent: Tuesday, August 8, 2023 12:49:03 PM
Subject: Letter to NPC- IEM Meters & Time Block Reg.

This in reference to the Time Block of ISTS Interface Energy Meters in which CTU has raised a problem of mismatch between CEA (Installation and Operation of Meters) regulations, 2019 and Technical Specification for ISTS Metering System prepared by Joint commission (Nov' 2020) under NPC. In light of this, **a meeting has been scheduled on 18 August 2023 at 11:00 AM in Room No: 628, 6th floor, Sewa Bhawan, Sector 1, R K Puram, New Delhi 110066.**

You are requested to nominate a person well versed with subject to attend the meeting. Further, documents related to above pertaining matter is attached for your reference.

Regards,
Vandana Singhal,
Chief Engineer(Distribution Policy and Regulatory Division),
Central Electricity Authority
Ph: 011-26732661
Fax: 011-26102793

Annexure-XXX

CEA-GO-17-14(13)/1/2023-NRPC

I/39534/2024

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 (72)/ 2024 दिनांक:19 अप्रैल, 2024

सेवा में/To,
एनआरपीसी एवं टीसीसी के सभी सदस्य एवं विशेष आमंत्रित (संलग्न सूचीनुसार)
Members of NRPC & TCC & Special Invitees (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति (एनआरपीसी) की 72 वीं और तकनीकी समन्वय समिति (टीसीसी) की 49 वीं बैठक का कार्यवृत।

Subject: MoM of 72th Northern Regional Power Committee (NRPC) & 49th Technical Co-ordination Committee (TCC)-reg

महोदय/महोदया,

तकनीकी समन्वयन समिति (टीसीसी) की 49 वीं बैठक दिनॉक 29.03.2024 (सुबह 09:30 बजे) एवं उत्तर क्षेत्रीय विद्युत समिति की 72 वीं बैठक दिनांक 30.03.2024 (सुबह 09:30 बजे) को लखनऊ, उत्तर प्रदेश में आयोजित की गयी थी। बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

49th meeting of Technical Co-ordination Committee (TCC) was held on 29.03.2024 (09:30 AM) and 72th meeting of Northern Regional Power Committee (NRPC) was held on 30.03.2024 (09:30 AM) at Lucknow, Uttar Prdesh. MoM of the same is attached herewith. The same is also available on NRPC Sectt. Website (http://164.100.60.165/).

भवदीय
Yours faithfully

19/04/2024

(वी.के. सिंह)
(V.K. Singh)
सदस्य सचिव
Member Secretary

प्रतिलिपि: एमडी, एचवीपीएनएल एवं अध्यक्ष, एनआरपीसी (md@hvpn.org.in)

18-ए, शहीद जीत सिंह मार्ग, कटवारिया सराय, नई दिल्ली-110016 फोन: 011-26513265 ई-मेल: ms-nrpc@nic.in वेबसाइट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

A.25.7 Forum decided that a separate sub-committee may be formed for RE in Northern Region that may meet quarterly.

NRPC Deliberation

A.25.1 Forum agreed on deliberations of TCC.

Decision of Forum:

A separate sub-committee shall be formed for RE in Northern Region. The committee shall meet at least quarterly. Conduct of Business Rules of NRPC may be modified accordingly.

A.26 Implementation of 5-minute IEMs along with AMR system in NR (Agenda by NRLDC)

TCC Deliberation

A.26.1 NRLDC representative apprised that NRLDC has consistently highlighted the ongoing challenges in metering and emphasized the benefits of transitioning to 5-minute metering infrastructure, particularly in preparation for 5-minute scheduling and settlement implementation.

A.26.2 In the 48th Commercial Sub-Committee Meeting, NRLDC had flagged the issue of clarity in CEA regulation regarding requirement of IEMs to "record and send 5 min block data and other specifications as finalized in the JC- Jul 2022" and adaption of newly TS meters which can be calibrated both for 5 min and 15 min recording in IEMs for a seamless transition from 15 min to 5 min scheduling and settlement process.

A.26.3 NRLDC also mentioned issues related with existing AMR infrastructure and need of a robust and completely integrated AMR infrastructure for 5 minute metering.

A.26.4 The forum had acknowledged NRLDC's concerns, recognizing the necessity of robust metering and AMR infrastructure for accurate energy accounting.

A.26.5 Recently, CTU had placed an agenda on “Implementation of 5-min meter along with AMR system from PAN India” in 14th meeting of NPC held on 03.02.2024. The deliberations were as follows:

i. Grid-India Informed that the provision of migrating to 5 min scheduling was made in their WBES and other application and similar provision need to be made in Unified Accounting software (UAS) of RPCs.

ii. CTU representative informed that the proposal of the scheme "5 min Interface Energy Meter along with AMR system" for Southern Region was put up to 17th NCT meeting held on 31st Jan'2024. After deliberation, it was decided that the same scheme shall be worked out for complete PAN India National level.

iii. Chairperson NPC was of the view that 5 min IEM with AMR system may be implemented for pan India for smoother transition from 15 min to 5 min regime. He further opined that the proposal/DPR for 5 min IEM with AMR system for pan India may be prepared by PGCIL based on the input provided by CTUIL regarding the ISTS metering points in consultation with Grid India. CTU may prepare the roadmap and activities to be done for transition from 15 min to 5 min regime based on the previous studies/ reports in present context. He emphasized that the timeline of the activities may also be prepared and it may be in sync and coordination with each activity for smoother implementation of the project. The PSDF funding may not be possible because limited funds in PSDF. The funding of the project may be decided in the NCT meeting.

A.26.6 Further, as per decision of NPC:

i. The agenda for 5 min Interface Energy Meters along with AMR system for PAN India (for all five regions) needs deliberations in all RPC. Agenda may be taken up in the upcoming meetings of all RPCs.

ii. The proposal/DPR for 5 min IEM with AMR system for pan India may be prepared by PGCIL based on the input provided by CTUIL regarding the ISTS metering points in consultation with Grid India.

iii. CTU may prepare the roadmap and activities to be done for transition from 15 min to 5 min regime based on the previous studies/ reports in present context. The timeline of the activities may also be prepared and it may be in sync and coordination with each activity for smoother implementation of the project.

A.26.7 Forum decided to club this agenda with agenda no. 30 of CTU.

NRPC Deliberation

NRPC agreed upon the deliberations of TCC.

Decision of Forum

CTU was advised to refer the case to NPC sub-group (of Communication) to review technical specifications in consultation with states.

A.27 Status of compliance with the directions of CERC order dtd. 14.08.2023 para no. 31 (Petition No. 156/MP/2022) (Agenda by NRLDC)

TCC Deliberation

A.27.1 NRLDC representative apprised that CERC order dtd. 14.08.2023 para no. 31 (Petition No. 156/MP/2022) is quoted below:

"31.The action plan submitted by the State SLDCs was discussed during the above said meetings with NRLDC during December 2022- January 2023. Subsequent to the meetings, State SLDCs submitted revised action plan. ***Considering the submissions of the Petitioner, Respondents and the detailed action plan submitted by NRLDC in discussion with the respective State SLDCs, we direct as follows:***

(a) The states to expedite work on the implementation of ADMS (Automatic Demand Management Scheme). Till the implementation of ADMS, manual load shedding of radial feeders identified by SLDCs may be done based on instructions of the concerned SLDCs, without any delay during emergency conditions shall be shared with NRLDC. ***The Status of the implementation of ADMS shall be updated to the NRLDC on quarterly basis by the respective SLDC.***

*(b) All the Respondent states should have in place better demand forecasting/ estimation systems so that there is minimum deviation from the schedule allocated to each drawing entity. Due to the intermittent nature of renewable sources, accurate Forecasting & Scheduling of renewable energy is required. Therefore, SLDCs needs to improve its current forecasting infrastructure for accurate forecasting of renewable generation. Further, Specialized RE forecasting tools for accurate RE forecasting & Scheduling shall be developed so that variability of RE Generation can be handled in advance by the SLDCs****. States should focus on reduction in forecast error to less than 2% in the day ahead forecast.***

(c) ***Management of the load in such a manner that the demand ramp should be limited to not more than 100 MW.*** *There should be efficient coordination with*

LGBR for 2024-25 regarding their plan for proposed shutdown. Moreover, proposal involves long outage of two hydro power plants totaling to 1400 MW and beneficiary States are also not agreed for the proposed shutdown. In view of above, shutdown may not be given at this time.

A.29.7 He suggested THDCIL to apply for outage in monthly OCC meeting.

A.29.8 THDCIL was also suggested to approach MoP for their requirement of shutdown in this summer.

NRPC Deliberation

A.29.9 Forum approved the deliberation held in TCC and denied the desired outage.

Decision of Forum

Forum suggested THDC to apply for outages in monthly OCC meetings so that outage can be provided at the earliest feasible time and also recommended THDC to approach MoP on this matter as commissioning of PSP is also very crucial.

A.30 Supply & Installation of AMR Compatible ISTS Interface Energy Meters along with AMR (Automatic Meter Reading) System under the scheme "5 min Interface Energy Meter along with AMR system"-For all five regions as PAN India level (agenda by CTUIL)

TCC Deliberation

A.30.1 CTUIL representative apprised that a Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has been prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes:

- All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary

computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations).

- Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose.

A.30.2 In view of above for making the system future ready for 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling, Accounting, Metering & Settlement; JC TS is being adopted for the above-mentioned project proposal as following:

S.No.	Items	Details
1.	Name of Scheme	Supply and installation of AMR compatible 5 min Interface Energy Meter along with AMR Systems- For all five regions NER, ER, NR, WR & SR.as PAN India.
2.	Scope of the scheme	1. Supply of AMR compatible 5 min Interface Energy Meters for all ISTS metering points of All five regions, 2. Installation of new AMR compatible IEMs by replacing existing meters in case of existing points and for newly added metering points. (Replacement work & New Installation work) 3. Supply and installation of AMR systems in dual LAN configuration at central location along with DCU, Ethernet Switch and other accessories at substation end and AMR software along with servers, consoles, historian software, database, printer, firewall, furniture, etc. at RLDC end to receive 5 min load profile data in auto mode. 4. Provision of streaming online instantaneous MW data at a user configurable rate (minimum 1 min) via AMR system for viewing purpose.

S.No.	Items	Details
		5. AMC includes Operations & Maintenance work (including data processing & report generation from AMR) for complete AMR system for 7 years. 6. On line Data storage of Raw Data & processed data for three years. The complete scope of IEM & AMR scheme shall be broadly in line with the Technical Specification (Section 1 & 2 of Part 1) circulated by NPC Division, CEA vide letter dtd. 6th July 2022. *Note: MDP system which is also part of the above TS mentioned shall be implemented by SRLDC/POSOCO and would match the timeline schedule with IEM & AMR project.*
3.	Objective / Justification	For Indian Power system, commercial settlements of energy generation and consumption are being computed through Availability Based Tariff (ABT) and Deviation Settlement Mechanism (DSM) which are in vogue for energy accounting. Availability Based Tariff was implemented in India in 2002/2003 considering the settlement period as 15-min. Government of India (GoI) has set a Renewable Energy (RE) target of 500 GW by 2030. In the last few years approximately since a decade, the need for implementing 5-minute meters along with AMR system for regional energy accounting and settlement at the Inter State level has been discussed and deliberated in various apex level forums & Committees. A PAN India pilot project on 5-minute metering was implemented as per the directive from Hon'ble CERC in 2018. A report on the pilot project covering

S.No.	Items	Details
		implementation aspects, challenges and suggested way forward has been submitted by POSOCO for perusal of the Hon'ble Commission This issue was discussed in OCC/TCC/RPC meetings at regional level and it was discussed to replace the existing SEMs (15-min Block) with AMR compatible Interface Energy Meters (5-min Block) and implementation of Automated Meter Reading (AMR) and Meter Data Processing (MDP) system for efficient and faster accounting. Moreover, there is a need expressed by States to get streaming online instantaneous MW data at a user configurable rate (minimum 1 min) at SLDCs via AMR system for viewing purpose to manage their drawl. A Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has been prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes: ● All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations). ● Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose. CTUIL sent a letter dtd. 27.06.2023 to CERC (attached as **Annexure-XXXVI**) stating that nodal

S.No.	Items	Details
		agency for AMR system implementation may be identified. CTUIL also informed NPC division, CEA vide letter dtd. 24.07.2023 (attached as **Annexure-XXXVII**) that JC TS calls for 5 min Time block recording by ISTS IEMs whereas as per CEA metering regulation it is 15 min time block. In this regard, Grid-India NLDC specified to NPC, CEA that 5-minute time block could be considered for procurement of new ISTS IEM, AMR & MDP (attached as **Annexure-XXXVIII**). Subsequently NPC CEA, coordinated a joint meeting (mail attached as **Annexure-XXXIX**) amongst the stakeholders comprising of CERC, Grid India (NLDC, RLDCs) & CTUIL, chaired by CEA Regulatory division dated 18th August'23 to check the feasibility for amendment of the CEA metering regulation in line with the ongoing developments and requirements of 5 min time block recording in IEMs. In view of the above mentioned system requirement of 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling, Accounting, Metering & Settlement; JC TS is being adopted for the above mentioned project proposal.
4.	Deliberations in RPCs	The scheme was discussed in all the RPCs and the status is as below: Scheme is approved in SRPC if 50% fund is available from PSDF(July'23). Scheme is in principle approved in NERPC (June'23) and WRPC (Feb'2023) as well. Funding status to be updated to the forums.

S.No.	Items	Details
		For NRPC- In 48th Commercial (Jan'24) Sub-Committee, M/s NRPC directed to take up the agenda in next NRPC meeting for approval. For ERPC- A special meeting was proposed in 47th TCC- Nov'22 meeting to deliberate the project in detail in line with the life of the existing AMR system, which is going to be ended on 31st March 2026. Project Cost was informed to all RPCs during Year 2022/23,
5.	Estimated DPR Cost	Rs. 444.87 Cr. excluding AMC & Rs 152.62 Cr. for 7 yr AMC *Costing to be updated considering latest no. of meters and locations at the time of tendering.
6.	Implementation timeframe	Approx. 24 months from gazette Notification.
7.	Implementation Mode	To be deliberated

A.30.3 Grant from PSDF for the FY 24-25 is not available as per MoP order. Accordingly, the funding is also to be deliberated. Earlier 90% of the project cost was allocated for grant.

A.30.4 MS, NPC stated that this scheme is for all ISTS metering points.

A.30.5 Rajasthan representative desired to get the data of such meters for them to send to Urja Vikas who do day ahead calculation of procurement of power and will help to minimize the error.

A.30.6 Director, UPSLDC enquired about provision of integration of these meter data with SAMAST Portal. He demanded to have integration of the same with SCADA at least.

A.30.7 Director, UPSLDC conveyed that the one-minute MW data is to be made available for SLDC preferably through integration with SCADA system.

A.30.8 Himachal Pradesh representative raised the concern over integration of 1-minute instantaneous meter data with existing system of SLDCs through api and correlating the same with SAMAST meters. That will help in calculation of transmission losses.

A.30.9 Haryana representative was in the same view of Himachal Pradesh.

A.30.10 CTUIL representative conveyed that 1-minute instantaneous data will go to the AMR system and then SLDC can view this through secure web browser. Further it was informed that these requirements of Integration are not part of JC Technical Specification for Metering & AMR. The scope for integration/ exchange of data in line with CERC applicable regulations is part of MDP, to be implemented by Grid-India as per JC Technical Specification for MDP.

A.30.11 MS, NRPC suggested CTUIL to look into the concern of various states and may come into next NRPC meeting.

NRPC Deliberation

A.30.12 Forum accorded the decision held in TCC meeting and directed CTUIL & RLDC to address the queries of SLDCs and STUs.

A.30.13 MS, NPC informed that most of members of JC have got transferred and retired. Hence in order to review the TS, NPC sub group members, CTUIL, RLDC may discuss and review the issues for finalization of TS.

Decision of Forum

CTU was advised to refer the case to NPC sub-group (of Communication) to review technical specifications in consultation with states.

A.31 Transmission scheme for evacuation of power from Ratle HEP (850MW) (agenda by CTUIL)

TCC Deliberation

A.31.1 GM, CTUIL apprised that System Study for evacuation of power from Ratle HEP (850 MW) was discussed and agreed in 26th CMETS-NR meeting held on 20.12.23. Subsequently, reactive compensation of above scheme was deliberated in recent 28th CMETS-NR meeting held on 27.03.24.

FW: Issues raised in 72nd NRPC on TS of IEM reg

Nutan Mishra {नूतन मिश्रा} <nutan@powergrid.in>

Wed 12-06-2024 09:51

To:Atul Kumar Agarwal {अतुल कुमार अग्रवाल} <atul_ag@powergrid.in>
Cc:Sangita Sarkar {संगीता सरकार} <jana.sangita@powergrid.in>;Rahul Kumar Shakya {} <rshakya@powergrid.in>; Tanay Jaiswal {Tanay Jaiswal} <tanay@powergrid.in>

For kind information Sir.
Regards

From: Nutan Mishra {नूतन मिश्रा}
Sent: Wednesday, June 12, 2024 9:44 AM
To: Rishika Sharan, NPC,CEA <cenpccea@gmail.com>; ramakrishna.meka78@gov.in; Shyam Kejriwal <shyam.kejriwal@gov.in>; deepak.gawali@gov.in; Praveen <praveen.cea@gov.in>; Omprakash Rajput <omprakashrajput002@gmail.com>; Sai <seshasaireddy007@gmail.com>; anusha.jdas@gov.in; singh.dinesh39@gov.in; RAJIB DAS <d.rajib2009@gmail.com>; agnivachatterjee.cea@gov.in; sagar.paladugu@nic.in; S. C. Saxena (एस. सी. सक्सेना) <scsaxena@grid-india.in>; agnivachatterjee1993@gmail.com; eeop.erpc@gov.in
Cc: sharan Rishika <rishika_sh@yahoo.com>; satyendra dotan <skdotan21@gmail.com>; NARESH BHANDARI <ms-nrpc@nic.in>; N. S. Mondal <mserpc-power@nic.in>; MEMBER SECRETARY <mssrpc-ka@nic.in>; Member Secretary NERPC <ms-nerpc@gov.in>; Member Secretary <ms-wrpc@nic.in>; Vivek Pandey (विवेक पांडे) <vivek.pandey@grid-india.in>
Subject: Issues raised in 72nd NRPC on TS of IEM reg

Dear Madam/Sir,

We endorse the views of Grid-India regarding Meter data and its flow as per CEA Regulations & CERC Grid code and other relevant regulations and Technical Specification of IEM finalized by JC.
The proposed scheme in NRPC needs to be approved for implementation for the said purpose.
Kind Regards,

Nutan Mishra
Sr GM, CTUIL

From: Vivek Pandey (विवेक पांडे) <vivek.pandey@grid-india.in>
Sent: Tuesday, June 11, 2024 8:14 PM
To: Rishika Sharan, NPC,CEA <cenpccea@gmail.com>; ramakrishna.meka78@gov.in; Shyam Kejriwal <shyam.kejriwal@gov.in>; deepak.gawali@gov.in; Praveen <praveen.cea@gov.in>; Omprakash Rajput <omprakashrajput002@gmail.com>; Sai <seshasaireddy007@gmail.com>; anusha.jdas@gov.in; singh.dinesh39@gov.in; RAJIB DAS <d.rajib2009@gmail.com>; agnivachatterjee.cea@gov.in; sagar.paladugu@nic.in; Nutan Mishra {नूतन मिश्रा} <nutan@powergrid.in>; S. C. Saxena (एस. सी. सक्सेना) <scsaxena@grid-india.in>; agnivachatterjee1993@gmail.com; eeop.erpc@gov.in
Cc: sharan Rishika <rishika_sh@yahoo.com>; satyendra dotan <skdotan21@gmail.com>; NARESH BHANDARI <ms-nrpc@nic.in>; N. S. Mondal <mserpc-power@nic.in>; MEMBER SECRETARY <mssrpc-ka@nic.in>; Member Secretary NERPC <ms-nerpc@gov.in>; Member Secretary <ms-wrpc@nic.in>
Subject: RE: Final SOP on Communication system Audit and Communication system outage planning considering GRID-India comments-reg.

Madam/Sir,

Inputs from Grid India on the issue raised in the 72nd NRPC meeting regarding the Technical Specifications of the 5-Minute IEM, AMR, and MDP systems are as under:

A committee comprising of the members from each RPC, CEA, CTUIL, PGCIL & Grid-India (erstwhile POSOCO) had prepared the Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for ISTS for pan-India deployment. The Technical Specifications were deliberated in various Forums. The scheme needs to be approved so that further work can be started.

The scheme would facilitate compliance to the provisions of the CEA metering regulation which mandates that the data shall be communicated to RLDCs using secured and dedicated communication system. The same is quoted below.

"(b) The metered data shall be communicated to the respective Load Despatch Centre by using a secured and dedicated communication system"

Further Indian Electricity Grid code 2023 clause 49.12. (e), mandates as under:

"(e) Entities in whose premises the IEMs are installed shall be responsible for (i) monitoring the healthiness of the CT and PT inputs to the meters, (ii) taking weekly meter readings for the seven day period ending on the preceding Sunday 2400 hrs and transmitting them to the RLDC by Tuesday noon, in case such readings have not been transmitted through automatic remote meter reading (AMR) facility (iii) monitoring and ensuring that the time drift of IEM is within the limits as specified in CEA Metering Regulations 2006 and (iv) promptly intimating the changes in CT and PT ratio to RLDC."

In view of above, the accurate energy meter data needs to be transmitted in a timely and secure manner to the RLDCs/NLDC through a dedicated communication system.

Further the interface energy meter data is primarily required for deviation accounting at the interstate level in line with the regulations. Any State specific requirement may be considered based on the feasibility study and without compromising the relevant standards and regulatory requirement.

Regards
Vivek Pandey

From: Rishika Sharan, NPC,CEA <cenpccea@gmail.com>
Sent: Monday, June 3, 2024 5:55 PM
To: ramakrishna.meka78@gov.in; Shyam Kejriwal <shyam.kejriwal@gov.in>; deepak.gawali@gov.in; Praveen <praveen.cea@gov.in>; Omprakash Rajput <omprakashrajput002@gmail.com>; Sai <seshasaireddy007@gmail.com>; anusha.jdas@gov.in; singh.dinesh39@gov.in; RAJIB DAS <d.rajib2009@gmail.com>; agnivachatterjee.cea@gov.in; sagar.paladugu@nic.in; Nutan Mishra {नूतन मिश्रा} <nutan@powergrid.in>; S. C. Saxena (एस. सी. सक्सेना) <scsaxena@grid-india.in>; Vivek Pandey (विवेक पांडे) <vivek.pandey@grid-india.in>; agnivachatterjee1993@gmail.com; eeop.erpc@gov.in
Cc: sharan Rishika <rishika_sh@yahoo.com>; satyendra dotan <skdotan21@gmail.com>; NARESH BHANDARI <ms-nrpc@nic.in>; N. S. Mondal <mserpc-power@nic.in>; MEMBER SECRETARY <mssrpc-ka@nic.in>; Member Secretary NERPC <ms-nerpc@gov.in>; Member Secretary <ms-wrpc@nic.in>
Subject: Final SOP on Communication system Audit and Communication system outage planning considering GRID-India comments-reg.

Madam/Sir,

In the meeting of the commercial sub-group held on 03.06.2024, the GRID-India comments on SOPs on Communication system Audit and Communication system outage planning were deliberated and revised accordingly. The final version of SOPs is attached herewith for your reference and compliance.

The issue raised in the 72nd NRPC meeting on Technical Specifications of 5 Min IEM, AMR and MDP system was not deliberated in the meeting due to absence of representation from GRID-India.

CTU and Grid India are requested to provide inputs/comments on the issue raised in the 72nd NRPC meeting regarding the Technical Specifications of the 5-Minute IEM, AMR, and MDP systems by 07.06.2024 for further necessary action from our end.

--

Regards,

O/o Chief Engineer (National Power Committee Division)
Central Electricity Authority
Phone No: 011-26732014
New Delhi - 110066.

Follow Grid-India on:

E-Mail /Website

भारत सरकार केंद्रीय विद्युत प्राधिकरण दक्षिण क्षेत्रीय विद्युत समिति 29, रेसकोर्स क्रास रोड बेंगलूर- 560 009	सत्यमेव जयते	Government of India Central Electricity Authority **Southern Regional Power Committee** 29, Race Course Cross Road Bengaluru-560 009
Email:mssrpc-ka@nic.in		Phone: 080-22287205

सं/No.	SRPC/50 (SRPC)/2024/1688 - 1764.	दिनांक/ Date	**19.04.2024**

सेवा में / To:

(वितरण सूची के अनुसार / *As per the distribution list)*

विषय : एसआरपीसी की 50वीं बैठक (16.03.2024) और टीसीसी की 48वीं बैठक (15. 03.2024) के कार्यवृत - के संबंध में

Subject: Minutes the 50th Meeting of SRPC (16.03.2024) & 48th Meeting of TCC (15.03.2024)-reg.

महोदय /महोदया
Sir/Madam,

एसआरपीसी की 50वीं बैठक 16 मार्च 2024 और एसआरपीसी की टीसीसी की 48 वीं बैठक 15 मार्च 2024 बैठकों के कार्यवृत संगलग्न है । कार्यवृत को एसआरपीसी वेबसाईट में अपलोड कर दिया गिया है ।

Please find minutes of the 50th meeting of SRPC and 48th Meeting of TCC of SRPC held on 16.03.2024 & 15.03.2024 at Kochi. The same has been uploaded on SRPC website.

धन्यवाद / Thanking you,

भवदीय/Yours faithfully,

(असित सिंह /Asit Singh)
सदस्य सचिव/Member Secretary

SRPC deliberations

e) SRPC secretariat highlighted on the regulatory as well as the operational requirement of Resource Adequacy Assessment.

f) TANGEDCO noting that peak requirements are for few hours, opined that NTPC may contract out some of the gas based stations through PSDF/DSM fund so that states can purchase the power from these stations for their peak requirements.

g) CEA informed that PSDF fund may not be viable, which had already been established. A scheme which looks in to the possibility of contracting gas stations at a larger scale for meeting peak hour requirements are under consideration of MoP.

h) TANGEDCO requested CEA to follow up with Ministry in this regard to ensure that the said scheme may be firmed up at the earliest so that peak hour requirements of States during coming months may be met at ease.

12) IMPLEMENTATION OF AUTOMATIC METER READING (AMR) IN SOUTHERN REGION

a) The following had been noted in the earlier meetings of SRPC:

- In the 24th Meeting of SRPC held on 15.03.2014, SRPC had approved implementation of the AMR scheme in SR by PGCIL.
- In the 37th meeting of SRPC held on 01.02.2020, SRPC had approved the estimated cost of Rs. 36.86 Crores for implementation AMR scheme in SR. However, the scheme was not implemented by PGCIL citing that Pan India Technical Specifications for the AMR were not available.
- NPC Division, CEA, vide email dated 6th July 2022, had intimated that the Joint Committee after due deliberation has finalized the "*Technical Specification (TS) of Interface Energy Meters, Automatic Meter Reading system and Meter Data Processing system*" and circulated the Final copy of the Technical Specifications.
- In the 43rd meeting of SRPC held on 23rd September 2022, SRPC had recommended CTUIL to come forward with the proposal for implementation of the AMR-MDP scheme in SR.
- In the 44th Meeting of SRPC (05.11.2022), CTUIL furnished the proposal for implementing the AMR scheme in Southern Region in RTM mode through PGCIL. In the proposal, CTUIL had mentioned the estimated cost for the scheme in SR is ₹ 100 crores (approximately). The estimated cost of Rs. 100 Crores does not include any communication system and Meter Data Processing (MDP). MDP is to be developed by POSOCO. After deliberations the following was concluded:
  - PGCIL/CTUIL was suggested to seek PSDF funding of IEM/AMR scheme for implementation in SR. If at least 50% funding is available it may approach NCT. If any change in PSDF funding, PGCIL/CTUIL would bring back the proposal to SRPC. This needs to be expedited by PGCIL/CTUIL.

- POSOCO may also consider PSDF funding for MDP and match the implementation with AMR schedule.

b) The issue was deliberated in the 45th Meeting of SRPC (04.03.2023), 47th SRPC (22.07.2023), 48th SRPC Meetings held on (13.10.2023) and in the 47th TCC and 49th SRPC Meetings held on 08.12.2023 & 09.12.2023 respectively and noted the following:

- PGCIL vide letter dated 24.11.2023 had submitted that the subject project may be implemented through one time reimbursement mode.
- PGCIL apprised the forum that AMR system is being implemented for first time in Southern Region, and work is spread across wider geographical area across many utilities and PGCIL will have to deploy huge resources for implementation of the project. As per TS of AMR, 10 years AMC is required. However, since currently vendors are giving AMC for 7 years, the AMC cost provided by vendors for 10 years is observed to be very high and increasing year on year. Hence getting this high AMC cost approved in CERC would be a challenge.
- SRPC forum noted that CTUIL/PGCIL to comply with SRPC decision of implementing through RTM mode with PSDF Funding. Higher AMC of the project is acknowledged by constituents. Based on difficulties faced in AMC in other projects, the project may include 7 years AMC and provide a provision for extension of the same for additional 3 years on the mutually agreed same terms & conditions.

c) The matter was discussed further in 58th CCM held on 16.02.2024 wherein the following status updates were provided by CTUIL:

- CTUIL updated that the scheme of 5 minute interface energy meters with AMR system was discussed in 17th NCT meeting held on 31st January 2024. In the meeting Chairperson CEA suggested that the scheme should be designed for implementation on PAN India basis so that system can be put into effective use. Subsequently, the matter of national scheme for 5 min interface energy meters with AMR system for all regions was discussed in the 14th NPC meeting held on 03.02.2024. It was decided then that the proposal for 5 min interface energy meters with AMR system for implementation on PAN India basis, along with roadmap for transition from 15 minutes to 5 minutes, shall be prepared by the CTUIL/PGCIL. The same would be presented for approval of all RPCs.

d) The issue was discussed in 14th NPC meeting held on 03.02.2024 and following was decided by the committee.

- ***The agenda for 5 min Interface Energy Meters along with AMR system for PAN India (for all five regions) needs deliberations in all RPC. Agenda may be taken up in the upcoming meetings of all RPCs.***
- ***The proposal/DPR for 5 min IEM with AMR system for pan India may be prepared by PGCIL based on the input provided by CTUIL regarding the ISTS metering points in consultation with Grid India.***

- ***CTU may prepare the roadmap and activities to be done for transition from 15 min to 5 min regime based on the previous studies/ reports in present context. The timeline of the activities may also be prepared and it may be in sync and coordination with each activities for smoother implementation of the project.***

TCC Deliberations

e) SRPC secretariat pointed out that implementation of AMR had been in discussion in various forums since 2014. CTUIL had submitted the scheme of 5 minute interface energy meters with AMR system for approval in the 17th NCT meeting held on 31st January 2024. As per the direction of Chairperson CEA the scheme was discussed in 14th NPC so that it may be designed for implementation on PAN India basis for effective use of the system. NPC requested CTUIL to put up proposal for PAN India implementation of AMR along with roadmap for transition from 15minute to 5 minute. They also informed that the project cost for SR would be nearly 126 Crores.

f) CTUIL had furnished the roadmap for transition from 15 minute to 5 minute (**Annexure-12A)**.However, it was noted that necessary minimum details, such as mode of implementation etc., were missing in the roadmap. Requirement of AMR for data for accounting and real-time visibility was emphasized by SRLDC and SR States and requested CTUIL/ PGCIL to come up with the scheme accordingly. The forum noted that in the backdrop of addition of several RE generators, existing practice of manually obtaining the data would not be feasible and AMR is necessary. CTUIL along with PGCIL shall put up the proposal for implementation of AMR including all necessary details. CTUIL raised concern regarding implementation of 5 min IEMs, vis-à-vis, CEA metering Regulations. It was informed that the matter had been adequately deliberated in various meetings and CTUIL shall implement the project as per Technical specifications of the JC.

g) The following was concluded

- TCC forum noted that implementation of AMR is essential for RLDC and SLDCs and CTUIL/ PGCIL to put up the proposal for AMR (including all necessary details) as noted in NPC.
- Region wise cost, mode of funding and cost sharing may be indicated in the proposal.

SRPC Deliberations

h) TANGEDCO opined that CTUIL proposal for 5 minute IEM with AMR shall ensure that 15 minute data is continued to be provided to all concerned (integrating 5minute values in the SEM itself) till scheduling and accounting continues on 15 minute basis. When Regulations mandates 5 minute scheduling and accounting, data shall accordingly be provided to all stakeholders.

i) CTUIL responded that AMR and IEMs have capability to record 5 minute and 15minute data and would provide data as per the requirement of prevailing Regulations. The agenda was brought to RPCs as per direction of the Chairperson, CEA for implementation on Pan India basis.

j) The following was concluded

- **Accorded in-principle approval for implementation of AMR on pan India basis and PGCIL/ CTUIL shall prepare proposal/ DPR accordingly.**
- **Region wise cost, mode of funding and cost sharing may be indicated in the proposal.**

13) COMPLIANCE OF CEA CONNECTIVITY REGULATION FOR RENEWABLE ENERGY GENERATORS

a) SRLDC vide mail dated 29.02.2024 (***refer Annexure 5A***) had furnished the agenda stating that due to high renewable energy penetration in Southern region, it is important that existing Renewable Energy Generators provide the various Grid Support services like the conventional synchronous machines. The Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 was notified on 6th Feb 2019. and the Compliance to these regulations (Amendments) by RE generators is to be monitored at regional and state level. SLDCs to apprise the status of compliance of CEA Regulations.

b) During First time charging of RE elements, all regulatory and technical compliance pertaining to IEGC-2023 and CEA standards for connectivity to grid need to be ensured. This is necessary to ensure grid support services from RE generators and to avoid any undesired operational challenges after integration with the grid. As per IEGC 2023 clause 8 (4), SLDC shall prepare procedure for first time energization of new or modified power system elements to intra-State transmission system. In the absence of such procedure of SLDC, the NLDC procedure shall apply for the elements of 220 kV and above (132 kV and above in case of North Eastern region). Each SLDC, is requested to inform regarding the procedure for first time energization of new or modified power system elements to intra-State transmission system.

TCC Deliberations

c) SRPC secretariat explained to the forum regarding requirement of procedure for first time energisation/charging (FTC) of new or modified power system elements getting connected/connected to intra-State transmission system, to be prepared by SLDCs. It was informed that in the absence of such SLDC procedure, the NLDC procedure shall be followed for FTC of elements at 220 kV level and above.

d) **TCC forum noted the above mandatory regulatory compliance**.

SRPC Deliberations

e) **SRPC forum noted the above for appropriate action**.

f) TANGEDCO opined that CEA connectivity Regulations may cover technical issues such as requirement of reactive compensation for various types of RE entities also. CEA stated that CEA connectivity Regulations are holistic in nature and covers technical as well as connectivity requirements. At ISTS level CTUIL and RLDCs are taking care of the requirements for connectivity and FTC, similarly, for RE entities getting connected

भारत सरकार
Government of India
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
पश्चिम क्षेत्रीय विद्युत समिति
Western Regional Power Committee
एफ -3, एमआयडीसी क्षेत्र, अंधेरी (पूर्व), मुंबई - 400 093
F-3, MIDC Area, Andheri (East), Mumbai - 400 093
दूरभाष Phone: 022- 28221636; 28200194/95/96; फैक्स Fax : 022 – 28370193
Website : www.wrpc.gov.in E-mail : as-wrpc@nic.in

सं. : पक्षेविस/ 49वीं/ पक्षेविस बैठक/ सहा.स. /2024/ दिनांक: 03 MAY 2024
No. : WRPC/49th/ WRPC Mtg./A.S./2024/ 4837-4944 Dated:

सेवा में/To,

(संलग्न सूची के अनुसार/
As per enclosed list)

विषय : पश्चिम क्षेत्रीय विद्युत समिति (पक्षेविसमिति) की 49 वीं बैठक का कार्यवृत्त।
Sub : Minutes of 49th meeting of Western Regional Power Committee (WRPC).

महोदय/Sir,

इस पत्र के साथ दिनांक 13 अप्रैल, 2024 को दमन में आयोजित पश्चिम क्षेत्रीय विद्युत समिति की 49 वीं बैठक एवं इससे पहले दिनांक 12 अप्रैल, 2024 को आयोजित तकनीकी समन्वय समिति की बैठक का कार्यवृत्त आपकी सूचना एवं आवश्यक कार्रवाई हेतु संलग्न है ।
बैठक का कार्यवृत्त पक्षेविस की वेबसाइट www.wrpc.nic.in पर भी उपलब्ध है ।

यह सदस्य सचिव, पक्षेविसमिति के अनुमोदन से जारी किया जाता है ।

Please find enclosed herewith the Minutes of the 49th meeting of Western Regional Power Committee held on 13th April, 2024 at Daman preceded by Technical Coordination Committee meeting held on 12th April, 2024 for your kind information and necessary action.

Minutes of the meetings is also available in the WRPC website: www.wrpc.nic.in.

This issue with the approval of Member Secretary, WRPC.

धन्यवाद / Thanking you,

भवदीय / Yours faithfully,

संलग्न: उपरोक्तानुसार/As above

Anil Gautam
(अनिल गौतम/Anil Gautam)
सहायक सचिव / Assistant Secretary

consideration by National Committee on Transmission. Further, Para 6(3A) & Para 11 of MoP Gazette dated 03.12.2021 on resolution for establishment of WRPC stipulates the following:

> *"3A- To provide views on the inter-state transmission system planned by CTU within 45 days of receipt of the proposal by the concerned RPC. The views of RPC will be considered by National Committee on Transmission for sending their recommendation of Ministry of Power for approval of new inter-state transmission system."*

49th TCC/WRPC Discussions:

MS, WRPC briefed the transmission line augmentation proposal submitted by CTU. He informed that the MoP directive says that views of RPC are required for proposals costing more than Rs. 500 Crores before consideration by National Committee on Transmission (NCT).

CTU emphasied that all three proposals are related to the evacuation of Green Hydrogen/Ammonia potential in the state of Gujarat. They clarified that the transmission lines projects are planned in three phases in sync with the timelines of Green Hydrogen/Ammonia projects indicated by MNRE. The transmission projects proposed at present are for the 1st phase only which is expected to come up by 2027-28.

TCC/WRPC recommended the proposals for implementation.

Item No. 3: Installation of new Interface Energy meters, AMR system and Meter Data Processing (MDP) system

(PGCIL/WRPC)

Background:

i. In the 36th WRPC meeting, it was decided that POWERGRID shall replace existing meters with New Interface Energy Meters (IEMs), Automatic Meter Reading (AMR) systems and Meter Data Processing (MDP) systems having specifications as approved in 34th WRPC meeting and recover the cost from the entities on one-time basis. Later on, in subsequent WRPC meetings, PGCIL requested that the matter be referred to CEA.

ii. A Joint Committee constituted by CEA comprising members from CEA, NPC, RPCs, CTU/PGCIL and POSOCO finalize the Technical Specifications (TS) for IEMs, AMR system and MDP system for Interstate transmission system (ISTS) in April 2022 after due deliberation. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes:

a) All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations).

b) Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purposes.

iii. 87th CCM Discussions (held on 10.01.2023): CTU representative informed that the data will be split into 2 parts which will be 5 Minute data and 1 Minute data. The 1-minute data will be provided to SLDCs for online monitoring and 5-minute meter data will be provided to RLDCs for accounting purposes. The cost of the entire project will be around 125 crores for WR excluding MDP. The cost included the one-time cost and the recurring cost on O&M, Spares, Cyber security Audit etc including AMC for 10 years. For funding the project in all 5 regions, CTU has already submitted an initial request for PSDF funding. The detailed DPR will be submitted once the initial funding request through PSDF is accepted. The project will be executed through POWERGRID-RTM and the proportion of funding will be between PSDF and RTM as accepted by PSDF. Gujarat, Maharashtra, Madhya Pradesh, Chhattisgarh & Goa representatives consented to the same.

iv. 46th WRPC (held on 03.02.2023): It was concluded that for the AMR project, the PSDF route will be explored and in case the funding request is not approved by PSDF Committee, the same will be discussed again by WRPC to decide on the cost-sharing. It was also agreed that the AMC of the AMR project will be recovered through the

PoC mechanism. Regarding MDP system, the same will be implemented by Grid-India through their RLDC fees and charges.

90th CCM discussion:

It was informed that the matter was discussed in the 14th NPC meeting and the updates are as follows;

a) CTU informed that the proposal for 5 min IEM with AMR system for SR was put up for PSDF funding.
b) Chairperson NPC opined that the proposal for 5 min. IEM with AMR system for pan India may be prepared along with the roadmap and activities to be done for the transition from 15 min. to 5 min. regime. He emphasized that the timeline of the activities may also be prepared.

Updates:

a) CTU has now submitted the proposal for pan India (Annexure – 3.1).
b) Estimated Project Cost: Rs. 444.87 Cr. excluding AMC of Rs 152.62 Cr. for 7 yr.
c) Estimated timeline for completion: Approx. 24 months from gazette Notification.

As grant from PSDF for the FY 24-25 is not available as per MoP order, the funding is required to be deliberated.

49th TCC Discussions:

CTU briefly explained the above agenda position. They informed the decision of 14th NPC meeting that the agenda for 5 min Interface Energy Meters along with AMR system for PAN India (for all five regions) needs deliberations in all RPCs. After obtaining consent from RPCs, the proposal would be put up before NCT. CTU has, accordingly, put up this proposal before TCC/WRPC. The DPR for the project is to be prepared by PGCIL. The estimated project cost is Rs. 444.87 Cr. excluding AMC of Rs 152.62 Cr. for 7 years for all India AMR systems. They also informed that the project was approved in WRPC way back in 2017 and since then, its implementation is pending. The meters in WR are very old and they need to be replaced.

MS WRPC informed that WRPC had already approved the project in its 36th meeting with funding proposed through PSDF. Now the route of PSDF funding is not available, therefore, other funding options are required to be explored.

CTU proposed that RTM mode of funding may be agreed.

MSEDCL opined that the cause of rejection of funds through PSDF should be ascertained. Also, as the constituents/beneficiaries are making huge payments to the regional pools towards the DSM and the surplus is going to PSDF, it seems unlikely that there is no money left in PSDF.

WRLDC informed that the surplus in the regional pool accounts is being deployed for availing the ancillary services and at present, hardly any surplus is going to PSDF from the regional pools.

Maharashtra SLDC stressed that this is a very important scheme for states also since the project envisages 1 min data to be made available to SLDCs for monitoring and therefore, there shall not be any further delay in the implementation of the project.

NPCIL stated that since the funding from PSDF is not available for FY 2024-25 only, the possibility of PSDF funding may again be explored in the next year. They also enquired whether any other recourse is available for funding the project or if it has to be funded by WRPC members as fait accompli. On which, MS WRPC clarified that the members may take a call on this issue and it is not a fait accompli situation.

NPCIL opined that the project has not been rejected on its merit rather it has been withheld. Therefore, considering the importance of the project, the necessity of the project is required to be impressed upon the PSDF Committee. He further suggested that in the meantime, the project may be funded for getting it implemented without any further delay.

CTU informed that the PSDF funding cannot be guaranteed. However, they will again approach the PSDF committee for funding.

MS WRPC proposed that the project may be approved and the procurement process may be initiated by CTU without waiting further. However, they shall again approach PSDF committee for funding.

TCC recommended for initiating the procurement process and approaching PSDF again for funding by CTU.

49th WRPC Discussions:

CTU briefly explained the above discussions held in TCC meeting.

Member (Grid Operation & Distribution), CEA opined that being a very important project, it would not be appropriate to wait for PSDF funding. The proposal may be submitted to CEA and simultaneously, the procurement process be taken up so that by the time the decision comes from PSDF committee, CTU will be in a position to take up implementation either through the PSDF grant or through RTM route.

MS, WRPC informed that TCC has already recommended for going ahead with the project in its meeting held yesterday with a rider that CTU shall pursue it with PSDF committee parallelly.

WRPC agreed to the recommendations of TCC.

Item No. 4: Notification of Procedures on "Centralized supervision for Quick fault detection and restoration of Communication System" and "Maintenance & Testing of Communication System" By CERC in Jan'2024

(CTUIL)

i. Hon'ble CERC vide order dated 19.01.2024 notified Procedures on "Centralized supervision for Quick fault detection and restoration of Communication System" and "Maintenance & Testing of Communication System"; these are SOP for Centralised Supervision & Maintenance for ISTS Communication Network.

भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

SPEED POST/FAX
Ph : 0364-2534039
Fax: 0364-2534040
email: nerpc@ymail.com
website: www.nerpc.gov.in

No.: No. NERPC/SE (O)/OCC/2021/ 644-686 May 31, 2024

To
As per list attached

Sub: Minutes of 214th OCC Meeting.

Sir/Madam,

Please find enclosed herewith the minutes of the 214th OCC Meeting held at NERPC conference Hall, Shillong on 17th May, 2024 for your kind information and necessary action. The minutes is also available on the website of NERPC: www.nerpc.gov.in.

Any comments/observations may kindly be communicated to NERPC Secretariat at the earliest.

भवदीय / Yours faithfully,

(अनिल कवरानी/ Anil Kawrani)
निदेशक / Director

Encl: As above

S. No.	Items	Details
7.	Implementation Mode	Through RTM to POWERGRID
8.	Location of National UNMS	Main UNMS at NLDC, Katwaria Sarai, and Backup UNMS at RLDC, Kolkata

Deliberation of the sub-committee

MS, NERPC requested all the States to deliberate internally on the matter and provide feedbacks to CTU. He opined that as the matter pertains to communication system, a special meeting needs to be organized shortly with all stake holders.

C.3 Supply & Installation of AMR Compatible ISTS Interface Energy Meters along with AMR (Automatic Meter Reading) System under the scheme "5 min Interface Energy Meter along with AMR system"-For all five regions as PAN India level

1. A Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has been prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes:
   - All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation to convert 5 min Time Block data to 15 min Time block data (in line with regulations).
   - Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose.
2. In view of the above for making the system future ready for 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling,

Accounting, Metering & Settlement; JC TS is being adopted for the above-mentioned project proposal as following:

S. No.	Items	Details
1.	Name of Scheme	Supply and installation of AMR compatible 5 min Interface Energy Meter along with AMR Systems- For all five regions NER, ER, NR, WR & SR.as PAN India.
2.	Scope of the scheme	1. Supply of AMR compatible 5 min Interface Energy Meters for all ISTS metering points of All five regions, 2. Installation of new AMR compatible IEMs by replacing existing meters in case of existing points and for newly added metering points. (Replacement work & New Installation work) 3. Supply and installation of AMR systems in dual LAN configuration at central location along with DCU, Ethernet Switch and other accessories at substation end and AMR software along with servers, consoles, historian software, database, printer, firewall, furniture, etc. at RLDC end to receive 5 min load profile data in auto mode. 4. Provision of streaming online instantaneous MW data at a user configurable rate (minimum 1 min) via AMR system for viewing purpose. 5. AMC includes Operations & Maintenance work (including data processing & report generation from AMR) for complete AMR system for 7 years. 6. On line Data storage of Raw Data & processed data for three years.

S. No.	Items	Details
		The complete scope of IEM & AMR scheme shall be broadly in line with the Technical Specification (Section 1 & 2 of Part 1) circulated by NPC Division, CEA vide letter dtd. 6th July 2022. *Note: MDP system which is also part of the above TS mentioned shall be implemented by RLDC/POSOCO and would match the timeline schedule with IEM & AMR project.*
3.	Conceptual Architecture of AMR connectivity of ISTS Meters	**Appendix-I**
4.	Objective / Justification	For Indian Power system, commercial settlements of energy generation and consumption are being computed through Availability Based Tariff (ABT) and Deviation Settlement Mechanism (DSM) which are in vogue for energy accounting. Availability Based Tariff was implemented in India in 2002/2003 considering the settlement period as 15-min. Government of India (GoI) has set a Renewable Energy (RE) target of 500 GW by 2030. In the last few years approximately since a decade, the need for implementing 5-minute meters along with AMR system for regional energy accounting and settlement at the Inter State level has been discussed and deliberated in various apex level forums & Committees. A PAN India pilot project on 5-minute metering was implemented as per the directive from Hon'ble CERC in

S. No.	Items	Details
		2018. A report on the pilot project covering implementation aspects, challenges and suggested way forward has been submitted by POSOCO for perusal of the Hon'ble Commission This issue was discussed in OCC/TCC/RPC meetings at regional level and it was discussed to replace the existing SEMs (15-min Block) with AMR compatible Interface Energy Meters (5-min Block) and implementation of Automated Meter Reading (AMR) and Meter Data Processing (MDP) system for efficient and faster accounting. Moreover, there is a need expressed by States to get streaming online instantaneous MW data at a user configurable rate (minimum 1 min) at SLDCs via AMR system for viewing purpose to manage their drawl. A Joint Committee (JC) comprising the members from each RPC, CEA, CTU/PGCIL & POSOCO has been prepared Technical Specifications (TS) of the "5/15 Minute Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP)" for interstate transmission system at PAN India basis. NPC Division, CEA vide letter dated 6th July 2022 had circulated the final copy of the TS. This Technical specification includes: • All the procured IEMs shall be configured as 5 min time block. These meters shall record and send 5 min block data to regional AMR system for necessary computation

S. No.	Items	Details
		to convert 5 min Time Block data to 15 min Time block data (in line with regulations). • Provision of 1 min instantaneous MW power flow data from IEMs to SLDC, for viewing purpose. CTUIL sent a letter dtd. 27.06.2023 to CERC (attached as **Annexure-C.3.1**) stating that nodal agency for AMR system implementation may be identified. CTUIL also informed NPC division, CEA vide letter dtd. 24.07.2023 (attached as **Annexure-C.3.2**) that JC TS calls for 5 min Time block recording by ISTS IEMs whereas as per CEA metering regulation it is 15 min time block. In this regard, Grid-India NLDC specified to NPC, CEA that 5-minute time block could be considered for procurement of new ISTS IEM, AMR & MDP (attached as **Annexure-C.3.3**). Subsequently NPC CEA, coordinated a joint meeting (mail attached as **Annexure-C.3.4**) amongst the stakeholders comprising of CERC, Grid India (NLDC, RLDCs) & CTUIL, chaired by CEA Regulatory division dated 18th August'23 to check the feasibility for amendment of the CEA metering regulation in line with the ongoing developments and requirements of 5 min time block recording in IEMs. In view of the above-mentioned system requirement of 5 min Time Block, while also complying the present regulations for 15 min time block for Scheduling, Accounting, Metering & Settlement; JC TS is being adopted for the above-mentioned project proposal.

S. No.	Items	Details
5.	Estimated DPR Cost	Rs. 444.87 Cr. excluding AMC & Rs 152.62 Cr. for 7 yr. AMC as per the DPR cost received from POWERGRID in March 2024. *Costing to be updated considering latest no. of meters and locations at the time of tendering.
6.	Implementation timeframe	Approx. 24 months from gazette Notification.
7.	Implementation Mode	To be deliberated

3. Grant from PSDF for the FY 24-25 is not available as per MoP order. Accordingly, the funding is also to be deliberated. Earlier 90% of the project cost was allocated for grant.
4. Implementation mode for the project is also to be deliberated by the forum before approval.

Sub-committee may deliberate

After detailed deliberation, the forum provided in-principal approval to the AMR system and referred the matter to upcoming Commercial Subcommittee meeting for obtaining financial approvals from the States. CTU added that an SoP regarding implementation of the scheme has been prepared by CTU and will be circulated shortly to the constituents.

Agenda from NERLDC

C.4 Power Procurement from Market to ensure Zero Load Shedding during Summer Season

CE(GM), CEA vide letter dated 29.04.2024(**Annexure-C.4**) had communicated to all Principal Chief Secretaries of States regarding efforts to be put to ensure adequate availability of power had emphasized that it is imperative that proactive steps are

~~Annexure-XX~~ ~~Annexue-XI~~

Annexure-XXXIII

Meeting Plan for FY 2023-24

S.N.	Month	Meeting	Host	Mode
1	Apr-2023	65th NRPC	SJVN	Physical
2	May-2023	66th NRPC	NRPC Secretariat	VC
3	June-2023	67th NRPC	NRPC Secretariat	VC
4	Jul-2023	-	-	-
5	Aug-2023	68th NRPC	NTPC	Physical
6	Sep-2023	69th NRPC	NRPC Secretariat	VC
7	Oct-2023	70th NRPC	NRPC Secretariat	VC
8	Nov-2023	71st NRPC & 48th TCC	NHPC	Physical
9	Dec-2023	72nd NRPC	NRPC Secretariat	VC
10	Jan-2024	73rd NRPC	NRPC Secretariat	VC
11	Feb-2024	74th NRPC & 49th TCC	Combined by CLP Jhajjar & Lanco Anpara Power Ltd	Physical
12	Mar-2024	75th NRPC	NRPC Secretariat	VC

Meeting Plan for FY 2024-25

S.N.	Month	Meeting	Host	Mode
1	Apr-2024	76th NRPC	NRPC Secretariat	VC
2	May-2024	77th NRPC & 50th TCC	UPPTCL	Physical
3	June-2024	78th NRPC	NRPC Secretariat	VC
4	Jul-2024	79th NRPC	NRPC Secretariat	VC
5	Aug-2024	80th NRPC & 51st TCC	Member Trader	Physical
6	Sep-2024	81st NRPC	NRPC Secretariat	VC
7	Oct-2024	82nd NRPC	NRPC Secretariat	VC
8	Nov-2024	83rd NRPC & 52nd TCC	DTL	Physical
9	Dec-2024	84th NRPC	NRPC Secretariat	VC
10	Jan-2025	85th NRPC	NRPC Secretariat	VC
11	Feb-2025	86th NRPC & 53rd TCC	Adani Power Ltd	Physical
12	Mar-2025	87th NRPC	NRPC Secretariat	VC