



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

दिनांक: 18.05.2026

सेवा में

As per attached list of Members and Other invitees

विषय: संरक्षण उप-समिति की 68 वीं बैठक की कार्यसूची |

Subject: Agenda for 68th Protection Sub-Committee Meeting.

संरक्षण उप-समिति की 68 वीं बैठक, दिनांक 22.05.2026 को 10:30 बजे से वीडियो कॉन्फ्रेंसिंग के मध्यम से आयोजित की जाएगी | उक्त बैठक की कार्यसूची संलग्न है | यह उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट पर भी उपलब्ध है | 56 वीं पीएससी बैठक के निर्णयों के अनुसार, आईईजीसी 2023 के सुरक्षा कोड का अनुपालन सुनिश्चित करने के लिए एनआरपीसी सदस्य के अलावा अन्य विद्युत् उपयोगिताओं को भी बैठक के लिए आमंत्रित किया गया है। मीटिंग का लिंक अलग से साझा किया जाएगा। कृपया बैठक में उपस्थिति सुनिश्चित करें।

The 68th meeting of Protection Sub-Committee is scheduled to be held on 22.05.2026 at 10:30 Hrs via video conferencing. The agenda for the meeting is attached herewith. The same is also available on NRPC website. As per decisions of 56th PSC meeting, utilities other than NRPC member have also been invited for meeting for ensuring compliance of protection code of IEGC 2023. Meeting link shall be shared separately. Kindly make it convenient to attend the same.

डी. के. मीणा
अधीक्षण अभियंता (संरक्षण)

Agenda of 68th Protection Sub-Committee Meeting (22th May, 2026)

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**Agenda for
68th Meeting of Protection Sub-Committee (PSC) of
Northern Regional Power Committee**

Date and time of meeting : 22.05.2026 10:30 Hrs.

Venue : Video Conferencing

Part-A: Agenda by NRPC Secretariat

A.1. Confirmation of minutes of 67th meeting of Protection Sub-Committee

A.1.1 67th PSC meeting was held on 18.03.2026. Minutes of the meeting were issued vide letter dtd. 24.04.2026. No comment has been received as of now.

Decision required from Forum:

Forum may approve the issued minutes.

A.2. Status of action taken on decisions of 67th Protection Sub-Committee meeting (agenda by NRPC Secretariat)

A.2.1 Status of action taken on the decisions of 67th PSC meeting is attached as **Annexure-A.I.**

Decision required from Forum

Status may be deliberated for timely action on issues.

A.3. Submission of protection performance indices of 220 kV and above system along with reason and corrective action taken for indices less than unity to NRPC Secretariat for month of March-April 2026 (agenda by NRPC Secretariat)

A.3.1 *As per clause 15 (6) of IEGC 2023;*

- *Users shall submit the following protection performance indices of previous month to their respective RPC and RLDC on monthly basis for 220 kV and above (132 kV and above in NER) system, which shall be reviewed by the RPC:*

a) *The **Dependability Index** defined as $D = N_c / N_c + N_f$*

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b) The **Security Index** defined as $S = Nc / (Nc + Nu)$

c) The **Reliability Index** defined as $R = Nc / (Nc + Ni)$

where,

Nc is the number of correct operations at internal power system faults,

Nf is the number of failures to operate at internal power system faults,

Nu is the number of unwanted operations,

Ni is the number of incorrect operations and is the sum of *Nf* and *Nu*

- Each user shall also submit the reasons for performance indices less than unity of individual element wise protection system to the respective RPC and action plan for corrective measures. The action plan will be followed up regularly in the respective RPC.

A.3.2 In earlier PSC meeting, it was decided that each utility shall submit the performance **indices of previous month by 7th day of next month.**

A.3.3 Accordingly, the status of the indices reported for the month of **March-April 2026** is attached as **Annexure-A.II.**

A.3.4 Further, based on submitted data by the utilities as on date, the summary of events that caused indices less than unity is also attached as **Annexure-A.III.**

A.3.5 **Submitted data has following issues:**

Some Utilities have not submitted data	As mention in Annexure-A.II.
Utilities have submitted data for some plants/regions but not all.	As mention in Annexure-A.II.
Some utilities have sent data after cut-off date of 7 th	As mention in Annexure-A.II.

Decision required from Forum:

- i. Forum may discuss cases where indices are less than 1 and may direct necessary action to be taken.
- ii. Forum may direct utilities to submit the performance indices of previous

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month by 7th day of next month element wise along with the reason for indices less than unity and corrective action taken.

A.4. Reporting of protection performance indices of SPS by SLDCs/RLDC (agenda by NRPC Secretariat)

A.4.1 As per clause 16 of IEGC 2023;

- *The users and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC in the format specified by the respective RPCs.*
- *The performance of SPS shall be assessed as per the protection performance indices specified in these Regulations. In case, the SPS fails to operate, the concerned User shall take corrective actions and submit a detailed report on the corrective actions taken to the concerned RPC within a fortnight.*

A.4.2 The agenda was discussed in previous PSC meeting and following has been decided:

- i. Utilities and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC.
- ii. SLDCs/NRLDC may submit protection performance indices for SPS on monthly basis by 7th date of each month. All utilities shall report their indices to concerned RLDC/SLDCs, then, after verifying SPS operation from all points, SLDC/RLDCs shall report performance indices to the NRPC Secretariat.
- iii. Prescribed format (Annexure-A.IV) shall be used for submission of protection performance indices of SPSs by SLDCs/NRDLC after verifying SPS operation from all points in their control area.

A.4.3 Only UPSLDC, HPSLDC, Punjab SLDC & Rajasthan SLDC & SJVN shared the same for the month of March, 2026.

A.4.4 Only UPSLDC, HPSLDC, SJVN shared the same for the month of April, 2026.

A.4.5 Others have not shared the same for the SPSs coming in their control area. Though, it was decided that RLDC/SLDCs after verifying SPS operation from all points, shall

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report performance indices to the NRPC Secretariat on monthly basis by 7th date of each month.

A.4.6 Based on submission by SLDCs', the status of protection performance indices of SPS for the months of March-April 2026 is attached as **Annexure-A.IV**.

A.4.7 NRLDC has shared the SPS operations till March, 2026 for FY 2025-26 & for April, 2026 attached as **Annexure-A.V**.

Decision required from Forum:

Forum may direct NRLDC/SLDC/utilities for compliance of following:

- I. Utilities and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC.
- II. SLDCs/NRLDC may submit protection performance indices for SPS on monthly basis by 7th date of each month. All utilities shall report their indices to concerned RLDC/SLDCs, then, after verifying SPS operation from all points, SLDCs/RLDC shall report performance indices to the NRPC Secretariat.
- III. Prescribed format (Annexure-A.IV) shall be used for submission of protection performance indices of SPSs by SLDCs/NRLDC after verifying SPS operation from all points in their control area.

A.5. Annual protection audit plan for FY 2026-27 (agenda by NRPC Secretariat)

A.5.1 As per clause 15 of IEGC 2023;

- *Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC.*

A.5.2 In view of above, all utilities were requested to submit the annual protection audit plan for FY-2026-27 latest by 31st October 2025 in 63rd, 64th, 65th, 66th, 67th PSC & in the 56th TCC & 81st NRPC meeting (held on 29-30 October, 2025).

A.5.3 Accordingly, annual audit plans submitted by utilities have been compiled (enclosed as **Annexure- A.VI**).

A.5.4 Further, it is requested that the concerned utility may furnish an update regarding the annual internal protection audit scheduled for March 2026 & April, 2026 as per details

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UT of Chandigarh	-	-	-	-	-	-	-	-	-
POWERGRID	-	-	-	-	-	✓	-	-	✓

A.5.5 Further, It is requested that the concerned utility may furnish an update regarding the 3rd party protection audit scheduled for March 2026 & April, 2026 as per details provided in **Annexure-A.IX**.

Decision required from Forum:

- I. Forum may direct utilities to update the status of 3rd party protection audit as per the submitted audit plans. Subsequently, the audit reports along with compliance status may be submitted to NRPC Secretariat regularly.
- II. Forum may direct all utilities to ensure strict adherence to the submitted schedule for conducting the 3rd party protection audit.

A.7. Discussion on audit reports submitted by utilities and compliance of recommendations of protection audit (agenda by NRPC Secretariat)

A.7.1 As per clause 15 (1) of IEGC 2023;

- All users shall conduct internal audit of their protection systems annually, **and any shortcomings identified shall be rectified and informed to their respective RPC**. The audit report along with action plan for rectification of deficiencies detected, if any, shall be shared with respective RPC for users connected at 220 kV and above (132 kV and above in NER).

A.7.2 As per clause 15 (4) of IEGC 2023;

The third-party protection audit report shall contain information sought in the format enclosed as Annexure–1 (IEGC). The protection audit reports, along with **action plan for rectification of deficiencies detected, if any, shall be submitted to the respective RPC and RLDC or SLDC, as the case may be, within a month of submission of third-party audit report**. The necessary compliance to such protection audit report shall be followed up regularly in the respective RPC.

A.7.3 Following utility has submitted the internal audit report based on the audit done at their substations:

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S.N.	FY (Audit Date)	Utility	Stations
1	2025-26	RVPN	13 Substations (220kV- Chomu, Dausa, Heerapura, IG Nagar, Kukas, VKIA, Chaksu, Phulera, Sanganer, SEZ, Vatika, Behror, Baansur)
2	2025-26	HPPTCL	220kV GIS Sunda
3	2025-26	SJVN	2 plants (NJHPS, RHPS)
4	2025-26	ADHPL	220kV Prini
5	2025-26	UJVNL	2 plants (Dharashu, Tiloth)
6	2025-26	Eden Renewable Cite Pvt Ltd.	Eden Renewable Cite Pvt Ltd.
7	2025-26	Juniper Green Energy	2 Plants (Juniper Green Cosmic Private Limited, Juniper Nirjara Energy Private Limited)
8	2025-26	NTPC	5 Plants (Dadri Thermal, Koldam, Unchahar, Singrauli, Rihand)
9	2025-26	APCPL	Jhajjar
10	2025-26	MUNPL	Meja
11	2025-26	UPRVUNL	Harduaganj TPS

A.7.4 Following utilities have submitted reports of 3rd Party audit:

S.N.	Utility	Stations
1	HPGCL	Khedar
2	HPSEBL	2 Substations (Kangoo, Nehrain)

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3	AGEL	2 Plants (Adani Renewable Energy (RJ) Limited, Rawara 300 MW, Adani Bhadla Park South Block 250 MW)
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A.7.5 Following utility have submitted action plan on recommendation of audit team for Internal (FY25-26) audit:

S.N.	Utility	Plant/Substation	Observations Discussed in PSC meeting
1	Gentari	Grain Energy Private Limited	65 th
2	Serentica	SRI4PL Bikaner	66 th
3	HPPTCL	220kV GIS Heiling	66 th
		400kV GIS Lahal	66 th
		400kV GIS Gumma	66 th
		220kV Charor	64 th
		220kV Dehan	64 th
		220kV Phozal	64 th

A.7.6 Following utilities have submitted action plan on recommendation of audit team for external audit:

S.N.	Utility	Plant/Substation	Observations to be Discussed in PSC meeting
1	HPSEBL	220kV Kangoo	68 th

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		220kV Nehrain	68 th
2	AGEL	220/33kV Adani Renewable Energy (RJ) Limited, Rawara 300 MW	68 th
		220/33kV Adani Bhadla Park South Block 250 MW	68 th
3	NHPC	Kishenganga	67 th
		Uri-I	67 th
		Chamera-II	67 th
		Chamera-III	67 th
		Dhauliganga	67 th
		Tanakpur	67 th
		Uri-2	67 th

A.7.7 The above submitted reports and action plan are available at NRPC website:
<https://nrpc.gov.in/meetings/prsub.html>

Decision required from Forum:

Forum may discuss audit report as well as action taken by utilities on recommendations of audit. Further, other utilities may be directed to submit the protection audit report (for audited S/s as per submitted plan) to NRPC Secretariat and may update the compliance status regularly.

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A.8. Update on Compliance with observations of internal and 3rd party protection audit (agenda by NRPC Secretariat)

- A.8.1 Several internal and 3rd Party protection audit reports were discussed in the 67th PSC meeting and Forum recommended observations considering approved protection philosophy of Northern Region that to be complied by concerned utilities.
- A.8.2 Accordingly, it is requested that the concerned utility may furnish an update regarding the action taken for compliance with observations of internal protection audit reports discussed in the 67th PSC meeting, as detailed in **Annexure-A.X**.
- A.8.3 Similarly, concerned utilities are also requested to furnish an update regarding the action taken for compliance with observations of 3rd party protection audit reports discussed in the 67th PSC meeting, as detailed in **Annexure-A.XI**.

Decision required from Forum:

Members may discuss and direct utilities to close the audit observations at the earliest.

A.9. Implementation of Process Bus technology at Ballabgarh, Mandola, Hissar, Meerut & Prayagraj (Allahabad) substations of POWERGRID (agenda by NRPC Secretariat)

- A.9.1 The agenda was first discussed in the 53rd TCC & 78th NRPC meeting (held on 16-17 March, 2025). The same is reproduced as below-

The Ballabgarh, Mandola, Hissar, Meerut & Prayagraj (Allahabad) transmission substations were commissioned in the year 1990, 1992, 1994, 2003 and 2001 respectively. These substations are among the oldest conventional substations in the NR-1 region. Over the years, as per operational requirements, they have undergone expansions, including bay additions, LILO (Line-In Line-Out) modifications, and the commissioning of various transmission equipment under different projects.

These substations have completed over 25 years of operation, most of the equipment has completed its expected operational life, however, certain other equipment is yet to complete its full lifecycle of 25 years.

As these substations are very old, the condition of the cables has deteriorated significantly and needs replacement. Since these are conventional type substations,

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therefore there are lots of cables and replacement of these old ageing cables are very difficult and time consuming, therefore, upgrading these substations to process bus system is prudent to extend operation life of these substations and to address the ageing cable issue effectively and efficiently.

Process bus technology is aligned with the latest advancement in substation automation and it provides better and more sustainable solutions with minimum cable requirement. These substations are highly critical and play a vital role in feeding the NCR (National Capital Region), making their modernization a top priority.

Petition for the implementation of process bus technology and equipment replacement of mentioned substations has been filed with the Central Electricity Regulatory Commission (CERC) under Additional Capitalization (ADD-CAP) for the tariff period 2024-29 for project which already completed 25 years of useful life.

The total financial implication for the complete upgradation of Hisar, Ballabgarh, Meerut, and Mandola substations is approx. INR 158.37 Cr. Out of this, INR 38.94 Cr (Annexure-II) pertains to those components that have not yet completed their useful life of 25 years, therefore, the petition for this amount has not been filed by the company. Further, INR 6.32 Cr pertains to other utilities at these stations. However, the partial implementation of the process bus system poses several challenges as described below:

- I. **Availability of Station Data to RLDC** -Availability of Station Data to RLDC from Single Port of each Gateway otherwise two different RTUs/SAS Gateways shall require to be maintained, which is not as per Standard Architecture of RLDC.*
- II. **Monitoring & Control at RTAMC/NTAMC** – Managing the complete station from Remote Transmission Asset Management Centre (RTAMC) / National Transmission Asset Management Centre (NTAMC) with two different gateways is complex and may require additional modifications for seamless integration.*
- III. **Busbar Protection & Future Extensions** – A process bus-based Busbar Protection system is more beneficial for future substation expansions. However, its implementation requires the inclusion of Merging Units for all bays, including those that have not yet completed their useful life. This creates integration challenges and necessitates additional investments for*

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compatibility with existing infrastructure.

- IV. **Hybrid System Complexity** – *A mix of conventional and process bus components leads to intricate configurations, requiring additional interfaces and protocols*
- V. **Interoperability Concerns** – *Mixing legacy protection schemes with IEC 61850-based process bus devices may create compatibility problems.*
- VI. **Higher Cost in the Long Run** – *A phased approach may increase the overall cost due to additional adaptation equipment and engineering efforts.*
- VII. **Testing and Maintenance Difficulties** – *Partial implementation requires extra testing efforts to ensure seamless integration with systems.*

Given these challenges and proper monitoring of above critical substations, it is proposed to implement the process bus in one go rather than partially at substations.

In view of the above, comprehensive upgradation of entire substation is crucial for ensuring the better implementation of the process bus system, addressing integration challenges, reducing technical constraints such as monitoring & control complexities, RLDC data availability issues, and Busbar Protection implementation. A comprehensive upgrade will also enhance operational efficiency, long-term reliability, and future scalability of the substations.

Therefore, POWERGRID has requested for approval of approx. INR 38.94 crore under Additional Capitalization (ADD-CAP) for the tariff period 2024-29 for the inclusion of process bus implementation of additional bays at Ballabgarh, Mandola, Hissar, Meerut & Prayagraj (Allahabad) substations of POWERGRID which have not completed the useful life.

- A.9.2 In the 53rd TCC & 78th NRPC meeting, Forum decided that agenda may firstly be deliberated from technical perspective in the upcoming TeST meeting and thereafter shall be taken up in the next NPC meeting for cost recovery mode for implementation of Process Bus in equipment that has not yet completed its 25-year useful life.
- A.9.3 Accordingly, agenda was taken in the 29th TeST sub-committee meeting (held on 27.11.2025) wherein POWERGRID proposed that this matter may be taken to

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Protection Sub Committee as process bus technology is part of SAS which is part of substation. Accordingly, it was decided that matter to be taken to Protection Sub Committee for deliberation.

A.9.4 Therefore, the same has been taken up in the meeting for discussion.

Decision required from Forum:

Forum may deliberate on the proposal of POWERGRID on the Process bus technology and consider to approve approx. INR 38.94 crore under Additional Capitalization (ADD-CAP) for the tariff period 2024-29 for the inclusion of process bus implementation of additional bays at Ballabgarh, Mandola, Hissar, Meerut & Prayagraj (Allahabad) substations of POWERGRID which have not completed the useful life.

A.10. Proposal of Process bus based solution for 400kV Switchyard of 400/220kV Bassi Substation under ADDCAP (agenda by POWERGRID NR-1)

A.10.1 400/220kV Bassi substation (Commissioned : 1988) is oldest Substation of POWERGRID in Rajasthan. 400/220kV Bassi Substation has completed more than 25 years of life.

A.10.2 At 400/220kV Bassi substation, Control/Power cables laid in the trenches have depreciated to a great extent due to wear and tear. Outer insulating layer and armour have been damaged due to ageing and it causes multiple DC earth faults and mixing in rainy and foggy weather. Hence, process bus based solution is proposed for 400kV Switchyard of 400/220kV Bassi Substation.

A.10.3 It is pertinent to mention that implementation of Process Bus for 220kV Switchyard of 400/220kV Bassi Substation is already approved under ADD CAP 2019-24.

A.10.4 Tentative Equipment Details/Financial Implication- As per the above-mentioned requirement, tentative estimated cost including supply and erection for implementation of process bus based solution for 400kV Switchyard of 400/220kV Bassi Substation comes to approximately ₹21 crore for Supply, Services & F&I (excluding taxes and duties).

A.10.5 Accordingly, POWERGRID has submitted the proposal for implementation of process bus based solution for 400kV Switchyard of 400/220kV Bassi Substation with a tentative cost estimate of ₹21 crore (excluding taxes and duties) under ADD-

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CAP (2024-29) for approval of Forum.

Decision required from Forum:

Forum may deliberate on the above proposal of POWERGRID and decide accordingly.

A.11. Upgradation of Tele-Protection Communication Scheme from PLCC to Digital Tele-Protection Communication (DTPC) for Nathpa Jhakri HPS & Rampur HPS ends (agenda by SJVN)

A.11.1 During the 65th Protection Sub-Committee (PSC) Meeting held on 30-12-2025 (extract of MoM is enclosed as **Annexure-A.XII**), the agenda regarding upgradation of the Tele-Protection Communication Scheme from PLCC to Digital Tele Protection Communication (DTPC) for Nathpa Jhakri HPS & Rampur HPS was deliberated. The forum directed to PGCIL to complete activities within the deadline i.e. 31st March,2026.

A.11.2 In this regard, SJVN has submitted that considering the criticality of reliable tele-protection for high-capacity inter-regional transmission lines during the upcoming peak season, the matter is once again placed before the committee for expeditious action so that the DTPC scheme at Nathpa Jhakri HPS and Rampur HPS end may be implemented prior to the upcoming peak season of 2026–27.

Decision required from Forum:

Forum may discuss and direct PGCIL to expedite completion of DTPC commissioning activities.

A.12. SPS for 220 KV LINE OVERLOAD Condition at ASEB1L NHPC Baiya - 600 MW SS (agenda by AGEL)

A.12.1 Adani Green Energy Ltd. Vide mail dated 08.05.2026 has proposed an SPS for for 220 KV LINE OVERLOAD Condition at ASEB1L NHPC Baiya - 600 MW SS.

A.12.2 To evacuate maximum power from Baiya Plant, AGEL has proposed to implement the Line Overload SPS to avoid total Generation loss, black out and provide safeguard against prevailing overloading condition in the event of tripping of one line

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(N-1 contingency).

A.12.3 The Proposed SPS scheme is attached as **Annexure-XIII**.

Decision required from Forum:

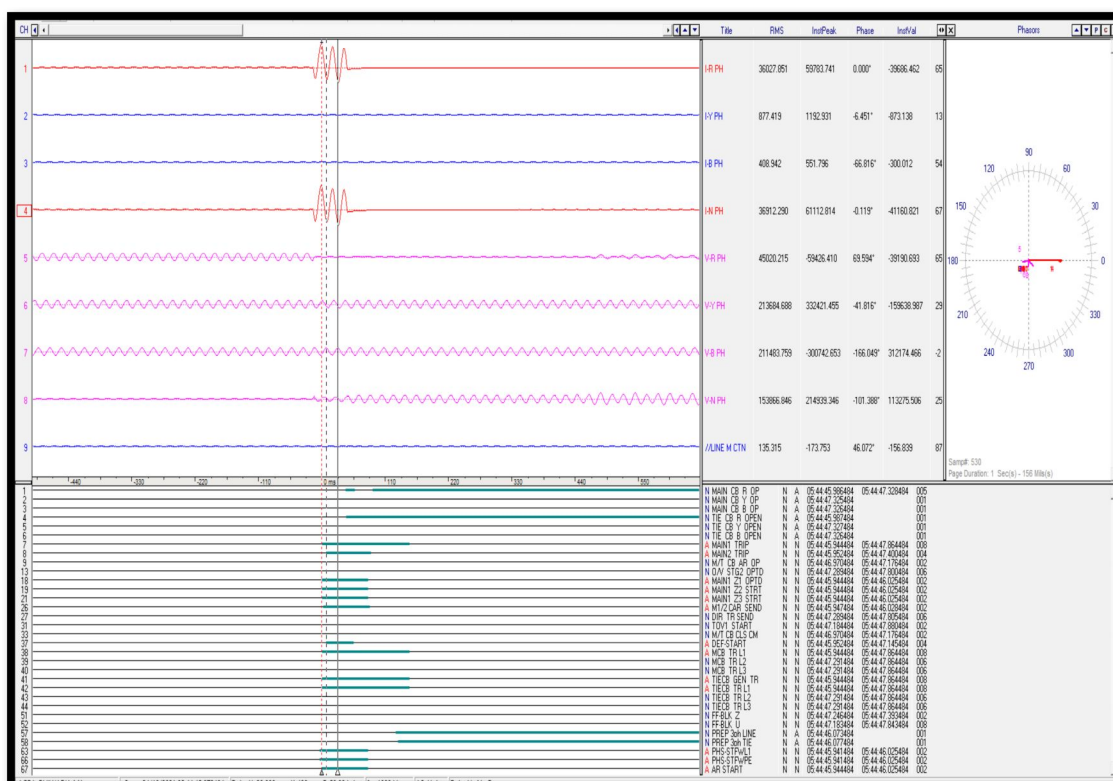
Forum may discuss and approve the proposed SPS scheme accordingly.

A.13. Increase in 400kV Bus Fault Level at Agra Substation (agenda by POWERGRID NR-3)

A.13.1 POWERGRID has shared that the fault current level of the 400kV bus at Agra has been observed as 55kA rms as shown below which exceeds the rated short-circuit current level of 50kA of the existing switchyard equipment like Circuit breakers, CTs, Disconnectors, CVTs etc.

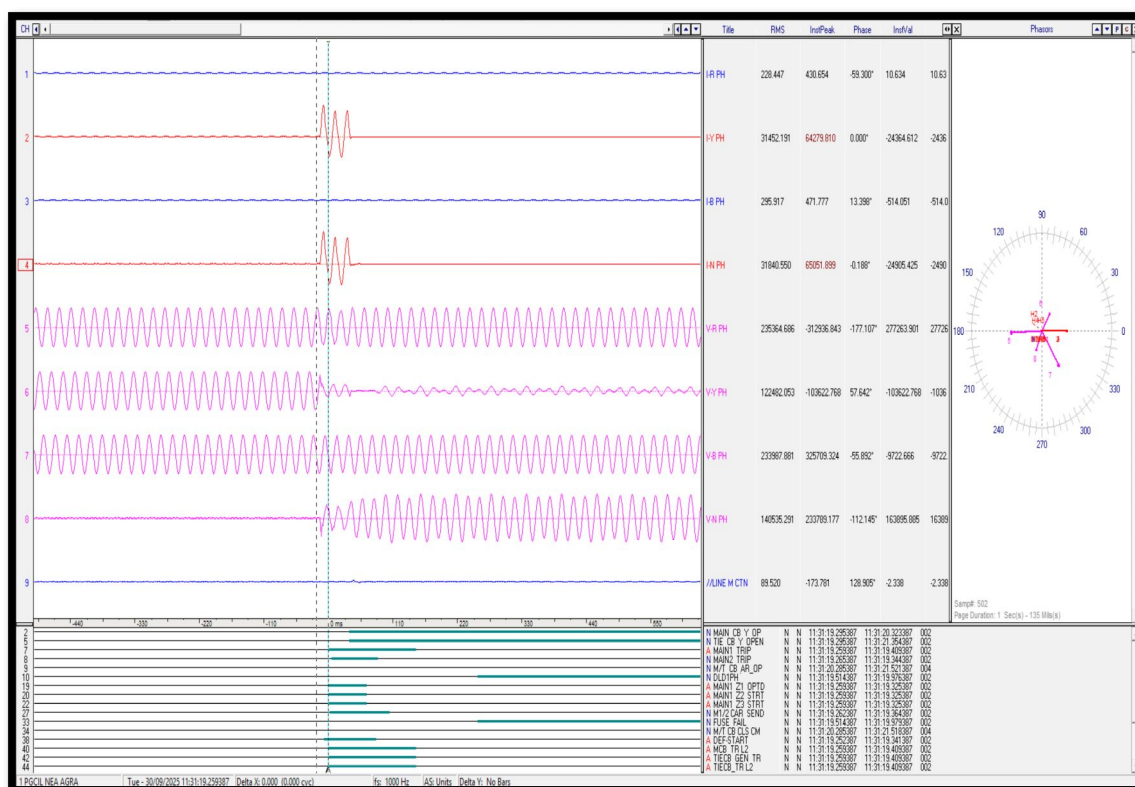
A.13.2 During recent trippings at Agra Substation, maximum fault instantaneous current level reached up to 64kA.

- DR: 400kV Agra-Bhiwadi-1 tripping dtd .24.10.2025 @05:44:45hrs, Max instant fault current = 59.783kA



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- DR: 400kV Agra-Auraiya 1 tripping dtd 30.09.2025 @13:11hrs, Max instant fault current = 64.279 kA



A.13.3 Circuit Breakers installed in switchyard are rated for Short Circuit Capacity of 40-50kA. Switching on such fault currents beyond rated cause undesired stress & deteriorate health of CB.

A.13.4 POWERGRID has proposed that there is need to adopt latest technologies (like Series reactor) to limit fault currents for smooth operation of system stability.

Decision required from Forum

Forum may review the above proposal to limit the fault current up to rated capacity of all existing equipment.

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A.14. Non-Tripping of Agra–Bharatpur Line from Bharatpur end on Fault (agenda by POWERGRID NR-3)

- A.14.1 220 kV Agra–Bharatpur line is a critical corridor for regional power transfer in Rajasthan as it carries a substantial amount of power
- A.14.2 POWERGRID has submitted that 220KV Agra–Bharatpur line experiences several single-phase-to-ground faults causing repeated tripping incidents in Zone-2 also.
- A.14.3 Non transmission of carrier signal from Bharatpur end even though communication link is healthy, indicating probable non-operation of their end protection, caused line fault to operate on Zone-2 time with a 350 msec. delay rather on operating on instantaneous tripping after receiving of carrier signal.
- A.14.4 Also, Auto-reclosure fails without permissive or carrier confirmation, prolonging outages and reducing system reliability. Prolonged faults impose thermal and mechanical stress on 400/220KV ICT and grid equipment, risking damage. Multiple fault events can lead to equipment failure, forced outages, and costly repairs, affecting system reliability.
- A.14.5 POWERGRID has shared list of recent Zone-2 Tripping of Agra-Bharatpur 220KV Line as below-

Sl.No.	Trip Incident	Date & Time	Fault
1	220 kV Agra Bharatpur line tripped on R-N Phase Fault on Zone-2 Protection FC=3.14 kA, FL =73Km No AR attempted.	10.04.2026 03:52 Hrs	Tripped due to R phase conductor snapping at this location
2	220 kV Agra Bharatpur line tripped on zone-2 Y-N Phase Fault, FC=3.351 kA, FL=68.97 Km No AR attempted.	21.02.2026 05:00 Hrs	
3	220 kV Agra Bharatpur line tripped on Y-N Phase Fault on Zone-2 Protection FC=3.31 kA, FL= 67.27 Km No AR attempted	22.01.2026 04:49 Hrs	

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4	220 kV Agra Bharatpur line tripped on zone-2	15.11.2025	12:05 Hrs
	Zone-2, FC=3.38 kA, FL= 64.35 Km No AR attempted.		

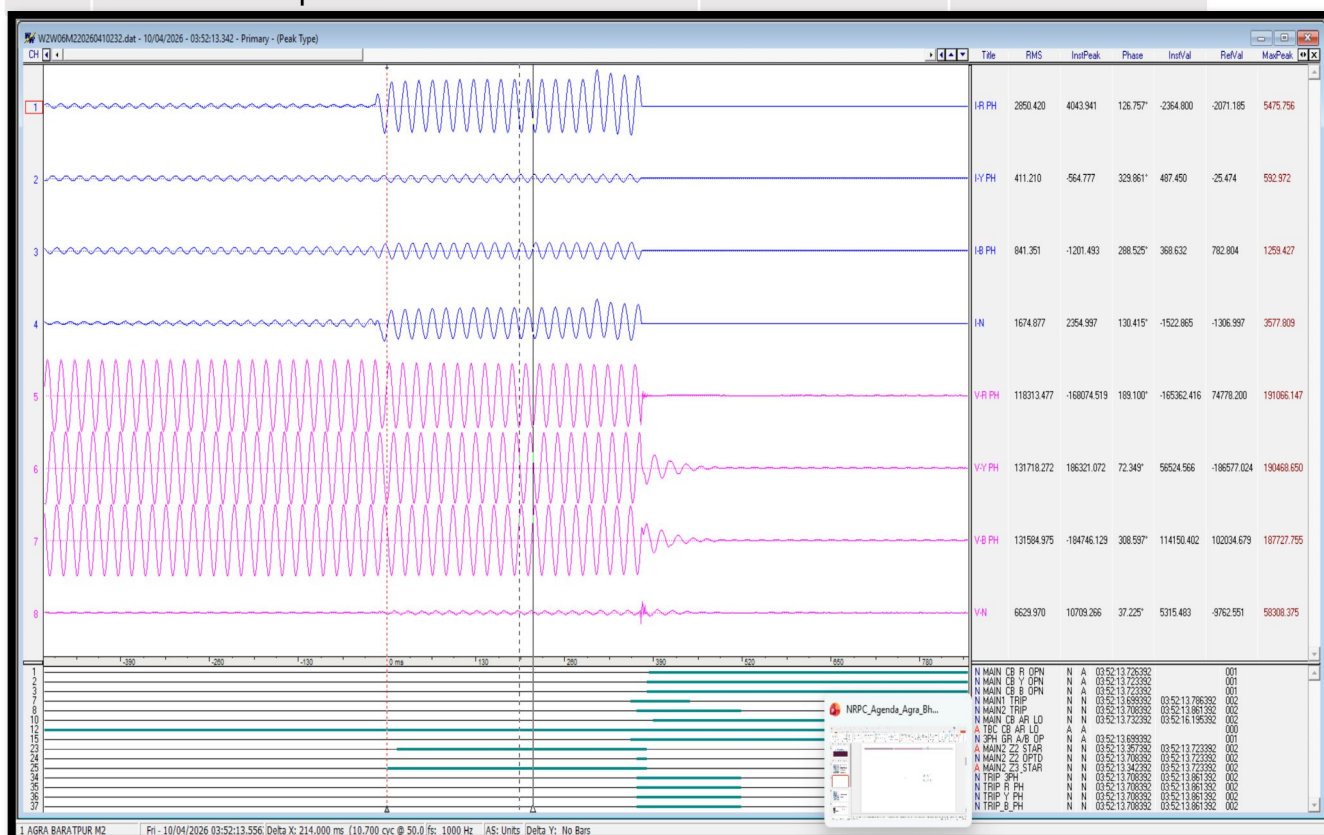


Fig: TFR showing tripping of 220KV Agra-Bharatpur Line on Zone-2 protection

A.14.6 POWERGRID communicated with RRVPNL Bharatpur via official letters dtd. 10.04.2026 and emails requesting implementation of weak end-infeed logic and permissive overreach (POR) transfer trip for improving fault detection and tripping reliability on the 220 kV line considering its radial nature.

A.14.7 Despite multiple reminders, RRVPNL Bharatpur has not taken corrective action on the carrier signal issue.

A.14.8 In view of POWERGRD has submitted that continued inaction risks operational incidents and requested PSC Forum to provide for resolution.

Decision required from Forum

Forum may discuss and arrange to resolve the issue.

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A.15. RPC/NRLDC consent to keep 400 kV bus bar protection out of service at POWERGRID Kanpur in view of complete C&P upgradation in IEC 61850-9-2 process-based CRP (agenda by POWERGRID Nr-3)

- A.15.1 Control and protection system at Kanpur 400/200 kV substation is being upgraded from conventional control and protection system to process bus-based control and protection system in order to improve system reliability. It is also to mention that at present static relays are in service for bus bar protection and LBB protection.
- A.15.2 POWERGRID has planned to avail shutdown of 400 kV elements at Kanpur 400/220 kV S/s tentatively from **15.05.26**. Each element shall be taken under shutdown one by one and then shall be taken in service through new C&P system. During the transition period when some elements shall be charged from old C&P system and some elements shall be charged from new C&P system.
- A.15.3 It shall be required to keep bus bar protection out of service. Tentative period for shifting all elements of 400 kV system from old C&P to new C&P shall be around **3 months**.
- A.15.4 Accordingly, POWERGRID has requested to provide RPC/NRLDC consent to keep 400 kV bus bar protection out of service for tentative period of 3 months from tentative date 15.05.26.
- A.15.5 POWERGRID has proposed that during period when 400 kV bus bar protection shall be out of service following modifications shall be made in protection settings –
- ✓ Time delay of **reverse zone protection** in **distance protection** relay of all 400 kV lines shall be reduced to **250 msec**.
 - ✓ Time delay of **reverse zone protection** in **backup impedance** protection relay of all **400/220 kV ICTs** shall be reduced to **250 msec**.

Decision required from Forum

Forum may discuss and accord approval to keep the proposed settings in case of 400 kV bus bar protection is kept out by POWERGRID at 400kV Substation Kanpur.

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A.16. Implementation of Travelling Wave Fault Locator (TWFL) on critical transmission lines in the Northern Region (agenda by NRPC Secretariat)

A.16.1 This agenda pertains to the proposal by PowerGrid for implementation of TWFL on critical transmission lines in NR, which was discussed in the 80th meeting of NRPC. A Sub-Group comprising representatives from CEA, CTUIL, NRLDC and other stakeholders evaluated the technology and recommended phased implementation on long, critical, renewable evacuation, inter-regional, and hilly terrain transmission lines. The Sub-Group observed that TWFL enables highly accurate fault location ($\approx \pm 500$ m), thereby reducing outage time and improving system reliability. Subsequently, it was suggested that a uniform national policy framework for TWFL implementation in ISTS and intra-state systems may be formulated by CEA in consultation with CTU, Grid-India and other stakeholders.

A.16.2 Further, agenda was discussed in the 17th NPC meeting (held on 27.02.2026 at Vizag, Andhra Pradesh) wherein following was decided as below-

- i. PSE&TD, CEA may prepare guidelines/procedure for implementation of Travelling Wave Fault Locator (TWFL) on critical transmission lines for 220kV and above (132 kV and above for NER) voltage levels. For new long transmission line, provision for installation of Travelling Wave Fault Locator (TWFL) may be included during planning/RfP stage.
- ii. For existing critical transmission line, PowerGrid/TSPs may implement the scheme on criticality/ need basis and associated expenditure may be booked under O&M so that it does not burden the beneficiaries.

A.16.3 In view of above at A.16.2 ii, PowerGrid/TSPs may look forward to proceed accordingly.

Decision required from Forum

Forum may discuss

A.17. Uniform Anti-islanding Protection Philosophy for the connected RE plants (agenda by NRPC Secretariat)

A.17.1 As per the directions of 16th NPC Meeting (held on 04.07.2025), a committee was constituted under SE(Protection), WRPC, with representatives from WRPC, SRPC, Grid-India, experts from IITs, OEMs, PowerGrid, major RE Developer and NPC, for

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preparation of the Uniform Anti Islanding Protection philosophy of the connected RE plants for further action by WRPC.

- A.17.2 Accordingly, final Report of Committee for Preparation of the Uniform Anti-Islanding Protection Philosophy for the Connected RE plants attached as **Annexure-A.XIV**.

Decision required from Forum

Submitted for information of members.

Part-B: Agenda by NRLDC

B.1 Status of remedial actions recommended during previous PSC meeting (agenda by NRLDC)

- B.1.1 As per the discussion in previous PSC meetings, necessary remedial actions were recommended based on the analysis and discussion of the grid events. It is expected that necessary actions would have taken place. In view of the same, a mail dt 08.05.2026 has also been sent from NRLDC to constituents requesting to share the status of remedial actions taken. List of points to be discussed in 68th PSC meeting is attached as **Annexure-B.I**. Constituents can email the details via mail to NRLDC and NRPC.

Decision required from Forum:

Members may like to discuss.

B.2 Multiple elements tripping events in Northern region in the month of March-April 2026 (agenda by NRLDC)

- B.2.1 A total of **24** grid events occurred during the month of **March, 2026** of which **12** are of GD-1 category, **10** are of GI-2 category and **02** are of GI-1 Category. Further, a total of **26** grid events occurred in the month of **April 2026** of which **15** are of GD-1 Category and **08** is of GI-2 Category and **03** is of GI-1 Category. The tripping report of all the events have been issued from NRLDC.
- B.2.2 Maximum delayed clearance of fault observed in multiple element tripping event at 400/220kV Nakodar(PS) at 12:00 hrs on 16th April 2026 (As per PMU at Moga(PG), Y-N phase to earth fault converted into 3-ph to earth fault with delayed fault clearing time of 2520 ms).

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B.2.3 Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **16** events out of **50** grid events occurred in the months. In **11** (no.) of grid event, there was no fault in the grid.

B.2.4 Remedial actions taken by constituents to avoid such multiple elements tripping may be shared.

As per IEGC clause 37.2 (c), Disturbance Recorder (DR), station Event Logger (EL), Data Acquisition System (DAS) shall be submitted within 24 hrs of the event and as per IEGC clause 37.2 (e), the user shall submit a detailed report in the case of grid disturbance or grid incidence within one (1) week of the occurrence of event to RLDC and RPC.

B.2.5 Members may take necessary preventive measures to avoid such grid incidents / disturbances in future and report actions taken by respective utilities in OCC & PSC forum. Moreover, utilities may impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events to RLDC in line with the regulations.

B.2.6 The list of major tripping events occurred during **March-April 2026** is attached as **Annexure-B.II**. Concerned constituents/utilities are requested to share the detailed analysis of the tripping elements along with status of remedial action taken/to be taken.

B.2.7 Utilities are requested to prepare detailed analysis report and present the event details during 68th PSC meeting. Events involving more than one utility may be jointly prepared and presented.

Decision required from Forum:

Members may like to discuss.

B.3 Frequent elements tripping during March-April 2026 (agenda by NRLDC)

B.3.1 The following transmission elements were frequently tripping during the month of **March-April 2026**:

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S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	11	Rajasthan/NPCIL
2	250 MW (PSP) TEHRI HPS - UNIT 6	8	Tehri PSP
3	220 KV Bhilwara(RS)-Kota(PG) (RS) Ckt-1	8	Rajasthan/PGCIL
4	400 KV Agra-Unnao (UP) Ckt-1	7	UP
5	125 MW Barsingsar (NLC) - UNIT 2	6	NLC/Rajasthan
6	220 KV Kishenpur(PG)-Ramban(PDD) (PDD) Ckt-1	5	PGCIL/J&K
7	400 KV Dadri(NT)-Loni Harsh Vihar(DV) (NT) Ckt-2	5	NTPC/Delhi
8	400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1	5	Rajasthan
9	400 KV Obra_B-Rewa Road (UP) Ckt-1	5	UP
10	250 MW (PSP) TEHRI HPS - UNIT 8	5	Tehri PSP
11	220 KV Bhakra_R-Jamalpur (BB) Ckt-1	4	BBMB
12	220 KV Jamalpur(BB)-DandhariKalan(PS) (PSTCL) Ckt-2	4	BBMB/Punjab
13	400 KV Aligarh-Shamli (UP) Ckt-2	4	UP
14	400 KV Jaisalmer-Barmer (RS) Ckt-1	4	Rajasthan

B.3.2 List of tripping is attached as **Annexure-B.III**.

B.3.3 It may be noted that frequent tripping of such elements affects the reliability and security of the grid. Hence, **utilities are requested to analyse the root cause of the tripping and share the remedial measures taken/being taken in this respect.**

Decision required from Forum:

Members may like to discuss.

B.4 Frequent tripping of 800kV HVDC Champa-Kurukshetra inter-regional link (agenda by NRLDC)

B.4.1 During 242nd & 243rd OCC meeting, NRLDC agenda point regarding frequent tripping of **800kV HVDC Champa-Kurukshetra inter-regional link** was discussed. NRLDC highlighted the frequent tripping of the link and requested POWERGRID to share the details of remedial action taken to avoid such tripping in future. In this regard, NRLDC also sent a letter communication dated 07.04.2026.

B.4.2 In reply to the NRLDC communication, POWERGRID submitted the details of remedial action taken / planned to be taken to avoid frequent tripping of **800kV HVDC Champa-Kurukshetra**. Details received from POWERGRID is attached as

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Annexure-B.IV. Major points related to actions plan are as follows:

- a) Isolation of SAS network ring of bipoles from TCR ring to prevent hanging of BCUs related to associated with filter banks.
- b) To review the RPC functioning for auto switching of filters by M/s GE.

B.4.3 POWERGRID may share the status of above actions points.

B.4.4 Since March 2026, 21 numbers of tripping instances of **800kV HVDC Champa-Kurukshetra** have been reported. The list of the tripping is as follows:

S. No	Element Name	Outage		Reason / Remarks
		Date	Time	
1	800 KV HVDC Kurukshetra(PG) Pole-2	01-Mar-26	08:11	Tripped from Champa end on VESDA (Smoke detection) protection operation due to valve hall fire detection
2	800 KV HVDC Kurukshetra(PG) Pole-1	18-Mar-26	09:57	Tripped from Champa end due to VESDA (Smoke detection) protection operated
3	800 KV HVDC Kurukshetra(PG) Pole-1	18-Mar-26	14:42	Due to Filter bank communication issue
4	800 KV HVDC Kurukshetra(PG) Pole-2	18-Mar-26	14:42	Due to Filter bank communication issue
5	800 KV HVDC Kurukshetra(PG) Pole-3	18-Mar-26	14:46	Due to Filter bank communication issue
6	800 KV HVDC Kurukshetra(PG) Pole-4	18-Mar-26	14:46	Due to Filter bank communication issue
7	800 KV HVDC Kurukshetra(PG) Pole-1	18-Mar-26	18:39	Due to non-availability of minimum filters
8	800 KV HVDC Kurukshetra(PG) Pole-2	18-Mar-26	18:39	Due to non-availability of minimum filters
9	800 KV HVDC Kurukshetra(PG) Pole-1	30-Mar-26	15:11	Pole blocked due to VESDA alarm from Champa end.
10	800 KV HVDC Kurukshetra(PG)	04-04-2026	19:21	DC line fault

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	Pole-2			
11	800 KV HVDC Kurukshetra(PG) Pole-4	04-04-2026	19:21	DC line fault
12	800 KV HVDC Kurukshetra(PG) Pole-1	06-04-2026	19:07	transient CNAP protection latched
13	800 KV HVDC Kurukshetra(PG) Pole-4	11-04-2026	17:22	tripped due to commutation failure at Kurukshetra
14	800 KV HVDC Kurukshetra(PG) Pole-2	30-04-2026	08:34	DC line fault
15	800 KV HVDC Kurukshetra(PG) Pole-4	30-04-2026	08:34	DC line fault
16	800 KV HVDC Kurukshetra(PG) Pole-2	30-04-2026	18:36	DC line fault
17	800 KV HVDC Kurukshetra(PG) Pole-4	30-04-2026	18:36	DC line fault
18	800 KV HVDC Kurukshetra(PG) Pole-1	02-05-2026	16:31	Pole-1 & Pole-3 blocked at 16:31 hrs due to CLD operated at Champa end.
19	800 KV HVDC Kurukshetra(PG) Pole-3	02-05-2026	16:31	
20	800 KV HVDC Kurukshetra(PG) Pole-2	02-05-2026	16:51	Due to issuance of CAT- B from parallel pole (i.e. Pole-4).
21	800 KV HVDC Kurukshetra(PG) Pole-4	02-05-2026	16:51	Due to Over-current protection at Kurukshetra end

B.4.5 DR/EL & tripping details of events have not been received yet from POWERGRID for most of the events.

B.4.6 Further, it is pertinent to mention that in view of this contingency, the Northern Regional import Available Transfer Capability (ATC) had to be reduced by 6600 MW on 30.04.2026 and 5800 MW on 02.05.2026.

B.4.7 It is also well known that, paddy season is going to start in Haryana & Punjab and in this context, ± 800 kV Champa–Kurukshetra HVDC (2 \times 3000 MW Bipole) is the most critical inter-regional link to facilitate the transfer of power from the Western Region to the Northern Region. Hence, healthiness and availability of this link is very important

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for ensuring the secure and stable grid operation, as well as for meeting the projected northern regional demand without transmission constraints during the upcoming months.

B.4.8 POWERGRID(NR-1) is requested to elaborate on the issues and status of remedial measures taken/to be taken to avoid frequent tripping of this inter-regional link and also to share the status of “Short Term Measures” recommended by Technical Committee under CEA on “addressing Trippings of HVDC Champa-Kurukshetra link” (Report published on 23.02.2026)

Decision required from Forum:

Members may like to discuss.

B.5 Multiple elements tripping at 765/400kV Agra(PG) on 30.04.2026 (agenda by NRLDC)

B.5.1 On 30.04.2026 at 06:28 hrs, multiple 765kV transmission elements tripped at 765/400kV Agra(PG). Details of the tripped elements are as follows:

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	765 KV Agra-Jhatikara (PG) Ckt-1	06:28 hrs	18:53 hrs	B-N fault in reclaim time
2.	765 KV Agra-Fatehpur (PG) Ckt-1		11:57 hrs	R-N fault with NO A/R operation
3.	765 KV Agra-Gwalior (PG) Ckt-1		11:36 hrs	R-N fault with NO A/R operation
4.	765 KV Agra-Gwalior (PG) Ckt-2		19:14 hrs	R-N fault in reclaim time
5.	765/400 kV 1500 MVA ICT 1 at Agra(PG)		10:16 hrs	B-N fault
6.	240 MVAR Bus Reactor No 1 at 765KV Agra(PG)		15:10 hrs	Tripped along with 765 KV Agra-Gwalior (PG) Ckt-1
7.	240 MVAR Bus Reactor No 2 at 765KV Agra(PG)		09:44 hrs	Tripped along with 765 KV Agra-Jhatikara (PG) Ckt-

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- B.5.2 As reported, multiple faults occurred due to lightning / thunderstorm during inclement weather conditions.
- B.5.3 During analysis of the event using PMU and SCADA data, it was observed that A/R didn't operate in 765 KV Agra-Fatehpur (PG) Ckt-1 and 765 KV Agra-Gwalior (PG) Ckt-1 on R-N fault. Tripping report prepared at NRLDC is attached as **Annexure-B.V**. Reason of tripping of 240 MVAR Bus Reactor No 1 & 2 at 765KV Agra(PG) and 765/400 kV 1500 MVA ICT 1 at Agra(PG) is yet to be received from POWERGRID.
- B.5.4 Being an important 765kV station connecting NR-WR through 765 KV Agra-Gwalior (PG) D/C, proper operation of protection system and its healthiness is crucial.
- B.5.5 In view of above, POWERGRID is requested to share the following details:
- i. Reason of multiple faults in lines need to be shared.
 - ii. Reason of non-operation of A/R in 765 KV Agra-Fatehpur (PG) Ckt-1 and 765 KV Agra-Gwalior (PG) Ckt-1.
 - iii. Remedial action taken to avoid such tripping event in future.

Decision required from Forum:

Members may like to discuss.

B.6 Details of tripping of Inter-Regional lines from Northern Region for March-April 2026 (agenda by NRLDC)

- B.6.1 A total of **33** inter-regional lines tripping occurred in the month of **March-April 2026**. The list is attached at **Annexure-B.VI**. The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event from SLDCs / ISTS licensees / ISGSs is in violation of regulation 37.2(c) of IEGC and regulation 15(3) of CEA Grid Standards. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than that mandated by CEA

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(Grid Standard) Regulations.

Decision required from Forum:

Members may please note and advise the concerned for taking corrective action to avoid such tripping as well as timely submission of the information.

B.7 Status of Bus bar protection (agenda by NRLDC)

B.7.1 Clause - 4 in schedule - V of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 reads as

"Bus bar protection and local breaker backup protection shall be provided in 220kV and higher voltage interconnecting sub- stations as well as in all generating station switchyards".

B.7.2 During analysis of many grid incidents/disturbances, it has been found that the Busbar protection at the affected substation was not present or non-operational which resulted in considerable increase in both the number of affected elements and fault clearance time. Accordingly, it becomes critical to monitor and keep Busbar protection at all the 220 kV and above voltage level substations healthy and operational.

B.7.3 Continuous follow-ups are being been done at OCC & PSC Forum to expedite the commissioning of bus bar protection at 220kV & above stations and to ensure their healthiness. On the basis of details received till date, it is observed that status of bus bar protection has been improved however, further improvement is desired.

B.7.4 Constituent wise status of bus bar protection where bus bar protection is either not installed or installed but not operational along with present status as per detail received from constituents is attached as **Annexure-B.VII** .

B.7.5 Constituents are requested to share the present status of remedial action taken/to be taken regarding commissioning and healthiness of bus bar protection at 220kV & above substations and also expedite the implementation of bus bar protection.

Decision required from Forum:

Members may discuss.

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B.8 Mock testing of System Protection Schemes (SPS) in Northern Region (agenda by NRLDC)

B.8.1 As per IEGC 2023 clause 16.2

“For the operational SPS, RLDC or NLDC, as the case may be, in consultation with the concerned RPC(s) shall perform regular load flow and dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year. RLDC or NLDC shall share the report of such studies and mock testing including any short comings to respective RPC(s). The data for such studies shall be provided by CTU to the concerned RPC, RLDC and NLDC.”

B.8.2 As per IEGC 2023 clause 16.3

“The users and SLDCs shall report about the operation of SPS immediately and detailed report shall be submitted within three days of operation to the concerned RPC and RLDC in the format specified by the respective RPCs.”

B.8.3 There are 60 numbers of System Protection Scheme (SPS) approved in Northern Region. These SPS are implemented at major generation complexes, important evacuating transmission lines and ICTs which are N-1 non-complaint. System Protection Scheme Document of Northern Region has been revised/updated on 31st January, 2026.

B.8.4 SPS is designed to detect abnormal system conditions and take predetermined, corrective action to preserve system integrity and provide acceptable system performance. Therefore, correct operation of SPS as per designed logic is important to serve its purpose. To ensure this, mock testing of SPS needs to be conducted at a regular period. Clause 16.2 of IEGC 2023 also mandates the mock testing of SPS for reviewing SPS parameters & functions, at least once a year.

B.8.5 In this regard, communication has already been sent to constituents through NRLDC letter dated 01.05.2024, 21.02.2025, 05.03.2025, 04.04.2025 & 28.05.2025 and continuous follow up is being done in OCC & PSC meeting since May 2024.

B.8.6 Status of mock testing of all the SPS in NR is attached as **Annexure-B.VIII**.

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B.8.7 Status of follow-up actions w.r.t. some of the SPS are as follows:

- i. **SPS of HVDC Rihand-Dadri:** During mock testing of SPS of HVDC Rihand-Dadri on 20.03.2025, issues i.e., faulty SPS hardware at Singrauli TPS (NTPC) and no receipt of SPS signal at 220/132kV Ratangarh(RS) were identified. Further, during recent operation of SPS on 21.05.2025 in incident of outage of both poles, desired SPS actions i.e., generation backdown at Singrauli TPS and load relief in UP, Delhi, Haryana & Punjab were not observed. Desired load / generation relief is important to ensure the security and reliability of grid during such contingency. As per details received, SPS signal was sent to all the mapped stations from POWERGRID end however either due to non-receipt of signal or error in SPS system at load / generation, SPS action didn't occur. NRLDC vide letter dated 02.07.2025, requested POWERGRID and Singrauli NTPC to take necessary remedial measures and make complete SPS system healthy. During 233rd OCC meeting, POWERGRID representative stated that the equipment's at Singrauli TPS end is owned by NTPC and need to be revived by them. SPS system at Rihand(PG) is healthy and operational. NTPC representative stated that as per details received from site, NTPC Singrauli team have initiated necessary actions in coordination with the POWERGRID. SPS operation is crucial as it is planned for special contingencies, and its unavailability may lead to cascade tripping or major grid disturbance especially in case of high demand period.

Discussion during 237th OCC meeting:

- a) NRLDC requested NTPC Singrauli and POWERGRID to share the details of necessary corrective actions taken / planned to be taken to ensure healthiness of SPS system at Singrauli TPS and load stations.
- b) Representative from NTPC informed that existing SPS system at Singrauli TPS is defective, procurement work has been initiated. NRLDC requested NTPC to share the tentative timeline for completion of work and to expedite the remedial actions for early restoration of SPS system at Singrauli TPS.
- c) Regarding issues at load stations, POWERGRID agreed to take necessary actions in coordination with the site stations.
- d) Further, NRLDC also informed that mock testing of SPS of HVDC Rihand-Dadri has been scheduled tentatively on 19.11.2025. Concerned members were requested to ensure the readiness and share the details of coordinators.

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SPS mock testing of HVDC Rihand-Dadri was conducted successfully on 19.11.2025. SPS command didn't receive at 220kV Muradnagar(UP), 220kV Merta(RS), 220kV Kota Sakatpura(RS), 220kV Dhanonda(HR) and Singrauli TPS(NTPC). SPS system at Rihand HVDC, Dadri HVDC and at remaining load and generating stations are healthy.

During 66th PSC meeting, POWERGRID(NR-1) representative informed that action is being taken and issues will be resolved by 15.02.2026. NTPC representative informed that communication card is faulty at Singrauli end and procurement is in progress, however this issue will be resolved by Dec'26. NRLDC representative emphasized that it is essential to make SPS healthy before peak summer season 2026.

During 67th PSC meeting, POWERGRID(NR-1) representative informed that link is ready however card is faulty in several stations which need further procurement. Hence work is expected to complete within 3-4 months. NRLDC representative requested POWERGRID to share the list of stations where card issue is present currently at the earliest.

POWERGRID, Singrauli(NTPC) and other concerned may share the details of actions taken / planned to be taken to rectify the issues in HVDC Rihand-Dadri SPS system.

- ii. **SPS of Anta, Kawai, Chhabra generation complex:** In one of the SPS cases i.e., N-1-1/ N-2 of 765kV Anta-Phagi 1 & 2, instantaneous generation backdown of ~2100 MW is designed as SPS action. In such scenario, to avoid overloading of WR-NR corridor and over drawl by Rajasthan, it was agreed that RVPNL shall implement the automatic load shedding of ~750 MW by 28.02.2018. However, as per details available, implementation of automatic load shedding as per SPS hasn't been done yet. This matter has already been discussed in PSC as well as OCC meetings on regular basis. The concern of grid security and reliability was also raised during request of shutdown of 765kV Anta-Phagi line. is requested to expedite implementation of the automatic load shedding of ~750 MW as per SPS (N-1-1/ N-2 contingency of 765kV Anta-Phagi-1 & 2).

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During 235th OCC meeting, SLDC-Rajasthan representative informed that automatic load shedding of ~750 MW has been implemented.

During 236th OCC meeting, SLDC-Rajasthan confirmed that mock testing of automatic load shedding part of the SPS has been conducted.

Discussion during 237th OCC meeting:

- a) NRLDC representative requested Rajasthan to share the mock test report of the automatic load shedding part of the SPS.
- b) RVPNL agreed to share the mock test report w.r.t. automatic load shedding part of the SPS at the earliest.

During 67th PSC meeting, SLDC Rajasthan informed that mock test was conducted for 11 no. of load feeders. Exact details will be collected regarding the same.

Details haven't been received yet. Rajasthan is requested to share the details with confirmation through mail at the earliest.

- iii. **SPS of 765kV Agra-Gwalior DIC:** Mock testing of the SPS was conducted on 10.10.2025. During the testing, it was observed that there is communication issue at Bhiwadi(PG), Bamnauli(DTL), Kota, Debari, Chittorgarh, Ratangarh, Nun-amajra, Safidon, Ajitwal, Dandhari-II, Ablowal substations.

NRLDC requested all the concerned states to submit the mock test report of their respective control area. Details have been received from Delhi, Rajasthan and Punjab. UP, BBMB, Haryana and POWERGRID have shared the partial details.

Further, POWERGRID was requested to share the details of actions taken / planned to be taken to resolve the issues in SPS system.

During 237th OCC meeting, POWERGRID was requested to take expeditious corrective actions to rectify the issues and make the SPS healthy and operational at all the stations.

NRLDC has also sent a letter dated 28.11.2025 to POWERGRID for expeditious

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corrective actions and make complete SPS system healthy and operational.

During 66th PSC meeting, POWERGRID(NR-1) representative informed that communication issue at Bhiwadi(PG) was already addressed. Action is being taken and issues will be resolved by 15.02.2026.

During 67th PSC meeting, POWERGRID(NR-1) representative informed that status is same as "SPS of HVDC Rihand-Dadri".

POWERGRID may share the details of actions taken / planned to be taken to rectify the issues in 765kV Agra-Gwalior D/C SPS system.

- iv. **SPS of 500kV Mundra-Mahindergarh:** Mock testing of the SPS was conducted on 11.03.2026. During the testing, communication links were found to be healthy. Further, deliberation needs to be done regarding wiring of load to be tripped.

An online meeting was held on 17.04.2026 for finalization of further action plan w.r.t. complete restoration and healthiness of SPS of HVDC Mundra-Mahindergarh.

Following was discussed during the meeting:

- i. Connection of feeder tripping cable (mapped in SPS) with DTPC of SPS at all the load stations (Action:all load stations)
- ii. Some of the feeders were found non-radial in present network connectivity. Details of alternate / additional feeders which can be mapped were discussed. Updated list of load groups is attached herewith the mail. Respective load stations may coordinate with ADANI team and take necessary actions. (Actions: ADANI Team, Load stations)
- iii. Feeder wise MW relief quantum mentioned in existing SPS document need to be updated. Respective SLDC, load stations may revise the same.

In view of above, POWERGRID, SLDCs, ADANI team and load stations are requested to take necessary actions and share the updated details as per sheet attached as **Annexure-B.IX**.

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B.8.8 Further, Clause 16.2 of IEGC 2023 also mandates the mock testing of SPS for reviewing SPS parameters & functions, at least once a year. Mock testing of all the SPS needs to be conducted in 2025-26. In view of this following is requested:

- i. Concerned constituents / utility shall conduct the mock testing of pending SPS (whose mock testing was not conducted in FY 2025-26) at the earliest.
- ii. In compliance with IEGC clause 16.2, users shall ensure that mock testing along with the review of SPS logic of all the SPS is conducted at least once a year. Hence utilities are also requested to share the tentative schedule and conduct the mock testing of SPS schemes in their respective control area w.r.t. FY 2026-27.
- iii. Further In compliance with IEGC clause 16.3, users shall also share the detailed report of SPS operation in their respective control area within 3 days of its operation. Presently, no such report is being received.

B.8.9 Implementation of SPS in POWERGRID substations in Rajasthan control area:

SPS stage wise logic (received from Rajasthan) for SPS of ICTs at POWERGRID stations in Rajasthan control area was discussed in 64th PSC meeting. The time delay logic proposed by Rajasthan was found OK and POWERGRID was requested to start the implementation process of the SPS at designated stations.

Time delay for stage-1&2 of SPS was decided as:

1. Stage-1: 105% loading with 1 sec delay
2. Stage-2: 105% loading with 1.5 sec delay

NRLDC through mail dated 02.12.2025 requested POWERGRID to implement the SPS at designated stations i.e., 400/220kV Kankroli(PG), Bassi(PG), Neemrana(PG), Kotputli(PG), Bhiwadi(PG), Jaipur South(PG) and Sikar(PG) at the earliest possible.

During 66th PSC meeting, POWERGRID representative informed that SPS (case-1 & 2) at designated stations i.e., 400/220kV Kankroli(PG), Bassi(PG), Neemrana(PG), Kotputli(PG), Bhiwadi(PG) and Sikar(PG) will be installed by 15.02.2026. Case 3 & 4 of 400/220kV Bassi(PG), Kotputli(PG), and Sikar(PG) will need time. SPS at Jaipur South is not required and SLDC Rajasthan may review the same.

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During 67th PSC meeting, SLDC Rajasthan confirmed that SPS at Jaipur South is not required. POWERGRID representative informed that mock testing was done for 400/220kV Bassi(PG), Neemrana(PG), Kotputli(PG) and Bhiwadi(PG). Wiring work is completed for 400/220kV Kankroli(PG) and Sikar(PG) and mock test of the same will be conducted within one week.

POWERGRID may share the update regarding implementation of above SPS. Mock testing report of the SPS also need to be shared after implementation.

Decision required from Forum:

Members may discuss.

B.9 Status of connected load relief quantum of UFR and df/dt (agenda by NRLDC)

- B.9.1 UFRs and df/dt are envisaged to take care of sudden contingencies arising out of outage of generation stations or separation of inter-regional lines. UFRs setting are for steady state operation of the Grid at considerably low frequency and df/dt settings are for dynamic change change when frequency falls suddenly with jerks.
- B.9.2 As per IEGC 2023 Clause 29.(13)(d),
“SLDC shall ensure that telemetered data of feeders (MW power flow in real time and circuit breaker status) on which UFR and df/dt relays are installed is available at its control centre. SLDC shall monitor the combined load in MW of these feeders at all times. SLDC shall share the above data with the respective RLDC in real time and submit a monthly exception report to the respective RPC...”
- B.9.3 In view of the above, SLDCs are requested to share the list of feeders mapped for UFR and df/dt along with feeder-wise planned load relief quantum. SLDCs are also requested to share details of mapped/telemetered stage-wise quantum of load relief on UFR and df/dt operation against the planned quantum. Data is to be furnished in the format attached as **Annexure-B.X**.
- B.9.4 As per IEGC 2023 Clause 30.(1),
“The National Reference Frequency shall be 50.000 Hz and the allowable band of frequency shall be 49.900-50.050 Hz. The frequency shall be measured with a resolution of +/-0.001 Hz....”

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B.9.5 As per Clause 29(12) of IEGC 2023 is as below:

Quote

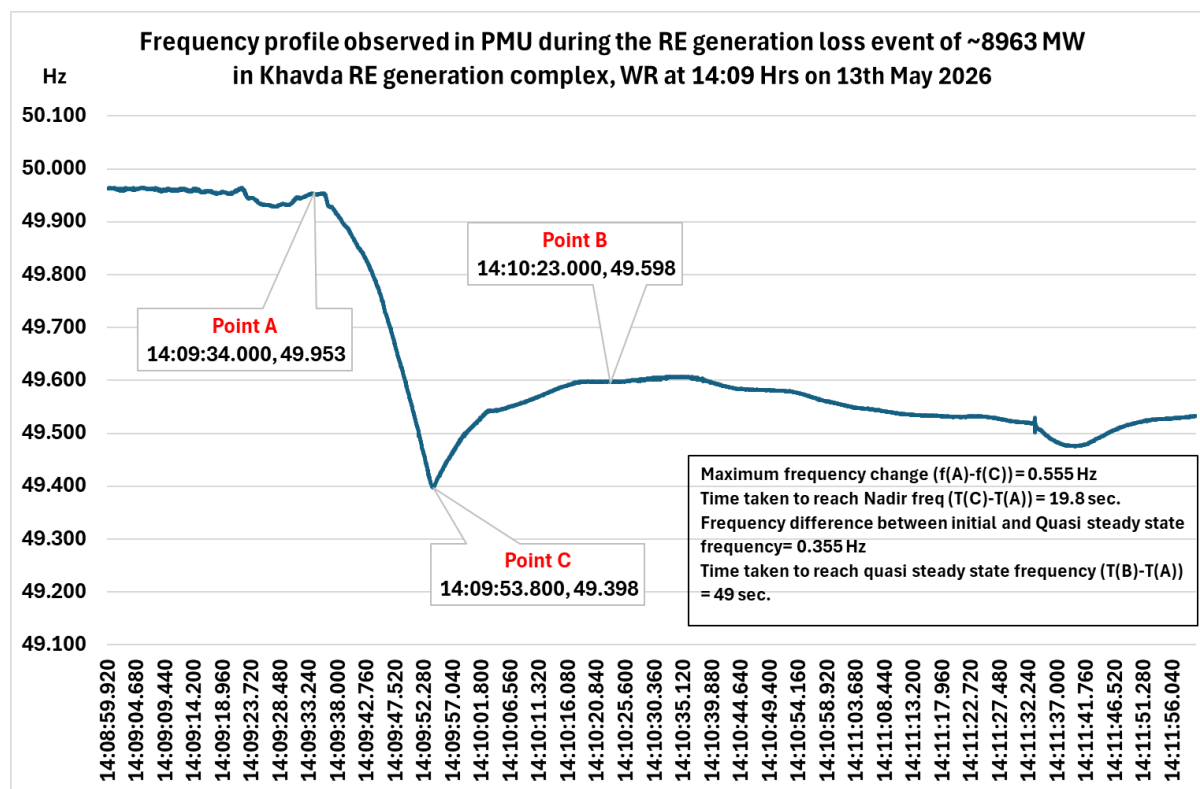
“Note 2: Pumped storage hydro plants operating in pumping mode or ESS operating in charging mode shall be automatically disconnected before the first stage of UFR.”

Unquote

B.9.6 Further, the Minutes of the 15th Meeting of NPC held on 14.11.2024 at Nagpur, Maharashtra, have been recorded as under:

“Chairperson, NPC suggested that BESS (in charging mode) may disconnect first at 49.6 Hz, while pumped hydro (in pumping mode) may disconnect at 49.5 Hz.”

B.9.7 On 13.05.2026, at 14:09 hrs, there was a major grid event (GD-1) at Khavda RE generation complex in Gujarat which led to a generation loss of 8963 MW. All India solar generation dropped from 69,224 MW to 60,611 MW resulting in sharp fall in frequency from 49.953 Hz (at 14:09:34) to 49.398 Hz (at 14:09:53).



B.9.8 Following are the observations during the event:

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- a. Upon receiving instructions from NRLDC, Tehri PSP reduced its pumping load from 600 MW to 0 MW within 7 minutes and started generation of 250 MW after a cooling off period of 15 min.
- b. Upon receiving instructions from NRLDC, BESS discontinued its charging operation, thereby providing an approximate load relief of 650 MW.

B.9.9 As the frequency was below **UFR stage-1 triggering frequency i.e., 49.4 Hz**, it is requested to review any UFR operation in your respective control area and share the details. As reported by SLDCs, it is observed that quantum of load relief is ~1704 MW (~41.56%) only against 4100 MW in UFR stage-1.

B.9.10 Feeder wise details is yet to be received **from J&K**.

B.9.11 SLDCs may confirm the healthiness of UFR and also share the reason of non-operation of UFR.

B.9.12 State-wise load relief quantum as per SCADA & as reported by SLDCs is as below:

State-wise Actual Load Relief Quantum on 13-05-2026 at 14:09 hrs

State Name	Planned Relief (MW) (in UFR Stage-1)	Actual Relief on 13-05-2026 at 14:09 hrs (MW) (as per SCADA)	Actual Relief on 13-05-2026 at 14:09 hrs (MW) (as reported by SLDC)
UP	1297	1286	1131.574
Rajasthan	853	158	214.47
Punjab	645	158	110.3*
Haryana	586	155	126.34*
Delhi	334	0	0
HP	101	21	0
Chandigarh	17	15	15
J&K and Ladakh	140	22	Not received yet
Uttarakhand	127	135	106.58*
Total NR	4100	1950	1704.264

Total Actual Relief in NR=~1950 MW (as per SCADA)

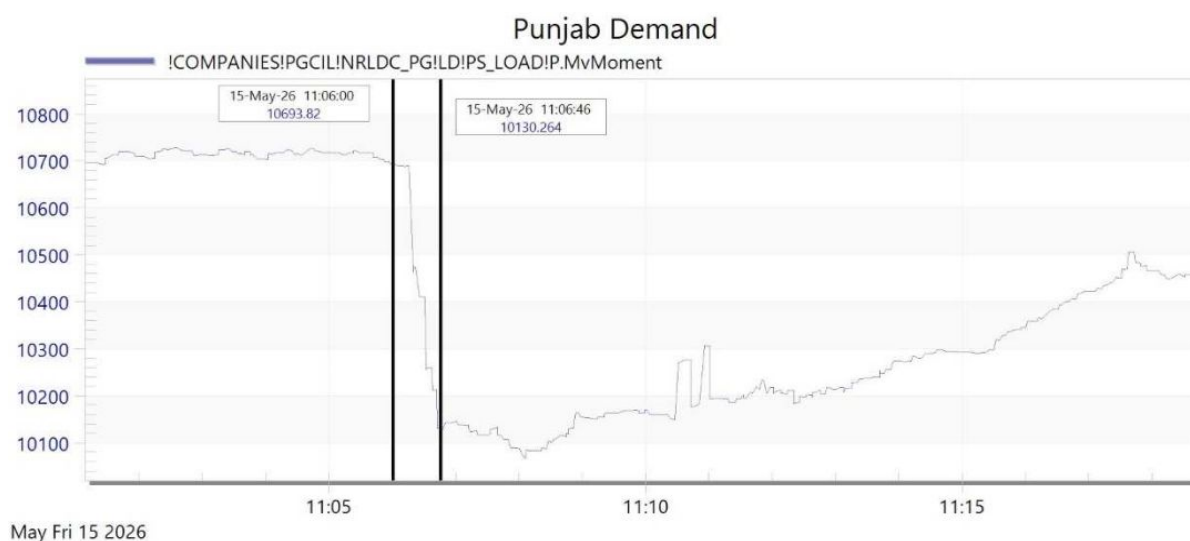
Total Actual Relief in NR=~1704 MW (as reported by SLDCs except J&K)

*Reported till 18:00 hrs of 14.05.2026

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B.9.13 The concept of immediate load relief by PSP and BESS was not observed on 13.05.2026 which compromises the grid security and system reliability. PSP and BESS may implement the same at the earliest. **Members may discuss the threshold frequency for disconnection in this regard.**

B.9.14 Further, on **15.05.2026 at 11:06 hrs**, it is observed that around 565 MW dip in Punjab demand occurred during the frequency dip from 49.99 Hz to 49.78 Hz within 8 seconds, coinciding with the tripping of elements at Bhadla(PG). As discussed telephonically, Punjab SLDC stated that df/dt protection operated in the Punjab control area.



B.9.15 In view of the above, it is requested to kindly share the details of df/dt operations at Punjab.

B.9.16 In view of recent events due to UFR and df/dt operation, major review of UFR and df/dt settings is required to avoid unwanted tripping of feeders and load loss in states.

B.9.17 SLDCs are requested to review UFR settings of the relays (whether frequency settings can be done upto three decimal places or not) and further take up for replacement of the relays, if necessary. SLDCs are also advised to look into any issue in transducer etc to avoid any unwanted tripping on UFR operation in future.

Decision required from Forum:

Members may like to discuss.

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Part-C: Agenda for final approval of protection settings by PSC Forum for FTCs which have been provisionally allowed by NRLDC/SLDCs

C.1. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by NRLDC

- C.1.1 NRLDC has submitted the FTCs allowed in month of **March, 2026 & April, 2026**. The same may be found on NRPC website: <https://nrpc.gov.in/meetings/prsub.html>
- C.1.2 All settings for the elements given FTCs in the months of **March, 2026 & April, 2026** accessed from NRLDC portal are available at NRPC website: <https://nrpc.gov.in/meetings/prsub.html>
- C.1.3 Accordingly, protection settings of the elements given FTCs in the **March, 2026 & April, 2026** are put up for final approval of PSC Forum.

Decision required from Forum:

Members may refer the settings for any correction required. Members may also check whether charging of these elements require any change in protection setting at their end. Accordingly, settings may be approved by Forum.

C.2. First Time Charging of transmission lines/Bays/Transformer/Reactor etc. by SLDCs

- C.2.1 HPSLDC had shared the list and protection settings of elements ($\geq 220\text{kV}$) for which Provisional approval given for FTC from HPSLDC level in the month of **January, 2026 which were discussed in the 67th PSC meeting**. The same are available on NRPC website: <https://nrpc.gov.in/meetings/prsub.html>. However, Forum found some observations and did not approve the settings finally.
- C.2.2 Further, HPPTCL vide email dated 08.05.2026 shared the revised protection settings in compliance with the observations raised. The same may be found the on NRPC

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website: <https://nrpc.gov.in/meetings/prsub.html>.

C.2.3 Similarly, UPSLDC has shared the protection settings of 160MVA at 220 KV Neebkarori for which Provisional approval given for FTC from UPSLDC level. The same are available on NRPC website: <https://nrpc.gov.in/meetings/prsub.html>.

C.2.4 The above proposals are put up for final approval of PSC Forum.

Decision required from Forum:

Members may refer the settings for any correction required. Members may also check whether charging of these elements require any change in protection setting at their end. Accordingly, settings may be approved by Forum.

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* Organizations from where nominations are not received for PSC, members of NRPC have been mentioned. Nomination for PSC forum may be sent at the earliest.

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22	Adani Hybrid Energy Jaisalmer Three Ltd.	
23	Adani Hybrid Energy Jaisalmer Four Ltd.	
24	Adani Renewable Energy (RJ) limited Rawara	
25	Adani Solar Energy Jaisalmer One Pvt. Ltd. 450MW (Solar)	
26	Adani Solar Energy Four Private Limited	
27	Adani Solar Energy Jaisalmer Two Private Limited	
28	Adani Solar Energy Jaisalmer Two Private Limited Project Two	
29	SB ENERGY FOUR PRIVATE LIMITED, Bhadla	
30	SB Energy Six Private Limited, Bhadla	
31	Adani Solar Energy Jodhpur Two Limited, Rawara	
32	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)	
33	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)	
34	Adani Green Energy Twenty Four Limited	
35	ADANI GREEN ENERGY TWENTY FIVE LIMITED	
36	Adani Solar Energy Jodhpur Six Pvt. Ltd.	
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56	Clean Solar Power (Jodhpur) Pvt. Ltd.	simhadri.kesapragada@herofutureenergies.com ;
57	Clean Solar Power (Bhadla) Pvt. Ltd	atul.tomar@herofutureenergies.com ; sushant.sinha@herofutureenergies.com ;
58	Eden Renewable Cite Private Limited	dejedra.sharma@eden-re.com ; operation.ERCPL@eden-re.com ;
59	Eden Renewable Alma Pvt. Ltd.	
60	Energizent Power Private Limited	Bhawya.chauhan@o2power.in ;
61	Grian Energy private limited	mehul.sharma@amplussolar.com ;
62	Juna Renewable Energy Pvt. Ltd.	aprakasam@acciona.com ; npalakshaiiah@acciona.com ; jkumawat@acciona.com
63	Juniper Green Cosmic Private Limited	ashok.sharma@junipergreenenergy.com
64	Juniper Nirjara Energy Private Limited	om.cosmic@junipergreenenergy.com
65	Karinsar Solar Plant NHPC Ltd	bikanerspp@nhpc.nic.in
66	Mega Surya Urja Pvt. Ltd. (MSUPL)	pankaj.vaidya@seit.co.in ; niraj.shah@seit.co.in ;
67	Megasolis Renewables Pvt Ltd(MSRPL)	dhirendra.bhati@seit.co.in
68	AURAIYA Solar	raiivgupta@ntpc.co.in ;
69	DADRI SOLAR	
70	SINGRAULI SOLAR	
71	Anta Solar	
72	Unchahar Solar	
73	NTPC Devikot Solar plant_240MW	
74	NTPC Kolayat_400kV	
75	Nedan Solar NTPC	
76	NTPC Nokh Solar	
77	NTPC Nokhra_300MW	
78	One Volt energy Pvt. Ltd.	amarjeet.thakur@amplussolar.com ;
79	ReNew Solar Energy (Jharkhand Three) Private Limited	purnendu.chaubey@renew.com ; kailash.pandey@renew.com ;
80	RENEW SOLAR POWER Pvt. Ltd. Bhadla	
81	Renew Surya jyoti Pvt. Ltd.	
82	Renew Surya Partap Pvt. Ltd.	
83	Renew Surya Ravi Pvt. Ltd.	
84	Renew Surya Roshni Pvt. Ltd.	
85	Renew Surya Vihan Pvt. Ltd.	
86	Renew Hans Urja Pvt Ltd.	
87	RENEW SOLAR POWER Pvt. Ltd. Bikaner	

88	Neemba Solar Plant Renew Surya Vihaan Pvt. Ltd.	
89	Renew Sun Bright Pvt. Ltd. (RSBPL) (sembcorp)	
90	Solzen Urja Private Limited	Neeraj.Verma@energy-sel.com
91	ReNew Solar Urja Private Limited	anilbhai.chaudhari@indigrid.com , rohit.kashav@indigrid.com ,
92	Renew Surya Ayaan Pvt. Ltd.	hiteshbhai.shiyal@indigrid.com , dinesh.laha@indigrid.com
93	Rising Sun Energy-K Pvt. Ltd.	tushar.gahlot@risingsunenergy.in ;
94	Serentica Renewables India 4 Private Limited	rajendra.gupta@serenticaglobal.com , regulatory@serenticaglobal.com , Serentica_Asset_NR@sterlitepower.com , kunal.kaistha@serenticaglobal.com , atul.pachauri@serenticaglobal.com , lalit.shukla@serenticaglobal.com , ashwary.sharma@serenticaglobal.com ;
95	Serentica Renewables India 5 Private Limited	
96	Khidrat Renewable energy Pvt Ltd.	
97	SJVN Green Energy Limited	cso.sgel@sjvn.nic.in
98	Tata Power Green Energy Ltd. (TPGEL)	vinod.kumar@tatapower.com ;
99	Tata Power Renewable Energy Ltd. (TPREL)	dhmahabale@tatapower.com ; imran.khan@tatapower.com ;
100	Thar Surya Pvt. Ltd.	vivek.reddy2@enel.com ; mahendra.vishnoi2@enel.com
101	TP Surya Pvt. Ltd.	sivanarayana@tatapower.com ; sagar.potdar@tatapower.com ;
102	Banderwala Solar Plant TP Surya Ltd.	arun.sahoo@tatapower.com ;
103	Adept Renewable Technologies Pvt. Ltd.	
104	Transition Cleantech Services Private Limited	kak@evrenewenergy.com ;
105	Transition Energy Services Private Limited	
106	Transition Green Energy Private Limited	
107	Transition Sustainable Energy Services Private Limited	
108	Transition Sustainable Energy Services One Pvt Ltd	
109	Gorbea Solar Pvt Ltd	richpal.singh@zelestra.energy ; kalpesh.umaretia@zelestra.energy ; varun.nadarajan@zelestra.energy ; selva.kumar@zelestra.energy ;
110	Prerak Greentech Private Limited	ikumpawat@evrenewenergy.com

Address List of ISTS Transmission Licensees (other than NRPC members)

S. N.	TBCB/ Licensee Name	Owner Company	E-mail ID
1	Gurgaon Palwal Transmission Ltd	INDIGRID	abhishek.kukreja@indigrid.com pranav.rathore@indigrid.com
2	NRSS-XXIX Transmission Ltd		
3	Parbati Koldam Transmission Company Limited		
4	Patran Transmission Company Ltd		
5	NRSS-XXXI(B) Transmission Ltd	SEKURA	neeraj.verma@energy-sel.com
6	NRSS XXXVI Transmission Ltd	TATA POWER	rajnishmehrotra@tatapower.com rajnishm1963@yahoo.co.in
7	AD Hydro Power Limited	-	sumitgarg@lnjbhilwara.com
8	Aravali Power Company Private Limited		amit.hooda01@apcpl.co.in
9	POWERLINKS TRANSMISSION LIMITED (PTL)	-	sandeep.shukla@tatapower.com
10	Adani Transmission India Limited	ADANI	Bhabesh.macwan@adani.com Sumeet.Sharma@adani.com enocaesloutage@adani.com enocenergysolutions@adani.com
11	Bikaner Khetri Transmission Limited		
12	Fatehgarh Bhadla Transmission Limited		
13	Kishtwar Transmission Limited	RESONIA	Secretarial.grid@sterlite.com

Status of action taken on decisions of 67th PSC

S.N.	Agenda No.	Agenda/ Issue	Decision of 67 th PSC	Status of action Taken
1	A4	Reporting of protection performance indices of SPS by SLDCs/RLDC (agenda by NRPC Secretariat)	<p>SLDCs/NRLDC may submit protection performance indices for SPS on monthly basis by 7th date of each month. All utilities shall report their indices to concerned NRLDC/SLDCs, then after verifying SPS operation from all points, SLDCs/NRLDC shall report performance indices to NRPC Secretariat.</p> <p>Prescribed format (Annexure-A.V) shall be used for submission of protection performance indices of SPSs by SLDCs/NRDLC after verifying SPS operation from all points in their control area.</p>	<p>1. Only UPSLDC, Punjab SLDC, Rajasthan SLDC, HPSLDC & SJVN shared the same for the month of March, 2026.</p> <p>2. Only UPSLDC, HPSLDC, SJVN shared the same for the month of April, 2026.</p> <p>3. NRLDC shared the SPS operations till March, 2026 for FY 2025-26 & for April, 2026</p>
2	A6	Third-party protection audit plan (agenda by NRPC Secretariat)	MS, NRPC directed to display the table of substations for which audit was planned in previous month to get update whether concerned utility has performed audit or not.	Same has been considered in respective agenda.

Status of action taken on decisions of 67th PSC

			Separate agenda may be taken to keep a sheet wherein tracking of compliance actions against audit observations.	Separate agenda has been taken.
3	A7	Discussion on audit reports submitted by utilities and compliance of recommendations of protection audit (agenda by NRPC Secretariat)	All generators were requested to share the protection philosophy used at their end within one week to NRPC Secretariat to prepare a draft.	Generators may update regarding non submission of protection philosophy used by them.
4	A9	Persistent Delay in Completion of OPGW Communication Network by POWERGRID/INDIGRID Affecting Commissioning of Line Differential Protection and AGC System at Parbati Complex (agenda by NHPC)	Forum requested INDIGRID to expedite the OPGW completion work so that NHPC may proceed for AGC and line differential protection implementation.	NHPC has updated that laying of OPGW work has not yet commenced from Parbati-II side. IndiGrid may be advised to expedite and complete work at the earliest.

Status of performance indices reporting of March 2026 (Last date of submission 07.04.2026)

S. No.	Utility		Received Status (Yes/No)	Vide mail dated	Remarks	Indices less than 1 (Yes/No)	Reason submitted and corrective action taken	
1	PGCIL	Central Government owned Transmission Company	Y	06.04.2026	NR-1	NO	NA	
			Y	09.04.2026	NR-2	NO	NA	
			Y	07.04.2026	NR-3	NO	NA	
2	NTPC	Central Generating Company	Y	07.04.2026	Anta (Gas& Solar)	NO	NA	
			Y	06.04.2026	Auriya (Thermal & Solar)	NO	NA	
			Y	06.04.2026	Dadri (Gas)	NO	NA	
			Y	08.04.2026	Dadri (Thermal & Solar)	NO	NA	
			Y	07.04.2026	Koldam	NO	NA	
			Y	08.04.2026	Rihand	NO	NA	
			Y	08.04.2026	Singrauli (Thermal & Solar)	NO	NA	
			Y	06.04.2026	Unchahar (Thermal & Solar)	NO	NA	
			Y	03.04.2026	Tanda	NO	NA	
			Y	08.04.2026	Faridabad (Gas)	NO	NA	
3	BBMB			Y	07.04.2026		NO	NA
4	THDC			Y	03.04.2026	Tehri	NO	NA
				Y	06.04.2026	Tehri PSP	NO	NA
				Y	06.04.2026	Koteshwar	NO	NA
					Khurja			
5	SJVN		Y	02.04.2026	RHPS	NO	NA	
			Y	06.04.2026	NJHPS	NO	NA	
6	NHPC		Y	01.04.2026	-	Yes	Yes	
7	NPCIL		Y	01.04.2026	RAPS-A	NO	NA	
			Y	03.04.2026	RAPS-B	NO	NA	
			Y	02.04.2026	RAPS-C(5&6)	NO	NA	
			Y	01.04.2026	RAP -D (7 & 8)	NO	NA	
			Y	13.04.2026	NAPS-1&2	NO	NA	
8	DTL		Y	07.04.2026		Yes	Yes	
9	HVPNL		Y	07.04.2026	-	NO	NA	
10	RRVPNL		Y	07.04.2026	-	Yes	Yes	
11	UPPTCL	State Transmission Utility	Y	02.04.2026	Meerut Circle	NO	NA	
			Y	05.04.2026	Agra Circle	NO	NA	
			Y	02.04.2026	Jhansi Circle	NO	NA	
			Y	05.04.2026	Prayagraj Circle	NO	NA	
			Y	05.04.2026	Gorakhpur Circle	NO	NA	
			Y	05.04.2026	Lucknow Circle	NO	NA	
			Y	06.04.2026	Kumaon	NO	NA	
			Y	02.04.2026	Jalandhar Diviosn	NO	NA	
			Y	05.04.2026	Mandi, Gobindgarh	Yes	Yes	
			Y	05.04.2026	Bathinda	Yes	Yes	
		Y	05.04.2026		Yes	Yes		
12	PTCUL		Y	06.04.2026		NO	NA	
13	PSTCL		Y	02.04.2026		NO	NA	
			Y	05.04.2026		Yes	Yes	
			Y	05.04.2026		Yes	Yes	
14	HPPTCL		Y	04.04.2026	-	Yes	Yes	
15	JKPTCL	UT	Y	06.04.2026	Jammu	NO	NA	
		UT	Y	06.04.2026	Kashmir	NO	NA	
16	Chandigarh Power Distribution Ltd	RPSG Group	Y	09.04.2026	220 Kv Kishangarh	NO	NA	
17	IPGCL		Y	07.04.2026	PPS-I	NO	NA	
			Y	07.04.2026	PPS-III, Bawana	NO	NA	
18	HPGCL		Y	09.04.2026	PTPS, Panipat	NO	NA	
			Y	09.04.2026	DCRTPP, Yamunanagar	NO	NA	
			Y	09.04.2026	RGTPP (Khedar)	NO	NA	
19	RRVUNL		Y	07.04.2026	KTPS	Yes	No	
			Y	07.04.2026	kATPP, Jhalawar	NO	NA	
			Y	07.04.2026	CSCTPP Chhabra	NO	NA	
			Y	01.04.2026	RGTPP, Ramgarh	NO	NA	
			Y	04.04.2026	Ctpp,Chhabra	NO	NA	
			Y	01.04.2026	DCCPP, Dholpur	NO	NA	
			Y	07.04.2026	STPS Suratgarh	NO	NA	
			Y	07.04.2026	SSCTPS Suratgarh	NO	NA	
18	UPRVUNL	State Generating Company	Y	01.04.2026	Parichha B (220 kV)	NO	NA	
			Y	06.04.2026	Parichha C (400 kV)	NO	NA	
			Y	01.04.2026	DTPS Anpara	NO	NA	
			Y	07.04.2026	Obra A & B	NO	NA	
			Y	07.04.2026	Obra C	NO	NA	
			Y	07.04.2026	Harduaganj 220 kV	NO	NA	
			Y	08.04.2026	Harduaganj 400 kV	NO	NA	
			Y	07.04.2026	Anpara-A&B	NO	NA	

60	ACME Sikar	ACME	Y	07.04.2026		Yes	No
61	ACME Chittorgarh Solar Energy Pvt Ltd (Ayana)	AYANA					
62	AHEJOL-Hybrid-1 Madhopura	ADANI GREEN	Y	06.04.2026		No	NA
63	AHEJ3L - Hybrid-2B 300MW	ADANI GREEN	Y	06.04.2026		No	NA
64	AHEJFL(AEML_250)	ADANI GREEN	Y	06.04.2026		No	NA
65	AHEJ4L(AEML-350)	ADANI GREEN	Y	06.04.2026		No	NA
66	ASEJ2PL(Hapasar 300MW) SPC11PL	ADANI GREEN	Y	06.04.2026		No	NA
67	Adani Renewable Energy (RJ) Limited Rawra 200	ADANI GREEN	Y	06.04.2026		No	NA
68	Adani Solar Energy Four Limited SECI 50	ADANI GREEN	Y	06.04.2026		No	NA
69	Adani Solar Energy Jodhpur Two Limited Merchant 50	ADANI GREEN	Y	06.04.2026		No	NA
70	ASEJ05PL (RJ200)	ADANI GREEN	Y	06.04.2026		No	NA
71	ASERJ2PL - Phalodi 150 MW	ADANI GREEN	Y	06.04.2026		No	NA
72	ASERJ01PL-Pokhran 300 MW (SB energy six)	ADANI GREEN	Y	06.04.2026		No	NA
73	AGE25L(Badi Sid)	ADANI GREEN	Y	06.04.2026		No	NA
74	Bhadla park - South block	ADANI GREEN	Y	06.04.2026		No	NA
75	AGE24L (Bhimsar)	ADANI GREEN	Y	06.04.2026		No	NA
76	AHEJ2L - Hybrid-2A 300MW	ADANI GREEN	Y	06.04.2026		No	NA
77	ASERJ2PL - Devikot 180 MW	ADANI GREEN	Y	06.04.2026		No	NA
78	ASEJOPL-Hybrid 450 MW	ADANI GREEN	Y	06.04.2026		No	NA
79	ASEB1L-Baiya 600MW	ADANI GREEN	Y	06.04.2026		No	NA
80	AREH4L-Siyamber	ADANI GREEN	Y	06.04.2026		No	NA
81	Ambuja Cements Limited_300MW	ADANI GREEN					
82	Altra Xerqi Pvt. Ltd.		Y	06.04.2026		No	NA
83	XL Xerqi Power Pvt. Ltd.		Y	06.04.2026		No	NA
84	AMP Energy Green Four Pvt. Ltd.	AMPIN ENERGY	Y	06.04.2026		No	NA
85	AMP Energy Green Five Pvt. Ltd.	AMPIN ENERGY	Y	06.04.2026		No	NA
86	AMP Energy Green Six Pvt. Ltd.	AMPIN ENERGY	Y	06.04.2026		No	NA
87	Amplus Ages Private Limited	GENTARI	Y	03.04.2026		No	NA
88	Avaada RJHN_240MW	AVAADA	Y	07.04.2026		No	NA
89	Avaada sunce energy Pvt limited						
90	Avaada Sustainable RJ Project Pvt. Ltd.						
91	Avaada Sunrays Pvt. Ltd.		Y	07.04.2026		No	NA
92	Ayana Renewable Power Three Private Limited						
93	Ayaana Renewable Power One Pvt. Ltd.						
94	Azure Power Forty One Pvt limited						
95	Azure Power Forty Three Pvt. Ltd._RSS						
96	Azure Power Forty Three Pvt. Ltd._PSS						
97	Azure Maple Pvt. Ltd.						
98	AZURE POWER INDIA Pvt. Ltd., Bhadla						
99	Azure Power Thirty Four Pvt. Ltd.						
100	Clean Solar Power (Jodhpur) Pvt. Ltd.	Hero Future Energies	Y	02.04.2026		No	NA
101	Eden Renewable Cite Private Limited		Y	01.04.2026		No	NA
102	Eden Renewable Alma Pvt. Ltd.		Y	06.04.2026		No	NA
103	Energizent Power Private Limited						
104	Grian Energy private limited	GENTARI	Y	03.04.2026		No	NA
105	Juna Renewable Energy Pvt. Ltd.		Y	09.04.2026		No	NA
106	Juniper Green Cosmic Private Limited		Y	09.04.2026		No	NA
107	Juniper Nirjara Energy Private Limited						
108	Karinsar Solar Plant NHPC Ltd	NHPC	Y	01.04.2026		No	NA
109	Megasolis Renewables Pvt Ltd(MSRPL)		Y	01.04.2026		No	NA
110	Mega Surya Urja Pvt. Ltd. (MSUPL)						
111	NTPC Devikot Solar plant-1	NGEL	Y	03.04.2026		No	NA
112	NTPC Devikot Solar plant-2		Y	03.04.2026		No	NA
113	SKB NTPC -1 (250MW)	NGEL	Y	03.04.2026		No	NA
114	SKB NTPC-2 (300MW)		Y	03.04.2026		No	NA

115	NTPC Nokhra_300MW		Y	03.04.2026		No	NA
116	NTPC Fatehgarh 296MW		Y	03.04.2026		No	NA
117	One Volt energy Pvt. Ltd.	GENTARI	Y	03.04.2026		No	NA
118	ReNew Solar Urja Private Limited	IndiGrid					
119	ReNew Solar Energy (Jharkhand Three) Private Limited		Y	08.04.2026		NO	NA
120	Neemba Renew Surya Vihan Pvt. Ltd.		Y	08.04.2026		NO	NA
121	Renew Surya Partap Pvt. Ltd.		Y	08.04.2026		NO	NA
122	Renew Surya jyoti Pvt. Ltd.		Y	08.04.2026		NO	NA
123	Renew Surya Ravi Pvt. Ltd.	ReNew	Y	08.04.2026		NO	NA
124	Renew Surya Roshni Pvt. Ltd.		Y	08.04.2026		NO	NA
125	Renew Surya Vihan Pvt. Ltd.		Y	08.04.2026		NO	NA
126	Renew Solar Photovoltaic Pvt Ltd		Y	08.04.2026		NO	NA
127	Renew Hans Urja Pvt. Ltd.		Y	08.04.2026		NO	NA
128	RENEW SOLAR POWER Pvt. Ltd. Bikaner		Y	08.04.2026		NO	NA
129	ReNew Dinkar Urja Pvt. Ltd.		Y	08.04.2026		NO	NA
130	Renew Sun Bright Pvt. Ltd. (RSBPL)	Sembcorp					
131	Renew Surya Ayaan Pvt. Ltd.	IndiGrid					
132	Rising Sun Energy-K Pvt. Ltd.						
133	Serentica Renewables India 4 & 5 Private Limited	Serentica	Y	02.04.2026		No	NA
134	Khidrat Renewable energy Pvt Ltd.		Y	02.04.2026		No	NA
135	SJVN Green Energy Limited						
136	Solzen Urja Private Limited	Sekura	Y	06.04.2026		No	NA
137	Tata Power Green Energy Ltd. (TPGEL)	TATA POWER	Y	06.04.2026		No	NA
138	Tata Power Renewable Energy Ltd. (TPREL)		Y	06.04.2026		No	NA
139	Banderwala Solar Plant TP Surya Ltd.		Y	06.04.2026		No	NA
140	Thar Surya Pvt. Ltd.						
141	Adept Renewable Technologies Pvt. Ltd.						
142	Transition Cleantech Services Private Limited						
143	Transition Energy Services Private Limited						
144	Transition Green Energy Private Limited						
145	Transition Sustainable Energy Services Private Limited						
146	Transition Sustainable Energy Services One Pvt Ltd						
147	GSPL_BHDL2 (Gorbea Solar Pvt Ltd)	Zelestra	Y	06.04.2026		No	NA
148	Prerak Greentech Pvt Limited		Y	08.04.2026		No	NA

Status of performance indices reporting of April 2026 (Last date of submission 07.05.2026)

S. No.	Utility		Received Status (Yes/No)	Vide mail dated	Remarks	Indices less than 1 (Yes/No)	Reason submitted and corrective action taken	
1	PGCIL	Central Government owned Transmission Company			NR-1			
			Y	11.05.2026	NR-2	No	NA	
			Y	06.05.2026	NR-3	No	NA	
2	NTPC	Central Generating Company	Y	11.05.2026	Anta (Gas& Solar)	No	NA	
			Y	11.05.2026	Auriya (Thermal & Solar)	No	NA	
			Y	04.05.2026	Dadri (Gas)	No	NA	
			Y	11.05.2026	Dadri (Thermal & Solar)	No	NA	
			Y	04.05.2026	Koldam	No	NA	
			Y	11.05.2026	Rihand	No	NA	
			Y	11.05.2026	Singrauli (Thermal & Solar)	No	NA	
			Y	07.05.2026	Unchahar (Thermal & Solar)	No	NA	
			Y	08.05.2026	Tanda	No	NA	
			Y	14.05.2026	Faridabad (Gas)	No	NA	
3	BBMB			Y	14.05.2026		No	NA
4	THDC		Central Generating Company	Y	06.05.2026	Tehri	No	NA
				Y	05.05.2026	Tehri PSP	No	NA
				Y	08.05.2026	Koteshwar	No	NA
					Khurja			
5	SJVN		Y	06.05.2026	RHPS	No	NA	
			Y	04.05.2026	NJHPS	No	NA	
6	NHPC		Y	04.05.2026	-	Yes	Yes	
7	NPCIL		Y	04.05.2026	RAPS-A	No	NA	
			Y	06.05.2026	RAPS-B	No	NA	
			Y	04.05.2026	RAPS-C(5&6)	No	NA	
			Y	02.05.2026	RAP -D (7 & 8)	No	NA	
			Y	07.05.2026	NAPS-1&2	No	NA	
8	DTL		Y	07.05.2026		Yes	Yes	
9	HVPNL		Y	05.05.2026	-	No	NA	
10	RRVNL		Y	07.05.2026	-	Yes	Yes	
11	UPPTCL	State Transmission Utility	Y	04.05.2026	Meerut Circle	Yes	Yes	
			Y	07.05.2026	Agra Circle	No	NA	
			Y	02.05.2026	Jhansi Circle	No	NA	
			Y	07.05.2026	Prayaqraj Circle	No	NA	
			Y	07.05.2026	Gorakhpur Circle	No	NA	
			Y	07.05.2026	Lucknow Circle	No	NA	
			Y	07.05.2026	Kumaon	No	NA	
					Jalandhar Diviosn			
				Mandi, Gobindgarh				
				Bathinda				
				other Division/zone				
12	PTCUL							
13	PSTCL							
14	HPPTCL		Y	05.05.2026	-	No	NA	
15	JKPTCL	UT	Y	05.05.2026	Jammu	No	NA	
		UT	Y	05.05.2026	Kashmir	No	NA	
16	Chandigarh Power Distribution Ltd	RPSG Group	Y	11.05.2026	220 Kv Kishangarh	No	NA	
17	IPGCL	State Generating Company	Y	06.05.2026	PPS-I	No	NA	
			Y	06.05.2026	PPS-III, Bawana	No	NA	
18	HPGCL		Y	06.05.2026	PTPS, Panipat	No	NA	
			Y	06.05.2026	DCRTPP, Yamunanagar	No	NA	
			Y	06.05.2026	RGTPP (Khedar)	No	NA	
19	RRVUNL		Y	06.05.2026	KTPS	No	NA	
			Y	06.05.2026	kATPP, Jhalawar	No	NA	
			Y	06.05.2026	CSCTPP Chhabra	No	NA	
			Y	04.05.2026	RGTPP, Ramgarh	No	NA	
			Y	02.05.2026	Ctpp,Chhabra	No	NA	
			Y	01.05.2026	DCCPP, Dholpur	No	NA	
			Y	06.05.2026	STPS Suratgarh	No	NA	
			Y	06.05.2026	SSCTPS Suratqarh	No	NA	
18	UPRVUNL		Y	06.05.2026	Parichha B (220 kV)	No	NA	
		Y	04.05.2026	Parichha C (400 kV)	No	NA		
		Y	04.05.2026	DTPS Anpara	No	NA		
		Y	07.05.2026	Obra A & B	No	NA		
		Y	07.05.2026	Obra C	No	NA		

56	ACME Phalodi	ACME	Y	06.05.2026		No	NA
57	ACME Deogarh	ACME					
58	ACME Raisal	ACME					
59	ACME Dhaulpur	ACME					
60	ACME Sikar	ACME	Y	06.05.2026		No	NA
61	ACME Chittorgarh Solar Energy Pvt Ltd (Ayana)	AYANA					
62	AHEJOL-Hybrid-1 Madhopura	ADANI GREEN	Y	11.05.2026		No	NA
63	AHEJ3L - Hybrid-2B 300MW	ADANI GREEN	Y	11.05.2026		No	NA
64	AHEJFL(AEML 250)	ADANI GREEN	Y	11.05.2026		No	NA
65	AHEJ4L(AEML-350)	ADANI GREEN	Y	11.05.2026		No	NA
66	ASEJ2PL(Hapasar 300MW) SPC11PL	ADANI GREEN	Y	11.05.2026		No	NA
67	Adani Renewable Energy (RJ) Limited Rawra 200	ADANI GREEN	Y	11.05.2026		No	NA
68	Adani Solar Energy Four Limited SECI 50	ADANI GREEN	Y	11.05.2026		No	NA
69	Adani Solar Energy Jodhpur Two Limited Merchant 50	ADANI GREEN	Y	11.05.2026		No	NA
70	ASEJ05PL (RJ200)	ADANI GREEN	Y	11.05.2026		No	NA
71	ASERJ2PL - Phalodi 150 MW	ADANI GREEN	Y	11.05.2026		No	NA
72	ASERJ01PL-Pokhran 300 MW (SB energy six)	ADANI GREEN	Y	11.05.2026		No	NA
73	AGE25L(Badi Sid)	ADANI GREEN	Y	11.05.2026		No	NA
74	Bhadla park - South block	ADANI GREEN	Y	11.05.2026		Yes	Yes
75	AGE24L (Bhimisar)	ADANI GREEN	Y	11.05.2026		No	NA
76	AHEJ2L - Hybrid-2A 300MW	ADANI GREEN	Y	11.05.2026		No	NA
77	ASERJ2PL - Devikot 180 MW	ADANI GREEN	Y	11.05.2026		No	NA
78	ASEJOPL-Hybrid 450 MW	ADANI GREEN	Y	11.05.2026		No	NA
79	ASEB1L-Baiya 600MW	ADANI GREEN	Y	11.05.2026		No	NA
80	AREH4L-Siyamber	ADANI GREEN	Y	11.05.2026		No	NA
81	Ambuja Cements Limited_300MW	ADANI GREEN					
82	Altra Xerqi Pvt. Ltd.		Y	07.05.2026		No	NA
83	XL Xerqi Power Pvt. Ltd.		Y	11.05.2026		No	NA
84	AMP Energy Green Four Pvt. Ltd.	AMPIN ENERGY	Y	05.05.2026		No	NA
85	AMP Energy Green Five Pvt. Ltd.	AMPIN ENERGY					
86	AMP Energy Green Six Pvt. Ltd.	AMPIN ENERGY					
87	Amplus Ages Private Limited	GENTARI	Y	06.05.2026		No	NA
88	Avaada RJHN 240MW	AVAADA	Y	04.05.2026		No	NA
89	Avaada sunce energy Pvt limited						
90	Avaada Sustainable RJ Project Pvt. Ltd.						
91	Avaada Sunrays Pvt. Ltd.		Y	04.05.2026		No	NA
92	Ayana Renewable Power Three Private Limited						
93	Ayaana Renewable Power One Pvt. Ltd.						
94	Azure Power Forty One Pvt limited		Y	04.05.2026		No	NA
95	Azure Power Forty Three Pvt. Ltd._RSS						
96	Azure Power Forty Three Pvt. Ltd._PSS						
97	Azure Maple Pvt. Ltd.						
98	AZURE POWER INDIA Pvt. Ltd., Bhadla						
99	Azure Power Thirty Four Pvt. Ltd.						
100	Clean Solar Power (Jodhpur) Pvt. Ltd.	Hero Future Energies	Y	02.05.2026		No	NA
101	Eden Renewable Cite Private Limited		Y	04.05.2026		No	NA
102	Eden Renewable Alma Pvt. Ltd.		Y	06.05.2026		No	NA
103	Energizent Power Private Limited						
104	Grian Energy private limited	GENTARI	Y	06.05.2026		No	NA
105	Juna Renewable Energy Pvt. Ltd.		Y	08.05.2026		No	NA
106	Juniper Green Cosmic Private Limited	Juniper	Y	04.05.2026		No	NA
107	Juniper Nirjara Energy Private Limited						
108	Karinsar Solar Plant NHPC Ltd	NHPC	Y	04.05.2026		No	NA

109	Megasolis Renewables Pvt Ltd(MSRPL)		Y	04.05.2026		No	NA
110	Mega Surya Urja Pvt. Ltd. (MSUPL)		Y	04.05.2026		No	NA
111	NTPC Devikot Solar plant-1	NGEL	Y	05.05.2026		No	NA
112	NTPC Devikot Solar plant-2		Y	05.05.2026		No	NA
113	SKB NTPC -1 (250MW)	NGEL	Y	05.05.2026		No	NA
114	SKB NTPC-2 (300MW)		Y	05.05.2026		No	NA
115	NTPC Nokhra_300MW		Y	05.05.2026		No	NA
116	NTPC Fatehgarh 296MW		Y	05.05.2026		No	NA
117	One Volt energy Pvt. Ltd.	GENTARI	Y	06.05.2026		No	NA
118	ReNew Solar Urja Private Limited	IndiGrid	Y	06.05.2026		No	NA
119	ReNew Solar Energy (Jharkhand Three) Private Limited		Y	07.05.2026		No	NA
120	Neemba Renew Surya Vihan Pvt. Ltd.		Y	07.05.2026		No	NA
121	Renew Surya Partap Pvt. Ltd.		Y	07.05.2026		No	NA
122	Renew Surya jyoti Pvt. Ltd.		Y	07.05.2026		No	NA
123	Renew Surya Ravi Pvt. Ltd.	ReNew	Y	07.05.2026		No	NA
124	Renew Surya Roshni Pvt. Ltd.		Y	07.05.2026		No	NA
125	Renew Surya Vihan Pvt. Ltd.		Y	07.05.2026		No	NA
126	Renew Solar Photovoltaic Pvt Ltd		Y	07.05.2026		No	NA
127	Renew Hans Urja Pvt Ltd.		Y	07.05.2026		No	NA
128	RENEW SOLAR POWER Pvt. Ltd. Bikaner		Y	07.05.2026		No	NA
129	ReNew Dinkar Urja Pvt. Ltd.						
130	Renew Sun Bright Pvt. Ltd. (RSBPL)	Sembcorp					
131	Renew Surya Ayaan Pvt. Ltd.	IndiGrid	Y	06.05.2026		No	NA
132	Rising Sun Energy-K Pvt. Ltd.						
133	Serentica Renewables India 4 & 5 Private Limited	Serentica	Y	04.05.2026		No	NA
134	Khidrat Renewable energy Pvt Ltd.		Y	07.05.2026		No	NA
135	SJVN Green Energy Limited						
136	Solzen Urja Private Limited	Sekura	Y	06.05.2026		No	NA
137	Tata Power Green Energy Ltd. (TPGEL)	TATA POWER	Y	04.05.2026		No	NA
138	Tata Power Renewable Energy Ltd. (TPREL)		Y	04.05.2026		No	NA
139	Banderwala Solar Plant TP Surya Ltd.		Y	04.05.2026		No	NA
140	Thar Surya Pvt. Ltd.						
141	Adept Renewable Technologies Pvt. Ltd.						
142	Transition Cleantech Services Private Limited						
143	Transition Energy Services Private Limited						
144	Transition Green Energy Private Limited						
145	Transition Sustainable Energy Services Private Limited						
146	Transition Sustainable Energy Services One Pvt Ltd						
147	GSPL_BHDL2 (Gorbea Solar Pvt Ltd)	Zelestra	Y	07.05.2026		No	NA
148	Prerak Greentech Pvt Limited		Y	06.05.2026		No	NA

Reporting of performance indices for protection System (for element connected at 220kV and above) Name of Utility : ACME Heergarh- MSEDCL2 Badisidd - 300 MW Month : March-26										
S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
1	300 MW MSEDCL2 Badisidd	220 kV Badisidd -Bhadla-2	0	0	0	0	0	0.0	0	
		150 MVA PTR-1	1	0	1	1	1	0.5	0.5	25.03.26-Tripped in LV REF due to LV Cable Insulation failure. Checking the relay setting and coordination.
		150 MVA PTR-2	1	0	0	1	1	1.0	0.5	02.03.26-Tripped in LV REF & Differential due to PTR-2 LV Flexible bus bar Melt
		Bus coupler Bay	0	0	0	0	0	0.0	0	
		220 kV Main BUS -1	0	0	0	0	0	0.0	0	
		220 kV Main BUS -2	0	0	0	0	0	0.0	0	

PERFORMANCES INDICES FORM ACME Heergarh- MSEDCL2 Badisidd 300 MW	Dependability Index (D) $D=(Nc/(Nc+Nf))$	0
	Security Index (S) $S=(Nc/(Nc+Nu))$	0
	Reliability Index (R) $R=(Nc/(Nc+Ni))$	0

NOTE:- Reason for performance indices less than unity is mentioned in respective element remark.

Nc - Number of correct operations at internal power system Faults.

Nf - Number of Failures to operations at internal power system Faults.

Nu - Number of unwanted operations.

Ni - Number of incorrect operations, (Ni= Nf+Nu)

**Reporting of performance indices for protection System
(for element connected at 220kV and above)**

Name of Utility : ACME Sikar Solar Pvt Ltd-300 MW

Month : Dec-25

S.N.	Sub-station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index (S)	Reliability Index (R)	Remark
1	300 MW Sikar Nokha	220 kV Sikar -Bikaner-2	0	0	0	0	0	0	0	
		150 MVA PTR-1	1	0	1	1	1	0.5	0.5	30/03/2026, 11:47 Hrs: PTR-1 tripped in Over current fault.
		150 MVA PTR-2	0	0	0	0	0	0	0	
		Bus coupler Bay	0	0	0	0	0	0	0	
		220 kV Main BUS -1	0	0	0	0	0	0	0	
		220 kV Main BUS -2	0	0	0	0	0	0	0	

PERFORMANCES INDICES FORM ACME Sikar Solar Pvt Ltd-300 MW	Dependability Index (D) D=(Nc/(Nc+Nf))	0
	Security Index (S) S=(Nc/(Nc+Nu))	0
	Reliability Index (R) R=(Nc/(Nc+Ni))	0

NOTE:- Reason for performance indices less than unity is mentioned in respective element remark.

Nc - Number of correct operations at internal power system Faults.

Nf - Number of Failures to operations at internal power system Faults.

Nu - Number of unwanted operations.

Ni - Number of incorrect operations, (Ni= Nf+Nu)

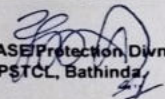
S.No.	Substation	Element name	Date of tripping	Time of tripping	Categorization (F/U) F = Failures to operate at internal power system faults U = Unwanted operations	Reason for failures/Unwanted operation	Corrective action taken/ to be taken
1	765 KV Bhiwani SS(PGCIL)	400KV Mohindergarh (ATIL) - Bhiwani (PG) Ckt-2	25-Mar-26	17:26	U	DT Received from 765 KV PGCIL Bhiwani SS End	
2	765 KV Agra SS	765KV Ghatampur TPP - Agra (UP) Line	03-Mar-26	14:12:00	U	Body Protection Control Cable of Spare Line Reactor found damaged which caused operation of Line & LR Tripping.	Damaged cable is replaced.
3	765 KV Bikaner SS(RRVPNL)	400 KV DEEDWANA (PPP) - BIKANER	3/27/2026	15:32	U	Fire in Bus Reactor at RRVPNL in vicinity of Line	
4	220 KV RANPUR (PPP)	220 KV RANPUR (PPP) - KTPS	3/8/2026	17:21	U	Auto-reclosure failed at RRVPN end - Scope - RRVPNL	

Mar-26

S.No.	Sub-Station	Unit (SPS/Line/CT/GT/etc.)	Date on which Power System Fault occurred	Local End Indications	Remote End Indications	Reason & Corrective Action
1	220 kV S/S Mansa	220 kV Mansa-Jhunir Line	15.03.2026 at 20:36 hrs	DPR operated Main 1, BN Phase Z-1, Distance=8.0 KM IR- 107.6 A IY- 135.5 A IB- 7359 A IN- 7108 A DPR operated Main -2, RB Phase Z-1, Distance=10.50 KM IR- 104.3 A IY- 134.2A IB- 7337A IN- 123.8 A	DPR operated Main 1, BN Phase Z-1, Distance=22.36 KM DPR operated Main -2, RB Phase Z-1, Distance=22.37 KM	Message conveyed to TL Bathinda and PC Patiala. No fault found. Line charged at 14 54hrs.
2	220 kV S/S Katorewala	220/66 kV 100 MVA PTF T-2	23.03.2026 at 15:07 hrs	HV side indications: RYB PH O/C LV side indications: RYB PH O/C & E/F H/S	N.A.	R Phase limb of LV side Breaker got damaged. PTF charged at 17:13 hrs after replacement of breaker.
3	220 kV S/S Mansa	220 kV Mansa-Patran Line	29.03.2026 at 20:27 hrs	DPR operated Main 1, Y Phase Z-1, Distance=24.76 KM IR- 308.6 A IY- 4.241 kA IB- 271.5 kA DPR operated Main -2, Y Phase HSU, Z-1, Distance=30.19 KM IR- 325.1 A IY- 4.403 kA IB-282 A	DPR operated Main -1, Y Phase HSU, Z-1, Distance=42.7 KM IY- 3.792 kA	Message conveyed to TL Bathinda. No fault found. Line charged at 22:13hrs after permission of PC Patiala and clearance from AAE/TL Bathinda. No supply affected.
4	220 kV S/S GNDTP Bathinda	220 kV GNDTP-Lehra CKT-1	30.03.2026 at 23:45 hrs	Overvoltage	CB not Tripped	During reconfiguration of DPR Main-2 REL650, the overvoltage setting is by default enabled. So as per data record, there is variation in voltage. These lines tripped on overvoltage. Now overvoltage function is disabled in Main-2
5	220 kV S/S GNDTP Bathinda	220 kV GNDTP-Badal Line	30.03.2026 at 23:45 hrs	Overvoltage	DT Received-Main-2 (GE Multilin D60)	

ASE/Protection Divn.,
PSTCL, Bathinda

REPORTING OF PERFORMANCE INDICES FOR PROTECTION SYSTEM for the Month March-2026										
Sr. No.	Sub - Station	Unit (SPS/Line/CT/GT/etc.)	Nc	Nf	Nu	Ni = Nf + Nu	Dependability	Security	Reliability	REMARKS
							Index (D)	Index (S)	Index (R)	
1	220 kV S/S Mansa	220 kV Mansa-Jhunir Line	1	0	0	0	1	1	1	
2	220 kV S/S Katorewala	220/66 kV 100 MVA PTF T-2	1	0	0	0	1	1	1	
3	220 kV S/S Mansa	220 kV Mansa-Patran Line	1	0	0	0	1	1	1	
4	220 kV S/S GNDTP Bathinda	220 kV GNDTP-Lehra CKT-1	1	0	1	1	1	0.5	0.5	
5	220 kV S/S GNDTP Bathinda	220 kV GNDTP-Badal Line	1	0	1	1	1	0.5	0.5	


 ASE Protection Divn.,
 PSTCL, Bathinda

Format No.-PI-01
Reporting of performance indices for protection system
(for elements connected at 220 kV and above)
Name of Utility: Delhi Transco Ltd
Month: March 2026

S. No.	Substation	Unit (SPS/Line/ICT/GT etc)	Nc	Nf	Nu	Ni	Dependability Index ($D=Nc/(Nc+Nf)$)	Security Index ($S=Nc/(Nc+Nu)$)	Reliability Index ($R=Nc/(Nc+Ni)$)	Remedial Action Taken (if applicable)/ Remarks
1	400kV Harsh Vihar	400kV Dadri Ckt-2	1	0	0	0	1	1	1	
2	400kV Bawana	400kV Abdullapur	1	0	0	0	1	1	1	
		100MVA Transformer (220/66kV)	1	0	0	0	1	1	1	
		220kV Rohini Ckt-1	1	0	0	0	1	1	1	
		220kV Rohini Ckt-2	1	0	0	0	1	1	1	
		220kV DSIIDC Bawana Ckt-1	2	0	0	0	1	1	1	
3	400kV Bamnauli	220kV DIAL Ckt-2	1	0	0	0	1	1	1	
4	220kV BTPS	220kV Alwar Ckt-1	8	0	0	0	1	1	1	
		220kV Ballabgarh Ckt-1	1	0	0	0	1	1	1	
		220kV Ballabgarh Ckt-2	2	0	0	0	1	1	1	
5	220kV DIAL	220kV Bamnauli Ckt-2	1	0	0	0	1	1	1	
6	220kV DSIIDC Bawana Ckt-1	220kV Bawana Ckt-1	2	0	0	0	1	1	1	
7	220kV Dwarka	220kV Pappankalan-3 Ckt-1	1	0	0	0	1	1	1	
8	220kV Kashmere Gate	220kV South of Wazirabad Ckt-1	2	0	0	0	1	1	1	
		220kV South of Wazirabad Ckt-2	2	0	0	0	1	1	1	
9	220kV Mehrauli	100MVA Transformer-2 (220/66kV)	0	0	2	2	0	0	0	Transformer tripped on OLTC (OSR). Faulty OSR relay was replaced.
10	220kV Geeta Colony	220kV Patparganj Ckt-2	1	0	0	0	1	1	1	
11	220kV Patparganj	220kV Geeta Colony Ckt-2	1	0	0	0	1	1	1	
12	220kV Peeragarhi	100MVA Transformer-I (220/33kV)	1	0	0	0	1	1	1	
13	220kV Rajghat	100MVA Transformer-I (220/33kV)	1	0	0	0	1	1	1	
14	220kV Rohini	220kV Bawana Ckt-1	1	0	0	0	1	1	1	
		220kV Bawana Ckt-2	1	0	0	0	1	1	1	
15	220kV Timarpur	100MVA Transformer-I (220/33kV)	1	0	0	0	1	1	1	
16	220kV Tuglakabad	160MVA Transformer-I (220/66kV)	1	0	0	0	1	1	1	

Justification for less than one index may be attached separately.

S. No.	Substation	Unit (SPS/Line/ICT/GT etc)	Nc	Nf	Nu	Ni	Dependability Index ($D=Nc/(Nc+Nf)$)	Security Index ($S=Nc/(Nc+Nu)$)	Reliability Index ($R=Nc/(Nc+Ni)$)	Remedial Action Taken (if applicable)/ Remarks
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Nc is the number of correct operations at internal power system faults

Nf is the number of failures to operate at internal power system faults

Nu is the number of unwanted operations

Ni is the number of incorrect operations and is the sum of Nf and Nu



H.P. POWER TRANSMISSION CORPORATION LIMITED

(A State Government Undertaking)

Regd. Office: Himfed Bhawan, Panjari, Tutikandi, Shimla-171005

DGM (Protection & Communication), Chowki Jamwalan, Hamirpur (H.P.)-177020

Email: dgmprot.tcl@hpmail.in; Web: www.hpptcl.com

No: HPPTCL/DGM(P&C)/NRPC/2026-27-349-351

Dated 04-04-2026

To

The Superintending Engineer (Protection),
Northern Regional Power Committee,
18-A, Shaheed Jeet Singh Marg,
Katwaria Sarai, New Delhi-110016.
Email: seo-nrpc@nic.in


Subject: Performance indices for protection system of HPPTCL substation and lines for the month of **March,2026.**

Sir,

Enclosed please find herewith the detailed performance indices of protection system of HPPTCL for elements connected at 220kV and voltage level for the month of **March,2026** for your reference please.


DA: As Above.

Yours faithfully,


Sr. Manager (E)
O/o DGM(Prot.&Comm.),
HPPTCL, Chowki Jamwalan,
Hamirpur (H.P.).

Copy to:

1. The General Manager (Projects), HPPTCL, Himfed Bhawan, Shimla-05.
2. The Superintending Engineer, HPSLDC, Totu, Shimla-04.


Sr. Manager (E)
O/o DGM(Prot.&Comm.),
HPPTCL, Chowki Jamwalan,
Hamirpur (H.P.).

Report of performance indices for protection System for March, 2026
(for elements connected at 220 kV and above)

Sr. No.	Name of Sub-Station	Unit (SPS/Line/CT/GT/ etc.)	Nc	Nf	Nu	$\frac{Nf+Nc}{Nu}$	Dependability Index (D) $D = \frac{Nc}{Nc+Nf}$	Security Index (S) $S = \frac{Nc}{Nc+Nf+Nu}$	Reliability Index (R) $R = \frac{Nc}{Nc+Nf+Nu}$	Brief Description of Tripping	Corrective Action		
1	400/220/66 K V Wangtoo Substation	400 kV Wangtoo - Karcham Ckt I	-	-	-	-	-	-	-	Tipping of Transformer-2 occurred on dated 02.03.2026 at 15:06 Hrs due to operation of the differential protection, indicating an internal fault condition. The disturbance subsequently escalated to Transformer-1, resulting in its tripping on Restricted Earth Fault (REF) protection. Upon detailed inspection, the 33 kV tertiary PT along with its associated cable was found to be damaged, which led to the differential protection operation of Transformer-2. The tripping of Transformer-1 on REF protection was attributed to the use of common bay CTs, causing spill current during the fault condition. Both transformers were successfully restored to service after isolating the faulty 33 kV tertiary PT and associated circuitry.			
		400 kV Wangtoo - Karcham Ckt II	-	-	-	-	-	-	-				
		400 kV Wangtoo - Kala Amb Ckt	-	-	-	-	-	-	-				
		400 kV Wangtoo - Sorang Ckt	-	-	-	-	-	-	-				
		ICT I (315 MVA, 400/220/33 kV)	-	-	-	-	-	-	-				
		ICT II (315 MVA, 400/220/33 kV)	-	-	-	-	-	-	-				
		220 kV Wangtoo - Bhabha Ckt.	-	-	-	-	-	-	-				
		220 kV Wangtoo - Tidong Ckt	1	0	0	0	1	1	1			1	Double line fault by 8.5KA, I _b : 8.6 KA Distance 6.3 KM
		220 kV Wangtoo-Kotla ckt.	-	-	-	-	-	-	-			-	Nil
		220 kV Wangtoo-Bhoktoo	-	-	-	-	-	-	-			-	
2	400/220/33kV GIS Lahal, Dist Chamba	Trafo I (80/100 MVA, 220/66/33 kV)	1	0	1	1	1	0.5	0.5	A planned shutdown was undertaken on the 400 kV Lahal-Kuther transmission line on dated 16.03.2026, which was the sole source feeding the 400 kV Bus-2 at the substation. Upon opening of the line breaker, the 400 kV Bus-2 became de-energized, as the only other element connected to the bus was ICT-1, while ICT-2 was already under outage. The sudden loss of source resulted in an abrupt load throw-off (approx 35MW) condition in the system. Consequently, the 220/33 kV transformer experienced overfluxing and tripped on Overflux Protection. Simultaneously, the 220 kV Budhil-Lahal line tripped on Overvoltage Protection, with the trip command issued by the Main-2 relay, indicating a transient overvoltage condition due to sudden load rejection and lack of voltage support. It is also clarified that no protection tripping occurred on the 220 kV Lahal-Bajoll Holi line. The tripping of the line was due to manual opening of the breaker at the remote end, following which a Direct Trip (DT) signal was received at the local end, resulting in tripping of the corresponding breaker at this end. Furthermore, in order to avoid similar unwanted operations under such system conditions, the overvoltage protection on the 220 kV Lahal-Budhil line has presently been disabled.			
		Trafo II (80/100 MVA, 220/66/33 kV)	1	0	0	0	1	1	1				
		400 kV Lahal Rajera ckt.	-	-	-	-	-	-	-			-	
		400 kV Lahal Kurehar ckt.	1	0	0	0	1	1	1				
		ICT -I (315 MVA, 400/220/33 kV)	-	-	-	-	-	-	-			-	
		ICT -2 (315 MVA, 400/220/33 kV)	-	-	-	-	-	-	-			-	
		105 MVA Spare Transformer (400/220/33 kV)	-	-	-	-	-	-	-			-	
		220 kV Lahal -Budhil Ckt. 1	1	0	1	1	1	0.5	0.5				
		220 kV Lahal - Bajoll Holi Ckt.	1	0	0	0	1	1	1				
		220 kV Lahal - Heiling Ckt	-	-	-	-	-	-	-			-	
220/33 kV Transformer	1	0	1	1	1	0.5	0.5						

10	220/132 kV GIS S/strn. Dehan	220 kV Dehan-Trikkar Ckt. 1	-	-	-	-	-	-	-	-	Nil
		220 kV Dehan-Trikkar Ckt. 2	-	-	-	-	-	-	-	-	
		220/132/33 kV, 60/80/100 MVA ICT-1	-	-	-	-	-	-	-	-	
		220/132/33 kV, 60/80/100 MVA ICT-2	-	-	-	-	-	-	-	-	
11	220/66/22 kV GIS S/strn. Bhoktoo	220/66 kV, 25/31.5 MVA Transformer	-	-	-	-	-	-	-	-	Nil
		220 kV Bhoktoo-Kashang Ckt.	-	-	-	-	-	-	-	-	
		220 kV Bhoktoo-Wangoo Ckt.	-	-	-	-	-	-	-	-	
		220 kV Andheri-PKATL Ckt. 1	-	-	-	-	-	-	-	-	
12	220/132/33 kV AIS S/strn Kala Amb	220 kV Andheri-PKATL Ckt. 2	-	-	-	-	-	-	-	-	Nil
		3x53.33/66 66 MVA (223/132/33 kV Auto Transformer)	-	-	-	-	-	-	-	-	
		220/66 kV, 80/100 MVA Transformer	-	-	-	-	-	-	-	-	
		220/66 kV, 80/100 MVA Transformer	-	-	-	-	-	-	-	-	
13	220/66 kV GIS S/strn Heiling	220 kV Heiling-Hoifi Ckt.	1	0	0	0	1	1	1	1	Line tripped due to Direct trip received from Bajohi Hoifi HEP on dated 16-03-2026 at 12:17 Hrs.
		220 kV Heiling-Lahal Ckt.	-	-	-	-	-	-	-	-	
		220/132 kV ICT	-	-	-	-	-	-	-	-	
14	220/132 kV AIS S/strn Kangoo	220 kV Dehar BBMB Ckt.	-	-	-	-	-	-	-	-	Nil
		220 kV Dehar BBMB Ckt.	-	-	-	-	-	-	-	-	
		220 kV HPSEBL Kangoo Ckt.	-	-	-	-	-	-	-	-	


 Assistant Engineer (E)
 O/o DGM (Prot Comm.)
 HPP TCL, Hamirpur (H.P.)

Format No.-PI-01
Reporting of performance indices for protection system
(for elements connected at 220KV and above)

Name of Utility:KSTPS,RRVUNL, Kota

Month:MAR'26

S.N.	Sub- station	Unit (SPS/Line/ICT/GT/ etc)	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index (S)	Reliability Index (R)
1	220KV KSTPS,Kota	GT-1	1	0	0	0	1	1	1
2		GT-2	2	0	0	0	1	1	1
3		GT-3	3	0	0	0	1	1	1
4		GT-4	1	0	0	0	1	1	1
5		GT-5	2	0	0	0	1	1	1
6		GT-6	1	0	0	0	1	1	1
7		GT-7	3	0	0	0	1	1	1
8		ST-1	0	0	0	0	NA	NA	NA
9		ST-2	0	0	0	0	NA	NA	NA
10		ST-3	0	0	0	0	NA	NA	NA
11		ST-4	0	0	0	0	NA	NA	NA
12		Bundi Feeder	1	0	0	0	1	1	1
13		Beawer(Bundi-Gulabpura) Feeder	1	0	0	0	1	1	1
14		Vatika Feeder	0	0	0	0	NA	NA	NA
15		Heerapura Feeder	6	0	0	0	1	1	1
16		Sakatpura-1 Feeder	1	0	0	0	1	1	1
17		Sakatpura-2 Feeder	1	0	0	0	1	1	1
18		Sakatpura-3 Feeder	1	0	0	0	1	1	1
19		Sakatpura-4 Feeder	0	0	0	0	NA	NA	NA
20		Ranpur Feeder	2	0	0	0	1	1	1
21		PGCIL-1 Feeder	1	1	0	1	0.5	1	0.5
22		PGCIL-2 Feeder	0	0	0	0	NA	NA	NA

Justification for less than one index may be attached separately.

Nc is the number of correct operations at internal power system faults ,Nf is the number of failures to operate at internal power system faults ,Nu is the number of unwanted operations

Ni is the number of incorrect operations and is the sum of Nf and Nu

$D.I=(Nc/(Nc+Nf)),$

$S.I=(Nc/(Nc+Nu)),$

$R.I=(Nc/(Nc+Ni))$

Memo. No. - 101/2026

Dated - 01/04/26

Tripping Details of March-2026						
Punjab State Transmission Corporation Limited						
S.N.	Sub-Station	Unit (SPS/Line/ICT/GT/etc.)	Date on which Power System	Local End Indications	Remote End Indications	Reason & Corrective Action
March 2026						
1	220 KV S/S G1	220kv G-1 - RTP Ckt. No.1	05.03.2026	Main 1, DPR P442 Zone-1 Fault Location - 47.36 KM R phase- 26.21 A, Y phase - 23.18 A, B phase - 2.77 kA	P442 Zone-1, R phase- 116.8 A, Y phase - 19.60 A, B phase - 6.195 kA, Trip C phase, F.L- 19.89 KM	Circuit has been patrolled from tower no 51 to 74, no visible fault found.
2	220 KV S/S G1	220kv G-1 - Wazirabad (G5) Ckt. No.2	20.03.2026	DPR Main-1 Ir-172.5 A, Iy-181 A, Ib-176.6 A, Main-2 Ir-171.58 A, Iy-177.92 A, Ib-174.73 A In-1.85 A	Breaker ON	Line charged after the instruction of PC Sir
3	220 KV S/S G1	220kv G-1 - Wazirabad (G5) Ckt. No.2	22.03.2026	DPR Main 1 :- IR-190.0 A, IY-193.1 A, IB-193.3 A Main 2- Ia- 189.45 A, Ib- 194.22 A, Ic- 192.64 A	Breaker ON	Engineers from M/s Credence, Mohali are working at 220 KV G5 Wazirabad sub station for retrofitting of Line Differential Relays of 220 KV G5-G1 Ckt-01. During their testing the 220 KV G5-G1 Ckt-02 tripped from G1 end. However, the command was given to 220 KV G5-G1 Ckt-01 as claimed by representative from M/s Credence.


 Senior Executive Engineer
 Protection Division
 STCL, Mandi Gobindgarh

REPORTING OF PERFORMANCE INDICES FOR PROTECTION SYSTEM
NAME OF UTILITY: PUNJAB STATE TRANSMISSION CORPORATION LIMITED

March - 2026

Sr. No.	Sub - Station	Unit (SPS/Line/ICT/GT/etc)	Nc	Nf	Nu	Ni = Nf + Nu	Dependability	Security	Reliability
							Index (D)	Index (S)	Index (R)
1	220 kV G-1	220kv G-1 - RTP Ckt. No.1	1	0	0	0	1	1	1
2	221 kV G-1	220kv G-1 - Wazirabad (G5) Ckt. No.2	0	0	0	2	0	0	0


Senior Executive Engineer
Protection Division
PSTCL, Mandi Gobindgarh

**Reporting of Performance Indices for NHPC Power Stations in NR-Region
Month-MARCH '2026**

Sl No	Name of Utility	Name of PS	Elements (Line/ Unit)	From	To	Total Outage	Outage Reason	Nc	Nf	Nu	Ni	Dependability Index (D=Nc/(Nc+Nf))	Security Index (S=Nc/(Nc+Nf))	Reliability Index (R=Nc/(Nc+Nf))	Reason for wrong operation	Action Taken
1	NHPC Ltd	Tanakpur	220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt-1	6-Mar-26 10:21:00	6-Mar-26 11:31:00	1:10	Operation of Z2 protection at R-Y Phase Fault with carrier receive from remote end.	1	0	0	0	1	1	1	NA	NA
2	NHPC Ltd	KARINSAR SOLAR PLANT	220/33 kv 125 MVA ICT 1	6-Mar-26 11:25:00	6-Mar-26 13:05:00	1:40	Operation of over fluxing protection of LV side	1	0	0	0	1	1	1	NA	NA
3	NHPC Ltd	KARINSAR SOLAR PLANT	220/33 kv 125 MVA ICT 2	11-Mar-26 22:03:00	12-Mar-26 21:05:00	23:02	Operation of Differential Protection	1	0	0	0	1	1	1	NA	NA
4	NHPC Ltd	Bairasiul	220 KV Bairasiul(NH)-Jessore(HP) (PG) Ckt-1	20-Mar-26 19:49:00	21-Mar-26 12:27:00	16:38	Operation of DPR in Zone-1 for a B-N phase fault, following which the auto-reclose operation was initiated. However, within 140 ms, a CBF re-trip command was activated, resulting in three-phase tripping.	1	0	1	1	1	0.5	0.5	CBF re-trip command was activated from Busbar Protection Relay, even though the current was below the predefined limit for CBF re-trip initiation	Matter is being taken up with relay OEM
5	NHPC Ltd	Kishanganga	220 KV Kishanganga(NH)-Delina(PDD) (PG) Ckt-1	22-Mar-26 5:19:00	22-Mar-26 12:40:00	7:21	Direct Trip received from Delina end.	1	0	0	0	1	1	1	NA	NA

No Line tripping has been observed from other Power Stations of NHPC of NR region for Month of March '2026

(Signature)
S. Inayatullah
01.04.26

Tripping Details						Remarks	Performance Indices for Protection System						
Punjab State Transmission Corporation Limited							Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index (S)	Reliability Index (R)
March-2026													
S.N.	Sub-Station	Unit (SPS/Line/ICT/GT/etc.)	Date on which Power System Fault occurred	Local End Indications	Remote End Indications								
1	400 kV S/S Dhuri	220 kV Dhuri(400)-Chajlii ckt.II	15-03-2026 at 21.14 Hrs	Zone-I, B-ph, Fault distance-32.7 km	Zone-I, B-ph, Fault distance-9.504 km	It was found that due to heavy windstorm a tree branch uprooted in tower span no 94-95.and touched with conductor.	1	0	0	0	1	1	1
2	400 kV S/S Dhuri	400 kV Dhuri-Talwandi ckt.II	13-03-2026 at 16.40 Hrs	DT send (without any power system fault)		Due to problem in PLCC ABB cabinets, mater has been taken up with OEM	0	0	1	1	0	0	0
3	400 kV S/S Makhu	400 kV Makhu-Amritsar ckt.II	28-03-2026 at 14.41 Hrs	Zone-I, R-ph, Fault Distance-31.1 km	Zone-I, R-ph, Fault Distance-42 km		1	0	0	0	1	1	1
4	400 kV S/S Nakodar	400 kv Nakodar Makhu ckt 2	06.03.26 AT 12:00	Zone-I, R-ph, Fault Distance-22.3 km	R-ph, 7.88 kA, Fault Distance-43.3 km	Fault at Tower no. 69 pilot string which was disconnect from jumper. After reconnect string ,line charged at 17:16 hr. Total outage 07:16 hrs	1	0	0	0	1	1	1
		220 kV Nakodar(400)-Kartarpur ckt.I	14-03-2026 at 18.43 Hrs	Zone-I, Y-ph, B-ph, Fault Distance-11.5 km	Zone-I, Y-ph, B-ph, Fault Distance-7 km	Line patrol by TL Nakodar , Nothing found abnormal. Line charged at 09:57 hrs dtd 15.03.26. Total outage 15:15hrs	1	0	0	0	1	1	1
		220 kV Nakodar(400)-Kartarpur ckt.II	26-03-2026 at 11.44 Hrs	Zone-I, R-ph, Fault Distance-4.3 km	R-ph, E/F , Fault Distance-30.13 km	Line patrol by TL Nakodar , 01 to 24 Tower. Polythene remove from tower no. 09 Line charged at 15:47 hrs. Total outage 04:03 hrs	1	0	0	0	1	1	1
5	400 kV S/S Rajpura	220 kV Rajpura(400)-Rajpura ckt.I	03-03-2026 at 05.35 Hrs	Ia = 11.02 Ka, Ib = 0.0 Ka, Ic = 1.70 Ka, Fault Location 4.5 Km	Ia = 343.5 Amp, Ib = 191 Amp, Ic = 334 Amp, Fault Location 2.19 Km	B Phase CT Damaged at 220 KV Sub Station Rajpura end	1	0	0	0	1	1	1
6	400 kV S/S Behman Jassa Singh	500 MVA, 400/220 kV ICT-3	31-03-2026 at 23.44 Hrs	No indication		Due to DC earth fault in DC source I & II, same has been rectified	1	0	0	0	1	1	1
7	400 kV S/S Ropar	400 kV Ropar-Koldam ckt.	20-03-2026 at 15.34 Hrs	DT Received	NA	The Line was under shutdown from Kol Dam due to retro fitting work of new relays at Kol Dam station. Breaker 404-52 and 405-52 were closed after opening line isolators as instructed by PC Patiala for completion of dia. During testing from Kol Dam end DT was received.that tripped both the breakers at Ropar end	0	0	1	1	0	0	0
8	400 kV S/S Ropar	400 kV Ropar-Koldam ckt.	22-03-2026 at 15.34 Hrs	DT Received	NA	The Line was under shutdown from Kol Dam due to retro fitting work of new relays at Kol Dam station. Breaker 404-52 and 405-52 were closed after opening line isolators as instructed by PC Patiala for completion of dia. During testing from Kol Dam end DT was received.that tripped both the breakers at Ropar end	0	0	2	2	0	0	0

S.No.	Substation	Element name	Date & Time of the tripping	Categorization (F/U) F = Failures to operate at internal power system faults U = Unwanted operations	Reason for failures/Unwanted operation	Corrective action taken/ to be taken
1	BARA	765 KV ICT2	20.03.2026	Unwanted operation	ICT 2 Tripped on differential	<p>During checking no abnormalities was found the relay data has been shared with OEM for the RCA and corrective action.</p> <p>However Following checks were done -</p> <ol style="list-style-type: none"> 1. Transformer IR of all 3 phases – Found healthy 2. IR measurement of core-1(used for 87T1) and core-2(used for 87T2) CT cables from field to rule out double grounding. – Found healthy 3. Current injec on from field in core-1 and core-2 – Measurement compared and verified in Main-1, Main-2 and LBBU relay- Found ok 4. CT secondary Burden measurement from the field - Found ok 5. Tightness of all CT secondary circuitry – Found ok

Reason for Performance Indices less than Unity-March 2026 (RVPN)

Case-1 400 KV Akal- Bhensara (Jaisalmer-II) Line at 400KV GSS AKAL on 20.03.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

SCADA upgradation work under progress at 400 KV Akal GSS during this command issued

Corrective Action taken – YES

Workmen asked to work carefully.

Case-2 400 KV Ajmer- Bhilwara ckt-II at 400KV GSS AJMER on 26.03.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

Tripping occurred while switching off PLCC panel due to continuous alarm of carrier.

Corrective Action taken – YES

Workmen asked to work carefully.

Case-3 220KV SANGANER-Vatika LINE, 220KV SANGANER-HEERAPURA LINE, 220KV SANGANER-Sitapura LINE, 220KV SANGANER-Mansarovar LINE and 220KV SANGANER-Chaksu LINE at 220KV GSS SANGANER on 04.03.2026

No. of Failures to operate – 5

Reason of unwanted operation –

DC problem at Sanganer GSS, Complete DC fail, hence no tripping at Sanganer GSS.

Corrective Action taken – YES

DC problem rectified and restored..

Case-4 220 KV GSS MANDAWAR- HINDAUN LINE at 400 KV GSS HINDAUN on 05.03.2026(2 times), 27.03.2026(2 times)

No. of Unwanted operation – 4

Reason of unwanted operation –

Problem in contact of Distance Protection Scheme.

Corrective Action taken – YES

Defective contact wiring removed.

Case-5 220KV SRI DUNGARGARH- RATANGARH LINE at 220KV GSS SRI DUNGARGARH on 31.03.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

Tripping occurred due to DC cable faulty.

Corrective Action taken – YES

Cable fault rectified.

Case-6 220/132 KV 100 MVA TRF at 220 KV GSS HALASAR on 05.03.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

W phase OSR relay operated. The relay is defective.

Corrective Action taken – Partial

Defective OSR relay removed from system and shall be replaced soon.

Case-7 220/132KV 100MVA Tr No 5 at 220KV GSS KHETRI on 20.03.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

Water logging in the OSR rely observed.

Corrective Action taken – YES

Relay cleaned.

AGEL - NR - Performance Indices for the period April-2026

S. No.	ELEMENT NAME	ELEMENT TYPE	Voltage Level	Installation status	Owner of the element	Date of last TRIPPING DATE	No. of TRIPPING TIME	AGEL	Safety End			Index			Remarks (Sending End)	Action Plan for Corrective Measures	
									Tripping in order as per protection operation	AGEL (No. of operations)	No. of failed operations (NF)	No. of incorrect operations (NI)	Security Index (SI=NI/(NI+NF))	Reliability Index (RI=NF/(NF+NI))			Availability Index (AI=(NF+NI))
1	AHEJOL-Hybrid-1 Madhupura	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
2	AHEJL - Hybrid-2B 300MW	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
3	AHEJL(AEML-250)	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
4	AHEJL(AEML-350)	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
5	ASEJ2PL(Hapasar 300MW) SPC1 IPL	ICT-3	220kV	Dedicated	AGEL	15.04.2026	14:10	AGEL	1	0	0	0	1	1	1	Differential Protection (33kV OVG CT Failure)	Outgoing panel R-phase CT found intermingled condition. Rest all physical inspection found ok. Damage CT replaced with new spare CT. IR values of BUS, OVG CT, HT Fused Oil/Paper transformer checked & found ok. Hardware tightness checked & changed the system again.
6	ari Renewable Energy (RJ) Limited Rawra 2	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
7	Adani Solar Energy Four Limited SECI 50	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
8	H Solar Energy Jodhpur Two Limited Mercha	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
9	ASEJ05PL (RJ200)	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
10	ASERJ2PL - Phalod 150 MW	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
11	SERJ01PL-Pokhran 300 MW (SB energy #)	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
12	AGE25L(Bad Sid)	TR-1 & PTR-2 Tripp	220kV	Dedicated	AGEL	17.04.2026	20:35	AGEL	1	0	0	0	1	1	1	SWGR-2_LA Failure of both OG-1 and OG-2 feeders	Faulty LA was removed and NEW LA installed in SWGR-2 OG-1 and OG-2 Bay & Verified the healthiness of associated equipment in SWGR-2 OG-1 Transformer-1 & Transformer-2 Bay.
13	Bhadra park - South block	PTR-02	400kV	Dedicated	AGEL	08.04.2026	21:22	AGEL	0	1	0	1	0	NA	0	OSR Malfunction	OSR replaced
14	AGE24L (Bhmsar)	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
15	AHEJL - Hybrid-2A 300MW	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
16	ASERJ2PL - Devkot 180 MW	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
17	ASEJ0PL-Hybrid 450 MW	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA
18	ASEB1L-Bajaj 600MW	Transmission Line	220kV	Dedicated	AGEL	02.04.2026	22:16	AGEL	1	0	0	0	1	1	1	Distance Protection Operated	OPOW cable tightened and line charged successfully
19	AREH4L-Syamber	No Tripping	220kV	Dedicated	AGEL	No Tripping		AGEL	0	0	0	0	NA	NA	NA	NA	NA

Format No.- PI-01

Reporting of performance indices for protection system

(for elements connected at 220 kV and above)

Name of station: APCPL/IGSTPP Jhajjar

Month: April 2026

S.N.	Sub-station	Unit(SPS/Line/ICT/ GT/ etc)	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index(S)	Reliability Index (R)
1.	APCPL Jhajjar	Jhajjar-Mundka Line-1	1	0	1	0	1	0.5	1
2.	APCPL Jhajjar	Jhajjar-Mundka Line-2	1	0	1	0	1	0.5	1
3.	APCPL Jhajjar	Jhajjar-Daultabad Line-1	1	0	1	0	1	0.5	1
4.	APCPL Jhajjar	Jhajjar-Daultabad Line-2	0	0	0	0	1	1	1

Justification for less than one index may be attached separately.

Nc is the number of correct operations at internal power system faults

Nf is the number of failures to operate at internal power system faults

Nu is the number of unwanted operations.

Ni is the number of incorrect operations and is the sum of Nf and Nu

ARAVALI POWER COMPANY PRIVATE LIMITED
INDIRA GANDHI SUPER THERMAL POWER PROJECT
JHAJJAR

OUTAGE DUE TO PLANNED SHUTDOWN AND TRIPPINGS ATTRIBUTED TO SELF BY LICENSEE

DOC No:											<i>Annexure - I</i>
MONTH –APRIL '2026											
LINE/ ICT OUTAGE DETAILS											
CODE	EVENT NO.	ELEMENT NAME	OUTAGE	RESTORATION	DURATION OF OUTAGE ATTRIBUTABLE TO				NRLDC CODE	Classification/ Category Code	REASON OF OUTAGE
			DATE TIME	DATE TIME	APCPL	OTHERS	System constraint/ Natural calamity/ Militancy	Deemed Available			
					@ (T) Hrs:Min	# (U) Hrs:Min	& (C) Hrs:Min	* (D) Hrs:Min			
A	B	C	D	E	F	G	H	I	J	K	L
APCNR40001	1	JHARLI(APCPL) -MUNDKA (DTL)-CIRCUIT 1	28/04/2026 02:19	28/04/2026 22:27	20:08				3094	LEFT	E/F Tripping, SD for Breakdown restoration
APCNR40002	2	JHARLI(APCPL) -MUNDKA (DTL)-CIRCUIT 2	28/04/2026 13:01	29/04/2026 12:07	23:06				8943	LEFT	E/F Tripping, SD for Breakdown restoration

Format No.-PI-01
Reporting of performance indices for protection system
(for elements connected at 220 kV and above)
Name of Utility: Delhi Transco Ltd
Month: April 2026

S. No.	Substation	Unit (SPS/Line/ICT/GT etc)	Nc	Nf	Nu	Ni	Dependability Index ($D=Nc/(Nc+Nf)$)	Security Index ($S=Nc/(Nc+Nu)$)	Reliability Index ($R=Nc/(Nc+Ni)$)	Remedial Action Taken (if applicable)/ Remarks
1	400kV Bamnauli	500MVA ICT-3	1	0	0	0	1	1	1	
2	400kV Bawana	400kV Abdullapur	1	0	0	0	1	1	1	
		400kV Deepalpur	1	0	0	0	1	1	1	
		315MVA ICT-6	0	0	1	1	0	0	0	Transformer tripped due to suspected DC leakage. It will be checked during shutdown.
		400kV Mandola Ckt-2	1	0	0	0	1	1	1	
		220kV Kanjhawala Ckt-1	1	0	0	0	1	1	1	
		220kV Kanjhawala Ckt-2	1	0	0	0	1	1	1	
3	400kV Harsh Vihar	400kV Dadri Ckt-1	1	0	0	0	1	1	1	
		400kV Dadri Ckt-2	4	0	0	0	1	1	1	
		315MVA ICT-2	0	0	1	1	0	0	0	Transformer tripped inadvertently during implementation and testing of SPS.
		315MVA ICT-3	0	0	1	1	0	0	0	Transformer tripped inadvertently during implementation and testing of SPS.
4	400kV Mundka	400kV Jhajjar Ckt-1	1	0	0	0	1	1	1	
		400kV Jhajjar Ckt-2	1	0	0	0	1	1	1	
		220kV Kanjhawala Ckt.	2	0	0	0	1	1	1	
5	220kV BTPS	220kV Alwar Ckt-1	7	0	0	0	1	1	1	
		220kV Ballabgarh Ckt-2	2	0	0	0	1	1	1	
6	220kV Gopalpur	20kV Mandola Ckt-1	3	0	0	0	1	1	1	
		220kV South of Wazirabad Ckt-2	1	0	0	0	1	1	1	
7	220kV Narela	220kV Rohtak Road Ckt-1	2	0	0	0	1	1	1	
		220kV Mandola Ckt-1	2	0	0	0	1	1	1	
		220kV Panipat Ckt-2	1	0	0	0	1	1	1	
8	220kV South of Wazirabad	220kV Mandola Ckt-2	1	0	0	0	1	1	1	
		220kV Geeta Colony Ckt-2	1	0	0	0	1	1	1	
		220kV Gopalpur Ckt-1	1	0	0	0	1	1	1	
		220kV Gopalpur Ckt-2	1	0	0	0	1	1	1	
		220kV Kashmere Gate Ckt-2	1	0	0	0	1	1	1	
9	220kV DIAL	220kV Bamnauli Ckt-2	2	0	0	0	1	1	1	
10	220kV Geeta Colony	220kV South of Wazirabad Ckt-2	1	0	0	0	1	1	1	

S. No.	Substation	Unit (SPS/Line/ICT/GT etc)	Nc	Nf	Nu	Ni	Dependability Index ($D=Nc/(Nc+Nf)$)	Security Index ($S=Nc/(Nc+Nu)$)	Reliability Index ($R=Nc/(Nc+Ni)$)	Remedial Action Taken (if applicable)/ Remarks
11	220kV Kanjhawala	220kV Bawana Ckt-1	1	0	0	0	1	1	1	
		220kV Mundka Ckt.	2	0	0	0	1	1	1	
		220kV Najafgarh Ckt	1	0	0	0	1	1	1	
12	220kV Kashmere Gate	220kV South of Wazirabad Ckt-2	1	0	0	0	1	1	1	
13	220kV Masjid Moth	100MVA Transformer-2 (220/33kV)	1	0	0	0	1	1	1	
14	220kV Mehrauli	220kV Tuglakabad Ckt-2	2	0	0	0	1	1	1	
		220kV DIAL Ckt-1	1	0	0	0	1	1	1	
		220kV Vasant Kunj Ckt-2	1	0	0	0	1	1	1	
15	220kV Najafgarh	220kV Kanjhawala Ckt	1	0	0	0	1	1	1	
16	220kV Pappankalan-II	100MVA Transformer-I (220/66kV)	0	0	1	1	0	0	0	Transformer tripped on Buchholz relay. Control cable from marshalling box to RTCC panel was found faulty and the same was replaced.
17	220kV Pragati	160MVA Transformer-I (220/66kV)	1	0	0	0	1	1	1	
		160MVA Transformer-II (220/66kV)	1	0	0	0	1	1	1	
18	220kV Rohini-II	160MVA Transformer-II (220/66kV)	1	0	0	0	1	1	1	
19	220kV Sarita Vihar	220kV Maharani Bagh	1	0	0	0	1	1	1	
20	220kV Subzi Mandi	100MVA Transformer-I (220/33kV)	1	0	0	0	1	1	1	
21	220kV Tuglakabad	220kV Mehrauli Ckt-2	2	0	0	0	1	1	1	

Justification for less than one index may be attached separately.

Nc is the number of correct operations at internal power system faults

Nf is the number of failures to operate at internal power system faults

Nu is the number of unwanted operations

Ni is the number of incorrect operations and is the sum of Nf and Nu

**Reporting of Performance Indices for NHPC Power Stations In NR-Region
Month-APRIL '2026**

Sl No	Name of Utility	Name of PS	Elements (Line/ Unit)	From	To	Total Outage	Outage Reason	Nc	Nf	Nu	Ni	Dependability Index (D=Nc/(Nc+Nf))	Security Index (S=Nc/(Nc+Nu))	Reliability Index (R=Nc/(Nc+Ni))	Reason for wrong operation	Action Taken
1	NHPC Ltd	SEWA-II	132 KV Sewa-II-Hiranagar Line#3	2-Apr-26 18:39	2-Apr-26 21:00	2:21	Distance Protection relay operated in Z2 at Y-N phase fault	1	0	0	0	1	1	1	NA	NA
2	NHPC Ltd	SEWA-II	132 KV Sewa-II-Hiranagar Line#4	2-Apr-26 18:39	2-Apr-26 21:00	2:21	Distance Protection relay operated in Z2 at Y-N phase fault	1	0	0	0	1	1	1	NA	NA
3	NHPC Ltd	BAIRASUIL	220KV Birasuil-Pong Line#1	3-Apr-26 19:32	3-Apr-26 21:50	2:18	Distance Protection relay operated in Z1 at B-N Phase fault	1	0	1	0	1	0.5	1	Auto reclose operation started, however within 30 msec "CBF retrip command" was extended from busbar protection relay and three phase tripping occurred from Bairasuil end.	Logic changed in relay PSL
4	NHPC Ltd	KARNISAR SOLAR	125 MVA, 33/220 KV ICT-2	6-Apr-26 13:58	7-Apr-26 04:34	14:36	Over Current Stage-2 protection operated	1	0	0	0	1	1	1	NA	NA
5	NHPC Ltd	KARNISAR SOLAR	125 MVA, 33/220 KV ICT-3	6-Apr-26 13:58	8-Apr-26 01:38	35:40	Over Current Stage-2 protection operated	1	0	0	0	1	1	1	NA	NA
6	NHPC Ltd	TANAKPUR	220 KV Tanakpur-CB Ganj Line#1	9-Apr-26 02:13	9-Apr-26 03:45	01:32	Busbar protection operated in Bus#1	1	0	1	0	1	0.5	1	Due to improper feedback status of Bus Isolator of Tanakpur-CB Ganj Line#1, Bus Protection operated	The feedback status of bus isolators of Line#1 has been rectified.
7	NHPC Ltd	TANAKPUR	220 KV Tanakpur-Sitaraganj Line#2	9-Apr-26 02:13	9-Apr-26 03:23	01:10	Busbar protection operated in Bus#1	1	0	1	0	1	0.5	1	Due to improper feedback status of Bus Isolator of Tanakpur-CB Ganj Line#1, Bus Protection operated	The feedback status of bus isolators of Line#1 has been rectified.
8	NHPC Ltd	TANAKPUR	132 kv Tanakpur-Mahendranagar Line#3	9-Apr-26 02:13	9-Apr-26 04:06	01:53	Busbar protection operated in Bus#1	1	0	1	0	1	0.5	1	Due to improper feedback status of Bus Isolator of Tanakpur-CB Ganj Line#1, Bus Protection operated	The feedback status of bus isolators of Line#1 has been rectified.

9	NHPC Ltd	SALAL	220 KV Salal-Jammu Line#1	16-Apr-26	22:02	17-Apr-26	00:24	02:22	Distance Protection relay operated in Z2 at R-Y-B Phase fault	1	0	1	0	0	1	0.5	1	NA	NA
10	NHPC Ltd	SEWA-II	132 KV Sewa-II-Hiranagar Line#3	18-Apr-26	16:04	18-Apr-26	17:30	01:26	Emergency Shutdown Awailed by Hiranagar end	1	0	0	0	0	1	1	1	NA	NA
11	NHPC Ltd	SEWA-II	132 KV Sewa-II-Hiranagar Line#4	18-Apr-26	16:04	18-Apr-26	17:35	01:31	Emergency Shutdown Awailed by Hiranagar end	1	0	0	0	0	1	1	1	NA	NA
12	NHPC Ltd	TANAKPUR	220 KV Tanakpur-Sitaraganj Line#2	18-Apr-26	16:43	18-Apr-26	18:24	01:41	DPR operated in Z3	1	0	1	0	0	1	0.5	1	Three-phase tripping occurred in Zone-3 without the intended time delay	Relay malfunctioning was observed. Matter is taking up with relay OEM
13	NHPC Ltd	TANAKPUR	220 KV Tanakpur-CB Ganj Line#1	19-Apr-26	13:08	19-Apr-26	16:14	03:06	DPR operated in Z1 at R-Y Phase fault	1	0	0	0	0	1	1	1	NA	NA

No Line tripping has been observed from other Power Stations of NHPC of NR region for Month of April 2026

Handwritten signature and notes:
 CS. Pawan,
 CS. S.M. (E)
 04.05.26

S.No.	Substation	Element name	Date & Time of the tripping	Categorization (F/U) F = Failures to operate at internal power system faults U = Unwanted operations	Reason for failures/Unwanted operation	Corrective action taken/ to be taken
1	400 KV Rosa	400 KV Rosa Badaun Ckt#1	15/04/2026, 13:38	U	AR failed	AR circuit and logic checked

Reason for Performance Indices less than Unity-April 2026 (RVPN)

Case-1 220 KV BIKANER-BADNU LINE at 220KV GSS BIKANER on 04.04.2026

No. of Failures to Operate – 1

Reason of failure to operate –

CB of 220 KV BIKANER-BADNU LINE at 220KV GSS Bikaner failed to operate on fault.

Corrective Action taken – YES

CB overhauled, now working satisfactorily.

Case-2 220 KV Baran -Dahara Line at 220KV GSS BARAN on 04.04.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

Overload setting was enabled.

Corrective Action taken – YES

Overload setting disabled.

Case-3 220 KV SURATGARH BIKANER LINE at 220KV GSS BIKANER on 07.04.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

M-2 relay operated due to VT selection relay problem.

Corrective Action taken – YES

VT selection problem rectified and restored.

Case-4 220 KV Hamirgarh -Bhilwara Line, 100 MVA,220/132 KV BHEL Make Tr No 1 & 2 at 220KV GSS HAMIRGARH on 18.04.2026

No. of Unwanted operation – 3

Reason of unwanted operation –

External LBB relay defective.

Corrective Action taken – YES

Defective external LBB relay put out of ckt., Internal LBB in Bus Bar Protection scheme is in service.

Case-5 220 KV BANSUR-KOTPUTLI-PGCIL CKT.-I LINE at 220KV GSS BANSUR on 20.04.2026

No. of Unwanted operation – 1

Reason of unwanted operation –

PD relay operated due to cable fault.

Corrective Action taken – YES

Faulty cable replaced.

Case-6 220 KV Bikaner (400kV) – Bikaner (220kV) Interconnector-I Line at 220KV GSS BIKANER on 25.04.2026

No. of Failures to Operate – 1

Reason of unwanted operation –

CB of 220 KV Interconnector-I at 220KV GSS Bikaner failed to operate on fault.

Corrective Action taken – YES

CB overhauled, now working satisfactorily.

Case-7 220 KV Bikaner (400kV) – Bikaner (220kV) Interconnector-II Line at 220KV GSS BIKANER on 26.04.2026

No. of Failures to Operate – 1

Reason of unwanted operation –

CB of 220 KV Interconnector-I at 220KV GSS Bikaner failed to operate on fault.

Corrective Action taken – YES

CB overhauled, now working satisfactorily.

South East UP Power Transmission Co. Ltd.

Protection Performance Indices-April 2026

S.No.	Substation	Element name	Total number of tripping	Nc	Nf	Nu	Ni	Dependability Index (D)	Security Index(S)	Reliability Index(R)
1	765/400 kV substation, Mainpuri	765 KV Mainpuri-Hapur Line		1	0	0	0	1	1	1
2		240 MVAR Bus Reactor		1	0	0	0	1	1	1
3		765 kV Bara-Mainpuri ckt-1		1	0	0	0	1	1	1
4		400 KV Orai-MNP CKT-2		1	0	0	0	1	1	1
5		400 KV Mainpuri- Aligarh CKT-1		2	0	0	0	1	1	1
6		400 KV Mainpuri- Aligarh CKT-1		0	0	1	1	#DIV/0!	0	0
7		765 kV Bara-Mainpuri ckt-2		1	0	0	0	1	1	1
1	400/220kV GIS SS Rewa Road Prayagraj	400kV Rewa Road- Obra(B) Line	3	3	0	0	0	1	1	1
2		400kV Rewa Road- Banda Ckt#1 Line	1	1	0	0	0	1	1	1
3		220kV Rewa Road- Chitrakoot Ckt#1 Line	1	1	0	0	0	1	1	1
4		220kV Rewa Road- Chitrakoot Ckt#1 Line	1	1	0	0	0	1	1	1
1	400/220/132 KV GONDA S/S	220 KV GONDA-BALRAMPUR LINE	1	1	0	0	0	1	1	1

The Dependability Index defined as (D) = Nc/(Nc+Nf)

The Security Index defined as (S) = Nc/(Nc+Nu)

The Reliability Index defined as (R) = Nc/(Nc+Ni)

Nc is the number of correct operations at internal power system faults.

Nf is the number of failures to operate at internal power system faults.

Nu is the number of unwanted operations.

Ni is the number of incorrect operations and the sum of Nf and Nu.

*** PPI (Protection Performance indices) should be submitted only for tripped elements of any sub station (Example 1,2 & 3)**

*** In case of no tripping of any element in a sub station it is should be submitted as "Nil" (Example 4)**

*** In case of single tripping which is Nf or Nu, PPI will be "Zero" (Example 1)**

*** In case of PPI less than one, details for that tripping should be submitted seperately (Example "Remarks for less than one sheet")**

मुख्य अभियन्ता (सं०)
निदेशक (आपरेशन)



U.P. Power Transmission
Corporation Ltd.
Shakti Bhawan Extn.
14 Ashok Marg, Lucknow- 226001
Tel/Fax: 0522-2287833 / 2286476
Email: director_op@upptcl.org

No: 3320 /Dir (Op)/ NRPC

Date: 07/05/2026


Subject: Protection performance indices of protection system for the month of 04/2026.

SEO
NRPC
New Delhi.

Through E- Mail

Mail ID – seo-nrpc@nic.in

Kindly find enclosed herewith copy of compiled Protection performance indices along with the reports obtained from all 06 Zonal offices of UPPTCL for the month of April, 2026.


(Rakesh Prasad)
Chief Engineer (Operation)

No: 3320 /Dir (Op)/ NRPC

Date: 07/05/2026

Copy to :-

- 1 Director (Operation) UPPTCL, Lucknow for information.
- 2 Chief Engineer, TC/TW/TSW/TSC/TSE/TNE, UPPTCL, Lucknow/Meerut/Agra/Jhansi/ Prayagraj/Gorakhpur.
- 3 Superintending Engineer (RA), UPSLDC, Lucknow.

/

(Rakesh Prasad)
Chief Engineer (Operation)

Protection Performance Indices (April, 2026)

S. No.	Transmission Zone	Dependability index	Security index	Reliability index	Remark
1	TC, Lucknow	1	1	1	
2	TSC, Jhansi	1	1	1	----
3	TNE, Gorakhpur	1	1	1	----
4	TSW, Agra	1	1	1	----
5	TSE, Prayagraj	1	1	1	----
6	TW, Meerut	1	0.98	0.99	<p>1. There are 2 No. 220 KV Lines (220 KV Mator(PG) Line & 220 KV Amroha Line) & 3 No. 220/132 KV Power Transformers (2*160 MVA+ 1*100 MVA) at 220 KV S/S Nehtaur. At the time of grid incident, Only 2 No. Transformers (2*160 MVA) were in operation.</p> <p>2. At 21:31:47 Hrs on 25.04.2026, Y phase CT of 132 KV Chandpur line blasted at 220 KV SS Nehtaur with heavy sound. On checking, Y phase CT & B phase CB Pole of 132 KV Chandpur Line found blasted & damaged.</p> <p>3. 132 KV Chandpur Line relay issued tripping command with flags: Y ph, Zone 1, Ir-0.17 KA, Iv-33.75 KA, Ib-0.14 KA, 86, RTT- 81 ms, Dist- 0.7 Km. But due to Very Heavy fault current & Blasting of B phase Pole of CB of Chandpur Line, the fault persisted & resulted into following cascading events: 132 KV Nehtaur- Chandpur Line relay issued tripping command with flags: Y ph, Zone 1, Ir- 0.17 KA, Iv-33.75 KA, Ib-0.14 KA, 86, RTT- 81 ms, Dist- 0.7 Km. & other end flags: Y Ph, B Ph, Zone 2, Ir- 0.104 KA, Iv- 1.78 KA, Ib-1.20 KA, Dist: 21 Km</p> <p>ii) 132 KV Nehtaur- Nagina line tripped at 21:32 hrs. at 220 KV S/S Nehtaur end with flags: Zone 4, R Ph, Y Ph, B Ph, Ir-3.89 KA, Iv-4.26 KA, Ib- 3.97 KA, Dist- 0.0 Km ii) 132 KV Nehtaur- Afzalgarh tripped at 21:32 hrs. at 220 KV S/S Nehtaur end with flags: Zone 4, R ph, Y Ph, B Ph, Ir-1.23 KA, Iv- 1.29 KA, Ib- 1.23 KA, Dist: -0.8 Km iv) 132 KV Nehtaur- Tajpur line tripped at 21:32 hrs. at 220 KV S/S Nehtaur end with flags: Zone 4, R Ph, Y Ph, B Ph, Ir-1.45 KA, Iv-1.57 KA, Ib- 1.46 KA, Dist: -1.4 Km v) 132 KV Nehtaur- Dhampur line tripped at 21:32 hrs. at 220 KV S/S Nehtaur end with flags: Zone 4, Y Ph, B Ph, Ir-0.074 KA, Iv-0.766 KA, Ib- 0.730 KA, Dist: -0.6 Km vi) 220 KV Nehtaur- Amroha Line tripped at 21:32 hrs. on dated</p>

			<p>25.04.2026 from 220 KV SS Amroha end with Flags: Zone 3, Y ph, B ph, Ir-0.16 KA, Iv-1.47KA, Ib-1.44KA, Dist: 152.52Km</p> <p>vii) 220 KV Nehtaur- Mataur Line tripped at 21:32 hrs on date 25.04.2026 at Mataur End with Flags: Zone 3, Y ph, B ph, Ir- 0.29 KA, Iv- 1.71 KA, Ib- 1.29 KA, Dist= 138.4 Km</p> <p>4. After inspection of 220 KV and 132 KV switchyard at 220 KV S/S Nehtaur, 132 KV Nehtaur-Nagina line breaker closed from 132 KV SS Nagina end & the supply was resumed at 220 KV S/S Nehtaur at 21:43 Hrs on 25/04/2026. (Feeding from 132 KV Nehtaur (400KV)- Nagina line)</p> <p>5. At 22:06 Hrs on 25/04/2026, 220 KV Nehtaur - Amroha line was charged. At 01:39 Hrs on 26/04/2026, 220 KV Nehtaur- Mator (PG) line was charged. At 21:31:47 Hrs on 25.04.2026, Y phase CT of 132 KV Chandpur line blasted at 220 KV SS Nehtaur with heavy sound. 132 KV Chandpur Line relay issued tripping command to clear the fault with RTT- 80 ms. But the blasting of Y Ph CT, damaging of B phase pole of Chandpur line & subsequent fire first created persistent Bus Fault at Y & B Phase and then the 3 phase fault at 132 II Y-B)= 2.91 KA 4. In both the T/F, HV Directional O/C-E/F of Micom P14D make with settings : IDMT O/C- 0.84A, TMS- 0.25 & IDMT E/F- 0.17 A, TMS- 0.25 & Highset O/C-E/F - 6.0 A, Time- 60 ms and LV Directional O/C-E/F of Micom P14D make with settings : IDMT O/C- 0.88 A, TMS- 0.20 & IDMT E/F- 0.17 A, TMS- 0.20 & Highset O/C-E/F- 6.0 A, Time- 60 ms are installed. 5. For the HV Side : If(160-I-Y-B) & If(160-II-Y-B) i.e 1.75 KA</p> <p>Top = $(0.14 / ((PSM^{0.02}) - 1)) * TMS = (0.14 / KV Busbar)$.</p> <p>2. It resulted into tripping of 04 No. Grid connected 132 KV Lines (Afzalgarh, Tajpur, Nagina, Dhampur) in Zone 4 at 220 KV SS Nehtaur end and also the tripping of both the 220 KV Lines in Zone 3 from other end. 3. As per the DR observations of both the 220 KV Lines ie Mataur (PG) Line & Amroha lines, the fault current flowing through 220 KV Side in Y & B phase is If(Mataur)= 2.15 KA, If(Amroha)= 1.35 KA. Therefore, If(Y-B) Bus = 2.15+1.35=3.50 KA is fed at the 220 KV Bus. At the time of tripping, 02 No 160 MVA T/F were in operation running in parallel. Therefore, this fault current is then divided into 2 No. 220/132 KV Transformers running in parallel. The fault current flowing through HV Side of transformers is If(160-I-Y-B)= 1.75 KA & If(160-II-Y-B)= 1.75 KA and through LV Side of transformers is If(160-I-Y-B)= 2.91 KA & If(160-II-Y-B)= 2.91 KA & If(160-((1750/0.84*500)^{0.02})-</p>
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				<p>1))*0.25 = 1.21 sec6. For the LV Side : If(160-I Y-B) & If(160-II Y-B) i.e 2.91 KATop = (0.14 / ((PSM^0.02) - 1))*TMS= (0.14 / ((2910/0.88*800)^0.02) - 1))*0.20 = 0.98 sec7. With respect to HV Highset O/C settings= 6A i.e. 6*500=3 KA & LV Highset O/C settings= 6A i.e. 6*800=4.8 KA, the HV Side fault current If(160-I Y-B) & If(160-II Y-B) i.e 1.75 KA and the LV Side fault current If(160-I Y-B) & If(160-II Y-B) i.e 2.91 KA never reached the pickup/trip values. Conclusion: 1. Trip timing for Zone 3 settings of 220 KV Mataur PG line & 220 KV Amroha Line are 800 ms (0.8 sec).2.As per above calculation, Top time for both the transformers at 220 KV SS Nehtaur:Top(HV Side)= 1.21 sec > 0.8 secTop(LV Side)= 0.98 sec > 0.8 sec3.As the time taken by the transformers is more than the Zone 3 timings (0.8 sec) of 220 KV Lines. Therefore, 220 KV Mataur PG line & 220 KV Amroha Line tripped in Zone 3 from other ends & the relays of both the transformers only picked up."</p>
Total indices Value	1	0.997	0.998	

Status of performance indices reporting of SPS																
Month-March 2026																
Sr. No.	Scheme Name	Owner / Agency	Controlling SLDC/ NRLDC	Reporting by Owner / Agency to Concerned SLDC/NRLDC (Latest by 07.04.2026)										Verification by NRLDC/SLDC		
				No	Ho	Nf	Ni	Dependability Index	Security Index	Reliability Index	Reason for indices less than 1	Corrective action taken	Date of Receipt of data from owner/agency (DD/MM/YYYY)	Verification of indices as per actual grid condition (Yes/No)	Remarks	NRLDC/SLDC reporting date
1	SPS for WR-NR corridor - 765kV Agra-Gwalior D/C	POWERGRID	NRLDC													
2	SPS for contingency due to tripping of HVDC Mundra-Mahendergarh	ADANI	NRLDC													
3	SPS for high capacity 400 kV Muzaffarpur-Gorakhpur D/C Inter-regional tie-line related contingency	POWERGRID	NRLDC													
4	SPS for 1500 MW HVDC Rihand-Dadri Bipole related contingency	POWERGRID	NRLDC													
5	System Protection Scheme (SPS) for HVDC Balla-Bhiwadi Bipole	POWERGRID	NRLDC													
6	SPS for reliable evacuation of power from NIPS, Rampur, Sawra Kuddu, Baspa Sorang and Karcham Wangtoo HEP	SJVN	NRLDC	0	0	0	0	NA	NA	NA	NA	NA	06.04.2026	Yes	No SPS Operation	
		HPPTCL/HPSLDC		0	0	0	0	NA	NA	NA	NA	06.04.2026				
		JSW														
		POWERGRID														
7	SPS for Transformers at Maharanihbagh (PG) substation	POWERGRID	NRLDC													
8	SPS for Transformers at Mandola (PG) substation	POWERGRID	NRLDC													
9	SPS for Transformers at 400kV Fatehgarh Solar Park (AREPL)	ADANI	NRLDC	0	0	0	0	NA	NA	NA	NA	NA	06.04.2026			
10	SPS to relieve transmission congestion in RE complex (Bhadia2)	POWERGRID	NRLDC													
11	SPS for Transformers at 765kV Jhatikara(PG) Substation (Bamnauli section)	POWERGRID	NRLDC													
	NRLDC															
12	SPS for Transformers at 765kV Bhawan(PG) Substation	POWERGRID	NRLDC													
13	SPS for Transformers at 400kV Agra(PG) Substation	POWERGRID	NRLDC													
14	SPS for Transformers at Bamnauli (DTL) substation	DTL	Dehli SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026		Submitted bu DTL	
15	SPS for Transformers at 400kV Mundka (DTL) Substation	DTL	Dehli SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026		Submitted bu DTL	
16	SPS for Transformers at 400kV Bawana (DTL) Substation	DTL	Dehli SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026		Submitted bu DTL	
17	SPS for Reliable Evacuation of Rosa Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	06.04.2026	YES	No SPS Operation	07.04.2026
18	SPS for evacuation of Anpara Generation Complex	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
19	SPS for evacuation of Lalitpur TPS Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
20	SPS for Reliable Evacuation of Bara TPS Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	06.04.2026	YES	No SPS Operation	07.04.2026
21	SPS for Transformers at Moradabad (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
22	SPS for Transformers at Muradnagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
23	SPS for Transformers at Agra (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
24	SPS for Transformers at 400kV Sarojinagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
25	SPS for Transformers at 220kV Sarojinagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
26	SPS for Transformers at 400kV Unnao (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
27	SPS for Transformers at 400kV Sultanpur (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
28	SPS for Transformers at 400kV Bareilly (UPPTCL) Substation	UPPTCL	UPSLDC	SPS not commissioned yet										07.04.2026		
29	SPS for Transformers at 400kV Azamgarh (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
30	SPS for Transformers at 400kV Mau (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
31	SPS for Transformers at 400kV Gorakhpur (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	YES	No SPS Operation	07.04.2026
32	SPS for Transformers at 400kV Samath (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
33	SPS for Transformers at 400kV Nehtaur(WUPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	03.04.2026	YES	No SPS Operation	07.04.2026
34	SPS for Transformers at Obra TPS	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
35	SPS for Transformers at 400kV Allahabad(PG) Substation	UPPTCL	UPSLDC	To be submitted by PGCIL										07.04.2026		
36	SPS for Transformers at 400kV Jaunpur(JUP) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	01.04.2026	YES	No SPS Operation	07.04.2026
37	SPS for Transformers at 400kV Panki (UPPTCL) Substation	UPPTCL	UPSLDC	SPS not commissioned yet										07.04.2026		
38	SPS for Lahal Generation	HPPTCL	HPSLDC	0	0	0	0	NA	NA	NA	NA	NA	06.04.2026	Yes	No SPS Operation	06.04.2026
39	SPS for Transformer at 400kV Rajpura (PSTCL) Substation	PSTCL	Punjab SLDC	0	0	0	0	NA	NA	NA	NA	NA	02.04.2026	Yes	No SPS Operation	02.04.2026
40	SPS for Transformers at 400kV Kashipur (PTCUL) Substation	PTCUL	Uttarakhand SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026		Submitted bu PTCUL	
41	SPS for Transformers at 400kV Ajmer (RVPNL) Substation	RVPNL	Rajasthan SLDC	1	0	0	0	1	1	1	NA	NA	07.04.2026	YES	correct	07.04.2026
42	SPS for Transformers at 400kV Merta (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
43	SPS for Transformers at 400kV Chittorgarh (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
44	SPS for Transformers at 400kV Jodhpur (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
45	SPS for Transformers at 400kV Bhadla (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
46	SPS for Transformers at 400kV Ratangarh (RVPNL) Substation	RVPNL	Rajasthan SLDC	1	0	0	0	1	1	1	NA	NA	07.04.2026	YES	correct	07.04.2026
47	SPS for evacuation of Kawai TPS, Kalisindh TPS generation complex	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
48	SPS for Transformers at 400kV Bikaner (RVPNL) Substation	RVPNL	Rajasthan SLDC	1	0	0	0	1	1	1	NA	NA	07.04.2026	YES	correct	07.04.2026
49	SPS for Transformers at 400kV Bhiwara (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
50	SPS for Transformers at 400kV Hinduan (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
51	SPS for Transformers at 400kV Suratgarh (RVPNL) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026
52	SPS for Transformers at 400kV Babi(RS) Substation	RVPNL	Rajasthan SLDC	0	0	0	0	NA	NA	NA	NA	NA	07.04.2026	YES	No SPS Operation	07.04.2026

Note- Any other SPS details (if implemented and not mentioned above) may be added in this format by Concerned Utility/SLDC/NRLDC

Status of performance indices reporting of SPS

Month-April 2026

Sr. No.	Scheme Name	Owner / Agency	Controlling SLDC/ NRLDC	Reporting by Owner / Agency to Concerned SLDC/NRLDC (Latest by 07.05.2026)										Verification by NRLDC/SLDC					
				No	Nu	NF	N	Dependability Index	Security Index	Reliability Index	Reason for indices less than 1	Corrective action taken	Date of Receipt date from owner/agency (DD/MM/YYYY)	Verification of indices as per actual grid condition (Yes/No)	Remarks	NRLDC/SLDC reporting date			
1	SPS for WR-NR corridor - 765kV Agra-Gwalior D/C	POWERGRID	NRLDC																
2	SPS for contingency due to tripping of HVDC Mundra-Mahendergarh	ADANI	NRLDC																
3	SPS for high capacity 400 KV Muzaffarpur-Gorakhpur D/C Inter-regional tie-line related contingency	POWERGRID	NRLDC																
4	SPS for 1500 MW HVDC Rihand-Dadri Bipole related contingency	POWERGRID	NRLDC																
5	System Protection Scheme (SPS) for HVDC Balla-Bhiwadi Bipole	POWERGRID	NRLDC																
6	SPS for reliable evacuation of power from NIPS, Rampur, Sawra Kuddu, Baspa Sorang and Karcham Wangtoo HEP	SJVN	NRLDC	0	0	0	0	NA	NA	NA	NA	NA	05.05.2026						
		HPPTCL/HPSLDC		0	0	0	0	NA	NA	NA	NA	NA	07.05.2026	YES	No SPS Operation				
		JSW																	
		POWERGRID																	
7	SPS for Transformers at Maharanibagh (PG) substation	POWERGRID	NRLDC																
8	SPS for Transformers at Mandola (PG) substation	POWERGRID	NRLDC																
9	SPS for Transformers at 400KV Fatehgarh Solar Park (AREPRL)	ADANI	NRLDC	0	0	0	0	NA	NA	NA	NA	NA	11.05.2026					Submitted by AGEL	
10	SPS to relieve transmission congestion in RE complex (Bhadia2)	POWERGRID	NRLDC																
11	SPS for Transformers at 765KV Jhatikara(PG) Substation (Bamnauli section)	POWERGRID	NRLDC																
	NRLDC																		
12	SPS for Transformers at 765KV Jhatikara(PG) Substation (Mundka section)	POWERGRID	NRLDC																
13	SPS for Transformers at 765KV Bhiwani(PG) Substation	POWERGRID	NRLDC																
14	SPS for Transformers at 400KV Agra(PG) Substation	POWERGRID	NRLDC																
14	SPS for Transformers at Bannauli (DTL) substation	DTL	Dehi SLDC	0	0	0	0	NA	NA	NA	NA	NA	05.05.2026					Submitted by DTL	
15	SPS for Transformers at 400KV Mundka (DTL) Substation	DTL	Dehi SLDC	0	0	0	0	NA	NA	NA	NA	NA	05.05.2026					Submitted by DTL	
16	SPS for Transformers at 400KV Bawana (DTL) Substation	DTL	Dehi SLDC	0	0	0	0	NA	NA	NA	NA	NA	05.05.2026					Submitted by DTL	
17	SPS for Reliable Evacuation of Rosa Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	06.05.2026	YES	No SPS Operation			07.05.2026	
18	SPS for evacuation of Anpara Generation Complex	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	04.05.2026	YES	No SPS Operation			07.05.2026	
19	SPS for evacuation of Lalitpur TPS Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	06.05.2026	YES	No SPS Operation			07.05.2026	
20	SPS for Reliable Evacuation of Bara TPS Generation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
21	SPS for Transformers at Moradabad (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	04.05.2026	YES	No SPS Operation			07.05.2026	
22	SPS for Transformers at Muradnagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	04.05.2026	YES	No SPS Operation			07.05.2026	
23	SPS for Transformers at Agra (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
24	SPS for Transformers at 400KV Sarojinagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
25	SPS for Transformers at 220KV Sarojinagar (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
26	SPS for Transformers at 400KV Unnao (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
27	SPS for Transformers at 400KV Sultanpur (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
28	SPS for Transformers at 400KV Bareilly (UPPTCL) Substation	UPPTCL	UPSLDC	SPS not commissioned yet														07.05.2026	
29	SPS for Transformers at 400KV Azamgarh (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
30	SPS for Transformers at 400KV Mau (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
31	SPS for Transformers at 400KV Gorakhpur (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
32	SPS for Transformers at 400KV Samath (UPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
33	SPS for Transformers at 400KV Nehtaur(WUPPTCL) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	04.05.2026	YES	No SPS Operation			07.05.2026	
34	SPS for Transformers at Obra TPS	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
35	SPS for Transformers at 400KV Allahabad(PG) Substation	UPPTCL	UPSLDC	To be submitted by PGCIL														07.05.2026	
36	SPS for Transformers at 400KV Jaunpur(IUP) Substation	UPPTCL	UPSLDC	0	0	0	0	NA	NA	NA	NA	NA	02.05.2026	YES	No SPS Operation			07.05.2026	
37	SPS for Transformers at 400KV Panki (UPPTCL) Substation	UPPTCL	UPSLDC	SPS not commissioned yet														07.05.2026	
38	SPS for Lahal Generation	HPPTCL	HPSLDC																
39	SPS for Transformer at 400KV Rajpura (PSTCL) Substation	PSTCL	Punjab SLDC																
40	SPS for Transformers at 400KV Kashipur (PTCUL) substation	PTCUL	Uttarakhand SLDC	1	0	0	0	1	1	1	-	-	07.05.2026					Submitted by PTCUL	
41	SPS for Transformers at 400KV Ajmer (RVPNL) Substation	RVPNL	Rajasthan SLDC																
42	SPS for Transformers at 400KV Merta (RVPNL) Substation	RVPNL	Rajasthan SLDC																
43	SPS for Transformers at 400KV Chittorgarh (RVPNL) Substation	RVPNL	Rajasthan SLDC																
44	SPS for Transformers at 400KV Jodhpur (RVPNL) Substation	RVPNL	Rajasthan SLDC																
45	SPS for Transformers at 400KV Bhadla (RVPNL) Substation	RVPNL	Rajasthan SLDC																
46	SPS for Transformers at 400KV Ratangarh (RVPNL) Substation	RVPNL	Rajasthan SLDC																
47	SPS for evacuation of Kawai TPS, Kalisindh TPS generation complex	RVPNL	Rajasthan SLDC																
48	SPS for Transformers at 400KV Bikaner (RVPNL) Substation	RVPNL	Rajasthan SLDC																
49	SPS for Transformers at 400KV Bhiwara (RVPNL) Substation	RVPNL	Rajasthan SLDC																
50	SPS for Transformers at 400KV Hinduan (RVPNL) Substation	RVPNL	Rajasthan SLDC																
51	SPS for Transformers at 400KV Suratgarh (RVPNL) Substation	RVPNL	Rajasthan SLDC																
52	SPS for Transformers at 400KV Babal(RS) Substation	RVPNL	Rajasthan SLDC																

Note- Any other SPS details (if implemented and not mentioned above) may be added in this format by Concerned Utility/SLDC/NRLDC

Sl. No.	Month	SPS Operated	Details of SPS operated	No. of times operated in Month	No. of correct operations	No. of mal-operation	No. of times failed to operate	Remarks
1	May25	SPS for safe evacuation of Lalitpur TPS Generation	<p>1. At 15:32:37 hrs, B-N fault occurred on 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 and A/R started. At the same instant, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 tripped on operation of OV stage-2 protection. As per DR of line, voltage of R-ph of 765KV Lalitpur-Agra Fatehabad line-II increased from 411kV to "845kV for ~140ms".</p> <p>ii)Further, after dead time of A/R operation, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 also tripped due to permanent nature of fault.</p> <p>iii)As per PMU at Agra765(PG), B-N phase to earth fault with delayed clearance of ~560ms is observed.</p> <p>iv)Due to tripping of both the 765KV evacuating lines, case-3 for SPS for safe evacuation of Lalitpur generation on operated. As per SPS case-3, in case of tripping of both the 765KV lines, one 660MW unit (in this case unit-3) shall come to house load and remaining unit shall trip. 220KV lines to Lalitpur and hansi shall also trip.</p> <p>v)However, as 100MVA ST-2 already tripped at 15:26 hrs during LBB operation of 220KV Bus-1, BFP for Unit-3 was not available and therefore, 660MW Unit-3 also tripped along with 660MW Unit-1&2. 220KV line to Lalitpur(2nd ckt) also tripped on SPS operation.</p> <p>vi)Due to tripping of both the units and all the 220KV feeders on loss of evacuation path and SPS operation, complete 765/220KV Lalitpur 5/6 got blackout.</p> <p>vii)As per SCADA, generation loss of 1040MW at Lalitpur (TPS) and change in UP demand of ~900MW is observed.</p> <p>2.</p> <p>i)At 13:49 hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 tripped on R-8 phase to phase fault.</p> <p>ii)Further at 13:56hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 tripped on R-N phase to earth fault.</p> <p>iii)Due to tripping of both the 765KV evacuating lines, case-3 for SPS for safe evacuation of Lalitpur generation on operated. As per SPS case-3, in case of tripping of both the 765KV lines, one 660MW unit (in this case unit-3) shall come to house load and remaining unit shall trip. 220KV lines to Lalitpur and hansi shall also trip.</p> <p>iv)As a result, 660 MW Lalitpur Unit-1 & Unit-2 tripped alongwith, 220 KV Lalitpur -hansi (UP) Ckt, 220KV Lalitpur-Lalitpur220 ckt-1 and 220 KV Lalitpur -Babina (UP) Ckt tripped on SPS.</p> <p>v)As per SPS, the generation of 660MW Unit-3 reduced to 70MW for house load operation.</p> <p>vi)As per PMU at 765KV Agra(PG), two consecutive R-N phase to phase faults with fault clearing time of 120ms is observed.</p>	<p>1 03.05.2025 at 15:32hrs</p> <p>2 11.05.2025 at 13:49hrs</p>	2	0	0	<p>During 1st event: As 100MVA ST-2 already tripped at 15:26 hrs during LBB operation of 220KV Bus-1, BFP for Unit-3 was not available and therefore, 660MW Unit-3 also tripped along with 660MW Unit-1&2. 220KV line to Lalitpur(2nd ckt) also tripped on SPS operation.</p>
2	May25	HVDC Rihand-Dadri SPS	<p>i)As reported at 20:21 hrs, during multiple elements tripping event in Dadri, Meenat complex on subsequent line faults, 500 KV HVDC Rihand-Dadri (PG) Ckt-1 and Ckt-2 tripped due to commutation failure. At the time of tripping 500 kv HVDC Rihand-Dadri (PG) Ckt-1 and Ckt-2 were carrying total ~1150 MW. As a result of tripping of both the ckt, SPS condition 2 operated.</p> <p>ii)As per details received from POWERGRID, as per logic if commutation failure persists for more than 2600 ms then the Protection shall issue a Y Trip to the converters. Since starting from 20:20:58.2765 Hrs, 12 successive commutation failures were detected at a gap of less than 500ms, at 20:21:00.8792 both Poles of the Rihand Dadri HVDC Link tripped on Commutation failure protection from HVDC Dadri 5/6.</p> <p>iii)As per SPS case-2 operation, there should be load shed in load group-A, B, C & D and generation back down of total ~500 MW at Rihand & Singrauli TPS. As per SCADA data, generation backdown of ~335MW is observed in Rihand Stage I and Stage II. However, there wasn't any significant generation back down (only ~30MW) in Singrauli observed. At load stations also, no significant load relief was observed as per SCADA. As per status received from sites, SPS signal was sent from POWERGRID (Dadri 5/6) however SPS action didn't occur at multiple stations due to issue in SPS system at load stations end.</p>	<p>1 21.05.2025 at 20:21hrs</p>	1	0	0	<p>As per details received from SLDs and POWERGRID, SPS signal was sent from POWERGRID (Dadri 5/6) however SPS action didn't occur at multiple stations due to issue in SPS system at load stations end. Non-operation of SPS at Singrauli, Maleskotia, Muzaffarnagar, Modipuram, Panchsathi. Confirmation from some of the load stations not received yet.</p>
3	Jul25	SPS for reliable evacuation of power from N. Jharkh, Rampur, Karamch Wangtoo, Sawa Kuddu, Baspa, Sorang and Naitwar Mori HEP	<p>At 06:25 hrs, case-1 of "SPS for reliable evacuation of power from N. Jharkh, Rampur, Karamch Wangtoo, Sawa Kuddu, Baspa, Sorang and Naitwar Mori HEP" operated. As per SPS logic, condition for SPS case-1 operation is "Load on any of the lines in Jharkh, Rampur or Gumma towards Nalagarh or Panchkula exceeds 900 MW". However, loading on all the evacuating lines were within permissible limit (~900MW).</p>	<p>1 14.07.2025 at 06:25hrs</p>	0	1	0	<p>As confirmed, SPS operated due to faulty transducer of the 400KV Rampur-Nalagarh transmission line at the Rampur end and faulty transducer has been successfully replaced by the RHPs team</p>
4	Aug25	SPS for Transformers at 400KV Kashipur (PTCUL) substation to avoid overloading of Transformers	<p>i)As reported, at 04:39 hrs, Y/N fault occurred on 220KV Kashipur-Jafarpur line. Due to non clearance of fault from Kashipur end relay issue, 400/220KV ICTs at Kashipur tripped on overcurrent protection operation. At the same time, case-2 of SPS ICTs at Kashipur also operated. This further led to tripping of 220KV Kashipur-Jafarpur line CB at Kashipur end and 132KV Kashipur-Jaspur line.</p>	<p>1 18.08.2025 at 04:39hrs</p>	1	0	0	
5	Sept25	SPS for Transformers at 220KV Sarojinagar (UPPTCL) substation	<p>As reported at 19:57 hrs, multiple elements tripped at 220/132KV Bijora(UP). This has further led to overloading of ICTs at Sarojinagar(UP) leading to operation of SPS for transformer at Sarojinagar(UP). On operation of SPS, 132KV TRT line-1&H, 132KV Nudargang-2, Geeru, Ustreta, Lasa-H&B tripped.</p>	<p>1 27.09.2025 at 19:57 hrs</p>	1	0	0	
6	Oct25	SPS for Transformers at 400/220KV Agra(UPPTCL) substation	<p>As reported at 19:16 hrs, multiple elements tripped at 400/220KV Agra(UP), 400/220KV 500MVA ICT-2 and 315 MVA ICT-3 tripped during the event. After tripping of ICT-2&3, case-2 of SPS for transformers at Agra(UP) triggered leading to tripping of 220KV feeder to Agra220KV(UP) ICT-1 and 132KV feeders to Foundry Nagar, Sadabad, Agra Taj, Dayalbagh-1 & Bhimnagri. 220KV feeder to Shamsabad and Mital didn't trip on SPS. During inspection, it was found that CB status of both the feeders was not showing in SPS system.</p>	<p>1 21.10.2025 at 19:16 hrs</p>	1	0	0	<p>220KV feeder to Shamsabad and Mital didn't trip on SPS. During inspection, it was found that CB status of both the feeders was not showing in SPS system.</p>
7	Feb26	SPS for safe evacuation of Lalitpur TPS Generation	<p>1. As reported, at 06:57:40 hrs, Case 5 of SPS scheme for safe evacuation of Lalitpur TPS Generation operated leading to generation backdown of ~200 MW of Unit-3 at Lalitpur TPS. Case-5 of SPS operated due to overloading of 400 kv Fatehabad-Agra PG line above 800 MW.</p> <p>2.</p> <p>i)At 13:49 hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-2 tripped on R-8 phase to phase fault.</p> <p>ii)Further at 13:56hrs, 765 KV Agra Fatehabad(UP)-Lalitpur(LPG) (UP) Ckt-1 tripped on R-N phase to earth fault.</p> <p>iii)Due to tripping of both the 765KV evacuating lines, case-3 for SPS for safe evacuation of Lalitpur generation on operated. As per SPS case-3, in case of tripping of both the 765KV lines, one 660MW unit (in this case unit-3) shall come to house load and remaining unit shall trip. 220KV lines to Lalitpur and hansi shall also trip.</p> <p>iv)As a result, 660 MW Lalitpur Unit-1 & Unit-2 tripped alongwith, 220 KV Lalitpur -hansi (UP) Ckt, 220KV Lalitpur-Lalitpur220 ckt-2, 220KV Lalitpur-Lalitpur220 ckt-1 and 220 KV Lalitpur -Babina (UP) Ckt tripped on SPS.</p> <p>v)As per SPS, the generation of 660MW Unit-3 reduced to 70MW for house load operation.</p> <p>vi)As per PMU at 765KV Agra(PG), two consecutive R-N phase to phase faults with fault clearing time of 120ms is observed.</p>	<p>1 27.02.2026 at 06:57 hrs</p> <p>2 11.05.2025 at 13:49hrs</p>	2	0	0	<p>During 1st event: As 100MVA ST-2 already tripped at 15:26 hrs during LBB operation of 220KV Bus-1, BFP for Unit-3 was not available and therefore, 660MW Unit-3 also tripped along with 660MW Unit-1&2. 220KV line to Lalitpur(2nd ckt) also tripped on SPS operation.</p>
8	Mar26	SPS related to Safe evacuation of generation of Chhabra/ Chhabra Super Critical/ Kawa/ Kalsindh Complex	<p>As reported, at 14:37 hrs, 400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1 tripped on R-N Phase to earth fault. Further, 400 kv Bhiwara (RS) - Chhabra (RVUN) Ckt-1 was already under planned shutdown.</p> <p>Due to tripping of 400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1 with 400 kv Bhiwara (RS) - Chhabra (RVUN) Ckt-1 under outage, 250 MW Chhabra Unit-4 tripped on SPS operation as per SPS logic related to Safe evacuation of generation of Chhabra TPS (Case-3).</p> <p>As per SPS logic w.r.t. this case, 2 units at Chhabra TPS should trip however, as reported by SLD Rajasthan, in case of N-1-1/N-2 contingency of 400 KV Chhabra-Hindaun & Chhabra-Bhiwara, if total generation at Chhabra TPS is >550 MW but <750 MW, then only one unit of Chhabra TPS will trip and if total generation at Chhabra TPS is >750 MW, then two units of Chhabra TPS will trip.</p>	<p>1 09.03.2026 at 14:37 hrs</p>	1	0	0	<p>As reported by SLD Rajasthan, in case of N-1-1/N-2 contingency of 400 KV Chhabra-Hindaun & Chhabra-Bhiwara, if total generation at Chhabra TPS is >550 MW but <750 MW, then only one unit of Chhabra TPS will trip and if total generation at Chhabra TPS is >750 MW, then two units of Chhabra TPS will trip.</p>
9	Mar26	SPS for Transformers at 400/220KV Ajmer(RS) substation	<p>During antecedent condition, 400/220 KV 315 MVA ICT 1 & 3 at Ajmer(RS) were carrying approx. 211 MW and 226 MW respectively.</p> <p>As reported by SLD Rajasthan, at 14:44 hrs, 220KV KPS-Bundi(RS) Ckt-1 & 2 tripped on B-N phase to earth fault. Consequently, 220 KV GSS Bundi(RS) was left with a single power source i.e. 220 KV Gulabpura(RS). 220 KV Gulabpura was being supplied by 220 KV Beawar and 220 KV Jethana, both of which were connected to the 400 KV GSS Ajmer(RS).</p> <p>This led to overloading of 400/220 KV 315 MVA ICT 1 & 3 at Ajmer(RS) triggering the SPS for Transformers at 400KV Ajmer(RVUN) substation. Due to SPS operation, 220 KV Ajmer-Beawar Ckt, 220 KV Ajmer-Kishangarh Ckt and 220 KV Ajmer-Bherunda Ckt-1 & 2 tripped (as per logic).</p> <p>However, the load from 220 KV GSS Bundi(RS), 220 KV Gulabpura(RS) and 220 KV Jethana along with 220KV GSS Ajmer(RS) continued to persist on both 400/220 KV 315 MVA ICT 1 & 3 at Ajmer(RS) and ultimately both the ICTs tripped on overloading. This led to complete blackout at 220 KV Kishangarh, 220 KV Bherunda, 220 KV Beawar, 220 KV Bundi(RS), 220 KV Gulabpura(RS) and 220 KV Jethana 5/6.</p>	<p>1 10.03.2026 at 14:44 hrs</p>	1	0	0	
10	Mar26	SPS related to Safe evacuation of generation of Chhabra/ Chhabra Super Critical/ Kawa/ Kalsindh Complex	<p>As reported, at 13:55 hrs, 400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1 tripped on R-N Phase to earth fault. Further, 400 kv Bhiwara (RS) - Chhabra (RVUN) Ckt-1 was already under planned shutdown.</p> <p>Due to tripping of 400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1 with 400 kv Bhiwara (RS) - Chhabra (RVUN) Ckt-1 under outage, 250 MW Chhabra Unit-4 tripped on SPS operation as per SPS logic related to Safe evacuation of generation of Chhabra TPS (Case-3).</p> <p>As per SPS logic w.r.t. this case, 2 units at Chhabra TPS should trip however, as reported by SLD Rajasthan, in case of N-1-1/N-2 contingency of 400 KV Chhabra-Hindaun & Chhabra-Bhiwara, if total generation at Chhabra TPS is >550 MW but <750 MW, then only one unit of Chhabra TPS will trip and if total generation at Chhabra TPS is >750 MW, then two units of Chhabra TPS will trip.</p>	<p>1 10.03.2026 at 13:56 hrs</p>	1	0	0	<p>As reported by SLD Rajasthan, in case of N-1-1/N-2 contingency of 400 KV Chhabra-Hindaun & Chhabra-Bhiwara, if total generation at Chhabra TPS is >550 MW but <750 MW, then only one unit of Chhabra TPS will trip and if total generation at Chhabra TPS is >750 MW, then two units of Chhabra TPS will trip.</p>
11	Mar26	SPS for Transformers at 400/220KV Bikaner(RS) substation	<p>As reported, at 11:43 hrs, there was an immediate surge in generation due to tripping of 220 KV Badnu-Tehandesar Ckt. The generation from 220 KV GSS Badnu was diverted via 220 KV GSS Bikaner(RS) to 400 GSS Bikaner(RS) which led to overloading of 400/220 KV 315 MVA ICT 1 & 2 at Bikaner(RS).</p> <p>Due to overloading of ICTs at Bikaner(RS), "SPS for Transformers at 400KV Bikaner (RVNPL)" operated and load feeders, e.g., 220KV Bikaner(RS)-Nokha Ckt & 220KV Bikaner(RS)-Sri Durgargarh Ckt tripped on SPS operation as per logic.</p> <p>Tripping of 220KV Bikaner(RS)-Nokha Ckt & 220KV Bikaner(RS)-Sri Durgargarh Ckt further caused overloading of 400/220 KV 315 MVA ICT 1 & 2 at Bikaner(RS) and both the ICTs tripped due to overloading.</p>	<p>1 11.03.2026 at 11:41 hrs</p>	1	0	0	
Total				13	12	1	0	

Sl. No.	Month	SPS Operated	Details of SPS operated	No. of times operated in Month	No. of correct operations	No. of mal-operation	No. of times failed to operate	Remarks
1	Apr'26	SPS related to safe evacuation of generation of Chhabra/ Chhabra Super Critical/ Kawai/ Kalsindh Complex	<p>i) IAs reported, at 16:34 hrs, 765 kV Anta-Phagi (RS) Ckt-1 tripped only from Anta end on B-N phase to earth fault with fault current of 9.846 kA from Anta and 4.316 kA from Phagi (as per DR) due to bad weather. As per DR, fault sensed in zone-2 and carrier received at Phagi end, A/R successfully operated at Phagi end, however no A/R operation observed at Anta end and line tripped from Anta end on zone-1 distance protection operation.</p> <p>ii) During the same time, 765/400 kV 1500 MVA CT 1, 2 and 3 at Anta(RS) also tripped on differential protection operation on consecutive B-N phase to earth faults followed by Y-N phase to earth fault respectively (exact reason of fault yet to be shared).</p> <p>iii) Due to tripping of all 3 ICTs at 765/400 kV Anta (RS), "SPS related to safe evacuation of generation of Chhabra/ Chhabra Super Critical/ Kawai/ Kalsindh Complex" operated (case-1 of Chhabra, Kawai and Kalsindh TPS Complex) leading to tripping of 660 MW Chhabra SCTPS unit-2.</p> <p>iv) IAs per PMU at Bhowanipalli, B-N phase to earth fault followed by B-N phase to earth fault with unsuccessful A/R again followed by Y-N phase to earth fault was observed with fault clearing time of 80 ms each.</p> <p>v) IAs per SCADA, generation loss of approx. 540 MW was observed at Chhabra SCTPS.</p>	1 04.04.2026 at 16:34hrs	1	0	0	
2	Apr'26	SPS for Transformers at 400KV Kashipur (PTCL) substation to avoid overloading of Transformers	<p>i) IAs reported, at 12:49 hrs, Y-B phase to phase fault occurred on 220KV Kashipur-Jafarpur Ckt. Fault occurred due to conductor snapping at Tower No. 12 (~6 km from Kashipur and ~49.24 km from Jafarpur end). Fault was detected in zone-1 by the distance relays at both ends. At the Jafarpur end, the breaker tripped successfully. However, at the Kashipur end, although the Main-2 distance relay detected the fault and issued a trip command, the breaker failed to operate, resulting in non-clearance of the fault from Kashipur end. Main-1 relay was already out of service prior to the incident.</p> <p>ii) Further, as fault was still persisting, after approximately 640 ms (as per PMU), the fault converted to 3-phase fault due to involvement of the remaining phase (R-ph) at Tower No. 17 and Tower No. 18 (as reported). The fault continued till another 1280 ms (as per PMU) and 220KV Kashipur-Pantnagar Ckt and 220 KV Pantnagar(UK)-Bareilly(UF) Ckt tripped from Pantnagar and Bareilly end respectively in zone-3 and 400/220KV 315 MVA CT-1 & 2 at Kashipur(UK) tripped on overcurrent protection operation.</p> <p>iii) At the same time, case-2 of SPS for ICTs at Kashipur also operated. This further led to tripping of 220KV Kashipur-Jafarpur Ckt and 132KV Kashipur-Jaspur Ckt & 132KV Rudrapur-Kisha Ckt.</p> <p>iv) The disturbance resulted in interruption of supply to multiple substations including 220KV Pantnagar(UK), 220KV Mahakheragang(UK), 220KV Jafarpur(UK), 220KV Haldwani(UK), 220 KV Kamalaganja, 132 KV Rudrapur, 132 KV Bhowali, 132 KV Kathgodam, 132 KV Kashipur and 132 KV Bazpur S/S.</p> <p>v) IAs per PMU at Bareilly(FC), Y-B phase to phase fault converted to 3-phase fault was observed with delayed fault clearing time of ~1920 ms.</p> <p>vi) IAs per SCADA, change in demand of approx. 380 MW was observed in Uttarakhand control area.</p> <p>vii) IAs remedial action taken, the faulty Main-2 relay at Kashipur end of 220KV Kashipur-Jafarpur Ckt has been replaced and its correct operation has been verified through testing.</p>	1 13.04.2026 at 12:49hrs	1	0	0	
Total				2	2	0	0	

Status of Internal Protection Audit Plan for FY 2026 -27				
S. No.	NRPC Member	Category	Status	Schedule submitted as per utility
1	PGCIL	Central Government owned Transmission Company	Received (NR-2) (24 Substations), Received (NR-1) (20+16 Substations), Received (NR-3) (14 Substations)	
2	NTPC	Central Generating Company	Received	
3	BBMB		Received (Tehri HPP)	Feb-27
4	THDC		Received (Koteshwar)	Dec-26
			Received (Tehri PSP)	Feb-27
5	SJVN		Received (NJHPS)	December 2026- March 2027
6	NHPC		Received (RHPS)	October 2026- December 2026
7	NPCIL		Received (13 stations)	
		RAP A		
		RAP B		
		Received (RAP C)	20-07-2026-25-07-2026	
		RAP D		
		NAP		
8	Haryana SLDC	SLDC (to share the audit plan for the substations under their purview which are not listed here)		
9	Rajasthan SLDC			
10	Uttar Pradesh SLDC			
11	Uttarakhand SLDC			
12	Punjab SLDC			
13	Himachal Pradesh SLDC			
14	DTL	State Transmission Utility	Received (47 Substations)	
15	HVPNL		Received (91 Substations)	
16	RRVNL		Received	31.03.2027
17	UPPTCL		Meerut Zone	10/1/2027 -15/3/2027
			Agra Zone	10/1/2027 -30/3/2027
			Lucknow Zone	1/1/2027-10/3/2027
			Jhansi Zone	5/1/2027 -30/3/2027
			Prayagraj Zone	1/1/2027- 10/3/2027
			Gorakhpur Zone	10/1/2027-30/3/2027
18	PTCUL		Received	
19	PSTCL	Received		
20	HPPTCL	Received (12 Substations)		
21	IPGCL	Received (PPS-I)	15.11.2026	
		Received (PPS-II)	30.10.2026	
		Received	Jun-26	
22	RRVUNL	CTPP, Chhabra	Oct-26	
		CSCTPP, Chhabra	Oct-26	
		STPS, Suratgarh	Dec-26	
		STPS, SC, Suratgarh	Sep-26	
		KaTPP, Kalisindh	Jun-26	
		KSTPS, Kota	Sep-26	
		DCCPP, Dholpur	Dec-26	
		RGTPP, Ramgarh	Dec-26	
		Anpara B	October 2026	
		Obra A & B	October 2026	
		Panki	October 2026	
		Anpara D	May 2026	
		Harduaganj	May 2026	
		Harduaganj D	May 2026	
Harduaganj E	May 2026			
24	UPRVUNL	Parichha	August 2026	
		Parichha Ext	August 2026	
		Obra C	October 2026	
		Jawaharpur	October 2026	
		Dharashu	December, 2026	
		Tiloth	December, 2026	
		Khodri	Nov-26	
25	UJVNL	Chibro	Oct-26	
		Vyasi	Dec-26	
26	HPPCL	State Generating Company & State owned Distribution Company	RSD	
27	PSPCL		GGSTPS, Rupnagar	
			GVK Power Goindwal Shahib Ltd.	
		GHSTPS, Lehra Mohabbat	Nov-26	
28	HPSEBL	Distribution company having Transmission connectivity ownership	Received (Hamirpur)	Jan-27
29	Prayagraj Power Generation Co. Ltd.	IPP having more than 1000 MW installed capacity	Received	Sep-26
30	Aravali Power Company Pvt. Ltd		Received	Mar-27
31	Apraava Energy Private Limited		Received	May-26
32	Talwandi Sabo Power Ltd.			
33	Nabha Power Limited			
34	MEIL Anpara Energy Ltd		Received	Aug-26
35	Rosa Power Supply Company Ltd		Received	Jan-27

36	Lalitpur Power Generation Company Ltd		Received	Sep-26
37	MEJA Urja Nigam Ltd.			
38	Adani Power Rajasthan Limited			
39	JSW Energy Ltd. (KWHEP)			
40	UT of J&K	UT of Northern Region	Received (Jammu)	
			Received (Kashmir)	
41	UT of Chandigarh (CPDL)			
	ISTS Transmission Utilities			
42	INDIGRID			

43	ADHPL			
44	Adani Transmission Limited		Received	Oct-26
45	Bikaner Khetri Transmission Limited		Received	Oct-26
46	Fatehgarh Bhadla Transmission Limited		Received	Sep-26
47	Kishtwar Transmission Limited	RESONIA		
	State Utilities			
	Uttar Pradesh			
48	Vishnuprayag Hydro Electric Plant (J.P.)		Received	March, 2027
49	Alaknanda Hydro Electric Plant (GVK)		Received	Nov-26
50	Ghatampur TPS		Received	Feb-27
51	Khara Power House (Khara)		Received	Dec-26
52	WUPPTCL		Received	Oct-26
53	SEUPPTCL		Received	Dec-26
54	AT SCL	AESL	Received	Sep-26
55	GTL (765 kV Hapur extension bays)	AESL	Received	Nov-26
56	GTL (765 kV Agra and Gr. Noida extension bays)	AESL	Received	Nov-26
57	HPTSL	AESL	Received	Aug-26
58	MTSCL	AESL	Received	Aug-26
59	OBTL	AESL	Received	Dec-26
60	STSL	AESL		
	Rajasthan			
61	Barsingsar Plant	NLC	Received	31-03-2027
62	Rajwest Plant	JSW	Received	Aug-26
	RE Utilities			
63	ABC Renewable Pvt. Ltd		Received	20-09-2026
64	ABC Renewable Energy (RJ-02) Pvt. Ltd.			
65	ACME Heeragarh powertech Pvt. Ltd	ACME	Received	Jan-27
66	ACME Pholodi	ACME	Received	
67	ACME Deagarh	ACME		Jan-27
68	ACME Raisar	ACME		
69	ACME Dhoulpar	ACME		
70	ACME Sikar	ACME	Received	Jan-27
71	ACME Chittorgarh Solar Energy Pvt Ltd	AYANA		
72	Adani Hybrid Energy Jaisalmer One Ltd.	AGEL	Received	7/16/2026
73	Adani Hybrid Energy Jaisalmer Two Ltd.	AGEL	Received	7/25/2026
74	Adani Hybrid Energy Jaisalmer Three Ltd.	AGEL	Received	8/8/2026
75	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 1 -350)	AGEL	Received	8/15/2026
76	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 2 -250)	AGEL	Received	9/11/2026
77	Adani Renewable Energy (RJ) limited Rawara	AGEL	Received	9/26/2026
78	Adani Solar Enegy Four Private Limited	AGEL	Received	9/26/2026
79	Adani Solar Energy Jaisalmer Two Private Limited Project Two	AGEL	Received	10/17/2026
80	SB Energy Six Private Limited, Bhadla	AGEL	Received	10/28/2026
81	Adani Solar Enegy Jodhpur Two Limited, Rawara	AGEL	Received	9/26/2026
82	Adani Solar Energy Jaisalmer One Ltd. (Hybrid450)	AGEL	Received	10/3/2026
83	Adani Solar Energy RJ Two Pvt. Ltd. (Devkot)	AGEL	Received	11/7/2026
84	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)	AGEL	Received	11/14/2026
85	Adani Green Energy 24 Limited (Bhimsar)	AGEL	Received	11/26/2026
86	Adani Green Twenty-Five Limited (Badisid)	AGEL	Received	12/4/2026
87	Bhadla park - South block	AGEL	Received	12/16/2026
88	AEML-250 WIND (Hybrid-2A)	AGEL	Received	9/16/2026
89	AEML-260 WIND (Hybrid-2B)	AGEL	Received	9/20/2026
90	Hybrid450-WIND (SBE Hybrid 450)	AGEL	Received	10/7/2026
91	Ambuja Cements Limited_300MW	AGEL		
92	Altra Xergi Pvt. Ltd.			
93	XL Xergi Power Pvt. Ltd.			
94	AMP Energy Green Four Pvt. Ltd.			

95	AMP Energy Green Five Pvt. Ltd.			
96	AMP Energy Green Six Pvt. Ltd.			
97	Amplus Ages Private Limited	Gentari	Received	31-12-2026
98	Avaada RJHN_240MW	Avaada	Received	Aug-26
99	Avaada sunce energy Pvt limited	Avaada	Received	Aug-26
100	Avaada Sunrays Pvt. Ltd.	Avaada	Received	Aug-26
101	Avaada Sustainable RJ Pvt. Ltd.	Avaada	Received	Aug-26
102	Ayaana Renewable Power Three Private Limited			
103	Ayaana Renewable Power One Pvt. Ltd.			
104	Azure Power Forty One Pvt limited			
105	Azure Power Forty Three Pvt. Ltd. _RSS			
106	Azure Power Forty Three Pvt. Ltd. _PSS			
107	Azure Maple Pvt. Ltd.			
108	AZURE POWER INDIA Pvt. Ltd. ,Bhadla			
109	Azure Power Thirty Four Pvt. Ltd.			
110	Clean Solar Power (Jodhpur) Pvt. Ltd.	Hero Future Energies	Received	May, 2026
111	Eden Renewable Cite Private Limited			
112	Eden Renewable Alma Pvt. Ltd.			
113	Energizent Power Private Limited			
114	Grian Energy private limited	Gentari	Received	31-12-2026
115	Juna Renewable Energy Pvt. Ltd.		Received	20-07-2026
116	Juniper Green Cosmic Private Limited		Received	31-03-2027
117	Juniper Nirjara Energy Private Limited		Received	31-03-2027
118	Karinsar Solar Plant NHPC Ltd.	NHPC	Received	30-11-2026
119	Megasolis Renewables Pvt Ltd(MSRPL)			
120	Mega Surya Urja Pvt. Ltd. (MSUPL)			
121	NTPC Devikot Solar plant. 240MW	NGEL	Received	15-05-2026
122	NTPC Kolayat (SKB -1)	NGEL	Received	31-05-2026
123	NTPC Kolayat (SKB-2)	NGEL	Received	30-11-2026
124	Nedan Solar NTPC	NGEL	Received	15-05-2026
125	NTPC Nokhra. 300MW	NGEL	Received	31-08-2026
126	One Volt energy Pvt. Ltd.	Gentari	Received	31-12-2026
127	ReNew Solar Urja Private Limited (IndiGrid)	IndiGrid		
128	Renew Surya Ayaan Pvt. Ltd. (IndiGrid)	IndiGrid		
129	ReNew Solar Energy (Jharkhand Three) Private Limited	ReNew	Received	24/11/2026
130	RENEW SOLAR POWER Pvt. Ltd. Bikaner	ReNew	Received	17/11/2026
131	Renew Surya Partap Pvt. Ltd.	ReNew	Received	21/11/2026
132	Renew Surya Ravi Pvt. Ltd.	ReNew	Received	18/11/2026
133	Renew Surya Roshni Pvt. Ltd.	ReNew	Received	24/11/2026
134	Renew Surya Vihan Pvt. Ltd.	ReNew		
135	Renew Solar Photovoltaic Pvt Ltd	ReNew		
136	Renew Hans Urja Pvt Ltd	ReNew		
137	Renew Surya Jyoti Pvt Ltd	ReNew	Received	15/10/2026
138	Neemba Renew Surya Vihan Pvt Ltd	ReNew	Received	15/10/2026
139	ReNew Dinkar Urja Pvt. Ltd.	ReNew		
140	Renew Sun Bright Pvt. Ltd. (RSBPL)	Sembcorp	Received (submitted by ReNew)	19/11/2026
141	Rising Sun Energy-K Pvt. Ltd.			
142	Serentica Renewables India 4 Private Limited	Serentica	Received	Sep-26
143	Serentica Renewables India 5 Private Limited	Serentica	Received	Sep-26
144	Khidrat Renewable energy Pvt Ltd.	Serentica	Received	Jun-26
145	SJVN Green Energy Limited	SJVN		
146	Solzen Urja Private Limited	Sekura	Received	November, 2026
147	Tata Power Green Energy Ltd. (TPGEL) (225MW)	Tata Power	Received	31-03-2027
148	Tata Power Renewable Energy Ltd. (TPREL) (300MW)	Tata Power	Received	31-03-2027
149	Thar Surya Pvt. Ltd.			
150	TP Surya Ltd., Noorsar (110MW)	Tata Power	Received	31-03-2027
151	Bandenwala Solar Plant TP Surya Ltd. (300MW)	Tata Power	Received	31-03-2027
152	Adept Renewable Technologies Pvt. Ltd.			
153	Transition Cleantech Services Private Limited			
154	Transition Energy Services Private Limited			
155	Transition Green Energy Private Limited			
156	Transition Sustainable Energy Services Private Limited			
157	Transition Sustainable Energy Services One Pvt Ltd			
158	Gorbea Solar Pvt Ltd (GSPL)		Received	Oct-26
159	Prerak Greentech Private Limited (PGPL)			
160	HRP Green Power Pvt. Ltd. (300MW)	RPSG		

Internal Protection Audit (to be done in month of March, 2026) based on plan submitted by Utilities and current status

S. No.	Organization	Substation Name	Voltage level	Schedule submitted as per utility (for March, 2026)	Status as on date about audit	Audit report status
1	PGCIL (NR-1)	Ajmer	765kV	March, 2026	Not updated	
		Bahadurgarh	400kV	March, 2026	Not updated	
		Kotputli	400kV	March, 2026	Not updated	
		Narela	400kV	March, 2026	Not updated	
	PGCIL (NR-2)	Kaithal	400kV	March, 2026	Not updated	
		Kala Amb	400kV	March, 2026	Not updated	
	PGCIL (NR-3)	Kanpur	400kV	March, 2026	Not updated	
2	THDC	Tehri	400kV	March, 2026	Completed on 11.02.2026	Audit Report Shared
3	SJVN	RHPS	400kV	January-March 2026	Completed on 12.02.2026	Audit Report Shared
4	DTL	Pragati	220kV	March, 2026	Not updated	
		Sarita Vihar	220kV	March, 2026	Not updated	
		Gazipur	220kV	March, 2026	Not updated	
		Rajghat	220kV	March, 2026	Not updated	
		Indraprastha	220kV	March, 2026	Not updated	
		Kashmere Gate	220kV	March, 2026	Not updated	
		Lodhi Road	220kV	March, 2026	Not updated	
		Timarpur	220kV	March, 2026	Not updated	
5	HVPNL	400kV Daulatabad	400kV	March, 2026	Not updated	
		220kV HSIIDC Bawal	220kV	March, 2026	Not updated	
		220kV Palli	220kV	March, 2026	Not updated	
		400 kV Kirori	400kV	March, 2026	Not updated	
		220 kV Mehnakhera	220kV	March, 2026	Not updated	
		220 kV Dadibana	220kV	March, 2026	Not updated	
		220kV Sonta	220kV	March, 2026	Not updated	
		220 KV Karnal	220kV	March, 2026	Not updated	
		220 KV Chajipur	220kV	March, 2026	Not updated	
		220KV GIS Rai	220KV	March, 2026	Not updated	
6	UPPTCL (Transmission West Zone, Meerut)	All substations having voltage level of 220kV and above.		15 January 2026 - 25 March 2026	Audit is going on	
	UPPTCL (Transmission South Zone, Agra)	All substations having voltage level of 220kV and above.		10 January 2026 - 19 March 2026	Audit is going on	
	UPPTCL (Transmission South Central Zone, Jhansi)	All substations having voltage level of 220kV and above.		15 January 2026 - 09 February 2026	Audit is going on	
	UPPTCL (Transmission South East Zone, Prayagraj)	All substations having voltage level of 220kV and above.		16 January 2026 - 16 March 2026	Audit is going on	
	UPPTCL (Transmission North East Zone, Gorakhpur)	All substations having voltage level of 220kV and above.		12 January 2026 - 25 March 2026	Audit is going on	
	UPPTCL (Transmission Central Zone, Lucknow)	All substations having voltage level of 220kV and above.		January 2026 - March 2026	Audit is going on	
7	HPPTCL	Wangtoo	400kV	March, 2026	Not updated	
8	UPRVUNL	Obra A & B	400kV	Jan - March 2026	Not updated	
		Obra C	765kV	March, 2026	Not updated	
9	HPPCL	Kasheng HEP		Nov'25-Mar'26	Not updated	
		Sawara Kuddu		Nov'25-Mar'26	Not updated	
		Sainj		Nov'25-Mar'26	Not updated	
10	PSPCL	GHTP Lehra	220kV	March, 2026	Not updated	
		GGSTP	220kV	February- March 2026	Not updated	
		RSD	220kV	March, 2026	Not updated	
11	NRSS 29	Amargarh	400kV	March, 2026	Not updated	
12	Alaknanda Hydro Electric Plant (GVK)		400kV	Dec'25 -Mar'26	Not updated	

Internal Protection Audit (to be done in month of April, 2026) based on plan submitted by Utilities and current status

S. No.	Organization	Substation Name	Voltage level	Schedule submitted as per utility (for April, 2026)	Status as on date about audit	Audit report status
1	POWERGRID (NR-1)	Bassi	400kV	April, 2026	Not updated	
	POWERGRID (NR-1)	Bhinmal	400kV	April, 2026	Not updated	
	POWERGRID (NR-1)	Dwarka	400kV	April, 2026	Not updated	
	POWERGRID (NR-1)	Jhatikara	400kV	April, 2026	Not updated	
	POWERGRID (NR-1)	Tughlaqabad	400kV	April, 2026	Not updated	
	POWERGRID (NR-2)	Fatehabad	765kV	April, 2026	Not updated	
	POWERGRID (NR-2)	Kishenpur	400kV	April, 2026	Not updated	
	POWERGRID (NR-3)	Lucknow	400kV	April, 2026	Not updated	
2	BBMB (Generation)	Bhakhra Left Power House		April, 2026	Not updated	
	BBMB (Generation)	Bhakhra Right Power House		April, 2026	Not updated	
	BBMB (Generation)	Pong Power House		April, 2026	Not updated	
	BBMB (Generation)	220kV Miss Ganguwal		April, 2026	Not updated	
	BBMB (Generation)	132kV Ganguwal and Kotla Switchyard		April, 2026	Not updated	
3	HVPN	GIS Sec-85 GGN	220kV	April, 2026	Not updated	
	HVPN	Sec-52A GGN	220kV	April, 2026	Not updated	
	HVPN	Sec-69 GGN	220kV	April, 2026	Not updated	
	HVPN	Madanpur	220kV	April, 2026	Not updated	
	HVPN	Jorian	220kV	April, 2026	Not updated	
	HVPN	Karnal	220kV	April, 2026	Not updated	
4	PSTCL	Mukatasar	400kV	April, 2026	Not updated	
	PSTCL	Behman Jassa Singh Wala	400kV	April, 2026	Not updated	
	PSTCL	Moga	220kV	April, 2026	Not updated	
	PSTCL	Bhagapurana	220kV	April, 2026	Not updated	
	PSTCL	Mansa	220kV	April, 2026	Not updated	
	PSTCL	Bajakhana	220kV	April, 2026	Not updated	
	PSTCL	Ferozpur	220kV	April, 2026	Not updated	
	PSTCL	Botainwala	220kV	April, 2026	Not updated	
	PSTCL	Mukatasar	220kV	April, 2026	Not updated	
5	HPGCL	RGTPP	220kV	April, 2026	Revised schedule (by 30.06.2026) submitted	
	HPGCL	Khedar	400kV	April, 2026	Revised schedule (by 30.06.2026) submitted	
	HPGCL	PTPS	220kV	April, 2026	Revised schedule (by 30.06.2026) submitted	
6	JKPTCL (Jammu Region)	Gladni G/Station	220kV	April, 2026	Not updated	
	JKPTCL (Jammu Region)	Udhampur G/Station	220kV	April, 2026	Not updated	
	JKPTCL (Jammu Region)	Janipur G/Station	132kV	April, 2026	Not updated	
	JKPTCL (Kashmir Region)	Pampore	220kV	15.04.2026 to 25.04.2026	Not updated	

	RE Utilities								
63	ABC Renewable Pvt. Ltd								
64	ABC Renewable Energy (PJ-02) Pvt. Ltd.								
65	ACME Heeraqarh powertech Pvt. Ltd	ACME	Received		2027				
66	ACME Pholodi	ACME	Received		2028				
67	ACME Desgarh	ACME							
68	ACME Raisar	ACME							
69	ACME Dhoubar	ACME							
70	ACME Sikar	ACME	Received		2028				
71	ACME Chittorgarh Solar Energy Pvt Ltd	Ayana							
72	Adani Hybrid Energy Jaisalmer One Ltd.		5 years have not completed since commissioning						
73	Adani Hybrid Energy Jaisalmer Two Ltd.		5 years have not completed since commissioning						
74	Adani Hybrid Energy Jaisalmer Three Ltd.		5 years have not completed since commissioning						
75	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 1 - 350)		5 years have not completed since commissioning						
76	Adani Hybrid Energy Jaisalmer Four Ltd. (AEML 2 - 250)		5 years have not completed since commissioning						
77	Adani Renewable Energy (R.J) limited Rawara		Received	1/15/2026		Completed (21.12.2025)	24.02.2026	68	68
78	Adani Solar Energy Four Private Limited		5 years have not completed since commissioning						
79	Adani Solar Energy Jaisalmer Two Private Limited Project Two		5 years have not completed since commissioning						
80	SB Energy Six Private Limited, Bhadla	AGEL	5 years have not completed since commissioning						
81	Adani Solar Energy Jodhpur Two Limited, Rawara		5 years have not completed since commissioning						
82	Adani Solar Energy Jaisalmer One Ltd. (Hybrid450)		5 years have not completed since commissioning						
83	Adani Solar Energy RJ Two Pvt. Ltd. (Devkot)		5 years have not completed since commissioning						
84	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)		5 years have not completed since commissioning						
85	Adani Green Energy 24 Limited (Bhimisar)		5 years have not completed since commissioning						
86	Adani Green Twenty-Five Limited (Badisid)		5 years have not completed since commissioning						
87	Bhadla park - South block		Received	1/28/2026		Completed (23.12.2025)	12.02.2026	68	68
88	AEML-250 WIND (Hybrid-2A)		5 years have not completed since commissioning						
89	AEML-250 WIND (Hybrid-2B)		5 years have not completed since commissioning						
90	Hybrid450-WIND (SBE Hybrid 450)		5 years have not completed since commissioning						
91	Ambuja Cements Limited, 300MW								
92	Altra Xerai Pvt. Ltd.		Concluded			Completed	04.02.2025	60	
93	XL Xerai Power Pvt. Ltd.								
94	AMP Energy Green Four Pvt. Ltd.		Received	Nov-27		Completed for common substation			
95	AMP Energy Green Five Pvt. Ltd.		Received	Nov-27			07.09.2025	63	
96	AMP Energy Green Six Pvt. Ltd.		Received	Nov-27					
97	Amplus Aces Private Limited		Received	31.12.2028					
98	Avsada RJHN_240MW		Received	Aug-26					
99	Avsada surplus energy Pvt limited		Received	Aug-26					
100	Avsada Sunrise Pvt. Ltd.		Received	Aug-27					
101	Avsada Sustainable RJ Pvt. Ltd.		Received	Aug-26					
102	Ayana Renewable Power Three Private Limited		Concluded			24.05.2025		61	
103	Ayana Renewable Power One Pvt. Ltd.		Concluded					59	
104	Azure Power Forty One Pvt limited								
105	Azure Power Forty Three Pvt. Ltd. RSS								
106	Azure Power Forty Three Pvt. Ltd. PSS								
107	Azure Maple Pvt. Ltd.								
108	AZURE POWER INDIA Pvt. Ltd., Bhadla								
109	Azure Power Thirty Four Pvt. Ltd.								
110	Clean Solar Power (Jodhpur) Pvt. Ltd.	Hero Future Energies	Received	Dec-26					
111	Eden Renewable Cite Private Limited		Received	Aug-26					
112	Eden Renewable Alma Pvt. Ltd.		Received	Jul-30					
113	Energizent Power Private Limited		Received	31-12-2028					
114	Grian Energy private limited		Received	31-12-2028					
115	Juna Renewable Energy Pvt. Ltd.		Received	Jun-30					
116	Juniper Green Cosmic Private Limited		Received	30-09-2029					
117	Juniper Nirjara Energy Private Limited		Received	30-09-2029					
118	Karinsar Solar Plant NHPCL	NHPCL	Received	30-11-2026					
119	Megasolis Renewables Pvt Ltd(MSRPL)								
120	Mega Surya Urja Pvt. Ltd. (MSUPL)		Received						
121	NTPC Devkot Solar plant_240MW		Received	Aug-26					
122	NTPC Kalayat_400KW		Received	May-26					
123	Nedan Solar NTPC		Received	Jul-26					
124	NTPC Nokhra_300MW		Received	Jun-26					
125	One Volt energy Pvt. Ltd.		Received	31-12-2028					
126	ReNew Solar Urja Private Limited	IndiGrid							
127	ReNew Surya Arsan Pvt. Ltd.	IndiGrid							
128	ReNew Solar Energy (Jharkhand Three) Private Limited	ReNew	Received	29-01-2027					
129	RENEW SOLAR POWER Pvt. Ltd. Bhadla	ReNew	Not Applicable as Plant running on 33KV						
130	Renew Surya Partap Pvt. Ltd.	ReNew	Received	22-07-2029					
131	Renew Surya Ravi Pvt. Ltd.	ReNew	Received	24-07-2027					
132	Renew Surya Roshni Pvt. Ltd.	ReNew	Received	49/2029					
133	Renew Surya Vihan Pvt. Ltd.	ReNew	Received	27-08-2029					
134	Neemba Renew Surya Vihan Pvt Ltd	ReNew	Received	30-09-2030					
135	ReNew Surya Jyoti Pvt. Ltd.	ReNew	Received	11/10/2030					
136	Renew Solar Photovoltaic Pvt Ltd	ReNew	370-connected projects						
137	ReNew Hans Urja Pvt Ltd.	ReNew	370-connected projects						
138	RENEW SOLAR POWER Pvt. Ltd. Bikaner	ReNew	Issued the NO						
139	ReNew Dinkar Urja Pvt. Ltd.	ReNew							
140	Renew Sun Bright Pvt. Ltd. (RSBPL)	Sembcorp	Received (submitted by ReNew)	16-04-2027					
141	Risina Sun Energy-K Pvt. Ltd.								
142	Serentica Renewables India 4 Private Limited		Received	Mar-29					
143	Serentica Renewables India 5 Private Limited		Received	Mar-29					
144	Khidrat Renewable energy Pvt Ltd.		Received	Jun-30					
145	SJVN Green Energy Limited	SJVN	Received						
146	Solzen Urja Private Limited		Received	Oct-26					
147	Tata Power Green Energy Ltd. (TPGEL) (225MW)		Received	31-03-2027					
148	Tata Power Renewable Energy Ltd. (TPREL) (300MW)		Received	31-03-2027					
149	Thar Surya Pvt. Ltd.								
150	TP Surya Ltd., Noorsar (110MW)		Received	31-03-2027					
151	Banderwala Solar Plant TP Surya Ltd. (300MW)		Received	31-03-2027					
152	Adapt Renewable Technologies Pvt. Ltd.								
153	Transition Cleantech Services Private Limited								
154	Transition Energy Services Private Limited								
155	Transition Green Energy Private Limited								
156	Transition Sustainable Energy Services Private Limited								
157	Transition Sustainable Energy Services One Pvt Ltd.								
158	Gorbea Solar Pvt Ltd (GSPL)		Received	Dec-28					
159	Prerak Greentech Private Limited (PGPL)								
160	HRP Green Power Pvt. Ltd. (300MW)	SPSC							

External Protection Audit (to be done in month of **March, 2026**) based on plan submitted by Utilities and current status

S. No.	Organization	Substation Name	Voltage level	Schedule submitted as per utility (for March, 2026)	Status as on date about audit	Audit report status
1	PGCIL (NR-1)	BAGPAT	400kV	Mar-26	not updated	
		MANDOLA	400kV	Mar-26	not updated	
	PGCIL (NR-2)	Kala Amb	400kV	Mar-26	not updated	
		Nalagarh	400kV	Mar-26	not updated	
2	THDC	Tehri	400kV	Mar-26	not updated	
3	RVPN	40 substations		Mar-26	not updated	
4	HPPTCL	All Substations		FY 25-26	not updated	
5	HPPCL	Kashang HEP		FY 25-26	not updated	
6	PSPCL	RSD	220kV	Mar-26	not updated	
7	Indigrid	PTCL	400kV	FY 25-26	not updated	

External Protection Audit (to be done in month of April, 2026) based on plan submitted by Utilities and current status

S. No.	Organization	Substation Name	Voltage level	Schedule submitted as per utility (for April, 2026)	Status as on date about audit	Audit report status
NIL						

Compliance status (Internal Protection Audit 2025-26)

S.N.	Organisation	Utility Name	Station Name	Voltage level	Observations	Observations discussed in PSC meeting	Date of PSC Meeting	Compliance status	Compliance submission Date	Required action submitted	Action taken	Remarks
1	Rajasthan	RVPN	Merta	400	REF for HV side of 400kV/220kV Transformer has pick up current as 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
2	Rajasthan	RVPN	Merta	400	For 220/132kV, 100MVA Transformer-1, Low set over current protection is kept at 106% for 220/132kV, 100MVA Transformer-2. Low set over current protection is kept at 100% while as per philosophy, pick is to be kept between 110%-150% of full load.	67	18/03/2026	Pending				
3	Rajasthan	RVPN	Merta	400	Over flux protection setting for power transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
4	Rajasthan	RVPN	Merta	400	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
5	Rajasthan	RVPN	Merta	400	Back up over current protection is enabled in 220kV Merta Makrana line, 220kV Merta-Kuchera line, 220kV Merta-Bhopalgarh line, 220kV Merta-Jethana line.	67	18/03/2026	Pending				
6	Rajasthan	RVPN	Merta	400	Main -1 & 2 are of same make and same model (7SA522) for 220kV Merta -Jethana line.	67	18/03/2026	Pending				
7	Rajasthan	RVPN	Merta	400	SOTF disabled.	67	18/03/2026	Pending				
8	Rajasthan	RVPN	Makrana	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
9	Rajasthan	RVPN	Makrana	220	For 220/132kV, 100MVA Transformers, Low set over current protection is kept at 100% while as per philosophy, pick is to be kept between 110%-150% of full load.	67	18/03/2026	Pending				
10	Rajasthan	RVPN	Makrana	220	Over current protection is enabled in 220kV transmission lines in 220kV Merta Makrana line, 220kV Makrana -Phulera line, 220kV Makrana-Kuchman line.	67	18/03/2026	Pending				
11	Rajasthan	RVPN	Makrana	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
12	Rajasthan	RVPN	Makrana	220	Main -1 & 2 are of same make and same model (P442) for 220kV Makrana -Phulera line.	67	18/03/2026	Pending				
13	Rajasthan	RVPN	Makrana	220	SOTF disabled.	67	18/03/2026	Pending				
14	Rajasthan	RVPN	Danta	220	For 220/132kV, 100MVA Transformers, Low set over current protection is kept at 100% while as per philosophy, pick is to be kept between 110%-150% of full load.	67	18/03/2026	Pending				
15	Rajasthan	RVPN	Danta	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
16	Rajasthan	RVPN	Danta	220	SOTF disabled.	67	18/03/2026	Pending				
17	Rajasthan	RVPN	Aau	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
18	Rajasthan	RVPN	Aau	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
19	Rajasthan	RVPN	Aau	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
20	Rajasthan	RVPN	Aau	220	SOTF disabled.	67	18/03/2026	Pending				
21	Rajasthan	RVPN	Phalodi	220	Main -1 & 2 are of same make and same model (P442) for 220kV Phalodi -Amarsagar, 220kV Phalodi-Tinwari line.	67	18/03/2026	Pending				
22	Rajasthan	RVPN	Phalodi	220	Main -2 relay of 220kV Phalodi-Dechu-2 line is defective as mentioned in the audit report.	67	18/03/2026	Pending				
23	Rajasthan	RVPN	Phalodi	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
24	Rajasthan	RVPN	Phalodi	220	Functionality of Bus Bar protection has not been mentioned in the audit report.	67	18/03/2026	Pending				
25	Rajasthan	RVPN	Phalodi	220	SOTF disabled.	67	18/03/2026	Pending				
26	Rajasthan	RVPN	Banar	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
27	Rajasthan	RVPN	Banar	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
28	Rajasthan	RVPN	Banar	220	Second slope (range as per philosophy 60-80%) for the differential protection of transformers has been kept at 100% which is not as per philosophy.	67	18/03/2026	Pending				
29	Rajasthan	RVPN	Banar	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
30	Rajasthan	RVPN	Banar	220	SOTF disabled.	67	18/03/2026	Pending				
31	Rajasthan	RVPN	Bhopalgarh	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
32	Rajasthan	RVPN	Bhopalgarh	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
33	Rajasthan	RVPN	Bhopalgarh	220	Functionality of Bus Bar protection & Auto recloser has not been mentioned in the audit report.	67	18/03/2026	Pending				
34	Rajasthan	RVPN	Bhopalgarh	220	SOTF disabled.	67	18/03/2026	Pending				
35	Rajasthan	RVPN	Boranda	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
36	Rajasthan	RVPN	Boranda	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
37	Rajasthan	RVPN	Boranda	220	High set over current time delay for the transformers has been kept at 100msec. while as per philosophy, it should be between 0-50msec.	67	18/03/2026	Pending				
38	Rajasthan	RVPN	Boranda	220	Main -1 & 2 are of same make and same model (7SR52) for 220kV Boranda Pachpadra line.	67	18/03/2026	Pending				
39	Rajasthan	RVPN	Boranda	220	Functionality of Bus Bar protection & Auto recloser has not been mentioned in the audit report.	67	18/03/2026	Pending				
40	Rajasthan	RVPN	Boranda	220	SOTF disabled.	67	18/03/2026	Pending				
41	Rajasthan	RVPN	Dechu	220	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
42	Rajasthan	RVPN	Dechu	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
43	Rajasthan	RVPN	Dechu	220	High set over current time delay for the transformers has been kept at 100msec. while as per philosophy, it should be between 0-50msec.	67	18/03/2026	Pending				
44	Rajasthan	RVPN	Dechu	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
45	Rajasthan	RVPN	Dechu	220	SOTF disabled.	67	18/03/2026	Pending				
46	Rajasthan	RVPN	Kakani	400	Over flux protection setting for transformers, may be kept as per capability curve provided by OEM curve or as per philosophy.	67	18/03/2026	Pending				
47	Rajasthan	RVPN	Kakani	400	For HV side, high set over current time delay for the ICTs has been kept at 100msec. while as per philosophy, it should be between 0-50msec.	67	18/03/2026	Pending				
48	Rajasthan	RVPN	Kakani	400	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
49	Rajasthan	RVPN	Kakani	400	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
50	Rajasthan	RVPN	Kakani	400	SOTF disabled.	67	18/03/2026	Pending				
51	Rajasthan	RVPN	Surpura	400	For 400/220 kV, 315 MVA ICT-1 (BHEL), I2/I1= 20% has been taken which is not as per philosophy.	67	18/03/2026	Pending				
52	Rajasthan	RVPN	Surpura	400	Pick up for REF of ICTs has been kept at .2pu while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
53	Rajasthan	RVPN	Surpura	400	For 400kV 125MVAR bus reactor, I2/I1= 32% has been taken in differential protection which is not as per philosophy.	67	18/03/2026	Pending				
54	Rajasthan	RVPN	Surpura	400	For 400kV 50MVAR bus reactor-1,2 & 3, I2/I1= 20% has been taken in differential protection which is not as per philosophy.	67	18/03/2026	Pending				
55	Rajasthan	RVPN	Surpura	400	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
56	Rajasthan	RVPN	Surpura	400	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
57	Rajasthan	RVPN	Surpura	400	SOTF disabled.	67	18/03/2026	Pending				
58	Rajasthan	RVPN	Barli	220	Pick up for REF of 160MVA Transformer has been kept at .2pu while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
59	Rajasthan	RVPN	Barli	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
60	Rajasthan	RVPN	Barli	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
61	Rajasthan	RVPN	Barli	220	SOTF disabled.	67	18/03/2026	Pending				
62	Rajasthan	RVPN	Basni	220	Pick up for REF of Transformers has been kept at .2pu while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
63	Rajasthan	RVPN	Basni	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
64	Rajasthan	RVPN	Basni	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
65	Rajasthan	RVPN	Basni	220	Relay settings have not been mentioned for 220kV Basni-NPH ckt-2.	67	18/03/2026	Pending				
66	Rajasthan	RVPN	Basni	220	SOTF disabled.	67	18/03/2026	Pending				
67	Rajasthan	RVPN	Bhawad	220	Main -1 & 2 are of same make and same model (P442) for 220kV Bhawad-Baitwasia ckt-1,2.	67	18/03/2026	Pending				
68	Rajasthan	RVPN	Bhawad	220	Pick up for REF of Transformers has been kept at .2pu while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
69	Rajasthan	RVPN	Bhawad	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
70	Rajasthan	RVPN	Bhawad	220	Functionality of Bus Bar protection & Auto recloser has not been mentioned in the audit report.	67	18/03/2026	Pending				
71	Rajasthan	RVPN	Bhawad	220	SOTF disabled.	67	18/03/2026	Pending				
72	Rajasthan	RVPN	Pali	220	Pick up for REF of Transformers has been kept at .2pu while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
73	Rajasthan	RVPN	Pali	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
74	Rajasthan	RVPN	Pali	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
75	Rajasthan	RVPN	Pali	220	SOTF disabled.	67	18/03/2026	Pending				
76	Rajasthan	RVPN	Sayala	220	Pick up for REF of Transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
77	Rajasthan	RVPN	Sayala	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
78	Rajasthan	RVPN	Sayala	220	SOTF disabled.	67	18/03/2026	Pending				
79	Rajasthan	RVPN	Tinwari	220	Pick up for REF of Transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				

80	Rajasthan	RVPN	Tinwari	220	No other protection settings have been mentioned in the audit report.	67	18/03/2026	Pending				
81	Rajasthan	RVPN	Tinwari	220	SOTF disabled.	67	18/03/2026	Pending				
82	Rajasthan	RVPN	Ramgarh	400	Pick up for REF of ICTs has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
83	Rajasthan	RVPN	Ramgarh	400	For 400kV 125MVAR bus reactor, I ₂ /I ₁ = 20% has been taken in differential protection which is not as per philosophy.	67	18/03/2026	Pending				
84	Rajasthan	RVPN	Ramgarh	400	Impedance protection time delay has been taken as 1 sec. for 400kV 125MVAR bus reactor while as per philosophy, it should be 1.2sec.	67	18/03/2026	Pending				
85	Rajasthan	RVPN	Ramgarh	400	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
86	Rajasthan	RVPN	Ramgarh	400	SOTF disabled.	67	18/03/2026	Pending				
87	Rajasthan	RVPN	Baithwasia	220	Pick up for REF of transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
88	Rajasthan	RVPN	Baithwasia	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
89	Rajasthan	RVPN	Baithwasia	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
90	Rajasthan	RVPN	Baithwasia	220	SOTF disabled.	67	18/03/2026	Pending				
91	Rajasthan	RVPN	Bali	220	Pick up for REF of transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
92	Rajasthan	RVPN	Bali	220	For 220/132kV, 100MVA Transformer-1, Low set over current protection is kept at 100% while as per philosophy, pick is to be kept between 110%-150% of full load.	67	18/03/2026	Pending				
93	Rajasthan	RVPN	Bali	220	Main -1 & 2 are of same make and same model (7SA522) for 220kV Bali-Sirohi -1 line & 220kV Bali-Bamantukda line.	67	18/03/2026	Pending				
94	Rajasthan	RVPN	Bali	220	Main- 1 relay is non functional of 220kV Bali-Sirohi -2 line.	67	18/03/2026	Pending				
95	Rajasthan	RVPN	Bali	220	Bus Bar protection functional has been mentioned in the audit report. Still zone-4 time setting has been kept as 160msec.	67	18/03/2026	Pending				
96	Rajasthan	RVPN	Bali	220	SOTF disabled.	67	18/03/2026	Pending				
97	Rajasthan	RVPN	Bhimnal	220	Main -1 & 2 are of same make and same model for 220kV Bhimnal-PGCIL Ckt-1 & 2.	67	18/03/2026	Pending				
98	Rajasthan	RVPN	Bhimnal	220	No protection settings have been mentioned in the audit report.	67	18/03/2026	Pending				
99	Rajasthan	RVPN	Bhimnal	220	SOTF disabled.	67	18/03/2026	Pending				
100	Rajasthan	RVPN	Dhorimanna	220	Main -1 & 2 are of same make and same model (P442) for 220kV Dhorimanna-Barmer line & 220kV Dhorimanna-Bhimnal line.	67	18/03/2026	Pending				
101	Rajasthan	RVPN	Dhorimanna	220	No protection settings have been mentioned in the audit report.	67	18/03/2026	Pending				
102	Rajasthan	RVPN	Dhorimanna	220	SOTF disabled.	67	18/03/2026	Pending				
103	Rajasthan	RVPN	Jalore	220	Pick up for REF of transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
104	Rajasthan	RVPN	Jalore	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
105	Rajasthan	RVPN	Jalore	220	Functionality of Bus Bar protection & Auto recloser has not been mentioned in the audit report.	67	18/03/2026	Pending				
106	Rajasthan	RVPN	Jalore	220	SOTF disabled.	67	18/03/2026	Pending				
107	Rajasthan	RVPN	NPH Ju	220	Pick up for REF of transformers has been kept at 20% while as per philosophy, it should be 10-15% of full load current.	67	18/03/2026	Pending				
108	Rajasthan	RVPN	NPH Ju	220	Over current protection pick up settings for transformers could not be verified due to unavailability of CT ratio in the report.	67	18/03/2026	Pending				
109	Rajasthan	RVPN	NPH Ju	220	Main-1 & 2 Relay is non functional of 220kV NPH Ju-Basni-II line.	67	18/03/2026	Pending				
110	Rajasthan	RVPN	NPH Ju	220	Functionality of Bus Bar protection & Auto recloser has not been mentioned in the audit report.	67	18/03/2026	Pending				
111	Rajasthan	RVPN	NPH Ju	220	SOTF disabled.	67	18/03/2026	Pending				
112	Rajasthan	RVPN	Reodar	220	Main -1 & 2 are of same make and same model (P442) for 220kV Reodar-PGCIL Bhimnal line, 220kV Reodar-Sirohi line.	67	18/03/2026	Pending				
113	Rajasthan	RVPN	Reodar	220	No protection settings have been mentioned in the audit report.	67	18/03/2026	Pending				
114	Rajasthan	RVPN	Reodar	220	SOTF disabled.	67	18/03/2026	Pending				
115	IPP	KWHEP	Karcham Wangtoo	400	Implemented Protection settings have not been included in the report. However, no deviation from the RPC protection philosophy has been reported in the audit report.	67	18/03/2026	Pending				
116	RE Plants	Renew	Renew Solar Power Private	400	Breaker failure protection is not active in 400kV ReNew Bikaner PG Line.	67	18/03/2026	Pending				
117	RE Plants	Renew	Renew Solar Power Private Limited	400	125MVA ICT-1 & 2, cross blocking is disabled in the differential protection.	67	18/03/2026	Pending				
118	RE Plants	Renew	Renew Solar Power Private Limited	400	For ICT 1 & 2, I ₅ /I=30% has been taken which is not as per philosophy.	67	18/03/2026	Pending				
119	RE Plants	Renew	Renew Solar Power Private Limited	400	For ICT-1 & 2, earth fault protection settings are not as per philosophy.	67	18/03/2026	Pending				
120	RE Plants	Renew	Renew Solar Power Private Limited	400	Back up O/C protection settings are not included in the audit report.	67	18/03/2026	Pending				
121	RE Plants	Renew	Renew Solar Power Private Limited	400	Zone-4 time delay of 400kV line has been kept at 1 sec.	67	18/03/2026	Pending				
122	RE Plants	Renew	Renew Surya Ravi Private	400	150MVA ICT-1 & 2, cross blocking is disabled in the differential protection.	67	18/03/2026	Pending				
123	RE Plants	Renew	Renew Surya Ravi Private Limited	400	For ICT 1 & 2, I ₅ /I=1% has been taken which is not as per philosophy.	67	18/03/2026	Pending				
124	RE Plants	Renew	Renew Surya Ravi Private Limited	400	For ICT 1 & 2, Earth fault high set time on HV side is 150msec which is not as per philosophy.	67	18/03/2026	Pending				
125	RE Plants	Renew	Renew Surya Ravi Private Limited	400	For ICT 1 & 2, HV side REF pick up current is higher than philosophy.	67	18/03/2026	Pending				
126	RE Plants	Renew	Renew Surya Ravi Private Limited	400	Back up O/C protection settings are not included in the audit report.	67	18/03/2026	Pending				
127	RE Plants	Renew	ReNew Solar Energy Jharkhand Three Pvt. Ltd.	220	Pick up for High set Back-up directional O/C for 220kV/33kV, 150MVA transformer-1,2 is not as per philosophy. (Adopted-50% I _b while as per philosophy, 100-110% of through fault level). Time delay has been kept at .4 sec. while as per philosophy, it should be 0-50msec.	67	18/03/2026	Pending				
128	RE Plants	Renew	ReNew Solar Energy Jharkhand Three Pvt. Ltd.	220	Pick up for High set Back-up directional E/F for 220kV/33kV, 150MVA transformer-1,2 is not as per philosophy. (Adopted-50% I _b while as per philosophy, 100-110% of through fault level). Time delay has been kept at .4 sec. while as per philosophy, it should be 0-50msec.	67	18/03/2026	Pending				
129	RE Plants	Renew	ReNew Solar Energy Jharkhand Three Pvt. Ltd.	220	Over voltage protection enabled for 220kV/33kV, 150MVA transformers-1,2 along with over flux protection.	67	18/03/2026	Pending				
130	RE Plants	Renew	ReNew Solar Energy Jharkhand Three Pvt. Ltd.	220	Zone -2 reach for transmission line has been kept at 150% of protected line though line is single circuit.	67	18/03/2026	Pending				
131	RE Plants	Tata Power	TPGEL, NOORSAR	220	Tripping on Power swing is to be kept blocked for all zones as per philosophy.	67	18/03/2026	Pending				
132	RE Plants	Tata Power	TPGEL, NOORSAR	220	Differential protection, REF protection settings of Transformers, Distance protection settings of line have not been included in the audit report.	67	18/03/2026	Pending				
133	RE Plants	Tata Power	TPREL Chhayan	220	Distance protection settings of line have not been included in the audit report.	67	18/03/2026	Pending				
134	RE Plants	Tata Power	TPREL Chhayan	220	Differential protection, REF protection settings of Transformers, Distance protection settings of line have not been included in the audit report.	67	18/03/2026	Pending				
135	Rajasthan	JSW	JSW Energy Barmer	400	Main -1 & 2 are of same make and same model (REL 670) for 220kV Barmer-1,2 & Dhorimanna lines and 400kV Pachpadra, Jodhpur & Barmer lines.	67	18/03/2026	Pending				
136	Rajasthan	JSW	JSW Energy Barmer	400	Implemented Protection settings of all lines have not been included in the report.	67	18/03/2026	Pending				
137	RE Plants	AGEL	ASERJ2PL_POK HRAN_212.5MW	220	Main Bus 1 & 2: LBB trip time is mentioned as 150 msec. However as per NRPC protection Philosophy, the LBB time delay shall be 200 msec.	67	18/03/2026	Pending				
138	RE Plants	AGEL	ASERJ2PL_POK HRAN_212.5MW	220	Power Transformer (125 MVA 220/33 KV)- 87T Cross blocking is disabled. Need to be enabled.	67	18/03/2026	Pending				
139	IPP	Rosa	RPSCCL	400	Zone-3 time setting in 220 KV Badaun-Ckt-1 & 2 is 600 msec. However, as per NRPC philosophy it should be between 800 -1000 msec.	67	18/03/2026	Pending				
140	IPP	Rosa	RPSCCL	400	I _h (5%)>35% for ICT	67	18/03/2026	Pending				

Compliance status (External Protection Audit)

S.N.	Organisation	Utility Name	Station Name	Voltage level	Observations	Observation is discussed in PSC meeting	Date of PSC Meeting	Compliance status	Compliance status submission date	Required Action Submitted	Action taken	Remarks
1	Central generating plant	NHPC	Kishanganga	220	Two stage over voltage protection is enabled in both Main I and Main II protections of distance relays for all 220 KV four lines.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection philosophy, Over Voltage Stage-I and Stage-II protections are kept enabled for all lines emanating from generating stations.	Yes	No change done
2	Central generating plant	NHPC	Kishanganga	220	The auto recloser built in feature is available in both Main I and Main II relays of the four lines but only enabled in Main I relays of Delta line -1, line -2 only and Main II relays of Wagooora line -1, line -2 only.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection scheme, Auto Reclosing (A/R) is enabled in one relay (either Main-I or Main-II) and disabled in the other. If the relay in which A/R is disabled detects a fault, it issues an external command to the relay where A/R is enabled, thereby enabling the A/R operation.	Yes	No change done
3	Central generating plant	NHPC	Uri-I	400	Main I (MICOM P442) and Main II (MICOM P442) relays of Areva make are used for 400KV Uri-II line. Both are of same make.	67	18/03/2026	Submitted	06.05.2026	This will be taken care during Renovation & Modernisation of Power Station	No	
4	Central generating plant	NHPC	Uri-I	400	Auto recloser & LBB is disabled in main -1 (MICOM P442) relays of 400KV Uri-1 to Amargah -1, 2. Auto recloser is disabled in main -2 (MICOM P442) relay of 400KV Uri-1 to Uri-II line.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection scheme, Auto Reclosing (A/R) is enabled in one relay (either Main-I or Main-II) and disabled in the other. If the relay in which A/R is disabled detects a fault, it issues an external command to the relay where A/R is enabled, thereby enabling the A/R operation.	Yes	No change done
5	Central generating plant	NHPC	Uri-I	400	Zone-2 reach has been taken as 120% of protected line for 400KV Uri-1 to Amargah -1, 2 while as per philosophy, it should be 150% of protected line for double circuit.	67	18/03/2026	Submitted		As per NRPC protection philosophy, the Zone-2 reach is set at 150% of the protected line length	Partial	(In Main -2 settings need to be changed) (page-125)
6	Central generating plant	NHPC	Uri-I	400	For 400KV Uri-1 to Uri-2 line time settings may be aligned with Philosophy.	67	18/03/2026	Submitted	06.05.2026	Aligned with NRPC philosophy	Yes	
7	Central generating plant	NHPC	Uri-I	400	Earth fault protection on 400KV Uri-1 to Uri-2 line has been set as DT instead of IEC SI.	67	18/03/2026	Submitted	06.05.2026	Earth fault protection is set as IEC NI	Yes	
8	Central generating plant	NHPC	Chamera-II	400	Trip time delay for the Zone 3 can be set as 1.0 sec as Zone 3 reach is encroaching to next voltage level at Kishanpur. However as per philosophy, time may be taken as 1.5 sec.	67	18/03/2026	Submitted	06.05.2026	As per existing practice, the time delay for Zone-3 is set at 0.8 sec when the Zone-3 reach does not encroach into the next voltage level, and 1.0 sec when it does	Yes	Not as per NRPC philosophy
9	Central generating plant	NHPC	Chamera-III	220	Trip time delay for the Zone 3 can be set as 1 sec as Zone 3 reach is encroaching to next voltage level at Mazra. However as per philosophy, time may be taken as 1.5 sec.	67	18/03/2026	Submitted	06.05.2026	As per existing practice, the time delay for Zone-3 is set at 0.8 sec when the Zone-3 reach does not encroach into the next voltage level, and 1.0 sec when it does	Yes	Not as per NRPC philosophy
10	Central generating plant	NHPC	Chamera-III	220	Main I (MICOM P442) and Main II (MICOM P442) relays of Alstom make are used for 220KV Chamera-III to Budhil Lanco line. Both are of same make.	67	18/03/2026	Submitted	06.05.2026	The Chamera-III to Budhil line is maintained and operated by Budhil. Therefore, this point pertains to Budhil and is not attributable to NHPC	Yes	Pertains to Budhil
11	Central generating plant	NHPC	Chamera-III	220	Auditor proposed to keep over voltage stage -1 & 2 protection for 220KV Chamera-III-Chamba line.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection philosophy, Over Voltage Stage-I and Stage-II protections are kept enabled for all lines emanating from generating stations. Accordingly two stage over voltage protection is kept enabled	Yes	No change done
12	Central generating plant	NHPC	Chamera-III	220	Earth fault stage 2 protection enabled on lines (VTS enabled, -11A, (11'1800), 1.5sec. delay DT) which is not particularly mentioned in the philosophy.	67	18/03/2026	Submitted		Earth Fault Stage-2 protection is kept in a disabled condition	Partial	(In Main -2 settings need to be changed) (page-127)
13	Central generating plant	NHPC	Dhauhganga	220	Two stage over voltage protection is enabled for both 220 KV lines.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection philosophy, Over Voltage Stage-I and Stage-II protections are kept enabled for all lines emanating from generating stations.	Yes	No change done
14	Central generating plant	NHPC	Dhauhganga	220	Auto recloser has been disabled in lines.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection scheme, Auto Reclosing (A/R) is enabled in one relay (either Main-I or Main-II) and disabled in the other. If the relay in which A/R is disabled detects a fault, it issues an external command to the relay where A/R is enabled, thereby enabling the A/R operation.	Yes	No change done
15	Central generating plant	NHPC	Tanakpur	220	Two stage over voltage protection is provided for all 220 KV lines the same has also been recommended by auditor which is not as per philosophy.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection philosophy, Over Voltage Stage-I and Stage-II protections are kept enabled for all lines emanating from generating stations.	Yes	No change done
16	Central generating plant	NHPC	Tanakpur	220	Auditor has recommended for A/R disabled which is not as per philosophy.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection scheme, Auto Reclosing (A/R) is enabled in one relay (either Main-I or Main-II) and disabled in the other. If the relay in which A/R is disabled detects a fault, it issues an external command to the relay where A/R is enabled, thereby enabling the A/R operation.	Yes	No change done
17	Central generating plant	NHPC	Uri-II	400	Main I (MICOM P442) and Main II (MICOM P442) relays of Areva make are used for 400KV Wagooora and Uri-II lines.	67	18/03/2026	Submitted	06.05.2026	This will be taken care during Renovation & Modernisation of Power Station	No	
18	Central generating plant	NHPC	Uri-II	400	Auto recloser is not active in Main-2 relay of 400KV Wagooora line.	67	18/03/2026	Submitted	06.05.2026	As per the existing protection scheme, Auto Reclosing (A/R) is enabled in one relay (either Main-I or Main-II) and disabled in the other. If the relay in which A/R is disabled detects a fault, it issues an external command to the relay where A/R is enabled, thereby enabling the A/R operation	Yes	No change done

19	Central generating plant	THDC	Koteshwar	400	Earth fault stage -2 protection enabled on lines (VTS enabled, 200A, 1.5sec. delay DT) which is not particularly mentioned in the philosophy.	67	18/03/2026	Pending				
20	Central generating plant	THDC	Koteshwar	400	Unrestrained operation level in the differential protection of reactor has been taken as 8 pu which is not as per philosophy.	67	18/03/2026	Pending				

65th Protection Sub-Committee Meeting (30th Dec, 2025)-MoM**A.8. Protection coordination of STU with DISCOMs along with ISTS (agenda by NRPC Secretariat)**

- A.8.1 EE, NRPC stated that a meeting under the chairmanship of the Chairperson, CEA, on the Scientific Distribution Network Planning methodology of the distribution system was held on 02.12.2025. Minutes of the meeting are attached as Annexure-A.VII. of the agenda.
- A.8.2 In the MoM, it has been mentioned that NPC/RPCs may also take up the protection coordination of STU with Discoms along with ISTS.
- A.8.3 EE, NRPC asked utilities to take up the matter and ensure the protection coordination of DISCOM feeders emanating from TRANSCO sub-stations. It will save the area from unnecessary blackout.

Decision of the Forum:

Utilities noted the requirement of protection coordination of DISCOM feeders to avoid unnecessary tripping.

A.9. Upgradation of Tele-Protection Communication Scheme from PLCC to Digital Tele-Protection Communication (DTPC) for Nathpa Jhakri HPS & Rampur HPS ends and rectification of major alarm observed in PLCC Channel-1 of Rampur-Nalagarh Ckt-1 (agenda by SJVN)

- A.9.1 SJVN representative apprised that during the 54th Protection Sub-Committee (PSC) Meeting held on 25th November 2024, the agenda regarding upgradation of the Tele-Protection Communication Scheme from PLCC to Digital Tele-Protection Communication (DTPC) for Nathpa Jhakri HPS and Rampur HPS was deliberated. The representative from POWERGRID (NR-II) informed the committee that the tendering process for DTPC had been completed and that the DTPC scheme for both Nathpa Jhakri HPS and Rampur HPS ends would be commissioned by 31st March 2025.
- A.9.2 Subsequently, after March 2025, the issue was again taken up with POWERGRID. In response, POWERGRID intimated via email dated 23.05.2025 that the replacement of one tele-protection channel for each line by DTPC was in process and was targeted for completion by December 2025.

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- A.9.3 However, no field activity related to retrofitting or commissioning of the DTPC scheme has commenced till date at either end.
- A.9.4 Further, it is also submitted that a major alarm has been observed in PLCC Channel-1 of Rampur–Nalagarh Ckt-1, which has been occurring frequently for the past 2–3 weeks. The same has been communicated to the Nalagarh end.
- A.9.5 In view of the above and considering the criticality of reliable tele-protection for high-capacity inter-regional lines, SJVN requested for expeditious action, confirmation of firm timelines and early implementation of the DTPC scheme at Nathpa Jhakri HPS and Rampur HPS ends and rectification of major alarms observed in PLCC Channel-1 of Rampur–Nalagarh Ckt-1.
- A.9.6 DGM, PGCIL, NR-2 stated that for DTPC implementation at Rampur HPS, material supply has been completed and implementation shall be done by 31st March 2026. Regarding the alarm issue at PLCC Channel-1 of Rampur–Nalagarh Ckt-1, PGCIL stated that vendor PUNCOM shall be called to attend to the issue.

Decision of the Forum:

PGCIL may complete activities within the deadline i.e. 31st March,2026.

A.10. Installation of Special Protection Scheme (SPS) for Haryana (agenda by NRPC Secretariat)

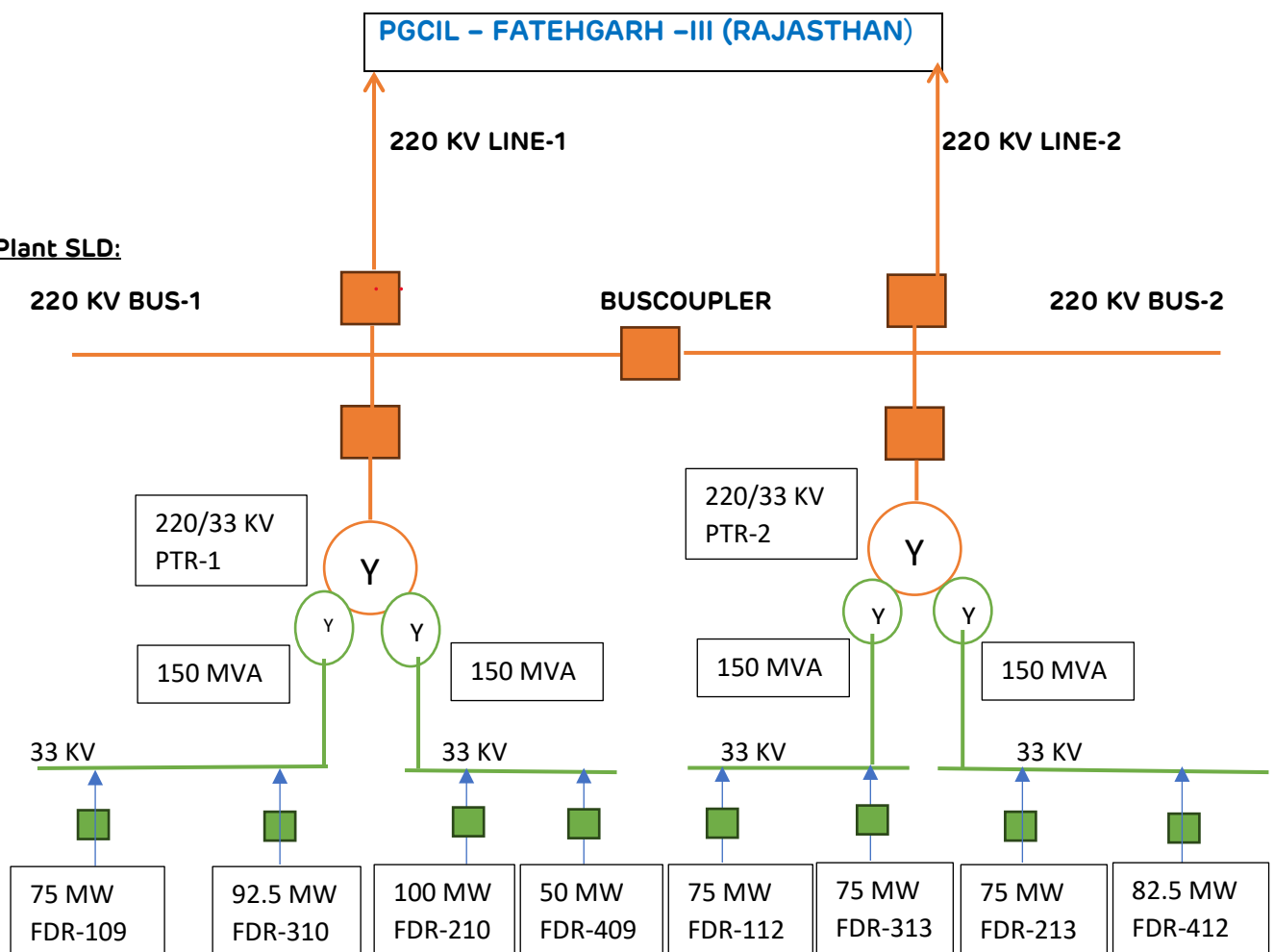
- A.10.1 AE, NRPC apprised that Haryana SLDC vide email dated 11.12.2025 has submitted that as per the minutes of the 237th OCC meeting for the agenda point no. B.11 regarding the State-wise transmission constraints during high demand season of 2025 and SPS proposals, it has been decided that Haryana will provide SPS at Panipat BBMB to mitigate the N-1 constraint observed on 400/220kV ICTs at Panipat BBMB.
- A.10.2 Accordingly, the matter has been taken up with TS/Wing HVPNL to expedite the installation of SPS at 400/220kV ICTs at Panipat BBMB at the earliest.
- A.10.3 It is to inform that the implementation of the proposed SPS involves coordination of multiple stakeholders / Utilities i.e. BBMB, DTL & Haryana, which necessitate due

Proposal for SPS for 220 KV LINE OVERLOAD Condition at ASEB1L NHPC Baiya - 600 MW SS

Plant Details:

- Plant Name : ASEB1L – BAIYA - Substation, Rajasthan
- Plant Capacity : 600 MW
- Switchyard Voltage : 220 kV
- Switchgear Voltage : 33 kV
- PPC Set Limit : 600 MW
- No of Lines : 2 no's
- No Transformers : 2*300 MVA

Plant SLD:



Pre-Condition:

In accordance with the Single Line Diagram provided, there are two transmission line configurations established for the evacuation of the entire Power capacity of 600 MW through double circuit transmission line and the conductor has a maximum current carrying capacity 1063 A.

Under normal conditions when the generation is at their peak, these transmission lines will evenly distribute the total load of 600 MW between them.

▪ **Need for Special Protection Scheme (SPS):**

According to the Single Line Diagram (SLD) of Baiya Substation with load details, In the tripping event of any one 220 kV line (N-1 Condition) connected to the PGCIL Fatehgarh-III (Rajasthan) Polling Station Baiya substation during peak generation, the total load will be shifted to single circuit consisting of OHL Line which is much more than its current carrying capacity as per cable / conductor maximum current rating.

However, under these circumstances, the sustained 220 kV line would eventually isolate due to the overload and can cause physical damage to transmission line conductor if such condition prevailed for longer duration. As per NRPC Philosophy, Line Trip in Over Current function is not implemented.

To prevent a blackout and safeguard our plant, it is necessary to limit the power/current by implementing the SPS for N-1 Contingencies.

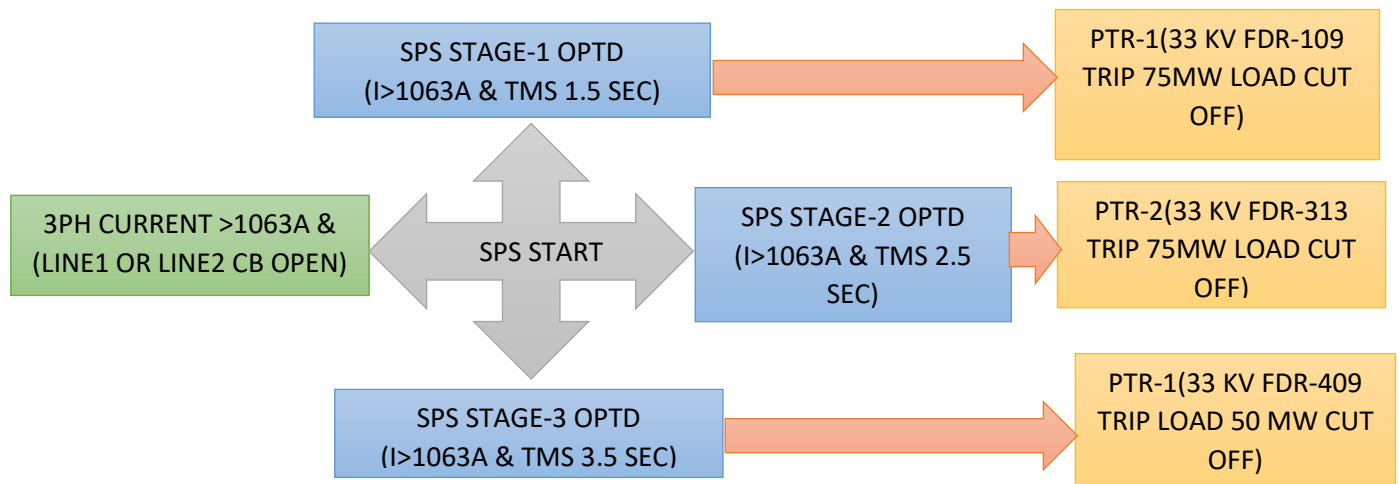
▪ **The philosophy of SPS is based on limiting the Generation to single Line current capacity.**

- 1- With a plant total set capacity of 600 MW, current is 1575 A at 220 kV Voltage.
- 2- One-line maximum current carrying capacity is considered as 1063A as per AL59 Single Zebra conductor maximum current carrying capacity at 220 kV which is equal to 405 MW.
- 3- With the above scenario we have to backdown 195 MW (600 MW-405 MW=195 MW).
- 4- The curtailment of Generation by tripping of selected 33kV LV Feeders, 195 MW
- 5- Three stage SPS is proposed to ensure firm curtailment

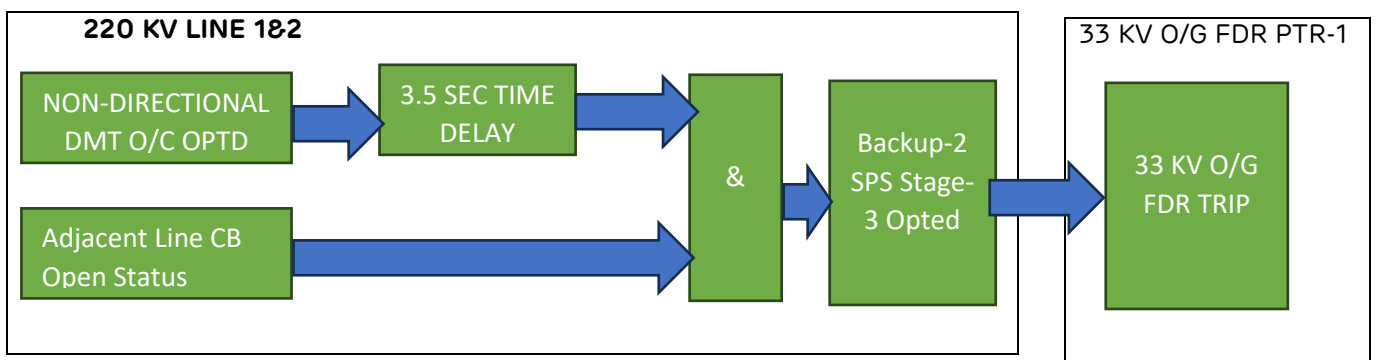
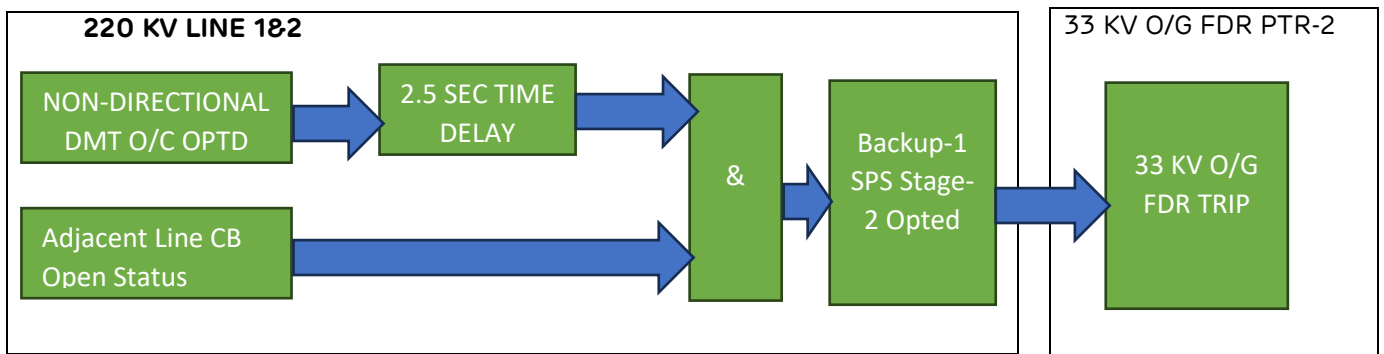
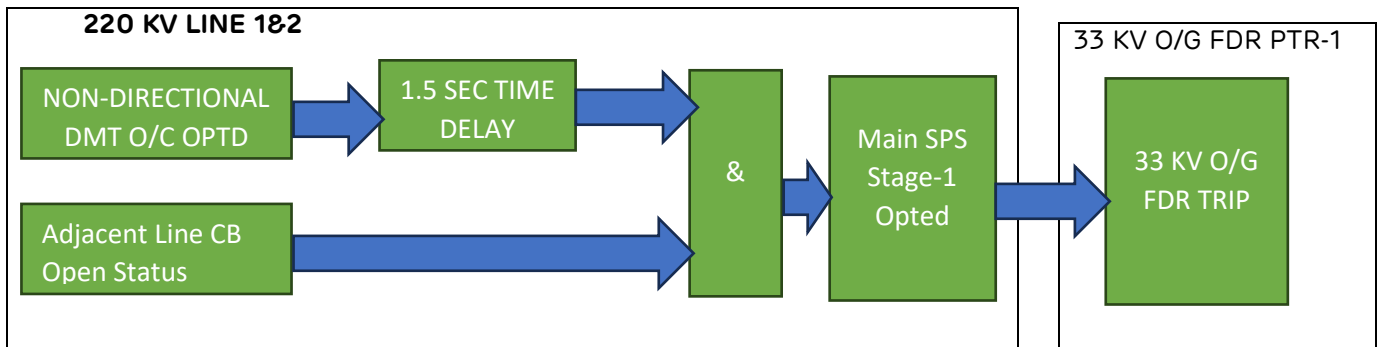
▪ **SPS configuration concept: -**

- The SPS is proposed to have three stages of operation to ensure reliable curtailment action.
- The Over current stages with DT characteristics, available in the Numerical Line Protection Relays, are used to detect and initiate action.
- The P/U of O/C stage 1-2 and 3 is considered as 1063 A, mentioned above, with time delay of 1.5 Sec. for Stage-1 , 2.5 Sec., for Stage-2,and 3.5 Sec., for Stage-3.
- In the event of failure of Stage-1 or not getting relief the current level may not reach below the threshold (1063 A), the stage -2 will be initiated to trip other 33 kV Feeders to get the required evacuation curtailment. In the event of failure of Stage-2 or not getting relief the current level may not reach below the threshold (1063 A), the stage -3 will be initiated to trip other 33 kV Feeders to get the required evacuation curtailment.
- The stage-1 is proposed to curtail feeders connected with PTR-1 / Stage-2 PTR-2 and Stage-3 with PTR-1 respectively.
- The functional flow chart and tripping logic are mentioned here under describing the three stage SPS proposed.
- The over current functions to be used are 3 Phase elements, to avoid undue initiation on fault.

SPS Flow Chart:



▪ Relay SPS Operating Logic:



Proposal:

With consideration of single line capacity to evacuate power from Baiya Plant, it is proposed to implement the proposed SPS to avoid total Generation loss and black out in the event of tripping of one line and overloading of other line

ASEB1L is requesting NRLDC / NRPC to approve SPS Proposal for Implementation.

Prepared by:

AGEL – PROTECTION & METERING DEPT.



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
F-3, MIDC Area, Andheri (East), Mumbai – 400093

No. WRPC/Prot.-AIP /NPC/2026/ 2262 - 2277 Date: 30.04.2026

To,
The Member Secretary, NPC
Central Electricity Authority
New Delhi – 110066

विषय: संबद्ध नवीकरणीय ऊर्जा संयंत्रों के लिए एकसमान द्वीप-विरोधी संरक्षण दर्शन तैयार करने हेतु गठित समिति की रिपोर्ट के संबंध में।

Subject: – Report of Committee constituted for the Preparation of the Uniform Anti-Islanding Protection Philosophy of the Connected RE plants: reg

Ref: NPC Division letter no. CEA-GO-15-14/3/2025-NPC Division dated 24.10.25

Please find enclosed herewith Report of Committee for the Preparation of the Uniform Anti-Islanding Protection Philosophy of the Connected RE plants constituted by NPC vide letter under reference.

Submitted for needful please.

भवदीय /Yours faithfully

Enclosed: As above.


(Deepak Sharma)
(सदस्य संयोजक/Member convener)

Copy to: All members as per list.

List of Committee Members:

1. Shri P. D. Lone, Superintending Engineer, WRPC, Chairman of Committee, Email ID: pramod.lone@gov.in
2. Shri Satyendra Kumar Dotan, Director (NPC), CEA, Member, Email ID: skdotancea@nic.in
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REPORT OF THE COMMITTEE CONSTITUTED
FOR
PREPARATION OF THE UNIFORM
ANTI-ISLANDING PROTECTION PHILOSOPHY
FOR THE CONNECTED RE PLANTS

APRIL 2026



**Western Regional Power Committee
Mumbai**

Acknowledgement

The Committee acknowledges the cooperation extended by IIT-Bombay, IISc-Bangalore, AEGL, TBEA Inverter, Greenko, POWERGRID & Grid-India for giving their valuable inputs to finalize the report on Uniform Anti-Islanding Protection Philosophy.

The Committee also acknowledges and extends gratitude to the sincere efforts of Shri Himanshu Pandey AD-I, WRPC, for putting all the inputs in proper perspective and giving shape and helping in drafting the report.

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CEA
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Member

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Senior Deputy General
Manager
POWERGRID
Member

(Shri Sanjay Bhatt)
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AGEL
Member

(Shri H.L. Parekh)
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Chief Technology Officer (CTO)
TBEA Inverter
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(Shri Madhukar Goodelli)
Deputy General Manager
WRLDC / GRID-India
Member

(Shri Deepak Sharma)
Deputy Director
WRPC
Member Convener

(Shri P.D. Lone)
Superintending Engineer
WRPC
Chairman of Committee

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I. Abbreviations and Symbols

<u>Abbreviations</u>	<u>Descriptions</u>
<u>AC</u>	<u>Alternating Current</u>
<u>AFD</u>	<u>Active Frequency Drift</u>
<u>AFDPF</u>	<u>Active Frequency Drift with Positive Feedback</u>
<u>AGEL</u>	<u>Adani Green Energy Limited</u>
<u>AI</u>	<u>Anti-Islanding</u>
<u>AIDT</u>	<u>Anti-Islanding Detection Technique</u>
<u>AIP</u>	<u>Anti-Islanding Protection</u>
<u>ALGBS</u>	<u>Automatic Load-Generation Balancing Scheme</u>
<u>ALPS</u>	<u>Active Islanding Protection Scheme</u>
<u>APTRANSCO</u>	<u>Andhra Pradesh Transmission Corporation</u>
<u>BCU</u>	<u>Bay Control Unit</u>
<u>CBRs</u>	<u>Converter Based Resources</u>
<u>CEA</u>	<u>Central Electricity Authority</u>
<u>CT</u>	<u>Current Transformer</u>
<u>DC</u>	<u>Direct Current</u>
<u>DEF</u>	<u>Directional Earth Fault</u>
<u>DER</u>	<u>Distributed Energy Resource</u>
<u>DG</u>	<u>Distributed Generation</u>
<u>DISCOM</u>	<u>Distribution Company</u>
<u>DSC</u>	<u>Decoupled Sequence Control</u>
<u>DTT</u>	<u>Direct Transfer Trip</u>

<u>E/F</u>	<u>Earth Fault</u>
<u>EPS</u>	<u>Electric Power System</u>
<u>EU</u>	<u>European Union</u>
<u>FRT</u>	<u>Fault Ride Through</u>
<u>GFL</u>	<u>Grid Following</u>
<u>GFM</u>	<u>Grid Forming</u>
<u>GIPCL</u>	<u>Gujarat Industries Power Company Limited</u>
<u>GRID-India</u>	<u>Grid Controller of India Limited</u>
<u>GSC</u>	<u>Grid Side Converter</u>
<u>HV</u>	<u>High Voltage</u>
<u>HVRT</u>	<u>High Voltage Ride Through</u>
<u>IBR</u>	<u>Inverter-Based Resource</u>
<u>IEC</u>	<u>International Electrotechnical Commission</u>
<u>IEEE</u>	<u>Institute of Electrical and Electronics Engineers</u>
<u>IEGC</u>	<u>Indian Electricity Grid Code</u>
<u>IISc</u>	<u>Indian Institute of Science</u>
<u>IIT</u>	<u>Indian Institute of Technology</u>
<u>ISTS</u>	<u>Inter-State Transmission System</u>
<u>LGB</u>	<u>Load-Generation Balance</u>
<u>LVRT</u>	<u>Low Voltage Ride Through</u>
<u>MW</u>	<u>Megawatt</u>
<u>NDZ</u>	<u>Non-Detection Zone</u>
<u>NERC</u>	<u>North American Electric Reliability Corporation</u>
<u>NPC</u>	<u>National Power Committee</u>

<u>NPSC</u>	<u>National Protection Standing Committee</u>
<u>O/C</u>	<u>Overcurrent</u>
<u>OEM</u>	<u>Original Equipment Manufacturer</u>
<u>OF/UF</u>	<u>Over Frequency / Under Frequency</u>
<u>OPGW</u>	<u>Optical Ground Wire</u>
<u>OV</u>	<u>Over Voltage</u>
<u>OV/UV</u>	<u>Over Voltage / Under Voltage</u>
<u>PCC</u>	<u>Point of Common Coupling</u>
<u>PLC</u>	<u>Power Line Communication</u>
<u>PLCC</u>	<u>Power Line Carrier Communication</u>
<u>PLL</u>	<u>Phase Locked Loop</u>
<u>PMU</u>	<u>Phasor Measurement Unit</u>
<u>PoI</u>	<u>Point of Interconnection</u>
<u>POWERGRID</u>	<u>Power Grid Corporation of India Limited</u>
<u>PPC</u>	<u>Power Plant Controller</u>
<u>PV</u>	<u>Photovoltaic</u>
<u>RCA</u>	<u>Relay Characteristic Angle</u>
<u>RE</u>	<u>Renewable Energy</u>
<u>RES</u>	<u>Renewable Energy Source</u>
<u>RIDS</u>	<u>Remote Islanding Detection Scheme</u>
<u>RLDC</u>	<u>Regional Load Despatch Centre</u>
<u>ROC</u>	<u>Residual Overcurrent</u>
<u>RoCoF</u>	<u>Rate of Change of Frequency</u>
<u>RPC</u>	<u>Regional Power Committee</u>

<u>SCADA</u>	<u>Supervisory Control and Data Acquisition</u>
<u>SEF</u>	<u>Sensitive Earth Fault</u>
<u>SG</u>	<u>Synchronous Generator</u>
<u>SLDC</u>	<u>State Load Despatch Centre</u>
<u>SMS</u>	<u>Slip Mode Frequency Shift</u>
<u>SRPC</u>	<u>Southern Regional Power Committee</u>
<u>STD</u>	<u>Standard</u>
<u>TANTRANSCO</u>	<u>Tamil Nadu Transmission Corporation</u>
<u>TOR</u>	<u>Terms of Reference</u>
<u>TRANSCO</u>	<u>Transmission Company</u>
<u>TS</u>	<u>Transmission System</u>
<u>UFR</u>	<u>Under Frequency Relay</u>
<u>UL</u>	<u>Underwriters Laboratories</u>
<u>UOV/UOF</u>	<u>Under/Over Voltage and Under/Over Frequency</u>
<u>UV</u>	<u>Under Voltage</u>
<u>VDE-AR-N</u>	<u>German Technical Connection Rule for High Voltage Networks</u>
<u>V_n</u>	<u>Nominal Voltage</u>
<u>VT</u>	<u>Voltage Transformer</u>
<u>WP</u>	<u>Watt Power</u>
<u>WRLDC</u>	<u>Western Regional Load Despatch Centre</u>
<u>WRPC</u>	<u>Western Regional Power Committee</u>
<u>WTG</u>	<u>Wind Turbine Generator</u>
<u>X/R</u>	<u>Reactance-to-Resistance Ratio</u>

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IV. Executive Summary

- Section 1 of the report presents the background and necessity for development of a uniform Anti-Islanding Protection (AIP) philosophy for transmission-connected Renewable Energy (RE) plants in view of the rapid increase in penetration of converter-based generation such as solar and wind plants in the Indian power system. The section describes the constitution of the expert committee under the guidance of the National Power Committee (NPC) comprising representatives from GRID-INDIA, RPCs, POWERGRID, IIT Bombay, IISc Bangalore, OEMs, and RE developers for reviewing existing practices and recommending a standardized national protection philosophy. The Committee, across four meetings between December 2025 and April 2026 discussed the issues and based on these discussions the report has been framed.
- Section 2 of the report covers review of regulatory provisions and international standards relevant to anti-islanding protection applicable to converter-based resources. The section examines provisions of CEA Connectivity Regulations (2019 and amendments), Indian Electricity Grid Code (IEGC), IEEE 1547, IEEE 2800, IEC 62116, European Commission Regulation (EU) 2016/631, and international utility practices adopted in systems with high RE penetration. Based on the review, the section highlights that converter-level active anti-islanding protection techniques developed primarily for distribution-level DER applications are not suitable for transmission-connected RE plants and may conflict with grid support requirements such as LVRT and HVRT compliance.
- Section 3 of the report examines various islanding detection techniques presently adopted in RE plants including passive methods, active methods, hybrid methods, and communication-assisted islanding detection schemes. Passive techniques based on voltage and frequency variations are simple but suffer from large non-detection zones. Active techniques improve detection capability but may affect power quality and create coordination challenges among multiple inverters. Hybrid techniques provide improved reliability but still have operational limitations. Communication-assisted islanding detection scheme Direct Transfer Trip (DTT) is generally found to be a reliable approach for transmission-connected RE plants due to their high dependability and negligible non-detection zone.
- Section 4 of the report presents the recommended uniform anti-islanding protection philosophy for existing transmission-connected RE plants and RE Plants that are will be commissioned by April 2027. The section emphasizes separation of inverter-level protection functions from plant-level anti-islanding protection logic and highlights the

requirement for coordination of anti-islanding protection with LVRT and HVRT envelopes specified under grid regulations. The section recommends that RE plants should remain connected during permissible voltage disturbances and should disconnect only under confirmed islanding conditions persisting beyond specified limits. Implementation of communication-assisted islanding detection schemes such as RIDS, particularly DTT, is recommended as the preferred approach. For existing RE plants where communication-assisted schemes are not immediately feasible, suitably coordinated passive or hybrid protection schemes with standardized frequency limits are recommended as interim measures, while communication-assisted schemes are recommended for new RE plants.

- Section 5 of the report examines the feasibility of the inclusion of RE plants in islanding schemes. The section recommends that participation of RE plants in intentional islanding schemes should be undertaken only with the approval of RPCs/RLDCs, after a detailed technical assessment. It further highlights that the stable operation of islanded systems requires adequate contribution from grid-forming converter-based generation or conventional synchronous generation sources. Implementation of Automatic Load-Generation Balancing Schemes (ALGBS)/local frequency control is a prerequisite for maintaining frequency stability within islanded systems during islanding operation. ALGBS/local frequency control should be disabled during normal grid operation.
- Section 6 of the report discusses the impact of increasing penetration of converter-based generation on conventional transmission protection systems due to limited fault current contribution from RE plants. Reduced sensitivity of distance protection, overcurrent protection, and earth-fault protection schemes has been observed in RE-dominated transmission corridors. To address these challenges, this report recommends the provision of controlled negative sequence current injection capability in inverter controls to support reliable fault detection and protection operation.
- Section 7 of the report presents recommendations on improving the protection system for RE systems using presently available protection relay functionalities such as directional earth fault protection, distance protection, and line differential protection to mitigate the challenges imposed by low fault current contribution from converter-based resources. The section recommends adoption of adaptive protection settings including multiple setting groups based on RE generation availability, use of voltage memory polarization and dual polarization methods for improving directional earth fault protection performance, and utilization of directional negative-sequence protection logic where coordinated converter contribution is available. The section further recommends implementation of duplicated line differential protection schemes on transmission lines connected to RE generators

considering availability of Optical Ground Wire communication infrastructure. In addition, implementation of weak-end infeed logic and permissive overreach schemes is recommended for improving distance protection performance under low fault current contribution conditions from inverter-based resources. These measures collectively provide a practical framework for strengthening protection reliability in RE-dominant transmission corridors.

Part -A- Uniform Philosophy for Anti-islanding Protection

Section-1: **Background and Introduction**

- 1.1** In the 1st meeting of the National Protection Standing Committee (NPSC) held on 26.03.2025, it was observed that the mal-operation of Anti-Islanding features may be attributed to low set values of sensing parameters or voltage distortion during disturbances. However, it was emphasized that false detection of an unintended island cannot be considered a valid justification for non-compliance with grid support requirements. The NPSC suggested that the matter warrants detailed deliberation for the appropriate way forward and a separate expert group, including industry specialists, may be constituted to support the analysis. Accordingly, it was recommended that a committee may be constituted comprising representatives from WRPC, SRPC, Grid-India, experts from IITs, IISc- Bangalore, OEMs, POWERGRID, major Renewable Energy (RE) developers, and the NPC Secretariat, for examining the issue of mal-operation of Anti-Islanding features, and also assess the impact of renewable energy integration on earth fault protection.
- 1.2** The issue was further discussed in the 16th meeting of the National Power Committee (NPC) held on 04.07.2025. It was decided to constitute a Committee under SE (Protection), WRPC, with representation from WRPC, SRPC, GRID-India, experts from IITS, IISc- Bangalore, OEMS, POWERGRID, major Renewable Energy Developer, and NPC, for the preparation of a Uniform Anti-Islanding Protection Philosophy for grid-connected Renewable Energy (RE) plants.
- 1.3** As per the decision taken in the 16th National Power Committee (NPC) meeting held on 04.07.2025, the NPC Secretariat constituted a Committee on Anti-Islanding Protection of grid-connected Renewable Energy (RE) plants and other protection-related issues associated with grid-connected RE plants. The members of the Committee so constituted was notified vide NPC letter dated 24.10.2025.

S. No.	Name	Designation	Organization	
1	Shri P. D. Lone	Superintending Engineer	WRPC	Chairman
2	Shri Satyendra Kumar Dotan	Director (NPC)	CEA	Member
3	Shri Moka Venkata Subba Reddy	Executive Engineer	SRPC	Member
4	Dr. Sarasij Das	Associate Professor	IISc Bangalore	Member
5	Shri Venkateswarlu Ande	Vice President	M/s Greenko	Member
6	Shri Thakur Prasad	Senior Vice President	M/s Watt Power	Member

7	Prof. Zakir H. Rather	Professor	IIT Bombay	Member
8	Shri Sanjay Bhatt	Assistant Vice President	AGEL	Member
9	Shri H. L. Parekh	Additional General Manager	GIPCL	Member
10	Shri Naveen Kumar	Chief Technology Officer (CTO)	TBEA Inverter	Member
11	Shri Ankit Vaish	Deputy General Manager	POWERGRID	Member
12	Shri Madhukar Goodelli	Deputy General Manager	WRLDC / GRID-India	Member
13	Shri Deepak Sharma	Deputy Director	WRPC	Member Convener

Table 1:Details of Committee Members

1.4 Terms of Reference (TOR)

The term of reference of Committee are as follows;

- a) To review the existing anti-islanding protection practices and identify gaps.
- b) To study the causes of mal-operations and suggest corrective measures.
- c) To recommend uniform national settings for frequency, rate of change of frequency (df/dt), and voltage thresholds.
- d) To ensure compatibility of the proposed philosophy with LVRT/HVRT and Grid Code requirements.
- e) To examine the impact of renewable energy integration on earth fault protection and other critical protection aspects.
- f) To prepare a comprehensive report with recommendations covering points (a) to (e)
- g) To provide any other suggestions or recommendations on related matters.
- h) The Committee shall submit its report within six months. The copy of the letter is enclosed as **Annexure -1.4**

In the 16th NPC meeting, it was decided that the matter regarding inclusion of Renewable Energy in islanding schemes may be referred to the existing Committee for Uniform Anti-Islanding Protection Philosophy of connected RE plants for detailed examination. The Committee may study the feasibility of incorporating Renewable Energy sources in islanding schemes and suggest suitable approaches.

1.5 Proceedings of Committee:

1.5.1. The first meeting of the Committee constituted for a Uniform Anti-Islanding Protection Philosophy was held on 11.12.2025. The Committee discussed the complete outage incidents at 400 kV/110 kV Thappagundu Substation (TANTRANSCO) on 03.12.2024 and multiple substations of APTRANSCO on 24.11.2024, wherein RE generators continued generation

despite tripping of evacuation lines due to non-operation of Anti-Islanding protection. However, detailed information such as fault details, PMU data, and Anti-Islanding protection settings was not available; therefore, the events could not be analyzed further. SRPC was requested to furnish detailed information on the above events, including fault details of evacuation lines, PMU data (if available), Anti-Islanding protection settings at connected stations, and any similar incidents reported in the Southern Region.

After deliberations, the Committee decided the following:

- To undertake a survey of international practices adopted for Anti-Islanding detection methodologies.
- To review available technical literature on anti-islanding protection schemes.
- To propose reliable and practical detection methodologies considering LVRT/HVRT and frequency ride-through requirements as specified in CEA Standards and IEGC, with minimal financial and logistical implications for RE generators.
- To identify suitable Anti-Islanding protection approaches based on RE connectivity, including:
 - o RE plants connected through pooling stations,
 - o RE plants having grid-forming capability,
- To suggest suitable implementation approaches for both existing and upcoming RE plants, including simulation studies wherever required.
- To review the challenges with Distance protection, over-current (O/C) & earth-fault (E/F) protection and prepare guidelines on relay settings to improve protection sensitivity without compromising selectivity and reliability, and to review available literature for proposing suitable protection systems for networks in and around RE plants.

1.5.2. The second meeting of the Committee was held on 13.02.2026. The Committee deliberated on the protection requirements of renewable energy (RE) plants with particular reference to Anti-Islanding detection philosophy and its coordination with existing grid protection schemes. It was observed that implementation of Anti-Islanding protection at the individual inverter level often leads to nuisance tripping during grid disturbances and may adversely affect system stability. In view of this, it was agreed that Anti-Islanding protection should preferably be implemented at the plant level through coordinated detection and tripping logic. It was also felt that there is a need for standardization of converter protection settings, particularly under/over-voltage and frequency protection limits, to ensure uniform response of RE plants during grid disturbances. With the impact of increasing penetration of RE generation on conventional protection schemes, especially distance protection performance in RE-connected transmission corridors it was noted that there is a need for detailed analysis of

reported protection mal-operations and recommended exploring the adoption of line differential protection schemes for new RE-connected transmission lines to enhance reliability. The draft report on Anti-Islanding protection circulated would be revised, incorporating updated technical perspectives, field experiences, and inputs from system operators, utilities, OEMs, and RE generators. Members also emphasized the need to collect and analyze event data related to Anti-Islanding protection mal-operations from different regions for inclusion in the report.

Subsequent to the meeting, preliminary draft report of the Committee constituted for the Uniform Anti-Islanding Protection Philosophy was prepared and circulated among members vide email dated 18.03.2026, seeking their comments on the same.

1.5.3. The third meeting was held on 23.03.2026, wherein the Committee reviewed Section-4 of the draft report relating to equipment protection settings, particularly LVRT/HVRT requirements, and emphasized the need to incorporate OEM inputs to ensure protection settings without adversely affecting inverters.

The Anti-Islanding detection methodologies were reviewed and it was noted that DTT is preferable. Active Anti-Islanding methods were generally discouraged due to the risk of nuisance tripping, issues of harmonics and interactions of converters.

The importance of controlled negative-sequence current injection from inverters during faults for improving directional protection performance, fault classification, and auto-reclosure coordination was also discussed. It was agreed that suitable recommendations may be included for future inverter specifications.

1.5.4. The fourth meeting was held on 02.04.2026 OEMs and AGEL, wherein the applicability of a wider range of Anti-Islanding protection settings beyond the LVRT and HVRT envelope and their impact on inverter health was discussed

Section-2
Anti-Islanding Requirements and Practices for Large-Scale Renewable
Energy Power Plants
(Literature Survey and International Practices)

2.1 Inverter Types:

The inverters deployed in the RE plants are of two types, the most predominant being the Grid Following inverters, which rely on Phase Locked Loop (PLL) to track the grid, while the other type is Grid Forming inverters, which act as voltage sources and are being increasingly preferred for the stability of a weak grid.

- **Grid-Forming (GFM) Control based sources:** Converter Interfaced sources that can create and maintain voltage and frequency at its terminals, effectively acting as an independent voltage source is known as GFM source. Besides various other grid support services, GFM converter-based sources can also provide black start service.
- **Grid-Following (GFL) Control based sources:** Converter interfaced sources that inject active and reactive power into the grid, while requiring PLL for continuous synchronization with the grid, and effectively acting as dependent current sources are known as GFL sources. GFL technology must have an active external grid for its operation.

The Grid Following (GFL) CBRs technology act as a current source that injects power into an existing grid and requires appropriate control techniques in order to remain interconnected and contribute in a proper way to the overall grid stability, whenever disturbances occur. The control of RES mainly depends on the synchronization algorithm, which should be fast and accurately detect the grid voltage status (e.g., phase, amplitude, and frequency). Typically, phase-locked loop (PLL) synchronization techniques are used for grid voltage monitoring. The design and performance of the PLL directly affect the dynamics of the RES grid side converter (GSC). Essentially, when there is no connection from the grid side, it cannot function in isolation and ceases to operate.

A Grid Forming (GFM) CBRs act as a voltage source and establishes its own voltage and frequency reference and regulates power output by adjusting the phase and magnitude of its internal voltage. If a disturbance occurs, the GFM inverter reacts instantly to counteract it, providing "virtual inertia" to slow down frequency changes similar to how a heavy rotating mass of a traditional power plant generator helps keep the grid stable. Essentially, when there is no connection from the grid side, it can also operate in isolation.

In the meetings, the requirement of Anti-Islanding Protection for GFL CBR-based plants was extensively discussed, wherein it was inferred that the GFL CBRs will cease to operate when there is no energization from the grid side and therefore, the AIP may not be required. However, conditions such as auxiliary power availed from the State Distribution Company may be available, also in some cases, the DG standby supply may also be available at the CBR-connected buses during the failure of supply from the grid side, or the Plant may have hybrid (GFM & GFL) CBRs. Under such scenarios, the AIP may be required as a safety measure to avoid accidents. The GFM CBR plants would certainly require the implementation of AIP, since they would remain connected with the grid irrespective of the supply availability from the grid side. However, the AIP of GFM CBRs will have to be bypassed during extending black start from the GFM-based battery storage system.

2.2 Unintentional Islanding.

Since the early integration of distributed energy resources (DERs), initially consisting of low-capacity generators connected to distribution systems, utilities and regulators have expressed concerns regarding safety, protection, and grid security due to the risk of unintentional islanding. To address these concerns, anti-islanding schemes and islanding detection methods became mandatory in DERs to ensure the protection of system components and personnel. These requirements are explicitly defined in standards such as IEEE 1547, IEC 62116, IEEE STD 929-2000, and UL 1741-2000, along with corresponding testing procedures. Consequently, inverters used in DER applications and RE plants are being typically equipped with unintentional islanding detection schemes.

The requirement of anti-islanding protection at distribution level primarily originated from distribution voltage level connected conventional distributed generators, and is actively being practiced in grid-tie inverter technologies used in rooftop and ground mounted distribution connected in renewable energy systems. Initially, inverter sizes were small and under low penetration of renewables, requirements for grid support functionalities were rather limited. Original Equipment Manufacturers (OEMs) concentrated mainly on steady-state operation, and during any disturbance or fault, the inverters were designed to disconnect from the grid as quickly as possible. As inverter technology was still in its nascent stage, OEMs introduced anti-islanding protection primarily to safeguard grid-tie inverters when a portion of the distribution system containing the inverters disconnects from the main grid and forms an island. Due to the absence of advanced protection logic and concerns about inverter safety, anti-islanding protection design was also applied to detect various known and unknown transient disturbances.

As inverter capacities increased and their penetration extended into transmission systems, OEMs retained the control programs and firmware originally developed for small-scale inverters and layered advanced control and protection logics on top of them. Consequently, anti-islanding protection became embedded in large-scale grid-tie inverters connected at transmission levels. Simultaneously, to comply with grid code requirements, OEMs introduced advanced protection algorithms such as Low Voltage Ride Through (LVRT), High Voltage Ride Through (HVRT), under-voltage, over-voltage, under-frequency, RoCoF and over-frequency protections. As a result, anti-islanding protection schemes began to coexist with these advanced protection algorithms without significant scrutiny, and this coexistence continues in many countries worldwide.

With the large-scale integration of renewable energy (RE), multiple inverter units were interconnected to form renewable energy power plants connected to transmission networks. Such utility-scale RE plants are expected to remain connected to the transmission network and support the grid during grid disturbances. Therefore, inverter-level islanding detection is generally discouraged in such large-scale applications. Instead, plant-level islanding detection schemes are required to ensure overall system protection and proper coordination with grid operations. The discussion focuses on anti-islanding and islanding detection for large-scale RE power plants, particularly examining their requirements and recommendations in grid codes and regulations across different regions.

Furthermore, the use of anti-islanding protection has also changed as inverters moved into transmission systems. In distribution networks, anti-islanding protection was primarily used to disconnect inverters when a section of the distribution system became isolated from the main grid. However, at the transmission level, it is predominantly viewed as a mechanism to disconnect large-scale inverters when the evacuating transmission lines are disconnected. **In case the Battery Storage system based on GFM inverter technology is identified for extending Black start facility, the AIPs of such a system is required to be bypassed during such operation. Such a provision should be brought out clearly by Grid-India in their black start procedures.**

2.3 Issues with Unintentional Islanding:

- 2.3.1 Personnel Safety** – Unintentional islands can cause hazards for utility maintenance and operational personnel if they assume downstream lines are not energized during restoration.

- 2.3.2 Overvoltage – Transient overvoltages due to rapid loss of load are possible. If an adequate ground source is not present in the island, a ground fault can result in voltages that exceed 173% on the unfaulted phases.
- 2.3.3 Reconnection out of phase - This can result in large transient torques applied to motors connected to the islanded area EPS and their mechanical systems (e.g., shafts, blowers, and pumps), which could result in damage or failure.
- 2.3.4 Power Quality – Unplanned Island area EPS may not have suitable power quality for loads.
- 2.3.5 Protection – Unintentional islands may not provide sufficient fault current to operate fuses or overcurrent relay protection devices inside island.

2.4 **Standards and Grid-Code Requirements on Anti-Islanding**

2.4.1 **IEEE 1547:**

These standards have been widely adopted in USA, Canada, Philippines, and adapted in many South American nations. The scope of the Standard is for Interconnection and Interoperability of Distributed Energy Resources.

Regarding anti-islanding, the standard provides that the RE plant must detect the island and cease to energize the area EPS (Electric Power System) within 2.0 seconds of the formation of an island. (IEEE 1547-2003)¹.

In IEEE 1547-2018 update mandates "Ride-Through" for transient faults to prevent cascading blackouts, but strict isolation for true islands².

2.4.2 **IEC 62116: Test procedure of islanding prevention measures for utility-interconnected photovoltaic Inverters**

IEC 62116 standard is a testing standard, which defines a test bench to rigorously verify if an inverter's active AI method works even when generation perfectly matches load (the worst-case NDZ scenario). This also defines the disconnection of the island within 2 seconds, similar to the IEEE standard³

2.4.3 **IEEE 2800-2022**

Converter-based resource (CBR) plants are required to remain connected to the grid during disturbances and comply with ride-through requirements. However,

unintentional islanding protection schemes embedded within individual CBR units may interfere with ride-through performance and may lead to the tripping of multiple CBR units within a plant⁴ ,Therefore, IEEE 28002022 recommends disabling active unintentional islanding protection schemes embedded within individual CBR units (Converters). If islanding protection is required for equipment protection purposes, active unintentional islanding detection may be permitted subject to agreement with the transmission system owner, and communication-based schemes may be utilized as the primary means for implementing this functionality. External methods such as Direct Transfer Trip (DTT) may be employed by monitoring breaker status and relay operations within the power system to detect islanding. Protection systems associated with interconnected networks may initiate trip signals that result in tripping of the breaker at the high-voltage side of the CBR transformer or the individual CBR unit breaker.

2.4.4 Indian grid standards

In accordance with the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019⁵ and the Indian Electricity Grid Code (IEGC)⁶ the Low Voltage Ride Through (LVRT) and High Voltage Ride Through (HVRT) requirements are applicable to grid-connected Renewable Energy (RE) plants.

- **Low Voltage Ride Through (LVRT) Requirement**

As per the CEA regulations, “*The converter based generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point on any or all phases dips up to the level depicted by the lines in the following curve*

(V_T : Actual Voltage; V_n : Nominal Voltage).

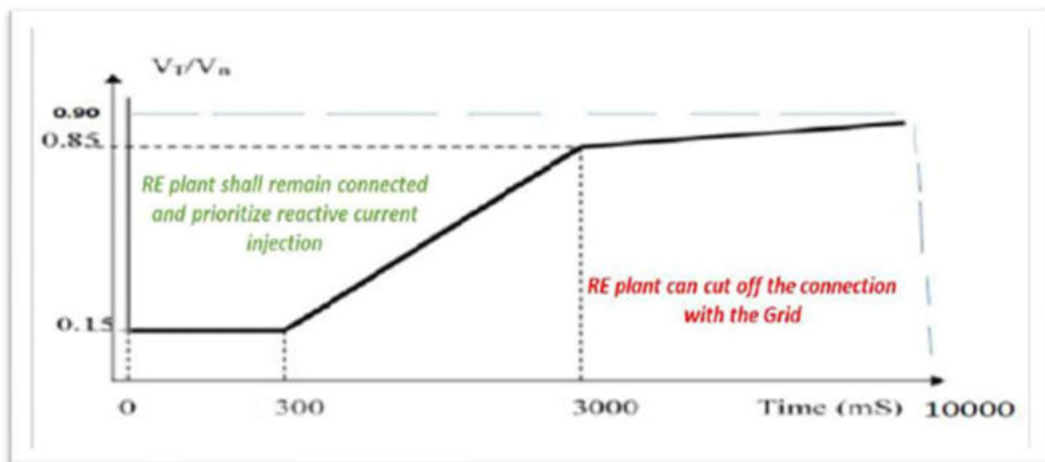


Figure 1: LVRT Requirement Specified in CEA connectivity standard

Provided that during the voltage dip, the supply of reactive power has first priority, while the supply of active power has second priority and the active power preferably be maintained during voltage drops, provided, a reduction in active power within the plant's design specifications is acceptable and active power be restored to at least 90% of the pre-fault level within 1 sec of restoration of voltage."

- **High Voltage Ride Through (HVRT) requirement**

As per the existing CEA regulations, "The generating station connected to the grid, shall remain connected to the grid when the voltage at the interconnection point, on any or all phases (symmetrical or asymmetrical overvoltage conditions) rises above the specified values given below for specified time."

S. No.	Voltage Level (p.u.)	Minimum Time to Remain Connected (seconds)
1	$V > 1.30$	0 (Instantaneous trip)
2	$1.20 < V \leq 1.30$	0.2 s
3	$1.10 < V \leq 1.20$	2 s
4	$V \leq 1.10$	Continuous

Table 2:HVRT Requirement Specified in CEA connectivity standard

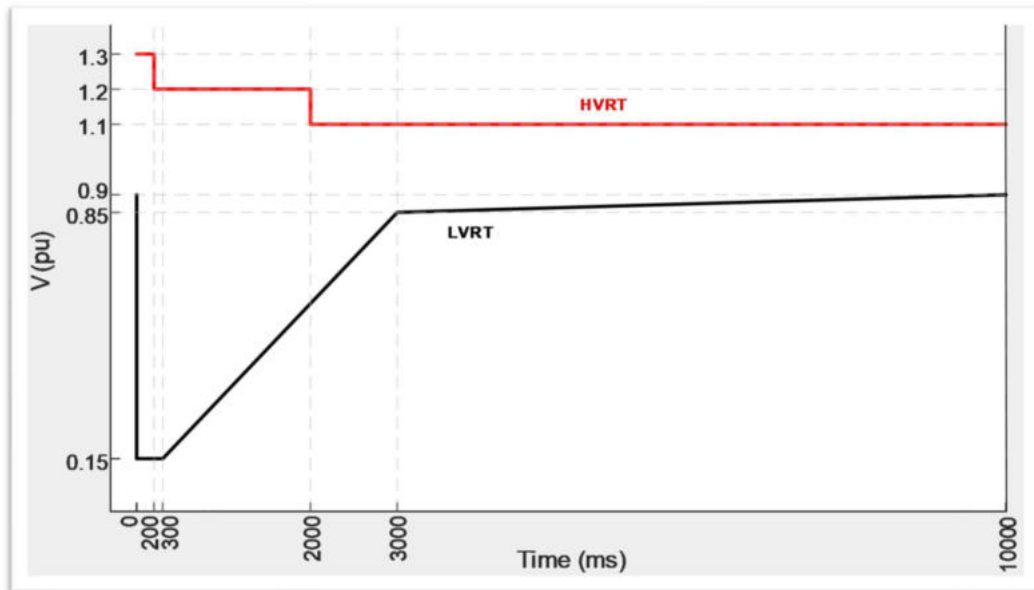


Figure 2 :LVRT/HVRT operating range

2.4.5 North America (NERC)

The NERC reliability guidelines explicitly state that anti-islanding requirements defined in IEEE 1547-2003, which are applicable to distribution systems, should not be applied to renewable energy resources connected to bulk power systems⁷. For individual inverters within an CBR plant, unintentional islanding protection, including passive and active anti-islanding functions, should be disabled as such functions may conflict with transmission system security requirements.

2.4.6 Australia

The Australian National Electricity Rules state that unintentional islanding protection may be applied depending on the requirements specified by the Australian Energy Market Operator (AEMO) or the Network Service Provider⁸. Generating plants with capacities greater than 5 MW may be required to automatically disconnect from the main grid whenever the connected portion of the network is separated from the national grid and forms an island supplying load.

2.4.7 Europe

The European Commission Regulation 2016/631 on requirements for grid connection of generators specifies that the detection method for identifying the transition from grid-connected operation to islanded operation shall be agreed upon between the generating facility owner and the system operator in coordination with the relevant transmission system operator⁹. Similar approaches are adopted by several European Union member states.

2.4.8 Finland

The Finnish grid code follows the European Commission Regulation with respect to black-start and islanding operation capability. Therefore, the requirements mentioned in **Section 2.4.7** are applicable¹⁰. In addition, the use of protection devices based on the detection of rate of change of frequency (RoCoF) is prohibited, which makes this method unsuitable for islanding detection. Fingrid generally discourages the use of RoCoF or vector shift (phase jump) based protection methods due to the high risk of malfunction.

2.4.9 Denmark

In Denmark, Energinet.dk closely follows European Commission Regulation 2016/631 as mentioned in Section 2.4.7. Additionally, Energinet’s Control Centre Electricity may change the operational status to an “alert state,” where islanding detection is supported using PMU data along with island operation detection modules¹¹.

2.4.10 Great Britain

The Grid Code issued by the National Energy System Operator broadly follows the European Commission Regulation described in Section 2.4.7. Additionally, it specifies that detection of transition from grid-connected to islanded operation should not rely solely on network operator switchgear position signals¹². For Scottish networks, non-synchronous generating units and power park modules are required to trip if voltage and frequency exceed specified operating ranges for defined durations.

2.4.11 Greater Mekong System (Cambodia, Myanmar, Thailand, etc.)

The requirements for islanding detection or transition from interconnected operation to islanded operation in the Greater Mekong System, which includes countries such as Cambodia, Myanmar, and Thailand, closely follow the European Commission Regulation described in Section 2.4.7¹³

2.5 Conclusion

Large-scale renewable energy power plants consist of multiple interconnected inverters operating collectively to supply significant power to transmission networks. These plants are expected to remain connected during major disturbances and comply with ride-through requirements. As a result, unit inverter-level islanding detection schemes are generally required to be disabled, and coordinated plant-level islanding detection schemes should be implemented instead. Across different grid codes, the common principle is that islanding detection for large-scale RE power plants should be coordinated with transmission system operators. Such schemes should not rely solely on breaker status signals but should employ advanced techniques, often supported by communication-assisted protection schemes. Detection techniques are emphasized in coordination between generating entities and network operators to develop reliable and secure islanding protection schemes.

Section-3

Anti-Islanding Detection methods

Islanding detection in general are associated with inverter-level systems designed to detect the unintended Island formation and disconnection the inverters from the main grid. This condition is also referred to as loss-of-mains for distributed energy sources. Several islanding detection methods are described in the literature and are generally classified as follows¹⁴⁻¹⁵.

3.1 Passive Methods:

Passive methods are generally implemented using Local measurements such as over-voltage/under-voltage, ROCOF (rate of change of frequency, df/dt), vector shift or phase displacement protection, and over-frequency/under-frequency criteria are monitored to detect loss of grid connection.

The generalized workflow of passive islanding detection schemes (IDSs) depicted in the figures 3. below involves measuring these parameters and comparing them with predefined threshold values. If any parameter exceeds the specified threshold, the condition is identified as islanding and the relay initiates tripping.

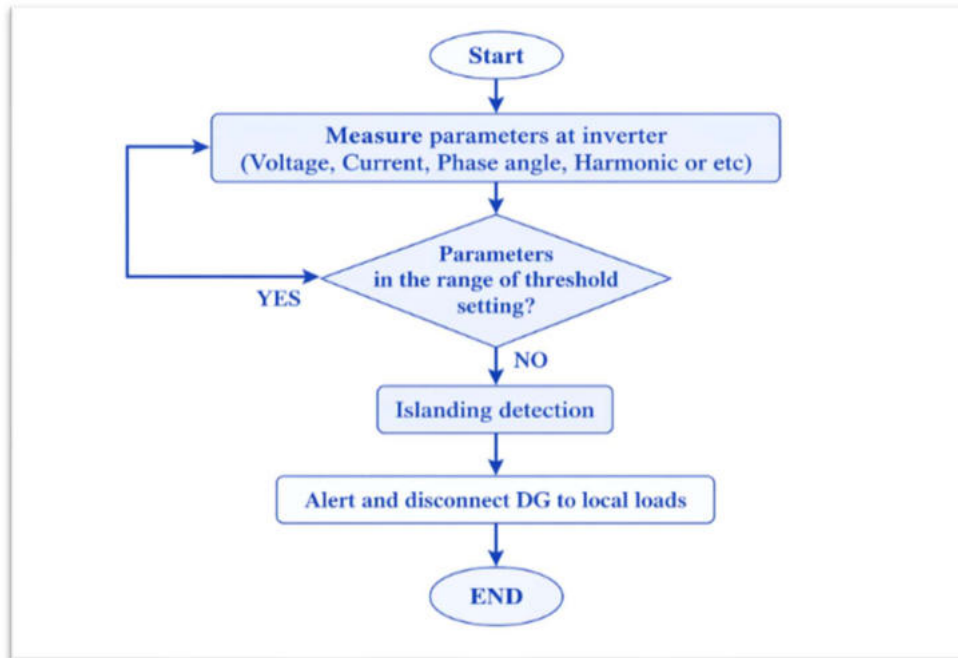


Figure 3: The generalized workflow of passive islanding detection schemes (IDSs)

Most common passive anti-islanding detection techniques are as follows;

3.1.1 Under/Over Voltage and Under/Over Frequency (UOV/UOF) protection is the most basic passive islanding detection technique. This method relies on the mismatch between renewable energy generation and local load within the islanded system. If the generated power approximately matches the local load ($P_{gen} \approx P_{load}$), the resulting voltage and frequency deviations are minimal and insufficient to trigger protection, thereby creating a Non-Detection Zone.

3.1.2 Rate of Change of Frequency (RoCoF / df/dt) protection measures the rate at which system frequency changes. This method is effective when there is a significant active power imbalance between generation and load within the island.

3.1.3 Vector Shift protection detects sudden changes in the phase angle of the voltage vector, which may occur during islanding events. However, this method is prone to mal-operation during transmission system faults and switching events, even when islanding has not actually occurred.

These methods are simple and easy to implement and do not interfere with normal system operation; however, they suffer from a large Non-detection zone¹ (NDZ) and may malfunction when the local load closely matches the power supplied by the inverter.

3.2 Active Methods:

Active islanding detection schemes are developed to address the Non-Detection Zone (NDZ)¹ inherent in passive islanding detection methods. These schemes intentionally inject a small, controlled disturbance into the power system and analyze the system response to detect grid disconnection.

When the grid is strong and the RE generation remains connected with the grid, the injected disturbance is absorbed by the network without causing significant deviation in system parameters. However, under islanded conditions, where the system becomes electrically weak, the disturbance is amplified, leading to voltage or frequency deviations that exceed predefined thresholds.

As a result, islanding can be detected even when the generation and load are closely matched, a condition under which passive methods typically fail. In some active approaches, harmonic

¹ NDZ (Non-Detection Zone): The operating region in which an anti-islanding protection scheme fails to detect islanding due to minimal mismatch between generation and load. A smaller or zero NDZ indicates higher reliability and improved safety.

current injection is used to estimate grid impedance, which changes significantly during islanding, thereby resulting in a near-zero NDZ.

The generalized workflow of Active IDSs is depicted in Figure 4 below.

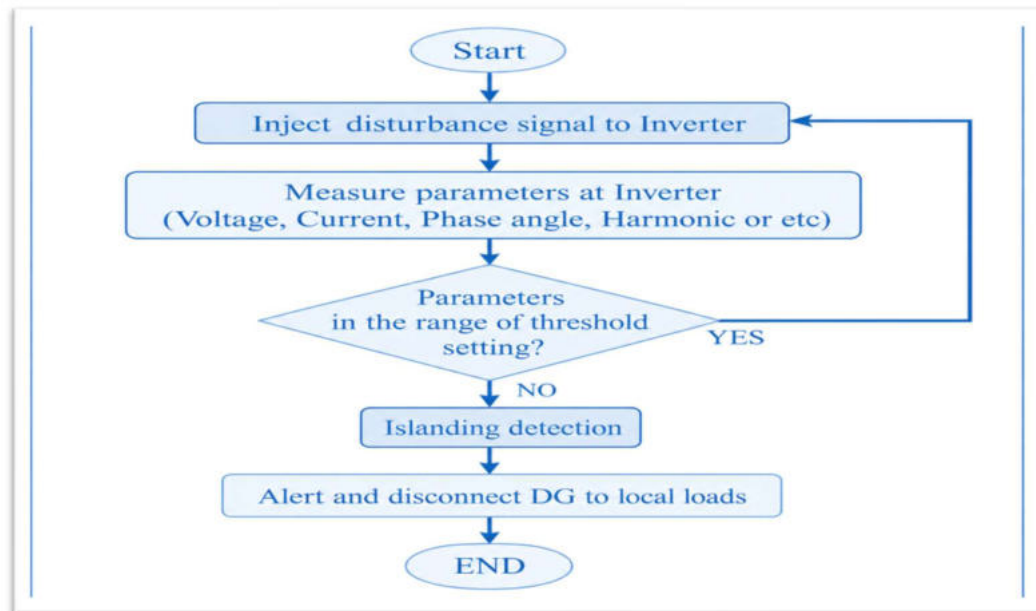


Figure 4: The generalized workflow of Active IDSs

Most common passive anti-islanding detection techniques are as follows;

3.2.1 Power Perturbation Method

This method introduces small, controlled variations in real or reactive power and monitors voltage and frequency response. It provides strong detection under balanced loads with a small NDZ. Low, randomized perturbations minimize power quality impact, and it works well in multi-DER systems. It can comply with IEEE 1547-2018 by disabling perturbations during ride-through events.

3.2.2 Active Frequency Drift

The inverter skews zero-crossing timing or phase angle to gradually change frequency. It offers moderate to strong detection and reduces NDZ compared to passive methods. Effectiveness depends on load characteristics. It may cause waveform distortion and harmonics, so careful tuning is needed in multi-inverter systems.

3.2.3 Sandia Frequency Shift

This method uses positive feedback between inverter phase and frequency. Small injected disturbances are amplified under islanding, triggering over/under-frequency protection. It has strong detection with small NDZ but may moderately affect power quality. Coordination is needed in high DER systems.

3.2.4 Reactive Power Variation Method

Controlled reactive power perturbations are injected, and voltage changes are monitored. It is effective in weak systems but NDZ increases in strong networks. Power quality impact is low, but coordination is needed in multi-DER setups to avoid masking and interference with voltage regulation.

Overall, the effectiveness of active islanding detection schemes lies in the fact that a small disturbance produces minimal impact when the RE generator is grid-connected but causes substantial variation in system characteristics when islanded.

While these methods significantly reduce or eliminate the NDZ associated with passive techniques, their primary limitations include potential power quality degradation and interaction among multiple inverters employing different active schemes. Therefore, careful design, coordination, and compliance with applicable standards such as IEEE 1547-2018 are essential for their successful implementation

3.3 Hybrid Methods:

Hybrid islanding detection schemes combine both passive and active islanding detection techniques in a coordinated manner to enhance detection reliability and overcome the limitations of individual approaches. In these schemes, the passive islanding detection method serves as the primary line of defense and continuously monitors system parameters without disturbing normal grid operation. When the passive method detects conditions indicative of possible islanding, an active detection technique is selectively activated to confirm the islanding condition.

By employing a two-stage detection process, hybrid islanding detection schemes effectively mitigate the large Non-Detection Zone (NDZ) associated with passive methods while limiting the continuous system perturbations introduced by active methods. During normal grid-connected operation, the passive stage ensures minimal impact on power quality, whereas the active stage provides decisive and reliable islanding detection only when required. This

coordinated approach results in higher overall detection effectiveness and improved system security. The generalized workflow of hybrid islanding detection strategies is depicted in the figure below.

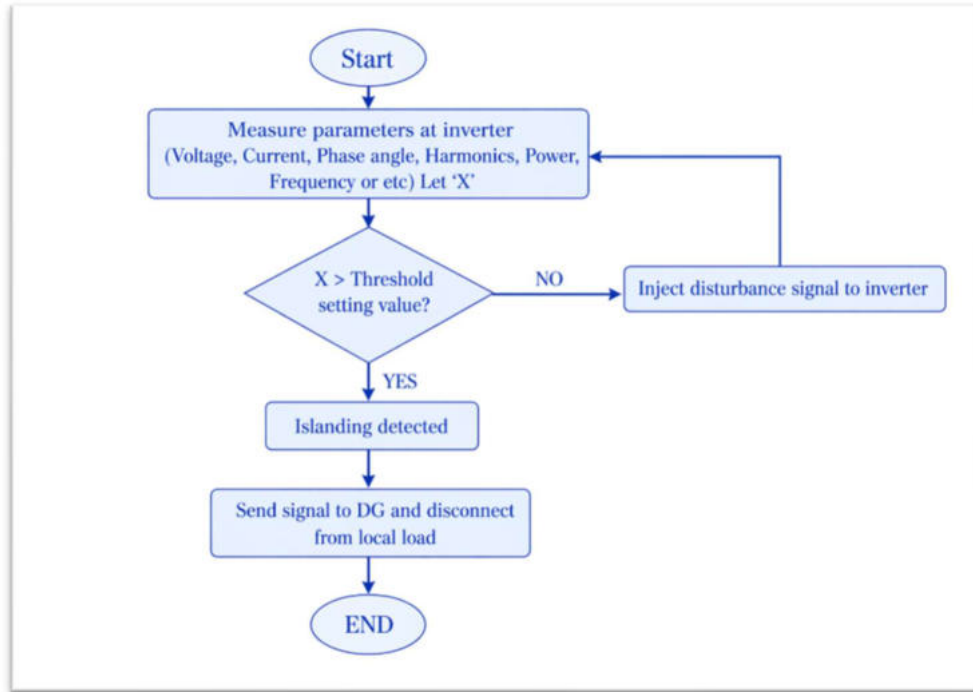


Figure 5: The generalized workflow of hybrid islanding detection strategies

3.4 Communication-Based Methods:

The Remote Islanding Detection Scheme (RIDS) or Direct Transfer Trip (DTT) detects islanding from the utility side rather than at the RE Generator end, using signals from phasor measurement units (PMUs), supervisory control systems, or breaker status information. These schemes are applicable to both inverter-based and synchronous-based RE Generation and rely on grid and network connectivity for operation.

The detection strategy is based on communication between the utility system and the RE Plant. Remote schemes depend on dedicated communication links to exchange information between the grid and the renewable energy (RE) plant. Measurements are typically performed at the grid side, often at the Point of Interconnection.

These schemes are generally of two types in RID, a PLC transmitter from the utility end system generates a continuous low frequency carrier signal of 200-400Hz. Each of the distributed generator connected at this interconnection with the utility has its own receiver, all listening

the transmitted signal. Whenever there is isolation from the utility side the signal gets lost and the distributed generation does not receive the signal which enables the permissive trip signal of the distributed generators and trips it. This method of Islanding detection is suitable for distributed generation where the length of feeders connecting the distributed generation is small. However, in case of RE plants the feeder lengths may be large and the carrier signal strength may attenuate while reaching the RE plants. Also, there are issues of cyber security since a deliberate attack may cause nuisance tripping of the plant. This method is at experimental stage for distributed generation connected

In DTT method, the utility substation communicates directly with the RE plant through SCADA or fiber-optic communication. When the substation breaker opens, a trip signal is immediately transmitted to the RE plant via links such as PLCC or OPGW, resulting in fast disconnection of the generation. The communication link plays a critical role in ensuring the reliable operation of the protection system.

DTT islanding detection schemes based on communication link are considered the most reliable anti-islanding protection methods, offering zero Non-Detection Zone (NDZ) and independence from the type of RE generation. However, this high reliability comes with increased system complexity, advanced signal processing requirements, and dependence on a robust communication infrastructure. Due to their high cost and need for reliable communication, these schemes are generally unsuitable for small-scale systems and are typically implemented in large utility-scale RE projects, usually above 5–10 MW, where communication infrastructure is already available or economically justified.

3.5 Computational intelligence-based Method:

Under this method, intelligent techniques that use advanced signal processing methods for effective and efficient islanding detection. This technique is generally highly accurate and can be employed where conventional islanding detection techniques fail, particularly in the cases of multi objective threshold selection-based criteria.

In practical implementations, inverter OEMs typically employ combinations of passive, active, and communication-based islanding detection schemes.

3.6 Comparison of Anti-Islanding Detection Techniques (AIDTs)

Before comparing islanding detection approaches, it is important to recognize that each technique operates within specific technical boundaries and application constraints. Common challenges applicable to most islanding detection schemes include the presence of a Non-Detection Zone (NDZ), the possibility of false or ineffective operation, potential system

instability or power quality degradation due to positive feedback, and relatively high implementation costs in certain cases.

Feature / Parameter	Remote IDSs/Communication methods	Passive AIDTs	Active AIDTs	Hybrid AIDTs
Basic principle	Detect islanding using communication or utility-side signalling from grid control center	Detects islanding by monitoring local electrical parameters only without injecting any signal	Detects islanding by injecting controlled disturbances into inverter output	Combines passive monitoring with selective activation of active disturbance
Detection location	Utility side / grid control centre	Local (at inverter or PCC)	Local (at inverter or PCC)	Local (at inverter or PCC)
Typical measured / influencing signals	Breaker status, communication signals, transfer-trip, PLC signals	Voltage magnitude, frequency, ROCOF, phase angle, harmonics	Same as passive methods plus injected ΔP , ΔQ , frequency or phase shift	Passive parameters continuously; active perturbation only when islanding is suspected
Detection mechanism	Direct confirmation of grid disconnection via communication	Relies on natural deviations in voltage or frequency caused by load-generation mismatch after islanding	Relies on artificially inducing deviations to accelerate detection of islanding	Two-stage detection: passive suspicion followed by active confirmation
Non-detection zone (NDZ)	Zero	High	Very small	Very low
Speed of detection	Very fast; instantaneous upon signal	Slower; depends on natural voltage/frequency drift	Faster due to forced perturbation	Moderate
Impact on power quality	None	None	Slight disturbance due to perturbation	Minimal
Reliability	Very high	Limited for balanced load conditions	High	Very high
Implementation complexity	Very high	Low	Moderate	High
Cost of implementation	High (especially for small systems)	Low	Moderate	Moderate to high
Typical examples	Transfer trip, PLC signalling	OV/UV, OF/UF, ROCOF, phase angle	Frequency shift, power disturbance,	Voltage-Q shift, positive feedback

Feature / Parameter	Remote IDSs/Communication methods	Passive AIDTs	Active AIDTs	Hybrid AIDTs
		jump, passive harmonic detection	impedance measurement, SMS, AFD, AFDPF, ALPS	with voltage imbalance
Suitability for high DER penetration	Limited	Poor	Good	Excellent
Compliance with IEEE 1547-2018	Fully compliant	Limited due to NDZ	Compliant with proper tuning	Highly compatible

Table 3: Comparison of Anti-Islanding Detection Techniques (AIDTs)

3.7 Anti-islanding philosophy adopted by DER inverter OEM in India.

3.7.1 Watt Power String inverter:

The Watt Power (WP) string inverter uses both passive and active anti-islanding control through reactive power and frequency positive feedback. The relationship is defined as:

$$\Delta I_q = k \cdot (f_r - f_{avg}) \cdot I_d$$

Where:

- f_{avg} = average grid frequency
- f_r = instantaneous grid frequency
- I_d = present active current

When the inverter is properly connected to the grid, the PCC clamps the voltage and frequency, making $f_r - f_{avg} \approx 0$ and $\Delta I_q \approx 0$.

During islanding, when the grid is disconnected:

- If $f_r - f_{avg} > 0$ Hz, the inverter supplies inductive reactive power. The positive feedback between reactive power and frequency causes the system frequency to rise continuously until over-frequency protection activates.
- If $f_r - f_{avg} < 0$ Hz, the inverter supplies capacitive reactive power. The positive feedback causes the frequency to drop continuously until under-frequency protection activates.

- During islanding, the grid is disconnected, causing grid frequency deviation wherein inverters and nearby load form a self-powered islanded system. In this scenario, inverter will supply reactive power, which will intensify the frequency deviation until the active anti-islanding protection is triggered.

3.7.2 TEMIC central inverter:

- Passive Method: Voltage phase jump (range: +/- 1deg to +/- 35 deg)
- Active Method: Slip Mode Frequency shift (setting: +/- 15Hz)

3.7.3 TBEA central inverter:

TBEA inverters uses both passive and active anti-islanding control through reactive power and frequency positive feedback.

3.7.4 Fimer central inverter:

As per user manual data they employed Passive Method with configurable settings listed below

- Under frequency limit: -5Hz, Range (-30 Hz to 0 Hz)
- Over frequency limit: 5Hz, Range (0 Hz to 30 Hz)
- Under voltage limit: 7%, Range (0% to 100%)
- Over voltage limit: 130%, Range (100% to 200%)

3.8 Evaluating Islanding Detection Methods: Challenges and Optimal Selection of Island Detection method for RE Plants.

Remote, passive, active, and hybrid islanding detection schemes exhibit distinct operational characteristics and suitability depending on network scale and DER penetration.

Passive islanding detection methods are simple, low-cost, and non-intrusive, but their large non-detection zones significantly reduce reliability under balanced load-generation conditions. **A more critical operational flaw is their poor selectivity during transient faults. Because they lack an active verification mechanism, passive sensors often struggle to distinguish between a localized islanding event and a temporary system-wide fault. This signal deterioration frequently causes mal-operation, where renewable plants trip offline unnecessarily due to external disturbances, undermining the overall stability and reliability of the power system.**

Active islanding detection methods substantially reduce the non-detection zone and improve detection reliability by injecting controlled perturbations, though they introduce power quality disturbances and involve moderate implementation complexity and cost. **The primary risk occurs in high-density renewable clusters, where many CBRs operate in close proximity. In these environments, the small perturbations from individual plants can constructively interfere, magnifying power quality distortion to unacceptable levels. This collective injection often leads to unstable inter-inverter oscillations, where the detection logic of one plant interferes with another, potentially destabilizing the very local grid it is trying to monitor.**

Hybrid islanding detection methods combine passive monitoring with selective active confirmation, achieving very low non-detection zones, high reliability, minimal impact on power quality, and a balanced trade-off between complexity and cost, making them the most suitable approach for power systems with high penetration of converter-based renewable energy resources. **However, a critical vulnerability exists during system-wide transients or nearby faults. In large-scale renewable hubs, a single fault can cause passive sensors at multiple plants to simultaneously misinterpret the disturbance as an islanding event. This triggers a controlled "perturbation storm" where every plant injects a confirmation signal at once.**

In case of a RE plant connected to the grid, the most favorable choice is DTT islanding detection schemes based on communication, which offer zero non-detection zone and have the highest reliability, with no impact on power quality; however, their reliance on communication infrastructure results in implementation complexity and cost. **While the implementation involves higher upfront costs and infrastructure complexity, these factors are increasingly justified by the operational risks of local methods. When compared to the mal-operation of passive sensors, the cumulative distortion of active injection, and the synchronized "perturbation storms" of hybrid triggers in complex RE hubs, the stability offered by remote communication becomes essential. For high-penetration power systems, the investment in communication-based detection is a necessary trade-off to ensure grid resilience and prevent the widespread nuisance tripping of renewable assets.**

Section-4

Recommendations for the Adoption of a Uniform Anti-Islanding Protection Philosophy for Renewable Energy (RE) Plants.

During the discussions, it transpired that there are two distinct protections whose boundaries have not been demarcated and their settings have often resulted in mal operations. Further during the discussions, it was also noted that in case of DGs, AIPs have been serving both the purposes of protecting the inverters from damage due to adverse grid parameters and disconnecting the CBRs from the grid when the grid is not energized, due to economic reasons and simplicity. This was more predominant in the case of DGs and also RE plants that were introduced in the initial phases and therefore, recommendations for settings need careful examination of the detection methods employed in AIP. However, when the CBR-based RE plants got matured, more sophisticated protections were employed to the inverters and along with these protections, the AIP also co-existed. Therefore, in the case of RE plants connected through pooling stations, the AIP should only perform its intended purpose of disconnection of the RE generation when the grid is not energized and dedicated protection of the inverters should only protect the inverters. The approach, therefore, is to clearly separate out other protections and settings of these protections in such a way that they do not interfere in each other's jurisdictions. The inverter protection has also been dealt with in this section to demarcate the boundaries of both these protections.

The diagrams below illustrate the distinct operating regions in which the inverter is required to ride through disturbances within the LVRT/HVRT voltage–time windows and the regions in which anti-islanding protection is permitted to operate.

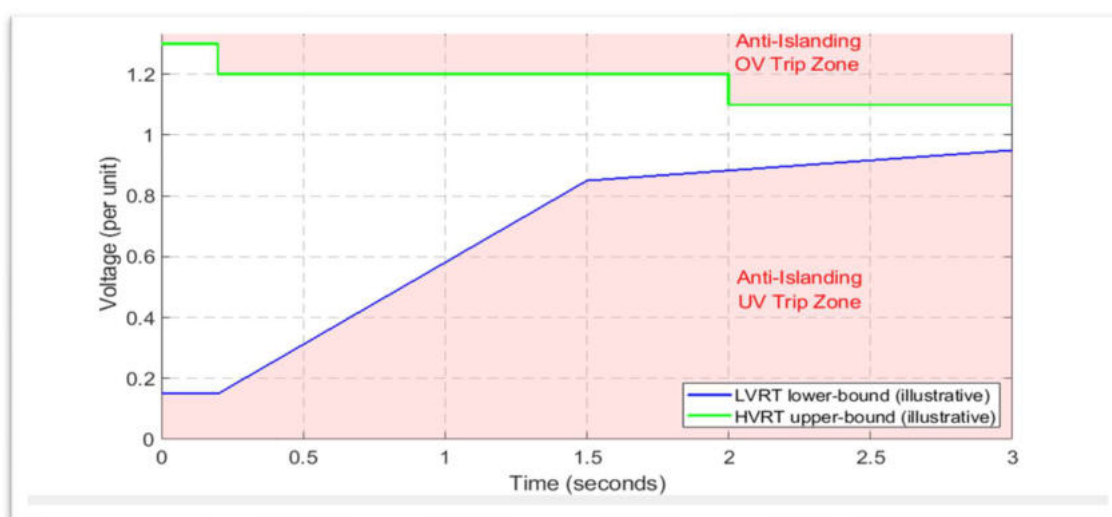


Figure 6 :Voltage Ride-Through with Anti-islanding Trip Zones (50 HZ)

As per CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (and subsequent amendments), when the POI voltage remains within the LVRT or HVRT envelope, the RE generating station shall remain connected and support with reactive current injection as mandated in the grid code. Within the mandated ride-through window, anti-islanding tripping is intentionally suspended to prevent nuisance disconnections during grid disturbances and to ensure compliance with ride-through obligations.

Outside the permissible voltage and frequency envelopes, anti-islanding protection is permitted to operate, however not mandated unless there is a loss of mains/grid. In the event of confirmed islanding, the RE generation is required to cease energizing the system within two seconds. This approach ensures compliance with ride-through requirements while maintaining system safety. However, some RE generation facility may have a provision of islanded operation, local demand (for example, hybrid RE-BESS system) and adequate control mechanism in place for islanded operation. Such RE generation facility under a grid disturbance driven operating point outside VRT envelope, may be permitted to operate in islanding mode in due consultation and agreement with respective Transmission utility/SLDC/DISCOM/RLDC/RPC. The LVRT and HVRT values shown are representative of common practice in India.

Accordingly, CBR protections have been divided under Inverter protections and AIP as described in the following sections;

Recommendations on adoption of Anti Islanding methods and settings:

4.1 Inverter Protection:

The inverters of the grid-connected RE generators based on GFL, GFM and hybrid GFL & GFM CBRs shall have the following protections:

4.1.1 Activation of LVRT/HVRT protection should be kept outside VRT envelope as mandated in CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (and amendments).

4.1.2 All LVRT/HVRT and frequency thresholds required in grid code regulations are to be complied at PoI, and in case of RE power plant, corresponding terminal voltages at WTG/inverter terminals shall be mapped accordingly based on the voltage drop/rise in the collector system of RE to avoid undesired undervoltage/overvoltage tripping of WTGs or PV inverters.

4.1.3 The other settings, such as Grid Short Circuit protection, AC over-current protection, DC over-voltage protection, overheat protection, DC overload protection, Earth fault protection, Lightning protection, Leakage current protection and Grid imbalance protection should be kept as recommended by the OEM.

4.2 **AIP protection for RE plants connected to 66kV and above Voltage level:**

4.2.1 Existing grid connected RE plants:

- If the RE plant supports Hybrid, Active and Passive AIPs, Hybrid AIP must be chosen as first choice and all other AIPs should be disabled.
- If the RE plant supports Active and Passive AIPs, Active AIP must be chosen and all other AIPs should be disabled.
- If only Passive method is supported, then RoCoF method of Island detection should be disabled and Vector shift $> 10^\circ$ with a time delay of 1.8 sec be adopted so that the generation is tripped within 2 seconds of Island detection through this method.
- Since Under-frequency/over-frequency is not an issue with CBR-based RE generators, the frequency for tripping the IBRs may be kept ± 3 Hz of the normative frequency with a time delay of 1.8 seconds so that it will avoid mal-operations. A necessary amendment is required in clause B2(2) of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019.

4.2.2 **For all grid-connected RE Plants (to be commissioned after April 2027):**

- For all the transmissions emanating from the RE plants should be equipped with optical fiber/PLCC communication so that the AIP method can be implemented.
- The AIP should be based on the DTT Islanding Detection Scheme and all other Islanding Detection Schemes for grid-connected RE Plants shall be disabled. For ensuring correct detection, the DTT-based AIP should acquire the status signal of breakers of outgoing lines of Plant to

pooling station (ISTS) and HV & LV breakers of IDT (Interconnecting Duty Transformer).

The schematic diagram of grid Connected RE plants is as given below;

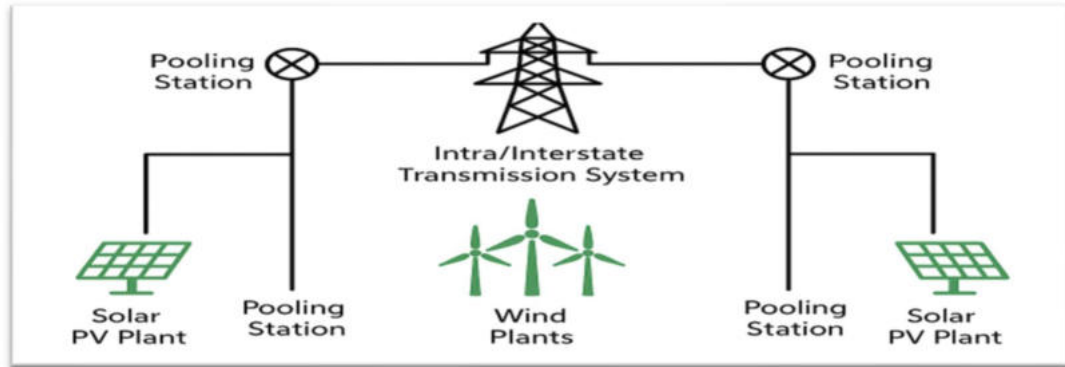


Figure 7:schematic diagram of grid Connected RE plants

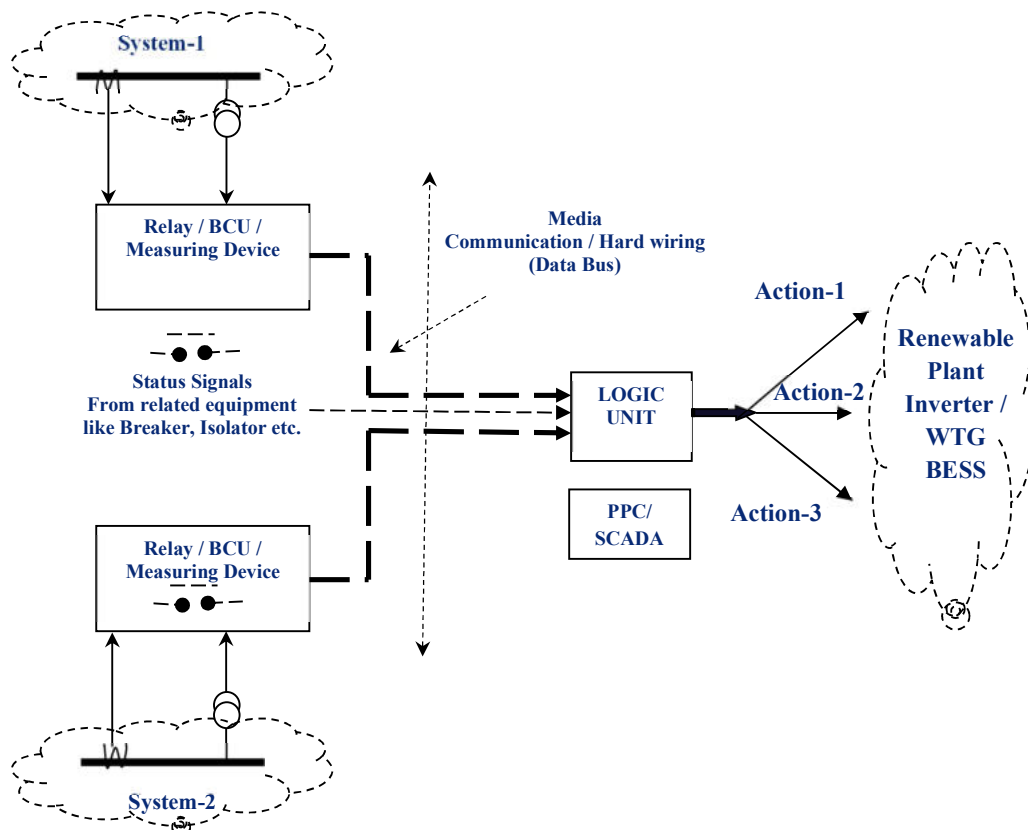


Figure 8:General Structure of DTT – Based on Analogue and Status

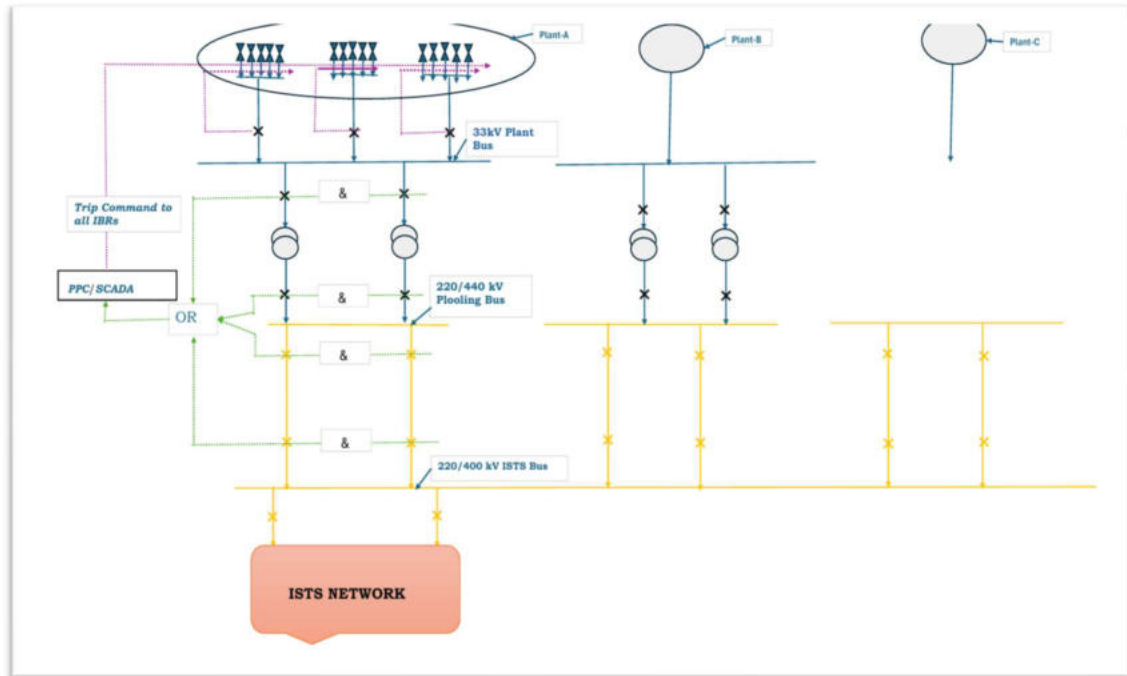


Figure 9:Diagram showing SLD and the RID scheme

- The generic DTT (Direct Transfer Trip) logic diagram for anti-islanding protection tripping of RE generators, which is based entirely on breaker status, is depicted in the above diagram. The inclusion of voltage signal has been omitted in this logic. However, for redundancy the scheme may include under voltage signal and the scheme may be finalized in consultation with the respective system operator/RPCs.
- Remote-end Grid Breaker Status (Open/Close) to be received via PLCC / OPGW (DTPC Channel is preferable), providing the breaker status signal of evacuating lines terminating at ISTS pooling station to the PPC/SCADA of RE generators shall be the responsibility of the ISTS licensee. The status of other breakers under the control of RE generator/RE Developer shall be made available to the PPC/SCADA by the respective RE generator/RE Developer.
- The actual field implementation of the DTT logic shall be done in consultation and approval of the concerned system operator (RLDC/SLDC).

4.3 AIP protection for RE plants connected to HV system (11kV up to 66kV):

4.3.1 Existing:

- **If the RE plant have a facility of Hybrid, Active and Passive AIPs, Hybrid AIP must be chosen as the first choice and all other AIPs should be disabled.**
- **If the RE plant has a facility of Active and Passive AIPs, Active AIP must be chosen and all other AIPs should be disabled.**
- **If only the Passive method is available, RoCoF method & all other methods of Island detection should be disabled and Vector shift $> 10^\circ$ with a time delay of 1.8 sec shall be implemented.**

4.3.2 For all grid-connected RE Plants connected to HV system (11kV up to 66kV): (to be commissioned after April 2027):

- **Hybrid method of islanding detection should be used.**

4.4 General important considerations regarding AIP protection for RE plants included in Islanding schemes:

- 4.4.1 RE Plant having a storage system which are intending to run in an Islanded operation for charging of the storage system, shall automatically disable the AIP when an island is formed, subject to approval of the concerned system operator/RPC.
- 4.4.2 In case of RE Plant having sufficient storage to run continuously as a microgrid that operates independently or in conjunction with the main grid, the AIP may be decided in consultation with the respective system operator.
- 4.4.3 The AIP of GFM IBRs will have to be bypassed during extending black start from the GFM-based battery storage system or any such system capable of extending black start.

Section-5

Inclusion of RE generators in Islanding Schemes

The recommendations of AIP for different types of RE plants have been given in the preceding section. This section deals with the precautions and changes in settings required in case of inverters of RE generating plants for including them in the Islanding schemes.

5.1 Important points to be considered for inclusion of RE Plants in Islanding schemes:

- 5.1.1 RE plants capable of operating in islanded mode should be included in Islanding scheme strictly in consultation with the local TRANSCO & DISCOM and approval of RLDC/RPC.
- 5.1.2 It is preferable that the RE generators included in the Island are based on Grid Forming IBR or a mix of Grid Forming & Grid Following CBR-based RE Generators.
- 5.1.3 The ratio of conventional generation to CBRs-based RE generation should preferably be more than 70%.
- 5.1.4 Island formation only with Grid Following CBRs without GFM CBRs or conventional generators is not technically feasible since GFL requires an external reference supply at its terminal.
- 5.1.5 The RE weather station telemetry should be available at the Islanding Control Centre and should be monitored during Islanded operation.
- 5.1.6 The shift toward a converter-based resource (CBR) system reduces grid inertia, making the island susceptible to high Rates of Change of Frequency (RoCoF). To prevent nuisance tripping of renewable energy (RE) sources, RoCoF-based Anti-Islanding Protection (AIP) of RE plants should be disabled and replaced with a DTT Islanding Detection Scheme. If a remote scheme is not feasible, AIP should be based on Hybrid or Active Islanding Detection method.
- 5.1.7 Reliable islanding schemes require high certainty in both load and generation, as island formation is often triggered by unpredictable grid events. The intermittent nature of renewable energy (RE) makes maintaining a post-islanding balance difficult. Further, high solar and wind penetration reduces system inertia, leading to high RoCoF and deteriorated frequency nadir even during small load-generation imbalances. To mitigate these risks, an Automatic Load-Generation Balancing Scheme (ALGBS) or equivalent frequency control shall be deployed to ensure real-time generation-demand balance. Additionally, load-shedding blocks should be divided into smaller increments to enable finer control and minimize frequency excursions within the island. Any such load-generation control/ALGBS shall be disabled during grid connected operation.

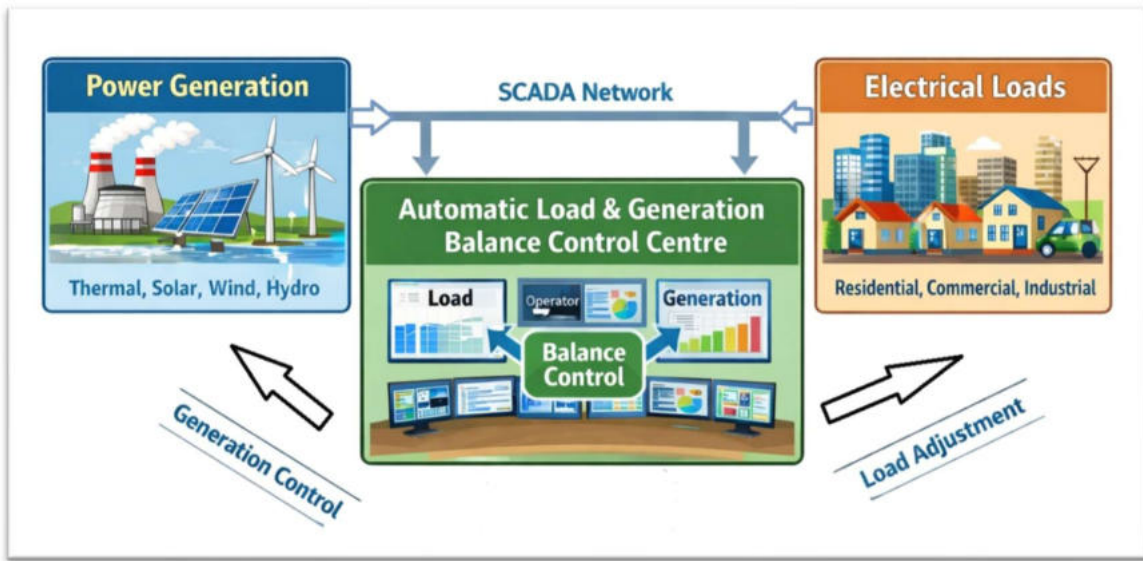


Figure 10:General structures ALGBS

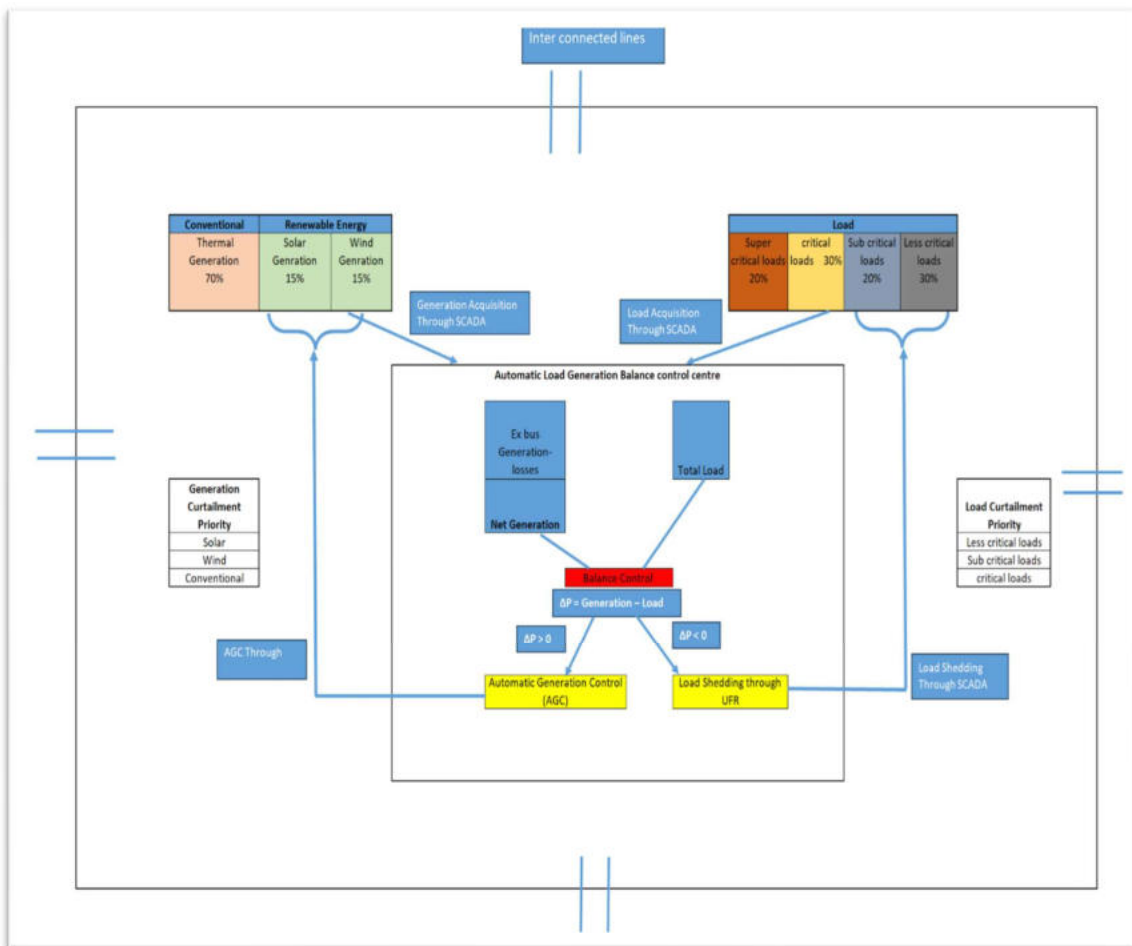


Figure 11:General Architecture of ALGBS

The ALGBS, hosted at the Island's Control Centre, utilizes SCADA to acquire real-time feeder data on local loads and generation within the Island. The ALGBS is activated when frequency reaches to 48.7Hz, so that under normal conditions, unintended tripping of loads is avoided. By continuously monitoring the Load-Generation Balance (LGB)—including system losses—the scheme identifies the necessary quantum of load shedding and transmits "Trip Enable" signals to the relevant feeders. These feeders are equipped with Under Frequency Relays (UFR); when the frequency threshold of the UFR is met and the ALGBS enable signal is present, the feeder trips to restore balance in the Island. Ultimately, the ALGBS ensures that demand dynamically tracks available generation to maintain island stability. The frequency settings for Pre-Island Preparatory Load Shedding, Islanding shall typically be kept as follows;

5.2 Recommendations:

5.2.1 The trigger frequency settings proposed are on the higher side than those of a traditional islanding scheme with conventional generators due to the uncertainty of available generation in the Island and the less time available for getting prepared for Island due to low Inertia of the System.

Pre-Island Preparatory Load Shedding: 48.5 Hz:

Major disturbance is sensed by frequency decay. At 48.5 Hz under frequency load shedding takes place by way of opening designated feeders, prior to islanding, to ensure generation rich island.

The load-shedding blocks should be of a smaller size than the traditional Islanding schemes, preferably 2% of the Island generation capacity, to have finer control over the frequency after Island formation. Otherwise, the logic of the ALGBS should be such that it automatically selects the feeders so that the generation in the Island is always greater than around 2%.

Islanding: 48.1 Hz:

- **The RE generators should be switched to frequency control mode and conventional generators should be switched over to speed control mode at 48.1 Hz.**
- **The ALGBS starts tracking the load generation in the island and if frequency is falling and load is more automatic trip enable signal is passed to the feeders. When frequency in the Island reaches 49Hz, the designated feeders are tripped.**

- **A logic needs to be built that will take care of RE generation variability or intermittency, particularly for the period of operation during Low to High (Ramp-up) and High to Low (Ramp-down) for establishing the Load-Generation Balance during the transitions.**
- **Auto restoration of loads in blocks of 2% should be possible if frequency rises to 50.5Hz**

Part-B- Protection Review of RE connected system

Section: 6

Assessment of the Impact of Renewable Energy (RE) Integration on Earth Fault Protection and Other Critical Protection Functions

In this section, the impact of the integration of Renewable Energy (RE), particularly converter-based resources such as solar PV and wind, on earth fault protection and other critical protection schemes in power systems is reviewed. The traditional protection schemes deployed in the power system have been designed primarily around the response of the synchronous generators (SGs) to different fault conditions and other contingency events. Several features of fault current from SGs, such as their high current amplitude and sequence components, are used to design several conventional protection schemes. However, current output from CBRs is limited by thermal capacity of converter switches and modulated by the control system, and therefore, the fault current characteristics are significantly different from those of SGs. Therefore, a protection system built on the fault characteristics of SGs is prone to malfunction when subjected to low magnitude and peculiar fault current characteristics from CBRs. It is imperative to formulate corrective measures, such as modification of traditional protection systems or using new protection schemes, to ensure adequate and accurate operation of system protection.

In RE-rich grids, the following issues are mainly observed:

1. Non-detection of faults by primary protection schemes such as distance protection and overcurrent protection & Directional Earth fault protection at the RE end.
2. Delayed fault clearance at the grid end for faults occurring in the Zone-2 portion of the line connected with RE generation.
3. Impact on distance protection
4. Impact on differential protection

Due to the above factors, several protection challenges arise, which are illustrated as follows.

6.1 Impact on Earth Fault Protection

6.1.1 Reduced Fault Current Contribution

Traditional synchronous Machine provide high short-circuit current (as high as 7-8 per unit) during faults, enabling overcurrent relays to operate quickly. In contrast, inverter-based RE sources are current-limited and typically contribute maximum of only about 1.1–1.4 per unit current for a few cycles during a fault. Moreover, the fault current from

IBR/CBRs is not always inductive/reactive as is the case in SGs, rather its power factor can be as high as close to unity depending on the fault level.

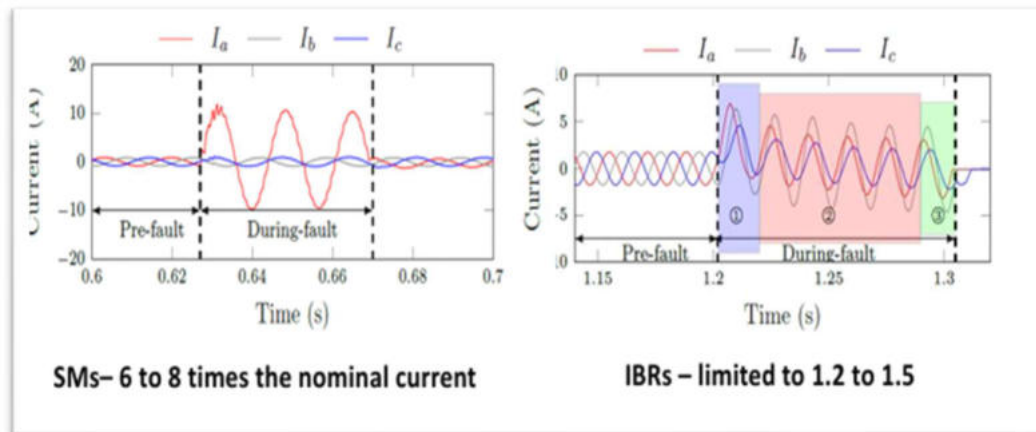


Figure 12: Indication of Fault current of SMs and IBR

As a consequence:

- Directional Earth Fault (DEF) and Residual Overcurrent (ROC) relays may fail to detect faults.
- Sensitive Earth Fault (SEF) settings require revision to enable detection of low-current earth faults.

6.1.2 Change in Zero-Sequence Network

In traditional synchronous generator behaviour, the response during asymmetrical faults is well understood through sequence component analysis. However, in current inverter-based resources /CBRs, the negative sequence components depend on the control system design and implementation.

Furthermore, RE plants often use transformer connections such as Dy or Yg-D, and they may not have a solid earth reference.

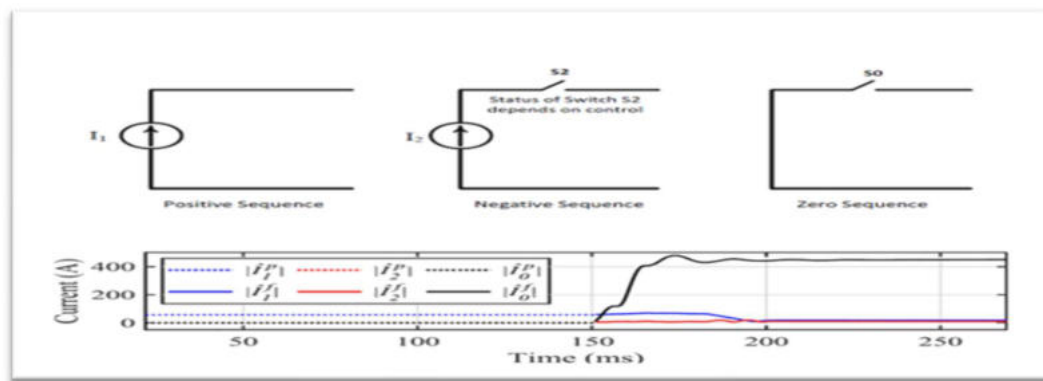


Figure 13: Zero sequence Network and Response of SMs and IBR/ CBR

Due to this following impact was observed:

- Changes in zero-sequence voltage and current paths, reducing the effectiveness of traditional neutral displacement relays.
- Isolated or high-impedance grounding practices in RE parks further complicate earth fault detection.

6.1.3 Inverter Control Behavior

During fault conditions, inverters may block current injection or switch to fault ride-through (FRT) mode in accordance with grid code requirements. Furthermore, the behaviour of the inverter during FRT determines the nature and magnitude of the fault current contribution.

Due to this control-dependent response, CBRs may or may not fully comply with grid code requirements under all fault conditions.

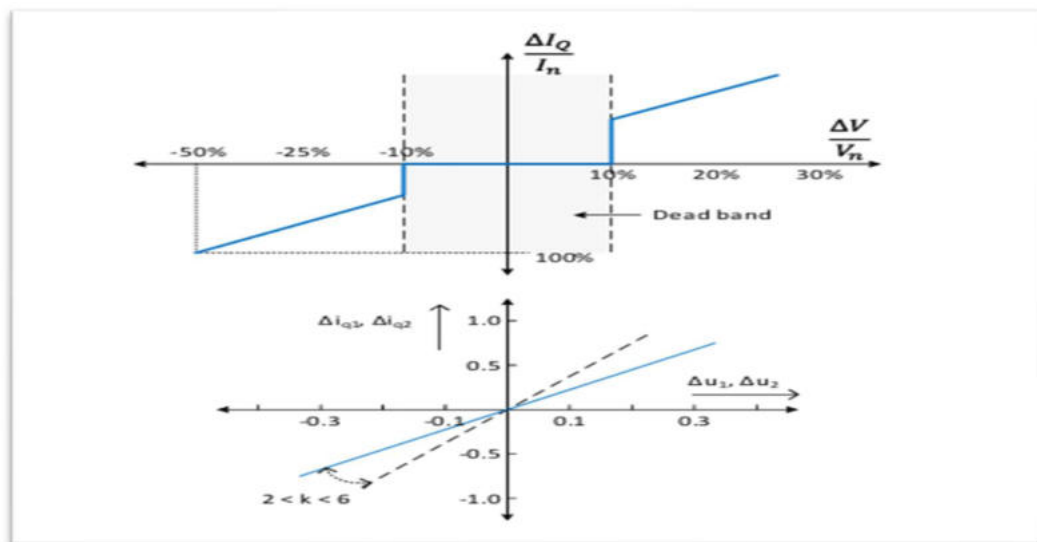


Figure 14: Inverter control Behavior during Fault

As a result:

- Earth fault current contribution may be delayed or absent.
- Protection elements may under-reach due to insufficient fault current levels.

6.2 Impact on Other Critical Protection Aspects

6.2.1 Distance Protection

The distance relaying principle is widely employed in transmission line protection.

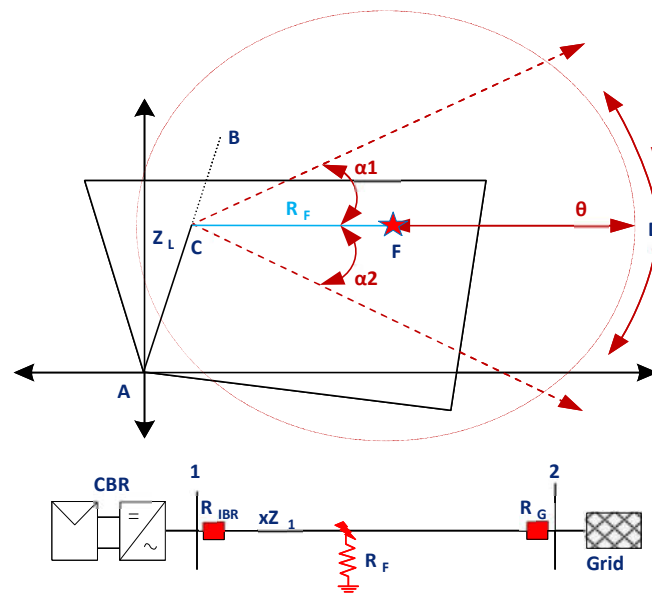
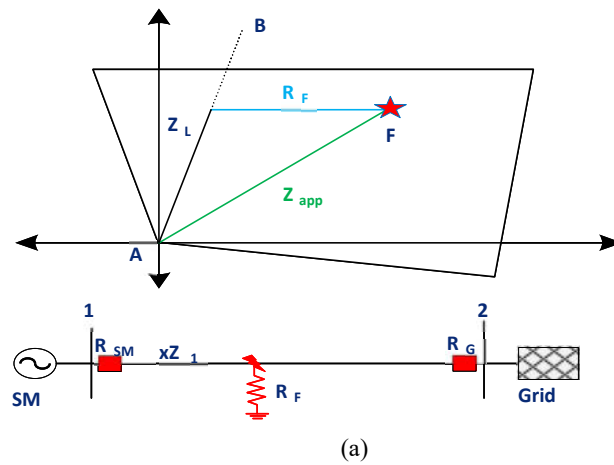


Figure 15: Apparent impedance calculated during a resistive fault by the relay (a) near a conventional generator and (b) an CBR.

The line AB in the relay characteristics in Figure 15 represents the transmission line, and for a bolted fault on the transmission line, the apparent impedance falls anywhere on this line, depending on the location of the fault. However, fault currents are not always resistance-free, especially when the fault current travels through the tower, ground or the fault current involves an arc. For such resistive faults in a transmission line, the apparent impedance is given by,

$$Z_{app} = xZ_{1L} + \left(\frac{I_F}{I_L} \right) R_F = xZ_{1L} + \Delta Z$$

Where, Z_{app} is the calculated apparent impedance, xZ_{1L} is the positive sequence impedance of the transmission line till the fault point, I_F and I_L are the fault current and the relay local current respectively, and R_F is the fault resistance which is a purely horizontal component. The CBR control system limits the fault current to 1.1 - 1.4 p.u. to protect the switches, whereas the fault contribution from the synchronous generator-dominated grid will be around 6 to 8 times the nominal value. The ratio will therefore take a high value, and the apparent impedance will tend to have a large horizontal shift (line CD in Figure) and may fall outside the relay characteristics. The apparent impedance calculation as shown in Figure will have multiple errors as listed below:

1. Limited fault current from CBRs resulting in further horizontal shift (FD)
2. Large phase angle difference between the fault currents injected by CBRs and the grid, causing an angular shift in either anti-clockwise (α_1) or clockwise (α_2) direction.
3. Frequency deviation of CBR fault currents from the system fault current results in apparent impedance rotation along a circle (center F and radius FD).

6.2.2 Differential Protection

Differential relaying makes quick decisions and offers high sensitivity and reliability. Unlike distance protection, differential protection of transmission lines is unaffected by power swing or load encroachment. Moreover, the operation of differential protection is not affected by the issues of zero sequence mutual coupling and uncertainty of line parameters. In RE dominated region, for a fault on the interconnecting transmission line, the fault current from CBR and from the grid may not have the same phase angle due to phase angle modulation by the converter control system. This discrepancy in the fault current angles at the ends of the transmission line may cause differential relay maloperation. A large difference in the fault current angles between CBRs and the grid can lead to low sensitivity for differential relays, and the effect is more prominent when the CBR is connected to a weak grid. For high-resistance faults in a line connecting IBR to a strong SG-based grid, the current through the faulted path is very low and even close to zero when it is assumed that the CBR control suppresses the zero-sequence current. Moreover, for a severe bolted fault, the differential relay was more prone to maloperate for longer lengths, higher CBR capacity and faults closer to RE plant.

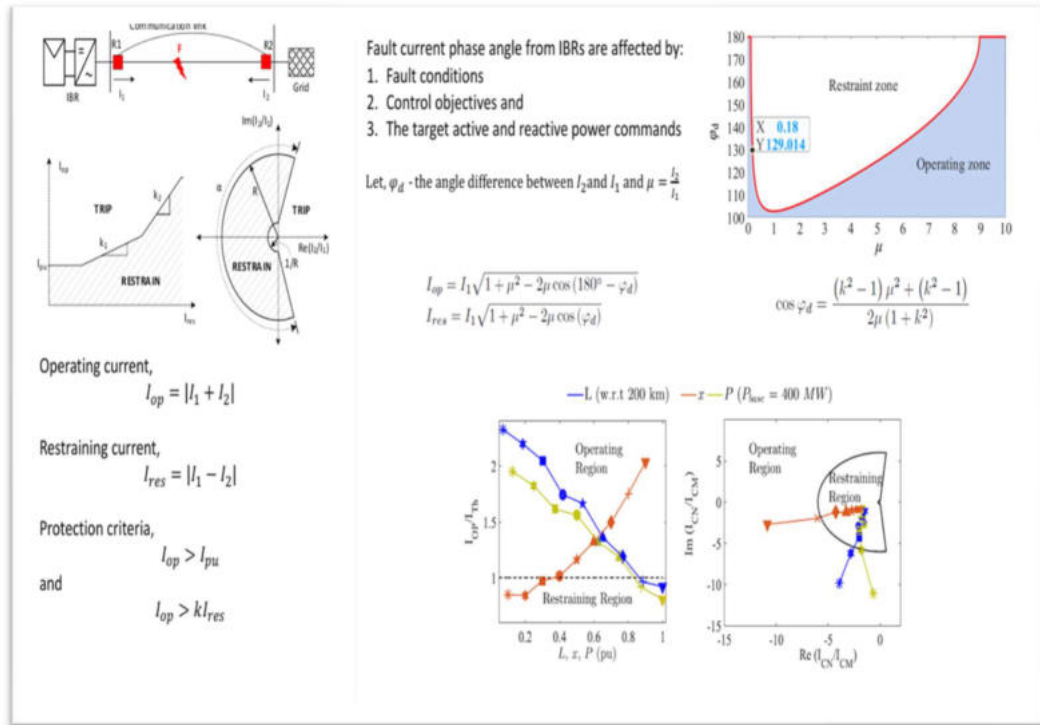


Figure 16: Response of Differential Protection during fault in case of IBR/CBR

6.2.3 Overvoltage Protection

In RE dominated regions, post fault clearance accompanied by delayed active power recovery and lack of adequate reactive power support may lead to sustained overvoltage in the transmission system and consequently at the RE plant side leading to overvoltage tripping of transmission lines and inverters/WTGs. Therefore, adequate overvoltage protection settings and coordinated protection schemes shall be worked out to address this specific protection challenge.

6.2.4 Frequency Protection

High RE penetration reduces overall system inertia, leading to higher rates of change of frequency (ROCOF) during system disturbances. Moreover, RE dominated systems are more prone to high frequency deviations compared to conventional system including power system oscillations that need to be factored in the protection system.

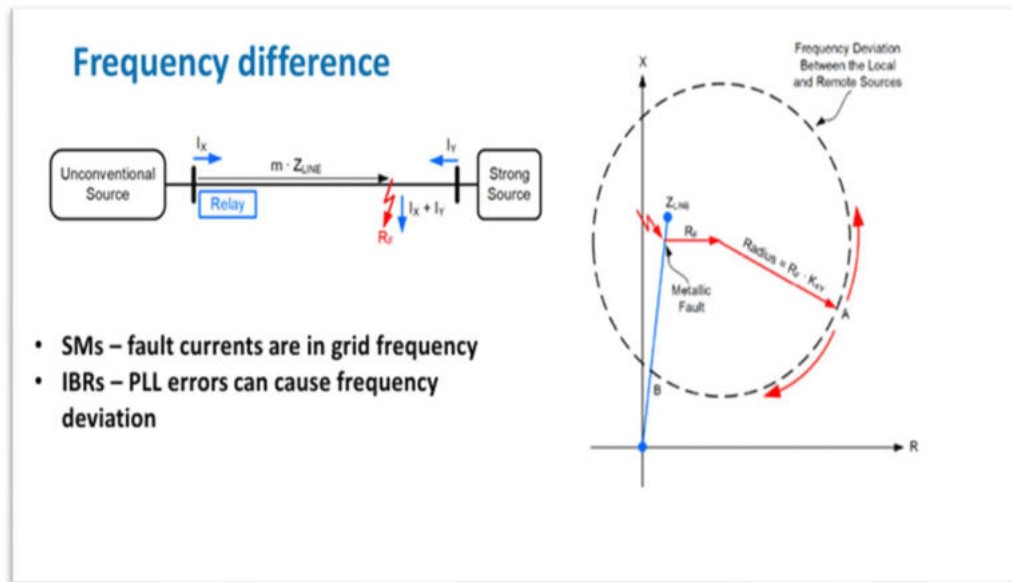


Figure 17: Response of Frequency Protection during fault in Case of SMs and IBR/CBR

6.3 Negative Sequence Current Injection Requirements from CBRs connected at Transmission Levels:

Negative sequence current injection is being made mandatory primarily because of the fundamental shift from Synchronous Generators (SGs) to Converter-Based Resources (CBRs) like wind and solar.

Traditional grid protection relies on the "natural" behavior of SGs, but inverters do not naturally produce the same electrical signatures during faults. Mandatory injection is required for the following critical reasons:

6.3.1 Enabling Fault Detection (Relay Sensitivity):

Conventional protection relays, such as Instantaneous Negative Sequence Overcurrent (50Q), identify unbalanced faults (like a single-phase-to-ground fault) by looking for a high level of negative sequence current.

Inverters naturally suppress negative sequence current to protect their own power electronics. Without a mandatory requirement to inject it, an inverter might provide almost zero negative sequence current, leaving a fault "invisible" to existing relays.

Mandatory injection ensures there is enough current for relays to "see" and clear the fault before it damages equipment.

6.3.2 Maintaining Proper Directionality (67Q Elements):

Relays often use the phase angle between negative sequence voltage and current to determine if a fault is "Forward" (on the protected line) or "Reverse" (behind the relay). Because inverters are software-controlled, their current can be in any phase relationship. Without a standard, an inverter might inject current that makes a forward fault look like a reverse fault, causing the relay to fail to trip or trip the wrong line. Standards and Grid codes (like IEEE 2800 and VDE-AR-N 4120) mandate an inductive phase relationship (leading voltage by 90° to 100°), essentially forcing the inverter to "act like a machine" so legacy relays can understand the signal.

6.3.3 Accurate Fault Identification (Phase Selection)

When a fault occurs, distance relays must decide which specific phase to trip. This logic often compares the angle of negative sequence current to zero sequence current. In systems with high inverter penetration, the "unnatural" phase angles from uncontrolled inverters cause misidentification. For example, a Phase-A-to-ground fault might be incorrectly identified as Phase-C-to-ground. Standards ensure a consistent angular relationship, allowing the relay to accurately identify and trip only the faulted phase.

6.3.4 Supporting "Weak" Grids

As the SGs are not coming up, the grid is becoming "weak" (low short-circuit ratio). In these areas, there is very little natural fault current. Mandatory injection ensures that even in a grid dominated by renewables, there is a predictable "synthetic" fault response to maintain system stability.

Summary of Mandatory Protection Requirements:

Problem without Injection	Consequence	Mandatory Solution
Low Amplitude of negative sequence currents	Relays don't "see" the fault.	Minimum k-factor (gain) for injection.
Random Phase Angle	Relays trip the wrong direction.	Forced Phase Angle (90° inductive).

Inverter Suppression	Phase selection fails.	Decoupled Control (DSC).	Sequence
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Table 4: Summary of Mandatory Protection Requirements

6.4 Recommendations:

- 6.4.1 **During LVRT:** For unbalanced faults, in addition to increased positive-sequence reactive current, the CBR unit shall inject negative sequence current which is dependent on CBR unit terminal (inverter terminal) negative sequence voltage. The minimum magnitude of the negative sequence current injection should be 1% of the negative sequence voltage at the CBR terminal. The negative sequence current injection should lead the CBR unit terminal negative sequence voltage by an allowable range as specified below: - 90 degrees to 100 degrees for full converter-based CBR units - 90 degrees to 150 degrees for type III WTG.

Assuming pre-fault negative sequence current output is zero or negligible, the negative sequence reactive current injection during a fault is an incremental negative sequence reactive current (ΔI_{R-2}). If the CBR unit's total current limit is reached, either ΔI_{R-1} , or ΔI_{R-2} , or both may be reduced with a preference of equal reduction in both currents. Additionally, the incremental positive-sequence reactive current (ΔI_{R1}) injection shall not be reduced below incremental negative sequence reactive current (ΔI_{R2}). In case of type III WTGs, the ΔI_{R1} and ΔI_{R2} injection during a fault is driven by machine parameters and control dynamics and may not be controllable in a manner described above.

When operating in reactive current priority mode, a full converter-based CBR unit shall be capable of injecting negative-sequence reactive current of 50% of its maximum current rating when the CBR unit terminal negative-sequence voltage is greater than or equal to 25% of nominal voltage. Injecting higher negative-sequence reactive current for a lower negative-sequence voltage at CBR unit terminals is permitted. In case of type III WTGs, the negative-sequence current injection is due to machine parameters and control dynamics.

The above provisions may be appropriately considered in the future amendments of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations.

Section:7

Recommendations on improving the protection system for RE systems

In this section, measures to mitigate the challenges imposed by Renewable Energy plants in case of earth faults and other critical protection aspects using presently available protection relay functionalities, such as directional earth fault, distance protection and line differential protection, are reviewed. Certain measures that can be implemented without any additional capital expenditure are recommended. These measures are outlined below.

7.1 Directional Earth Fault (DEF) relays:

To improve the performance and reliability of DEF relays in systems with high Renewable Energy (RE) penetration, several technical measures can be implemented:

7.1.1 Modify Directional Polarizing Methods:

Traditional voltage or current polarization can be unreliable with inverters.

- **Memory Voltage:** Use "Voltage Memory" features that store the pre-fault voltage phase angle for a few cycles. This prevents the relay from being confused by the rapid phase shifts inherent in inverter control loops.
- **Dual Polarization:** Use both Zero-Sequence Voltage (V_0) and Zero-Sequence Current (I_0) from a local transformer neutral simultaneously to increase the security of the directional decision.

The above approaches of settings may be implemented if it is available in the existing relays. In case of upcoming projects, the project developers/ISTS licensees may incorporate these features in the relay's specifications.

7.1.2 Implement Negative Sequence Logic (with Caution):

If the inverters are programmed to provide a controlled amount of negative sequence current (I_2):

Directional Negative Sequence (67Q): This is often more sensitive than standard earth fault (67N) logic. However, this requires coordinating with the RE developer to ensure the inverters don't suppress I_2 entirely during faults.

The line owners may take care of this fact in the existing/upcoming system.

7.1.3 Compensate for Capacitive "Sympathetic" Tripping:

In systems with extensive cabling (like wind farms):

- **Sensitive Earth Fault (SEF) with Harmonic Filtering:** Use relays that can filter out the high-frequency transients and charging currents common in cable networks.
- **Phase Angle Shifting:** Adjust the Relay Characteristic Angle (RCA) to ensure the relay ignores the purely capacitive (90-degree) current that flows during external faults.

The line owners may take care of this fact in the existing/upcoming system.

7.1.4 Adopt Adaptive Protection Settings (Futuristic approach):

Since fault levels vary based on weather (wind/solar intensity), "fixed" settings are often inadequate.

- **Multiple Setting Groups:** Program the relay with different setting groups that switch automatically based on the number of inverters online or the status of the RE plant.
- **Dynamic Pickup Thresholds:** Use relays that can communicate with the plant's SCADA system to lower pickup thresholds when the RE source is the primary infeed (weak infeed conditions).

Since this approach requires proper study and coordination among the transmission utilities, these types of schemes are required to be implemented in consultation with RPCs/RLDCs.

7.2 Implementation of Line Differential Protection:

As mandated by the Central Electricity Authority (CEA), all transmission lines are being provided with Optical Ground Wire (OPGW). Accordingly, duplicated line differential protection may be considered for transmission lines connected to Renewable Energy (RE) generators. Present-day line differential relays support direct end-to-end communication for line lengths of up to approximately 100 km. Considering the advantages of unit protection, line differential schemes are effective in mitigating challenges arising due to low fault current contribution from the RE side.

This may be made applicable to all upcoming projects in the vicinity of RE Generation pocket by CTUIL.

7.3 Implementation of Weak-End Infeed Logic at RE Generation End

In general, the RE generation end contributes little or no-fault current to transmission line faults, making the operation of distance protection functions difficult. In cases where a fault occurs in the Zone-2 portion of the line from the grid end, fault clearance may be delayed due to non-receipt of carrier signals. To address this issue, weak-end infeed logic at the RE end enables echo-back of the carrier signal to the grid end when there is no reverse zone pickup at the RE end, thereby accelerating tripping. This logic is particularly useful when line differential protection is unavailable due to reasons such as communication failure.

The above approaches of settings may be implemented if it is available in the existing relays. In case of upcoming projects, the project developers/ISTS licensees may incorporate these features in the relay's specifications.

7.4 Permissive Overreach Scheme for Distance Protection

Considering the challenges associated with low fault current contribution from the RE end, it is prudent to mandatorily implement permissive overreach schemes for distance protection on transmission lines connected to RE generation.

The above approaches of settings may be implemented if it is available in the existing relays. In case of upcoming projects, the project developers/ISTS licensees may incorporate these features in the relay's specifications.

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¹⁵ Taxonomy for inverter island-detection methods,” Electric Power Research Institute, “Taxonomy for Inverter Island-Detection Methods,” Tech. Rep. 3002022455, 2021. <https://www.epri.com/research/products/000000003002022455>



सत्यमेव जयते

भारत सरकार/Government of India

विद्युत मंत्रालय/Ministry of Power

केंद्रीय विद्युत प्राधिकरण/Central Electricity Authority

राष्ट्रीय विद्युत समिति प्रभाग /National Power Committee Division

6th Floor (North), Sewa Bhawan, R.K. Puram, New Delhi-66

No. CEA-GO-15-14/3/2025-NPC Division 191

Date: 24.10.2025

To,

(As per distribution list)

विषय:- संबद्ध नवीकरणीय ऊर्जा संयंत्रों के लिए एकसमान द्वीप-विरोधी संरक्षण दर्शन तैयार करने हेतु समिति का गठन के संबंध में।

Subject: Constitution of Committee for the preparation of the Uniform Anti-islanding Protection Philosophy of the connected RE plants-reg.

Sir/Madam,

SRPC vide email dated 26.02.2025 informed that during the SR Protection Co-ordination Sub-Committee (PCSC) deliberations, instances were observed where renewable energy (RE) generation and downstream loads continued to operate during complete outages of certain substations, suggesting possible formation of electrical islands, though this couldn't be confirmed due to lack of PMU data. SRLDC inferred such islanding and sought details from TRANSCOs/STUs about connected generation, load, and anti-islanding protection schemes. In response, TRANSCOs/STUs requested guidance on appropriate voltage and frequency settings for RE stations. SRLDC recommended an under-frequency setting of 47.5 Hz and highlighted that various OEMs use differing protection mechanisms, including df/dt and phase displacement protections. To ensure consistency, PCSC advised SRLDC to consult NLDC and the National Protection Standing Committee (NPSC) for insights from other regions and to develop a uniform protection philosophy applicable across the Southern Region.

2. In this context, the above matter was subsequently deliberated in the 1st meeting of the National Protection Standing Committee (NPSC) held on 26.03.2025, wherein, the following were decided :

- a) After detailed deliberations it emerged that the Anti Islanding protection depends on frequency, rate of change of frequency, Vector Shift Protection or angle detection and Voltages at the time of grid supply failure. It often mal-operates by falsely detecting islanding. This results in premature inverter disconnection (within 2 seconds), thereby disabling Low Voltage Ride through (LVRT) functionality.
- b) The reasons for mal operation of the Anti-Islanding features may be due to the low set values of the sensing parameters or voltage distortion at the time of disturbances. However, it was felt that false detection of unintended island, which does not actually exist, is not justifiable for noncompliance with grid support requirements.

- c) The matter needs detailed deliberations and may be referred to Protection subgroup of NPC for detailed deliberations and way forward. If required, a separate group including some expert from industry may be formed at subgroup level.
3. The issue was further discussed in the 16th meeting of the National Power Committee (NPC) held on 04.07.2025. It was decided to constitute a Committee under the Chairmanship of SE (Protection), WRPC, with representation from WRPC, SRPC, GRID-India, experts from IITs, OEMs, POWERGRID, a major Renewable Energy Developer, and NPC, for preparation of a Uniform Anti-Islanding Protection Philosophy for grid-connected Renewable Energy (RE) plants.
4. In this regard, NPC Secretariat vide email dated 16.09.2025 requested WRPC, SRPC, GRID-India and POWERGRID, to send nominations for the Constitution of the Committee for the preparation of the Uniform Anti-islanding Protection Philosophy of the connected RE plants. Further, WRPC and SRPC have also been requested to seek nominations from IITs (for academic expertise), OEMs, and a major Renewable Energy (RE) developer for the said Committee. Accordingly, based on the nomination received from WRPC, SRPC, GRID-India, POWERGRID and from IITs /IISc (for academic expertise), OEMs, and a major Renewable Energy (RE) developer, the Committee is constituted as follows:

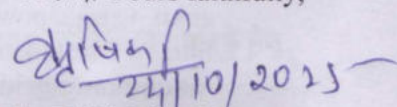
S. No.	Name	Designation	Organization	
1.	Shri. P. D. Lone	Superintending Engineer	WRPC	Chairman
2.	Shri. Satyendra Kumar Dotan	Director (NPC)	CEA	Member
3.	Shri. Moka Venkata Subba Reddy	Executive Engineer	SRPC	Member
4.	Dr. Sarasij Das	Associate Professor	IISc Bangalore	Member
5.	Shri. Venkateswarlu Ande	Vice President	M/s Greenko	Member
6.	Shri. Thakur Prasad	Senior Vice President	M/s. Watt power	Member
7.	Prof. Zakir H. Rather	Professor	IIT Bombay	Member
8.	Shri Sanjay Bhatt	Assistant Vice President	AGEL	Member
9.	Shri. H. L. Parekh	Additional General Manager	GIPCL	Member
10.	Shri. Naveen Kumar	Chief Technology Officer (CTO)	TBEA Inverter	Member
11.	Shri. Ankit Vaish	Deputy General Manager	POWERGRID	Member
12.	Shri. Madhukar Goodelli	Deputy General Manager	WRLDC / GRID-India	Member
13.	Shri. Deepak Sharma	Deputy Director	WRPC	Member Convener

5. The **Terms of Reference** of the Committee are as follows: -

- a) Review existing Anti-Islanding Protection practices and identify gaps.
 - b) Study causes of mal-operations and suggest corrective measures.
 - c) Recommend uniform national settings for frequency, df/dt, and voltage thresholds.
 - d) Ensure compatibility with LVRT/HVRT and grid code requirements.
 - e) Examination of the impact of RE on earth fault protection and other critical protection aspects shall also be examined by the Committee.
 - f) Prepare a comprehensive report with recommendations on above (a) to (e)
 - g) Any other suggestions/recommendations on related matters.
6. The Committee shall submit its report within six months.
7. The committee can co-opt for any member, as per the requirement.

This issues with the approval of the competent authority.

भवदीय, /Yours faithfully,



(ऋषिका शरण/Rishika Sharan)

(सदस्य सचिव (एनपीसी) /Member Secretary(NPC))

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Copy for kind information to:

1. SA to Chairperson, CEA,
2. SA to Member (GO&D), CEA

Status of actions points recommended during previous PSC meetings				
S. No	Agenda	Remdial actions recommended during PSC meeting	Status of remedial action taken	
			67th PSC (18.03.2026)	68th PSC (22.05.2026)
1	Frequent multiple elements tripping at 220kV Kunihar, Baddi, Upperla Nangal complex and load loss event in HP control area	51 PSC: PSC Forum requested HP to complete the protection audit as per mentioned timelines (protection audit of 220kV Kunihar has been awarded and it would be completed within next 15-20 days. In next phase, by 15th September, protection audit of substations in downstream and upstream of 220kV Kunihar S/s would be completed) and resolve the protection related issues. HP was also requested to share the reports of protection audit to NRPC & NRLDC after completion of audits.	HPSEBL stated that work could not be completed due to financial issue (not getting fund). PSC forum suggested to resolve protection related issues at the earliest and requested HPSEBL to submit the compliance report mentioning details of action taken and planned to be taken with tentative timeline. Further, these stations to be kept under observation and necessary actions need to be taken to minimise the tripping incidents.	
2	Multiple elements tripping at 220kV Hissar(BBMB) 07th May 2024, 11:16 hrs	51 PSC: a) Expedite the implementation of differential protection in short lines to avoid undesired operation of distance protection.	HVPNL representative stated that tender float is yet not done and approval is pending from state govt. PSC forum raised concern over long pending action and requested HVPNL to expedite the process of implementation of differential protection in short lines and also share the expected timeline.	
3	Multiple elements tripping at 400kV Sainj (HP), 400kV Parbat2 & Parbt3 (NHPC) Stations on 07th May 2024, 16:17 hrs	51 PSC: a) NHPC shall follow up with the relay engineer and taken necessary remedial actions to ensure proper operation of A/R scheme at Parbat2 end. b) NHPC and HPPCTCL shall review the healthiness of PLCC at Parbat3 and Sainj end and take necessary actions to ensure their proper operation. c) Expedite the implementation of differential protection in 400kV Parbat2-Sainj line. d) Standardisation of recording instruments (DR/EL) need to be ensured.	INDIGRID representative stated that tender is placed by INDIGRID in Dec'25. Work is expected to be completed by Apr'26. PSC forum recommended NHPC, INDIGRID & HPPCL to take expeditious action at their end and ensure healthiness of protection system.	
4	Multiple elements tripping at 400kV Koteshwar(PG) on 17th May 2024, 17:21 hrs	51 PSC: a) In view of short line length of 400kV Koteshwar(PG)-Tehri D/C, POWERGRID shall plan for the differential protection in the line on priority in near future to avoid overreach of distance protection.	POWERGRID(NR-1) representative stated that status is same and work is expected to get completed by June'26. PSC forum requested POWERGRID(NR-1) to expedite the process of implementation of differential protection at Koteshwar HEP.	
5	Multiple elements tripping at 220kV Sarna (PS) on 04th May 2024, 07:10 hrs	51 PSC: a) Punjab shall expedite the commissioning of new bus scheme. b) POWERGRID shall revise the Z-4 time delay setting of Kishanpur lines at Sarna (PS) end as 160msec till bus bar get operational.	PSTCL representative informed that separate tender will be done for commissioning of busbar protection and work will be completed within 3 months. PSC forum requested PSTCL to expedite the work related to implementation of bus bar protection at Sarna S/s.	
6	Multiple elements tripping at 220kV KTPS (RVUN) on 21st June 2024, 11:37 hrs	51 PSC: a) Commissioning of bus coupler between 220kV Bus-3 & 5 need to be expedited.	No representative from RVUNL was present during the meeting.	
7	Frequent tripping of 220 KV Anta(NHPC)-Sakatpura(RS) (RS) Ckt-1	52 & 53 PSC: RVPN was requested to expedite the process of relay replacement and rectification of issues related to A/R operation.	RVPNL representative informed that work will be completed by Apr'26. PSC forum requested RVPNL to expedite the actions at their end.	
8	Frequent tripping of 220 KV Khara(UP)-Saharanpur(PG) (UP) Ckt-1	52 & 53 PSC: UP was requested to expedite the process of relay replacement at Khara end. POWERGRID shall review and ensure the A/R operation at their end.	SLDC UP informed that Unit 3 relay replacement work has been delayed due to non-visit of site engineer and work will be completed by Apr'26. PSC forum requested UPPTCL to expedite the replacement of relays at Khara(UP) end.	
9	Multiple elements tripping at 400/220kV Obra_A(UP) on 9th October 2024	54 PSC Recommendations: a) UPPTCL & Obra_A(UP) shall ensure the implementation of LBB protection at the earliest at 220kV side. b) GPS scheme shall be implemented at Obra_B(UP) by the end of January 2025 and time sync of recording devices will be ensured.	UPPTCL representative informed that time sync work is completed and approval of LBB relay work is pending from headquarters. PSC forum requested UPPTCL to follow up with headquarters for expedited corrective actions.	
10	Frequent tripping of 220 KV RAPS_A(NP)-Sakatpura (RS) (RS) Ckt-1 & 2	55 PSC Recommendations: Expeditious corrective actions to minimise frequent faults in line.	NPCL representative stated that NPCL design team has submitted a study report to OEM. OEM will do a feasibility study and response from OEM in this regard is awaited. PSC forum requested NPCL to take up this issue with OEM and explore any other possibility to avoid frequent unwanted tripping of line.	
11	Frequent tripping of 400 KV Amritsar(PG)-Makhu(PS) (PSTCL) Ckt-1 & 400 KV Talwandi Saboo(PSG)-Nakodar (PSG) (PS) Ckt-1	55 PSC Recommendations: PSTCL was requested to plan replacement of porcelain insulators with polymer type.	PSTCL representative informed that work will be done by Oct'26. PSC forum requested PSTCL for expeditious actions to avoid frequent trippings of lines due to string failures/during fog.	
12	Multiple element tripping event at 400kV Aligarh(UP) on 02nd November, 2024	55 PSC Recommendations: UPPTCL shall ensure the healthiness of carrier communication and A/R operation at Muradnagar_1(UP) end.	UPPTCL representative informed that, PLCC is available for replacement, however Hitachi team is delaying the work. PSC forum requested UPPTCL to expedite the corrective actions.	
13	Frequent tripping of 220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	58 PSC Recommendations: Expeditious corrective actions to minimise frequent faults in line.	RVPNL representative informed that work will start from April'26. NPCL informed that study report from their design team is already sent to OEM for feasibility study. A/R can be enabled only after OEM clearance. PSC forum requested NPCL and RVPNL to resolve the issue of A/R at RAPS end and to take expeditious corrective action to minimise frequent faults in line.	
14	Multiple elements tripping at 220/132kV Pampore(J&K) at 23:25 hrs on 20.06.2025	62 PSC Recommendation: a) DR/EL along with detailed tripping report along with remedial action taken details need to be shared within one week. b) Healthiness of protection system and other auxiliary equipments need to be ensured at 220/132kV Pampore(J&K). c) Line protection settings at 220/132kV Pampore(J&K) need to be reviewed in line with NRPC Protection philosophy.	No representative from J&K was present during the meeting.	
15	Multiple elements tripping at 220/132kV Moga(PS), 220 kv /66kV Badhni kalan(PS) & 220/66 kv Himmatpura(PS) at 11:06 hrs on 01.07.2025	62 PSC Recommendation: a) Healthiness of bus bar protection need to be ensured at Baghapurana and Ajitwal S/s. b) New busbar protection need to be installed at Moga PSTCL at the earliest. c) Line protection settings at 220/132kV Moga(PS), 220 kv /66kV Badhni kalan(PS) & 220/66 kv Himmatpura(PS) need to be reviewed in line with NRPC Protection philosophy. d) CT mismatch issue at both the ends of 220 kv Moga PSTCL – Moga ckt-2 need to be addressed and differential protection need to be installed at the earliest by PSTCL in co-ordination with PGCL.	PSTCL representative stated that busbar commissioning will be done within 3 months. PSC forum requested PSTCL to complete the bus bar protection installation work within the stipulated time.	
16	Multiple elements tripping at 220/132kV Ziankote(J&K) at 10:18 hrs on 24.07.2025	62 PSC Recommendation: a) DR/EL along with detailed tripping report along with remedial action taken details need to be shared within one week. b) Zone-2 settings need to be revised to 160ms at Amargarh end of 220kV Amargarh-Ziankote D/C. c) Healthiness of protection system and other auxiliary equipments need to be ensured at 220/132kV Ziankote(J&K). d) Line protection settings at 220/132kV Ziankote(J&K) need to be reviewed in line with NRPC Protection philosophy.	No representative from J&K was present during the meeting.	
17	Multiple elements tripping at 765/400kV Bara TPS(UP) at 21:33 hrs on 08.08.2025	63 PSC Recommendation: a) UPPTCL shall review and correct the DEF protection setting at Mainpuri end of 765kV Bara-Mainpuri line-2 to avoid unwanted tripping of the line. b) UPPTCL and Bara TPS shall review the logic of SPS operation (breaker status of both ends may be taken for desired decision) to ensure its proper operation in future events.	UPPTCL representative stated that SPS logic has been discussed in last 240th OCC meeting and will be revised. PSC forum requested UPPTCL to expedite the corrective actions and send a mail regarding the same.	
18	Multiple elements tripping at 220/66kV Lalokalan(PS) at 04:35 hrs on 30.08.2025	63 PSC Recommendation: a) PSTCL shall ensure the bus bar protection at 220/66kV Lalokalan(PS) at the earliest possible. b) Timely submission of DR/EL & tripping report need to be ensured.	PSTCL representative informed that as per communication received from OEM relay is not repairable and relay replacement will be done within 2 months. PSC forum requested PSTCL to ensure healthiness of busbar protection at the earliest.	

19	Multiple elements tripping at 400kV Kishenpur(PG) & Baglihar stage-I HEP at 21:58 hrs on 05.09.2025	<p>64 PSC Recommendation:</p> <p>a) DT was not sent to remote end on TEED protection operation at Kishenpur end. PLCC/DTPC system needs to be reviewed and DT scheme needs to be configured if not available.</p> <p>b) Overreach of distance protection in 400kV Kishenpur-New Wanpoh line-IV needs to be reviewed.</p> <p>c) Protection settings of units at Baglihar need to be reviewed.</p>	<p>POWERGRID(NR-2) representative informed that there is no issue from PG end and JKPTCL need to address this issue. However no response received from JKPTCL.</p> <p><i>PSC forum requested JKPTCL to expedite the corrective actions.</i></p>
20	Multiple element tripping event at 220/33kV Chowadhi(JK) at 19:44 hrs on 22.11.2025	<p>65 PSC Recommendation:</p> <p>a) Carrier communication issue at Chowadhi(JK) end need to be resolved at the earliest.</p>	<p>No representative from J&K was present during the meeting.</p>
21	Multiple elements tripping at 400/132kV Anpara TPS(UP) at 08:01 hrs on 08.01.2026	<p>67 PSC Recommendation:</p> <p>a) Commissioning work of new numerical low impedance Busbar scheme need to be expedited.</p> <p>b) LA replacement work need to be expedited.</p> <p>c) Electromechanical Relay of Bus Coupler need to be changed with new numerical relay.</p>	<p>UPPTCL representative stated that Commissioning work of new numerical low impedance BUS BAR protection scheme for 132 KV is under progress. Erection Work of new numerical Busbar scheme has been completed & M/S GE have been requested to deploy the commissioning team at the earliest. Expected schedule is April 2026. Commissioning work will be completed within three months. All LAs more than 10 years old will be replaced in a phase manner. Requirement has been processed. Electromechanical Relay of BUS Coupler will be changed with new numerical relay. Replacement is expected in first week of April 2026.</p> <p><i>PSC forum requested UPPTCL to expedite the corrective actions.</i></p>
22	Multiple elements tripping at 400/220kV Bikaner2(PG) at 17:08 hrs on 22.02.2026	<p>67 PSC Recommendation:</p> <p>a) Over-voltage protection Stage-1 need to be disabled in 220kV Bikaner2-Karnisar Ckt.</p>	<p>NHPC representative informed that 220kV Bikaner2-KSP Ckt tripped on over-voltage stage-1 protection operation. NRLDC representative highlighted that over-voltage protection in all 220kV lines need to be disabled as per NRPC protection philosophy. NHPC agreed for the same.</p> <p><i>PSC forum requested NHPC to disable over-voltage protection stage-1 in 220kV Bikaner2-Karnisar Ckt at the earliest.</i></p>

Grid Event summary for March-April 2026

S.No.	Category of Grid Incident/ Disturbance (GL-1 to GL-V)	Name of Elements (Tripped/Manually opened)	Affected Area	Owner/ Agency	Outage		Re-visit		Duration (hh:mm)	Event (As reported)	Loss of generation / bus of load during the Grid Disturbance		Fault Clearance time (in ms)	Points of Discussion
					Date	Time	Date	Time			Generation Loss(MW)	Load Loss (MW)		
1	GL-2	1) 400 KV Ajmer(RS)-Deedwana(MTS) (RS) Ckt 2) 400 KV Ajmer(RS)-Ajmer(PG) (PG) Ckt-1 3) 400 KV Ajmer(RS)-Ajmer(PG) (PG) Ckt-2 4) 400 KV Phagi-Ajmer (RS) Ckt-1 6) 400 KV Phagi-Ajmer (RS) Ckt-2 7) 400/220 KV 315 MVA ICT 1 at Ajmer(RS) 8) 400/220 KV 315 MVA ICT 2 at Ajmer(RS)	Rajasthan	RVPNL, PGCL	2-Mar-26	14:50	2-Mar-26	15:51	01:01	<p>i) 400/220KV Ajmer(RS) has one and half breaker scheme at 400kV level and double main and transfer bus scheme at 220kV level.</p> <p>ii) As reported, at 12:42 hrs, 400 KV Ajmer(RS)-Deedwana(MTS) (RS) Ckt auto-reclosed from both the ends on transient fault.</p> <p>iii) Further, at 14:50 hrs, 400 KV Ajmer(RS)-Deedwana(MTS) (RS) Ckt tripped on R-N phase to earth fault with fault distance of 14.69km from Ajmer(RS) end and 84.9km from Deedwana end. During patrolling, some burnt bushes were found between Tower Nos. 38-39 and same were cleared from line range.</p> <p>iv) As per DR at Ajmer(RS) end of 400 KV Ajmer(RS)-Deedwana(MTS) (RS) Ckt, B-N phase to earth fault (phase sequence issue at Ajmer(RS) with unsuccessful A/R was observed with fault current of ~11.06 kA from Ajmer(RS) end. Delayed fault clearing time ~1.5 sec. Zone-1 distance protection operated at Ajmer(RS) end.</p> <p>v) During the same time, 400 KV Ajmer(RS)-Ajmer(PG) (PG) Ckt-1 & 2 also tripped sensing this fault (delayed clearance) in zone-1 at Ajmer(PG) end.</p> <p>vi) As per DR, 400 KV Phagi-Ajmer (RS) Ckt-1 tripped on over-voltage stage-1 operation at Phagi(RS) end (Voltage reached 1.11 pu at Phagi end) and 400 KV Phagi-Ajmer (RS) Ckt-2 tripped sensing this fault (delayed clearance) in zone-3 at Phagi(RS) end (Fault current, Ir=7.374kA from Phagi end).</p> <p>vii) Due to delayed clearance of fault, 400/220 KV 315 MVA ICT 1 & 2 at Ajmer(RS) also tripped on O/C (E) (S/N) and Directional E/F (67N) protection operation respectively at the same time.</p> <p>viii) As per PMU at Ajmer(PG), R-N phase to earth fault with unsuccessful A/R was observed with fault clearing time of 80 ms and 1560 ms (delayed) respectively.</p> <p>ix) As per SCADA, change in demand of approx. 520 MW was observed in Rajasthan control area. However, as reported by SLDC Rajasthan, load loss of approx. 375 MW occurred.</p>	0	375	1560	i) Reason of delayed clearance of fault need to be shared. ii) As per DR at Ajmer(RS), B-N fault occurred. However, as per PMU at Ajmer(PG), A/R fault was observed. Phase sequence issue at Ajmer(RS) need to be reviewed at the earliest. iii) VDR (dat/ ctb) file for 400 KV Ajmer(RS)-Ajmer(PG) (PG) Ckt-1 & 2 need to be shared from both the ends. iv) Detailed report along with remedial action taken need to be shared.
2	GD-1	1) 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-1 2) 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-2 3) 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-3 4) 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-4 5) 220 KV Mohana(HV)-Sampla (HVPNL) Ckt-1 6) 220 KV Mohana(HV)-Sampla (HVPNL) Ckt-2 7) 220/132KV 100MVA ICT 2 at Mohana(HV)	Haryana	HVPNL, PGCL	7-Mar-26	20:08	7-Mar-26	22:22	02:14	<p>i) 220/132KV Mohana(HV) has double main bus scheme at 220kV level.</p> <p>ii) During antecedent condition, 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-1, 2, 3 & 4 were connected to 220kV Bus-1 at Mohana(HV) and 220 KV Mohana(HV)-Sampla (HVPNL) Ckt-1 & 2 and 220/132KV 100 MVA ICT-2 at Mohana(HV) were connected to 220kV Bus-2 at Mohana(HV).</p> <p>iii) As reported, at 20:08 hrs, B-Ph CT of 220/132KV 100 MVA ICT-2 at Mohana(HV) burst occurred.</p> <p>iv) During the same time, 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-1, 2, 3 & 4 also tripped from Sonapat(PG) end only. As per DR, fault sensed in zone-2 (delayed fault clearance of ~400ms) for 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-1 & 2 and in zone-3 (delayed fault clearance of ~800ms) for 220 KV Mohana(HV)-Sonapat(PG) (HVPNL) Ckt-3 & 4 from Sonapat(PG) end.</p> <p>v) As per SCADA SOE, 220 KV Sonapat(PG)-IMT Kharkhoda A (HVPNL) Ckt-1 and 220 KV Mohana(HV)-Sampla (HVPNL) Ckt-1 & 2 also tripped during the same time (exact reason of tripping and nature of protection operation yet to be shared).</p> <p>vi) Due to tripping of all the 220kV lines from Mohana(HV), complete blackout occurred at 220/132KV Mohana(HV) SA.</p> <p>vii) As per PMU at Sonapat(PG), B-N fault followed by B-N fault was observed with fault clearing time of 80 ms and 840 ms (delayed) respectively.</p> <p>viii) As per SCADA, change in demand of approx. 450 MW was observed in Haryana control area.</p>	0	450	840	i) Exact reason, nature and location of fault along with nature of protection operation for all elements need to be shared. ii) Reason of delayed clearance of fault need to be shared. iii) As per SCADA SOE, 220 KV Sonapat(PG)-IMT Kharkhoda A (HVPNL) Ckt-1 and 220 KV Mohana(HV)-Sampla (HVPNL) Ckt-1 & 2, also tripped during the same time. Exact reason of tripping and nature of protection operation need to be shared. iv) VDR (dat/ ctb) file for need to be shared from Haryana end for each tripped elements. v) Detailed tripping report along with remedial action taken need to be shared.
3	GD-1	1) 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt 2) 220 KV Tanakpur(NH)-Starganj(UP) (PG) Ckt-1 3) 220 KV Mahendra Nagar(Tanakpur(NH)) (PG) Ckt 3) 31.4 MW Tanakpur(NH) Unit-1 5) 31.4 MW Tanakpur(NH) Unit-3	Uttarakhand	NHPC, UPTCL, PGCL	9-Apr-26	02:13	9-Apr-26	03:23	01:10	<p>i) During antecedent condition, 31.4 MW Tanakpur(NH) Unit-1 & 3 were only in running condition and generating approx. 13 MW and 10 MW respectively.</p> <p>ii) As reported, at 02:13hrs, 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt tripped on R-N phase to earth fault (exact reason, nature and location of fault yet to be shared).</p> <p>iii) During the same time, busbar differential (zone-A) protection operated due to improper feedback status of the Bus Isolator for 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt and tripped all elements connected to 220kV Bus-1 at Tanakpur(NH).</p> <p>iv) Due to the non-availability of power evacuation path, 31.4 MW Tanakpur(NH) Unit-3 connected to Bus-2 also tripped because of sudden load throw-off and complete blackout occurred at 220/132KV Tanakpur (HVPNL) SA.</p> <p>v) As per DR, Busbar differential current of ~122 A was present before the event (persisting Id alarm) which matched the load current of 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt.</p> <p>vi) After investigation, it was found that "Switch Alarm" and "ZA ID Alarm" signals were active prior to the incident, and feedback status of the Bus Isolator for 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt was improper.</p> <p>vii) As a result, when R-N phase to earth fault occurred on 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt, R-phase current increased to 816 A which was reflected as differential current in the R-phase of ZA busbar relay as per existing relay configuration.</p> <p>viii) This exceeded the permissible pickup threshold of the busbar protection relay (set at 360 A) and busbar protection operated at 220kV Bus-1 at Tanakpur(NH).</p> <p>ix) As per PMU at CB Ganj(UP), R-N phase to earth fault with unsuccessful A/R was observed with fault clearing time of 80 ms.</p> <p>x) As per SCADA, generation loss of approx. 21 MW was observed at Tanakpur (HVPNL).</p> <p>xi) As remedial action taken, the feedback status of bus isolators of 220 KV Tanakpur(NH)-CBGanj(UP) (PG) Ckt has been rectified.</p>	23	0	80	i) Exact reason, nature and location of fault need to be shared. ii) VDR (dat/ ctb) file for tripping report need to be shared for each element from both the ends. iii) Busbar differential alarm was persisting before the event. Such alarms need to be attended to avoid such tripping events in future.
4	GD-1	1) 220 KV Magal(PG) Mehal Kalan(PS) (PSTCL) Ckt-1 2) 220 KV Magal(PG) Mehal Kalan(PS) (PSTCL) Ckt-2 3) 220 KV Pahawal-Mehal Kalan (PS)(PSTCL) Ckt-1 4) 220 KV Pahawal-Mehal Kalan (PS)(PSTCL) Ckt-2 5) 220kV Bus-1 at Mehal Kalan(PS) 6) 220kV Bus-2 at Mehal Kalan(PS) 7) 220/66KV 100MVA ICT 1 at Mehal Kalan(PS) 8) 220/66KV 100MVA ICT 2 at Mehal Kalan(PS)	Punjab	PSTCL, PGCL	10-Mar-26	10:39	10-Mar-26	10:54	00:15	<p>i) 220/66KV Mehal Kalan(PS) has double main bus scheme at 220kV level.</p> <p>ii) As reported, at 10:39 hrs, B-Ph CT of 220 KV Magal(PG) Mehal Kalan(PS) (PSTCL) Ckt-2 blast occurred which further led to bus bar protection operation at Mehal Kalan(PS).</p> <p>iii) Due to busbar operation, all the elements connected to 220kV Bus-1 & 2 at Mehal Kalan(PS) tripped and complete blackout occurred at 220/66KV Mehal Kalan(PS).</p> <p>iv) As per PMU at Jalandhar(PS), B-N phase to earth fault was observed with fault clearing time of 560 ms.</p> <p>v) As per SCADA, change in demand of approx. 10 MW is observed in Punjab control area.</p>	0	10	560	i) Exact reason, nature and location of fault need to be shared. ii) Why both the busbar tripped due to CT blast? Bus coupler opened or not? iii) Reason of delayed clearance of fault need to be shared. iv) VDR (dat/ ctb) file for need to be shared from both ends for each tripped elements. v) Detailed tripping report along with remedial action taken need to be shared.
5	GD-1	1) 220 KV Salal(NH)-Jammu(PDO) (PG) Ckt-1 2) 220 KV Salal(NH)-Jammu(PDO) (PG) Ckt-2 3) 220 KV Chowadhik(JK)-Jammu(PDO) (JK) Ckt	Jammu and Kashmir	PDD Jk, NHPC, PGCL	16-Apr-26	22:02	17-Apr-26	00:21	02:19	<p>i) 220/132KV Jammu/Gladni(JK) SA has double main bus arrangement at 220kV side.</p> <p>ii) As reported, at 22:02 hrs, B-Ph CT of 220 KV Magal(PG) Mehal Kalan(PS) (PSTCL) Ckt-2 blast occurred which further led to bus bar protection operation at Mehal Kalan(PS).</p> <p>iii) As reported, at 22:02 hrs, 220KV R-Ph CT of Bus coupler bay at Jammu/Gladni(JK) blasted. During the same time, 220 KV Salal(NH)-Jammu(PDO) (PG) Ckt-1 & 2 and 220 KV Chowadhik(JK)-Jammu(PDO) (JK) Ckt tripped and complete blackout occurred at 220/132KV Jammu/Gladni(JK) SA (exact nature and location of fault yet to be shared).</p> <p>iv) As per DR at Jammu/Gladni(HV), R-N phase to earth fault converted to 3 phase to earth fault occurred. Fault current was Ir=2.946kA, Ir=3.026kA, Ir=2.643kA from Jammu end for 220 KV Salal(NH)-Jammu(PDO) (PG) Ckt-1 and Ir=2.678kA, Ir=2.821kA, Ir=2.504kA from Jammu end for 220 KV Salal(NH)-Jammu(PDO) (PG) Ckt-2. Fault sensed in zone-4 at Jammu end. Fault clearing time was ~720 ms and ~540 ms respectively.</p> <p>v) As per PMU at Kishanganj(PS), R-N phase to earth fault converted to 3 phase to earth fault with delayed fault clearing time of 720ms.</p> <p>vi) As per SCADA, change in demand of approx. 70 MW was observed in JK control area.</p>	0	72	720	i) Exact reason, nature and location of fault need to be shared. ii) Reason of delayed clearance of fault need to be shared. iii) Did bus fault occur in this case? If yes the, why did busbar protection not operate? Healthiness of busbar protection need to be ensured. If busbar protection is not available/not in healthy condition, zone-4 time delay of 220kV lines connected at Jammu need to be modified to 160 ms as per NRPC protection philosophy. iv) Elements tripping were not recorded in SCADA SOE. Availability of SCADA data need to be ensured. v) VDR (dat/ ctb) file of all the tripped elements along with tripping report need to be shared from both ends. vi) Remedial action taken report to be shared.
6	GL-2	1) 400/220 KV 315 MVA ICT 1 at Nakodar(PS) 2) 400/220 KV 315 MVA ICT 2 at Nakodar(PS) 3) 400/220 KV 500 MVA ICT 3 at Nakodar(PS) 4) 220 KV Nakodar-Kartarpur Ckt-1 5) 220 KV Nakodar-Kartarpur Ckt-2 6) 220 KV Nakodar-Hochhapur Ckt 7) 220 KV Nakodar-Ribana Jatta Ckt 8) 220 KV Nakodar-Nurmahal Ckt-1 9) 220 KV Nakodar-Nurmahal Ckt-2 10) 220KV Nakodar-Ladowal Ckt-1 11) 220KV Nakodar-Ladowal Ckt-2	Punjab	PSTCL	16-Apr-26	12:00	16-Apr-26	13:57	01:57	<p>i) 400/220KV Nakodar(PS) has one and half breaker scheme at 400kV level and double main and transfer bus scheme at 220kV level.</p> <p>ii) As reported, at 12:00 hrs, bus fault occurred due to bus isolator sparking at Nakodar end of 220KV Nakodar-Ladowal Ckt-2 during shutdown work (exact nature and location of fault yet to be shared). On this bus fault, bus bar protection at 220kV Nakodar(PS) failed to operate.</p> <p>iii) Due to non-clearance of fault, all 220kV lines connected at Nakodar(PS) tripped from remote end on zone-2 distance protection operation and 400/220 KV 315 MVA ICT 1 & 2 and 500 MVA ICT 3 at Nakodar(PS) tripped on directional over-current protection operation.</p> <p>iv) As per PMU at Magal(PG), Y-N Phase to earth fault converted to 3 phase to earth fault was observed with delayed fault clearing time of 2520ms.</p> <p>v) As per SCADA, change in demand of approx. 96 MW was observed in Punjab control area.</p>	0	96	2520	i) Exact nature and location of fault need to be shared. ii) Reason of delayed clearance of fault need to be shared. iii) Reason of non-operation of busbar protection need to be analysed and healthiness of busbar protection need to be ensured at the earliest. iv) VDR/EL (dat/ ctb) file of all the tripping elements need to be shared from both ends. v) Detailed tripping report along with remedial action taken need to be shared.
7	GD-1	1) 220 KV Harduaganj(UP) – Khai(UP) Ckt-1 2) 220 KV Harduaganj(UP) – Khai(UP) Ckt-2 3) 220 KV Harduaganj(UP) – Sikandrabad(UP) Ckt 4) 220 KV Harduaganj(UP) – Etah(UP) Ckt 5) 220 KV Harduaganj(UP) – Atrami(UP) Ckt 6) 220 KV Harduaganj(UP) – Boseri(UP) Ckt 7) 220 KV Harduaganj(UP) – Rukhi(UP) Ckt 8) 220 KV Harduaganj(UP) Bus Coupler 9) 400/220 KV 315 MVA ICT 2 at Harduaganj(UP) 10) 110 MW Harduaganj C TPS - UNIT 7 11) 250 MW Harduaganj D TPS - UNIT 8 12) 350 MW Harduaganj D TPS - UNIT 9	Uttar Pradesh	UPTCL	21-Apr-26	19:29	22-Apr-26	00:17	04:48	<p>i) 220/132KV Harduaganj (UP) has double main and transfer bus arrangement at 220kV and single main and transfer bus arrangement at 132 KV level.</p> <p>ii) During antecedent condition, total Generation of Harduaganj(UP) was approx. 460 MW.</p> <p>iii) As reported, at 19:29 hrs, R-ph CT of 220KV Harduaganj(UP) Khai(UP) Ckt-2 at Harduaganj end got damaged. Fault was sensed in zone-4 at Harduaganj end.</p> <p>iv) During the same time, the circuit breaker of 220 KV Harduaganj(UP) – Khai(UP) Ckt-2 failed to operate. Bus bar protection was not operational at 220 KV Harduaganj.</p> <p>v) This led to tripping of unit and other elements connected to 220 KV Main Bus-1, and also Units 7 and 9 connected to Main Bus-1. This led to complete blackout at 220/132KV Harduaganj(UP).</p> <p>vi) As per PMU at Alighar(PS), R-N phase to earth fault was observed with fault clearing time of 600ms.</p> <p>vii) As per SCADA, change in demand of approx. 100 MW was observed in UP control area and generation loss of approx. 460 MW occurred at Harduaganj(UP).</p>	460	100	600	i) Exact nature of protection operation in each tripped element need to be shared. ii) Reason of delayed fault clearance need to be shared. iii) Busbar protection need to be made operational at 220 KV Harduaganj at the earliest. iv) VDR/EL along with detailed tripping report need to be shared for all tripped elements from both the ends. v) Remedial action taken report need to be shared.
8	GD-1	1) 220 KV Bikaner(RS)-Bikaner400(RS) Ckt-1 2) 220 KV Bikaner(RS)-Bikaner400(RS) Ckt-2 3) 220 KV Bikaner(RS)-Bikaner400(RS) Ckt-3 4) 220 KV Bikaner(RS)-Bansingar Ckt 5) 220 KV Bikaner(RS)-VSLPP Ckt 6) 220 KV Bikaner(RS)-Suratgarh Ckt 7) 220 KV Bikaner(RS)-Badnu Ckt 8) 135 MW VSLPP (PP) - UNIT 1	Rajasthan	RVPNL, VSLPP	26-Apr-26	14:49	26-Apr-26	15:04	00:15	<p>i) 220/132KV Bikaner(RS) has double main and transfer bus scheme and 220KV VSLPP(RS) has double main bus scheme at 220kV level.</p> <p>ii) During antecedent condition, 135 MW VSLPP (PP) - UNIT 1 was generating approx. 68 MW (as per SCADA).</p> <p>iii) As reported, at 14:48 hrs, 220 KV Bikaner(RS)-Bikaner400(RS) Ckt-3 tripped from Bikaner400(RS) end only on R-Y phase to phase fault with fault distance of 2.984km from Bikaner400(RS) end; zone-1 distance protection operated at Bikaner400(RS) end.</p> <p>iv) Further, as reported, at 14:49 hrs, 220 KV Bikaner(RS)-Bikaner400(RS) Ckt-1 tripped from Bikaner220(RS) end only on R+B-3 phase fault with fault distance of 3.33km from Bikaner220(RS) end; zone-1 distance protection operated at Bikaner220(RS) end.</p> <p>v) During this fault, all other 220kV lines connected at Bikaner(RS) tripped from remote ends only on zone-3 distance protection operation. Due to this, complete blackout occurred at 220/132KV Bikaner(RS).</p> <p>vi) Further, due to tripping of 220 KV Bikaner(RS)-VSLPP Ckt (only available evacuating line), 135 MW VSLPP (PP) - UNIT 1 also tripped due to loss of evacuation path and complete blackout occurred at 220KV VSLPP(RS).</p> <p>vii) As per PMU at Bikaner(PS), R-N phase to earth fault followed by R-N phase to earth fault was observed with fault clearing time of 80 ms each, however voltage dip observed in all 3-phases in both the cases.</p> <p>viii) As per SCADA, change in Solar generation of approx. 210 MW was observed in Rajasthan control area. Generation loss of approx. 68 MW occurred at VSLPP(RS).</p>	278	0	80	i) Exact reason, location and nature of fault need to be shared. ii) Reason for zone-1 protection from remote ends need to be analysed. iii) SCADA data was received at 220KV VSLPP(RS) during the event. Availability and healthiness of SCADA data need to be ensured. iv) VDR/EL need to be shared from both the ends for each tripped elements. v) Detailed report along with remedial action taken need to be shared.
9	GD-1	1) 220KV Panipat TPS-Bastra (HR) Ckt 2) 220KV Panipat TPS-Safidon (HR) Ckt-1 3) 220KV Panipat TPS-Safidon (HR) Ckt-2 4) 220KV Panipat TPS-Safidon (HR) Ckt-3 5) 250 MW Panipat TPS - UNIT 7 6) 250 MW Panipat TPS - UNIT 8 7) 220KV Bastra-Kurukshetra HVDC Ckt 8) 220KV Bastra-Safidon (HR) Ckt	Haryana	HVPNL, HVUNL	27-Apr-26	06:33	27-Apr-26	11:16	04:43	<p>i) 220/132KV Bastra(HR) has double main bus scheme at 220kV level.</p> <p>ii) During antecedent condition, 250 MW Panipat TPS - UNIT 7 & 8 were generating approx. 204 MW and 192 MW respectively.</p> <p>iii) As reported, at 06:33 hrs, R and V-ph Cts of 220KV Panipat TPS-Bastra (HR) Ckt and B-Ph CT of 220KV Panipat TPS-Bastra (HR) Ckt got damaged at Bastra end and all 220kV lines connected at Bastra(HR) tripped (exact reason, nature and location of fault and nature of protection operation yet to be shared). Due to this, complete blackout occurred at 220/132KV Bastra(HR).</p> <p>iv) During the same time, 220KV Panipat TPS-Safidon (HR) Ckt-1, 2 & 3 and 250 MW Panipat TPS - UNIT 7 & 8 also tripped (exact reason and nature of protection operation yet to be shared).</p> <p>v) As per PMU at Panipat(BB), 3 Phase to earth fault with delayed fault clearing time of 400 ms was observed.</p> <p>vi) As per SCADA change in demand of approx. 300 MW in Haryana control area was observed. Generation loss of approx. 396 MW occurred at Panipat TPS.</p>	396	300	400	i) Exact reason, nature and location of fault and nature of protection operation for all elements need to be shared. ii) Reason for delayed clearance of fault need to be shared. iii) VDR (dat/ ctb) file for all the tripped elements need to be shared from all the ends. iv) Detailed tripping report along with remedial action taken need to be shared.

Sr No	Element Name	Outage Date	Outage Time	Reason		
1	220 KV Debari(RS)-RAPS_A(NP) (RS) Ckt-1	10-Mar-26	12:37	Transient fault		
		11-Mar-26	13:26	Transient fault		
		14-Mar-26	16:37	Transient fault		
		20-Mar-26	03:10	Earth fault		
		24-Mar-26	05:29	Transient fault		
		02-Apr-26	12:43	Transient fault		
		11-Apr-26	13:06	Transient fault		
		14-Apr-26	13:05	Transient fault		
		14-Apr-26	15:10	Transient fault		
		22-Apr-26	16:50	Transient fault		
2	250 MW (PSP) TEHRI HPS - UNIT 6	26-Apr-26	16:50	Transient fault		
		04-Mar-26	06:20	Unit major fault due to IHR controller absence.		
		04-Mar-26	08:10	Partial Outage		
		06-Mar-26	12:13	Partial Outage		
		03-Apr-26	09:00	Partial Outage		
		09-Apr-26	12:41	Generator Fault		
		16-Apr-26	09:15	Generator Fault		
		22-Apr-26	10:51	Partial Outage		
		29-Apr-26	13:17	Partial Outage		
		3	220 KV Bhilwara(RS)-Kota(PG) (RS) Ckt-1	03-Mar-26	12:42	Transient fault
04-Mar-26	13:03			Transient fault		
08-Mar-26	12:33			Transient fault		
11-Mar-26	13:15			Transient fault		
24-Mar-26	13:46			Transient fault		
15-Apr-26	11:50			Phase to Ground Fault B-N		
16-Apr-26	11:45			Transient fault		
29-Apr-26	21:27			Transient fault		
4	400 KV Agra-Unnao (UP) Ckt-1			17-Mar-26	06:14	Transient fault
				04-Apr-26	18:53	Phase to earth fault B-N
		08-Apr-26	12:34	Over Voltage		
		11-Apr-26	20:26	Transient fault		
		14-Apr-26	15:35	Phase to Ground Fault Y-N		
		15-Apr-26	11:41	Transient fault		
		15-Apr-26	13:31	Phase to Ground Fault B-N		
5	125 MW Barsingsar (NLC) - UNIT 2	07-Mar-26	13:24	due to electrical disturbance.		
		24-Mar-26	13:27	Transient fault		
		17-Apr-26	03:35	Transient fault		
		18-Apr-26	11:23	Transient fault		
		19-Apr-26	20:59	Generator Fault		
		22-Apr-26	13:26	GT trip		
6	220 KV Kishenpur(PG)-Ramban(PDD) (PDD) Ckt-1	20-Mar-26	16:08	Earth fault		
		29-Mar-26	14:49	Earth fault		
		30-Mar-26	22:21	Earth fault		
		30-Mar-26	22:21	Earth fault		
		22-Apr-26	12:49	Earth fault		
7	400 KV Dadri(NT)-Loni Harsh Vihar(DV) (NT) Ckt-2	07-Mar-26	12:40	Three phase to earth fault		
		09-Apr-26	14:30	Phase to earth fault B-N		
		19-Apr-26	16:45	Phase to Phase Fault R-Y		
		22-Apr-26	17:59	Phase to Phase Fault Y-B		
		30-Apr-26	15:55	Flashover at Tie CT of Harsh Vihar-2.		
8	400 KV Hindaun(RS)-Chhabra(RVUN) (RS) Ckt-1	09-Mar-26	14:37	Phase to earth fault R-N		
		10-Mar-26	13:55	Transient fault		
		04-Apr-26	15:42	Transient fault		
		13-Apr-26	14:59	Transient fault		
9	400 KV Obra_B-Rewa Road (UP) Ckt-1	30-Apr-26	16:04	Transient fault		
		11-Mar-26	07:50	Hand tripped		
		26-Mar-26	13:38	Transient fault		
		09-Apr-26	06:19	Phase to Ground Fault Y-N		
		23-Apr-26	20:37	Earth fault		
10	250 MW (PSP) TEHRI HPS - UNIT 8	29-Apr-26	23:00	Phase to Ground Fault R-N		
		16-Apr-26	12:31	Generator Fault		
		16-Apr-26	18:30	Generator Fault		
		19-Apr-26	22:20	Generator Fault		
		27-Apr-26	09:15	Partial Outage		
11	220 KV Bhakra_R-Jamalpur (BB) Ckt-1	27-Apr-26	18:45	PRV trip		
		05-Apr-26	16:34	Phase to earth fault R-N		
		06-Apr-26	14:40	Phase to Phase Fault R-Y		
		17-Apr-26	04:25	LBB operated		
12	220 KV Jamalpur(BB)-DandhariKalani(PS) (PSTCL) Ckt-2	26-Apr-26	13:11	Phase to Phase Fault R-B		
		17-Apr-26	04:25	LBB operated		
		17-Apr-26	16:20	Phase to Ground Fault R-N		
		26-Apr-26	13:12	Phase to Ground Fault B-N		
13	400 KV Aligarh-Shamli (UP) Ckt-2	27-Apr-26	12:13	Relay maloperation		
		14-Apr-26	11:23	Transient fault		
		16-Apr-26	13:55	Earth fault		
		17-Apr-26	12:45	Phase to earth fault B-N		
14	400 KV Jaisalmer-Barmer (RS) Ckt-1	30-Apr-26	15:28	Transient fault		
		01-Mar-26	13:30	Transient fault		
		02-Mar-26	12:52	Over Voltage		
		03-Mar-26	11:44	Over Voltage		
		03-Mar-26	12:55	Transient fault		



Ref: N1/AM/25-26/NRLDC

Date: 15.04.2026

To,

General Manager (System Operation)
Northern Regional Load Dispatch Centre, New Delhi

Subject: Action taken from POWERGRID for frequent tripping of ± 800 kV HVDC Champa-Kurukshetra inter-regional link

Reference: Letter No. NRLDC/SO/2026/133 dated 07.04.2026

Sir

This is in reference to the above-mentioned letter regarding frequent tripping of the ± 800 kV HVDC Champa-Kurukshetra link. It is submitted that eleven tripping incidents have occurred since March 2026 majorly due to operation of VESDA-based fire detection at Champa end, filter bank communication issues, and DC line fault due to lightning.

Corrective and preventive actions have been promptly taken in all the tripping incidences, including rectification of VESDA system as per OEM recommendations, rectification of SAS network rings to avoid communication disturbances, coordination with OEM for improvement in RPC logic, and strengthening of tower earthing at the affected DC line location. The details of rectification action taken by POWERGRID for above mentioned trippings is provided as Annexure-I

It is assured that POWERGRID is continuously monitoring the trippings and taking all necessary measures to ensure reliable operation during the forthcoming high-demand summer period.

Thanking you.

Yours faithfully,

जी.एस.आर.राव
15/4/26
(G S R Rao)

CGM (NR-I, AM)

Annexure-I

S. No	Element Name	Outage		Revival		Reason / Remarks	Action taken from POWERGRID
		Date	Time	Date	Time		
1	800 KV HVDC Kurukshetra(PG) Pole-2	1/3/2026	8:11	1/3/2026	15:43	Blocked by operation of VESDA due to valve hall fire detection at Champa end.	OEM of VESDA (Xtralis) visited the site. As per their recommendations pipelines of detectors of all poles have been vacuumed with high power vacuum machine and filters of all detector units of all poles have been changed with new one. Additionally suspected detectors were changed with new detectors
2	800 KV HVDC Kurukshetra(PG) Pole-1	18-03-26	9:57	18-03-26	14:10	Tripped from Champa end due to VESDA (Smoke detection) protection operated	
3	800 KV HVDC Kurukshetra(PG) Pole-2	18-03-26	14:42	18-03-26	15:53	Tripped due to Filter bank communication issue.	Disturbance in the SAS ring caused multiple BCUs connected in the ring— including those associated with the filter banks and GIS—to enter a hung state. As a result, the control system generated DBI (Data Bit Invalid) alarms due to loss of status updates. This triggered a “Minimum Filter Unavailable” alarm on both Bi-poles, causing their subsequent blocking.
4	800 KV HVDC Kurukshetra(PG) Pole-1	18-03-26	14:42	18-03-26	16:03	Tripped due to Filter bank communication issue.	
5	800 KV HVDC Kurukshetra(PG) Pole-3	18-03-26	14:47	18-03-26	16:16	Tripped due to Filter bank communication issue.	

illegible signature

डेटा वर्गीकरण : प्रतिबंधित/RESTRICTED

6	800 KV HVDC Kurukshetra(PG) Pole-4	18-03-26	14:47	18-03-26	16:25	Tripped due to Filter bank communication issue.	SAS network ring of bipoles from TCR ring to prevent such type of disturbances in future.
7	800 KV HVDC Kurukshetra(PG) Pole-1	18-03-26	18:39	18-03-26	20:06	Tripped due to non availability of minimum filters	Communication has been sent to M/s GEV to review and implement the RPC functioning for Auto switching of essential filters even though the essential filter and RPC were in AUTO mode.
8	800 KV HVDC Kurukshetra(PG) Pole-2	18-03-26	18:39	18-03-26	20:24	Tripped due to non availability of minimum filters	
9	800 KV HVDC Kurukshetra(PG) Pole-1	30-03-26	15:11	30-03-26	21:58	Blocked due to VESDA alarm from Champa end.	OEM of VESDA (Xtralis) visited the site. As per their recommendations pipelines of detectors of all poles have been vacuumed with high power vacuum machine and filters of all detector units of all poles have been changed with new one. Additionally suspected detectors were changed with new detectors
10	800 KV HVDC Kurukshetra(PG) Pole-2	4/4/2026	19:21	4/4/2026	23:31	DC Line Fault. FLR- Kurukshetra: 362.1kM, Champa: 925.1kM. Tower no.- 2483	On emergency patrolling actual fault was found at Loc No 2482. Flashover mark noticed on Dead end and CC Ring at Loc 2482. As a corrective course of action Additional AI Bonds (2 Nos) have been provided of Tower Peak and moreover Additional Rod Type Earthing has also been provided for faster dissipation of lightning current into earth and to improve TFR of the Location.
11	800 KV HVDC Kurukshetra(PG) Pole-4	4/4/2026	19:21	5/4/2026	0:14	DC Line Fault. FLR- Kurukshetra: 362.1kM, Champa: 925.1kM. Tower no.- 2483	

Ullas

**Multiple elements tripping at
765/400kV Agra(PG) at 06:28 hrs on
30.04.2026**

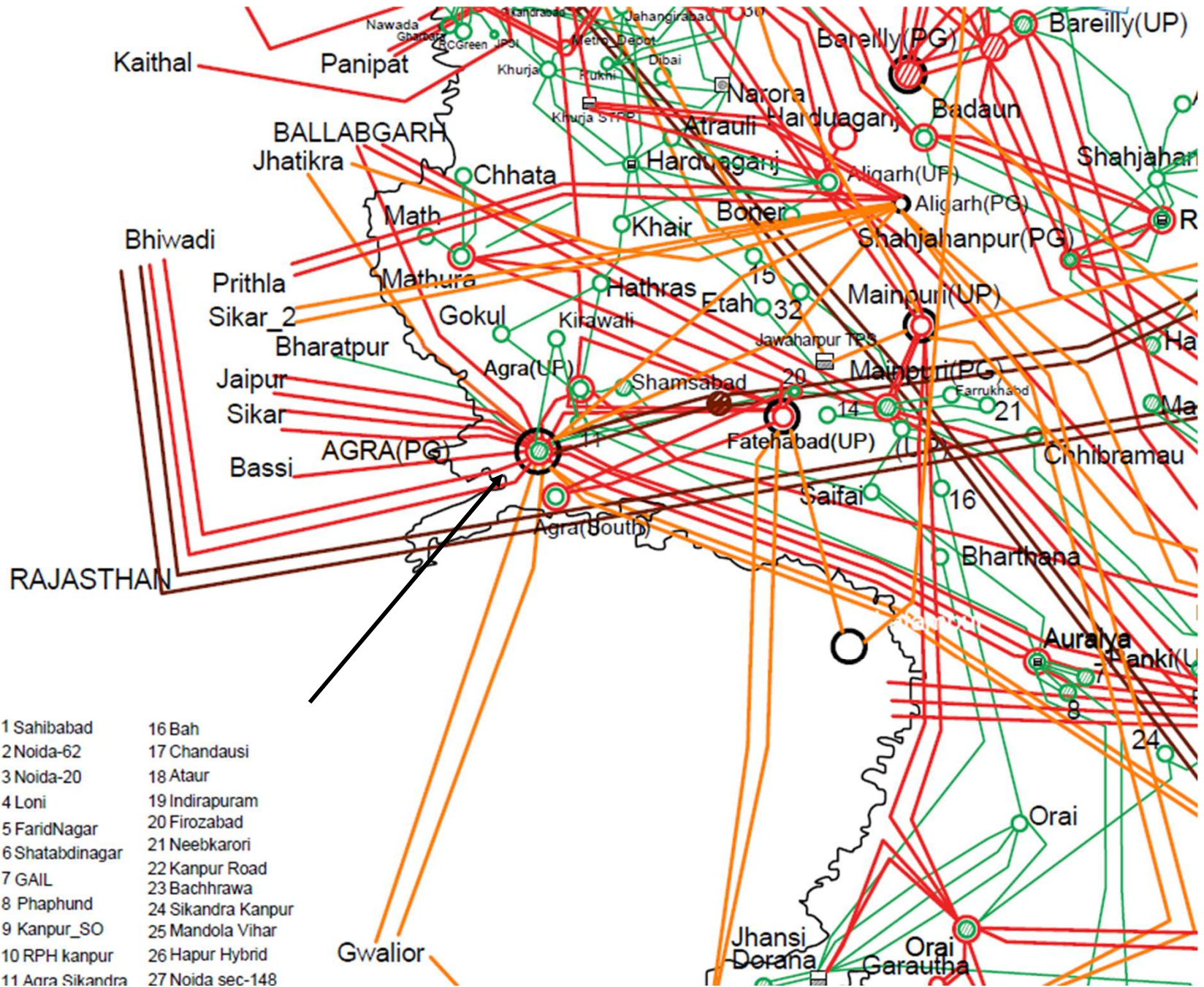
Tripped Elements

S. No	Name of Elements	Outage Time	Revival Time	Reason of tripping
1.	765 KV Agra-Jhatikara (PG) Ckt-1	06:28 hrs	18:53 hrs	B-N fault in reclaim time
2.	765 KV Agra-Fatehpur (PG) Ckt-1		11:57 hrs	R-N fault with NO A/R operation
3.	765 KV Agra-Gwalior (PG) Ckt-1		11:36 hrs	R-N fault with NO A/R operation
4.	765 KV Agra-Gwalior (PG) Ckt-2		19:14 hrs	R-N fault in reclaim time
5.	765/400 kV 1500 MVA ICT 1 at Agra(PG)		10:16 hrs	B-N fault
6.	240 MVAR Bus Reactor No 1 at 765KV Agra(PG)		15:10 hrs	Tripped along with 765 KV Agra-Gwalior (PG) Ckt-1
7.	240 MVAR Bus Reactor No 2 at 765KV Agra(PG)		09:44 hrs	Tripped along with 765 KV Agra-Jhatikara (PG) Ckt-

Brief details of the event

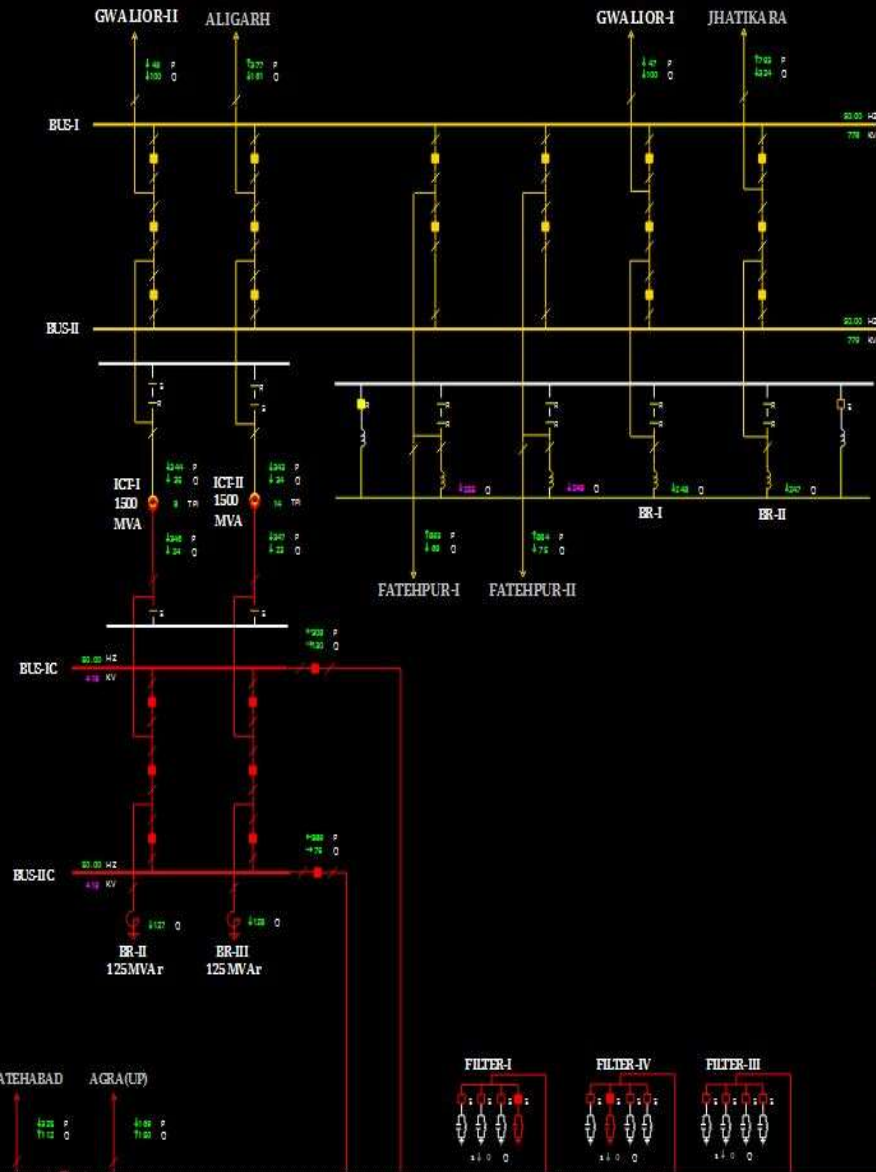
- 765/400kV Agra(PG) have one and half breaker bus scheme at both 765 & 400kV level.
- During antecedent condition, 765 KV Agra-Gwalior (PG) ckt-1 & 2 were carrying ~47 MW each. As reported, there was inclement weather condition (thunderstorm / lightning).
- As reported, at 06:28 hrs, 765 KV Agra-Jhatikara (PG) Ckt-1, 765 KV Agra-Fatehpur (PG) Ckt-1, 765 KV Agra-Gwalior (PG) Ckt-1 & 2, 765/400 kV 1500 MVA ICT 1 at Agra(PG) and 240 MVAR Bus Reactor No 1 & 2 at 765KV Agra(PG) tripped. Tripping occurred due to phase to earth faults in lines due to thunderstorm / lightning during inclement weather conditions.
- As per PMU plot of phase voltage and currents of all the tripped lines at Agra(PG), it was observed that at first instance i.e., 06:28 29 hrs, B-N fault occurred on 765 KV Agra-Jhatikara (PG) Ckt-1. On this fault line successfully autoreclosed however tripped on B-N fault in reclaim time. Further, at 06:28:34hrs, 765 KV Agra-Fatehpur (PG) Ckt-1 tripped on R-N fault without A/R operation. Further at 06:28:41 hrs, 765 KV Agra-Gwalior (PG) Ckt-1 tripped on R-N fault without A/R operation. Further at 06:28:40 hrs, 765 KV Agra-Gwalior (PG) Ckt-2 tripped on R-N fault in reclaim time after successful A/R operation. 240 MVAR bus reactor-1 & 2 also tripped along with the 765 KV Agra-Gwalior (PG) Ckt-1 & 765 KV Agra-Jhatikara (PG) Ckt-1 respectively (bus reactor and both the lines were on the same dia). Further at 06:28:44 hrs, 765/400 kV 1500 MVA ICT 1 at Agra(PG) tripped on B-N fault. Exact nature and location of fault and details of protection operation (DR/EL) not received yet from POWERGRID(NR-III). All the faults cleared within 80 msec.
- As per SCADA, no change in demand of UP control area is observed

Network connectivity diagram



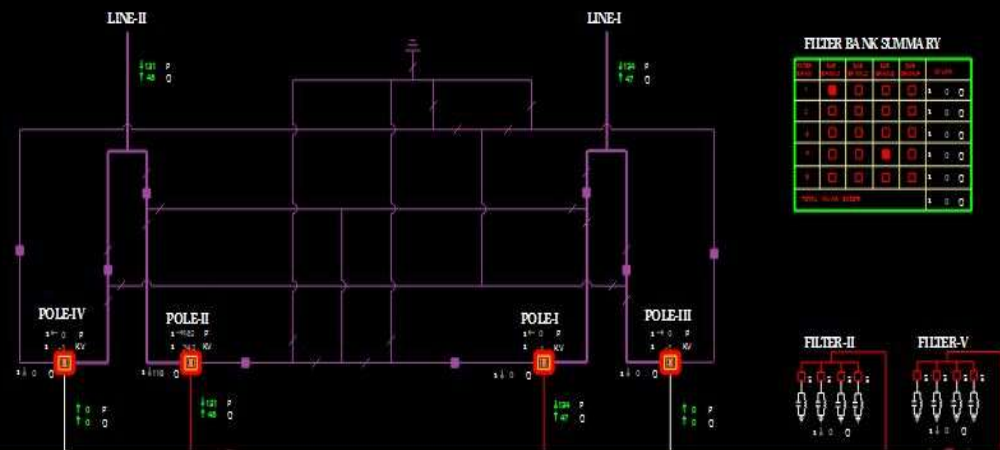
SLD of 765/400kV Agra(PG) before the event

AGRA
 30.4.26 6:25:59
 Stat Expl Gen Sum Company



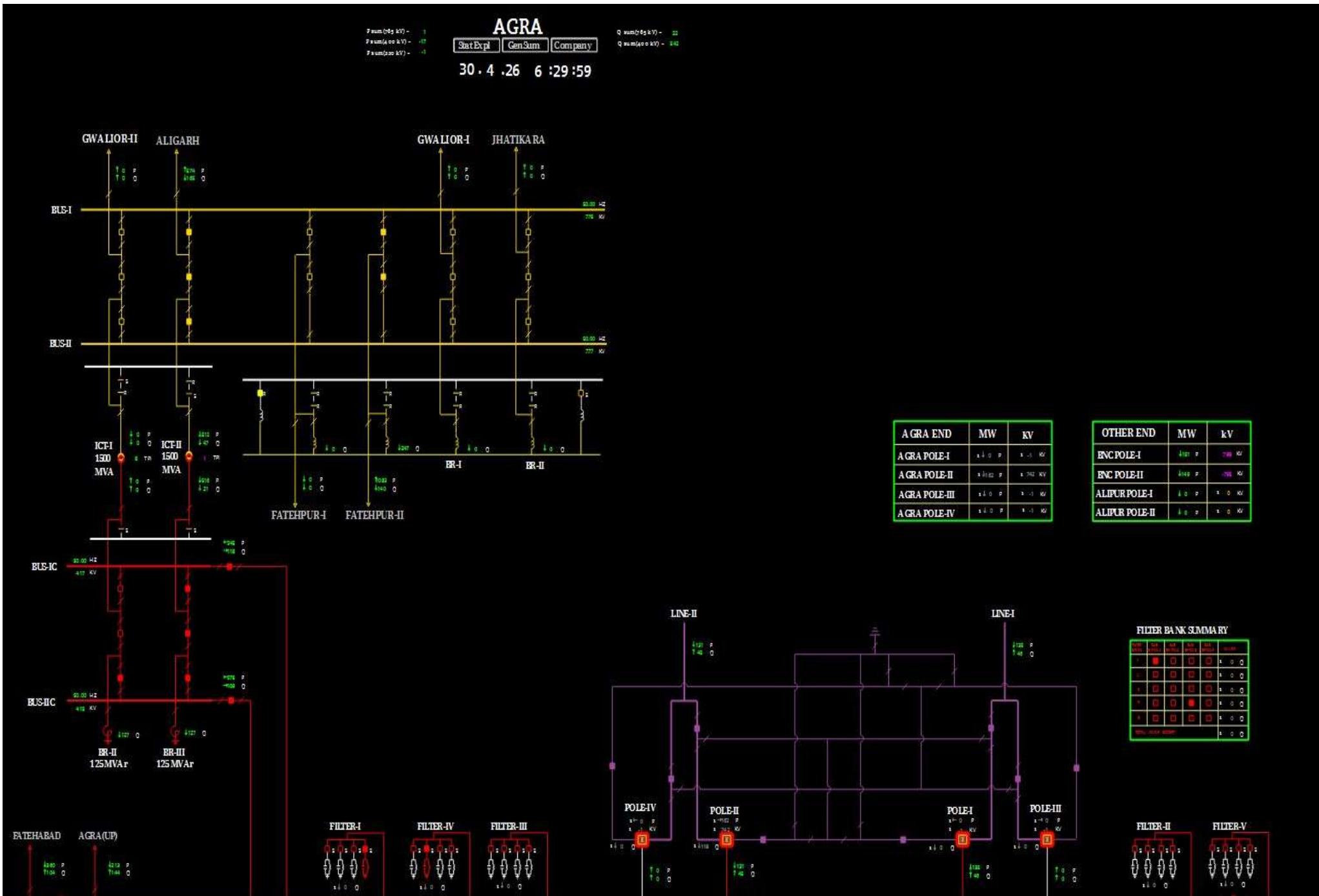
A GRA END	MW	kV
A GRA POLE-I	4.0 P	4.00 KV
A GRA POLE-II	4.00 P	4.00 KV
A GRA POLE-III	4.0 P	4.0 KV
A GRA POLE-IV	4.0 P	4.0 KV

OTHER END	MW	kV
ENC POLE-I	4.00 P	4.00 KV
ENC POLE-II	4.00 P	4.00 KV
ALIPUR POLE-I	4.0 P	4.0 KV
ALIPUR POLE-II	4.0 P	4.0 KV



FILTER BANK SUMMA KV				
LINE	FILTER	POLE	TYPE	STATUS
LINE-I	FILTER-I	POLE-I	TYPE	STATUS
LINE-I	FILTER-II	POLE-II	TYPE	STATUS
LINE-I	FILTER-III	POLE-III	TYPE	STATUS
LINE-I	FILTER-IV	POLE-IV	TYPE	STATUS
LINE-I	FILTER-V	POLE-V	TYPE	STATUS
LINE-II	FILTER-I	POLE-I	TYPE	STATUS
LINE-II	FILTER-II	POLE-II	TYPE	STATUS
LINE-II	FILTER-III	POLE-III	TYPE	STATUS
LINE-II	FILTER-IV	POLE-IV	TYPE	STATUS
LINE-II	FILTER-V	POLE-V	TYPE	STATUS

SLD of 765/400kV Agra(PG) after the event



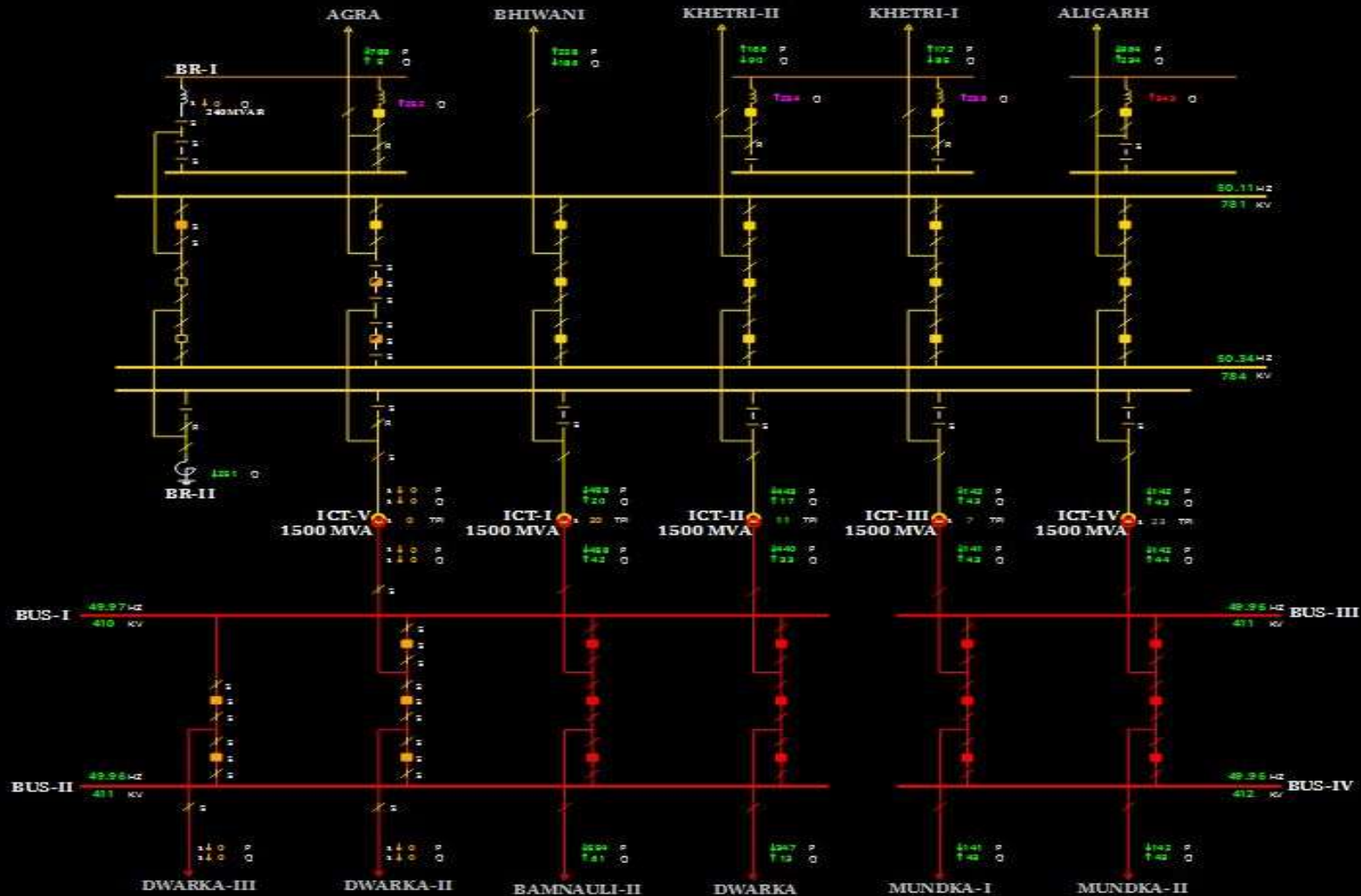
SLD of 765/400kV Jhatikara(PG) before the event

CONTACT DETAILS	
EMAIL	jkcr@powergrid.co.in
MOBILE	5750913000
HOTLINE	20112360 / 20112174

JHATIKARA

Stat Expl GenSum Company

30 4 .26 6 :25 :59



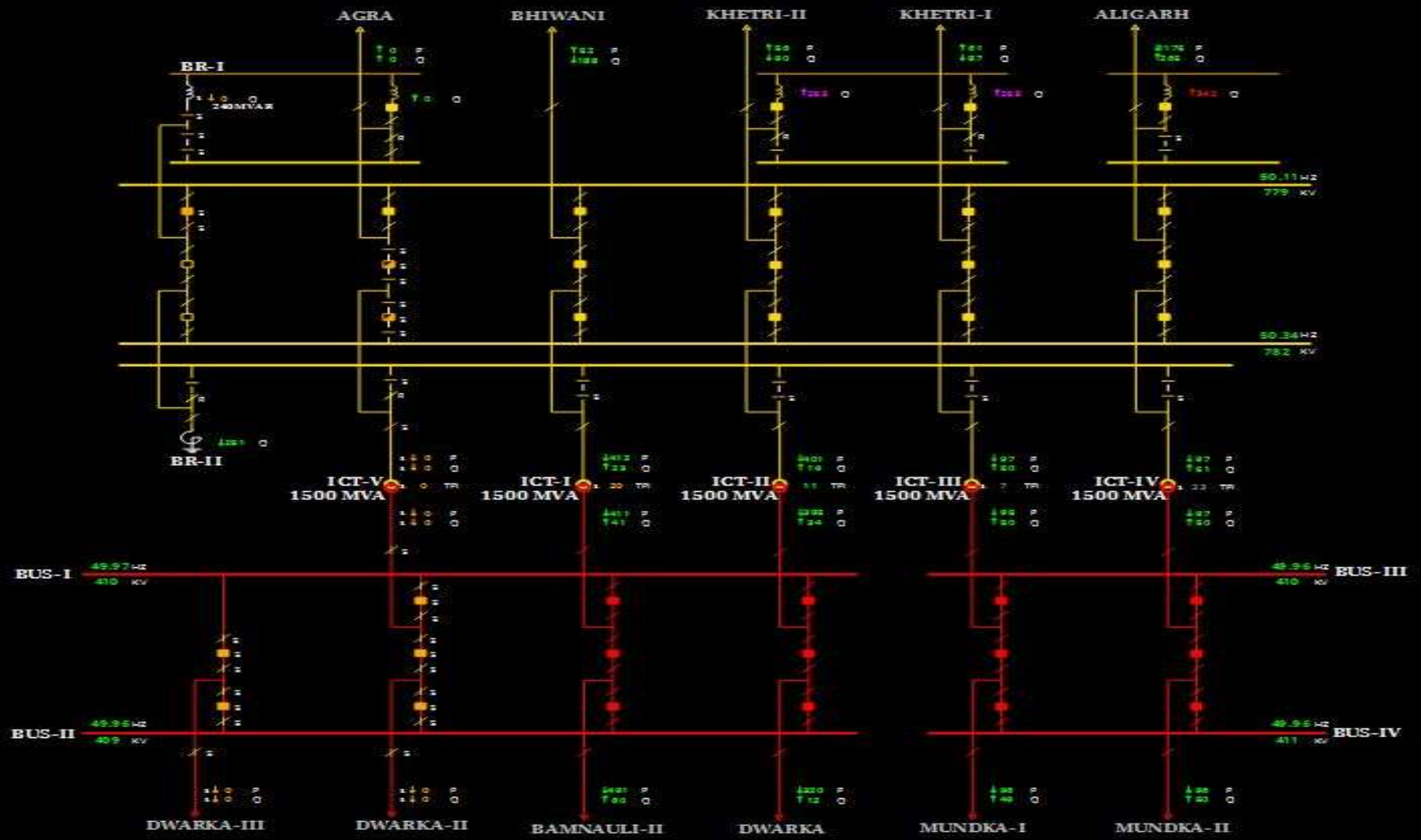
SLD of 765/400kV Jhatikara(PG) after the event

CONTACT DETAILS	
EMAIL	jtk.r@powergrid.co.in
MOBILE	8750913000
HOTLINE	20112360 / 20112174

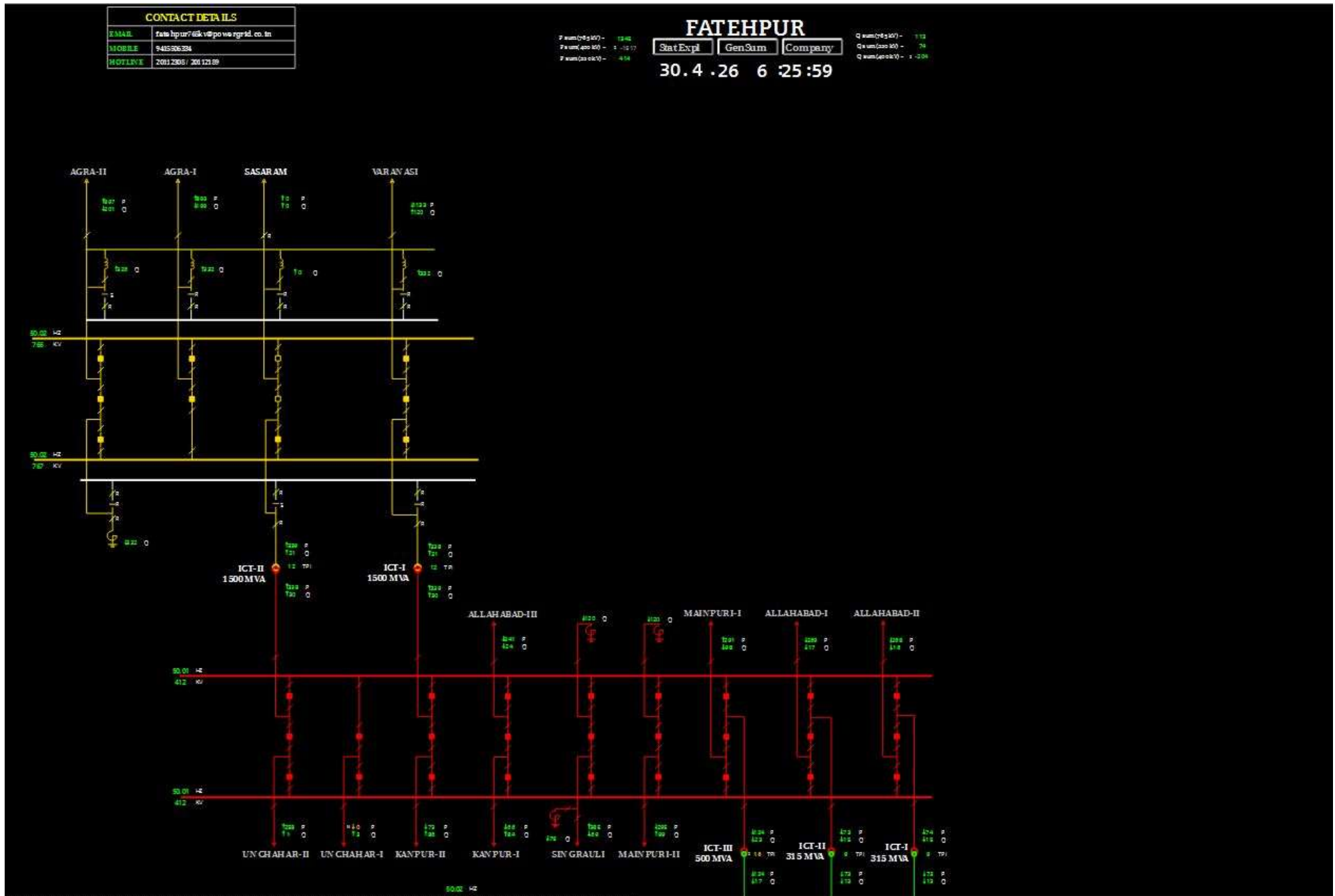
JHATIKARA

Stat Expl GenSum Company

30 4 .26 6 :29 :59



SLD of 765/400kV Fatehpur(PG) before the event



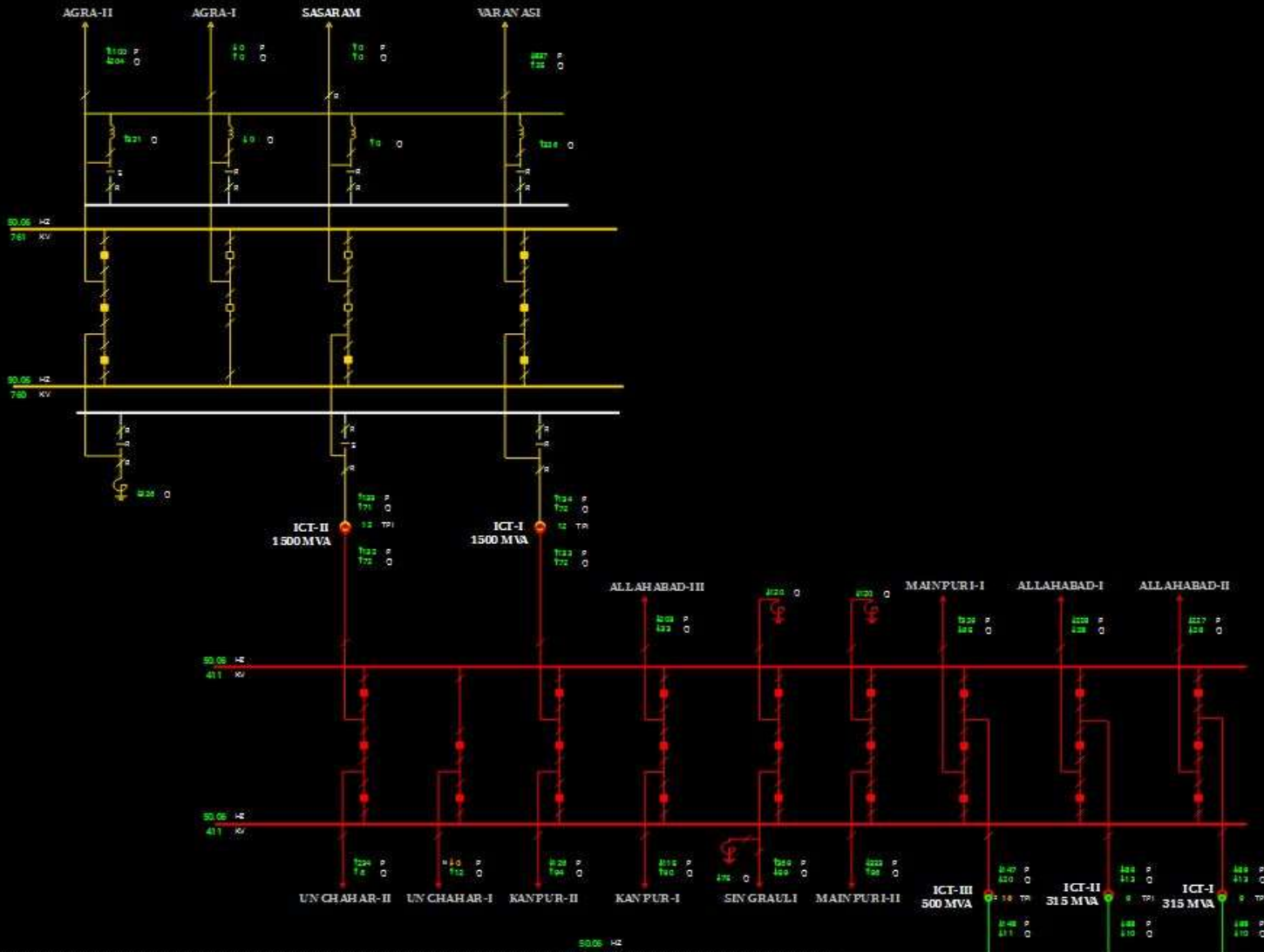
SLD of 765/400kV Fatehpur(PG) after the event

CONTACT DETAILS	
EMAIL	fatehpur765kv@powergrid.co.in
MOBILE	945506384
HOTLINE	2011286 / 2012189

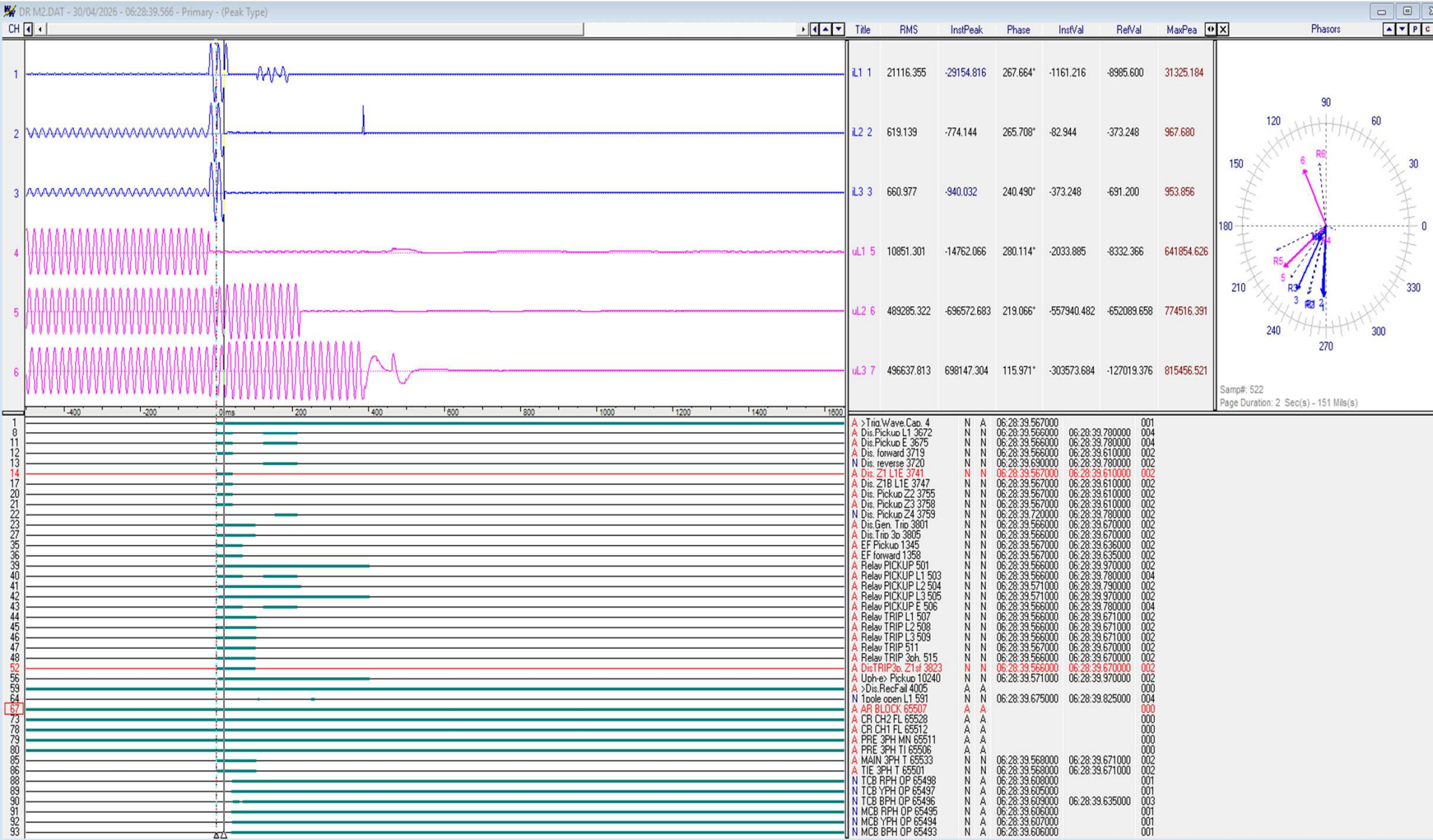
P sum(765KV) - 529
 P sum(400KV) - 14800
 P sum(220KV) - 497

FATEHPUR
 Stat Expl Gen Sum Company
 30.4 .26 6 :29 :59

Q sum(765KV) - 291
 Q sum(400KV) - 54
 Q sum(220KV) - 1748



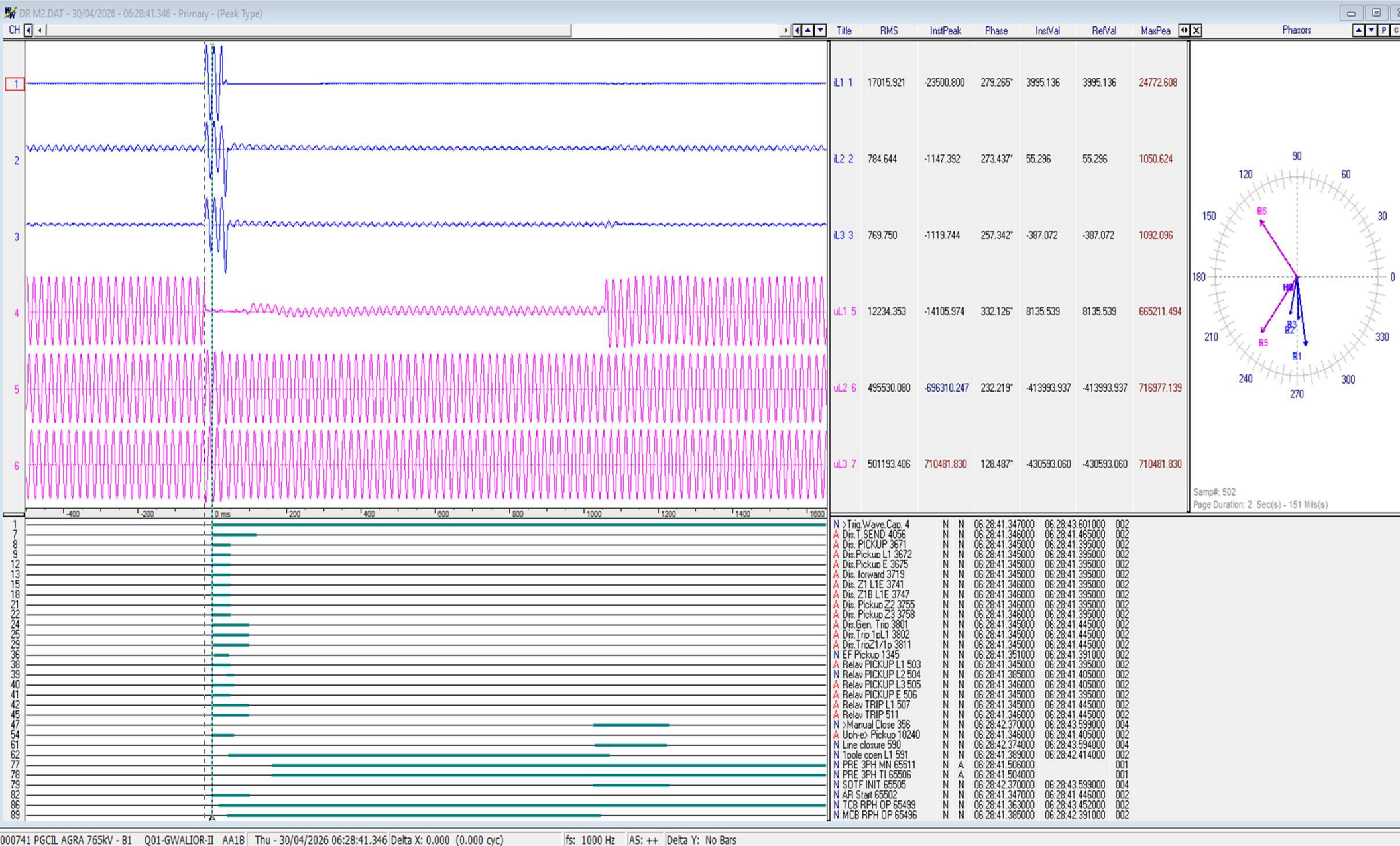
DR of 765 KV Agra (end)-Gwalior (PG) Ckt-1



000895 PGCIL AGRA 765KV - B1 Q13-GWALIOR-I AA1B Thu - 30/04/2026 06:28:39.587 Delta X: 21.000 ms (1.050 cyc @ 50.00 Hz) AS: ++ Delta Y: No Bars

As per DR, R-N phase to earth fault was observed with fault clearing time of 80 ms and fault current of ~21.12kA from Agra; fault sensed in zone-1 at Agra end; no A/R operation was observed (A/R blocked).

DR of 765 KV Agra (end)-Gwalior (PG) Ckt-2



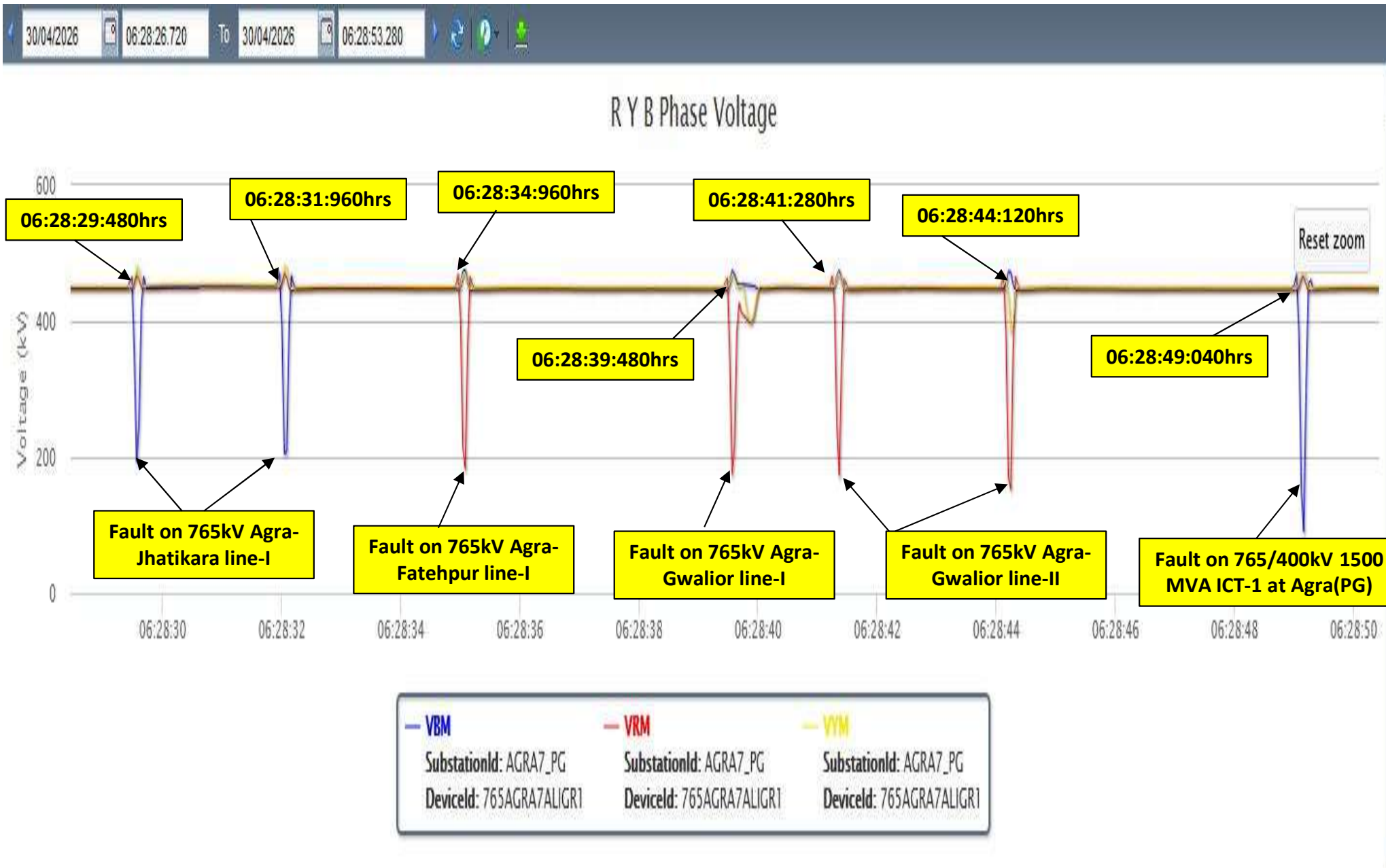
As per DR, R-N phase to earth fault was observed with fault clearing time of 80 ms and fault current of ~17.02kA from Agra; fault sensed in zone-1 at Agra end; A/R successful. DR of second fault not received.

PMU Plot of frequency at Aligarh(PG)

06:28hrs/30-Apr-26

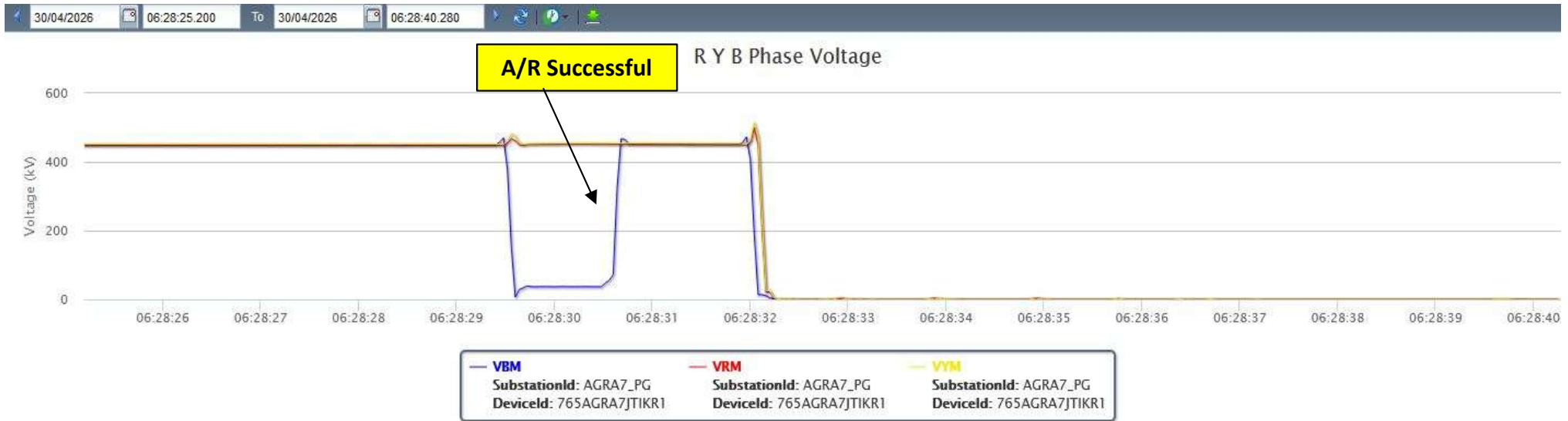


PMU Plot of Phase Voltage Magnitude of 765kV Agra-Aligarh(PG) line-I at Agra(PG) 06:28hrs/30-Apr-26

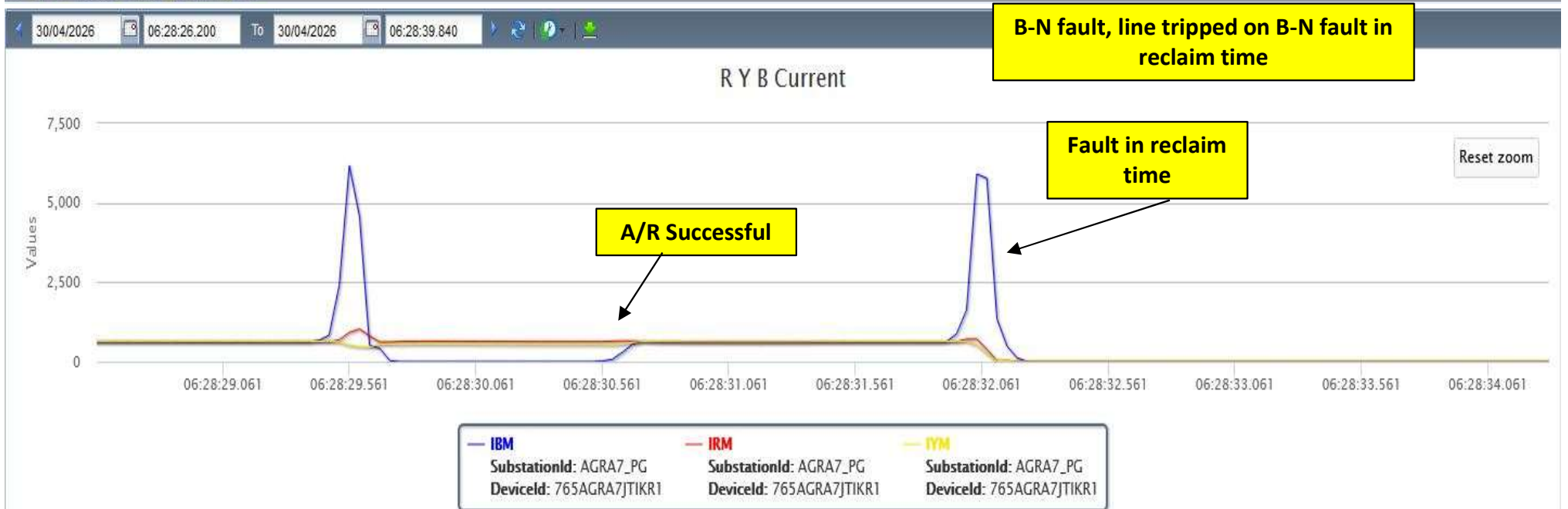


PMU Plot of Phase current Magnitude of 765kV Agra-Jhatikara line-I at

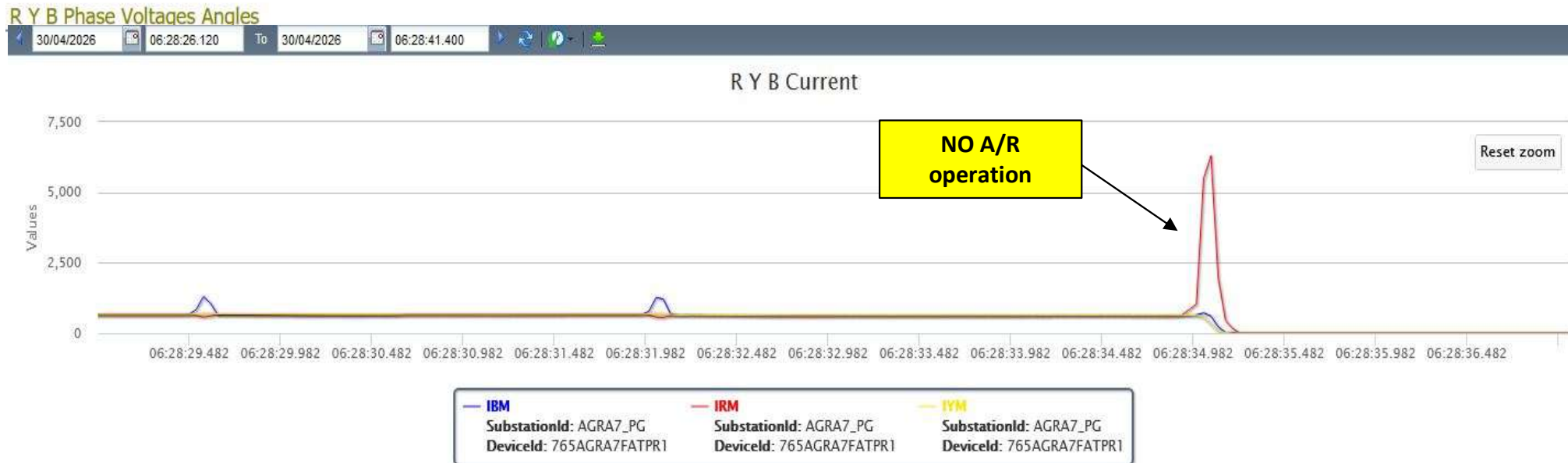
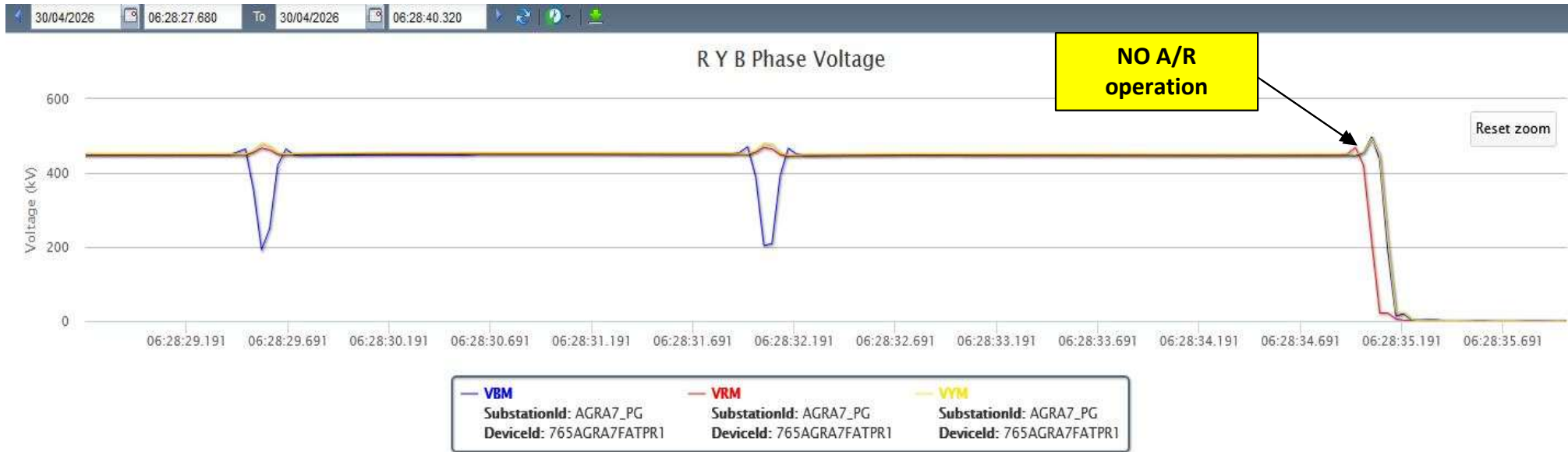
Agra(PG) 06:28:32hrs/30-Apr-26



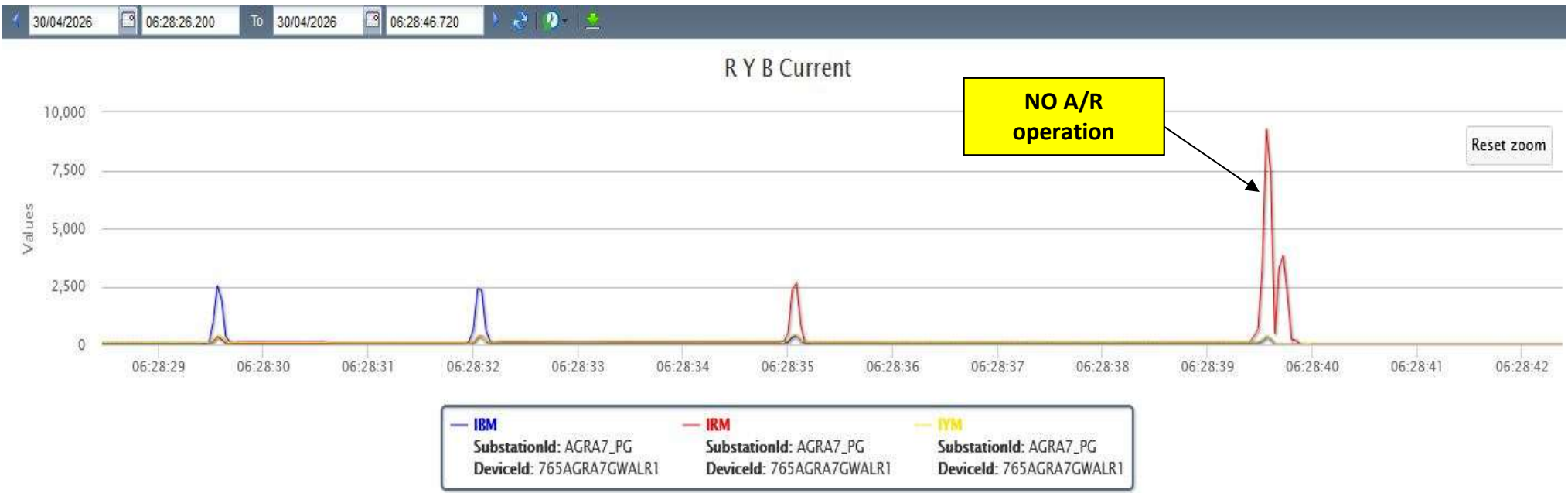
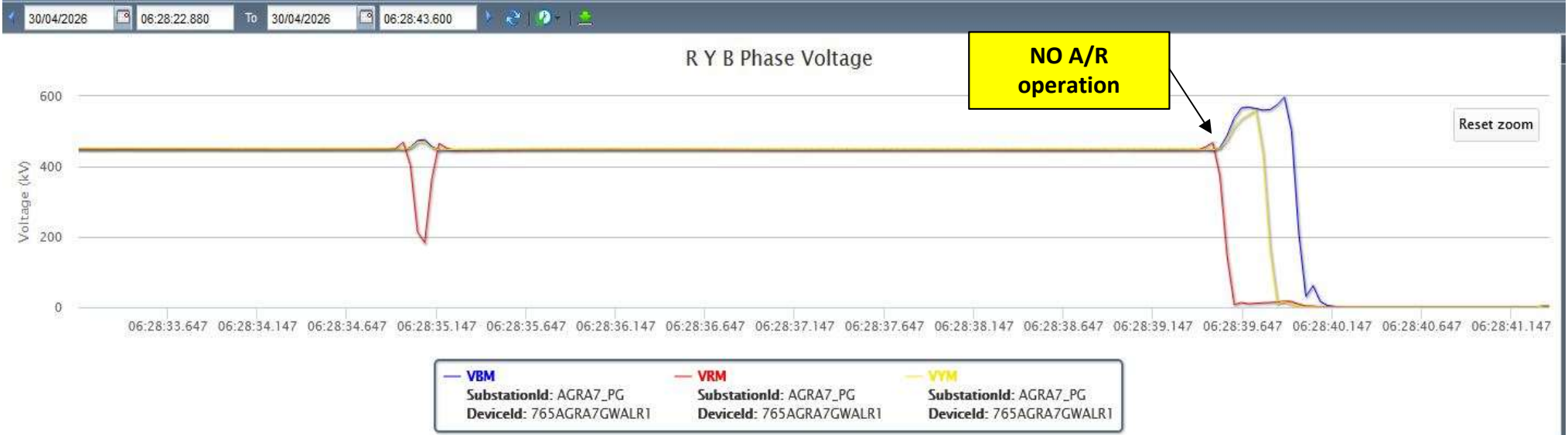
R Y B Phase Voltages Angles



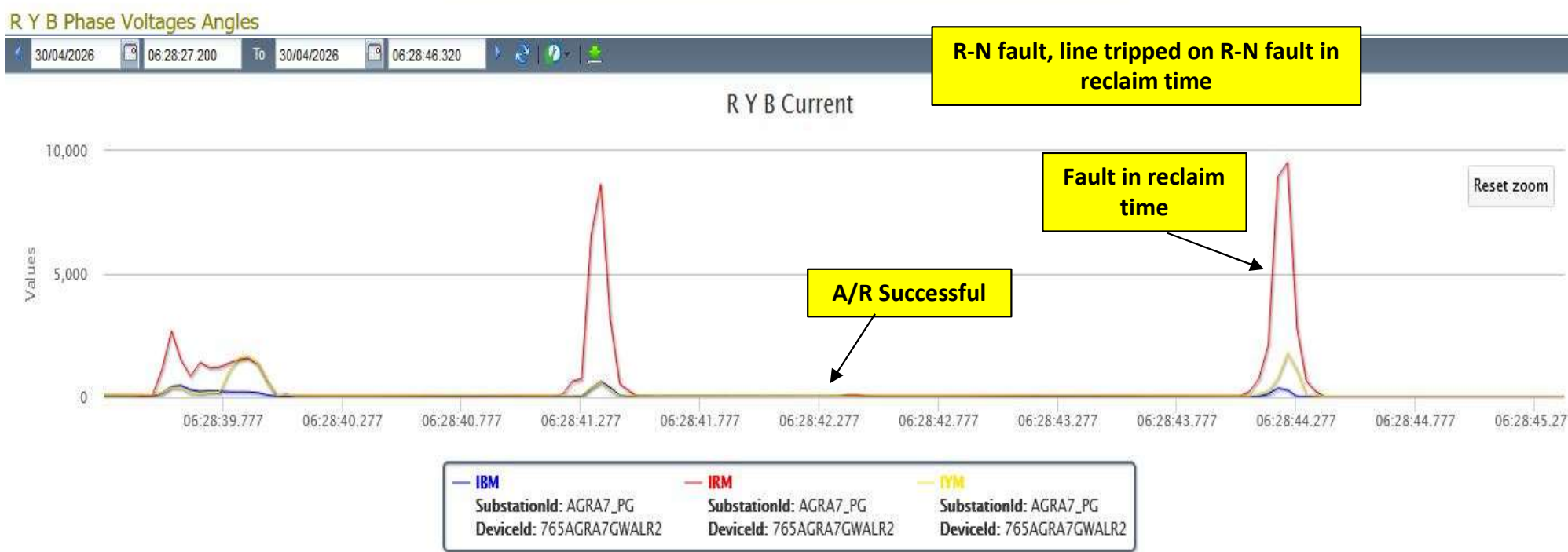
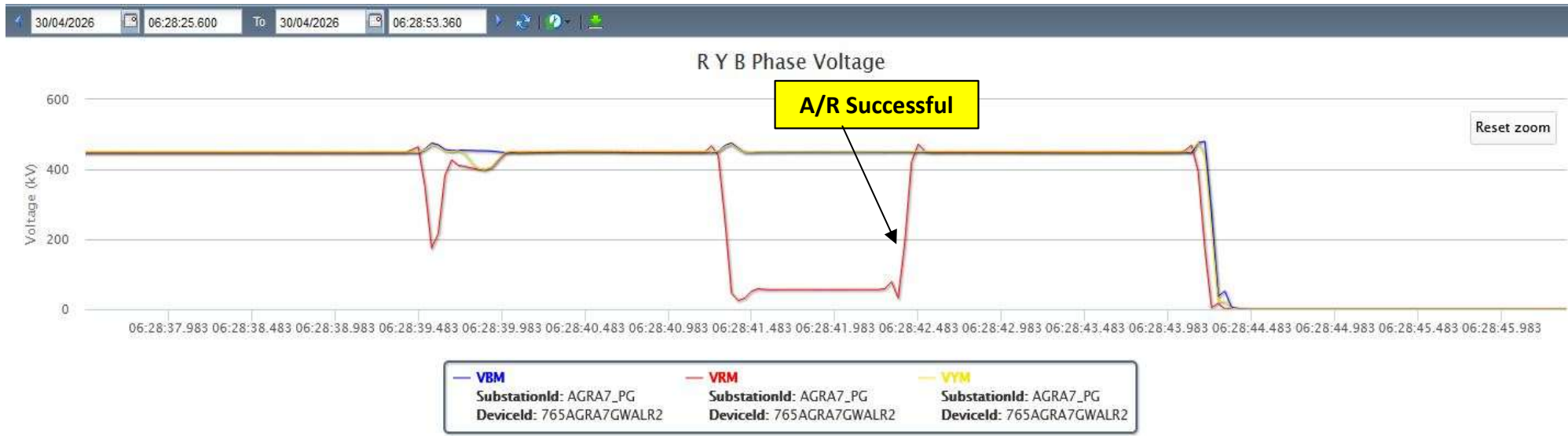
PMU Plot of Phase voltage & current Magnitude of 765kV Agra-Fatehpur line-I at Agra(PG) 06:28:35hrs/30-Apr-26



PMU Plot of Phase voltage & current Magnitude of 765kV Agra-Gwalior line-I at Agra(PG) 06:28:40hrs/30-Apr-26



PMU Plot of Phase voltage & current Magnitude of 765kV Agra-Gwalior line-II at Agra(PG) 06:28:44hrs/30-Apr-26



SCADA SOE

Time	Station Name	Voltage	Element Name	Element Type	Element Status	Remarks
06:28:29,601	AGRA	765kV	16JTIKR1	Circuit Breaker	disturbe	
06:28:29,650	AGRA	765kV	18R2	Circuit Breaker	Open	Main CB of 240 MVAR Bus Reactor No 2 at 765KV Agra(PG) opened
06:28:29,652	AGRA	765kV	17JT1R2	Circuit Breaker	Open	Tie CB at Agra(PG) end of 765 KV AGRA - JHATIKARA (PG) CKT-1 opened
06:28:30,642	AGRA	765kV	16JTIKR1	Circuit Breaker	Close	Main CB at Agra(PG) end of 765 KV AGRA - JHATIKARA (PG) CKT-1 closed
06:28:32,127	AGRA	765kV	16JTIKR1	Circuit Breaker	Open	Main CB at Agra(PG) end of 765 KV AGRA - JHATIKARA (PG) CKT-1 opened
06:28:35,106	AGRA	765kV	7FATPR1	Circuit Breaker	Open	Main CB at Agra(PG) end of 765 KV AGRA - FATEHPUR (PG) CKT-1 opened
06:28:35,108	AGRA	765kV	8FAT1TIE	Circuit Breaker	Open	Tie CB at Agra(PG) end of 765 KV AGRA - FATEHPUR (PG) CKT-1 opened
06:28:35,317	FATEHPUR	765kV	8AGR1TIE	Circuit Breaker	Open	Tie CB at Fatehpur(PG) end of 765 KV AGRA - FATEHPUR (PG) CKT-1 opened
06:28:37,106	FATEHPUR	765kV	7AGRA_1	Circuit Breaker	Open	Main CB at Fatehpur(PG) end of 765 KV AGRA - FATEHPUR (PG) CKT-1 opened
06:28:39,604	AGRA	765kV	13GWLIR1	Circuit Breaker	Open	Main CB at Agra(PG) end of 765 KV AGRA - GWALIOR (PG) CKT-1 opened
06:28:39,604	AGRA	765kV	14GW1R1	Circuit Breaker	Open	Tie CB at Agra(PG) end of 765 KV AGRA - GWALIOR (PG) CKT-1 opened
06:28:39,613	AGRA	765kV	15R1	Circuit Breaker	Open	Main CB of 240 MVAR Bus Reactor No 1 at 765KV Agra(PG) opened
06:28:41,380	AGRA	765kV	2T1GW2	Circuit Breaker	disturbe	A/R operation of 765KV AGRA - GWALIOR (PG) CKT-2
06:28:41,381	AGRA	765kV	1GWLIR2	Circuit Breaker	disturbe	
06:28:42,420	AGRA	765kV	1GWLIR2	Circuit Breaker	Close	
06:28:43,446	AGRA	765kV	2T1GW2	Circuit Breaker	Close	
06:28:44,249	AGRA	765kV	2T1GW2	Circuit Breaker	Open	Tie CB at Agra(PG) end of 765 KV AGRA - GWALIOR (PG) CKT-2 opened
06:28:44,250	AGRA	765kV	1GWLIR2	Circuit Breaker	Open	Main CB at Agra(PG) end of 765 KV AGRA - GWALIOR (PG) CKT-2 opened
06:28:49,193	AGRA	400kV	31T1R2	Circuit Breaker	Open	Tie CB at 400kV side of 765/400kV 1500 MVA ICT-1 at Agra(PG) openend
06:28:49,206	AGRA	400kV	30T1	Circuit Breaker	Open	Main CB at 400kV side of 765/400kV 1500 MVA ICT-1 at Agra(PG) openend
06:28:49,221	AGRA	765kV	3T1	Circuit Breaker	Open	Main CB at 765kV side of 765/400kV 1500 MVA ICT-1 at Agra(PG) openend

Points of Discussion

- i. As per PMU data, A/R operation is not observed in 765 KV Agra-Fatehpur (PG) Ckt-1 and 765 KV Agra-Gwalior (PG) Ckt-1 on R-N fault. Whether A/R is ON in the line at both ends? Reason for non-operation of A/R needs to be shared.
- ii. Exact location and nature of fault need to be shared.
- iii. Remedial action taken report needs to be shared.

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Remarks
			Date	Time								
1	800 KV HVDC Kurukshetra(PG) Pole-2	POWERGRID	01-Mar-26	08:11	Nil	Tripped from Champa end on VESDA (Smoke detection) protection operation due to valve hall fire detection	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed.
2	400 KV RAPS_D(NP)-Shujalpur(PG) (RTCL) Ckt-2	POWERGRID	07-Mar-26	11:42	Nil	Relay maloperation	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system. However, reduction in voltage was observed
3	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	09-Mar-26	12:52	Nil	Phase to earth fault B-N	NA	80 ms	No	Yes	A/R lockout at Auraiya end; DR time sync issue	As per PMU & DR, B-N phase to earth fault (no A/R at Auraiya end) was observed with fault current of ~24.7kA from Auraiya; fault sensed in zone-1 at Auraiya end.
4	400 KV Gorakhpur(PG)-Muzaffarpur(PG) (POWERLINK) Ckt-2	POWERLINK	15-Mar-26	06:29	Nil	Phase to Ground Fault B-N	NA	80 ms	Yes	Yes	-	As per PMU & DR, B-N phase to earth fault (A/R operated but unsuccessful at Gorakhpur) was observed with fault current of ~3.13kA from Gorakhpur; fault sensed in zone-2 at Gorakhpur end.
5	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	18-Mar-26	09:57	Nil	Tripped from Champa end due to VESDA (Smoke detection) protection operated	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed.
6	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	18-Mar-26	14:42	Nil	Due to Filter bank communication issue	GI-2	NA	No	Yes (Partial)	FIR/DR not submitted	As per PMU, no fault was observed in the system. However, reduction in voltage was observed. As per EL, Filter Control Blocking was initiated due to filter power limit. As reported, a physical inspection revealed that several BCUs were unresponsive, which led to the DBI alarms.
7	800 KV HVDC Kurukshetra(PG) Pole-2											
8	800 KV HVDC Kurukshetra(PG) Pole-3	POWERGRID	18-Mar-26	14:46	Nil	Due to Filter bank communication issue	GI-2	NA	No	Yes (Partial)	FIR/DR not submitted	As per PMU, no fault was observed in the system. However, reduction in voltage was observed. As per EL, Filter Control Blocking was initiated due to filter power limit. As reported, a physical inspection revealed that several BCUs were unresponsive, which led to the DBI alarms.
9	800 KV HVDC Kurukshetra(PG) Pole-4											
10	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	18-Mar-26	18:39	Nil	Due to non-availability of minimum filters	GI-2	NA	No	Yes (Partial)	FIR/DR not submitted	As per PMU, no fault was observed in the system. However, reduction in voltage was observed. As per EL, Filter Control Blocking was initiated due to filter power limit. As reported, for bipolar operation, even at minimum load, a minimum configuration of 2A + 1B filters must remain energized; failure to meet this requirement resulted in Bipole tripping.
11	800 KV HVDC Kurukshetra(PG) Pole-2											
12	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	19-Mar-26	04:05	Nil	Auto reclosed	NA	80 ms	No	Yes	A/R lockout at Auraiya end; DR time sync issue	As per PMU & DR, R-N phase to earth fault (no A/R at Auraiya end) was observed with fault current of ~7.39kA from Auraiya; fault sensed in zone-1 at Auraiya end.
13	765 KV Chittorgarh-Banaskantha (PG) Ckt-2	POWERGRID	19-Mar-26	23:42	Nil	Phase to Phase Fault R-Y	NA	80 ms	Yes	Yes	-	As per PMU & DR, R-Y phase to phase fault was observed with fault distance of 149.3km (49.4%) and fault current of $I_r \sim 6.07kA$ & $I_y \sim 5.49kA$ from Chittorgarh; fault sensed in zone-2 at Chittorgarh end.
14	220 KV Sahupuri(UP)-New Karamnasa (BS) (BSEB) Ckt-1	BSEB	21-Mar-26	01:13	Nil	Earth fault	NA	360 ms	Yes	Yes	DR date sync issue; Carrier communication issue suspected	As per PMU & DR, R-B phase to phase fault was observed with fault current of $I_r \sim 1.94kA$ & $I_b \sim 1.65kA$ from Sahupuri; fault sensed in zone-1 at Sahupuri end. Delayed fault clearance of 360 ms was observed as per PMU.
15	220 KV Auraiya(NT)-Mehgaon(MP) (MPSEB) Ckt-1	POWERGRID	22-Mar-26	02:40	Nil	Phase to Ground Fault Y-N	NA	80 ms	No	Yes	A/R lockout at Auraiya end; DR time sync issue	As per PMU & DR, Y-N phase to earth fault (no A/R at Auraiya end) was observed with fault current of ~15.95kA from Auraiya; fault sensed in zone-1 at Auraiya end.
16	220 KV Sahupuri(UP)-New Karamnasa (BS) (BSEB) Ckt-1	BSEB	27-Mar-26	23:13	Nil	Phase to Phase Fault R-B	NA	360 ms	Yes	Yes	DR date sync issue; Carrier communication issue suspected	As per PMU & DR, R-B phase to phase fault was observed with fault current of $I_r \sim 2.69kA$ & $I_b \sim 2.36kA$ from Sahupuri; fault sensed in zone-1 at Sahupuri end. Delayed fault clearance of 360 ms was observed as per PMU.
17	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	30-Mar-26	15:11	Nil	Pole blocked due to VESDA alarm from Champa end.	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed.

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Remarks
			Date	Time								
1	220 KV Sahupuri(UP)-New Karamnasa (BS) (BSEB) Ckt-1	BSEB	01-Apr-26	08:33	Nil	Phase to earth fault B-N	NA	80 ms	Yes	Yes	Carrier communication issue suspected at Sahupuri	As per PMU & DR, B-N phase to earth fault within reclaim time was observed with fault clearing time of 80 ms and fault current of ~3.1kA from Sahupuri; fault sensed in zone-1 at Sahupuri end.
2	800 KV HVDC Kurukshetra(PG) Pole-4	POWERGRID	04-Apr-26	19:21	Nil	DC Supply Fail	GI-2	120 ms	Yes	Yes (Partial)	FIR/DR not submitted	As per PMU & EL, two consecutive R-Y-B-N three phase to earth faults were observed with fault clearing time of 120 msec. At 19:21:08.788 hrs, the DC line fault occurred and control attempted the restart sequence, but due to the persistent nature of the fault and exhaustion of all restart attempts, 800 KV HVDC Kurukshetra(PG) Pole-2 & 4 were eventually blocked.
3	800 KV HVDC Kurukshetra(PG) Pole-2					DC Supply Fail		120 ms	Yes	Yes (Partial)	FIR/DR not submitted	
4	800 KV HVDC Kurukshetra(PG) Pole-1	POWERGRID	06-Apr-26	19:07	Nil	transient CNAP protection latched	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed.
5	800 KV HVDC Kurukshetra(PG) Pole-4	POWERGRID	11-Apr-26	17:22	Nil	tripped due to commutation failure at Kurukshetra	NA	NA	No	No	FIR/DR/EL not submitted	As per PMU, no fault was observed in the system.
6	220 KV Sahupuri(UP)-New Karamnasa (BS) (BSEB) Ckt-1	BSEB	15-Apr-26	13:06	Nil	Phase to Ground Fault B-N	NA	240 ms	Yes	Yes	Carrier communication issue suspected at Sahupuri; DR date sync issue at Sahupuri	As per PMU & DR, R-N phase to earth fault (Ir~1.82kA from Sahupuri) followed by R-B phase to phase fault (Ir=Ib~1.74kA from Sahupuri) was observed with fault clearing time of 240 ms (delayed) & 80 ms respectively; fault sensed in zone-1 at Sahupuri end.
7	220 KV Auraiya(NT)-Malanpur(MP) (PG) Ckt-1	POWERGRID	25-Apr-26	12:49		Phase to Ground Fault R-N	NA	80 ms	No	No	FIR/DR/EL not submitted	As per PMU, B-N phase to earth fault was observed with fault clearing time of 80 ms.
8	765 KV Fatehpur-Sasaram (PG) Ckt-1	POWERGRID	29-Apr-26	16:14	Nil	Phase to Phase Fault R-B	NA	520 ms	Yes	Yes	Carrier communication issue suspected at Sasaram	As per PMU & DR, R-B phase to phase fault was observed with delayed fault clearing time of 520 ms and fault current of Ir~3.04kA & Ib~3.22kA from Fatehpur; fault sensed in zone-2 at Fatehpur end.
9	220 KV Sahupuri(UP)-New Karamnasa (BS) (BSEB) Ckt-1	BSEB	29-Apr-26	17:39		Over loading	NA	NA	Yes	NA	-	As per PMU, no fault was observed in the system. As per FIR, line tripped only from New Karamnasa(BS) end and remained charged from Sahupuri end.
10	765 KV Agra-Gwalior (PG) Ckt-1	POWERGRID	30-Apr-26	06:28	Nil	AC Supply Fail	GI-2	80 ms	Yes	Yes	-	As per PMU & DR, R-N phase to earth fault was observed with fault clearing time of 80 ms and fault current of ~21.12kA from Agra; fault sensed in zone-1 at Agra end; no A/R operation was observed (A/R blocked).
11	765 KV Agra-Gwalior (PG) Ckt-2					AC Supply Fail		80 ms	Yes	Yes	DR of second R-N fault (within reclaim time) not submitted	As per PMU & DR, R-N phase to earth fault was observed with fault clearing time of 80 ms and fault current of ~17.02kA from Agra; fault sensed in zone-1 at Agra end. A/R was successful during first fault however line tripped due to R-N fault within reclaim time.
12	800 KV HVDC Kurukshetra(PG) Pole-4	POWERGRID	30-Apr-26	08:34	Nil	Transient fault	GI-2	NA	Yes	No	DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed. As per FIR, Ckt-2 tripped due to DC line fault with fault distance of 456.83 Km from Kurukshetra end. During patrolling flashover marks were found on the jumper conductor and the tower body at location No. 2229. The marks appear to have been caused by the swinging of the jumper during a heavy thunderstorm.
13	800 KV HVDC Kurukshetra(PG) Pole-2					Transient fault		NA	Yes	No	DR/EL not submitted	
14	800 KV HVDC Kurukshetra(PG)-Champa(PG) (PG) Ckt-2					Transient fault		NA	Yes	No	DR/EL not submitted	
15	800 KV HVDC Kurukshetra(PG) Pole-2	POWERGRID	30-Apr-26	18:36		Transient fault	GI-2	NA	Yes	No	DR/EL not submitted	As per PMU, no fault was observed in the system. However, fluctuation in voltage was observed. As per FIR, Ckt-2 tripped due to DC line fault with fault distance of 363.23 Km from Kurukshetra end. After patrolling, it was observed that tripping occurred due to jumper swing at location No. 2482.
16	800 KV HVDC Kurukshetra(PG) Pole-4	POWERGRID	30-Apr-26	18:36	Nil	Transient fault		NA	Yes	No	DR/EL not submitted	

Status of Bus bar protection				
Constituent Name	Name of Station	Status of Bus bar protection(as reported)	Expected date of implementation (as reported in 51st PSC meeting)	Remarks
Uttarakhand	220 KV Substation, Ramnagar, Roorkee	Blocked due to more elements added at 220 KV Voltage level.		
	220 KV Sub Station, SIDCUL, Haridwar			
	220kv Jhajhra, Dehradun	Not commissioned yet		
	400KV Kashipur (220kv side)	Available but Non operational	Revised date not received	Work is under process.
	220kv Haldwani	Not Available	31 December 2024	It has been Taken in Budget for FY 2023-24.
	220kv Pantnagar	Available but Non operational	Revised date not received	Work is under process.
	220kv Rishikesh	Available but Non operational	31 December 2024	It has been Taken in Budget for FY 2023-24.
	220kv Chamba	Not commissioned yet	31 December 2024	It has been Taken in Budget for FY 2023-24.
Haryana	220kv Badshahpur	Commissioned	-	Commissioned on 20.02.2023
	220kv Sec-52A Gurugram	Not Commissioned	31.05.2026	Panel has been installed. Commissioning pending due to non- availability of shutdown and some pending wiring work.
	220kv Sec-1 IMT Manesar	Commissioned	-	Commissioned on 26.02.2023
	220kv Panchgaon	Commissioned	-	Commissioned on 05.01.2024
	220kv Rewari	Not Commissioned	31.10.2026	Material received at site. The work for installation, erection & wiring of 220KV C&R Panel for Bus Bar Protection is to be carried out.
	220kv Narnaul	Commissioned	-	Commissioned on 25.02.2025
	220kv Mahendargarh	Commissioned	-	Commissioned on 28.08.2023
	220kv Palwal	Not Commissioned	31.10.2026	Panel has been installed. Commissioning is pending for want of control cables.
	220kv Rangala Rajpur	Commissioned	-	Commissioned on dated 22.06.2023
	220KV Unispur Make: Siemens	Installed but not operational	30.09.2026	2 Nos. Peripheral relay of bus bar protection are defective. The same shall be made operational by 30.09.2026.
	220kv Nissing Make: ER	Installed and operational	-	220kv Busbar Protection scheme was successfully commissioned on 02.06.2025 at 220kv S/stn. Nissing.
	220KV Pehowa Make: ER	Not operational	31.12.2026	Old & Obsolete. Allocation of new BBP and allied material awaited.
	220KV Kaithal	Installed and operational	-	220kv Busbar Protection scheme was successfully commissioned on 15.01.2025 at 220kv S/stn. Kaithal
	220 KV Sonipat	Installed and operational	-	220kv Busbar Protection scheme was successfully commissioned on 23.05.2025 at 220kv S/stn. Sonipat.
	220KV RGEC Sonipat	Installed and operational	-	220kv Busbar Protection scheme was successfully commissioned on 07.04.2025 at 220kv S/stn. RGEC Sonipat
	220kv Jind	Commissioned	-	Commissioned on dated 27.06.2023
	220kv Fatehabad	Commissioned	-	Commissioned on dated 22.07.2023
	220kv Hukumawali	Installed but Non-Operational	30.04.2026	Bus bar protection relay is non-operational for which matter is being taken up with the firm.
	220kv Bhuna	Installed but not operational	30.04.2026	Busbar protection is out of service due to pending integration work of 160 MVA Transformer commissioned recently, wiring work is completed and integration work will be completed till 15.04.2026 The matter has been taken up with firm.
	220kv Sirsa	Not Commissioned	-	Not required being radial.
220kv Rania	Commissioned	27.02.2025	Commissioned on dated 27.02.2025	
220kv Bhiwani	Not Commissioned	31.05.2026	Bus Bar Panel has been drawn from store of the Nigam. 220kv Bus Coupler bay is not available at the S/Stn. for which work order to be issued to the firm and the work will be executed post completion of the bus coupler bay on priority.	
220KV Tepla Make: Siemens	Commissioned	--	Made operational on dated 23.06.2025	
220KV Rajokheri Make: ZIV	Commissioned	--	Made operational on dated 30.05.2024.	
BBMB	220kv Charkhi Dadri	Installed and Operational		commissioned on 31.01.2023
	220kv Samaypur	Installed and Operational		made operational on 23.12.2023
	220kv Dhulkote	Not Installed		Not feasible
	220kv Jagadhari	Not Installed		
	220kv Barnala	Not Installed		
	220kv Partapur	Installed and Operational		made operational on 06.01.2023
	220kv Pilibhit	Installed and Operational		commissioned on 28.10.2023
	220kv Amariya	Installed and Operational		commissioned on 15th July 2023
	220kv Sultanpur	Installed and Operational		commissioned on 02.03.2024. Mostly operational. Minor cable issue of isolator status .
	220kv New Tanda	Installed and Operational		commissioned on 20.04.2024
	220kv IITGNL	Installed and Operational		made operational on 19.02.2023
	220kv Barahua	Installed and Operational		made operational on 28.01.2024
	220kv Bansi	Installed and Operational		commissioned on 10th August 2023
	220 KV S/S Azamgarh-2(Bargahan)	Installed and Operational		made operational on 28.01.2024
	220kv Chandausi	Installed and Operational		made operational on 13.10.2023
	220KV Sec. - 148, Noida	Installed but Non-Operational		Requirement of Busbar Protection sent
	220kv sec.-62, Noida	Installed and Operational		made operational on 12.10.2023
	220kv Dadri	Installed and Operational		made operational on 23.04.2024

UP

400kV S/S Agra	Installed and Operational		commissioned on 13th September 2023
220kV S/S Farrukhabad (New)	Installed and Operational		commissioned on 25th August 2023
220kV Boner	Installed and Operational		commissioned on 19.03.2024
220kV Kasganj (Sorone)	Installed and Operational		
220kV Lalitpur	Installed and Operational		commissioned on 09.02.2024
220kV substation Fatehpur	Installed and Operational		Operational
220kV Hardoi Road, Lucknow	Installed and Operational		commissioned on 08th October 2023
400 KV Substation Sarnath	Installed and Operational		
220kV S/S Raja ka Talab	Installed and Operational		Commissioned on 30.04.2024
220kV S/S Mirzapur	Installed and Operational		Commissioned on 17.07.2024
400 KV Gorakhpur	Installed and Operational		Commissioning awaited
220 KV Gorakhpur	Installed and Operational		
220kV Parichha	Installed but Non-Operational	Revised date not received	
220kV Bareilly (400/220kV Bareilly)	Installed but Non-Operational	Revised date not received	Arrange of control cable is being done
220kV Shahjhanpur	Installed and Operational		
220kV Ajjipur	Installed but Non-Operational		S/S is under construction. Working agency has been instructed to install the BUS BAR Protection, expected to be completed by June-26
220kV Nirpura	Installed but Non-Operational	Revised date not received	
220kV Rampur	Installed but Non-Operational	Revised date not received	
220kV Rasara	Not Installed		
220kV Rampur	Installed and Operational		Main unit keypad and HMI unit sometimes hangs, peripheral units are working
220kV sec. 38A, Botanic Garden	Installed but Non-Operational	Revised date not received	Panel received but not yet commissioned
220kV S/S Bah	Not Installed		Requirement sent to design circle.
220kV Sirsaganj	Not Installed		Requirement sent to design circle.
220kV Khair	Installed but Non-Operational		PU has been received & Installation work in progress.
220kV Kidwainagar	Installed but Non-Operational		
220kV Chhata	Installed and Operational		160 MVA TF-3 is Configured with bus bar protection
220kV Harduaganj	Installed but Non-Operational	Revised date not received	
220kV Khorabar	Installed but Non-Operational	Revised date not received	
220kV Phoolbagh	Not Installed		
220kV Mahoba	Installed but Non-Operational		Approval for the rectification is in progress vide office comp no 101343 dated 20.02.2026
220kV Sarnath	Installed and Operational		
220kV Sirathu, Kaushambi	Installed and Operational		
220kV S/S Bhelupur	Not Required		New Bus bar Protection panel received on Dated 18.12.2025. For Commissioning M/s CTR, has informed that team will arrive within three days at site.
220kV CG City, Lucknow	Installed and Operational		
220kV Barabanki	Installed but Non-Operational	Revised date not received	Panel is obsolete. Requirement of new panels have been submitted to SE ESDC-I, UPPTCL, Lucknow 1360 dt 23.09.2025 and 2907 dt 30.10.2025
220kV Kursi Road, Lucknow	Installed but Non-Operational		Panel is obsolete. Requirement of new panels have been submitted to SE ESDC-I, UPPTCL, Lucknow 1360 dt 23.09.2025 and 2907 dt 30.10.2025
220kV BKT, Lucknow	Installed but Non-Operational	Revised date not received	Panel is obsolete. Requirement of new panels have been submitted to SE ESDC-I, UPPTCL, Lucknow 1360 dt 23.09.2025 and 2907 dt 30.10.2025
220kV Gomti Nagar, Lucknow	Installed and Operational		
20kV S/S Harahua	Installed but Non-Operational	28-Feb-25	Busbar Protection is to be commissioned, for which case is being prepared and moved for approval to invite tender.
220kV Rewa Road	Installed and Operational		
220kV S/S Sahupuri	Installed but Non-Operational	28-Feb-25	New Bus bar Protection panel received on 19.12.2025. For Commissioning, L.N. 1341/ETD(S) Dated 31.12.2025 and L.N. 175/ETD(S) Dated 09.03.2026 written to M/s CTR for early commissioning. M/s CTR has informed that team will arrive within a week at site.
220 KV Deoria	Installed and Operational		
220 KV Gopala Mahrajganj	Installed and Operational		
220 KV Hata	Installed and Operational		
220 KV Karkhi Anand Nagar	Installed and Operational		
220 KV Gola	Installed and Operational		
400 KV Azamgarh	Installed and Operational		
400/132 KV Kasara, Mau	Installed and Operational		
400 KV Rasara Ballia	Installed and Operational		
400 KV Rasara Ballia	Installed and Operational		
220 KV Azamgarh -1	Installed and Operational		
400KV Basti	Installed and Operational		
220KV Basti	Installed and Operational		
220KV Dulhipaar	Installed and Operational		
220KV Hardoi Road	Installed and Operational		
220 KV Bachhrawan	Installed and Operational		
220kV Amethi	Installed and Operational		
220 KV Dahi Chowki, Unnao	Installed and Operational		
220 KV Trans Ganga City, Unnao	Installed and Operational		
220kV Behat	Installed but Non-Operational		Requirement of Busbar Protection sent to HQ
220kV Robertganj	Installed and partillay operational	31.01.2025	New panel has been received. Concerned firm service engineer is awaited for installation
220kV Chamba	Installed and Operational		commissioned in Jan-2024
220kV MattaSidh	Installed but Non-Operational		
220kV kangoo	Installed but Non-Operational	31.12.2024	Work in under progress, issues are being taken up with ABB
220kV Nangal	Installed but Non-Operational		
220kV Katha Baddi	Installed but Non-Operational		
220 KV S/S Kotlisurat Malhi	Not Installed		
220 KV S/S Maur	Not Installed		

HP

Punjab	220 KV S/S Science city	Not installed	Dec-24	Commissioning is in process. Material has arrived, commissioning shall be done as per shutdown availability.	
	220 KV S/S Banga	Not installed			
	220 KV S/S Hoshiarpur	Not Installed			
	220 KV S/S Goraya	Not Installed			
	220 KV S/S Bhawanigarh	Installed and Operational			Commissioned
	220 KV S/S Badhni kalan	Installed and Operational			Commissioned
Rajasthan	220 KV S/S Bhari	Installed and Operational		Commissioned	
	220KV GSS Dooni	Installed and Operational		commissioned	
	220KV GSS Bhawanimandi	Installed and Operational		commissioned	
	220 KV GSS Sakatpura, Kota	Installed and Operational		commissioned on 09.07.2024	
	220 kV GSS, Beawar	Installed and Operational		commissioned	
	220 KV GSS Jethana	Installed and Operational		commissioned	
	220 KV GSS Bherunda	Installed and Operational		commissioned	
	220 KV GSS Kuchera	Installed and Operational		commissioned	
	220 KV GSS Reengus	Installed and Operational		commissioned	
	220 KV GSS Laxmangarh	Installed and Operational		Commissioned	
	220KV GSS Khetri Nagar	Installed and Operational		commissioned	
	400 KV GSS, Babai	Installed and Operational		commissioned	
	220 KV GSS Chittorgarh	Installed and Operational		commissioned	
	400 KV GSS BHILWARA(220 KV BUS)	Installed and Operational		commissioned	
	220 KV GSS MANDALGARH	Installed and Operational		commissioned	
	220KV GSS Debari	Installed and Operational		commissioned	
	220KV GSS Amberi	Installed and Operational		commissioned	
	220KV GSS Madri	Installed and Operational		commissioned	
	220 KV GSS Badisid	Installed and Operational		commissioned	
	220 KV GSS Pali	Installed and Operational		commissioned	
	220 KV GSS Balotra	Installed and Operational		commissioned	
	220 KV GSS Sayla	Installed and Operational		commissioned	
	220 KV GSS Ratangarh	Installed and Operational		commissioned	
	220 KV GSS Sujangarh	Installed and Operational		commissioned	
	220 KV GSS Halasar	Installed and Operational		commissioned	
	220 KV GSS Rawatsar	Installed and Operational		commissioned	
	220 KV GSS Tehandesar	Installed and Operational		commissioned	
	220 KV GSS Bhadla	Installed and Operational		commissioned	
	400 KV GSS Bikaner 400 KV BUS	Installed and Operational		commissioned	
	220 KV GSS Ramgarh	Installed and Operational		commissioned	
	400 KV GSS Surpura (Jodhpur) 220 KV	Installed and Operational		commissioned	
	400 KV GSS Akal (Jaisalmer) 220 KV	Installed and Operational		commissioned	
	220 KV GSS Jodhpur	Installed and Operational		commissioned	
	220 KV GSS NPH Jodhpur	Not installed	Revised date not received	Case file moved	
	220 KV GSS Kuchaman City	Installed and Operational		commissioned	
	400 KV GSS Ajmer (220 KV BUS)	Installed and Operational		commissioned	
	765 KV GSS Phagi	Installed and Operational		commissioned	
	220 KV GSS Vatika	Not installed	Revised date not received	As M/s ER did not finished the project, so it was awarded to M/s Kaycee infra on risk-cost basis , however the bus bar scheme has not been commissioned yet. Matter has been taken up with firm	
	220 kV GSS Niwana	Installed and Operational		commissioned	
	220 kV GSS Alwar	Installed and Operational		commissioned	
220 kV GSS Bansur	Installed and Operational		commissioned		
220 kV GSS Behror	Installed and Operational		commissioned		
220KV GSS Hindaun	Installed and Operational		commissioned		

Status of Mock Test of SPS in NR during 2026-27

Sr. No.	Scheme Name	Owner / Agency	Mock testing conducted before 2026-27	Tentative Schedule of SPS Mock testing to be conducted during 2026-27	Date of SPS Mock testing conducted during 2026-27	Remarks
1	SPS for WR-NR corridor - 765kV Agra-Gwalior D/C	POWERGRID	10.10.2025			Communication issue at Bhiwadi(PG), Bamnauli(DTL), Kota, Debari, Chittorgarh, Ratangarh, Nunamajra, Safidon, Ajitwal, Dandhari-II, Ablowal.
2	SPS for contingency due to tripping of HVDC Mundra-Mahendergarh	ADANI	11.03.2026			As reported by ADANI, scheme has been made ready to be taken into service. During the testing, communication links were found to be healthy.
3	SPS for high capacity 400 kV Muzaffarpur-Gorakhpur D/C Inter-regional tie-line related contingency	POWERGRID	NA	SPS Under Review		Not conducted in 2024-25 also. NRLDC Studies team advised to disable the same. NLDC input awaited.
4	SPS for 1500 MW HVDC Rihand-Dadri Bipole related contingency	POWERGRID	19.11.2025			SPS command didn't receive at 220kV Muradnagar(UP), 220kV Merta(RS), 220kV Kota Sakatpura(RS), 220kV Dhanonda(HR) and Singrauli TPS(NTPC)
5	System Protection Scheme (SPS) for HVDC Balia-Bhiwadi Bipole	POWERGRID	NA	SPS Under Review		
6	SPS for reliable evacuation of power from NJPS, Rampur, Sawra Kuddu, Baspa Sorang and Karcham Wangtoo HEP	SJVN/HPPTCL/JSW/POWERGRID/SORANG	04.09.2025			Case-6(i) & (ii) has been implemented (as confirmed by Karcham(JSW) via mail dated 08.12.2025). Communication card issue at Wangtoo(HP) resolved
7	SPS for Reliable Evacuation of Rosa Generation	UPPTCL	12-04-2025			SPS revised in 239th OCC (Jan'26)
8	SPS for evacuation of Kawai TPS, Kalisindh TPS generation complex	RVPNL	26-04-2025 & 18.08.2025			As informed by RVPNL, automatic load shedding part of the SPS has been implemented and mock tested.
9	SPS for evacuation of Anpara Generation Complex	UPPTCL	21-07-2025			
10	SPS for evacuation of Lalitpur TPS Generation	UPPTCL	09-04-2025			
11	SPS for Reliable Evacuation of Bara TPS Generation	UPPTCL	23-05-2025			
12	SPS for Lahal Generation	HPPTCL	NA	SPS Under Review		
13	SPS for Transformers at Maharaniabagh (PG) substation	POWERGRID		conducted	Apr-25	Mock test report received
14	SPS for Transformers at Mandola (PG) substation	POWERGRID	25.04.2026			
15	SPS for Transformers at Bamnauli (DTL) Substation	DTL	19-01-2026			N-1 compliant (To be removed). As reported by SLDC Delhi, scheme may be kept in service until 315 MVA ICT is revived which currently is not in service
16	SPS for Transformers at Moradabad (UPPTCL) Substation	UPPTCL	02-04-2025			
17	SPS for Transformers at Muradnagar (UPPTCL) Substation	UPPTCL	27-03-2025	Mar-26		
18	SPS for Transformers at Agra (UPPTCL) Substation	UPPTCL	21-03-2025	Mar-26		

19	SPS for Transformers at 400kV Sarojininagar (UPPTCL) Substation	UPPTCL	23-07-2025			
20	SPS for Transformers at 220kV Sarojininagar (UPPTCL) Substation	UPPTCL	23-07-2025			
21	SPS for Transformers at 400kV Unnao (UPPTCL) Substation	UPPTCL	27.05.2025			SPS made healthy on 27.05.2025
22	SPS for Transformers at 400kV Sultanpur (UPPTCL) Substation	UPPTCL		Mar-26		As reported by SLDC UP, scheme is required as loading exceeded (N-1) limit during summer of 2025
23	SPS for Transformers at 400kV Bareilly (UPPTCL) Substation	UPPTCL		Revised SPS approved in 234 OCC (Aug25)		SPS yet to be implemented
24	SPS for Transformers at 400kV Azamgarh (UPPTCL) Substation	UPPTCL	19-04-2025			
25	SPS for Transformers at 400kV Mau (UPPTCL) Substation	UPPTCL	21-04-2025			
26	SPS for Transformers at 400kV Gorakhpur (UPPTCL) Substation	UPPTCL	21-04-2025			As reported by SLDC UP, scheme is required as loading exceeded (N-1) limit during summer of 2025
27	SPS for Transformers at 400kV Sarnath (UPPTCL) Substation	UPPTCL	01-04-2025			
28	SPS for Transformer at 400kV Rajpura (PSTCL) Substation	PSTCL	31-01-2025	Mar-26		
29	SPS for Transformers at 400kV Mundka (DTL) Substation	DTL	29-01-2026			
30	SPS for Transformers at 400kV Deepalpur (JKTPL) Substation	HVPNL	08-05-2025			
31	SPS for Transformers at 400kV Ajmer (RVPN) Substation	RVPNL	20-08-2025			
32	SPS for Transformers at 400kV Merta (RVPN) Substation	RVPNL	09-09-2025			
33	SPS for Transformers at 400kV Chittorgarh (RVPN) Substation	RVPNL	11-09-2025 & 12-09-2025			
34	SPS for Transformers at 400kV Jodhpur (RVPN) Substation	RVPNL	24-09-2024	conducted	Date need to be shared	
35	SPS for Transformers at 400kV Bhadla (RVPN) Substation	RVPNL	27-09-2025			
36	SPS for Transformers at 400kV Ratangarh (RVPN) Substation	RVPNL	25-09-2025			
37	SPS for Transformers at 400kV Nehtaur(WUPPTCL) Substation	UPPTCL	11-01-2025	Mar-26		SPS implemented in BCU. Shutdown required for mock testing.
38	SPS for Transformers at Obra TPS	UPPTCL	20-05-2024	NA		ICTs failed during fire incident, Mock test will be conducted after revival of ICT
39	SPS for Transformers at 400KV Kashipur (PTCUL) substation	PTCUL	05-10-2025	conducted	05-10-2025	
40	SPS for Transformers at 400KV Fatehgarh Solar Park (AREPRL)	ADANI	19-04-2025	conducted	19-04-2025	
41	SPS to relive transmission congestion in RE complex (Bhadla2)	POWERGRID	26-08-2025	conducted	26-08-2025	
42	SPS for Transformers at 400kV Bikaner (RVPN) Substation	RVPNL	13-09-2025 & 17-09-2025	conducted	13-09-2025 & 17-09-2025	
43	SPS for Transformers at 400kV Bawana (DTL) Substation	DTL	04-01-2025	Feb-26		Not required currently as submitted by SLDC Delhi
44	SPS for Transformers at 400kV Bhilwara (RVPN) Substation	RVPNL	19-09-2025 & 23-09-2025			
45	SPS for Transformers at 400kV Hindaun (RVPN) Substation	RVPNL	11-09-2025			
46	SPS for Transformers at 400kV Suratgarh (RVPN) Substation	RVPNL	20-10-2024	Dec-25		
47	SPS for Transformers at 400kV Babai(RS) Substation	RVPNL	07-08-2025			
48	SPS for Transformers at 400kV Allahabad(PG) Substation	UPPTCL	29-12-2025 (Real time operation)			

49	SPS for Transformers at 400kV Jaunpur(UP) Substation	UPPTCL		Mar-26	Scheduled on 20-03-2026	Implemented on 08.10.2025
50	SPS for Transformers at 765kV Jhatikara(PG) Substation (Bamnauli section)	POWERGRID		conducted	Jun-25	Mock test report received.
	SPS for Transformers at 765kV Jhatikara(PG) Substation (Mundka section)			conducted	Jun-25	
51	SPS for Transformers at 765kV Bhiwani(PG) Substation	POWERGRID		SPS implemented		Mock test report received.
52	SPS for Transformers at 400kV Panki (UPPTCL) Substation	UPPTCL		Approved in 234 OCC (Aug'25)		Expected to be implemented by Mar-26
53	SPS for Transformers at 400kV Agra(PG) Substation	POWERGRID/UPPTCL		Approved in 234 OCC (Aug'25)		Implemented (date yet to be shared)
54	SPS for Transformers at 400kV Jaipur South(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)		Yet to be implemented (During 66th PSC, POWERGRID informed that SPS is not required, SLDC Rajasthan confirmed the same)
55	SPS for Transformers at 400kV Bassi(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)		Yet to be implemented
56	SPS for Transformers at 400kV Kankroli(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)		Yet to be implemented
57	SPS for Transformers at 400kV Kotputli(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)		Yet to be implemented
58	SPS for Transformers at 400kV Neemrana(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)	24.02.2026 & 27.02.2026	Implemented. Mock test report received.
59	SPS for Transformers at 400kV Bhiwadi(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)	16.03.2026	implemented. Mock test report received.
60	SPS for Transformers at 400kV Sikar(PG) Substation	POWERGRID/RVP NL		Approved in 237 OCC (Nov'25)		Yet to be implemented
61	SPS for Transformers at 400kV Hissar(PG) Substation	POWERGRID/HV PNL		Approved in 237 OCC (Nov'25)		Implemented on 18.04.2026
62	SPS of HVDC Champa-Kurukshetra	POWERGRID		Approved in 240 OCC (Feb'26)		Implemented on 07.05.2026
63	SPS for Transformers at 400kV Lucknow(PG) Substation	POWERGRID/UPPTCL		Approved in 239 OCC (Feb'26)		Yet to be implemented

Load Group details of HVDC Mundra-Mahindergarh SPS

S. No.	State/ L.S. quantum	Name of feeding substation	Feeder/ line/ equipment	MW (as per details available)	Revised updated MW	Case-1 300MW	Case-2 600MW	Case-3 1400MW	Case-4 2000MW	Remarks	
1	Rajasthan	220/132kV Alwar	132kV Mandawar	25		1	1	1	1	Radial	
2			132kV Bansoor	45			1	1	1		
3			132kV Ramgarh	14			1	1	1		
4			132kV Malakheda	10				1	1		
5			132kV Alwar(local load)	50					1		
6		Case-1: 50MW	220/132kV Ratangarh	132kV Sardar Shahar	26		1	1	1	1	Radial
7		Case-2: 100MW	220/132kV Bhilwara	132kV Gangapur	20				1	1	Radial
8		Case-3: 200MW		132kV Danta	15				1	1	
9		Case-4: 300MW		132kV Devgarh	10				1	1	
10				132kV Kareda	10				1	1	
11			220/132kV Merta	132kV Kuchera	35				1	1	Lamaba and Gotan may be removed (cement plant load). Merta road and Roon feeders may be incorporated.
12				132kV Lamaba	25					1	
13				132kV Gotan	25					1	
14	Haryana	400/220kV Bhiwani_BBMB	220kV Bapora D/C	65+65				1	1	Bapora is also connected from Bhiwani(PG). Either ICTs at Bapora OR Bhiwani(PG)-Bapora D/C need to be incorporated in SPS	
15		Case-1: 150MW	400/220kV Hissar_PG	220kV Isharwal D/C	40+35				1	1	Isherwal is also connected from Bhiwani(PG). Either ICTs at Isherwal OR Bhiwani(PG)-Isherwal D/C need to be incorporated in SPS
16		Case-2: 300MW	400/220kV Dhanonda through 220kV Lula Ahir	220kV Rewari D/C (3x100MVA)	95+90		1	1	1	1	Rewari is being mostly fed from Bhiwadi(PG). Lulahir is also connected with 220kV Dadri. Therefore, 220kV Dadri Lulahir also need to be incorporated in SPS.
17		Case-3: 600MW		400/220kV Bahadurgarh	220kV Nuna Majra D/C (3x100MVA)	80+80			1	1	1
18	Case-4: 700MW	132kV Charkhi Dadri	132kV Kalanaur	50				1	1	Radial	
19	Punjab	220/66kV Gobindgarh	66kV Talwara-1	35				1	1	Radial	
20			66kV Talwara-2	35					1		
21		220/66kV Laltokalan	66kV Gill Road-1	50				1	1	Radial	
22			66kV Gill Road-2	50		1	1	1	1		
23		Case-1: 50MW	220/66kV Malerkotla	66kV Dugri	65				1	1	Non radial; alternate source also need to be incorporated in SPS.
24		Case-2: 100MW		66kV Malerkotla	35					1	Radial
25		Case-3: 200MW		66kV Lasoi Amargarh	45					1	
26		Case-4: 300MW		66kV Malaud	20						Non radial; alternate source also need to be incorporated in SPS.
27			66kV Siarh	20						Radial	

28			Thana Bhagwan-1	25		1	1	1		Revised feeders which can be added: i) 220kV Khatauli ii) 132kV Jasala-I iii) 132kV Baraut-I iv) 132kV Lalukheri v) 132kV Budhana vi) 132kV Kairana
29	Uttar Pradesh		Thana Bhagwan-2	25		1	1	1		
30			Jasala-1	25			1	1		
31	Case-1: 50MW	Shamli	Jasala-2	25			1	1		
32	Case-2: 100MW		Kharad-1	50				1		
33	Case-3: 200MW		Kharad-2	50				1		
34	Case-4: 300MW		Baraut-1	150					1	
35			Baraut-2	150					1	
36	Delhi			100				1	1	Non radial; many times, Papankalan is being fed from Dwarka(PG) also. Therefore, 220kV Dwarka-Papankalan D/C feeders also need to be incorporated in SPS.
37	Case-1: 50MW	400/220kV Bamnauli	Papankalan1 ckt-1							
38	Case-2: 100MW			Papankalan1 ckt-2	100				1	1
39	Case-3: 200MW	400/220kV Mandola	Gopalpur-1	150				1	1	Radial
39	Case-4: 300MW			Gopalpur-2	150				1	

State Name	Defense Scheme	Planned Relief (MW)	Mapped Relief (MW)	No. of Main feeders Planned	No. of Main feeders Telemetered	No. of Alternate feeders Telemetered
UP	UFR	6486				
	df/dt	2561.92				
Rajasthan	UFR	4266				
	df/dt	776				
Punjab	UFR	3223				
	df/dt	1410				
Haryana	UFR	2931				
	df/dt	900				
Delhi	UFR	1668				
	df/dt	809.36				
HP	UFR	507				
	df/dt	190				

S.N.	Name of S/stn (including voltage level)	Name of feeder/transformer (including voltage level)	UFR Stage-wise Estimated Load relief (MW)			
			49.4 Hz	49.2 Hz	49.0 Hz	48.8 Hz

S.N.	Name of S/stn (including voltage level)	Name of feeder/transformer (including voltage level)	df/dt Stage-wise Estimated Load relief (MW)		
			49.9 Hz; 0.1Hz/s	49.9 Hz; 0.2Hz/s	49.9 Hz; 0.3Hz/s