BEFORE

THE CENTRAL ELECTRICITY REGULATORY COMMISSION,

NEW DELHI

PETITION NO. _____ OF 2024

IN THE MATTER OF

Application under Section-14 & 15 of the Electricity Act, 2003 read with Central Electricity Regulatory Commission (Procedure, Terms and Conditions for Grant of Transmission License and other related matters) Regulations, 2024 for Grant of separate Transmission License for Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme under Regulated Tariff Mechanism (RTM) route

AND IN THE MATTER OF

Khavda IVA Power Transmission Limited

.... Petitioner

Versus

Central Transmission Utility of India Limited and Ors.

.... Respondents

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Khavda IVA Power Transmission Limited

Petitioner

Place: Ahmedabad

Date: 09.12.2024

BEFORE

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....Respondents

MEMO OF PARTIES

Khavda IVA Power Transmission Limited

Having its registered office at;

C 105, Anand Niketan

New Delhi 110021 ..... Petitioner

Versus

1. Central Transmission Utility of India Limited

   Plot No, 2, Saudamini.

   Sector-29, Gurgaon,

   Haryana – 122002

2. Madhya Pradesh Power Management Company Limited (MPPMCL)

   Block No. -11, Ground Floor,

   Shakti Bhavan, Vidhyut Nagar, Rampur,

   Jabalpur - 482 008, Madhya Pradesh

3. Chhattisgarh State Power Distribution Company Limited (CSPDCL)

   P.O. Sunder Nagar, Dangania,

   Raipur - 492013, Chhattisgarh

4. Maharashtra state Electricity Distribution

   Company Limited (MSEDCL)

   Prakashgad, 4th Floor,

   Bandra (East), Mumbai - 400051

5. Gujarat Urja Vikas Nigam Limited (GUVNL)

Vidhyut Bhavan, Racecourse Road,

Vadodara - 390007

6. DNH Power Distribution Corporation Limited

   66 kV, Amii Ind. Estate,

   Silvasa - 396230 Dadar Nagar Haveli

7. Electricity Department, Government of Goa

   Vidyut Bhavan, Near Mandvi Hotel,

   Panaji, Goa - 403001

8. Dadra and Nagar Haveli and Daman and Diu

   Power Distribution Corporation Limited (DNHDDPDCL)

   1st & 2nd Floor, Vidyut Bhavan, Silvassa,

   DADRA & NAGAR HAVELI – 396230

.... Respondents

Khavda IVA Power Transmission Limited

Petitioner

Place: Ahmedabad
Date: 09.12.2024

BEFORE

THE CENTRAL ELECTRICITY REGULATORY COMMISSION,

NEW DELHI

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Application under Section-14 & 15 of the Electricity Act, 2003 read with Central Electricity Regulatory Commission (Procedure, Terms and Conditions for Grant of Transmission License and other related matters) Regulations, 2024 for Grant of separate Transmission License for Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme under Regulated Tariff Mechanism (RTM) route

AND IN THE MATTER OF

Khavda IVA Power Transmission Limited

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Versus

Central Transmission Utility of India Limited and Ors.

....Respondents

NOTARY VIJAY C. SHAH AHMEDABAD GUJARAT STATE REGD. 2259/02

Khavda IVA Power Transmission Limited

5

S. No. 9360 / 2024

VIJAY C. SHAH
NOTARY
GOVT. OF INDIA

AFFIDAVIT

- 9 DEC 2024

I, **Afak Pothiwala**, son of **Aminbhai Pothiwala, aged about 38 years, R/o F-1102, Al burooj, Near Empire Party Plot, Sarkhej, Ahmedabad – 380055** do hereby solemnly affirm and state on oath as under:

1. That I am the Authorised Representative, of the Petitioner, Khavda IVA Power Transmission Limited, and I am fully conversant with the facts and circumstances of the case, and I have been duly authorized and am, therefore, competent to affirm this affidavit.

2. That I have read the accompanying submissions being submitted on behalf of Khavda IVA Power Transmission Limited and have understood the contents thereof and that the contents therein are true and correct to the best of my knowledge and belief.

Khavda IVA Power Transmission Limited

DEPONENT

VERIFICATION

I, **Afak Pothiwala**, the above named deponent do hereby verify that the contents of this affidavit are true and correct to the best of my knowledge and belief, no part of it is false and nothing material has been concealed therefrom.

Verified by me on this 09th December, 2024, at Ahmedabad

Khavda IVA Power Transmission Limited

DEPONENT

NOTARIAL NOTARIAL NOTARIAL NOTARIAL NOTARIAL NOTARIAL NOTARIAL NOTARIAL

SOLEMNLY AFFIRMED
BEFORE ME

VIJAY C. SHAH
NOTARY
GOVT. OF INDIA

- 9 DEC 2024

BEFORE

THE CENTRAL ELECTRICITY REGULATORY COMMISSION,

NEW DELHI

PETITION NO. _____ OF 2024

IN THE MATTER OF

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AND IN THE MATTER OF

Khavda IVA Power Transmission Limited

.... Petitioner

Versus

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.... Respondents

PETITION / APPLICATION UNDER SECTION 14 & 15 OF THE ELECTRICITY ACT, 2003 FOR GRANT OF TRANSMISSION LICENSE

MOST RESPECTFULLY SHOWETH:

1. The present application is being filed by Khavda IVA Power Transmission Limited (herein after referred to as "Petitioner") under Section 14 of the Electricity Act, 2003 read with Central Electricity Regulatory Commission (Procedure, Terms and Conditions for Grant of Transmission License and other related matters) Regulations, 2024 for grant of separate Transmission License for Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme on RTM route.

2. It is most respectfully submitted that Ministry of Power, Government of India, vide Gazette Notification dated 29.08.2023 has notified REC Power Development and Consultancy Limited (RECPDCL) to be the Bid Process Coordinator (Hereinafter referred as "BPC") for the purpose of selection of Bidder as Transmission Service Provider (Hereinafter referred as "TSP") to establish below mentioned project through Tariff Based Competitive Bidding process on build, own, operate and maintain basis:

SN	Name of the Transmission Element
1	Creation of 765 kV bus section-II at KPS3 (GIS) along with 765 kV Bus Sectionaliser and 1x330 MVAR, 765 kV Bus Reactors on Bus Section-II Bus section - II shall be created at 765 kV and 400 kV level both with 3x1500 MVA, 765/400 kV ICTs at Bus Section-II
2	Creation of 400 kV bus Section-I I at KPS3 (GIS) along with 400 kV Bus Sectionaliser and 1x125 MVAR, 420 kV Bus Reactors on Bus Section-II and 3 Nos. 400 kV bays at Bus Section-II for RE interconnection.
3	KPS3 (GIS) - Lakadia (AIS) 765 kV D/C line
4	2 Nos. of 765 kV line bays each at KPS3 (GIS) and Lakadia (AIS) for KPS3 (GIS) - Lakadia (AIS) 765 kV D/C line
5	±300MVAR STATCOM with 1x125 MVAR MSC, 2x125 MVAR MSR at KPS3 400 kV Bus section-II
6	PS1 (GIS) - Bhuj PS 765 kV 2nd D/C line
7	2 Nos. of 765 kV line bays each at KPS1 (GIS) and Bhuj PS for KPS1 (GIS) - Bhuj PS 765 kV D/C Line
8	330 MVAR switchable line reactors at KPS3 end of KPS3 (GIS) -Lakadia 765 kV D/C line (with NGR bypass arrangement)

Note:

i) Bay(s) required for completion of diameter (GIS) in one-and-half breaker scheme, shall also be executed by TSP

ii) TSP ofKPS3 shall provide space for work envisaged at SI. 1, 2, 4 and 8.

iii) The TSP of the present scheme shall arrange for additional land for installation of STATCOM (with MSC/MSR) as specified at Sl.

Khavda IVA Power Transmission Limited

No.5 at KPS3 and TSP of KPS3 shall provide space for 1 No. 400 kV bay for termination of STATCOM.

3. Thereafter, a Company under the Companies Act 2013 by the name "Khavda IVA Power Transmission Limited" having its registered office at C 105, Anand Niketan, New Delhi, 110021 has been incorporated on 31.10.2023 by REC POWER DEVELOPMENT AND CONSULTANCY LIMITED (Bid Process Coordinator) as its 100% wholly owned subsidiary to initiate the activities for execution of the Project and subsequently to act as Transmission Service Provider after being acquired by the successful bidder selected through Tariff Based Competitive Bidding process.

4. Subsequently, BPC initiated the process for selection of the successful bidder to acquire the TSP in accordance with the "Tariff Based Competitive Bidding Guidelines for Transmission Service" and "Guidelines for Encouraging Competition in Development of Transmission Projects" issued by Government of India, Ministry of Power under section - 63 of The Electricity Act, 2003 and as amended from time to time. Subsequent to the process of competitive bidding conducted by the BPC, M/s. Adani Energy Solutions Limited (AESL) had been declared as the successful bidder. The Letter of Intent dated 7th August, 2024 was issued to M/s. Adani Energy Solutions Limited (AESL) by the BPC.

Khavda IVA Power Transmission Limited

5. Thereafter in accordance with the RFP documents, Adani Energy Solutions Limited (AESL) on 30th August, 2024 acquired Khavda IVA Power Transmission Limited, after execution of the Share Purchase Agreement and completing all procedural requirements specified.

6. Subsequently, Petition No. 338/TL/2024 has been filed by the Khavda IVA Power Transmission Limited before this Hon'ble Commission for grant of Transmission License. The said Petition was heard on 28.10.2024 wherein commission reserved the matter for order.

7. In addition to above scope of work, National Committee on Transmission (NCT), vide its Minutes of the 24th Meeting dated 23.10.2024, notified Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme under Regulated Tariff Mechanism (RTM) and allocated to Khavda IVA Power Transmission Limited in line with the MoP office order dated 28.10.2021. The MoP office order dated 28.10.2021 was issued with reference to the Re-constitution of the National Committee on Transmission (NCT) and Terms of Reference of NCT. The Terms of Reference of the NCT as specified in the order is as under:

> *"viii. The NCT shall recommend to Ministry of Power (MoP) for implementation of the ISTS for projects with cost more than Rs 500 crore, along with their mode of implementation i.e. Tariff Based Competitive Bidding (TBCB) / Regulated Tariff Mechanism (RTM), as per the existing Tariff Policy.* ***However, the NCT shall approve the ISTS costing between Rs 100 crore to Rs.500 crore or such limit***

as prescribed by MoP from time to time, along with their mode of implementation under intimation to MoP. *The ISTS costing less than or equal to Rs. 100 crores, or such limit as prescribed by MoP from time to time, will be approved by the CTU along with their mode of implementation under intimation to the NCT and MoP. After approval of the ISTS by the NCT or the CTU (as the case may be), the TBCB project shall be allocated to Bid Process Coordinators through Gazette Notification, while the RTM project shall be allocated to CTU."*

8. In the above background, NCT approved the Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme under Regulated Tariff Mechanism (RTM) by Khavda IV A Power Transmission Limited. The copies of NCT Minutes of the 24th Meeting dated 23.10.2024 and MoP office order 28.10.2021 are enclosed as **Annexure - 1** and **Annexure – 2** respectively.

The Scope of the Project for Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme is as follows:

SN	**Name of the scheme and Implementation timeframe**	**Estimated Cost (₹ Crores)**	**Remark**
1	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme Tentative Implementation timeframe: 24 months	252	Approved to be implemented under RTM by Khavda IV A Power Transmission Limited

Detailed scope of the Scheme is given below:

SN	Scope of the Transmission Scheme	Capacity/ km
1	Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 No. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	• 765/400 kV ICT – 1 (1x1500 MVA) • 765 kV ICT bay – 1 (+1 no. bay for dia completion with Switchable Line Reactor (SLR) provision in future bay) on Bus section-II • 400 kV ICT bay – 1 (+ 1 no. bay for dia completion and termination of the proposed Line for RE interconnection) on Bus section-II
2	1 Nos. 400 kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	400 kV line bays – 1 no. (+ 1 no. bay for dia completion with the provision to terminate future 400/220 kV ICT)
Note: TSP of KPS3 (GIS) shall provide space for above scope of work.		

9. Chief Engineer & Member Secretary (NCT), vide its letter dated 22.11.2024, requested Central Transmission Utility of India Limited (CTUIL) to take necessary action for implementation of the above scheme. A copy of letter dated 22.11.2024 is attached as **Annexure – 3**.

10. Thereafter, CTUIL, vide its letter dated 25.11.2024, requested the Petitioner to initiate the necessary actions for implementation of the aforementioned transmission scheme. A copy of letter dated 25.11.2024 is attached as **Annexure – 4.**

11. It is humbly submitted that Section-14 of the Electricity Act, 2003 provides that the Appropriate Commission may, on an application made under Section-15 of the Electricity Act, 2003, grant Licence to any person to transmit electricity as a transmission licensee in any area as may be specified in the Licence. The word 'person' has been defined in Section 2(49) of the Act to include any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person. Therefore, the Petitioner under Section 14 of the Electricity Act, 2003 is filing the present Petition/Application inter-alia seeking grant of Transmission Licence for the Project as explained above.

12. The Hon'ble Commission in its CERC (Procedure, Terms & Conditions for grant of Transmission Licence and other related matters) Regulations, 2024 had prescribed the form of Application and the amount of fee for making an Application for a Transmission Licence. Accordingly, the Petitioner is submitting herewith the Application in such prescribed format along with the fees as per Regulation 5(1) of the said Regulation. Copy of duly filled

Form-I of Khavda IV A Power Transmission Limited is enclosed herewith and marked as **Annexure – 5**.

13. It is most respectfully submitted that the copy of the Application for grant of Transmission Licence is being forwarded to each of the Respondents as per Regulation 5(3) of CERC (Procedure, Terms and Conditions of Transmission Licence and other related matters) Regulations, 2024.

14. It is further submitted that the Petitioner is submitting/furnishing a copy of the instant Application to Central Transmission Utility, as required under Section 15(3) of the Act and Regulation 5(3) of CERC (Procedure, Terms and Conditions of Transmission Licence and other related matters) Regulations, 2024 for the recommendation, if any, in accordance with Section 15(4) simultaneously along with submission of this petition to Hon'ble Commission.

15. The Petitioner has posted the Application for grant of Transmission Licence on the website www.adanienergysolutions.com as required under Regulation 5(4) of CERC (Procedure, Terms and Conditions of Transmission Licence and other related matters) Regulations, 2024 so as to facilitate the access to the Application by any person through internet. The petitioner shall publish a notice of its application in Form II prescribed under Regulation 5(5) of CERC (Procedure, Terms and Conditions of Transmission Licence and other related matters) Regulations, 2024 for

inviting comments from general public. This notice shall also be uploaded on website of the petitioner.

16. Keeping in view of the above, the Petitioner fulfils the eligibility criteria for grant of transmission licence as stipulated in Central Electricity Regulatory Commission (Procedure, Terms and Conditions for grant of Transmission Licence and other related matters) Regulations, 2024 and therefore the Hon'ble Commission may be pleased to grant the license as prayed for.

17. The Petitioner shall also comply with all the other requirements as provided in the Transmission License Regulations including posting the public notice in Form-II on its website, service on the beneficiaries of the Petitioner's Transmission System. The Petitioner shall place the compliance report on record before the Hon'ble Commission.

18. On completion of the Project, the Applicant shall approach the Hon'ble Commission with the actual cost incurred for determination of transmission charges in accordance with Section 61, 62 of the Electricity Act, 2003.

19. **PRAYER**

The Petitioner hereby humbly prays the Hon'ble Commission to:

a) Grant Separate Transmission Licence to the Applicant for implementation of "Augmentation of transformation capacity at KPS3

(GIS) S/s under Khavda Phase – V Part B3 Scheme" under Regulated Tariff Mechanism (RTM) with detailed scope as per para 8.

b) Allow the Applicant liberty to approach the Hon'ble Commission for determination of transmission charges for the additional scope of work in the proposed Transmission license in this petition in accordance with Section 61, 62 of the Electricity Act, 2003.

c) Condone any inadvertent errors omissions/ errors / shortcomings and permit the Petitioner to add/change/modify/alter these filings and make further submissions as may be required at a future date.

d) Pass any such other order / orders, as may be deemed fit and proper in the facts and circumstances of the case.

Petitioner

Place: Ahmedabad

Date: 09.12.2024

CEA-PS-12-13/3/2019-PSPA-II Division

I/44640/2024

Annexure 1

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केंद्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग- II
Power System Planning & Appraisal Division-II

सेवा में /To

As per list of Addresses

विषय: ट्रांसमिशन पर राष्ट्रीय समिति (एनसीटी) की चौबीसवीं बैठक के कार्यवृत – के सम्बन्ध में ।

Subject: Minutes of the 24th Meeting of National Committee on Transmission (NCT) – regarding.

महोदया (Madam) / महोदय (Sir),

The 24th meeting of the National Committee on Transmission (NCT) was held on 23rd October, 2024, at CEA, New Delhi. Minutes of the meeting are enclosed herewith.

भवदीय/Yours faithfully,

22.11.2024

(बी.एस.बैरवा/ B.S. Bairwa)
मुख्य अभियन्ता (इंचार्ज) एवं सदस्य सचिव,एन.सी.टी./
Chief Engineer (I/C) & Member Secretary (NCT)

प्रतिलिपि / Copy to:

Joint Secretary (Trans), Ministry of Power, New Delhi-110001

सेवा भवन, आर. के पुरम-I, नई दिल्ली-110066 **टेलीफोन**: 011-26732325 **ईमेल**: cea-pspa2@gov.in वेबसाइट: www.cea.nic.in
Sewa Bhawan, R.K Puram-I, New Delhi-110066 **Telephone**: 011-26732325, **Email**: cea-pspa2@gov.in **Website**: www.cea.nic.in

List of Addresses:

1.	Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	2.	Member (Power Systems), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.
3.	Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	4.	Director (Trans), Ministry of Power Shram Shakti Bhawan, New Delhi-110001.
5.	Sh. Lalit Bohra, Joint Secretary Room no 602, Atal Akshay Urja Bhawan Opposite CGO Complex, Gate No. 2, Lodhi Road, New Delhi – 110003	6.	Chief Operating Officer, CTUIL, Floors No. 5-10, Tower 1, Plot No. 16, IRCON International Tower, Institutional Area, Sector 32, Gurugram, Haryana - 122001.
7.	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog, Parliament Street, New Delhi – 110 001.	8.	CMD, Grid Controller of India, B-9 (1st Floor), Qutub Institutional Area, Katwaria Sarai, New Delhi – 110016
9.	Sh. Ravinder Gupta Ex. Chief Engineer CEA		

Table of Agenda

Minutes of the 24th meeting of National Committee on Transmission (NCT)

The 24th meeting of NCT was held on 23rd October, 2024 at CEA, New Delhi. List of participants is enclosed at **Annexure-I**. Agenda wise deliberations are given below:

1 Confirmation of the minutes of the 22nd and 23rd meeting of National Committee on Transmission.

1.1 The minutes of the 22nd meeting of NCT held on 23.08.2024 were issued on 01.09.2024 vide CEA letter No. CEA-PS-12-13/3/2019-PSPA-II. No comments have been received on the minutes.

1.2 The minutes of the 23rd meeting of NCT held on 02.09.2024 were issued on 09.09.2024 vide CEA letter No. CEA-PS-12-13/3/2019-PSPA-II. No comments have been received on the minutes.

1.3 Members confirmed the minutes of 22nd and 23rd meetings of NCT.

2 Status of the transmission schemes noted/approved/recommended to MoP in the 22nd and 23rd meetings of NCT:

2.1 Status of new transmission schemes approved/recommended:

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Mode of Implementation	BPC	Award/ Gazette notification
22nd NCT Meeting					
1.	Transmission system for supply of power to Green Hydrogen/Ammonia manufacturing potential in Mundra area of Gujarat under Phase-I: Part B1 scheme (3 GW at Navinal S/s)"	Recommended	TBCB	PFCCL	Gazette Notified by MoP dated 12.09.2024
2.	Eastern Region Expansion Scheme-43 (ERES-43)	Approved	RTM	Not applicable	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
3.	Additional Transmission System Proposed for redundant power supply to Dholera area	Approved	RTM	Not applicable	
4.	Transmission System for Integration of Anantapur-II REZ - Phase-I (for 4.5 GW)	Recommended	TBCB	PFCCL	Gazette Notified by MoP dated 12.09.2024
5.	Transmission system for proposed Green Hydrogen / Green	Recommended	TBCB	RECPDCL	Gazette Notified by MoP dated 12.09.2024

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Mode of Implementation	BPC	Award/ Gazette notification
	Ammonia projects in Tuticorin area)				
6.	Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (6th - 8th) and 1x1500 MVA,765/400 kV ICT (4th) at Bidar PS	Approved	TBCB	RECPDCL	Gazette Notified by CEA on 25.09.2024
7.	Scheme for Requirement of Additional FOTE for redundancy at AGC locations in NER: Revised	Approved	RTM	Not applicable	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
8.	Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi	Approved	RTM	Not applicable	
23rd NCT Meeting					
1.	Transmission System for Integration of Kurnool-IV REZ - Phase-I (for 4.5 GW)	Recommended	TBCB	RECDPCL	Gazette Notified by MoP dated 19.09.2024

2.2 Status of transmission schemes where modifications was suggested by NCT:

S. No.	Scheme where modifications was suggested	Status
1.	Modification in Transmission system for evacuation of power from Luhri Stage-I HEP	Informed to RECPDCL vide letter dated 02.09.2024
2.	Transmission system for evacuation of power from Shongtong Karcham HEP (450 MW) and Tidong HEP (150 MW)	Informed to RECPDCL vide letter dated 02.09.2024
3.	Modification in timeframe of one of the elements in the scope of "Transmission system for offshore windzone phase-1(500 MW VGF off coast of Gujrat for subzone B-3)	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
4.	Time extension for Communication Scheme "Requirement of additional FOTE of STM-16 capacity at Bhuj-II substation to cater connectivity of RE Gencos"	

3 Modifications in the earlier approved/notified transmission schemes:

3.1 Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme

3.1.1 Representative from CTUIL stated that the implementation of the 400 kV D/C Jhatikara-Dwarka line, along with two 400 kV bays each at Jhatikara and Dwarka

under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" was allocated to POWERGRID under RTM mode with completion schedule of 18 months vide MoP OM Ref. No. 15/3/2018-Trans-Part(5) dated 06.11.2023. POWERGRID vide letter dated 29.12.2023 requested an extension of the implementation timeline to at least 24 months due to technical and execution challenges and proposed changing the conductor configuration from quad to Twin HTLS on Monopole structure.

3.1.2 NCT in its 17th meeting held on 31.01.24 directed CTUIL to re-survey of the scheme through implementing agency so as to arrive at the optimum requirement of monopole/narrow base tower towers, and work out the revised estimated cost. Further, NCT in its 19th meeting held on 29.04.2024 approved the scope modifications in the Jhatikara – Dwarka 400 kV D/c line under Rajasthan REZ Ph-III, Part-D- Ph-II Scheme. Tentative implementation time-frame of 18 months from MOP OM-06/11/23 was unchanged. CTUIL vide letter Ref. No. CTUIL/OM/14/19 NCT dated 29.05.2024 informed that the scope of project was revised and conductor configuration was changed to Twin HTLS, However, the implementation timeline remains unchanged. POWERGRID on 06.06.2024, once again requested an extension of project timelines to at least 24 months from the fresh allocation date of 29.05.2024, instead of 18 months from original allocation date.

3.1.3 Subsequently, in a meeting chaired by Secretary (Power) on 01.07.2024, POWERGRID was advised to proceed with inviting tender based on 18 months' timelines for the implementation of Rajasthan Phase-II, Part-D, Phase-II scheme. In compliance with the directives, POWERGRID floated the tender and the award is expected by November, 2024 with a project completion timeline of February 2026.

3.1.4 Director (SO), Grid-India stated that 765/400 kV Jhatikara ICTs and 400 kV lines from Jhatikara were N-1 non-compliant during summer of 2024. In case of further delay in 400 kV D/C Jhatikara - Dwarka line, severe constraints are expected in the existing 400 kV Jhatikara – Dwarka and 400 kV Jhatikara – Bamnouli lines with further RE capacity addition in Rajasthan etc. The loading of these lines emerged as N-1 non-compliant during high demand season of NR and the same may lead to RE curtailment in future. Requirement of any augmentation in the Delhi intra-state system also needs to be examined. Chairperson, CEA directed that the above issues shall be studied in a holistic manner in the transmission Resource Adequacy Plan of Delhi.

3.1.5 After deliberations, NCT approved the revised SCOD for 400 kV D/C (Twin HTLS) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis).

3.2 Change in scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex

3.2.1 The transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1:4 GW) (Sirohi/Nagaur complex) was recommended in the 21st NCT meeting held on 06.08.2024. Subsequently, the scheme was notified by MoP vide Gazette dated

29.08.2024. The scheme involves 5x500 MVA, 400/220 kV ICTs along with 6 Nos. 220 kV line bays at Sirohi S/s for RE interconnection at Sirohi S/s. The scheme is currently under bidding by RECPDCL.

3.2.2 Representative from CTUIL stated that connectivity up to 2100 MW was agreed to be granted at Sirohi S/s. Out of this, 1400 MW was agreed to be granted at 220 kV level through 5 Nos. of 220 kV line bays and balance 700 MW was agreed to be granted at 400 kV level (1 No. bay). It is to mention that out of above 700 MW, earlier 400 MW was agreed to be granted at 220 kV level of Sirohi S/s, however due to additional application of 300 MW, considering cumulative quantum (700 MW), it was proposed to be granted at 400 kV level. Further, it is proposed to add the following transmission element as part of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part- 1) (Sirohi Complex)

- 1 No. of 400 kV line bay at Sirohi S/s for RE interconnection

3.2.3 As total connectivity granted at Sirohi S/s on 220 kV level is 1400 MW through 5 Nos. of 220 kV line bays (out of 6 Nos.), 1 No. of 220 kV line bay which is part of the above scheme shall remain unutilised. Additionally, for RE evacuation requirement of 1400 MW at 220 kV level, through 4 Nos. of 400/220 kV ICTs (out of 5 Nos.), 1 No. of 400/220 kV ICT which is part of the above scheme shall remain unutilised. In view of the above, it is proposed to delete the following elements from Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part- 1) (Sirohi Complex)

- 1 No. of 220 kV line bay at Sirohi S/s
- 1x500 MVA, 400/220 kV ICT at Sirohi S/s along with transformer bays

3.2.4 The original cost of scheme is Rs 5027.61 Cr. With above modifications of scope, cost shall reduce only by Rs 40.75 Cr which is about (-) 0.81 % of original cost of package.

3.2.5 Representative of RECPDCL stated that NIT for the scheme was issued on 26.09.2024. The bid submission deadline is 29.11.2024 while SPV transfer is targeted in December 2024.

3.2.6 After Deliberations, NCT approved the revised scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex as follows:

Sl. No.	**Original scope of the transmission scheme**	**Revised scope of the transmission scheme**
1. Transmission system for immediate Evacuation of Power from Sirohi S/s (2 GW)		
1	5x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays • 400/220 kV 500 MVA ICTs- 5 Nos. • 400 kV ICT bays-5 Nos. • 220 kV ICT bays- 5 Nos.	**4x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays** **• 400/220 kV 500 MVA ICTs- 4 Nos.** **• 400 kV ICT bays-4 Nos.** **• 220 kV ICT bays- 4 Nos.**
2	6 Nos. 220 kV line bays at Sirohi S/s	**5 Nos. 220 kV line bays at Sirohi S/s**

Sl. No.	Original scope of the transmission scheme	Revised scope of the transmission scheme
	for RE interconnection • 220 kV line bays – 6 Nos.	**for RE interconnection** • **220 kV line bays – 5 Nos.**
3	220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s	• 220 kV Sectionalizer bay (1 set) • 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay
4	-	**1 No. 400 kV line bays at Sirohi S/s for RE interconnection** • **400 kV line bay – 1 No.**
	Note: There will be no change in other elements of the transmission scheme w.r.t agreed in the 21st NCT meeting/ MoP Gazette dated 29.08.2024.	

3.3 **Bid process for selection of Bidder as Transmission Service Provider (TSP) to establish "Augmentation of transformation capacity at Bhuj-II PS (GIS)" and "Transmission system strengthening to facilitate evacuation of power from Bhadla/Bikaner complex"**

3.3.1 The transmission scheme "Augmentation of transformation capacity at Bhuj-II PS (GIS)" was agreed in the 16th meeting of National Committee on Transmission held on 30.11.2023 under TBCB route with estimated cost of Rs. 428 crores and implementation timeframe of 21 months. Gazette was notified on 23.01.2024 with PFCCL as BPC. The RFP for the transmission scheme was issued on March 29, 2024. RFP bid submission originally scheduled on May 31, 2024 had been extended to August 20, 2024 on request from the bidders. Out of the two bidders who purchased the RFP documents for the subject transmission scheme, only one bidder i.e. Power Grid Corporation of India Limited submitted the bid on August 20, 2024. The bid was again extended and on August 27, 2024 also only one bidder i.e. Power Grid Corporation of India Limited submitted the bid. As there was only one bid, PFCCL vide letter dated 04.09.2024 sought the guidance from MoP on the matter. MoP vide letter dated 09.10.2024 referred the matter to National Committee on Transmission (NCT) for deliberation in the next NCT meeting and submit the recommendations to the Ministry.

3.3.2 Another transmission scheme "Transmission system strengthening to facilitate evacuation of power from Bhadla/Bikaner complex)" was approved in the 19th meeting of National Committee on Transmission held on 29.04.2024 under TBCB route with estimated cost of Rs. 198.75 crores and implementation timeframe of 18 months. Gazette was notified on 18.06.2024 with PFCCL as BPC. The RfP for the subject transmission scheme was issued on August 01, 2024. RFP bid submission was originally scheduled on October 04, 2024. RfP documents for the subject transmission scheme have been purchased by only one bidder, i.e. Power Grid Corporation of India Limited. Accordingly, bid submission for the project has already been extended three

(03) times and latest date of bid submission is 25th October, 2024. Subsequently, no bid has been received on the due date.

3.3.3 CTU stated that above strengthening schemes are getting delayed due to above bid issues.

3.3.4 As per clause 9.6 of "Tariff based Competitive-bidding Guidelines for Transmission Service" issued by Ministry of Power (MoP) on August 10, 2021, there have to be minimum two qualified bidders for conducting the bid process.

3.3.5 It was mentioned that in case of single bid is received, clarity is not available in TBCB Guidelines. Members opined that to save time of rebidding, certain provisions need to be worked out. It was discussed that whether the project can be awarded in case of single bid if the cost discovered is of the level of estimated tariff.

3.3.6 After deliberations, following was agreed:

A. For the project costing less than Rs. 500 crore

a) In case, no bid or single bid is received, the BPC may extend the bid process for 7 more days. After the extended period, the BPC may open the bid. If single bid is received, steps given in subsequent paragraphs need to be followed.

b) Based on estimated cost by the Cost Committee constituted by CEA and the norms provided in CERC tariff regulations, the levelised tariff for the project shall be calculated by the BPC.

c) If the quoted transmission charges by the bidder are lower than levelised tariff estimated by the BPC, the bidder may be declared as successful bidder and Letter of Intent (LoI) may be issued.

d) In case, the quoted transmission charges by the bidder are higher than the estimated levelised tariff by the BPC, the bidding process may be annulled and matter may be referred by the BPC to the Government. The Government may give exemption to the transmission project from competitive bidding and allocate the same under Regulated Tariff Mechanism (Section-62 of the Electricity Act, 2003).

e) If no bids are received, even after extension, the bidding process may be annulled by BPC and the matter may be referred by the BPC to the Government. The Government may give exemption to the transmission project from competitive bidding and allocate the same under Regulated Tariff Mechanism (Section-62 of the Electricity Act, 2003).

B. For the project with estimated cost of more than Rs. 500 crore, if only one bid is received, BPC may not open the bid and refer the matter to the Government. In case no bids are received, the bid process would be annulled and the matter shall be referred to the Government.

C. For making the enabling provisions, "Tariff based Competitive-bidding Guidelines for Transmission Service-2021" needs to be modified.

3.4 Change in the implementation timeframe of Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I

3.4.1 Representative from CTUIL stated that Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I was recommended in the 20th NCT meeting held on 25.06.2024 under TBCB route with PFCCL as BPC and implementation time frame of 30 months from SPV transfer. Applications for cumulative 3050 MW linked with Ph-I 3 GW scheme have been received at Raghanesda S/s, out of 3050 MW applications, start date of connectivity required for 4 nos. of applications (connectivity quantum of 1150 MW) is from Dec'26 (JSW Neo Energy Limited: 400 MW & ACME: 400 MW) to Mar'27 (Sunsure Solarpark RJ One Pvt. Ltd.: 350 MW).

3.4.2 CTUIL proposed to change the implementation timeframe of the subject scheme from 30 months from SPV transfer to 24 months from SPV transfer so that the substation can come up earlier matching with requirement of above RE developers.

3.4.3 Representative of PFCCL informed that the RfP was issued on 14.09.2024 while the bid submission date is 19.11.2024.

3.4.4 After deliberations, it was decided that the implementation timeline of Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I may be kept as 30 months and need not be changed.

4 New Transmission Schemes:

4.1 Eastern Region Expansion Scheme-44 (ERES-44)

4.1.1 Representative of CTUIL stated that several 220 kV transmission lines and substations were implemented in Indian grid along with cross border lines for importing power from Chukha Hydro Electric Plant in Bhutan. The generating station was commissioned in years 1986-88 and the transmission system is now more than 35 years old. Considering the age of conductors and increase in conductor snapping incidences, reconductoring of these transmission lines has become necessary. The matter was also deliberated in ERPC forum.

4.1.2 As the system involved cross border links also, a meeting was convened by CEA under the chairpersonship of Member (Power System) on 27-08-2024, wherein it was decided that matter of reconductoring of cross border lines will be separately taken up with Bhutan. However, reconductoring of ISTS portion of 220 kV corridor viz. Alipurduar (POWERGRID) – Falakata (WBSETCL) – Birpara (POWERGRID) – Binaguri (POWERGRID) – Siliguri (POWERGRID) – Kishanganj (POWERGRID) – Dalkhola (POWERGRID) – Gazole (WBSETCL) – Malda (POWERGRID), may be taken up under ISTS. Further, reconductoring of intra-state LILO portion of Birpara (POWERGRID) – Alipurduar (POWERGRID) 220 kV D/c line at Falakata (WBSETCL) and Dalkhola – Malda 220 kV D/c line at Gazol (WBSETCL) shall be carried out by WBSETCL matching with HTLS conductor of the main ISTS line in the matching timframe.

4.1.3 Director (SO), Grid-India stated that it is necessary that the intra-state portion of lines (under the jurisdiction of WBSETCL) is also re-conductored in the matching time-frame of that of the ISTS portion. Without the reconductoring of the intra-state portion, the benefits of reconductoring of the ISTS part cannot be realized. He further suggested that as intra-state portion is quite less compared to the inter-state portion, the intra-state part may also be re-conductored under ISTS at the cost of WBSETCL in matching timeframe.

4.1.4 It was suggested that reconductoring of Intra state portion of WBSETCL by an ISTS licensee may lead to commercial complications, therefore, reconductoring of intra state LILO portion may be carried out by the owner of the asset i.e. WBSETCL in matching timeframe.

4.1.5 After deliberations, NCT approved Transmission scheme "Eastern Region Expansion Scheme-44 (ERES-44))" as mentioned below:

4.1.5.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks
1.	Eastern Region Expansion Scheme-44 (ERES-44) Tentative implementation timeframe: 18 months (15 months on best effort basis) from the date of allocation of project	385.77	Approved under RTM through POWERGRID

4.1.5.2 Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
(i)	Reconductoring of ISTS portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A	54 ckm
(ii)	Reconductoring of ISTS portion of Falakata (WBSETCL) – Birpara (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	54 ckm
(iii)	Reconductoring of Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	160 ckm
(iv)	Reconductoring of Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	12 ckm
(v)	Reconductoring of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	216 ckm
(vi)	Reconductoring of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	62 ckm
(vii)	Reconductoring of ISTS portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A	195 ckm
(viii)	Reconductoring of ISTS portion of Gazole (WBSETCL) –	33 ckm

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
	Malda (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	
(ix)	Upgradation of associated 220 kV bay equipment at Alipurduar (POWERGRID)	Replacement of Wave Traps of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line commensurate with rating of HTLS.
(x)	Upgradation of associated 220 kV bay equipment at Birpara (POWERGRID)	Replacement of Wave Traps of Falakata (WBSETCL) – Birpara (POWERGRID) and Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xi)	Upgradation of associated 220 kV bay equipment at Binaguri (POWERGRID)	Replacement of Wave Traps of Birpara (POWERGRID) – Binaguri (POWERGRID) and Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xii)	Upgradation of associated 220 kV bay equipment at Siliguri (POWERGRID)	Replacement of Wave Traps of Binaguri (POWERGRID) – Siliguri (POWERGRID) and Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xiii)	Upgradation of associated 220 kV bay equipment at Dalkhola (POWERGRID)	Replacement of Wave Traps of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) and Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c lines commensurate with rating of HTLS.
(xiv)	Upgradation of associated 220 kV bay equipment at Malda (POWERGRID)	Replacement of Wave Traps of Gazole (WBSETCL) – Malda

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
		(POWERGRID) 220 kV D/c line commensurate with rating of HTLS.
(xv)	Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c (HTLS) line	108 km

Note:

(a) WBSETCL shall reconductor their following lines sections under intra-state scheme matching with completion of ISTS scheme namely ERES-44:

- *About 4 km intra-state portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line at Falakata end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Falakata (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 4 km intra-state portion of Birpara (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line at Falakata end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Falakata (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 2 km intra-state portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line at Gazole end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Gazole (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 2km intra-state portion of Gazole (WBSETCL) – Malda (POWERGRID) 220 kV D/c line at Gazole end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Gazole (WBSETCL) end commensurate with rating of HTLS (1250 A).*

(b) WBSETCL will LILO the Dhalkola – Gazole 220 kV D/c line with 1250 A HTLS under their intra-state scheme for establishment of 220 kV level at their existing 132/33kV Raiganj (WBSETCL) S/s.

(c) ISTS licensee and WBSETCL shall coordinate for reconductoring of their respective portion of the lines matching with completion schedule of this scheme.

4.2 Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III

4.2.1 Representative of CTUIL stated that 2.5 GW REZ potential has been identified at Rajgarh (MP).

i. Phase-I of 1.5 GW involves establishment of Pachora PS with 3x500 MVA 400/220 kV ICTs and Pachora PS – Bhopal 400 kV D/c line which has been implementation by M/s G R Infraprojects Ltd. (Commissioned).

ii. Phase-II (1 GW) involves ICT augmentation (4th, 5th & 6th) Pachora PS along with Pachora PS – Ujjan (MPPTCL) 400 kV D/c line which is presently under implementation by M/s G R Infraprojects Ltd. with SCOD of 14.02.2026.

4.2.2 He further stated that in view of applications received for cumulative capacity of ~4000 MW at Pachora PS till July-2024, it was found prudent to expand the substations to its full capacity so as to accommodate applications being received

beyond 2.5 GW at Pachora PS. Out of 1508 MW applications received for Rajgarh Ph-III system, RE projects for 1321 MW have been agreed for grant with start date of March 2027. For additional 187 MW applications received in July 2024 are under process and shall also be granted with start date of March 2027.

4.2.3 To evacuate the power from these areas, CTUIL proposed a transmission scheme broadly consisting of augmentation at Pachora PS and Pachora PS – Rajgarh(PG) 400 kV D/c line. CTUIL also mentioned that with the augmentation at Pachora PS, the substation will be closed for further connectivity.

4.2.4 After deliberations, NCT recommended the transmission scheme "Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III" to enable evacuation of upto 4000 MW Power from RE Projects in Rajgarh (i.e. 1500 MW beyond 2500 MW) SEZ in Madhya Pradesh as mentioned below:

4.2.4.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III **Tentative implementation timeframe**: Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV Transfer & for element at Sl. No. 2b shall be 31.03.2028 in matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)	1079	Recommended under TBCB route with RECPDCL as BPC

4.2.4.2 Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity
1.	Creation of New 220 kV Bus Section (3rd) with 220 kV Bus Sectionaliser and 400/220 kV, 3x500 MVA ICT augmentation (7th, 8th & 9th) at Pachora PS terminated on 220 kV Bus Section (3rd)	500 MVA 400/220 kV ICT – 3 Nos. 400 kV ICT bay – 3 Nos. (on Section-II) 220 kV ICT bay – 3 Nos. (on Section-III) 220 kV Bus Sectionaliser bays – 1 set 220 kV BC & TBC – 1 Nos. each
2.	**2a**. 3 Nos. 220 kV line bays for RE interconnection on Bus Section (3rd)	3 Nos. on Sec-III
	2b. 1 Nos. 220 kV line bay for RE Interconnection of Purvah Green Power Pvt. Ltd. on Bus Section (3rd)	1 No. on Sec-III
3.	Pachora PS – Rajgarh(PG) 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays at both ends and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends	Line length: 180 km. 400 kV line bays: 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS) 420 kV, Switchable Line Reactors (Sw LRs): 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS) Switching equipment for 400 kV line reactor – 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS)
4.	Installation of 1x125 MVAR, 420 kV bus	125 MVAr, 420 kV Bus reactor – 1 Nos.

Sl. No.	Scope of the Transmission Scheme	Capacity
	reactor at Pachora PS (400 kV Bus Section-II)	400 kV Bus reactor bay: 1 Nos.

4.3 Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II

4.3.1 Representative of CTUIL stated that applications for cumulative capacity of 1970 MW has been received at Neemuch PS till July 24, it was found prudent to expand the substations to its full capacity so as to accommodate applications being received beyond 1 GW at Pachora PS. CTUIL proposed transmission scheme consisting of augmentation a Neemuch PS, creation of 400/220 kV Handiya substation, Neemuch PS – Pachora PS 400 kV D/c line, Pachora PS – Handiya 400 kV D/c line and LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s etc. CTUIL also mentioned that with the augmentation at Neemuch PS, the substation will be closed for further connectivity.

4.3.2 After deliberations, NCT recommended the scheme "Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II" to enable Evacuation of upto 2000 MW Power from RE Projects in Neemuch (i.e. 1000 MW beyond 1000 MW) SEZ in Madhya Pradesh as mentioned below:

4.3.2.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Crore)	Remarks
1.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II Implementation timeframe: 24 months from date of SPV transfer	2393	Recommended under TBCB route with PFCCL as BPC

4.3.2.2 Detailed scope of the scheme is given below:

Sl.No.	Scope of the Transmission Scheme	Capacity
1.	Creation of New 220 kV Bus Section-II at Neemuch PS with Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (3rd, 4th & 5th) at Neemuch S/s along with associated bays.	500 MVA 400/220 kV ICT – 3 Nos. 400 kV ICT bay – 3 Nos. 220 kV ICT bay – 3 Nos. (on Sec-II) 220 kV Bus Sectionaliser bays – 1 set 220 kV BC & TBC – 1 Nos. each
2.	4 Nos. 220 kV Line bays at Neemuch PS for RE interconnection	220 kV Bays – 4 Nos. on Sec-II
3.	Neemuch PS – Pachora PS 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along associated Line bays and 50 MVAr Switchable Line Reactor (Sw LR) on each ckt at both ends	Line length: 190km. 400 kV Line bays: 4 Nos. (2 at Neemuch PS & 2 at Pachora PS) 420 kV, Switchable Line Reactors (Sw LRs): 4 Nos. (2 at Neemuch PS & 2 at Pachora PS) Switching equipment for 400 kV

		line reactor – 4 Nos. (2 at Neemuch PS & 2 at Pachora PS)
4.	Establishment of 2x500 MVA, 400/220 kV S/s at Handiya alongwith 2x125 MVAr 420 kV Bus Reactors **Future provision (space for):** ➢ 400 kV line bays along with switchable line reactors– 6 Nos. (Sec-II) ➢ 400/220 kV ICT along with bays - 4 Nos. (1 Nos. on Sec-I & 3 Nos. on Sec-II) ➢ 400 kV Bus Reactor along with bays: 2 Nos. (Sec-II) ➢ 220 kV line bays: 8 Nos. (on Sec-II) ➢ 400 kV Sectionalization bay: 1 set ➢ 220 kV Sectionalization bay: 1 set ➢ 220 kV TBC & BC: 1 Nos.	400/220 kV ICTs: 2 Nos. 400 kV ICT Bays: 2 Nos. 220 kV ICT Bays: 2 Nos. 400 kV Line bays: 6 Nos. 220 kV line bays for MPPTCL – 8 Nos. 125 MVAr, 420 kV Bus reactor – 2 Nos. 400 kV Bus reactor bay: 2 Nos. 220 kV TBC bay – 1 Nos. 220 kV BC bay – 1 Nos.
5.	Pachora PS – Handiya 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated bays at Pachora PS end and 50 MVAr Switchable Line Reactor (Sw LR) on each ckt at both *ends*	Line length: 190 km. 400 kV bays: 2 Nos. (at Pachora PS) 420 kV, Sw LRs: 4 Nos. (2 at Handiya & 2 at Pachora PS) Switching equipment for 400 kV line reactor – 4 Nos. (2 at Handiya & 2 at Pachora PS)
6.	LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s	LILO route length : 22 km (88 ckm) The Khandwa(PG) – Itarsi(PG) 400 kV D/c line is of Twin Moose configuration and LILO shall be of similar conductor configuration
7.	Installation of 1x125 MVAR, 420 kV bus reactor (2nd) at Neemuch PS	125 MVAr, 420 kV Bus reactor – 1 Nos. 400 kV Bus reactor bay: 1 Nos.
Note: TSP of Neemuch & Pachora PS shall provide space for above scope of work		

4.4 North Eastern Region Expansion Scheme-XXI Part-B (NERES-XXI Part-B)

4.4.1 Representative from CTUIL stated that the existing 132 kV Badarpur (POWERGRID) switching station was commissioned in 1999 and shall be completing 25 years in service by 2024. POWERGRID the owner of the substation has informed that they are facing issues in O&M of the switching station and to improve the reliability it would be prudent to upgrade the switching station from single main and transfer bus scheme to double main transfer bus scheme by converting from Air Insulated Switchgear (AIS) to Gas Insulated Switchgear (GIS).

4.4.2 Further, towards adoption of new technology in the Indian Grid, it was proposed that the upgradation could be carried out as Green GIS instead of conventional GIS owing to the following benefits:

- Green GIS is a new technology in which Sulfur Hexafluoride (SF_6) gas is not used and this technology is being adopted by several countries in the world.
- This would help in the reduction of usage of Green House Gas and would be a step towards achieving sustainable development targets.

4.4.3 The scheme was taken up for deliberations in the 15th meeting of NCT held on 25-08-2023, wherein it was decided to review the scheme subsequently. The scheme was thereafter discussed in the 16th meeting of NCT held on 30-11-2023, it was decided to defer the scheme at present and take it up after additional discussions on new technology such as major benefits of Green GIS, availability of Green GIS vendors in India, additional cost implication (conventional GIS vis-à-vis Green GIS) etc.

4.4.4 Director (SO), Grid-India suggested that instead of going for green GIS for complete station, some portion of the station (limited number of bays) may be considered for green GIS. Also, stations in other regions where green GIS might be more suitable due to environmental conditions may also be considered as potential candidates for green GIS.

4.4.5 After deliberations, it was decided that a committee with members from CEA, CTUIL and POWERGRID to be constituted to survey the green GIS literature, technical aspects, undertake visit of the substation, exploring possible solutions etc. The committee shall submit its recommendations within 06 months.

4.5 **Upgradation of ±800 kV, 6000 MW Raigarh-Pugalur HVDC system for enhancement of reverse power capacity upto 6000 MW from existing 3000 MW**

4.5.1 Raigarh-Pugalur ± 800 kV, 6000 MW HVDC system is capable of transferring 6000 MW of power from Raigarh to Pugalur. However, its reverse power capacity i.e. Pugalur to Raigarh is 3000 MW.

4.5.2 Representative of CTUIL stated that enhancement of reverse power capacity upto 6000 MW from existing 3000 MW has been approved in 52nd SPRC meeting held on 03.08.2024 at an indicative cost of Rs 1000 Cr (including cost of system studies) and required AC system strengthening at Pugalur (estimated cost of Rs 400 crores) & Raigarh (estimated cost of Rs 1800 Crores)

4.5.3 Further, SRPC vide letter dated 02.09.2024 recommended CTUIL to take up the matter to NCT at the earliest.

4.5.4 Director (SO), Grid-India stated that until the adequate AC system is available on both ends, the HVDC capacity of 6000 MW in reverse direction can't be utilized even after the proposed HVDC upgradation.

4.5.5 CTU stated that as confirmed by POWERGRID vide e-mail dated 10.10.2024, there is no space available at both Raigarh (Kotra) and Dharamjaygarh S/s for augmentation of AC system to enable reverse power flow on Raigarh- Pugalur HVDC beyond 3000 MW. AC System augmentation at Raigarh (Kotra) S/s in WR is not possible and if at all reverse flow of more than 3000 MW is required with N-1 compliance, it would require an elaborate exercise of shifting certain Thermal generating stations from Raigarh (Kotra) S/s to a new substation which would be cumbersome and shall entail significant costs as well as consent from thermal generating stations which are already connected at Raigarh (Kotra) S/s. Further, it was also informed that with the reversal

of HVDC from 3000 MW to 6000 MW, no enhancement in TTC/ATC between SR-NEW Grid is expected looking into the very less sensitivity of the HVDC in TTC/ATC. .

4.5.6 After deliberations, it was decided that a committee will be formed comprising members from CEA, CTUIL, POWERGRID, Grid-India, SRPC and WRPC. The committee shall carry out comprehensive study and propose comprehensive plan including AC system strengthening in Southern Region and Western Region along with the total scheme cost. The comprehensive plan may again be put up to SRPC before bringing it to NCT.

4.6 **Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme**

4.6.1 Representative from CTUIL stated that KPS3 S/s with 3x1500 MVA ICTs on Section-I is under implementation by M/s KPS3 Transmission Ltd. (Subsidiary of POWERGRID). 1x1500 MVA Addl. ICT at Section-I is also being implemented by M/s POWERGRID (under RTM) under Khavda Ph-IV Part E3 scheme. Further, Section-II of KPS3 is being established by M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) with SCOD of Aug-26 with 3x1500 MVA ICTs and 3 Nos. 400 kV bays at Bus Section-II for RE interconnection. Out of above bays, 2 bays had been allocated to M/s SRPL (1250 MW) & NHPC (600 MW).

4.6.2 Applications for cumulative 3290 MW have been received at KPS3 (Sec-II) which require 3 Nos. 400 kV bays. 1 No. 400 kV bay is already being implemented under Khavda Phase-IV Part A scheme. Balance 2 nos. 400 kV bays along with addl. 1x1500 MVA ICT at KPS3 (Sec-II) are required to be implemented after considering N-1 compliance of already planned 765/400 kV ICTs at KPS3 (Sec-II). The proposed 765/400 kV ICT & 400 kV bays would facilitate immediate injection of power at KPS3 (Section-II). CTUIL also informed that the substation will be closed for further applications.

4.6.3 NCT directed CTUIL to explore the possibility for Battery Energy Storage System (BESS) for optimizing transmission infrastructure at Khavda as well as other RE potential Zones. Consideration of Storage may facilitate integration of additional RE Capacity.

4.6.4 After deliberations, NCT approved the transmission scheme "Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme" under RTM mode as follows

4.6.4.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Crore)	Remarks
1.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	252	Approved under RTM through M/s Khavda IV A Power

Khavda IVA Power Transmission Limited

	Implementation timeframe: 24 months from the date of allocation		Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))

4.6.4.2 Detailed scope of the scheme is given below:

S.N.	Scope of the Transmission Scheme	Capacity
1.	Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 No. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	• 765/400 kV ICT – 1 (1x1500 MVA) • 765 kV ICT bay – 1 (+1 no. bay for dia completion with Switchable Line Reactor (SLR) provision in future bay) on Bus section-II • 400 kV ICT bay – 1 (+ 1 no. bay for dia completion and termination of the proposed Line for RE interconnection) on Bus section-II
2.	1 Nos. 400 kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	400 kV line bays – 1 no. (+ 1 no. bay for dia completion with the provision to terminate future 400/220 kV ICT)
Note: TSP of KPS3 (GIS) shall provide space for above scope of work.		

4.7 **Supply and Installation of additional Fiber Optic Test Equipment (FOTE) and Ethernet cards at Automatic Generation Control (AGC) and Critical Nodes of SR Region.**

4.7.1 Representative of CTUIL stated that as per CEA, Manual of Communication Planning in Power System Operation 2022, CTU for high availability requirements for Power System Communication, redundancy with route diversity for critical links shall be maintained. Additional FOTE and redundant Ethernet ports are required at all AGC operated generating stations, in view of resource disjoint and criticality of AGC operation for grid operation purpose.

4.7.2 After deliberations, NCT approved the communication scheme "Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region" under RTM mode as follows

4.7.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks

1.	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region Tentative implementation timeframe: 12 months from date of allocation of project	1.02	Approved under RTM through POWERGRID

4.7.2.2 Detailed scope of the scheme is given below:

(i) Supply and installation of 3 nos. FOTE with STM 16 capacity at following locations:

SI.No.	Station Name	No of FOTE	Remark
1.	Simhadri-1	1	For AGC purpose
2.	NP KUNTA	1	Shortage of ports
3.	NLC-TPS-2 Stage 1	1	For AGC purpose
Total		**3**	

(ii) Supply and installation of 10 Nos. ethernet cards at following locations:

SI.No.	Station Name	Ethernet Cards required
1	Ramagundam -I	2
2	Ramagundam -II	
3	Ramagundam -III	
4	NTPC Vallur	2
5	NTPL Tuticorin	1
6	NTPC Kudgi	2
7	NLC - TPS 2 Exp	1
8	NLC - TPS 1 Exp	1
9	NNTPS new Neyveli	1
Total		**10**

4.8 Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity

4.8.1 Representative of CTUIL stated that the transmission scheme "Requirement of Additional FOTE at various ISTS nodes in ER" with capacity utilisation of approximately 90% and above and few other important stations is required.

4.8.2 After deliberations, NCT approved the communication scheme "Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity" under RTM mode as follows

4.8.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks

1.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity Tentative implementation timeframe: 12 months from date of allocation of project	9.78	Approved Under RTM through POWERGRID

4.8.2.2 Detailed scope of the scheme is given below:

a) Conversion of 13 nos. STM 16 FOTE to STM 64 FOTE
b) Conversion of 4 nos. STM 4 FOTE to STM 16 FOTE by utilizing four (4) Nos. FOTEs freed from upgradation of STM 16 FOTE to STM 64 FOTE

S. No.	Node Name(with approx 90% capacity exhausted)	Upgradation/replacement required	Detail of Card/Equipment required for upgradation	Estimated Cost (Rs.)
1	Kasba	STM 16 to STM 64	Existing Equipment Cannot be upgraded. New STM 64 SDH Equipment Required	74 Lakhs
2	ERLDC	STM 16 to STM 64		74 Lakhs
3	Jeerat	STM 16 to STM 64		74 Lakhs
4	Subhashgram	STM 16 to STM 64		74 Lakhs
5	Farakka	STM 16 to STM 64		74 Lakhs
6	Kahalgaon	STM 16 to STM 64		74 Lakhs
7	Saharsa	STM 16 to STM 64		74 Lakhs
8	Binaguri	STM 16 to STM 64		74 Lakhs
9	Purnea	STM 16 to STM 64		74 Lakhs
10	Kishenganj	STM 16 to STM 64		74 Lakhs
11	Sasaram	STM 16 to STM 64		74 Lakhs
12	AB380 Repeater	STM 16 to STM 64		74 Lakhs
13	Allahabad	STM 16 to STM 64		74 Lakhs
Total Cost for conversion of 13 nos. of STM 16 equipment to STM 64:A				**9.62 Cr**
14	Gaya	STM 4 to STM 16	Upgradation to be done by utilizing four Nos. of STM 16 equipment freed in above list after upgradation to STM 64.	4 Lakhs
15	Essar Chandwa	STM 4 to STM 16		4 Lakhs
16	Darbhanga(KPTL)	STM 4 to STM 16		4 Lakhs
17	Arrah	STM 4 to STM 16		4 Lakhs
Total Cost for conversion of 04 Nos. of STM 4 equipment to STM 16: B				**16 Lakhs**
Total Cost for conversion of 13 Nos. of STM 16 to STM 64 and 04 nos. of STM4 equipment to STM 16: A+B				**9.78 Cr**

4.9 **Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from Punatsangchhu-II Hydroelectric Project (PHEP-II), Punatsangchhu-I Hydroelectric Project (PHEP-I) and Jigmeling of Bhutan to Alipurduar, India**

4.9.1 Representative of CTUIL stated that to ensure the accurate coordination of devices between SDH at one end i.e Alipurduar, India and MPLS-TP at other end i.e., Punatsangchhu-II, as well as to cater to cybersecurity issue of the Indian Grid, the proposed scheme for Alipurdwar S/s end needs to be implemented.

4.9.2 After deliberations, NCT approved the communication scheme "Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India" under RTM mode as follows

4.9.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost	Remarks
1.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India Tentative implementation timeframe: 6 months from date of allocation	₹ 65 lakhs	Approved Under RTM through POWERGRID

4.9.2.2 Detailed scope of the scheme is given below:

a) One (1) set of STM-4 SDH equipment along with panel supporting minimum five directions with MSP (Multiplex Section Protection 1+1) & equipped with E1 and Ethernet interfaces.
b) Six (6) sets of 175 km Amplifiers solutions: 2 directed towards Punatsangchhu-II (PHEP-II), 2 directed towards Punatsangchhu-I (PHEP-I) and 2 directed towards Jigmeling.

Note: POWERGRID to coordinate with Bhutan ends while procuring the equipment to avoid any non-compatibility issues

5 Grid-India Presentation on Performance of the National Grid in Q1 and Q2 of FY 2024-25

5.1.1 Representative of Grid-India made a presentation on performance of the National Grid in Q1 and Q2 of FY 2024-25. Copy of presentation is attached at Annex-II. Major points highlighted during the presentation are given in subsequent paragraphs.

5.1.2 **Large number of generation loss events in NR RE Complex:** NLDC representative informed that there have been more than 55 events between January 2022 and September 2024 involving RE generation loss of more than 1000 MW. Around 13 such generation loss events (>500 MW) have occurred between April – September 2024.

One of the major reasons for these grid events has been the non-compliance of the RE plants against CEA's standards. The details of the non-compliance and measures being taken by Grid-India to address the issues were explained by NLDC representative in the meeting.

5.1.3 **Oscillations in NR RE complex and issues with performance of STATCOMs:** NLDC representative informed that low frequency oscillations (3-4 Hz) are being observed in NR RE complex on a regular basis. The oscillations start during morning hours with increase in solar generation and are mainly observed in voltage and reactive power. The non-standardization of PPC delays is one of the potential reasons for these oscillations.

He further informed that currently 05 Nos. STATCOMs are operational in NR RE complex. These STATCOMs have been installed to provide the fast dynamic reactive power support to the grid during any contingency. The response time of the installed STATCOMs shall be less than 30 ms as per their control manuals.
However, following observations in the performance of STATCOMs (as visible in DR as well as PMU plots) in NR RE complex has been observed:

- High response time (sluggish response) during faults leading to injection of reactive power post clearance of fault
- Automatic gain reduction by stability controller of the STATCOMs on hunting detection, possibly leading to enhancement in magnitude of oscillations

The problem of amplification of oscillations with reduction of STATCOM gain in voltage control mode has been analyzed with measurement (TFR) data and simulation results for a large data set. Detailed analysis in this regard was also shared with CEA, CTUIL, POWERGRID and OEM.

It is observed that oscillations damp out when the STATCOMs are being operated in Fixed 'Q' mode. This mode of operation, however, defeats the purpose of providing STATCOMs for fast dynamic reactive power support.

The performance issues being observed in the current STATCOMs necessitate proper tuning of the STATCOM controllers. Also, necessary modifications in the RfP of upcoming STATCOMs is required based on the current experience.

NCT directed that a committee may be constituted with members from CEA, CTUIL, Grid-India, Power Grid and all the STATCOM OEMs to deliberate the performance

related issues and the possible remedial measures. The matter to be coordinated by GM Division, CEA in consultation with PS Wing, CEA.

5.1.4 **17th June 2024 Load Loss Event in Northern Region and Reactive Power Planning for Bulk Loads (Electrolyzers and Data Centers):** Director (SO), Grid-India explained the 17th June 2024 grid event of simultaneous tripping of both bipoles of the +/-800 kV HVDC Champa (WR) – Kurukshetra (NR) link led to a substantial load reduction (~16.5 GW) in the northern region. The event started with the tripping of the aforementioned HVDC link and triggered a series of events starting from the sudden voltage drop across the stations in the Northern region and subsequent stalling and tripping of certain portion of load.

He further informed that the Ministry of Power constituted a Committee under the Chairmanship of Member (GO&D), CEA to analyze the event. The committee, in its suggestions, recommended the planning of suitable dynamic reactive power compensation near load centers.

He further stated that the event (especially the stalling of load) was replicated in simulation studies with proper load modelling. As the load behavior is changing, the existing philosophy for modelling of loads in the planning and operational studies need to be reviewed. Without proper load modelling in the studies, it would be difficult to capture such phenomenon in the studies. The standards for protection settings of loads, especially 1-ph and 3-ph motor loads, also needs to be reviewed.

Further, as a large quantum of electrolyzer and data center load is also envisaged to be connected at ISTS level in near future, it is important that adequate reactive power compensation is planned nearby such ISTS load feeding stations.

He suggested that the following activities may be taken up on priority:

- Study of load behavior and consideration of same in the simulation studies
- Planning of dynamic reactive power compensation at both inter-state and intra-state level near major load centers
- Review of the standards specifying standards for protection settings of loads, especially 1-ph and 3-ph motor loads
- Planning of suitable reactive power compensation at large ISTS stations being planned for feeding large electrolyzer and data center loads

Chairperson, CEA directed that the reactive power planning study at all the major load centers shall be taken up on priority. Grid India was advised to identify important BIS standards/committees in this regard and CEA/Stakeholders may take up with BIS.

He further directed that two separate committees comprising of members from CEA, CTUIL and Grid-India may be constituted for comprehensive study of performance, control strategy, reactive power requirements etc. of electrolyzer and data center loads respectively so that suitable reactive power compensation could be planned. The characteristics and load pattern/behaviour of electrolysers would be coordinated by ET&I Division, CEA and of data centres would be coordinated by PDM&LF Division, CEA.

5.1.5 **Evacuation of large quantum of RE under T-GNA:** NLDC representative informed that a large quantum of RE generation (~5700 MW) is being evacuated under T-GNA due to the delay in the commissioning of associated transmission system. There is possibility of certain RE curtailment if the commissioning of the associated transmission system is not expedited.

5.1.6 **Flexibility and Ramping Requirement:** NLDC representative informed that persistent high frequency was observed in the India's grid during solar hours on few days in the month of August 2024. The high RE generation and the limited flexibility to further reduce the thermal generation to accommodate the RE generation was one of the major factors for this high frequency operation. Further, as the thermal generating units are required during non-solar hours, these units cannot be taken out of service during the high frequency operation period.

Another challenge is being faced in meeting the ramping requirement during evening hours where the flexibility requirements have increased significantly due to the increasing demand ramp up coupled with the simultaneous decline in solar generation. There is an urgent requirement of fast ramping resources in the grid to meet the flexibility requirements in coming days.

5.1.7 **Constraints in Maharashtra system during high export from Southern Region:** Director (SO), Grid-India stated that the congestion is being faced in export of power from SR during high RE periods. To relieve the congestion, 765 kV Narendra – Pune D/C was planned with commissioning schedule of July 2024. However, the line is delayed and revised date of commissioning is December2024.

He further stated that even after commissioning of 765 kV Narendra – Pune D/C, constraints in western Maharashtra would still remain in export of power from SR. There is an urgent requirement for expediting the planned transmission system augmentation in western Maharashtra area.

Chairperson, CEA directed that the augmentation works in Maharashtra and other critical areas shall be monitored on priority.

Summary of the deliberations of the 24th meeting of NCT held on 23rd October, 2024

I. Modification in the earlier approved/notified transmission schemes:

1. Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme

NCT approved the revised SCOD for 400 kV D/C (quad) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis).

2. Change in scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex

NCT approved the revised scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex as follows:

Sl. No.	Original scope of the transmission scheme	Revised scope of the transmission scheme
1. Transmission system for immediate Evacuation of Power from Sirohi S/s (2 GW)		
1	5x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays • 400/220 kV 500 MVA ICTs- 5 Nos. • 400 kV ICT bays-5 Nos. • 220 kV ICT bays- 5 Nos.	**4x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays** • **400/220 kV 500 MVA ICTs- 4 Nos.** • **400 kV ICT bays-4 Nos.** • **220 kV ICT bays- 4 Nos.**
2	6 Nos. 220 kV line bays at Sirohi S/s for RE interconnection • 220 kV line bays – 6 Nos.	**5 Nos. 220 kV line bays at Sirohi S/s for RE interconnection** • **220 kV line bays – 5 Nos.**
3	220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s	• 220 kV Sectionalizer bay (1 set) • 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay
4	-	**1 No. 400 kV line bays at Sirohi S/s for RE interconnection** • **400 kV line bay – 1 No.**
	Note: There will be no change in other elements of the transmission scheme w.r.t agreed in the 21st NCT meeting/ MoP Gazette dated 29.08.2024.	

II. ISTS Transmission schemes, costing between Rs 100 Crore to Rs 500 Crore, approved by NCT:

1. The transmission schemes approved by NCT under RTM route is given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹ Cr)

1.	Eastern Region Expansion Scheme-44 (ERES-44)	RTM through POWERGRID	18 months (15 months on best effort basis) from the date of allocation	385.77
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	RTM through M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))	24 months from the date of allocation	252

The broad scope of above schemes are given below

Sl. No.	**Name of Scheme & Tentative implementation timeframe**	**Broad Scope**
1.	Eastern Region Expansion Scheme-44 (ERES-44) **Implementation timeframe: 18 Months (15 months on best effort basis) from the date of allocation of project**	1. Reconductoring of ISTS portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A (54 ckm) 2. Reconductoring of ISTS portion of Falakata (WBSETCL) – Birpara (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (54 Km.) 3. Reconductoring of Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (160 ckm) 4. Reconductoring of Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (12 ckm) 5. Reconductoring of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A. (216 ckm) 6. Reconductoring of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (62 ckm) 7. Reconductoring of ISTS portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A (195 ckm) 8. Reconductoring of ISTS portion of Gazole (WBSETCL) – Malda (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (33 ckm) 9. Upgradation of associated 220 kV bay equipment at

		Alipurduar (POWERGRID) 10. Upgradation of associated 220 kV bay equipment at Birpara (POWERGRID) 11. Upgradation of associated 220 kV bay equipment at Binaguri (POWERGRID) 12. Upgradation of associated 220 kV bay equipment at Siliguri (POWERGRID) 13. Upgradation of associated 220 kV bay equipment at Dalkhola (POWERGRID) 14. Upgradation of associated 220 kV bay equipment at Malda (POWERGRID) 15. Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c (HTLS) line (108 km)
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme **Implementation timeframe:** 24 months from the date of allocation	1. Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 Nos. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530MW 2. 1 No. 400kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW Note: TSP of KPS3 (GIS) shall provide space for above scope of work.

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

III. ISTS Transmission schemes, costing greater than ₹ 500 Crore, recommended by NCT to MoP:

The ISTS transmission schemes recommended by NCT to MoP are given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Tentative Implementation timeframe	BPC	Estimated Cost (₹ Crs)
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III	TBCB	Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV transfer & for element at Sl. No. 2b shall be 31.03.2028 in	RECPDCL	1079

Khavda IVA Power Transmission Limited

			matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)		
2.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II	TBCB	24 months from date of SPV transfer	PFCCL	2393

The broad scope of the above ISTS schemes to be notified in Gazette of India is as given below:

Sl. No.	**Name of Scheme & Tentative implementation timeframe**	**Broad Scope**	**Bid Process Coordinator**
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III **Implementation timeframe:** Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV transfer & for element at Sl. No. 2b shall be 31.03.2028 in matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)	1. Creation of New 220 kV Bus Section (3rd) with 220 kV Bus Sectionaliser and 400/220 kV, 3x500 MVA ICT augmentation (7th, 8th & 9th) at Pachora PS terminated on 220 kV Bus Section (3rd) 2. **2(a)** 3 Nos. 220 kV line bays for RE Interconnection on Bus Section (3rd) **2(b)** 1 Nos. 220 kV line bay for RE Interconnection of Purvah Green Power Pvt. Ltd. on Bus Section (3rd) 3. Pachora PS – Rajgarh(PG) 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays at both ends and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (180 Km) 4. Installation of 1x125 MVAR, 420 kV bus reactor at Pachora PS (400 kV Bus Section-II)	RECPDCL
2.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II	1. Creation of New 220 kV Bus Section-II at Neemuch PS with Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (3rd, 4th & 5th) at Neemuch S/s along with associated bays. 2. 4 Nos. 220 kV Line bays at Neemuch	PFCCL

Khavda IVA Power Transmission Limited

	Implementation timeframe: 24 months from date of SPV transfer	PS for RE interconnection 3. Neemuch PS – Pachora PS 400 kV 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (190 km) 4. Establishment of 2x500 MVA, 400/220 kV S/s at Handiya with 2x125MVAr 420 kV Bus Reactors **Future provision (space for):** • *400 kV line bays along with switchable line reactors– 6 Nos. (Sec-II)* • *400/220 kV ICT along with bays - 4 Nos. (1 Nos. on Sec-I & 3 Nos. on Sec-II)* • *400 kV Bus Reactor along with bays: 2 Nos. (Sec-II)* • *220 kV line bays: 8 Nos. (on Sec-II)* • *400 kV Sectionalization bay: 1 set* • *220 kV Sectionalization bay: 1 set* • *220 kV TBC & BC: 1 Nos.* 5. Pachora PS – Handiya 400 kV 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated bays at Pachora PS end and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (190 km) 6. LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s (22 km) 7. Installation of 1x125 MVAR, 420 kV bus reactor (2nd) at Neemuch PS *Note: TSP of Neemuch & Pachora PS shall provide space for above scope of work*	

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

IV. ISTS communication schemes approved by NCT:

Khavda IVA Power Transmission Limited

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹)
1	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region	RTM through POWERGRID	12 months from the date of allocation	1.02 Cr
2	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	RTM through POWERGRID	12 months from date of allocation	9.78 Cr
3	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	RTM through POWERGRID	6 months from date of allocation	65 Lakhs

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

Annexure-I

List of participants of the 24th meeting of NCT

CEA:

1. Sh. Ghanshyam Prasad, Chairperson, CEA & Chairman, NCT
2. Sh. Ajay Talegaonkar, Member (E&C)
3. Sh. A.K. Rajput, Member (Power Systems)
4. Sh. Ishan Sharan, Chief Engineer (PSPA-I)
5. Sh. Y.K. Swarnkar, Chief Engineer (PSPM)
6. Sh. B.S. Bairwa, Chief Engineer (I/C) (PSPA-II)
7. Sh. Rahul Raj, Director (PSPA-II)
8. Sh. B.S. Meena, Director (PSPM)
9. Sh. Pranay Garg, Deputy Director (PSPA-II)
10. Sh. Manish Maurya, Deputy Director (PSPA-II)
11. Sh. Manish Kumar Verma, Assistant Director (PSPA-II)

MoP:

1. Sh. Om Kant Shukla, Director (Trans.)

MNRE:

1. Sh. Himanshu Prabhakar, Under Secretary

SECI:

1. Sh. Vineet Kumar, DGM
2. Sh. R.K. Agarwal, Consultant

CTUIL:

1. Sh. P C Garg, COO
2. Sh. Ashok Pal, Deputy COO
3. Sh. K K Sarkar, Sr GM
4. Sh. P.S. Das, Sr GM
5. Sh. Rajesh Kumar, Sr GM
6. Sh. Anil Kumar Meena, GM
7. Sh. Kashish Bhambhani, GM
8. Sh. Bhaskar Wagh, DGM
9. Sh. Pratyush Singh, DGM
10. Sh. Venkatesh Gorli, Chief Manager
11. Sh. Anupam Kumar, Manager

GRID India:

1. Sh. Rajiv Porwal, Director (SO)
2. Sh. Rahul Shukla, Chief Manager
3. Sh. Priyam Jain, Chief Manager
4. Sh. Raj Kishan, Deputy Manager
5. Sh. Gaurab Dash, Deputy Manager

Khavda IVA Power Transmission Limited

RECPDCL

1. Sh. Satyabhan Sahoo, GM (Tech)

PFCCL

1. Sh. Deepak Kumar, AM

Expert Member

1. Sh. Ravinder Gupta, Ex Chief Engineer, CEA

POWERGRID

1. Sh. Anand Shankar, CGM
2. Sh. Sanjeev Kr. Chaudhary, Sr. GM
3. Sh. YKPN Singh, GM

***

Khavda IVA Power Transmission Limited

24th Meeting of National Committee on Transmission

Grid Performance – 1st & 2nd Quarter (2024-25)

23rd Oct 2024

Grid Controller of India Limited

formerly Power System Operation Corporation Ltd. (POSOCO)

National Load Despatch Center

CONTENTS

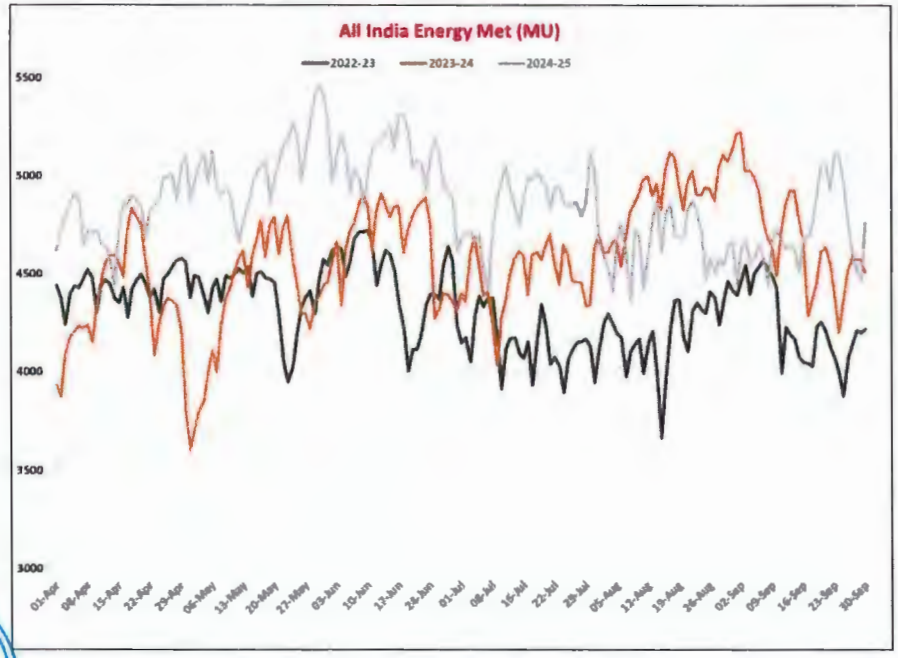
Overview of Grid Operation – Q1 & Q2 - FY 2024-25

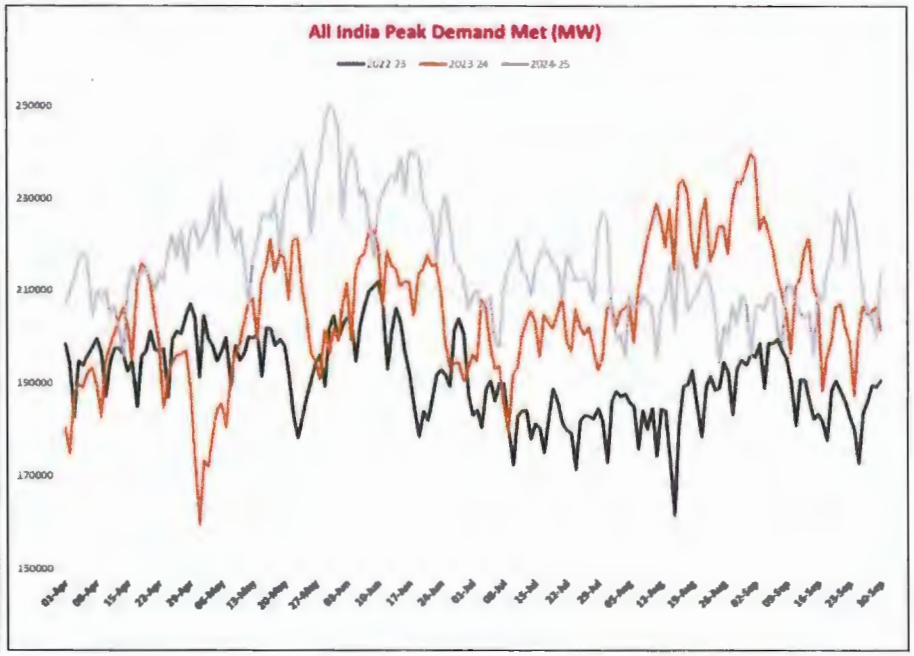
All India Demand met	Q1 (Apr-June)	Q2 (July-Sep)	Q3 (Oct-Dec)*
Maximum (MW)	**250070 (30-May-2024)**	**230568 (23-Sept-2024)**	**219356 (03-Oct-2024)**
Minimum	**175349 (14-Apr-2024)**	**167667 (27-Aug-2024)**	**157806 (13-Oct-2024)**

*Upto 18th October 2024

Projections as per 20th EPS for 2024-25	
All India Peak Demand	**230144 MW**

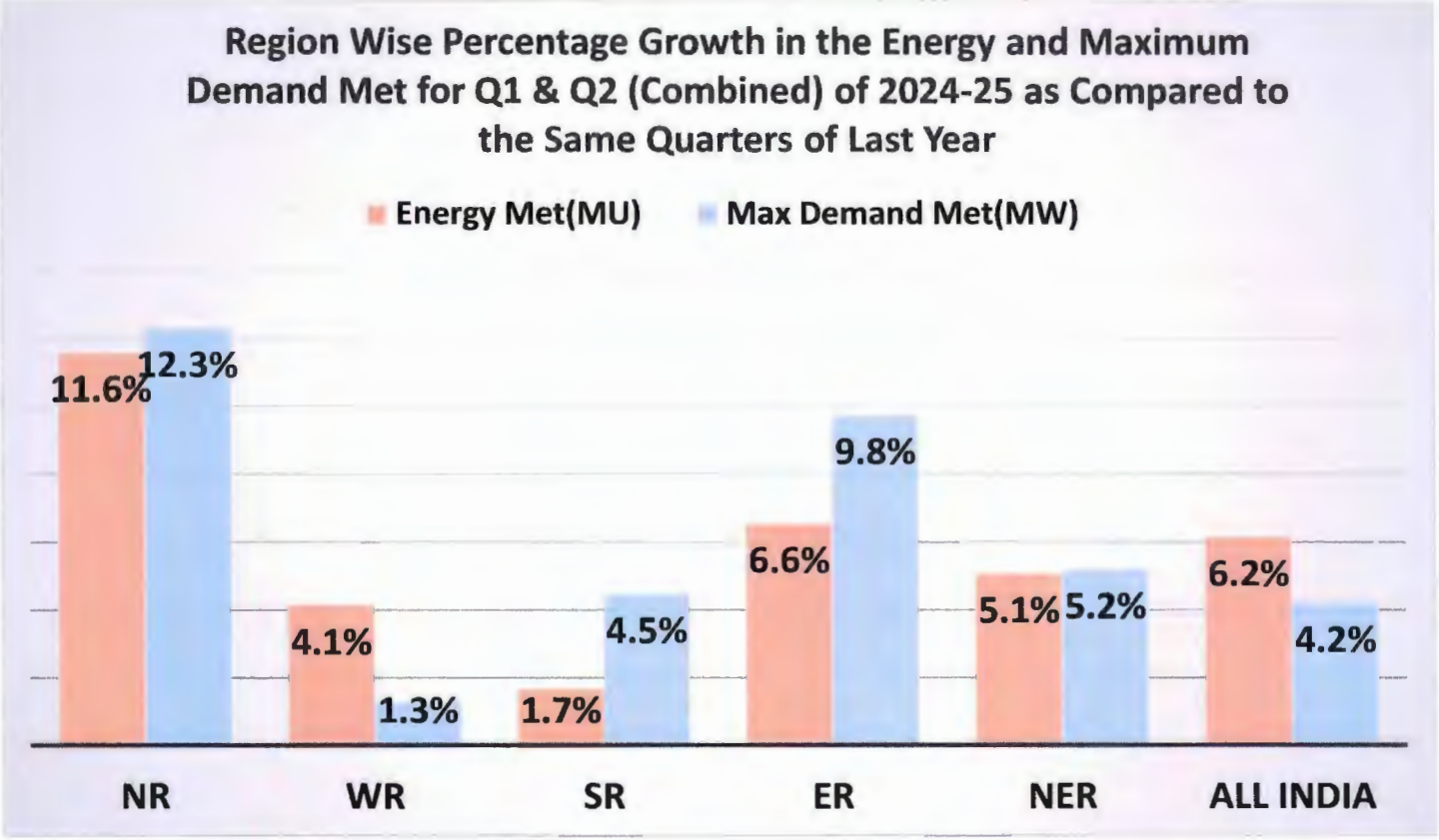
All India Daily Energy Met and Peak Demand of FY 2024-25, 2023-24 & 2022-23



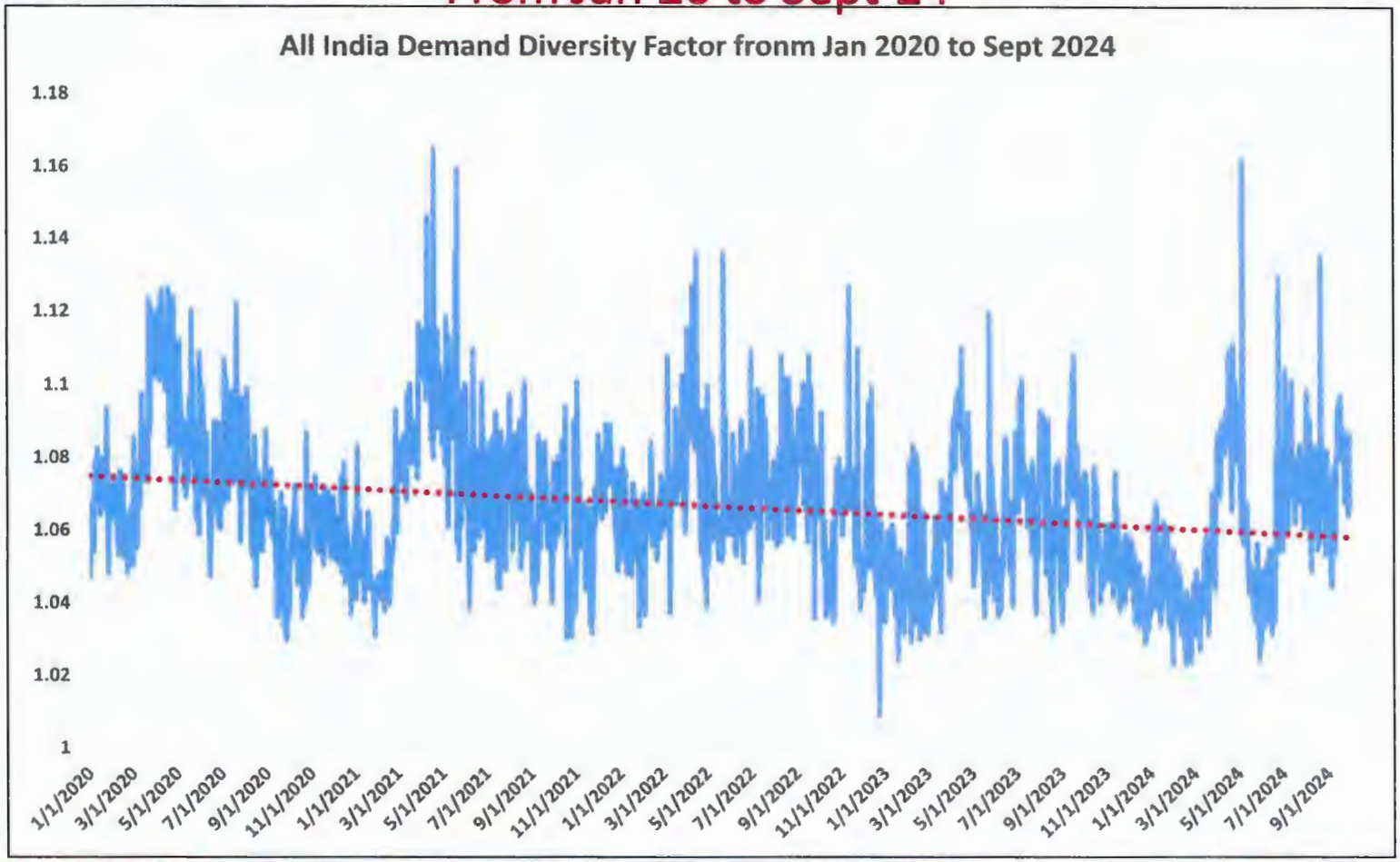


Significant increase in both Maximum Demand and Energy Met in FY 2023-24

All India Percentage Growth in the Energy Consumption and Maximum Demand Met



All India Maximum Demand Diversity Factor From Jan'20 to Sept'24



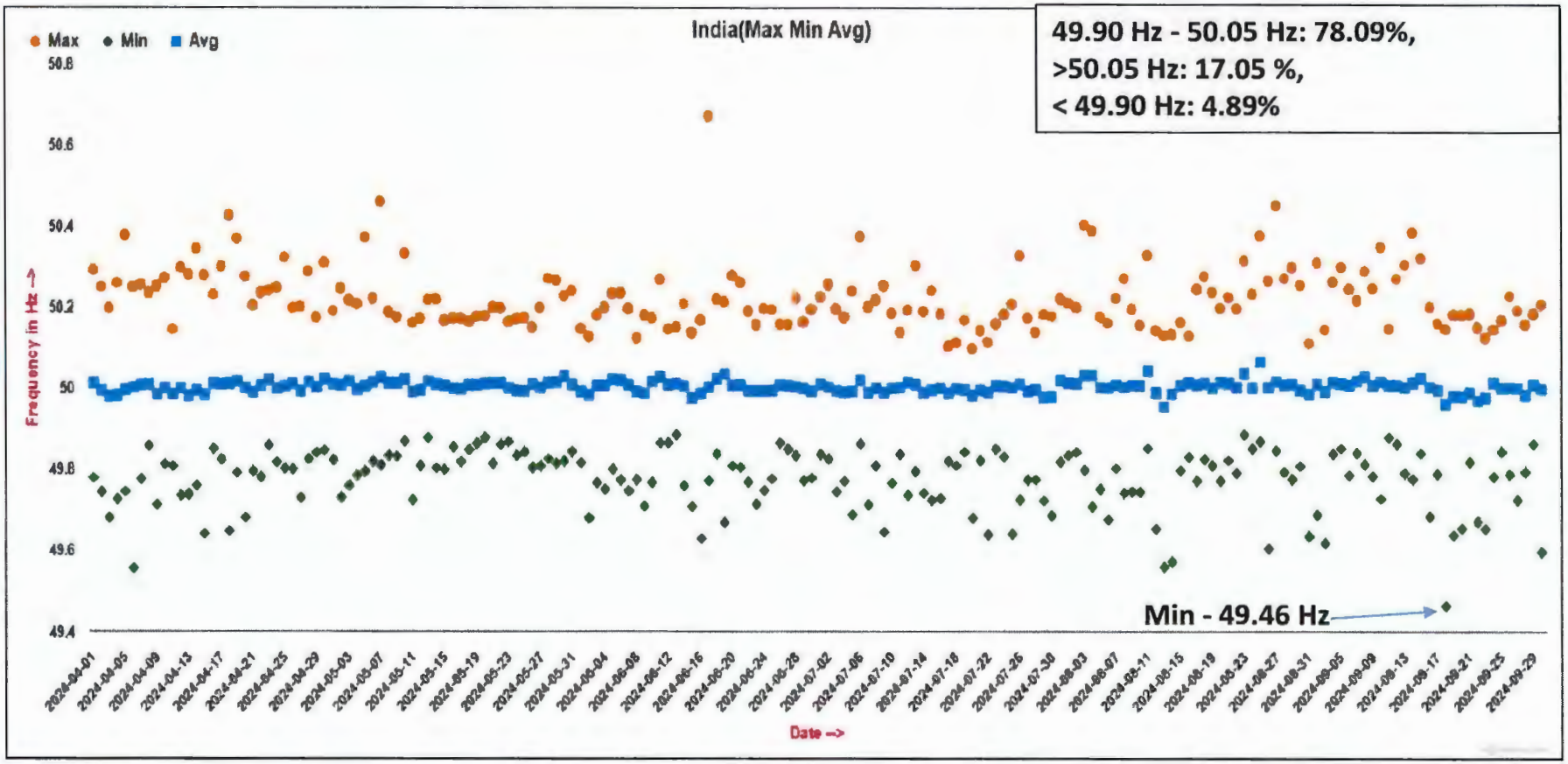
All Time Highest Figures (In – 2024-25)

Regions	Maximum Demand Met during the day(MW)	Demand Met During Evening Peak hrs(MW)	Energy Met(MU)	Hydro Gen(MU)	Wind Gen(MU)	Solar Gen(MU)
NR	91215 19-06-2024	82312 23-07-2024	1990 18-06-2024	442.6 01-08-2023	85.7 07-08-2023	185.7 01-05-2024
WR	74974 01-06-2024	67482 30-05-2024	1648 06-05-2024	167 18-12-2014	310.2 28-05-2024	102.9 30-04-2024
SR	68735 13-03-2024	54798 29-04-2024	1415.8 05-04-2024	208 31-08-2018	323 26-07-2024	148.7 31-03-2024
ER	32531 10-06-2024	29695 29-05-2024	692 10-06-2024	157.4 14-09-2022	-	9.1 15-08-2024
NER	3905 19-09-2024	3787 19-09-2024	80.3 20-09-2024	166.2 06-11-2023	-	3.5 08-09-2024
All India	250070 30-05-2024	227354 29-05-2024	5466.1 30-05-2024	877.5 30-08-2022	619.4 28-05-2024	426.5 30-04-2024

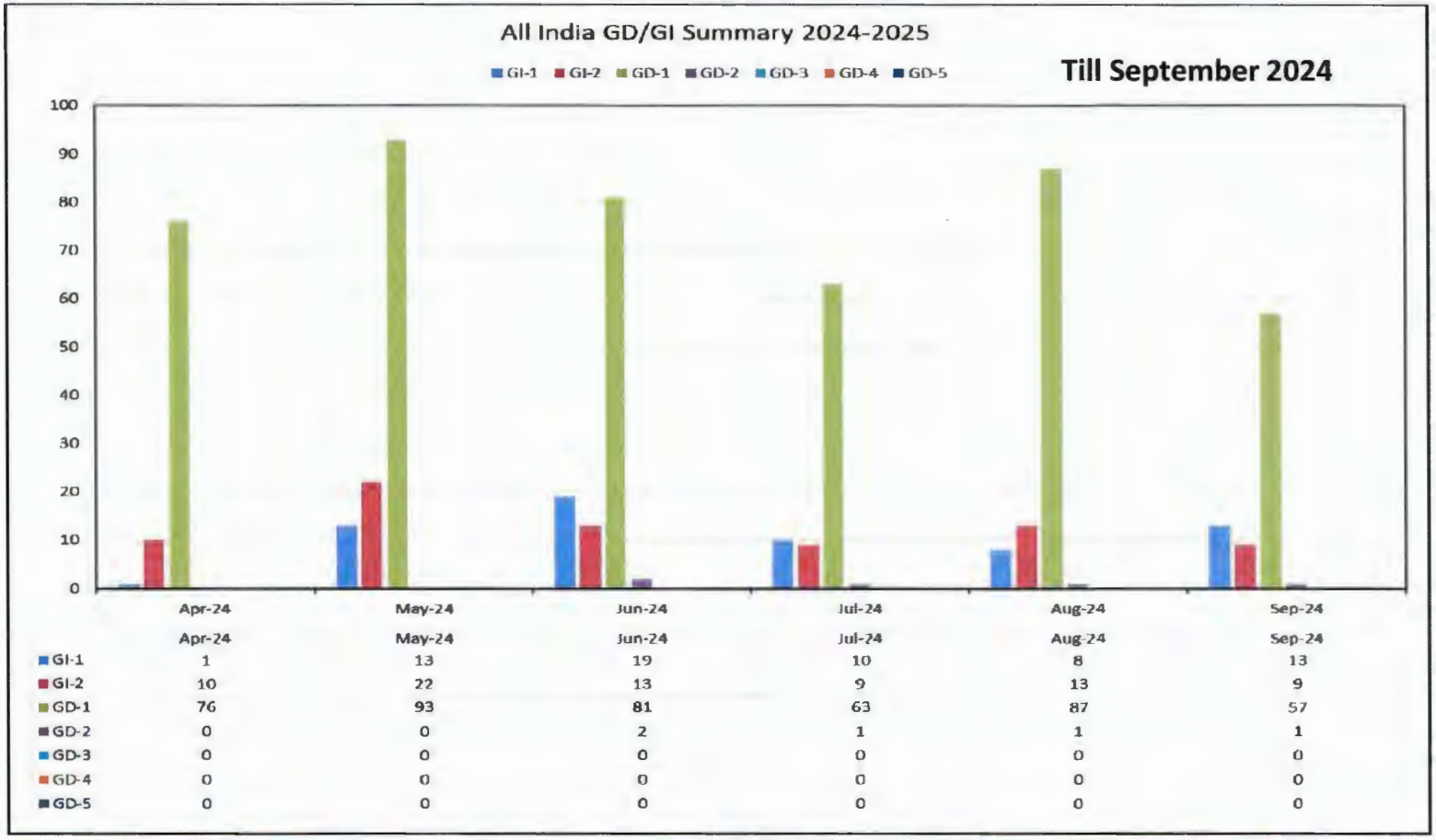
Maximum Figures in Q1, Q2 of 2024-25		
All India Peak Demand	250070	30-05-2024
All India Energy Met	5466.1	30-05-2024

Previous All-Time Highest Figures		
All India Peak Demand	239978	01-09-2023
All India Energy Met	5223.9	02-09-2023

Frequency Profile for Q2 & Q3 of FY – 2024-25



All India Grid Incidents/Disturbances in FY 2024-25



	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
GI-1	1	13	19	10	8	13
GI-2	10	22	13	9	13	9
GD-1	76	93	81	63	87	57
GD-2	0	0	2	1	1	1
GD-3	0	0	0	0	0	0
GD-4	0	0	0	0	0	0
GD-5	0	0	0	0	0	0

Reliability Issues Experienced in NR RE Complexes

Reliability issues experienced in NR RE Complexes

1. RE Generation Loss Events and Performance of RE Plants
2. Oscillations observed in NR RE Complexes and issue in STATCOM performance
3. Evacuation of large quantum of RE under T-GNA

RE Contingencies in 2024-25

S. No	Date	Time	Event
1	06-04-2024	11:24:00	400kV Bhadla(RS)-Bikaner(RS) Ckt-1 tripped due to R-Y fault respectively from Bhadla(RS) resulting in total NR RE generation loss of **4870 MW** (~3884MW ISTS RE generation and ~986 MW Rajasthan RE generation). Frequency dropped by **0.49 Hz** (from 50.029Hz to 49.539 Hz.
2	07-04-2024	10:24:00	400 KV Abdullapur-Kurukshetra (PG) Ckt-2 tripped on Y-N phase to earth fault. At the same time, 220/33 kV 100 MVA ICT 3 at RSDCL(PSS4)_SL_BHD2_PG also tripped due to over-flux protection operation resulting in total NR RE generation dip of **~1680 MW**
3	25-05-2024	12:46:00	Y-B fault converted into R-Y-B after ~220msec occurred on 220 KV Hissar(BBMB)-Hissar IA(HV) (HVPNL) Ckt-1. At the same time, line CB at Hissar(BBMB) end of 220 KV Hissar (BBMB)-Hissar IA(HV) (HVPNL) Ckt-2 also opened. On this fault, generation reduction at reduction of **~1100 MW** RE generation at Rajasthan occurred
4	30-05-2024	10:16:00	400 KV Sikar(PG)- Ratangarh (RS) (PG) Ckt-1 tripped on R-Y-N fault, 220kV Ratangarh (RS)-Khetri(RS) Ckt-2 tripped during the same time resulting in total NR RE generation drop/loss was **~1290 MW.**
5	01-06-2024	13:26:00	765 kV Meerut- Bhiwani (PG) Ckt-1 tripped from Bhiwani (PG) end only on R-N phase to earth fault with fault current of 4.679 kA and fault distance of 148.715 km from Bhiwani (PG) end resulting in dip in NR total solar generation of **~1695 MW** (ISTS Solar: ~1695 MW)
6	01-06-2024	13:43:00	400 KV Bawana-Mundka (DV) Ckt-1 & 2 tripped from Mundka(DV) end only on R-B phase to phase fault resulting in dip NR total solar generation of ~**3120 MW** (ISTS Solar: ~2710 MW, Rajasthan Solar: ~410 MW)
7	09-06-2024	11:21:00	R-phase conductor of 400 KV Akal-Jaisalmer2 (Bhainsra) (RS) Ckt broke at location no. 134 which caused R-B phase to phase fault on 400 KV Akal-Jaisalmer2 (Bhainsra) (RS) Ckt. During the same time, tripping of 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt on R-B phase to phase fault , 220kV Akal-Bhensra (Suzlon) , 400 KV Barmer(RS)-Jaisalmer2(Bhainsra) (RS) Ckt on R-B phase to phase fault resulting in dip in total RE generation of **~2625 MW** (ISTS Solar: ~1910 MW, Rajasthan Solar: ~715 MW
8	17-06-2024	13:53:00	Tripping of all four poles of HVDC Champa – Kurukshetra carrying ~4500MW from the Western Region to Northern Region resulting in dip of NR RE (Solar) of **~2800 MW**, however 1500 MW was generation was restored with 04 minutes.
9	19-06-2024	12:42:00	Low voltage scenario was prevailing in mainly Rajasthan, Delhi and UP control area. The voltage at 400kV Bikaner(RS), Bhadla(RS), Bhinmal(RS) and Kankani(RS) were 377kV, 382kV, 379kV and 375kV respectively. 3-phase to ground fault observed at Bhadla-II leading to loss of total NR RE generation of ~**4930 MW**

Total 13 RE generation loss event(>500 MW) in Rajasthan complex since Apr 2024

RE Contingencies in 2024-25

S. No	Date	Time	Event
10	06-07-2024	05:26:00	R-phase conductor of 220 KV Akal-Akal(Suzlon) (RS) ckt-2 brooked which caused R-N phase to earth fault and subsequently 220 KV Akal-Akal (Suzlon) (RS) ckt-2 tripped on zone-1 distance protection from Akal(RS) end. At the same time, 220 KV Akal-Akal(Suzlon) (RS) Ckt-1 and 220 KV Akal- Mulana (RS) Ckt also tripped from Akal(RS) end. During this event, dip in Rajasthan wind generation of **~1800 MW** observed
11	13-09-2024	02:49:00	Y-phase jumper of 220kV bus-1 of 220kV Akal-Bhensara Ckt-1 and R-phase jumper of 220kV bus-2 of 220kV Akal-Bhensara Ckt-2 snapped which created bus fault on both 220kV buses at Akal(RS). 400/220 kV 500 MVA ICT-1, ICT-2 tripped on earth fault protection and 400/220 kV 315 MVA ICT-3 & 500 MVA ICT-4 tripped on over current protection at Akal(RS) S/s. 220kV lines from Akal(RS) to Giral & Amarsagar tripped on zone-4 distance protection from Akal(RS) end. 220kV Akal-Bhensara Ckt-1 & 2 tripped. Due to tripping of all four ICTs at Akal(RS), evacuation path lost for all the wind power plants connected at 220kV bus-1 & bus-2 at Akal(RS). During this event, dip in Rajasthan wind generation of **~1295 MW** is observed out of which approx.
12	13-09-2024	13:15:00	220 kV Bhadla(PG)-Azure Power 34 Solar(APTFL) (APTFL) Ckt tripped due to B-N phase to earth fault (B phase jumper broken. Due to tripping of 220 kV Bhadla(PG)-Azure Power 34 Solar(APTFL) (APTFL) Ckt, Azure Power 34 (APTFL) (IP) S/s lost its connectivity from grid and blackout occurred at 220/33kV Azure Power 34 (APTFL) (IP) S/s. This led to loss of solar generation of **~770 MW**
13	20-09-2024	12:00:00	Y-phase jumper of 220kV Jaisalmer -Akal Ckt-2 broke at Jaisalmer end. At the same time, bus bar protection operated at 220kV level of Jaisalmer and all the elements connected at 220kV level of Jaisalmer tripped and both the 220kV buses became dead. During this event, as per SCADA, solar generation loss of **~1070 MW** observed in Rajasthan control area.

Total 13 RE generation loss event(>500 MW) in Rajasthan complex since Apr 2024

RE Contingencies in 2024-25

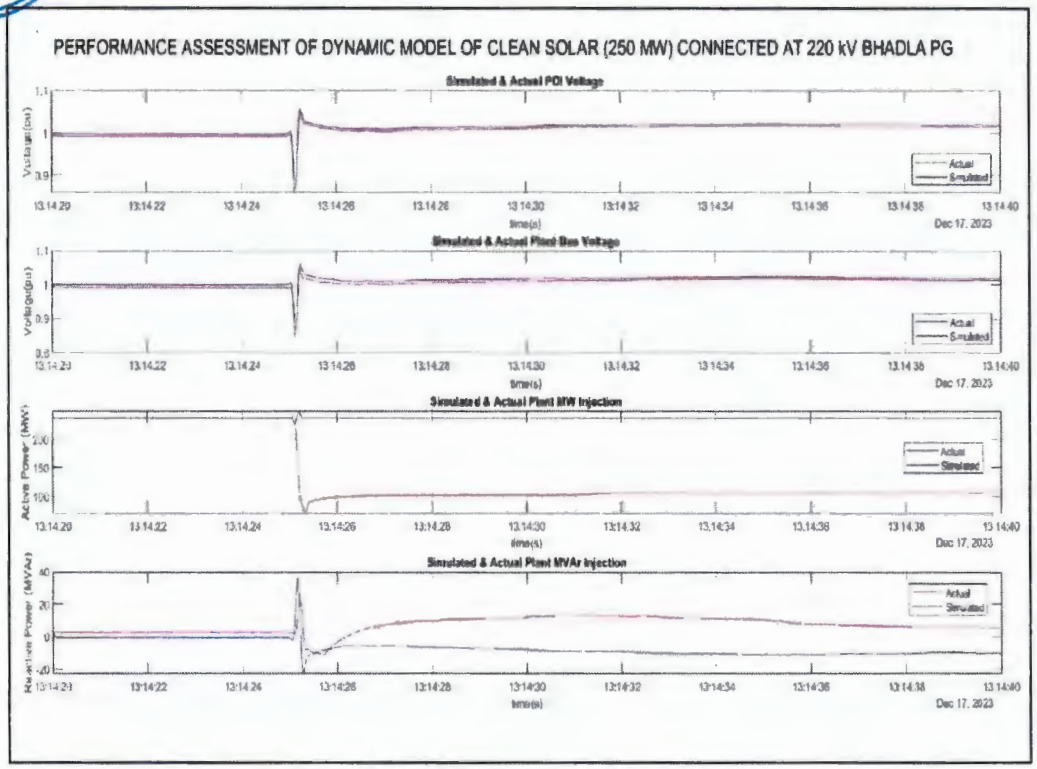
Major Observations:

- Plants entering into LVRT mode even when POI voltage is > 0.9 pu
- Opposite/insignificant reactive power injection observed by plants during faults
- Delayed recovery of active power by RE plants post fault clearance
- Partial recovery of active power after clearance of fault in the system
- Inadequate capacitive support from RE plants in intra-state
- No issues observed in the submitted dynamic models of the RE plants. Real-time behavior completely in variance with the models submitted during FTC

Non-compliance Summary

Compliance summary Apr 24 - June 24				
Date & Time of event	PMU data Reporting	Type of Compliance	Reactive Power Support during fault condition (partially, fully, non-complaint)	Active Power (MW) - Recovery/LVRT Compliance
		CEA Technical Standard to the connecticity regulation Clause	B(2) -1	B (2) -3
Compliance status Based on 06 Apr 24 Event(11:24 hrs)	No. of plants with data reporting - 35	Complied	13	9
		Non-Complied	22	26
Compliance status Based on 07 Apr 24 Event(10:24 hrs)	No. of plants with data reporting - 35	Complied	21	11
		Non-Complied	14	24
Compliance status Based on 19 Apr 24 Event(10:24 hrs)	No. of plants with data reporting - 37	Complied	32	3
		Non-Complied	5	34
Compliance status Based on 02 May 24 Event(14:40 hrs)	No. of plants with data reporting - 45	Complied	30	10
		Non-Complied	15	35
Compliance status Based on 01 Jun 24 Event(13:26 hrs)	No. of plants with data reporting - 29	Complied	22	2
		Non-Complied	7	27
Compliance status Based on 01 Jun 24 Event(13:43 hrs)	No. of plants with data reporting - 27	Complied	21	7
		Non-Complied	6	20
Compliance status Based on 04 Jun 24 Event(10:26 hrs)	No. of plants with data reporting - 37	Complied	33	7
		Non-Complied	4	30
Compliance status Based on 04 Jun 24 Event(12:35 hrs)	No. of plants with data reporting - 40	Complied	32	9
		Non-Complied	8	31
Compliance status Based on 09Jun 24 Event(10:21	No. of plants with data reporting - 40	Complied	22	15
		Non-Complied	17	27
Compliance status Based on 17 Jun 24 Event(13:53 hrs)	No. of plants with data reporting - 44	Complied	33	10
		Non-Complied	11	34
Compliance status Based on 19 Jun 24 Event(12:42 hrs)	No. of plants with data reporting - 47	Complied	20	10
		Non-Complied	27	37

Constraints in carrying out the studies at RLDC/NLDC



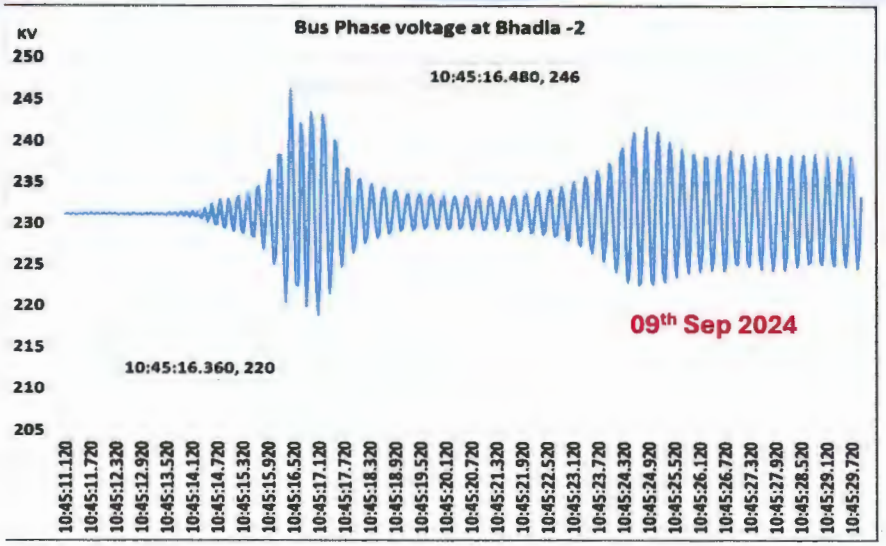
Accurate model with all control and protection settings to be prepared and submitted before interconnection

Inaccurate models submitted by OEMs :- Mismatch in performance of **submitted dynamic models** by RE developers for ISTS-connected plants in Rajasthan vis-à-vis actual performance of plants in real-time during faults

Observed deficiencies in submitted models

- High consideration of Short Circuit ratio (SCR) by RE Developers.
- Improper modelling - Post fault characteristics, Collector System Network etc.
- Consideration of different LVRT/HVRT K-factors in models in place of implemented value at site.
- No/incorrect modelling of relay in simulation model for IBRs, Collector system etc.
- Non-consideration of communication delays, polling rates/update rates of equipment in modelling

Oscillations Observed in NR RE Complex



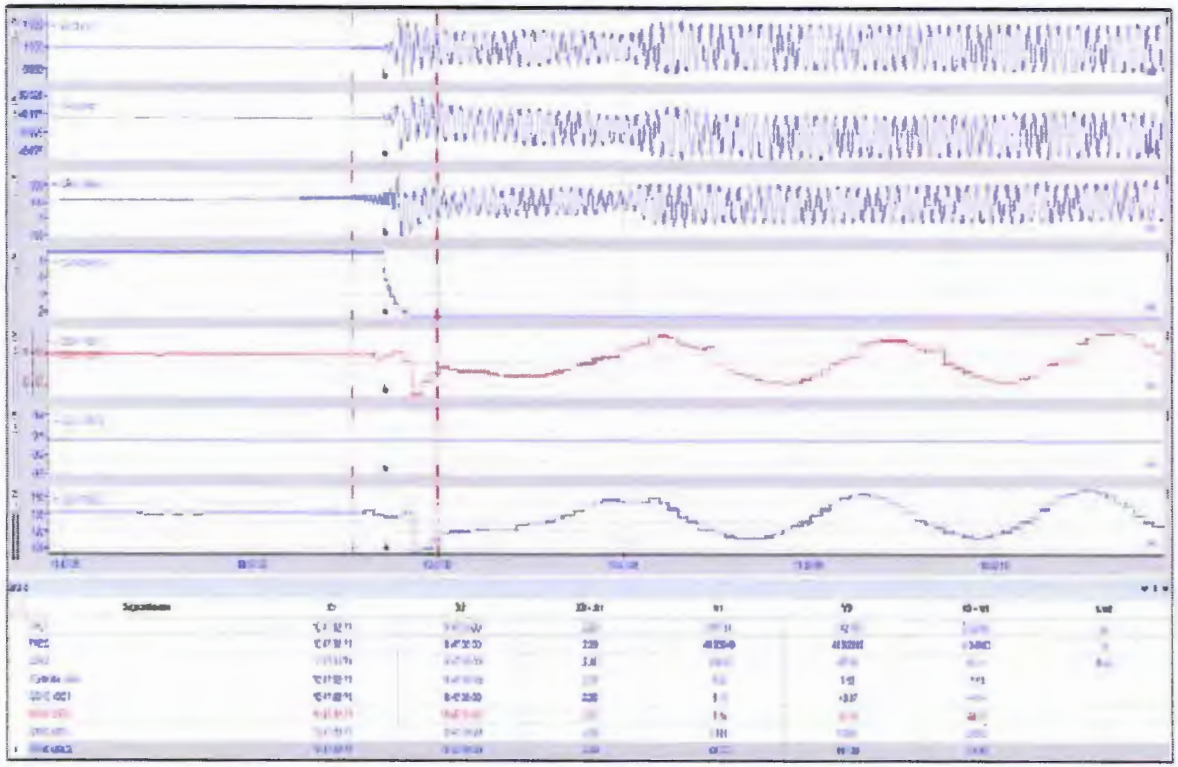
- No triggering event (reactor switching, line charging etc.)
- Frequency of oscillation observed in the range of 3 to 6 Hz.
- Primarily observed in voltage and reactive power.

Actions taken to minimize the issue of voltage oscillation in RE pocket of NR (Rajasthan RE complex):

1. Detection of source and sink of oscillation, their modes and damping factor through OSLp tool in real-time operation
2. The observations and possible measures were communicated to plant having issue of oscillatory response and momentarily sharp reduction in voltage
3. Changing the mode of control for a few RE plants from Voltage control to Fixed PF and Fixed Q
4. Tuning of few parameters of their PPCs like Proportional gain (Kp), Integral time constant (Ti) and change in Voltage dead-band (Vdb) (changed from 1% to 2%) for identified RE Plants connected at Fatehgarh-II(PG) and Fatehgarh-I.
5. Studies for IBRs interaction with STATCOM need to be carried out by the OEM in consultation with CTUIL and Grid-India.

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Observations on response time:

Measured w.r.t Qmax.
- Fault case: **60 ms**
- Oscillations case: **80 ms**

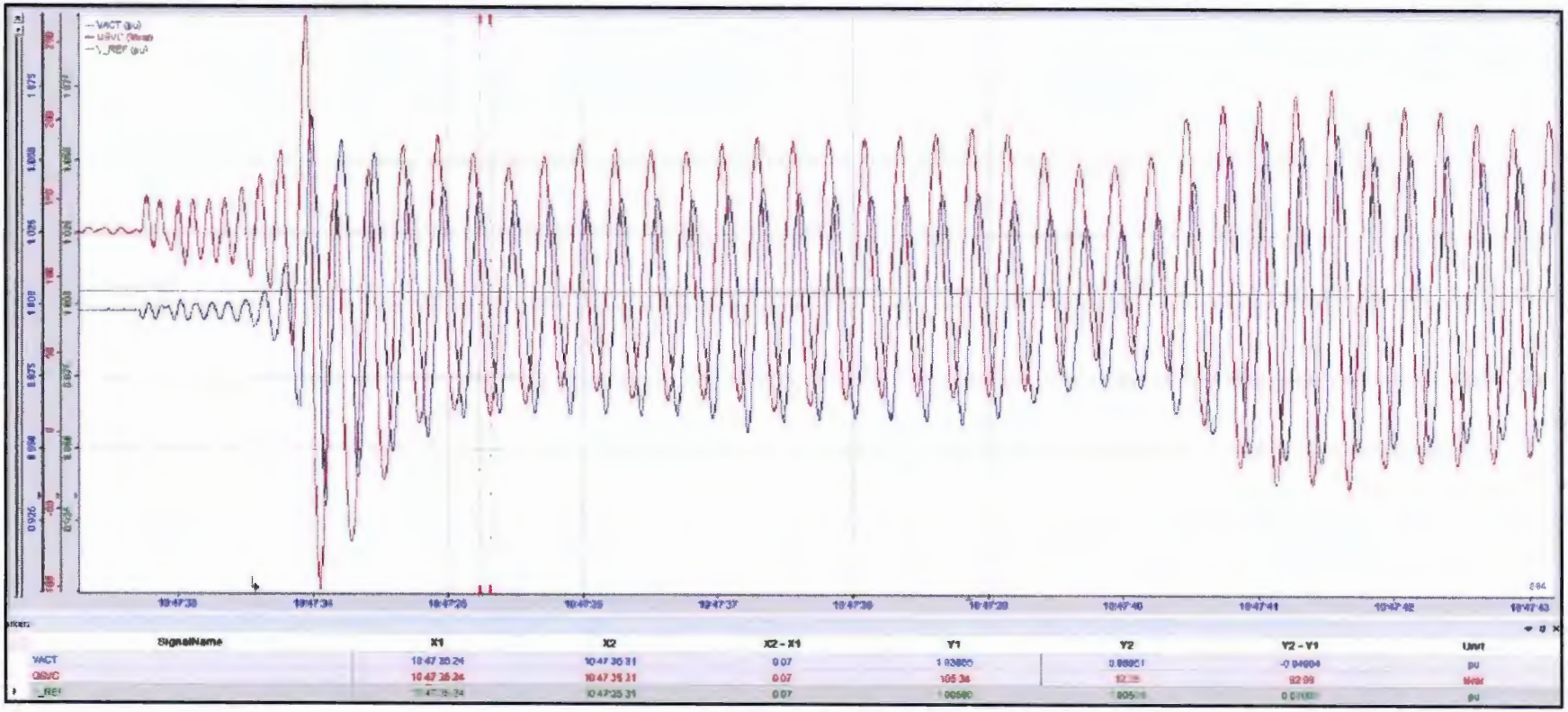
Measured w.r.t Id act. (max.)
- Fault case: **50 ms**
- Oscillations case: **70 ms**

- **High response time (sluggish response)** during faults leading to injection of reactive power post clearance of fault
- **Automatic gain reduction by stability controller of the STATCOMs on hunting detection, possibly leading to enhancement in magnitude of oscillations**

A meeting may be convened by CEA with the STATCOM OEMs POWERGRID, CTUIL and Grid-India on priority to deliberate the highlighted issues and potential remedial measures. (Detailed analysis shared with CEA, CTUIL & Asset owner)

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Measured w.r.t Qmax.

- Fault case: **60 ms**
- Oscillations case: **80 ms**

Measured w.r.t Id act. (max.)

- Fault case: **50 ms**
- Oscillations case: **70 ms**

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Simulation based Analysis of Bhadla-II STATCOM-1

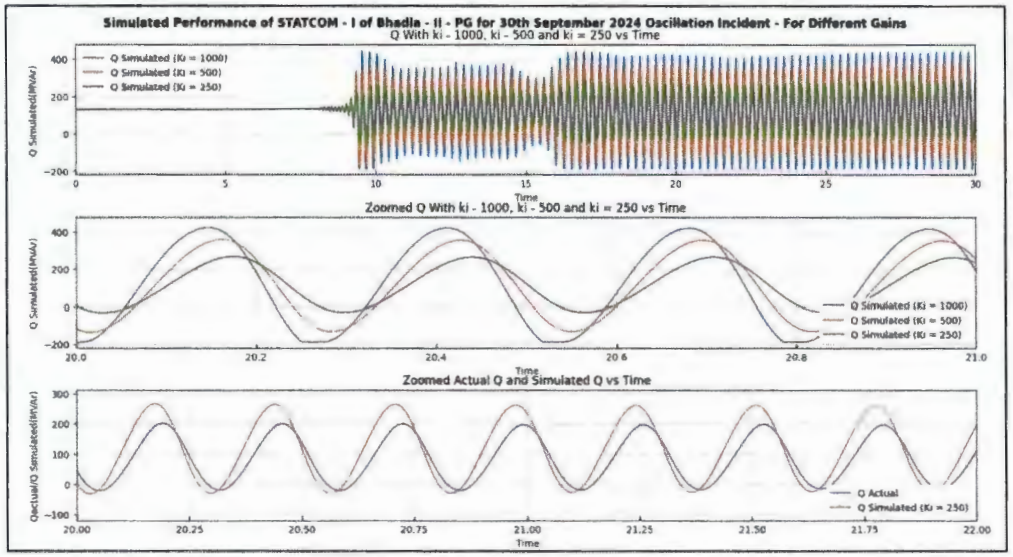


Figure 22: (a) Qsim. (ki = 1000, 500 & 250) (b) Zoomed Version - Qsim. (ki = 1000, 500 & 250) (c) Qact. & Qsim. (ki = 250)

Date	Event Type	Antecedent Conditions and Control Modes of STATCOM	Observations	
			From Transient Fault Recorder (TFR)	RMS Simulation
20 Sep 2024	Fault Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~160 MVAr ➢ VSC 1 + VSC 2: ~20 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~140 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~5 ➢ Max STATCOM MVAr Injection: **480 MVAr** ➢ Time taken to reach max. MVAR : **60 ms**	➢ Max STATCOM MVAr Injection: a) **Kp = 1, Ki = 1000 - 490 MVAr** b) **Kp = 1, Ki = 500 - 443 MVAr** c) **Kp = 1, Ki = 250 - 327 MVAr** ➢ Time for reaching max. MVAR: **57 ms**
30 Sep 2024	Low Frequency Oscillation Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~130 MVAr ➢ VSC 1 + VSC 2: ~(-)7 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~137 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~1.5 ➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for a selected cycle: **+221/-36 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): **70 ms**	➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for the selected cycle: a) **Kp = 1, Ki = 1000 - +438/-187 MVAr** b) **Kp = 1, Ki = 500 - +394/-166 MVAr** c) **Kp = 1, Ki = 250 - +290/-48 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): a) **Kp = 1, Ki = 1000 – 35 ms** b) **Kp = 1, Ki = 1000 – 50 ms** c) **Kp = 1, Ki = 1000 – 70 ms**

RMS Simulations

- Output of the STATCOM is getting delayed with **reduction in gain**
- The reduction in gain not only impacts the response time but also the **max. output of the STATCOM** within a certain interval.

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Simulation based Analysis of Bhadla-II STATCOM-1

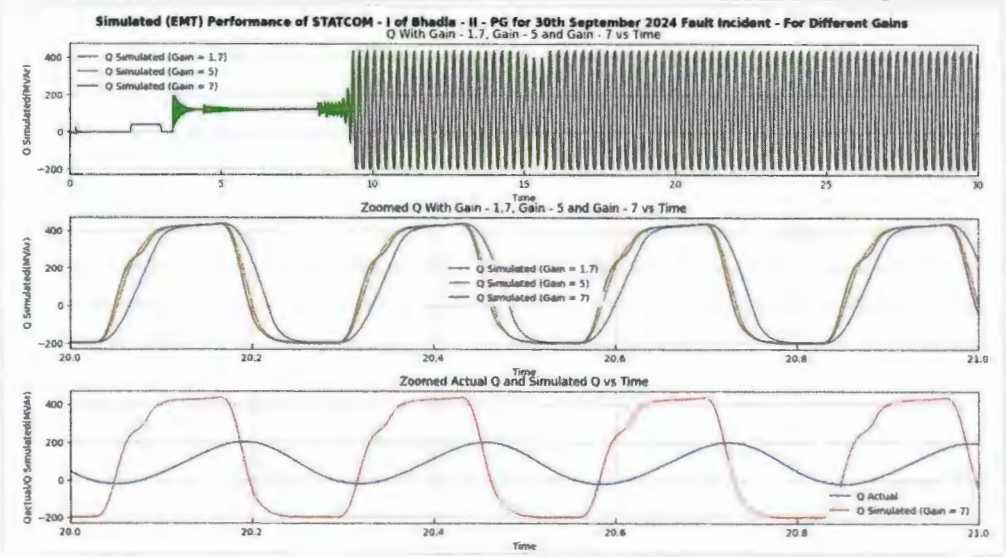


Figure 37: (a) Qsim (Gain = 1.7, 5, 7) (b) Zoomed Qsim. (Gain = 1.7, 5, 7) (c) Zoomed Qact v/s Qsim (Gain = 7)

Date	Event Type	Antecedent Conditions and Control Modes of STATCOM	Observations	
			From Transient Fault Recorder (TFR)	EMT Simulation
20 Sep 2024	Fault Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~160 MVAr ➢ VSC 1 + VSC 2: ~20 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~140 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~5 ➢ Max STATCOM MVAr Injection: **480 MVAr** ➢ Time taken to reach max. MVAR : **60 ms**	➢ Max STATCOM MVAr Injection: a) **Gain = 1.5 and 5 - 454 MVar** b) **Gain = 7 and beyond - Unstable response** ➢ Time for reaching max. MVAR: **60 - 66 ms**
30 Sep 2024	Low Frequency Oscillation Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~130 MVAr ➢ VSC 1 + VSC 2: ~(-)7 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~137 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~1.5 ➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for a selected cycle: **+221/-36 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): **70 ms**	➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for the selected cycle: **Gain = 1.7, 5, 7 - +439/-195 MVAr**

EMT Simulations

- Delay in providing reactive power response increases with reduction in gain.
- The reduction of gain by the stability controller, therefore, might be one of the reasons for not getting adequate and fast reactive power support by the STATCOM during oscillations.

STATCOMS in Indian Power System and YTC

Region wise List of STATCOMs						YTC (in Lakhs)
Region	Name	VSC	MSC	MSR	Make	
Eastern Region	Rourkela	2X150	Nil	2X125	Siemens	757.6
	Kishanganj	2X100	Nil	2X125	Siemens	757.6
	Ranchi (New)	2X150	Nil	2X125	Siemens	757.6
	Jeypore	2X100	2X125	2X125	Siemens	757.6
Western Region	Satna	2X150	1X125	2X125	RXPE	3265.63
	Aurangabad	2X150	1X125	2X125	RXPE	3265.63
	Solapur	2X150	1X125	2X125	RXPE	3265.63
	Gwalior	2X100	1X125	2X125	RXPE	3265.63
Southern Region	NP Kunta	2x50	-	-	Hyosung	175.447
	Trichy	2x100	1 x 125	2 x 125	Hyosung	1008.82
	Hyderabad	2x100	1 x 125	2 x 125	Hyosung	1012.38
	Udumalpet	2x100	1 x 125	2 x 125	Hyosung	1232.86
Northern Region	Nallagarh	2X200	2 x 125	2 x 125	RXPE	2799.9
	Lucknow	2X300	2 x 125	2 x 125	RXPE	3593.8
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bikaner-II	1x300	2 x 125	1 x 125	Siemens	2099.9
North Eastern Region	No Statcom					
Total YTC						36415.52

6.2.1. STATCOM Station Functions and Applications

6.2.1.1. Voltage Control mode (Automatic and Manual)

Control of the positive sequence component of the fundamental frequency voltage in steady state and dynamic operation, with slope in the range as specified at clause 6.1 e) above.

6.2.1.2. Fixed Reactive Power Mode

In this mode, the reactive power output of the STATCOM as well as switching of MSRs and MSCs, should be manually controlled, by direct operator action. This feature is normally utilized for testing purpose.

6.2.1.3. Steady State Condition

The STATCOM Station (STATCOM along with MSCs and MSRs) shall provide necessary reactive power support to the 400 kV bus (PCC) to compensate for voltage variation under steady state.

6.2.1.4. Dynamic Over-voltage Control Performance

The STATCOM shall be required to provide necessary reactive power support with fast and smooth variation so that over-voltages under dynamic conditions are controlled. STATCOM shall smooth out the step caused by switching of MSCs and MSRs.

The operation of each STATCOM over its range of MVAR from full capacitive to full Inductive capacity and vice-versa shall be on the basis of smooth variation.

6.2.1.5. Transient and Dynamic Stability Performances

The STATCOM Station shall provide necessary reactive power so that transient and dynamic stability of the Owner's system are enhanced.

6.2.1.6. Damping of Power Oscillations

The STATCOM shall provide necessary damping to power oscillations by modulating its output in its entire range based on measured rate of change of power/frequency at the 400kV bus. The

6.2.1.9. Gain Supervision and Control

To control regulator gain in order to prevent oscillations and excessive overshoot in the STATCOM response, a gain supervision function shall be implemented.

This shall be an essential function for supervision of stability of the closed loop voltage control. The function of this controller is that when the supervision of the gain in the voltage regulator detects oscillations in the voltage controller output, the gain shall gradually be reduced until stability is reached. Normally it is a changed condition in the transmission system contribution to the closed loop gain that results in the instability. The reduction in the voltage regulator gain shall only balance the external change. The control should be adaptive in order to maximize its effectiveness. Gain reductions should be indicated and the reduction of the gain shall be able to be reset to nominal value by means of commands from the operator interface or automatically. A relative gain factor shall also be able to be changed from a gain optimizer.

6.2.1.10. Coordinated reactive power control of external devices

To optimize the use of dynamic vars versus steady state vars, control of externally connected shunt capacitor or reactor banks shall be implemented. Such banks will be connected locally to a HV bus or/and at MV bus. For simultaneous control with the supplementary VSC current controller, coordination for the two functions shall be provided. External devices like mechanically switched capacitor (MSC)/mechanically switched reactor (MSR) can be switched ON or OFF to position the steady state operating point of the VSC so as to extend its dynamic range.

6.2.1.11. Supplementary VSC current controller

To optimize the use of dynamic vars versus steady state vars, a control function that slowly reduces or offsets the STATCOM point of operation shall be implemented. By deliberately adjusting the voltage reference setting within a narrow window the STATCOM system output is pushed toward either a specific point or toward a window to preserve dynamic range. This slow operating function is meant to provide for slower controllers, such as externally connected shunt bank to operate and meet the slower long term voltage variations caused by daily or weekly load variations. Rapid changes in the system voltage that call for dynamic compensation will have priority over this type of controller.

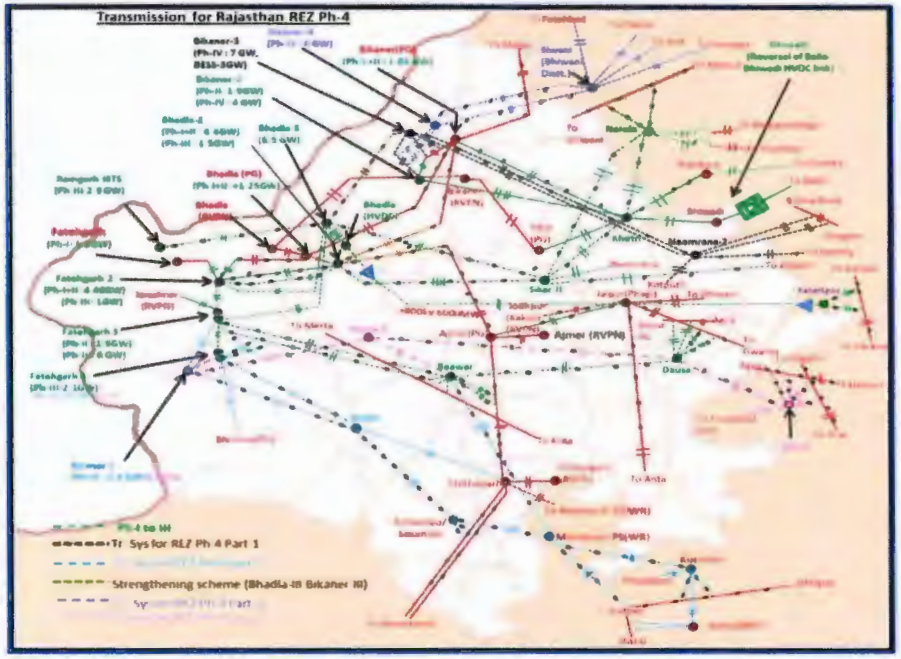
6.2.1.12. Gain optimization

To provide operation at optimal regulator gain, a fully automatic optimizing function shall be implemented. This function operates by inducing a small change in the STATCOM output. The gain is adjusted based on the network response signal.

Synchronous Condensers committee

- Committee of members from CEA, NRPC, NRLDC, NTPC, BHEL, CTU and STUs constituted under chairmanship of MS, NRPC to do futuristic analysis for requirement of Synchronous Condensers based on the inertia considerations for Northern Region.
- Committee conducted **4 nos of meetings** wherein deliberations on the requirements of Synchronous Condenser including other available technologies were done.
- During the Committee meetings, presentation by different OEMs viz **BHEL, Hitachi & Andritz Hydro** was also made highlighting various technological options available and its suitability under different system requirements.
- **CTUIL and CEA** to carry out system study for requirement of synchronous condenser as already mentioned in 500 GW RE report for every two-year time frame till year 2030
- **Detailed study submitted by Grid India on impact of installing synchronous condenser in the present scenario at Fatehgarh complex**
- **Observations based on study results**
  - Enhanced System Strength / Short Circuit Ratio (SCR)
  - Fast Reactive Power Support during Faults/Transients
  - Increased Inertia and Frequency Response
  - Damping of Low Frequency Oscillations.
  - Steady-state Reactive Power Support
- **Inputs given by Grid-India on Compensation Mechanism for Synchronous Condenser Facilities**

Evacuation of large quantum of RE under T-GNA



Pooling station	GNA Non-effective (Complete ATS not yet commissioned)
Bhadla(PG)	0
Bikaner(PG)	663
Fatehgarh-II(PG)	420
Bhadla-II(PG)	2132
Fatehgarh-I_Adani Pooling	0
Bikaner-II PS	1322
Fatehgarh-III PS	1180
Total	**5717**

- The phase-I & II transmission system has mostly been commissioned whereas transmission elements part of Phase-III transmission scheme are yet to be commissioned. (765 kV Bhadla-II – Sikar-II 2xD/C, 765 kV Khetri – Narela D/C, 765 kV Sikar-II – Narela, LILO of 765 kV Meerut – Bhiwani at 765 kV Narela etc.)
- Currently, 5717 MW RE in Rajasthan is being evacuated through T-GNA. The associated transmission schemes needs to be expedited as large quantum of RE is being evacuated through T-GNA.

Issues with evacuation of large quantum of RE under T-GNA

- As of now system is N-1 secure in steady state in terms of loading and angular separation with ~5GW of TGNA using NRLDC NOC.

Most credible contingency are given below

- N-1 contingency of 765kV Bhadla-II(PG)-Ajmer(PG) D/C line
- N-1 contingency of 400kV Bhadla(RS)-Bikaner(RS) D/C line
- N-1 contingency of 765kV Bikaner(PG)-Khetri D/C line

Limiting Constraint:

- **Angular separation exceeding 30°** under **N-1 contingency of 765kV Bhadla-II(PG)-Ajmer(PG) D/C** line if pre-contingency loading remains 2400MW each ckt.

765kV Bhadla-II(PG)-Ajmer(PG) D/C line			
Basecase		**N-1 contingency**	
Loading (MW)	Angular seperation (°)	Loading (MW)	Angular seperation (°)
2371	20.47	3230	28.59

- SPS implemented for 765kV Bhadla-II(PG)-Ajmer(PG) contingency.
- Despite being Quad moose line (due to poor condition of conductor), loading on 400kV Bhadla(RS)-Bikaner(RS) D/C line needs to be kept below 700MW each ckt to ensure N-1 compliance.

High frequency oscillation (>4Hz) observed during peak solar generation

- STATCOMs being kept in manual fixed 'Q' mode during peak solar period to address the issue of oscillation

- **NO further additional NOC shall be granted for RE generation evacuation from the complex till the charging of 765kV Bhadla-II-Sikar-II D/C line**

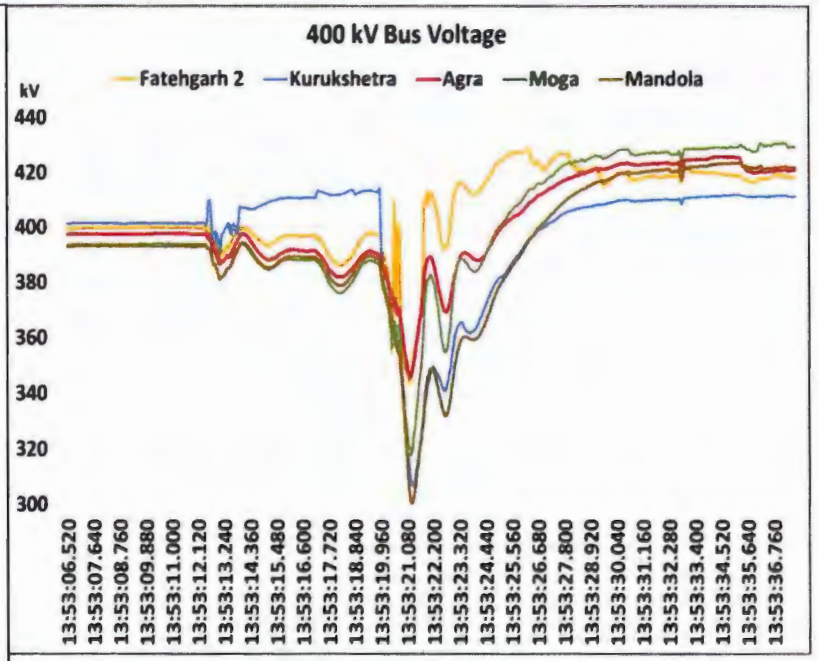
Present practice for curtailment is given below;

Infirm (Bilateral) > GNA Not effective (Bilateral) > GNA effective being scheduled in T-GNA (Bilateral) > GNA effective (Bilateral) > Collective.

Major Grid Disturbances leading to transmission constraints

Grid Event in Northern Region on 17 June 2024: Event Overview

1. Tripping of both Bipoles of **+/-800 kV HVDC Champa (WR) – Kurukshetra (NR) carrying 4,500 MW** from WR to NR
2. Sharp grid **voltage decline** and Northern Region **demand reduction by around 16.5 GW.**
   - Reduction in **NR RE generation of approx. 2870 MW.**
   - **12 conventional units tripped**, aggregating gen is **6775 MW,** majorly on over frequency.
3. High voltage scenario due to offloading of transmission network.
   - A **total of 23 (nos) transmission lines** (765kV and 400kV) **tripped on OV,** causing a partial blackout at the 765/400kV Aligarh(PG) S/s.
4. Load that reduced during the **low voltage at 13:53 hrs** began to recover gradually, the grid experienced another **low voltage scenario at 14:05 hrs.**
5. Frequency rise from **50.03 Hz to 50.68 Hz,** recovered back to 50.00 Hz within **~ 6 minutes**



Voltage touched 300 kV

- A Committee (CEA, NRPC,GRID-INDIA, CTUIL, POWERGRID) was constituted by MOP to look into the issues of this multiple tripping incidents.
- The committee has submitted the detailed analysis report to MOP

Major Observations

HVDC Link Vulnerability (N-4 Scenario):

- Tripping of +/-800 kV HVDC Champa-Kurukshetra link (4500 MW) triggered load loss event.
- Localized storm caused jumper swing and flashover.
- No redundancy in DMR.

Protection Philosophy Review:

- Over 30 trippings of HVDC link from Jan-Jun 2024. Detailed fault analysis and remediation needed to enhance reliability.

Voltage Collapse and Reactive Power Drawl:

- Significant voltage drops across Northern Region.
- Reactive power absorption increased, exacerbating voltage issues.

Load Behavior Analysis:

- Voltage reduction caused stalling of induction motors: total 16.5 GW load Reduced in NR.
- Stalling of motors at comparatively higher voltages (~0.85 - 0.9 p.u. voltage).

Outage of Generating Stations:

- Approximately 2800 MW of RE generation was reduced with around 1500 MW recovering within 4 minutes
- 16 Conventional Generating Units tripped, majorly on over frequency.

Reactive Power Support:

- Heavy reactive power drawl by loads are observed.
- Many RE plants have opposite response

High Voltage Scenario:

- Total 23 (no.) of transmission lines (765kV and 400kV) tripped on OV, causing a partial blackout at the 765/400kV Aligarh(PG) S/s.

Frequency Response :

- Inadequate Response:
  - More than 50% capacity in inter-state generators
  - more than 85% capacity of the intra-state generators

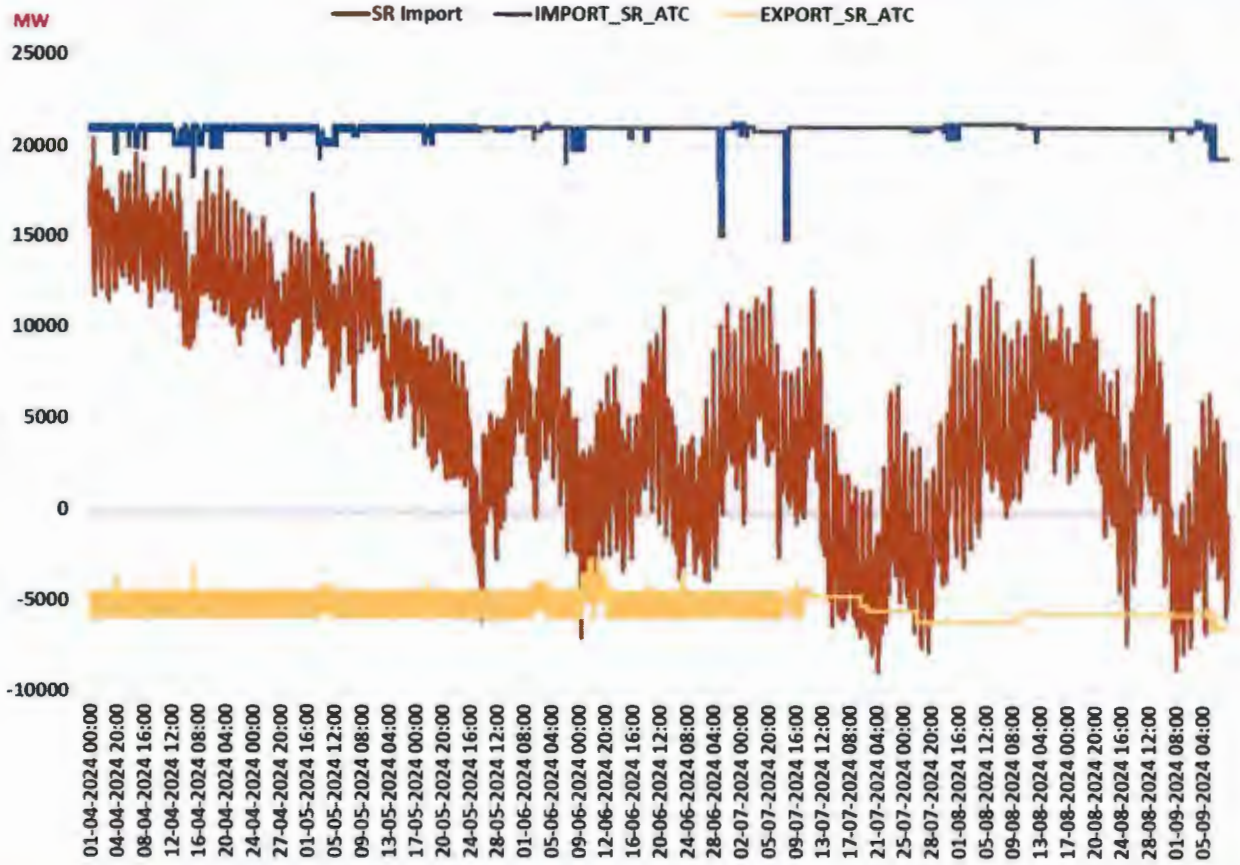
Coordination and Communication: Timely report submissions and communication are essential.

Recommendations of the Committee

- **Reduced reliability of HVDC Link:** Review of protection schemes and filter switching logic
- **Fault in HVDC Lines:** Review of transmission line design including cross arms, jumpers, etc.
- **Load Behaviour:**
  - Sudden voltage drop caused stalling of induction motor loads led to a reduction in active power transfer to key load centers in the Northern region (also validated using dynamic simulation studies).
  - The stalling of motors at high voltage (0.85-0.9 pu) is to be investigated and the motors serving load shall be compliant with IS/IEC.
- **Planning for dynamic reactive power sources near load centers based on load composition**
- **Frequency Response by Generating Units & Importance of non-pit-head-based generators near load centers for providing grid support during such events**
- **Compliance of CEA Standards by Renewable Generating Plants**
- **Reactive Power Management by SLDC and DISCOMs**
- **Review of Overvoltage gradings of EHV transmission lines**
- **Amendments in Existing Regulations** :Provisions related to different emerging types of loads (Electrolysers etc.)

Major Constraints in Inter-regional Network

Export by Southern Region (SR Import)



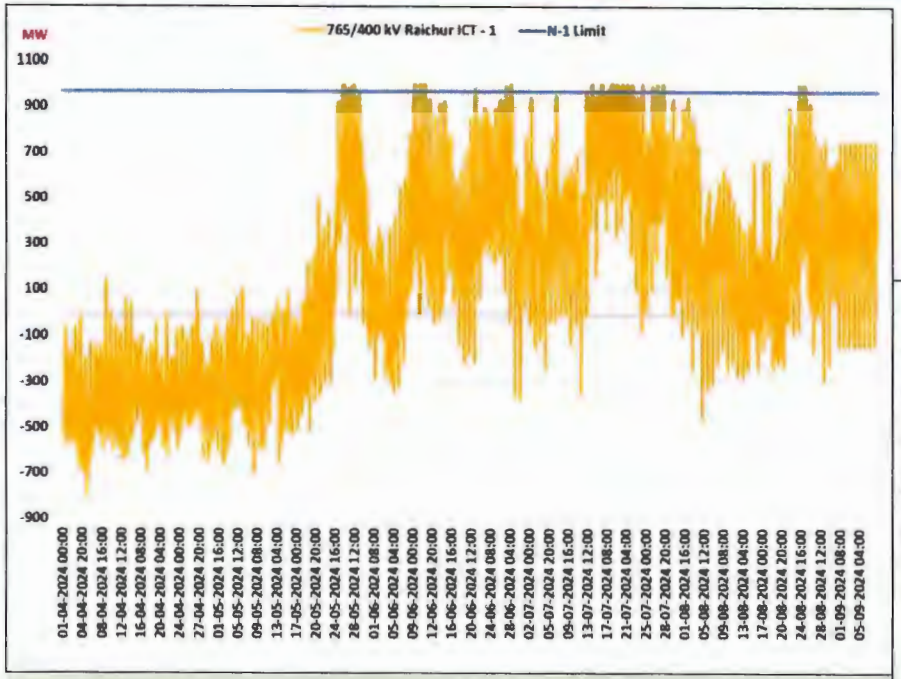
Constraint in SR Export Corridor

Sl No	Corridor	Time	TTC (MW)	ATC (MW)	Limiting Constraint
1	SR-WR	00 – 06 Hrs & 18 – 24 Hrs	7200	6550	➢ Angular separation between Kudgi & Kolhapur (PG) under N-1 touches 30 deg. ➢ N-1 Contingency of 765/400 kV, 1500 MVA ICTs at Raichur - PG will overload the other circuit. ➢ N-1 Contingency of 400 kV Kolhapur – Karad D/C will overload the other circuit. ➢ N-1 non-compliance of 2*1500 MVA, 765/400 kV ICTs at Section– B at Raigarh – PS (Kotra) with operation of HVDC Raigarh – Pugalur Bipole – 1 in SR-WR direction ➢ Restriction in power order of HVDC Gazuwaka(SR to ER) to maximum set point of 700 MW for solar hrs and 500 MW for non-solar hrs against the rated capacity of 1000 MW
		06 – 18 Hrs	7100	6450	
2	SR Export	00 – 06 Hrs & 18 – 24 Hrs	6400	5750	
		06 – 18 Hrs	6400	5750	

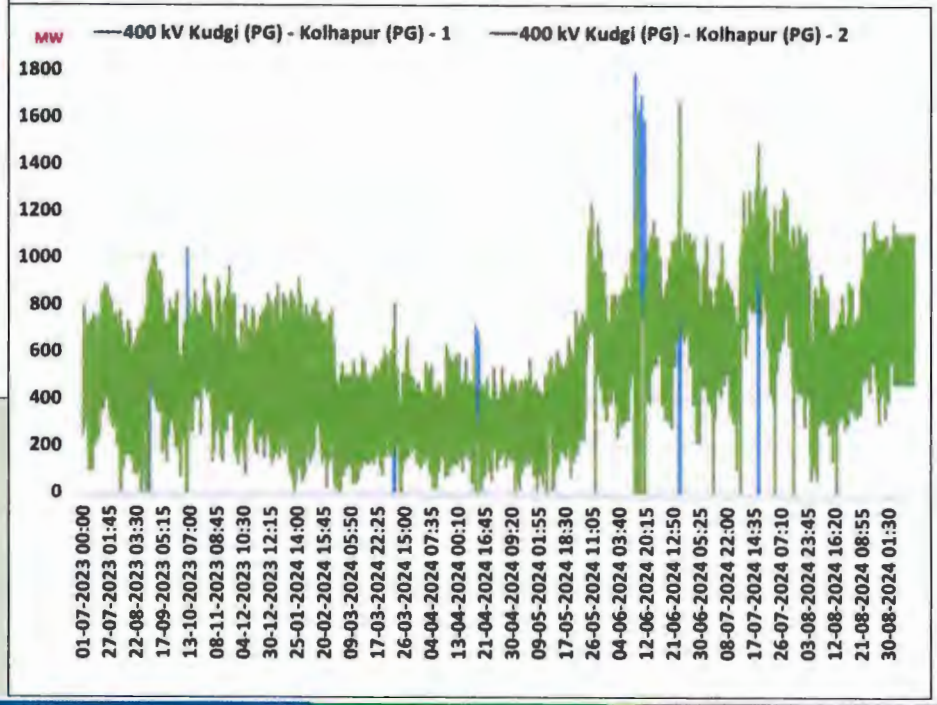
TTC/ATC for SR – WR & SR Export corridor is being regularly reviewed by NLDC and the figures are updated with any change in LGB or network topology including planned and forced shutdowns.

https://posoco.in/en/market/monthly-atc-inter-regional/inter-regional-2024-25/

Inter-regional Transmission Constraints for SR Export Corridor

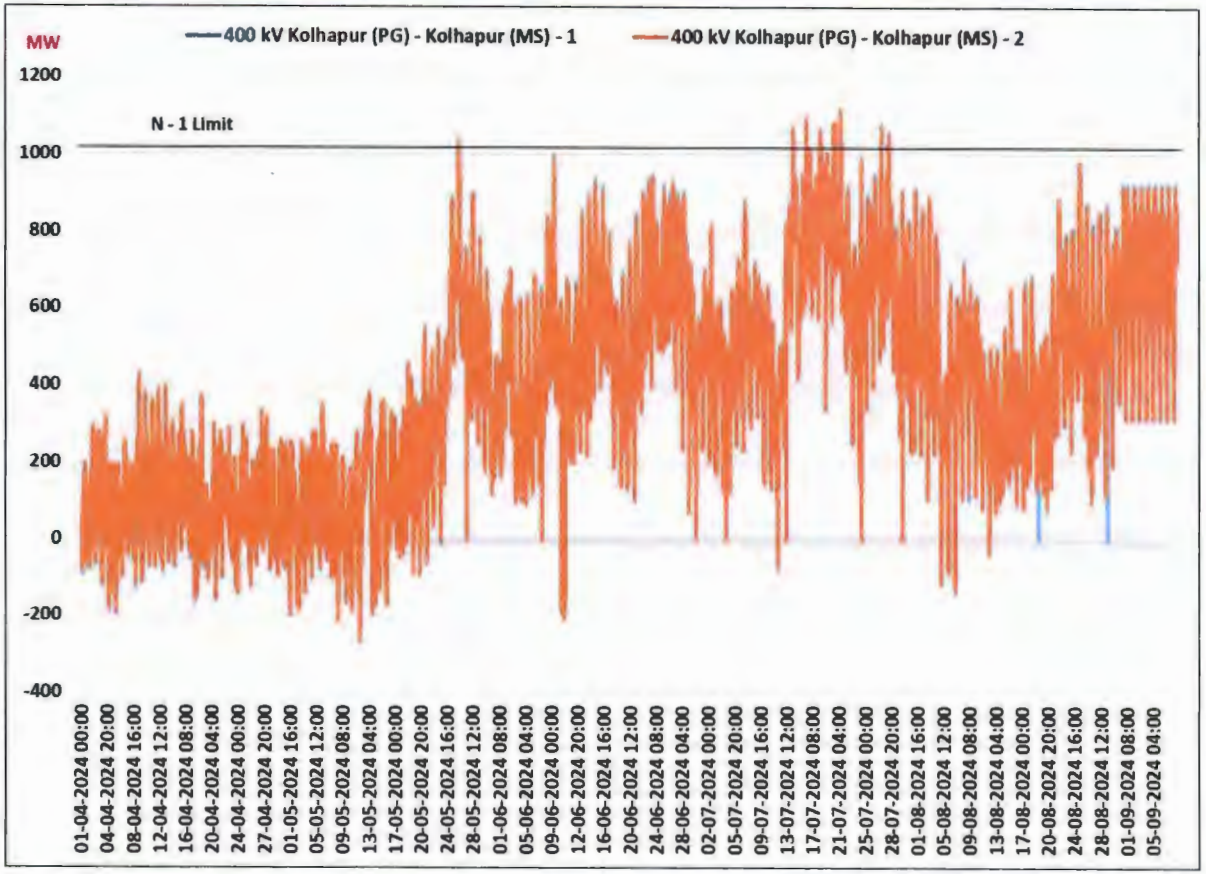


*Up to 8th September 2024



- 2x1500 MVA, 765/400 kV ICTs at Raichur – PG remain critically loaded and N-1 non compliant during peak SR Export Periods
- 400 kV Kudgi (PG) – Kolhapur (PG) (Quad Moose) also remain loaded above 1100 MW on a continuous basis with angular separation crossing 20-25 degrees under N condition.

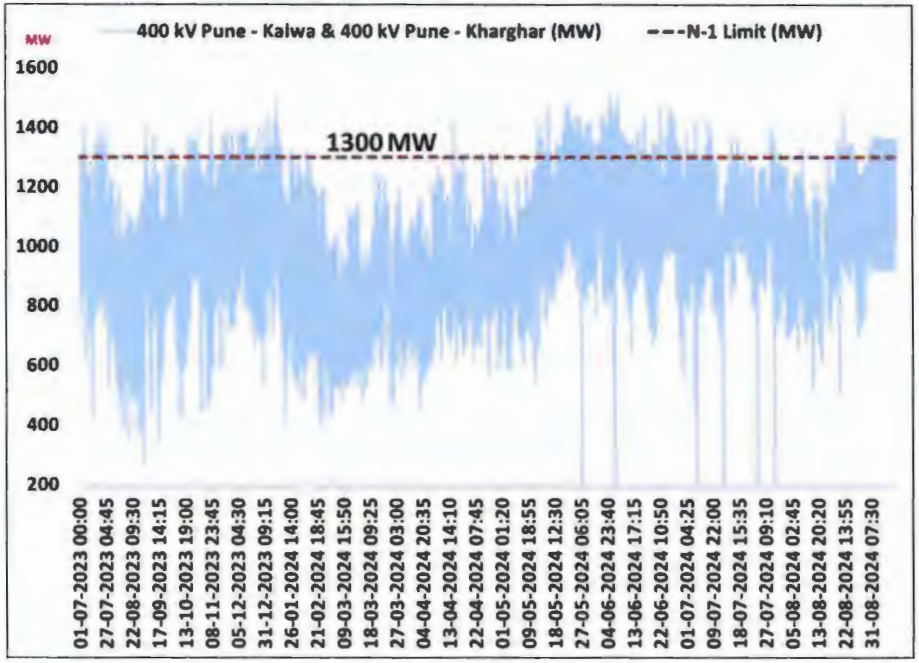
Maharashtra Network Constraints in SR Export Corridor

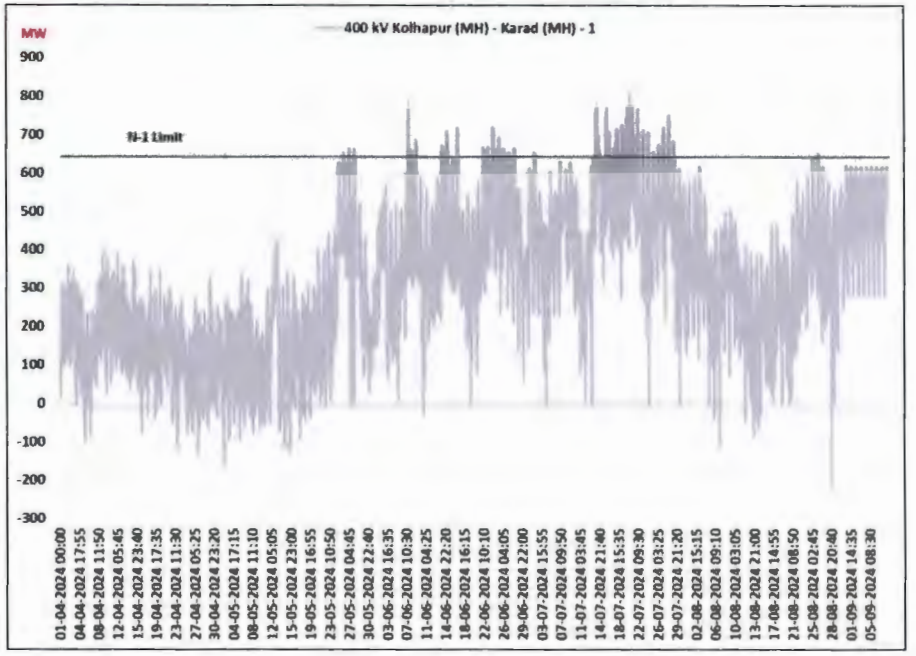


*Up to 8th September 2024

Heavy Loading of 400 kV Kohapur (PG) – Kolhapur (MH) D/C Under Peak SR Export Periods

Maharashtra Network Constraints in SR Export Corridor



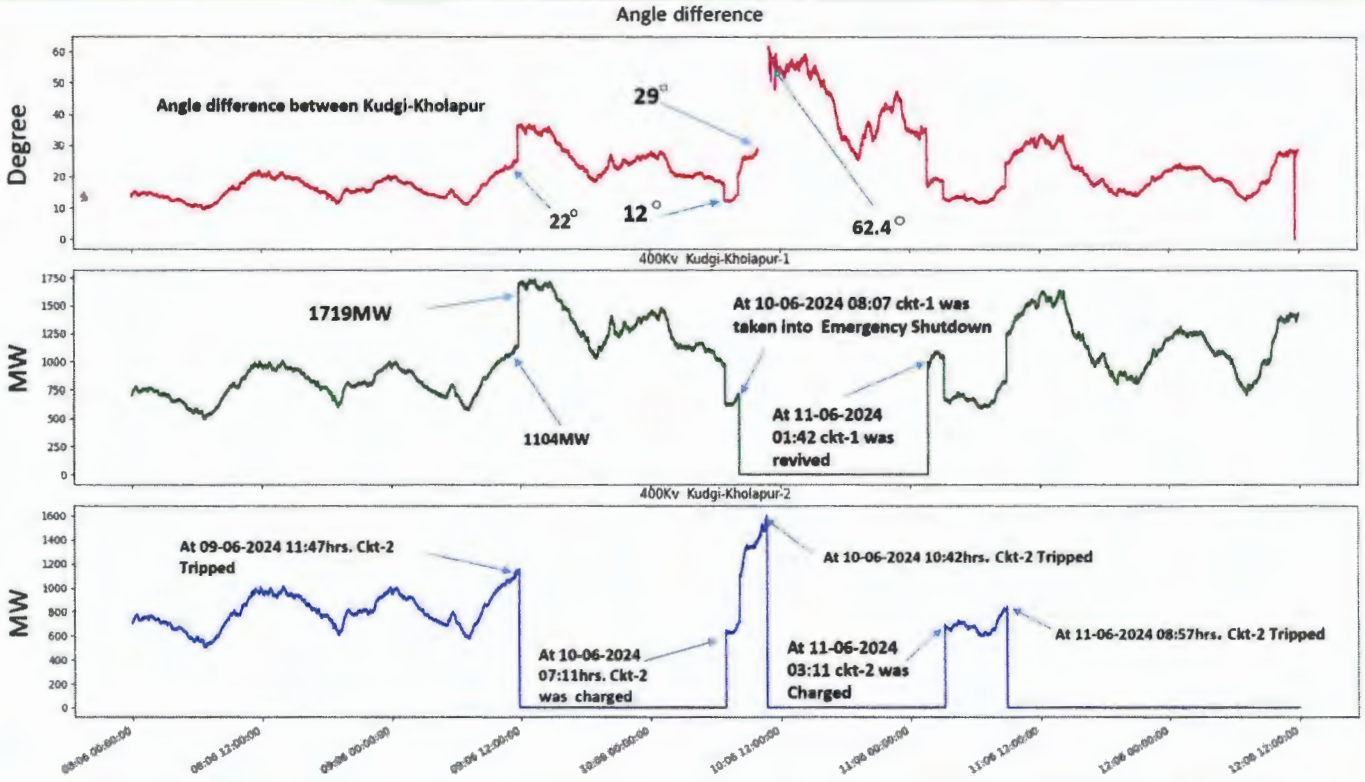


*Up to 8th September 2024

400 kV Kolhapur – Karad D/C, 400 kV Pune – Kalwa & Pune – Kharghar and other lines in the Western Maharashtra remain critically loaded and N-1 non compliant during peak SR Export Periods

Real-Time Angular Difference Between Kudgi (PG) and Kolhapur(PG)

Plot of the Angular difference between Kudgi (PG) and Kolhapur (PG) on 9th,10th , 11th June 2024 during the outage of 400 kV Kudgi (PG) – Kolhapur (PG) - DC



Steps Taken by NLDC/SRLDC/WRLDC to Control Real Time Congestion

- Regulating the HVDC links in WR-SR/ER-SR corridors to control the loading of highly loaded lines
- Issue of under-drawl and over-drawl violation messages to states in the Southern Region and Western Region by NLDC/SRLDC/WRLDC and continuous follow-up by RLDCs with SLDCs for adhering to the schedule.
- During real-time violation of TTC/ATC in the SR Export corridor, real-time system operators in the NLDC control room take the following action points through ancillary services.
  - **User ATC limits in SCED for SR Export Corridor by NLDC Control Room**
  - **Exclusion of SR Plants from the SCED portal to prevent any SCED up instruction**
  - **Exclusion of SR Plants from the TRAS portal while giving TRAS up instruction by NLDC control room.**
  - **Tie line bias (TLB) mode of operation of AGC**
- Generation reduction in ISGS (particularly in SR) thermal power stations to minimum turn down level during Solar hours/high RE injection
- Issuance of congestion warning notices to the concerned constituents

Challenges and Way Forward for Managing SR Export Congestion

➢ **Constraints in the Operation of Several HVDC Links**

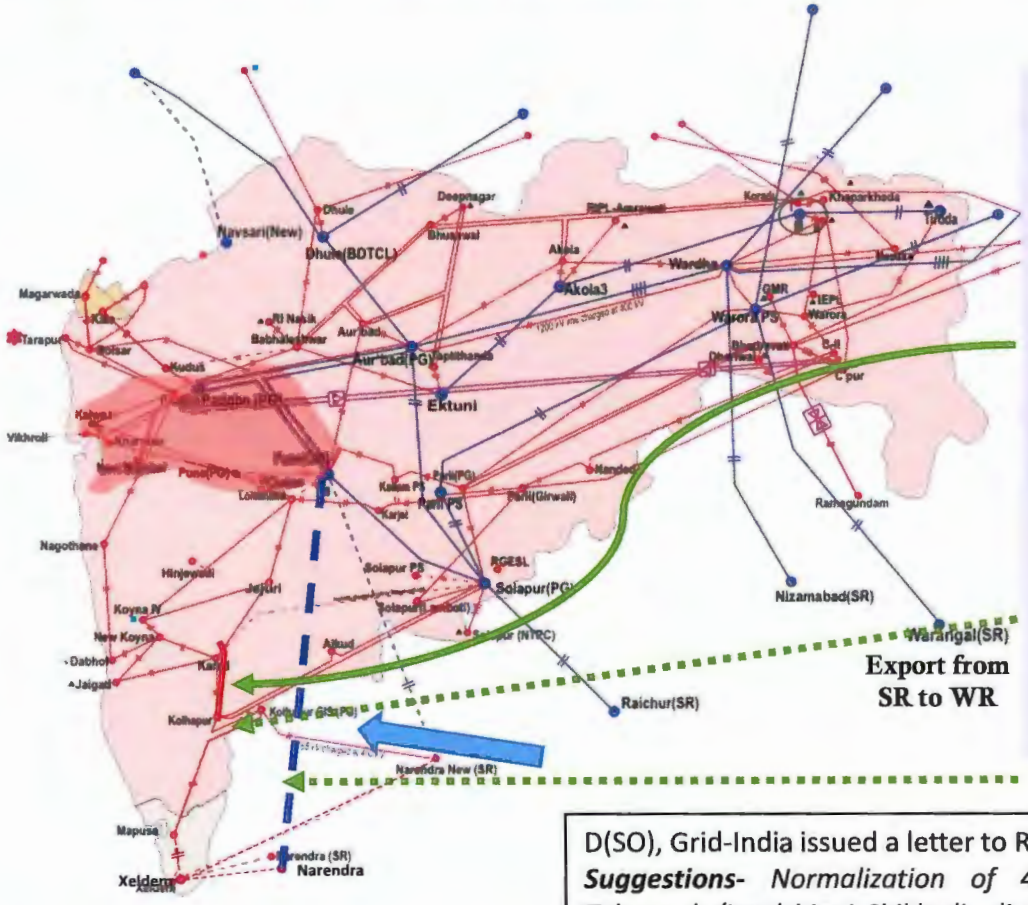
- **HVDC Raigarh – Pugalur in SR-WR direction**: Constraint in ICTs at Raigarh (Kotra) End.
- **HVDC Talcher – Kolar at minimum power order:** Constraint in the Loading of 400 kV Talcher – Meramundali – 1 & 2
- **HVDC Gazuwaka in SR – ER direction at max power order**: Constraint in 220 kV Network in Odisha
- **Delay in the commissioning of 765 kV Narendra (PG) – Kolhapur (PG) – D/C and constraints in Western Maharashtra due to significant delay in commissioning of planned intra-state transmission system**

➢ **Flexible operation of intra-state thermal power plants in Southern Region**

State	Technical Minimum	Regulations/ Data Source	Remarks
Karnataka	55%	KERC (Merit Order Despatch and Optimization of Power Purchase Cost) Regulations, 202410	Includes compensation mechanism for part load operation Two units operating with Technical minimum of 40% (intimated in 210th SR OCC meeting)
Andhra Pradesh	520 MW & above: 55% Upto 500 MW: 71.4%	Minutes of 210th Meeting of Southern Region Operation Coordination Committee (OCC)	-
Tamil Nadu	600 MW: 60%, 210 MW: 80%	Minutes of 210th Meeting of Southern Region OCC	-
Telangana	58-67% for different units	Minutes of 210th Meeting of Southern Region OCC	-

➢ **CTUIL may Share the dynamic model for Raichur-Pugalur HVDC reverse flow studies (upgradation of HVDC reverse capacity from 3000MW to 6000MW).**

Maharashtra constraints leads to congestion in IR:



Large-scale integration of RE generation, mainly in the Gadag/ Koppal area in Karnataka and in the Southern Region.

Constraints observed

- Kolhapur(PG) – Kolhapur (MSETCL) – Karad (MSETCL)

To relieve constraints

- Reconductoring of 400 kV Kolhapur(PG) – Kolhapur (MSETCL) 400kV D/c line with HTLS: Completed on 31st Aug'23.
- Expedition of planned intra-state transmission system
- Narendra – Pune 765kV D/c : Dec'24

D(SO), Grid-India issued a letter to RPCs/CTUIL/POWERGRID/MSETCL/ATL on 31.8.23:-
Suggestions- *Normalization of 400 kV Solapur-Karad-S/c, charging of 220 kV Talangade/Mudshingi-Chikkodi lines & consideration of dynamic line ratings*

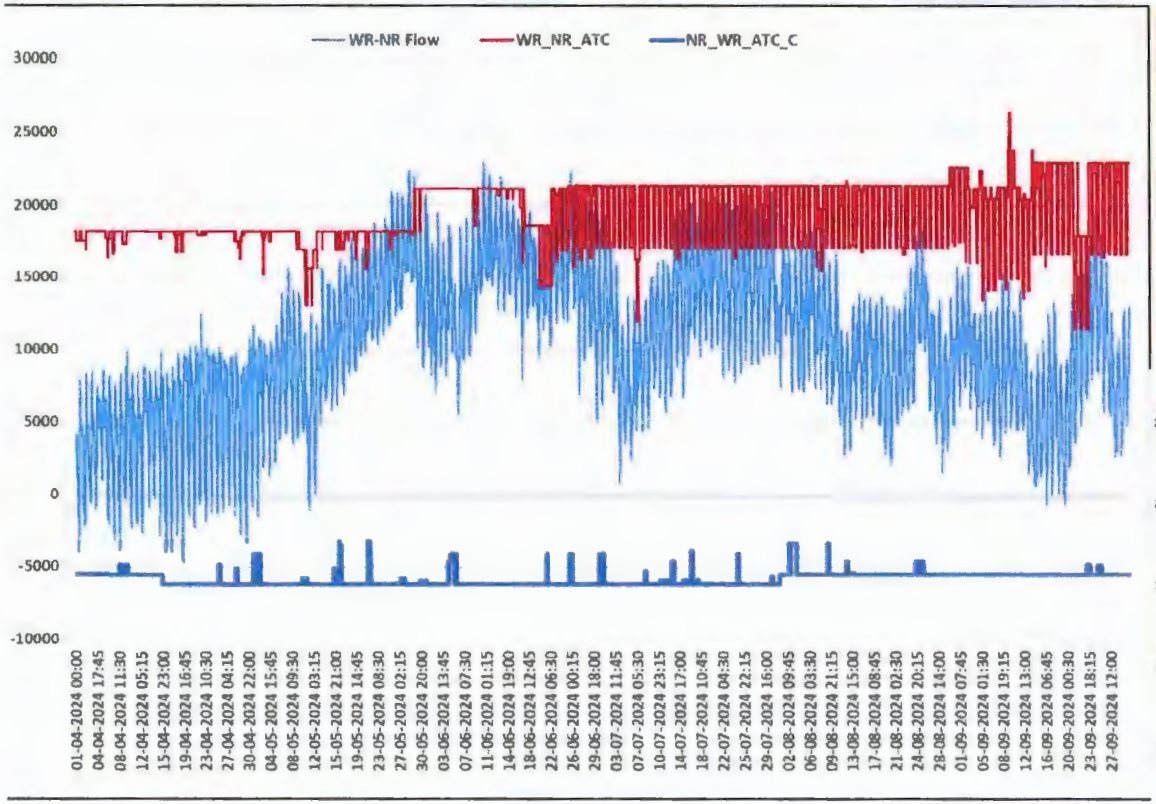
Observations post charging of Mumbai infeed system

- Loading on critical corridor (Pune(GIS) -> Pune (PG) -> Mumbai Metropolitan Region (MMR) area & Padghe (Mh)-> MMR area) reduced
- Loading on Padghe(PG)-Kudus-Kala corridor also reduced
- Voltage profile in MMR area and Pune area improved
- Joint studies for reviewing of Maharashtra & Mumbai import capability was initiated (E-mailed to SLDC & STU, MSETCL)

Ongoing Works

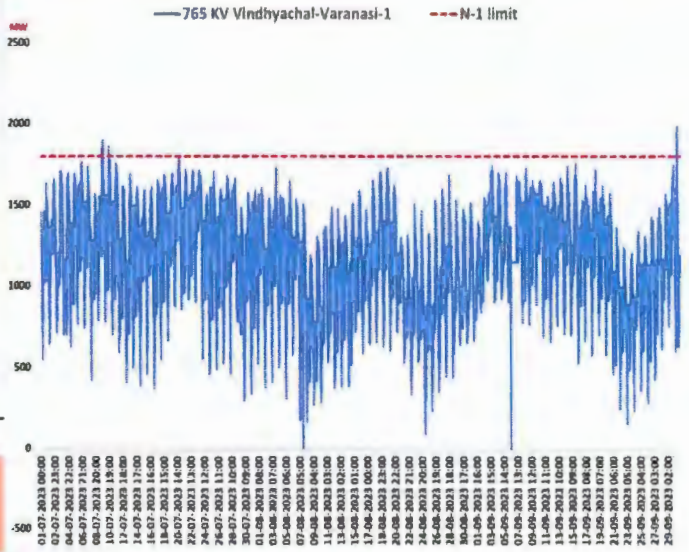
- LILO works of 400 kV Pune(PG)-Kharghar-S/c at Navi Mumbai also in process.

NR Import Constraints



1. High WR-NR/NR Import flow has been observed in 2023-24 specially in the month of July and September

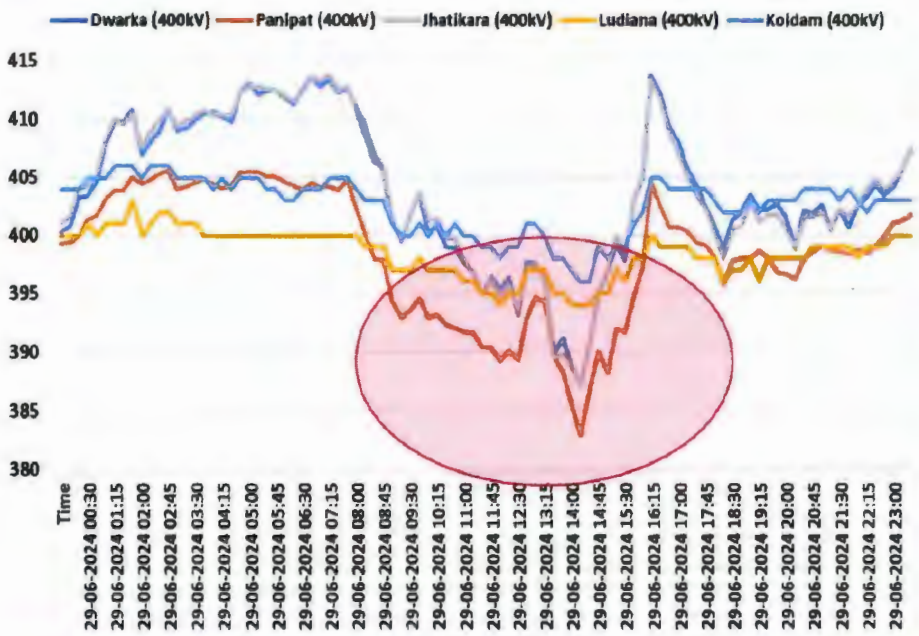
2. The loading on 765 KV Varanasi-Vindhyachal also remained high (also exceeded its N-1 limit) during high NR Import period



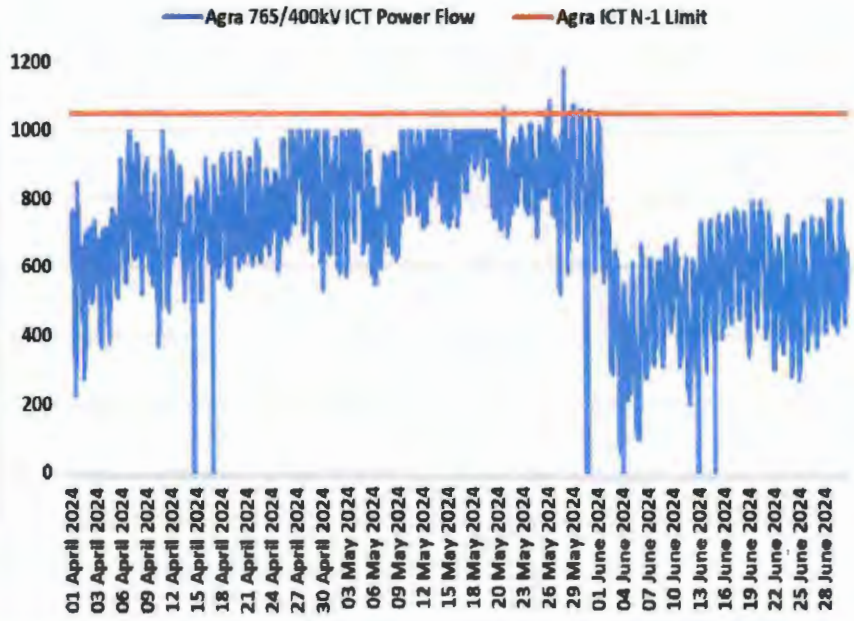
HVDC Vindhyachal could not be operated from WR to NR direction for considerable period of time due to high loading of 400 KV Anpara-Obra-S/C.

NR Import Constraints

Bus Voltage of some major nodes in Northern Region

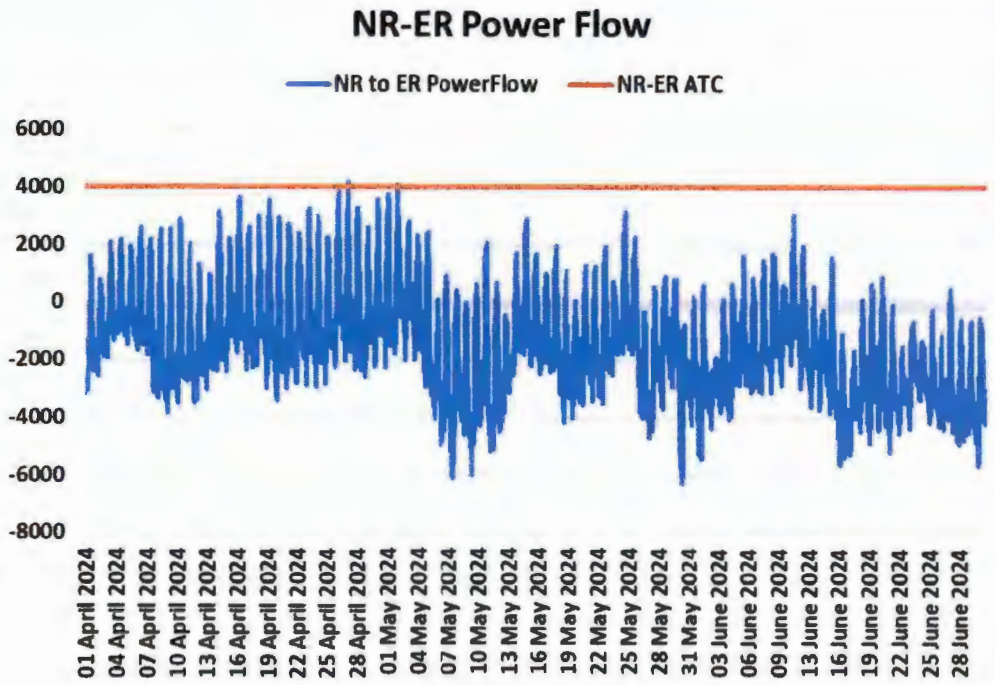


Agra PG 765/400kV ICT-1 Power Flow



- Low voltage were observed at major load centre points during solar hrs.
- Lack of static/dynamic reactive power support at the intra-state level.
- TTC/ATC figure of WR-NR/NR Import corridor is being declared separately for solar hrs considering the constraints of low voltage.
- The loading of 2*1500 MVA ICT at Agra were N-1 non compliant during high NR Import period. The loading reduced after reversal of HVDC BNC-Agra (from NR->NER to NER->NR). This was done based on real time grid conditions

NR Import Constraints



- High NR to ER flow observed in the month of April particularly during solar hours primarily due to high RE in NR and back down of thermal generation in the Eastern Region during peak solar hours.
- This has aggravated the constraints in the Eastern Region (400 kV Kahalgaon – Farakka D/c & 400 kV Farakka – Sagardighi D/c).

➢ With reduced power flow from Eastern to Northern Region, the WR-NR corridor was observed to be stressed during non-solar peak demand hours.

Shifting of Rihand stage-III generating station (2x500 MW) to Northern region

In order to relieve the loading of 765 kV Vindhyachal-Varanasi and facilitate higher import by NR, following interim network rearrangement was carried out

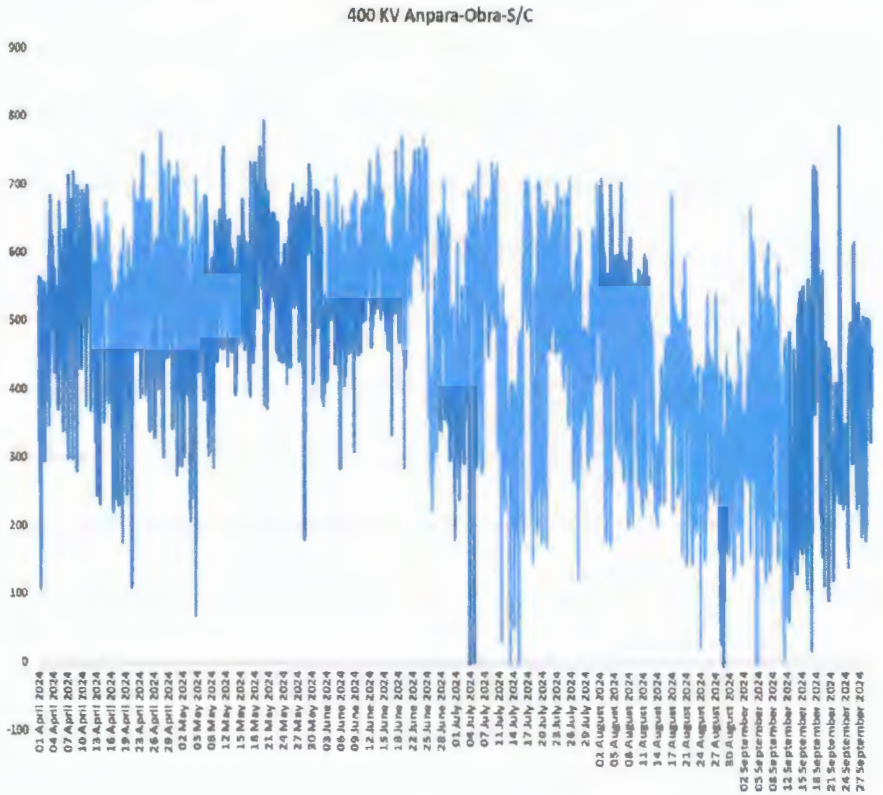
- **Shifting of Rihand stage-III generating station (2x500 MW) to NR** by closing the bus coupler between Rihand-III and Rihand-I & II and disconnecting Rihand-III from WR by opening 400 kV Rihand stage-III - Vindhyachal PS D/C .
- **Opening of 400 kV Singrauli-Anpara S/C** (also, as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) to control the high fault levels in Anpara – Singrauli – Rihand complex)

Post shifting observations

- Relief of ~250 MW in loading of each circuit of 765 kV Vindhyachal - Varanasi D/C observed.
- Increment in WR-NR TTC/ATC of the order of ~2450 MW after the implementation of above arrangement

Constraint in HVDC Vindhyachal B2B

- It is observed that due to high loading of lines in Anpara complex, particularly 400 kV Anpara – Obra S/C (loading more than 700 MW), real-time constraint is faced in increasing the power order of HVDC B2B V'chal in WR to NR direction.
- UPPTCL needs to explore the possibility by shifting some load, keeping generation at 220kV Obra or by reconfiguration of existing network to mitigate this constraint.
- Also, as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara opened to control the high fault levels in Anpara – Singrauli – Rihand complex.
- Rihand-III units are also shifted to the northern region to relieve constraints in WR-NR corridor (765 KV Vindhyachal-Varanasi)
- Even after opening of this line the loading of 400 kV Anpara – Obra remains on the higher side.

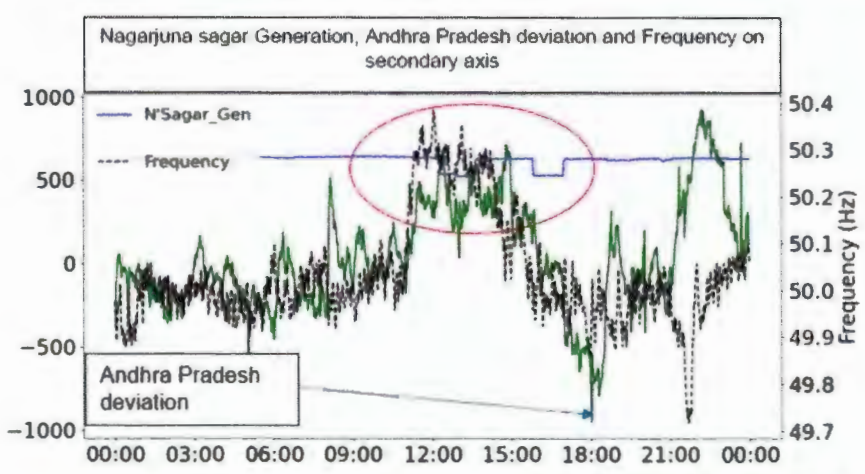


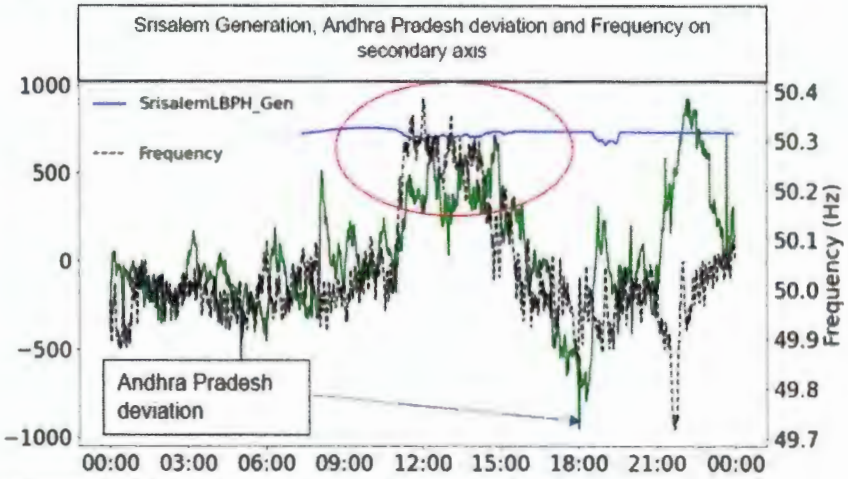
Constraint in HVDC Mundra-Mahendragarh:

- HVDC Mundra - Mahendragarh needs to be operated at maximum capacity **(2500 MW)** in WR to NR direction during high NR import period to relieve loading on ac lines .
- Due to issue in DC CMD (current measurement device) of pole-2, HVDC Mundra – Mahendragarh Pole-2 power order was restricted to a max. 500 MW for over a month.
- This had resulted in restriction in total HVDC power order to 1750 MW.
- Apart from this, there have been multiple outages of the HVDC in the last 2-3 months due to various reasons.
- Restriction in max. power order of HVDC Mundra – M'garh has also resulted in reduction in WR-NR and NR Import TTC/ATC.

HIGH-FREQUENCY OPERATION IN INDIAN POWER SYSTEM ON 04 , 11 & 25 AUGUST 2024

- Increased reservoir heads in Nagarjun Sagar and Srisailam resulted in inflexibility to use the power plants for pumping during Solar hours, as they have to be kept in majority generating mode.
- Even during the congestion periods from Southern Region to the Western Region, the pumped hydro stations had to be operated in generating mode, and created grid security challenges





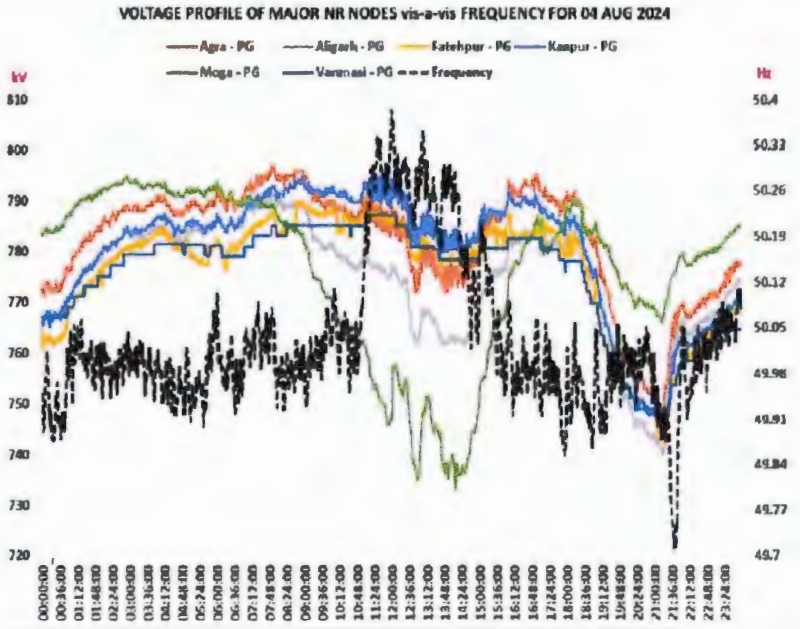
PSP Plants Generation at on Nagarjuna sagar, Srisalem day 04th –August 2024

PSP not working in Pumping mode

SCHEMES	STATE	INSTALLED CAPACITY
Kadana	Gujarat	4x60
Sardar Sarovar Project	Gujarat	6x200

Constraints during HIGH-FREQUENCY OPERATION IN INDIAN POWER SYSTEM ON 04 , 11 & 25 AUGUST 2024

- Backing down of intra-state generation in few states like Punjab may have been constrained on account of intrastate transmission constraints since actual drawl was around ATC limit for Punjab import. I
- During the peak solar hours, voltage levels at major load centers within the NR were observed to be on the lower side.
- This was primarily due to heavy reactive power drawl by states and inadequate static and dynamic reactive power support at the intra-state level.
- Specifically, the voltage at the 765 kV bus at Moga station in Punjab dropped to 730-740 kV. Punjab continued to under-draw from the grid during periods of high frequency.
- A reduction in internal generation by Punjab could have raised concerns about increased power drawl from the Inter-State Transmission System (ISTS) grid, which could exacerbate voltage dips at critical buses.



Report link

https://posoco.in/en/download/report-on-high-frequency-operation-for-4th-11th-and-25th-aug-2024/?wpdmdl=59532

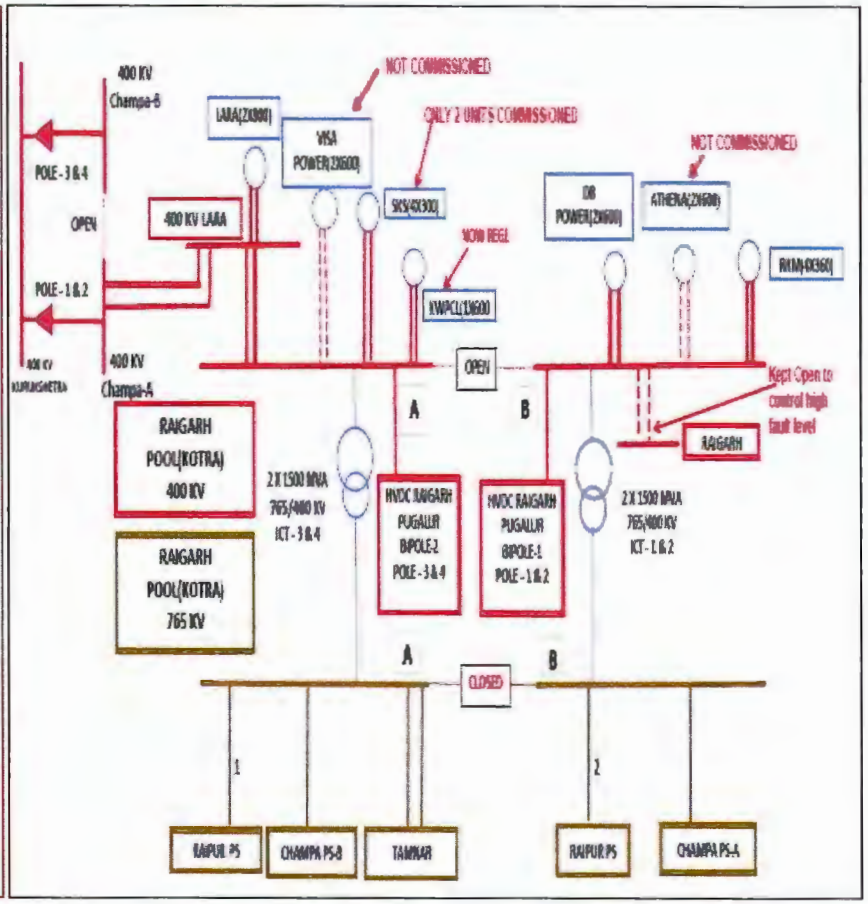
Thank you !!

Augmentation in Maharashtra System to Mitigate Operational Constraints

- High loading is observed near the Mumbai area during peak demand periods
- During those periods, any constraint in HVDC Pagdhe power order have also created alarming situations in real time as it leads to further increase in the line loadings.
- N-1 violation observed in,
  - 400 kV Parli(PG)- Parli(MS) D/C line **(Bypassing of 400 kV Parli(PG)- Parli(MH)-D/c and 400 kV Parli(New)-Parli(PG)_D/c at outskirts Parli(PG) S/s completed, Reconductoring of Ckt – 1 completed & Ckt – 2 completed)**
  - 2x1500 MVA, 765/400 kV Ektuni ICTs **(Inter trip scheme implemented. Installation of 1x1500MVA ICT-III at Ektuni to be expedited)**
  - 400 kV Pune (GIS)-Pune (PG)-Q/c lines
    - **220kV level at Pune (PG)(GIS) and Installation of 2x500MVA, 400/220kV ICTs at Pune (PG)(GIS) & LILO of both ckts of 220kV Khed City – Ranjangaon D/c line at Pune GIS with high capacity conductor**
    - **LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section**
  - 400kV Pune(PG)-Kharghar & 400kV Pune(PG)-Kalwa S/C line & 400 kV Padghe- Kalwa D/C
  - **3x500 MVA, 400/220kV ICTs, 400 kV Kharghar-Vikhroli-D/c & LILO of 220 kV Trombay - Salsette-D/c at Vikhroli completed**
  - **Commissioning of remaining planned system at 400/220 kV Navi Mumbai & Vikhroli completed**
  - 400 kV Pune(PG)-Chakan S/C

Inadequate reactive compensation: Constraint in utilization of HVDC

- High SR Import during morning hours necessitates the operation of HVDC Raigarh – Pugalur at a high power order in WR – SR direction
- **The loading on 400 KV Lara-Kotra-D/C is restricting further increase in power order of HVDC Raigarh - Pugalur(WR-SR). (1st WRPC(TP): Reconductoring with quad moose ampacity conductor is agreed with connectivity of Lara Stage-II)**
- Due to the bus split at Champa, sensitivity of HVDC Champa - KKR Bipole - II has negligible sensitivity on 400 kV Lara - Kotra loading. However, 100 MW increase in HVDC Champa - KKR Bipole – I (i.e Pole-1 & 2 connected to 400 KV Champa PS_A bus) power order will reduce the loading of Lara – Kotra(each ckt) by 12 MW
- However, **the voltages at 765kV & 400 kV buses of Champa - A remain above 780 kV & 412 kV for all the time and this prevents the deblocking of HVDC Champa – Kurukshetra Bipole- 1 inspite of VAR absorption by Units at Champa & Raigarh (Kotra).**
- This creates issue in the flexible operation of both the HVDCs
- Additional reactive compensation to be planned at Champa-PS



Intra-state Constraints in Rajasthan Network

- N-1 Constraints in several ICTs
- Severe low voltage & huge MVAR drawl at RVPN during winter months (even below 0.8 at number of 400/220kV ICTs)
- **37 Nos.** of Grid disturbances/incidents in 2023 in Rajasthan (intra-state) network
- **23 Nos. of load loss events & 12 Nos. of generation loss events in 2023.**

ICT Constraints	
N-1 Contingency of 3*315 MVA ICT at Chittorgarh	3rd 315MVA ICT at Chittorgarh first time charged on 06.01.2024. Even after capacity augmentation at Chittorgarh, 3*315MVA ICTs are near to N-1 non-compliance. Rajasthan STU has planned and implemented SPS at these locations. (except Bhilwara) New 1*500MVA ICT under bidding at these S/s by RVPNL. As per latest information shared by RVPN, bids for new 500MVA transformers at Ajmer, Bikaner, Hindaun, Merta, Babai and Jaisalmer-2 substations will be opened on 22.01.2024.
N-1 Contingency of 2*315+1*500 MVA ICT at Bassi	
N-1 Contingency of 2*315 MVA ICT at Jodhpur	
N-1 Contingency of 2*315 MVA ICT at Bhinmal	
N-1 Contingency of 2*315 MVA ICT at Ajmer	
N-1 Contingency of 2*315 MVA ICT at Bikaner	
N-1 Contingency of 2*315 MVA ICT at Merta	
N-1 Contingency of 2*315 MVA ICT at Hindaun	
N-1 Contingency of 1*315+1*500 MVA ICT at Bhilwara	

Low Voltage Issues	
Low voltage issues at Hindaun , Alwar, Bhinmal Voltages reaching 310kV at Alwar (400kV), 360 KV(Bhinmal) and 325kV at Hindaun (400kV). Similar poor profile at 220kV side also.	New 400/220kV Dholpur S/s likely to provide some relief, however approved by CEA on 27th Jan 2023, so issue likely to persist for next 1-2 winter seasons.
	Other immediate measures required by RVPN. 400kV Bharatpur is under internal approval with LILO of 400kV Agra-Sikar.
	Severe issues observed during Dec 2022-Jan 2023 months. As discussed in 70 NRPC meeting, RVPN is being asked to run Dholpur generation, however, same is not being done by RVPN. Communications sent from NRLDC side in this regard.
Low voltage issues in RE generation pockets	Additional reactive power support devices for maintaining grid voltages within IEGC prescribed limits to be expedited (STATCOMs approved in intrastate network). Intrastate RE generators to support the grid by operating in voltage control mode.

REMEDIAL ACTION TO MITIGATE THE MAHARASHTRA CONSTRAINTS

N-1 contingency of 2x1500 MVA, 765/400 kV Ektuni ICTs	1x1500MVA ICT-III at Ektuni along with scheme to control fault level at A'bad-I / A'bad-II / A'bad-III **Interim Measures:** To control ICTs loadings, Inter trip scheme implemented at Ektuni on 16th Oct 23 involving tripping of transmission lines (Tripping of 400 kV Ektuni-Tatpitanda D/C) and manual Generation backing down at APML Tiroda, Koradi & Ratan India by SLDC. **Permanent Solution:** Installation of 1x1500MVA ICT-III at Ektuni
N-1 contingency of 400 kV Pune (GIS)-Pune (PG)-Q/c lines	**Interim Measures:** Presently managed with load trimming scheme for overloading of any of the 4 ckts above 1300 A. **Permanent Solution:** Creation of 220kV level at Pune (PG)(GIS) and Installation of 2x500MVA, 400/220kV ICTs at Pune (PG)(GIS) & LILO of both ckts of 220kV Khed City – Ranjangaon D/c line at Pune GIS with high capacity conductor. ACOD: Dec'24 **(SCOD-June'24)** LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400kV Pune (PG)-Kharghar & 400kV Pune (PG)-Vikhroli-Kalwa S/C line	**Presently managing with LTS.** **Remedial Action:** Keeping all the generation on-bar in MMR irrespective of MOD order, facilitating outage only during holidays & load staggering days, import capability monitoring of Mumbai. Commissioning of 400/220kV Vikhroli & Navi Mumbai substations along with associated transmission system would relieve the loading on these lines and will improve reliability of power supply to Mumbai area. **Present Status:-** 220 KV Feeders from 400/220 KV Navi Mumbai charged. (220 KV N.Mumbai-Apta-D/C, 220 KV N.Mumbai-Taloja-D/C, 220 KV N.Mumbai-Print house-D/C.

Contd.

REMEDIAL ACTION TO MITIGATE THE MAHARASHTRA CONSTRAINTS

400 kV Padghe-Kalwa D/C	**Presently managing with LTS.** **Remedial Action:** Re-conductoring of 400 kV Kalwa-Padghe-D/c with HTLS was planned by MSETCL, ckt-2 re-conductoring completed and ckt-1 work is in progress. **Commissioning of 400/220kV Vikhroli & Navi Mumbai substations along with associated transmission system would relieve the loading on these lines and will improve reliability of power supply to Mumbai area.** **Status:- 220 KV Feeders from 400/220 KV Navi Mumbai charged. (220 KV N.Mumbai-Apta-D/C, 220 KV N.Mumbai-Taloja-D/C, 220 KV N.Mumbai-Printhouse-D/C**
400 kV Pune (PG)-Chakan S/C	**Presently managing with LTS.** **Remedial Measure:** 400kV Pune PG-Lonikhand S/c line LILO at Chakan would improve reliability of power supply. MSETCL may explore this option to relieve constraints.
Low voltages at Kalwa/Padghe/Pune/Chakan/Lonikhand/Solapur	Strengthening of transmission system in south-west Maharashtra is much needed.
220 kV Pune (PG)-Talegaon D/C	**Remedial Action:** - As per CTU Report on Transmission Network adequacy for the state of Maharashtra Nov-22, LILO of both ckts of 220 kV Khed City – Ranjangaon-D/c line at Pune GIS with high capacity conductor and 2x500 MVA, 400/220 kV ICTs at Pune(GIS) are expected in Dec'24**(SCOD-June'24).**

Contd.

REMEDIAL ACTION TO MITIGATE THE MAHARASHTRA CONSTRAINTS

220 kV Bableshwar-Nashik D/C line	**Remedial Action:** MSETCL to expedite commissioning of 220kV Bableshwar-Nashik D/c LILO at Sinner (SCOD- Mar-20), 2x500MVA S/s along with Nashik S/s (SCOD- Mar-21)- Work progress to be given by MSETCL 400/220 kV Pimpalgaon S/s along with transmission system was planned by MSETCL. SCOD: Apr'24
400kV Parli MH-Karjat D/c	LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400 kV Karjat-Lonikhand-II DC	LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400 kV Solapur-Alkud & Solapur-Kholapur lines	400 kV Solapur-PG-Karad presently charged as 220 kV Solapur-Jeur to be restored.
N-1 contingency of 2x315+2x500 MVA Boisar-PG ICTs	**Remedial measure:** Commissioning of 500 MVA, 400/220 kV ICT (5th). SCOD: Jan'26

BACK

Constraint in Generation Evacuation from TalcherComplex

- The generation from Talcher Super Thermal Power Plant Stage – I (1000 MW) & Stage – II (2000 MW) is evacuated through the following transmission lines,
  - 400 kV Talcher – Meramunadli – Short Line
  - 400 kV Talcher – Angul – Meramundali (Bypassed at Angul) – Long Line
  - 400 kV Talcher – Rengali D/C
  - 400 kV Talcher – Rourkela D/C
  - HVDC Talcher – Kolar Bipole (2000 MW from ER to SR)
- It may be noted that due to frequent outage of HVDC Talcher – Kolar or any other transmission element in the complex on forced outages/tripping/maintenance activities, constraints in evacuating Talcher Stages I & II generation are being faced in the lines emanating from Talcher-I particularly 400 kV Talcher – Meramundali lines.

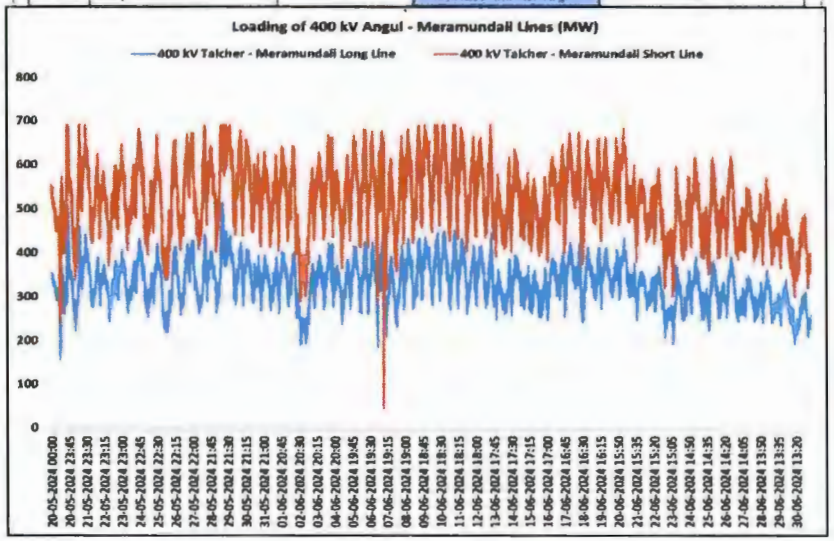
The same is handled with the help of Generation restriction at Talcher - I & II & network rearrangements in nearby stations.

- The permissible line loading limit based on the seasonal Imax setting of 400 KV Talcher - Meramundli – 1 & 2 are as follows

Reconductoring of 400 kV Talcher – Meramundali Lines D/C lines has been approved in 22nd NCT Meeting

IMAX Setting for 400 kV Talcher Meramundali circuits based on seasonal thermal rating Confirmed by PGCIL in 175th OCC of ER

Sl.No.	Months	Ambient Temperature consideration (oCelsius)	IMAX: Ampacity for 75 oCelsius conductor temperature	Line Loading (MVA) = (1.73X400X IMAX)/1000
1	November- February	40	2 X 714=1428 Amp	989
2	March-June	50	2 X 516=1032 Amp	714
3	July-October	45	2 X 631=1262 Amp	874

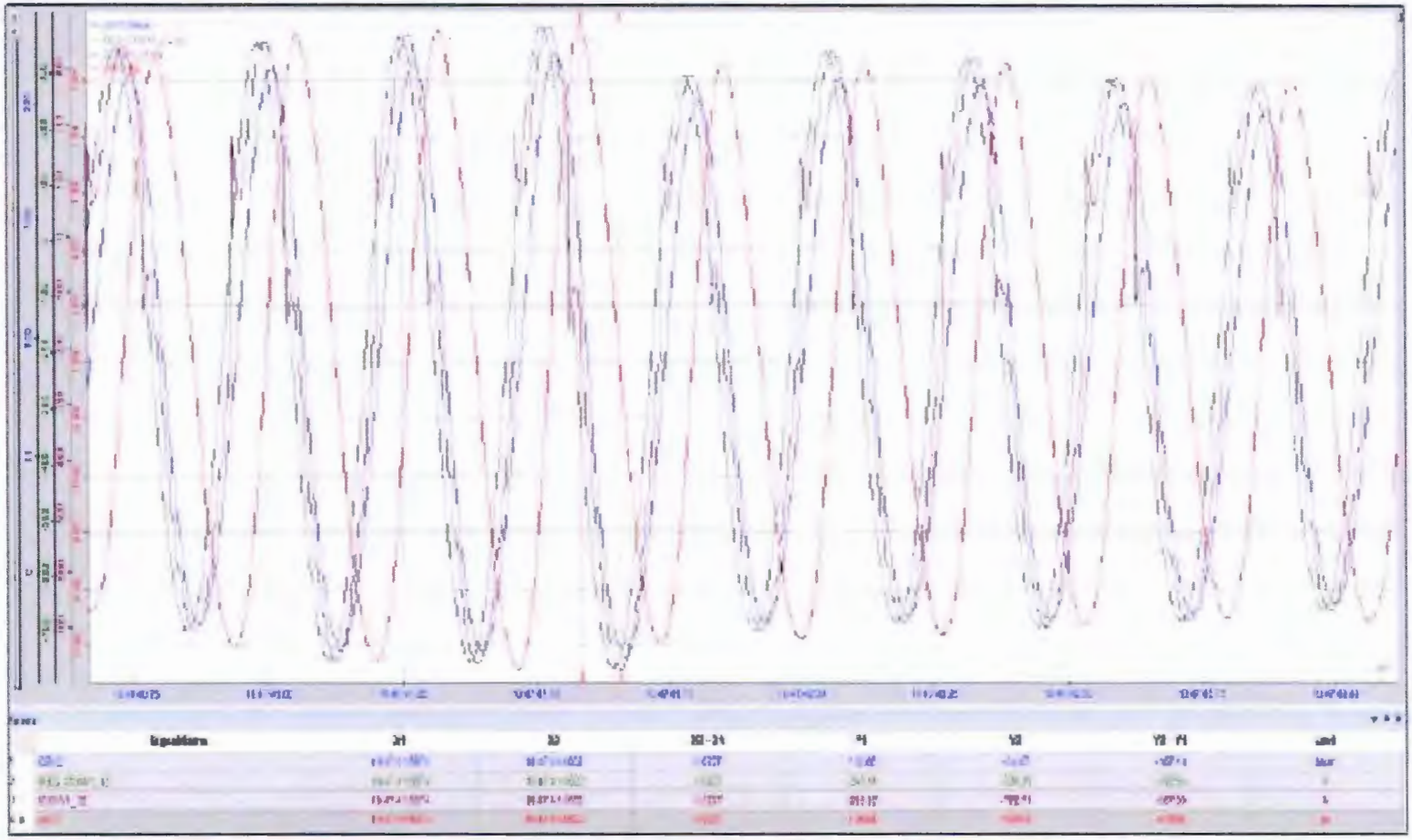


Constraint in Reverse Operation of HVDC Gazuwaka

- Presently HVDC Gazuwaka is operated in the reverse direction (SR to ER) direction during SR Export hours. However, the same cannot be maximized to operate at full capacity i.e. 1000 MW because of N-1 violation of a few critical lines in the 220 kV intra-state network of Odisha.
  - 220 kV Jaynagar-Lakshmipur
  - 220 kV Lakshmipur-Therubali
  - 220 kV Therubali-Bhanjanagar

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Annexure 2

No.15/3/2018-Trans-Pt(5)
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi
Dated, the 28h October 2021

OFFICE ORDER

Subject: - Re-constitution of the "National Committee on Transmission" (NCT) - reg.

In super-session of this Ministry's Office Order No. 15/3/2017-Trans dated 04.11.2019, regarding constitution of the National Committee on Transmission (NCT) and subsequent amendment issued vide this Ministry's Office Order No. 15/3/2018-Trans Pt(5) dated 20.05.2021, the undersigned is directed to state that the composition and terms of reference of the existing NCT are amended as mentioned below:

1. Composition of NCT

1	Chairperson, Central Electricity Authority (CEA)	Chairman
2	Member(Power System), CEA	Member
3	Member(Economic & Commercial), CEA	Member
4	Joint Secretary level officer nominated by Secretary, MNRE	Member
5	Director(Trans), M/o Power, Govt. of India	Member
6	Chief Operating Officer, Central Transmission Utility	Member
7	CMD POSOCO	Member
8	Advisor(Energy) , NITI Aayog	Member
9	Two experts from Power Sector to be nominated by MoP*	Members
10	Chief Engineer (from Power System Wing), CEA	Member Secretary

* Will be nominated for a maximum period of two years from the date of their nomination.

2. Terms of Reference (ToR) of the NCT are as under:

i. The NCT shall evaluate the functioning of the National Grid on a quarterly basis.

ii. The Central Transmission Utility (CTU), as mandated under the Electricity Act, 2003, is to carry out periodic assessment of transmission requirement under Inter-State Transmission System (ISTS). The CTU shall also make a comprehensive presentation before the NCT every quarter for ensuring development of an efficient, co-ordinated and economical ISTS for smooth flow of electricity. The CTU, in the process, may also take inputs from the markets to identify constraints and congestion in the transmission system.

28/10/2021

Khavda IVA Power Transmission Limited

iii. The CTU after consulting Regional Power Committee(s) [RPC(s)] shall submit the proposal for expansion of ISTS to the NCT for their consideration. For proposal upto Rs. 500 crores, prior consultation with RPC would not be required.

iv. As per provision of Electricity (Planning, Development and Recovery of ISTS charges) Rules 2021, the CTU shall also prepare a five-year rolling plan for ISTS capacity addition every year. The Annual Plan shall be put up to the NCT six months in advance, e.g. The Annual Plan for FY 2023-24 will be put up before the NCT by 30th September 2022..

v. After considering the recommendations of the CTU and views of the RPCs, the NCT shall propose expansion of ISTS after assessing the trend of growth in demand and generation in various regions, constraints, if any, in the inter- State, inter- Region transfer of power, which are likely to arise in the near term/ medium term, so that transmission does not constrain the growth.

vi. The NCT shall formulate the packages for the proposed transmission schemes for their implementation.

vii. The NCT shall estimate the cost of transmission packages and may constitute a cost committee for this purpose.

viii. The NCT shall recommend to Ministry of Power (MoP) for implementation of the ISTS for projects with cost more than Rs 500 crore, along with their mode of implementation i.e. Tariff Based Competitive Bidding (TBCB) / Regulated Tariff Mechanism (RTM), as per the existing Tariff Policy. However, the NCT shall approve the ISTS costing between Rs 100 crore to Rs.500 crore or such limit as prescribed by MoP from time to time, along with their mode of implementation under intimation to MoP. The ISTS costing less than or equal to Rs. 100 crores, or such limit as prescribed by MoP from time to time, will be approved by the CTU along with their mode of implementation under intimation to the NCT and MoP. After approval of the ISTS by the NCT or the CTU (as the case may be), the TBCB project shall be allocated to Bid Process Coordinators through Gazette Notification, while the RTM project shall be allocated to CTU.

ix. The NCT shall allocate the task of carrying out survey amongst the CTU and Bid Process Coordinators by maintaining a roster.

3. The NCT meetings shall be held every quarter, and on monthly basis, if required.

4. While making their recommendations,

i. the NCT shall keep in mind the relevant Act, Rules, Regulation, policies and guidelines such as but not limited to - Electricity Act 2003, National Electricity Policy, Tariff Policy, Electricity (Transmission System Planning, Development and Recovery of Inter-State Transmission Charges) Rules, 2021, Guidelines for Encouraging Competition in Development of Transmission Projects, Tariff based Competitive Bidding Guidelines for Transmission Service and any specific advice received from MoP.

ii. For enabling growth of Renewable Energy (RE) capacity, areas which have high solar/wind energy potential, as identified by Ministry of New and Renewable Energy

Khavda IVA Power Transmission Limited

28/10/2021.

(MNRE), need to be connected to ISTS, so that the RE capacity can come up there. This is a national mission as a part of our energy transition goal.

5. This issues with the approval of the Hon'ble Minister of Power and New & Renewable Energy.

28/10/2021

(Bihari Lal)
Under Secretary to the Govt. of India
Telefax: 23325242
Email: transdesk-mop@nic.in

To

1. All Members of NCT.
2. Secretary, Ministry of New & Renewable Energy, Govt. of India.
3. Chairperson, CEA, New Delhi.
4. Secretary, CERC
5. CMDs of all CPSUs under the Ministry of Power, Govt. of India.
6. Heads of all autonomous bodies under the Ministry of Power, Govt. of India.
7. Finance/ Budget Section, Ministry of Power.
8. Power/ Energy Secretaries of all States/UTs.
9. Chief Executives of all State Power Transmission Utilities.
10. CEO, NITI Aayog, New Delhi.

Copy to:

i. PS to Hon'ble MoP/ PS to Hon'ble MoSP/Sr PPS/ PPS/ PS to Secretary(Power)/ AS&FA/ AS(SKGR)/ AS(VKD)/ all Joint Secretaries/ Economic Advisor/ Chief Engineer(Th)/ all Directors/ Dy. Secretaries, Ministry of Power.

ii. Technical Director, NIC, M/o Power, for publishing this order on the website of M/o Power.

28/10/2021

Khavda IVA Power Transmission Limited

CEA-PS-12-13/3/2019-PSPA-II Division

Annexure 3

I/44643/2024

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II
Power System Planning & Appraisal Division-II

सेवा में / To,

Chief Operating Officer, CTUIL
Floors No. 5-10, Tower 1, Plot No. 16,
IRCON International Tower, Institutional Area,
Sector 32, Gurugram, Haryana - 122001

विषय: 23.10.2024 को आयोजित एनसीटी की 24वीं बैठक में अनुमोदित आईएसटीएस पारेषण/संचार योजनाओं के कार्यान्वयन के संबंध में

Subject: Implementation of ISTS Transmission/Communication Schemes approved by NCT in its 24th meeting held on 23.10.2024- regarding

महोदय/Sir,

The undersigned is directed to inform that NCT has approved implementation of the following ISTS Transmission and Communication Schemes in its 24th meeting held on 23.10.2024, in line with MoP office order dated 28.10.2021 and MoP Guidelines dated 09th March, 2022, to be implemented through Regulated Tariff Mechanism (RTM) route by agency as indicated below:

I. ISTS schemes costing between Rs. 100 Crs. To Rs. 500 Crs. approved by NCT:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹ Cr)
1.	Eastern Region Expansion Scheme-44 (ERES-44)	RTM through POWERGRID	18 months (15 months on best effort basis) from the date of allocation	385.77
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	RTM through M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))	24 months from the date of allocation	252

II. Communication schemes approved by NCT:

Khavda IVA Power Transmission Limited

Sl. No.	Name of Transmission Scheme	Implementation Mode	Tentative Implementation timeframe	Implementing Agency	Estimated Cost (in Rs.)
1.	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region	RTM	12 months from the date of allocation	POWERGRID	1.02 Cr.
2.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	RTM	12 months from the date of allocation	POWERGRID	9.78 Cr.
3.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	RTM	6 months from the date of allocation	POWERGRID	65 Lakhs

The above schemes are awarded to CTUIL for implementation under RTM mode. CTUIL is requested to take necessary action for entering into a concession agreement with the respective agency for implementation of the above schemes.

III. Modifications in earlier approved schemes:

1. **Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme**

   NCT approved the revised SCOD for 400 kV D/C (Twin HTLS) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis)

CTU is requested to intimate the implementing Agency. Detailed scope of the schemes are as per minutes of the meeting. Copy of the minutes are enclosed.

Encl.: As above.

भवदीय / Yours faithfully,

22.11.2024

(बी.एस.बैरवा/ B.S.Bairwa)

मुख्य अभियन्ता (इंचार्ज) एवं सदस्य सचिव,एन.सी.टी./

Chief Engineer (I/C) & Member Secretary (NCT)

Copy to:

Joint Secretary (Trans), Ministry of Power, Shram Shakti Bhawan, New Delhi-110001

Khavda IVA Power Transmission Limited

Annexure 4

सेंट्रल ट्रांसमिशन यूटिलिटी ऑफ इंडिया लिमिटेड
(पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड के स्वामित्व में)
(भारत सरकार का उद्यम)
CENTRAL TRANSMISSION UTILITY OF INDIA LTD.
(A wholly owned subsidiary of Power Grid Corporation of India Limited)
(A Government of India Enterprise)

Ref. No.: CTUIL/OM/19/24th NCT

25th November 2024

As per distribution list

Sub: Implementation of ISTS Transmission/Communication Schemes approved by NCT in its 24th meeting held on 23rd October 2024 under Regulated Tariff Mechanism (RTM).

NCT vide letter dated 22.11.2024 has awarded various ISTS Transmission/Communication schemes for its implementation under RTM mode by the respective implementing agencies as indicated in the table below:

Sl. No.	Transmission Schemes	Implementing Agency
I. ISTS Transmission schemes approved by NCT		
1.	Eastern Region Expansion Scheme-44 (ERES-44)	POWERGRID
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))
II. ISTS Communication schemes approved by NCT		
1.	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region	POWERGRID
2.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	POWERGRID
3.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	POWERGRID

Further, NCT also approved the modification in the earlier approved/notified transmission schemes as follows:

1. **Revision in SCOD of 400kV D/c Jhatikara- Dwarka line under REZ Phase-III Part-D Phase-II scheme**

   NCT approved the revised SCOD for 400kV D/c (Twin HTLS) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis)

Khavda IVA Power Transmission Limited

Copy of NCT letter dated 22.11.2024 is enclosed. The detailed scope of work along with implementation time frame for the above Transmission/Communication Schemes shall be as per the enclosed NCT letter and Minutes of the 24th meeting of NCT.

The implementing agency shall enter into a concession agreement with CTUIL for implementation of the aforementioned Transmission Schemes. However, pending finalization of Concession Agreement, it is requested to initiate necessary actions for implementation of the aforementioned Transmission Schemes.

This is for your kind information and necessary action, please.

Thanking you.

Yours faithfully,

(Partha Sarathi Das)
Sr. General Manager

Encl.: as stated.

Khavda IVA Power Transmission Limited

Distribution List:

1. **The Chairman & Managing Director** Power Grid Corporation of India Ltd., Saudamini, Plot No. 2, Sector-29, Gurgaon- 122 001 cmd@powergrid.in	2. **Shri Prashanth Kumar** Authorised Representative, Khavda IV A Power Transmission Ltd. C-105, Anand Niketan, New Delhi 110021 prashant.kumar1@adani.com

CEA-PS-12-13/3/2019-PSPA-II Division

I/44643/2024

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II
Power System Planning & Appraisal Division-II

सेवा में / To,

Chief Operating Officer, CTUIL
Floors No. 5-10, Tower 1, Plot No. 16,
IRCON International Tower, Institutional Area,
Sector 32, Gurugram, Haryana - 122001

विषय: 23.10.2024 को आयोजित एनसीटी की 24वीं बैठक में अनुमोदित आईएसटीएस पारेषण/संचार योजनाओं के कार्यान्वयन के संबंध में

Subject: Implementation of ISTS Transmission/Communication Schemes approved by NCT in its 24th meeting held on 23.10.2024- regarding

महोदय/Sir,

The undersigned is directed to inform that NCT has approved implementation of the following ISTS Transmission and Communication Schemes in its 24th meeting held on 23.10.2024, in line with MoP office order dated 28.10.2021 and MoP Guidelines dated 09th March, 2022, to be implemented through Regulated Tariff Mechanism (RTM) route by agency as indicated below:

I. ISTS schemes costing between Rs. 100 Crs. To Rs. 500 Crs. approved by NCT:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹ Cr)
1.	Eastern Region Expansion Scheme-44 (ERES-44)	RTM through POWERGRID	18 months (15 months on best effort basis) from the date of allocation	385.77
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	RTM through M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))	24 months from the date of allocation	252

II. Communication schemes approved by NCT:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Tentative Implementation timeframe	Implementing Agency	Estimated Cost (in Rs.)
1.	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region	RTM	12 months from the date of allocation	POWERGRID	1.02 Cr.
2.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	RTM	12 months from the date of allocation	POWERGRID	9.78 Cr.
3.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	RTM	6 months from the date of allocation	POWERGRID	65 Lakhs

The above schemes are awarded to CTUIL for implementation under RTM mode. CTUIL is requested to take necessary action for entering into a concession agreement with the respective agency for implementation of the above schemes.

III. Modifications in earlier approved schemes:

1. **Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme**

   NCT approved the revised SCOD for 400 kV D/C (Twin HTLS) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis)

CTU is requested to intimate the implementing Agency. Detailed scope of the schemes are as per minutes of the meeting. Copy of the minutes are enclosed.

Encl.: As above.

भवदीय / Yours faithfully,

22.11.2025

(बी.एस.बैरवा/ B.S.Bairwa)
मुख्य अभियन्ता (इंचार्ज) एवं सदस्य सचिव,एन.सी.टी./
Chief Engineer (I/C) & Member Secretary (NCT)

Copy to:

Joint Secretary (Trans), Ministry of Power, Shram Shakti Bhawan, New Delhi-110001

Khavda IVA Power Transmission Limited

CEA-PS-12-13/3/2019-PSPA-II Division

I/44640/2024

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केंद्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग- II
Power System Planning & Appraisal Division-II

सेवा में /To

As per list of Addresses

विषय: ट्रांसमिशन पर राष्ट्रीय समिति (एनसीटी) की चौबीसवीं बैठक के कार्यवृत्त – के सम्बन्ध में ।

Subject: Minutes of the 24th Meeting of National Committee on Transmission (NCT) – regarding.

महोदया (Madam) / महोदय (Sir),

The 24th meeting of the National Committee on Transmission (NCT) was held on 23rd October, 2024, at CEA, New Delhi. Minutes of the meeting are enclosed herewith.

भवदीय/Yours faithfully,

22.11.2024

(बी.एस.बैरवा/ B.S. Bairwa)
मुख्य अभियन्ता (इंचार्ज) एवं सदस्य सचिव,एन.सी.टी./
Chief Engineer (I/C) & Member Secretary (NCT)

प्रतिलिपि / Copy to:

Joint Secretary (Trans), Ministry of Power, New Delhi-110001

सेवा भवन, आर. के पुरम-I, नई दिल्ली-110066 **टेलीफोन**: 011-26732325 **ईमेल**: cea-pspa2@gov.in वेबसाइट: www.cea.nic.in
Sewa Bhawan, R.K Puram-I, New Delhi-110066 **Telephone**: 011-26732325, **Email**: cea-pspa2@gov.in **Website**: www.cea.nic.in

Khavda IVA Power Transmission Limited

List of Addresses:

1.	Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	2.	Member (Power Systems), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.
3.	Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	4.	Director (Trans), Ministry of Power Shram Shakti Bhawan, New Delhi-110001.
5.	Sh. Lalit Bohra, Joint Secretary Room no 602, Atal Akshay Urja Bhawan Opposite CGO Complex, Gate No. 2, Lodhi Road, New Delhi – 110003	6.	Chief Operating Officer, CTUIL, Floors No. 5-10, Tower 1, Plot No. 16, IRCON International Tower, Institutional Area, Sector 32, Gurugram, Haryana - 122001.
7.	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog, Parliament Street, New Delhi – 110 001.	8.	CMD, Grid Controller of India, B-9 (1st Floor), Qutub Institutional Area, Katwaria Sarai, New Delhi – 110016
9.	Sh. Ravinder Gupta Ex. Chief Engineer CEA		

Table of Agenda

Minutes of the 24th meeting of National Committee on Transmission (NCT)

The 24th meeting of NCT was held on 23rd October, 2024 at CEA, New Delhi. List of participants is enclosed at **Annexure-I**. Agenda wise deliberations are given below:

1 Confirmation of the minutes of the 22nd and 23rd meeting of National Committee on Transmission.

1.1 The minutes of the 22nd meeting of NCT held on 23.08.2024 were issued on 01.09.2024 vide CEA letter No. CEA-PS-12-13/3/2019-PSPA-II. No comments have been received on the minutes.

1.2 The minutes of the 23rd meeting of NCT held on 02.09.2024 were issued on 09.09.2024 vide CEA letter No. CEA-PS-12-13/3/2019-PSPA-II. No comments have been received on the minutes.

1.3 Members confirmed the minutes of 22nd and 23rd meetings of NCT.

2 Status of the transmission schemes noted/approved/recommended to MoP in the 22nd and 23rd meetings of NCT:

2.1 Status of new transmission schemes approved/recommended:

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Mode of Implementation	BPC	Award/ Gazette notification
22nd NCT Meeting					
1.	Transmission system for supply of power to Green Hydrogen/Ammonia manufacturing potential in Mundra area of Gujarat under Phase-I: Part B1 scheme (3 GW at Navinal S/s)"	Recommended	TBCB	PFCCL	Gazette Notified by MoP dated 12.09.2024
2.	Eastern Region Expansion Scheme-43 (ERES-43)	Approved	RTM	Not applicable	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
3.	Additional Transmission System Proposed for redundant power supply to Dholera area	Approved	RTM	Not applicable	
4.	Transmission System for Integration of Anantapur-II REZ - Phase-I (for 4.5 GW)	Recommended	TBCB	PFCCL	Gazette Notified by MoP dated 12.09.2024
5.	Transmission system for proposed Green Hydrogen / Green	Recommended	TBCB	RECPDCL	Gazette Notified by MoP dated 12.09.2024

Khavda IVA Power Transmission Limited

Sr. No	Name of the Transmission Scheme	Noted/ Recommended/ Approved	Mode of Implementation	BPC	Award/ Gazette notification
	Ammonia projects in Tuticorin area)				
6.	Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (6th - 8th) and 1x1500 MVA,765/400 kV ICT (4th) at Bidar PS	Approved	TBCB	RECPDCL	Gazette Notified by CEA on 25.09.2024
7.	Scheme for Requirement of Additional FOTE for redundancy at AGC locations in NER: Revised	Approved	RTM	Not applicable	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
8.	Optical Fibre Connectivity for NLDC new building, August Kranti Marg, New Delhi	Approved	RTM	Not applicable	
23rd NCT Meeting					
1.	Transmission System for Integration of Kurnool-IV REZ - Phase-I (for 4.5 GW)	Recommended	TBCB	RECDPCL	Gazette Notified by MoP dated 19.09.2024

2.2 Status of transmission schemes where modifications was suggested by NCT:

S. No.	Scheme where modifications was suggested	Status
1.	Modification in Transmission system for evacuation of power from Luhri Stage-I HEP	Informed to RECPDCL vide letter dated 02.09.2024
2.	Transmission system for evacuation of power from Shongtong Karcham HEP (450 MW) and Tidong HEP (150 MW)	Informed to RECPDCL vide letter dated 02.09.2024
3.	Modification in timeframe of one of the elements in the scope of "Transmission system for offshore windzone phase-1(500 MW VGF off coast of Gujrat for subzone B-3)	Informed to CTUIL vide letter dated 02.09.2024 CTUIL awarded the projects to the implementing agency on 02.09.2024
4.	Time extension for Communication Scheme "Requirement of additional FOTE of STM-16 capacity at Bhuj-II substation to cater connectivity of RE Gencos"	

3 Modifications in the earlier approved/notified transmission schemes:

3.1 Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme

3.1.1 Representative from CTUIL stated that the implementation of the 400 kV D/C Jhatikara-Dwarka line, along with two 400 kV bays each at Jhatikara and Dwarka

under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" was allocated to POWERGRID under RTM mode with completion schedule of 18 months vide MoP OM Ref. No. 15/3/2018-Trans-Part(5) dated 06.11.2023. POWERGRID vide letter dated 29.12.2023 requested an extension of the implementation timeline to at least 24 months due to technical and execution challenges and proposed changing the conductor configuration from quad to Twin HTLS on Monopole structure.

3.1.2 NCT in its 17th meeting held on 31.01.24 directed CTUIL to re-survey of the scheme through implementing agency so as to arrive at the optimum requirement of monopole/narrow base tower towers, and work out the revised estimated cost. Further, NCT in its 19th meeting held on 29.04.2024 approved the scope modifications in the Jhatikara – Dwarka 400 kV D/c line under Rajasthan REZ Ph-III, Part-D- Ph-II Scheme. Tentative implementation time-frame of 18 months from MOP OM-06/11/23 was unchanged. CTUIL vide letter Ref. No. CTUIL/OM/14/19 NCT dated 29.05.2024 informed that the scope of project was revised and conductor configuration was changed to Twin HTLS, However, the implementation timeline remains unchanged. POWERGRID on 06.06.2024, once again requested an extension of project timelines to at least 24 months from the fresh allocation date of 29.05.2024, instead of 18 months from original allocation date.

3.1.3 Subsequently, in a meeting chaired by Secretary (Power) on 01.07.2024, POWERGRID was advised to proceed with inviting tender based on 18 months' timelines for the implementation of Rajasthan Phase-II, Part-D, Phase-II scheme. In compliance with the directives, POWERGRID floated the tender and the award is expected by November, 2024 with a project completion timeline of February 2026.

3.1.4 Director (SO), Grid-India stated that 765/400 kV Jhatikara ICTs and 400 kV lines from Jhatikara were N-1 non-compliant during summer of 2024. In case of further delay in 400 kV D/C Jhatikara - Dwarka line, severe constraints are expected in the existing 400 kV Jhatikara – Dwarka and 400 kV Jhatikara – Bamnouli lines with further RE capacity addition in Rajasthan etc. The loading of these lines emerged as N-1 non-compliant during high demand season of NR and the same may lead to RE curtailment in future. Requirement of any augmentation in the Delhi intra-state system also needs to be examined. Chairperson, CEA directed that the above issues shall be studied in a holistic manner in the transmission Resource Adequacy Plan of Delhi.

3.1.5 After deliberations, NCT approved the revised SCOD for 400 kV D/C (Twin HTLS) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis).

3.2 **Change in scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex**

3.2.1 The transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1:4 GW) (Sirohi/Nagaur complex) was recommended in the 21st NCT meeting held on 06.08.2024. Subsequently, the scheme was notified by MoP vide Gazette dated

Khavda IVA Power Transmission Limited

29.08.2024. The scheme involves 5x500 MVA, 400/220 kV ICTs along with 6 Nos. 220 kV line bays at Sirohi S/s for RE interconnection at Sirohi S/s. The scheme is currently under bidding by RECPDCL.

3.2.2 Representative from CTUIL stated that connectivity up to 2100 MW was agreed to be granted at Sirohi S/s. Out of this, 1400 MW was agreed to be granted at 220 kV level through 5 Nos. of 220 kV line bays and balance 700 MW was agreed to be granted at 400 kV level (1 No. bay). It is to mention that out of above 700 MW, earlier 400 MW was agreed to be granted at 220 kV level of Sirohi S/s, however due to additional application of 300 MW, considering cumulative quantum (700 MW), it was proposed to be granted at 400 kV level. Further, it is proposed to add the following transmission element as part of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part- 1) (Sirohi Complex)

- 1 No. of 400 kV line bay at Sirohi S/s for RE interconnection

3.2.3 As total connectivity granted at Sirohi S/s on 220 kV level is 1400 MW through 5 Nos. of 220 kV line bays (out of 6 Nos.), 1 No. of 220 kV line bay which is part of the above scheme shall remain unutilised. Additionally, for RE evacuation requirement of 1400 MW at 220 kV level, through 4 Nos. of 400/220 kV ICTs (out of 5 Nos.), 1 No. of 400/220 kV ICT which is part of the above scheme shall remain unutilised. In view of the above, it is proposed to delete the following elements from Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part- 1) (Sirohi Complex)

- 1 No. of 220 kV line bay at Sirohi S/s
- 1x500 MVA, 400/220 kV ICT at Sirohi S/s along with transformer bays

3.2.4 The original cost of scheme is Rs 5027.61 Cr. With above modifications of scope, cost shall reduce only by Rs 40.75 Cr which is about (-) 0.81 % of original cost of package.

3.2.5 Representative of RECPDCL stated that NIT for the scheme was issued on 26.09.2024. The bid submission deadline is 29.11.2024 while SPV transfer is targeted in December 2024.

3.2.6 After Deliberations, NCT approved the revised scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex as follows:

Sl. No.	**Original scope of the transmission scheme**	**Revised scope of the transmission scheme**
1. Transmission system for immediate Evacuation of Power from Sirohi S/s (2 GW)		
1	5x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays • 400/220 kV 500 MVA ICTs- 5 Nos. • 400 kV ICT bays-5 Nos. • 220 kV ICT bays- 5 Nos.	**4x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays** • **400/220 kV 500 MVA ICTs- 4 Nos.** • **400 kV ICT bays-4 Nos.** • **220 kV ICT bays- 4 Nos.**
2	6 Nos. 220 kV line bays at Sirohi S/s	**5 Nos. 220 kV line bays at Sirohi S/s**

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Sl. No.	Original scope of the transmission scheme	Revised scope of the transmission scheme
	for RE interconnection • 220 kV line bays – 6 Nos.	**for RE interconnection** • **220 kV line bays – 5 Nos.**
3	220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s	• 220 kV Sectionalizer bay (1 set) • 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay
4	-	**1 No. 400 kV line bays at Sirohi S/s for RE interconnection** • **400 kV line bay – 1 No.**
	Note: There will be no change in other elements of the transmission scheme w.r.t agreed in the 21st NCT meeting/ MoP Gazette dated 29.08.2024.	

3.3 **Bid process for selection of Bidder as Transmission Service Provider (TSP) to establish "Augmentation of transformation capacity at Bhuj-II PS (GIS)" and "Transmission system strengthening to facilitate evacuation of power from Bhadla/Bikaner complex"**

3.3.1 The transmission scheme "Augmentation of transformation capacity at Bhuj-II PS (GIS)" was agreed in the 16th meeting of National Committee on Transmission held on 30.11.2023 under TBCB route with estimated cost of Rs. 428 crores and implementation timeframe of 21 months. Gazette was notified on 23.01.2024 with PFCCL as BPC. The RFP for the transmission scheme was issued on March 29, 2024. RFP bid submission originally scheduled on May 31, 2024 had been extended to August 20, 2024 on request from the bidders. Out of the two bidders who purchased the RFP documents for the subject transmission scheme, only one bidder i.e. Power Grid Corporation of India Limited submitted the bid on August 20, 2024. The bid was again extended and on August 27, 2024 also only one bidder i.e. Power Grid Corporation of India Limited submitted the bid. As there was only one bid, PFCCL vide letter dated 04.09.2024 sought the guidance from MoP on the matter. MoP vide letter dated 09.10.2024 referred the matter to National Committee on Transmission (NCT) for deliberation in the next NCT meeting and submit the recommendations to the Ministry.

3.3.2 Another transmission scheme "Transmission system strengthening to facilitate evacuation of power from Bhadla/Bikaner complex)" was approved in the 19th meeting of National Committee on Transmission held on 29.04.2024 under TBCB route with estimated cost of Rs. 198.75 crores and implementation timeframe of 18 months. Gazette was notified on 18.06.2024 with PFCCL as BPC. The RfP for the subject transmission scheme was issued on August 01, 2024. RFP bid submission was originally scheduled on October 04, 2024. RfP documents for the subject transmission scheme have been purchased by only one bidder, i.e. Power Grid Corporation of India Limited. Accordingly, bid submission for the project has already been extended three

(03) times and latest date of bid submission is 25th October, 2024. Subsequently, no bid has been received on the due date.

3.3.3 CTU stated that above strengthening schemes are getting delayed due to above bid issues.

3.3.4 As per clause 9.6 of "Tariff based Competitive-bidding Guidelines for Transmission Service" issued by Ministry of Power (MoP) on August 10, 2021, there have to be minimum two qualified bidders for conducting the bid process.

3.3.5 It was mentioned that in case of single bid is received, clarity is not available in TBCB Guidelines. Members opined that to save time of rebidding, certain provisions need to be worked out. It was discussed that whether the project can be awarded in case of single bid if the cost discovered is of the level of estimated tariff.

3.3.6 After deliberations, following was agreed:

A. For the project costing less than Rs. 500 crore

a) In case, no bid or single bid is received, the BPC may extend the bid process for 7 more days. After the extended period, the BPC may open the bid. If single bid is received, steps given in subsequent paragraphs need to be followed.

b) Based on estimated cost by the Cost Committee constituted by CEA and the norms provided in CERC tariff regulations, the levelised tariff for the project shall be calculated by the BPC.

c) If the quoted transmission charges by the bidder are lower than levelised tariff estimated by the BPC, the bidder may be declared as successful bidder and Letter of Intent (LoI) may be issued.

d) In case, the quoted transmission charges by the bidder are higher than the estimated levelised tariff by the BPC, the bidding process may be annulled and matter may be referred by the BPC to the Government. The Government may give exemption to the transmission project from competitive bidding and allocate the same under Regulated Tariff Mechanism (Section-62 of the Electricity Act, 2003).

e) If no bids are received, even after extension, the bidding process may be annulled by BPC and the matter may be referred by the BPC to the Government. The Government may give exemption to the transmission project from competitive bidding and allocate the same under Regulated Tariff Mechanism (Section-62 of the Electricity Act, 2003).

B. For the project with estimated cost of more than Rs. 500 crore, if only one bid is received, BPC may not open the bid and refer the matter to the Government. In case no bids are received, the bid process would be annulled and the matter shall be referred to the Government.

C. For making the enabling provisions, "Tariff based Competitive-bidding Guidelines for Transmission Service-2021" needs to be modified.

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3.4 Change in the implementation timeframe of Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I

3.4.1 Representative from CTUIL stated that Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I was recommended in the 20th NCT meeting held on 25.06.2024 under TBCB route with PFCCL as BPC and implementation time frame of 30 months from SPV transfer. Applications for cumulative 3050 MW linked with Ph-I 3 GW scheme have been received at Raghanesda S/s, out of 3050 MW applications, start date of connectivity required for 4 nos. of applications (connectivity quantum of 1150 MW) is from Dec'26 (JSW Neo Energy Limited: 400 MW & ACME: 400 MW) to Mar'27 (Sunsure Solarpark RJ One Pvt. Ltd.: 350 MW).

3.4.2 CTUIL proposed to change the implementation timeframe of the subject scheme from 30 months from SPV transfer to 24 months from SPV transfer so that the substation can come up earlier matching with requirement of above RE developers.

3.4.3 Representative of PFCCL informed that the RfP was issued on 14.09.2024 while the bid submission date is 19.11.2024.

3.4.4 After deliberations, it was decided that the implementation timeline of Transmission System for evacuation of RE power from Raghanesda area of Gujarat – 3 GW under Phase-I may be kept as 30 months and need not be changed.

4 New Transmission Schemes:

4.1 Eastern Region Expansion Scheme-44 (ERES-44)

4.1.1 Representative of CTUIL stated that several 220 kV transmission lines and substations were implemented in Indian grid along with cross border lines for importing power from Chukha Hydro Electric Plant in Bhutan. The generating station was commissioned in years 1986-88 and the transmission system is now more than 35 years old. Considering the age of conductors and increase in conductor snapping incidences, reconductoring of these transmission lines has become necessary. The matter was also deliberated in ERPC forum.

4.1.2 As the system involved cross border links also, a meeting was convened by CEA under the chairpersonship of Member (Power System) on 27-08-2024, wherein it was decided that matter of reconductoring of cross border lines will be separately taken up with Bhutan. However, reconductoring of ISTS portion of 220 kV corridor viz. Alipurduar (POWERGRID) – Falakata (WBSETCL) – Birpara (POWERGRID) – Binaguri (POWERGRID) – Siliguri (POWERGRID) – Kishanganj (POWERGRID) – Dalkhola (POWERGRID) – Gazole (WBSETCL) – Malda (POWERGRID), may be taken up under ISTS. Further, reconductoring of intra-state LILO portion of Birpara (POWERGRID) – Alipurduar (POWERGRID) 220 kV D/c line at Falakata (WBSETCL) and Dalkhola – Malda 220 kV D/c line at Gazol (WBSETCL) shall be carried out by WBSETCL matching with HTLS conductor of the main ISTS line in the matching timframe.

4.1.3 Director (SO), Grid-India stated that it is necessary that the intra-state portion of lines (under the jurisdiction of WBSETCL) is also re-conductored in the matching time-frame of that of the ISTS portion. Without the reconductoring of the intra-state portion, the benefits of reconductoring of the ISTS part cannot be realized. He further suggested that as intra-state portion is quite less compared to the inter-state portion, the intra-state part may also be re-conductored under ISTS at the cost of WBSETCL in matching timeframe.

4.1.4 It was suggested that reconductoring of Intra state portion of WBSETCL by an ISTS licensee may lead to commercial complications, therefore, reconductoring of intra state LILO portion may be carried out by the owner of the asset i.e. WBSETCL in matching timeframe.

4.1.5 After deliberations, NCT approved Transmission scheme "Eastern Region Expansion Scheme-44 (ERES-44))" as mentioned below:

4.1.5.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks
1.	Eastern Region Expansion Scheme-44 (ERES-44) Tentative implementation timeframe: 18 months (15 months on best effort basis) from the date of allocation of project	385.77	Approved under RTM through POWERGRID

4.1.5.2 Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
(i)	Reconductoring of ISTS portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A	54 ckm
(ii)	Reconductoring of ISTS portion of Falakata (WBSETCL) – Birpara (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	54 ckm
(iii)	Reconductoring of Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	160 ckm
(iv)	Reconductoring of Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	12 ckm
(v)	Reconductoring of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	216 ckm
(vi)	Reconductoring of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	62 ckm
(vii)	Reconductoring of ISTS portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A	195 ckm
(viii)	Reconductoring of ISTS portion of Gazole (WBSETCL) –	33 ckm

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
	Malda (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A	
(ix)	Upgradation of associated 220 kV bay equipment at Alipurduar (POWERGRID)	Replacement of Wave Traps of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line commensurate with rating of HTLS.
(x)	Upgradation of associated 220 kV bay equipment at Birpara (POWERGRID)	Replacement of Wave Traps of Falakata (WBSETCL) – Birpara (POWERGRID) and Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xi)	Upgradation of associated 220 kV bay equipment at Binaguri (POWERGRID)	Replacement of Wave Traps of Birpara (POWERGRID) – Binaguri (POWERGRID) and Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xii)	Upgradation of associated 220 kV bay equipment at Siliguri (POWERGRID)	Replacement of Wave Traps of Binaguri (POWERGRID) – Siliguri (POWERGRID) and Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c lines commensurate with rating of HTLS.
(xiii)	Upgradation of associated 220 kV bay equipment at Dalkhola (POWERGRID)	Replacement of Wave Traps of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) and Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c lines commensurate with rating of HTLS.
(xiv)	Upgradation of associated 220 kV bay equipment at Malda (POWERGRID)	Replacement of Wave Traps of Gazole (WBSETCL) – Malda

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Sl. No.	Scope of the Transmission Scheme	Capacity (MVA) / Circuit km (ckm) / Nos.
		(POWERGRID) 220 kV D/c line commensurate with rating of HTLS.
(xv)	Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c (HTLS) line	108 km

Note:

(a) WBSETCL shall reconductor their following lines sections under intra-state scheme matching with completion of ISTS scheme namely ERES-44:

- *About 4 km intra-state portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line at Falakata end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Falakata (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 4 km intra-state portion of Birpara (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line at Falakata end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Falakata (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 2 km intra-state portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line at Gazole end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Gazole (WBSETCL) end commensurate with rating of HTLS (1250 A).*
- *About 2km intra-state portion of Gazole (WBSETCL) – Malda (POWERGRID) 220 kV D/c line at Gazole end with HTLS conductor of ampacity 1250 A along with necessary upgradation of associated 220 kV bay equipment at Gazole (WBSETCL) end commensurate with rating of HTLS (1250 A).*

(b) WBSETCL will LILO the Dhalkola – Gazole 220 kV D/c line with 1250 A HTLS under their intra-state scheme for establishment of 220 kV level at their existing 132/33kV Raiganj (WBSETCL) S/s.

(c) ISTS licensee and WBSETCL shall coordinate for reconductoring of their respective portion of the lines matching with completion schedule of this scheme.

4.2 Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III

4.2.1 Representative of CTUIL stated that 2.5 GW REZ potential has been identified at Rajgarh (MP).

i. Phase-I of 1.5 GW involves establishment of Pachora PS with 3x500 MVA 400/220 kV ICTs and Pachora PS – Bhopal 400 kV D/c line which has been implementation by M/s G R Infraprojects Ltd. (Commissioned).

ii. Phase-II (1 GW) involves ICT augmentation (4th, 5th & 6th) Pachora PS along with Pachora PS – Ujjan (MPPTCL) 400 kV D/c line which is presently under implementation by M/s G R Infraprojects Ltd. with SCOD of 14.02.2026.

4.2.2 He further stated that in view of applications received for cumulative capacity of ~4000 MW at Pachora PS till July-2024, it was found prudent to expand the substations to its full capacity so as to accommodate applications being received

beyond 2.5 GW at Pachora PS. Out of 1508 MW applications received for Rajgarh Ph-III system, RE projects for 1321 MW have been agreed for grant with start date of March 2027. For additional 187 MW applications received in July 2024 are under process and shall also be granted with start date of March 2027.

4.2.3 To evacuate the power from these areas, CTUIL proposed a transmission scheme broadly consisting of augmentation at Pachora PS and Pachora PS – Rajgarh(PG) 400 kV D/c line. CTUIL also mentioned that with the augmentation at Pachora PS, the substation will be closed for further connectivity.

4.2.4 After deliberations, NCT recommended the transmission scheme "Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III" to enable evacuation of upto 4000 MW Power from RE Projects in Rajgarh (i.e. 1500 MW beyond 2500 MW) SEZ in Madhya Pradesh as mentioned below:

4.2.4.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III **Tentative implementation timeframe**: Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV Transfer & for element at Sl. No. 2b shall be 31.03.2028 in matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)	1079	Recommended under TBCB route with RECPDCL as BPC

4.2.4.2 Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity
1.	Creation of New 220 kV Bus Section (3rd) with 220 kV Bus Sectionaliser and 400/220 kV, 3x500 MVA ICT augmentation (7th, 8th & 9th) at Pachora PS terminated on 220 kV Bus Section (3rd)	500 MVA 400/220 kV ICT – 3 Nos. 400 kV ICT bay – 3 Nos. (on Section-II) 220 kV ICT bay – 3 Nos. (on Section-III) 220 kV Bus Sectionaliser bays – 1 set 220 kV BC & TBC – 1 Nos. each
2.	**2a**. 3 Nos. 220 kV line bays for RE interconnection on Bus Section (3rd)	3 Nos. on Sec-III
	2b. 1 Nos. 220 kV line bay for RE Interconnection of Purvah Green Power Pvt. Ltd. on Bus Section (3rd)	1 No. on Sec-III
3.	Pachora PS – Rajgarh(PG) 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays at both ends and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends	Line length: 180 km. 400 kV line bays: 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS) 420 kV, Switchable Line Reactors (Sw LRs): 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS) Switching equipment for 400 kV line reactor – 4 Nos. (2 at Rajgarh(PG) & 2 at Pachora PS)
4.	Installation of 1x125 MVAR, 420 kV bus	125 MVAr, 420 kV Bus reactor – 1 Nos.

Sl. No.	Scope of the Transmission Scheme	Capacity
	reactor at Pachora PS (400 kV Bus Section-II)	400 kV Bus reactor bay: 1 Nos.

4.3 Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II

4.3.1 Representative of CTUIL stated that applications for cumulative capacity of 1970 MW has been received at Neemuch PS till July 24, it was found prudent to expand the substations to its full capacity so as to accommodate applications being received beyond 1 GW at Pachora PS. CTUIL proposed transmission scheme consisting of augmentation a Neemuch PS, creation of 400/220 kV Handiya substation, Neemuch PS – Pachora PS 400 kV D/c line, Pachora PS – Handiya 400 kV D/c line and LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s etc. CTUIL also mentioned that with the augmentation at Neemuch PS, the substation will be closed for further connectivity.

4.3.2 After deliberations, NCT recommended the scheme "Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II" to enable Evacuation of upto 2000 MW Power from RE Projects in Neemuch (i.e. 1000 MW beyond 1000 MW) SEZ in Madhya Pradesh as mentioned below:

4.3.2.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Crore)	Remarks
1.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II Implementation timeframe: 24 months from date of SPV transfer	2393	Recommended under TBCB route with PFCCL as BPC

4.3.2.2 Detailed scope of the scheme is given below:

Sl.No.	Scope of the Transmission Scheme	Capacity
1.	Creation of New 220 kV Bus Section-II at Neemuch PS with Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (3rd, 4th & 5th) at Neemuch S/s along with associated bays.	500 MVA 400/220 kV ICT – 3 Nos. 400 kV ICT bay – 3 Nos. 220 kV ICT bay – 3 Nos. (on Sec-II) 220 kV Bus Sectionaliser bays – 1 set 220 kV BC & TBC – 1 Nos. each
2.	4 Nos. 220 kV Line bays at Neemuch PS for RE interconnection	220 kV Bays – 4 Nos. on Sec-II
3.	Neemuch PS – Pachora PS 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along associated Line bays and 50 MVAr Switchable Line Reactor (Sw LR) on each ckt at both ends	Line length: 190km. 400 kV Line bays: 4 Nos. (2 at Neemuch PS & 2 at Pachora PS) 420 kV, Switchable Line Reactors (Sw LRs): 4 Nos. (2 at Neemuch PS & 2 at Pachora PS) Switching equipment for 400 kV

		line reactor – 4 Nos. (2 at Neemuch PS & 2 at Pachora PS)
4.	Establishment of 2x500 MVA, 400/220 kV S/s at Handiya alongwith 2x125 MVAr 420 kV Bus Reactors **Future provision (space for):** ➢ 400 kV line bays along with switchable line reactors– 6 Nos. (Sec-II) ➢ 400/220 kV ICT along with bays - 4 Nos. (1 Nos. on Sec-I & 3 Nos. on Sec-II) ➢ 400 kV Bus Reactor along with bays: 2 Nos. (Sec-II) ➢ 220 kV line bays: 8 Nos. (on Sec-II) ➢ 400 kV Sectionalization bay: 1 set ➢ 220 kV Sectionalization bay: 1 set ➢ 220 kV TBC & BC: 1 Nos.	400/220 kV ICTs: 2 Nos. 400 kV ICT Bays: 2 Nos. 220 kV ICT Bays: 2 Nos. 400 kV Line bays: 6 Nos. 220 kV line bays for MPPTCL – 8 Nos. 125 MVAr, 420 kV Bus reactor – 2 Nos. 400 kV Bus reactor bay: 2 Nos. 220 kV TBC bay – 1 Nos. 220 kV BC bay – 1 Nos.
5.	Pachora PS – Handiya 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated bays at Pachora PS end and 50 MVAr Switchable Line Reactor (Sw LR) on each ckt at both *ends*	Line length: 190 km. 400 kV bays: 2 Nos. (at Pachora PS) 420 kV, Sw LRs: 4 Nos. (2 at Handiya & 2 at Pachora PS) Switching equipment for 400 kV line reactor – 4 Nos. (2 at Handiya & 2 at Pachora PS)
6.	LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s	LILO route length : 22 km (88 ckm) The Khandwa(PG) – Itarsi(PG) 400 kV D/c line is of Twin Moose configuration and LILO shall be of similar conductor configuration
7.	Installation of 1x125 MVAR, 420 kV bus reactor (2nd) at Neemuch PS	125 MVAr, 420 kV Bus reactor – 1 Nos. 400 kV Bus reactor bay: 1 Nos.
Note: TSP of Neemuch & Pachora PS shall provide space for above scope of work		

4.4 North Eastern Region Expansion Scheme-XXI Part-B (NERES-XXI Part-B)

4.4.1 Representative from CTUIL stated that the existing 132 kV Badarpur (POWERGRID) switching station was commissioned in 1999 and shall be completing 25 years in service by 2024. POWERGRID the owner of the substation has informed that they are facing issues in O&M of the switching station and to improve the reliability it would be prudent to upgrade the switching station from single main and transfer bus scheme to double main transfer bus scheme by converting from Air Insulated Switchgear (AIS) to Gas Insulated Switchgear (GIS).

4.4.2 Further, towards adoption of new technology in the Indian Grid, it was proposed that the upgradation could be carried out as Green GIS instead of conventional GIS owing to the following benefits:

- Green GIS is a new technology in which Sulfur Hexafluoride (SF_6) gas is not used and this technology is being adopted by several countries in the world.
- This would help in the reduction of usage of Green House Gas and would be a step towards achieving sustainable development targets.

4.4.3 The scheme was taken up for deliberations in the 15th meeting of NCT held on 25-08-2023, wherein it was decided to review the scheme subsequently. The scheme was thereafter discussed in the 16th meeting of NCT held on 30-11-2023, it was decided to defer the scheme at present and take it up after additional discussions on new technology such as major benefits of Green GIS, availability of Green GIS vendors in India, additional cost implication (conventional GIS vis-à-vis Green GIS) etc.

4.4.4 Director (SO), Grid-India suggested that instead of going for green GIS for complete station, some portion of the station (limited number of bays) may be considered for green GIS. Also, stations in other regions where green GIS might be more suitable due to environmental conditions may also be considered as potential candidates for green GIS.

4.4.5 After deliberations, it was decided that a committee with members from CEA, CTUIL and POWERGRID to be constituted to survey the green GIS literature, technical aspects, undertake visit of the substation, exploring possible solutions etc. The committee shall submit its recommendations within 06 months.

4.5 **Upgradation of ±800 kV, 6000 MW Raigarh-Pugalur HVDC system for enhancement of reverse power capacity upto 6000 MW from existing 3000 MW**

4.5.1 Raigarh-Pugalur ± 800 kV, 6000 MW HVDC system is capable of transferring 6000 MW of power from Raigarh to Pugalur. However, its reverse power capacity i.e. Pugalur to Raigarh is 3000 MW.

4.5.2 Representative of CTUIL stated that enhancement of reverse power capacity upto 6000 MW from existing 3000 MW has been approved in 52nd SPRC meeting held on 03.08.2024 at an indicative cost of Rs 1000 Cr (including cost of system studies) and required AC system strengthening at Pugalur (estimated cost of Rs 400 crores) & Raigarh (estimated cost of Rs 1800 Crores)

4.5.3 Further, SRPC vide letter dated 02.09.2024 recommended CTUIL to take up the matter to NCT at the earliest.

4.5.4 Director (SO), Grid-India stated that until the adequate AC system is available on both ends, the HVDC capacity of 6000 MW in reverse direction can't be utilized even after the proposed HVDC upgradation.

4.5.5 CTU stated that as confirmed by POWERGRID vide e-mail dated 10.10.2024, there is no space available at both Raigarh (Kotra) and Dharamjaygarh S/s for augmentation of AC system to enable reverse power flow on Raigarh- Pugalur HVDC beyond 3000 MW. AC System augmentation at Raigarh (Kotra) S/s in WR is not possible and if at all reverse flow of more than 3000 MW is required with N-1 compliance, it would require an elaborate exercise of shifting certain Thermal generating stations from Raigarh (Kotra) S/s to a new substation which would be cumbersome and shall entail significant costs as well as consent from thermal generating stations which are already connected at Raigarh (Kotra) S/s. Further, it was also informed that with the reversal

of HVDC from 3000 MW to 6000 MW, no enhancement in TTC/ATC between SR-NEW Grid is expected looking into the very less sensitivity of the HVDC in TTC/ATC. .

4.5.6 After deliberations, it was decided that a committee will be formed comprising members from CEA, CTUIL, POWERGRID, Grid-India, SRPC and WRPC. The committee shall carry out comprehensive study and propose comprehensive plan including AC system strengthening in Southern Region and Western Region along with the total scheme cost. The comprehensive plan may again be put up to SRPC before bringing it to NCT.

4.6 Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme

4.6.1 Representative from CTUIL stated that KPS3 S/s with 3x1500 MVA ICTs on Section-I is under implementation by M/s KPS3 Transmission Ltd. (Subsidiary of POWERGRID). 1x1500 MVA Addl. ICT at Section-I is also being implemented by M/s POWERGRID (under RTM) under Khavda Ph-IV Part E3 scheme. Further, Section-II of KPS3 is being established by M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) with SCOD of Aug-26 with 3x1500 MVA ICTs and 3 Nos. 400 kV bays at Bus Section-II for RE interconnection. Out of above bays, 2 bays had been allocated to M/s SRPL (1250 MW) & NHPC (600 MW).

4.6.2 Applications for cumulative 3290 MW have been received at KPS3 (Sec-II) which require 3 Nos. 400 kV bays. 1 No. 400 kV bay is already being implemented under Khavda Phase-IV Part A scheme. Balance 2 nos. 400 kV bays along with addl. 1x1500 MVA ICT at KPS3 (Sec-II) are required to be implemented after considering N-1 compliance of already planned 765/400 kV ICTs at KPS3 (Sec-II). The proposed 765/400 kV ICT & 400 kV bays would facilitate immediate injection of power at KPS3 (Section-II). CTUIL also informed that the substation will be closed for further applications.

4.6.3 NCT directed CTUIL to explore the possibility for Battery Energy Storage System (BESS) for optimizing transmission infrastructure at Khavda as well as other RE potential Zones. Consideration of Storage may facilitate integration of additional RE Capacity.

4.6.4 After deliberations, NCT approved the transmission scheme "Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme" under RTM mode as follows

4.6.4.1 Summary of the scheme is given below:

Sl. No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Crore)	Remarks
1.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	252	Approved under RTM through M/s Khavda IV A Power

	Implementation timeframe: 24 months from the date of allocation		Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))

4.6.4.2 Detailed scope of the scheme is given below:

S.N.	Scope of the Transmission Scheme	Capacity
1.	Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 No. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	• 765/400 kV ICT – 1 (1x1500 MVA) • 765 kV ICT bay – 1 (+1 no. bay for dia completion with Switchable Line Reactor (SLR) provision in future bay) on Bus section-II • 400 kV ICT bay – 1 (+ 1 no. bay for dia completion and termination of the proposed Line for RE interconnection) on Bus section-II
2.	1 Nos. 400 kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW	400 kV line bays – 1 no. (+ 1 no. bay for dia completion with the provision to terminate future 400/220 kV ICT)
Note: TSP of KPS3 (GIS) shall provide space for above scope of work.		

4.7 **Supply and Installation of additional Fiber Optic Test Equipment (FOTE) and Ethernet cards at Automatic Generation Control (AGC) and Critical Nodes of SR Region.**

4.7.1 Representative of CTUIL stated that as per CEA, Manual of Communication Planning in Power System Operation 2022, CTU for high availability requirements for Power System Communication, redundancy with route diversity for critical links shall be maintained. Additional FOTE and redundant Ethernet ports are required at all AGC operated generating stations, in view of resource disjoint and criticality of AGC operation for grid operation purpose.

4.7.2 After deliberations, NCT approved the communication scheme "Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region" under RTM mode as follows

4.7.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks

1.	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region Tentative implementation timeframe: 12 months from date of allocation of project	1.02	Approved under RTM through POWERGRID

4.7.2.2 Detailed scope of the scheme is given below:

(i) Supply and installation of 3 nos. FOTE with STM 16 capacity at following locations:

SI.No.	Station Name	No of FOTE	Remark
1.	Simhadri-1	1	For AGC purpose
2.	NP KUNTA	1	Shortage of ports
3.	NLC-TPS-2 Stage 1	1	For AGC purpose
Total		**3**	

(ii) Supply and installation of 10 Nos. ethernet cards at following locations:

SI.No.	Station Name	Ethernet Cards required
1	Ramagundam -I	2
2	Ramagundam -II	
3	Ramagundam -III	
4	NTPC Vallur	2
5	NTPL Tuticorin	1
6	NTPC Kudgi	2
7	NLC - TPS 2 Exp	1
8	NLC - TPS 1 Exp	1
9	NNTPS new Neyveli	1
Total		**10**

4.8 Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity

4.8.1 Representative of CTUIL stated that the transmission scheme "Requirement of Additional FOTE at various ISTS nodes in ER" with capacity utilisation of approximately 90% and above and few other important stations is required.

4.8.2 After deliberations, NCT approved the communication scheme "Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity" under RTM mode as follows

4.8.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost (₹ Cr)	Remarks

1.	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity Tentative implementation timeframe: 12 months from date of allocation of project	9.78	Approved Under RTM through POWERGRID

4.8.2.2 Detailed scope of the scheme is given below:

a) Conversion of 13 nos. STM 16 FOTE to STM 64 FOTE
b) Conversion of 4 nos. STM 4 FOTE to STM 16 FOTE by utilizing four (4) Nos. FOTEs freed from upgradation of STM 16 FOTE to STM 64 FOTE

S. No.	Node Name(with approx 90% capacity exhausted)	Upgradation/replacement required	Detail of Card/Equipment required for upgradation	Estimated Cost (Rs.)
1	Kasba	STM 16 to STM 64	Existing Equipment Cannot be upgraded. New STM 64 SDH Equipment Required	74 Lakhs
2	ERLDC	STM 16 to STM 64		74 Lakhs
3	Jeerat	STM 16 to STM 64		74 Lakhs
4	Subhashgram	STM 16 to STM 64		74 Lakhs
5	Farakka	STM 16 to STM 64		74 Lakhs
6	Kahalgaon	STM 16 to STM 64		74 Lakhs
7	Saharsa	STM 16 to STM 64		74 Lakhs
8	Binaguri	STM 16 to STM 64		74 Lakhs
9	Purnea	STM 16 to STM 64		74 Lakhs
10	Kishenganj	STM 16 to STM 64		74 Lakhs
11	Sasaram	STM 16 to STM 64		74 Lakhs
12	AB380 Repeater	STM 16 to STM 64		74 Lakhs
13	Allahabad	STM 16 to STM 64		74 Lakhs
Total Cost for conversion of 13 nos. of STM 16 equipment to STM 64:A				**9.62 Cr**
14	Gaya	STM 4 to STM 16	Upgradation to be done by utilizing four Nos. of STM 16 equipment freed in above list after upgradation to STM 64.	4 Lakhs
15	Essar Chandwa	STM 4 to STM 16		4 Lakhs
16	Darbhanga(KPTL)	STM 4 to STM 16		4 Lakhs
17	Arrah	STM 4 to STM 16		4 Lakhs
Total Cost for conversion of 04 Nos. of STM 4 equipment to STM 16: B				**16 Lakhs**
Total Cost for conversion of 13 Nos. of STM 16 to STM 64 and 04 nos. of STM4 equipment to STM 16: A+B				**9.78 Cr**

Khavda IVA Power Transmission Limited

4.9 **Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from Punatsangchhu-II Hydroelectric Project (PHEP-II), Punatsangchhu-I Hydroelectric Project (PHEP-I) and Jigmeling of Bhutan to Alipurduar, India**

4.9.1 Representative of CTUIL stated that to ensure the accurate coordination of devices between SDH at one end i.e Alipurduar, India and MPLS-TP at other end i.e., Punatsangchhu-II, as well as to cater to cybersecurity issue of the Indian Grid, the proposed scheme for Alipurdwar S/s end needs to be implemented.

4.9.2 After deliberations, NCT approved the communication scheme "Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India" under RTM mode as follows

4.9.2.1 Summary of the scheme is given below:

SI No.	Name of the scheme and tentative implementation timeframe	Estimated Cost	Remarks
1.	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and teleprotection for 400kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India Tentative implementation timeframe: 6 months from date of allocation	₹ 65 lakhs	Approved Under RTM through POWERGRID

4.9.2.2 Detailed scope of the scheme is given below:

a) One (1) set of STM-4 SDH equipment along with panel supporting minimum five directions with MSP (Multiplex Section Protection 1+1) & equipped with E1 and Ethernet interfaces.
b) Six (6) sets of 175 km Amplifiers solutions: 2 directed towards Punatsangchhu-II (PHEP-II), 2 directed towards Punatsangchhu-I (PHEP-I) and 2 directed towards Jigmeling.

Note: POWERGRID to coordinate with Bhutan ends while procuring the equipment to avoid any non-compatibility issues

5 Grid-India Presentation on Performance of the National Grid in Q1 and Q2 of FY 2024-25

5.1.1 Representative of Grid-India made a presentation on performance of the National Grid in Q1 and Q2 of FY 2024-25. Copy of presentation is attached at Annex-II. Major points highlighted during the presentation are given in subsequent paragraphs.

5.1.2 **Large number of generation loss events in NR RE Complex:** NLDC representative informed that there have been more than 55 events between January 2022 and September 2024 involving RE generation loss of more than 1000 MW. Around 13 such generation loss events (>500 MW) have occurred between April – September 2024.

One of the major reasons for these grid events has been the non-compliance of the RE plants against CEA's standards. The details of the non-compliance and measures being taken by Grid-India to address the issues were explained by NLDC representative in the meeting.

5.1.3 **Oscillations in NR RE complex and issues with performance of STATCOMs:** NLDC representative informed that low frequency oscillations (3-4 Hz) are being observed in NR RE complex on a regular basis. The oscillations start during morning hours with increase in solar generation and are mainly observed in voltage and reactive power. The non-standardization of PPC delays is one of the potential reasons for these oscillations.

He further informed that currently 05 Nos. STATCOMs are operational in NR RE complex. These STATCOMs have been installed to provide the fast dynamic reactive power support to the grid during any contingency. The response time of the installed STATCOMs shall be less than 30 ms as per their control manuals.

However, following observations in the performance of STATCOMs (as visible in DR as well as PMU plots) in NR RE complex has been observed:

- High response time (sluggish response) during faults leading to injection of reactive power post clearance of fault
- Automatic gain reduction by stability controller of the STATCOMs on hunting detection, possibly leading to enhancement in magnitude of oscillations

The problem of amplification of oscillations with reduction of STATCOM gain in voltage control mode has been analyzed with measurement (TFR) data and simulation results for a large data set. Detailed analysis in this regard was also shared with CEA, CTUIL, POWERGRID and OEM.

It is observed that oscillations damp out when the STATCOMs are being operated in Fixed 'Q' mode. This mode of operation, however, defeats the purpose of providing STATCOMs for fast dynamic reactive power support.

The performance issues being observed in the current STATCOMs necessitate proper tuning of the STATCOM controllers. Also, necessary modifications in the RfP of upcoming STATCOMs is required based on the current experience.

NCT directed that a committee may be constituted with members from CEA, CTUIL, Grid-India, Power Grid and all the STATCOM OEMs to deliberate the performance

related issues and the possible remedial measures. The matter to be coordinated by GM Division, CEA in consultation with PS Wing, CEA.

5.1.4 **17th June 2024 Load Loss Event in Northern Region and Reactive Power Planning for Bulk Loads (Electrolyzers and Data Centers):** Director (SO), Grid-India explained the 17th June 2024 grid event of simultaneous tripping of both bipoles of the +/-800 kV HVDC Champa (WR) – Kurukshetra (NR) link led to a substantial load reduction (~16.5 GW) in the northern region. The event started with the tripping of the aforementioned HVDC link and triggered a series of events starting from the sudden voltage drop across the stations in the Northern region and subsequent stalling and tripping of certain portion of load.

He further informed that the Ministry of Power constituted a Committee under the Chairmanship of Member (GO&D), CEA to analyze the event. The committee, in its suggestions, recommended the planning of suitable dynamic reactive power compensation near load centers.

He further stated that the event (especially the stalling of load) was replicated in simulation studies with proper load modelling. As the load behavior is changing, the existing philosophy for modelling of loads in the planning and operational studies need to be reviewed. Without proper load modelling in the studies, it would be difficult to capture such phenomenon in the studies. The standards for protection settings of loads, especially 1-ph and 3-ph motor loads, also needs to be reviewed.

Further, as a large quantum of electrolyzer and data center load is also envisaged to be connected at ISTS level in near future, it is important that adequate reactive power compensation is planned nearby such ISTS load feeding stations.

He suggested that the following activities may be taken up on priority:

- Study of load behavior and consideration of same in the simulation studies
- Planning of dynamic reactive power compensation at both inter-state and intra-state level near major load centers
- Review of the standards specifying standards for protection settings of loads, especially 1-ph and 3-ph motor loads
- Planning of suitable reactive power compensation at large ISTS stations being planned for feeding large electrolyzer and data center loads

Chairperson, CEA directed that the reactive power planning study at all the major load centers shall be taken up on priority. Grid India was advised to identify important BIS standards/committees in this regard and CEA/Stakeholders may take up with BIS.

He further directed that two separate committees comprising of members from CEA, CTUIL and Grid-India may be constituted for comprehensive study of performance, control strategy, reactive power requirements etc. of electrolyzer and data center loads respectively so that suitable reactive power compensation could be planned. The characteristics and load pattern/behaviour of electrolysers would be coordinated by ET&I Division, CEA and of data centres would be coordinated by PDM&LF Division, CEA.

5.1.5 **Evacuation of large quantum of RE under T-GNA:** NLDC representative informed that a large quantum of RE generation (~5700 MW) is being evacuated under T-GNA due to the delay in the commissioning of associated transmission system. There is possibility of certain RE curtailment if the commissioning of the associated transmission system is not expedited.

5.1.6 **Flexibility and Ramping Requirement:** NLDC representative informed that persistent high frequency was observed in the India's grid during solar hours on few days in the month of August 2024. The high RE generation and the limited flexibility to further reduce the thermal generation to accommodate the RE generation was one of the major factors for this high frequency operation. Further, as the thermal generating units are required during non-solar hours, these units cannot be taken out of service during the high frequency operation period.

Another challenge is being faced in meeting the ramping requirement during evening hours where the flexibility requirements have increased significantly due to the increasing demand ramp up coupled with the simultaneous decline in solar generation. There is an urgent requirement of fast ramping resources in the grid to meet the flexibility requirements in coming days.

5.1.7 **Constraints in Maharashtra system during high export from Southern Region:** Director (SO), Grid-India stated that the congestion is being faced in export of power from SR during high RE periods. To relieve the congestion, 765 kV Narendra – Pune D/C was planned with commissioning schedule of July 2024. However, the line is delayed and revised date of commissioning is December2024.

He further stated that even after commissioning of 765 kV Narendra – Pune D/C, constraints in western Maharashtra would still remain in export of power from SR. There is an urgent requirement for expediting the planned transmission system augmentation in western Maharashtra area.

Chairperson, CEA directed that the augmentation works in Maharashtra and other critical areas shall be monitored on priority.

Summary of the deliberations of the 24th meeting of NCT held on 23rd October, 2024

I. Modification in the earlier approved/notified transmission schemes:

1. Revision in SCOD of 400 kV D/C Jhatikara-Dwarka line under REZ Phase-III Part-D Phase-II scheme

NCT approved the revised SCOD for 400 kV D/C (quad) Jhatikara-Dwarka line under "Transmission system for evacuation of 20 GW REZ power from Rajasthan under phase-III, Part-D, Phase-II" scheme as 28th February, 2026 (31st December 2025 on best effort basis).

2. Change in scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex

NCT approved the revised scope of Transmission system for evacuation of power from Rajasthan REZ Ph-V (Part-1: 4 GW) [Sirohi/Nagaur] Complex as follows:

Sl. No.	Original scope of the transmission scheme	Revised scope of the transmission scheme
1. Transmission system for immediate Evacuation of Power from Sirohi S/s (2 GW)		
1	5x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays • 400/220 kV 500 MVA ICTs- 5 Nos. • 400 kV ICT bays-5 Nos. • 220 kV ICT bays- 5 Nos.	**4x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays** • **400/220 kV 500 MVA ICTs- 4 Nos.** • **400 kV ICT bays-4 Nos.** • **220 kV ICT bays- 4 Nos.**
2	6 Nos. 220 kV line bays at Sirohi S/s for RE interconnection • 220 kV line bays – 6 Nos.	**5 Nos. 220 kV line bays at Sirohi S/s for RE interconnection** • **220 kV line bays – 5 Nos.**
3	220 kV Sectionalizer bay (1 set) along with 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay at Sirohi S/s	• 220 kV Sectionalizer bay (1 set) • 220 kV BC (2 Nos.) bay and 220 kV TBC (2 Nos.) bay
4	-	**1 No. 400 kV line bays at Sirohi S/s for RE interconnection** • **400 kV line bay – 1 No.**
	Note: There will be no change in other elements of the transmission scheme w.r.t agreed in the 21st NCT meeting/ MoP Gazette dated 29.08.2024.	

II. ISTS Transmission schemes, costing between Rs 100 Crore to Rs 500 Crore, approved by NCT:

1. The transmission schemes approved by NCT under RTM route is given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹ Cr)

1.	Eastern Region Expansion Scheme-44 (ERES-44)	RTM through POWERGRID	18 months (15 months on best effort basis) from the date of allocation	385.77
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme	RTM through M/s Khavda IV A Power Transmission Ltd. (Subsidiary of Adani Energy Solutions Ltd.) (i.e. TSP of KPS3 (Sec-II))	24 months from the date of allocation	252

The broad scope of above schemes are given below

Sl. No.	**Name of Scheme & Tentative implementation timeframe**	**Broad Scope**
1.	Eastern Region Expansion Scheme-44 (ERES-44) **Implementation timeframe: 18 Months (15 months on best effort basis) from the date of allocation of project**	1. Reconductoring of ISTS portion of Alipurduar (POWERGRID) – Falakata (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A (54 ckm) 2. Reconductoring of ISTS portion of Falakata (WBSETCL) – Birpara (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (54 Km.) 3. Reconductoring of Birpara (POWERGRID) – Binaguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (160 ckm) 4. Reconductoring of Binaguri (POWERGRID) – Siliguri (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (12 ckm) 5. Reconductoring of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A. (216 ckm) 6. Reconductoring of Kishanganj (POWERGRID) – Dalkhola (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (62 ckm) 7. Reconductoring of ISTS portion of Dalkhola (POWERGRID) – Gazole (WBSETCL) 220 kV D/c line with HTLS conductor of ampacity 1250 A (195 ckm) 8. Reconductoring of ISTS portion of Gazole (WBSETCL) – Malda (POWERGRID) 220 kV D/c line with HTLS conductor of ampacity 1250 A (33 ckm) 9. Upgradation of associated 220 kV bay equipment at

		Alipurduar (POWERGRID) 10. Upgradation of associated 220 kV bay equipment at Birpara (POWERGRID) 11. Upgradation of associated 220 kV bay equipment at Binaguri (POWERGRID) 12. Upgradation of associated 220 kV bay equipment at Siliguri (POWERGRID) 13. Upgradation of associated 220 kV bay equipment at Dalkhola (POWERGRID) 14. Upgradation of associated 220 kV bay equipment at Malda (POWERGRID) 15. Supply and installation of OPGW along with terminal equipment at both ends of Siliguri (POWERGRID) – Kishanganj (POWERGRID) 220 kV D/c (HTLS) line (108 km)
2.	Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase-V Part B3 scheme **Implementation timeframe:** 24 months from the date of allocation	1. Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 Nos. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530MW 2. 1 No. 400kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL (Appl. No. 2200000953) for 1530 MW Note: TSP of KPS3 (GIS) shall provide space for above scope of work.

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

III. ISTS Transmission schemes, costing greater than ₹ 500 Crore, recommended by NCT to MoP:

The ISTS transmission schemes recommended by NCT to MoP are given below:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Tentative Implementation timeframe	BPC	Estimated Cost (₹ Crs)
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III	TBCB	Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV transfer & for element at Sl. No. 2b shall be 31.03.2028 in	RECPDCL	1079

			matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)		
2.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II	TBCB	24 months from date of SPV transfer	PFCCL	2393

The broad scope of the above ISTS schemes to be notified in Gazette of India is as given below:

Sl. No.	**Name of Scheme & Tentative implementation timeframe**	**Broad Scope**	**Bid Process Coordinator**
1.	Transmission system for Evacuation of Power from RE Projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh-Phase III **Implementation timeframe:** Implementation timeframe of elements at Sl. No. 1, 2a, 3 & 4 shall be 24 months from date of SPV transfer & for element at Sl. No. 2b shall be 31.03.2028 in matching timeframe of RE generator (Purvah Green Power Pvt. Ltd.: 297 MW)	1. Creation of New 220 kV Bus Section (3rd) with 220 kV Bus Sectionaliser and 400/220 kV, 3x500 MVA ICT augmentation (7th, 8th & 9th) at Pachora PS terminated on 220 kV Bus Section (3rd) 2. **2(a)** 3 Nos. 220 kV line bays for RE Interconnection on Bus Section (3rd) **2(b)** 1 Nos. 220 kV line bay for RE Interconnection of Purvah Green Power Pvt. Ltd. on Bus Section (3rd) 3. Pachora PS – Rajgarh(PG) 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays at both ends and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (180 Km) 4. Installation of 1x125 MVAR, 420 kV bus reactor at Pachora PS (400 kV Bus Section-II)	RECPDCL
2.	Transmission system for Evacuation of Power from RE Projects in Neemuch (1000 MW) SEZ in Madhya Pradesh-Phase II	1. Creation of New 220 kV Bus Section-II at Neemuch PS with Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (3rd, 4th & 5th) at Neemuch S/s along with associated bays. 2. 4 Nos. 220 kV Line bays at Neemuch	PFCCL

	Implementation timeframe: 24 months from date of SPV transfer	PS for RE interconnection 3. Neemuch PS – Pachora PS 400 kV 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated line bays and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (190 km) 4. Establishment of 2x500 MVA, 400/220 kV S/s at Handiya with 2x125MVAr 420 kV Bus Reactors **Future provision (space for):** • *400 kV line bays along with switchable line reactors– 6 Nos. (Sec-II)* • *400/220 kV ICT along with bays - 4 Nos. (1 Nos. on Sec-I & 3 Nos. on Sec-II)* • *400 kV Bus Reactor along with bays: 2 Nos. (Sec-II)* • *220 kV line bays: 8 Nos. (on Sec-II)* • *400 kV Sectionalization bay: 1 set* • *220 kV Sectionalization bay: 1 set* • *220 kV TBC & BC: 1 Nos.* 5. Pachora PS – Handiya 400 kV 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) along with associated bays at Pachora PS end and 50 MVAr Switchable Line Reactors (Sw LR) on each ckt at both ends (190 km) 6. LILO of Khandwa(PG) – Itarsi(PG) 400 kV D/c (Twin Moose) line at Handiya S/s (22 km) 7. Installation of 1x125 MVAR, 420 kV bus reactor (2nd) at Neemuch PS *Note: TSP of Neemuch & Pachora PS shall provide space for above scope of work*	

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

IV. ISTS communication schemes approved by NCT:

Sl. No.	Name of Transmission Scheme	Implementation Mode	Implementation timeframe	Estimated Cost (₹)
1	Supply and Installation of additional FOTE and Ethernet cards at AGC & Critical Nodes of SR Region	RTM through POWERGRID	12 months from the date of allocation	1.02 Cr
2	Requirement of Additional FOTE at various ISTS nodes in ER due to exhaustion of existing capacity	RTM through POWERGRID	12 months from date of allocation	9.78 Cr
3	Deployment of FOTE (SDH Equipment) and amplifier solutions at Alipurduar S/s end for OPGW based communication and Teleprotection for 400 kV lines from PHEP-II, PHEP-I and Jigmeling of Bhutan to Alipurduar, India	RTM through POWERGRID	6 months from date of allocation	65 Lakhs

(Detailed scope as approved by 24th NCT and subsequent amendments thereof)

Khavda IVA Power Transmission Limited

Annexure-I

List of participants of the 24th meeting of NCT

CEA:

1. Sh. Ghanshyam Prasad, Chairperson, CEA & Chairman, NCT
2. Sh. Ajay Talegaonkar, Member (E&C)
3. Sh. A.K. Rajput, Member (Power Systems)
4. Sh. Ishan Sharan, Chief Engineer (PSPA-I)
5. Sh. Y.K. Swarnkar, Chief Engineer (PSPM)
6. Sh. B.S. Bairwa, Chief Engineer (I/C) (PSPA-II)
7. Sh. Rahul Raj, Director (PSPA-II)
8. Sh. B.S. Meena, Director (PSPM)
9. Sh. Pranay Garg, Deputy Director (PSPA-II)
10. Sh. Manish Maurya, Deputy Director (PSPA-II)
11. Sh. Manish Kumar Verma, Assistant Director (PSPA-II)

MoP:

1. Sh. Om Kant Shukla, Director (Trans.)

MNRE:

1. Sh. Himanshu Prabhakar, Under Secretary

SECI:

1. Sh. Vineet Kumar, DGM
2. Sh. R.K. Agarwal, Consultant

CTUIL:

1. Sh. P C Garg, COO
2. Sh. Ashok Pal, Deputy COO
3. Sh. K K Sarkar, Sr GM
4. Sh. P.S. Das, Sr GM
5. Sh. Rajesh Kumar, Sr GM
6. Sh. Anil Kumar Meena, GM
7. Sh. Kashish Bhambhani, GM
8. Sh. Bhaskar Wagh, DGM
9. Sh. Pratyush Singh, DGM
10. Sh. Venkatesh Gorli, Chief Manager
11. Sh. Anupam Kumar, Manager

GRID India:

1. Sh. Rajiv Porwal, Director (SO)
2. Sh. Rahul Shukla, Chief Manager
3. Sh. Priyam Jain, Chief Manager
4. Sh. Raj Kishan, Deputy Manager
5. Sh. Gaurab Dash, Deputy Manager

RECPDCL

1. Sh. Satyabhan Sahoo, GM (Tech)

PFCCL

1. Sh. Deepak Kumar, AM

Expert Member

1. Sh. Ravinder Gupta, Ex Chief Engineer, CEA

POWERGRID

1. Sh. Anand Shankar, CGM
2. Sh. Sanjeev Kr. Chaudhary, Sr. GM
3. Sh. YKPN Singh, GM

***

24th Meeting of National Committee on Transmission

Grid Performance – 1st & 2nd Quarter (2024-25)

23rd Oct 2024

Grid Controller of India Limited

formerly Power System Operation Corporation Ltd. (POSOCO)

National Load Despatch Center

CONTENTS

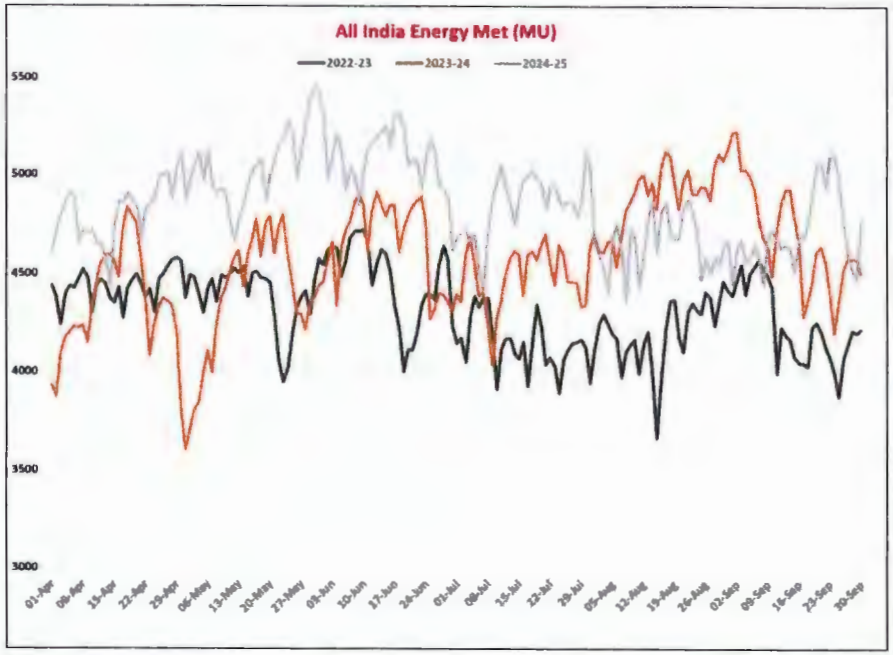
Overview of Grid Operation – Q1 & Q2 - FY 2024-25

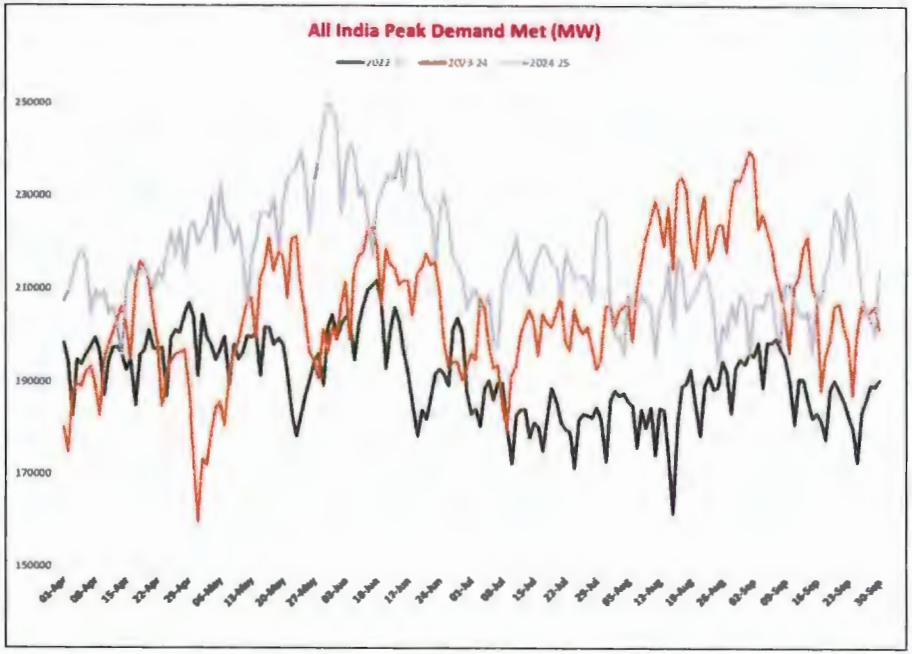
All India Demand met	Q1 (Apr-June)	Q2 (July-Sep)	Q3 (Oct-Dec)*
Maximum (MW)	**250070 (30-May-2024)**	**230568 (23-Sept-2024)**	**219356 (03-Oct-2024)**
Minimum	**175349 (14-Apr-2024)**	**167667 (27-Aug-2024)**	**157806 (13-Oct-2024)**

*Upto 18th October 2024

Projections as per 20th EPS for 2024-25	
All India Peak Demand	**230144 MW**

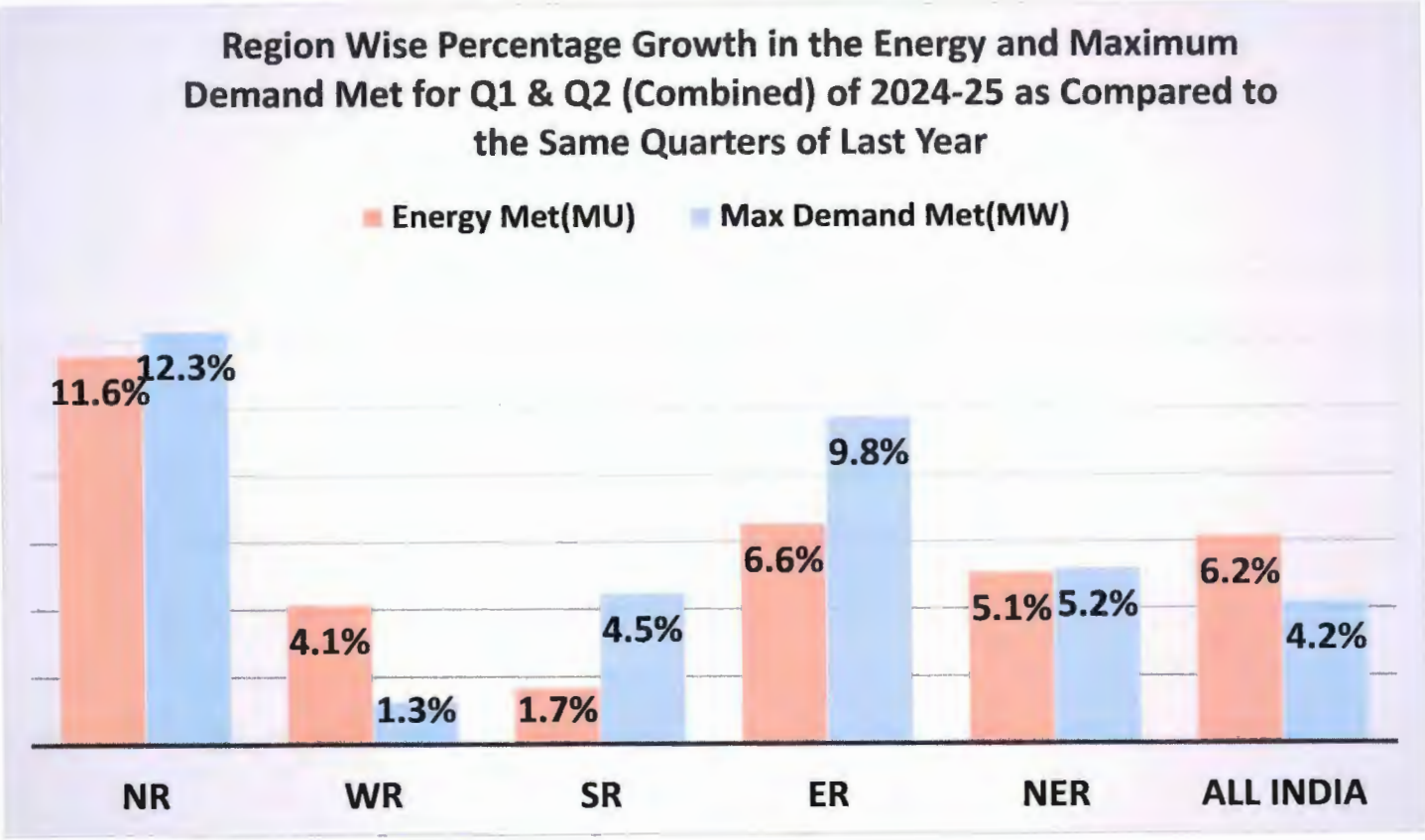
All India Daily Energy Met and Peak Demand of FY 2024-25, 2023-24 & 2022-23



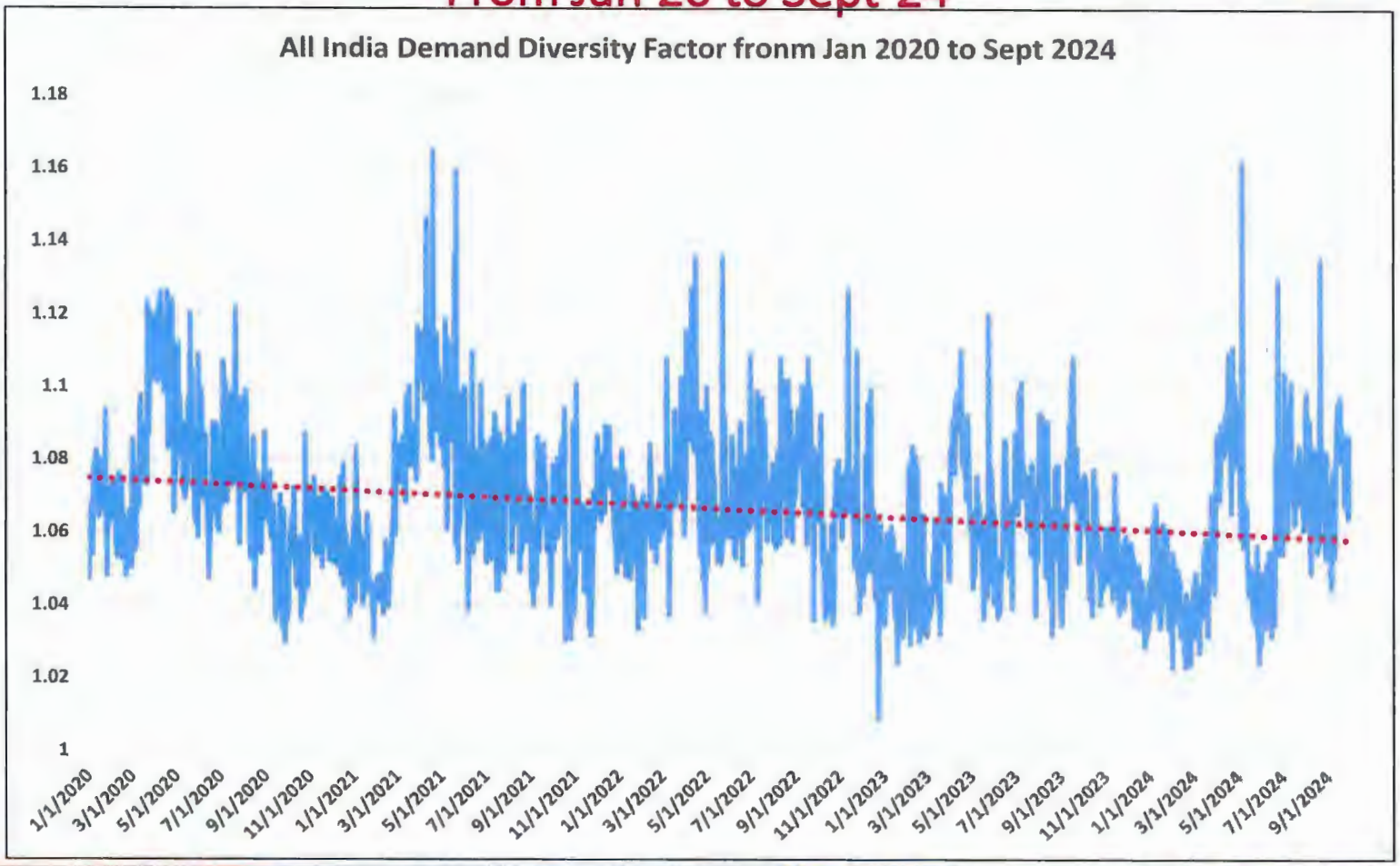


Significant increase in both Maximum Demand and Energy Met in FY 2023-24

All India Percentage Growth in the Energy Consumption and Maximum Demand Met



All India Maximum Demand Diversity Factor From Jan'20 to Sept'24



All Time Highest Figures (In – 2024-25)

ग्रिड-इंडिया GRID-INDIA

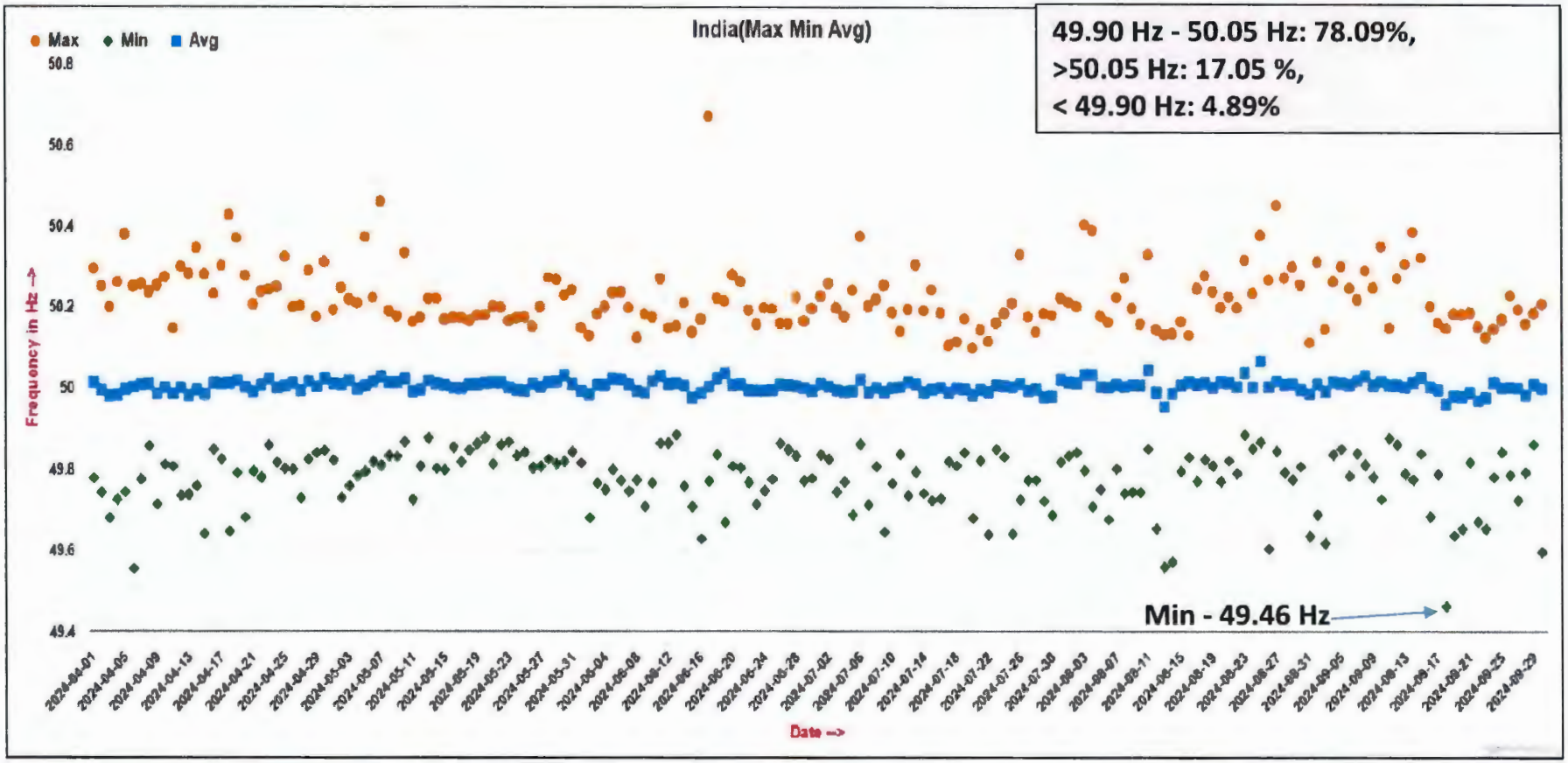
Regions	Maximum Demand Met during the day(MW)	Demand Met During Evening Peak hrs(MW)	Energy Met(MU)	Hydro Gen(MU)	Wind Gen(MU)	Solar Gen(MU)
NR	91215 19-06-2024	82312 23-07-2024	1990 18-06-2024	442.6 01-08-2023	85.7 07-08-2023	185.7 01-05-2024
WR	74974 01-06-2024	67482 30-05-2024	1648 06-05-2024	167 18-12-2014	310.2 28-05-2024	102.9 30-04-2024
SR	68735 13-03-2024	54798 29-04-2024	1415.8 05-04-2024	208 31-08-2018	323 26-07-2024	148.7 31-03-2024
ER	32531 10-06-2024	29695 29-05-2024	692 10-06-2024	157.4 14-09-2022	-	9.1 15-08-2024
NER	3905 19-09-2024	3787 19-09-2024	80.3 20-09-2024	166.2 06-11-2023	-	3.5 08-09-2024
All India	250070 30-05-2024	227354 29-05-2024	5466.1 30-05-2024	877.5 30-08-2022	619.4 28-05-2024	426.5 30-04-2024

Khavda IVA Power Transmission Limited

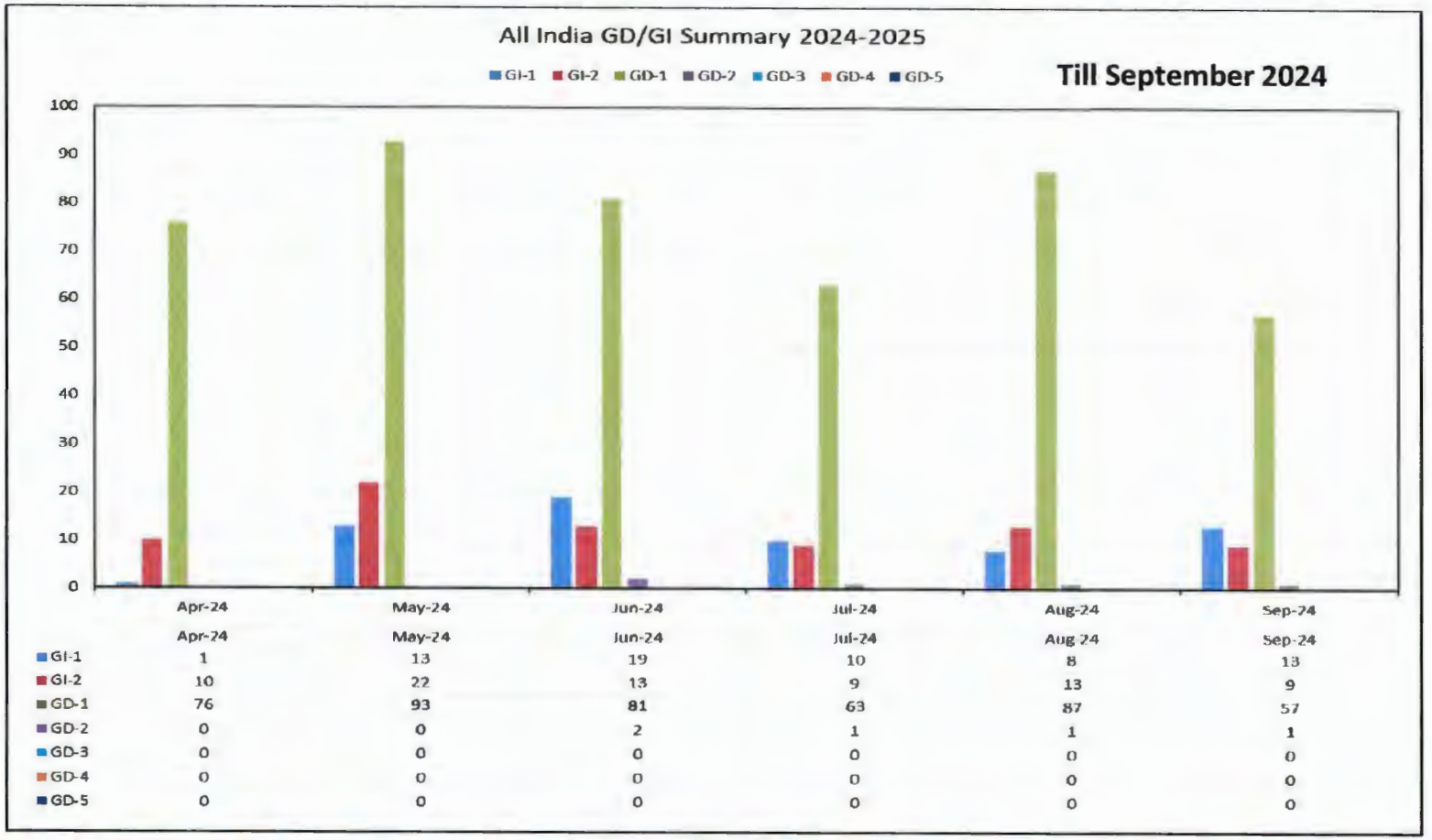
Maximum Figures in Q1, Q2 of 2024-25		
All India Peak Demand	250070	30-05-2024
All India Energy Met	5466.1	30-05-2024

Previous All-Time Highest Figures		
All India Peak Demand	239978	01-09-2023
All India Energy Met	5223.9	02-09-2023

Frequency Profile for Q2 & Q3 of FY – 2024-25



All India Grid Incidents/Disturbances in FY 2024-25



	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
GI-1	1	13	19	10	8	13
GI-2	10	22	13	9	13	9
GD-1	76	93	81	63	87	57
GD-2	0	0	2	1	1	1
GD-3	0	0	0	0	0	0
GD-4	0	0	0	0	0	0
GD-5	0	0	0	0	0	0

Reliability Issues Experienced in NR RE Complexes

Reliability issues experienced in NR RE Complexes

1. RE Generation Loss Events and Performance of RE Plants
2. Oscillations observed in NR RE Complexes and issue in STATCOM performance
3. Evacuation of large quantum of RE under T-GNA

RE Contingencies in 2024-25

S. No	Date	Time	Event
1	06-04-2024	11:24:00	400kV Bhadla(RS)-Bikaner(RS) Ckt-1 tripped due to R-Y fault respectively from Bhadla(RS) resulting in total NR RE generation loss of **4870 MW** (~3884MW ISTS RE generation and ~986 MW Rajasthan RE generation). Frequency dropped by **0.49 Hz** (from 50.029Hz to 49.539 Hz.
2	07-04-2024	10:24:00	400 KV Abdullapur-Kurukshetra (PG) Ckt-2 tripped on Y-N phase to earth fault. At the same time, 220/33 kV 100 MVA ICT 3 at RSDCL(PSS4)_SL_BHD2_PG also tripped due to over-flux protection operation resulting in total NR RE generation dip of **~1680 MW**
3	25-05-2024	12:46:00	Y-B fault converted into R-Y-B after ~220msec occurred on 220 KV Hissar(BBMB)-Hissar IA(HV) (HVPNL) Ckt-1. At the same time, line CB at Hissar(BBMB) end of 220 KV Hissar (BBMB)-Hissar IA(HV) (HVPNL) Ckt-2 also opened. On this fault, generation reduction at reduction of **~1100 MW** RE generation at Rajasthan occurred
4	30-05-2024	10:16:00	400 KV Sikar(PG)- Ratangarh (RS) (PG) Ckt-1 tripped on R-Y-N fault, 220kV Ratangarh (RS)-Khetri(RS) Ckt-2 tripped during the same time resulting in total NR RE generation drop/loss was **~1290 MW.**
5	01-06-2024	13:26:00	765 kV Meerut- Bhiwani (PG) Ckt-1 tripped from Bhiwani (PG) end only on R-N phase to earth fault with fault current of 4.679 kA and fault distance of 148.715 km from Bhiwani (PG) end resulting in dip in NR total solar generation of **~1695 MW** (ISTS Solar: ~1695 MW)
6	01-06-2024	13:43:00	400 KV Bawana-Mundka (DV) Ckt-1 & 2 tripped from Mundka(DV) end only on R-B phase to phase fault resulting in dip NR total solar generation of **~3120 MW** (ISTS Solar: ~2710 MW, Rajasthan Solar: ~410 MW)
7	09-06-2024	11:21:00	R-phase conductor of 400 KV Akal-Jaisalmer2 (Bhainsra) (RS) Ckt broke at location no. 134 which caused R-B phase to phase fault on 400 KV Akal-Jaisalmer2 (Bhainsra) (RS) Ckt. During the same time, tripping of 400 KV Barmer(RS)-Rajwest(RW) (RS) Ckt on R-B phase to phase fault , 220kV Akal-Bhensra (Suzlon) , 400 KV Barmer(RS)-Jaisalmer2(Bhainsra) (RS) Ckt on R-B phase to phase fault resulting in dip in total RE generation of **~2625 MW** (ISTS Solar: ~1910 MW, Rajasthan Solar: ~715 MW
8	17-06-2024	13:53:00	Tripping of all four poles of HVDC Champa – Kurukshetra carrying ~4500MW from the Western Region to Northern Region resulting in dip of NR RE (Solar) of **~2800 MW**, however 1500 MW was generation was restored with 04 minutes.
9	19-06-2024	12:42:00	Low voltage scenario was prevailing in mainly Rajasthan, Delhi and UP control area. The voltage at 400kV Bikaner(RS), Bhadla(RS), Bhinmal(RS) and Kankani(RS) were 377kV, 382kV, 379kV and 375kV respectively. 3-phase to ground fault observed at Bhadla-II leading to loss of total NR RE generation of **~4930 MW**

Total 13 RE generation loss event(>500 MW) in Rajasthan complex since Apr 2024

RE Contingencies in 2024-25

S. No	Date	Time	Event
10	06-07-2024	05:26:00	R-phase conductor of 220 KV Akal-Akal(Suzlon) (RS) ckt-2 brooked which caused R-N phase to earth fault and subsequently 220 KV Akal-Akal (Suzlon) (RS) ckt-2 tripped on zone-1 distance protection from Akal(RS) end. At the same time, 220 KV Akal-Akal(Suzlon) (RS) Ckt-1 and 220 KV Akal- Mulana (RS) Ckt also tripped from Akal(RS) end. During this event, dip in Rajasthan wind generation of **~1800 MW** observed
11	13-09-2024	02:49:00	Y-phase jumper of 220kV bus-1 of 220kV Akal-Bhensara Ckt-1 and R-phase jumper of 220kV bus-2 of 220kV Akal-Bhensara Ckt-2 snapped which created bus fault on both 220kV buses at Akal(RS). 400/220 kV 500 MVA ICT-1, ICT-2 tripped on earth fault protection and 400/220 kV 315 MVA ICT-3 & 500 MVA ICT-4 tripped on over current protection at Akal(RS) S/s. 220kV lines from Akal(RS) to Giral & Amarsagar tripped on zone-4 distance protection from Akal(RS) end. 220kV Akal-Bhensara Ckt-1 & 2 tripped. Due to tripping of all four ICTs at Akal(RS), evacuation path lost for all the wind power plants connected at 220kV bus-1 & bus-2 at Akal(RS). During this event, dip in Rajasthan wind generation of **~1295 MW** is observed out of which approx.
12	13-09-2024	13:15:00	220 kV Bhadla(PG)-Azure Power 34 Solar(APTFL) (APTFL) Ckt tripped due to B-N phase to earth fault (B phase jumper broken. Due to tripping of 220 kV Bhadla(PG)-Azure Power 34 Solar(APTFL) (APTFL) Ckt, Azure Power 34 (APTFL) (IP) S/s lost its connectivity from grid and blackout occurred at 220/33kV Azure Power 34 (APTFL) (IP) S/s. This led to loss of solar generation of ~**770 MW**
13	20-09-2024	12:00:00	Y-phase jumper of 220kV Jaisalmer -Akal Ckt-2 broke at Jaisalmer end. At the same time, bus bar protection operated at 220kV level of Jaisalmer and all the elements connected at 220kV level of Jaisalmer tripped and both the 220kV buses became dead. During this event, as per SCADA, solar generation loss of **~1070 MW** observed in Rajasthan control area.

Total 13 RE generation loss event(>500 MW) in Rajasthan complex since Apr 2024

RE Contingencies in 2024-25

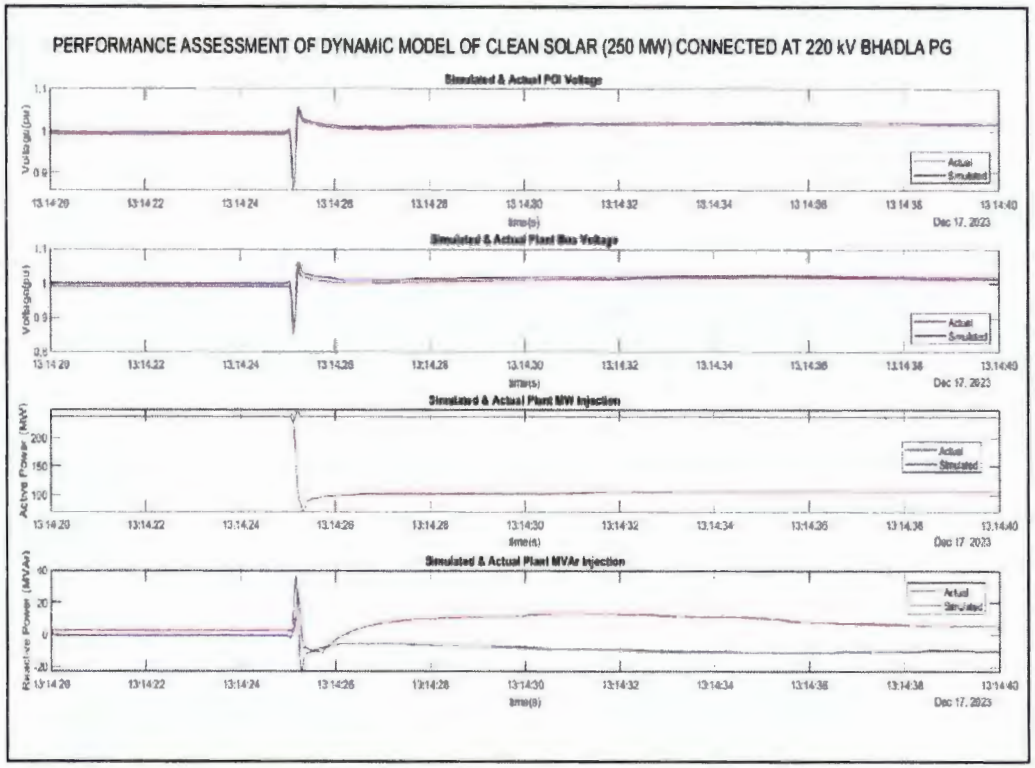
Major Observations:

- Plants entering into LVRT mode even when POI voltage is > 0.9 pu
- Opposite/insignificant reactive power injection observed by plants during faults
- Delayed recovery of active power by RE plants post fault clearance
- Partial recovery of active power after clearance of fault in the system
- Inadequate capacitive support from RE plants in intra-state
- No issues observed in the submitted dynamic models of the RE plants. Real-time behavior completely in variance with the models submitted during FTC

Non-compliance Summary

Compliance summary Apr 24 - June 24				
Date & Time of event	PMU data Reporting	Type of Compliance	Reactive Power Support during fault condition (partially, fully, non-complaint)	Active Power (MW) - Recovery/LVRT Compliance
		CEA Technical Standard to the connecticity regulation Clause	B(2) -1	B (2) -3
Compliance status Based on 06 Apr 24 Event(11:24 hrs)	No. of plants with data reporting - 35	Complied	13	9
		Non-Complied	22	26
Compliance status Based on 07 Apr 24 Event(10:24 hrs)	No. of plants with data reporting - 35	Complied	21	11
		Non-Complied	14	24
Compliance status Based on 19 Apr 24 Event(10:24 hrs)	No. of plants with data reporting - 37	Complied	32	3
		Non-Complied	5	34
Compliance status Based on 02 May 24 Event(14:40 hrs)	No. of plants with data reporting - 45	Complied	30	10
		Non-Complied	15	35
Compliance status Based on 01 Jun 24 Event(13:26 hrs)	No. of plants with data reporting - 29	Complied	22	2
		Non-Complied	7	27
Compliance status Based on 01 Jun 24 Event(13:43 hrs)	No. of plants with data reporting - 27	Complied	21	7
		Non-Complied	6	20
Compliance status Based on 04 Jun 24 Event(10:26 hrs)	No. of plants with data reporting - 37	Complied	33	7
		Non-Complied	4	30
Compliance status Based on 04 Jun 24 Event(12:35 hrs)	No. of plants with data reporting - 40	Complied	32	9
		Non-Complied	8	31
Compliance status Based on 09Jun 24 Event(10:21	No. of plants with data reporting - 40	Complied	22	15
		Non-Complied	17	27
Compliance status Based on 17 Jun 24 Event(13:53 hrs)	No. of plants with data reporting - 44	Complied	33	10
		Non-Complied	11	34
Compliance status Based on 19 Jun 24 Event(12:42 hrs)	No. of plants with data reporting - 47	Complied	20	10
		Non-Complied	27	37

Constraints in carrying out the studies at RLDC/NLDC



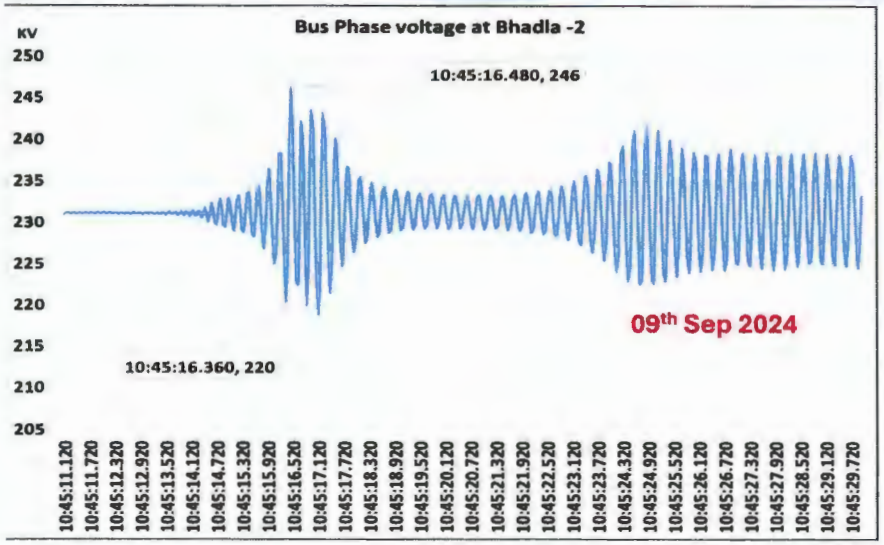
Accurate model with all control and protection settings to be prepared and submitted before interconnection

Inaccurate models submitted by OEMs :- Mismatch in performance of **submitted dynamic models** by RE developers for ISTS-connected plants in Rajasthan vis-à-vis actual performance of plants in real-time during faults

Observed deficiencies in submitted models

- High consideration of Short Circuit ratio (SCR) by RE Developers.
- Improper modelling - Post fault characteristics, Collector System Network etc.
- Consideration of different LVRT/HVRT K-factors in models in place of implemented value at site.
- No/incorrect modelling of relay in simulation model for IBRs, Collector system etc.
- Non-consideration of communication delays, polling rates/update rates of equipment in modelling

Oscillations Observed in NR RE Complex



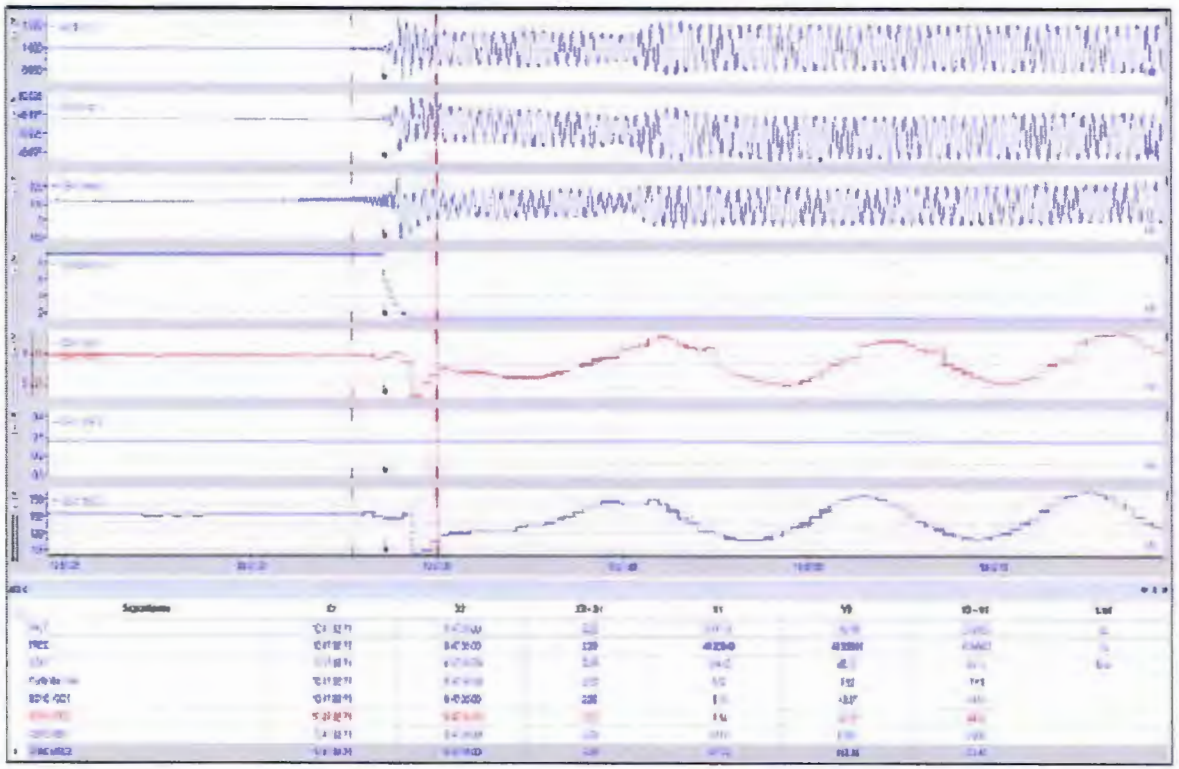
- No triggering event (reactor switching, line charging etc.)
- Frequency of oscillation observed in the range of 3 to 6 Hz.
- Primarily observed in voltage and reactive power.

Actions taken to minimize the issue of voltage oscillation in RE pocket of NR (Rajasthan RE complex):

1. Detection of source and sink of oscillation, their modes and damping factor through OSLp tool in real-time operation
2. The observations and possible measures were communicated to plant having issue of oscillatory response and momentarily sharp reduction in voltage
3. Changing the mode of control for a few RE plants from Voltage control to Fixed PF and Fixed Q
4. Tuning of few parameters of their PPCs like Proportional gain (Kp), Integral time constant (Ti) and change in Voltage dead-band (Vdb) (changed from 1% to 2%) for identified RE Plants connected at Fatehgarh-II(PG) and Fatehgarh-I.
5. Studies for IBRs interaction with STATCOM need to be carried out by the OEM in consultation with CTUIL and Grid-India.

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Observations on response time:

Measured w.r.t Qmax.
- Fault case: **60 ms**
- Oscillations case: **80 ms**

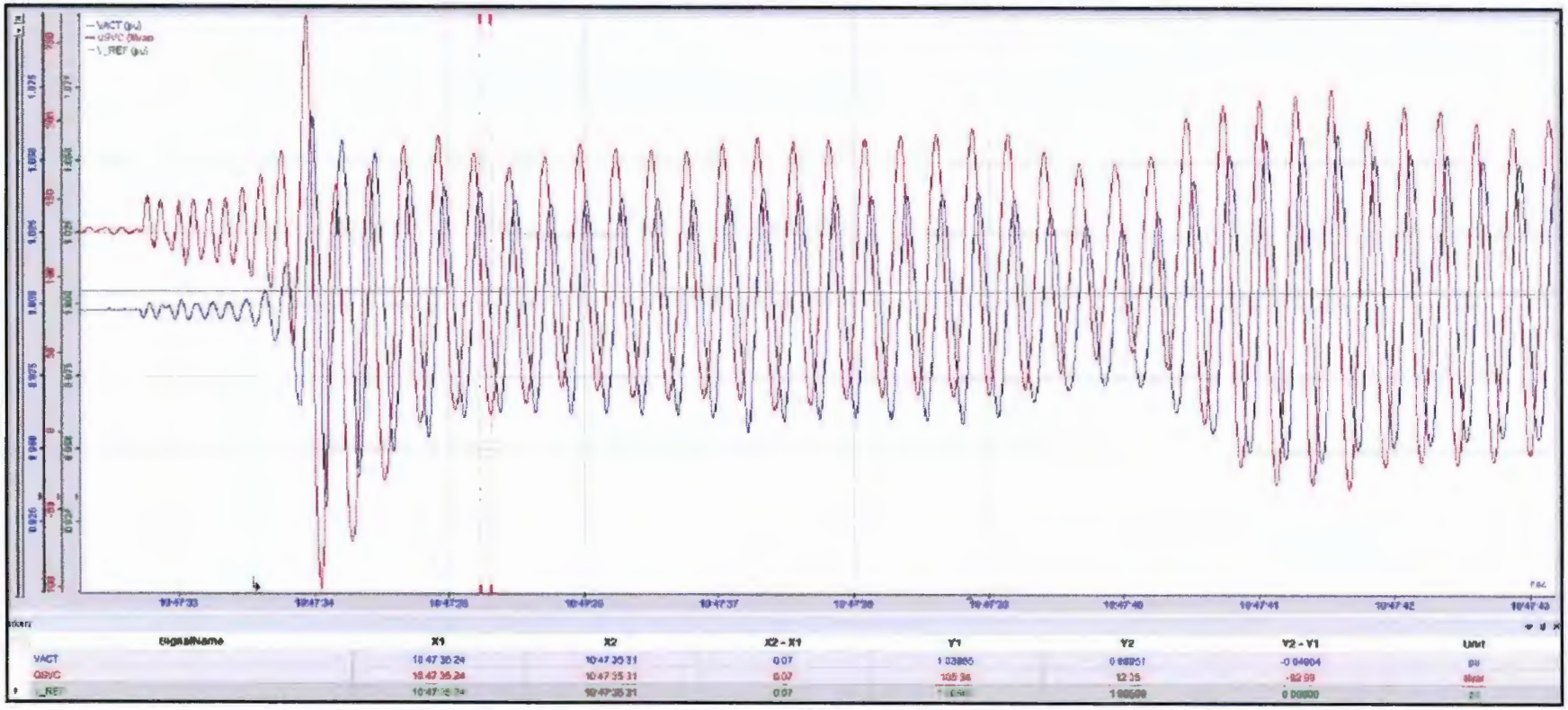
Measured w.r.t Id act. (max.)
- Fault case: **50 ms**
- Oscillations case: **70 ms**

- **High response time (sluggish response)** during faults leading to injection of reactive power post clearance of fault
- **Automatic gain reduction by stability controller of the STATCOMs on hunting detection, possibly leading to enhancement in magnitude of oscillations**

A meeting may be convened by CEA with the STATCOM OEMs POWERGRID, CTUIL and Grid-India on priority to deliberate the highlighted issues and potential remedial measures. (Detailed analysis shared with CEA, CTUIL & Asset owner)

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Measured w.r.t Qmax.

- Fault case: **60 ms**
- Oscillations case: **80 ms**

Measured w.r.t Id act. (max.)

- Fault case: **50 ms**
- Oscillations case: **70 ms**

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Simulation based Analysis of Bhadla-II STATCOM-1

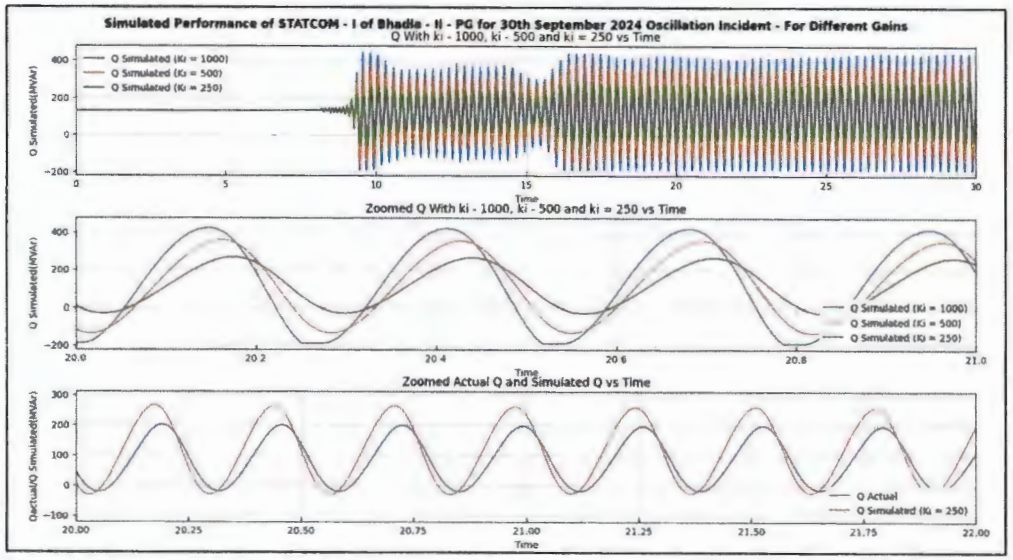


Figure 22: (a) Qsim. (ki = 1000, 500 & 250) (b) Zoomed Version - Qsim. (ki = 1000, 500 & 250) (c) Qact. & Qsim. (ki = 250)

Date	Event Type	Antecedent Conditions and Control Modes of STATCOM	Observations	
			From Transient Fault Recorder (TFR)	RMS Simulation
20 Sep 2024	Fault Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~160 MVAr ➢ VSC 1 + VSC 2: ~20 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~140 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~5 ➢ Max STATCOM MVAr Injection: **480 MVAr** ➢ Time taken to reach max. MVAR : **60 ms**	➢ Max STATCOM MVAr Injection: a) **Kp = 1, Ki = 1000 - 490 MVar** b) **Kp = 1, Ki = 500 - 443 MVar** c) **Kp = 1, Ki = 250 - 327 MVar** ➢ Time for reaching max. MVAR: **57 ms**
30 Sep 2024	Low Frequency Oscillation Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~130 MVAr ➢ VSC 1 + VSC 2: ~(-)7 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~137 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~1.5 ➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for a selected cycle: **+221/-36 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): **70 ms**	➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for the selected cycle: a) **Kp = 1, Ki = 1000 - +438/-187 MVAr** b) **Kp = 1, Ki = 500 - +394/-166 MVAr** c) **Kp = 1, Ki = 250 - +290/-48 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): a) **Kp = 1, Ki = 1000 – 35 ms** b) **Kp = 1, Ki = 1000 – 50 ms** c) **Kp = 1, Ki = 1000 – 70 ms**

RMS Simulations

- Output of the STATCOM is getting delayed with **reduction in gain**
- The reduction in gain not only impacts the response time but also the **max. output of the STATCOM** within a certain interval.

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Simulation based Analysis of Bhadla-II STATCOM-1

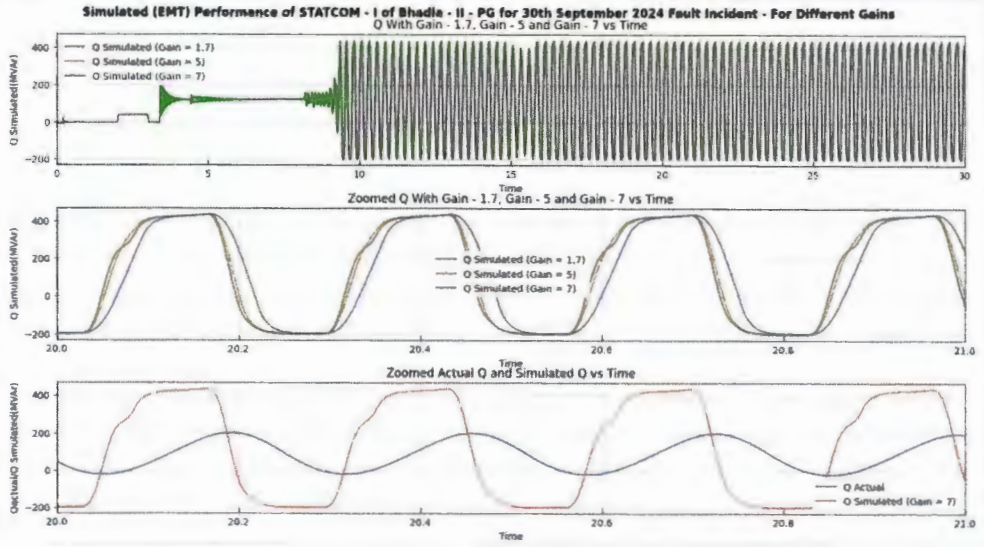


Figure 37: (a) Qsim (Gain = 1.7, 5, 7) (b) Zoomed Qsim. (Gain = 1.7, 5, 7) (c) Zoomed Qact v/s Qsim (Gain = 7)

Date	Event Type	Antecedent Conditions and Control Modes of STATCOM	Observations	
			From Transient Fault Recorder (TFR)	EMT Simulation
20 Sep 2024	Fault Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~160 MVAr ➢ VSC 1 + VSC 2: ~20 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~140 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~5 ➢ Max STATCOM MVAr Injection: **480 MVAr** ➢ Time taken to reach max. MVAR : **60 ms**	➢ Max STATCOM MVAr Injection: a) **Gain = 1.5 and 5 - 454 MVar** b) **Gain = 7 and beyond - Unstable response** ➢ Time for reaching max. MVAR: **60 - 66 ms**
30 Sep 2024	Low Frequency Oscillation Case	➢ Mode: Voltage Control ➢ Vref: 402 kV or 1.005 pu ➢ Droop: 3% ➢ MVAR Injection: ~130 MVAr ➢ VSC 1 + VSC 2: ~(-)7 MVAr ➢ MSC 1: 0 MVAr ➢ MSC 2: ~137 MVAr ➢ MSR: 0 MVAr	➢ Controller gain during the event = ~1.5 ➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for a selected cycle: **+221/-36 MVAr** ➢ Time Difference Between Bus Voltage (min or max) and STATCOM-Q (max or min): **70 ms**	➢ Osc. Peak-to-Peak STATCOM MVAr Injection/Absorption for the selected cycle: **Gain = 1.7, 5, 7 -** **+439/-195 MVAr**

EMT Simulations

- Delay in providing reactive power response increases with reduction in gain.
- The reduction of gain by the stability controller, therefore, might be one of the reasons for not getting adequate and fast reactive power support by the STATCOM during oscillations.

STATCOMS in Indian Power System and YTC

Region wise List of STATCOMs						YTC (in Lakhs)
Region	Name	VSC	MSC	MSR	Make	
Eastern Region	Rourkela	2X150	Nil	2X125	Siemens	757.6
	Kishanganj	2X100	Nil	2X125	Siemens	757.6
	Ranchi (New)	2X150	Nil	2X125	Siemens	757.6
	Jeypore	2X100	2X125	2X125	Siemens	757.6
Western Region	Satna	2X150	1X125	2X125	RXPE	3265.63
	Aurangabad	2X150	1X125	2X125	RXPE	3265.63
	Solapur	2X150	1X125	2X125	RXPE	3265.63
	Gwalior	2X100	1X125	2X125	RXPE	3265.63
Southern Region	NP Kunta	2x50	-	-	Hyosung	175.447
	Trichy	2x100	1 x 125	2 x 125	Hyosung	1008.82
	Hyderabad	2x100	1 x 125	2 x 125	Hyosung	1012.38
	Udumalpet	2x100	1 x 125	2 x 125	Hyosung	1232.86
Northern Region	Nallagarh	2X200	2 x 125	2 x 125	RXPE	2799.9
	Lucknow	2X300	2 x 125	2 x 125	RXPE	3593.8
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens	2099.9
	Bikaner-II	1x300	2 x 125	1 x 125	Siemens	2099.9
North Eastern Region	No Statcom					
Total YTC						36415.52

6.2.1. STATCOM Station Functions and Applications

6.2.1.1. Voltage Control mode (Automatic and Manual)

Control of the positive sequence component of the fundamental frequency voltage in steady state and dynamic operation, with slope in the range as specified at clause 6.1 c) above.

6.2.1.2. Fixed Reactive Power Mode

In this mode, the reactive power output of the STATCOM as well as switching of MSRs and MSCs, should be manually controlled, by direct operator action. This feature is normally utilized for testing purpose.

6.2.1.3. Steady State Condition

The STATCOM Station (STATCOM along with MSCs and MSRs) shall provide necessary reactive power support to the 400 kV bus (PCC) to compensate for voltage variation under steady state.

6.2.1.4. Dynamic Over-voltage Control Performance

The STATCOM shall be required to provide necessary reactive power support with fast and smooth variation so that over-voltages under dynamic conditions are controlled. STATCOM shall smooth out the step caused by switching of MSCs and MSRs.

The operation of each STATCOM over its range of MVAR from full capacitive to full Inductive capacity and vice-versa shall be on the basis of smooth variation.

6.2.1.5. Transient and Dynamic Stability Performances

The STATCOM Station shall provide necessary reactive power so that transient and dynamic stability of the Owner's system are enhanced.

6.2.1.6. Damping of Power Oscillations

The STATCOM shall provide necessary damping to power oscillations by modulating its output in its entire range based on measured rate of change of power/frequency at the 400kV bus. The

6.2.1.9. Gain Supervision and Control

To control regulator gain in order to prevent oscillations and excessive overshoot in the STATCOM response, a gain supervision function shall be implemented.

This shall be an essential function for supervision of stability of the closed loop voltage control. The function of this controller is that when the supervision of the gain in the voltage regulator detects oscillations in the voltage controller output, the gain shall gradually be reduced until stability is reached. Normally it is a changed condition in the transmission system contribution to the closed loop gain that results in the instability. The reduction in the voltage regulator gain shall only balance the external change. The control should be adaptive in order to maximize its effectiveness. Gain reductions should be indicated and the reduction of the gain shall be able to be reset to nominal value by means of commands from the operator interface or automatically. A relative gain factor shall also be able to be changed from a gain optimizer.

6.2.1.10.Coordinated reactive power control of external devices

To optimize the use of dynamic vars versus steady state vars, control of externally connected shunt capacitor or reactor banks shall be implemented. Such banks will be connected locally to a HV bus or/and at MV bus. For simultaneous control with the supplementary VSC current controller, coordination for the two functions shall be provided. External devices like mechanically switched capacitor (MSC)/mechanically switched reactor (MSR) can be switched ON or OFF to position the steady state operating point of the VSC so as to extend its dynamic range.

6.2.1.11.Supplementary VSC current controller

To optimize the use of dynamic vars versus steady state vars, a control function that slowly reduces or offsets the STATCOM point of operation shall be implemented. By deliberately adjusting the voltage reference setting within a narrow window the STATCOM system output is pushed toward either a specific point or toward a window to preserve dynamic range. This slow operating function is meant to provide for slower controllers, such as externally connected shunt bank to operate and meet the slower long term voltage variations caused by daily or weekly load variations. Rapid changes in the system voltage that call for dynamic compensation will have priority over this type of controller.

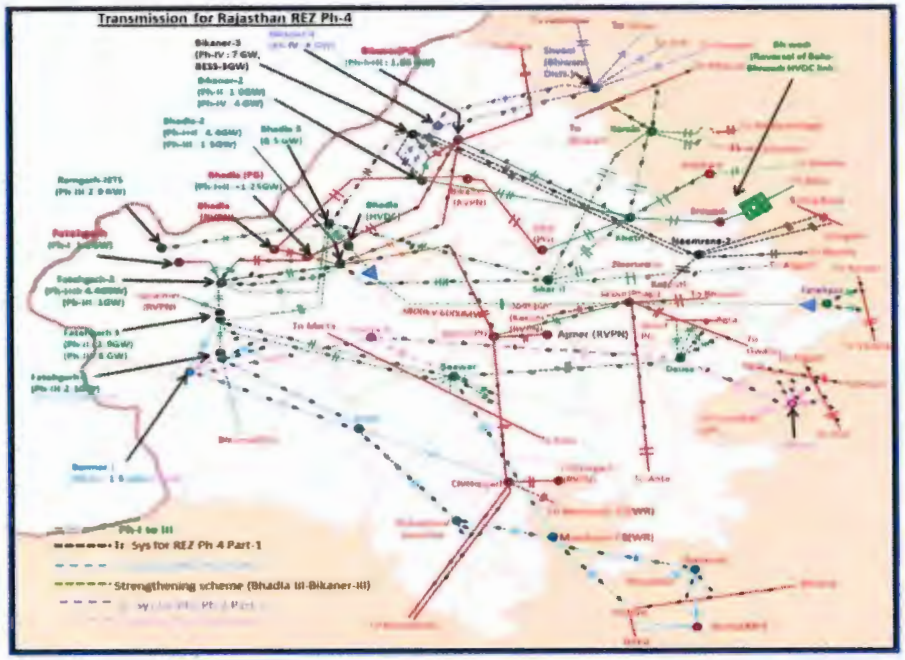
6.2.1.12.Gain optimization

To provide operation at optimal regulator gain, a fully automatic optimizing function shall be implemented. This function operates by inducing a small change in the STATCOM output. The gain is adjusted based on the network response signal.

Synchronous Condensers committee

- Committee of members from CEA, NRPC, NRLDC, NTPC, BHEL, CTU and STUs constituted under chairmanship of MS, NRPC to do futuristic analysis for requirement of Synchronous Condensers based on the inertia considerations for Northern Region.
- Committee conducted **4 nos of meetings** wherein deliberations on the requirements of Synchronous Condenser including other available technologies were done.
- During the Committee meetings, presentation by different OEMs viz **BHEL, Hitachi & Andritz Hydro** was also made highlighting various technological options available and its suitability under different system requirements.
- **CTUIL and CEA** to carry out system study for requirement of synchronous condenser as already mentioned in 500 GW RE report for every two-year time frame till year 2030
- **Detailed study submitted by Grid India on impact of installing synchronous condenser in the present scenario at Fatehgarh complex**
- **Observations based on study results**
  - Enhanced System Strength / Short Circuit Ratio (SCR)
  - Fast Reactive Power Support during Faults/Transients
  - Increased Inertia and Frequency Response
  - Damping of Low Frequency Oscillations.
  - Steady-state Reactive Power Support
- **Inputs given by Grid-India on Compensation Mechanism for Synchronous Condenser Facilities**

Evacuation of large quantum of RE under T-GNA



Pooling station	GNA Non-effective (Complete ATS not yet commissioned)
Bhadla(PG)	0
Bikaner(PG)	663
Fatehgarh-II(PG)	420
Bhadla-II(PG)	2132
Fatehgarh-I_Adani Pooling	0
Bikaner-II PS	1322
Fatehgarh-III PS	1180
Total	**5717**

- The phase-I & II transmission system has mostly been commissioned whereas transmission elements part of Phase-III transmission scheme are yet to be commissioned. (765 kV Bhadla-II – Sikar-II 2xD/C, 765 kV Khetri – Narela D/C, 765 kV Sikar-II – Narela, LILO of 765 kV Meerut – Bhiwani at 765 kV Narela etc.)
- Currently, 5717 MW RE in Rajasthan is being evacuated through T-GNA. The associated transmission schemes needs to be expedited as large quantum of RE is being evacuated through T-GNA.

Issues with evacuation of large quantum of RE under T-GNA

- As of now system is N-1 secure in steady state in terms of loading and angular separation with ~5GW of TGNA using NRLDC NOC.

Most credible contingency are given below

- N-1 contingency of 765kV Bhadla-II(PG)-Ajmer(PG) D/C line
- N-1 contingency of 400kV Bhadla(RS)-Bikaner(RS) D/C line
- N-1 contingency of 765kV Bikaner(PG)-Khetri D/C line

Limiting Constraint:

- **Angular separation exceeding 30°** under **N-1 contingency of 765kV Bhadla-II(PG)-Ajmer(PG) D/C** line if pre-contingency loading remains 2400MW each ckt.

765kV Bhadla-II(PG)-Ajmer(PG) D/C line			
Basecase		N-1 contingency	
Loading (MW)	Angular seperation (°)	Loading (MW)	Angular seperation (°)
2371	20.47	3230	28.59

- SPS implemented for 765kV Bhadla-II(PG)-Ajmer(PG) contingency.
- Despite being Quad moose line (due to poor condition of conductor), loading on 400kV Bhadla(RS)-Bikaner(RS) D/C line needs to be kept below 700MW each ckt to ensure N-1 compliance.

High frequency oscillation (>4Hz) observed during peak solar generation

- STATCOMs being kept in manual fixed 'Q' mode during peak solar period to address the issue of oscillation

- **NO further additional NOC shall be granted for RE generation evacuation from the complex till the charging of 765kV Bhadla-II-Sikar-II D/C line**

Present practice for curtailment is given below;

Infirm (Bilateral) > GNA Not effective (Bilateral) > GNA effective being scheduled in T-GNA (Bilateral) > GNA effective (Bilateral) > Collective.

Major Grid Disturbances leading to transmission constraints

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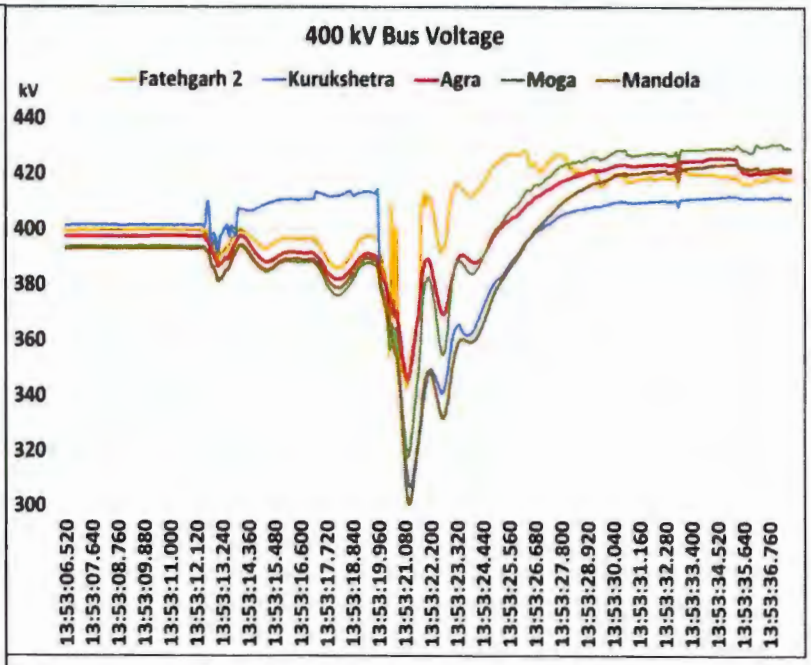
Grid Event in Northern Region on 17 June 2024: Event Overview

1. Tripping of both Bipoles of **+/-800 kV HVDC Champa (WR) – Kurukshetra (NR) carrying 4,500 MW** from WR to NR
2. Sharp grid **voltage decline** and Northern Region **demand reduction by around 16.5 GW.**
   - Reduction in **NR RE generation of approx. 2870 MW.**
   - **12 conventional units tripped**, aggregating gen is **6775 MW,** majorly on over frequency.
3. High voltage scenario due to offloading of transmission network.
   - A **total of 23 (nos) transmission lines** (765kV and 400kV) **tripped on OV**, causing a partial blackout at the 765/400kV Aligarh(PG) S/s.
4. Load that reduced during the **low voltage at 13:53 hrs** began to recover gradually, the grid experienced another **low voltage scenario at 14:05 hrs.**
5. Frequency rise from **50.03 Hz to 50.68 Hz**, recovered back to 50.00 Hz within **~ 6 minutes**



Voltage touched 300 kV

- A Committee (CEA, NRPC,GRID-INDIA, CTUIL, POWERGRID) was constituted by MOP to look into the issues of this multiple tripping incidents.
- The committee has submitted the detailed analysis report to MOP

Major Observations

HVDC Link Vulnerability (N-4 Scenario):

- Tripping of +/-800 kV HVDC Champa-Kurukshetra link (4500 MW) triggered load loss event.
- Localized storm caused jumper swing and flashover.
- No redundancy in DMR.

Protection Philosophy Review:

- Over 30 trippings of HVDC link from Jan-Jun 2024. Detailed fault analysis and remediation needed to enhance reliability.

Voltage Collapse and Reactive Power Drawl:

- Significant voltage drops across Northern Region.
- Reactive power absorption increased, exacerbating voltage issues.

Load Behavior Analysis:

- Voltage reduction caused stalling of induction motors: total 16.5 GW load Reduced in NR.
- Stalling of motors at comparatively higher voltages (~0.85 - 0.9 p.u. voltage).

Outage of Generating Stations:

- Approximately 2800 MW of RE generation was reduced with around 1500 MW recovering within 4 minutes
- 16 Conventional Generating Units tripped, majorly on over frequency.

Reactive Power Support:

- Heavy reactive power drawl by loads are observed.
- Many RE plants have opposite response

High Voltage Scenario:

- Total 23 (no.) of transmission lines (765kV and 400kV) tripped on OV, causing a partial blackout at the 765/400kV Aligarh(PG) S/s.

Frequency Response :

- Inadequate Response:
  - More than 50% capacity in inter-state generators
  - more than 85% capacity of the intra-state generators

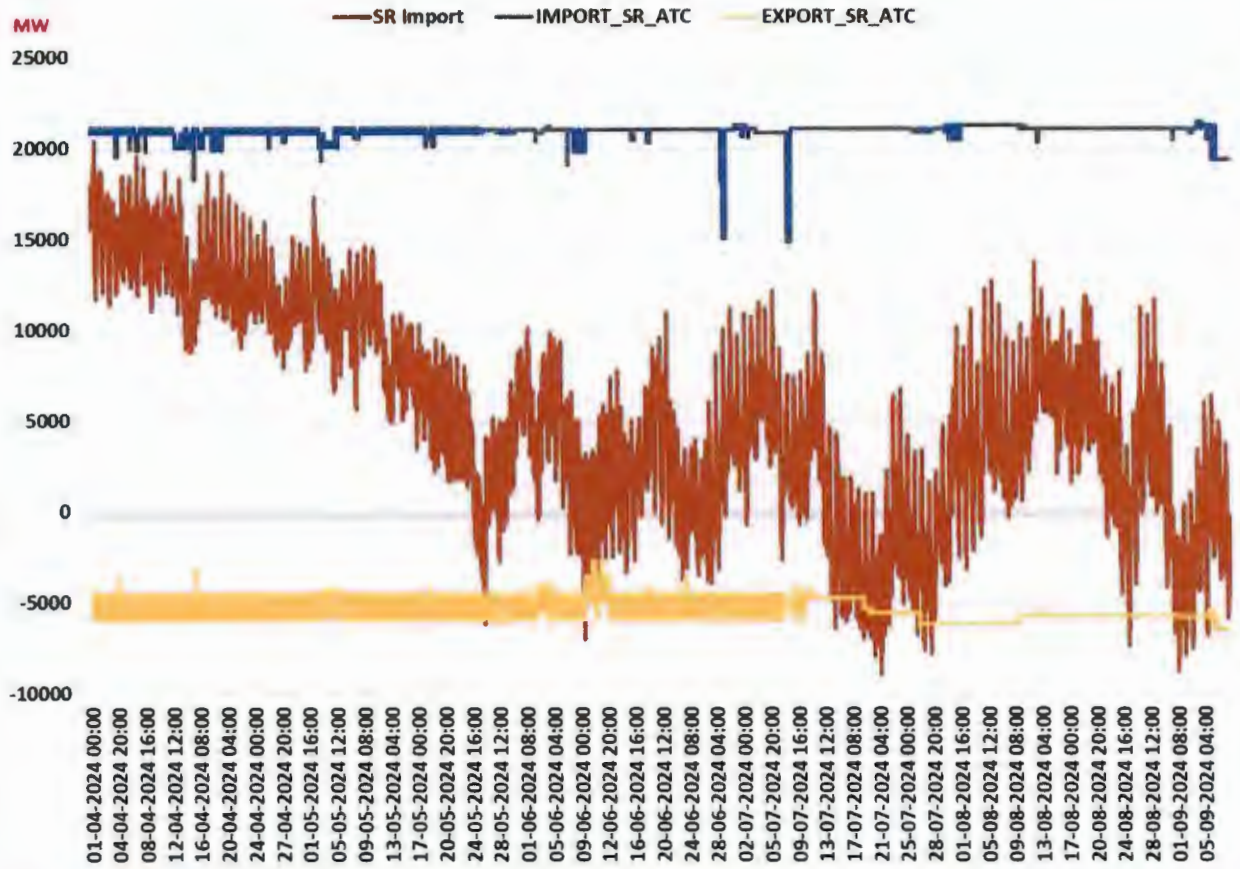
Coordination and Communication: Timely report submissions and communication are essential.

Recommendations of the Committee

- **Reduced reliability of HVDC Link:** Review of protection schemes and filter switching logic
- **Fault in HVDC Lines:** Review of transmission line design including cross arms, jumpers, etc.
- **Load Behaviour:**
  - Sudden voltage drop caused stalling of induction motor loads led to a reduction in active power transfer to key load centers in the Northern region (also validated using dynamic simulation studies).
  - The stalling of motors at high voltage (0.85-0.9 pu) is to be investigated and the motors serving load shall be compliant with IS/IEC.
- **Planning for dynamic reactive power sources near load centers based on load composition**
- **Frequency Response by Generating Units & Importance of non-pit-head-based generators near load centers for providing grid support during such events**
- **Compliance of CEA Standards by Renewable Generating Plants**
- **Reactive Power Management by SLDC and DISCOMs**
- **Review of Overvoltage gradings of EHV transmission lines**
- **Amendments in Existing Regulations :**Provisions related to different emerging types of loads (Electrolysers etc.)

Major Constraints in Inter-regional Network

Export by Southern Region (SR Import)



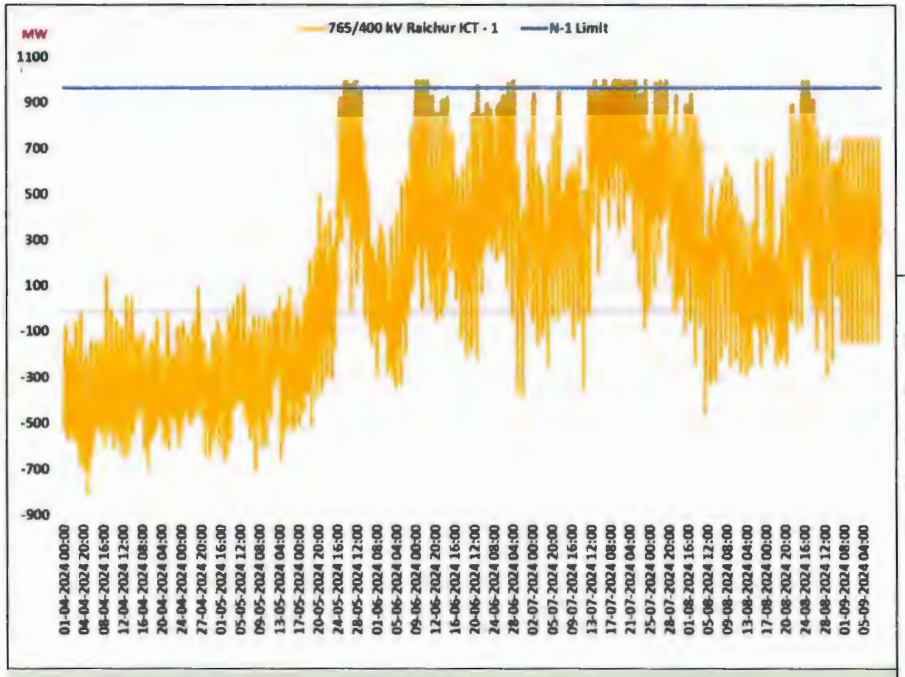
Constraint in SR Export Corridor

Sl No	Corridor	Time	TTC (MW)	ATC (MW)	Limiting Constraint
1	SR-WR	00 – 06 Hrs & 18 – 24 Hrs	7200	6550	➢ Angular separation between Kudgi & Kolhapur (PG) under N-1 touches 30 deg. ➢ N-1 Contingency of 765/400 kV, 1500 MVA ICTs at Raichur - PG will overload the other circuit. ➢ N-1 Contingency of 400 kV Kolhapur – Karad D/C will overload the other circuit. ➢ N-1 non-compliance of 2*1500 MVA, 765/400 kV ICTs at Section– B at Raigarh – PS (Kotra) with operation of HVDC Raigarh – Pugalur Bipole – 1 in SR-WR direction ➢ Restriction in power order of HVDC Gazuwaka(SR to ER) to maximum set point of 700 MW for solar hrs and 500 MW for non-solar hrs against the rated capacity of 1000 MW
		06 – 18 Hrs	7100	6450	
2	SR Export	00 – 06 Hrs & 18 – 24 Hrs	6400	5750	
		06 – 18 Hrs	6400	5750	

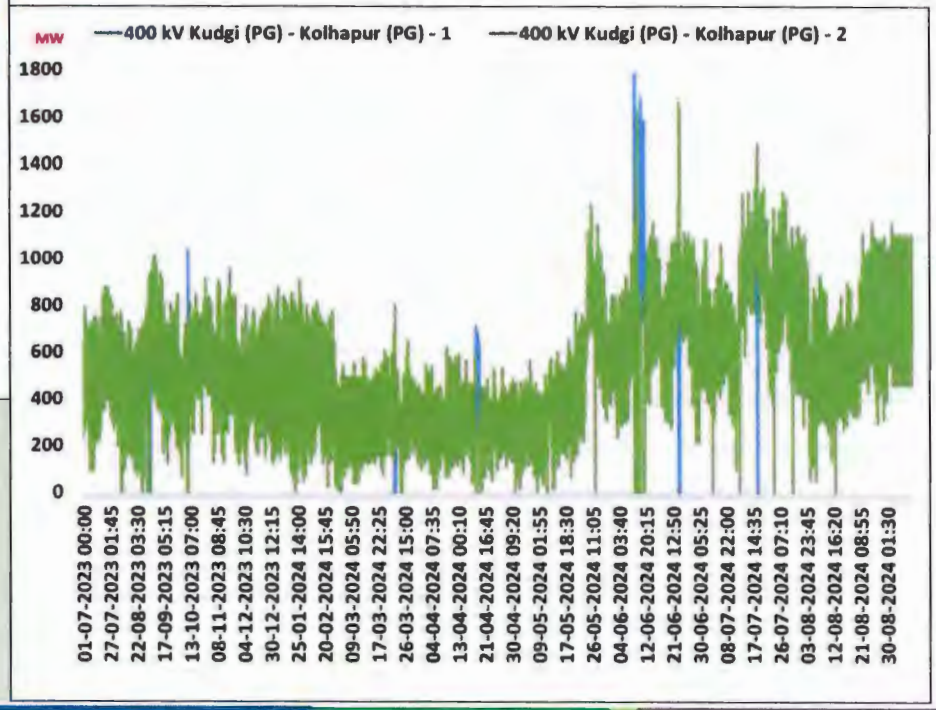
TTC/ATC for SR – WR & SR Export corridor is being regularly reviewed by NLDC and the figures are updated with any change in LGB or network topology including planned and forced shutdowns.

https://posoco.in/en/market/monthly-atc-inter-regional/inter-regional-2024-25/

Inter-regional Transmission Constraints for SR Export Corridor

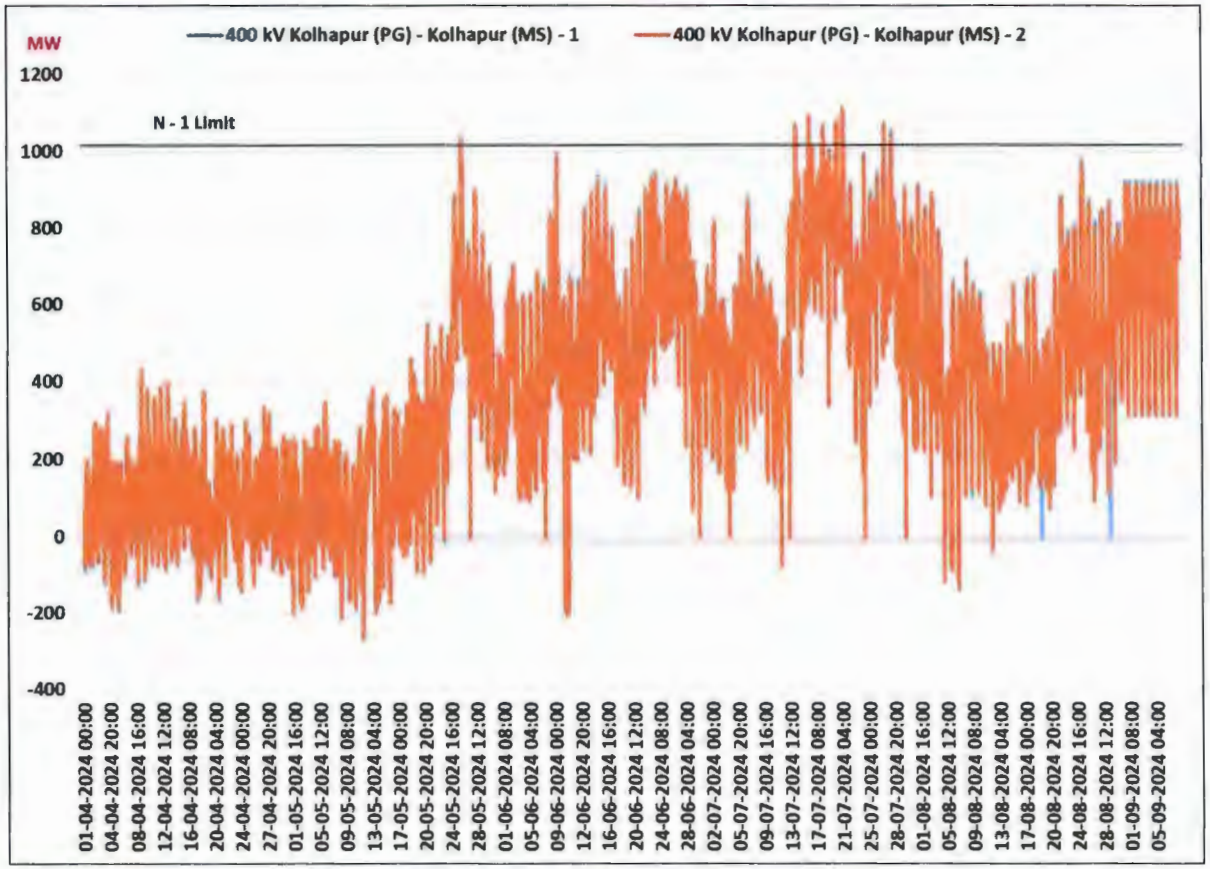


*Up to 8th September 2024



- 2x1500 MVA, 765/400 kV ICTs at Raichur – PG remain critically loaded and N-1 non compliant during peak SR Export Periods
- 400 kV Kudgi (PG) – Kolhapur (PG) (Quad Moose) also remain loaded above 1100 MW on a continuous basis with angular separation crossing 20-25 degrees under N condition.

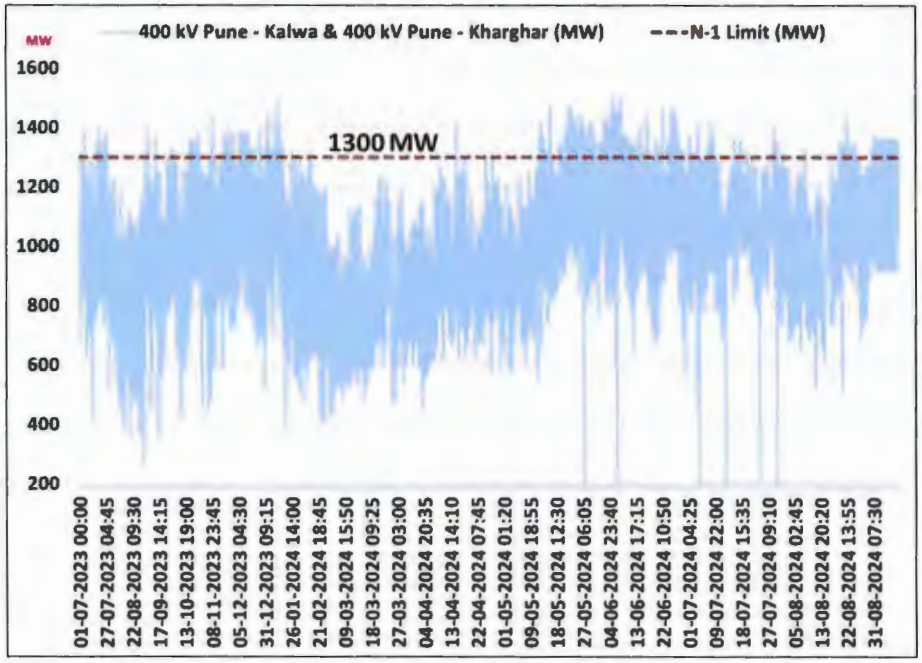
Maharashtra Network Constraints in SR Export Corridor

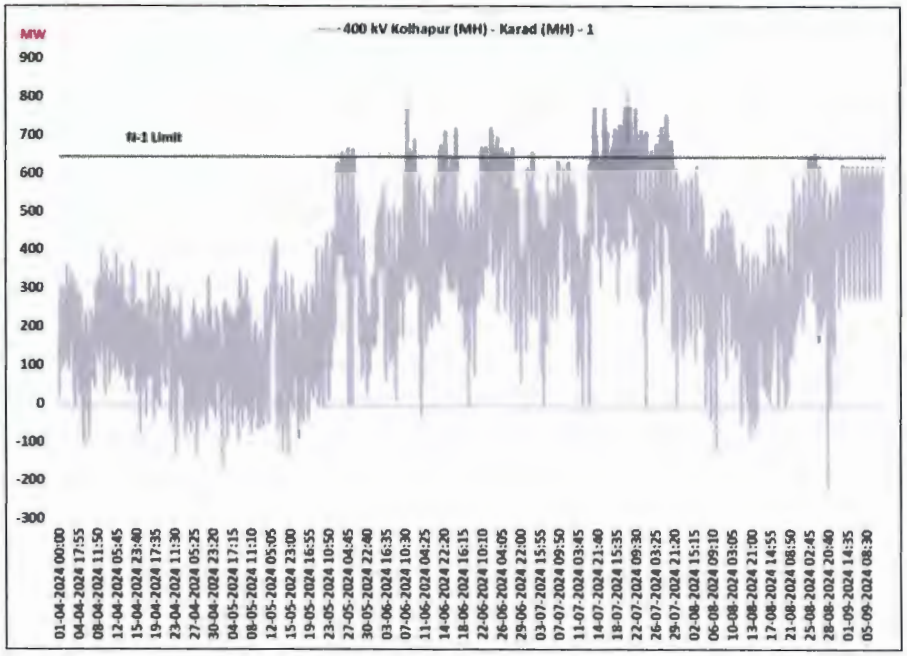


*Up to 8th September 2024

Heavy Loading of 400 kV Kohapur (PG) – Kolhapur (MH) D/C Under Peak SR Export Periods

Maharashtra Network Constraints in SR Export Corridor





*Up to 8th September 2024

400 kV Kolhapur – Karad D/C, 400 kV Pune – Kalwa & Pune – Kharghar and other lines in the Western Maharashtra remain critically loaded and N-1 non compliant during peak SR Export Periods

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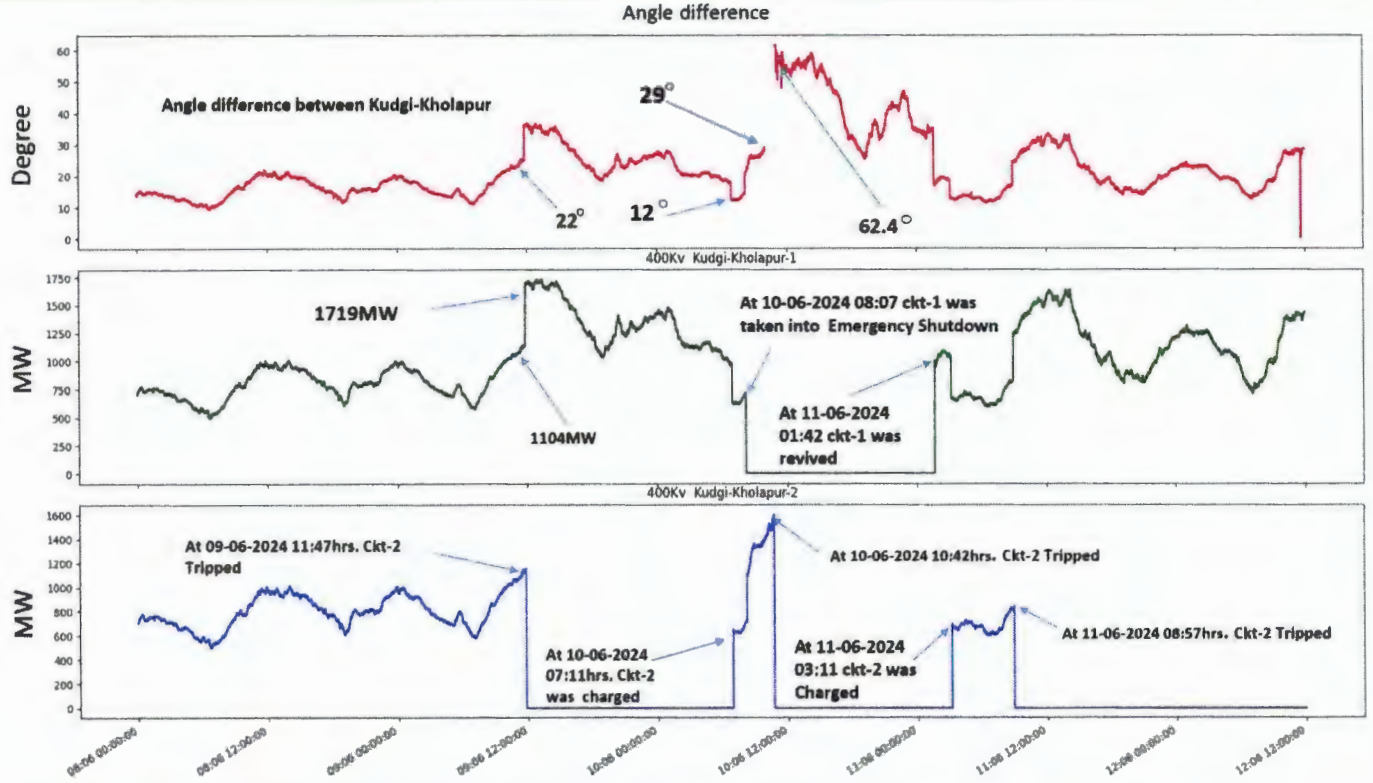
Real-Time Angular Difference Between Kudgi (PG) and Kolhapur(PG)

Plot of the Angular difference between Kudgi (PG) and Kolhapur (PG) on 9th,10th , 11th June 2024 during the outage of 400 kV Kudgi (PG) – Kolhapur (PG) - DC



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Steps Taken by NLDC/SRLDC/WRLDC to Control Real Time Congestion

- Regulating the HVDC links in WR-SR/ER-SR corridors to control the loading of highly loaded lines
- Issue of under-drawl and over-drawl violation messages to states in the Southern Region and Western Region by NLDC/SRLDC/WRLDC and continuous follow-up by RLDCs with SLDCs for adhering to the schedule.
- During real-time violation of TTC/ATC in the SR Export corridor, real-time system operators in the NLDC control room take the following action points through ancillary services.
  - **User ATC limits in SCED for SR Export Corridor by NLDC Control Room**
  - **Exclusion of SR Plants from the SCED portal to prevent any SCED up instruction**
  - **Exclusion of SR Plants from the TRAS portal while giving TRAS up instruction by NLDC control room.**
  - **Tie line bias (TLB) mode of operation of AGC**
- Generation reduction in ISGS (particularly in SR) thermal power stations to minimum turn down level during Solar hours/high RE injection
- Issuance of congestion warning notices to the concerned constituents

Challenges and Way Forward for Managing SR Export Congestion

➢ **Constraints in the Operation of Several HVDC Links**

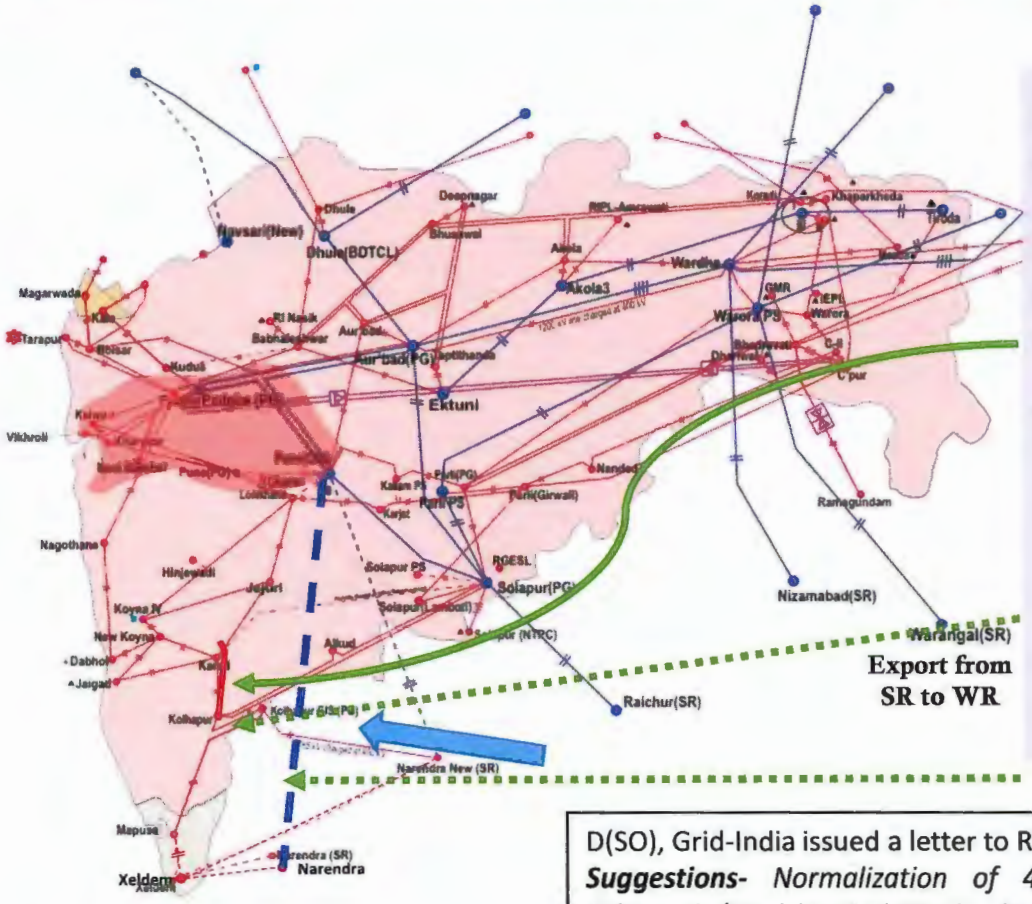
- **HVDC Raigarh – Pugalur in SR-WR direction**: Constraint in ICTs at Raigarh (Kotra) End.
- **HVDC Talcher – Kolar at minimum power order:** Constraint in the Loading of 400 kV Talcher – Meramundali – 1 & 2
- **HVDC Gazuwaka in SR – ER direction at max power order**: Constraint in 220 kV Network in Odisha
- **Delay in the commissioning of 765 kV Narendra (PG) – Kolhapur (PG) – D/C and constraints in Western Maharashtra due to significant delay in commissioning of planned intra-state transmission system**

➢ **Flexible operation of intra-state thermal power plants in Southern Region**

State	Technical Minimum	Regulations/ Data Source	Remarks
Karnataka	55%	KERC (Merit Order Despatch and Optimization of Power Purchase Cost) Regulations, 202410	Includes compensation mechanism for part load operation Two units operating with Technical minimum of 40% (intimated in 210th SR OCC meeting)
Andhra Pradesh	520 MW & above: 55% Upto 500 MW: 71.4%	Minutes of 210th Meeting of Southern Region Operation Coordination Committee (OCC)	-
Tamil Nadu	600 MW: 60%, 210 MW: 80%	Minutes of 210th Meeting of Southern Region OCC	-
Telangana	58-67% for different units	Minutes of 210th Meeting of Southern Region OCC	-

➢ **CTUIL may Share the dynamic model for Raichur-Pugalur HVDC reverse flow studies (upgradation of HVDC reverse capacity from 3000MW to 6000MW).**

Maharashtra constraints leads to congestion in IR:



Large-scale integration of RE generation, mainly in the Gadag/ Koppal area in Karnataka and in the Southern Region.

Constraints observed

- Kolhapur(PG) – Kolhapur (MSETCL) – Karad (MSETCL)

To relieve constraints

- Reconductoring of 400 kV Kolhapur(PG) – Kolhapur (MSETCL) 400kV D/c line with HTLS: Completed on 31st Aug'23.
- Expedition of planned intra-state transmission system
- Narendra – Pune 765kV D/c : Dec'24

D(SO), Grid-India issued a letter to RPCs/CTUIL/POWERGRID/MSETCL/ATL on 31.8.23:-
Suggestions- *Normalization of 400 kV Solapur-Karad-S/c, charging of 220 kV Talangade/Mudshingi-Chikkodi lines & consideration of dynamic line ratings*

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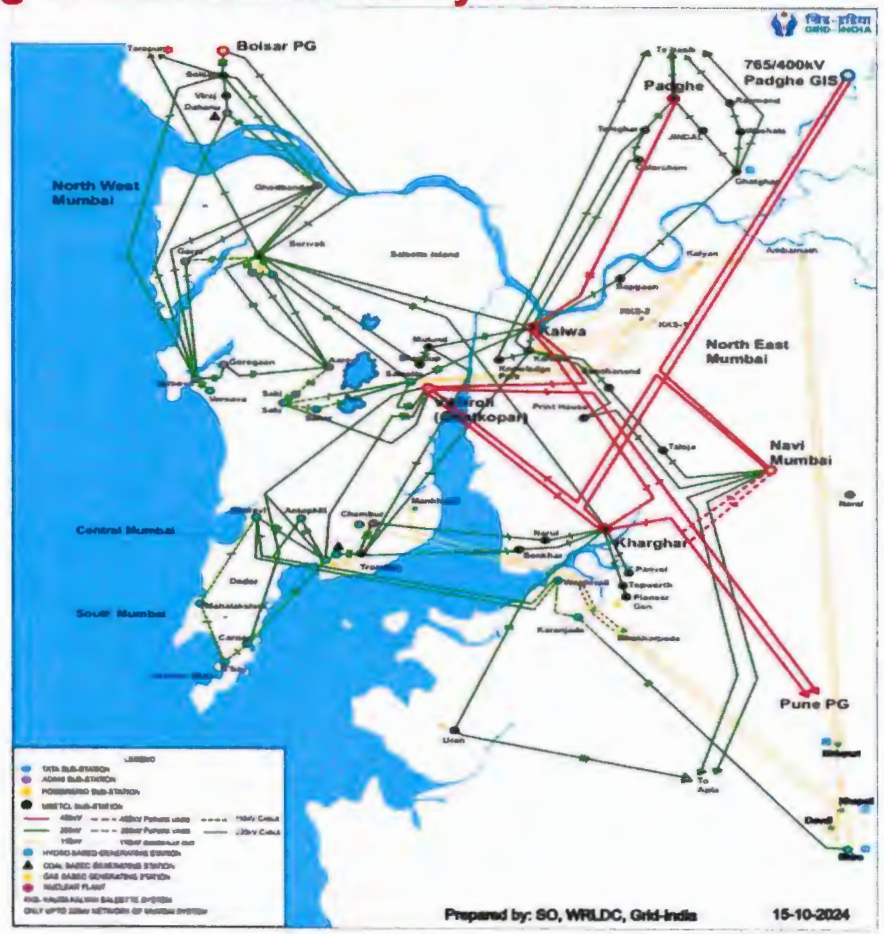
Observations post charging of Mumbai infeed system

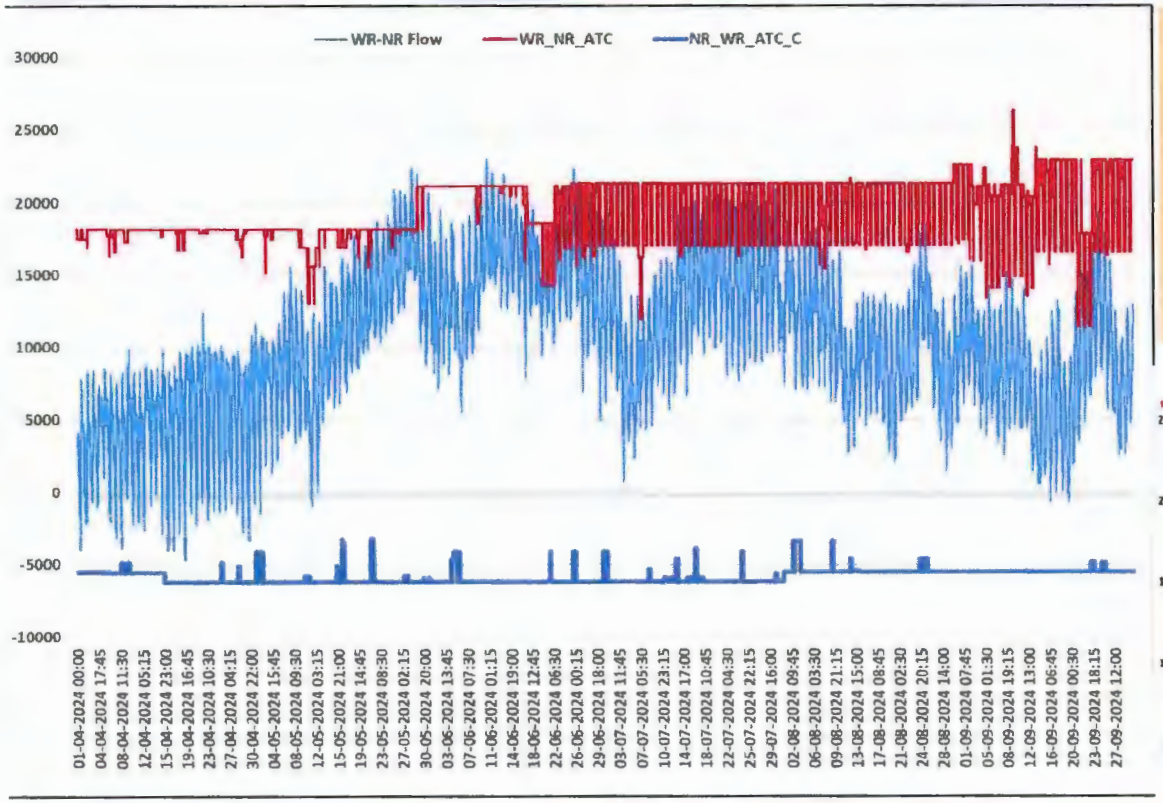
- Loading on critical corridor (Pune(GIS) -> Pune (PG) -> Mumbai Metropolitan Region (MMR) area & Padghe (Mh)-> MMR area) reduced
- Loading on Padghe(PG)-Kudus-Kala corridor also reduced
- Voltage profile in MMR area and Pune area improved
- Joint studies for reviewing of Maharashtra & Mumbai import capability was initiated (E-mailed to SLDC & STU, MSETCL)

Ongoing Works

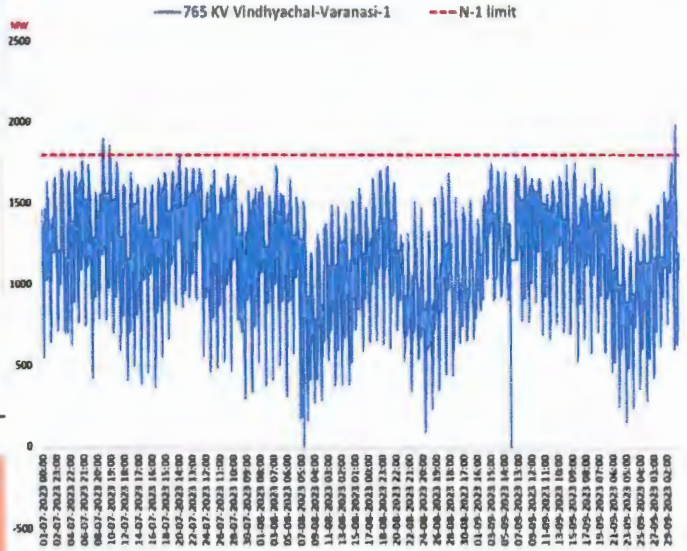
- LILO works of 400 kV Pune(PG)-Kharghar-S/c at Navi Mumbai also in process.



NR Import Constraints

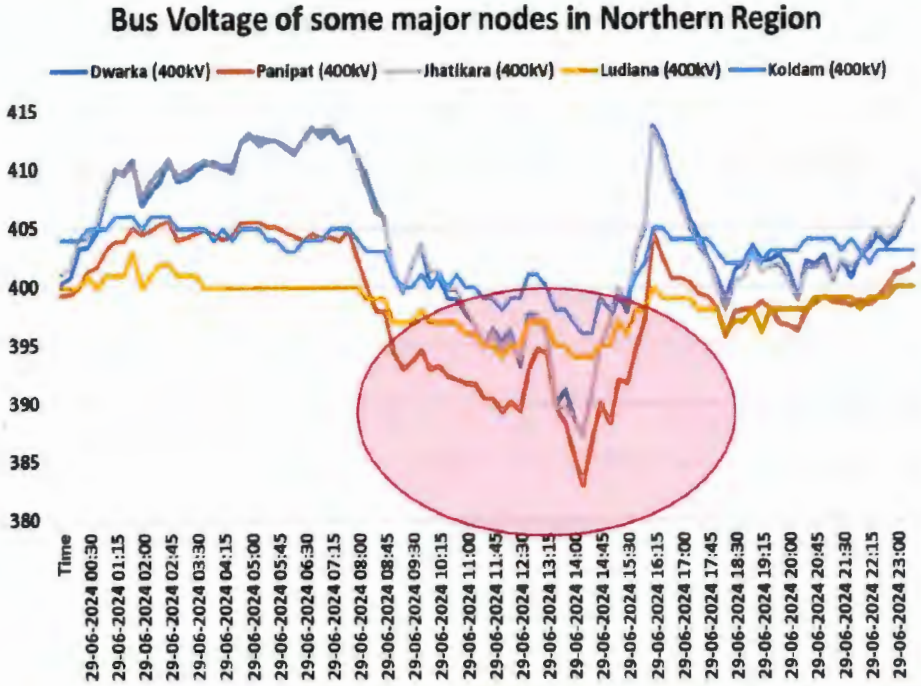


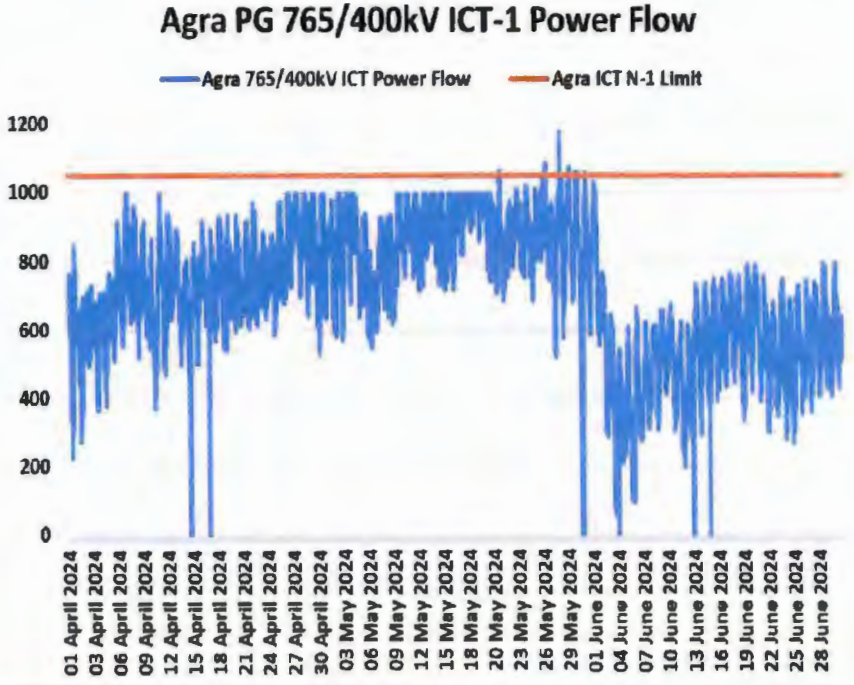
1. High WR-NR/NR Import flow has been observed in 2023-24 specially in the month of July and September
2. The loading on 765 KV Varanasi-Vindhyachal also remained high (also exceeded its N-1 limit) during high NR Import period



HVDC Vindhyachal could not be operated from WR to NR direction for considerable period of time due to high loading of 400 KV Anpara-Obra-S/C.

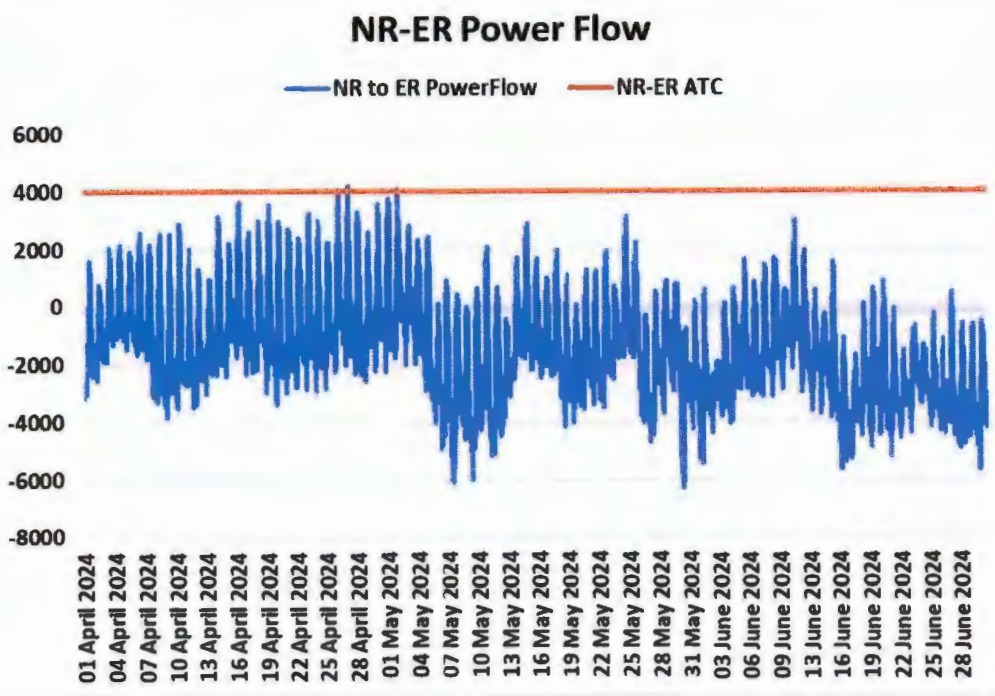
NR Import Constraints





- Low voltage were observed at major load centre points during solar hrs.
- Lack of static/dynamic reactive power support at the intra-state level.
- TTC/ATC figure of WR-NR/NR Import corridor is being declared separately for solar hrs considering the constraints of low voltage.
- The loading of 2*1500 MVA ICT at Agra were N-1 non compliant during high NR Import period. The loading reduced after reversal of HVDC BNC-Agra (from NR->NER to NER->NR). This was done based on real time grid conditions

NR Import Constraints



- High NR to ER flow observed in the month of April particularly during solar hours primarily due to high RE in NR and back down of thermal generation in the Eastern Region during peak solar hours.
- This has aggravated the constraints in the Eastern Region (400 kV Kahalgaon – Farakka D/c & 400 kV Farakka – Sagardighi D/c).

➢ With reduced power flow from Eastern to Northern Region, the WR-NR corridor was observed to be stressed during non-solar peak demand hours.

Shifting of Rihand stage-III generating station (2x500 MW) to Northern region

In order to relieve the loading of 765 kV Vindhyachal-Varanasi and facilitate higher import by NR, following interim network rearrangement was carried out

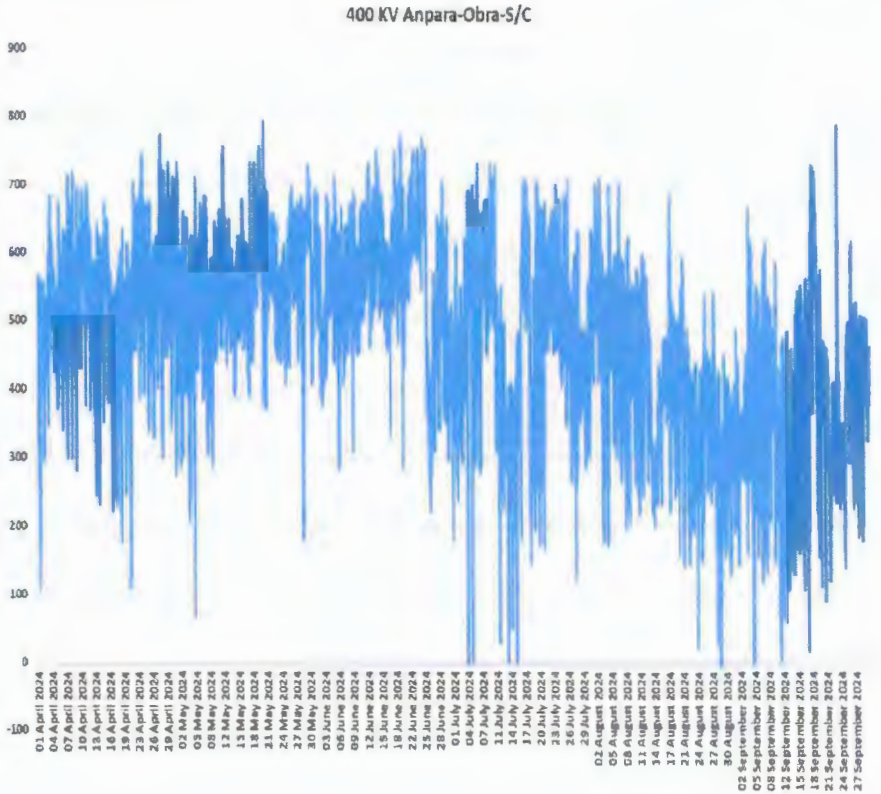
- **Shifting of Rihand stage-III generating station (2x500 MW) to NR** by closing the bus coupler between Rihand-III and Rihand-I & II and disconnecting Rihand-III from WR by opening 400 kV Rihand stage-III - Vindhyachal PS D/C .
- **Opening of 400 kV Singrauli-Anpara S/C** (also, as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) to control the high fault levels in Anpara – Singrauli – Rihand complex)

Post shifting observations

- Relief of ~250 MW in loading of each circuit of 765 kV Vindhyachal - Varanasi D/C observed.
- Increment in WR-NR TTC/ATC of the order of ~2450 MW after the implementation of above arrangement

Constraint in HVDC Vindhyachal B2B

- It is observed that due to high loading of lines in Anpara complex, particularly 400 kV Anpara – Obra S/C (loading more than 700 MW), real-time constraint is faced in increasing the power order of HVDC B2B V'chal in WR to NR direction.
- UPPTCL needs to explore the possibility by shifting some load, keeping generation at 220kV Obra or by reconfiguration of existing network to mitigate this constraint.
- Also, as per the recommendations of the 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP), 400 kV Singrauli – Anpara opened to control the high fault levels in Anpara – Singrauli – Rihand complex.
- Rihand-III units are also shifted to the northern region to relieve constraints in WR-NR corridor (765 KV Vindhyachal-Varanasi)
- Even after opening of this line the loading of 400 kV Anpara – Obra remains on the higher side.

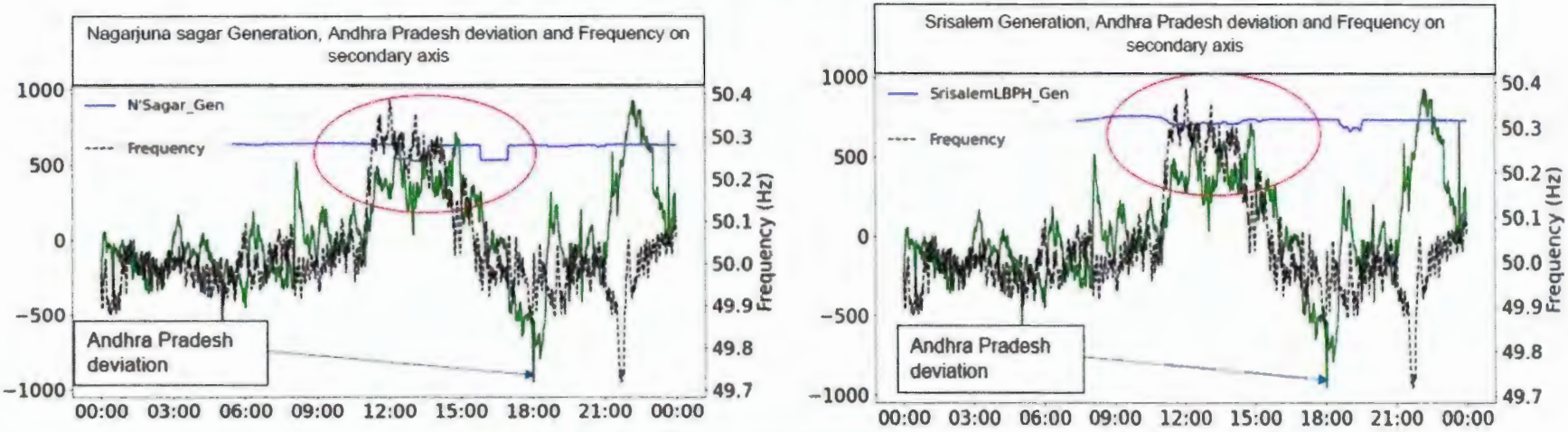


Constraint in HVDC Mundra-Mahendragarh:

- HVDC Mundra - Mahendragarh needs to be operated at maximum capacity **(2500 MW)** in WR to NR direction during high NR import period to relieve loading on ac lines .
- Due to issue in DC CMD (current measurement device) of pole-2, HVDC Mundra – Mahendragarh Pole-2 power order was restricted to a max. 500 MW for over a month.
- This had resulted in restriction in total HVDC power order to 1750 MW.
- Apart from this, there have been multiple outages of the HVDC in the last 2-3 months due to various reasons.
- Restriction in max. power order of HVDC Mundra – M'garh has also resulted in reduction in WR-NR and NR Import TTC/ATC.

HIGH-FREQUENCY OPERATION IN INDIAN POWER SYSTEM ON 04 , 11 & 25 AUGUST 2024

- Increased reservoir heads in Nagarjun Sagar and Srisailam resulted in inflexibility to use the power plants for pumping during Solar hours, as they have to be kept in majority generating mode.
- Even during the congestion periods from Southern Region to the Western Region, the pumped hydro stations had to be operated in generating mode, and created grid security challenges



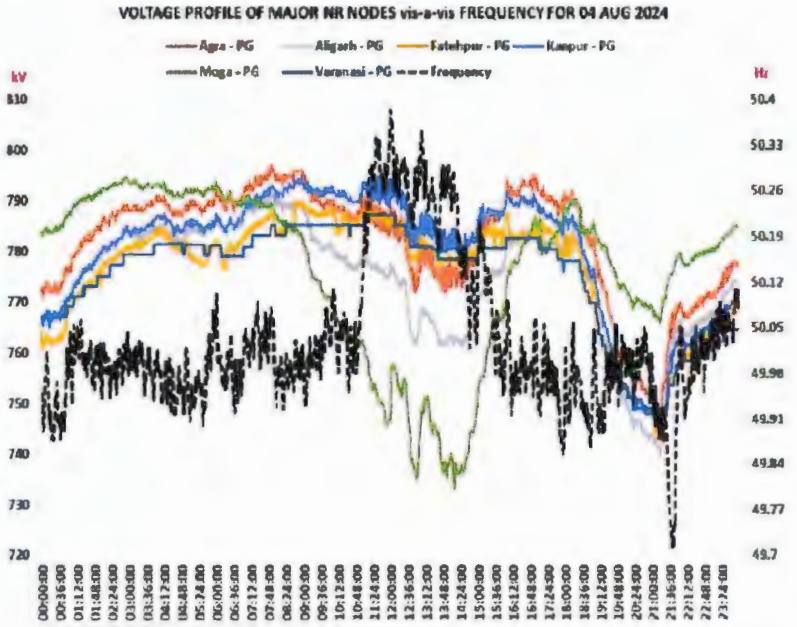
PSP Plants Generation at on Nagarjuna sagar, Srisalem day 04th –August 2024

PSP not working in Pumping mode

SCHEMES	STATE	INSTALLED CAPACITY
Kadana	Gujarat	4x60
Sardar Sarovar Project	Gujarat	6x200

Constraints during HIGH-FREQUENCY OPERATION IN INDIAN POWER SYSTEM ON 04 , 11 & 25 AUGUST 2024

- Backing down of intra-state generation in few states like Punjab may have been constrained on account of intrastate transmission constraints since actual drawl was around ATC limit for Punjab import. I
- During the peak solar hours, voltage levels at major load centers within the NR were observed to be on the lower side.
- This was primarily due to heavy reactive power drawl by states and inadequate static and dynamic reactive power support at the intra-state level.
- Specifically, the voltage at the 765 kV bus at Moga station in Punjab dropped to 730-740 kV. Punjab continued to under-draw from the grid during periods of high frequency.
- A reduction in internal generation by Punjab could have raised concerns about increased power drawl from the Inter-State Transmission System (ISTS) grid, which could exacerbate voltage dips at critical buses.



Report link

https://posoco.in/en/download/report-on-high-frequency-operation-for-4th-11th-and-25th-aug-2024/?wpdmdl=59532

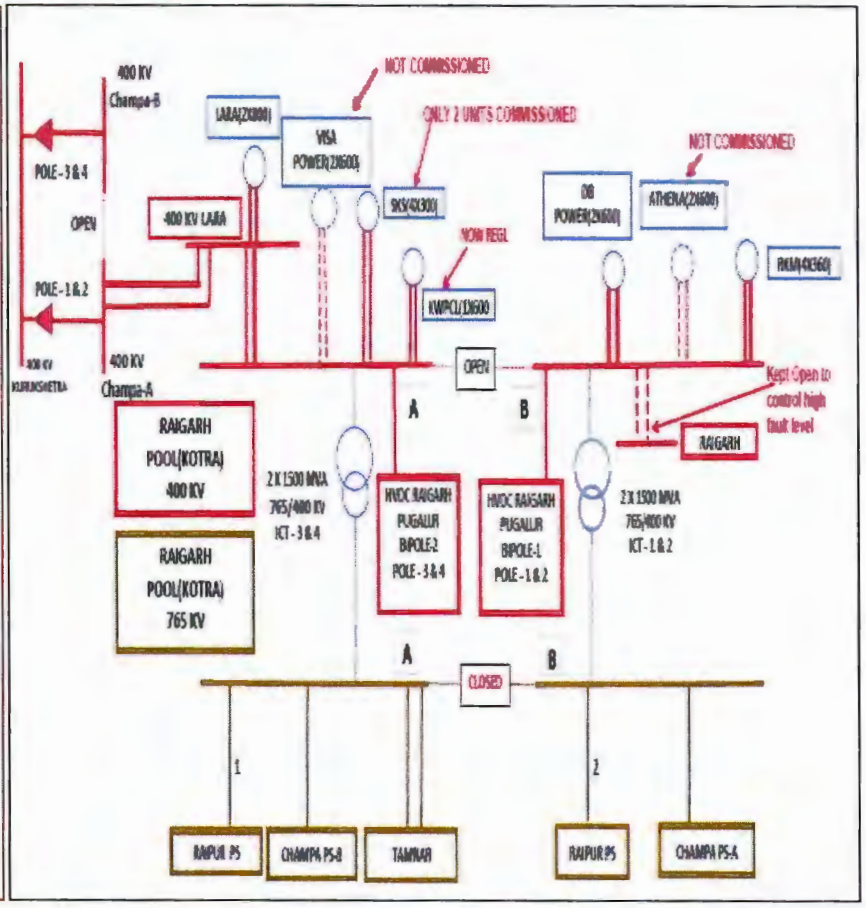
Thank you !!

Augmentation in Maharashtra System to Mitigate Operational Constraints

- High loading is observed near the Mumbai area during peak demand periods
- During those periods, any constraint in HVDC Pagdhe power order have also created alarming situations in real time as it leads to further increase in the line loadings.
- N-1 violation observed in,
  - 400 kV Parli(PG)- Parli(MS) D/C line **(Bypassing of 400 kV Parli(PG)- Parli(MH)-D/c and 400 kV Parli(New)-Parli(PG)_D/c at outskirts Parli(PG) S/s completed, Reconductoring of Ckt – 1 completed & Ckt – 2 completed)**
  - 2x1500 MVA, 765/400 kV Ektuni ICTs **(Inter trip scheme implemented. Installation of 1x1500MVA ICT-III at Ektuni to be expedited)**
  - 400 kV Pune (GIS)-Pune (PG)-Q/c lines
    - **220kV level at Pune (PG)(GIS) and Installation of 2x500MVA, 400/220kV ICTs at Pune (PG)(GIS) & LILO of both ckts of 220kV Khed City – Ranjangaon D/c line at Pune GIS with high capacity conductor**
    - **LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section**
  - 400kV Pune(PG)-Kharghar & 400kV Pune(PG)-Kalwa S/C line & 400 kV Padghe- Kalwa D/C
  - **3x500 MVA, 400/220kV ICTs, 400 kV Kharghar-Vikhroli-D/c & LILO of 220 kV Trombay - Salsette-D/c at Vikhroli completed**
  - **Commissioning of remaining planned system at 400/220 kV Navi Mumbai & Vikhroli completed**
  - 400 kV Pune(PG)-Chakan S/C

Inadequate reactive compensation: Constraint in utilization of HVDC

- High SR Import during morning hours necessitates the operation of HVDC Raigarh – Pugalur at a high power order in WR – SR direction
- **The loading on 400 KV Lara-Kotra-D/C is restricting further increase in power order of HVDC Raigarh - Pugalur(WR-SR). (1st WRPC(TP): Reconductoring with quad moose ampacity conductor is agreed with connectivity of Lara Stage-II)**
- Due to the bus split at Champa, sensitivity of HVDC Champa - KKR Bipole - II has negligible sensitivity on 400 kV Lara - Kotra loading. However, 100 MW increase in HVDC Champa - KKR Bipole – I (i.e Pole-1 & 2 connected to 400 KV Champa PS_A bus) power order will reduce the loading of Lara – Kotra(each ckt) by 12 MW
- However, **the voltages at 765kV & 400 kV buses of Champa - A remain above 780 kV & 412 kV for all the time and this prevents the deblocking of HVDC Champa – Kurukshetra Bipole- 1 inspite of VAR absorption by Units at Champa & Raigarh (Kotra).**
- This creates issue in the flexible operation of both the HVDCs
- Additional reactive compensation to be planned at Champa-PS



Intra-state Constraints in Rajasthan Network

- N-1 Constraints in several ICTs
- Severe low voltage & huge MVAR drawl at RVPN during winter months (even below 0.8 at number of 400/220kV ICTs)
- **37 Nos.** of Grid disturbances/incidents in 2023 in Rajasthan (intra-state) network
- **23 Nos. of load loss events & 12 Nos. of generation loss events in 2023.**

ICT Constraints	
N-1 Contingency of 3*315 MVA ICT at Chittorgarh	3rd 315MVA ICT at Chittorgarh first time charged on 06.01.2024. Even after capacity augmentation at Chittorgarh, 3*315MVA ICTs are near to N-1 non-compliance. Rajasthan STU has planned and implemented SPS at these locations. (except Bhilwara) New 1*500MVA ICT under bidding at these S/s by RVPNL. As per latest information shared by RVPN, bids for new 500MVA transformers at Ajmer, Bikaner, Hindaun, Merta, Babai and Jaisalmer-2 substations will be opened on 22.01.2024.
N-1 Contingency of 2*315+1*500 MVA ICT at Bassi	
N-1 Contingency of 2*315 MVA ICT at Jodhpur	
N-1 Contingency of 2*315 MVA ICT at Bhinmal	
N-1 Contingency of 2*315 MVA ICT at Ajmer	
N-1 Contingency of 2*315 MVA ICT at Bikaner	
N-1 Contingency of 2*315 MVA ICT at Merta	
N-1 Contingency of 2*315 MVA ICT at Hindaun	
N-1 Contingency of 1*315+1*500 MVA ICT at Bhilwara	

Low Voltage Issues	
Low voltage issues at Hindaun , Alwar, Bhinmal Voltages reaching 310kV at Alwar (400kV), 360 KV(Bhinmal) and 325kV at Hindaun (400kV). Similar poor profile at 220kV side also.	New 400/220kV Dholpur S/s likely to provide some relief, however approved by CEA on 27th Jan 2023, so issue likely to persist for next 1-2 winter seasons.
	Other immediate measures required by RVPN. 400kV Bharatpur is under internal approval with LILO of 400kV Agra-Sikar.
	Severe issues observed during Dec 2022-Jan 2023 months. As discussed in 70 NRPC meeting, RVPN is being asked to run Dholpur generation, however, same is not being done by RVPN. Communications sent from NRLDC side in this regard.
Low voltage issues in RE generation pockets	Additional reactive power support devices for maintaining grid voltages within IEGC prescribed limits to be expedited (STATCOMs approved in intrastate network). Intrastate RE generators to support the grid by operating in voltage control mode.

N-1 contingency of 2x1500 MVA, 765/400 kV Ektuni ICTs	1x1500MVA ICT-III at Ektuni along with scheme to control fault level at A'bad-I / A'bad-II / A'bad-III **Interim Measures:** To control ICTs loadings, Inter trip scheme implemented at Ektuni on 16th Oct 23 involving tripping of transmission lines (Tripping of 400 kV Ektuni-Tatpitanda D/C) and manual Generation backing down at APML Tiroda, Koradi & Ratan India by SLDC. **Permanent Solution:** Installation of 1x1500MVA ICT-III at Ektuni
N-1 contingency of 400 kV Pune (GIS)-Pune (PG)-Q/c lines	**Interim Measures**: Presently managed with load trimming scheme for overloading of any of the 4 ckts above 1300 A. **Permanent Solution:** Creation of 220kV level at Pune (PG)(GIS) and Installation of 2x500MVA, 400/220kV ICTs at Pune (PG)(GIS) & LILO of both ckts of 220kV Khed City – Ranjangaon D/c line at Pune GIS with high capacity conductor. ACOD: Dec'24 **(SCOD-June'24)** LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400kV Pune (PG)-Kharghar & 400kV Pune (PG)-Vikhroli-Kalwa S/C line	**Presently managing with LTS.** **Remedial Action:** Keeping all the generation on-bar in MMR irrespective of MOD order, facilitating outage only during holidays & load staggering days, import capability monitoring of Mumbai. Commissioning of 400/220kV Vikhroli & Navi Mumbai substations along with associated transmission system would relieve the loading on these lines and will improve reliability of power supply to Mumbai area. **Present Status:-** 220 KV Feeders from 400/220 KV Navi Mumbai charged. (220 KV N.Mumbai-Apta-D/C, 220 KV N.Mumbai-Taloja-D/C, 220 KV N.Mumbai-Print house-D/C.

Contd.

REMEDIAL ACTION TO MITIGATE THE MAHARASHTRA CONSTRAINTS

400 kV Padghe-Kalwa D/C	**Presently managing with LTS.** **Remedial Action:** Re-conductoring of 400 kV Kalwa-Padghe-D/c with HTLS was planned by MSETCL, ckt-2 re-conductoring completed and ckt-1 work is in progress. **Commissioning of 400/220kV Vikhroli & Navi Mumbai substations along with associated transmission system would relieve the loading on these lines and will improve reliability of power supply to Mumbai area.** **Status:- 220 KV Feeders from 400/220 KV Navi Mumbai charged. (220 KV N.Mumbai-Apta-D/C, 220 KV N.Mumbai-Taloja-D/C, 220 KV N.Mumbai-Printhouse-D/C**
400 kV Pune (PG)-Chakan S/C	**Presently managing with LTS.** **Remedial Measure:** 400kV Pune PG-Lonikhand S/c line LILO at Chakan would improve reliability of power supply. MSETCL may explore this option to relieve constraints.
Low voltages at Kalwa/Padghe/Pune/Chakan/Lonikhand/Solapur	Strengthening of transmission system in south-west Maharashtra is much needed.
220 kV Pune (PG)-Talegaon D/C	**Remedial Action:** - As per CTU Report on Transmission Network adequacy for the state of Maharashtra Nov-22, LILO of both ckts of 220 kV Khed City – Ranjangaon-D/c line at Pune GIS with high capacity conductor and 2x500 MVA, 400/220 kV ICTs at Pune(GIS) are expected in Dec'24**(SCOD-June'24).**

Contd.

REMEDIAL ACTION TO MITIGATE THE MAHARASHTRA CONSTRAINTS

220 kV Bableshwar-Nashik D/C line	**Remedial Action:** MSETCL to expedite commissioning of 220kV Bableshwar-Nashik D/c LILO at Sinner (SCOD- Mar-20), 2x500MVA S/s along with Nashik S/s (SCOD- Mar-21)- Work progress to be given by MSETCL 400/220 kV Pimpalgaon S/s along with transmission system was planned by MSETCL. SCOD: Apr'24
400kV Parli MH-Karjat D/c	LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400 kV Karjat-Lonikhand-II DC	LILO of one ckt of Lonikand-I–Jejuri 400 kV D/c line at Pune (PG)(GIS) with high capacity conductor along with reconductoring of Lonikand-I –Jejuri line section. **SCOD: Apr'25.**
400 kV Solapur-Alkud & Solapur-Kholapur lines	400 kV Solapur-PG-Karad presently charged as 220 kV Solapur-Jeur to be restored.
N-1 contingency of 2x315+2x500 MVA Boisar-PG ICTs	**Remedial measure:** Commissioning of 500 MVA, 400/220 kV ICT (5th). SCOD: Jan'26

BACK

Constraint in Generation Evacuation from TalcherComplex

- The generation from Talcher Super Thermal Power Plant Stage – I (1000 MW) & Stage – II (2000 MW) is evacuated through the following transmission lines,
  - 400 kV Talcher – Meramunadli – Short Line
  - 400 kV Talcher – Angul – Meramundali (Bypassed at Angul) – Long Line
  - 400 kV Talcher – Rengali D/C
  - 400 kV Talcher – Rourkela D/C
  - HVDC Talcher – Kolar Bipole (2000 MW from ER to SR)
- It may be noted that due to frequent outage of HVDC Talcher – Kolar or any other transmission element in the complex on forced outages/tripping/maintenance activities, constraints in evacuating Talcher Stages I & II generation are being faced in the lines emanating from Talcher-I particularly 400 kV Talcher – Meramundali lines.

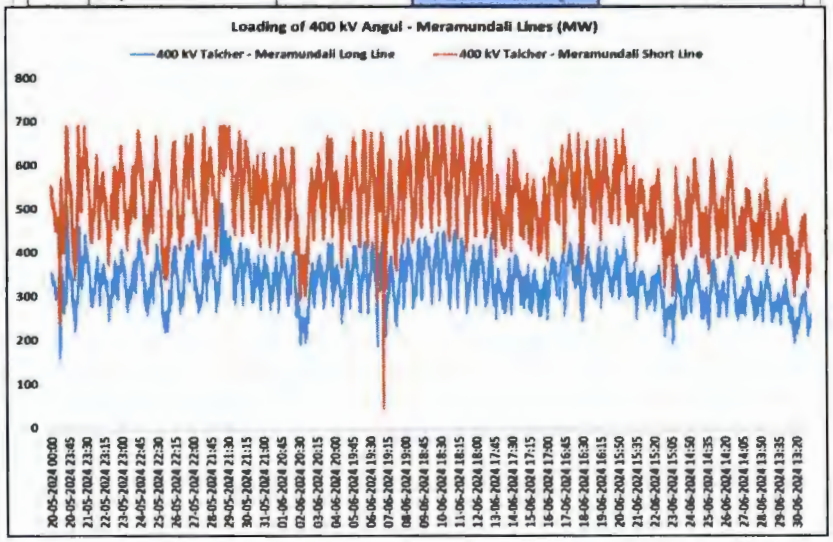
The same is handled with the help of Generation restriction at Talcher - I & II & network rearrangements in nearby stations.

- The permissible line loading limit based on the seasonal Imax setting of 400 KV Talcher - Meramundli – 1 & 2 are as follows

Reconductoring of 400 kV Talcher – Meramundali Lines D/C lines has been approved in 22nd NCT Meeting

IMAX Setting for 400 kV Talcher Meramundali circuits based on seasonal thermal rating Confirmed by PGCIL in 175th OCC of ER

Sl.No.	Months	Ambient Temperature consideration (◦Celsius)	IMAX: Ampacity for 75 ◦Celsius conductor temperature	Line Loading (MVA) = (1.73X400X IMAX)/1000
1	November- February	40	2X714=1428 Amp	989
2	March-June	50	2X516=1032 Amp	714
3	July-October	45	2X631=1262 Amp	874

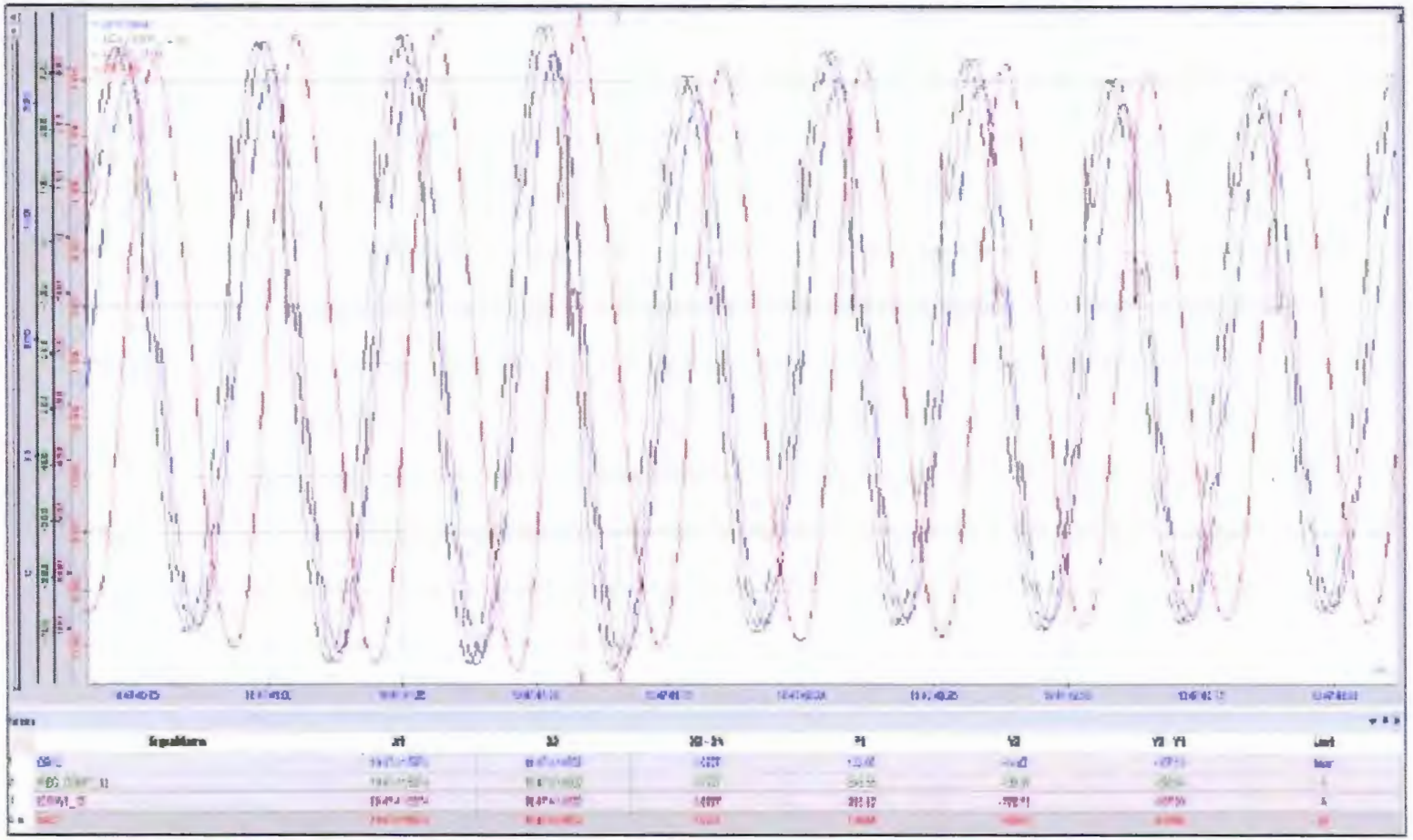


Constraint in Reverse Operation of HVDC Gazuwaka

- Presently HVDC Gazuwaka is operated in the reverse direction (SR to ER) direction during SR Export hours. However, the same cannot be maximized to operate at full capacity i.e. 1000 MW because of N-1 violation of a few critical lines in the 220 kV intra-state network of Odisha.
  - 220 kV Jaynagar-Lakshmipur
  - 220 kV Lakshmipur-Therubali
  - 220 kV Therubali-Bhanjanagar

Oscillations Observed in NR RE Complex (STATCOM Behaviour)

Measurement (TFR) based Analysis of Bhadla-II STATCOM-1



Form-I

Application Form for Grant of Separate Transmission licence

1. **Particulars of the Applicant**

SN	Particulars	Details
i.	Name of the Applicant	Khavda IV A Power Transmission Limited
ii.	Status	Public Limited Company
iii.	Address	C 105, Anand Niketan, New Delhi, India,110021
iv.	Name, Designation & Address of the Contact Person	Shri Afak Pothiawala, Khavda IV A Power Transmission Limited, 4th Floor, South Wing K P Epitome, Makarba, Ahmedabad 380051
v.	Contact Telephone No	6359974051
vi.	Fax No	079-25558471
vii.	Email ID	afak.pothiawala@adani.com
viii.	Place of Incorporation/ Registration	New Delhi
ix.	Year of Incorporation/ Registration	2023
x.	Following documents are to be enclosed	
	a) Certificate of Registration	Annexure 6
	b) Copy of Board resolution	Annexure 8

2. **Particulars of the Project for which licence is being sought:**

Central Transmission Utility of India Limited (CTUIL) has approved Augmentation of transformation capacity at KPS3 (GIS) S/s under Khavda Phase – V Part B3 Scheme on Regulated Tariff Mechanism (RTM) route. Hence, KPTL4A has sought Grant of separate transmission licence for the following:

a) Transmission Lines:

S No	Name (end-points Location)	Voltage Class (kV)	Length (km)	Type (S/C or D/C)
-	-	-	-	-

b) Sub-stations:

Khavda IVA Power Transmission Limited

Sr No	Name (Location)	Voltage Level (s) (kV)	Transformer (Nos. and MVA capacity)	Reactive/ Capacitive compensation (device with MVAR Capacity)	No. of bays
1	Augmentation of transformation capacity at KPS3(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (8th) along with 1 No. 400 kV line bay for termination of 1st ckt out of 400 kV D/c line being implemented by AGEL	765/400 kV	1x500 MVA ICT – 1 No.	-	• 765 kV ICT bay – 1 No. • 400 kV ICT bay – 1 No.
2	1 Nos. 400 kV line bay on KPS3 400 kV Bus Section-II for termination of 2nd ckt out of 400 kV D/c line being implemented by AGEL	400kV	-	-	• 400 kV line bays – 1 No.

c) Commissioning Schedule: 25.11.2026

d) Identified Long-Term transmission customers of the Project:

1. Central Transmission Utility of India Limited
2. Madhya Pradesh Power Management Company Limited
3. Chhattisgarh State Power Distribution Company Limited
4. Maharashtra state Electricity Distribution Company Limited
5. Gujarat Urja Vikas Nigam Limited
6. DNH Power Distribution Corporation Limited
7. Electricity Department, Government of Goa
8. Dadra and Nagar Haveli and Daman and Diu Power Distribution Corporation Limited

e) Any other relevant information: Nil

3. Levelised transmission charges in case of project selected through the transparent process of competitive bidding and estimated completion cost of the project in other cases: - This project is Awarded by CTU through RTM route and estimated Capital Cost will be determined through Competitive Bidding.

4. In case applicant has been selected in accordance with the guidelines for competitive bidding, enclose:

(a) Recommendation of selection by the Empowered Committee: - Not Applicable
(b) Evaluation report made public by the Bid Process Coordinator: - Not Applicable

5. List of documents enclosed:

Name of the Document

a) **Certificate of Registration: Annexure 6**
b) **MoA & AoA: Annexure 7**
c) **Copy of Board Resolution: Annexure 8**

(Signature of the Applicant)

Dated: 09.12.2024
Place: Ahmedabad

Annexure 6

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF CORPORATE AFFAIRS

Central Registration Centre

Certificate of Incorporation

[Pursuant to sub-section (2) of section 7 and sub-section (1) of section 8 of the Companies Act, 2013 (18 of 2013) and rule 18 of the Companies (Incorporation) Rules, 2014]

I hereby certify that KHAVDA IVA POWER TRANSMISSION LIMITED is incorporated on this NINETH day of OCTOBER TWO THOUSAND TWENTY THREE under the Companies Act, 2013 (18 of 2013) and that the company is Company limited by shares

The Corporate Identity Number of the company is **U42202DL2023GOI420963**

The Permanent Account Number (PAN) of the company is **NULL***

The Tax Deduction and Collection Account Number (TAN) of the company is **DELK26921G***

Given under my hand at Manesar this NINETH day of OCTOBER TWO THOUSAND TWENTY THREE

Signature Not Verified
Digitally signed by
DS MINISTRY OF CORPORATE
AFFAIRS 10
Date: 2023.10.11 13:42:53 IST

SHEETAL KUMARI

Assistant Registrar of Companies/ Deputy Registrar of Companies/ Registrar of Companies

For and on behalf of the Jurisdictional Registrar of Companies

Registrar of Companies

Central Registration Centre

Disclaimer: This certificate only evidences incorporation of the company on the basis of documents and declarations of the applicant(s). This certificate is neither a license nor permission to conduct business or solicit deposits or funds from public. Permission of sector regulator is necessary wherever required. Registration status and other details of the company can be verified on mca.gov.in

Mailing Address as per record available in Registrar of Companies office:

KHAVDA IVA POWER TRANSMISSION LIMITED

CORE-4, SCOPE COMPLEX,7, LODHI ROAD,Lodi Road,Delhi,Central Delhi-110003,Delhi

*as issued by Income tax Department

Khavda IVA Power Transmission Limited

Annexure 7

Form No. INC-33

Form language

(•) English ( ) Hindi

e-MOA (e-Memorandum of Association)
[Pursuant to Schedule I (see Sections 4 and 5) to the Companies Act, 2013)]

Refer instruction kit for filing the form

*All fields marked in * are mandatory*

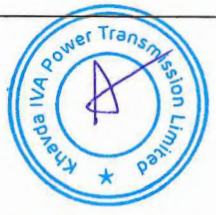
*** Table applicable to company as notified under schedule I of the Companies Act, 2013**

(A - MEMORANDUM OF ASSOCIATION OF A COMPANY LIMITED BY SHARES
B - MEMORANDUM OF ASSOCIATION OF A COMPANY LIMITED BY GUARANTEE AND NOT HAVING A SHARE CAPITAL
C - MEMORANDUM OF ASSOCIATION OF A COMPANY LIMITED BY GUARANTEE AND HAVING A SHARE CAPITAL
D - MEMORANDUM OF ASSOCIATION OF AN UNLIMITED COMPANY AND NOT HAVING SHARE CAPITAL
E - MEMORANDUM OF ASSOCIATION OF AN UNLIMITED COMPANY AND HAVING SHARE CAPITAL)

A - MEMORANDUM OF ASSOCIATION OF A COMPANY LIMITED BY SHARES

Table A/B/C/D/E

1 The name of the company is	KHAVDA IVA POWER TRANSMISSION LIMITED
2 The registered office of the company will be situated in the State of	Delhi
3 (a) The objects to be pursued by the company on its incorporation are:	1.To plan, promote and develop an integrated and efficient power transmission system network in all its aspects including planning, investigation, research, design and engineering, preparation of preliminary, feasibility and definite project reports, construction, operation and maintenance of transmission lines, sub-stations, load dispatch stations and communication facilities and appurtenant works, coordination of integrated operation of regional and national grid system, execution of turn-key jobs for other utilities/organizations and wheeling of power in accordance with the policies, guidelines and objectives laid down by the Central Government from time to time. 2. To study, investigate, collect information and data, review operation, plan, research, design and prepare Report, diagnose operational difficulties and weaknesses and advise on the remedial measures to improve,



undertake development of new and innovative product connected with business of the Company as well as modernize existing EHV, HV lines and Sub-Stations.
3.To act as consultants, technical advisors, surveyors and providers of technical and other services to Public or Private Sector enterprises engaged in the planning, investigation, research, design and preparations of preliminary, feasibility and definite project reports, manufacture of power plant and equipment, construction, generation, operation and maintenance of power transmission system from power generating stations and projects, transmission and distribution of power.
4.To plan, promote, develop, erect and maintain, operate and otherwise deal in Telecommunication networks and services in all its aspects including planning, investigation, research, design and engineering, preparation of preliminary, feasibility and definite project reports: to purchase, sell, import, export, assemble, manufacture, install, commission, maintain, operate commercially whether on own or along with other, on lease or otherwise. These networks and for such purposes to set up and/ or install all requisite communications facilities and other facilities including fibre optic links, digital microwave links, communication cables, other telecommunication means, telephone and other exchanges, co-axial stations, microwave stations, repeater stations, security system databases, billing systems, subscriber management systems and other communication systems whether consisting of sound, visual impulse, or otherwise, existing or that may be developed or invented in the future and to manufacture, purchase, sell, import, export, assemble, take or give on lease/rental/subscription

Khavda IVA Power Transmission Limited

	basis or by similar means or otherwise deal in all components and other support and ancillary hardware and software systems, accessories, parts and equipments etc. used in or in connection with the operation of the above communication systems and networks including to deal with telecommunication operations or directly with the general public, commercial companies or otherwise.
(b) *Matters which are necessary for furtherance of the objects specified in clause 3(a) are	1.To obtain license, approvals and authorization from Governmental Statutory and Regulatory Authorities, as may be necessary to carry out and achieve the Objects of the Company and connected matters which may seem expedient to develop the business interests of the Company in India and abroad. 2.To enter into any arrangement with the Government of India or with any State Government or with other authorities/ commissions, local bodies or public sector or private sector undertakings, Power Utilities, Financial Institutions, Banks, International Funding Agencies and obtain such charters, subsidies, loans, advances or other money, grants, contracts, rights, sanctions, privileges, licenses or concessions whatsoever (whether statutory or otherwise) which the Company may think it desirable to obtain for carrying its activities in furthering the interests of the Company or its members. 3.To enter into any agreement, contract or any arrangement for the implementation of the power generation, evacuation, transmission and distribution system and network with Power/ Transmission Utilities, State Electricity Boards, Vidhyut Boards, Transmission Companies, Generation Companies, Licensees, Statutory bodies,

Khavda IVA Power Transmission Limited

other organizations (whether in Private, Public or Joint Sector Undertaking) and bulk consumers of power etc.
4.To secure the payments of money, receivables on transmission and distribution of electricity and sale of fuel, as the case may be, to the State Electricity Boards, Vidyut Boards, Transmission Utilities, Generating Companies, Transmission Companies, Distribution Companies, State Governments, Licensees, statutory bodies, other organizations (whether in Private, Public or Joint Sector Undertaking) and bulk consumers of power etc. through Letter of Credits/ESCROW and other security documents.
5.To coordinate with the Central Transmission Utility of electricity generated by it under the relevant provisions of Electricity Act 2003 and any amendments thereto.
6.Subject to provisions of Sections 73, 74, 179, 180 & 186 and other applicable provisions of the Companies Act, 2013 and rules made thereunder and subject to other laws or directives, if any, of SEBI/RBI, to borrow money in Indian rupees or foreign currencies and obtain foreign lines of credits/ grants/ aids etc. or to receive money or deposits from public for the purpose of the Company's business in such manner and on such terms and with such rights, privileges and obligations as the Company may think fit. The Company may issue bonds/ debentures whether secured or unsecured; bills of exchange, promissory notes or other securities, mortgage or charge on all or any of the immovable and movable properties, present or future and all or any of the uncalled capital for the time being of the Company as the Company may deem fit and To repay, redeem or pay off any such securities or charges.
7.To lend money on property or on mortgage of immovable properties or against Bank

Khavda IVA Power Transmission Limited

guarantee and to make advances of money against future supply of goods and services on such terms as the Directors may consider necessary and to invest money of the Company in such manner as the Directors may think fit and to sell, transfer or to deal with the same.

8.To own, possess, acquire by purchase, lease or otherwise rights, title and interests in and to, exchange or hire real estate, equipment, Transmission lines, lands, buildings, apartments, plants, equipment, machinery, fuel blocks and hereditaments of any tenure or descriptions situated in India or abroad or any estate or interest therein and any right over or connected with land so situated and turn the same to account in any manner as may seem necessary or convenient for the purpose of business of the Company and to hold, improve, exploit, reorganize, manage, lease, sell, exchange or otherwise dispose of the whole or any part thereof.

9.Subject to applicable provisions of Companies Act, 2013, to subscribe for, underwrite, or otherwise acquire, hold, dispose of and deal with the shares, stocks, debentures or other securities and titles of indebtedness or the right to participate in profits or other similar documents issued by any Government authority, Corporation or body or by any company or body of persons and any option or right in respect thereof.

10.To create any depreciation fund, reserve fund, sinking fund, insurance fund, gratuity, provident fund or any other fund, for depreciation or for repairing, improving extendingor maintaining any of the properties of the Company or for any other purposes whatsoever conducive to the interests of the Company.

11.To acquire shares, stocks, debentures or securities of any company carrying on any

Khavda IVA Power Transmission Limited

business which this Company is entitled to carry on or acquisition of undertaking itself which may seem likely or calculated to promote or advance the interests of the Company and to sell or dispose of or transfer any such shares, stocks or securities and the acquired undertaking.

12.To enter into partnership or into any agreement for joint working, sharing or pooling profits, joint venture, amalgamation, union of interests, co-operation, reciprocal concessions or otherwise or amalgamate with any person or company carrying on or engaged in or about to carry on or engaged in any business or transaction in India or abroad which the Company is authorized to carry on or engage in any business undertaking having objects identical or similar to, as are being carried on by this Company.

13.To establish and maintain agencies, branch offices and local agencies, to procure business in any part of India and world and to take such steps as may be necessary to give the Company such rights and privileges in any part of the world as deemed proper in the interest of the Company.

14.To promote and undertake the formation of any institution or Company or subsidiary company or for any aforesaid objects intended to benefit the Company directly or indirectly and to coordinate, control and guide their activities.

15(a).To negotiate and enter into agreements and contracts with domestic and foreign companies, persons or other organizations, banks and financial institutions, in relation to the business of the Company including that of technical know-how, import, export, purchase or sale of plant, machinery, equipment, tools, accessories and consumables, financial assistance and for carrying out all or any of the objects of the Company.

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15(b). To negotiate and enter into agreements and contracts for execution of turnkey jobs, works, supplies and export of plant, machinery, tools and accessories etc.

16.Upon and for the purpose of any issue of shares, debentures or any other securities of the Company, to enter into agreement with intermediaries including brokers, managers of issue/commission agents and underwriters and to provide for the remuneration of such persons for their services by way of payment in cash or issue of shares, debentures or other securities of the Company or by granting options to take the same or in any other manner as permissible under the law.

17.To enter into contracts of indemnity and get guarantee and allocations for the business of the Company.

18.To make arrangements for training of all categories of employees and to employ or otherwise engage experts, advisors, consultants etc. in the interest of achieving the Company's objects.

19.To promote conservation and protection of electricity from theft, safety of life and to protect environments including air, land and water etc.

20.To pay and provide for the remuneration, amelioration and welfare of persons employed or formerly employed by the Company and their families providing for pension, allowances, bonuses, other payments or by creating for the purpose from time to time the Provident Fund, Gratuity and other Funds or Trusts. Further to undertake building or contributing to the building or houses, dwellings or chawls by grants of money, or by helping persons employed by the Company to effect or maintain insurance on their lives by contributing to the payment of premium or otherwise and by providing or subscribing or

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contributing towards educational institutions, recreation, hospitals and dispensaries, medical and other assistance as the Company may deem fit.

21.To ensure any rights, properties, undertakings, contracts, guarantees or obligations or profits of the Company of every nature and kind in any manner with any person, firm, association, institution or company.

22.To distribute among members of the Company dividend including bonus shares out of profits, accumulated profits or funds and resources of the Company in any manner permissible under law.

23.To institute, conduct, defend, compound or abandon any legal proceedings by or against the Company or its officers or otherwise concerning the affairs of the Company and also to compound and to allow time for payment or satisfaction of any debts or recovery due, claims or demands by or against the Company and to refer any claims or demands by or against the Company or any differences arising in execution of contracts to conciliation and arbitration and to observe, comply with and/or challenge any awards preliminary, interim or final made in any such arbitration.

24.To pay out of the funds of the Company all costs, charges, expenses and preliminary and incidental to the promotion, formation, establishment and registration of the Company or other expenses incurred in this regard.

25.Subject to provisions of Sections 181, 182 & 183 of Companies Act, 2013 to contribute money or otherwise assist to charitable, benevolent, religious, scientific national, defense, public or other institutions or objects or purposes.

26.To open an account or accounts with any individual,

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firm or company or with any bank bankers or shroofs and to pay into and withdraw money from such account or accounts.
27.To accept gifts, bequests, devises and donations from members and others and to make gifts to members and others of money, assets and properties of any kind.
28.To carry out all or any of the objects of the company and do all or any of the above things in any part of the world and either as principal, agent, contractor or trustee or otherwise and either alone or in conjunction with others.
29.To negotiate and/or enter into agreement and contract with individuals, companies, corporations, foreign or Indian, for obtaining or providing technical, financial or any other assistance for carrying on all or any of the objects of the Company and also for the purpose of activating, research, development of projects on the basis of know-how and/or financial participation and for technical collaboration, and to acquire or provide necessary formulate and patent rights for furthering the objects of the company.
30.To aid peculiarly or otherwise, any association, body or movement having for its object the solution, settlement or surmounting of industrial or labour problems or trouble or the promotion of industry or trade.
31.Subject to the provisions of Companies Act, 2013 or any amendment or re-enactment thereof in the event of winding up to distribute among the members in specie any property of the Company or any proceeds of sale on disposal of any property in accordance with the provisions of the Act.
32.To do all such other things as may be deemed incidental or conducive to the attainment of the above Objects or any of them and to carry on any business which may seem to the Company

capable of being conveniently carried in connection with any of the Company's Objects or calculated directly or indirectly to enhance the value of or render profitable any of the Company's property or rights.

33.To establish, provide, maintain and conduct or otherwise subsidies research laboratories and experimental workshops for scientific, technical or researches, experiments and to undertake and carry on directly or in collaboration with other agencies scientific and technical research experiments and tests of all kinds and to process, improve and invent new products and their techniques of manufacture and to promote, encourage, reward in every manner studies and research, scientific and technical investigations and inventions of any kind that may be considered likely to assist, encourage and promote rapid advances in technology, economies, import substitution or any business which the Company is authorized to carry on.

34.Subject to provisions of the Companies Act, 2013, to evolve scheme for restructuring or arrangement, to amalgamate or merge or to enter into partnership or into any consortium or arrangement for sharing of profits, union of interests, co-operation, joint venture with any Person or Persons, partnership firm/firms, or company or companies carrying on or engaged in any operation capable of being conducted so conveniently in cooperation with the business of the Company or to benefit the Company or to the activities for which the Company has been established.

35.To apply for purchase, or otherwise acquire any trade marks, patents, brevets, inventions, licenses, concessions and the like, conferring any exclusive or nonexclusive or

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limited rights to use, or any secret or other information as to any invention which may be capable of being used for any of the purposes of the Company, or the acquisition of which may benefit the Company and to use, exercise, develop or grant licenses in respect of or otherwise turn to account the property, rights or information so acquired.
36.To sell, dispose or hive off an undertaking of the Company or any part thereof for such consideration as the Company may think fit and in particular for shares, debentures or securities of any other association, corporation or company.
37.To sell, improve, manage, develop, exchange, loan, lease or let, under-lease, sub - let, mortgage, dispose of, deal with in any manner, turn to account or otherwise deal with any rights or property of the Company.

4 The liability of the member(s) is limited, and this liability is limited to the amount unpaid if any, on the shares held by them.

The liability of the member(s) is limited
The liability of the member(s) is Unlimited

5 Every member of the company undertakes to contribute:

(i) to the assets of the company in the event of its being wound up while he is a member, or within one year after he ceases to be a member, for payment of the debts and liabilities of the company or of such debts and liabilities as may have been contracted before he ceases to be a member; and

(ii) to the costs, charges and expenses of winding up (and for the adjustment of the rights of the contributories among themselves), such amount as may be required, not exceeding * [ ] rupees.

(iii) The share capital of the company is [500000] rupees, divided into

Equity Share	Shares of	10	Rupees each		50000

6

We, the several persons, whose names and address are subscribed, are desirous of being formed into a company in pursuance of this memorandum of association, and we respectively agree to take the number of shares in the capital of the company set against our respective names:

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I, whose name and address is given below, am desirous of forming a company in pursuance of this memorandum of association and agree to take all the shares in the capital of the company:

We, the several persons, whose names and addresses are subscribed, are desirous of being formed into a company in pursuance of this memorandum of association:

Subscriber Details					
S. No.	***Name, Address, Description and Occupation**	**DIN / PAN / Passport number**	**No. of shares taken**	**DSC**	**Dated**
1	ALOK SINGH S/O JAGDHARI SINGH NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O MF-23, ELDECO MANSIONZ, SECTOR-48, SOHNA ROAD, GURUGRAM - 122018, OCCUPATION-SERVICE	07498786	1 Equity,0 Preference	ALOK SINGH	22/09/2023
2	REC POWER DEVELOPMENT AND CONSULTANCY LIMITED, CORE-4, SCOPE COMPLEX, 7, LODHI ROAD, NEW DELHI-110003, THROUGH ITS CEO RAJESH KUMAR S/O SHRINIWAS GUPTA R/O L-187, NAG MANDIR KE PAS SHASTRI NAGAR, ASHOK VIHAR, DELHI-110052, OCCUPATION-SERVICES	06941428	49994 Equity,0 Preferenc	RAJESH KUMAR	22/09/2023
3	PUTHIYARKATTU SHIVARAMAN HARIHARAN S/ O SHRI PUTHIYARAKAT VELAYUDHAN SIVARAMAN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED FLAT NO.104, SADAR APARTMENT, MAYUR VIHAR EXTENTION, PHASE-1, PLOT NO.9, NEW DELHI-110091, OCCUPATION-SERVICE	08657652	1 Equity,0 Preference	P S HARIHARAN	22/09/2023
4	SAHAB NARAIN S/O HARI NARAIN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O A-1, FLAT NO 103, SOAMI NAGAR, MALVIYA NAGAR, DELHI-110017, OCCUPATION-SERVICE	03641879	1 Equity,0 Preference	SAHAB NARAIN	22/09/2023
5	THANGARAJAN BOSH S/O SHRI SITHAN THANGARAJAN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O APARTMENT NO S-2,	02772316	1 Equity,0 Preference	Thangarajan Sobesh Chandra Bosh	22/09/2023

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	MIDDLE PORTION 2-B, JANGPURA, MATHURA ROAD, NEW DELHI-110014, OCCUPATION-SERVICE				
6	MOHAN LAL KUMAWAT S/O SHRI RAMU RAM KUMAWAT NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED FLAT NO 142 TOWER -1 GC EMERALD, RAMPRASTHA GREENS VAISHALI SECTOR-7, GHAZIABAD-201010, UTTAR PRADESH, OCCUPATION-SERVICE	07682898	1 Equity,0 Preference	Mohan Lal Kumawat	22/09/2023
7	ARVIND KUMAR S/O NAND KISHOR SINGH NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O T4-8A, SAI VATIKA APARTMENT, SECTOR-63, FARIDABAD - 121004, OCCUPATION-SERVICE	AHHPK0531C	1 Equity,0 Preference	ARVIND KUMAR	22/09/2023
Total shares taken			50000 Equity,0 Preference		

Signed before me

Membership type of the witness *(ACA/FCA/ACS/FCS/ ACMA/FCMA)*	*Name of the witness	*Address, Description and Occupation	DIN / PAN / Passport number / Membership number	DSC	Dated
FCA	VINAY KUMAR	1803, TOWER-9, LA RESIDENTIA, TECH ZONE-4, GREATER NOIDA WEST-201306	402996	Vinay Kumar	22/09/2023

7 Shri / Smt _____ Of _____ resident of _____ aged _____ years shall be the nominee in the event of death of the sole member.

Khavda IVA Power Transmission Limited

Form No. INC-34

e-AOA (e-Articles of Association)

[Pursuant to Section 5 of the Companies Act, 2013 and rules made thereunder read with Schedule I]

Form language

(•) English ( ) Hindi

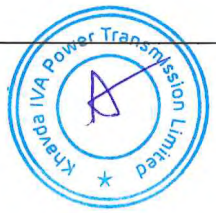
Refer instruction kit for filing the form.

*All fields marked in * are mandatory*

Table applicable to company as notified under schedule I of the Companies Act, 2013 *(F, G, H)*	F
Table F / G / H (basis on the selection of above-mentioned field) as notified under schedule I of the companies Act, 2013 is applicable to *(F – a company limited by shares G– a company limited by guarantee and having a share capital H – a company limited by guarantee and not having share capital)*	F - A COMPANY LIMITED BY SHARES
The name of the company is	KHAVDA IVA POWER TRANSMISSION LIMITED

Check if not applicable	Check if altered	Article No.	Description
			Interpretation
☐	☑	I	• (1) In theseregulations- (a) the Act means the Companies Act2013 (b)the seal means the common seal of the company. (2)Unless thecontext otherwise requires words or expressions contained in these regulationsshall bear the same meaning as in the Act or any statutory modification thereofin force at the date at which these regulations become binding on thecompany.(3)Public company means a company which-(a) is not a privatecompany(b) has a minimum paid-up share capital as maybe prescribed Providedthat a company which is a subsidiary of a company not being a private companyshall be deemed to be public company for the purposes of this Act even wheresuch subsidiary company continues to be a private company inits articles.
			Share Capital and Variation of rights
☐	☐	II 1	• Subject to the provisions of the Act and these Articles the shares in the capital of the company shall be under the control of the Directors who may issue allot or otherwise dispose of the same or any of them to such persons in such proportion and on such terms and conditions and either at a premium or at par and at such time as they may from time to time think fit.
			• Every person whose nameis entered as a member in the register

☐	☑	2	ofmembers shall be entitled toreceive within two months afterincorporation in case of subscribers tothe memorandum or afterallotment or within one month after the applicationfor theregistration of transfer or transmission or within such otherperiodas the conditions of issue shall be provided one certificate forallhis shares without payment of any charges or severalcertificateseach for one or more of his shares upon payment of twentyrupeesfor each certificate after the first. Every certificate shall beunder theseal and shall specify the shares to which it relates and theamountpaid - up thereon. In respect of any share or shares held jointlybyseveral persons the company shall not be bound to issue morethanone certificate and delivery of certificate for a share to one ofseveraljoint holders shall be sufficient delivery to all such holders.
☐	☐	3	• If any share certificate be worn out defaced mutilated or torn or if there be no further space on the back for endorsement of transfer then upon production and surrender thereof to the company a new certificate may be issued in lieu thereof and if any certificate is lost or destroyed then upon proof thereof to the satisfaction of the company and on execution of such indemnity as the company deem adequate a new certificate in lieu thereof shall be given. Every certificate under this Article shall be issued on payment of twenty rupees for each certificate. The provisions of Articles(2) and(3) shall mutatis mutandis apply to debentures of the company.
☐	☐	4	• Except as required by law no person shall be recognised by the company as holding any share upon any trust and the company shall not be bound by or be compelled in any way to recognise (even when having notice thereof) any equitable contingent future or partial interest in any share or any interest in any fractional part of a share or (except only as by these regulations or by law otherwise provided) any other rights in respect of any share except an absolute right to the entirety thereof in the registered holder.
☐	☐	5	• The company may exercise the powers of paying commissions conferred by sub-section (6) of section 40 provided that the rate per cent or the amount of the commission paid or agreed to be paid shall be disclosed in the manner required by that section and rules made thereunder. The rate or amount of the commission shall not exceed the rate or amount prescribed in rules made under sub-section (6) of section 40. The commission may be satisfied by the payment of cash or the allotment of fully or partly paid shares or partly in the one way and partly in the other.
☐	☐	6	• If at any time the share capital is divided into different classes of shares the rights attached to any class (unless otherwise provided by the terms of issue of the shares of that class) may subject to the provisions of section 48 and whether or not the company is being wound up be varied with the consent in writing of the holders of three-fourths of the issued shares of that class or with the sanction of a special resolution passed at a separate meeting of the holders of the shares of that class. To every such separate meeting the provisions of these regulations relating to general meetings shall mutatis mutandis apply but so that the necessary quorum shall be at least two persons holding at least one-third of the issued shares



		of the class in question.
	7	• The rights conferred upon the holders of the shares of any class issued with preferred or other rights shall not unless otherwise expressly provided by the terms of issue of the shares of that class be deemed to be varied by the creation or issue of further shares ranking pari passu therewith.
	8	• Subject to the provisions of section 55 any preference shares may with the sanction of an ordinary resolution be issued on the terms that they are to be redeemed on such terms and in such manner as the company before the issue of the shares may by special resolution determine.
		Lien
	9	• The company shall have a first and paramount lienon every share (not being a fully paid share) for all monies (whether presently payable or not) called or payable at a fixed time in respect of that share and on all shares (not being fully paid shares) standing registered in the name of a single person for all monies presently payable by him or his estate to the companyProvided that the Board of directors may at any time declare any share to be wholly or in part exempt from the provisions of this clause. The companys lien if any on a share shall extend to all dividends payable and bonuses declared from time to time in respect of such shares.
	10	• The company may sell in such manner as the Board thinks fit any shares on which the company has a lienProvided that no sale shall be madea unless a sum in respect of which the lien exists is presently payable or b until the expiration of fourteen days after a notice in writing stating and demanding payment of such part of the amount in respect of which the lien exists as is presently payable has been given to the registered holder for the time being of the share or the person entitled thereto by reason of his death or insolvency.
	11	• To give effect to any such sale the Board may authorise some person to transfer the shares sold to the purchaser thereof The purchaser shall be registered as the holder of the shares comprised in any such transfer. The purchaser shall not be bound to see to the application of the purchase money nor shall his title to the shares be affected by any irregularity or invalidity in the proceedings in reference to the sale.
	12	• The proceeds of the sale shall be received by the company and applied in payment of such part of the amount in respect of which the lien exists as is presently payable. The residue if any shall subject to a like lien for sums not presently payable as existed upon the shares before the sale be paid to the person entitled to the shares at the date of the sale.
		Calls on shares
		• The Board may from time to time make calls upon the members in respect of any monies unpaid on their shares (whether on account

	13	of the nominal value of the shares or by way of premium) and not by the conditions of allotment thereof made payable at fixed timesProvided that no call shall exceed one-fourth of the nominal value of the share or be payable at less than one month from the date fixed for the payment of the last preceding call. Each member shall subject to receiving at least fourteen days notice specifying the time or times and place of payment pay to the company at the time or times and place so specified the amount called on his shares. A call may be revoked or postponed at the discretion of the Board.
	14	• A call shall be deemed to have been made at the time when the resolution of the Board authorizing the call was passed and may be required to be paid by instalments.
	15	• The joint holders of a share shall be jointly and severally liable to pay all calls in respect thereof.
	16	• If a sum called in respect of a share is not paid before or on the day appointed for payment thereof the person from whom the sum is due shall pay interest thereon from the day appointed for payment thereof to the time of actual payment at ten per cent per annum or at such lower rate if any as the Board may determine. The Board shall be at liberty to waive payment of any such interest wholly or in part.
	17	• Any sum which by the terms of issue of a share becomes payable on allotment or at any fixed date whether on account of the nominal value of the share or by way of premium shall for the purposes of these regulations be deemed to be a call duly made and payable on the date on which by the terms of issue such sum becomes payable. In case of non-payment of such sum all the relevant provisions of these regulations as to payment of interest and expenses forfeiture or otherwise shall apply as if such sum had become payable by virtue of a call duly made and notified.
	18	• The Board - a. may if it thinks fit receive from any member willing to advance the same all or any part of the monies uncalled and unpaid upon any shares held by him andb. upon all or any of the monies so advanced may (until the same would but for such advance become presently payable) pay interest at such rate not exceeding unless the company in general meeting shall otherwise direct twelve per cent per annum as may be agreed upon between the Board and the member paying the sum in advance.
		Transfer of shares
	19	• The instrument of transfer of any share in the company shall be executed by or on behalf of both the transferor and transferee. The transferor shall be deemed to remain a holder of the share until the name of the transferee is entered in the register of members in respect thereof.
	20	• The Board may subject to the right of appeal conferred by section 58 decline to register the transfer of a share not being a fully paid share to a person of whom they do not approve or any transfer of

		shares on which the company has a lien.
	21	• The Board may decline to recognise any instrument of transfer unlessa. the instrument of transfer is in the form as prescribed in rules made under sub-section (1) of section 56b. the instrument of transfer is accompanied by the certificate of the shares to which it relates and such other evidence as the Board may reasonably require to show the right of the transferor to make the transfer andc. the instrument of transfer is in respect of only one class of shares.
	22	• On giving not less than seven days previous notice in accordance with section 91 and rules made thereunder the registration of transfers may be suspended at such times and for such periods as the Board may from time to time determineProvided that such registration shall not be suspended for more than thirty days at any one time or for more than forty-five days in the aggregate in any year.
		Transmission of shares
	23	• On the death of a member the survivor or survivors where the member was a joint holder and his nominee or nominees or legal representatives where he was a sole holder shall be the only persons recognised by the company as having any title to his interest in the shares Nothing in clause (i) shall release the estate of a deceased joint holder from any liability in respect of any share which had been jointly held by him with other persons.
	24	• Any person becoming entitled to a share in consequence of the death or insolvency of a member may upon such evidence being produced as may from time to time properly be required by the Board and subject as hereinafter provided elect either to be registered himself as holder of the share or to make such transfer of the share as the deceased or insolvent member could have made. The Board shall in either case have the same right to decline or suspend registration as it would have had if the deceased or insolvent member had transferred the share before his death or insolvency.
	25	• If the person so becoming entitled shall elect to be registered as holder of the share himself he shall deliver or send to the company a notice in writing signed by him stating that he so elects. If the person aforesaid shall elect to transfer the share he shall testify his election by executing a transfer of the share. All the limitations restrictions and provisions of these regulations relating to the right to transfer and the registration of transfers of shares shall be applicable to any such notice or transfer as aforesaid as if the death or insolvency of the member had not occurred and the notice or transfer were a transfer signed by that member.
		• A person becoming entitled to a share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holder of the share except that he shall not before being registered as a member in respect of the share be entitled in

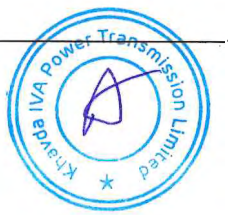
	26	respect of it to exercise any right conferred by membership in relation to meetings of the company Provided that the Board may at any time give notice requiring any such person to elect either to be registered himself or to transfer the share and if the notice is not complied with within ninety days the Board may thereafter withhold payment of all dividends bonuses or other monies payable in respect of the share until the requirements of the notice have been complied with.
☑ ☐	27	• In case of a One Person Company on the death of the sole member the person nominated by such member shall be the person recognised by the company as having title to all the shares of the member the nominee on becoming entitled to such shares in case of the members death shall be informed of such event by the Board of the company such nominee shall be entitled to the same dividends and other rights and liabilities to which such sole member of the company was entitled or liable on becoming member such nominee shall nominate any other person with the prior written consent of such person who shall in the event of the death of the member become the member of the company.
		Forfeiture of shares
☐ ☐	28	• If a member fails to pay any call or instalment of a call on the day appointed for payment thereof the Board may at any time thereafter during such time as any part of the call or instalment remains unpaid serve a notice on him requiring payment of so much of the call or instalment as is unpaid together with any interest which may have accrued.
☐ ☐	29	• The notice aforesaid shall name a further day (not being earlier than the expiry of fourteen days from the date of service of the notice) on or before which the payment required by the notice is to be made and state that in the event of non-payment on or before the day so named the shares in respect of which the call was made shall be liable to be forfeited.
☐ ☐	30	• If the requirements of any such notice as aforesaid are not complied with any share in respect of which the notice has been given may at any time thereafter before the payment required by the notice has been made be forfeited by a resolution of the Board to that effect.
☐ ☐	31	• A forfeited share may be sold or otherwise disposed of on such terms and in such manner as the Board thinks fit.At any time before a sale or disposal as aforesaid the Board may cancel the forfeiture on such terms as it thinks fit.
☐ ☐	32	• A person whose shares have been forfeited shall cease to be a member in respect of the forfeited shares but shall notwithstanding the forfeiture remain liable to pay to the company all monies which at the date of forfeiture were presently payable by him to the company in respect of the shares. The liability of such person shall cease if and when the company shall have received payment in full of all such monies in respect of the shares.
		• A duly verified declaration in writing that the declarant is a director

		33	the manager or the secretary of the company and that a share in the company has been duly forfeited on a date stated in the declaration shall be conclusive evidence of the facts therein stated as against all persons claiming to be entitled to the share The company may receive the consideration if any given for the share on any sale or disposal thereof and may execute a transfer of the share in favour of the person to whom the share is sold or disposed of The transferee shall thereupon be registered as the holder of the share and The transferee shall not be bound to see to the application of the purchase money if any nor shall his title to the share be affected by any irregularity or invalidity in the proceedings in reference to the forfeiture sale or disposal of the share.
		34	• The provisions of these regulations as to forfeiture shall apply in the case of non-payment of any sum which by the terms of issue of a share becomes payable at a fixed time whether on account of the nominal value of the share or by way of premium as if the same had been payable by virtue of a call duly made and notified.
			Alteration of capital
		35	• The company may from time to time by ordinary resolution increase the share capital by such sum to be divided into shares of such amount as may be specified in the resolution.
		36	• Subject to the provisions of section 61 the company may by ordinary resolution consolidate and divide all or any of its share capital into shares of larger amount than its existing shares convert all or any of its fully paid-up shares into stock and reconvert that stock into fully paid-up shares of any denomination sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the memorandum cancel any shares which at the date of the passing of the resolution have not been taken or agreed to be taken by any person.
		37	• Where shares are converted into stock the holders of stock may transfer the same or any part thereof in the same manner as and subject to the same regulations under which the shares from which the stock arose might before the conversion have been transferred or as near thereto as circumstances admit Provided that the Board may from time to time fix the minimum amount of stock transferable so however that such minimum shall not exceed the nominal amount of the shares from which the stock arose. the holders of stock shall according to the amount of stock held by them have the same rights privileges and advantages as regards dividends voting at meetings of the companyand other matters as if they held the shares from which the stock arose but no such privilege or advantage (except participation in the dividends and profits of the company and in the assets on winding up) shall be conferred by an amount of stock which would not if existing in shares have conferred that privilege or advantage. such of the regulations of the company as are applicable to paid-up shares shall apply to stock and the words share and shareholder in those regulations shall include stock and stock-holder respectively.

	38	• The company may by special resolution reduce in any manner and with and subject to any incident authorised and consent required by law it share capital any capital redemption reserve account or any share premium account.
		Capitalisation of profits
	39	• The company in general meeting may upon the recommendation of the Board resolve that it is desirable to capitalise any part of the amount for the time being standing to the credit of any of the companys reserve accounts or to the credit of the profit and loss accountor otherwise available for distribution and that such sum be accordingly set free for distribution in the manner specified in clause (ii) amongst the members who would have been entitled thereto if distributed by way of dividend and in the same proportions. The sum aforesaid shall not be paid in cash but shall be applied subject to the provision contained in clause (iii) either in or towards paying up any amounts for the time being unpaid on any shares held by such members respectively paying up in full unissued shares of the company to be allotted and distributed credited as fully paid-up to and amongst such members in the proportions aforesaid partly in the way specified in sub-clause (A) and partly in that specified in sub-clause (B) A securities premium account and a capital redemption reserve account may for the purposes of this regulation be applied in the paying up of unissued shares to be issued to members of the company as fully paid bonus shares The Board shall give effect to the resolution passed by the company in pursuance of this regulation.
	40	• Whenever such a resolution as aforesaid shall have been passed the Board shall make all appropriations and applications of the undivided profits resolved to be capitalised thereby and all allotments and issues of fully paid shares if any and generally do all acts and things required to give effect thereto. The Board shall have power to make such provisions by the issue of fractional certificates or by payment in cash or otherwise as it thinks fit for the case of shares becoming distributable in fractions and to authorise any person to enter on behalf of all the members entitled thereto into an agreement with the company providing for the allotment to them respectively credited as fully paid-up of any further shares to which they may be entitled upon such capitalisation or as the case may require for the payment by the company on their behalf by the application thereto of their respective proportions of profits resolved to be capitalised of the amount or any part of the amounts remaining unpaid on their existing shares Any agreement made under such authority shall be effective and binding on such members
		Buy-back of shares
	41	• Notwithstanding anything contained in these articles but subject to the provisions of sections 68 to 70 and any other applicable provision of the Act or any other law for the time being in force the company may purchase its own shares or other specified securities.

Khavda IVA Power Transmission Limited

			General meetings
☐	☐	42	• All general meetings other than annual general meeting shall be called extraordinary general meeting.
☐	☐	43	• The Board may whenever it thinks fit call an extraordinary general meeting. If at any time directors capable of acting who are sufficient in number to form a quorum are not within India any director or any two members of the company may call an extraordinary general meeting in the same manner as nearly as possible as that in which such a meeting may be called by the Board.
			Proceedings at general meetings
☐	☐	44	• No business shall be transacted at any general meeting unless a quorum of members is present at the time when the meeting proceeds to business. Save as otherwise provided herein the quorum for the general meetings shall be as provided in section 103.
☐	☐	45	• The chairperson if any of the Board shall preside as Chairperson at every general meeting of the company.
☐	☐	46	• If there is no such Chairperson or if he is not present within fifteen minutes after the time appointed for holding the meeting or is unwilling to act as chairperson of the meeting the directors present shall elect one of their members to be Chairperson of the meeting.
☐	☐	47	• If at any meeting no director is willing to act as Chairperson or if no director is present within fifteen minutes after the time appointed for holding the meeting the members present shall choose one of their members to be Chairperson of the meeting.
☑	☐	48	• In case of a One Person Company the resolution required to be passed at the general meetings of the company shall be deemed to have been passed if the resolution is agreed upon by the sole member and communicated to the company and entered in the minutes book maintained under section 118 such minutes book shall be signed and dated by the member the resolution shall become effective from the date of signing such minutes by the sole member.
			Adjournment of meeting
☐	☐	49	• The Chairperson may with the consent of any meeting at which a quorum is present and shall if so directed by the meeting adjourn the meeting from time to time and from place to place. No business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for thirty days or more notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid and as provided in section 103 of the Act it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an



		adjourned meeting.
		Voting rights
	50	• Subject to any rights or restrictions for the time being attached to any class or classes of shares on a show of hands every member present in person shall have one vote and on a poll the voting rights of members shall be in proportion to his share in the paid-up equity share capital of the company.
	51	• A member may exercise his vote at a meeting by electronic means in accordance with section 108 and shall vote only once.
	52	• In the case of joint holders the vote of the senior who tenders a vote whether in person or by proxy shall be accepted to the exclusion of the votes of the other joint holders.For this purpose seniority shall be determined by the order in which the names stand in the register of members.
	53	• A member of unsound mind or in respect of whom an order has been made by any court having jurisdiction in lunacy may vote whether on a show of hands or on a poll by his committee or other legal guardian and any such committee or guardian may on a poll vote by proxy.
	54	• Any business other than that upon which a poll has been demanded maybe proceeded with pending the taking of the poll.
	55	• No member shall be entitled to vote at any general meeting unless all calls or other sums presently payable by him in respect of shares in the company have been paid
	56	• No objection shall be raised to the qualification of any voter except at the meeting or adjourned meeting at which the vote objected to is given or tendered and every vote not disallowed at such meeting shall be valid for all purposes. Any such objection made in due time shall be referred to the Chairperson of the meeting whose decision shall be final and conclusive.
		Proxy
	57	• The instrument appointing a proxy and the power-of-attorney or other authority if any under which it is signed or a notarised copy of that power or authority shall be deposited at the registered office of the company not less than 48 hours before the time for holding the meeting or adjourned meeting at which the person named in the instrument proposes to vote or in the case of a poll not less than 24 hours before the time appointed for the taking of the poll and in default the instrument of proxy shall not be treated as valid.
	58	• An instrument appointing a proxy shall be in the form as prescribed in the rules made under section 105
		• A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity

		59	of the principal or the revocation of the proxy or of the authority under which the proxy was executed or the transfer of the shares in respect of which the proxy is givenProvided that no intimation in writing of such death insanity revocation or transfer shall have been received by the company at its office before the commencement of the meeting or adjourned meeting at which the proxy is used.
			Board of Directors
☐	☑	60	• Theday to day management of the business of the Company Shallbevested with the Board of Directors of the Company or Suchpersonsas may be authorized by the Board from time to time TheBoardmay exercise all such powers of the Company and do all suchactsdeeds and things as are not prohibited by the Act or any otherlawfor the time being in force or by the MemorandumofAssociation of the Company and without prejudice to theforegoingshall be responsible for all policy matters and thesupervisiondirection and control of the conduct of the businessaffairsand operations of the Company i The first Directors of theCompanyshall be 1. AJAYMATHUR 2. ALOK SINGH 3. MUKUL AGARWALii at every annual general meeting Onethird Of such of the directors for the time being as are liable toretireby rotation or if their number is neither three nor a multiple ofThreethen the number nearest to one third shall retire fromOfficeThe directors to retire by rotation at every annual generalMeetingshall be those who have been longest in office since theirLastappointment but as between persons who became directors onthesame day those who are to retire shall in default of and subjecttoany subject to any agreement among themselves bedateremined by lotiv At annual general meeting at which a directorretiresas afore said the company may fill up the vacancy byappointingthere tiring director or some other person there to TheBoardof Directors of the Company shall consist of not less than butnotmore than Directors The appointment of Directors including theChairmanManaging Director Whole time Director Part time Directorshallbe done in the General Meetings in accordance with theprovisionsof the Companies Act and Rules made there underandshall be eligible for appointment However till the Company is aGovernmentCompany REC Power Development and ConsultancyLimitedRECPDCL the holding company shall have the full powers torecommendnominate the name of any Directors to be appointedonthe Board of the Company Further RECPDCL shall also have thepowerto remove any director from office at any time in its absolutediscretionRECPDCL shall also have the right to fill any vacanciesinthe office of director caused by removal resignation death orotherwiseSubject to provisions of the Act the Company maybypassingthere solution in General Meeting increased crease themaximumnumber of Directors and may alter their qualificationFurtherthe Company may subject to the provisions of the Actremoveany Director before the expiration of his period of office andappointanother person in place of him The Board may appoint anypersonto act as alternate director for a Director during the later sabsencefor a period of not less than three months from India andsuchappointment shall have effect and such appointee whilst heholdsoffice as an alternate director shall be entitled to notice ofmeetingof the Board and to attend and vote there at accordinglybuthe shall not require any qualification and shall ipso facto vacateofficeif and when the absent Director returns to India

		Casualvacanciesamong Directors may be filled by the Board of Directors attheirmeeting and any person so appointed shall hold the office asperthe provision of section of the Act Subject to the provisions ofSectionand other applicable provisions if any of the Act the Boardshallhave power at any time and from time to time to appointaperson as an Additional Director but so that the total number ofDirectorsshall not at any time exceed the maximum number fixedbythese Articles The Additional Director so appointed shall retirefromOffice at next annual General Meeting but shall be eligible forelectionby the company at that meeting as a Director
	61	• The remuneration of the directors shall in so far as it consists of a monthly payment be deemed to accrue from day-to-day. In addition to the remuneration payable to them in pursuance of the Act the directors may be paid all travelling hotel and other expenses properly incurred by them in attending and returning from meetings of the Board of Directors or any committee thereof or general meetings of the company or in connection with the business of the company.
	62	• The Board may pay all expenses incurred in getting up and registering the company.
	63	• The company may exercise the powers conferred on it by section 88 with regard to the keeping of a foreign register and the Board may (subject to the provisions of that section) make and vary such regulations as it may think fit respecting the keeping of any such register.
	64	• All cheques promissory notes drafts hundis bills of exchange and other negotiable instruments and all receipts for monies paid to the company shall be signed drawn accepted endorsed or otherwise executed as the case may be by such person and in such manner as the Board shall from time to time by resolution determine
	65	• Every director present at any meeting of the Board or of a committee thereof shall sign his name in a book to be kept for that purpose.
	66	• Subject to the provisions of section 149 the Board shall have power at any time and from time to time to appoint a person as an additional director provided the number of the directors and additional directors together shall not at any time exceed the maximum strength fixed for the Board by the articles. Such person shall hold office only up to the date of the next annual general meeting of the company but shall be eligible for appointment by the company as a director at that meeting subject to the provisions of the Act.
		Proceedings of the Board
	67	• The Board of Directors may meet for the conduct of business adjourn and otherwise regulate its meetings as it thinks fit. A director may and the manager or secretary on the requisition of a director shall at any time summon a meeting of the Board.

☐ ☐	68	• Save as otherwise expressly provided in the Act questions arising at any meeting of the Board shall be decided by a majority of votes. In case of an equality of votes the Chairperson of the Board if any shall have a second or casting vote.
☐ ☐	69	• The continuing directors may act notwithstanding any vacancy in the Board but if and so long as their number is reduced below the quorum fixed by the Act for a meeting of the Board the continuing directors or director may act for the purpose of increasing the number of directors to that fixed for the quorum or of summoning a general meeting of the company but for no other purpose.
☐ ☐	70	• The Board may elect a Chairperson of its meetings and determine the period for which he is to hold office. If no such Chairperson is elected or if at any meeting the Chairperson is not present within five minutes after the time appointed for holding the meeting the directors present may choose one of their number to be Chairperson of the meeting.
☐ ☐	71	• The Board may subject to the provisions of the Act delegate any of its powers to committees consisting of such member or members of its body as it thinks fit. Any committee so formed shall in the exercise of the powers so delegated conform to any regulations that may be imposed on it by the Board.
☐ ☐	72	• A committee may elect a Chairperson of its meetings. If no such Chairperson is elected or if at any meeting the Chairperson is not present within five minutes after the time appointed for holding the meeting the memberspresent may choose one of their members to be Chairperson of the meeting.
☐ ☐	73	• A committee may meet and adjourn as it thinks fit. Questions arising at any meeting of a committee shall be determined by a majority of votes of the members present and in case of an equality of votes the Chairperson shall have a second or casting vote.
☐ ☐	74	• All acts done in any meeting of the Board or of a committee thereof or by any person acting as a director shall notwithstanding that it may be afterwards discovered that there was some defect in the appointment of any one or more of such directors or of any person acting as aforesaid or that they or any of them were disqualified be as valid as if every such director or such person had been duly appointed and was qualified to be a director.
☐ ☐	75	• Save as otherwise expressly provided in the Act a resolution in writing signed by all the members of the Board or of a committee thereof for the time being entitled to receive notice of a meeting of the Board or committee shall be valid and effective as if it had been passed at a meeting of the Board or committee duly convened and held.
☑ ☐	76	• In case of a One Person Company where the company is having only one director all the businesses to be transacted at the meeting of the Board shall be entered into minutes book maintained under section 118 such minutes book shall be signed and dated by the director the resolution shall become effective from the date of

		signing such minutes by the director.
		Chief Executive Officer, Manager, Company Secretary or Chief Financial Officer
	77	• Subject to the provisions of the Act A chief executive officer manager company secretary or chief financial officer may be appointed by the Board for such term at such remuneration and upon such conditions as it may think fit and any chief executive officer manager company secretary or chief financial officer so appointed may be removed by means of a resolution of the Board A director may be appointed as chief executive officer manager company secretary or chief financial officer
	78	• A provision of the Act or these regulations requiring or authorising a thing to be done by or to a director and chief executive officer manager company secretary or chief financial officer shall not be satisfied by its being done by or to the same person acting both as director and as or in place of chief executive officer manager company secretary or chief financial officer.
		The Seal
	79	• The Board shall provide for the safe custody of the seal. The seal of the company shall not be affixed to any instrument except by the authority of a resolution of the Board or of a committee of the Board authorised by it in that behalf and except in the presence of at least two directors and of the secretary or such other person as the Board may appoint for the purpose and those two directors and the secretary or other person aforesaid shall sign every instrument to which the seal of the company is so affixed in their presence.
		Dividends and Reserve
	80	• The company in general meeting may declare dividends but no dividend shall exceed the amount recommended by the Board.
	81	• Subject to the provisions of section 123 the Board may from time to time pay to the members such interim dividends as appear to it to be justified by the profits of the company.
	82	• The Board may before recommending any dividend set aside out of the profits of the company such sums as it thinks fit as a reserve or reserves which shall at the discretion of the Board be applicable for any purpose to which the profits of the company may be properly applied including provision for meeting contingencies or for equalizing dividends and pending such application may at the like discretion either be employed in the business of the company or be invested in such investments (other than shares of the company) as the Board may from time to time thinks fit. The Board may also carry forward any profits which it may consider necessary not to divide without setting them aside as a reserve
		• Subject to the rights of persons if any entitled to shares with special rights as to dividends all dividends shall be declared and paid according to the amounts paid or credited as paid on the shares in

	83	respect whereof the dividend is paid but if and so long as nothing is paid upon any of the shares in the company dividends may be declared and paid according to the amounts of the shares. No amount paid or credited as paid on a share in advance of calls shall be treated for the purposes of this regulation as paid on the share. All dividends shall be apportioned and paid proportionately to the amounts paid or credited as paid on the shares during any portion or portions of the period in respect of which the dividend is paid but if any share is issued on terms providing that it shall rank for dividend as from a particular date such share shall rank for dividend accordingly.
⌜ ⌜	84	• The Board may deduct from any dividend payable to any member all sums of money if any presently payable by him to the company on account of calls or otherwise in relation to the shares of the company.
⌜ ⌜	85	• Any dividend interest or other monies payable in cash in respect of shares may be paid by cheque or warrant sent through the post directed to the registered address of the holder or in the case of joint holders to the registered address of that one of the joint holders who is first named on the register of members or to such person and to such address as the holder or joint holders may in writing direct. Every such cheque or warrant shall be made payable to the order of the person to whom it is sent.
⌜ ⌜	86	• Any one of two or more joint holders of a share may give effective receipts for any dividends bonuses or other monies payable in respect of such share.
⌜ ⌜	87	• Notice of any dividend that may have been declared shall be given to the persons entitled to share therein in the manner mentioned in the Act.
⌜ ⌜	88	• No dividend shall bear interest against the company.
		Accounts
⌜ ⌜	89	• The Board shall from time to time determine whether and to what extent and at what times and places and under what conditions or regulations the accounts and books of the company or any of them shall be open to the inspection of members not being directors. No member (not being a director) shall have any right of inspecting any account or book or document of the company except as conferred by law or authorised by the Board or by the company in general meeting.
		Winding up
⌜ ⌜		• Subject to the provisions of Chapter XX of the Act and rules made thereunder If the company shall be wound up the liquidator may with the sanction of a special resolution of the company and any other sanction required by the Act divide amongst the members in specie or kind the whole or any part of the assets of the company whether they shall consist of property of the same kind or not. For the purpose aforesaid the liquidator may set such value as he

		90	deems fair upon any property to be divided as aforesaid and may determine how such division shall be carried out as between the members or different classes of members. The liquidator may with the like sanction vest the whole or any part of such assets in trustees upon such trusts for the benefit of the contributories if he considers necessary but so that no member shall be compelled to accept any shares or other securities whereon there is any liability.
			Indemnity
☐	☐	91	• Every officer of the company shall be indemnified out of the assets of the company against any liability incurred by him in defending any proceedings whether civil or criminal in which judgment is given in his favour or in which he is acquitted or in which relief is granted to him by the court or the Tribunal.
			Others
☐	☐	92	•

Subscriber Details

S. No.	Subscriber Details				
	***Name, Address, Description and Occupation**	**DIN / PAN / Passport number**	***Place**	**DSC**	**Dated**
1	REC POWER DEVELOPMENT AND CONSULTANCY LIMITED, CORE-4, SCOPE COMPLEX, 7, LODHI ROAD, NEW DELHI-110003, THROUGH ITS CEO RAJESH KUMAR S/O SHRINIWAS GUPTA R/O L-187, NAG MANDIR KE PAS SHASTRI NAGAR, ASHOK VIHAR, DELHI-110052, OCCUPATION-SERVICES	06941428	NEW DELHI	RAJESH KUMAR	22/09/2023
2	PUTHIYARKATTU SHIVARAMAN HARIHARAN S/ O SHRI PUTHIYARAKAT VELAYUDHAN SIVARAMAN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED FLAT NO.104, SADAR APARTMENT, MAYUR VIHAR EXTENTION, PHASE-1, PLOT NO.9, NEW DELHI-110091, OCCUPATION-SERVICE	08657652	NEW DELHI	P S HARIHARAN	22/09/2023
3	SAHAB NARAIN S/O HARI NARAIN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O A-1, FLAT NO 103, SOAMI NAGAR, MALVIYA NAGAR, DELHI-110017, OCCUPATION-SERVICE	03641879	NEW DELHI	SAHAB NARAIN	22/09/2023

Khavda IVA Power Transmission Limited

4	THANGARAJAN BOSH S/O SHRI SITHAN THANGARAJAN NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O APARTMENT NO S-2, MIDDLE PORTION 2-B, JANGPURA, MATHURA ROAD, NEW DELHI-110014, OCCUPATION-SERVICE	02772316	NEW DELHI	Thangarajan Subash Chandra Bosh	22/09/2023
5	MOHAN LAL KUMAWAT S/O SHRI RAMU RAM KUMAWAT NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED FLAT NO 142 TOWER -1 GC EMERALD, RAMPRASTHA GREENS VAISHALI SECTOR-7, GHAZIABAD-201010, UTTAR PRADESH, OCCUPATION-SERVICE	07682898	NEW DELHI	Mohan Lal Kumawat	22/09/2023
6	ARVIND KUMAR S/O NAND KISHOR SINGH NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O T4-8A, SAI VATIKA APARTMENT, SECTOR-63, FARIDABAD - 121004, OCCUPATION-SERVICE	AHHPK0531C	NEW DELHI	ARVIND KUMAR	22/09/2023
7	ALOK SINGH S/O JAGDHARI SINGH NOMINEE OF REC POWER DEVELOPMENT AND CONSULTANCY LIMITED R/O MF-23, ELDECO MANSIONZ, SECTOR-48, SOHNA ROAD, GURUGRAM - 122018, OCCUPATION-SERVICE	07498786	NEW DELHI	ALOK SINGH	22/09/2023

Signed before me

Name Prefix *(ACA/FCA/ACS/ FCS/ACMA/ FCMA)*	***Name of the witness**	***Address, Description and Occupation**	***DIN / PAN / Passport number / Membership**		**DSC**	**Dated**
FCA	VINAY KUMAR	1803, TOWER-9, LA RESIDENTIA, TECH ZONE-4, GREATER NOIDA WEST-201306	402996	NEW DELHI	Vinay Kumar DIN#402996	22/09/2023

Khavda IVA Power Transmission Limited

Annexure 8

adani
Energy Solutions

CERTIFIED TRUE COPY OF THE RESOLUTION PASSED IN THE MEETING OF THE BOARD OF DIRECTORS OF KHAVDA IVA POWER TRANSMISSION LIMITED ("THE COMPANY") HELD ON FRIDAY, 30TH AUGUST, 2024

TO ADD AUTHORITIES TO MAKE APPLICATION BEFORE CENTRAL ELECTRICITY REGULATORY COMMISSION

"**RESOLVED THAT** Mr. M. R. Krishna Rao, Mr. Vivek Gautam, Mr. Molay Kumar Maitra, Mr. Tanmay Vyas, Mr. Praveen Tamak, Mr. Narendra Ojha, Mr. Bhavesh Kundalia, Mr. Prashant Kumar, Mr. Naresh Desai, Mr. Afak Pothiawala, Mr. Matulya Shah and Mr. Rajesh Sirigirisetty (hereinafter referred to as Authorised Signatories) be and are hereby severally Authorised to sign and submit petitions, affidavits, agreements, declarations, undertakings, deeds, Bills, submission of details of Bank Accounts or change of Bank Accounts and other documents in connection therewith or incidental thereto before Central Electricity Regulatory Commission (CERC), Appellate Tribunal for Electricity (APTEL), Power Grid Corporation of India Limited (PGCIL), Central Transmission Utility of India Ltd (CTUIL), Power System Operation Corporation Limited (POSOCO), Regional Power Committees and Regional Load Dispatch Centres and other regulatory authorities for and on behalf of the Company.

RESOLVED FURTHER THAT Authorised Signatories be and are hereby severally authorised (a) to issue notices, affidavit and other documents, communications to Long Term Transmission Customers and other Parties / agencies, including Central Transmission Utility of India Limited. and WRLDC/SRLDC (b) to file Petition, Affidavit, Notices and other documents before Regulatory Commission or other Electricity body, Appellate Tribunal for Electricity and Supreme Court for issues arising out of Transmission Service Agreement and Bulk Power Transmission Agreement, (c) to engage, appoint or remove any pleaders or advocates, and sign vakalatnamas, power of attorney for such engagement or appointment and (d) to file appeal and defend the interest of the Company."

Certified True Copy
For Khavda IVA Power Transmission Limited

Prashant Soni
Director
DIN 09761923

Khavda IVA Power Transmission Limited

KHAVDA IVA POWER TRANSMISSION LIMITED
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