

ROLLING PLAN

INTER STATE TRANSMISSION SYSTEM

2030-31

Power Supply Scenarios
Load Generation Balances
ISTS Schemes Additions
System Studies and Analysis
Network Plans
Cross-border Interconnections



Central Transmission Utility Of India Limited

March 2026

ROLLING PLAN 2030-31
INTER-STATE TRANSMISSION SYSTEM (ISTS)
(REPORT)

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Table of Contents

EXECUTIVE SUMMARY	13
CHAPTER 1: BACKGROUND AND OBJECTIVE	19
CHAPTER 2: POWER SUPPLY SCENARIO.....	21
2.1 POWER SUPPLY SCENARIO AS OF JAN'26	23
2.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31.....	23
CHAPTER 3: ALL INDIA.....	26
3.1 LOAD GENERATION BALANCE.....	27
3.2 STUDY RESULTS AND ANALYSIS	35
3.2.1 <i>Power Flow Analysis</i>	36
3.2.2 <i>Contingency Analysis</i>	41
3.2.3 <i>Short Circuit Analysis</i>	44
3.3 ISTS EXPANSION UP TO 2030-31.....	46
3.2.1 <i>Summary of ISTS network</i>	46
3.2.2 <i>Inter-Regional (IR) Capacity</i>	50
CHAPTER 4: NORTHERN REGION	51
4.1 POWER SUPPLY SCENARIO AS ON JAN'26	51
4.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31.....	51
4.3 LOAD GENERATION BALANCE FOR 2030-31 TIMEFRAME.....	53
4.4 ISTS NETWORK EXPANSION SCHEMES EVOLVED FROM MARCH'25 TO FEB'26.....	54
4.4.1 <i>Rajasthan</i>	55
4.4.2 <i>Jammu and Kashmir</i>	78
4.4.3 <i>Himachal Pradesh</i>	79
4.4.4 <i>Delhi</i>	80
4.4.5 <i>Uttar Pradesh</i>	83
4.5 SYSTEM STUDY RESULTS AND ANALYSIS.....	84
4.5.1 <i>Short Circuit Analysis</i>	85
4.5.2 <i>Contingency Analysis</i>	88
4.5.3 <i>Voltage Analysis</i>	90
CHAPTER 5: WESTERN REGION	91
5.1 POWER SUPPLY SCENARIO AS ON JAN'26	91
5.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31.....	92
5.3 LOAD GENERATION BALANCE FOR 2030-31 TIMEFRAME	93
5.4 ISTS NETWORK SCHEMES EVOLVED FROM FEB'25 TO JAN'26	94
5.4.1 <i>Gujarat</i>	96
5.4.2 <i>Maharashtra</i>	109
5.4.3 <i>Madhya Pradesh</i>	120
5.4.4 <i>Chhattisgarh</i>	122
5.5 SYSTEM STUDY RESULTS AND ANALYSIS.....	124
5.6 POWER FLOW STUDIES	125

5.7 VOLTAGE ANALYSIS	125
5.8 CONTINGENCY ANALYSIS.....	125
5.9 SHORT CIRCUIT ANALYSIS	128
CHAPTER 6: SOUTHERN REGION	132
6.1 POWER SUPPLY SCENARIO AS ON JAN'26	132
6.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31	133
6.3 LOAD GENERATION BALANCE FOR 2030-31 TIMEFRAME.....	134
6.4 ISTS NETWORK EXPANSION SCHEMES EVOLVED FROM FEB'25 TO JAN'26.....	135
6.4.1 Karnataka:	137
6.4.2 Andhra Pradesh.....	143
6.4.3 Kerala	158
6.4.4 Tamil Nadu	159
6.4.5 Telangana	163
6.4.6 Puducherry	165
6.5 SYSTEM STUDIES RESULTS AND ANALYSIS	166
6.5.1 Voltage Analysis	166
6.5.2 Power Flow Analysis.....	166
6.5.3 Contingency Analysis	168
6.5.4 Short Circuit Analysis.....	170
CHAPTER 7: EASTERN REGION.....	174
7.1 POWER SUPPLY SCENARIO AS ON JAN'26	174
7.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31	175
7.3 LOAD GENERATION BALANCE FOR 2030-31 TIMEFRAME	176
7.4 ISTS NETWORK EXPANSION SCHEMES EVOLVED FROM FEB/MAR'25 TO JAN'26.....	177
7.4.1 Jharkhand, West Bengal, Odisha & Chhattisgarh	178
7.4.2 West Bengal & Bihar.....	185
7.4.3 West Bengal.....	188
7.4.4 Odisha.....	192
7.4.5 Bihar	194
7.5 SYSTEM STUDY RESULTS AND ANALYSIS.....	198
7.5.1 Power Flow Analysis.....	198
7.5.2 Contingency Analysis	198
7.5.3 Short Circuit Analysis.....	200
CHAPTER 8: NORTH EASTERN REGION.....	202
8.1 POWER SUPPLY SCENARIO AS ON JAN'26	202
8.2 ENVISAGED POWER SUPPLY SCENARIO BY 2030-31	202
8.3 LOAD GENERATION BALANCE FOR 2030-31 TIMEFRAME	203
8.4 ISTS NETWORK EXPANSION SCHEMES EVOLVED FROM FEB/MAR'25 TO JAN'26	204
8.4.1 Arunachal Pradesh.....	205
8.4.2 Arunachal Pradesh & Assam	207
8.5 SYSTEM STUDY RESULTS AND ANALYSIS.....	209

8.5.1 Power Flow Analysis	209
8.5.2 Contingency Analysis	211
8.5.3 Short Circuit Analysis.....	212
CHAPTER 9: CROSS-BORDER INTERCONNECTION.....	214
9.1 INDIA-BANGLADESH	214
9.2 INDIA-BHUTAN.....	214
9.3 INDIA-MYANMAR.....	214
9.4 INDIA-NEPAL.....	215
CHAPTER 10: CONCLUSION.....	216

List of Figures

Figure 2-1: Installed Capacity & Demand trend in GW	21
Figure 2-2: Growth of RE resources	21
Figure 2-3: ckm growth in past decade	22
Figure 2-4: MVA growth in past decade	22
Figure 2-5: Installed Capacity and Peak Demand as of Jan'26	23
Figure 2-6: Projected Installed Capacity & Peak Demand by FY 2030-31	24
Figure 3-1: India's map showing various generations in different parts of the country	26
Figure 3-2: Summer (June'25) Load Curve	28
Figure 3-3: Monsoon (Aug'25) Load Curve	29
Figure 3-4: Winter (Feb'25) Load Curve	29
Figure 3-5: Demand factors considered for 2030-31 Timeframe	30
Figure 3-6: LGB for Monsoon (Aug'2030)	32
Figure 3-7: LGB for Summer (June'2030)	33
Figure 3-8: LGB for Winter (Feb'2031)	34
Figure 3-9: Summary of Regional Surplus-Deficit & IR flows in MW	36
Figure 3-10: 765kV Tr. line flow > 70% of thermal limit under base case	38
Figure 3-11: 400kV Tr. line flow > 70% of thermal limit under base case	39
Figure 3-12: 765/400kV ICT Loading under base case	39
Figure 3-13: 400/220kV ICT loading under Base Case	40
Figure 3-14: Pie-chart showing number of 765 KV & 400 KV buses	41
Figure 3-15: 765kV Tr. line loadings > 3000MW under N-1 Contingency	41
Figure 3-16: 765kV line loading > 3500 MW under N-1 Contingency	42
Figure 3-17: 400kV line loading > 90% of thermal limit under N-1 Contingency	42
Figure 3-18: 400kV line loading > thermal limit under N-1 Contingency	43
Figure 3-19: 765/400kV ICT loading $\geq$ 90% of MVA rating under N-1 Contingency	43
Figure 3-20: 765/400kV ICT loading $\geq$ 100% of MVA rating under N-1 Contingency	43
Figure 3-21: 400/220kV ICT loadings $\geq$ 90% of MVA rating under N-1 Contingency	44
Figure 3-22: 400/220kV ICT loadings $\geq$ 100% of MVA rating under N-1 Contingency	44
Figure 3-23: Pie-chart showing short circuit level at 765 kV & 400 kV buses on pan India basis	45
Figure 3-24: Violation of fault level at ISTS/STU/Gen buses at 765 kV & 400 kV levels	45
Figure 3-25: Cumulative ckm and MVA of ISTS Network by 2030-31	49
Figure 3-26: IR Capacity	50
Figure 3-27: Inter-Regional Transmission Capacity by 2030-31	50
Figure 4-1: Schematic of 765/400/220 kV Bikaner-IV PS	56
Figure 4-2: Schematic of 400/220 kV Sikar (PG) S/s	57
Figure 4-3: Schematic of 765/400/220 kV Fatehgarh-IV (PG) PS	58
Figure 4-4: Schematic of 400/220 kV Jaipur South (PG) S/s	60
Figure 4-5: Schematic of 400/220 kV Neemrana (PG) S/s	61
Figure 4-6: Schematic of 765/400/220 kV Bikaner-IV PS	62
Figure 4-7: Schematic of 765/400/220 kV Barmer-I PS	63
Figure 4-8: Schematic of 765/400/220 kV Bhadla-III PS	64

Figure 4-9: Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-5 :6 GW) [Barmer Complex] Barmer-II: 6GW (Solar)	65
Figure 4-10: Transmission scheme for evacuation of power as part of Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bikaner Complex) (Bikaner V:6GW)	68
Figure 4-11: Schematic of 765/400/220kV Ramgarh PS	76
Figure 4-12: Schematic of 765/400kV Kanpur S/s.....	76
Figure 4-13: Schematic of 765/400/220kV Bhadla-III PS	76
Figure 4-14: Schematic of 400/220 kV New Wanpoh (PG) S/s.....	79
Figure 4-15: Schematic of 400/220kV Nallagarh S/s	80
Figure 4-16: Schematic of 400/220 kV Maharani Bagh (PG) S/s	81
Figure 4-17: Schematic of 765/400 kV Jhatikara (PG) S/s.....	82
Figure 4-18: Schematic of 400/220 kV Lucknow (PG) S/s.....	84
Figure 5-1: Schematic of 400/220 kV Pirana (PG) S/s.....	97
Figure 5-2: Scheme for providing connectivity to M/s Sarjan Realities Pvt Ltd. (1100MW) at KPS3 (400kV Sec-I)	108
Figure 5-3: 1 no. of 220 kV line bay for interconnection of M/s KINURJA S1 PRIVATE LIMITED (65MW) BESS project at 400/220kV Banaskantha (Radhanesda) PS (GIS).....	109
Figure 5-4: Augmentation of Transformation capacity at Navi Mumbai (GIS) (PG) S/s in Maharashtra by 400/220 kV, 1x500 MVA (3rd)	110
Figure 5-5: Network Expansion Scheme for drawal of power at South Kalamb S/s	113
Figure 5-6: ISTS Works associated with uprating of existing conductors by High performance conductors by MSETCL in Talegaon area and upgradation of bay equipment at Navi Mumbai S/s	119
Figure 5-7: Western Region Bay Scheme-I (WRBS-I)	121
Figure 5-8: Augmentation of Transformation capacity at Raipur (PG) S/s in Chhattisgarh by 400/220 kV, 1x500 MVA (4th ICT)	122
Figure 6-1: Augmentation of transformation capacity by 1x500 MVA (3rd), 400/220kV ICT at Narendra(existing) 400/220kV GIS S/s in Karnataka.....	138
Figure 6-2: Transmission system strengthening for integration of additional RE potential at Davanagere (0.25 GW) and Bellary (2.75 GW)	140
Figure 6-3 Transmission system strengthening at Tumkur-II for integration of additional RE potential(2.7GW)	141
Figure 6-4: Implementation of 1 no. of 220kV line bay at Tumkur (Pavagada) PS for providing Connectivity to M/s TEQ Green Power XX Pvt. Ltd.....	142
Figure 6-5: Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (6th) at N P Kunta PS in Andhra Pradesh.....	144
Figure 6-6: Transmission System for Integration of Krishnagiri REZ Phase-I.....	148
Figure 6-7: Transmission System for integration of Anantapur-III REZ Phase-I.....	151
Figure 6-8: Transmission System for Integration of Kadapa-II REZ	153
Figure 6-9: Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh.....	156
Figure 6-10: Reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor.....	158

<i>Figure 6-11: Augmentation of 1x500 MVA, 400/220kV ICT (3rd) at Thrissur VSC HVDC Station in Kerala</i>	<i>159</i>
Figure 6-12: Augmentation of Transformation capacity by 1x500 MVA, 400/230 kV ICT (4 th) at Kalivanthapattu S/s in Tamil Nadu	160
Figure 7-1: Schematic of WR-ER Inter-Regional Network Expansion Scheme	184
Figure 7-2: Schematic of ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor..	188
Figure 7-3: ERES-48: Jeerat – Rajarhat – Subhasgram reconductoring.....	191
Figure 7-4: Schematic of ERBS-III: Maithon bays for Dendua	192
Figure 7-5: Schematic of ERES-49: Jeypore Bus Reactor	193
Figure 7-6: ERES-50: Spare Reactor at Sundargarh.....	194
Figure 7-7: Schematic of ERES-52: Purnea 220/132kV 4 th ICT	195
Figure 7-8: Pusauli HVDC Upgradation.....	197
Figure 8-1: Schematic of NERES-31	206
Figure 8-2: Schematic of NERGS-III	209

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List of Tables

Table 2-1: Installed Capacity and Peak Demand in GW till Jan'26	23
Table 2-2: Projected Installed Capacity & Peak Demand by FY 2030-31	24
Table 2-3: Peak demand & Generation IC till Jan'26 and 2030-31	25
Table 3-1: Regional Surplus/Deficit summary in MW	35
Table 3-2: IR flow summary in MW	36
Table 3-3: Maximum violation of fault level at ISTS/STU/GEN buses.....	45
Table 3-4: Transmission Line addition by 2030-31 (in ckm)	46
Table 3-5: Transformation Capacity addition by 2030-31 (in MVA)	46
Table 3-6: Broad estimated cost of schemes to be added by 2030-31 (in ₹ Cr.).....	46
Table 3-7: Under Construction Transmission Line (in ckm).....	47
Table 3-8: Under Construction Transformation Capacity (in MVA)	47
Table 3-9: Broad estimated cost (in ₹ Cr.) (Under Construction)	47
Table 3-10: Under planning/approval/bidding Transmission Lines (in ckm)	48
Table 3-11: Under planning/approval/bidding Transformation Capacity (in MVA)	48
Table 3-12: Broad estimated cost (in ₹ Cr.) (under planning/approval/bidding)	48
Table 3-13: Rolling Plan Summary	49
Table 4-1: NR Installed Capacity and Peak Demand as on Jan'26	51
Table 4-2: NR Installed Capacity and peak demand (2030-31)	52
Table 4-3: Increase in Peak Demand of Various States of NR.....	52
Table 4-4: Northern Region Generation Dispatch and Demand Factors	53
Table 4-5: IR Flows & Surplus/Deficit (Northern Region)	53
Table 4-6: ISTS Buses Exceeding Designed Fault Level in NR	85
Table 4-7: STU/Generators Buses Exceeding Designed Fault Level in NR	86
Table 4-8: Major transmission lines having critical loading in NR.....	88
Table 4-9: Major transformers having critical loading in NR	89
Table 4-10: Over Voltage buses in NR.....	90
Table 5-1: WR Installed Capacity and Demand met till Jan'26	91
Table 5-2: WR Installed Capacity and Peak Demand (2030-31)	92
Table 5-3: Increase in Peak Demand of Various States of WR.....	92
Table 5-4: Western Region Generation Dispatch and Demand Factors	93
Table 5-5: IR flows & Surplus/Deficit of WR.....	93
Table 5-6: Details of the schemes evolved in WR.....	94
Table 5-7: 765kV ISTS Transmission lines not meeting N-1 Criteria in WR.....	125
Table 5-8: 400kV Transmission lines not meeting N-1 Criteria in WR.....	126
Table 5-9: ISTS ICTs not meeting N-1 Criteria in WR.....	127
Table 5-10: Generator & STU ICTs not meeting N-1 Criteria in WR	128
Table 5-11: ISTS Buses Exceeding Designed Fault Level in WR	129
Table 5-12: STU Buses Exceeding Designed Fault Level in WR.....	130
Table 5-13: Generator Buses Exceeding Designed Fault Level in WR.....	130
Table 6-1: SR Installed Capacity and Peak Demand as on Jan'26	132
Table 6-2: SR Installed Capacity and peak demand (2030-31)	133
Table 6-3: Increase in Peak Demand of Various States of SR	134

Table 6-4: Southern Region Generation Dispatch and Demand Factors	134
Table 6-5: IR Flows & Surplus/Deficit (Southern Region)	135
Table 6-6: Details of the schemes evolved in SR	135
Table 6-7: Over Voltage buses in SR	166
Table 6-8: Transmission Lines Loading in the Base Cases	166
Table 6-9: Transformers Loading in the Base Cases	167
Table 6-10: ISTS Transmission lines not meeting N-1 Criteria in SR	168
Table 6-11: STU Transmission lines not meeting N-1 Criteria in SR	168
Table 6-12: ISTS ICTs not meeting N-1 Criteria in SR	169
Table 6-13: STU ICTs not meeting N-1 Criteria in SR	170
Table 6-14: ISTS Buses Exceeding Designed Fault Level in SR	171
Table 6-15: STU Buses Exceeding Designed Fault Level in SR	172
Table 7-1: ER Installed Capacity and Peak Demand as on Jan'26	174
Table 7-2: ER Installed Capacity and Peak Demand (2030-31)	175
Table 7-3: Increase in Peak Demand of Various States of ER	175
Table 7-4: Eastern Region Generation Dispatch and Demand Factors	176
Table 7-5: Import / Export of Eastern Region	176
Table 7-6: Approved Transmission Schemes in this Rolling Plan	177
Table 7-7: Scope of works of WR-ER Inter-Regional Network Expansion Scheme (Part-A)	180
Table 7-8: Scope of works of ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor	185
Table 7-9: Scope of works of ERES-48: Jeerat – Rajarhat – Subhasgram reconductoring..	189
Table 7-10: Scope of works of ERBS-III: Maithon bays for Dendua line	191
Table 7-11: Scope of works of ERES-49: Jeypore Bus Reactor	193
Table 7-12: Scope of works of ERES-50: Spare Reactor at Sundargarh	194
Table 7-13: Scope of works of ERES-52: Purnea 220/132kV 4 th ICT	195
Table 7-14: Pusauli HVDC Upgradation	197
Table 7-15 Transformer Loading in the Base Cases	198
Table 7-16: ISTS Transmission lines not meeting N-1 Criteria in ER	199
Table 7-17: STU Transmission lines not meeting N-1 Criteria in ER	199
Table 7-18: ISTS ICTs not meeting N-1 Criteria in ER	199
Table 7-19: STU ICTs not meeting N-1 Criteria in ER	200
Table 7-20: ISTS Buses Exceeding Designed Fault Level in ER	201
Table 8-1: NER Installed Capacity and Peak Demand as on Jan'26	202
Table 8-2: NER Installed Capacity and peak demand (2030-31)	203
Table 8-3: Increase in Peak Demand of Various States of NER	203
Table 8-4: North Eastern Region Generation Dispatch and Demand Factors	204
Table 8-5: Import / Export of North Eastern Region	204
Table 8-6: Approved Transmission Schemes in this Rolling Plan	205
Table 8-7: Scope of works of NERES-31	206
Table 8-8: Scope of works of NERGS-III Siang Basin	207
Table 8-9 Transmission Lines Loading in the Base Cases	209
Table 8-10 List of substations with Voltage greater than 1.1pu in North Eastern Region ...	210

Table 8-11: Transmission lines not meeting N-1 Criteria in NER	211
Table 9-1: Cross-border power transfer capacity by 2030-31	215

Executive Summary

India's power sector constitutes a foundational pillar of economic growth and national development, enabling industrial expansion and advancing overall living standards. With a vast and evolving energy landscape, the sector is undergoing rapid transformation through policy reforms, technological upgrades, and increased focus on clean energy. As demand rises, India is intensifying efforts to provide universal access to clean, reliable, and cost-effective electricity, in a sustainable way.

The Union Budget 2026-27 further strengthened India's clean energy pathway by significantly increasing allocations for nuclear research and development and setting record public sector capital expenditure targets with a strong focus on energy infrastructure. With the launch of the Nuclear Energy Mission for Viksit Bharat¹, India seeks to expand its power generation capacity to meet growing electricity demand while advancing environmental objectives. Additionally, at COP30 (Conference of Parties) in November 2025, India emphasized equitable and people-centric energy transitions, reaffirmed its stance on Common but Differentiated Responsibilities, and joined global discussions on phasing down unabated fossil fuels while ensuring energy security and affordability. These provisions and commitments collectively reinforce India's trajectory toward a resilient, sustainable, and inclusive energy future. India in collaboration with International Solar Alliance (ISA) also highlighted the role of solar energy in ensuring energy security and climate resilience for developing nations at Energy Transition for the Global South, which called for a 20x increase in solar adoption by 2050.

A strong push toward clean energy underpins India's response to rapidly increasing electricity demand that is in line with its revised Nationally Determined Contributions (NDC) targets, India aims to reduce emissions intensity by 45% and ensure 50% of installed power capacity comes from non-fossil sources by 2030. India has achieved a landmark in its energy transition journey by crossing 50% of its installed electricity capacity from non-fossil fuel sources in October 2025, five years ahead of the target set under its NDCs to the Paris Agreement. These efforts are part of India's broader vision to become energy independent by 2047 and achieve net-zero emissions by 2070. Meanwhile, India's data centre ecosystem is expanding rapidly to support the nation's growing digital infrastructure needs. With an existing capacity of roughly 1,280 MW, the sector is on track to increase four to five times by 2030².

Central Electricity Authority (CEA) released a report in March 2026 titled "Transmission Plan for Integration of over 900GW Non-Fossil Fuel Capacity by 2035-36" to accommodate large-scale renewable energy integration and support national energy transition ambitions. This report outlines the transmission needs for RE integration up to 2036, including energy storage requirements for the grid and the need for new HVDC systems. In line with global best practices in transmission planning, the CEA has also updated and published the "Manual on Transmission Planning Criteria, 2023 and subsequent amendment" which provides a

¹ PIB-Nuclear Power in Union Budget 2025-26: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2099244>

² PIB- Bridging Digital Divide, Empowering Bharat in the Digital Age: <https://www.pib.gov.in/PressNoteDetails.aspx?id=157722&NoteId=157722&ModuleId=3&reg=20&lang=1>

comprehensive framework for planning and implementing transmission systems. Further, regulations for Solar and Non-solar hours-based connectivity have been introduced for effective and optimal utilisation of Transmission Infrastructure and Energy Resources. Complementing these initiatives, the National Electricity Plan (NEP) 2023–2032 outlines the long-term roadmap for India’s generation and transmission expansion. The NEP details the transmission system additions required between 2023 and 2032 to meet a projected peak electricity demand by 2032, including expansion of central and state networks at 220 kV and above, enhanced inter-regional transfer capability, and significant HVDC corridors to evacuate power from RE-rich states to major load centres.³

Achieving India’s energy transition goals through the large-scale integration of renewable energy generation into the National Grid requires a reliable and secure transmission system capable of delivering power efficiently to major load centres, while maintaining grid stability, resilience, and sustainability. This calls for ongoing development of a resilient National Grid, featuring high-capacity AC and HVDC systems, as well as advanced FACTS devices & Synchronous Condensers for controlling power system parameters. India’s Renewable energy potential, Green Hydrogen strategy, and climate action plan are key elements in attaining these energy transition goals. The country’s approach to integrate RE into its National Grid could serve as a model for other nations in developing modern electricity grids. Furthermore, there is a focus on the development and integration of energy storage solutions such as Battery Energy Storage System (BESS) and Pumped Storage Plant (PSP) into the National Grid to provide balancing of power during periods of low or no renewable energy generation and to enhance the utilization of transmission systems linked to RE projects.

A well-planned and robust transmission system plays a central role in connecting generation assets to demand centres within the National Grid, thereby facilitating efficient project integration and ensuring reliable, secure, and cost-effective power supply. Given India’s generation landscape, renewable energy (RE) resources, particularly solar and wind, are geographically concentrated in specific high-potential zones such as Rajasthan, Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh. The abundant RE potential are often located far from major load centres. As a result, robust and strategically designed transmission corridors are essential to evacuate power from these RE-rich areas to demand-heavy regions, maintain grid stability, and support large-scale renewable integration in line with national clean-energy goals.

CTUIL carries out Inter-State Transmission System (ISTS) planning for the evacuation of power from generation pockets to load centres, including the augmentation and reconfiguration of existing systems, in consultation with stakeholders. These schemes are deliberated in monthly consultation meetings and subsequently taken up with the NCT, RPCs, and the Ministry of Power for recommendations and approvals, following which they are implemented through either the Tariff-Based Competitive Bidding (TBCB) or Regulated Tariff Mechanism (RTM) route by the Transmission Service Providers (TSPs). Planning of cross-border

³ PIB- Initiatives Regarding National Electricity Plan:
<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2114440&reg=3&lang=2>

interconnections with neighbouring countries is also undertaken in consultation with the respective country counterparts. CTU also draws up plan for ISTS for up to next five years on rolling basis every year in consultation with various stakeholders, which provides visibility of new transmission system for next five years. CTU publishes ISTS Rolling Plan Reports twice a year (an Interim Report in September and a Final Report in March). This ISTS Rolling Plan report evaluates the transmission system needs for the 2030-31 period.

Chapter-1 gives Background and Objectives of the ISTS Rolling Plan Report.

In **Chapter-2**, Installed capacity(IC) & Peak demand met till Jan'26 and projected installed capacity & demand by FY 2030-31 have been presented. All India installed capacity is expected to increase from about 520 GW (including about 212 GW RE + 51 GW Hydro) to about 1012 GW (including about 566 GW RE + 69 GW Hydro + 64 GW ESS) by FY 2030-31. All India Peak demand is 250 GW till Jan'26 and is expected to increase to about 351 GW by FY 2030-31. Furthermore, an additional demand of about 40 GW has been considered as direct drawl from ISTS bulk consumers by 2030-31 (including Green Hydrogen/Ammonia projects of about 24 GW and industrial demand/data centres of about 16 GW).

FY 2025-26(IC)	FY 2030-31(IC)
Thermal – 248 GW	Thermal – 301GW
Nuclear – 9 GW	Nuclear – 12 GW
Hydro – 51GW	Hydro – 69 GW
RE – 212 GW	RE – 566GW
	ESS – 64 GW
Total – 520 GW	Total – 1012 GW
Demand: 250 GW	Demand: 391 GW

In order to integrate the envisaged generation capacity, predominantly RE, and to meet the projected demand, comprehensive studies have been performed for planning and development of Inter-State Transmission System (ISTS). To perform the studies, Load Generation Balance (LGB) has been prepared considering the diurnal and seasonal load and generation variations across the country. Accordingly, nine number of load-generation scenarios have been identified corresponding to Monsoon, Summer, and Winter seasons along with three points on daily load curve for each season viz. Solar max, Peak demand, and Night Off-peak demand.

Detailed overview of the load generation balance preparation, challenges observed while balancing the same and study results have been brought out in **Chapter-3**. While preparing the Load Generation Balance (LGB) of 2030-31 timeframe, initially for evening peak, on-bar thermal plants is dispatched upto 90% capacity and balance from other generation resources to meet the demand. Further, in the solar max scenario, it is observed that there is an absolute surplus power available in the grid due to availability of peak solar generation and inadequate demand during the noon. This surplus is also on account of keeping the same number of thermal plants on-bar operating at a technical minimum (40%) in Solar max scenario which are required to meet evening peak demand. Even after considering the flexibility exhibited by gas and hydro generation between the evening peak and solar max scenario, the absolute surplus generation of about **55 GW, 95 GW and 48 GW** was observed in solar max scenarios

of monsoon, summer and winter scenarios respectively, which either to be stored in ESS/PSP or to be backed down.

This surplus is observed even after considering 351GW demand growth as per 20th EPS report and green Hydrogen loads (about 24 GW) & bulk consumer loads/data centres (16GW) and drawl of power in Solar hours by ESS/PSPs (about 64 GW). The extent of surplus shall further increase in case of delay in materialization of envisaged Green Hydrogen demand, Data Centre loads, PSP & BESS projects as well as consideration of thermal dispatch (minimum technical level) to 55% level instead of 40%.

For instance, Transmission system for Khavda Phase-VI & VII of about 11.5GW was identified & discussed in NCT, wherein, it was decided to take up implementation of the scheme after visibility of Green Hydrogen/Green Ammonia loads to the tune of 9-10 GW in Mundra and Kandla areas of Gujarat.

In Rajasthan till date, RE Potential of 223 GW (under ISTS) has been declared by the MNRE. Out of this, 205 GW (about 90%) potential is concentrated primarily in four (4) districts of Rajasthan, namely, Jaisalmer, Jodhpur, Barmer and Bikaner. Against this potential, connectivity applications for about 150 GW have been received till Feb'26. Out of which, about 80 GW RE of transmission system (EHVAC:68 GW and HVDC:12 GW) has already been identified to connect all the available major load centres in neighbouring States. Similar, against total declared RE potential of 96.2 GW under ISTS in Gujarat, Transmission System for evacuation of about 65 GW renewable capacity is existing or under various stages of implementation (under construction / bidding) in Gujarat to cater to various RE connectivity applications received in the state. Out of this, major capacity of about 54.7 GW transmission capacity has been planned in northern area of Gujarat i.e. Kutchh/Banaskantha (about 30.5 GW in Khavda area and 24.2 GW in Bhuj/Banaskantha and Lakadia areas).

Since all the nearby load centres were already covered, no nearby load centres are available for evacuation of additional RE power from Rajasthan and Gujarat. Due to this, transmission system for evacuation of about 70 GW RE & 35GW RE could not be finalized in Rajasthan & Gujarat, respectively.

Applications for Battery Energy Storage System (BESS) of more than 100GW has been received for ISTS connectivity at various locations of the country, which are currently under process. To absorb the excess generation during the daytime, the additional BESS of 95GW in the vicinity of RE generators, proportion to their generation despatch, has been considered in the LGBR as an interim measure to avoid the curtailment in solar max scenarios. Detailed modelling of BESS across the scenarios shall be carried out after issuance of grant in consultation with stakeholders.

Detailed system studies have been carried out for nine scenarios using PSS/E software after considering all the planned and under construction system. Due to intermittent and variable nature of RE and with high penetration of RE in the Indian Grid, loading pattern on some of the lines is expected to change diurnally as well as seasonally. Further, transmission lines

associated with thermal and hydro generations would be lightly loaded during high RE scenario. In the Chapter 3, study results have been presented for All India grid (above 400kV) including critically loaded lines & transformers under normal & N-1 condition, voltage violations, short circuit violations etc. Network expansion schemes have been planned and are being planned to take care of the observed system violations. Accordingly, year on year progressive addition of transmission system in ISTS network in terms of new transmission lines (ckm) and substations (MVA) upto 2030-31, and corresponding broad estimated cost has also been brought out in the report. Cumulatively by 2030-31, transmission schemes comprising of 77,228 ckm of transmission lines and transformation capacity of 6,97,747 MVA at estimated cost of ₹5,41,481 Cr. are expected to be added in the grid in the next five years.

The Inter-Regional (IR) transmission capacity is expected to grow from present level of 1,20,340 MW to about 1,67,740 MW by 2030-31. Due to diurnal and seasonal variation in RE generation, power flow on all IR corridors is observed in both directions. Power of the order of 26GW is flowing from SR→WR in Monsoon evening peak scenario and WR → NR in Summer evening peak scenarios. New high-capacity links in WR-SR, WR-NR, and WR-ER corridors are under various stages of planning or approval to cater to increased inter-regional power transfer are also covered in this chapter.

Chapter-4 to Chapter-8 is dedicated to detailed study results pertaining to each of the five regions, i.e., one Chapter for each Region. State wise LGBs have been prepared for all the regional grids for nine load-generation scenarios and outcomes of study results have been brought out. Critically loaded lines & transformers under normal & N-1 condition, voltage violations, short circuit violations etc. have been reported in both ISTS and STU network and possible reasons/cause for the same are also brought out in respective regional chapters. Further, detailed scope of works and implementation timeframe along with schematic of new ISTS schemes including schemes for RE evacuation for mitigating some of these violations have been brought out in these Chapters. For remaining violations, additional expansion schemes in ISTS are being planned after detailed studies, and accordingly the details of the same would be brought out in the subsequent Rolling Plan reports.

India being centrally placed in South Asia is playing a vital role in establishment of interconnections among South Asian countries to establish a large South Asian electricity grid. In **Chapter-9**, details on existing, under-construction and under discussion cross-border interconnections between India and neighbouring countries have been brought out.

The summary of the ISTS expansion schemes which were under various stages of planning/implementation, way forward etc. are included in **Chapter-10**.

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Chapter 1: Background and Objective

India's power sector has witnessed a remarkable transformation over the years. As one of the world's fastest-growing economies, the country faces a continuously rising demand for energy, driving persistent efforts to expand generation capacity. India achieved a significant milestone—fulfilling one of its core COP26 'Panchamrit'⁴ commitments by reaching more than 50% of installed electric power capacity from non-fossil fuel sources as of October 2025, five years ahead of the 2030 target⁵. This milestone reflects nation's strong policy support, technological innovation, and strategic investments, positioning India as a global leader in clean energy. Committed to reliable, affordable, and sustainable power, the nation continues to strengthen its energy infrastructure through reforms and inclusive access to support long-term economic growth.

India is dedicated to build its sustainable energy future, powered by a rich mix of clean energy sources—from solar and wind to hydro and bioenergy. It's a testament to India's strategic vision and relentless pursuit of green growth. With 52.3% of its total installed generation capacity i.e., 272 GW out of 520 GW sourced from non-fossil fuel as on Jan'26⁶ out of which Solar and Wind capacity is about 27% (141 GW) and 11% (55 GW) respectively and balance 14.3% from other non-fossil sources, India is well-positioned to emerge as a global leader in renewable energy, contributing to environmental sustainability and energy security. India envisaged to enhance the non-Fossil fuel based installed generation capacity to about 647 GW out of 1012 GW total installed capacity by 2031. 64% of the total installed capacity shall be from Non-Fossil Fuel based energy resource comprising of 41% (411 GW) Solar, 15% (152 GW) Wind and balance 8% from other resources such as Hydro, Nuclear etc. The several ongoing efforts of India reflect a holistic approach to building a greener economy, ensuring that India not only meets its energy needs but also addresses the pressing challenges of climate change and resource conservation.

The integration of large-scale renewable energy (RE) generation capacity into the grid faces several challenges, including low-capacity utilization factor (CUF), intermittency of supply, variability and the need for round-the-clock availability, all of which requires advanced technological solutions in storage, flexible generation, and grid modernization to ensure stability and reliability. To address these challenges, mitigating measures such as deployment of Battery Energy Storage System, Pumped Storage Plants, Dynamic Reactive Compensation such as STATCOM and Synchronous Condensers (for Grid Inertia support and Dynamic Stability, as required) is being taken up in consultation with stakeholders.

To address the daily and seasonal fluctuations in electricity generation and demand, it is essential to prepare a Load Generation Balance (LGB) based on sound assumptions. Building

⁴ <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/oct/doc20251029680001.pdf>

⁵ PIB- India achieved Historic milestone in power sector: Surpasses 500 GW and Renewable Generation Exceeds 50% of demand:

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2183866&reg=3&lang=2#:~:text=India's%20power%20sector%20has%20achieved,500%20GW%2C%20reaching%20500.89%20GW.>

⁶ CEA-Installed Capacity Report: <https://cea.nic.in/wp-content/uploads/installed/2026/01/Website.pdf>

on this foundation, the planning process has incorporated optimal dispatch scenarios that account for resource availability and peak demand requirements. Through extensive stakeholder consultation, this has resulted in the development of an optimised ISTS network plan designed to ensure reliable and efficient power transmission across the country.

In line with the Electricity (Transmission System Planning, Development and Recovery of Inter-state Transmission charges) Rules, 2021 notified by Ministry of Power, CTU draws up a plan for Inter-State Transmission System (ISTS) for up to next five years on Rolling basis every year, involving two cycles i.e., from April to September and October to March (Interim Report in Sept and Final Report in March of every financial year), identifying specific transmission projects which are required to be taken up along with their implementation timelines. In this direction, rolling plan reports have been published from 2021 providing the visibility of ISTS system requirements for next five years and the same is available on CTU website. This ISTS Rolling Plan report is being brought out wherein transmission system requirement in ISTS has been identified upto 2030-31 timeframe. For preparation of this rolling plan, details of nodal officers and status of data received from various stakeholders are attached at **Annex-1.1**.

This report covers the present v/s future (FY 2030-31) Power Supply Scenario, Load Generation Balance (and its challenges), year wise ISTS planned and under implementation across the country to integrate the RE generation and to cater the growing demand along with the estimated (approx.) cost of the proposed ISTS Network Schemes. Detailed studies were carried out on the planned Transmission system including load flow, contingency analysis, voltage profile (reactive power management), short circuit studies etc on all India basis for 2030-31 timeframe for nine perspective load-generation scenarios covering three seasons and three different load condition (Solar max, Evening peak and Night off peak) of each season.

Chapter 2: Power Supply Scenario

India's peak demand met is about 250 GW till Jan'26⁷ and as per 20th EPS it is projected to be about 351 GW by 2030-31. Furthermore, an additional demand of about 40 GW is envisaged to be added as direct drawl from ISTS bulk consumers including Green Hydrogen/ Green Ammonia projects of about 24 GW and industrial demand/data centres of 16 GW by 2030-31 which will further boost the projected peak demand.

As on Jan'26, non-fossil fuel based installed generation capacity is around 272 GW (52.3% of total installed capacity) and is planned to increase to around 647 GW (68% of total installed capacity, excluding ESS) by 2030-31 at a CAGR of about 19%. Further, about 64 GW of Energy Storage is also planned to integrate in the grid by 2030-31. Installed capacity vis a vis peak demand trend from FY 2014-15 to Jan'26 is depicted in **Figure 2-1** and growth of RE resources is shown in **Figure 2-2**.

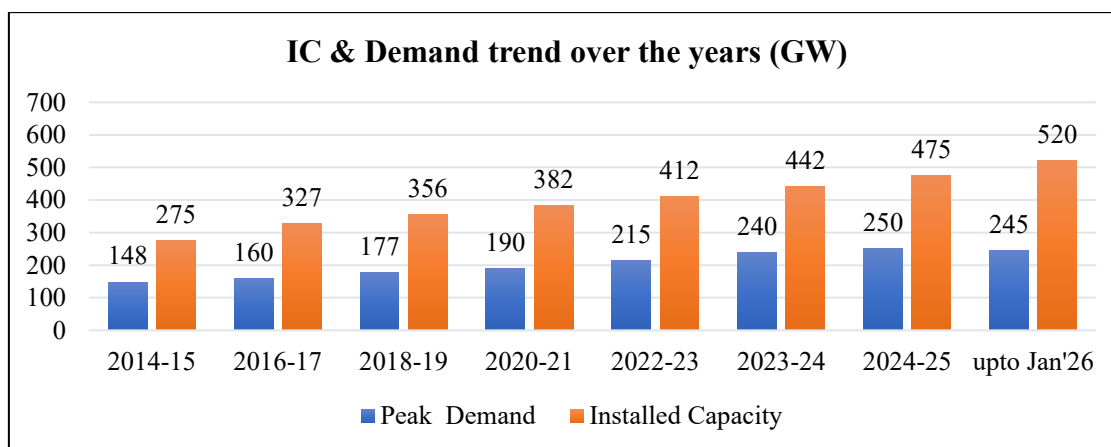


Figure 2-1: Installed Capacity & Demand trend in GW

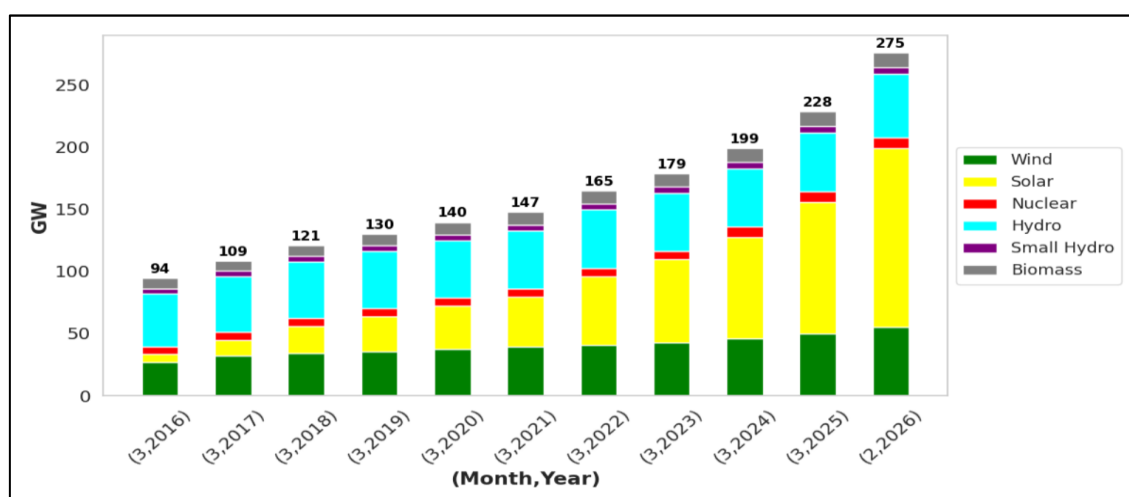


Figure 2-2: Growth of RE resources

⁷ CEA-Power Supply Report: https://cea.nic.in/wp-content/uploads/power_supply/2026/01/Peak_January_26_Revised.pdf

Transmission system has played a vital role in catering the country's demand from various generating plants located across the country. Electricity transmission system in India is generally categorised as Inter-State Transmission System (ISTS) and Intra-State Transmission System (Intra-STs) Transmission system. CTU is the nodal agency for planning and co-ordinating the ISTS system. Growth of ISTS from 2015 till Jan'26 in terms of ckm and MVA is depicted in **Figure 2-3** and **Figure 2-4**.

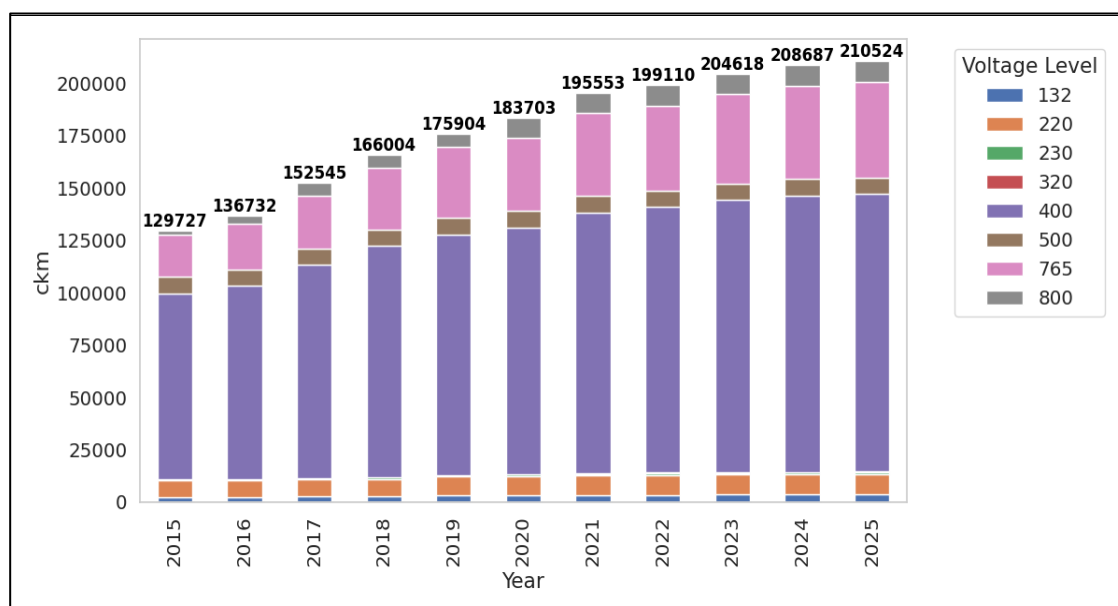


Figure 2-3: ckm growth in past decade

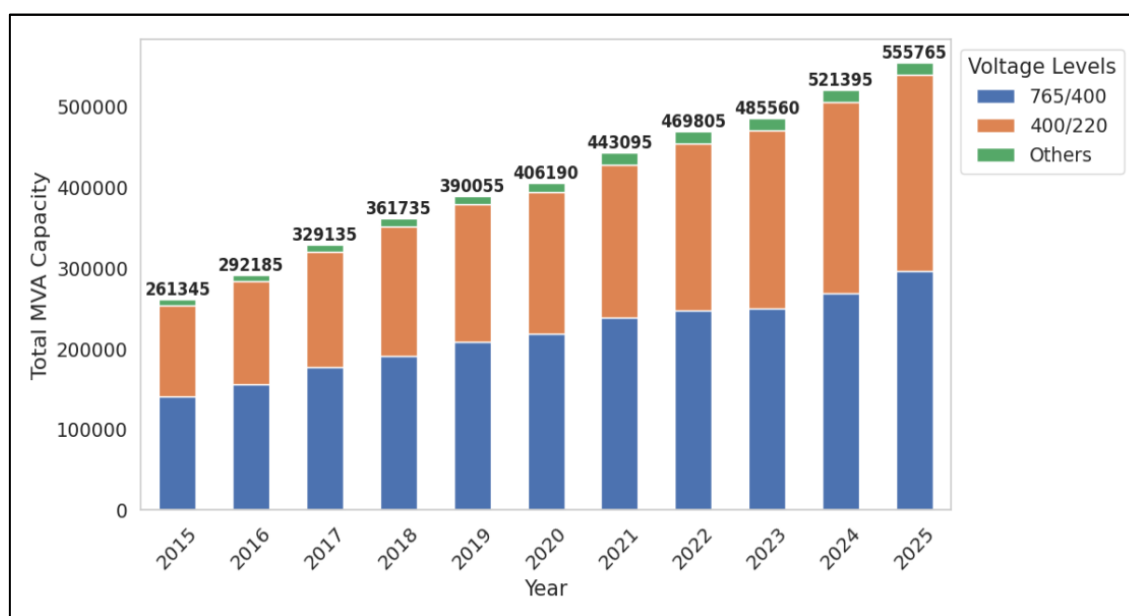


Figure 2-4: MVA growth in past decade

2.1 Power Supply Scenario as of Jan'26

Total installed capacity as on Jan'26 is about 520 GW⁸ and the All-India peak demand met is of about 250 GW. Region-wise breakup of source wise installed capacity and peak demand met till Jan'26 is given in the **Table 2-1**. Fossil and non-fossil fuel-based generation installed capacity accounts for 47.7% and 52.3% of total installed generation capacity respectively, which is portrayed in **Figure 2-5**.

Table 2-1: Installed Capacity and Peak Demand in GW till Jan'26

(All Fig in GW)

Region	Fossil			Non-Fossil				Grand Total	Peak Demand*
	Thermal	Gas/Diesel	Total	Nuclear	Hydro	RES	Total		
NR	63.4	5.7	69.1	2.2	22.5	58.3	83.1	152.1	90.75
WR	75.0	9.4	84.4	3.2	7.9	82.4	93.6	178.0	80.59
SR	58.0	3.3	61.3	3.3	13.7	67.6	84.6	145.9	66.99
ER	31.2	0.0	31.2	0.0	4.9	2.7	7.6	38.7	31.40
NER	0.8	1.7	2.5	0.0	2.2	0.9	3.1	5.6	3.91
All India	228.30	20.12	248.42	8.78	51.16	211.98	271.93	520.35	249.85*

*with diversity

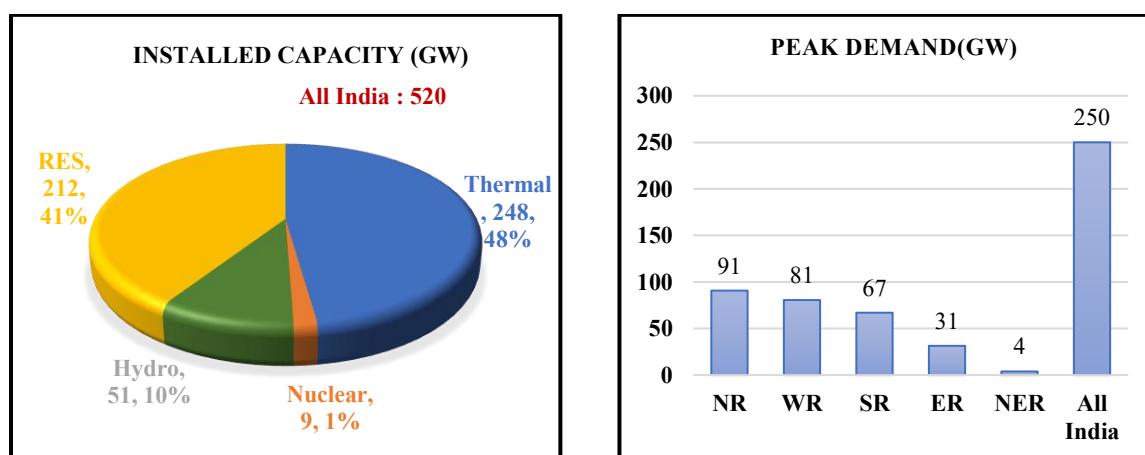


Figure 2-5: Installed Capacity and Peak Demand as of Jan'26

2.2 Envisaged Power Supply Scenario by 2030-31

All India peak demand for 2030-31 is envisaged to be about 351 GW as per 20th Electric Power Survey (EPS) report of CEA. Furthermore, an additional demand of about 40 GW has been considered as direct drawl by ISTS bulk consumers including Green Hydrogen/Ammonia projects of about 24 GW and industrial demand/data centres of 16 GW is planned to be integrated to the grid by 2030-31. To meet the enhanced demand of about 106 GW from present peak demand met of 250 GW, net generation capacity addition of about 428 GW including

⁸ CEA-Installed Capacity Report: <https://cea.nic.in/wp-content/uploads/installed/2026/01/Website.pdf>

ESS is planned to be integrated in the grid after accounting the retirement of thermal generation by 2030-31 as anticipated in draft National Electricity Plan (NEP) of CEA.

Total installed generation capacity for 2030-31 shall be about 1012 GW including the pumped storage and energy storage capacity. The anticipated region-wise breakup of the installed capacity and projected peak demand for 2030-31 are summarised in **Table 2-2**. Renewable Energy resources generation installed capacity is expected to be about 56% of total installed generation capacity, which is shown in **Figure 2-6**.

Table 2-2: Projected Installed Capacity & Peak Demand by FY 2030-31

(All Fig in GW)

Region	Fossil			Non-Fossil				ESS (PSP+ BESS)	Grand Total	Peak Demand
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
NR	64.8	3.6	68.4	3.0	26.3	138.9	168.3	21.3	258.0	122.1
WR	106.0	10.1	116.1	3.2	6.1	215.3	224.6	15.3	356.1	123.4
SR	54.3	1.5	55.9	5.8	12.3	201.6	219.7	23.9	299.4	102.4
ER	58.6	0.0	58.6	0.0	19.5	5.6	25.1	3.2	86.8	48.1
NER	0.8	1.7	2.5	0.0	5.0	4.2	9.2	0.0	11.7	7.5
All India	284.46	16.96	301.41	12.08	69.21	565.67	646.96	63.70	1012.07	350.67

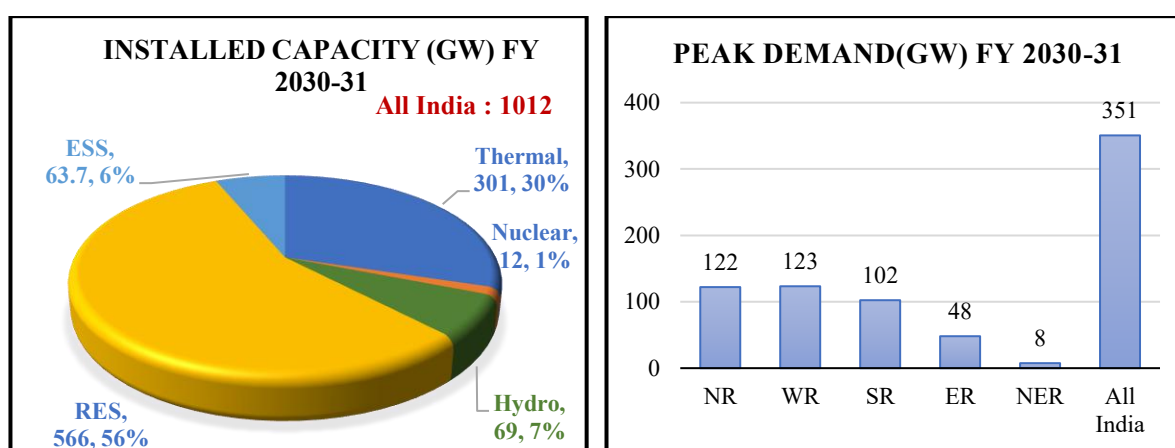


Figure 2-6: Projected Installed Capacity & Peak Demand by FY 2030-31

The region wise growth in demand and fuel type wise increase in installed generation capacity for 2030-31 from Jan'26 is tabulated below in **Table 2-3**.

Table 2-3: Peak demand & Generation IC till Jan '26 and 2030-31

Peak Demand (GW)				
Reg.	Till Jan'26	2030-31	Growth	CAGR
NR	90.75	122.13	31.38	6.12%
WR	80.59	123.38	42.79	8.89%
SR	66.99	102.38	35.39	8.85%
ER	31.40	48.13	16.73	8.92%
NER	3.91	7.53	3.62	14.00%
All India	249.85	350.67	100.82	7.01%

Generation IC (GW)				
Type	As on Jan'26	2030-31	Growth	CAGR
Thermal	228.30	284.46	56.16	4.50%
Gas	20.12	16.96	-3.17	-3.36%
Nuclear	8.78	12.08	3.30	6.59%
Hydro	51.16	69.21	18.04	6.23%
Solar	140.60	410.56	269.96	23.90%
Other RE+ESS	71.38	218.81	147.43	25.11%
Total	520.35	1012.07	491.72	14.23%

Chapter 3: All India

Share of Solar and Wind generation capacity in total installed capacity mix is expected to enhance from present share of 41% to 56% by March'31 in Indian power sector. To plan transmission network for integrating this RE potential and meet electricity requirement of the country, first it is important to understand the locations of generation pockets and load centre in wide Indian demography. Most of the conventional thermal generation are located in eastern part of the India due to availability of coal-reserves. Hydro-potential is mostly concentrated in Himalayan Ranges whereas, new generation addition in the form of renewable energy is emerging in northern, western, and southern part of India as depicted in **Figure 2-1** which makes Indian power sector one of the most challenging and diversified. To meet energy demand of the country from conventional generation, strong backbone transmission system is already planned from eastern part of the country to the major load centre across the country and implemented in past decades. With the advent of renewable-based generation addition, new transmission system is being planned and implemented from northern, western, and southern part of country to cater the load requirements across the country, which is resulting in changed power flow pattern on existing transmission system. It becomes important to understand the change in power flow pattern and regional power exchange in various seasons and in different times of a day depending upon the generation and demand of a region. Therefore, additional transmission system needs to be planned considering continuous changing load-generation scenarios.

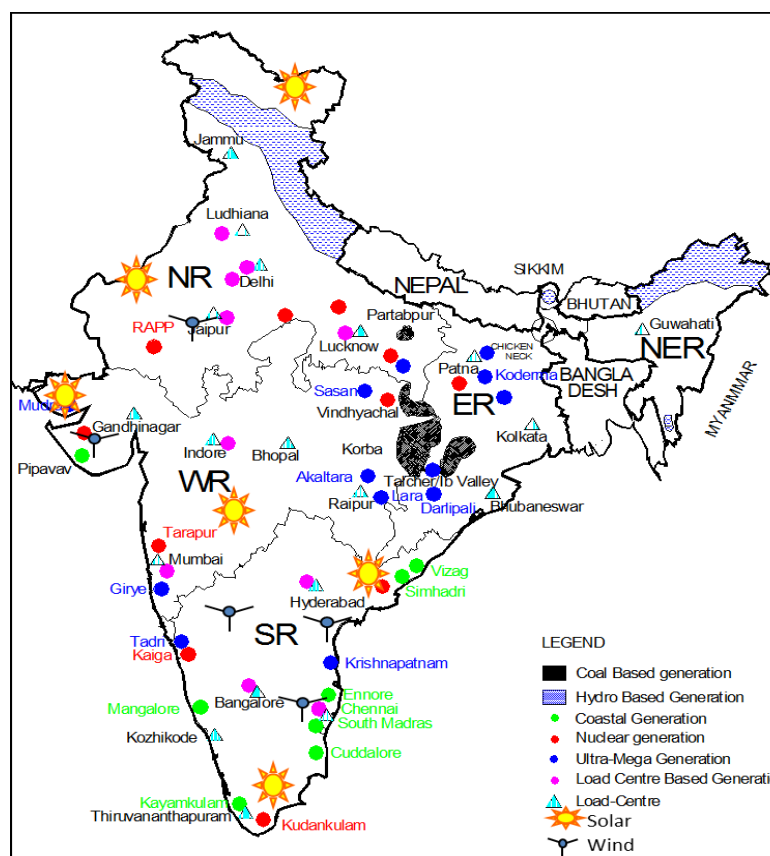


Figure 3-1: India's map showing various generations in different parts of the country

The present study has been carried out to identify power exchanges across the regions and adequacy of existing, approved and planned transmission systems to meet the power transfer requirement for the Timeframe of 2030-31 with an All-India perspective. Periodic assessment of transmission requirement under ISTS is also made part of this report. Here it is to mention that substantial solar generation capacity addition has been envisaged in future which shall only generate in daytime. A region having a high solar installed capacity shall become an exporter of power during the afternoon and may become importer of the power during evening.

To study such phenomenon and analyse power flow patterns in transmission network, various scenarios were identified. Accordingly, nine load generation balance scenarios were prepared corresponding to Monsoon, Summer, and Winter season along with three points on daily load curve for each season. Details about the same will be discussed in next section.

3.1 Load Generation Balance

For the study of load generation balance nine different scenarios are taken based on different season and different times of a day, as follows:

- Scenarios 1, 4 and 7 belong to Solar Max Generation scenario for Monsoon (August), Summer (June), and Winter (February) season respectively.
- Scenarios 2, 5 and 8 belong to Evening Peak Load scenario for Monsoon (August), Summer (June), and Winter (February) season respectively.
- Scenarios 3, 6 and 9 belong to Night Off-Peak scenario for Monsoon (August), Summer (June), and Winter (February) season respectively.

To replicate and simulate daily power requirement variations in different seasons in a year, three load-generation scenarios within a day in three different seasons were chosen. Three points on load curves were identified for each day i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night). Further, the same was carried out for three seasons viz. Monsoon (August), Summer (June) and Winter (February). Accordingly, load generation has been prepared for following nine scenarios:

- Aug'30: Solar max (Scenario-1), Evening Peak (Scenario-2) and Night off-peak (Scenario-3)
- Jun'30: Solar max (Scenario-4), Evening Peak (Scenario-5) and Night off-peak (Scenario-6)
- Feb'31: Solar max (Scenario-7), Evening Peak (Scenario-8) and Night off-peak (Scenario-9)

Load Generation Balance (LGB) for above mentioned nine scenarios considered for the study was prepared. During afternoon hours, solar generation is at its peak and thermal generation requirement is minimal. While in evening, solar generation is zero and the thermal generation

requirement is maximum. To prepare load generation balance, details about the selection of points on load curve and generation despatching philosophies are discussed subsequently.

All India peak demand considered for current study Timeframe 2030-31 is about 351 GW as per 20th EPS. Further an additional demand of about 40 GW (including Green Hydrogen/Ammonia plants of about 24 GW and others of about 16 GW) has been considered as direct drawl from ISTS. To find out variation of this demand for nine scenarios, demand pattern of calendar year 2025 for the three representative months of three seasons were collected from system operator (Grid-INDIA) for monsoon (Aug-25), summer (Jun-25) and for winter (Feb-25). The data comprises of demand profile of all the days of the month with resolution of 5 mins time interval. Three load conditions each corresponding to solar max, evening peak and night off peak were selected from the representative demand curve of three seasons as depicted in **Figure 3-2, Figure 3-3 & Figure 3-4**. For evening peak scenario and night off peak scenario, maximum demand (between 4:00 pm to midnight) and minimum demand (between midnight to 06:00 am) were considered respectively. However, for solar max scenario, maximum demand corresponding to noon (12:00 pm) was considered. To obtain the demand factors for study timeframe of 2030-31, demand corresponding to these load conditions were divided by maximum All India/regional demand of the corresponding year i.e. 2025. All India/regional demand factors for different scenarios of 2030-31 are shown in **Figure 3-5**.

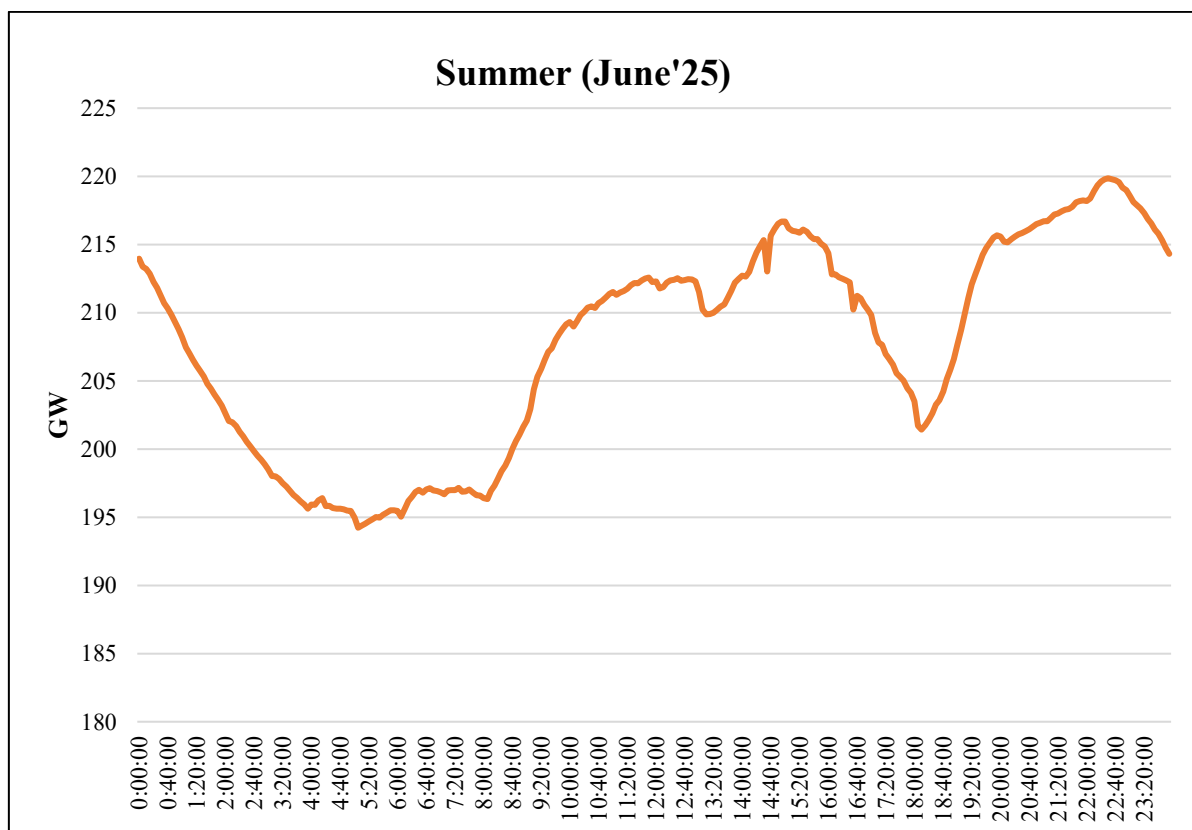
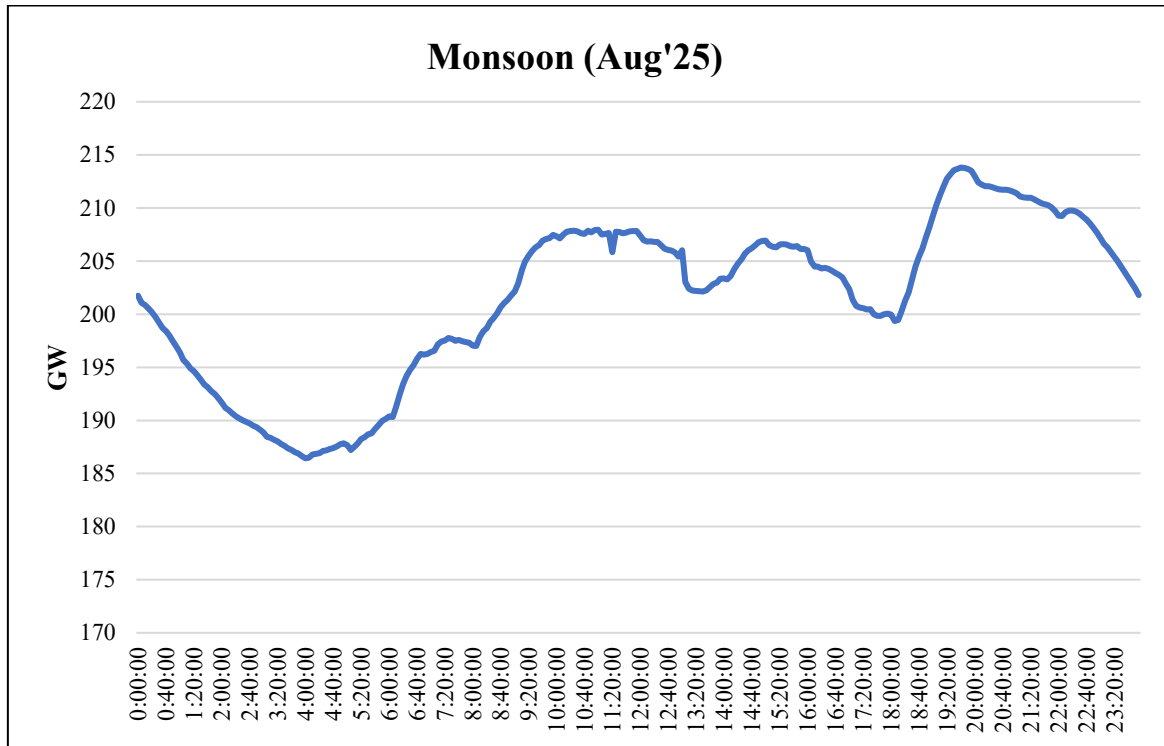
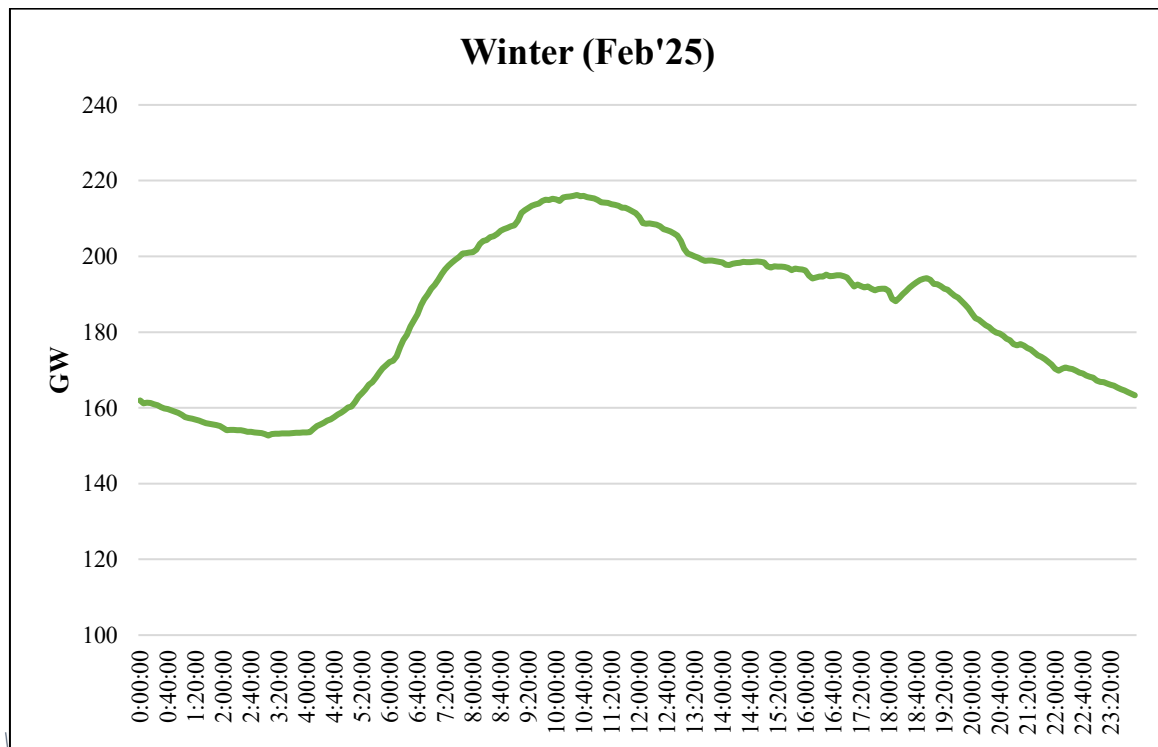


Figure 3-2: Summer (June'25) Load Curve

*Figure 3-3: Monsoon (Aug'25) Load Curve**Figure 3-4: Winter (Feb'25) Load Curve*

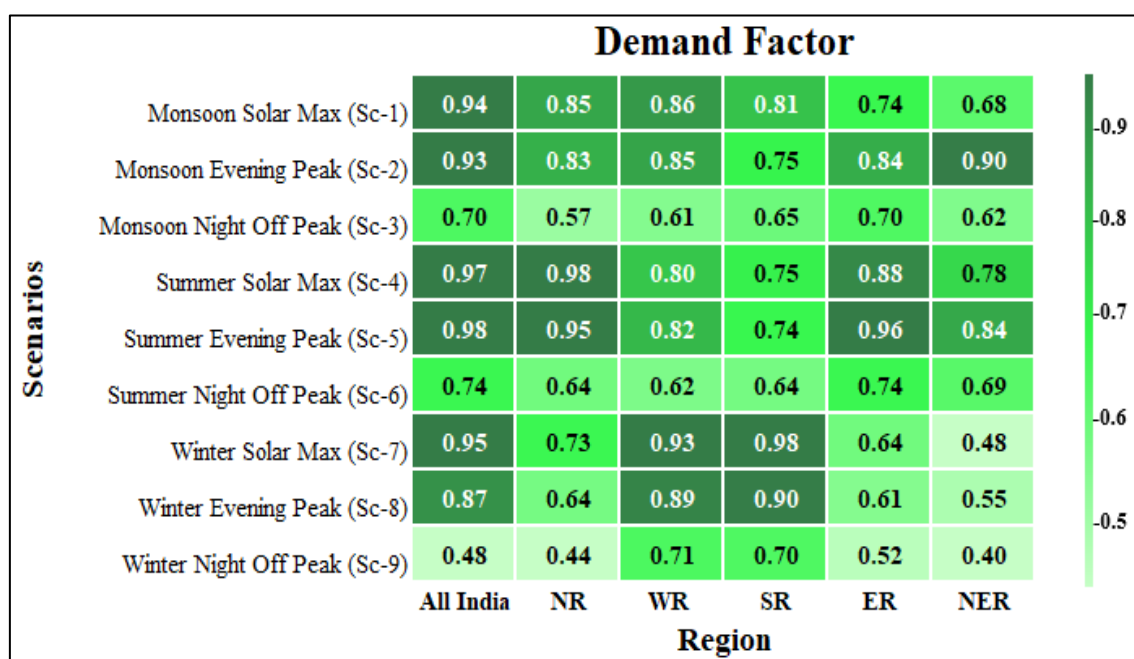


Figure 3-5: Demand factors considered for 2030-31 Timeframe

To meet the anticipated demand in different scenarios, various sources of generations viz. Thermal, Nuclear, Hydro, Gas, Solar, Wind is available. However, despatch of some of these generators shall be as per their diurnal and seasonal variation. Each generation except thermal generation in a region was despatched as per the despatch factors considered in regional chapters.

RE has been scheduled on priority for meeting the demand considering all utilities have RE RPO obligation and total RE generation has been apportioned as per RE RPO to all regions based on their projected EPS demand. Further, for accounting the availability of solar roof-top generation, equivalent demand was reduced from respective regions. After determining the demand met by renewable energy, nuclear and hydro generation, remaining demand was met by Thermal generation.

The evening peak scenario of each month was established first as the number of thermal units required on bar shall be maximum. Total thermal generation requirement for the evening peak scenario was apportioned between State and Central sector thermal generations as per their installed capacity in each region. Further, state thermal generation requirement was divided among the states as per their maximum demand in respective month of 2025. After obtaining state thermal generation requirement, state thermal units were dispatched about 90% of their IC in merit order for each state.

To meet the balance load requirements, ISGS, CGS & IPP thermal plants are deployed, with merit order dispatch carried out region-wise to determine the minimum number of thermal units to be kept on-bar while running them at around 90% of their capacity. Subsequently, an all-India merit order dispatch is applied to thermal plants in the evening peak scenario, bringing additional units on bar & setting the suitable dispatch levels between 40% to 90% wherever necessary to meet the demand and optimal utilization of transmission system and available

generation resources across the nation. For preparing night off-peak scenario, on bar thermal units were proportionately scaled down. As such, for solar max scenario, thermal generation on bar was set at around 40% of capacity facilitate integration & dispatch of renewable generation.

In the solar max scenario, it is observed that there is an absolute surplus power available in the grid due to availability of peak solar generation and inadequate demand during the noon. This surplus is also on account of keeping the same number of thermal plants on-bar operating at a technical minimum (40%) in Solar max scenario which are required to meet evening peak demand. Even after considering the flexibility exhibited by gas and hydro generation between the evening peak and solar max scenario, the absolute surplus generation of about **55 GW, 95 GW and 48 GW** was observed in solar max scenarios of monsoon, summer and winter scenarios respectively, which either to be stored in ESS/PSP or to be backed down.

This surplus is observed even after considering 351GW demand growth as per 20th EPS report and green Hydrogen loads (about 24 GW) & bulk consumer loads/data centres (16GW) and drawl of power in Solar hours by ESS/PSPs (about 64 GW). The extent of surplus shall further increase in case of delay in materialization of envisaged Green Hydrogen demand, Data Centre loads, PSP & BESS projects as well as consideration of thermal dispatch (minimum technical level) to 55% level instead of 40%. For instance, Transmission system for Khavda Phase-VI & VII of about 11.5GW was identified & discussed in NCT, wherein, it was decided to take up implementation of the scheme after visibility of Green Hydrogen/Green Ammonia loads to the tune of 9-10 GW in Mundra and Kandla areas of Gujarat.

In Rajasthan till date, RE Potential of 223 GW (under ISTS) has been declared by the MNRE. Out of this, 205 GW (about 90%) potential is concentrated primarily in four (4) districts of Rajasthan, namely, Jaisalmer, Jodhpur, Barmer and Bikaner. Against this potential, connectivity applications for about 150 GW have been received till Feb'26. Out of which, about 80 GW RE of transmission system (EHVAC:68 GW and HVDC:12 GW) has already been identified to connect all the available major load centres in neighbouring States. Similar, against total declared RE potential of 96.2 GW under ISTS in Gujarat, Transmission System for evacuation of about 65 GW renewable capacity is existing or under various stages of implementation (under construction / bidding) in Gujarat to cater to various RE connectivity applications received in the state. Out of this, major capacity of about 54.7 GW transmission capacity has been planned in northern area of Gujarat i.e. Kutchh/Banaskantha (about 30.5 GW in Khavda area and 24.2 GW in Bhuj/Banaskantha and Lakadia areas).

Since all the nearby load centres were already covered, no nearby load centres are available for evacuation of additional RE power from Rajasthan and Gujarat. Due to this, transmission system for evacuation of about 70 GW RE & 35GW RE could not be finalized in Rajasthan & Gujarat, respectively.

Applications for Battery Energy Storage System (BESS) of more than 100GW has been received for ISTS connectivity at various locations of the country, which are currently under process. To absorb the excess generation during the daytime, the additional BESS of 95GW in

the vicinity of RE generators, proportion to their generation despatch, has been considered in the LGBR as an interim measure to avoid the curtailment in solar max scenarios. Detailed modelling of BESS across the scenarios shall be carried out after issuance of grant in consultation with stakeholders.

Monsoon Aug'2030

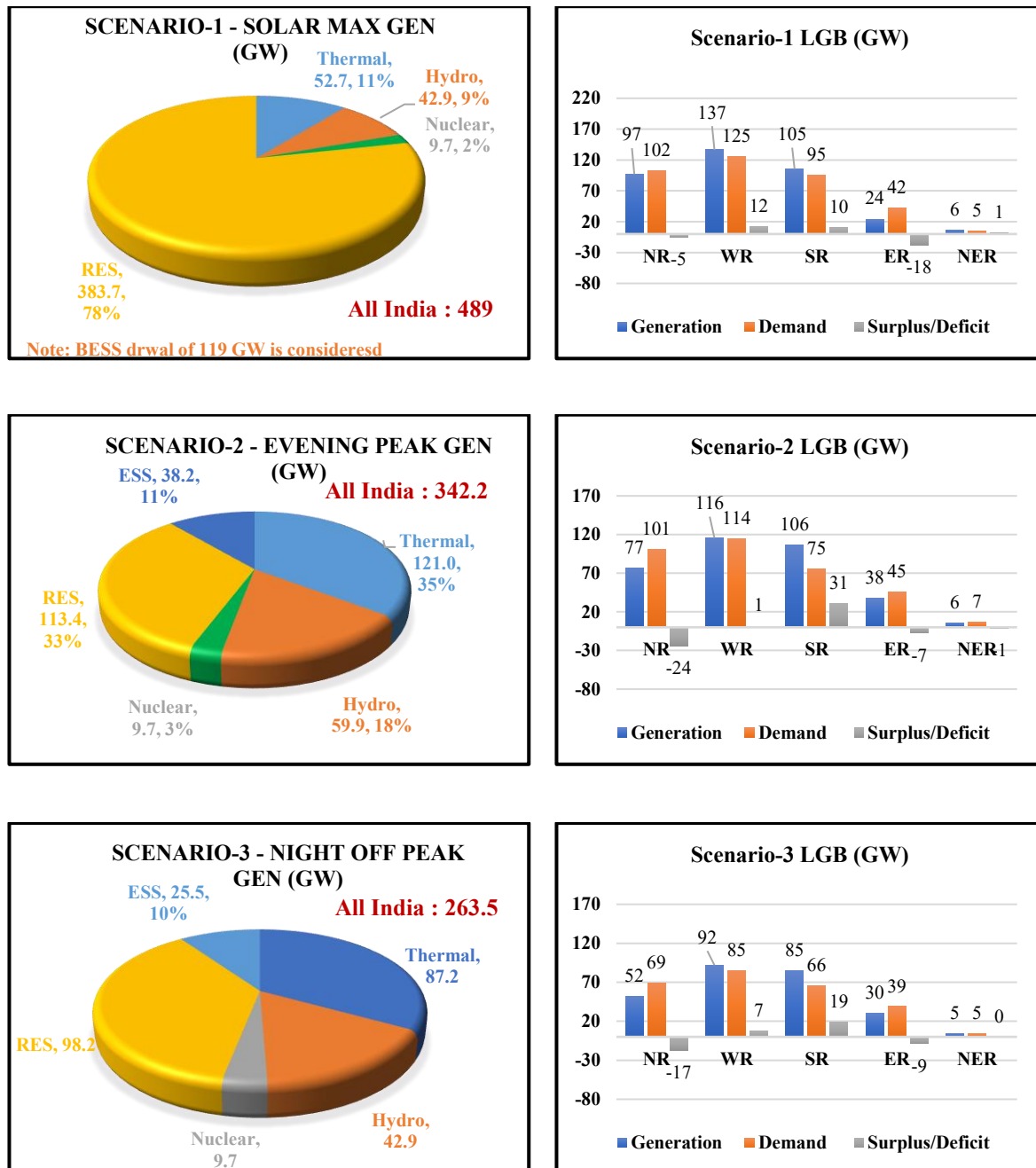


Figure 3-6: LGB for Monsoon (Aug'2030)

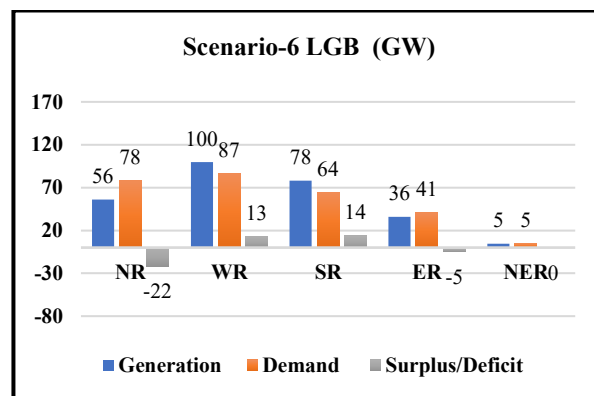
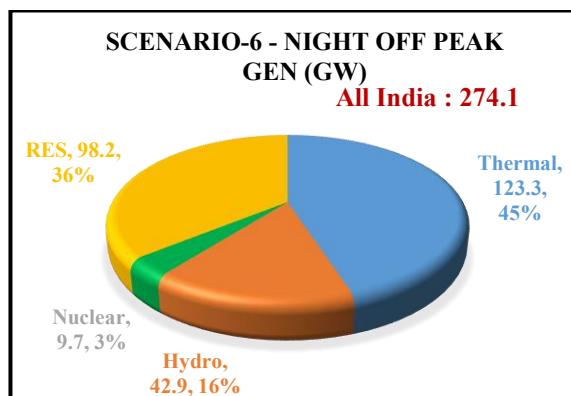
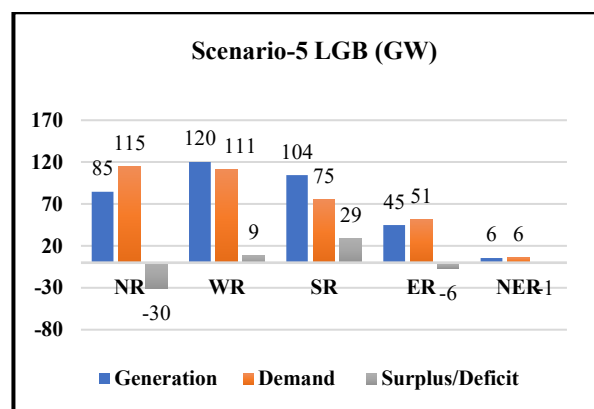
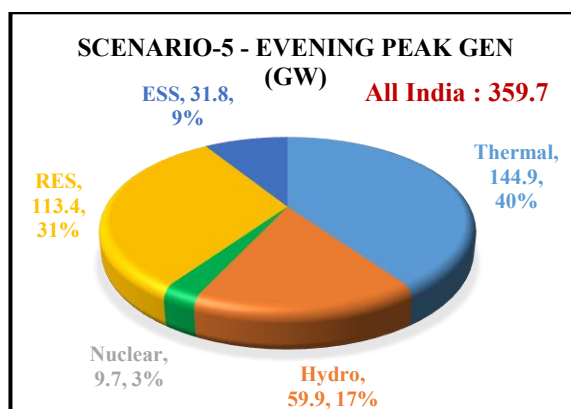
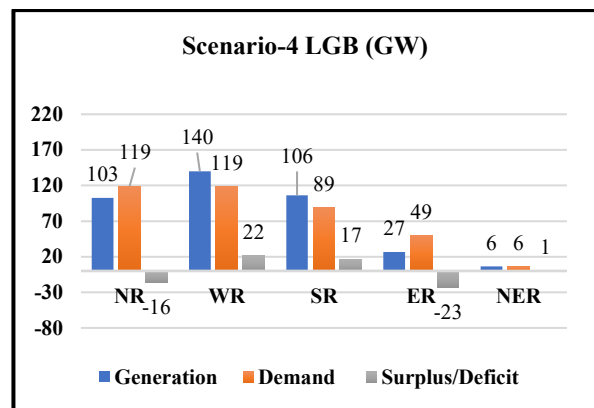
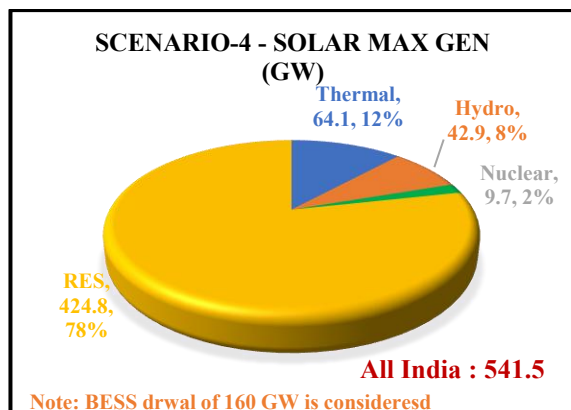
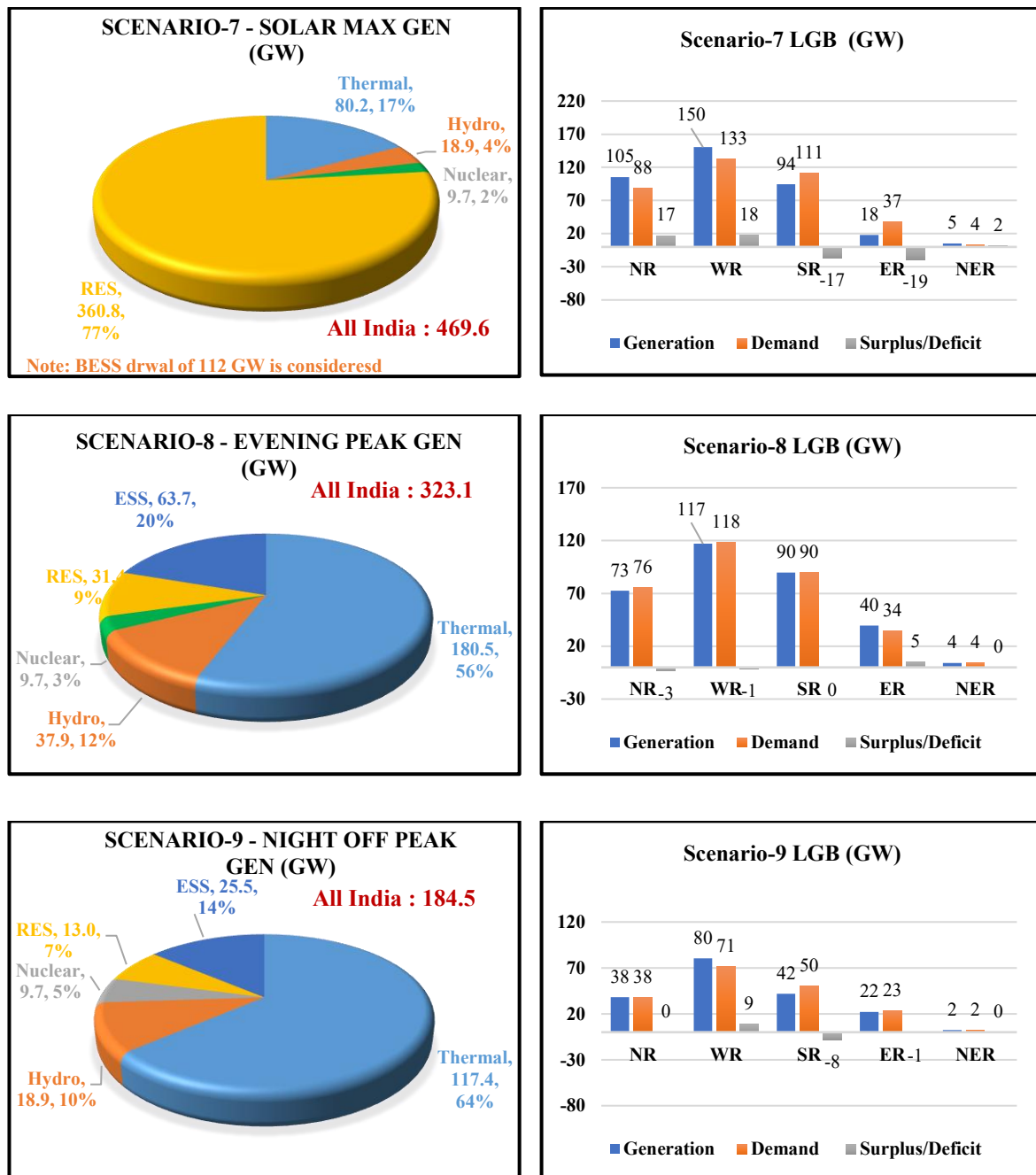
Summer June'2030

Figure 3-7: LGB for Summer (June'2030)

Winter Feb'2031*Figure 3-8: LGB for Winter (Feb'2031)*

Out of these nine scenarios, Scenario-4 (Jun'30 Solar Max) and Scenario-9 (Feb'31 Night off peak) corresponds to two extreme cases with respect to demand i.e., highest demand (382 GW) and lowest demand (184 GW) scenarios respectively. In all other scenarios, all India demand is varying between these two demands as per demand factors. Further Scenario-1 corresponds to maximum RE generation share to meet the demand of that scenario. Based on LGB, region wise surplus/deficit in each scenario is summarised in **Table 3-1**. Furthermore, both maximum surplus and deficit of each region is highlighted too in **Table 3-1**.

Table 3-1: Regional Surplus/Deficit summary in MW

Surplus (+)/ Deficit (-)	Monsoon (Aug'30)			Summer (Jun'30)			Winter (Feb'31)		
Scenario No. Region	1	2	3	4	5	6	7	8	9
	Solar Max	Evenin g Peak	Night Off Peak	Solar Max	Evenin g Peak	Night Off Peak	Solar Max	Evening Peak	Night Off Peak
NR	-6564	-24448	-18067	-18258	-32799	-22444	15236	-4048	-1000
WR	10008	-488	4733	20738	6553	10466	16040	-3578	5462
SR	8147	29057	17088	14281	26458	12347	-19271	-2761	-8960
ER	-20691	-13180	-11682	-25124	-9981	-7762	-16290	3633	1484
NER	1261	-1112	70	476	-645	-465	1520	175	299

From the above table it may be inferred that:

- NR is importing power in each scenario except in Winter (Feb) solar max scenario where it is exporting power. Maximum import of power is happening in Summer (June) evening peak load scenario & Maximum export of power is in Winter (Feb) solar max scenario.
- WR is exporting the power in most of the scenarios with Maximum export of about 21 GW, observed in Summer (June) solar max scenario.
- SR is expected to export power in most of the scenarios except Winter (Feb) scenarios. Maximum export of power is about 29 GW in Monsoon (Aug) evening peak scenario, whereas maximum import of the order of 19 GW is taking place in the Winter (Feb) solar max scenario.
- ER is importing power in all the scenarios except Winter (Feb) evening peak and night off-peak scenarios, due to RE RPO requirements of ER. It shall not be able to meet its RPO requirement from its own regional RE and must import RE power from neighbouring regions.
- NER has maximum export of about 1.5 GW in Winter (Feb) solar max scenario and maximum import of 1.1 GW in Monsoon (Aug) evening peak scenario.

Considering the above LGB for nine scenarios, load flow cases were prepared for detailed studies to assess the adequacy of Inter State Transmission System including inter-regional corridors planned to cater the power transfer requirement across the region in study Timeframe of FY 2030-31. Study results of the same have been discussed in subsequent sections.

3.2 Study Results and Analysis

Based on the load-generation scenarios for different regions, various simulation studies have been carried out in PSSE. Transmission system planned and under implementation for various loads/generations scheduled to be commissioned up to current study timeframe of 2030-31 are

considered for conducting these studies. Based on the studies performed, results of the study are analysed and deliberated below-

3.2.1 Power Flow Analysis

a) Inter-Regional Corridor

Inter-regional flows between various regions, based on simulation studies for current study timeframe of 2030-31 are summarised below in **Table 3-2**. for all the nine scenarios. Maximum and minimum flow between each inter-regional corridor is also highlighted in **Figure 3-9**.

Table 3-2: IR flow summary in MW

IR Flows	Monsoon (Aug'29)			Summer (Jun'29)			Winter (Feb'30)		
	1	2	3	4	5	6	7	8	9
Scenario No.									
Corridor	Solar Max	Evening Peak	Night Off Peak	Solar Max	Evening Peak	Night Off Peak	Solar Max	Evening Peak	Night Off Peak
WR-NR	4158	19899	15123	18128	25524	17794	-11007	-985	-1077
ER-NR	-612	748	-82	-2905	3394	1624	-4947	2434	776
WR-ER	12802	5908	5799	13815	5601	6056	11259	242	3915
ER-SR	-1196	-2762	-899	-3076	-1886	1037	3483	5596	6336
WR-SR	-6952	-26295	-16189	-11205	-24572	-13384	15788	-2835	2624
ER-NER	-1199	1073	-44	-435	634	485	-1951	-119	-197

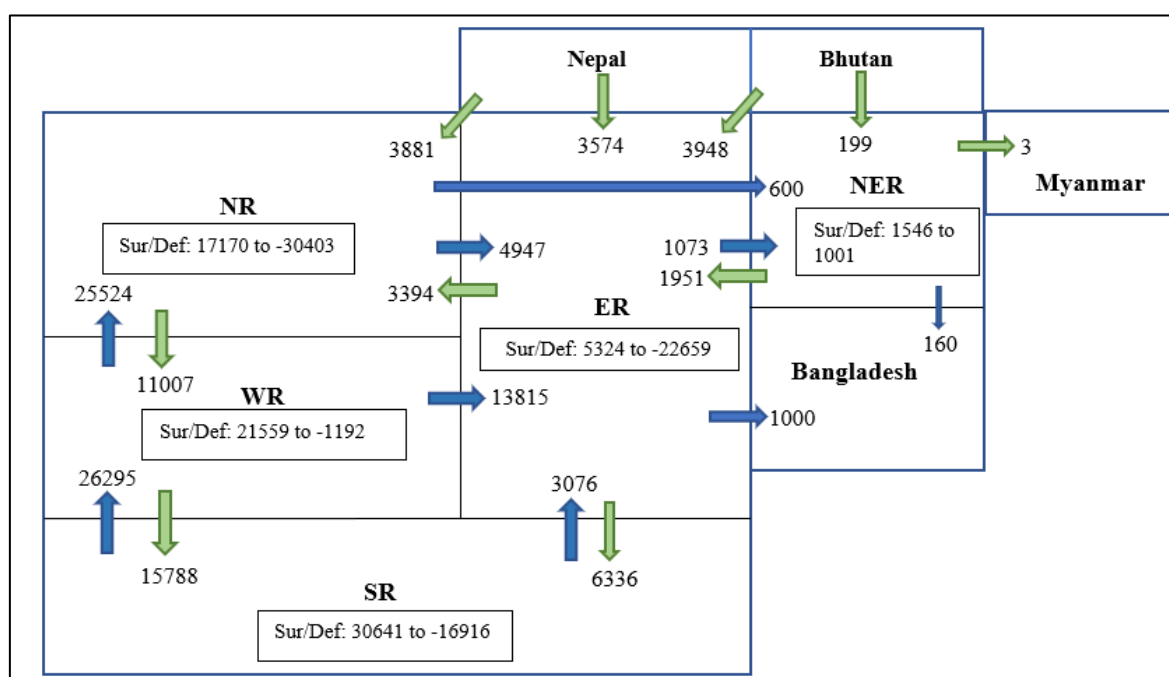


Figure 3-9: Summary of Regional Surplus-Deficit & IR flows in MW

From above it can be seen that-

- Power on WR-NR corridor is flowing in both directions in different scenarios. Maximum power of the order of 25 GW is flowing from WR to NR in summer evening peak scenario whereas, maximum power flow of the order of 11 GW is flowing from NR to WR in winter solar max scenario.
- Power on ER-NR corridor is flowing in both directions in different scenarios. But in solar max scenarios the power is flowing from NR to ER. Maximum power of the order of 3.4 GW is flowing from ER to NR in summer evening peak scenario whereas, maximum power flow of the order of 5 GW is flowing from NR to ER in winter solar max scenario.
- Power on ER-WR corridor is always flowing from WR to ER in all scenarios. Maximum power of the order of 14 GW is flowing from WR to ER in summer solar max scenario.
- Power on ER-SR corridor is flowing in both directions in different scenarios. Maximum power of the order of 6 GW is flowing from ER to SR in winter night off peak scenario whereas, maximum power flow of about 2.6 GW is flowing from SR to ER in summer solar max scenario.
- Power on WR-SR corridor is mostly flowing towards WR from SR with maximum flow of about 26 GW in monsoon evening peak scenario, except in winter solar max and night off peak scenarios, where it reaches a maximum of about 16 GW from WR to SR.
- Power on Biswanath Chariyali-Alipurduar (3000 MW) & Alipurduar-Agra (6000 MW) are included within the NER-ER & ER-NR flows. The reverse power flow of about 600 MW Agra-Biswanath Chariyali HVDC line in winter Solar Max scenario is shown separately in the **Figure 3-9**.

Each inter-regional corridor comprises of multiple 765kV, 400kV, 220kV & HVDC transmission lines. Loading on these inter-regional tie lines for all nine scenarios along with their permissible thermal design limit are tabulated in **Annex-3.2** and power flow exceeding the 70% of thermal design limit are highlighted in yellow in the same annexure. While analysing the annexure, it is observed that all the inter-regional tie lines are loaded below 70% of their design limit except for two 765kV lines and one 400kV line.

b) Transmission Line

All the 765 kV and 400 kV lines of ISTS and Intra-state were monitored for any possible overloading in the base cases prepared for nine scenarios. There are about 642 nos. of 765 kV lines and about 2860 nos. of 400 kV lines. Lines with their base case loading were compared with their thermal design limit and flows exceeding the 70% of thermal design limit in any of the scenario are tabulated at **Annex-3.3**. Few of 765 kV lines were observed to be loaded beyond 70% thermal limit and few 400 kV lines were loaded beyond the limit. If we see in terms of percentage, less than 2% of total no. of lines (400

kV) are loaded beyond 70% of thermal limit. Summary of the results is shown below in **Figure 3-10 & Figure 3-11**.

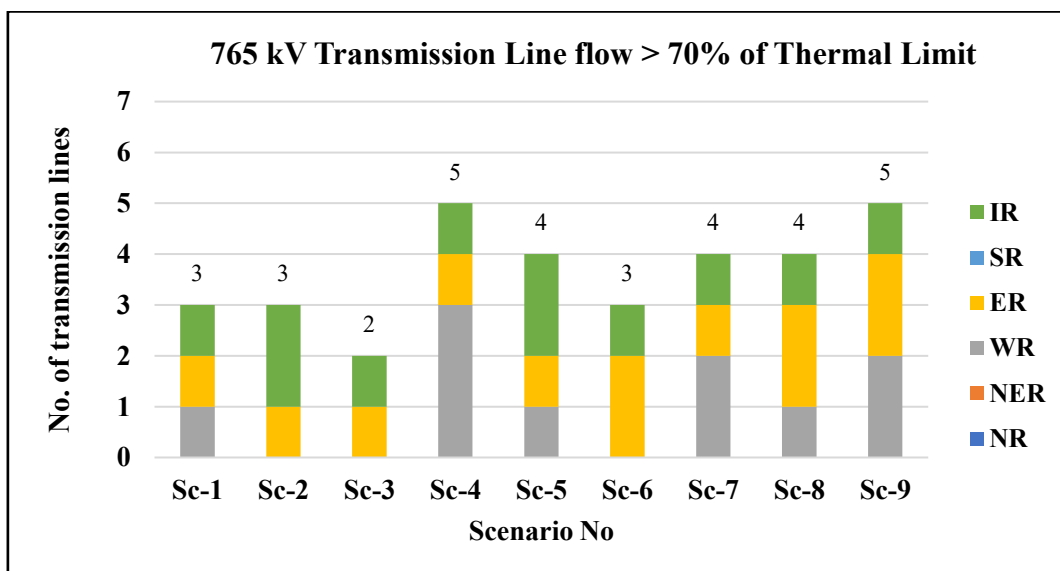
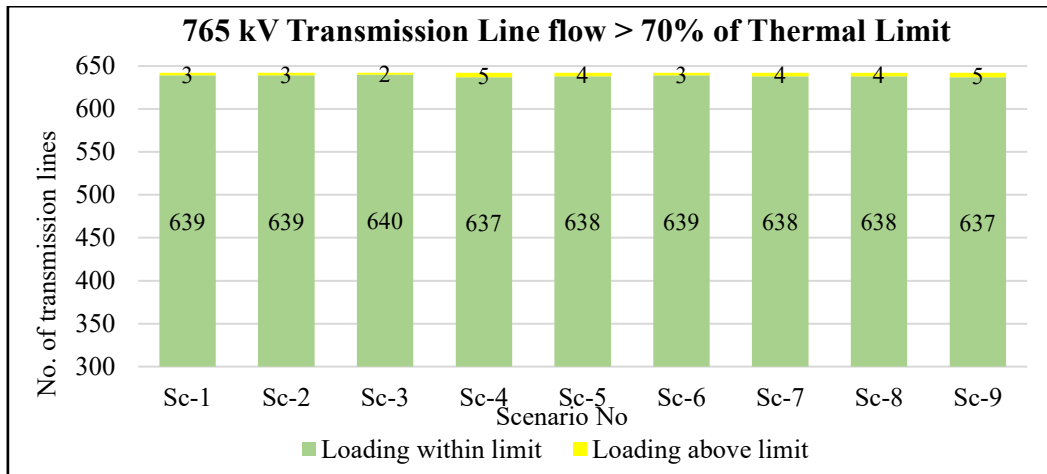
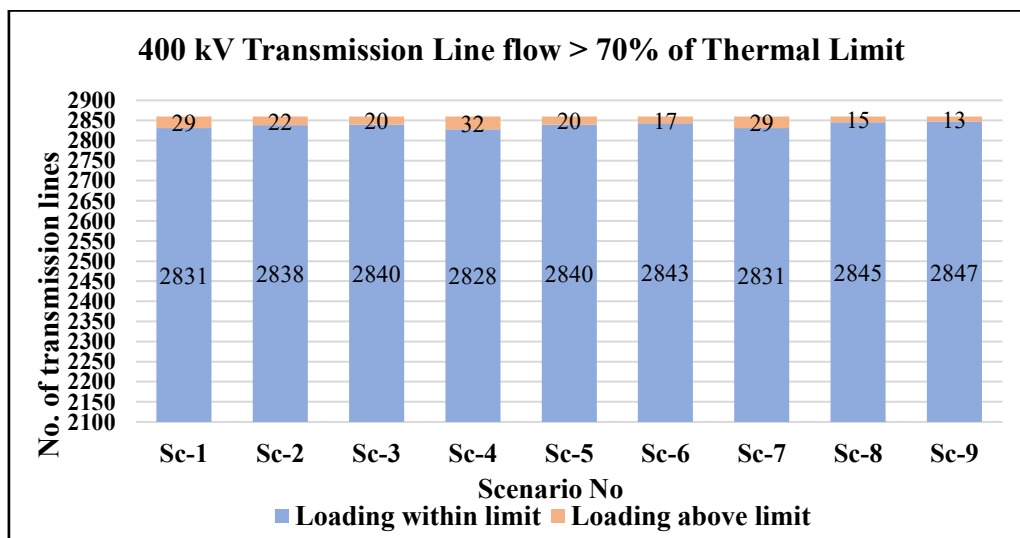


Figure 3-10: 765kV Tr. line flow > 70% of thermal limit under base case



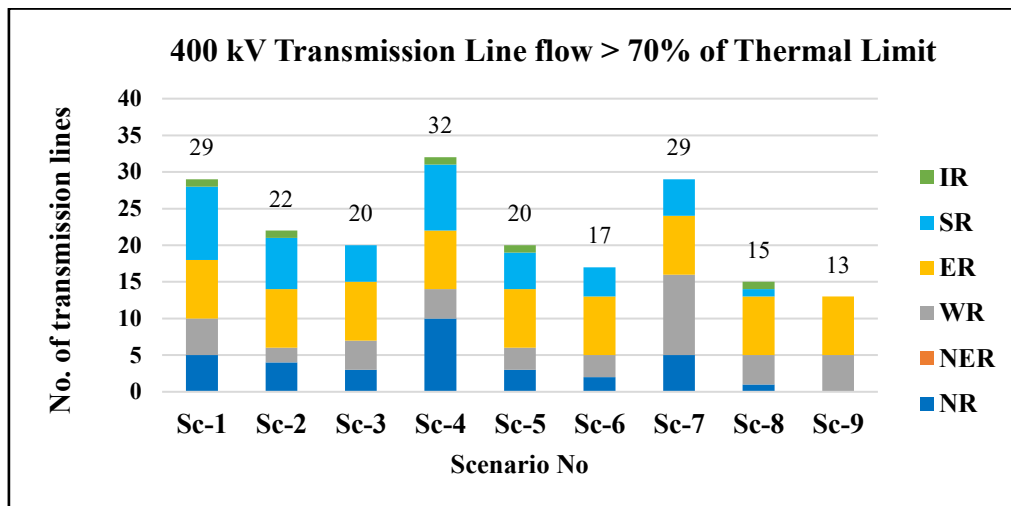


Figure 3-11: 400kV Tr. line flow > 70% of thermal limit under base case

It was observed that 5 nos. of 765 kV lines are loaded beyond 70% of the thermal limit in Scenario-4, however their loading is below 3500 MW. About 29, 32 and 29 nos. of 400 kV lines in Scenarios-1, 4, and 7 (Solar max scenarios) respectively are loaded above 70% of the thermal limit. However, to understand the criticality of this loading, detailed contingency studies have been carried out, which are discussed in subsequent sections.

c) Transformer

In the study time frame, there would be about 522 nos. of 765/400 kV transformer at 170 nos. of 765/400 kV substations. Loading patterns of these transformers obtained from simulation studies are tabulated in **Annex-3.4** and loading more than 80% of their rating in any scenarios are also highlighted. Number of substations, where loading is more than 80% of rating in all scenarios are depicted in **Figure 3-12 & Figure 3-13**. However, if we see in terms of percentage, less than about 10% of total no. of transformer locations are loaded beyond 80% of their rating.

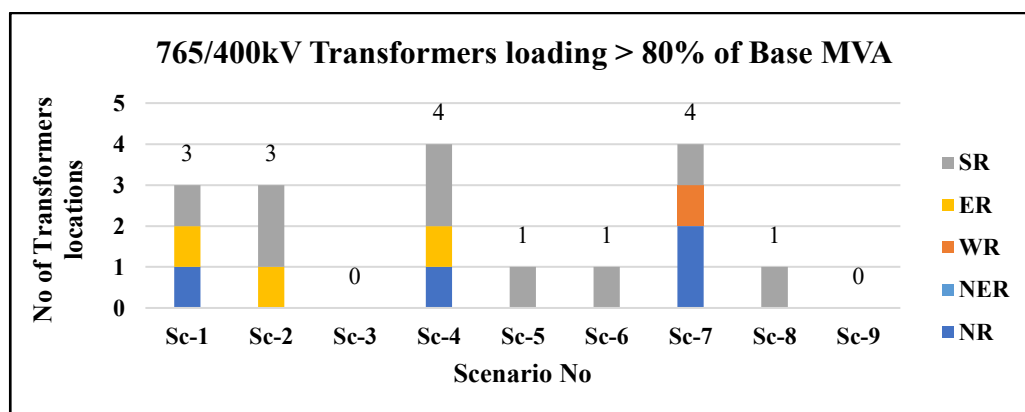


Figure 3-12: 765/400kV ICT Loading under base case

Under solar max scenarios viz. Scenarios 1, 4 and 7 only 3, 4 and 4 substations located in different region, where ICTs are getting loaded above 80% of MVA rating. Maximum

number of substation where loading is above 80% of MVA rating are corresponding to solar max and evening peak scenarios.

Similar analysis was carried out for 400/220 kV transformers. There are 1322 nos. of transformers located at about 459 nos. of 400/220 kV stations.

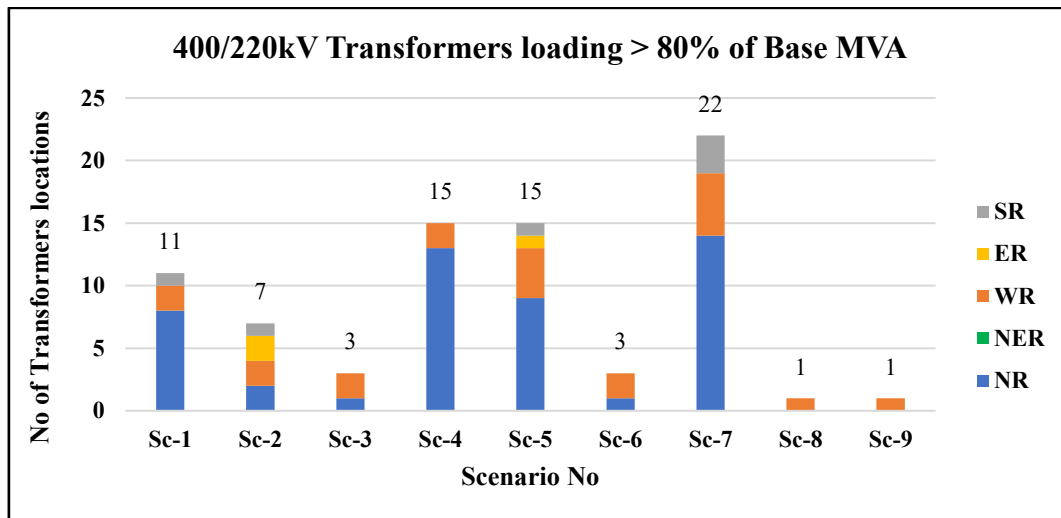


Figure 3-13: 400/220kV ICT loading under Base Case

Under solar max scenarios viz. Scenarios 1, 4 and 7 about 11, 15 and 22 substations located in different region predominantly in northern region, where ICTs are getting loaded above 80% of MVA rating. However, if we see in terms of percentage, about 17% of total no. of transformer locations are loaded beyond 80% of their rating. The need for augmentation would depend upon the number of transformers, parallel paths availability etc. Hence simulation with contingencies is discussed in subsequent sections.

d) Voltage Profile

With injection of high amount of RE into the Indian Grid, it is expected that in the same day power flow on a line would reverse. Transmission lines associated with thermal and hydro would be lightly loaded in solar max scenarios. Though adequate reactive compensation is planned in the form of switchable line reactors, bus reactors, STATCOMs, SVCs and SynCons at the time of inception of transmission projects. Impact of various shunt devices on voltages of all buses in all the scenarios are observed and analysed during simulation studies.

Per unit (pu) voltages of all 765 kV and 400 kV buses were observed in all the nine scenarios. Maximum and minimum voltage of each bus was identified from nine voltages available in nine scenarios. For voltage variation beyond ± 0.05 pu from nominal voltage was considered as voltage violation. Maximum and minimum voltage of buses is considered to calculate the number of buses having voltage beyond 1 pu and voltage below 1 pu respectively. Results of the analysis is plotted below in **Figure 3-14**.

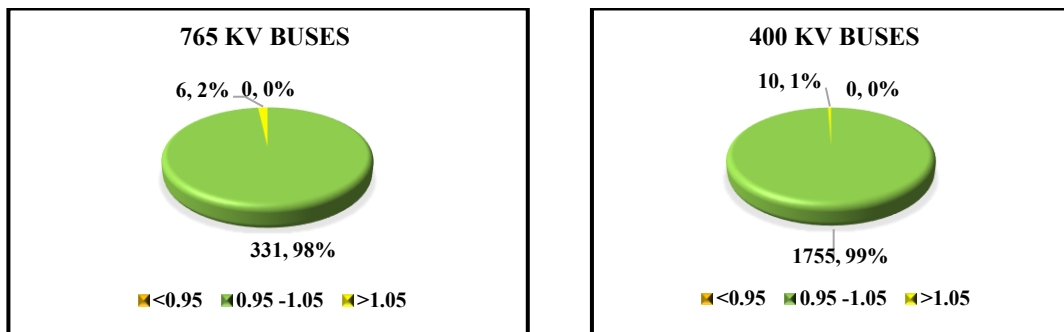


Figure 3-14: Pie-chart showing number of 765 KV & 400 KV buses

From the above voltage plots it can be observed that about 98% of the buses at 765 kV level and 99% of the buses at 400 kV level voltage are found to be in the range of 0.95 to 1.05 pu in All India Base case scenarios. 6 nos. of buses at 765kV & 10 nos. of buses at 400 kV voltage are having voltage beyond 1.05 pu in one or more than scenarios. However low voltages have not been observed on any of the buses.

Details of the buses exceeding the voltage 1.05 pu and buses having voltage below the 0.95 pu in any of the scenario are enclosed at **Annex-3.5**. For buses experiencing low voltages, measures like switching of switchable line reactors, increasing operating voltage of nearby generators may be taken into consideration.

3.2.2 Contingency Analysis

Contingency analysis has been carried out on all the 765 kV & 400kV transmission lines, and 765/400 kV & 400/220 kV transformers to ascertain the loading levels under outage of any other 765 kV or 400 kV or HVDC transmission. Results of the analysis are discussed below:

a) Transmission Line

765kV line loadings beyond 3000 MW under N-1 contingency was assessed first. Thereafter, to carry out a sensitivity analysis, number of lines loaded beyond 3200 MW and 3500 MW under N-1 contingencies were also identified. The list of such lines is at **Annex-3.6** and the same has been summarised below in **Figure 3-15 & Figure 3-16**.

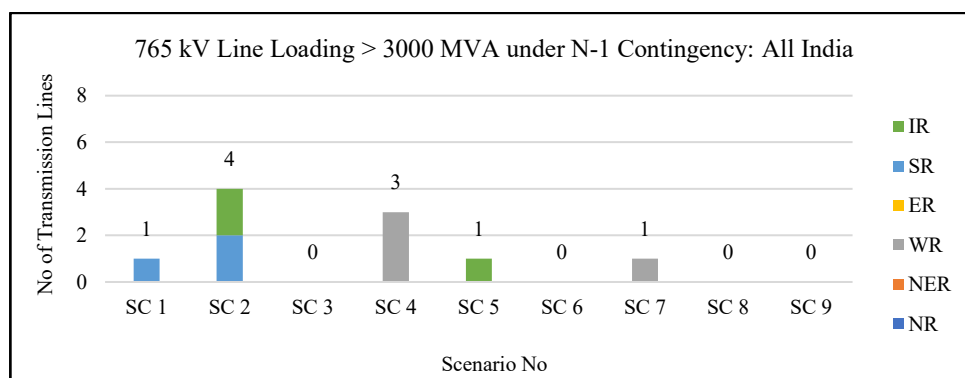


Figure 3-15: 765kV Tr. line loadings > 3000MW under N-1 Contingency

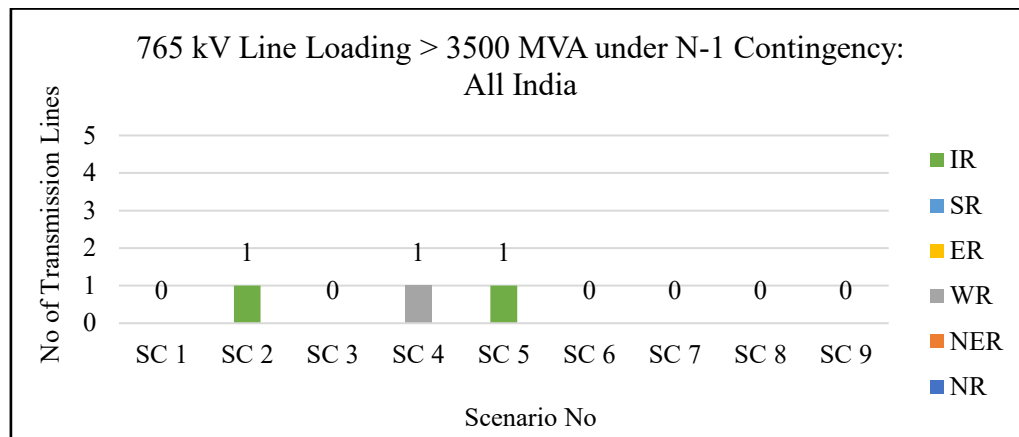


Figure 3-16: 765kV line loading > 3500 MW under N-1 Contingency

The most critical 765 kV lines are Narendra-Pune, Raigarh (Kotra)-Dharamjaigarh. Maximum loadings occur during solar max scenarios. Detailed studies regarding the reason for the overloading and probable mitigation measures are discussed in respective regional chapters. Further, for 400kV transmission lines, loading greater than 90% and 100% of thermal limit under N-1 Contingency has been assessed and the results are tabulated at **Annex-3.6**. The results are summarised below in **Figure 3-17 & Figure 3-18**.

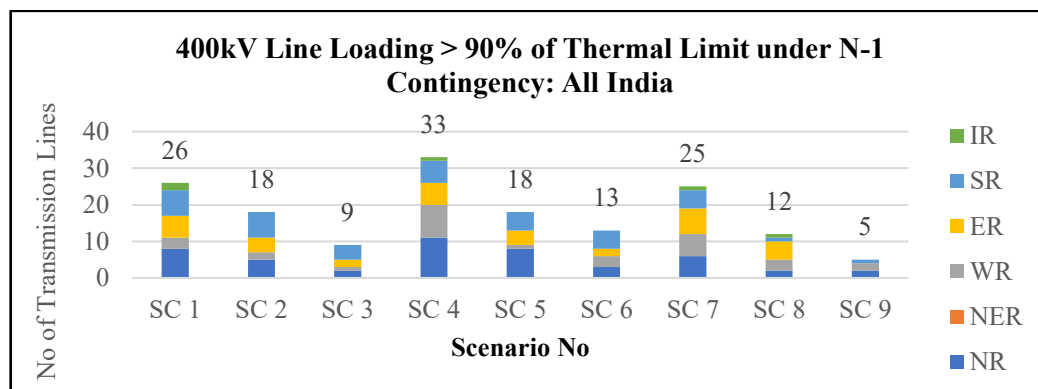


Figure 3-17: 400kV line loading > 90% of thermal limit under N-1 Contingency

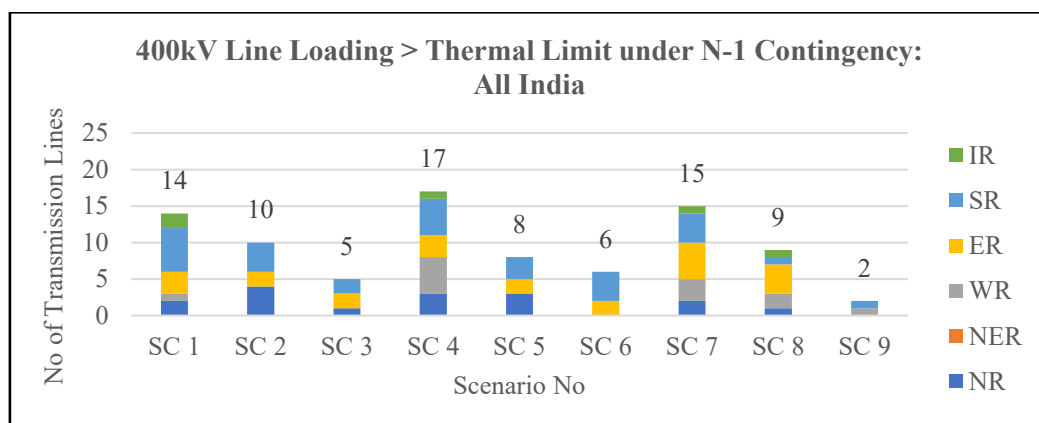
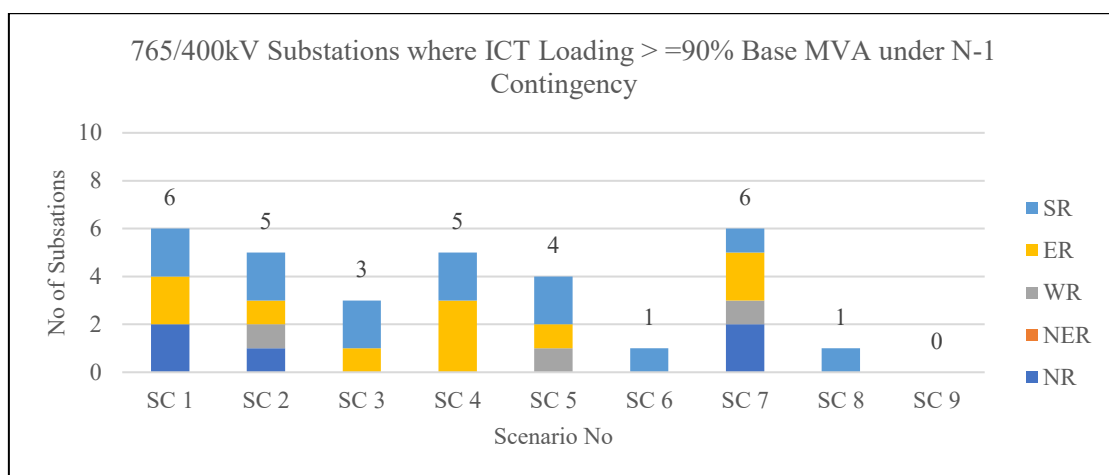
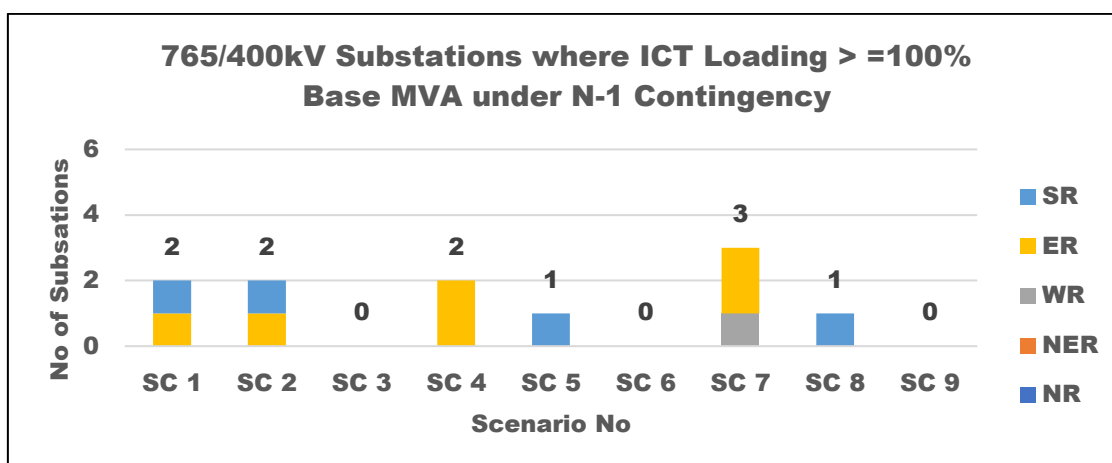


Figure 3-18: 400kV line loading > thermal limit under N-1 Contingency

Max no. of 400kV lines on which loadings exceed 90% and 100% of thermal limit is 42 and 26 in Solar max scenario, i.e. Scenario-4 and Scenario-7 respectively. Further, detailed analysis and studies are being carried to plan additional systems, if any, in respective regional chapter.

b) Transformers

Number of substations where ICTs shall get loaded above 90% and 100% of MVA rating under N-1 contingency are depicted below in **Figure 3-19** & **Figure 3-20** for 765/400 kV ICT and **Figure 3-21** & **Figure 3-22** for 400/220 kV ICT. Detailed results are attached at **Annex-3.7**.

Figure 3-19: 765/400kV ICT loading $\geq 90\%$ of MVA rating under N-1 ContingencyFigure 3-20: 765/400kV ICT loading $\geq 100\%$ of MVA rating under N-1 Contingency

Maximum number of transformers exceeding the loading greater than MVA rating under N-1 contingency in each of the seasons are corresponding to Solar max scenarios viz. Scenario 7. The locations corresponding to Scenario-7 where ICT loading violations have been observed

are Raichur, Duburi, Murbad, Hindalco, Kudgi, Kanarpatti, Parli, etc. Thus, detailed analysis and studies are performed in respective regional chapter to plan for remedial measures.

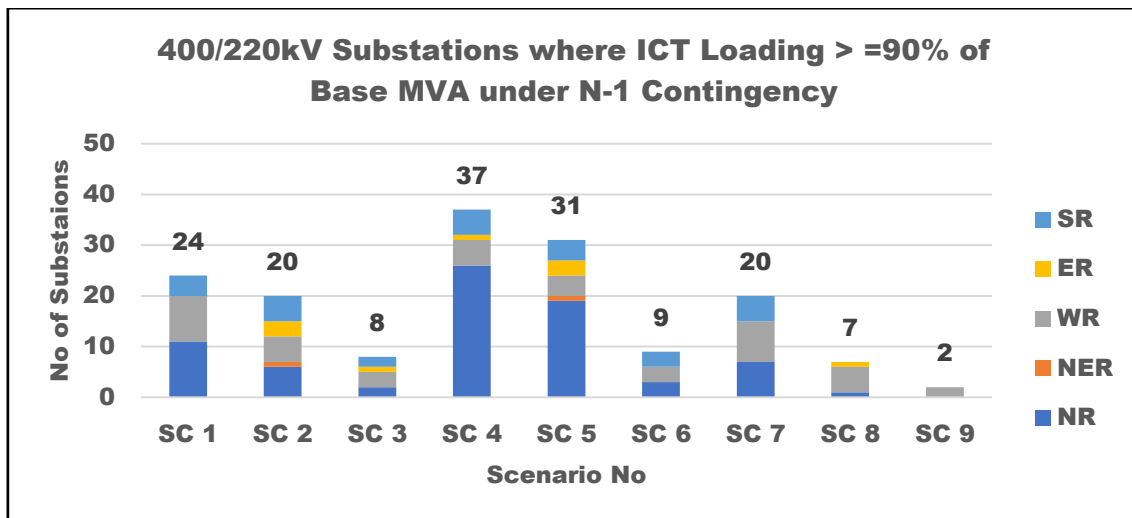


Figure 3-21: 400/220kV ICT loadings $\geq$ 90% of MVA rating under N-1 Contingency

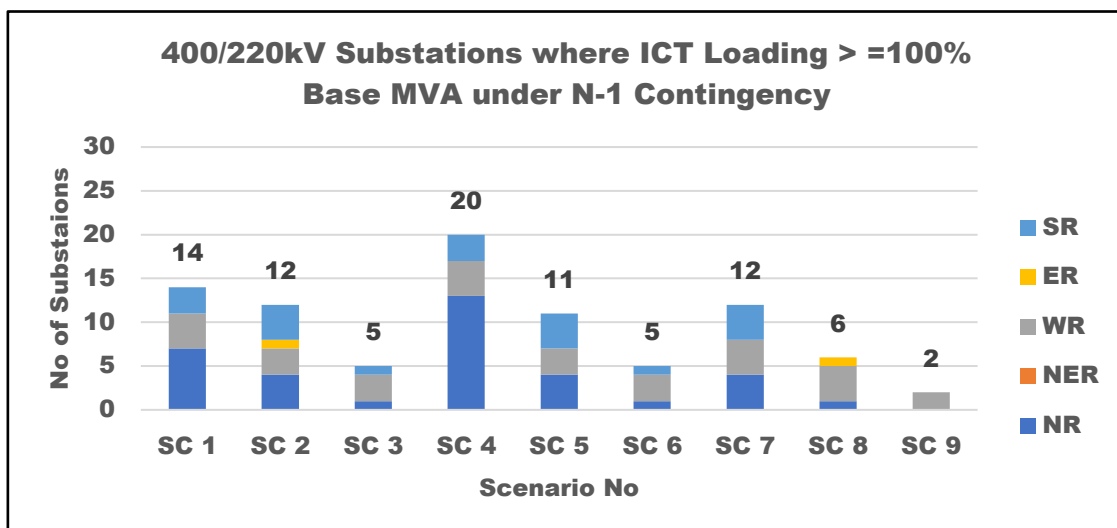


Figure 3-22: 400/220kV ICT loadings $\geq$ 100% of MVA rating under N-1 Contingency

Maximum number of transformers exceeding the loading greater than MVA rating under N-1 contingency in each of the seasons are corresponding to Solar max scenarios viz. Scenarios-1, 4 and 7. Thus, substations requiring ICT augmentation are being studied in detail in respective regional chapters.

3.2.3 Short Circuit Analysis

Short circuit level was calculated for all 765kV and 400 kV buses on pan India basis. After finding the fault level for all buses exceeding the design fault level under different scenarios were identified. **Figure 3-23** shows the number of 765 kV & 400 kV buses potentially exceeding the design fault current under different scenarios. Details of such buses are attached at **Annex-3.8**.

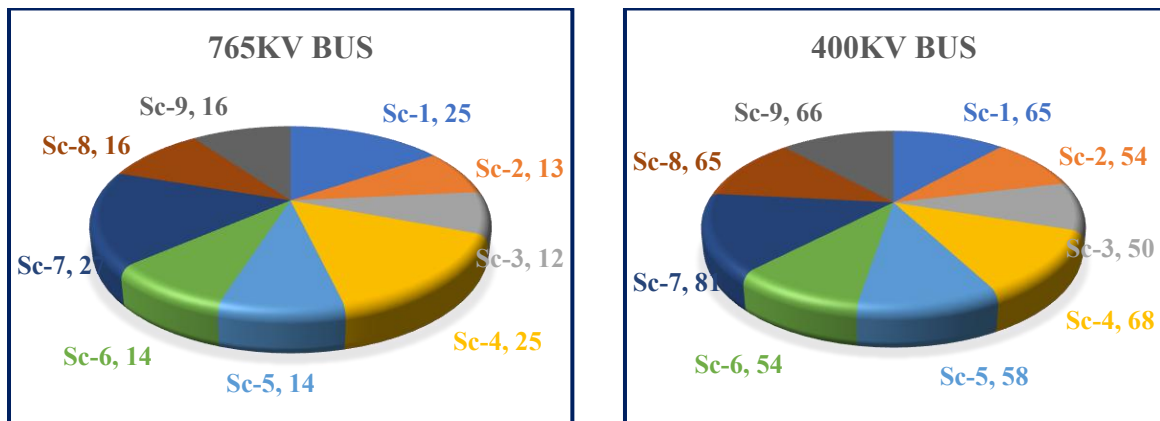


Figure 3-23: Pie-chart showing short circuit level at 765 kV & 400 kV buses on pan India basis

From the above charts it can be seen that number of fault level violations are highest in February scenario i.e. scenario-7, 8 and 9. While identifying the reason for the same it is noticed that number of thermal machines on bar are maximum in February scenario. Hence fault contribution from conventional machines shall be maximum under these scenarios. Summary of buses potentially crossing the design fault level is represented below in **Figure 3-24**.

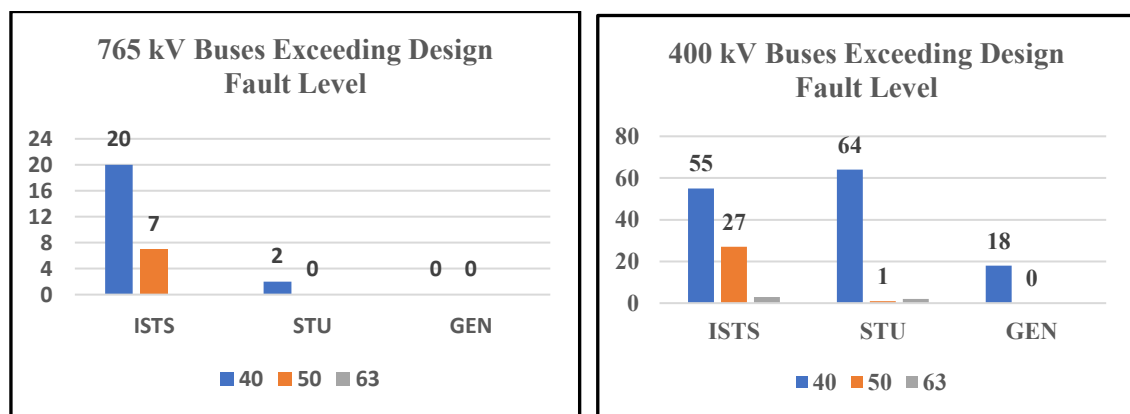


Figure 3-24: Violation of fault level at ISTS/STU/Gen buses at 765 kV & 400 kV levels

Maximum fault violations observed in the analysis for 765kV & 400kV buses is tabulated below in **Table 3-3**.

Table 3-3: Maximum violation of fault level at ISTS/STU/GEN buses

➤ 765 kV ISTS ▪ Kurnool (40kA): 66kA ▪ Raichur (40kA): 58kA ▪ Vataman (50kA): 56kA	➤ 400 kV ISTS ▪ Kurnool-New (50kA): 83kA ▪ Bikaner-III (50kA): 89kA ▪ Kurnool-III (63kA): 75kA
➤ 765 kV STU ▪ Jaipur (40kA): 54kA	➤ 400 kV STU ▪ Doddabalapur (63kA): 80 kA ▪ Kurnool4 (40kA): 74 kA ▪ GnoidaUP (40kA): 66KA

3.3 ISTS Expansion up to 2030-31

3.2.1 Summary of ISTS network

ISTS network expansion schemes across the country up to FY 2030-31 are enclosed in **Annex-3.2**. Summary of the same i.e. ckm addition, MVA addition and the broad estimated cost are tabulated below in **Table 3-4**, **Table 3-5** & **Table 3-6** respectively.

Table 3-4: Transmission Line addition by 2030-31 (in ckm)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	185	1,607	3,079	-	1	4,872
2	2026-27	6,909	4,431	13,305	387	114	25,146
3	2027-28	2,526	788	1,251	1,662	271	6,498
4	2028-29	324	5257.5	132	1332	680	7,726
5	2029-30	7,337	6,790	3,280	3,424	1,210	22,041
6	2030-31	2,930	-	8,016	-	-	10,946
	Total	20,211	18,874	29,063	6,805	2,276	77,228

Table 3-5: Transformation Capacity addition by 2030-31 (in MVA)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	12,000	18,500	27,315	1,000	-	58,815
2	2026-27	78,500	70,500	94,100	3,500	1,450	2,48,050
3	2027-28	50,000	34,500	7,185	11,000	32	1,02,717
4	2028-29	15,000	73,000	10,205	4,000	2,000	1,04,205
5	2029-30	44,500	63,130	12,630	-	-	1,20,260
6	2030-31	19,000	-	44,500	200	-	63,700
	Total	2,19,000	2,59,630	1,95,935	19,700	3,482	6,97,747

Table 3-6: Broad estimated cost of schemes to be added by 2030-31 (in ₹ Cr.)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	2,006	5,762	14,317	121	592	22,797
2	2026-27	44,403	28,874	65,637	3,420	644	1,42,979
3	2027-28	19,989	7,404	5,383	10,337	259	43,372
4	2028-29	5,313	31,579	5,649	6,183	2,834	51,558
5	2029-30	65,577	40,388	39,667	37,981	11,570	1,95,183
6	2030-31	27,917	-	57,644	30	-	85,592
	Total	₹ 1,65,206	₹ 1,14,006	₹ 1,88,297	₹ 58,072	₹ 15,900	₹ 5,41,481

Above summary has been divided in two categories-

- Summary of **under construction** ISTS network - ckm addition, MVA addition and the broad estimated cost of are tabulated below in **Table 3-7, Table 3-8 & Table 3-9** respectively.

Table 3-7: Under Construction Transmission Line (in ckm)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	185	1,607	3,079	-	1	4,872
2	2026-27	6,909	4,431	13,305	387	114	25,146
3	2027-28	1,886	508	1,251	482	271	4,398
4	2028-29	-	953	-	-	230	1,183
5	2029-30	3,669	280	3,280	-	-	7,229
6	2030-31	-	-	-	-	-	-
	Total	12,649	7,779	20,915	869	616	42,828

Table 3-8: Under Construction Transformation Capacity (in MVA)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	12,000	18,500	27,315	1,000	-	58,815
2	2026-27	78,500	70,500	94,100	3,500	1,450	2,48,050
3	2027-28	29,000	27,000	7,185	3,500	-	66,685
4	2028-29	6,000	11,000	-	-	-	17,000
5	2029-30	9,000	1,630	12,630	-	-	23,260
6	2030-31	-	-	-	-	-	-
	Total	1,34,500	1,28,630	1,41,230	8,000	1,450	4,13,810

Table 3-9: Broad estimated cost (in ₹ Cr.) (Under Construction)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	2,006	5,762	14,317	121	592	22,797
2	2026-27	44,403	28,874	65,637	3,420	644	1,42,979
3	2027-28	12,424	4,537	5,383	3,501	259	26,103
4	2028-29	1,713	6,140	-	-	825	8,678
5	2029-30	36,819	6,242	39,667	-	-	82,728
6	2030-31	-	-	-	-	-	-
	Total	₹ 97,365	₹ 51,554	₹ 1,25,004	₹ 7,041	₹ 2,321	₹ 2,83,285

- Summary under **planning/approval/bidding** ISTS network - ckm addition, MVA addition and the broad estimated cost of are tabulated below in **Table 3-10, Table 3-11 & Table 3-12** respectively.

Table 3-10: Under planning/approval/bidding Transmission Lines (in ckm)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	-	-	-	-	-	-
2	2026-27	-	-	-	-	-	-
3	2027-28	640	280	-	1,180	-	2,100
4	2028-29	324	4,305	132	1,332	450	6,543
5	2029-30	3,668	6,510	-	3,424	1,210	14,812
6	2030-31	2,930	-	8,016	-	-	10,946
	Total	7,562	11,095	8,148	5,936	1,660	34,401

Table 3-11: Under planning/approval/bidding Transformation Capacity (in MVA)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	-	-	-	-	-	-
2	2026-27	-	-	-	-	-	-
3	2027-28	21,000	7,500	-	7,500	32	36,032
4	2028-29	9,000	62,000	10,205	4,000	2,000	87,205
5	2029-30	35,500	61,500	-	-	-	97,000
6	2030-31	19,000	-	44,500	200	-	63,700
	Total	84,500	1,31,000	54,705	11,700	2,032	2,83,937

Table 3-12: Broad estimated cost (in ₹ Cr.) (under planning/approval/bidding)

Sl. No.	FY	WR	SR	NR	ER	NER	Total
1	2025-26	-	-	-	-	-	-
2	2026-27	-	-	-	-	-	-
3	2027-28	7,566	2,868	-	6,836	-	17,270
4	2028-29	3,600	25,439	5,649	6,183	2,009	42,880
5	2029-30	28,758	34,146	-	37,981	11,570	1,12,455
6	2030-31	27,917	-	57,644	30	-	85,592
	Total	₹ 67,841	₹ 62,453	₹ 63,293	₹ 51,030	₹ 13,579	₹ 2,58,196

In this Rolling plan a number of schemes have been evolved, region wise summary of the same in terms of ckm addition, MVA addition, the broad estimated cost and MW of ISTS network are tabulated below in **Table 3-13**.

Table 3-13: Rolling Plan Summary

Sl. No.		WR	SR	NR	ER	NER	Total
1	ckm	3,752	9,900	7,640	2,488	450	24,230
2	MVA	47,500	93,500	50,315	13,200	2031.5	2,06,547
3	Cost (in crs.)	30,883	52,800	55,681	16,572	2,009	₹ 1,57,945
4	MW	22,070	41,200	12,000	-	426	75,696

Cumulative ckm and MVA capacity of ISTS network by 2030-31 is depicted in **Figure 3-25**

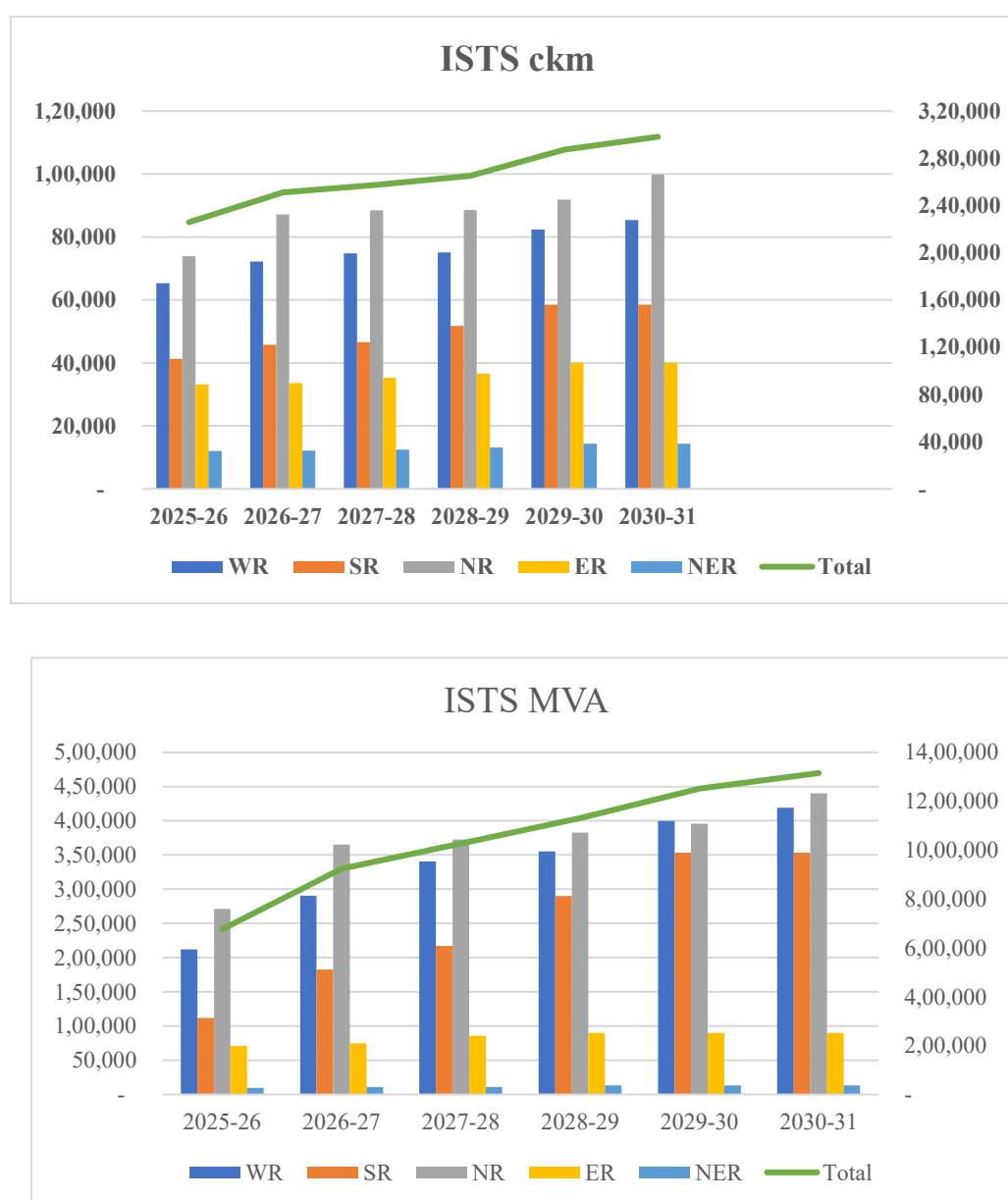


Figure 3-25: Cumulative ckm and MVA of ISTS Network by 2030-31

3.2.2 Inter-Regional (IR) Capacity

The progressive growth in Inter-Regional (IR) transmission capacity from 2014-15 till 2030-31 is given below in **Figure 3-26**. As on Jan'26, IR transmission capacity is about 120 GW which is expected to increase to about 167 GW by 2030-31.

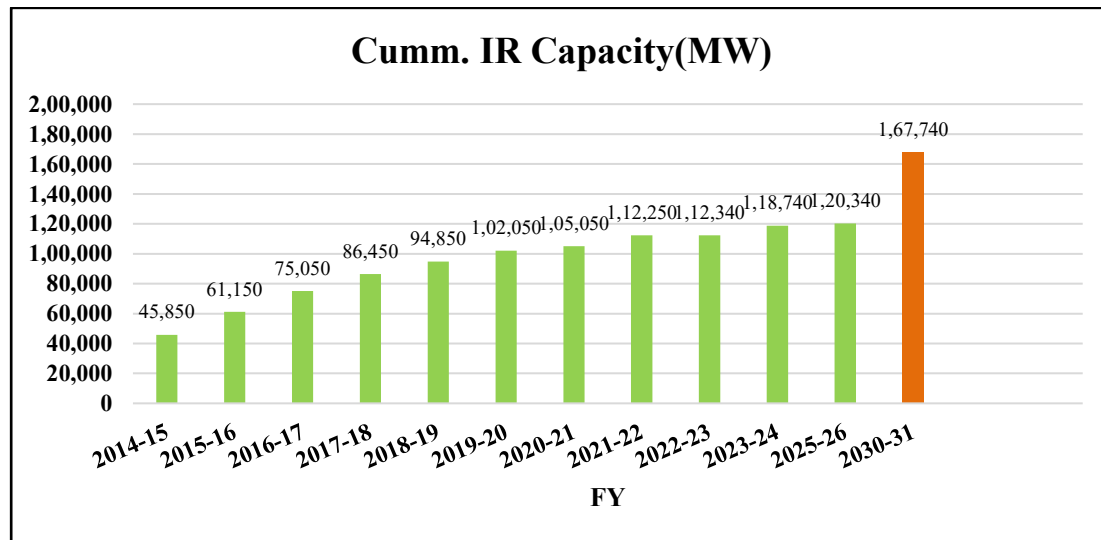


Figure 3-26: IR Capacity

Details of approved Inter Regional corridor capacity are attached at **Annex-3.3** for 2030-31 and the schematic of the same is given below in **Figure 3-27**.

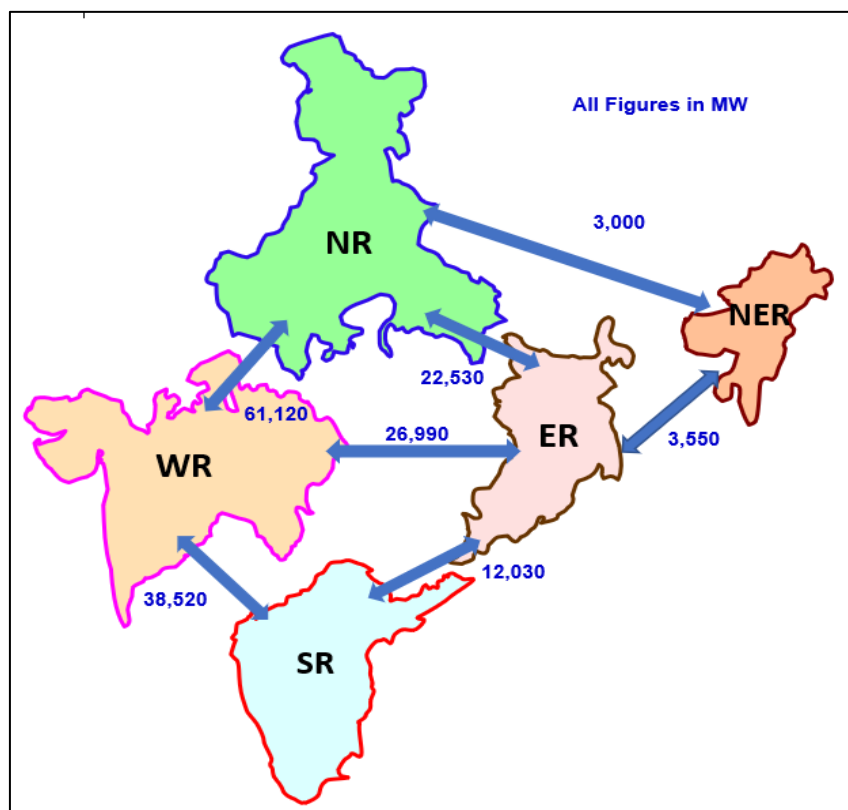


Figure 3-27: Inter-Regional Transmission Capacity by 2030-31

Chapter 4: Northern Region

Northern Region is connected to Western and Eastern Region through 765kV/400kV high-capacity corridors and Back to Back/ HVDC links. The thermal generating stations of Northern Regions are predominantly located in UP, Rajasthan and Haryana whereas hydro generation concentrated into J&K, HP and Uttarakhand. Further, Rajasthan is being a RE rich state comprise of lot of Solar & Wind capacity.

As of now Northern Region imports power from other regions during evening peak load period whereas it will export power to other region in winter during high RE scenario.

4.1 Power Supply Scenario as on Jan'26

As on Jan'2026, total Installed Capacity of Northern Region is about 152 GW, and the peak demand is about 90.8 GW. The state-wise breakup of installed capacity and peak demand is summarised at **Table 4-1** below.

Table 4-1: NR Installed Capacity and Peak Demand as on Jan'26

(All Fig in GW)

(All Fig in Cr)

State	Generation							Grand Total	Peak Demand
	Fossil			Non-Fossil					
	Thermal	Gases	Total	Nuclear	Hydro	RES	Total		
Delhi	3.6	2.0	5.7	0.2	1.1	0.5	1.7	7.4	8.4
Haryana	8.6	0.6	9.2	0.1	2.5	2.9	5.5	14.8	14.1
Himachal Pradesh	0.1	0.0	0.1	0.0	3.7	1.4	5.1	5.3	2.3
Jammu & Kashmir, Ladakh	0.9	0.1	1.0	0.1	2.3	0.3	2.8	3.8	3.4
Punjab	8.2	0.2	8.4	0.2	3.8	2.3	6.4	14.8	16.7
Rajasthan	14.0	0.8	14.7	0.8	2.2	43.4	46.3	61.1	19.6
UP	25.6	1.0	26.6	0.4	3.6	6.2	10.2	36.8	31.5
Uttarakhand	0.7	0.7	1.4	0.0	2.3	1.2	3.6	5.0	2.9
Chandigarh	0.05	0.0	0.05	0.0	0.1	0.1	0.2	0.3	0.5
Central unallocated	1.7	0.3	1.9	0.3	0.9	0.0	1.2	3.2	-
Total	63.4	5.7	69.1	2.2	22.5	58.3	83.1	152.1	90.8

Source: CEA monthly report

From above, it is observed that share of non-fossil fuel-based generation capacity in total present installed capacity (IC) of 152.1 GW is about 83.1 GW i.e. 54.6% of total IC. This share would further increase in envisaged scenario of 2030-31 timeframe.

4.2 Envisaged Power Supply Scenario by 2030-31

As per the 20th EPS, Northern Region demand for 2030-31 timeframe is expected to increase to about 122.1 GW. As per the inputs received from various stakeholders, total installed capacity of Northern Region for 2030-31 is expected to be about 258 GW. The state wise bifurcation of installed capacity and peak demand is summarized below at **Table 4-2**.

Table 4-2: NR Installed Capacity and peak demand (2030-31)

(All Fig in GW)

State	Generation									Peak Demand
	Fossil			Non-Fossil				ESS	Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
Delhi	0.51	1.46	1.97	0	0.00	0.00	0.00	0.0	1.97	11.6
Haryana	5.22	0	5.22	0.00	0.06	0.91	0.98	0.00	6.20	20.6
Himachal Pradesh	0.00	0.00	0.00	0.00	1.38	0.00	1.38	0.00	1.38	3.0
Jammu & Kashmir*	0.00	0.18	0.18	0.00	1.22	0.00	1.22	0.00	1.40	4.5
Punjab	5.68	0	5.68	0.00	1.37	0.00	1.37	0.00	7.05	20.0
Rajasthan	12.41	0.18	12.60	0	0.55	34.94	35.49	8.83	56.91	26.0
UP	29.13	0	29.13	0.00	1.30	11.59	12.88	3.65	45.66	41.9
Uttarakhand	0.00	0.00	0.00	0.00	2.16	0.00	2.16	0	2.16	4.0
Chandigarh	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.5
Central	11.88	1.76	13.64	3.02	14.20	78.15	95.36	5.09	114.10	-
IPP	0.0	0.0	0.0	0.00	4.10	12.00	16.10	3.73	19.84	-
Other RE	0.0	0.0	0.0	0.0	0.0	5.86	5.86	0.0	5.86	-
NR	64.82	3.58	68.41	3.02	26.33	138.94	168.30	21.31	258.01	122.13

From above, it is observed that growth in installed capacity of Northern Region is majorly from non-fossil fuel-based generation, predominantly from RE sources. Share of non-fossil fuel-based generation capacity in total present installed capacity (IC) is expected to be increased from 54.6% to 73.48%. There is a growth in peak demand of Northern Region from present timeframe (2025-26) to 2030-31 with a CAGR of 6.12%. The state wise peak demand growth is given at **Table 4-3**.

Table 4-3: Increase in Peak Demand of Various States of NR

(All Fig in MW)

	Peak Demand			
	2025-26	2030-31 (20 th EPS)	Increase in demand	CAGR (%)
Chandigarh	460	549	89	3.60
Delhi	8,442	11,615	3173.0	6.59
Haryana	14,084	20,648	6564.0	7.95
Himachal Pradesh	2,310	3,087	777.0	5.97
J& K(including Ladakh)	3,325	4,539	1214.0	6.42
Punjab	16,670	20,028	3358.0	3.74
Rajasthan	19,617	26,048	6431.0	5.83
UP	31,486	41,910	10424.0	5.89
Uttarakhand	2,910	4,004	1094.0	6.59
NR	90,772	1,22,134	31,362	6.12

From the above data it is observed that the CAGR growth of peak demand is maximum for Haryana (7.95%) and minimum for Chandigarh (3.60%).

4.3 Load Generation Balance for 2030-31 Timeframe

In Chapter-3, All India Load Generation Balance (LGB) for identified nine scenarios - was prepared as per the methodology finalized in consultation with CTU, CEA and GRID INDIA. This section elaborates the Northern Region Load Generation Balance (LGB) for 2030-31 time-frame. For Northern Region also, three points on the daily load curve i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night) for three seasons viz. Monsoon (August), Summer (June) and Winter (February) have been considered.

Load generation balance has been prepared considering the generation despatch factors as mentioned at **Table 4-4** for the 9 scenarios. Further, thermal generators have been despatched as per the merit order, as elaborated in the Chapter-3 section-3.1.

Table 4-4: Northern Region Generation Dispatch and Demand Factors

Scenario No & Name	Hydro	Nuclear	Solar	Wind	ESS	Gas	Regional DF
1-Aug Solar Max	70%	80%	75%	50%	-100%	0%	85%
2-Aug Peak Load	95%	80%	0%	70%	60%	50%	83%
3-Aug Night Off Peak	70%	80%	0%	60%	40%	50%	57%
4-Jun Solar Max	70%	80%	85%	50%	-100%	0%	98%
5-Jun Peak Load	95%	80%	0%	70%	50%	50%	95%
6-Jun Night Off Peak	70%	80%	0%	60%	1%	50%	64%
7-Feb Solar Max	30%	80%	90%	10%	-100%	0%	73%
8-Feb Peak Load	60%	80%	0%	35%	100%	50%	64%
9-Feb Night Off Peak	30%	80%	0%	10%	40%	30%	44%

Based on the LGB, import / export of NR and the inter-regional flows through various corridors is summarised in subsequent sections. Further, both maximum and minimum import/export is also highlighted in table **Table 4-5** below.

Table 4-5: IR Flows & Surplus/Deficit (Northern Region)

(All Fig in MW)

IR Flows	Aug'30 (Monsoon)			Jun'30 (Summer)			Feb'31 (Winter)		
Scenario No.	1	2	3	4	5	6	7	8	9
	Solar Max	Peak Load	Off Peak	Solar Max	Peak Load	Off Peak	Solar Max	Peak Load	Off Peak
Corridor									
NR-WR	-4158	-19899	-15123	-18128	-25524	-17794	11007	985	1077
NR-ER	612	-748	82	2905	-3394	-1624	4947	-2434	-776
NR-NER	0	0	0	0	0	0	600	0	0
NR-NEPAL	-3018	-3801	-3026	-3035	-3881	-3026	-1318	-2599	-1301
NR	-6564	-24448	-18067	-18258	-32799	-22444	15236	-4048	-1000

Considering the above LGB for nine scenarios, load flow cases were prepared for 2030-31 timeframe. Detailed system studies have been carried out on the finalized load flow cases. The study results are discussed in subsequent sections.

4.4 ISTS Network Expansion Schemes Evolved from March'25 to Feb'26

Various transmission schemes have been discussed/finalized in the Consultative Meeting for Evolution of Transmission System of Northern Region (CMETS-NR) from March 2025 to February 2026. Brief of all such deliberated transmission schemes are tabulated below:

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (MW)	Type of Scheme	Tentative Cost (in Cr.)
Rajasthan					
(i)	Augmentation of 2x500 MVA (7th & 8th), 400/220 kV ICTs along with 220 kV Sectionalizer bay (1 set), 220 kV BC (1 no.) bay and 220 kV TBC (1 no.) bay at Bikaner-IV PS	2026-27	-	RE	122.88
(ii)	Augmentation of Transformation capacity by 1x500MVA, 400/220kV ICT (4th) at 400/220kV Sikar (PG) S/s in Rajasthan	2027-28	-	SS	53.57
(iii)	Implementation of 3 nos. 220kV line bays and 1 no. 400kV line bay for interconnection of REGS at 765/400/220kV Fatehgarh-IV (sec-2) PS	2026-27	-	RE	33.06
(iv)	Augmentation of Transformation capacity at 400/220kV Jaipur South (PG) S/s in Rajasthan by 1x500MVA, 400/220kV ICT (3rd)	2026-27	-	SS	48.96
(v)	Augmentation of transformation capacity at 400/220kV Neemrana (PG) in Rajasthan by 1x500 MVA, 400/220kV ICT (3rd)	2026-27	-	SS	48.96
(vi)	Implementation of 3 nos. of 220 kV line bays for interconnection of M/s Furies Solren Private Limited (300MW) [1 no. bay] & M/s SJVN Green Energy Limited (500MW) [2 no. bays] RE power projects at 765/400/220kV Bikaner-IV PS	2026-27	-	RE	18.54
(vii)	Implementation of 1 no. of 220 kV line bay at 765/400/220kV Barmer-I PS for interconnection of M/s Anboto Solar Private Limited (250MW+50MW) RE power projects	2026-27	-	RE	6.18
(viii)	Implementation of 1 no. 220kV line bay for interconnection of M/s Rajasthan BESS Private Limited (250MW) BESS Project at 765/400/220kV Bhadla-III PS	2026-27	-	RE	10.64
(ix)	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-5:6 GW) [Barmer Complex] Barmer-II: 6GW (Solar)	2030-31	6000	RE	24951.28

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (MW)	Type of Scheme	Tentative Cost (in Cr.)
(x)	Transmission scheme for evacuation of power as part of Rajasthan REZ Ph-IV (Part-6: 6GW) (Bikaner Complex) (Bikaner V: 6GW)	2029-30	6000	RE	29067
(xi)	Augmentation at Bhadla-III, Ramgarh PS and Kanpur (PG)	2028-29	-	RE	1014.62
Jammu and Kashmir					
(i)	Augmentation of Transformation Capacity at 400/220kV New Wanpoh (PG) S/s in Jammu & Kashmir by 400/220kV, 1x315MVA (3x105MVA) ICT (3rd)	2027-28	-	SS	61
Himachal Pradesh					
(i)	Implementation of 2 nos. 220kV line bays (GIS) at 400/220kV Nallagarh (PG) S/s for the termination of 220kV D/c line from 220/132kV Kunihar S/s to Nallagarh S/s	2028-29	-	SS	27.82
Delhi					
(i)	Augmentation of transformation capacity at 400/220kV Maharani Bagh (PG) S/s (GIS) in Delhi by 1x500 MVA, 400/220kV ICT (5th)	2027-28	-	SS	77.59
(ii)	Implementation of 1 no. 400kV ICT bay along with 400kV Sectionalization bay (GIS) at 765/400kV Jhatikara (PG) S/s	2026-27	-	SS	51.88
Uttar Pradesh					
(i)	Augmentation of transformation capacity at 400/220kV Lucknow (PG) S/s in Uttar Pradesh by 1x500 MVA, 400/220kV ICT (3 rd)	2027-28	-	SS	87.10
Total			12000		55681.08

Details of the schemes are reproduced below state-wise:

4.4.1 Rajasthan

- (i) **Augmentation of 2x500 MVA (7th & 8th), 400/220 kV ICTs along with 220 kV Sectionalizer bay (1 set), 220 kV BC (1 no.) bay and 220 kV TBC (1 no.) bay at Bikaner-IV PS**

765/400/220 kV Bikaner-IV Pooling Station (SCoD: Nov'26) is an under implementation RE pooling station with a transformation capacity of 6x1500 MVA (765/400 kV) and 6x500 MVA (400/220 kV). Total 6000 MW connectivity has been granted at Bikaner-IV, comprising 3150 MW at 220 kV and 2850 MW at 400 kV. As per

the Manual on Transmission Planning Criteria 2023, N-1 contingency criteria is to be ensured for ICTs at ISTS/STU pooling stations integrating more than 1000 MW of renewable generation considering RE capacity factors. Accordingly, augmentation of 400/220 kV 2x500 MVA (7th & 8th) ICTs at Bikaner-IV PS were agreed in 36th CMETS-NR meeting held on 15.01.25 & 29th NCT meeting held on 17.04.25. Schematic is also given at **Figure 4-1**.

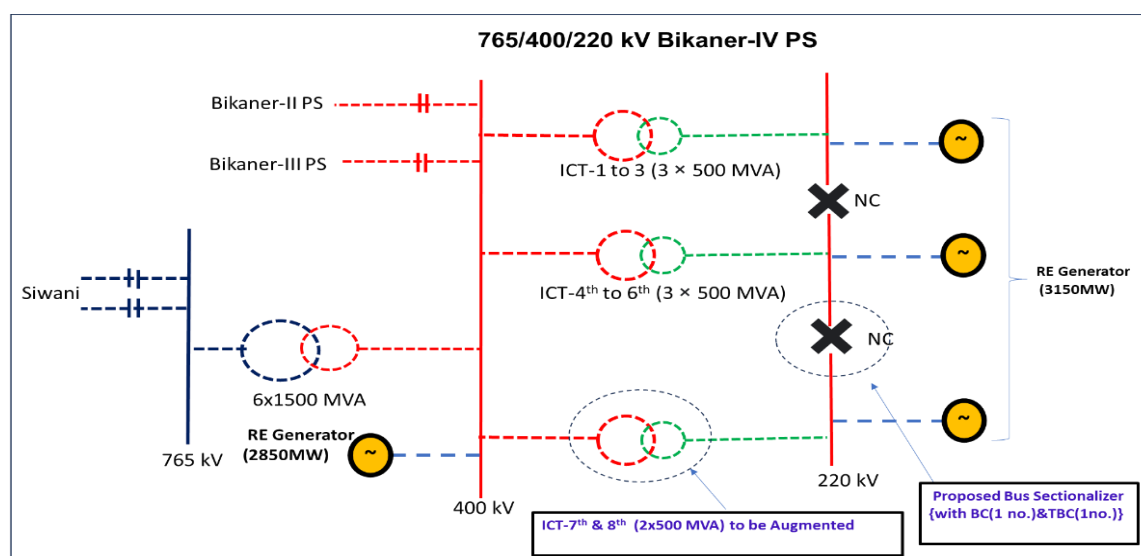


Figure 4-1: Schematic of 765/400/220 kV Bikaner-IV PS

The scheme is under implementation with following details:

Project Name - Augmentation of 2x500 MVA (7th & 8th), 400/220 kV ICTs along with 220 kV Sectionalizer bay (1 set), 220 kV BC (1 no.) bay and 220 kV TBC (1 no.) bay at Bikaner-IV PS.

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Augmentation of 400/220 kV, 2x500 MVA (7 th & 8 th) ICTs at Bikaner-IV PS along with associated transformer bays	- 500 MVA, 400/220 kV ICT - 2 nos. - 400kV ICT bays – 2 nos. - 220 kV ICT bay – 2 nos.
2.	220 kV Sectionalizer bay (1 set), 220 kV BC (1 no.) bay and 220 kV TBC (1 no.) bay at Bikaner-IV PS	- 220 kV Sectionalizer bay: 1 set - 220 kV BC bay: 1 no. - 220 kV TBC bay: 1 no.

Implementation Timeframe: 05.02.2027

Total Estimated Cost: ₹ 122.88 Cr.

(ii) **Augmentation of Transformation capacity by 1x500MVA ,400/220kV ICT (4th) at 400/220kV Sikar (PG) S/s**

N-1 non-compliance of the 400/220 kV ICTs at Sikar (PG) Substation was reported by Grid- India in its operational feedback and noted in the 225th OCC meeting (12.11.2024). Load analysis of the existing ICTs ($1 \times 500 \text{ MVA} + 2 \times 315 \text{ MVA}$) indicates that ICT loading exceeds the N-1 limit of 820 MW during both summer and winter seasons for significant durations, reflecting sustained noncompliance.

The matter was discussed in the 38th CMETS-NR meeting (28.05.2025), wherein RVPN highlighted the need for capacity augmentation considering future load growth and system reliability. Accordingly, installation of an additional 400/220 kV, 500 MVA (4th) ICT at Sikar (PG) Substation was agreed. Schematic is also given at **Figure 4-2**.

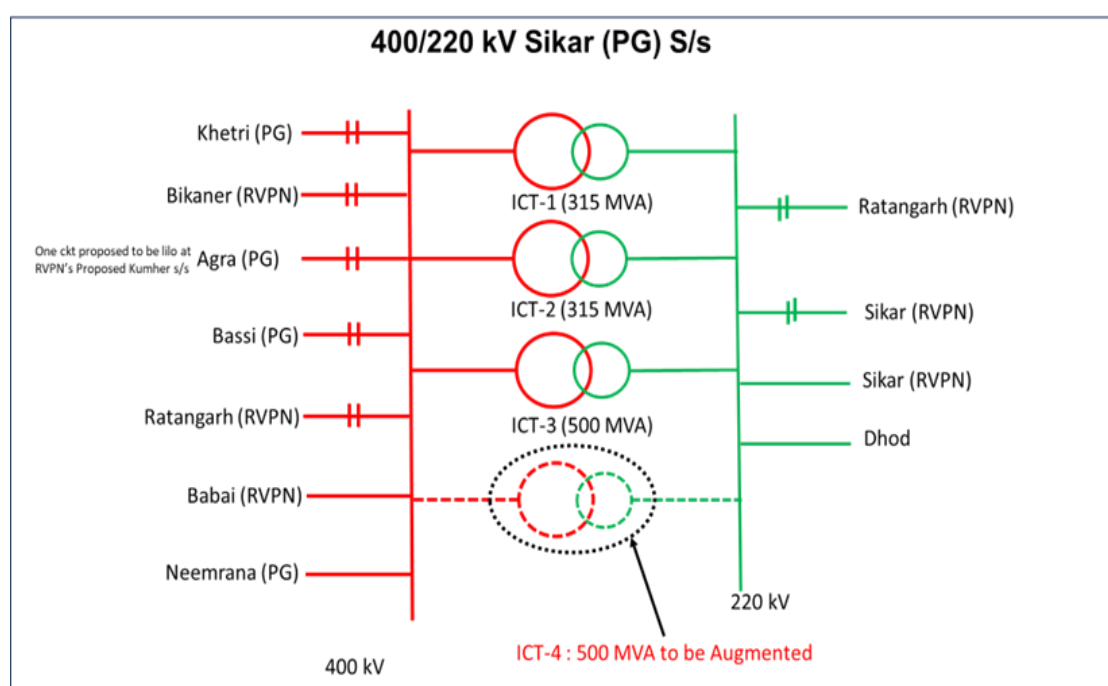


Figure 4-2: Schematic of 400/220 kV Sikar (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of Transformation capacity by 1x500MVA ,400/220kV ICT (4th) at 400/220kV Sikar (PG) S/s

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of Transformation capacity by 400/220 kV, 1x500 MVA (4 th) ICT at 400/220kV Sikar (PG) S/s along with transformer bays.	- 500 MVA, 400/220 kV ICT - 1 No. - 400 kV ICT bay – 1 No. Main Bay (termination in existing spare bay of half diameter)

Sl. No.	Scope of the Transmission Scheme	Capacity/km
		- 220 kV ICT bay – 1 No. - 245 kV, 2500 Sq.mm XLPE cable - 720m (approx.) along with associated cable termination.

Implementation Timeframe: 03.06.2027

Total Estimated Cost: ₹ 53.57 Cr.

(iii) Implementation of 3 nos. 220kV line bays and 1 no. 400kV line bay for interconnection of REGS at 765/400/220kV Fatehgarh-IV (sec-2) PS

In 23rd CMETS-NR held on 29.08.2023, connectivity application of M/s BN Dispatchable was agreed for grant through 1 no. of 220kV line bay at Fatehgarh-IV (Sec-2) PS with bay implementation at Fatehgarh-IV(Sec-2) end under ISTS scope.

In 27th CMETS-NR held on 10.01.2024, connectivity application of M/S NTPC Renewable Energy Limited was agreed for grant through 1 no. of 400kV line bay at Fatehgarh-IV PS(Sec-2) PS under ISTS scope. In 31st CMETS-NR held on 27.06.2024, connectivity application of M/s Avaada and M/s Gamma Renewables was agreed for grant through 1 no. of 220kV line bay each at Fatehgarh-IV (Sec-2) PS with bay implementation of both bays at Fatehgarh-IV (Sec-2) under ISTS scope.

Considering matching implementation timeframes of RE generators and corresponding transmission schemes, implementation of 3 nos. of 220 kV line bays and 1 nos. of 400 kV line bay for above generators at Fatehgarh-IV (Sec-2) PS were taken up. Schematic is also given at **Figure 4-3**.

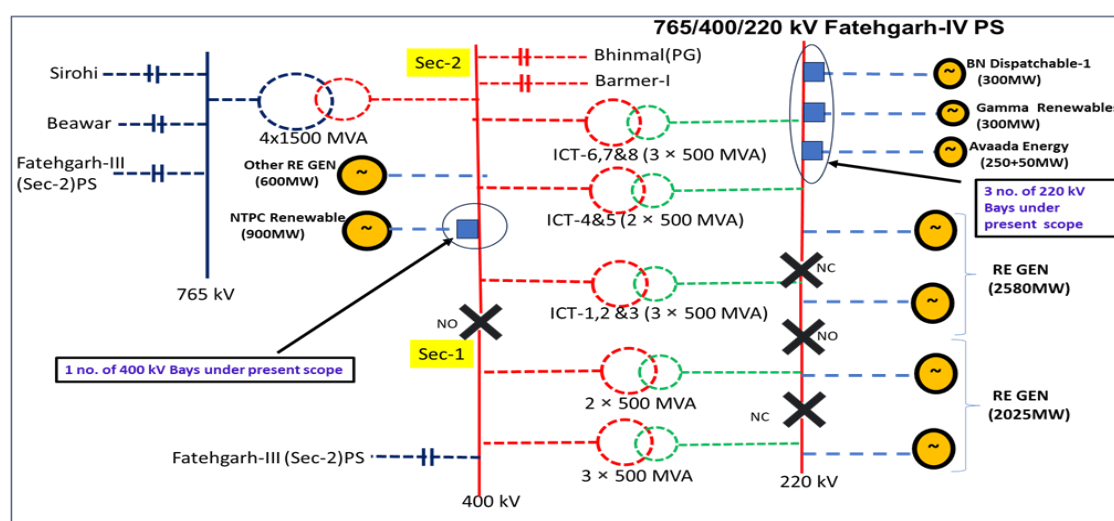


Figure 4-3: Schematic of 765/400/220 kV Fatehgarh-IV (PG) PS

The scheme is under implementation with following details:

Project Name - Implementation of 3 nos. 220kV line bays and 1 no. 400kV line bay for interconnection of REGS at 765/400/220kV Fatehgarh-IV (sec-2) PS

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation Timeframe
1	1 no. of 220 kV line bays at 765/400/220kV Fatehgarh-IV (sec-2) PS for interconnection of 300MW REGS of M/s Avaada Energy Pvt. Ltd. (App. No. 2200000290-250MW & App no. 2200000077-50MW)	220 kV Line Bay (AIS) - 1 no.	07-Nov-2026 (matching with SCOD of Rajasthan REZ Ph-IV (Part-2), Part F transmission scheme)
2	1 no. of 220 kV line bays at 765/400/220kV Fatehgarh-IV (sec-2) PS for interconnection of 300MW REGS of M/s BN Dispatchable-1 Pvt. Ltd. (App. no. 2200000103 - 300MW)	220 kV Line Bay (AIS) - 1 no.	
3	1 no. of 220 kV line bays at 765/400/220kV Fatehgarh-IV (sec-2) PS for interconnection of 300MW REGS of M/s Gamma Renewables India Project One Pvt. Ltd. (App. No. 2200000355-300MW)	220 kV Line Bay (AIS) - 1 no.	30-Dec-2026 (matching with SCOD of Rajasthan REZ Ph-IV (Part-4: 3.5 GW) transmission scheme)
4	1 no. of 400 kV line bay at 765/400/220kV Fatehgarh-IV (sec-2) PS for interconnection 900MW REGS of M/s NTPC Renewable Energy Ltd. (App. no. 2200000348 - 900MW)	400 kV Line Bay (along with associated Tie Bay) (AIS) - 1 No.	

Implementation Timeframe: As mentioned above in detailed scope of scheme

Total Estimated Cost: ₹ 33.06 Cr.

(iv) Augmentation of Transformation capacity at 400/220kV Jaipur South (PG) S/s in Rajasthan by 1x500MVA ,400/220kV ICT (3rd)

POWERGRID vide letter dated 27.08.2024 informed that ICTs at few substations (including Jaipur South S/s) are having high utilization and violating N-1 contingency criteria. POWERGRID also mentioned that Peak Utilization of Jaipur South ICTs observed in May'24 is 77%. Further, in the 225th OCC meeting held on 12.11.2024, NRLDC also highlighted the issue of N-1 non-compliance of 400/220kV ICT at Jaipur South (PG) Substation. Considering above, the proposal for 400/220kV ICT augmentation at Jaipur South (PG) S/s was deliberated & agreed in 36th CMETS-NR meeting held on 15.01.2025. Schematic is also given at **Figure 4-4**.

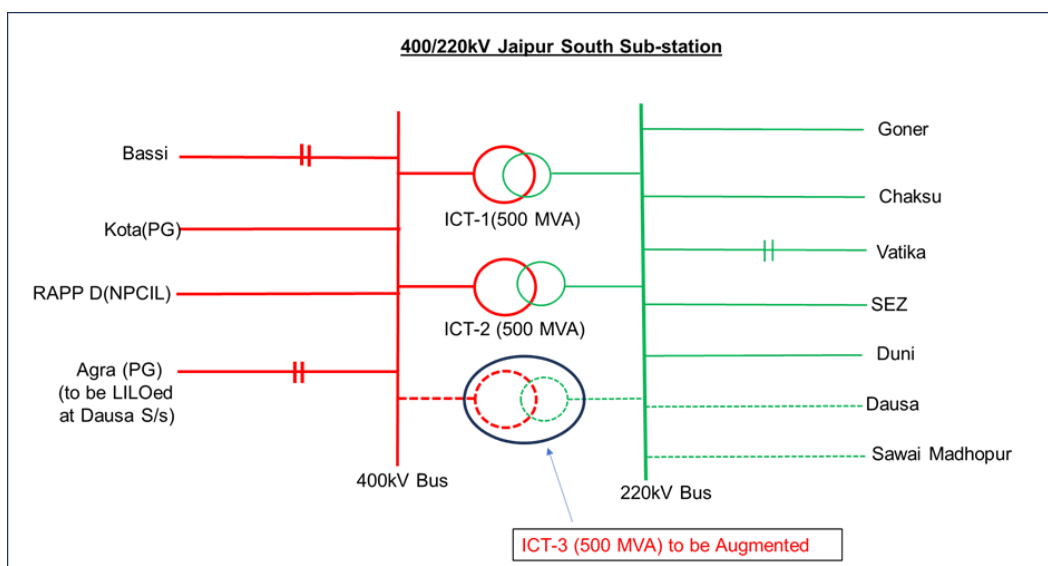


Figure 4-4: Schematic of 400/220 kV Jaipur South (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of Transformation capacity at 400/220kV Jaipur South (PG) S/s in Rajasthan by 1x500MVA ,400/220kV ICT (3rd)

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of transformation capacity at 400/220kV Jaipur South (PG) S/s by 1x500 MVA, 400/220kV ICT (3 rd) along with associated bays	- 500 MVA, 400/220 kV ICT -1 no. - 400 kV ICT bay (in existing diameter) - 1 no. - 220 kV ICT bay- 1 no

Implementation Timeframe: 08.02.2027

Total Estimated Cost: ₹ 48.96 Cr.

(v) Augmentation of transformation capacity at 400/220kV Neemrana (PG) in Rajasthan by 1x500 MVA, 400/220kV ICT (3rd)

POWERGRID vide letter dated 27.08.2024 informed that ICTs in few substations (including Neemrana (PG) S/s) are having high utilization and violating N-1 contingency criteria. POWERGRID also mentioned that Peak Utilization of Neemrana ICTs observed in May'24 is 76%. Further, in 225th OCC meeting held on 12.11.2024, NRLDC also highlighted the issue of N-1 non-compliance of 400/220kV ICT at Neemrana (PG) Substation. Considering above, the 400/220kV ICT augmentation at Neemrana (PG) S/s was agreed in 36th CMETS-NR meeting held on 15.01.2025. Schematic is also given at **Figure 4-5**.

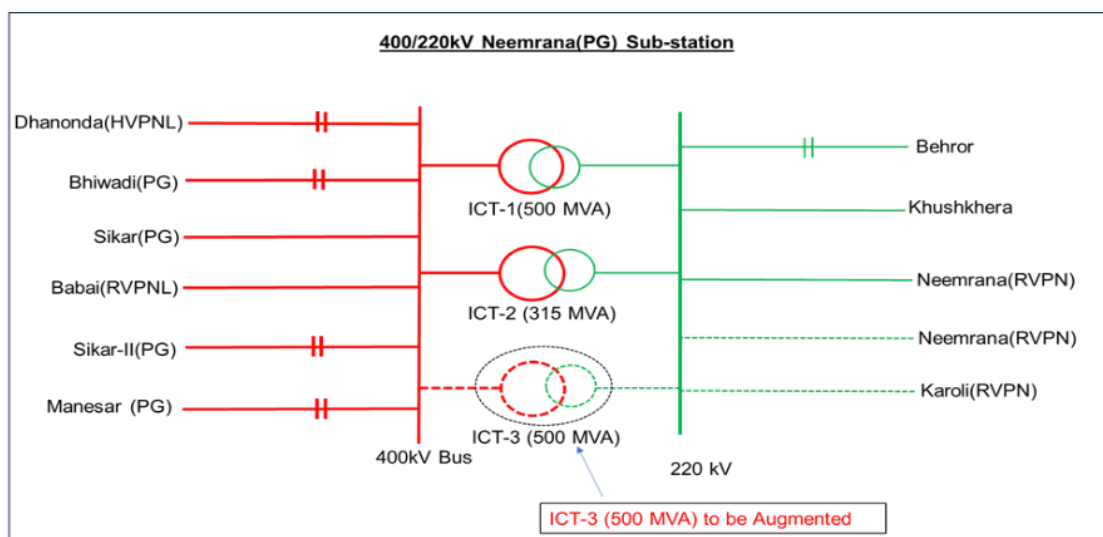


Figure 4-5: Schematic of 400/220 kV Neemrana (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of transformation capacity at 400/220kV Neemrana (PG) in Rajasthan by 1x500 MVA, 400/220kV ICT (3rd).

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of transformation capacity at 400/220kV Neemrana (PG) by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays	- 500 MVA, 400/220 kV ICT -1 no. - 400 kV ICT bay (in existing diameter) - 1 no. - 220 kV ICT bay- 1 no

Implementation Timeframe: 08.02.2027

Total Estimated Cost: ₹ 48.96 Cr.

- (vi) **Implementation of 3 nos. of 220 kV line bays for interconnection of M/s Furies Solren Private Limited (300MW) [1 no. bay] & M/s SJVN Green Energy Limited (500MW) [2 no. bays] RE power projects at 765/400/220kV Bikaner-IV PS**

In 31st CMETS-NR held on 27.06.2024, connectivity application of M/s Furies Solren (300MW) and M/s SJVN Green Energy (500MW) was agreed for grant through 1 no. and 2 nos. of 220kV line bay at Bikaner-IV PS respectively with bay implementation at Bikaner-IV PS end under ISTS scope. Considering matching implementation timeframes of RE generators and corresponding transmission schemes, implementation of 3 nos. of 220 kV line bays for interconnection of M/s Furies Solren and M/s SJVN Green Energy were taken up. Schematic is also given at **Figure 4-6**.



Project Name - Implementation of 3 nos. of 220 kV line bays for interconnection of M/s Furies Solren Private Limited (300MW) [1 no. bay] & M/s SJVN Green Energy Limited (500MW) [2 no. bays] RE power projects at 765/400/220kV Bikaner-IV PS.

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	3 nos. of 220 kV line bays at 765/400/220 kV Bikaner-IV PS (1 no. for M/s Furies Solren Private Limited (300MW) & 2 nos. for M/s SJVN Green Energy Limited (500MW)) for interconnection of its RE power projects	220 kV Line bay- 3 nos.

Total Estimated Cost: ₹ 18.54 Cr.

In 31st CMETS-NR held on 27.06.2024, connectivity application of M/s Anboto Solar (250MW + 50MW) was agreed for grant through 1 no. of 220kV line bay at Barmer-I PS with bay implementation at Barmer-I PS end under ISTS scope.

62 | Page

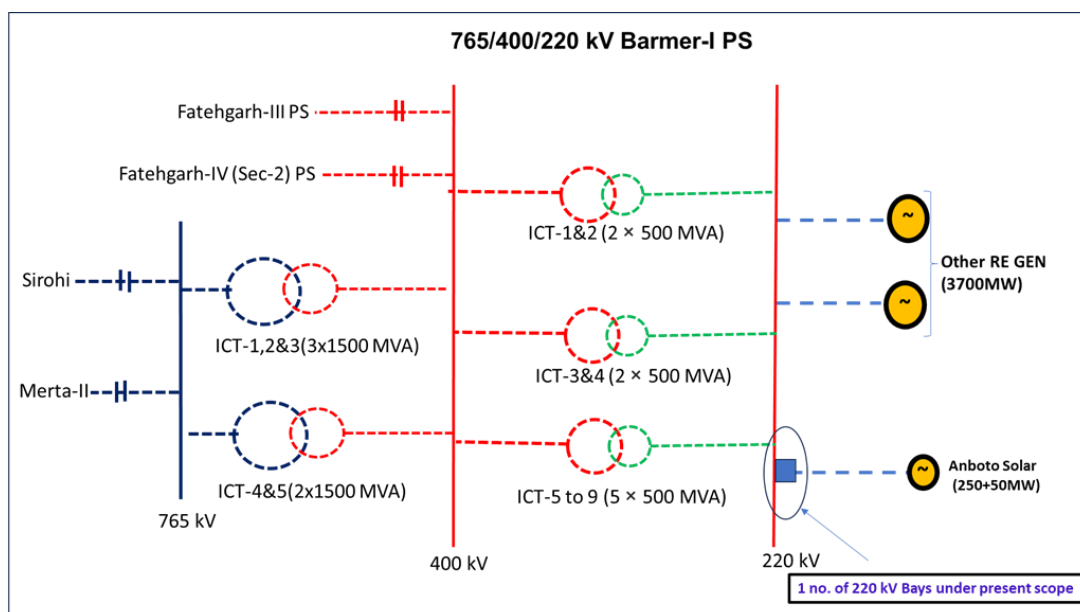


Figure 4-7: Schematic of 765/400/220 kV Barmer-I PS

The scheme is under implementation with following details:

Project Name - Implementation of 1 no. of 220 kV line bay at 765/400/220kV Barmer-I PS for interconnection of M/s Anboto Solar Private Limited (250MW+50MW) RE power projects

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	1 no. of 220 kV line bay for interconnection of M/s Anboto Solar Private Limited (250MW+50MW) RE power projects at 765/400/220kV Barmer-I PS	220 kV Line bay- 1 no.

Implementation Timeframe: 07.11.2026

Total Estimated Cost: ₹ 6.18 Cr.

(viii) Implementation of 1 no. 220kV line bay for interconnection of M/s Rajasthan BESS Private Limited (250MW) BESS Project at 765/400/220kV Bhadla-III PS

In 39th CMETS-NR held on 28.07.2025, connectivity application of M/s Rajasthan BESS (250MW) was agreed for grant through 1 no. of 220kV line bay at Bhadla-III PS with bay implementation at Bhadla-III PS end under ISTS scope.

Considering matching implementation timeframe of RE generator and corresponding transmission schemes, implementation of 1 no. of 220 kV line bay for interconnection of M/s Rajasthan BESS at Bhadla-III PS was taken up. Schematic is also given at **Figure 4-8**.

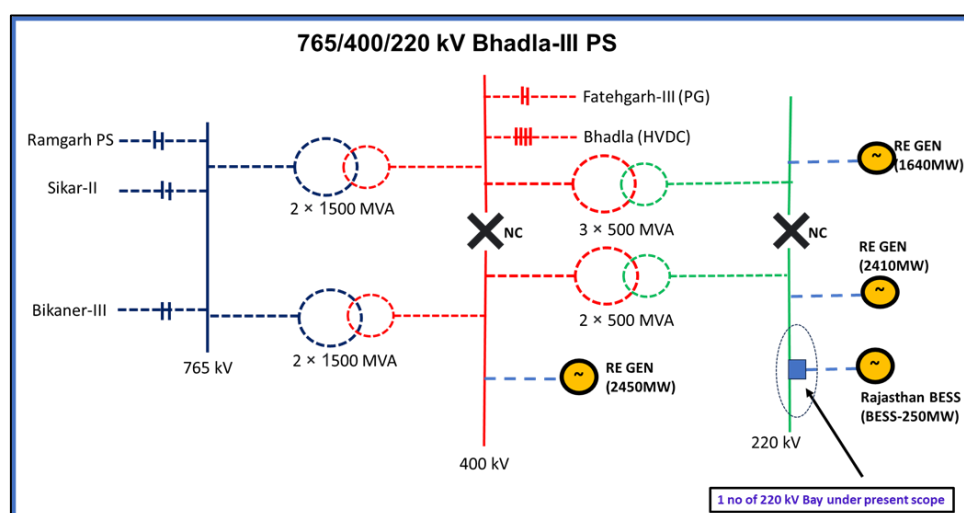


Figure 4-8: Schematic of 765/400/220 kV Bhadla-III PS

The scheme is under implementation with following details:

Project Name - Implementation of 1 no. 220kV line bay for interconnection of M/s Rajasthan BESS Private Limited (250MW) BESS Project at 765/400/220kV Bhadla-III PS

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	1 No. of 220 kV line bay for interconnection of M/s Rajasthan BESS Private Limited (250MW) RE power projects at 765/400/220 kV Bhadla-III PS	220 kV Line bay- 1 no.
2	Associated Bus extension works	Bus extension works for 10 days.

Implementation Timeframe: 25.02.2027

Total Estimated Cost: ₹ 10.64 Cr.

(ix) Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-5 :6 GW) [Barmer Complex] Barmer-II: 6GW (Solar)

MNRE/SECI identified 75 GW REZ (as part of target of 500GW) capacity in Rajasthan (15 GW Wind, 60 GW Solar), of which 13 GW as planned in the Fatehgarh (5 GW) and Barmer (8 GW) complexes. In joint study meetings on 28.12.2023 and 09.01.2024, CTU indicated that BarmerII PS was planned for 6 GW RE potential, including 2 GW BESS, with 4 GW evacuation capacity. However, in the 27th CMETSNR meeting (10.01.2024), SECI indicated that RE projects with BESS are unlikely before 2027 as award process will take time (1-2 years), resulting in 7.5 GW solar potential remaining untapped due to nonavailability of BESS. Accordingly, planning for additional 2 GW RE potential from BarmerII PS was suggested.

Detailed scope of the scheme is given below:

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
1	Establishment of 400/220kV, 6x500MVA S/s at suitable location near Barmer (Barmer-II Substation) along with 2x125 MVAR bus reactor <u>Future provisions (excl. scope of present scheme):</u> ➤ 400 kV line bays along with switchable line reactor –6 ➤ 400 kV line bays –4 nos. ➤ 400 kV Bus Reactor along with bays: 1 no. ➤ 400/220 kV ICT along with bays-4 Nos. ➤ 400 kV Sectionalization bays: 2 sets ➤ 220 kV line bays for connectivity of RE Applications -5 Nos. ➤ 220kV Sectionalization bay: 2 sets ➤ 220 kV BC (2 Nos.) & TBC (2 Nos.) ➤ 2 nos. of Syncon units* at 400kV level along with 2 nos. of 400kV bays ➤ STATCOM (2x+300 MVAR, 4x125 MVAR MSC, 2x125 MVAR MSR) along with 400 kV bays (2 Nos.) *(1 No. of SynCon unit comprises dynamic support of +300 MVAR/ -200 MVAR (Minimum) & Short circuit contribution at PCC of 1200 MVA (Minimum)) (Value of inertia (MW-secs) shall be provided in RfP document)	Barmer-II PS - AIS - 400/220 kV 500 MVA ICTs- 6 nos. - 400 kV ICT bays- 6 no. - 220 kV ICT bays- 6 no. - 125 MVAR Bus Reactor-2 nos. - 400 kV Bus reactor bays- 2 no. - 400kv line bays– 4 nos. (for RE interconnection) - 220KV line bays – 7 nos. (for RE connectivity) - 220kV Sectionalization bay: 1 set - 220 kV BC (2 Nos.) & TBC (2 Nos.) - 400 kV sectionalizer bay- 1 Set
2	LILO of both ckts of 400kV Fatehgarh-IV PS - Barmer-I PS at Barmer-II PS	Line Length ~ 10 km (LILO length ~ 10 km) - 400 kV line bays-4 nos. (at Barmer-II PS end)
3	400kV Barmer-II PS - Barmer-I PS D/c line (Quad)	Line Length – (~30 km) - 400 kV line bays at Barmer-II PS – 2 nos. - 400 kV line bays at Barmer-I PS S/s – 2 nos.
4	Establishment of 6000 MW, $\pm$ 800 kV Barmer-II (HVDC) [LCC] terminal station	HVDC terminal station ($\pm$ 800 kV, 3000 MW (Bipole configuration)- 2nos.)

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	(4x1500 MW) at a suitable location near Barmer-II substation	
5	Establishment of 6000MW, $\pm$ 800kV South Kalamb S/s (HVDC) [LCC] terminal station (4x1500 MW) at a suitable location near South of Kalamb	HVDC terminal station ($\pm$ 800 kV, 3000 MW (Bipole configuration)- 2nos.)
6	$\pm$ 800 kV HVDC Bipole line (Hexa lapwing) between Barmer-II (HVDC) & South Kalamb (HVDC) (with parallel Dedicated Metallic Return) (capable to evacuate 6000MW) [with 100% reverse power capability]	Line Length – (~900 km)
7	Augmentation of South Kalamb S/s# by 4x1500 MVA, 765/400 kV ICTs (3 on 400 kV & 765 kV Section-II & 1 No. on 400 kV & 765 kV Section-I) along with 2x330 MVAR, 765 kV bus reactor & 2x125 MVAR, 420 kV bus reactor on Section-II. The Section-II will be established under a different network expansion scheme in WR as per details given below* (2x1500 MW HVDC Bipole-I to be terminated on 400 kV Sec-I & 2x1500 MW HVDC Bipole-II to be terminated on 400 kV Sec-II of South Kalamb S/s & 765 kV bus sectionalizer to be kept normally closed & 400 kV bus sectionalizer to be kept normally open)	- 765/400 kV 1500 MVA ICTs- 4 nos. - 765 kV ICT bays- 4 no. - 400 kV ICT bays- 4 no - 330 MVar Bus Reactor-2 nos. (at bus section-II) - 765 kV Bus reactor bays- 2 nos. (at bus section-II) - 125 MVar Bus Reactor-2 nos. (at bus section-II) - 400 kV Bus reactor bays- 2 nos. (at bus section-II)
8	2 nos. of Syncon* units at 400kV level of Barmer-II PS (1 no. of SynCon unit comprises dynamic support of +300MVar/-150MVar (Minimum) & Short circuit contribution at PCC of 1200MVA (Minimum) * Value of inertia constant (H) shall be provided in RfP document.	- Syncon units – 2 nos. - 400kV line bays – 2nos.

#South Kalamb S/s establishment with 2x1500 MVA, 765/400 kV ICTs with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor along with LILO of Pune-III – Boisar-II 765 kV D/c line (presently under bidding stage).

* Network Expansion Scheme: Creation of New 765 kV & 400 kV Bus Sections-II & III through 765 kV Sectionalization bay: 2 sets & 400 kV Sectionalization bay: 2 sets along with 2x330 MVAR, 765 kV bus reactor & 2x125 MVAR, 420 kV bus reactor on Section-III is being proposed along with ICT augmentation (3x1500 MVA, 765/400 kV ICTs) at Bus Section -III at both 765 kV & 400 kV levels

along with downstream 400 kV lines at bus section-III from South Kalamb S/s with implementation Timeframe of 24 months from effective date. [400 kV Sectionaliser between Sections-I & II & between sections-II & III to be normally open. Further, 765 kV sectionaliser between Sections-I & II & between II & III shall be kept normally closed. The 400 kV sectionalisers can be closed under contingency conditions.].

Implementation Timeframe: 54 months from SPV transfer (Pole-1: 48 months, Pole-2: 54 months)

Total Estimated Cost: ₹ 24951.28 Cr.

(x) Transmission scheme for evacuation of power as part of Rajasthan REZ Ph-IV (Part-6: 6GW) (Bikaner Complex) (Bikaner V: 6GW)

Transmission scheme evolved for evacuation of 6GW RE power from Bikaner complex (Bikaner V PS) in Rajasthan to various load centres (i.e. Punjab, Haryana, U.P.) of Northern region. Subject scheme was agreed in 40th CMETS-NR meeting held on 12.09.2025 & 47th CMETS-ER meeting held on 29.09.2025, 55th TCC & ERPC meeting held on 16th -17th Dec'25, Special meeting of NRPC held on 23.02.26. The transmission scheme has been deliberated in the 39th NCT meeting held on 17.03.2026 wherein it was decided to take up the scheme in next NCT meeting. Schematic is also given at **Figure 4-10**.



Figure 4-10: Transmission scheme for evacuation of power as part of Rajasthan REZ Ph-IV (Part-6 : 6GW) (Bikaner Complex) (Bikaner V:6GW)

Detailed scope of the scheme is given below:

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
1	Establishment of 765/400 kV, 6x1500 MVA & 400/220 kV, 10x500 MVA Bikaner-V Pooling Station along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors at a suitable location near Bikaner <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400/220 kV ICT along with bays-2 Nos. ➤ 400 kV Sectionalization bays: 1 set ➤ 220 kV line bays for connectivity RE Applications -4 Nos. ➤ 220kV Sectionalization bay: 2 sets ➤ 220 kV BC (2 Nos.) & TBC (2 Nos.) ➤ 1 No. of Syncon units* at 400kV level along with 1 nos. of 400kV bay <i>*1 No. of SynCon unit comprises dynamic support of +300MVar/-200MVar (Minimum) & Short circuit contribution at PCC of 1200MVA (Minimum)) (Value of inertia (MW-secs) shall be provided in RfP document)</i>	Bikaner-V PS - AIS - 765/400 kV 1500 MVA ICTs- 6 Nos. (19x500 MVA including one spare unit) - 400/220 kV 500 MVA ICTs- 10 Nos. - 765kV line bays – 4 nos. (for 765kV interconnection with Pallu S/s) - 400kV line bays – 4 nos. (for 400kV interconnection with LILO of one D/c of 400kV Bikaner II PS- Khetri 2xD/c line) - 765kV ICT bays – 6 nos. - 400 kV ICT bays- 16 Nos. - 220 kV ICT bays - 10 Nos. - 240 MVar Bus Reactor-2 Nos. (7x80 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos. - 400kV line bays– 3 Nos. (for RE interconnection) - 220kV line bays – 10 Nos. (for RE interconnection) - 220kV Sectionalization bay: 1 set - 220 kV BC (2 Nos.) & TBC (2 Nos.) - 400kV sectionaliser bay- 1 Set
2	STATCOM (2x±300MVar) along with MSC (4x125 MVar) & MSR (2x125 MVar) at Bikaner-V PS	- STATCOM (2x+300MVar) along with MSC (4x125 MVar) & MSR (2x125 MVar) - 400 kV bays: 2 Nos. (for STATCOM)
3	LILO of one double ckt of 400kV Bikaner II PS-Khetri (Twin HTLS) 2xD/c line at Bikaner-V PS along with 50 MVar switchable line reactor for each circuit at Bikaner-V PS end of 400kV Bikaner-V-Khetri section	Length-28km (Quad) (LILO length) - 420 kV, 50 MVar switchable line reactors at Bikaner-V PS end– 2 Nos. - Switching equipment for 420kV, 50MVar switchable line reactors at Bikaner-V PS end – 2 Nos.
4	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Pallu (Distt. Hanumangarh)	Pallu S/s - AIS

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –2 nos. ➤ 765/400 kV 1500 MVA ICTs- 2 Nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400 kV Sectionalization bays: 1 set ➤ 400/220 kV ICT along with bays-5 Nos. ➤ 220 kV line bays -8 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (2 Nos.) & TBC (2 Nos.) ➤ 2 No. of Syncon units* at 220kV level along with 2 nos. of 220kV bay <i>*1 No. of SynCon unit comprises dynamic support of +300MVar/-200MVar (Minimum) & Short circuit contribution at PCC of 1200MVA (Minimum)) (Value of inertia (MW-secs) shall be provided in RfP document)</i>	- 765/400 kV 1500 MVA ICTs- 2 Nos. (7x500 MVA including one spare unit) - 765kV line bays – 12 nos. (for 765kV 2xD/c interconnection each with Bikaner-V PS, Panipat S/s and LILO of both ckts of 765kV Bikaner – Moga D/c line) - 400kV line bays – 2 nos. (for 400kV interconnection with Hanumangarh S/s) - 765kV ICT bays – 2 nos. - 400 kV ICT bays- 2 Nos. - 240 MVar Bus Reactor-2 Nos. (7x80 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos.
5	765 kV Bikaner-V PS – Pallu 2xD/c line	Line Length -135 km
6	LILO of both ckts of 765kV Bikaner – Moga D/c line at Pallu S/s along with 240MVar switchable line reactor for each circuit at Pallu S/s end of 765kV Pallu-Moga D/c line	Length-10 km (LILO length) - 765 kV, 240 MVar switchable line reactors at Pallu S/s end– 2 Nos. - Switching equipment for 765kV, 240MVar switchable line reactors at Pallu S/s end – 2 Nos.
7	400 kV Pallu – Hanumangarh (RVPN) D/c (Quad) line	Line Length -92 km - 400kV line bays – 2 nos. (at Hanumangarh (RVPN) S/s)
8	Establishment of 765/400 kV, 3x1500 MVA S/s at suitable location near Panipat (Distt. Panipat) along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –4 nos.	Panipat S/s - AIS - 765/400 kV 1500 MVA ICTs- 3 Nos. (10x500 MVA including one spare unit) - 765kV line bays –8 nos. (for 765kV 2xD/c interconnection each with Pallu S/s and Bulandshahr S/s)

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	➤ 765/400 kV 1500 MVA ICTs- 3 Nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400 kV Sectionalization bays: 1 set ➤ 400/220 kV ICT along with bays-5 Nos. ➤ 220 kV line bays -8 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (2 Nos.) & TBC (2 nos.) ➤ STATCOM (2x±300MVar) along with MSC (4x125 MVar) & MSR (2x125 MVar) along with 400kv bays (2nos.)	- 400kV line bays – 4 nos. (for 400kV interconnection with Mohali and Mandola S/s) - 765kV ICT bays – 3 nos. - 400 kV ICT bays- 3 Nos. - 240 MVar Bus Reactor-2 Nos. (7x80 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos.
9	765 kV Pallu-Panipat 2xD/c line along with 240 MVar switchable line reactor for each circuit at each end	Length-260 km - 765 kV, 240 MVar switchable line reactors at Pallu S/s end– 4 Nos. - 765 kV, 240 MVar switchable line reactors at Panipat S/s end– 4 Nos. - Switching equipment for 765kV, 240MVar switchable line reactors at Pallu S/s end – 4 Nos. - Switching equipment for 765kV, 240MVar switchable line reactors at Panipat S/s end – 4 Nos.
10	Establishment of 400/220kV, 4x500 MVA S/s at suitable location near Mohali (Distt. Mohali district) along with 2x125 MVar (420kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –2 Nos. ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400/220 kV ICT along with bays-3 Nos. ➤ 400 kV Sectionalization bays: 1 set ➤ 220 kV line bays -4 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (1 Nos.)	Mohali S/s - GIS - 400kV line bays – 4 nos. (for 400kV interconnection with Panipat S/s & LILO of one circuit of 400kV Patiala-Panchkula D/c line) - 400/220kV ICTs – 4 nos. - 400kV ICT bays – 4 nos. - 220 kV ICT bays- 4 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos. - 220 kV line bays -6 Nos. - 220kV Bus Coupler bay-1 No. <i>400/220 ICTs and 220kV bays are implemented to meet PSTCL drawl requirement</i>

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	➤ STATCOM (2x±300MVar) along with MSC (4x125 MVar) & MSR (2x125 MVar) along with 400kv bays (2nos.)	
11	LILO of one circuit of 400kV Patiala-Panchkula D/c line at Mohali (Twin HTLS*) <i>* with minimum capacity of 2100 MVA on each circuit at Nominal voltage</i>	Length-20 km (LILO length) (Twin HTLS)
12	Reconductoring of 400kV Patiala – Mohali section (upto LILO point) with twin HTLS line * <i>* with minimum capacity of 2100 MVA on each circuit at Nominal voltage</i>	Line Length-30km
13	400 kV Panipat S/s – Mohali D/c (Quad Moose) line along with 80 MVar (420kV) switchable line reactor for each circuit at Mohali end	Line Length-160km (Quad) - 420 kV, 80 MVar switchable line reactors at Mohali S/s end– 2 Nos. - Switching equipment for 420kV, 80MVar switchable line reactors at Mohali S/s end – 2 Nos.
14	400 kV Panipat S/s – Mandola D/c (Quad) line	Line Length-70km (Quad) - 400kV line bays at Mandola S/s – 2 nos.
15	Establishment of 765 kV S/s at suitable location near Bulandshahr (Distt. Bulandshahr) along with 2x330 MVar (765kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –4 nos. ➤ 765/400 kV 1500 MVA ICTs- 4 Nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400 kV Sectionalization bays: 1 set ➤ 400/220 kV ICT along with bays-5 Nos. ➤ 220 kV line bays -8 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (2 Nos.) & TBC (2 nos.)	Bulandshahr S/s – AIS - 765kV line bays –10 nos. (for 765kV 2xD/c interconnection with Panipat S/s, 765kV D/c interconnection with Lucknow-II S/s & Noida sec-148 (UPPTCL) S/s and LILO of 765kV Aligarh – Gr. Noida line) - 330 MVar Bus Reactor-2 Nos. (7x110 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos.

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	➤ STATCOM (2x±300MVar) along with MSC (4x125 MVar) & MSR (2x125 MVar) along with 400kv bays (2nos.)	
16	765 kV Panipat- Bulandshahr 2xD/c line along with 240 MVar switchable line reactor for each circuit at Bulandshahr end	Line Length-155 km - 765 kV, 240 MVar switchable line reactors at Bulandshahr S/s end– 4 Nos. - Switching equipment for 765kV, 240MVar switchable line reactors at Bulandshahr S/s end – 4 Nos. - 1x80 MVar, 765kv reactor spare unit
17	LILO of 765kV Aligarh – Gr. Noida line at Bulandshahr S/s	Length-35 km (LILO length)
18	765kV Bulandshahr - Noida sec-148 (UPPTCL) D/c line	Line Length- 65 km - 765kV line bays at Noida sec-148 S/s(UPPTCL) – 2 nos.
19	Establishment of 765/400 kV, 2x1500 MVA Lucknow-II S/s at suitable location near Lucknow along with 2x330 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –8 nos. ➤ 765/400 kV 1500 MVA ICTs- 4 Nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400 kV Sectionalization bays: 1 set ➤ 400/220 kV ICT along with bays-5 Nos. ➤ 220 kV line bays -8 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (2 Nos.) & TBC (2 nos.) ➤ 2 No. of Syncon units* at 400kV level along with 2 nos. of 400kV bays <i>*1 No. of SynCon unit comprises dynamic support of +300MVar/-200MVar (Minimum) & Short circuit contribution at PCC of 1200MVA</i>	Lucknow-II S/s – AIS - 765/400 kV 1500 MVA ICTs- 2 Nos. (7x500 MVA including one spare unit) - 765kV line bays –4 nos. (for 765kV D/c interconnection each with Asana & Bulandshahr S/s) - 400kV line bays – 2 nos. (for 400kV interconnection with Gonda (UPPTCL) S/s) - 765kV ICT bays – 2 nos. - 400 kV ICT bays- 2 Nos. - 330 MVar Bus Reactor-2 Nos. (7x110 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos.

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	<i>(Minimum)) (Value of inertia (MW-secs) shall be provided in RfP document)</i>	
20	765 kV Bulandshahr – Lucknow-II D/c line along with 330 MVar switchable line reactor for each circuit at each end	Line Length- 330km - 765 kV, 330 MVar switchable line reactors at Bulandshahr S/s end– 2 Nos. - Switching equipment for 765kV, 330MVar switchable line reactors at Bulandshahr S/s end – 2 Nos. - 765 kV, 330 MVar switchable line reactors at Lucknow-II S/s end– 2 Nos. - Switching equipment for 765kV, 330MVar switchable line reactors at Lucknow-II S/s end – 2 Nos.
21	400 kV Lucknow-II – Gonda D/c (Quad Moose) line	Line Length- 150km • 400kV line bays at Gonda S/s(UPPTCL) – 2 nos.
22	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Asana Village (Chandauli District) along with 2x330 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors <u>Future provisions (excl. scope of present scheme):</u> ➤ 765 kV line bays along with switchable line reactor –6 nos. ➤ 765/400 kV 1500 MVA ICTs- 4 Nos. ➤ 400 kV line bays along with switchable line reactor –4 nos. ➤ 400 kV line bays –4 Nos. ➤ 765 kV Bus Reactor along with bays: 1 No ➤ 400 kV Bus Reactor along with bays: 1 No. ➤ 400 kV Sectionalization bays: 1 set ➤ 400/220 kV ICT along with bays-5 Nos. ➤ 220 kV line bays -8 Nos. ➤ 220kV Sectionalization bay: 1 set ➤ 220 kV BC (2 Nos.) & TBC (2 nos.) ➤ 2 No. of Syncon units* at 400kV level along with 2 nos. of 400kV bays <i>*1 No. of SynCon unit comprises dynamic support of +300MVar/-200MVar (Minimum) & Short circuit contribution at PCC of 1200MVA</i>	Asna (Chandauli) S/s – AIS - 765/400 kV 1500 MVA ICTs- 2 Nos. (7x500 MVA including one spare unit) - 765kV line bays –4 nos. (for 765kV D/c interconnection each with Lucknow-II S/s & Nawada) - 400kV line bays – 4 nos. (for LILO of both ckts of 400kV Varanasi – Biharsharif D/c line) - 765kV ICT bays – 2 nos. - 400 kV ICT bays- 2 Nos. - 330 MVar Bus Reactor-2 Nos. (7x110 MVar, including one spare unit) - 765 kV Bus reactor bays-2 Nos. - 125 MVar Bus Reactor-2 Nos. - 400 kV Bus reactor bays- 2 Nos.

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation/Conductor capacity/km/no. of bays etc.)
	<i>(Minimum)) (Value of inertia (MW-secs) shall be provided in RfP document)</i>	
23	765 kV Lucknow-II-Asana D/c line along with 330 MVAR switchable line reactor for each circuit at each end	Line Length- 350km - 765 kV, 330 MVAR switchable line reactors at Asana S/s end– 2 Nos. - Switching equipment for 765kV, 330MVAR switchable line reactors at Asana S/s end – 2 Nos. - 765 kV, 330 MVAR switchable line reactors at Lucknow-II S/s end– 2 Nos. - Switching equipment for 765kV, 330MVAR switchable line reactors at Lucknow-II S/s end – 2 Nos.
24	LILO of both ckts of 400kV Varanasi – Biharsharif D/c line at Asana S/s along with 80 MVAR switchable line reactor for each circuit at Asana end of 400kV Asana- Biharsharif section	Length-35km (LILO length) - 420 kV, 80 MVAR switchable line reactors at Asana S/s end– 2 Nos. - Switching equipment for 420kV, 80MVAR switchable line reactors at Asana S/s end – 2 Nos.
25	Asana – Nawada 765kV D/c line along with 330MVAR switchable line reactors in each circuits at Asana end	Line Length - 215km - 765 kV, 330 MVAR switchable line reactors at Asana S/s end– 2 Nos. - Switching equipment for 765kV, 330MVAR switchable line reactors at Asana S/s end – 2 Nos.

Implementation time frame: 36 months from allocation of project (Tentative)

Estimated Cost: ₹ 29000 Crore (Tentative)

(xi)Augmentation at Bhadla-III, Ramgarh PS and Kanpur (PG)

Augmentation of 400/220 kV, 5x500 MVA (6th to 10th) ICTs at 765/400/220kV Bhadla-III PS, 765/400 kV, 2x1500 MVA (3rd & 4th) ICTs at 765/400kV Ramgarh PS and 765/400 kV, 1x1500 MVA (3rd) ICT at Kanpur (GIS) was deferred earlier considering to approve in matching with implementation of Bhadla–Fatehpur HVDC.

Since, Bhadla–Fatehpur HVDC is now under implementation with implementation schedule of Jan-29 (Pole-1), augmentation at BhadlaIII PS, Ramgarh PS and Kanpur (PG) was agreed in the 41st CMETS-NR (10.10.2025) and approved in the 37th NCT meeting (19.01.2026). Schematic is also given at **Figure 4-11, Figure 4-12 and Figure 4-13.**

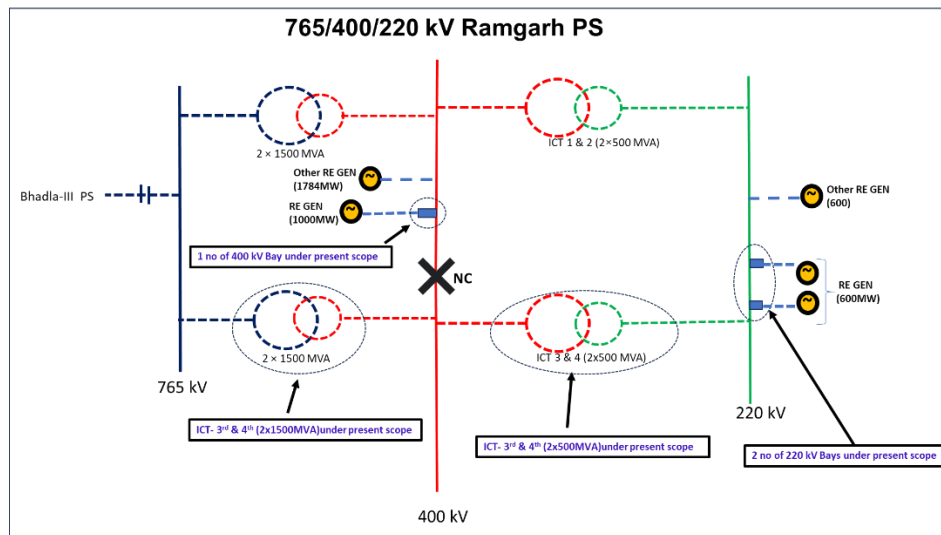


Figure 4-11: Schematic of 765/400/220kV Ramgarh PS

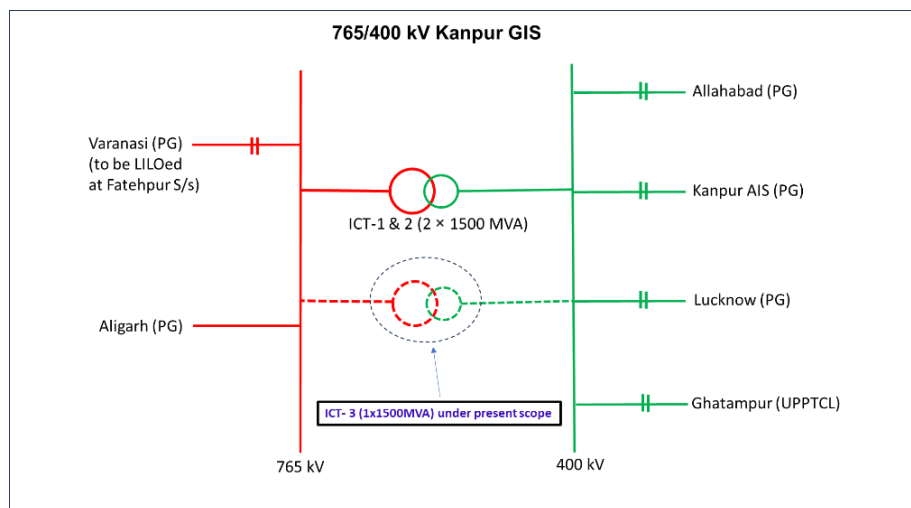


Figure 4-12: Schematic of 765/400kV Kanpur S/s

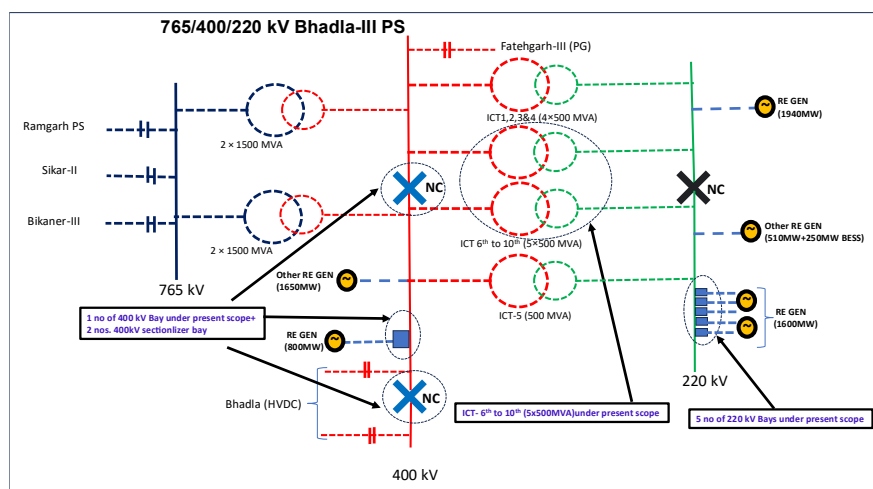


Figure 4-13: Schematic of 765/400/220kV Bhadla-III PS

The scheme is under implementation with following details:

Project Name- Augmentation at Bhadla-III, Ramgarh PS and Kanpur (PG)

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Item Description	Estimated Cost
1.	Augmentation of 400/220 kV, 5x500 MVA (6 th to 10 th) ICTs at 765/400/220kV Bhadla-III PS	- 500 MVA, 400/220 kV ICT - 5 nos. - (4 nos. ICTs in 220kV Sec-2 (6th to 9th) and 1 no. ICT in 220kV Sec-1 (10th)) - 400kV ICT bays – 5 nos. - 220 kV ICT bay – 4 nos. - 220 kV ICT (GIS) bay – 1 no. (for 10th ICT) - 220kV GIS bus duct/Cable for interconnection of 220 kV side of ICT (10th) to 220kV GIS bay (Section-1)	₹ 366.67 Cr.
2.	Implementation of 5 nos. of 220kV line bays at 765/400/220kV Bhadla-III PS.	220kV line bay – 5 nos.	
3.	Implementation of 1 no. of 400kV line bay at 765/400/220kV Bhadla-III PS.	400kV line bay – 1 no.	
4.	Implementation of 2 sets 400kV sectionalizer bay at 765/400/220kV Bhadla-III PS	400kV sectionalizer bay – 2 sets	
5.	Augmentation of 765/400 kV, 2x1500 MVA (3rd & 4th) ICTs at 765/400kV Ramgarh PS	- 1500 MVA, 765/400 kV ICT - 2 nos. - 765kV ICT bays – 2 nos. 400 kV ICT bay – 2 nos.	₹ 403.86 Cr.
6.	Augmentation of 400/220 kV, 2x500 MVA (3rd & 4th) ICTs at 765/400kV Ramgarh PS	- 500 MVA, 400/220 kV ICT - 2 nos. - 400kV ICT bays – 2 nos. - 220 kV ICT bay – 2 nos.	
7.	Implementation of 2 nos. of 220kV line bays at 765/400kV Ramgarh PS	220kV line bay – 2 nos.	
8.	Implementation of 1 no. of 400kV line bay at 765/400kV	400kV line bay – 1 no.	

Sl. No.	Scope of the Transmission Scheme	Item Description	Estimated Cost
	Ramgarh PS		
9.	Augmentation of 765/400 kV, 1x1500 MVA (3rd) ICT at 765/400kV Kanpur (PG) substation	- 1500 MVA(3x500MVA), 765/400 kV ICT - 1 no. - 765kV ICT bay (GIS) including completion of diameter. - 400 kV ICT bay (GIS) in existing spare bay - All associated GIS duct with terminations.	₹ 244.09 Cr.
Total Estimated Cost:			₹ 1014.62 Cr.

Implementation time frame: 20.01.2029 (matching with timeframe of Transmission System for Evacuation of Power from REZ in Rajasthan (20 GW) under Phase III – Part I scheme (Pole 1))

Estimated Cost: ₹ 1014.62 Cr.

4.4.2 Jammu and Kashmir

(i) Augmentation of Transformation Capacity at 400/220kV New Wanpoh (PG) S/s in Jammu & Kashmir by 400/220kV, 1x315MVA (3x105MVA) ICT (3rd)

Augmentation of 400/220kV, 1x315 MVA ICT(3rd) at New Wanpoh (PG) S/s was awarded to Power Grid Corporation of India Ltd. with implementation schedule of 31.12.2025. POWERGRID vide letter dated 24.12.2024 informed that several challenges are being faced in execution of substation extension work with a completion schedule of 21 months i.e., Dec'25, and requested for implementation time of at least 30 months (24 months for supply and 6 months for execution).

Accordingly, the matter for configuration of ICT (3x105 MVA single phase units) and implementation timeframe was deliberated and agreed in 38th CMETS-NR meeting held on 28.05.2025. Schematic is also given at **Figure 4-14**.

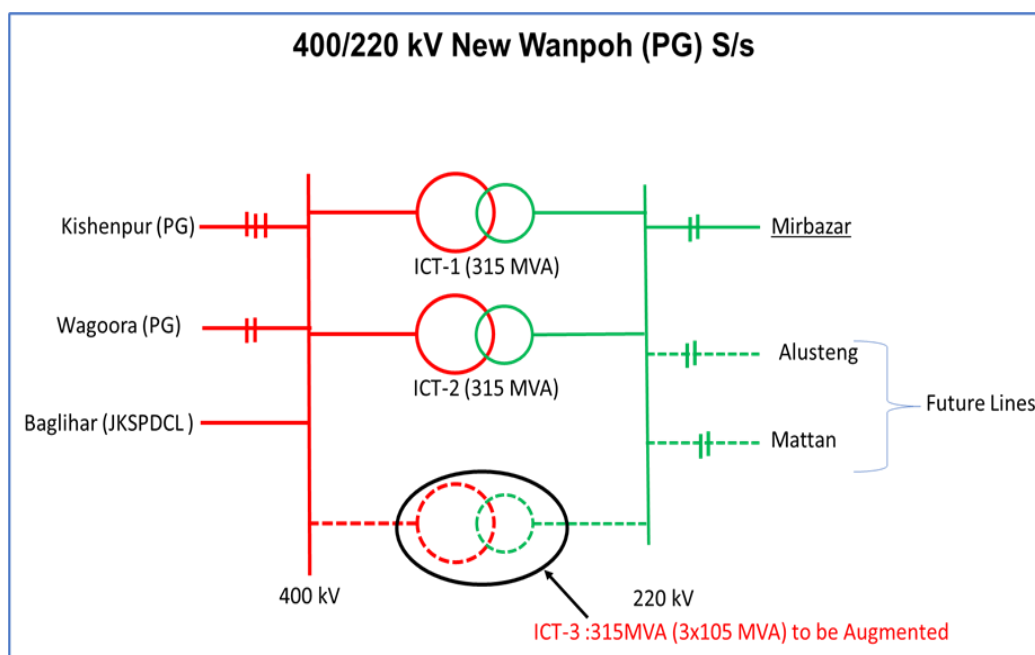


Figure 4-14: Schematic of 400/220 kV New Wanpoh (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of Transformation Capacity at 400/220kV New Wanpoh (PG) S/s in Jammu & Kashmir by 400/220kV, 1x315MVA (3x105MVA) ICT (3rd)

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of Transformation Capacity at 400/220 kV New Wanpoh (PG) S/s in Jammu & Kashmir by 400/220kV, 1x315 MVA ICT (3rd) (3x105 MVA single phase units) along with associated transformer bays.	- 315 MVA, 400/220 kV ICT (3x105 MVA single phase units)- 1 No - 400 kV ICT bay (AIS) – 1 No. (in existing dia) - 220 kV ICT bay (AIS) – 1 No.

Implementation Timeframe: 30.06.2027

Total Estimated Cost: ₹ 61 Cr.

4.4.3 Himachal Pradesh

- (i) **Implementation of 2 nos. 220kV line bays (GIS) at 400/220kV Nallagarh (PG) S/s for the termination of 220kV D/c line from 220/132kV Kunihar S/s to Nallagarh S/s**

In 40th CMETS-NR held on 12.09.2025, HPPTCL informed that Kunihar S/s was proposed as 400kV S/s with interconnection of 400kV Nalagarh (PG)-Kunihar D/c line which is already constructed with one ckt strung. Subsequently, Wangtoo S/s is being integrated with Kunihar S/s at 220kV level so there is no requirement envisaged for

interconnection of Kunihar S/s with Nalagarh S/s at 400kV level. Further, HPPTCL has decided that to charge 400kV Nalagarh (PG)-Kunihar D/c line (twin moose) at 220kV level so as to make an additional source of supply from Nalagarh S/s and shall strung 2nd ckt of 400kV Nalagarh (PG)-Kunihar D/c line itself.

Based on HPPTCL request and deliberation held in CMETS-NR implementation of 2 nos. of 220kV line bays (GIS) at 400/220kV Nallagarh S/s was agreed in the 40th CMETS NR. Schematic is also given at **Figure 4-15**.

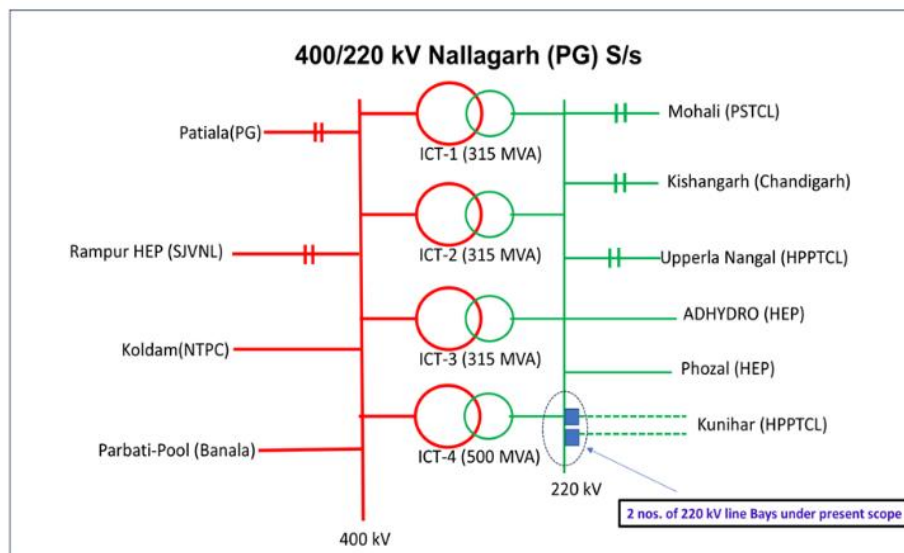


Figure 4-15: Schematic of 400/220kV Nallagarh S/s

Project Name- Implementation of 2 nos. 220kV line bays (GIS) at 400/220kV Nallagarh (PG) S/s for the termination of 220kV D/c line from 220/132kV Kunihar S/s to Nallagarh S/s

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	2 nos. of 220kV line bays (GIS) at 400/220kV Nallagarh (PG) S/s	220kV Line Bay – 2 Nos.

Implementation time frame: 30.04.2028

Estimated Cost: ₹ 27.82 Crore

4.4.4 Delhi

(i) Augmentation of transformation capacity at 400/220kV Maharani Bagh (PG) S/s (GIS) in Delhi by 1x500 MVA, 400/220kV ICT (5th)

As part of Rajasthan Phase-II Part-G and G1 scheme, 765/400kV Narela along with 400kV Narela-Maharani Bagh 2xD/c is being implemented. Further, 1xD/c 400kV

Narela-Maharani Bagh was proposed to be LILOed at Gopalpur (DTL) S/s. However, Gopalpur S/s is yet to be awarded by DTL and may be available by 2027-28.

Considering growing demand of Delhi and delay in implementation of 400/220kV Gopalpur S/s by DTL, proposal for 400/220kV ICT augmentation at Maharani Bagh (PG) S/s was agreed in 34th CMETS-NR. Schematic is also given at **Figure 4-16**.

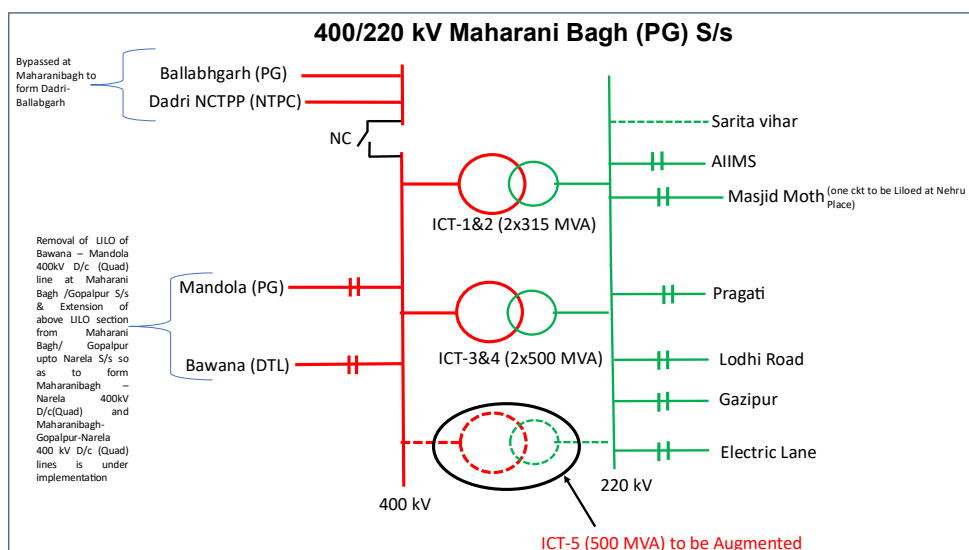


Figure 4-16: Schematic of 400/220 kV Maharani Bagh (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of transformation capacity at 400/220kV Maharani Bagh (PG) S/s (GIS) in Delhi by 1x500 MVA, 400/220kV ICT (5th)

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of transformation capacity at 400/220kV Maharani Bagh (PG) S/s (GIS) by 1x500 MVA, 400/220kV ICT (5 th) along with associated bays	- 500 MVA, 400/220 kV ICT– 1 No. - 400 kV ICT bay (GIS) – 1 No. - 220 kV ICT bay (GIS) – 1 No. - 400kV GIB Duct (1-Ph) – 225 m (approx.) - 220kV GIB Duct (1-Ph) – 100 m (approx.) - 400kV Air Bushing for connecting GIS to AIS – 3 Nos. - 220kV Air Bushing for connecting GIS to AIS – 3 Nos. - 220kV XLPE Cable – 300 m - Cable Termination Kit – 2 Nos.

Sl. No.	Scope of the Transmission Scheme	Capacity/km
		- Store, Drains, Boundary wall and spare ICT foundation and other associated civil works - 1 No.

Implementation Timeframe: 05.05.2027

Total Estimated Cost: ₹ 77.59 Cr.

(ii) Implementation of 1 no. 400kV ICT bay along with 400kV Sectionalization bay (GIS) at 765/400kV Jhatikara (PG) S/s

Congestion in power flow to the Delhi Ring Main through the 400 kV switchyard at 765/400 kV Jhatikara S/s was discussed in the 224th OCC meeting (18.10.2024). In the subsequent 225th OCC meeting (12.11.2024), CTU informed that various alternatives were examined to address critical loading of the Section2 tiebay, including modification of the existing bay and implementation of a new tie bay. In view of urgent shortterm requirement of the Delhi system and comparative implementation timelines, it was decided to create a new tiebay in a new diameter in Section2, with an implementation timeframe of ~6 months. The new diameter would also cater to future integration of 765/400 kV ICT6 (3rd in Mundka section) to meet growing Delhi demand.

Considering the above, 1 no. 400kV bay (Main+Tie) (2 Breaker) (in Mundka section) & 400kV Sectionalization bay (1 set) at 765/400kV Jhatikara (PG) S/s was agreed in 36th CMETS-NR meeting held on 15.01.2025. Schematic is also given at **Figure 4-17**.

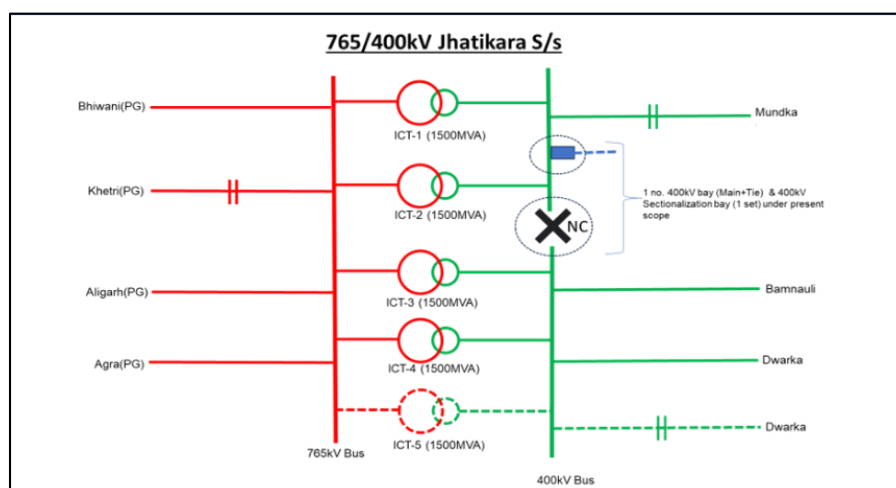


Figure 4-17: Schematic of 765/400 kV Jhatikara (PG) S/s

The scheme is under implementation with following details:

Project Name - Implementation of 1 no. 400kV ICT bay along with 400kV Sectionalization bay (GIS) at 765/400kV Jhatikara (PG) S/s.

dDetailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km	Implementation Timeframe
1	Implementation of 1 No. 400kV ICT Bay at 400kV Mundka Section to mitigate power flow congestion at Delhi Ring Main unit through 400 kV Switchyard at 765/400kV Jhatikra substation	- 400kV ICT Bay (along with associated Tie Bay) – 1 no. (at 400kV Mundka section) - 400kV Bus Extension works	9 months from the date of issuance of OM by CTUIL i.e. 05-Feb-2026
2	400kV Sectionalization bay (GIS) at 765/400kV Jhatikara (PG) S/s to interconnect both 400kV sections in the event of contingency	- 400kV Sectionalization Bay (GIS) - 1 set - 400kV GIB Duct (1-Ph) – 840 m (approx.) along with associated 400kV Air Bushing for connecting GIS to AIS	18 months from the date of issuance of OM by CTUIL i.e. 05-Nov-2026

Implementation Timeframe: As mentioned above in Detailed scope of scheme

Total Estimated Cost: ₹ 51.88 Cr.

4.4.5 Uttar Pradesh

(i) Augmentation of transformation capacity at 400/220kV Lucknow (PG) S/s in Uttar Pradesh

N-1 noncompliance of the 400/220 kV ICTs at Lucknow (PG) Substation was highlighted in the 50th TCC / 74th NRPC meeting (28–29.06.2024) and subsequently confirmed by POWERGRID in the 221st OCC meeting (19.07.2024) under peak loading conditions. Further, UPPTCL, vide letter dated 30.08.2024, informed that system studies indicate the requirement of an additional 500 MVA ICT at Lucknow (PG) to meet present and projected drawal.

Considering the persistent N-1 noncompliance and future load growth requirements of UP, the proposal for augmentation of 400/220 kV ICT capacity at Lucknow (PG) Substation was agreed in the 34th CMETSNR meeting (20.09.2024). Schematic is also given at **Figure 4-18**.

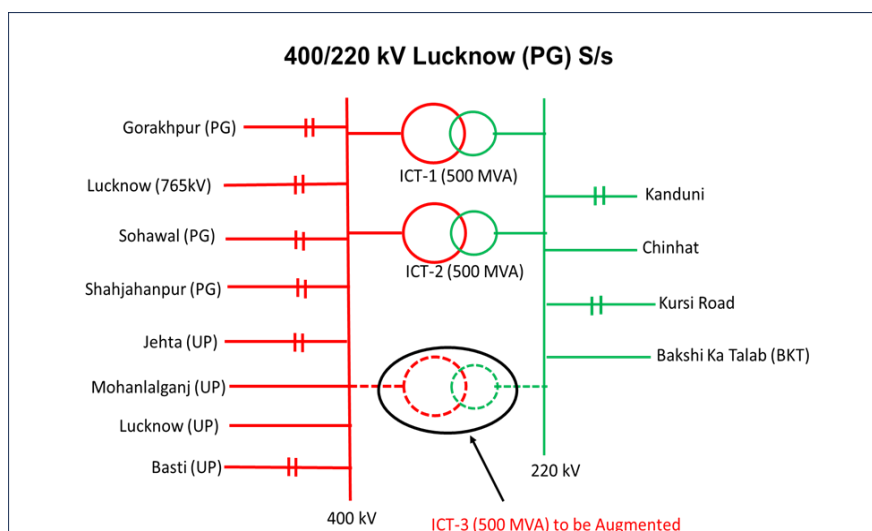


Figure 4-18: Schematic of 400/220 kV Lucknow (PG) S/s

The scheme is under implementation with following details:

Project Name - Augmentation of transformation capacity at 400/220kV Lucknow (PG) S/s in Uttar Pradesh

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
1	Augmentation of transformation capacity at 400/220kV Lucknow (PG) S/s by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays	- 500 MVA, 400/220 kV ICT- 1 no. - 400 kV ICT bay (including associated tie bay) (Outdoor GIS) - 1 No. - 220 kV ICT bay (AIS) - 1 no. - 220kV Bus extension works for 2 nos. future bays - 1 Set - 400kV Bus extension with GIB Duct - 1100 m (approx.) - Interconnection from 220kV Bay to 220kV ICT side through Duct (245kV GIB Duct) – 300 m (approx.) - Associated 400kV & 220kV interconnection works (420kV SF6/Air bushing for Bus extension through GIS Duct & ICT interconnection and 245KV SF6/Air bushing for ICT interconnection)

Implementation Timeframe: 08.05.2027

Total Estimated Cost: ₹ 87.10 Cr.

4.5 System Study Results and Analysis

Based on the load-generation scenarios as elaborated in section 4.3, various system studies have been carried out in PSSE. Planned/ Under implementation Transmission system that are expected to be commissioned in 2030-31 timeframe is considered for conducting these studies.

System studies have been conducted on files prepared for 9 scenarios. Results of these studies were analysed and the same are deliberated in subsequent sections-

4.5.1 Short Circuit Analysis

Short circuit level was calculated for all 765kV and 400 kV buses of Northern Region and buses having fault level more than the design rating under different scenarios were identified. From analysis, it has emerged that there are 83 nos. of substations (765kV-8 nos., 400kV- 75 nos) in NR having fault level more than designed capacity.

Out of above, 43 nos. of ISTS substations and 40 nos. of STU/Generator substations are there for which immediate action shall be required. Details of the substations under different scenarios are tabulated below in **Table 4-6 & Table 4-7.**

ISTS Substations

Table 4-6: ISTS Buses Exceeding Designed Fault Level in NR

Sl. No.	Substation Name	Scenario No.	Highest Fault level (kA)	Design Rating (kA)
1.	400kV Abdullapur	All	55	40
2.	400kV Agra	All	62	40
3.	400kV Aligarh	All	45	40
4.	400kV Allahabad	All	58	40
5.	400kV Balia (PG)	All	49	40
6.	400kV Ballabhgarh	All	59	50
7.	400kV Bareilly (765kV)	All	59	50
8.	400kV Bareilly PG	All	59	50
9.	400kV Bassi	All	61	40
10.	400kV Bhadla (PG)	Three	61	50
11.	400kV Bhadla-II	Three	63	50
12.	400kV Bhiwadi	All	62	40
13.	400kV Bhiwani PG	All	59	50
14.	400kV Bikaner-III	All	89	63
15.	400kV Bikaner-II	All	73	50
16.	400kV Bikaner-IV	Three	73	63
17.	400kV Bikaner	All	68	50
18.	400kV Chittorgarh	All	46	40
19.	400kV Fatehgarh	Most	54	50
20.	400kV Fatehgarh-2	Three	60	50

Sl. No.	Substation Name	Scenario No.	Highest Fault level (kA)	Design Rating (kA)
21.	400kV Fatehgarh-3	Three	64	50
22.	400kV Gurgaon	All	54	50
23.	400kV Jaipur PG	All	45	40
24.	400kV Jalandhar	All	45	40
25.	400kV Jind PG	All	49	40
26.	400kV Kaithal	All	44	40
27.	400kV Kanpur NEW	All	53	50
28.	400kV Khetri	Three	52	50
29.	400kV Lucknow PG	All	61	40
30.	400kV Lucknow (765kV)	All	58	40
31.	400kV Mandola	All	56	40
32.	400kV Meerut	All	70	40
33.	400kV Neemrana PG	All	61	40
34.	400kV Panchkula PG	All	52	40
35.	400kV Patiala	All	49	40
36.	400kV Sikar	All	50	40
37.	400kV Varanasi	All	53	50
38.	765kV Ajmer	All	44	40
39.	765kV Aligarh	All	52	40
40.	765kV Bhadla-II	Three	47	40
41.	765kV Bikaner	All	47	40
42.	765kV Jhatikara PG	All	43	40
43.	765kV Varanasi	All	44	40

STU/Generation Substations

Table 4-7: STU/Generators Buses Exceeding Designed Fault Level in NR

Sl. No.	Substation Name	Owner State	Scenario No.	Highest Fault level (kA)	Design Rating(kA)
1.	400kV Agra	UP	All	49	40
2.	400kV Anta	Rajasthan	All	44	40
3.	400kV Babai	Rajasthan	All	49	40
4.	400kV Bagpat	UP	All	41	40

Sl. No.	Substation Name	Owner State	Scenario No.	Highest Fault level (kA)	Design Rating(kA)
5.	400kV Bara	UP	All	56	40
6.	400kV Bareilly	UP	Most	44	40
7.	400kV Bawana	Delhi	All	55	40
8.	400kV Bhadla	Rajasthan	All	55	40
9.	400kV Daulatabad	Haryana	All	53	40
10.	400kV Dhanonda	Haryana	All	62	40
11.	400kV Gaziabad	UP	All	50	40
12.	400kV Greater Noida (400kV)	UP	All	62	40
13.	400kV Greater Noida (765kV)	UP	All	66	40
14.	400kV Gopalpur	Delhi	All	47	40
15.	400kV Hapur	UP	All	44	40
16.	400kV Herapur	Rajasthan	All	43	40
17.	400kV Jaipur	Rajasthan	All	63	40
18.	400kV Jaisalmer-2	Rajasthan	Most	44	40
19.	400kV Kabulpur	Haryana	All	46	40
20.	400kV Karchna	UP	All	44	40
21.	400kV Mainpuri	UP	All	46	40
22.	400kV Mundka	Delhi	Most	43	40
23.	400kV Noida-Sec123	UP	All	49	40
24.	400kV Noida-Sec148	UP	All	55	40
25.	400kV Rewa	UP	All	46	40
26.	400kV Sarnath	UP	All	46	40
27.	400kV Sikanderabad	UP	All	46	40
28.	400kV Sohna road	Haryana	All	44	40
29.	400kV Tikri Khurd	Delhi	All	48	40
30.	400kV Unnao	UP	Most	44	40
31.	765kV Greater Noida	UP	All	45	40
32.	765kV Jaipur	Rajasthan	All	54	40
33.	400kV Anpara-D	UP	All	42	40

Sl. No.	Substation Name	Owner State	Scenario No.	Highest Fault level (kA)	Design Rating(kA)
34.	400kV Anpara	UP	All	47	40
35.	400kV Anpara C	UP	All	46	40
36.	400kV Bawana-G	Delhi	All	54	40
37.	400kV Dadri-HVDC (Generator)	UP	All	63	40
38.	400kV Dadri-NCR (Generator)	UP	All	64	40
39.	400kV Jhajar (Generator)	Haryana	All	50	40
40.	400kV Meja (Generator)	UP	All	57	40

Studies to limit high short circuit on ISTS S/s will be carried out and taken up in upcoming rolling plan. STUs/Generation developer are also required to take necessary actions such as bus splitting, bypassing of lines, fault limiting reactors etc to resolve the issue of high fault level at their substations.

4.5.2 Contingency Analysis

a) Transmission Lines

In the base case file prepared for 2030-31 timeframe, in NR, 8 nos. of 400 kV lines are observed to be having critical loading in base case or Contingency scenario. Details of such lines are as under **Table 4-8**.

Table 4-8: Major transmission lines having critical loading in NR

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base Case Loading	Loading under N-1	Rating	% Loading
1.	RAJPURA_TH - RAJPURA 400kv Line	RAJPURA_TH - RAJPURA 400kV D/c Line (other ckt)	2,5,8	STU	529	1010	857	117
2.	KHEDAR - KIRORI 400kV Line	KHEDAR - KIRORI 400kV D/c Line (other ckt)	2,5	STU	481	926	857	108
3.	AGRA (UP) - AGRA PG 400kV	AGRA (UP) 765kV - AGRA PG	1,2,3,4,5,7	ISTS	1307	1608	857	187
4.	BAREILLY PG (400kV) - BAREILLY PG	BAREILLY PG (400kV) - BAREILLY PG (400/220 kV)	4	ISTS	505	917	857	107

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base Case Loading	Loading under N-1	Rating	% Loading
	(400/220 kV) 400kV Line	400kV D/c Line (other ckt)						
5.	AGRA (UP) 765kV) – Agra PG 400kV Line	AGRA (UP) - Agra PG 400kV Line	1,2,7	ISTS	721	1114	857	130
6.	BALIA PG - MAU 400kV Line	BALIA PG - RASRA (MAU) 400kV Line	4	ISTS	751	1022	857	119
7.	KANKROLI - ZERDA 400kV Line	KANKROLI - ZERDA D/c Line (other ckt)	1,4,8	ISTS	866	1008	857	117
8.	VARANASI - SASARAM 400kV Line	ALLAHABAD – SASARAM 400kV Line	1,7	ISTS	735	1002	857	117

Additional system strengthening may be planned to feed the growing demand.

b) Transformers

In the base case file prepared for 2030-31 timeframe, following ICTs are having critical loading. Details of transformers is as under **Table 4-9**.

Table 4-9: Major transformers having critical loading in NR

Sl. No.	Name of the Element	Scenario No.	Owner	Base Flow	Loading of ICT under N-1	% Loading	Rating (MVA)
1.	Chittorgarh 400/220kV ICT 1	1,4,7	STU	432	612	194	315
2.	Kota 400/220kV ICT 1	1,4,7	ISTS	360	463	147	315
3.	Panchkula 400/220kV ICT 1	1,4	ISTS	292	386	123	315
4.	Kurukshetra 400/220kV ICT 1	2,4,5	ISTS	433	535	107	500
5.	Dwarka 400/220kV ICT 1	4	ISTS	398	546	109	500
6.	Bhinmal 400/220kV ICT 1	1,4,7	ISTS	380	511	162	315
7.	Orai 400/220kV ICT 1	2,4,5	STU	185	277	115	240

Sl. No.	Name of the Element	Scenario No.	Owner	Base Flow	Loading of ICT under N-1	% Loading	Rating (MVA)
8.	Agra South 400/132kV ICT 1	2,4	STU	176	233	117	200
9.	Kanpur 400/220kV ICT 1	1,4,7	ISTS	290	367	117	315
10.	Mau 400/132kV ICT 1	1,4	STU	212	257	128	200
11.	Pipalkotli 400/220kV ICT 1	1,2,3,4,5,6,8	STU	234	472	197	240
12.	Jauljivi 400/220kV ICT 1	2	ISTS	179	338	107	315
13.	Dhanansu 400/220kV ICT 1	2	STU	397	527	105	500
14.	Shahjahanpur 400/220kV ICT 1	4	ISTS	255	332	105	315

Respective STUs/Owners are required to take advance action to mitigate this issue. Additional system strengthening in these areas such as planning additional feeds from ISTS, shifting of loads, ICT augmentation, increase in self generation, etc. may be required to feed the growing demand.

4.5.3 Voltage Analysis

Voltages of all 765 kV and 400 kV buses were observed in all the nine scenarios. Maximum and minimum voltage of each bus were identified from the bus voltages in all nine scenarios. From the simulation results, 765kV & 400kV buses were observed to be having voltage more than 1.05 pu is depicted in **Table 4-10**.

Table 4-10: Over Voltage buses in NR

Sl. No.	Bus Name	Voltage Level (kV)	Owner	Max(pu)	Scenario
1	Shahjahanpur	400	ISTS	1.06	9
2	Farrukhabad	400	STU	1.06	9
3	Rosa	400	STU	1.06	9
4	Badaun	400	STU	1.06	9

Studies for improvement of voltage profile under various scenarios will be carried out and taken up in upcoming rolling plan. However adequate bus reactive compensation is also provided at ISTS substations in this regard. STUs are also required to take necessary actions for improvement of voltage profile by providing suitable reactive power compensation.

Chapter 5: Western Region

Due to geographical location, Western Region is connected to Northern, Southern and Eastern Regions through 765/400kV high-capacity corridors, Back-to-Back HVDCs and Bi-Pole HVDC links. The thermal generating stations of Western Regions are predominantly concentrated in the coal rich states of Chhattisgarh, Eastern part of Maharashtra and Madhya Pradesh. Further, Gujarat, Maharashtra and Madhya Pradesh are also RE rich states comprising of Solar & Wind capacity. Western part of Maharashtra, southern Gujarat and DD & DNH have high demand and less internal generation. Accordingly, power flows from Chhattisgarh/ Eastern Maharashtra through high-capacity corridors to Western part of Maharashtra, Southern Gujarat, DD & DNH. Based on the generation availability and demand, Western Region imports power from NR & exports to ER during high RE scenarios whereas it exports power to NR & SR during evening peak and night off peak load.

5.1 Power Supply Scenario as on Jan'26

As on Jan'26, total Installed Capacity (IC) of Western Region was about 178GW which constitute capacity from fossil sources (47.4% share) & balance (52.6% share) from non-fossil sources comprising of nuclear, renewable generation capacity including hydro and the peak demand met was about 82.7 GW. The share from non-fossil sources would further increase in future considering Indias vision of generating 500 GW of non-fossil generation capacity by 2030. State-wise breakup is summarised at Table 5-1.

Table 5-1:WR Installed Capacity and Demand met till Jan '26

(All Fig in GW)

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*Peak demand for WR was observed in 2025-26 whereas peak demand of India was observed was 2024-25 timeframe.

Source: CEA Monthly Report

5.2 Envisaged Power Supply Scenario by 2030-31

As per the 20th EPS, Western Region demand for 2030-31 timeframe is expected to increase to about 123.4 GW. The Installed capacity of Western Region is expected to be about 356.1GW. The state wise bifurcation of the same is given at **Table 5-2**.

Table 5-2: WR Installed Capacity and Peak Demand (2030-31)

(All Fig in GW)

State	Generation									Peak Demand
	Fossil			Non-Fossil				ESS	Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
Gujarat	7.8	2.8	10.6	0.0	0.3	51.8	52.1	0.2	63.0	35.1
MP	10.9	0.0	10.9	0.0	3.1	4.2	7.3	0.0	18.2	26.5
Maharashtra	19.5	1.2	20.7	0.0	2.5	50.0	52.5	4.4	77.7	55.8
Chhattisgarh	3.4	0.0	3.4	0.0	0.1	0.2	0.4	0.0	3.7	9.2
DD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
DNH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
Goa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Central	24.4	3.3	27.7	3.2	0.0	109.1	112.4	10.7	150.8	-
IPP	40.0	2.8	42.8	0.0	0.0	0.0	0.0	0.0	42.8	-
WR	106.0	10.1	116.1	3.2	6.1	215.3	224.6	15.3	356.1	123.4

There is growth of around 40.7GW in the peak demand of Western Region from present timeframe to 2030-31. The state wise growth in demand for 2030-31 from present timeframe is tabulated below at **Table 5-3**:

Table 5-3: Increase in Peak Demand of Various States of WR

(All Fig in MW)

State	Peak Demand			
	Present (MW)	20th EPS (MW)	Increase in demand (MW)	CAGR
	2025-26 (Till Jan'2026)	2030-31		
Gujarat	26457	35,137	8680	5.8%
MP	19895	26,534	6639	5.9%
Maharashtra	30782	55,773	24991	12.6%
Chhattisgarh	6819	9,248	2429	6.3%
UT of DD & DNH	1411	2172	761	9.0%
Goa	864	1086	222	4.7%
WR	82695	1,23,381	40686	8.3%

From the above data it is observed that the CAGR growth of peak demand is maximum for Maharashtra (12.6%) and minimum for Goa (4.7%). The CAGR of demand of WR is about 8.3%.

In addition to above, bulk power demand of about 20000MW proposed to be directly connected to ISTS has also been considered from various upcoming green hydrogen/ green ammonia identified by MNRE & various other bulk consumers/distribution licensees who have been granted GNA under GNA Regulations, 2022.

5.3 Load Generation Balance for 2030-31 timeframe

In Chapter 3, All India Load Generation Balance (LGB) for identified nine scenarios was prepared as per the methodology finalized in consultation with CTU, CEA and GRID INDIA. This section elaborates the Western Region Load Generation Balance (LGB) for 2030-31 timeframe. For Western Region also, three points on the daily load curve i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night) for three seasons viz. Monsoon (August), Summer (June) and Winter (February) have been considered.

Load generation balance has been prepared considering the generation despatch factors as mentioned at **Table 5-4** for the 9 scenarios. Further, thermal generators have been despatched as per the merit order, as elaborated in the Chapter-3 section-3.1.

Table 5-4: Western Region Generation Dispatch and Demand Factors

Scenario No & Name	Generation Dispatch Factors						Demand Factors
	Hydro	Nuclear	Solar	Wind	ESS	Gas	
1-Aug Solar Max	40%	80%	75%	50%	-100%	0%	86%
2-Aug Peak Load	70%	80%	0%	75%	60%	50%	85%
3-Aug Night Off Peak	40%	80%	0%	65%	40%	50%	61%
4-Jun Solar Max	40%	80%	85%	50%	-100%	0%	80%
5-Jun Peak Load	70%	80%	0%	75%	50%	50%	82%
6-Jun Night Off Peak	40%	80%	0%	65%	1%	50%	62%
7-Feb Solar Max	20%	80%	90%	10%	-100%	0%	93%
8-Feb Peak Load	40%	80%	0%	20%	100%	50%	89%
9-Feb Night Off Peak	20%	80%	0%	20%	40%	30%	71%

Based on the simulation study, import / export of WR and the inter-regional flows through various corridors is summarised in **Table 5-5**:

Table 5-5: IR flows & Surplus/Deficit of WR

(All Fig in MW)

(All Fig in MW)

IR Flows		Import / Export of Western Region							
Scenario No	Aug'29 Timeframe			Jun'29 Timeframe			Feb'30 Timeframe		
	1 (Solar Max)	2 (Peak Load)	3 (Off Peak)	4 (Solar Max)	5 (Peak Load)	6 (Off Peak)	7 (Solar Max)	8 (Peak Load)	9 (Off Peak)
Corridors									
WR-NR	4158	19899	15123	18128	25524	17794	-11007	-985	-1077

IR Flows		Import / Export of Western Region							
Scenario No Corridors	Aug'29 Timeframe			Jun'29 Timeframe			Feb'30 Timeframe		
	1 (Solar Max)	2 (Peak Load)	3 (Off Peak)	4 (Solar Max)	5 (Peak Load)	6 (Off Peak)	7 (Solar Max)	8 (Peak Load)	9 (Off Peak)
WR-ER	12802	5908	5799	13815	5601	6056	11259	242	3915
WR-SR	-6952	-26295	-16189	-11205	-24572	-13384	15788	-2835	2624
Western Region	10008	-488	4733	20738	6553	10466	16040	-3578	5462

Out of these nine scenarios, Scenario-8 and Scenario-4 corresponds to two extreme cases with import / export requirement of Western Region i.e. Maximum import (3.5 GW) and maximum export (20.7 GW) respectively. In all other scenarios, the import / export of Western Region varies between these two extremes.

Considering the above LGB for nine scenarios, load flow cases were prepared for 2030-31 timeframe. Detailed system studies have been carried out on the finalized load flow cases. The study results are discussed in subsequent sections.

5.4 ISTS Network schemes evolved from Feb'25 to Jan'26

Various transmission systems have been planned and deliberated for implementation in the Consultation Meetings for Evolving Transmission Schemes in Western Region (CMETS-WR) and joint study meetings held from Feb'25 to Jan'26. These schemes have either been approved or under various stages of approval. The details of the schemes have been summarized below at **Table 5-6**:

Table 5-6: Details of the schemes evolved in WR

Sl. No.	Name of Scheme	Timeframe	Quantum (MW)	Type of Scheme*	Tentative cost (in Crs.)
Gujarat					
(i)	Addition of 1 x 500 MVA ICT along with 400 kV & 220 kV bays at Pirana (PG) S/s	2027-28	0	SS	50
(ii)	Transmission system for Evacuation of Power from RE Projects for cumulative capacity of 14GW in Gujarat	2030-31	14000	RE	24,048
(iii)	Scheme for providing connectivity to M/s Sarjan Realities Pvt Ltd. (1100MW) at KPS3 (400kV Sec-I)	2027-28	0	RE	51
(iv)	1 no. of 220 kV line bay for interconnection of M/s Kinurja S1 Private Limited (65MW) BESS project at 400/220kV Banaskantha (Radhanesda) PS (GIS)	2026-27	0	RE	9.73

Sl. No.	Name of Scheme	Timeframe	Quantum (MW)	Type of Scheme*	Tentative cost (in Crs.)
Maharashtra					
(i)	Augmentation of Transformation capacity at Navi Mumbai (GIS) (PG) S/s in Maharashtra by 400/220 kV, 1x500 MVA (3rd) ICT	2027-28	0	SS	63.75
(ii)	Network Expansion Scheme for drawal of power at South Kalamb S/s	2028-29	0	RE	917
(iii)	Network Expansion scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW)	2029-30	4500	RE	4732.77
(iv)	Implementation of 1 no. 220kV bay at Dhule PS for Interconnection of 94MW Hybrid project of Adyant Enersol Private Limited (AEPL)	2027-28	0	RE	6
(v)	ISTS Works associated with uprating of existing conductors by High performance conductors by MSETCL in Talegaon area and upgradation of bay equipment at Navi Mumbai S/s	2027-28	0	SS	90
Madhya Pradesh					
(i)	Implementation of 1 no. 400kV bay at Ishanagar (New) S/s for Interconnection of 350MW Wind project of Avaada Energy Pvt. Ltd. (AEPL)	2027-28	650	RE	13.98
(ii)	Implementation of 2 Nos. 220kV line bays at Shujalpur (PG) S/s (for LILO of Shujalpur (MP) – Narsinghgarh (MP) 220kV line at Shujalpur (PG) S/s	2028-29	0	RE	10.64
Chhattisgarh					
(i)	Augmentation of Transformation capacity at Raipur (PG) S/s in Chhattisgarh by 400/220 kV, 1x500 MVA (4th) ICT	2027-28	0	SS	63.40
(ii)	Augmentation of Transformation Capacity at Champa PS for interconnection of Thermal	2027-28	1320	Conv.	169.72

Sl. No.	Name of Scheme	Timeframe	Quantum (MW)	Type of Scheme*	Tentative cost (in Crs.)
	Project of Korba Power Limited				
(iii)	ICT Augmentation at Dharamjaigarh S/s for providing connectivity to Thermal Project of Korba Power Limited (KPL)	2028-29	1600	Conv	657
	Total	-	22,070	-	30882.99

*RE – Renewable Energy; SS- System Strengthening; GH – Green Hydrogen; Conv – Conventional generators.

The schemes are detailed in the following sections.

5.4.1 Gujarat

(i) Addition of 1 x 500 MVA ICT along with 400 kV & 220 kV bays at Pirana (PG) S/s:

For grant of GNA of GETCO, 400/220kV, 2x315MVA Pirana (PG) ICTs was observed to be N-1 non-compliant. WRLDC in its operational feedback also reported 2x315 MVA, 400/220 kV Pirana (PG) ICTs as one of the limiting constraints for drawl of power from ISTS by Gujarat.

Accordingly, the matter was deliberated & agreed in 36th CMETS -WR held on 26.05.2025. In the meeting it was noted that with the 3rd ICT, the Pirana–Bhat 220 kV lines become critical, so GETCO must plan additional 220 kV outlets/reconductoring/load-management measures.

Details of scheme is tabulated below and Schematic is given at **Figure 5-1**

Detailed scope of work:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	400/220kV, 1x500MVA ICT (3 rd) at Pirana (PG) S/s along with associated bays	- 400/220kV, 1x500MVA ICT-1 No. - 400kV ICT bay –1 No. - 220kV ICT bay –1 No.

Implementation Timeframe: 31.12.2027

Estimated Cost: ₹ 49.27 Cr.

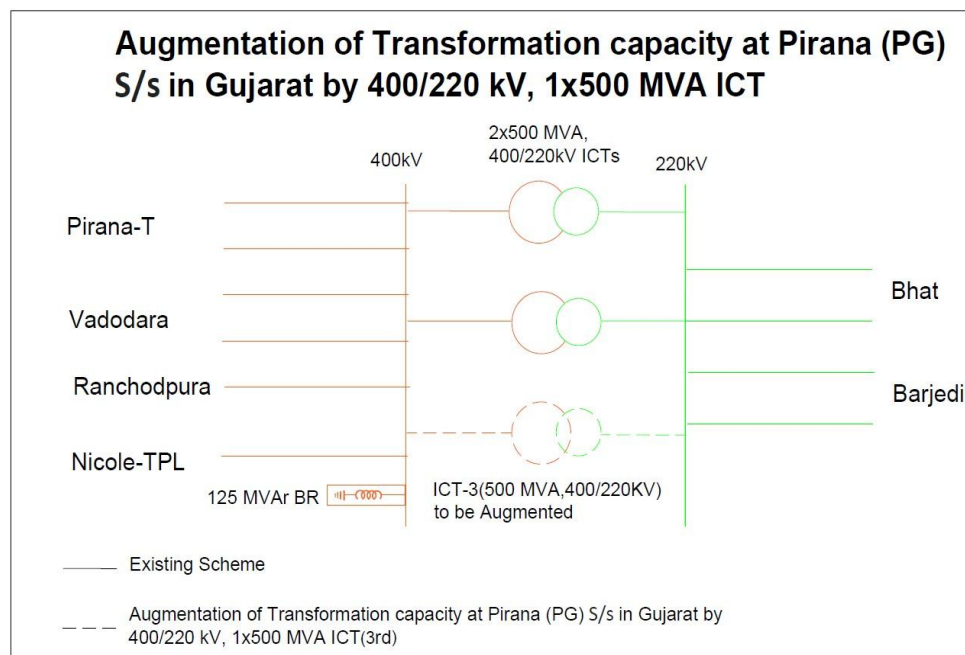


Figure 5-1: Schematic of 400/220 kV Pirana (PG) S/s

(ii) Transmission system for Evacuation of Power from RE Projects for cumulative capacity of 14GW in Gujarat (Modification in earlier proposal)

Transmission system for evacuation of power from RE Projects for cumulative capacity of 25.5GW in Gujarat was planned [Jam Khambhaliya REZ - Phase II (5500MW), Jamnagar REZ - Phase I (1000MW), Lakadia REZ - Phase II (7500MW), Khavda REZ-Phase VI (5500MW) and Khavda REZ- Phase VII (6000MW)]. In the meantime, MNRE vide letter dated 28.08.2025, declared additional potential to the tune of 69.6GW in the state of Gujarat (comprising 20.2GW in Kutch area (namely Bhuj, Lakadia & Khavda); 7GW in Jamnagar, Porbandar and Dwarka areas and balance 15.74GW in Amreli, Junagarh, Rajkot, Bhavnagar areas).

Accordingly, the schemes were taken up in the 36th NCT meeting held on 30.12.2025, wherein it was observed that the transmission system was identified considering 9.25 GW of Green Hydrogen/Green Ammonia loads in Mundra/Kandla area, however, only one application of 0.575 GW from M/s L&T at Kandla Substation was received. Therefore, it was requested that MNRE may indicate tentative timelines for integration of about 9–10 GW of Green Hydrogen/Green Ammonia capacity in the Kandla and Mundra areas.

Looking into the uncertainty towards visibility of the bulk loads of Green Hydrogen, Transmission system for Evacuation of Power from RE Projects for cumulative capacity of 14GW out of 25.5GW in Gujarat i.e. Jam Khambhaliya REZ Phase-II (5.5 GW), Lakadia-II (7.5GW) and Jamnagar REZ Phase-I (1 GW) was agreed in 37th NCT Meeting held on 19.01.2026.

It was noted that for evacuation of power from Jam Khambhaliya REZ Phase-II (5.5 GW) and Jamnagar REZ Phase-I (1 GW) through Rajkot (Saurashtra)(GETCO) Substation, which has a scheduled completion of March 2030, it was agreed that the associated transmission system should be aligned with the commissioning timeline of Rajkot (Saurashtra)(GETCO) Substation, i.e., March 2030. Further, Lakadia-II (7.5GW) transmission scheme requires LILO of Halvad – Kandla 765kV D/c line which is presently under bidding process.

Detailed scope of work:

A. Transmission system for Integration of Power from RE Projects in Jam Khambhaliya REZ in Gujarat - Phase II (5500MW) and Jamnagar Phase-I (1000 MW)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment 4x1500 MVA, 765/400 kV & 10x500MVA, 400/220kV Substation near Kalyanpur (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor Future provision (space for): ➤ 765/400 kV, 1500MVA ICT along with bays- 2 Nos. (on Sec-II) ➤ 765 kV line bays along with switchable line reactors – 8 Nos. (4 Nos. on Sec-I & 4 Nos. on Sec-II) ➤ 765 kV, 330MVA Bus Reactor along with bay: 2 Nos. (1 on Sec-I & 1 on Sec-II) ➤ 400 kV line bays along with switchable line reactors– 12 Nos. (4 Nos. on Sec-I & 8 Nos. on Sec-II) ➤ 420 kV, 125MVA Bus Reactor along with bays: 2 Nos. (1 on Sec-I & 1 on Sec-II) ➤ 220 kV line bays: 3 No. on Sec-I & 3 Nos. on Section-II ➤ Establishment of 6000 MW, ± 800 kV Kalyanpur (GIS) (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard & all associated equipment (incl. filters)/bus extension, etc.	- 765/400 kV, 1500 MVA ICT – 4 Nos. (13x500 MVA single phase units including one spare ICT Unit) (3 on Sec-I & 1 on Sec-II) - 400/220kV, 500MVA ICT – 10 Nos. (5 on Sec-I & 5 on Sec-II) - 765 kV ICT bays – 4 Nos. - 400 kV ICT bays – 14 Nos. - 220kV ICT bays – 10 Nos. - 765 kV Line bays – 4 Nos. (2 on Sec-I & 2 on Sec-II) - 765 kV Sectionalizer bay: 1 -set - 400 kV Sectionalization bay: 1- set - 220 kV Sectionalization bay: 1 set - 1x330 MVA, 765 kV bus reactor- 2 Nos. (7x110 MVAR single phase Reactors including one spare Unit for bus /line reactors) (1 on Sec-I & 1 on Sec-II) - 765 kV Bus reactor bay – 2 Nos. - 125 MVA, 420 kV reactor- 2 Nos. (1 on Sec-I & 1 on Sec-II) - 400 kV Reactor bay- 2 Nos. - 220kV BC Bay-2 No. - 400 kV line bay – 1 No. (for interconnection of RE Project at Sec-I) - 220kV line bays – 12 Nos. (for interconnection of RE Projects, 6 on Sec-I & 6 on Sec-II)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	(2x1500MW Poles on each 400kV bus section) ➤ ±400MVA _r STATCOM with 400kV bay – 2 No. (1 on Sec-I & 1 on Sec-II)	
2.	Kalyanpur (GIS) – Jamnagar (GIS) 765 kV D/c line	95 km
3.	2 Nos. 765 kV line bays at Jamnagar (GIS) S/s	765 kV line bays – 2 Nos. (GIS)
4.	Kalyanpur (GIS) – Saurashtra (near Rajkot) (GETCO) 765 kV D/c line	225km.
5.	330MVA _r Switchable line reactors on each circuit at Kalyanpur (GIS) end of Kalyanpur (GIS) – Saurashtra (near Rajkot) (GETCO) 765 kV D/c line (with NGR bypass arrangement)	- 330 MVA_r, 765 kV switchable line reactor- 2 Nos. - Switching equipment for 765 kV line reactor- 2 Nos.
6.	2 Nos. 765 kV line bays at Saurashtra (near Rajkot) (GETCO) S/s	765 kV line bays – 2 Nos.
7.	Installation of Synchronous Condenser (+300/-200MVA _r) (Minimum) & Short circuit contribution at PCC of 1200MVA (Minimum) at Jam Kalyanpur (GIS)– 2 Nos. Value of Inertia (MW-s) shall be defined in RfP document.	Synchronous Condenser along with associated 400kV Bay-2 Nos. (one on each Sec-I & II)
8.	Creation of 220kV switchyard along with Installation of 3x500MVA, 400/220kV ICTs at Jamnagar (GIS) S/s	- Creation of 220kV Bus Section-I - 220kV BC Bay – 1 No. - 400/220 kV, 500 MVA ICT – 3 Nos. (on 400kV & 220kV Sec-I) - 400 kV ICT bays – 1 No. (2 Nos. ICTs to be terminated in 2 nos. GIS bays being implemented as part of Diameter completion at Jamnagar S/s under “Network Expansion scheme in Gujarat for drawl of about 3.6 GW load under Phase-I in Jamnagar area” scheme) - 220kV ICT bays – 3 Nos.
9.	4 nos. 220kV line bays for RE interconnection	220kV line bays – 4 Nos.

Note:

- TSP of Jamnagar S/s shall provide space for above scope of work at Sl. 3, 8 & 9 on free of cost basis

- GETCO shall provide space for above scope of work at Sl. 6 on free of cost basis
- Bay(s) required for completion of diameter (GIS) in one-and-half breaker scheme shall also be executed by the TSP.
- Above Syncons (at Sl. 7) shall be considered as 'transmission asset' similar to STATCOM & SVC for its tariff mechanism.

Implementation time-frame: 31.03.2030 (To be reviewed prior to award, based on the best-effort schedule received from GETCO for Rajkot (Saurashtra) substation and Rajkot (Saurashtra)(GETCO) - Vataman 765kV D/c)

Estimated Cost: ₹ 7688 Cr.

B. Transmission system for Integration of Power from RE Projects in Lakadia REZ in Gujarat-Phase II (7500MW)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 765/400 kV, 6x1500MVA & 10x500MVA, 400/220kV Lakadia-II (Near Chitrod) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor. <i>[765kV, 400kV & 220kV levels to be established in two sections with Sectionaliser arrangement. The 220kV Sectionaliser shall be kept normally open and may be closed under contingency condition. The 400kV and 765kV Sectionaliser shall be kept normally closed. The bus operation may be reviewed after proposed HVDC implementation as per requirement of Grid operator. (3x1500MVA 765/400kV ICTs, 5x500MVA 400/220kV ICTs, 1x330MVA 765kV BR & 1x125MVA 400kV BR shall be on Sec-I & 3x1500MVA 765/400kV ICTs, 5x500MVA 400/220kV ICTs, 1x330MVA 765kV BR & 1x125MVA 400kV BR shall be on Sec-II)]</i> Future provision (space for): ➤ 765 kV line bays along with switchable line reactors – 6 Nos. (2 Nos. on Sec-I & 4 Nos. on Sec-II) ➤ 765 kV Bus Reactor along with bay: 2 Nos. (1 on Sec-I & 1 on Sec-II) ➤ 400 kV line bays along with switchable line reactors– 7 Nos. (3 on Sec-I & 4 on Sec-II) + 4 Nos. 400kV bays (2 nos. on each section) for HVDC Interconnection	- 765/400 kV, 1500 MVA ICT – 6 Nos. (19x500 MVA single phase units including one spare ICT Unit) - 400/220 kV ICTs - 10 Nos. (5 on Sec-I & 5 on Sec-II) - 765 kV ICT bays – 6 Nos. - 400 kV ICT bays – 16 Nos. - 220kV ICT bays – 10 Nos. - 1x330 MVA, 765 kV bus reactor- 2 Nos. (7x110 MVAR single phase Reactors including one spare Unit for bus /line reactor) (1 on Sec-I & 1 on Sec-II) - 765 kV Bus reactor bay – 2 Nos. - 765kV line bays: 8 nos. (4 Nos. on Sec-I (2 for Halvad D/c & 2 for Ahmedabad D/c) and 4 Nos. on Sec-II (2 for Kandla D/c and 2 for Vataman)) - 765 kV Sectionaliser bay: 1 -set - 400 kV Sectionaliser bay: 1- set - 220 kV Sectionaliser bay: 1- set - 220kV BC– 2 No. - 220kV TBC – 2 No. - 125 MVA, 420 kV reactor- 2 Nos. (1 on Sec-I & 1 on Sec-II) - 400 kV Reactor bay- 2 Nos. - 400 kV line bays - 3 Nos. (2 nos. on Section-I & 1 No. on Sec-II for interconnection of RE Projects) - 220 kV line bays - 15 Nos. (7 nos.

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	➤ 420 kV, 125MVA Bus Reactor along with bays: 2 Nos. (1 on Sec-I & 1 on Sec-II) ➤ 220 kV line bays: 2 No. on Sec-I & 1 Nos. on Section-II ➤ Establishment of 6000 MW, $\pm$ 800 kV Lakadia-II (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard & all associated equipment (incl. filters)/bus extension, etc. (2x1500MW poles on each 400kV section) ➤ Synchronous Condenser (+300/-200MVA) along with 400kV bay – 2 Nos. (1 on Sec-I & 1 on Sec-II)	on Sec-I & 8 nos. on Sec-II for interconnection of RE Projects)
2.	Installation of Synchronous Condenser (+300/-200MVA) (Minimum) & Short circuit contribution at PCC of 1200MVA (Minimum) at Lakadia-II – 2 Nos. Value of Inertia (MW-s) shall be defined in RfP document.	Synchronous Condenser along with associated 400kV Bay-2 Nos. (one each on Sec-I & II)
3.	LILO of Halvad – Kandla 765kV D/c line at Lakadia-II	LILO route length ~22km. (88ckm)
4.	Lakadia-II – Ahmedabad 765kV D/c line	190 km (380 ckm)
5	2 Nos. 765 kV line bays at Ahmedabad S/s for Lakadia-II – Ahmedabad 765kV D/c line	765 kV line bays – 2 Nos. (AIS)
6	765kV, 330MVA Switchable line reactors on each circuit at Ahmedabad end of Lakadia-II – Ahmedabad 765kV D/c line	- 330 MVA, 765 kV switchable line reactor- 2 Nos. - 765 kV Switchable Line Reactor Bay - 2 Nos. - 110MVA spare single phase reactor at Ahmedabad S/s is already available and same shall be used for subject Sw LR.
7	Lakadia-II – Vataman 765kV D/c line (220km.)	220 km (440 ckm)
8	2 Nos. 765 kV line bays at Vataman S/s for Lakadia-II – Vataman 765kV D/c line	765 kV line bays – 2 Nos. (AIS)
9	765kV, 240MVA Switchable line reactors on each circuit at both ends of Lakadia-II – Vataman 765kV D/c line	- 240 MVA, 765 kV switchable line reactor- 4 Nos. (2 for Lakadia-II end and 2 for Vataman end)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
		- 765 kV switchable Line Reactor Bay - 4 Nos (2 for Lakadia-II end and 2 for Vataman end) - 80MVAr spare single-phase reactor at Lakadia-II for above 240MVAr Sw LR. - 80MVAr spare single-phase reactor at Vataman S/s is already available and same shall be used for subject Sw LR.

Note:

- TSPs of Ahmedabad S/s & Vataman S/s to provide space for above scope of work in their respective substations (free of cost)
- Above Syncons (at Sl. No. 2) shall be considered as 'transmission asset' similar to STATCOM & SVC for its tariff mechanism.

Implementation timeframe: 36 Months (To be reviewed prior to award, based on the bidding status of the Transmission System for supply of power to Green Hydrogen/Ammonia manufacturing potential in Kandla area of Gujarat (Phase-I: 3 GW))

Estimated Cost: ₹ 7506 Cr.

C. Common Transmission System for evacuation of power from Lakadia (Phase-II: 7.5GW), Jam Khambhaliya (Phase-II: 5.5GW) and Jamnagar (Phase-I: 1GW):

Part-A

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Augmentation of transformation capacity at South Olpad (GIS) S/s by 1x1500MVA, 765/400kV (3 rd) ICT	- 765/400 kV, 1500 MVA ICT – 1 No. - 765 kV ICT bays – 1 No. (GIS) (Being constructed as a part of diameter completion under Khavda Ph-IV Part-C Scheme) - 400 kV ICT bays – 1 No. (GIS)
2.	Vadodara (GIS) – Halvad 765kV D/c line to be terminated into Lakadia – Halvad 765kV D/c line (near Halvad S/s) so as to form Lakadia – Vadodara (GIS) 765kV D/c line	250 km (500 ckm) <i>(Length of complete Lakadia – Vadodara (GIS) 765kV D/c line after implementation of above line section between Vadodara and Halvad is expected to be around 350km.)</i>

Sl. No.	Scope of the Transmission Scheme	Capacity /km
3.	765kV line bays at Vadodara (GIS) end for termination of Lakadia – Vadodara 765kV D/c line (formed as per details above at Sl. 2)	- 765kV line bays – 2 nos. (GIS) (being constructed as a part of diameter completion under “ Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-IV (7 GW): Part B ”. Line side equipment for termination of the line at these bays to be implemented under the subject transmission scheme)
4.	765kV, 240MVAR Switchable line reactors on each circuit at Vadodara (GIS) end of Lakadia – Vadodara (GIS) 765kV D/c line (formed as per details above at Sl. 2)	- 240 MVAR, 765 kV switchable line reactor- 2 Nos. - 765 kV switchable Line Reactor Bay- 2 Nos. (being constructed as a part of diameter completion under “ Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-IV (7 GW): Part B ”) - 80MVAR, 1-Ph spare reactor at Vadodara S/s is already available and same shall be utilized for subject switchable LR.
5.	765kV, 330MVAR Switchable Mid-point reactors at the bypass point at Halvad Switching Station on Lakadia – Vadodara (GIS) 765kV D/c line (<i>refer Not d</i>)	- 330 MVAR, 765 kV switchable line reactor- 2 Nos. - 765 kV switchable Line Reactor Bay - 2 Nos. - 110MVAR spare single phase reactor at bypass point near Halvad S/s

Note:

- Bay(s) required for completion of diameter (GIS) in one-and-half breaker scheme shall also be executed by the TSP.
- TSP of South Olpad S/s to provide space for above scope of work as Sl. 1 (Free of cost)
- TSP of Vadodara (GIS) to provide space for above scope of work as Sl. 3 & 4 (Free of cost)
- As the provision for 765kV, 330MVAR switchable mid-point reactor at the bypass point at Halvad Switching Station on Lakadia – Vadodara (GIS) 765kV D/c line was not envisaged while allocating space for future scope at Halvad Switching Station under the “**Transmission Scheme for evacuation of additional 7GWE of RE power from Khavda RE Park under Phase III Part A**” project (under implementation by Halvad Transmission Ltd-AESL), the reactor shall be installed at Halvad Switching Station by utilizing the space reserved for other transmission elements, which will be specified in the RfP document.

Part-B

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 765/400 kV, 3x1500MVA & 400/220kV, 3x500MVA Nasik S/s (towards South of Nasik) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor. Future provision (space for): ➤ 765/400 kV, 1500MVA ICT along with bays- 3 Nos. (on Sec-II) ➤ 765 kV line bays along with switchable line reactors – 10 Nos. (4 Nos. on Sec-I & 6 Nos. on Sec-II) ➤ 765 kV, 330MVAR Bus Reactor along with bay: 2 Nos. (on Sec-II) ➤ 765 kV Sectionaliser bay: 1 -set ➤ 400 kV Sectionaliser bay: 1- set ➤ 400/220 kV, 500MVA ICT along with bays - 7 Nos. (2 on Sec-I & 5 on Sec-II) ➤ 400 kV line bays along with switchable line reactors– 10 Nos. (4 on Sec-I & 6 on Sec-II) ➤ 420 kV, 125MVAR Bus Reactor along with bays: 2 Nos. (on Sec-II) ➤ 220 kV Sectionaliser bay: 1- set ➤ 220kV BC & TBC – 1 No. each ➤ 220 kV line bays: 2 No. on Sec-I & 8 Nos. on Section-II	- 765/400 kV, 1500 MVA ICT – 3 Nos. (10x500 MVA single phase units including one spare ICT Unit) - 400/220 kV ICTs - 3 Nos. - 765 kV ICT bays – 3 Nos. - 400 kV ICT bays –6 Nos. - 220kV ICT bays – 3 Nos. - 765 kV Line bays – 2 Nos. - 1x330 MVAR, 765 kV bus reactor- 2 Nos. (7x110 MVAR single phase Reactors including one spare Unit for bus /line reactor) - 765 kV Bus reactor bay – 2 Nos. - 220kV BC– 1 No. - 220kV TBC – 1 No. - 125 MVAR, 420 kV reactor- 2 Nos. - 400 kV Reactor bay- 2 Nos. - 400 kV line bays - 2 Nos. - 220 kV line bays - 6 Nos. (for MSETCL 220kV lines: Adwadi 220kV D/c, Nasik GCR 220kV D/c & Nasik OCR 220kV D/c)
2.	South Olpad (GIS) – Nasik 765kV D/c line (240km.)	240 km (480 ckm)
3.	2 Nos. 765 kV line bays at South Olpad (GIS) S/s (Sec-II) for South Olpad – Nasik 765kV D/c line	765 kV line bays – 2 Nos. (GIS) (Sec-II) along with 1 Set of 765kV sectionaliser so as to establish 765kV Sec-II.
4.	765kV, 240MVAR Switchable line reactors on each circuit at both ends of South Olpad – Nasik 765kV D/c line	- 240 MVAR, 765 kV switchable line reactor- 4 Nos. (2 for South Olpad end and 2 for Nasik end) - 765 kV switchable Line Reactor Bay - 4 Nos. (2 for South Olpad end and 2 for Nasik end) - 80MVAR spare single-phase reactor at Nasik for above 240MVAR switchable LR. - 80MVAR spare single-phase reactor at South Olpad S/s is already available and same shall be used for subject switchable LR.

Sl. No.	Scope of the Transmission Scheme	Capacity /km
5.	Nasik – Pimpalgaon (MSETCL) 400kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent) <i>(Line to be routed from near Sinner TPP / Raymond i.e. from eastern side of Nasik).</i>	80km. (160ckm)
6.	2 Nos. 400 kV line bays at Pimpalgaon S/s for Nasik – Pimpalgaon (MSETCL) 400kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent)	400 kV line bays – 2 Nos.

Note:

- Bay(s) required for completion of diameter (GIS) in one-and-half breaker scheme shall also be executed by the TSP.
- TSP of South Olpad (GIS) to provide space for above scope of work (Free of cost)
- MSETCL to provide space for above scope of work at Pimpalgaon S/s (Free of cost)
- MSETCL to implement 220kV downstream system from Nasik S/s in matching time-frame.

Part-C

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 765/400 kV, 2x1500MVA & 400/220kV, 3x500MVA Alephata S/s with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor. [765kV & 400kV Bus sectionalisers to be kept normally closed. May be opened based on Grid conditions] Future provision (space for): ➤ 765/400 kV, 1500MVA ICT along with bays- 4 Nos. (2 on Sec-I & 2 on Sec-II) ➤ 765 kV line bays along with switchable line reactors – 6 Nos. (2 Nos. on Sec-I & 4 Nos. on Sec-II) ➤ 765 kV, 330MVA Bus Reactor along with bay: 2 Nos. (1 on Sec-I & 1 on Sec-II) ➤ 400/220 kV, 500MVA ICT along with bays - 7 Nos. (2 on Sec-I & 5 on Sec-II) ➤ 400 kV line bays along with switchable line reactors– 10 Nos. (4 on Sec-I & 6 on Sec-II) + 4 nos. 400kV bays (2 nos. on each section) for HVDC Interconnection ➤ 420 kV, 125MVA Bus Reactor along with bays: 2Nos. (1 on Sec-I & 1 on Sec-II) ➤ 220 kV Sectionaliser bay: 1- set ➤ 220kV BC & TBC – 1 No. each	- 765/400 kV, 1500 MVA ICT – 2 Nos. (7x500 MVA single phase units including one spare ICT Unit) (1 on Sec-I & 1 on Sec-II) - 400/220 kV ICTs - 3 Nos. (on Sec-I) - 765 kV ICT bays – 2 Nos. - 400 kV ICT bays – 5 Nos. - 220kV ICT bays – 3 Nos. - 765 kV Line bays – 6 Nos. (4 on Sec-I: Nasik D/c, Pune (Shikrapur) & Padghe S/c & 2 on Sec-II: Pune (Shikrapur) & Aurangabad) - 1x330 MVA, 765 kV bus reactor- 2 Nos. (7x110 MVAR single phase Reactors including one spare Unit for bus /line reactor) (1 on Sec-I & 1 on Sec-II) - 765 kV Bus reactor bay – 2 Nos. - 220kV BC– 1 No. - 220kV TBC – 1 No. - 125 MVA, 420 kV reactor- 2 Nos. (1 on Sec-I & 1 on Sec-II)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	➤ 220 kV line bays: 4 No. on Sec-I & 8 Nos. on Section-II ➤ Establishment of 6000 MW, $\pm$ 800 kV Alephata (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard & all associated equipment (incl. filters)/bus extension, etc. (2x1500MW poles on each 400kV section)	- 400 kV Reactor bay- 2 Nos. - 400 kV line bays - 2 Nos. (on Sec-I) - 220 kV line bays - 4 Nos. (for MSETCL 220kV lines: Alephata(M) 220kV D/c & Bridgestone 220kV D/c) - 765 kV Sectionaliser bay: 1 - set - 400 kV Sectionaliser bay: 1- set
2.	Alephata – Lonikand-I 400kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent) (~70km.)	70 km (140 ckm)
3.	2 Nos. 400 kV line bays at Lonikand-I (MSETCL) S/s for Alephata – Lonikand-I 400kV D/c line	400 kV line bays – 2 Nos.
4.	LILO of Aurangabad – Pune (Shikrapur) (GIS) 765kV S/c line and Padghe (GIS) – Pune (Shikrapur) (GIS) 765kV S/c line at Alephata S/s (LILO route length ~ 20km.)	LILO route length – 20 km. (80ckm)
5.	Nasik – Alephata 765kV D/c line (~100km.)	100 km (200 ckm)
6.	2 Nos. 765kV bays at Nasik for Nasik – Alephata 765kV D/c line	765 kV Line bays – 2 Nos.

Note-1:

- TSP of Nasik S/s to provide space for above scope of work as Sl. 6 (Free of cost)*
- MSETCL to provide space for above scope of work as Sl. 3 (Free of cost)*
- MSETCL to implement 220kV downstream system from Alephata S/s in matching time-frame.*

Note-2:

- 240MVar line reactor at Pune (GIS) end of Pune (GIS) – Aurangabad 765kV line is already switchable. Since length of the line will reduce after the LILO at Alephata (Pune (GIS) – Alephata), NGR Bypassing along with Inter tripping scheme would need to be implemented to avoid parallel resonance phenomena due to overcompensation on the short line. NGR bypassing also helps in utilization of switchable LR as Bus Reactor when line is out of service. As confirmed by POWERGRID vide e-mail dated 02.12.2024, NGR bypass arrangement in 240MVar line reactor at Pune (GIS) end of 765kV Pune (GIS) – Aurangabad line is available. Hence, only Inter tripping scheme to trip switchable LR along with main line breaker would need to be enabled after implementation of LILO, which shall be ensured by TSP in coordination with POWERGRID. After the LILO, Alephata – Aurangabad line length is expected to be ~190-200km, Alephata – Padghe: ~140km. & Alephata – Pune (GIS): ~70km. The lengths are tentative and subject to change.*

- b) *Alephata – Pune (West) 765kV D/c line has been proposed by MSETCL in its master plan for 2030. Same may be implemented by MSETCL along with associated bays at both ends as per requirement. Line shall be terminated at 765kV Sec-II of Alephata S/s.*
- c) *After implementation of Alephata – Lonikand-I 400kV D/c line by TSP under subject scheme and Pune (East)(Karjat-II) S/s – Lonikand-II 400kV D/c line by MSETCL under In-STS scheme, 400kV interconnector between Lonikand-I and Lonikand-II may be kept normally open (for fault level control) and may be closed based on requirement of Grid Operation. TSP to sensitize MSETCL after completion of above lines.*

Implementation Timeframe: 36 Months (To be reviewed prior to award, based on the bidding status of the Transmission System for supply of power to Green Hydrogen/Ammonia manufacturing potential in Kandla area of Gujarat (Phase-I: 3 GW))

Estimated Cost: ₹ 8854 Crs. (Part A: ₹ 2252 Cr. Part B: ₹ 3839 Cr. Part C: ₹ 2763 Cr.)

(iii) Scheme for providing connectivity to M/s Sarjan Realities Pvt Ltd. (1100MW) at KPS3 (400kV Sec-I)

KPS3 S/s (Sec-I) with 3×1500 MVA, 765/400 kV ICTs is an existing S/s. Augmentation of transformation capacity by 1x1500MVA, 765/400kV ICT (4th) on Sec-I is also currently under implementation. An additional 400 kV GIS bay is required for connectivity of SRPL's 1100 MW project.

Accordingly, the matter was discussed in the 38th WR-CMETS meeting held on 11.08.2025 wherein, 2 Nos. 400kV line bays (1 no. for SRPL and 1 no. future) on Bus section-I of KPS3 S/s considering requirement of implementation of complete Dia. in GIS was agreed for providing interconnection to SRPL's project. Schematic is attached at **Figure 5-2**

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity / line length km
1	1 No. 400kV GIS bay at KPS3 (Sec-I) for interconnection of 1100MW RE project of M/s Sarjan Realities Pvt Ltd (Appl. no. 0230700014) along with future 400kV GIS bay for dia completion.	400kV GIS line bay – 2 Nos. (1 No. for SRPL and 1 no. future bay for dia completion) on KPS3 (Sec-I). 400kV GIS Duct along with associated equipment: appr. 650 (m) Extension of Existing GIS Hall along with associated civil works

Implementation time frame: 04.11.2027 (24 months from the date of allocation)

Estimated Cost: ₹ 51 Crs.

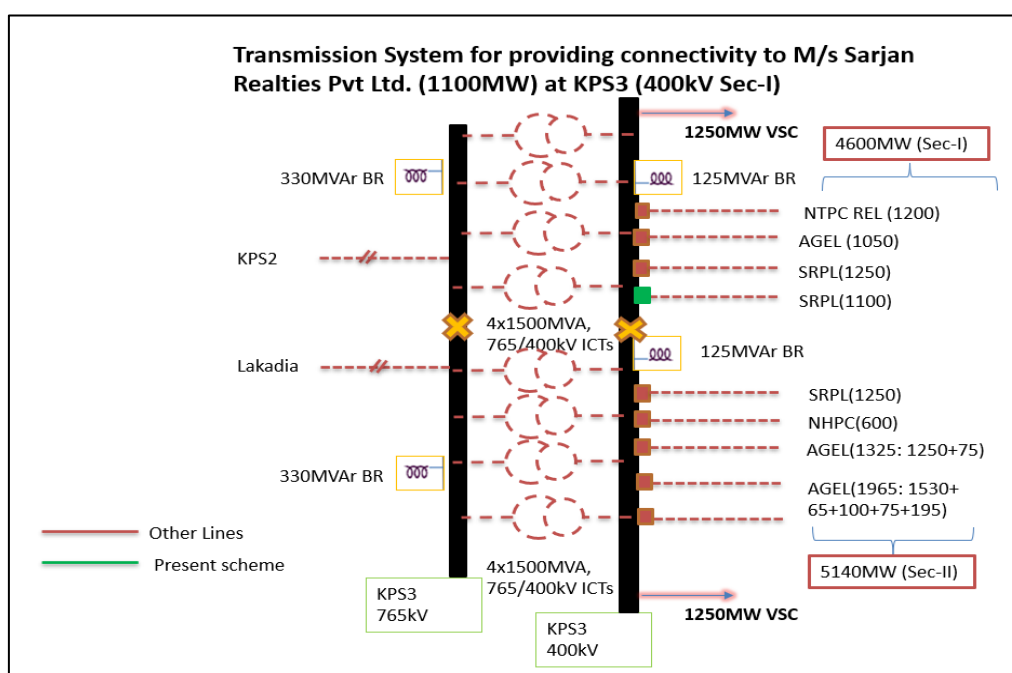


Figure 5-2: Scheme for providing connectivity to M/s Sarjan Realities Pvt Ltd. (1100MW) at KPS3 (400kV Sec-I)

(iv) 1 no. of 220 kV line bay for interconnection of M/s KINURJA S1 PRIVATE LIMITED (65MW) BESS project at 400/220kV Banaskantha (Radhanesda) PS (GIS)

2 nos. of Connectivity applications for BESS interconnection at Banaskantha (Raghanesda) PS (GIS) from H.G. Banaskantha Bess Private Limited (Appl No.: 2200002049) for 217.64MW (Max Drawl) & Kinurja S1 Private Limited Appl No.: 2200002108) for 65MW (Max Drawl) have been received. Start date of Connectivity requested by H.G. Banaskantha Bess Private Limited 01.12.2026 & for Kinurja S1 Private Limited is 30.11.2026. The subject applications were deliberated in the 38th WR-CMETS meeting held on 11.08.2025, wherein, considering the earlier start date of Kinurja S1 Private Limited, it was agreed to grant Connectivity to Kinurja S1 Private Limited for its 65MW BESS project through 1 no. of 220kV line bay at Banaskantha (Raghanesda) PS end under ISTS scope. Further, it was agreed that H.G. Banaskantha Bess Private Limited for its 217.64MW BESS project shall share the dedicated transmission system proposed for Kinurja S1 Private Limited including bay Banaskantha (Raghanesda) PS end under ISTS scope.

As the above applications are BESS projects, the connectivity was agreed to be granted through existing system with the restriction on injection of power during solar hours due to evacuation constraints. Schematic is attached at **Figure 5-3**

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity/km
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1	220kV line bay at Banaskantha (Radhanesda) PS (GIS) for BESS Interconnection (Appl. 2200002108: KINURJA S1 PRIVATE LIMITED: 65MW)	220kV line bay –1 No. (GIS) along with associated equipment
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Implementation time frame: 24.03.2027(30.11.2026 on best effort basis)

Estimated Cost: ₹ 9.73 Crs.

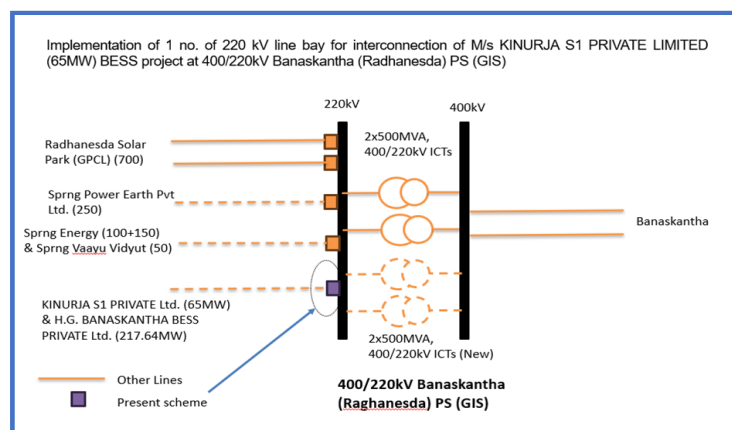


Figure 5-3: 1 no. of 220 kV line bay for interconnection of M/s KINURJA S1 PRIVATE LIMITED (65MW) BESS project at 400/220kV Banaskantha (Radhanesda) PS (GIS)

5.4.2 Maharashtra

(i) Augmentation of Transformation capacity at Navi Mumbai (GIS) (PG) S/s in Maharashtra by 400/220 kV, 1x500 MVA (3rd) ICT

400/220kV Navi Mumbai (GIS) (PG) S/s is an existing S/s and presently under operation with 2x315 MVA, 400/220kV ICTs. In general, it is observed that majority of the time loading on each ICT is more than 60 - 75 % of their rated ICT capacity, except during the rainy season and off-peak hours. Keeping in view of high loading, there is requirement of augmentation of transformation capacity at Navi Mumbai (GIS) S/s by 1x500MVA, 400/220kV ICT (3rd) to cater to the high demand requirement on 220kV side of Navi Mumbai Sub-station and also for ensuring N-1 contingency compliance of 400/220kV ICTs at Navi Mumbai (GIS) S/s, as stipulated in the CEA Transmission Planning Criteria, 2023 and its subsequent amendments thereof.

Considering the above, “Augmentation of Transformation capacity at Navi Mumbai (GIS) (PG) S/s in Maharashtra by 400/220 kV, 1x500 MVA (3rd) ICT” scheme was agreed in the 35th CMETS-WR meeting held on 07.02.2025. Schematic is attached at **Figure 5-4**

Detailed scope of the scheme is given below:

Sl.No.	Scope of the Transmission Scheme	Item Description
1	Augmentation of Transformation capacity at 400/220kV Navi Mumbai (GIS) (PG) S/s by 400/220kV 1x500MVA ICT (3rd) along with associated bays at both ends	- 400/220kV, 1x500MVA ICT – 1 No. - 400kV ICT bay (GIS) – 1 No. (Double main scheme) - 220kV ICT bay (GIS) – 1 No. - 245 kV 2500 Sqm XLPE Cable - 300m (approx.) along with associated cable termination. - 400kV GIS Bus Duct (m) - 150m (approx.) along with associated GIS to AIS bushings.

Implementation time frame: 03.09.2027 (24 months from the date of OM)

Estimated Cost: ₹ 63.75 Crs.

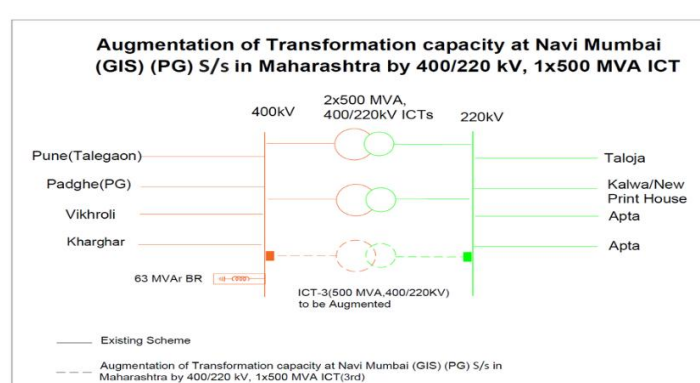


Figure 5-4: Augmentation of Transformation capacity at Navi Mumbai (GIS) (PG) S/s in Maharashtra by 400/220 kV, 1x500 MVA (3rd)

(ii) Network Expansion Scheme for drawal of power at South Kalamb S/s

Establishment of South Kalamb S/s with 2x1500 MVA, 765/400 kV ICTs alongwith LILO of Pune-III – Boisar-II 765 kV D/c line is under implementation. Further, ± 800 kV Barmer-II – South Kalamb HVDC scheme alongwith augmentation of transformation capacity at South Kalamb S/s with 4 nos. of 1500MVA ICTs (in section-I&II) is also being implemented under separate scheme. The above scheme is under bidding stage and would require minimum timeframe of 48 to 54 months for commissioning.

From studies & as per discussions with MSETCL, various downstream lines were planned from South Kalamb S/s along with Installation of 3x1500MVA, 765/400kV ICTs at South Kalamb S/s (400kV Sec-III & 765kV Section-III).

Considering the above, the subject scheme was agreed in the 35th CMETS-WR meeting held on 07.02.2025 & would provide direct infeed of power into Mumbai area and would help increase ATC of the area.

The Transmission scheme was agreed in 54th WRPC meeting held on 26.04.2025 and 31st NCT meeting held on 14.07.2025. In the NCT, the scheme was agreed to be implemented in three as detailed below. Schematic of the scheme is attached at **Figure 5-5**

Detailed scope of the scheme is given below:

Sl. No.	Description of Transmission Element	Scope of work
Part A		
1	- Creation of New 765 kV Bus Sections-II & III & 400 kV Bus Sections-II & III through 765 kV Sectionalization bay: 2 set & 400 kV Sectionalization bay: 2 set along with 2x330 MVAR, 765 kV bus reactor & 2x125 MVAR, 420 kV bus reactor on Section-III. 400 kV Sectionalizer between Sections-I & II & between sections-II & III to be normally open. Further, 765 kV sectionaliser between Sections-I & II & between II & III shall be kept normally closed. The 400 kV sectionalisers can be closed under contingency conditions. - Installation of 3x1500MVA, 765/400 kV ICTs at South Kalamb S/s (400 kV Sec-III & 765 kV Section-III) - All space provisions on 400 kV & 765 kV Bus Sections-I & II of South Kalamb S/s as per RfP document of “Network Expansion scheme in Western Region to cater to Pumped storage potential near Talegaon (Pune)” scheme shall be kept while implementing this scheme. TSP of “Network Expansion scheme in Western Region to cater to Pumped storage potential near Talegaon (Pune)” scheme shall provide necessary space free of cost for above bus extension / sectionalisation / augmentation works.	- 765/400 kV 1500 MVA ICTs- 3 nos. - 765 kV ICT bays- 3 Nos. (at bus section-III) - 400 kV ICT bays- 3 no (at bus section-III) - 330 MVA Bus Reactor-2 nos. (at bus section-III) - 765 kV Bus reactor bays- 2 nos. (at bus section-III) - 125 MVA Bus Reactor-2 nos. (at bus section-III) - 400 kV Bus reactor bays- 2 nos. (at bus section-III) - 765 kV Sectionalization bay: 2 sets - 400 kV Sectionalization bay: 2 sets
2	LILO of Nagothane – Padghe 400 kV D/c line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	LILO route length~10km.
3	LILO of Pune (AIS) – Navi Mumbai 400 kV line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	LILO route length~10km.
4	LILO of Pune (AIS) – Vikhroli 400 kV line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	LILO route length~10km.
5	8 Nos. 400 kV bays at South Kalamb S/s for LILO lines at Sl. 2, 3 & 4	400 kV line bays – 8 Nos. (Sec-III)
Note: TSP of South Kalamb S/s shall provide space for above scope of work at South Kalamb S/s free of cost		
Part-B:		

Sl. No.	Description of Transmission Element	Scope of work
6	Reconductoring of the balance line section of Pune(AIS) – Vikhroli 400 kV line (upto LILO point of LILO of Lonikand-Kalwa 400 kV line at Pune(AIS)) of Western Transco Power Ltd. (a subsidiary of AESL) with conductor having capacity of 2100MVA per ckt at nominal voltage [MSETCL shall reconductor the balance line portion from above LILO point upto Kalwa (excl. LILO portion at Vikhroli which is already implemented with high capacity conductor) with conductor having capacity of 2100MVA per ckt at nominal voltage in matching time-frame]	1.707 km. reconductoring (under ownership of WTPL)
Part-C:		
7	Upgradation of 400 kV bay at Pune (AIS) of POWERGRID (associated with Pune (AIS) – Vikhroli 400 kV line) commensurate with the reconductoring capacity of 2100MVA at nominal voltage.	Upgradation of the Complete Dia 6 (Vikroli Line Main Bay, Tie Bay & 315 MVA ICT3 Main Bay) to be carried out

Implementation timeframe:**Part A:** 24 months from the date of SPV transfer or allocation**Part B & C:** 04.08.2027 (24 months from the date of issuance of OM)**Estimated Cost:****Part A:** ₹ 901 Crs.**Part B:** ₹ 5 Crs.**Part C:** ₹ 11 Crs.

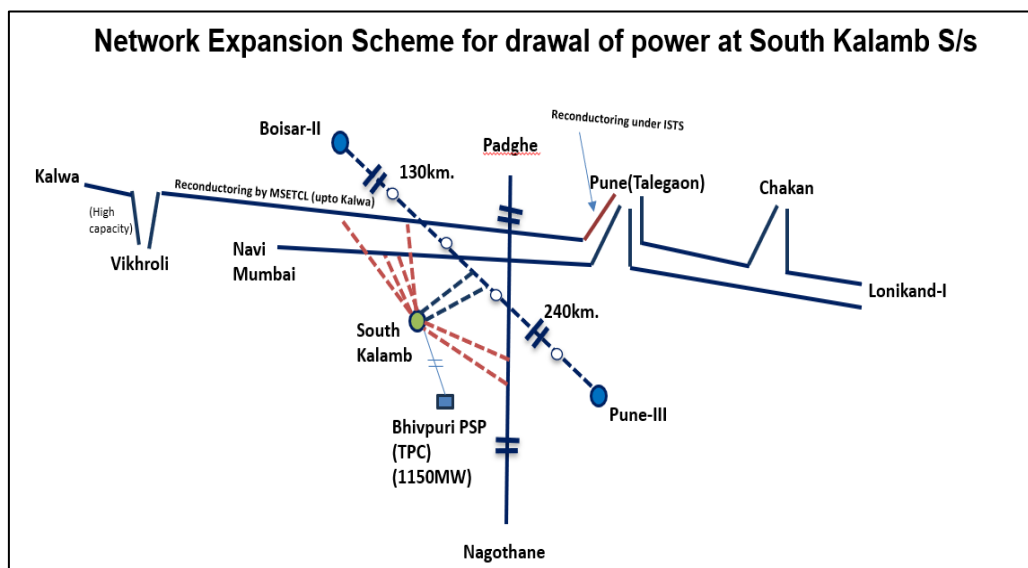


Figure 5-5: Network Expansion Scheme for drawal of power at South Kalamb S/s

(iii) Network Expansion scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW)

As per the Ministry of Power letter shared by NTPC dated 08.08.2022, Ministry of Power provided revised indication of PSP sites to the tune of about 73GW to various Hydro CPSEs/ BBMB/ DVC for development of Pumped Storage Projects (PSPs). Based on the above letter and subsequent discussions with CEA, it was gathered that a potential of more than 10GW is available for Pumped Storage Plants in Maharashtra near the Satara area (corroborated based on the list of potential PSPs in the Satara area received from CEA). Further, Applications for integration of PSP to the tune of 3.6GW in Satara area have been received.

In view of the above, transmission scheme for integration of PSP Projects in Satara area of Maharashtra for cumulative capacity of 4.5GW namely “Network Expansion Scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW)” was agreed in the following meetings.

- 36th CMETS-WR meeting held on 26.05.25, 27.05.2025 & 28.05.2025
- 56th WRPC meeting held on 26.09.2025 & 27.09.2025
- 39th CMETS-SR meeting held on 18.07.2025

In the 38th NCT meeting held on 25.02.2026, it was decided that the scheme may be implemented under Part A (Phase-I & Phase-II) under TBCB route & Part-B under RTM route. This scheme shall facilitate an additional 765kV Inter-regional corridor between SR and WR Grids (Narendra – Kolhapur – Satara – Pune-III / Pune (East) 765kV corridor) and will enable further additional evacuation of RE power in Karnataka towards load centers and PSP projects in Satara / Pune / MMR areas of Maharashtra.

Detailed scope of the scheme is given below:

Network Expansion Scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW) - Part A

Sl. No.	Scope of works	Capacity /km
Phase-I (Cumulative 1800MW)		
1.	Creation of 765kV level at Kolhapur (PG) GIS with Installation of 2x1500MVA, 765/400kV ICTs at Kolhapur (PG) S/s along with upgradation of Kolhapur (PG) S/s to 765kV level.	- 765/400 kV, 1500 MVA ICT – 2 No. (7x500MVA single phase ICTs including 1x500MVA spare ICT) - 765 kV ICT bays – 2 No. (GIS) - 400 kV ICT bays – 2 No. (GIS)
2.	Installation of 765 kV, 2x330 MVAR bus reactors at Kolhapur (PG) S/s.	- 765 kV, 330 MVAR bus reactor- 2 Nos. (7x110 MVAR single-phase Reactors, including one spare Unit for bus /line reactor) - 765 kV Bus reactor bay – 2 Nos. (GIS)
3.	Bay Works required for upgradation of Narendra (New) – Kolhapur (PG) 765kV D/c line (presently charged at 400kV) to 765kV level.	- 765kV line bays at Narendra (New) – 2 Nos. (GIS) - 765kV line bays at Kolhapur (PG) – 2 Nos. (GIS)
4.	Installation of 765kV, 330MVAR Switchable line reactors on each circuit at Kolhapur (PG) end of Narendra (New) – Kolhapur (PG) 765kV D/c line	- 765 kV, 330 MVAR Switchable Line Reactor- 2 Nos. (6x110 MVAR single-phase Reactors) - 765 kV Switchable Line Reactor Bay- 2 Nos. - 765kV, 110MVAR spare single-phase reactor provided at Sl. 2 above at Kolhapur (PG) to be utilized for the above Switchable Line Reactor.
5.	Establishment of 765/400 kV Satara Substation with 765/400 kV, 3x1500 MVA ICTs, 765kV 2x330 MVAR bus reactors and 400 kV 1x125 MVAR bus reactor Future provision (space only) (in addition to scope of work given under Sl. 5 & 7)): - 765/400 kV, 1500MVA ICT along with bays- 2 Nos. (on Bus Section-II) - 765 kV line bays along with Switchable Line Reactors – 6 Nos. (2 Nos. on Bus Section-I & 4 Nos. on Bus Section-II) - 765 kV, 330MVAR Bus Reactor along with bay: 2 Nos. (1 on Bus Section-I & 1 on Bus Section-II) - 400/220 kV, 500MVA ICT along with bays - 6 Nos. (3 on Bus Section-I & 3 on Bus Section-II)	- 765/400 kV, 1500 MVA ICT – 3 Nos. (10x500 MVA single-phase units, including one spare ICT Unit) - 765 kV ICT bays – 3 Nos. on Bus Section-I - 400 kV ICT bays –3 Nos. on Bus Section-I - 765 kV Line bays – 4 Nos. (2 Nos. on Bus Section-I for Pune (East) D/c lines and 2 Nos. on Bus Section-II for Pune-III D/c lines) - 330 MVAR, 765 kV bus reactor- 2 Nos. (7x110 MVAR single-phase Reactors, including one spare Unit for bus /line reactor) - 765 kV Bus reactor bay – 2 Nos. (1 on Bus Section-I & 1 on Bus Section-II) - 420 kV, 125MVAR Bus reactor- 1

Sl. No.	Scope of works	Capacity /km
	- 400 kV line bays along with Switchable Line Reactors– 12 Nos. (6 on Bus Section-I & 6 on Bus Section-II) - 420 kV, 125MVA Bus Reactor along with bays: 2 Nos. (1 on Bus Section-I & 1 on Bus Section-II) - 220 kV Sectionalizer bay: 1- set - 220kV TBC – 2 Nos. - 220kV BC – 2 Nos. - 220 kV line bays-12 Nos. (6 on each Bus Section).	- No. - 400 kV Bus Reactor bay- 1 No. (on Bus Section-I) - 400 kV line bays - 2 Nos. (on Bus Section-I) for PSP Interconnection - 765 kV Sectionalizer bay: 1 -set
6.	LILO of Pune-III – Pune (East) 765kV D/c line at Satara.	LILO route length 65km. (260ckm)
Phase-II (Cumulative 4500MW)		
7.	Creation of 400kV Bus Section-II and augmentation of transformation capacity at 765/400 kV Satara S/s by 765/400 kV, 1x1500MVA ICT (4 th) along with 1x125 MVAR 400kV bus reactor (on Bus Section-II)	- 400 kV Sectionalizer bay: 1- set - 400 kV line bays - 2 Nos. (on Bus Section-II) for PSP Interconnection - 765/400 kV, 1500 MVA ICT – 1 No. (3x500 MVA single-phase units utilizing spare ICT at Sl. 5) - 765 kV ICT bays – 1 No. on Bus Section-II - 400 kV ICT bays –1 No. on Bus Section-II - 420 kV, 125 MVA Bus reactor- 1 No. - 400 kV Reactor bay- 1 No. (on Bus Section-II)
8.	Kolhapur (PG) – Satara 765kV D/c line	150 km (300 ckm)
9.	765 kV line bays for Kolhapur (PG)– Satara 765kV D/c line	- 765 kV line bays – 2 Nos. (GIS) (Kolhapur) - 765 kV Line bays – 2 Nos. (AIS) at Satara on Bus Section-I
10.	765kV, 240MVA Switchable line reactors on each circuit at Satara end of Kolhapur (PG) – Satara 765kV D/c line	- 240 MVA, 765 kV Switchable Line Reactor- 2 Nos. (7x80 MVAR single-phase Reactors) - 765 kV Switchable Line Reactor Bay- 2 Nos.

Network Expansion Scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW) - Part B

Sl. No.	Scope of works	Capacity /km
1	Reorientation of existing Narendra (New) – Kolhapur (PG) 765kV D/c line (presently charged at 400kV) and its termination into 765kV bays, including all associated works required for charging the line at 765kV level	Line length – ~1 to 2 kms on both ends

Note:

- 1.The 765/400kV Pune (East) substation is being implemented through LILO of both circuits of the 765kV Pune (GIS) (Shikrapur) (existing) – Pune III (GIS) (under construction) line, under the Intra-STS transmission scheme “**Network Expansion Scheme in Maharashtra for Removal of Transmission Constraints in Pune Region-I (765/400kV Pune East)**” by NES Pune East New Transmission Ltd. (a 100% subsidiary of POWERGRID), with a SCOD of 24 months from effective date.*
- 2.Bay(s) required for completion of diameter (GIS) under the one-and-half breaker scheme shall also be executed by the TSP.*
- 3.POWERGRID, being the TSP of Kolhapur (PG) S/s and Narendra (New) S/s, shall space for the above scope of works free of cost.*

Implementation time-frame:

Part A Phase-I: 31.03.2029 (subject to minimum implementation schedule of 30 months)
 Part A Phase-II: 31.12.2029 (subject to minimum implementation schedule of 36 months)
 Part B: Matching with Part A, Phase-I Scheme

Estimated Cost:

Part A Phase-I: ₹ 3130.36 Cr.
 Part A Phase-II: ₹ 1579.80 Cr.
 Part B: ₹ 22.60 Cr.

(iv)Implementation of 1 no. 220kV bay at Dhule PS for Interconnection of 94MW Hybrid project of Adyant Enersol Private Limited (AEPL)

4x500 MVA, 400/220 kV Pooling Station near Dhule is under implementation under “Transmission Scheme for evacuation of power from Dhule 2 GW REZ” and expected by June 2026.

In the 36th CMETS-WR meeting held on 26.05.2025, AEPL was agreed to be granted connectivity for its 94MW Hybrid project (Application No. -2200001584) at Dhule S/s through 220kV S/c line with the availability of Common Transmission system Augmentation which inter-alia includes Establishment of 4x500 MVA, 400/220 kV Pooling Station near Dhule & 1 no of 220kV line bay at Dhule PS for interconnection of DTL of AEPL.

Accordingly, the scheme with following scope of works was agreed in the 36th CMETS-WR held on 26.05.2025.

Details of the scheme are given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	220kV line bay at Dhule PS for RE Interconnection (Appl. 2200001584: Adyant Enersol Private Limited: 94MW)	220kV line bay –1 No.

Implementation time-frame: 04-05-2027 (18 Months from award to implementing agency)

Estimated Cost: ₹5.32 Cr.

(v) ISTS Works associated with upgradation of existing conductors by High performance conductors by MSETCL in Talegaon area and upgradation of bay equipment at Navi Mumbai S/s

STU has proposed LILO of 400 kV Talegaon (PG) - Navi Mumbai-Kharghar, 400 kV Talegaon (PG) - Vikroli -Kalwa & 400 kV Padghe-Nagothane D/c Line for downstream network of 765/400 kV South Kalam (Neral).

Considering the grid connectivity anticipated for datacenters / applications received in Navi Mumbai and upcoming projected demand of MMR, during N-1 system contingency of 400 kV Padghe –Kalwa S/c Line existing 400kV Corridor of Pune -NaviMumbai (PG)-Kharghar and Pune –Vikroli –Kalwa gets critically loaded in 2030-31 scenario.

Further increased loading is observed in this corridor with proposed LILO 400 kV Talegaon (PG) - Navi Mumbai-Kharghar, 400 kV Talegaon (PG) - Vikroli -Kalwa at 765/400 kV South Kallam (Neral).

In order to strengthen the In-STS system for integration with ISTS network for evacuation of RE power , catering to the projected demand in MMR area without any system constraints and mitigating the existing transmission system constrains in Pune Ring main network MSETCL proposed to upgrade the line Conductor (525 sq. mm Twin moose) for Sr. no 1 to 5 & 0.4 ACSR for Sr. no 6 by twin/single High performance to enhance the capacity of the 400kV Line to 2000 MW each & 220kV line to 500 MW:

Sl. No.	Name of Line	STU Plan	Status (HTLS: 3600A)
1	400 kV Talegaon (PG)-Vikhroli S/C Line	2026-27	Dec-26 MERC approval pending
2	400 kV Talegaon (PG)-Kharghar to be LILO at Navi Mumbai (PG) S/C Line	2026-27	Dec-26 MERC approval pending
3	400 kV Kharghar – Kalwa Line	2026-27	Dec-26 MERC approval pending

Sl. No.	Name of Line	STU Plan	Status (HTLS: 3600A)
4	400 kV Talegaon (PG) – Chakan	2025-26	LOA in Apr-25 Apr-26
5	400 kV Talegaon (PG) – Lonikand-I	2026-27	Dec-26 MERC approval pending
6	220 kV Talegaon (PG)-Talegaon Ambi I&II	2026-27	Dec-26 MERC approval pending

Some part of lines under sr no 1, 2, 4 & 5 along with bays at 400kV Talegaon (PGCIL) and 400kV Navi Mumbai (PG) end is under the ownership of WTL & PGCIL respectively and are part of the ISTS network. For Sr no 6 the bays 220 kV Talegaon (PG) end are owned by PGCIL. It is thus necessary to upgrade the corresponding ISTS bays /line portion equivalent with the capacity of the lines in matching timelines.

The matter regarding uprating of 400 kV Talegaon (PG) – Chakan & 400 kV Talegaon (PG) – Lonikand-I lines alongwith bay upgradation at Talegaon (PG) S/s & Navi Mumbai S/s was agreed in the 36th CMETS-WR meeting held on 26.05.2025 & 41st CMETS-WR meeting held on 02.02.2026 with the following scope of work under ISTS. Schematic of the scheme is at **Figure 5-6**.

Bay Upgradation Works at Talegaon (PG) S/s:

- Upgradation of Equipment (like CT, CVT, Isolator, Wave Trap) in 400kV DIAMETER 1-400kV Chakan Line -Tie- Kharghar Line (401-402-403) at Talegaon S/s (POWERGRID) from 2000A to 3150A and Jack Bus conductor from Twin Moose to Twin HTLS/Quad Moose commensurate with upgraded bay equipment ampacity
- Upgradation of Equipment (like CT, CVT, Isolator, Wave Trap) in 400kV DIAMETER 5-400kV Lonikand Line -Tie- Bus Reactor Bay (413-414-415) at Talegaon S/s (POWERGRID) from 2000A to 3150A and Jack Bus conductor from Twin Moose to Twin HTLS/Quad Moose commensurate with upgraded bay equipment ampacity
- Upgradation of Equipment (like CT, CVT, Isolator, Wave Trap) in 400kV DIAMETER 3 (400 kV Talegaon GIS Line # 2- Tie - Talegaon GIS Line # 3) (407-408-409) from 2000A to 3150A and Jack Bus conductor from Twin Moose to Twin HTLS/Quad Moose commensurate with upgraded bay equipment ampacity

Implementation time frame: 18 months from the date of allocation

Reconductoring works of WTPL line portion emanating from Talegaon (PG) S/s:

- Reconductoring of the balance line section of Pune (AIS) –Lonikand-I 400kV D/c line (one ckt via Chakan) (upto LILO point of LILO of Lonikand-Kalwa 400kV line at Pune (AIS)) of Western Transco Power Ltd. (a subsidiary of AESL)) with

conductor having capacity of 2100MVA per ckt at nominal voltage* (Chakan section: 0.092km & Lonikand-I section: 1.317km)

**MSETCL shall reconductor the balance line portion from above LLO point upto Kalwa with conductor having capacity of 2100MVA per ckt at nominal voltage*

Implementation time frame: 18 months from the date of allocation

Note: *As decided in the 26th NCT meeting held on 06.01.2025, all the reconductoring proposals will be deliberated in NCT along with cost breakup of Reconductoring portion and the developer who is awarded the scheme under RTM shall approach the appropriate commission in terms of the existing provisions of the regulations.*

Bay Upgradation work at Navi Mumbai S/s:

- Replacement of the conductor of Jack Bus for 400 kV Padghe (PG) - Navi Mumbai Line Bay (404 Bay) and 400 kV Vikroli-Navi Mumbai Line Bay (403 Bay) from Twin ACSR Moose to Quad ACSR Moose along with associated connectors at Powergrid Navi Mumbai substation.
- Replacement of wave trap in 400 kV Padghe (PG) -Navi Mumbai 404 Line Bay at Navi Mumbai S/s from existing 2000 Amp rating to 3000A/3150 A current rating.

Implementation time frame: 18 months from the date of allocation

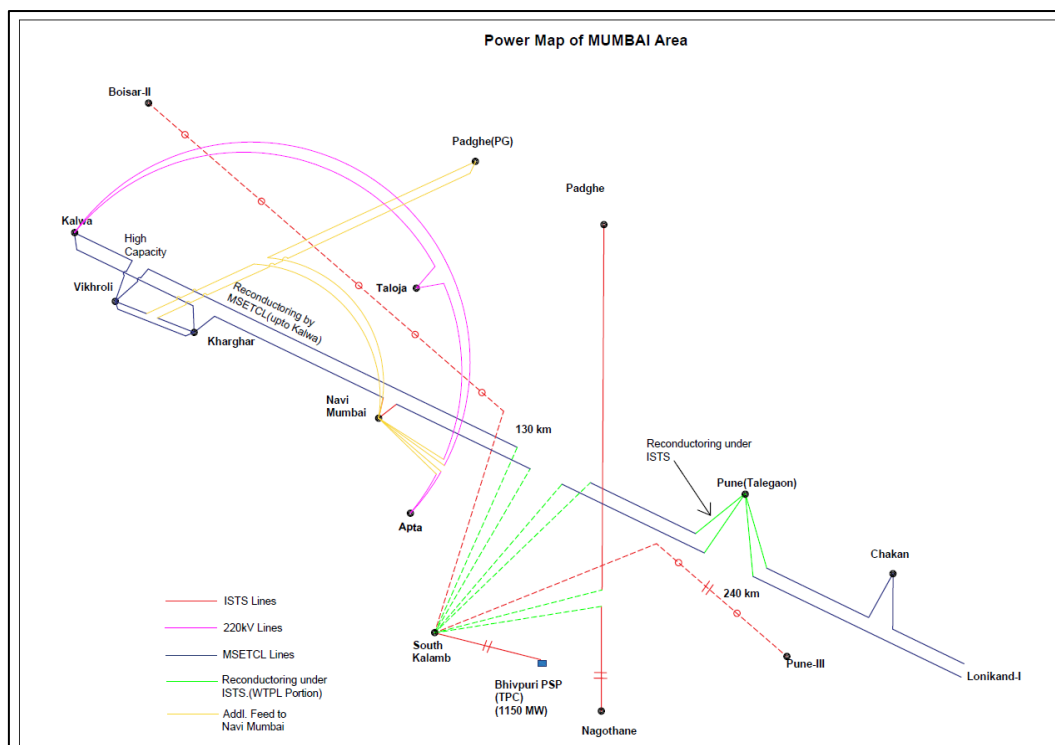


Figure 5-6: ISTS Works associated with uprating of existing conductors by High performance conductors by MSETCL in Talegaon area and upgradation of bay equipment at Navi Mumbai S/s

5.4.3 Madhya Pradesh

(i) Implementation of 1 no. 400kV bay at Ishanagar (New) S/s for Interconnection of 350MW Wind project of Avaada Energy Pvt. Ltd. (AEPL)

2x1500MVA 765/400kV and 2x500MVA, 400/220kV Ishanagar (New) S/s is under implementation under “Western Region Expansion Scheme XXXIII (WRES - XXXIII): Part C” and expected by June 2026.

In the 35th CMETS-WR meeting held on 07.02.2025, AEPL was agreed to be granted connectivity for its 350MW Wind plant (Application No.: 2200001421) at Ishanagar (New) S/s through 400kV S/c line (on D/c tower) with the availability of Common Transmission system Augmentation which inter-alia includes Establishment of 2x1500MVA, 765/400kV and 2x500MVA, 400/220kV Ishanagar (New) S/s & 1 no of 400kV line bay at Ishanagar (New) S/s.

Accordingly, the scheme with following scope of works was agreed in the 35th CMETS-WR held on 07.02.2025.

Details of the scheme are given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	400kV line bay at Ishanagar (New) S/s for RE Interconnection (Appl. 2200001421: Avaada Energy Pvt. Ltd.)	400kV line bay –1 No.

Implementation time-frame: 30.06.2027 (As per start date of connectivity requested by applicant)

Estimated Cost: ₹ 13.98 Crs.

(ii) Implementation of 2 Nos. 220kV line bays at Shujalpur (PG) S/s (for LILO of Shujalpur (MP) – Narsinghgarh (MP) 220kV line at Shujalpur (PG) S/s

Following downstream system is being implemented by MPPTCL in matching timeframe of Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2) (Jaisalmer/Barmer Complex) under ISTS:

220kV Works:

- Upgradation of Narsinghgarh 132kV to 220kV
- Charging of existing Shujalpur 220kV – Narsinghgarh 132kV(U/G on 220kV) DCSS line on 220kV level

- 2nd Circuiting of Shujalpur 220kV - Narsinghgarh 132kV (U/G on 220kV) DCSS line (with HTLS conductor from Shujalpur 220kV S/s upto LILO location for Shujalpur 400kV S/s)
- LILO of one circuit of Shujalpur 220kV - Narsinghgarh 132kV (U/G on 220kV) DCDS line at Shujalpur 400kV S/s (with HTLS conductor on portion of Shujalpur 400kV – Shujalpur 220kV-Circuit-III upto LILO point for Shujalpur 400kV S/s)

MPPTCL was to implement the LILO of Shujalpur (MP) – Narsinghgarh (MP) 220kV line at Shujalpur (PG) S/s along with 2 nos. 220kV bays at Shujalpur (PG) S/s. However, MPPTCL vide letter dated 04.06.2025 & 16.07.2025 requested CTUIL for construction of 2 Nos. 220kV line Bay (Suitable for High Ampacity Conductor (HTLS)) under ISTS at 400kV Shujalpur (PGCIL) Substation for termination of proposed LILO at Shujalpur 400kV S/s

The above scope of transmission Scheme was agreed in the 38th WR-CMETS meeting held on 11.08.2025 and subsequently agreed under ISTS as Western Region Bay Scheme-I (WRBS-I). Further, MPPTCL shall ensure that the 220kV feeders shall come up in matching time-frame of the ISTS bays. Schematic is at **Figure 5-7**

Details of the scheme are given below:

Sl. No.	Scope of works	Details
1.	2 Nos. 220kV line bays at Shujalpur (PG) S/s (for LILO of Shujalpur (MP) – Narsinghgarh (MP) 220kV line at Shujalpur (PG) S/s, which is being implemented by MPPTCL)	220kV line bays – 2 Nos.

Implementation time frame: 18 months from the date of allocation

Estimated Cost: ₹ 10.64 Crs

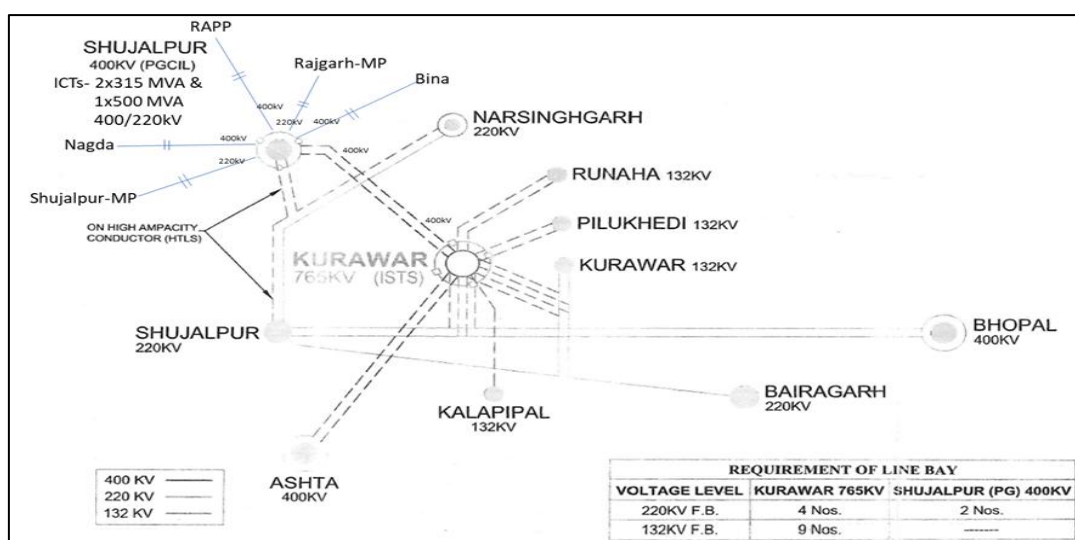


Figure 5-7: Western Region Bay Scheme-I (WRBS-I)

5.4.4 Chhattisgarh

(i) Augmentation of Transformation capacity at Raipur (PG) S/s in Chhattisgarh by 400/220 kV, 1x500 MVA (4th) ICT

Raipur (PG) S/s is an existing substation with 3x315 MVA, 400/220kV ICTs. POWERGRID informed that the monthly average loading on existing 3x315 MVA 400/220kV ICTs at Raipur S/s is more than 75% and monthly peak loading is more than 90%. Hence, to meet the N-1 contingency, implementation of 1x500 MVA 400/220kV ICT (4th) along with associated bays was required. Accordingly, the scheme was agreed in the 36th CMETS-WR held from 26.05.2025 to 28.05.2025. Schematic is attached at Figure 5-8.

Details of the scheme are given below:

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Augmentation of Transformation capacity at 400/220kV Raipur (PG) S/s by 400/220kV 1x500MVA ICT (4th) along with associated bays at both ends	- 400/220kV, 1x500MVA ICT-1 No. - 400kV ICT bay –1 No. Main Bay (Termination in existing spare bay of half diameter) - 220kV ICT bay –1 No. - 220kV 2500 Sqm XLPE Cable - 4x750Mtrs (approx.) along with associated cable termination.

Note: As informed by POWERGRID vide e-mail dated 23.04.2025, the ICT will be located on the opposite side of the existing 400/220kV ICTs, but within the same 400kV Bus Section as the other three ICTs. Consequently, the 220kV cable will need to be routed across the entire 400kV diameter.

Implementation time frame: 21 months from the date of allocation

Estimated Cost: ₹ 63.40 Crs

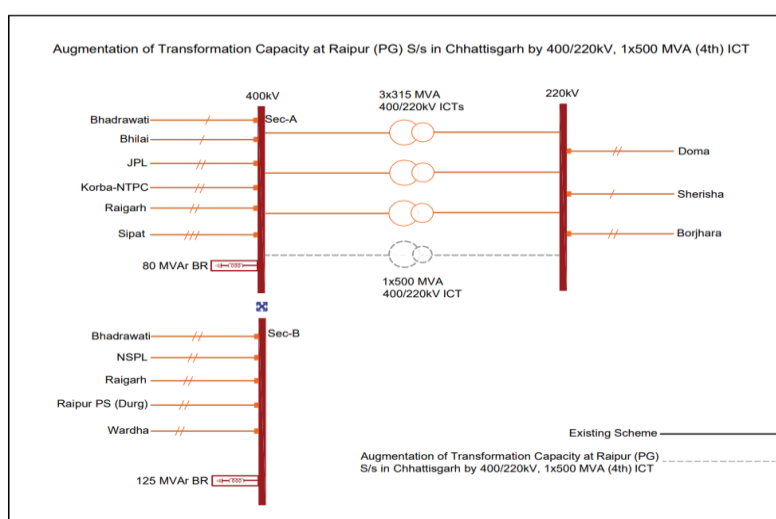


Figure 5-8: Augmentation of Transformation capacity at Raipur (PG) S/s in Chhattisgarh by 400/220 kV, 1x500 MVA (4th) ICT

(ii) Augmentation of Transformation Capacity at Champa PS for interconnection of Thermal Project of Korba Power Limited (KPL)

Korba Power Ltd. (Erswhile Lanco Amarkantak) has applied for connectivity for its Phase-I generation project of 2x660MW capacity at Champa-PS. Earlier, connectivity was granted to M/s Lanco at Champa PS through 400kV D/c line on Sec-A (where Lara-I units are connected). However, in the revised load generation scenario and also considering reverse flow requirement on Raigarh – Pugalur HVDC link (from SR to WR), constraints are being observed on Raigarh (Kotra) 765/400kV ICTs. Hence, in case Korba Power Ltd.'s connectivity is again proposed at Sec-A (where Lara-I units are connected), it would lead to further overloading of ICTs at Raigarh (Kotra) since Champa 400kV Sec-A is connected to Raigarh (Kotra) through Lara-I project.

With the grant of Connectivity to KPL at Section-B, no further margins for injection would be left at Champa PS as fault level would reach near design limit. Also, S/s N-1 compliance limit would also be near its limit at 400kV Sec-B of Champa PS. The proposed 765/400kV ICT augmentation at Champa PS (Sec-B) would enable immediate injection of power from Korba Power Limited generation project. For onwards evacuation of power, WR-ER Inter-Regional Network Expansion Scheme would be required inter-alia including Raigarh (Kotra)-II S/s, Jamshedpur establishment alongwith Raigarh (Tamnar) – Jamshedpur 765kV D/c line which would be Common transmission system for the generation project. The subject scheme was agreed as “**Associated Transmission System for Korba Power Limited generation 2x660MW project**” in the 36th CMETs-WR meeting held on 26.05.2025.

Details of the scheme are given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Augmentation of Transformation capacity at Champa Sec-B by 765/400kV 1500MVA ICT (7th) (on Sec-B) with associated ICT bays including 500MVA single phase spare ICT bank	- 765/400 kV, 1500 MVA ICT – 1 Nos. (4x500 MVA single phase units including one spare ICT Unit) - 765 kV ICT bays – 1 No. - 400 kV ICT bays –1 No.

Implementation time-frame: 21 months from award to implementing agency

Estimated Cost: ₹ 169.72 Cr.

(iii) ICT Augmentation at Dharamjaigarh S/s for providing connectivity to Thermal Project of Korba Power Limited (KPL)

Dharamjaigarh is an existing substation with 2x1500MVA 765/400kV and 2x500MVA 400/220kV level. Korba Power Limited has applied for connectivity for its 1600MW thermal project at area near Dharamjaigarh.

In the 36th CMETS-WR meeting held on 26.05.2025, Korba Power Limited was agreed to be granted connectivity for its 1600MW thermal project (Application no. - 2200001692) by creation of 400kV Sec-B at Dharamjaigarh S/s along with Augmentation of Transformation capacity at Dharamjaigarh S/s by 3x1500MVA ICTs (on Sec-B) with associated ICT bays & 2 nos. 400kV line bays at Sec-B for termination of DTL of KPL generation project.

The proposed 765/400kV ICT augmentation at Dharamjaigarh S/s would enable immediate injection of power from Korba Power Limited generation project. For onwards evacuation of power, WR-ER Inter-Regional Network Expansion Scheme would be required inter-alia including Raigarh (Kotra)-II S/s, Jamshedpur establishment alongwith Raigarh (Tamnar) – Jamshedpur 765kV D/c line which would be Common transmission system for the generation project.

The subject scheme was agreed as “**Associated Transmission System for Korba Power Limited generation 1600MW project**” in the 36th CMETS-WR meeting held on 26.05.2025.

Details of the scheme are given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Creation of 400kV Sec- B at D'jaigarh S/s along with Augmentation of Transformation capacity at D'jaigarh S/s by 3x1500MVA ICTs (on Sec-B) (with associated ICT bays)	- 765/400 kV, 1500 MVA ICT – 3 Nos. (9x500 MVA single phase units) (existing 500MVA spare unit to be utilised) - 765 kV ICT bays – 3 Nos. (on Sec-B) - 400 kV ICT bays –3 Nos. (on Sec-B) - 400kV Sectionalizer bays – 1 set - 125 MVA_r, 420 kV reactor- 1 No. - 400 kV Reactor bay- 1 Nos. (on Sec-B)
2.	2 no. 400kV bays at Dharamjaigarh S/s (Sec-B) for Korba Power Limited (TPP): 1600MW: 2200001692	- 400 kV Line bays- 2 Nos. (on Sec-B)

Implementation time-frame: 01-11-2028 (matching with start date sought by Korba Power Limited: 1600MW)

Estimated Cost: ₹ 657 Cr.

5.5 System Study Results and Analysis

Based on the load-generation scenarios as elaborated in section 5.3, various system studies have been carried out in PSSE. Planned/ Under implementation Transmission system that are expected to be commissioned in 2030-31 timeframe is considered for conducting these studies.

In this direction to achieve the target of Govt. of India, MNRE has identified cumulative 159 GW RE potential in the Western Region. Out of the identified 159 GW Potential, 96.2 GW RE Potential is identified in the State of Gujarat, 20GW in Maharashtra & 42.8 GW in Madhya Pradesh.

The integration of above capacity in ISTS is being planned phase-wise depending on the receipt of applications. Accordingly, transmission system planned / approved till date in ISTS along with the corresponding RE capacities has been considered in the system studies. Further, as per the deliberations held with STUs, additional generation capacities in STU along with the planned STU transmission system has been considered in the studies.

System studies have been conducted on these files prepared in consultation with the constituents for 9 scenarios. Results of these studies were analysed and the same are deliberated below-

5.6 Power Flow Studies

The base case file was prepared for 2030-31 timeframe. The study results are detailed in subsequent sections.

5.7 Voltage Analysis

Per Unit voltages of all 765 kV and 400 kV buses were monitored in all the nine scenarios. Maximum and minimum voltage of each bus was identified from nine voltages available in nine number of scenarios. All bus voltages are within limit from their nominal value.

5.8 Contingency Analysis

Contingency analysis has been performed on all the 765 kV & 400kV transmission lines, and 765/400 kV & 400/220 kV transformers to ascertain the loading levels under outage of any other 765 kV or 400 kV transmission element. Results of the analysis are discussed below:

a) Transmission Lines

List of 765kV ISTS lines loaded around 3500MW under N-1 contingency are summarized below at **Table 5-7:**

Table 5-7: 765kV ISTS Transmission lines not meeting N-1 Criteria in WR

(All Fig in MW)

Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under n-1	Rating	% Loading
Raigarh (Kotra)-Dharamjaigarh 765kV one line	Raigarh (Kotra)-Dharamjaigarh 765kV other line	4	ISTS	2757	4180	3500	119.4

Due to low generation & high demand in ER, high power is flowing on Raigarh (Kotra)-Dharamjaigarh-Ranchi-Jamshedpur 765kV D/c corridor. By suitable modulation of

Champa Kurushetra HVDC & operation of sectionalizer 765kV buses (Sec-A & Sec-B) of Raigarh (Kotra), loading under N-1 contingency is observed to be within 3500MW permissible limit of 765kV line.

Further, 400kV ISTS/STU lines loaded beyond 100% of thermal rating under N-1 contingency are summarized below at **Table 5-8**.

Table 5-8: 400kV Transmission lines not meeting N-1 Criteria in WR

(All Fig in MW)

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	% Loading	Rating
1.	Kolhapur-Alkud 400kV D/c line one ckt	Kolhapur-Alkud 400kV D/c line other ckt	1,4,7	ISTS/STU	1411	1501	175.27	857
2.	Dhamtari-Jagdarpur 400kV D/c line one ckt	Dhamtari-Jagdarpur 400kV D/c line other ckt	7	STU	638.07	892.76	106.08	857
3.	A'bad – I – A'bad – II 400kV D/c line one ckt	A'bad – I – A'bad – II 400kV D/c line other ckt	7	STU	742.9	1411.46	161.83	857
4.	Satpura – Koradi-I 400kV S/c line	Bhilai – Koradi-I 400kV S/c line	4	STU	755.72	881.18	103.5	857
5.	Chegaon – Malwa 400kV D/c line one ckt	Chegaon – Malwa 400kV D/c line other ckt	8	STU	564.01	890.57	103.92	857
6.	Tarapur – Velgaon 400kV D/c line one ckt	Tarapur – Velgaon 400kV D/c line other ckt	8,9	STU	525.64	882.72	102.1	857
7.	Rajgarh (PG)- Halol-II 400kV line one circuit	Rajgarh (PG)- Halol-II 400kV line other circuit	4	ISTS/STU	710.61	1169.04	137.33	857
8.	Kasor-Halol-II 400kV line one ckt	Kasor-Halol-II 400kV line other ckt	4	STU	718.28	1049.22	122.43	857

765/400kV Alkud New substation has been planned by MSETCL, where, about 2500MW generation is proposed to be connected. At 400kV level, Alkud New has been interconnected with existing Alkud S/s which is very short line. From the studies, it is observed that majority of the power at Alkud New is flowing towards Alkud S/s through 400kV D/c line thereby overloading Alkud – Kolhapur 400kV S/c line. Reconductoring or any other suitable augmentation would be evolved with MSETCL & other stakeholders.

High loadings on Dhamtari-Jagdarpur 400kV D/c line is on account of High RE & low self generation of Chhattisgarh during solar max period.

A'bad-I and A'bad-II substations are interconnected through very short lines and to resolve overloading, reconductoring or any other suitable augmentation would be evolved with MSETCL.

With respect to overloading observed on Rajgarh (PG)- Halol-II 400kV D/c line under outage of one circuit, loading on the line may be controlled with bypassing of the FSC installed at Rajgarh end of the subject line. This would in turn reduce the loadings on Kasor-Halol-II 400kV D/c line.

b) Transformers

List of ISTS ICTs loaded beyond MVA rating under N-1 contingency are summarized below at **Table 5-9**:

Table 5-9: ISTS ICTs not meeting N-1 Criteria in WR

(All Fig in MW)

Sl. No.	Name of the Element	Scenario No.	Owner	Maximum Base Case Flow	Maximum Loading under N-1 of ICT	% Loading	Rating
1	400/220kV, 2x315MVA Aurangabad ICTs	8	ISTS	249.59	346.77	110.09	315

From the studies it is observed that no 765/400kV at ISTS S/s is loaded beyond MVA rating under N-1 contingency. However due to low generation considered at Champa (Sec-B where KSK units are connected), high loading is observed. With suitable modulation of Champa Kurushetra HVDC, loading is observed within permissible rating of 1500MVA under N-1 contingency.

Aurangabad ICTs are observed to be overloaded due to high demand in western part of Maharashtra and low self-generation. Import capability (ATC) constraints for Maharashtra have been reported by WRLDC and associated system augmentation in consultation with MSETCL would be evolved.

Further under N-1 contingency, high loading of more than 90% ICT rating is observed on 765/400kV ICTs at Kolhapur S/s in Maharashtra due to interconnection of Kolhapur with Satara which is further proposed to be interconnected to Kandalgaon/other areas where Bulk loads are proposed to be connected in Maharashtra under In-STs. Further,

In Gujarat, during afternoon peak period, high loading of 400/220kV ICTs at Sugan is observed on account of less availability of gas based generations at Sugan, Gandhar, DGEN etc and high demand in Gujarat. Suitable system augmentation at these substations would be finalised after discussions with concerned stakeholders.

List of Generation/STU ICTs loaded beyond MVA rating under N-1 contingency are summarized below at **Table 5-10**.

Table 5-10: Generator & STU ICTs not meeting N-1 Criteria in WR

(All Fig in MW)

Sl. No.	Name of the Element	Scenario No.	Owner	Maximum Base Case Flow	Maximum Loading under N-1 of ICT	% Loading	Rating
1.	400/220kV, 2X315 MVA Mundra APL ICTs	2,3,5,6	APL	305.86	415.84	132.01	315
2.	400/220kV, 2X315 MVA Jindal ICTs	All Scenerios	JPL	176.87	358.46	113.8	315
3.	400/220kV, 3X315 MVA Bhilai ICTs	8	CSPTCL	285.06	348.34	110.58	315
4.	400/220kV, 3x500 MVA Keshod ICTs	1	GETCO	314.85	539.62	107.92	500
5.	765/400kV, 2X1500 MVA Parli (M) ICTs	7	MSETCL	1093.25	1714.81	114.32	1500
6.	400/220kV, 2x315+1X500 MVA Akola ICTs	1,4,7	MSETCL	314.85	435.72	138.33	315/500
7.							
8.	400/220kV, 2x500 MVA Lonikand-II ICTs	1,2,4,5,7,8	MSETCL	435	594.91	118.98	500
9.	400/220kV, 2x500 MVA Dolvi ICTs	3,6,9	MSETCL	328.47	737.08	147.42	500

From above, it is observed that ICT loadings i.r.o 1 no. of substation in Gujarat, 3 nos. of substation in Chattisgarh and 4 nos. in Maharashtra are not complying with N-1 criteria in 2030-31 timeframe.

Therefore, respective STUs/Owners are required to take advance action to mitigate this issue. Additional system strengthening in these areas such as planning additional feeds from ISTS, shifting of loads, ICT augmentation, increase in self generation, etc. may be required to feed the growing demand.

5.9 Short Circuit Analysis

Short circuit level was calculated for all 765 and 400 kV buses of Western Region and buses having fault level more than the design rating under various scenarios were identified. From

analysis, it emerged that there are 13 nos. of 765kV substations and 44 nos. of 400kV substations in WR having fault level more than designed capacity. Details of the ISTS buses exceeding design fault level are tabulated below at **Table 5-11**:

Table 5-11: ISTS Buses Exceeding Designed Fault Level in WR

Sl. No.	Substation Name	Scenario No.	Highest Fault level (kA)	Designed Rating (kA)
1.	765kV Ahmedabad	1,4,7	55	50
2.	765kV Aurangabad	All	44	40
3.	765kV Bina	All	44	40
4.	765kV Bilaspur	All	49	40
5.	765kV Boisar-II	All	55	50
6.	765kV Gwalior	All	43	40
7.	765kV Indore	All	44	40
8.	765kV Lakadia	1,4,7	54	50
9.	765kV Padghe GIS	All	49	40
10.	765kV Sipat	All	44	40
11.	765kV Vadodara	1,4,7	53	50
12.	765kV Vataman	1,4,7	56	50
13.	765kV Wardha	All	44	40
14.	400kV Aurangabad	All	57	50
15.	400kV Bachau	All	47	40
16.	400kV Banaskantha	All	64	50
17.	400kV Bhadrawati	All	46	40
18.	400kV Bilaspur Pool	All	55	40
19.	400kV Bina	All	45	40
20.	400kV Boisar	All	50	40
21.	400kV Dehgam	All	45	40
22.	400kV Itarsi	All	44	40
23.	400kV Jabalpr Pool	7,8,9	56	50
24.	400kV Jabalpur	All	49	40
25.	400kV Padghe GIS	All	54	50
26.	400kV Pune PG AIS	All	50	40
27.	400kV Pune-PG GIS	All	54	50
28.	400kV Seoni PG	All	45	40
29.	400kV Vadodara	All	57	50

From the above, it can be seen that 29 nos. of buses i.e. 400kV & 765kV violates the design fault level. Studies shall be carried out to mitigate the same in consultation with various stakeholders of WR.

Further, following 400kV STU buses exceeding the substation design fault level under different scenarios are mentioned at **Table 5-12**:

Table 5-12: STU Buses Exceeding Designed Fault Level in WR

Sl. No.	Substation Name	State	Scenario No.	Highest Fault level (kA)	Designed Rating (kA)
1.	Aurangabad-I	Maharashtra	All	52	40
2.	Aurangabad-II	Maharashtra	All	50	40
3.	Bableswar	Maharashtra	All	44	40
4.	Bhopal	Madhya Pradesh	All	46	40
5.	Bina	Madhya Pradesh	All	45	40
6.	Chorania	Gujarat	All	46	40
7.	Dhule	Maharashtra	1,4,7,9	44	40
8.	Indore	Madhya Pradesh	All	43	40
9.	Jejuri	Maharashtra	All	46	40
10.	Karad	Maharashtra	All	46	40
11.	Kharghar	Maharashtra	All	44	40
12.	Lonikand I	Maharashtra	All	51	40
13.	Nagda	Madhya Pradesh	All	45	40
14.	Padghe	Maharashtra	All	45	40
15.	Ranchodpura	Gujarat	All	45	40
16.	Soja	Gujarat	All	47	40
17.	Ujjain	Madhya Pradesh	All	43	40
18.	Zerda	Gujarat	1,4,7	44	40

From the above, it can be seen that 18 nos. of 400kV STU buses violates the design fault level. Studies shall be carried out by respective STUs to mitigate the same in consultation with various stakeholders of WR.

Following Generator buses exceeding the substation design fault level under different scenarios are mentioned at **Table 5-13** below:

Table 5-13: Generator Buses Exceeding Designed Fault Level in WR

Sl. No.	Substation Name	State	Scenario No.	Highest Fault level (kA)	Designed Rating (kA)
1.	Athena	Chhattisgarh	All	50	40

Sl. No.	Substation Name	State	Scenario No.	Highest Fault level (kA)	Designed Rating (kA)
2.	CGPL	Gujarat	All	49	40
3.	Chandrapur I	Maharashtra	All	52	40
4.	Chandrapur-II	Maharashtra	All	52	40
5.	Chandrapur SW	Chattisgarh	All	49	40
6.	DB Power	Chattisgarh	4,5,6,7,8,9	43	40
7.	Dhariwal	Maharashtra	7,8,9	44	40
8.	Gandhar	Gujarat	All	57	40
9.	Mundra APL	Gujarat	7,8,9	44	40
10.	Tarapur	Maharashtra	All	47	40

With respect to high fault levels at Chandrapur and Aurangabad complex, high fault levels are seen at the above MSETCL substations primarily because of very short lines between C'pur-I & C'pur-II and between A'bad-I, A'bad-II & A'bad-III and presence of generators in close proximity. In this regard, MSETCL has planned Jalna S/s through LILO of A'bad-II - A'bad-III 400kV D/c line which will reduce the SC levels at Aurangabad complex.

STUs shall check ratings of breakers at above substations and possibility of upgradation of equipments from 40kA to 50kA (in earlier cases, several old equipments were already found to be rated to 50kA). Otherwise, STUs may explore possibility of reducing fault levels at above substations through suitable splitting / bypassing arrangement with or without series bus / line reactors.

Further, STUs/Generators are required to take necessary actions such as bus splitting, bypassing of lines, fault limiting reactors etc to resolve the issue of high fault level at their buses.

Chapter 6: Southern Region

Southern Region, part of peninsular India, is surrounded by the Arabian Sea towards west, Bay of Bengal in the east and Indian ocean in the south. It features the Western and Southern Ghats mountains ranges and major rivers like Kaveri, Krishna and Godavari.

Southern Region is connected to Western and Eastern Regions through high capacity 765kV AC links, Back-to-Back HVDC and Bi-pole HVDC links. The thermal generating stations of Southern Region are predominantly concentrated in the States of Tamil Nadu, Karnataka, Andhra Pradesh and Telangana. The States of Tamil Nadu, Karnataka and Andhra Pradesh are rich in RE comprising of large-scale Solar & Wind potential. Southern part of Karnataka (Bangalore), Kerala and Central part of Telangana (Hyderabad) has high demand and less internal generation. Southern Region imports power from NEW Grid during peak demand period whereas it exports power to NEW Grid (comprising of North, East, North-East, West regional grids) during high RE scenario / off peak demand period.

6.1 Power Supply Scenario as on Jan'26

As on January, 2026 total Installed Capacity (IC) of Southern Region was about 146 GW and the peak demand was about 67 GW. Southern Region has touched the maximum export of about 11 GW and maximum import of about 22 GW. The state-wise breakup of generation installed capacity (incl. allocations) and peak demand is summarised at **Table 6-1**.

Table 6-1: SR Installed Capacity and Peak Demand as on Jan '26

All Fig in GW

State	Generation								Peak Demand
	Fossil			Non-Fossil				Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total		
Andhra Pradesh	12.9	1.3	14.2	0.1	3.4	12.1	15.6	29.8	13.1
Telangana	13.3	0.4	13.7	0.1	2.5	5.5	8.1	21.8	16.6
Karnataka	10.4	0.4	10.8	0.7	3.6	22.4	26.7	37.5	17.7
Kerala	2.7	0.4	3.1	0.4	2	2.4	4.8	7.9	5.2
Tamil Nadu	16.1	0.8	16.9	1.4	2.2	25	28.6	45.5	19.9
NLC and Lakshadweep	0.2	0	0.2	0	0	0	0	0.2	0.0
Puducherry	0.3	0	0.3	0.1	0	0.1	0.2	0.5	0.6
Central unallocated	2.1	0	2.1	0.5	0	0	0.5	2.6	0.0
SR	58	3.3	61.3	3.3	13.7	67.5	84.5	145.8	67

(Source: CEA monthly report)

From above, it can be concluded that share of non-fossil fuel based generation capacity in total present installed capacity (IC) of 145.8 GW is 84.5 GW i.e. 58% of total IC. This share would further increase in envisaged scenario of 2030-31 timeframe.

6.2 Envisaged Power Supply Scenario by 2030-31

Govt. of India has set a target of over 900 GW generation capacity from non-fossil fuel resources by 2035-36. In this direction to achieve the target of Govt. of India, MNRE identified 181.5 GW RE potential in the States of Andhra Pradesh, Telangana, Karnataka, Rajasthan, Madhya Pradesh and Tamil Nadu (Offshore). Out of the identified 181.5 GW Potential, 86 GW RE Potential is identified in the State of Andhra Pradesh (51 GW), Telangana (13 GW), Karnataka (17 GW) and Tamil Nadu (5 GW: Offshore) in Southern Region. In addition to the above, additional potential of 29 GW in Andhra Pradesh and 8.2 GW in Karnataka has been declared. As per the 20th EPS, Southern Region demand for 2030-31 timeframe is expected to increase to about 104 GW. Further, a large number of Green hydrogen/ Green Ammonia based loads of about 24 GW have also been envisaged in Southern Region.

As per the inputs received from various stakeholders, total expected installed capacity of Southern Region for 2030-31 is expected to be about 300 GW that includes 220 GW (about 74%) of Non-fossil fuel generation. The state wise bifurcation of installed capacity and peak demand is summarized at **Table 6-2**.

Table 6-2: SR Installed Capacity and peak demand (2030-31)

(All Fig in GW)

State	Generation									Peak Demand
	Fossil			Non-Fossil				ESS	Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
Andhra Pradesh	7.1	0.2	7.3	0.0	2.9	9.4	12.3	2.9	22.4	23.2
Telangana	9.2	0.0	9.2	0.0	0.8	3.1	3.8	1.7	14.8	25.6
Karnataka	7.7	0.4	8.1	0.0	4.3	51.7	56.0	8.0	72.0	21.0
Kerala	0.0	0.4	0.4	0.0	2.4	0.5	2.8	0.0	3.2	6.7
Tamil Nadu	10.3	0.6	10.9	0.0	1.9	35.6	37.5	1.9	50.3	27.0
Puducherry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Central	15.3	0.0	15.3	5.8	0.0	0.0	5.8	0.0	21.1	-
ISTS IPP	4.8	0.0	4.8	0.0	0.0	101.5	101.5	9.4	115.6	-
SR	54.3	1.5	55.9	5.8	12.3	201.6	219.7	23.9	299.4	102.4

From above, it is observed that growth in installed capacity of Southern Region is majorly from non-fossil fuel-based generation resources. Share of non-fossil fuel-based generation capacity in total present installed capacity (IC) will increase from 58% to 74%. Compound annual growth rate in peak demand of Southern Region from present timeframe to 2030-31 is around 9 % CAGR. The state wise peak demand growth is given at **Table 6-3**.

Table 6-3: Increase in Peak Demand of Various States of SR

(All Fig in MW)

Peak Demand				
State	Present	2030-31	Difference	% CAGR
Andhra Pradesh	13117	23243	10126	12%
Telangana	15443	25639	10196	11%
Karnataka	17330	20954	3624	4%
Kerala	5178	6707	1529	5%
Tamil Nadu	19878	27033	7155	6%
Puducherry	548	639	91	3%
SR	66994	102379	35685	9%

In addition to above, bulk power demand of about 13 GW (out of 24 GW of potential Green Hydrogen/Green Ammonia envisaged in Southern Region) has been considered from various upcoming Green Hydrogen / Green Ammonia identified by MNRE and proposed to be directly connected to ISTS. From the above table it is clear that the CAGR growth of peak demand in AP is highest of 12 % and total is 9% which is much above the national average of 7.5 %.

6.3 Load Generation Balance for 2030-31 Timeframe

In chapter-3, all India Load Generation Balance (LGB) for identified nine scenarios was prepared as per the methodology finalized in consultation with CTU, CEA and Grid-India. This section elaborates the Southern Region Load Generation Balance (LGB) for 2030-31 Timeframe. For Southern Region also, three points on the daily load curve i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night) for three seasons viz. Monsoon (August), Summer (June) and Winter (February) have been considered.

Load generation balance has been prepared considering the generation dispatch factors as mentioned at **Table 6-4** for the 9 scenarios. Further, thermal generators have been despatched as per the merit order, as elaborated in the Chapter-3 section-3.1.

Table 6-4: Southern Region Generation Dispatch and Demand Factors

Scenario No & Name	Generation Dispatch Factors						Demand Factors
	Hydro	Nuclear	Solar	Wind	ESS	Gas	
1-Aug Solar Max	40%	80%	75%	50%	-100%	0%	84%
2-Aug Peak Load	70%	80%	0%	75%	60%	50%	72%
3-Aug Night Off Peak	40%	80%	0%	65%	40%	50%	64%
4-Jun Solar Max	40%	80%	85%	50%	-100%	0%	79%
5-Jun Peak Load	70%	80%	0%	75%	50%	50%	72%
6-Jun Night Off Peak	40%	80%	0%	65%	0%	50%	60%
7-Feb Solar Max	20%	80%	90%	0%	-100%	0%	97%
8-Feb Peak Load	40%	80%	0%	20%	100%	50%	75%
9-Feb Night Off Peak	20%	80%	0%	0%	40%	30%	61%

Based on the LGB, import / export of SR and the inter regional flows through various corridors is summarised below. It can be seen that with high renewable penetration in SR Grid with a good mix of Solar, wind and storage, SR exports power during most of the scenarios. Maximum export is observed during Peak load condition of Monsoon & Summer i.e. Scenarios (2&5). Maximum import of SR is observed during Winter Solar max condition i.e. Scenario 7. Further, both maximum and minimum is also highlighted in **Table 6-5** below.

Table 6-5: IR Flows & Surplus/Deficit (Southern Region)

(All Fig in MW)

IR Flows	Aug'30 (Monsoon)			Jun'30 (Summer)			Feb'31 (Winter)		
Scenario No.	1	2	3	4	5	6	7	8	9
Corridor	Solar Max	Peak Load	Off Peak	Solar Max	Peak Load	Off Peak	Solar Max	Peak Load	Off Peak
SR-ER	1196	2762	899	3076	1886	-1037	-3483	-5596	-6336
SR-WR	6952	26295	16189	11205	24572	13384	-15788	2835	-2624
SR	8147	29057	17088	14281	26458	12347	-19271	-2761	-8960

Considering the above LGB for nine scenarios, load flow cases were prepared for 2030-31 timeframe. Detailed system studies have been carried out on the finalized load flow cases. The study results are discussed in subsequent sections.

6.4 ISTS Network Expansion Schemes Evolved from Feb'25 to Jan'26

Various transmission schemes have been discussed/finalized in the Consultative Meeting for Evolution of Transmission System of Southern Region (CMETS-SR) from Feb' 2025 to Jan' 2026. Brief of all such deliberated transmission schemes are tabulated at **Table 6-6**.

Table 6-6: Details of the schemes evolved in SR

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (MW)	Type of scheme*	Tentative Cost (in Cr.)
Karnataka					
1.	Transmission system strengthening for integration of additional RE potential at Davanagere (0.25 GW) and Bellary (2.75 GW)	2027-28	3000	RE	1111
2.	Transmission system strengthening at Tumkur-II for integration of additional RE potential (2.7 GW)	2028-29	2700	RE	1221
3.	Implementation of 1 no. of 220kV line bay at Tumkur (Pavagada) PS for providing Connectivity to M/s TEQ Green Power XX Pvt. Ltd.	2026-27	-	RE	6
4.	Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (3 rd) at Narendra (existing) S/s in Karnataka	2027-28	-	SS	68
5.	Implementation of 2 nos. of 220kV Bus Sectionalizers at 220kV level of Gadag-II 400/220kV PS	2027-28		RE	31

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (MW)	Type of scheme*	Tentative Cost (in Cr.)
Andhra Pradesh					
1.	Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (6 th) at N P Kunta PS in Andhra Pradesh	2027-28	500	RE	53
2.	Transmission System for integration of Krishnagiri REZ – Phase-I (4.5 GW)	2028-29	4500	RE	7,627
3.	Transmission System for integration of Krishnagiri REZ – Phase-II (3 GW)	2029-30	3000	RE	4,300
4.	Transmission Scheme for integration of Anantapur-III Phase-I REZ (3GW)	2028-29	3000	RE	2,659
5.	Transmission Scheme for integration of Anantapur-III Phase-II REZ (4.5 GW)	2029-30	4500	RE	5,500
6.	Transmission System for Integration of Kadapa-II REZ -Phase-I (4.5 GW)	2029-30	4500	RE	5,105
7.	Transmission System for Integration of Kadapa-II REZ -Phase-II (3 GW)	2029-30	3000	RE	3,200
8.	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-I)	2028-29	4500	GH	8,386
9.	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-II)	2029-30	3000	GH	4,600
10.	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Ramayapatnam area (4 GW)	2029-30	4000	GH	5,800
11.	Reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor	2028-29		SS	325
Tamil Nadu					
1.	Augmentation of 1x500 MVA, 400/230kV ICT (4 th) at Kalivanthapattu S/s	2027-28	-	SS	74
2.	Transmission System strengthening at Karur PS for integration of RE generation capacity	2028-29	1000	RE	621
3.	Upgradation of Udumalpet – Madurai 400kV S/c line	2028-29	-	SS	643
4.	Reconductoring of Tirunelveli – Udumalpet and Pugalur – Madurai 400kV D/c lines with HTLS conductor	2027-28	-	SS	1193
5.	Implementation of 1 no. of 230kV line bay at Tuticorin-II GIS for providing Connectivity to M/s Indianoil NTPC Green Energy Pvt. Ltd.	2027-28		RE	8.27
Kerala					
1.	Augmentation of 1x500 MVA, 400/220kV ICT (3 rd) at Thrissur VSC HVDC Station in Kerala	2027-28		SS	170
Telangana					
1.	Proposal for reduction of High Short Circuit level at 400kV Maheshwaram (TG) bus#	2028-29		SS	
2.	Augmentation of transformation capacity by 1x500 MVA (5 th), 400/220kV ICT at Hyderabad (Ghanapur) S/s in Telangana	2028-29		SS	75

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (MW)	Type of scheme*	Tentative Cost (in Cr.)
Puducherry					
1.	Transmission system for reliable power supply to Puducherry and Tamil Nadu#	2029-30		SS	
Total					52,776

*RE – Renewable Energy; SS- System Strengthening; GH – Green Hydrogen;

Inputs awaited for estimating the cost.

Details of the schemes are reproduced below state-wise:

6.4.1 Karnataka:

(i) Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (3rd) at Narenda (existing) S/s in Karnataka

During the 210th OCC meeting of SRPC held on 10.01.2024, requirement of additional ICT at Narenda (existing) S/s due to continuous overloading / N-1 violation of existing ICTs was discussed and the proposal for additional 500 MVA ICT at Narenda (existing) was approved in principle. SRLDC in its quarterly report Q4 (Jan'24-Mar'24) has highlighted that during high demand period of Karnataka, ICTs at Narenda are not complying N-1 criteria. Proposal for augmentation of 1x500 MVA ICT (3rd) at Narenda was deliberated and agreed in joint study meeting held on 01.04.2024. Same was agreed in the 38th CMETS-SR held on 02.06.2025. Schematic is given at **Figure 6-1**.

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (3 rd) at Narenda (existing) S/s in Karnataka	- 1x500 MVA, 400/220 kV ICT - 400 kV Bay – 1 No. Main Bay (Termination in existing spare bay of half diameter). - 220 kV Outdoor GIS Bay – 1 No. - 220 kV, 1Ph. GIB (to connect outdoor GIS to AIS main bus) – 500m along with associated GIS to AIS bushings. - 245 kV, 2500 Sq.mm, Cu XLPE Cable (To connect LV side 400/220kV Transformer to 220kV Bay) –1200m (approx.) along with associated cable termination

Implementation Timeframe: 24 months, Presently, this scheme is under implementation and expected by Sep'27.

Estimated Cost: ₹ 67.92 Crs.

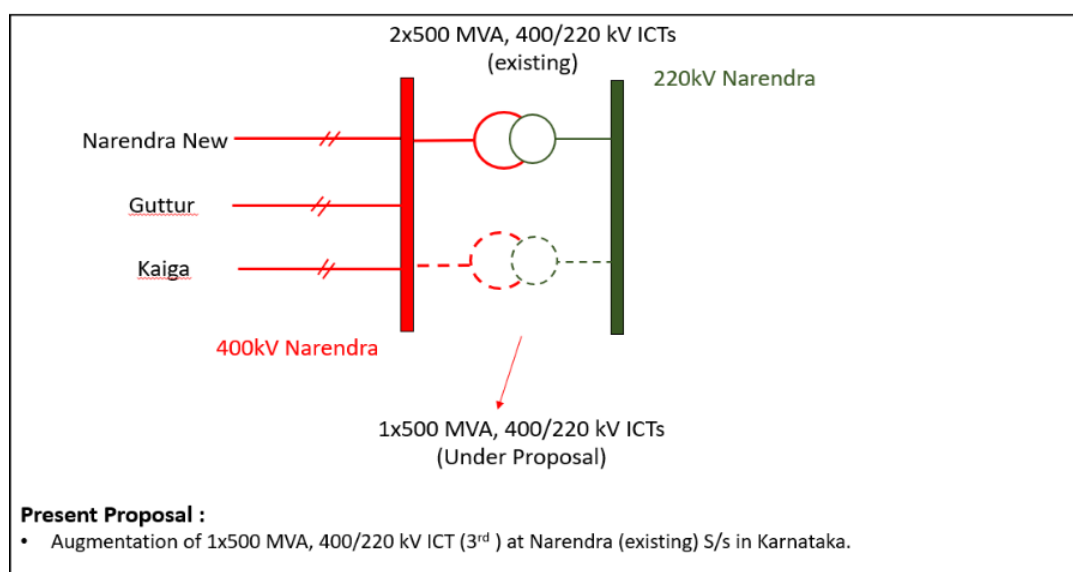


Figure 6-1: Augmentation of transformation capacity by 1x500 MVA (3rd), 400/220kV ICT at Narendra(existing) 400/220kV GIS S/s in Karnataka

(i) Transmission system for integration of additional RE capacity in Davanagere, Bellary and Tumkur-II REZ

MNRE vide letter dated 25.06.2025 identified additional RE potential of 6 GW in the state of Karnataka. The details are as given below:

District	Pooling Station	Existing RE potential declared (GW)	Additional RE potential declared (GW)	Total (GW)
Vijayanagar	Bellary	1.5	2.75	4.25
Davangere	Davangere	4	0.25	4.25
Vijayapura	Bijapur	2	1.5	3.5
Tumkuru	Tumkur-II	1.5	1.5	3
Total		9	6	15

Earlier based on the identified potential by MNRE as the part of 500 GW non-fossil capacity by 2030, transmission system was identified and taken-up for integration of Davanagere / Chitradurga (4 GW), Bellary (1.5 GW) and Tumkur-II (1.5 GW). Subsequently, following transmission system was identified for integration of additional RE potential declared at Davanagere (0.25 GW), Bellary (2.75 GW) and Tumkur-II (1.5 GW) :

a) Transmission system strengthening for integration of additional RE potential at Davanagere (0.25 GW) and Bellary (2.75 GW):

- Augmentation of transformation capacity by 2x1500 MVA, 765/400kV ICTs (6th & 7th) at Davanagere PS

- Augmentation of transformation capacity by 6x500 MVA, 400/220kV ICTs (5th – 10th) at Bellary PS
- Bellary – Davanagare 2nd 400kV (Quad) D/c line
- 4 nos. of 220kV line bays and 1 no. of 400kV line bay at Davanagere PS for termination of dedicated transmission lines of RE generation projects.
- 7 nos. of 220kV line bays at Bellary PS for termination of dedicated transmission lines of RE generation projects.

b) Transmission system strengthening at Tumkur-II for integration of additional RE potential (2.7 GW)

- Augmentation of transformation capacity by 3x500 MVA, 400/220kV ICTs (5th – 7th) at Tumkur-II PS
- Tumkur-II – Madhugiri 400kV (Quad) D/c line
- $\pm$ 300 MVAR STATCOM with switching arrangement of under implementation 2x125 MVar bus reactors.
- 2 nos. of 220kV line bays for termination of dedicated transmission lines of RE generation projects

The above transmission schemes were agreed in the special SRPC meeting held on 4th Feb, 2025 and 31st NCT held on 14th July, 2025. Subsequently additional potential of 1.2 GW was declared in Tumkur for which transmission system was identified. During the 33rd NCT meeting held on 16.09.2025, it was decided to merge the 1.2 GW transmission scheme with the already under-bidding scheme and NCT also recommended renaming the combined scheme as “Transmission system strengthening at Tumkur-II for integration of additional RE potential (2.7 GW)”. Schematics are given at **Figure 6-2** and **Figure 6-3**.

Detailed scope of the schemes are given below:

Transmission system strengthening for integration of additional RE potential at Davanagere (0.25 GW) and Bellary (2.75 GW):

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Augmentation of transformation capacity by 2x1500 MVA, 765/400kV ICTs (6 th & 7 th) at Davanagere PS	- 220 kV line bay – 1 No. - 765/400kV, 1500 MVA, ICTs – 2 Nos. - 765kV ICT bays – 2 Nos. - 400kV ICT bays – 2 Nos. - 400kV Bus Sectionalizer: 1 set
2.	4 Nos. of 220kV line bays and 1 No. of 400kV line bay at Davanagere PS for termination of dedicated transmission lines of RE generation projects	- 400kV line bays – 1 No - 220kV line bays – 4 Nos
3.	Augmentation of Bellary PS by 400/220kV, 6x500 MVA ICTs	- 400/220kV, 500 MVA, ICTs – 6 Nos. - 400kV ICT bays – 6 Nos. - 220kV ICT bays – 6 Nos. - 220kV Bus Sectionalizer: 2 set

Sl. No.	Scope of the Transmission Scheme	Item Description
		- 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos
4.	Bellary – Davanagare 2nd 400kV (Quad) D/c line (~ 80 km)	~ 80 km - 400kV line bays – 2 Nos. (at Bellary PS) - 400kV line bays – 2 Nos. (at Davanagare)
5.	5 Nos. of 220kV line bays at Bellary PS for termination of dedicated transmission lines of RE developers	220kV line bay – 5 Nos

Implementation Timeframe: 24 month, the scheme is presently under implementation and expected by Feb'28.

Estimated Cost: ₹ 1111 Crs.

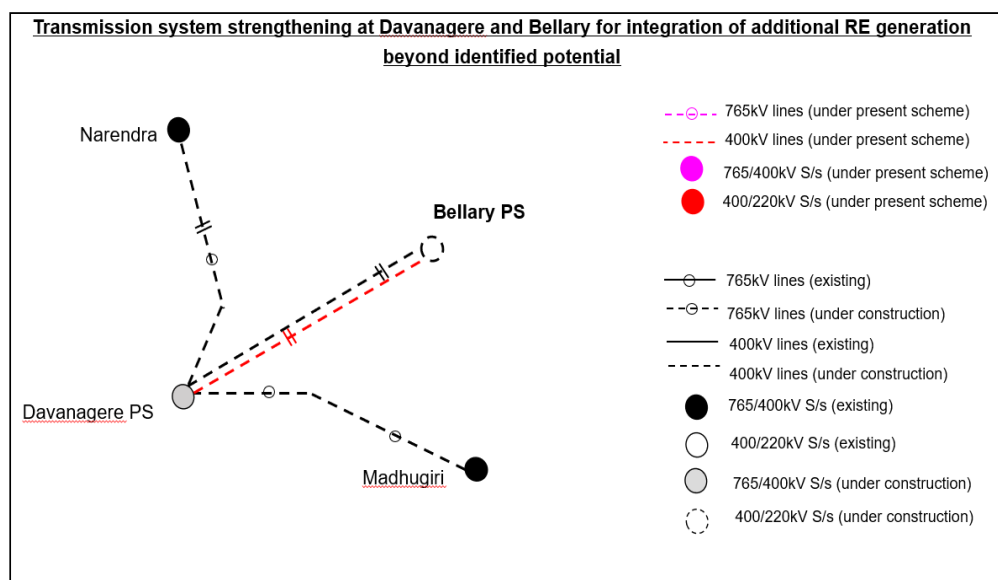


Figure 6-2: Transmission system strengthening for integration of additional RE potential at Davanagare (0.25 GW) and Bellary (2.75 GW)

Transmission system strengthening at Tumkur-II for integration of additional RE potential (2.7 GW)

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Augmentation of Tumkur-II PS by 400/220 kV, 3x500 MVA ICTs (5 th to 7 th)	- 400/220kV, 500 MVA, ICTs – 3 Nos. - 400kV ICT bays – 3 Nos. - 220kV ICT bays – 3 Nos. - 220kV Bus Sectionalizer: 2 set - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos.

Sl. No.	Scope of the Transmission Scheme	Item Description
2.	Tumkur-II – Madhugiri 400kV (Quad) D/c line (~ 100 km)	- 400kV line bays – 2 Nos. (at Tumkur-II PS) - 400kV line bays – 2 Nos. (at Madhugiri)
3.	+300 MVAR STATCOM at Tumkur-II PS with switching arrangement of under implementation 2x125 MVAR bus reactors	- + 300 MVAR STATCOM at Tumkur-II PS with switching arrangement of under implementation 2x125 MVAR bus reactors - 400 kV bay – 1 No
4.	2 Nos. of 220kV line bay at Tumkur-II PS for termination of dedicated transmission lines of RE developers	220kV line bays – 2 Nos
5.	Augmentation of Tumkur-II PS by 400/220 kV, 3x500 MVA ICTs (8th to 10th)	- 400/220 kV, 500 MVA, ICTs – 3 Nos. - 400 kV ICT bays – 3 Nos. - 220 kV ICT bays – 3 Nos. - 220 kV Bus Sectionalizer: 1 set - 220 kV Bus Coupler (BC) Bay – 1 No. - 220 kV Transfer Bus Coupler (TBC) Bay – 1 No.
6.	4 Nos. of 220 kV line bay at Tumkur-II PS for termination of dedicated transmission lines of RE developers	220 kV line bays – 4 Nos.

Implementation Timeframe: 36 months from the date of SPV transfer. Presently this scheme is under bidding & SPV transfer expected by 31.03.26.

Estimated Cost: ₹ 1221 Crs.

Transmission system strengthening at Tumkur-II for integration of additional RE potential (2.7GW)

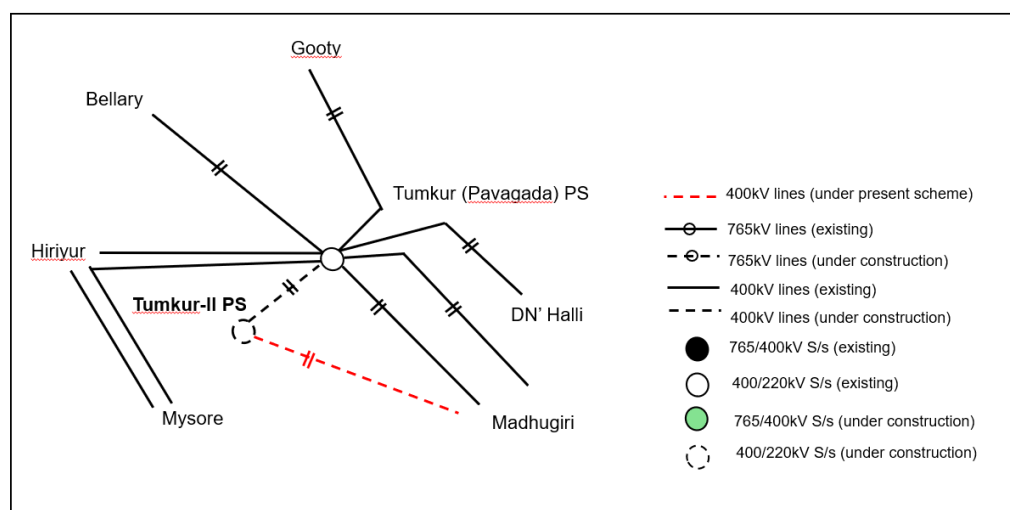


Figure 6-3 Transmission system strengthening at Tumkur-II for integration of additional RE potential(2.7GW)

(ii) Implementation of 1 no. of 220kV line bay at Tumkur (Pavagada) PS for providing Connectivity to M/s TEQ Green Power XX Pvt. Ltd.

Tumkur (Pavagada) PS is under operation with 6x500 MVA, 400/220kV ICTs and owned by POWERGRID. Further, addl. 4x500 MVA (7th to 10th) ICTs are under construction by POWERGRID for providing connectivity for RE generation projects. Connectivity of 300 MW has been agreed for grant to M/s TEQ Green Power XX Pvt. Ltd. at 220kV level of Tumkur (Pavagada) PS with 1 no. of 220kV bay under ISTS during the 36th CMETS-SR held on 19.12.2024. Schematic is given in **Figure 6-4**. The details are as below:

- 1 no. of 220kV line bay at Tumkur (Pavagada) PS for termination of dedicated transmission line of M/s TEQ Green Power XX Pvt. Ltd.

Sl. No.	Scope of the Transmission Scheme	Item Description
1.	Implementation of 1 no. of 220kV line bay at Tumkur (Pavagada) PS for providing Connectivity to M/s TEQ Green Power XX Pvt. Ltd	- 220 kV line bay – 1 No.

Implementation Timeframe: 18 months. The scheme is under implementation and expected by Mar'27.

Estimated Cost: ₹ 6 Crs.

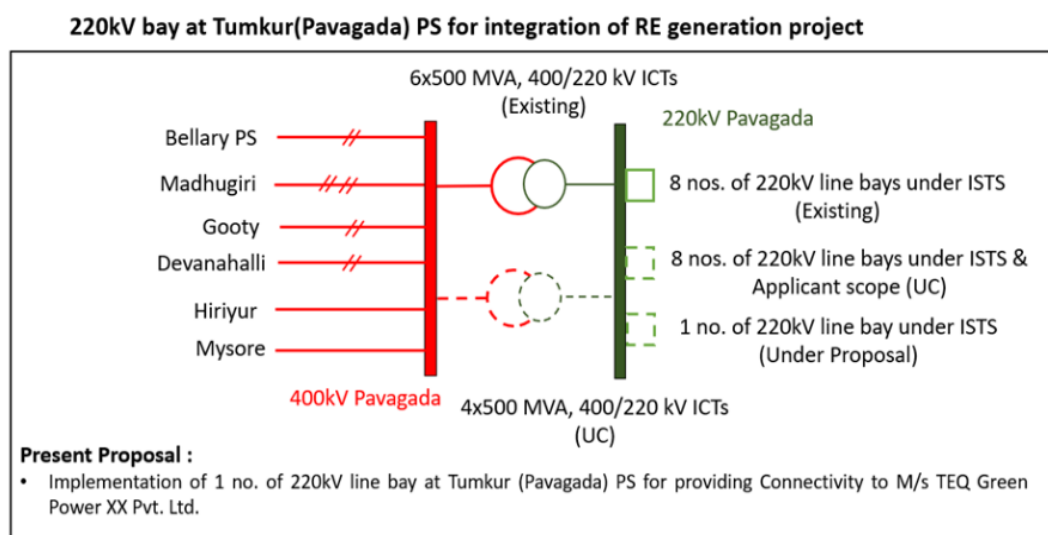


Figure 6-4: Implementation of 1 no. of 220kV line bay at Tumkur (Pavagada) PS for providing Connectivity to M/s TEQ Green Power XX Pvt. Ltd.

(iii) Implementation of 2 nos. of 220kV Bus Sectionalizers at 220kV level of Gadag-II 400/220kV PS

Presently, Gadag-II 400/220kV PS is under construction with implementation schedule of 24 months i.e. Dec'2025 under the scheme "Transmission Scheme for integration of Renewable Energy Zone (Phase-II) in Koppal-II (Phase-A) and Gadag-II (Phase- A) in Karnataka". Space provision for 220kV bus sectionalizer at Gadag-II PS has been kept

in the original scope. However, 220kV bus sectionalizers has not been taken up for implementation at Gadag-II PS. Connectivity of about 5275 MW (3475 MW at 220 kV level and 1800 MW at 400 kV level) has been granted / agreed for grant at Gadag-II PS. During interconnection study analysis, it is observed that the fault level at 220kV bus is crossing its design limit (50 kA) considering the above generation. Accordingly, 220kV bus sectionalizers are required to be placed in the 220kV bus and the 220kV buses need to be operated independently with 220kV bus sectionalizers under open condition for control of short circuit level of 220kV bus.

The proposal was agreed in 41st CMETS held on 27.11.2025. It was agreed in 28th CCTP meeting held on 09.01.2026 and following system was agreed:

- 220kV Bus Sectionalizer – 2 sets
- 220 kV Bus Coupler (BC) Bay – 2 nos.
- 220 kV Transfer Bus Coupler (TBC) Bay – 2 nos

Implementation time frame: 18 months, The scheme is under implementation and expected by Aug'27.

Estimated Cost: ₹ 31 Crs.

6.4.2 Andhra Pradesh

i) **Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (6th) at N P Kunta PS in Andhra Pradesh**

NP Kunta PS is under operation with 4x500 MVA, 400/220kV ICTs. Further, 1x500 MVA ICT (5th) at NP Kunta PS is under implementation and is expected by Dec'25. Connectivity of above 2000 MW has been granted / received at NP Kunta. Accordingly, for grant of connectivity to above applications, 1x500 MVA, 400/220 kV ICT (6th) at NP Kunta PS is required.

In view of the above, the augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (6th) at NP Kunta PS in Andhra Pradesh was agreed in the 39th CMETS-SR held on 18th Jul, 2025. Schematic is given at **Figure 6-5**.

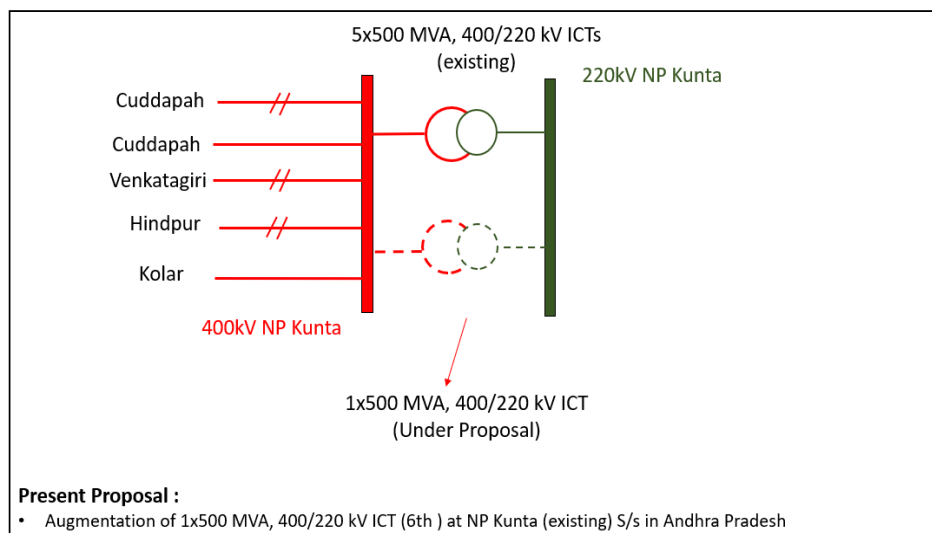


Figure 6-5: Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (6th) at N P Kunta PS in Andhra Pradesh

Implementation Timeframe: 21 months from the date of allocation. Presently, this scheme is under approval.

Estimated Cost: ₹ 53 Cr

ii) Transmission System for integration of Kurnool-V, Ananthapuram-III and Kadapa-II REZs in Andhra Pradesh

The transmission system for integration of 7.5 GW each at Ananthapuram-II and Kurnool-IV is under implementation. Further, connectivity of about 7500 MW has already been granted / agreed for grant at Ananthapuram-II PS and Kurnool-IV PS. In addition to the above, additional applications for about 3630 MW at Ananthapuram-III PS and 1900 MW at Kurnool-V PS has already been received till Jun' 25. As Ananthapuram-II PS and Kurnool-IV PS is planned for 7.5 GW and accordingly Ananthapuram-III PS and Kurnool-V PS shall be required for grant of connectivity for balance applications seeking connectivity in Anantapur and Kurnool area. Further, Connectivity of about 600 MW has been received at Kadapa-II PS till Jun'25 and accordingly Kadapa-II PS shall be required for grant of connectivity to the applications seeking connectivity in Kadapa area.

Joint Study meeting of SR constituents was held from 23rd to 25th April, 2025 at Thrissur wherein transmission system for integration of RE generation projects at Kurnool-V, Ananthapuram-III and Kadapa-II in Andhra Pradesh was evolved.

a) Transmission System for Integration of Krishnagiri REZ – 7.5 GW

Transmission System for Integration of Krishnagiri REZ – 7.5 GW was discussed and agreed in the 38th CMETS-SR held on 02.06.2025. Details of the transmission system are as under :

Phase-I (4.5 GW)

- Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Krishnagiri Pooling Station near Kodumur in Kurnool district along with 2x330 MVAr (765 kV) bus reactors at Krishnagiri PS with provision of two (2) sections of 4500 MVA each at 400kV level
- $\pm$ 300 MVAr STATCOM at Krishnagiri PS
- Krishnagiri– Doma 765 kV D/c line with 240 MVAr SLR (convertible) at both ends on both circuits
- Krishnagiri – Raichur New 765 kV D/c line with 1x240 MVAr SLR (convertible) at Krishnagiri end on both circuits
- Establishment of 3x1500 MVA, 765/400 kV Sagar substation with 2x330 MVAr bus reactors and space provision for establishment of 400/220 kV switchyard
- Sagar – N'Sagar 400 kV quad D/c line (25 km)
- Krishnagiri – Sagar 765 kV D/c line with 240 MVAr SLR (convertible) at both ends on both circuits

Phase-II (3 GW)

- Augmentation of 2x1500 MVA, 765/400 kV and 9x500 MVA, 400/220kV ICTs at Krishnagiri Pooling Station
- Krishnagiri – Nellore 765 kV D/c line with 1x240 MVAr SLR (convertible) at both ends on both circuits
- Khammam-II – Sagar 765 kV D/c line with 1x240 MVAr SLR (convertible) at Khammam-II end on both circuits.

Phase-I of the scheme was further discussed and agreed in the 55th SRPC meeting held on 26.07.2025 and recommended under TBCB route in the 32nd NCT meeting held on 12.08.2025. Subsequently, the scheme was discussed in the 33rd NCT meeting held on 16.09.2025 wherein it was opined that in order to ensure optimum utilization of the transmission lines, RE power from Krishnagiri REZ-Phase-1 (4.5 GW) and of Ananthapuram-III REZ-Phase-I (4.5GW) may be evacuated through the already identified Transmission System in Kurnool and Ananthapuram areas during non-solar hours with implementation of co-located BESS. However, adequate response from developers towards optimization of connectivity and transmission system was not received.

The scheme was again discussed in the 35th NCT meeting held on 19.11.2025 wherein it was deliberated that holding up of implementation of Krishnagiri PS may lead to non-development of RE generation in that area and after detailed deliberations, NCT recommended that Transmission Scheme for Krishnagiri Phase-I may be taken up for implementation. Schematic is given in **Figure 6-6**.

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Krishnagiri Pooling Station near Kodumur in Kurnool district along with 2x330 MVA (765 kV) bus reactors at Krishnagiri PS with provision of two (2) sections of 4500 MVA each at 400kV level Future Space Provisions: - 765/400kV, 1500 MVA, ICTs – 2 Nos. - 765kV ICT bays – 2 Nos. - 400kV ICT bays – 2 Nos. - 400/220kV, 500 MVA, ICTs – 13 Nos. - 400kV ICT bays – 13 Nos. - 220kV ICT bays – 13 Nos. - 765kV line bays – 8 Nos. (with provision for SLR) - 400kV line bays – 12 Nos. (with provision for SLR) - 220kV line bays – 19 Nos. - 220kV Bus Sectionalizer : 2 sets - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos. - 400kV Bus Sectionalizer : 1 set	- 765/400kV, 1500 MVA, ICTs – 4 Nos. (13x500 MVA incl. 1 spare unit) - (765kV ICT bays – 4 Nos. - (iii) 400kV ICT bays – 4 Nos. - 765kV line bays – 6 Nos. (at Krishnagiri PS for Termination of Krishnagiri Doma, Krishnagiri–Raichur New and Krishnagiri–Sagar 765kV D/c lines) - 765 kV, 330 MVA Bus Reactor – 2 Nos. (7x110 MVA inc. 1 switchable spare unit for both bus reactor and line reactor) - 765 kV Bus Reactor bays – 2 Nos. - 400/220kV, 500 MVA, ICTs – 5 Nos. - 400kV ICT bays – 5 Nos. - 220kV ICT bays – 5 Nos. - 220kV line bays – 6 Nos. - 220kV Bus Sectionalizer : 1 set - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos.
2.	± 300 MVA STATCOM at Krishnagiri PS	- 400kV bay – 1 no. - ± 300 MVA STATCOM – 1 set
3.	Krishnagiri–Doma 765 kV D/c line (about 240 km) with 240 MVA SLR (convertible) at both ends on both circuits	~ 240 km - 765 kV line bays – 2 Nos. (at Doma) - 765 kV, 240 MVA SLR at Krishnagiri PS – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Krishnagiri PS – 2 Nos. - 765 kV, 240 MVA SLR at Doma PS – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Doma PS – 2 Nos.
4.	Krishnagiri – Raichur New 765 kV D/c line (about 150 km) with 240 MVA SLR (convertible) at Raichur New end on both circuits	~ 150 km
5.	Establishment of 3x1500 MVA, 765/400 kV Sagar substation with 2x330 MVA (765 kV) bus reactors with space provision for establishment of 220 kV switchyard Future Space Provisions: - 765/400kV, 1500 MVA, ICTs – 3 Nos. - 765kV ICT bays – 3 Nos. - 400kV ICT bays – 3 Nos.	- 765/400kV, 1500 MVA, ICTs – 3 Nos. (10x500 MVA incl. 1 spare unit) - 765kV ICT bay – 3 Nos. - 400kV ICT bay – 3 Nos. - 765kV line bays – 2 Nos. (at Sagar for termination of Krishnagiri – Sagar 765 kV D/c line)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	- 765kV line bays – 12 Nos. (with provision for SLR) - 400kV line bays – 10 Nos. (with provision for SLR) - 400kV Bus Sectionalizer : 1 set Future Space Provisions for 220kV switchyard: - 400/220kV, 500 MVA, ICTs – 10 Nos. - 400kV ICT bays – 10 Nos. - 220kV ICT bays – 10 Nos. - 220kV line bays – 16 Nos. - 220kV Bus Sectionalizer: 3 set - 220 kV Bus Coupler (BC) Bay – 4 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 4 Nos.	- 765 kV, 330 MVA Bus Reactors – 2 Nos. (7x110 MVA inc. 1 switchable spare unit) - 765 kV Bus Reactor bays – 2 Nos. - 400kV line bays – 2Nos. (at Sagar for termination of Sagar – Nagarjunasagar 400 kV quad D/c line)
6.	Krishnagiri – Sagar 765 kV D/c line (about 240 km) with 240 MVA SLR (convertible) at both ends on both circuits	~ 240 km - 765 kV, 240 MVA SLR at Krishnagiri PS – 2 Nos. (6x80 MVA switchable units) - Switching Equipment for 765 kV SLR at Krishnagiri PS – 2 Nos. - 765 kV, 240 MVA SLR at Sagar – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Sagar – 2 Nos.
7	Sagar – Nagarjunasagar 400 kV quad D/c line (about 25 km)	~25km - 400kV line bays – 2 Nos. (at Nagarjunasagar)

Implementation Timeframe: 36 months from date of SPV transfer. Presently this scheme is under bidding & SPV transfer expected by 30.04.26.

Estimated Cost: ₹ 7627 Crs

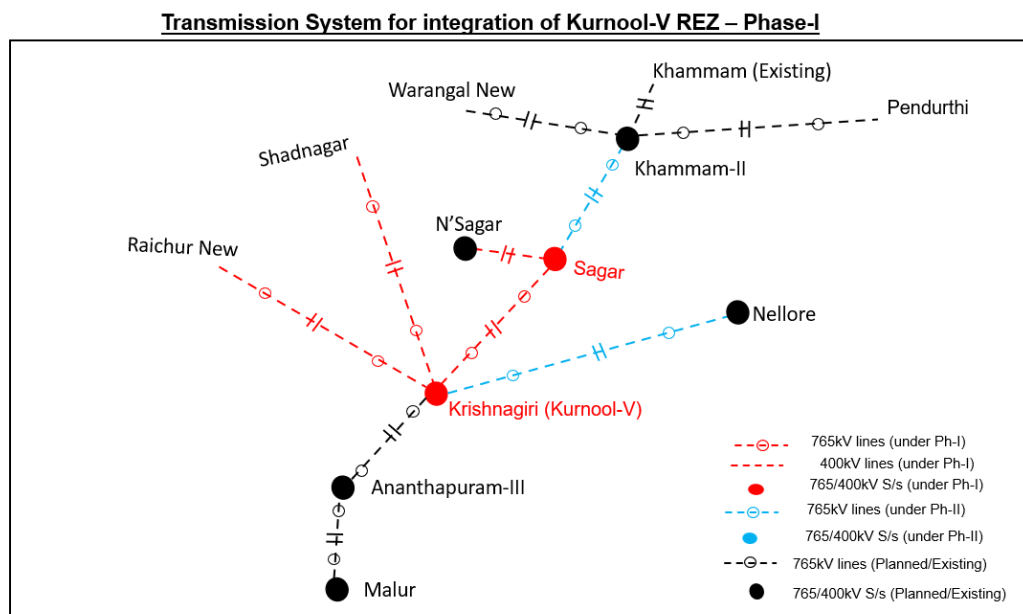


Figure 6-6: Transmission System for Integration of Krishnagiri REZ Phase-I

b) Transmission System for Integration of Ananthapuram-III REZ – 7.5 GW

Transmission System for Integration of Ananthapuram-III REZ was discussed and agreed in the 38th CMETS-SR held on 02.06.2025. The scheme was further discussed and agreed in the 55th SRPC meeting held on 26.07.2025 and was recommended under TBCB route in the 32nd NCT meeting held on 12.08.2025. Subsequently, the scheme was discussed in the 33rd NCT meeting held on 16.09.2025 wherein it was informed that in order to ensure optimum utilization of the transmission lines, RE power from Kurnool-V REZ Phase-1 (4.5 GW) and of Ananthapuram-III REZ Phase-1 (4.5 GW) may be evacuated through the already identified transmission system in Kurnool and Ananthapuram areas during non-solar hours with implementation of co-located BESS. However, adequate response from developers towards optimization of connectivity and transmission system was not received.

The scheme was again discussed in the 36th NCT meeting held on 30.12.2025 wherein it was deliberated that requisite land for upgradation of existing 400/220 kV Bidadi GIS to 765 kV level is not available in the proximity. Further, severe RoW are envisaged for implementation of 765 kV transmission lines from Bidadi S/s which was identified to facilitate reliable power supply to increasing demand of Bangalore and nearby area. Therefore, implementation of 765 kV lines from Bidadi seems to be difficult. Accordingly, proposed transmission system including location of 765 kV Bidadi S/s is required to be reviewed. Subsequently, transmission scheme was reviewed in consultation with SR constituents in the Joint Studies held in Jan'26. Details of transmission scheme evolved are as follows :

Transmission System for Integration of Ananthapuram-III REZ

Phase-I (3 GW)

- Establishment of 3x1500 MVA, 765/400 kV and 7x500 MVA, 400/220kV Ananthapuram-III Pooling Station near Urvakonda/Beluguppa/Kalyandurg areas in Anantapur district along with 2x330 MVar (765 kV) bus reactors at Ananthapuram-III PS with provision of two (2) sections of 4500 MVA each at 400kV level
- $\pm$ 300 MVar STATCOM at Ananthapuram-III PS
- Ananthapuram-III – Krishnagiri (Kurnool-V) 765kV D/c line with 1x330MVar SLR (convertible) at Ananthapuram-III end on both circuits

Phase-II (4.5 GW)

- Establishment of 2x1500 MVA, 765/400 kV GIS substation near Malur with 1x240 MVar (765 kV) bus reactor with space provision for establishment of 220 kV switchyard at Malur
- Augmentation of 3x1500 MVA, 765/400 kV and 7x500 MVA, 400/220kV Ananthapuram-III Pooling Station
- Ananthapuram-III – Malur 765kV D/c line with 240 MVar SLR (convertible) at both ends on both circuits
- $\pm$ 300 MVar STATCOM at Malur
- Malur – Somanahalli 400 kV (Quad) D/c line [utilization of existing RoW of Gooty – Somanahalli 400kV S/c line and conversion of part S/c towers as M/c towers]
- Malur – Hosur 400 kV (Quad) D/c line
- Malur – Dommasandra 400 kV (quad) S/c line

Note :

- Malur – Somanahalli 400 kV (Quad) D/c line may be implemented by utilizing existing RoW of Gooty – Somanahalli 400kV S/c line and conversion of part S/c towers as M/c towers
- Malur – Dommasandra 400kV (Quad) S/c line may be implemented by utilizing existing RoW of Kolar – Dommasandra 400kV S/c line by converting S/c towers into M/c towers
- Malur – Hosur 400kV (Quad) D/c line may be implemented by converting existing D/c towers of Kolar – Hosur 400kV D/c line near the Hosur S/s into M/c towers at Hosur end.

Phase-III :

- Malur – Yarandahalli 400 kV D/c (Quad) line or Somanahalli – Yarandahalli 400 kV S/c line or Hosur – Yarandahalli 400 kV (Quad) D/c line

Note : *Based on the detailed survey and implementation feasibility, any of the above lines may be finalised for further implementation*

Evolved transmission scheme was again discussed in the 37th NCT meeting held on 19.01.2026 wherein it was agreed that the transmission scheme for Ananthapuram-III PS

REZ Phase-I may be taken up for implementation for 3 GW. Schematic is shown in Figure 6-7.

Detailed scope of the Phase -I scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 3x1500 MVA, 765/400 kV and 7x500 MVA, 400/220kV Ananthapuram-III Pooling Station near Urvakonda / Beluguppa / Kalyandurg areas in Anantapur district along with 2x330 MVA (765 kV) bus reactors at Ananthapuram-III PS with provision of two (2) sections of 4500 MVA each at 400kV level Future Space Provisions: - 765/400kV, 1500 MVA, ICTs – 3 Nos. - 765kV ICT bays – 3 Nos. - 400kV ICT bays – 3 Nos. - 400/220kV, 500 MVA, ICTs – 7 Nos. - 400kV ICT bays – 7 Nos. - 220kV ICT bays – 7 Nos. - 765kV line bays – 12 Nos. (with provision for SLR) - 400kV line bays – 11 Nos. (with provision for SLR) - 220kV line bays – 15 Nos. - 220kV Bus Sectionalizer : 2 sets - 220 kV Bus Coupler (BC) Bay – 2 nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 nos. - 400kV Bus Sectionalizer : 1 set	- 765/400kV, 1500 MVA, ICTs – 3 Nos. (10x500 MVA incl. 1 spare unit) - 765kV ICT bays – 3 Nos. - 400kV ICT bays – 3 Nos. - 765kV line bays – 2 Nos. (at Ananthapuram-III PS for termination of Ananthapuram-III – Krishnagiri 765kV D/c line) - 765 kV, 330 MVA Bus Reactor – 2 Nos. (7x110 MVA inc. 1 switchable spare unit for both bus reactor and line reactor) - 765 kV Bus Reactor bays – 2 Nos. - 400/220kV, 500 MVA, ICTs – 7 Nos. - 400kV ICT bays – 7 Nos. - 220kV ICT bays – 7 Nos. - 220kV line bays – 10 Nos. - 220kV Bus Sectionalizer: 1 set - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos.
2.	± 300 MVA STATCOM at Ananthapuram-III PS	- 400kV bay – 1 no. - ± 300 MVA STATCOM – 1 set
3.	Ananthapuram-III – Krishnagiri 765 kV D/c line with 240 MVA SLR (convertible) at Ananthapuram-III end on both circuits	~ 140 km - 765 kV line bays – 2 Nos. (at Krishnagiri) - 765 kV, 240 MVA SLR at Ananthapuram-III PS – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Ananthapuram-III PS – 2 Nos.

Implementation Schedule: 36 months from date of SPV transfer. Presently this scheme is under bidding & SPV transfer expected by 31.05.2026.

Estimated Cost: ₹ 2659 Cr.

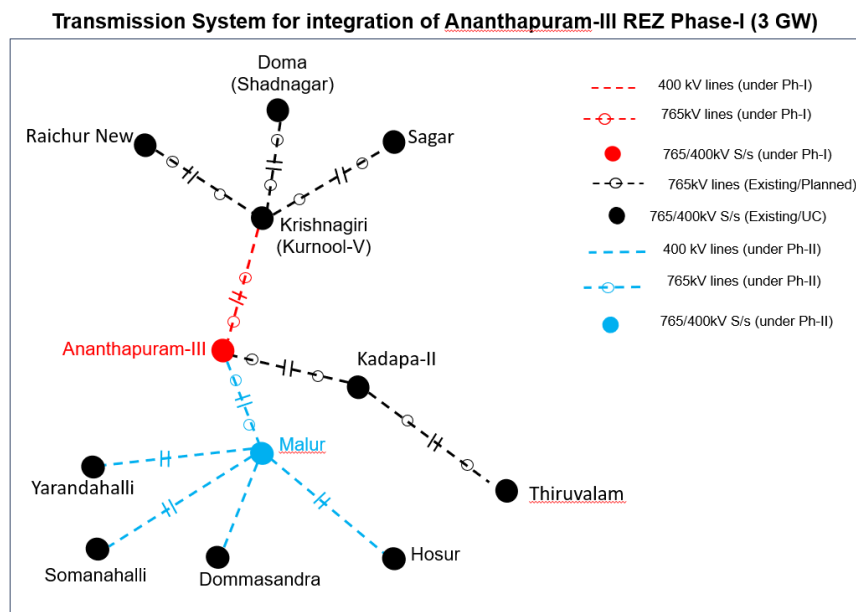


Figure 6-7: Transmission System for integration of Anantapur-III REZ Phase-I

c) Transmission System for Integration of Kadapa-II REZ – 7.5 GW:

Transmission System for Integration of Kadapa-II REZ was agreed in the 38th CMETS-SR held on 02.06.2025. Details of the transmission scheme are as under :

Phase-I (4.5GW)

- Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station along with 2x330 MVAr bus reactor
- ± 300 MVAr STATCOM at Kadapa-II
- Kadapa-II – Thiruvelam 765kV D/c line with 1x240 MVAr SLR (convertible) at both ends on both circuits
- Ananthapuram-III – Kadapa-II 765kV D/c line with 1x330 MVAr SLR (convertible) at Ananthapuram-III end on both circuits

Phase-II (3 GW)

- Augmentation of 2x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station
- Upgradation of Nagapattinam GIS to 765 kV level with 2x1500 MVA, 765/400kV ICTs
- Thiruvelam – Nagapattinam 765kV D/c line with 1x240 MVAr SLR (convertible) at both ends on both circuits

The scheme was agreed in the 55th SRPC meeting held on 26.07.2025. During the 32nd NCT meeting, considering the insufficient quantum of applications at Kadappa, it was decided that Transmission system for Phase-I of Kadapa-II REZs may be taken up for implementation upon receipt of applications at Kadappa. Schematic is shown in **Figure 6-8**.

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station along with 2x330 MVA (765 kV) bus reactors at Kadapa-II PS with provision of two (2) sections of 4500 MVA each at 400kV level Future Space Provisions: - 765/400kV, 1500 MVA, ICTs – 2 Nos. - 765kV ICT bays – 2 Nos. - 400kV ICT bays – 2 Nos. - 400/220kV, 500 MVA, ICTs – 14 Nos. - 400kV ICT bays – 14 Nos. - 220kV ICT bays – 14 Nos. - 765kV line bays – 10 Nos. (with provision for SLR) - 400kV line bays – 12 Nos. (with provision for SLR) - 220kV line bays – 19 Nos. - 220kV Bus Sectionalizer: 2 sets - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos. - 400kV Bus Sectionalizer: 1 set	- 765/400kV, 1500 MVA, ICTs – 4 Nos. (13x500 MVA incl. 1 spare unit) - 765kV ICT bays – 4 Nos. - 400kV ICT bays – 4 Nos. - 765kV line bays – 4 Nos. (at Kadapa-II PS for termination of Kadapa-II – Thiruvallam and Kadapa-II – Ananthapuram-III 765kV D/c lines) - 765 kV, 330 MVA Bus Reactor – 2 Nos. (7x110 MVA inc. 1 switchable spare unit for both bus reactor and line reactor) - 765 kV Bus Reactor bays – 2 Nos. - 400/220kV, 500 MVA, ICTs – 4 Nos. - 400kV ICT bays – 4 Nos. - 220kV ICT bays – 4 Nos. - 220kV line bays – 6 Nos. - 220kV Bus Sectionalizer: 1 set - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos..
2.	Kadapa-II – Thiruvallam 765 kV D/c line (about 250 km) with 240 MVA SLR (convertible) at both ends on both circuits	~ 250 km - 7765 kV line bays – 2 Nos. of complete diameters (GIS) at Thiruvallam - 765 kV, 240 MVA SLR at Kadapa-II PS – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Kadapa-II PS – 2 Nos. - 765 kV, 240 MVA SLR at Thiruvallam – 2 Nos. (7x80 MVA inc. 1 switchable spare unit) - Switching Equipment for 765 kV SLR at Thiruvallam – 2 Nos
7.	Kadapa-II – Ananthapuram-III 765 kV D/c line (about 220 km) with 330 MVA SLR (convertible) at Kadapa-II end on both circuits	~ 220 km - 765 kV line bays – 2 Nos. (at Ananthapuram-III) - 765 kV, 330 MVA SLR at Kadapa-II PS – 2 Nos. (6x110 MVA switchable units) - Switching Equipment for 765 kV SLR at Kadapa-II PS – 2 Nos.
8.	$\pm$ 300 MVA STATCOM at t Kadapa-II PS	- 400 kV bay – 1 no. - $\pm$ 300 MVA STATCOM – 1 set

Implementation Timeframe: 30 months from the date of SPV transfer. Presently this scheme is under approval.

Estimated Cost: Rs. 5105 Crs.

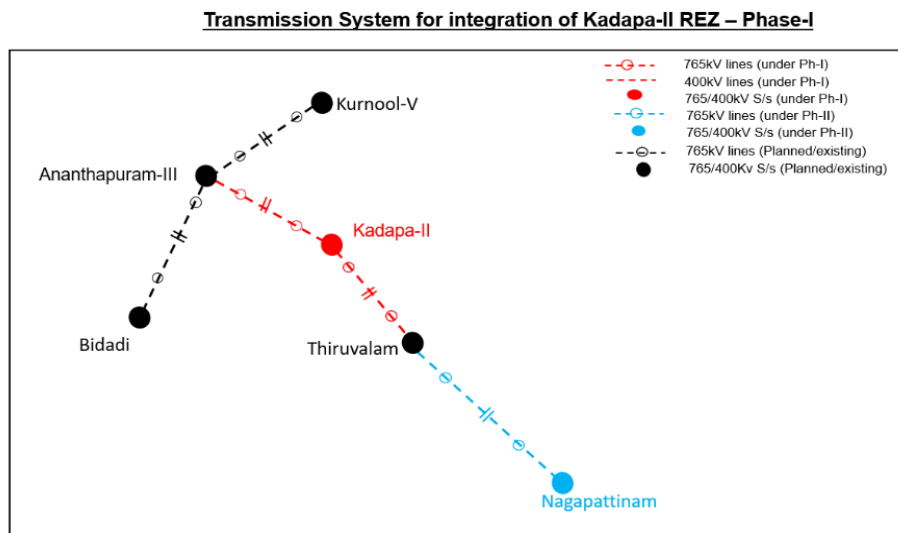


Figure 6-8: Transmission System for Integration of Kadapa-II REZ

iii) Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-I)

As per the Communication from MNRE, about 5000 MW demand at Vizag area and 6000 MW at Kakinada area has been envisaged for the Green Hydrogen / Green Ammonia projects. The transmission system for proposed Green Hydrogen / Green Ammonia projects in Kakinada area, Andhra Pradesh (Phase-I) is presently under bidding. Further, a comprehensive Transmission system for Green Hydrogen / Green Ammonia projects at Kakinada (Ph-II) and Pendurthi was evolved during the Joint Study meeting conducted from 23rd to 25th April 2025. Details of the transmission scheme are as under:

Phase-I (for AP loads & GH loads at Pendurthi)

- Establishment of 4x1500 MVA, 765/400 kV Pendurthi (Vizag) GIS substation with 1x330 MVAr bus reactor and space provision for establishment of 400/220 kV switchyard
- Establishment of 3x1500 MVA, 765/400 kV Khammam-II substation with 1x330 MVAr bus reactor and space provision for establishment of 400/220 kV switchyard
- ± 300 MVAr STATCOM at Pendurthi and space provision for additional 2nd STATCOM
- Pendurthi – Srikakulam 765 kV D/c line with 1x330 MVAr SLR at Pendurthi end on both circuits
- Khammam-II – Warangal (new) 765 kV D/c line
- Khammam-II – Pendurthi 765 kV D/c line with 1x330 MVAr SLR on both circuits on both ends

- Khammam-II – Khammam (existing) 400 kV (quad) D/c line (20 km)
- LILO of Kalpakka – Maradam 400 kV (quad) D/c line at Pendurthi (20 km)

Phase-II (for GH loads at Kakinada & Pendurthi)

- Augmentation of 2x1500 MVA, 765/400 kV ICTs at Pendurthi (Vizag)
- Augmentation of 3x1500MVA, 765/400 kV ICTs at Kakinada GH
- Sagar – Kakinada 765 kV D/c line with 1x330 MVar SLR on both circuits on both ends
- Pendurthi – Kakinada GH 765 kV D/c line with 1x240 MVar SLR at Pendurthi end on both circuits

Note: Above transmission system shall be taken-up in phases based on receipt of GNA applications

CTU has also processed application from M/s NTPC Green Energy Limited seeking GNARE for 2500 MW as “Bulk Consumer seeking to connect to ISTS” in Vizag area.

The above transmission scheme was agreed in the 38th CMETS-SR held on 2nd June 2025 wherein it was decided that initially transmission system for Phase-I of Pendurthi GH may be taken up for implementation and Phase-II transmission system for Pendurthi GH may be taken up subsequently based on the receipt of further applications. This scheme was also agreed in 55th SRPC held on 26th Jul,2025 and 32nd NCT held on 12th Aug 2025.. Schematic is shown in **Figure 6-9**.

Detailed scope of the scheme is given below:

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 4x1500 MVA, 765/400 kV Pendurthi (Vizag) GIS substation with 1x330 MVar (765 kV) bus reactor with space provision for establishment of 220 kV switchyard Future Space Provisions: - 765/400kV, 1500 MVA, ICTs – 2 Nos. - 765kV ICT bays – 2 Nos - 400kV ICT bays – 2 Nos. - 765kV line bays – 8 Nos. (with provision for SLR) - 400kV line bays – 12 Nos. (with provision for SLR) - 400kV Bus Sectionalizer : 1 set Future Space Provisions for 220kV switchyard: - 400/220kV, 500 MVA, ICTs – 10 Nos. - 400kV ICT bays – 10 Nos. - 220kV ICT bays – 10 Nos. - 220kV line bays – 16 Nos.	- 765/400kV, 1500 MVA, ICTs – 4 Nos. (13x500 MVA incl. 1 spare unit) - 765kV ICT bay – 4 Nos. - 400kV ICT bay – 4 Nos. - 765kV line bays – 2 Nos. (at Pendurthi (Vizag) GIS for termination of Pendurthi (Vizag) – Srikakulam 765 kV D/c line) - 220 kV Bus Coupler (BC) Bay – 2 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 2 Nos. - 765kV line bays – 2 Nos. with provision of SLR (at Pendurthi (Vizag) GIS for termination of Khammam-II – Pendurthi (Vizag) –765 kV D/c line) - 765 kV, 330 MVar Bus Reactors – 1 no. (4x110 MVar inc. 1 switchable spare unit for both bus reactor and line reactor) - 765 kV Bus Reactor bays – 1 no. - 400kV line bays – 4 Nos. (at Pendurthi (Vizag) GIS for termination of LILO of Kalpakka – Maradam 400 kV (quad) D/c line at Pendurthi)

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	- 220kV Bus Sectionalizer : 3 set - 220 kV Bus Coupler (BC) Bay – 4 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 4 Nos.	
2.	Pendurthi (Vizag) – Srikakulam 765 kV D/c line (about 200 km) with 330 MVar SLR (convertible) at Srikakulam end on both circuits	~ 200 km - 765 kV line along with SLR GIS bays at Srikakulam - The D/c line to be terminated in the future line bays with SLR proposed under the scheme “Inter - Regional Strengthening between SR Grid and ER Grid” 765 kV, 330 MVar SLR at Srikakulam – 2 Nos. (7x110 MVar switchable units inc. 1 switchable spare unit)
3.	LILO of Kalpakka – Maradam 400 kV (quad) D/c line at Pendurthi (about 20 km)	~ 20 km
4.	- ± 300 MVar STATCOM with 2x125 MVar MSC at Pendurthi (Vizag) GIS with control switching arrangement for proposed 1x330 MVar bus reactor - Space provision for 2nd + 300 MVar STATCOM with 2x125 MVar MSC at Pendurthi (Vizag) GIS	- 400kV bay – 1 no. - + 300 MVar STATCOM with 2x125 MVar MSC at Pendurthi (Vizag) GIS with control switching arrangement for proposed 1x330 MVar bus reactor – 1 set
5.	Establishment of 3x1500 MVA, 765/400 kV Khammam-II substation with 1x330 MVar (765 kV) bus reactor with space provision for establishment of 220 kV switchyard Future Space Provisions for 220kV switchyard: - 400/220kV, 500 MVA, ICTs – 10 Nos. - 400kV ICT bays – 10 Nos. - 220kV ICT bays – 10 Nos. - 220kV line bays – 16 Nos. - 220kV Bus Sectionalizer : 3 set - 220 kV Bus Coupler (BC) Bay – 4 Nos. - 220 kV Transfer Bus Coupler (TBC) Bay – 4 Nos.	- 765/400kV, 1500 MVA, ICTs – 3 Nos. (10x500 MVA incl. 1 spare unit) - 765kV ICT bay – 3 Nos. - 400kV ICT bay – 3 Nos. - 765kV line bays – 4 Nos. (at Khammam-II for termination of Khammam-II – Pendurthi and Khammam-II – Warangal New 765 kV D/c lines) - 765 kV, 330 MVar Bus Reactors – 1 no. (4x110 MVar inc. 1 switchable spare unit for both bus reactor and line reactor) - 765 kV Bus Reactor bays – 1 no. - 400kV line bays – 2 Nos. (at Khammam-II for termination of Khammam-II – Khammam (existing) 400 kV (quad) D/c line)
6.	Khammam-II – Warangal New 765 kV D/c line (about 100 km)	~ 100 km - 765 kV line bays – 2 Nos. (at Warangal New)
7.	Khammam-II – Pendurthi (Vizag) 765 kV D/c line (about 350 km) with 330	~ 350 km

Sl. No.	Scope of the Transmission Scheme	Capacity /km
	MVAr SLR (convertible) at both ends on both circuits	- 765 kV line bays – 2 Nos. (GIS) (at Pendurthi(Vizag)) - 765 kV, 330 MVAr SLR at Pendurthi(Vizag) – 2 Nos. (6x110 MVAr switchable units) - Switching Equipment for 765 kV SLR at Kadapa-II PS – 2 Nos. - 765 kV, 330 MVAr SLR at KhammamII – 2 Nos. (6x110 MVAr switchable units) - Switching Equipment for 765 kV SLR at Kadapa-II PS – 2 Nos.
8.	Khammam-II – Khammam (existing) 400 kV (quad) D/c line (about 20 km)	~ 20 km - 400kV line bays – 2 Nos. (at Khammam (existing))

Implementation Timeframe:30 months from the date of SPV transfer. Presently this scheme is under bidding & SPV transfer expected by 31.05.2026.

Estimated Cost: ₹ 8386 Crs.

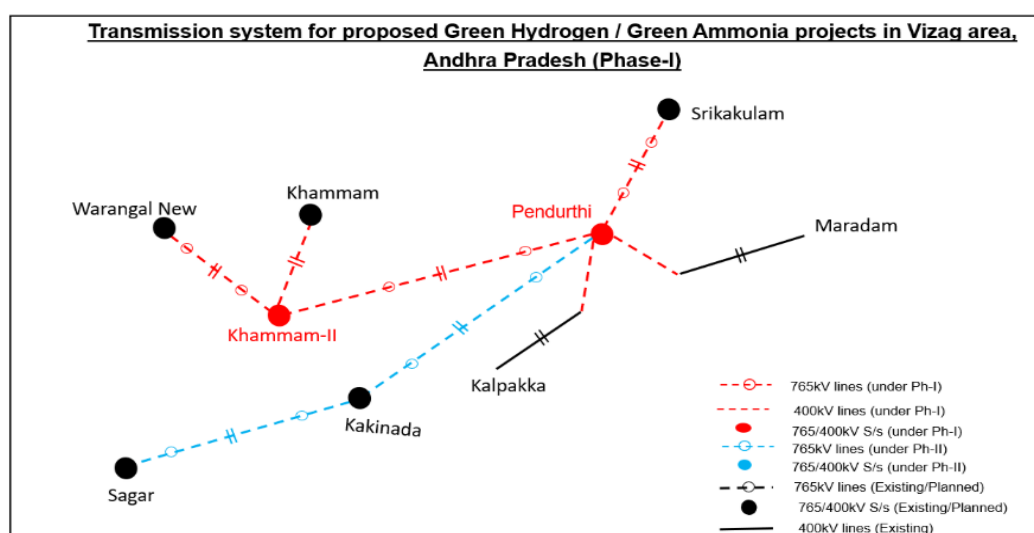


Figure 6-9: Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh

iv) Transmission system for proposed Green Hydrogen / Green Ammonia projects in Ramayapatnam area (4 GW):

Joint Study meeting of SR constituents was held from 23rd to 25th April ,2025 at Thrissur wherein transmission system for integration of green hydrogen/green ammonia based loads of 4 GW in Ramyapatnam area was agreed.

The Transmission System was discussed and agreed in the 38th CMETS-SR held on 02.06.2025. The scheme was further agreed in the 55th SRPC meeting held on 26.07.2025. Details of transmission system are as follows:

Phase-I

- Establishment of 3x1500 MVA, 765/400 kV Ramayapatnam substation with 1x330 MVar bus reactor and space provision for establishment of 400/220 kV switchyard
- ± 300 MVar STATCOM at Ramayapatnam and space provision for additional 2nd STATCOM
- Ramayapatnam – Kadapa-II 765 kV D/c line with 1x330 MVar SLR at Kadapa-II end on both circuits
- Ramayapatnam – Sagar 765 kV D/c line with 1x330 MVar SLR at Ramayapatnam end on both circuits

Phase-II:

- Augmentation of 2x1500 MVA, 765/400 kV ICTs at Ramayapatnam
- LILO of Krishnagiri – Nellore PS 765 kV D/c line at Ramayapatnam

Note - The scheme shall be taken up for further after receipt of GNA applications at Ramayapatnam.

Implementation Timeframe: 30 months from the date of SPV transfer. Presently, this scheme is under approval.

Estimated Cost: ₹ 5800 Crs.

v) Reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor

The high loading on Gooty – Tumkur (Pavagada) 400kV D/c line crossing its thermal rating (850 MVA) under N-1 contingency was highlighted in the ISTS Rolling plan reports for 2029-30. The high loading is also observed during the peak RE time due to High RE injection at Tumkur (Pavagada) from ISTS as well STU network. High loading on the above line was also observed during the Joint Study of SR Constituents held in April 2025. NLDC, Grid-India in its operational feedback for Q4 2024-25 (Jan'25-Mar'25) and Q1 2025-26 (Apr'25-Jun'25) has highlighted the issue of high loading on Gooty – Tumkur (Pavagada) 400kV D/c line. The high loading issue was also highlighted during previous OCC meetings. In view of the above, the reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor along with associated bay upgradation works at Gooty and Tumkur (Pavagada) substations was agreed in 41st CMETS held on 27.11.2025. Schematic is shown in **Figure 6-10**.

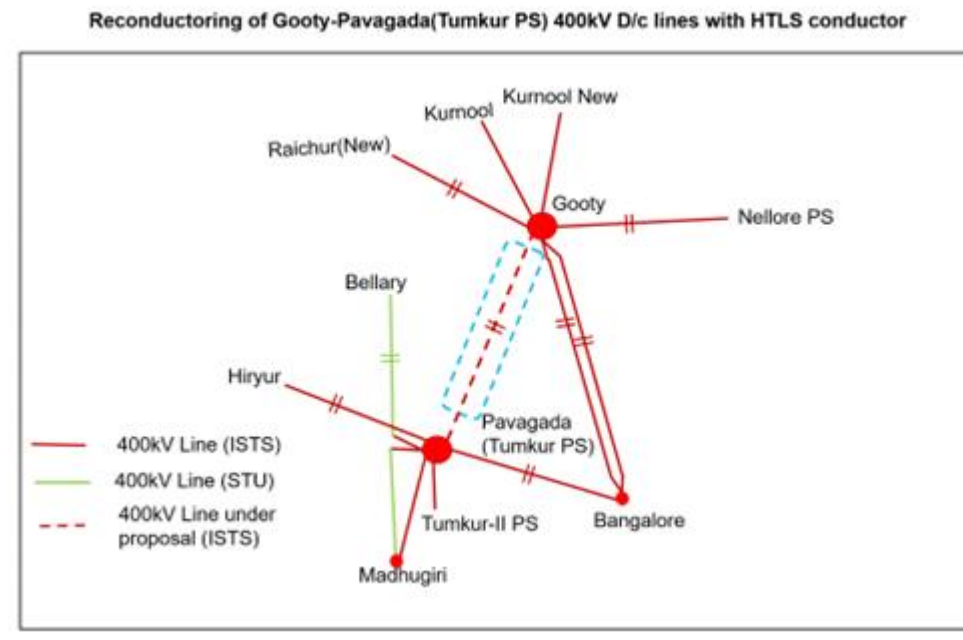


Figure 6-10: Reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor

Implementation Timeframe: 24 months from the date of allocation. Presently, this scheme is under approval.

Estimated Cost: ₹ 325 Crs.

6.4.3 Kerala

(i) Augmentation of 1x500 MVA,400/220kV ICT (3rd) at Thrissur VSC HVDC Station in Kerala

Thrissur VSC HVDC Station is under operation with 2x315 MVA, 400/220 kV ICTs and 400kV & 220kV switchyards are owned by POWERGRID. The proposal for augmentation of 1x500 MVA, 400/220kV ICT (3rd) at Thrissur VSC HVDC Station in Kerala was discussed in the 36th CMETS-SR held on 19.12.2024 and same was agreed to meet the increasing demand of Kerala and based on the observations of SRLDC. A Joint site visit for assessment of space availability for additional 1x500 MVA ICT (3rd) at Thrissur VSC HVDC was held on 26th April 2025 with participation of officials from SRPC, CEA, CTUIL, POWERGRID & KSEB. Subsequently, the augmentation of 1x500 MVA, 400/220kV ICT (3rd) at Thrissur VSC HVDC Station in Kerala was agreed in the 38th CMETS-SR held on 2nd June, 2025. Schematic is shown in **Figure 6-11**.

Detailed scope of the scheme is given below:

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation / Conductor capacity / km / no. of bays etc.)
1	Augmentation of 1x500 MVA, 400/220kV ICT (3rd) at Thrissur VSC HVDC station along with 33kV tertiary power supply and associated ICT bays	- 1x500 MVA, 400/220kV ICT - 400kV ICT bay – 1 No. (GIS) - 220kV ICT bay – 1 No. (GIS) - 400 kV & 220 kV GIS duct – 1 Lot - Tertiary arrangement with 33 kV cable – 1 se
2	2 Nos. of 220kV line bays for termination of 220kV transmission lines along with 220kV bus sectionaliser	- 220kV line bays – 2 Nos. (GIS) - 220kV bus sectionaliser – 1 set - 220 kV Bus Coupler (BC) Bay – 1 no
3	Extension of 220kV GIS hall to accommodate 6 Nos. of 220kV bays (2 Nos. of 220kV ICT bays and 4 Nos. of 220kV line bays) and associated 220kV bus sectionaliser	- Extension of 220kV GIS hall to accommodate 6 Nos. of 220kV bays and associated 220kV bus sectionaliser

Implementation Timeframe: 24 months. Presently, the scheme is under implementation & expected by Aug'27

Estimated Cost: ₹ 170 Crs.

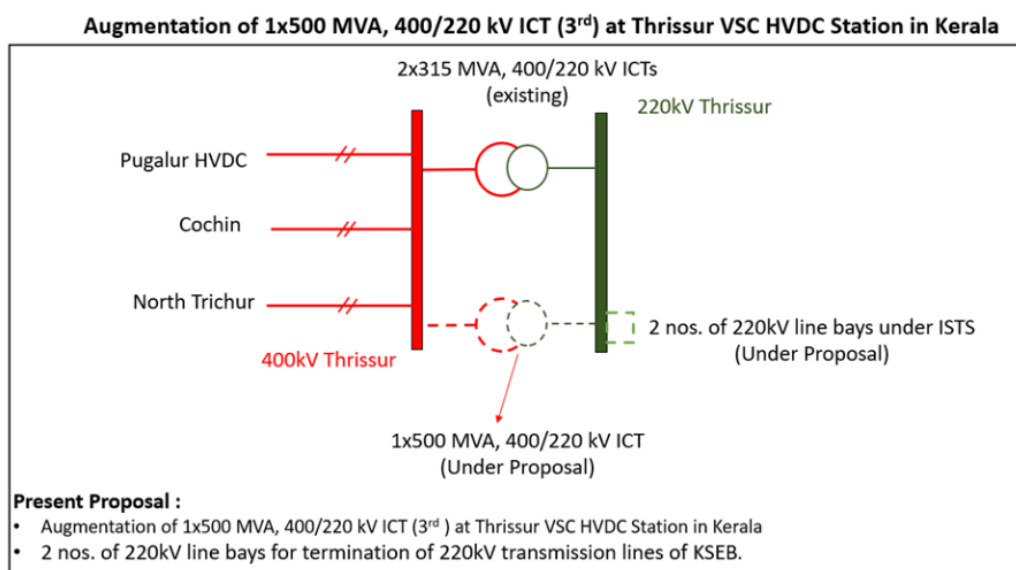


Figure 6-11: Augmentation of 1x500 MVA, 400/220kV ICT (3rd) at Thrissur VSC HVDC Station in Kerala

6.4.4 Tamil Nadu

(i) Augmentation of 1x500 MVA, 400/230kV ICT (4th) at Kalivanthapattu S/s

Kalivanthapattu 400/230kV substation is under operation with 1130 MVA (2x315 MVA + 1x500 MVA) transformation capacity and 400kV & 220kV switchyards are owned by POWERGRID. In the 195th and 216th OCC meetings of SRPC, the overloading of ICTs

(2x315 MVA + 1x500 MVA) at Kalivanthapattu was discussed and it was observed that ICTs are not meeting N-1 criteria. The augmentation of 1x500 MVA, 400/230kV ICT (4th) at Kalivanthapattu S/s was agreed in the 54th SRPC meeting held on 22.03.2025. Same was agreed in the 38th CMETS-SR held on 02.06.2025. It was also agreed to allocate 2 nos. of 230kV line bays at Kalivanthapattu for termination of 230kV transmission lines of TANTRANSCO. Schematic is shown in **Figure 6-12**.

Detailed scope of the scheme is given below:

Sl. No.	Description of Transmission Element	Scope of work (Type of Substation / Conductor capacity / km / no. of bays etc.)
1	Augmentation of Transformation capacity by 1x500 MVA, 400/230 kV ICT (4 th) at Kalivanthapattu S/s in Tamil Nadu	- 500 MVA, 400/230 kV ICT – 1 No - 400 kV ICT Bay -1 No. Main Bay (along with associated Tie Bay)) - 220kV ICT bay – 1 No. (GIS) - 230 kV ICT Bay- 1 No. 245 kV, 2500 Sq.mm XLPE Cable (To connect LV side 400/230 kV Transformer to 230 kV Bay) – 1200m (approx.) along with associated cable termination - 230 kV line Bays – 2 Nos

Implementation Timeframe: 21 months. Presently, the scheme is under implementation & expected by June'27.

Estimated Cost: ₹ 74 Crs.

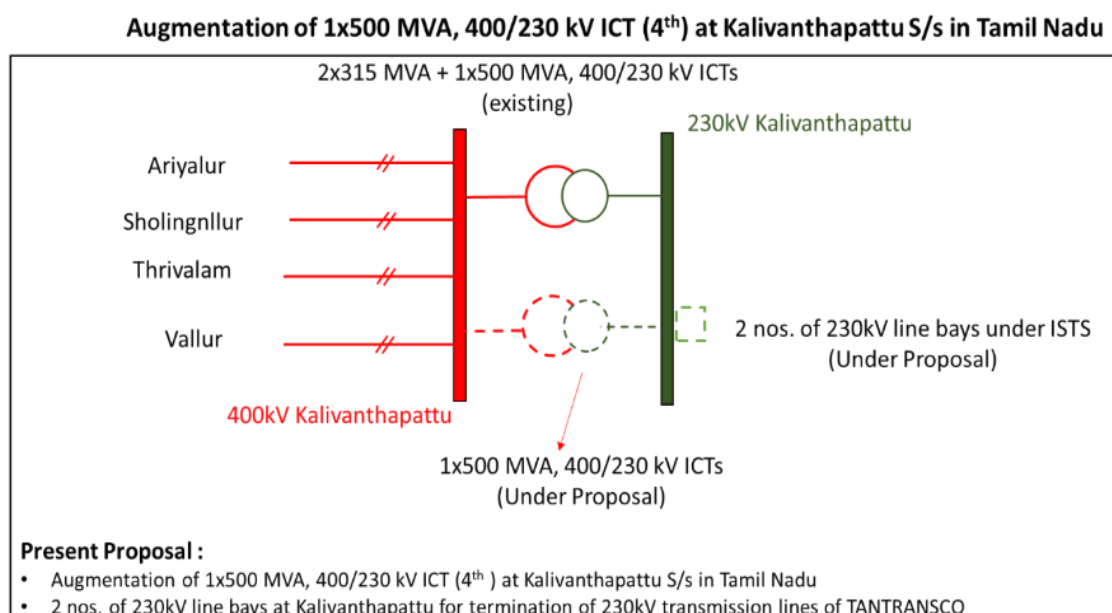


Figure 6-12: Augmentation of Transformation capacity by 1x500 MVA, 400/230 kV ICT (4th) at Kalivanthapattu S/s in Tamil Nadu

(ii) Transmission System strengthening at Karur PS for integration of RE generation capacity

Karur REZ (2.5 GW) was identified as a part of 18.5 GW RE potential in SR. Karur PS was implemented by M/s Adani through LILO of Pugalur (HVDC) – Pugalur (Existing) 400kV (Quad) D/c line at Karur PS and presently is under operation with 2x500 MVA, 400/230kV ICTs. Further, the pooling station is being augmented with 2x500 MVA, 400/230kV ICTs expected by Sep'25. Connectivity of about 1739.1 MW has been granted / agreed for grant at Karur PS with above system. Further, additional Connectivity of 1030 MW has been received at Karur PS. With this, the total connectivity granted / agreed for grant / received shall be about 2769.1 MW (including 500 MW at 400 kV level). For grant of additional connectivity, augmentation of 2x500 MVA, 400/230kV ICTs (5th & 6th) and strengthening of transmission system beyond Karur PS is required. Further, SRLDC in various forums and in its operational feedback has highlighted the high loading on Karur PS – Pugalur HVDC 400kV (Quad) D/c line and Karur PS – Pugalur (existing) 400kV (Quad) D/c lines under N-1 conditions.

Accordingly, following transmission scheme was agreed in 37th CMETS-SR held on 17th April, 2025. Schematic is shown in **Figure 6-13**.

- Augmentation of 2x500 MVA, 400/230kV ICTs (5th & 6th) at Karur PS
- Karur PS – Pugalur HVDC 400kV (Quad) 2nd D/c line
- Karur PS – Pugalur (existing) 400kV (Quad) 2nd D/c line

Further joint site visits were conducted to access space availability at Pugalur (existing) and Pugalur HVDC substations for bays for termination of Karur PS – Pugalur HVDC 400kV (Quad) 2nd D/c line and Karur PS – Pugalur (existing) 400kV (Quad) 2nd D/c line. As per the joint site visit and deliberations in the CMETS meeting, following was agreed:

- (i) Option 1 (AIS) [Acquisition of additional land] at Pugalur(existing) for 2 nos. of 400kV line bays at Pugalur (existing) for Karur PS – Pugalur (existing) 400kV (Quad) 2nd D/c line. It was also agreed that Tamil Nadu will help in acquisition of additional land for the same.
- (ii) Option 2 [Implementation of future lines bay(s) at area B, Alt.2 : implementation of 2 nos. new diameter (without future provision of line reactor)] at Pugalur(HVDC) for 2 nos. of 400kV line bays at Pugalur (HVDC) for Karur PS – Pugalur (HVDC) 400kV (Quad) 2nd D/c line.

Implementation Timeframe: 30 months from the date of SPV transfer. Presently, the scheme is under approval.

Estimated Cost: ₹ 621 Crs.

Transmission System strengthening at Karur PS for integration of RE generation capacity

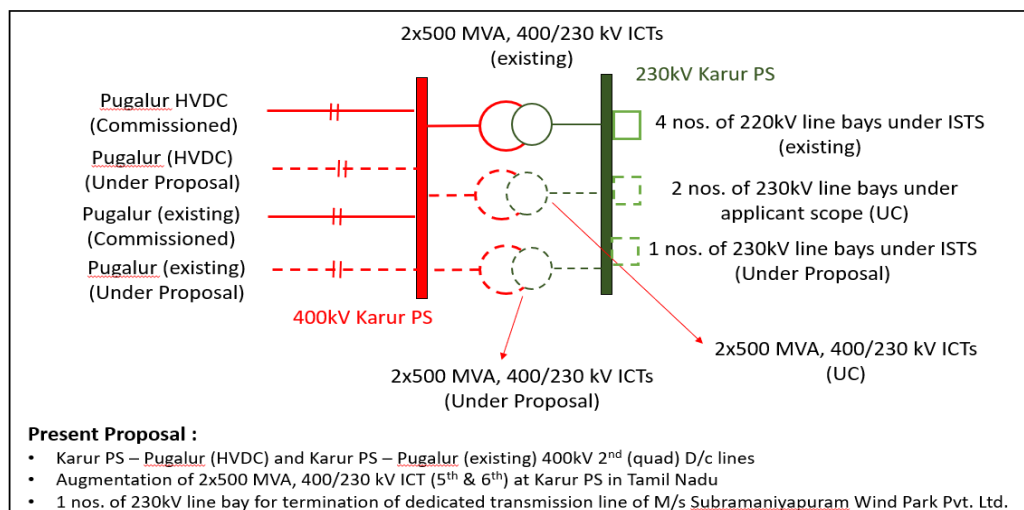


Figure 6-13: Transmission System strengthening at Karur PS for integration of RE generation capacity within the declared potential

(iii) Upgradation/conversion of Udumalpet – Madurai 400kV S/c line to Udumalpet – Madurai 400kV (quad) D/c line

Proposal for upgradation of Udumalpet – Madurai 400kV S/c line was discussed in the 221st OCC meeting of SRPC held on 10.12.2024. POWERGRID also proposed to upgrade the of Udumalpet – Madurai 400kV S/c line to D/c line. SRLDC highlighted the high loading on the line in its operational feedback and suggested for reconductoring of Udumalpet – Madurai 400kV S/c line.

Accordingly, following transmission scheme was agreed in 39th CMETS-SR held on 18th July 2025:

- Upgradation/conversion of Udumalpet – Madurai 400kV S/c line to Udumalpet – Madurai 400kV (quad) D/c line along with associated bay upgradation works at Udumalpet and Madurai substations

Implementation Timeframe: 30 months. Presently, the scheme is under implementation & expected by Aug'28.

Estimated Cost: ₹ 643 Crs.

(iv) Reconductoring of Tirunelveli – Udumalpet and Pugalur – Madurai 400kV D/c lines with HTLS conductor

Proposal for reconductoring of Pugalur – Madurai 400kV D/c was discussed in the 221st OCC meeting of SRPC held on 10.12.2024. SRLDC proposed for reconductoring of 400kV Udumalpet – Madurai S/c and 400kV Madurai-Pugalur D/c line and highlighted the high loading on Tirunelveli – Udumalpet and Pugalur – Madurai 400kV D/c lines during high RE season in Tamil Nadu in its operational feedback and informed in 221st OCC meeting of SRPC held on 10.12.2024 that further addition of RE generation in the south Tamil Nadu and Kundankulam 3&4, this issue may become severe. High loading

on Tirunelveli – Udumalpet and Pugalur – Madurai 400kV D/c lines was also discussed during the Joint Study meeting of SR held from 23rd – 25th April 2025. The high loading on the above lines was also highlighted in the CTU Rolling Plan reports. After detailed deliberations in 39th CMETS-SR 18th July 2025, following transmission scheme was agreed:

- Reconductoring of Tirunelveli – Udumalpet 400kV D/c line with HTLS conductor along with associated bay upgradation works at Tirunelveli and Udumalpet substations
- Reconductoring of Pugalur – Madurai 400kV D/c line with HTLS conductor along with associated bay upgradation works at Pugalur and Madurai substation

Implementation Timeframe: 24 months. Presently, the scheme is under implementation & expected by Feb'28.

Estimated Cost: ₹ 1194 Crs.

(v) Implementation of 1 no. of 230kV line bay at Tuticorin-II GIS for providing Connectivity to M/s Indianoil NTPC Green Energy Pvt. Ltd.

During the 38th CMETS-SR held on 02.06.2025, Connectivity of 200 MW (Solar) has been agreed for grant to M/s Indianoil NTPC Green Energy Pvt. Ltd. at 230kV level with 1 no. of 230kV line bay at Tuticorin-II GIS. Further, for grant of connectivity 1x500 MVA, 400/230kV ICT(7th) at Tuticorin-II GIS is required. The applicant has also requested for implementation of 230kV line bay at Tuticorin-II GIS under the scope of ISTS. Accordingly, implementation of 1 no. of 230kV line bay at Tuticorin-II GIS for integration of RE generation project of M/s Indianoil NTPC Green Energy Pvt. has been approved and is under implementation.

Implementation time frame: 24 months, The scheme is presently under implementation and expected by Feb'28.

Estimated Cost: ₹ 8.27 Crs

6.4.5 Telangana

(i) Proposal for reduction of High Short Circuit level at 400kV Maheshwaram (TG) bus

Transmission system to control High Short Circuit level at 400kV Maheshwaram (TGTRANSCO) bus was discussed and agreed in the meeting convened by CEA on 19.09.2022 through VC for Intra-state proposals of APTRANSCO and TGTRANSCO:

- To install 12 ohms fault limiting series reactor at one end of both the ckts of 400 kV Maheshwaram (PGCIL) to Maheshwaram (TGTRANSCO) line
- Bus Split arrangement at 400/220kV Maheshwaram (TGTRANSCO) S/s

Proposal was discussed in the 36th CMETS-SR wherein it was decided that a joint site visit for assessment of feasibility for installation of series reactor at Maheshwaram (PGCIL) end may be planned with participation from CTU, CEA, SRPC, POWERGRID & TGTRANSCO and the proposal will be discussed in the next CMETS-SR meeting based on the outcome of joint site visit. Accordingly, joint site visit was held on 07.02.2025, wherein after detailed deliberations following was concluded:

- Installation of series reactor on Line-1 is feasible at Maheshwaram (TGTRANSCO) end and installation of series reactor on Line-2 is feasible at Maheshwaram (PGCIL) end.

After detailed deliberations in the 37th CMETS SR held on 17.04.25, following transmission scheme was agreed for control of high short circuit levels at Maheshwaram (TGTRANSCO) and Maheshwaram (PGCIL) substations:

Scheme for reduction of high short circuit levels at Maheshwaram (TGTRANSCO) and Maheshwaram (PGCIL) substations ISTS Scope:

- Installation of 12 ohms fault limiting series reactor on Line-1 at Maheshwaram (TGTRANSCO) end of Maheshwaram (PGCIL) – Maheshwaram (TGTRANSCO) 400kV (Quad) D/c line
- Installation of 12 ohms fault limiting series reactor on line-2 at Maheshwaram (PGCIL) end of Maheshwaram (PGCIL) – Maheshwaram (TGTRANSCO) 400kV (Quad) D/c line

TGTRANSCO Scope:

- Bus Split arrangement at 400/220kV Maheshwaram (TGTRANSCO) substation

Implementation Timeframe: 24 months from the date of allocation. Presently, the scheme is under approval.

(ii) Augmentation of transformation capacity by 1x500 MVA (5th), 400/220kV ICT at Hyderabad (Ghanapur) S/s in Telangana

Hyderabad (Ghanapur) S/s is under operation with 3x315 + 1x500 MVA, 400/220kV ICTs, feeding multiple downstream 220kV substations of TGTRANSCO including Nagole, Chandrayangutta, Moulali, Pocharam, and Hayathnagar. Recent loading data indicates significant utilization of existing ICTs, with peak loads approaching operational limits. While no N-1 contingency violations were observed during the Joint Study and Rolling Plan 2029–30 exercise, TGTRANSCO emphasized the need for proactive capacity planning considering future demand and implementation timelines.

After detailed deliberations in the 39th CMETS-SR meeting held on 18th Jul, 2025, augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (5th) at Hyderabad (Ghanapur) S/s was agreed. Due to space availability for 400/220kV ICT

(5th) at Hyderabad (Ghanapur) S/s it was proposed to conduct Joint site visit. During joint site visit held on 22nd January, 2026, two options were explored Outdoor GIS (Option-1) and Cable-based interconnection (Option-2). After detailed deliberations, Option-1 was agreed.

Implementation Timeframe: 21 months from the date of allocation. Presently, the scheme is under approval.

Estimated Cost: ₹ 75 Crs.

6.4.6 Puducherry

(i) Transmission system for reliable power supply to Puducherry and Tamil Nadu

Transmission system for reliable power supply to Puducherry was discussed in the Joint Study meeting held from 21st to 23rd Nov'24. Further Puducherry has already submitted application in Sept, 2024 for grant of additional GNA of 80 MW. In addition, CTU has also received application for grant of GNA-RE in Feb, 2025 from M/s Chemfab Alkalies Limited for 10 MW connected in Puducherry network.

Transmission system for reliable power supply to Puducherry was again deliberated in Joint study meeting of SR constituents held from 23rd to 25th April, 2025 at Thrissur. The Scheme was agreed in 38th CMETS held on 2nd June, 2025. The scheme was also agreed in the 55th SRPC meeting held on 25.07.2025. Details of the transmission system are as under:

Reliable power supply to Puducherry and Tamil Nadu – Under ISTS

- Establishment of 230kV level at Nagapattinam 765/400kV GIS (presently charged at 400kV) with 3x500 MVA, 400/230kV ICTs
- Nagapattinam – Bahoor 230kV S/c high capacity line
- Nagapattinam – Karaikal 230kV S/c high capacity line
- Nagapattinam – Villianur 230kV S/c high capacity line
- Nagapattinam – Thondamanatham 230kV S/c high capacity line
- 4 nos. of 230kV line bays at Nagapattinam GIS
- 4 nos. 230kV line bays one each at Bahoor, Karaikal, Villianur & Thondamanatham substations

Reliable power supply to Puducherry and Tamil Nadu – Under STU scope

- Nagapattinam – Kumbakonam 230kV S/c line
- Nagapattinam – Thiruvarur 230kV S/c line
- LILO of Kadalangudy – Neyveli TS-II 230kV S/c line at Nagapattinam
- LILO of Kadalangudy – Neyveli Auto S/s 230kV S/c line at Nagapattinam
- 6 nos. of 230kV line bays at Nagapattinam GIS for termination of above lines – **Under ISTS**

Implementation Timeframe: 24 months from the date of allocation. Presently, the scheme is under approval.

6.5 System Studies Results and Analysis

Based on the load-generation scenarios as elaborated in section 6.3, various system studies have been carried out in PSSE. Transmission system which is planned or is under different stages of implementation and expected to be commissioned in 2030-31 timeframe has been considered along with the corresponding generation capacities for conducting these studies. Further, as per the deliberations held with STUs, additional generation capacities in STU along with the planned STU transmission system has been considered in the studies.

System studies have been conducted on these files prepared in consultation with the constituents for 9 scenarios. Results of these studies were analysed and the same are deliberated below:

6.5.1 Voltage Analysis

Voltages of all 765 kV and 400 kV buses were observed in all the nine scenarios. Maximum and minimum voltage of each bus were identified from the bus voltages in all nine scenarios. From the simulation results, 765kV & 400kV buses observed to be having voltage more than 1.05 pu is depicted in **Table 6-7**.

Table 6-7: Over Voltage buses in SR

Sl. No.	Bus Name	Voltage Level (kV)	Owner	Max(pu)	Scenario
1.	Kakinada	765	ISTS	1.05	2,3
2.	Srikakulam	765	ISTS	1.06	2,3,5,6
3.	Vemagiri	765	ISTS	1.05	3
4.	C'Peta	765	ISTS	1.05	3
5.	Sagar	765	ISTS	1.05	5,6,8
6.	Khammam new	765	ISTS	1.05	8
7.	Srikakulam	400	ISTS	1.05	2,3,5,6

Studies for improvement of voltage profile under various scenarios will be carried out and taken up in upcoming rolling plan/ joint study meetings.

6.5.2 Power Flow Analysis

a) Transmission Lines

In the base case file prepared for 2030-31 timeframe, 1 no. of 765kV and 11 nos. of 400 kV lines are having loading more than 70% of the thermal limit of the line. Scenarios where loading is more than 70% of rating and maximum loading obtained on these transmission lines in the simulation studies are tabulated at **Table 6-8**.

Table 6-8: Transmission Lines Loading in the Base Cases

(All Fig in MVA)

Sl. No.	Name of the Line	Scenario No.	Owner	Maximum Loading	Rating
1.	Narendra-Pune 765 kV D/c line	2,5	ISTS	3340	3500

Sl. No.	Name of the Line	Scenario No.	Owner	Maximum Loading	Rating
2.	Veltoor – Raichur 400 kV S/C line	1,2,3,4,5,6	ISTS	2038	2186
3.	Narendra – Xeldem 400 kV S/C line	2,5	ISTS	1614	2186
4.	Vemagiri (AP)- Vemagiri 400 kV D/C line	1,7	ISTS	678	874
5.	Nagarjuna Sagar –Cuddapah 400 kV S/C line	1,2,4	ISTS	767	948
6.	Gooty – Kurnool 400 kV S/C line	1,2,3,4,5,6	ISTS	1026	874
7.	Raichur – Bellary TPP 400 kV D/C line	1,2,3,4,5,6	KPTCL	1020	850
8.	Guttur new-Pump storage 400 kV D/C line	1	KPTCL	658	852
9.	Munirabad— Raichur 400 kV S/C line	2,5	KPTCL	674	852
10.	Kamalapadu-Talarich 400 kV D/C line	4,7	APTRANSCO	1225	1365
11.	Kurnool – Srisailem LB 400 kV S/C line	1,3,4,7	APTRANSCO	1122	874
12.	Chandanvally-Kethireddypally 400 kV S/C line	1,4	TGTRANSCO	1649	2186

b) Transformers

In the base case file prepared for 2030-31 timeframe, transformers at 3 nos. of 765/400kV & 6 nos. of 400/220kV substations are having loading more than 70% of the ICT rating. Scenarios where loading is more than 70% of rating and maximum loading hit by these transformers in the simulation studies are tabulated at **Table 6-9**.

Table 6-9: Transformers Loading in the Base Cases

Sl. No.	Name of the Element	Scenario No.	Owner	Maximum Loading	Rating (MVA)
1.	765/400kV, 2x1500 MVA Raichur ICTs	2,5	ISTS	1331	1500
2.	765/400kV, 4x1500 MVA Shadnagar ICTs	1,4,7	ISTS	1193	1500
3.	765/400kV, 3x1500 MVA Tuticorin ICTs	1,4,7	ISTS	1074	1500
4.	400/220kV, 3x500 MVA Narendra ICTs	2,5	ISTS	397	500
5.	400/220kV, 1x315 MVA, 3x500 MVA N'Sagar ICTs	2,5	ISTS	229 363	315 500
6.	400/220kV, 2x500 MVA Kudgi ICTs	2,3,4,5,6	ISTS	691	500
7.	400/220kV, 2x315 MVA, 2x500 MVA Urvakonda ICTs	2,5	APTRANSCO	385 243	500 315
8.	400/220kV, 2x315 MVA Kanarpatti ICTs	1,4,7	TANTRANSCO	347	315
9.	400/220kV, 3x315MVA Talaguppa ICTs	1,4	KPTCL	343	315

6.5.3 Contingency Analysis

Contingency analysis has been performed on all the 765 kV & 400kV transmission lines, and 765/400 kV & 400/220 kV transformers to ascertain the loading levels under outage of any other 765 kV or 400 kV transmission element. From the study analysis, 4 nos. of ISTS lines and 7 nos. of STU lines were observed to be ‘N-1’ non-compliant under various contingencies. Further, 3 nos. of 765/400 kV ICTs and 4 nos. of 400/220 kV ICTs under ISTS were found to be ‘N-1’ non-compliant under various contingencies. In STU, 15 nos. of 400/220, 400/230 and 400/110 KV ICTs were found to be ‘N-1’ non-compliant.

Results of the analysis are discussed below:

a) Transmission Lines

ISTS lines loaded beyond thermal rating under N-1 contingency are summarized at **Table 6-10**

Table 6-10: ISTS Transmission lines not meeting N-1 Criteria in SR

(All Fig in MW)

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	Rating	% Loading
1.	Narendra – Pune-III 765 kV D/c line	Opening of one ckt of Narendra – Pune-III 765 kV D/c line	2	ISTS	3364	4496	3500	129
Remark: High loading is absorbed in Scenario-2 wherein SR is surplus to the extend of 29 GW. Upgradation of Narendra-Kolhapur (presently charged at 765 kV) to its rated capacity at 765 kV has been recently approved. Same shall facilitate export of surplus power from SR thereby relieving high loading on Narendra-Pune 765 kV D/c lines.								
2.	Veltoor - Raichur 400 kV S/c line	Opening of 1x1500 MVA ICT at Raichur	4	ISTS	2115	2212	2186	101
Remark: High RE injection at Raichur from STU network is causing the overloading. Mitigating measures for the same shall be studied and taken-up.								
3.	Gooty-Kurnool 400 kV S/c line	Gooty-Kurnool new 400 kV S/c line	1,4	ISTS	996	1163	874	133
Remark: Matter regarding high loading of Gooty-Kurnool 400 kV S/c line discussed in the 41 st CMTETS-SR wherein it was decided that matter shall be discussed in the future joint study meeting.								
4.	Vemagiri (AP)-Vemagiri (PG)400 kV D/C line	Vemagiri (AP)-Vemagiri (PG)400 kV one ckt	1,7	ISTS	693	1055	874	121
Remark: Matter shall be studied and discussed in the future joint study meeting.								

Further, STU lines loaded beyond thermal rating under N-1 contingency are summarized at **Table 6-11**.

Table 6-11: STU Transmission lines not meeting N-1 Criteria in SR

(All Fig in MW)

Sl.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	Rating	% Loading
1.	Kurnool-Srisailem LB 400 kV S/c line	Raichur – Veltoor 400 kV S/c line	1,4	APTRAN SCO	1122	1200	874	138
2.	Krishnapatnam (AP)- Nellore (AP) 400 kV S/c line	Krishnapatnam – Karedu 400 kV S/c line	2,5	APTRAN SCO	1686	1686	1749	96
3.	Kalampadu-Talarich 400 kV D/c line	Kalampadu-Talarich 400 kV one ckt	4,7	APTRAN SCO	1233	2479	1365	181
4.	Kakinada SEZ - Uppersileru 400 kV D/c line	Kakinada-Uppersileru 400 kV one ckt	1	APTRAN SCO	938	1935	1749	111
5.	Gulburg-Yalwar 400 kV D/c line	Gulburg-Yalwar 400 kV one ckt	2	KPTCL	535	956	948	101
6.	Raichur - Bellary(TPP) 400 kV D/c line	Raichur - Munirabad 400 kV S/c line	2,5,6	KPTCL	1025	1127	850	133
7.	Gutter new-Pumpstorage 400 kV D/c line	Gutter new-Pumpstorage 400 kV one ckt	1	KPTCL	660	857	852	101

Suitable system strengthening may be planned by STU based on operational feedback and system studies.

b) Transformers

ISTS ICTs loaded beyond 100% of MVA rating under N-1 contingency are summarized at **Table 6-12**.

Table 6-12: ISTS ICTs not meeting N-1 Criteria in SR

(All Fig in MVA)

Sl. No.	Name of the Element	Scenario No.	Owner	Base Case Flow	Loading of ICT under N-1	Rating (MVA)	% Loading
1.	400/220 kV, 2x500 MVA Kudgi ICTs	1,2,3,4,5,6	ISTS	759	1146	500	229
2.	400/220 kV, 2x315 MVA and 1x500 MVA Cuddapah ICTs	7	ISTS	310	429	315	136
				492	596	500	120
3.	765/400kV, 2x1500 MVA Nellore ICTs	8	ISTS	1106	1764	1500	118
4.	765/400kV, 4x1500 MVA Shadnagar ICTs	1	ISTS	1217	1521	1500	102
5.	400/220 kV, 2x500 MVA Kaiga ICTs	2,5	ISTS	327	558	500	112
6.	765/400kV, 2x1500 MVA Raichur ICTs	2	ISTS	1368	1989	1500	133
7.	400/220 kV, 3x500 MVA Narendra ICTs	2,5	ISTS	402	542	500	109

Requirement of additional transformation augmentation wherever necessary would be planned subsequently in coordination with respective STUs.

STU ICTs loaded beyond 100% of MVA rating under N-1 contingency are summarized at **Table 6-13**.

Table 6-13: STU ICTs not meeting N-1 Criteria in SR

(All Fig in MVA)

Sl. No.	Name of the Element	Scenario No.	Owner	Base Case Flow	Loading of ICT under N-1	Rating (MVA)	% Loading
1.	400/220 kV 2x500 MVA Urvakonda ICTs	2,5	APTRANSCO	386	522	500	105
2.	400/220 kV, 3x315 MVA Talguppa ICTs	1,4	KPTCL	346	527	315	168
3.	400/110 kV, 3x200 MVA Thenampatti ICTs	1,4,7	TANTRANSCO	143	285	200	142
4.	400/110 kV, 5x200 MVA Sholingur ICTs	1,7,8	TANTRANSCO	224	295	200	148
5.	400/110 kV, 3x200 MVA Kanarpatti ICTs	1,2,4,6	TANTRANSCO	177	230	200	115
6.	400/230 kV, 2x315 MVA Kanarpatti ICTs	1,4,7	TANTRANSCO	350	704	315	224
7.	400/110 kV, 2x200 MVA Kayathar ICTs	1,2,3,4,6,7	TANTRANSCO	235	400	200	200
8.	400/110 kV, 2x200 MVA Cuddalore ICTs	8	TANTRANSCO	140	218	200	109
9.	400/110 kV, 3x200 MVA Tappakun ICTs	1,2,3,4,6	TANTRANSCO	200	300	200	150
10.	400/110 kV, 3x100 MVA Rasipalayam ICTs	6	TANTRANSCO	91	122	100	122
11.	400/110 kV, 3x200 MVA Edayarapalayam ICTs	7	TANTRANSCO	173	207	200	104
12.	400/230 kV, 1x315 MVA Kamudhi ICTs	7	TANTRANSCO	179	353	315	112
13.	400/110 kV, 2x200 MVA Kamudhi ICTs	1,4,7	TANTRANSCO	235	469	200	235
14.	400/110 kV, 2x200 MVA Palavady ICTs	1,7,8	TANTRANSCO	208	309	200	155
15.	400/110 kV, 2x200 MVA Samugarang ICTs	2	TANTRANSCO	141	218	200	109

From above, it is observed that 1 nos. of ICT in AP, 1 nos. of ICT in Karnataka and 13 nos. of ICTs in Tamil Nadu are not complying N-1 criteria in 2030-31 timeframe. Some of them are violating the limits in present timeframe also and are continuously flagged by GRID INDIA in their Operational Feedback. Therefore, STUs are required to take immediate measures to mitigate this issue of high transformer loading.

6.5.4 Short Circuit Analysis

Short circuit analysis was done for all 765 and 400 kV buses of Southern Region and buses having fault level more than the design rating under any scenario were identified. From

analysis, it is emerged that 8 nos. of 765kV buses and 47 nos. of 400kV buses in SR are having fault level more than designed capacity.

Details of the ISTS buses exceeding design fault level under any scenario are tabulated at **Table 6-14.**

Table 6-14: ISTS Buses Exceeding Designed Fault Level in SR

(All Fig in kA)

Sl. No.	Substation Name	Owner	Scenario No.	Highest Fault level	Designed Rating
1.	400kV Kurnool-New	ISTS	All	83	50
2.	400kV Kurnool-III	ISTS	All	80	50
3.	765kV Kurnool-New	ISTS	All	66	40
4.	400kV Khammam	ISTS	All	65	40
5.	400kV Bidadi	ISTS	All	61	40
6.	400kV Somanhali	ISTS	All	61	40
7.	400kV Raichur	ISTS	All	58	40
8.	400kV Tirunelveli	ISTS	All	57	40
9.	400kV Udumalpet	ISTS	All	57	40
10.	765kV Maheshwaram	ISTS	All	56	40
11.	400kV Nagararjun sagar	ISTS	All	56	40
12.	400kV Nyveli TS	ISTS	1,4,7,8,9	54	40
13.	400kV Madhugiri	ISTS	All	67	50
14.	400kV Pugalur HVDC	ISTS	All	53	40
15.	400kV Simhadri	ISTS	3,6,7,8,9	50	40
16.	400kV Nagapattinam	ISTS	4,7,8,9	49	40
17.	400kV Neyveli I - ex	ISTS	7,8,9	49	40
18.	400kV Simhadri-II	ISTS	6,7,8,9	49	40
19.	400kV Gazuwaka- SR	ISTS	7,8,9	48	40
20.	400kV Gazwaka	ISTS	7,8,9	48	40
21.	400kV Narendra- New	ISTS	7,8,9	60	50
22.	400kV Thiruvalm	ISTS	1,3,4,5,6,7	48	40
23.	765kV Cuddapah	ISTS	All	47	40
24.	400kV Hyderabad	ISTS	AII	47	40
25.	765kV Warangal New	ISTS	All	47	40

Sl. No.	Substation Name	Owner	Scenario No.	Highest Fault level	Designed Rating
26.	400kV Ramagundum	ISTS	7,8,9	46	40
27.	400kV Yelahanka	ISTS	All	46	40
28.	400kV C'Peta	ISTS	All	56	50
29.	400kV Kudgi-NTPC	ISTS	7,8,9	56	50
30.	765kV Raichur-New	ISTS	7,8,9	55	50
31.	400kV Salem	ISTS	All	44	40
32.	400kV Vallur Tps	ISTS	7,8,9	44	40
33.	400kV Pugalur-New	ISTS	1,4,7,8,9	54	50
34.	400kV Madurai	ISTS	7,8,9	43	40
35.	765kV Krishnagiri	ISTS	1,4,7	53	50
36.	765kV Kurnool-III	ISTS	1,4,7,8,9	53	50
37.	765kV Thiruvalm	ISTS	All	42	40

CTU is carrying out detailed system studies for controlling the short circuit level of ISTS buses. The schemes for controlling fault levels would be finalized in a separate joint study meetings with Southern Region Constituents. After finalization, the schemes would be deliberated in the CMETS-SR.

Further, STU buses exceeding the substation design fault level under different scenario are mentioned at **Table 6-15**.

Table 6-15: STU Buses Exceeding Designed Fault Level in SR

(All Fig in kA)

Sl. No.	Substation Name	Owner	Scenario No.	Highest Fault level	Designed Rating
1.	400 kV Kurnool	APTRANSCO	All	74	40
2.	400kV Neelamangla	KPTCL	All	62	40
3.	400kV CN'Halli	KPTCL	All	55	40
4.	400kV Devanhalli	KPTCL	All	52	40
5.	400kV Vijayawada-AP	APTRANSCO	All	52	40
6.	400kV Vizag Pool	APTRANSCO	7,8,9	51	40
7.	400kV Doddabalapur	KPTCL	All	80	63
8.	400kV Veltoor	TGTRANSCO	All	50	40
9.	400kV Dichipally	TGTRANSCO	All	49	40
10.	400kV Gajwel	TGTRANSCO	All	48	40
11.	400kV Vemagiri	APTRANSCO	All	46	40
12.	400kV Mamidipally	TGTRANSCO	All	45	40
13.	400kV Arasur	TANTRANSCO	1,4,5,7,8,9	44	40
14.	400kV Almathi	APTRANSCO	7,8,9	44	40
15.	400kV GMR Vemagiri	APTRANSCO	All	43	40

Sl. No.	Substation Name	Owner	Scenario No.	Highest Fault level	Designed Rating
16.	400kV Hinduja	APTRANSCO	7,8,9	43	40
17.	400kV KG Layout	KPTCL	1,4,7	67	63
18.	400kV Kethireddypally	TGTRANSCO	All	53	50

STUs are required to take necessary actions such as bus splitting, bypassing of lines, fault limiting reactors etc to resolve the issue of high fault level at their buses.

Chapter 7: Eastern Region

Eastern Region is stretching from Sikkim in the southern Himalayas to the coast of the Bay of Bengal. In this region, the states of Bihar and West Bengal lie on the Indo - Gangetic plain and Jharkhand lies on the Chota-Nagpur Plateau. Odisha lies on the Eastern Ghats and the Deccan Plateau. The region is bounded by Bhutan & Nepal in the north, the states of Uttar Pradesh & Chhattisgarh on the west, the state of Andhra Pradesh in the south and the state of Assam and country of Bangladesh in the east. It has a very important narrow corridor between international border of Nepal and Bangladesh, called “Chicken's Neck”, with a size of 18km by 22km, which connects the north Bengal, Sikkim and entire North Eastern Region with the remaining part of National Grid.

The generating stations of Eastern Regions are predominantly concentrated in the coal rich states of Jharkhand, Odisha and West Bengal and hydro generations are concentrated in Sikkim and southern part of Odisha. Cross-border interconnection in the Eastern Region facilitates in optimal utilization of energy resources in South Asian region in a cost effective manner. During wet season (Monsoon period) hydro power is imported from Bhutan and Nepal and during dry season (Winter period), surplus power is exported to these countries to meet their energy requirement. Cross-border interconnections with Bangladesh in Eastern Region helps Bangladesh in meeting its energy requirement throughout the year.

7.1 Power Supply Scenario as on Jan'26

As on Jan'2026, the total Installed Capacity (IC) of Eastern Region was about 38.7 GW and the peak demand met was about 31.4GW. The state-wise breakup of installed capacity and peak demand is summarised at **Table 7-1** below.

Table 7-1: ER Installed Capacity and Peak Demand as on Jan'26

(All Fig in MW)

State	Generation								Peak Demand
	Fossil			Non Fossil				Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES* (MNRE)	Total		
Bihar	7975	-	7975	-	73	646	719	8694	7852
DVC	3037	-	3037	-	221	-	221	3258	3605
Jharkhand	3421	-	3421	-	177	260	437	3858	2292
Odisha	5972	-	5972	-	2179	978	3157	9130	6905
Sikkim	89	-	89	-	643	63	706	795	134
West Bengal	8514	-	8514	-	1483	771	2254	10769	12640
Central unallocated	2154	-	2154	-	86	-	86	2240	64
ER	31163	-	31163	-	4862	2718	7580	38744	31399

Source: CEA monthly report

7.2 Envisaged Power Supply Scenario by 2030-31

As per the 20th EPS, Eastern Region demand for 2030-31 timeframe is expected to increase to about 48.1 GW. As per the inputs received from various stakeholders, total installed capacity of Eastern Region for 2030-31 is expected to be about 82.5GW. The state wise bifurcation of installed capacity and peak demand is summarized below at **Table 7-2**.

Table 7-2: ER Installed Capacity and Peak Demand (2030-31)

(All Fig in MW)

State	Generation									Peak Demand
	Fossil			Non Fossil				ESS / PSS/ Rooftop	Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
Bihar	4495	0	4495	0	0	714	714	116	5324	14301
DVC	1161	0	1161	0	143.2	1600	1743.2	350	3254.2	5409
Jharkhand	5803	0	5803	0	180	860	1040	0	6843	4800
Odisha	3945	0	3945	0	2148	2143	4290	600	8835	9456
Sikkim	0	0	0	0	305	0	305	6	311	227
West Bengal	8390	0	8390	0	305	0		2400	9133.8	16164
Central	29920	0	29920	0	6013	0	6013	10	35943	
IPP	4850	0	4850	0	5943	0	5943	0	10793	
ER	58564	0	58564	0	15170	5583	20753	3182	82498	48106

There is a growth in peak demand of Eastern Region from present timeframe (2025-26) to 2030-31 with a CAGR of 8.9%. The state wise peak demand growth is given at **Table 7-3**.

Table 7-3: Increase in Peak Demand of Various States of ER

(All Fig in MW)

State	2025-26	2030-31	Increase in demand	CAGR
Bihar	7852	14301	6449	12.7%
DVC	3605	5409	1804	8.5%
Jharkhand	2292	4800	2508	15.9%
Odisha	6905	9456	2551	6.5%
Sikkim	134	227	93	11.1%
West Bengal	12640	16164	3524	5.0%
Andaman	64	73	9	2.7%
ER	31399	48106	16732	8.9%

From the above data, it is observed that the CAGR growth of peak demand is maximum for Jharkhand (15.9%) and minimum for West Bengal (5%). The CAGR of demand of ER is about 8.9% which is more than the National Average of about 7.5%. In addition to above, bulk power demand of about 6280MW has been considered at various upcoming green hydrogen/ green ammonia, bulk consumers/distribution licensees directly connected to ISTS in the following areas: Paradeep: 3000MW, Gopalpur: 3000MW, Sundargarh: 180MW and Maithon:100MW. The hydro generations of Bhutan (about 4500MW) and Nepal (8350MW) and demand of Bangladesh (1160MW) have been considered in 2030-31 timeframe as a part of Eastern Region for study purpose.

7.3 Load Generation Balance for 2030-31 timeframe

In the chapter 3, All India Load Generation Balance (LGB) for identified nine scenarios was prepared as per the methodology finalized in a meeting among CTU, CEA and Grid-India. This section elaborates the Eastern Region Load Generation Balance (LGB) for 2030-31 timeframe. For Eastern Region also, three points on the daily load curve i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night) for three seasons viz. Monsoon (August), Summer (June) and Winter (February) have been considered.

Load generation balance has been prepared considering the generation despatch factors as mentioned at **Table 7-4** for the 9 scenarios. Further, thermal generators have been despatched as per the merit order, as elaborated in the Chapter-3 section-3.1.

Table 7-4: Eastern Region Generation Dispatch and Demand Factors

Scenario No. & Name	Generation Dispatch Factors			Demand Factors
	Hydro	Solar	ESS	
1-Aug Solar Max	70%	75%	-100%	74%
2-Aug Peak Load	90%	0%	60%	84%
3-Aug Night Off Peak	70%	0%	40%	70%
4-Jun Solar Max	70%	85%	-100%	88%
5-Jun Peak Load	90%	0%	50%	96%
6-Jun Night Off Peak	70%	0%	1%	74%
7-Feb Solar Max	30%	90%	-100%	64%
8-Feb Peak Load	60%	0%	100%	61%
9-Feb Night Off Peak	30%	0%	40%	52%

The despatch from thermal generations have been done considering merit order despatch. Based on the LGB, import / export of ER and the inter-regional flow through various corridors is summarised in **Table 7-5**. Further, both maximum and minimum is also highlighted in table below.

Table 7-5: Import / Export of Eastern Region

(All Fig in MW)

State / UTs	Import / Export of Eastern Region								
Scenario No	Aug'30 Timeframe			Jun'30 Timeframe			Feb'31 Timeframe		
	1 (Solar Max)	2 (Peak Load)	3 (Off Peak)	4 (Solar Max)	5 (Peak Load)	6 (Off Peak)	7 (Solar Max)	8 (Peak Load)	9 (Off Peak)
ER-NR	-612	748	-82	-2905	3394	1624	-4947	2434	776
ER-WR	-12802	-5908	-5799	-13815	-5601	-6056	-11259	-242	-3915
ER-SR	-1196	-2762	-899	-3076	-1886	1037	3483	5596	6336
ER-NER	-1199	1073	-44	-435	634	485	-1951	-119	-197
ER- Cross border	-4882	-6331	-4858	-4893	-6522	-4852	-1616	-4036	-1516

State / UTs	Import / Export of Eastern Region								
Scenario No	Aug'30 Timeframe			Jun'30 Timeframe			Feb'31 Timeframe		
	1 (Solar Max)	2 (Peak Load)	3 (Off Peak)	4 (Solar Max)	5 (Peak Load)	6 (Off Peak)	7 (Solar Max)	8 (Peak Load)	9 (Off Peak)
Corridors									
Eastern Region (net)	-20691	-13180	-11682	-25124	-9981	-7762	-16290	3633	1484

It can be seen that with the huge penetration of renewables, Eastern Region is net importing region in all of the scenarios. Out of these nine scenarios, Scenario-4 and Scenario-8 corresponds to two extreme cases of import/export requirement of Eastern Region i.e. Maximum import (25.1GW) and export (3.6GW). In all other scenarios, the import/export of Eastern Region varies between these two extremes.

Considering the above LGB for nine scenarios, load flow cases were prepared for 2030-31 timeframe. Detailed system studies have been carried out on the finalized load flow cases. The study results are discussed in subsequent sections.

7.4 ISTS Network Expansion Schemes Evolved from Feb/Mar'25 to Jan'26

Various transmission schemes have been discussed/finalized in the Consultative Meeting for Evolution of Transmission System of Eastern Region (CMETS-ER) from Feb/Mar'25 to Jan'26. The brief of all such transmission schemes is tabulated below in **Table 7-6**:

Table 7-6: Approved Transmission Schemes in this Rolling Plan

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (in MW)	Scheme Type (RE/Conventional/ Drawal incl strengthening)	Tentative Cost (in ₹Cr.)
Jharkhand, West Bengal, Odisha & Chhattisgarh					
1.	WR-ER Inter-Regional Network Expansion Scheme (Part-A)	24/30/36 months from date of allocation	-	Strengthening	6444.08
2.	WR-ER Inter-Regional Network Expansion Scheme (Part-B)	24 months from date of allocation	-	Strengthening	80.05
3.	WR-ER Inter-Regional Network Expansion Scheme (Part-C)	30 months from date of allocation	-	Strengthening	912.6
West Bengal & Bihar					
1.	ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor	31-03-2029	-	Strengthening	5270.09
West Bengal					
1.	Eastern Region Expansion Scheme-48 (ERES-48): Jeerat – Rajarhat –	31-03-2028	-	Strengthening	336

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (in MW)	Scheme Type (RE/Conventional/ Drawal incl strengthening)	Tentative Cost (in ₹Cr.)
	Subhasgram reconductoring				
2.	Eastern Region Bay Scheme-III: Maithon bays for Dendua	31-12-2028	-	Strengthening	11.45
Odisha					
1.	Eastern Region Expansion Scheme-49: Jeypore Bus Reactor	24 months from date of allocation	-	Strengthening	29.53
2.	Eastern Region Expansion Scheme-50: Spare reactor at Sundargarh	21 months from date of allocation	-	Strengthening	17.91
Bihar					
1.	ERES-52: Purnea 220/132kV 4 th ICT	24 months from date of allocation	-	Strengthening	30.2
2.	Pusauli HVDC Upgradation	60 months from date of allocation	-	Strengthening	3440
Total					~16,571.91

7.4.1 Jharkhand, West Bengal, Odisha & Chhattisgarh

(i) WR-ER Inter-Regional Network Expansion Scheme (Part-A)

From the Grid India operational feedback, it was observed that Ranchi – Dharamjaygarh 765kV 2XS/c line, Ranchi – Sipat 400kV D/c line and Ranchi New – New PPSP 400kV D/c lines are getting critically loaded under N-1 contingency. In order to relieve the critical loading on the above-mentioned lines, a new ISTS 765/400kV S/s has been planned in Jamshedpur area through Tamnar (POWERGRID) – Jamshedpur (New) 765kV D/c line along with associated 400kV interconnections from Jamshedpur (New).

Subsequently, Adani Power Limited applied for grant of connectivity for 1600MW quantum for its 2x800MW Raigarh TPS on 29.01.2025 under GNA in Pussore, Raigarh, Chhattisgarh. Further, new connectivity/GNA applications have also been received in Chhattisgarh from:

1. Korba Power Limited (Erstwhile Lanco Amarkantak) (2x660MW) which is proposed for grant at Champa 400kV Sec-B (with KSK 3x600MW Units & Lara-II (2x800MW) generating stations)
2. Korba Power Limited (2x800MW) which is proposed for grant at Dharamjaigarh 400kV Sec-B

Currently, there is no margin for injection left at Raigarh(Kotra) substation for injection of power, as any injection at 400kV level of Raigarh(Kotra) S/s leads to N-1 non-compliance of 765/400kV ICTs [especially under Raigarh-Pugalur HVDC reverse power flow scenario (3000MW reversal)] and any additional interconnection of generation project shall lead to increase in fault level at Raigarh(Kotra) S/s beyond its design limits of 50kA. Further, there is no space available at Raigarh(Kotra) S/s for any augmentation.

Moreover, overloading issues on Raigarh (Tamnar) – D’jaigarh (Sec-B) 765kV D/c line as well as Sipat – Ranchi 400kV D/c line are also being observed in the planning studies) and measures are being planned to alleviate the same. In order to alleviate overloading issues in WR – ER corridors and as well as to facilitate evacuation of power from 2x800MW Raigarh TPS of APL at Raigarh (Kotra)-II, Korba Power Limited (2x660MW) at Champa and & Korba Power Limited (2x800MW) at Dharamjaygarh Substation, subject scheme in WR as well as IR link between WR & ER have been planned.

There is Part-B of the scheme which includes reconductoring of LILO point to New PPSP line section of Ranchi (New) – New PPSP 400kV D/c line with Twin HTLS (ampacity of single HTLS as 1574A at nominal voltage level), which is being taken up with commissioning matching with Part-A of the scheme. Further, OPTCL is planning a new 400/220kV S/s at Balasore. Jamshedpur (New) – Balasore 400kV D/c (Quad) line has also been planned to alleviate the critical loading of Jamshedpur – Baripada 400kV D/c line under N-1 contingency. The said scheme has been agreed in the 36th CMETS-WR meeting held from 26.05.2025 to 28.05.2025 & in 43rd CMETS-ER held on 29.05.2025.

With the growing demand of West Bengal area, the power flow on Jeerat-New 765/400kV, 2x 1500MVA ICTs are getting critically loaded under N-1 contingency. Accordingly, augmentation of 3rd 765/400kV, 1500MVA ICT has been included in the part-A of this scheme in the 32nd NCT meeting held on 12-08-2025. Jamshedpur (New) – Balasore (OPTCL) 400kV D/c (Quad) line is being taken up as Part-C of the scheme with an implementation schedule of 31-03-2029 as agreed in the 32nd NCT meeting.

Further, OPTCL informed that the completion timeframe for 400/220kV Balasore S/s shall be March 2028 instead of March 2029. Accordingly, completion schedule of Part-C of the scheme “WR–ER Inter-Regional Network Expansion Scheme” revised to 30 months from SPV transfer as utilisation of Part-C is linked with completion of Jamshedpur (New) S/s under Part-A is agreed in the 37th NCT meeting

Details of the scheme is tabulated below at **Table 7-7**. Schematic is also given at **Figure 7-1**.

Table 7-7: Scope of works of WR-ER Inter-Regional Network Expansion Scheme (Part-A)

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1.	Establishment of 2x1500MVA, 765/400kV S/s at Jamshedpur (New) in Jharkhand Additional space for future expansion: - 765/400kV, 4x1500MVA (12x500MVA single phase units) ICTs along with associated ICT bays at both voltage levels - 400/220kV, 6x500MVA ICTs along with associated ICT bays at both voltage levels - 765kV, 2x330MVA (6x110MVA single phase units) bus reactor along with associated bay - 420kV, 2x125MVA bus reactor along with associated bay - 765kV line bays (along with space for switchable line reactor) for future lines: 8 nos. - 400kV line bays (along with space for switchable line reactor) for future lines: 10 nos. - 220kV line bays for future lines: 12 nos. - 765kV bus sectionaliser bay: 1 set - 400kV bus sectionaliser bay: 1 set - 220kV bus sectionaliser bay: 1 set - 220kV bus coupler bay: 2 set - 220kV transfer bus coupler bay: 2 set	- 765/400kV, 2x1500MVA ICT (7x500MVA single phase units) - 765kV, 2x330MVA bus reactor (7x110MVA single phase units) - 420kV, 125MVA bus reactor: 2 nos. - 765kV ICT bays: 2 nos. - 765kV Bus reactor bays: 2 nos. - 400kV ICT bays: 2 nos. - 400kV Bus reactor bays: 2 nos. - 765kV line bays: 6 nos. (2 nos for Jamshedpur – Tamnar 765kV D/c line and 4 nos for LILO of Ranchi (New) – Medinipur 765kV D/c line) - 400kV line bays: 4 nos. [for LILO of Ranchi (New) – New PPSP 400kV D/c line] - 765kV, 330MVA (3x110MVA single phase units) switchable line reactor along with associated bays in each circuit of Raigarh (Tamnar) – Jamshedpur 765kV D/c line
2.	Establishment of 3x1500MVA, 765/400kV S/s (on 765kV Bus section-II & 400kV Bus Section-II) at Raigarh (Kotra)-II S/s in Chhattisgarh with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor (on 765kV Bus section-II & 400kV Bus Section-II)	
2A	Additional space for future expansion: - Creation of 1100kV level - 1100kV bus sectionaliser bay: 1 set (to establish Sec-I & Sec-II) - 400kV bus sectionaliser bay :3 sets (to establish Sec-I, Sec-III & Sec-IV) - 1100/400kV, 6x3000MVA (19x1000 MVA single phase units) ICTs along with associated ICT bays.	<u>Common Transmission System Augmentation:</u> - 765kV, 2x330MVA bus reactor (7x110MVA single phase units) - 420kV, 125MVA bus reactor: 2 nos. - 765kV Bus reactor bays: 2 nos. - 400kV Bus reactor bays: 2 nos. - 765kV line bays: 6 nos. (2 nos for Raigarh (Tamnar) – Raigarh

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
	• 1100kV side: - 3 nos. on Bus Sec-I & 3 nos on Bus Sec-II) • 400kV side: 3 nos. on Bus Sec-III & 3 nos. on Bus Sec-IV) - 1100kV line bays (along with space for switchable line reactor) for future lines: 12 nos. (6 nos. on Bus Sec-I & 6 nos. on Bus Sec-II) - 1200kV, 4x660MVAR (13 x 220MVAR single phase units) bus reactor along with associated bays (2 nos. on Bus Sec-I & 2 nos. on Bus Sec-II) - 765kV bus sectionaliser bay: 1 set (to establish Sec-I) - 765/400kV, 5x1500MVA (15 x 500 MVA single phase units) ICTs along with associated ICT bays • 765kV side: - 4 nos. on Bus Sec-I & 1 nos. on Bus Sec-II) • 400kV side: - 4 nos. on Bus Sec-I & 1 nos. on Bus Sec-II) - 765kV, 2x330MVAR (6 x 110MVAR single phase units) bus reactor along with associated bay (on Bus Sec-I) - 420kV, 6x125MVAR bus reactor along with associated bay (2 on Bus Sec-I; 2 on Bus Sec-III & 2 on Bus Sec-IV) - 765kV line bays (along with space for switchable line reactor) for future lines: 6 nos. (6 on Bus Sec-I) - 400kV line bays (along with space for switchable line reactor) for future lines: 10 nos. (6 on Bus Sec-I; 4 on Bus Sec-II, (6 on Bus Sec-III & 6 on Bus Sec-IV,) - Establishment of 6000 MW, $\pm$ 800 kV Raigarh (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard (2x1500 MW on 400 kV Sec-III along with associated 4 no. bays & 2x1500 MW on 400 kV Sec-IV along with associated 4 no. bays) & all associated equipment (incl. filters)/bus extension, etc.	(Kotra)-II 765kV D/c line and 4 nos. for LILO of LILO of Dharamjaygarh (Sec-B) – Jharsuguda (Sec-A) 765kV D/c line 765kV D/c line) - 765kV, 240MVAR (3x80MVAR single phase units) switchable line reactor along with associated bays in each circuit of Raigarh (Kotra)-II – Jharsuguda (Sec-A) 765kV D/c section along with 1x80MVAR 765kV spare reactor

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
2B		ATS incl. terminal bays identified for Adani Power Limited (appl. No.2200001709): - 765/400kV, 3x1500MVA ICT (10x500MVA single phase units) - 765kV ICT bays: 3 nos. - 400kV ICT bays: 3 nos. - 400kV line bays: 2 nos. [for interconnection of 2x800MW Raigarh TPS of APL to Raigarh (Kotra)-II 400kV D/c line]
3.	Bypassing of Raigarh (Tamnar) – Dharamjaygarh (Sec-B) 765kV D/c line & Raigarh (Kotra) – Raigarh (Tamnar) 765kV D/c line at Raigarh (Tamnar) S/s so as to form at Raigarh (Kotra) – Dharamjaygarh (Sec-B) 765kV D/c line	10km (Route length)
4.	LILO of Dharamjaygarh (Sec-B) – Jharsuguda (Sec-A) 765kV D/c line at Raigarh (Kotra)-II S/s	LILO length ~40 km
5.	Raigarh (Tamnar)@- Raigarh(Kotra)-II S/s 765kV D/c line	50km
6.	765kV, 330MVAR switchable line reactor along with associated bays in each line of Raigarh(Tamnar) – Jamshedpur 765kV D/c line at Raigarh(Tamnar) end	- 765kV, 330MVAR switchable line reactors – 2 Nos. - Switching equipment for line reactors – 2 Nos. - 765kV spare reactor: 1x110MVAR
7.	Raigarh(Tamnar)@ – Jamshedpur (New) 765kV D/c line	315km
8.	LILO of Ranchi (New) – Medinipur 765kV D/c line at Jamshedpur (New)	51km and 49km
9.	LILO of Ranchi (New) – New PPSP 400kV D/c line at Jamshedpur (New) (b) Jamshedpur (New) to LILO section towards Ranchi (New) needs to be implemented with Twin Moose (b) Jamshedpur (New) to LILO section towards New PPSP needs to be implemented with Twin HTLS (ampacity of single HTLS as 1574A at nominal voltage)	63km Twin Moose 63km Twin HTLS
10.	Installation of new 765/400kV, 1x1500MVA (3x500MVA single phase units) ICT (3 rd) at Jeerat (New) S/s of M/s POWERGRID	- 765/400kV, 1x1500MVA (3x500MVA single phase units) ICT: 1 no.

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
	Medinipur Jeerat Transmission Limited (PMJTL) along with associated bays at both ends	- 765kV ICT bay: 1 no. - 400kV ICT bay: 1 no

Note:

1. @4 Nos. 765kV line bays vacated at Raigarh (Tamnar) S/s after bypass arrangement mentioned at sl. no. 3 of the scope of works [i.e. bypassing of Raigarh (Tamnar) – Dharamjaygarh (Sec -B) 765kV D/c line & Raigarh (Kotra) – Raigarh (Tamnar) 765kV D/c at Raigarh (Tamnar)] to be utilized for termination of 765kV lines at Raigarh (Tamnar) S/s i.e. 2 nos. for Raigarh (Tamnar) – Raigarh (Kotra-II) 765kV D/c proposed line and 2 nos. for Raigarh (Tamnar) – Jamshedpur (New) 765kV D/c proposed line.

Further, after the implementation of subject bypassing arrangement at the outskirts of Raigarh (Tamnar) S/s, the existing unutilized portions of Raigarh (Kotra) – Raigarh (Tamnar) and Raigarh (Tamnar) – Dharamjaygarh (Sec -B) 765kV D/c line sections at Raigarh (Tamnar) end may be utilized for termination of proposed 765kV D/c lines under the subject scheme i.e. proposed 765kV D/c lines may be terminated at bypassing points. This shall ensure utilization of existing ISTS transmission infrastructure. However, if the said existing ISTS transmission line sections remain unutilized at Raigarh (Tamnar) end, due to any reason, the same shall be dismantled by the TSP of the subject scheme and cost of scrapped assets may be adjusted under subject transmission scheme. In both cases (viz. utilization of existing line sections or its scarping), the original tariff of Raigarh (Tamnar) – Dharamjaygarh (Sec -B) 765kV D/c line & Raigarh (Kotra) – Raigarh (Tamnar) 765kV D/c line shall remain unaffected. Also, TSP of Raigarh (Tamnar) S/s shall provide space for above scope of work at the existing Raigarh (Tamnar) S/s free of cost

2. TSP shall implement Inter-tripping scheme on D'jaygarh (Sec-B) – Raigarh (Kotra)-II 765 kV D/c line (for tripping of the switchable line reactor at D'jaygarh (Sec-B) end along with the main line breaker).
3. TSP of the subject scheme shall implement Inter-tripping scheme on Raigarh (Kotra)-II – Jharsuguda 765 kV D/c line (for tripping of the switchable line reactor at Raigarh (Kotra)-II end along with the main line breaker).
4. LILO of Ranchi (New) – Medinipur 765kV D/c line at Jamshedpur (New) shall be carried out such that one circuit of Ranchi (New) – Jamshedpur (New) 765kV D/c line and one circuit of Jamshedpur (New) – Medinipur 765kV D/c line are terminated in same diameter. Similarly, second circuit of both line sections may also be terminated in bays of the same diameter.
5. LILO of Ranchi (New) – New PPSP 400kV D/c line at Jamshedpur (New) shall be carried out such that one circuit of Ranchi (New) – Jamshedpur (New) 400kV D/c line and one circuit of Jamshedpur (New) – New PPSP 400kV D/c line are terminated in same diameter. Similarly, second circuit of both line sections may also be terminated in bays of the same diameter.

Note:

1. OPTCL shall implement 2 Nos. 400kV line bays along with 1x80MVar switchable line reactor at its planned Balasore 400/220kV S/s for termination of Jamshedpur (New) – Balasore 400kV D/c (Quad) line. Balasore (OPTCL) 400/220kV S/s is yet to be awarded. However, the expected commissioning schedule is March 2028, as per OPTCL.
2. TSP of Jamshedpur (New) S/s [a new 765/400kV S/s being implemented under WR-ER Inter-Regional Network Expansion Scheme-Part A scheme] shall provide space for above scope of work at Jamshedpur (New) S/s free of cost.

Completion Schedule: 30 months from SPV

Estimated Cost: ₹ 912.6Cr

7.4.2 West Bengal & Bihar

(i) ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor

A 765kV ring was planned in ER from Ranchi (New) – Medinipur – Jeerat (New) – Gokarna – Banka – Gaya and Ranchi – Gaya through 400kV D/c (Quad) line. Ranchi (New) – Medinipur – Jeerat (New) 765kV D/c line has already been implemented. In order to improve reliability in the Eastern Region and improve reliability of power supply to Kolkata area, need for implementation of balance portion of the ring viz. Jeerat (New) – Gokarna – Banka – Gaya came up as per operational feedback.

After detailed studies, “ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor” scheme was agreed to be implemented as a strengthening scheme in the 47th CMETS-ER held on 29-09-2025. It was also observed that this link can also be utilized for grant of 1200MW ISTS Connectivity to NTPC for its Nabinagar STPP Stage-II generation plant (3x800MW). The final scope of works was discussed and agreed in 48th CMETS-ER held on 30-10-2025. Subsequently the final scope was discussed, revised and agreed in 38th NCT meeting held on 25th February 2026.

Details of the scheme is tabulated below at **Table 7-8**. Schematic is also given at **Figure 7-2**.

Table 7-8: Scope of works of ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1.	Establishment of new 765/400/220kV S/s at Nawada in Bihar Additional space for future expansion: - 765kV bus sectionaliser bay: 1 set (to establish Sec-II)	- 765/400kV, 2x1500MVA ICT (7x500MVA single phase units including one spare unit) - 765kV, 2x330MVar bus reactor (7x110MVar single phase units including one spare unit)

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
	- 400kV bus sectionaliser bay :1 set (to establish Sec-II) - 220kV bus sectionaliser bay: 1 set (to establish Sec-II) - 220kV bus coupler bay: 1 set (1 No. on bus Sec-II) - 220kV transfer bus coupler bay: 1 set (1 No. on bus Sec-II) - 765/400kV, 4x1500MVA (12x500MVA single phase units) ICTs along with associated ICT bays at both voltage levels - o 765kV side: - 1 No. on Bus Sec-I & 3 Nos. on Bus Sec-II) - o 400kV side: - 1 Nos. on Bus Sec-I & 3 Nos. on Bus Sec-II) - 400/220kV, 4x500MVA ICTs along with associated ICT bays at both voltage levels - o 400kV side: - 1 No. on Bus Sec-I & 3 Nos. on Bus Sec-II) - o 220kV side: - 1 Nos. on Bus Sec-I & 3 Nos. on Bus Sec-II) - 765kV, 2x330MVA (6x110MVA single phase units) bus reactor along with associated bay (on Bus Sec-II) - 420kV, 2x125MVA bus reactor along with associated bay (on Bus Sec-II) - 765kV line bays (along with space for switchable line reactor) for future lines: 8 Nos. (2 Nos. on Bus Sec-I and 6 on Bus Sec-II) - 400kV line bays (along with space for switchable line reactor) for future lines: 10 Nos. (4 Nos. on Bus Sec-I and 6 on Bus Sec-II) - 220kV line bays for future lines: 10 Nos. (4 Nos. on Bus Sec-I and 6 on Bus Sec-II)	- 400/220kV, 2x500MVA ICT - 420kV, 125MVA bus reactor: 2 nos. - 765kV ICT bays: 2 nos. - 765kV Bus reactor bays: 2 nos. - 400kV ICT bays: 4 nos. - 400kV Bus reactor bays: 2 nos. - 220kV ICT bays: 2 nos. - 765kV line bays: 4 nos. (2 nos. for Nawada – Durgapur 765kV D/c line and 2 nos. for LILO of Gaya – Ballia 765kV S/c line) - 765kV, 240MVA (3x80MVA single phase units) switchable line reactor along with associated switching equipment in both circuits of Nawada – Durgapur 765kV D/c line at Nawada end - 765kV, 240MVA (3x80MVA single phase units) switchable line reactor along with associated switching equipment in Nawada – Ballia 765kV S/c line section at Nawada end formed after LILO of Ballia – Gaya 765kV S/c line at Nawada - 765kV spare reactor: 1x80MVA - 400kV line bays: 2 nos. [for Nabinagar-II Stage-II – Nawada (ISTS) 400kV D/c (Quad) line viz. DTL, under the scope of NTPC Ltd.] - 220kV line bays: 2 nos. [for Nawada (ISTS) – Guraru 220kV D/c line – line under scope of BSPTCL] - 220kV bus coupler bay: 1 set (1 No. on bus Sec-II) - 220kV transfer bus coupler bay: 1 set (1 No. on bus Sec-II)

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
2.	Establishment of new 765kV Switching station at Durgapur in West Bengal with provision for establishment of 765/400kV level in future Additional space for future expansion: - 765kV line bays (along with space for switchable line reactor) for future lines: 6 nos. - 765/400kV, 5x1500MVA ICT (16x500MVA single phase units including one spare unit) along with associated bays at both levels - 765kV, 330MVA bus reactor (3x110MVA single phase units) along with associated bay: 1 no. - 400kV line bays (along with switchable line reactor): 10 nos. - 420kV, 2x125MVA bus reactor along with associated bay	- 765kV, 2x330MVA bus reactor (7x110MVA single phase units including one spare unit) - 765kV Bus reactor bays: 2 nos. - 765kV line bays: 4 nos. (2 nos. for Nawada – Durgapur (New) 765kV D/c line and 2 nos. for Durgapur (New) – Jeerat (New) 765kV D/c line) - 765kV, 240MVA (3x80MVA single phase units) switchable line reactor along with associated switching equipment in both circuits of Nawada – Durgapur (New) 765kV D/c line at Durgapur (New) end - 765kV, 1x80MVA (single phase unit) spare reactor: 1 no.
3.	LILO of Gaya – Ballia 765kV S/c line at Nawada S/s	Loop in 82km Loop out 82km
4.	Nawada – Durgapur (New) 765kV D/c line	258km
5.	Durgapur (New) – Jeerat (New) 765kV D/c line	152km
6.	Extension at Jeerat (New) 765/400kV S/s	- 765kV line bays: 2 Nos. (for Durgapur – Jeerat (New) 765kV D/c line) - 765kV, 240MVA (3x80MVA single phase units) switchable line reactor in Durgapur – Jeerat (New) 765kV D/c line – 2 Nos. - Switching equipment for line reactors – 2 Nos. - Provision for utilization of existing 765kV, 1x80MVA single phase spare reactor to be made for the above 2x240MVA (6x80MVA single phase units) switchable line reactor to be installed at Jeerat (New) end in Durgapur – Jeerat (New) 765kV D/c line

Note:

1. BSPTCL shall take up implementation of Nawada (ISTS) – Guraru 220kV D/c line along with Guraru 220/132kV substation and other associated 220kV & 132kV lines in matching time-frame of Nawada (ISTS) S/s.
2. M/s POWERGRID Medinipur Jeerat Transmission Limited (PMJTL) shall provide space for above scope of work at the existing Jeerat (New) S/s free of cost.
3. TPS shall terminate 765kV D/c lines at Durgapur (New) S/s such that one circuit of Nawada – Durgapur (New) 765kV D/c line and one circuit of Durgapur (New) – Jeerat (New) 765kV D/c line are terminated in same diameter. Similarly, second circuit of both lines may also be terminated in bays of the same diameter.
4. Line lengths mentioned above are tentative. Exact line length shall be ascertained after detailed survey.

Implementation Timeframe: 31-03-2029

Estimated Cost: ₹5270.09 Cr.

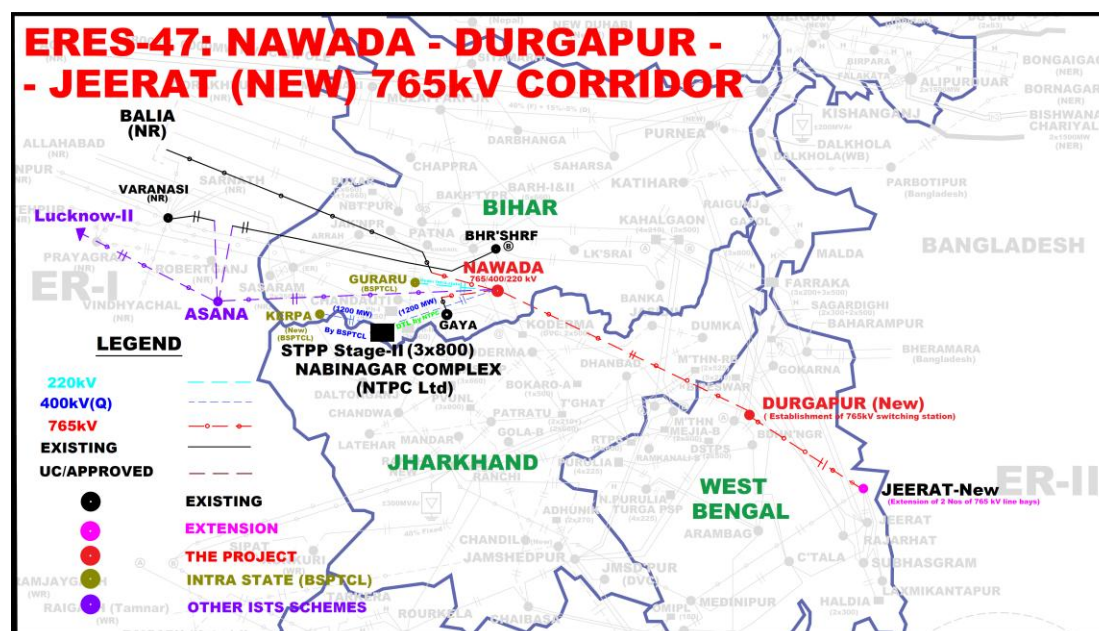


Figure 7-2: Schematic of ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor

7.4.3 West Bengal

- (i) **Eastern Region Expansion Scheme-48 (ERES-48): Jeerat – Rajarhat – Subhasgram reconductoring.**

WBSETCL has informed that in the state of West Bengal, demand of power as well as load growth of the two 24 Parganas Districts (North & South) and Kolkata are maximum compared to other districts. Out of the three, 24 Pargana (North) district and Kolkata demand are growing very rapidly. Looking into the northern part of the district, the main sources of supply are mainly New Jeerat 765/400 kV S/s [PG], Jeerat 400 kV S/s [WBSETCL], Subhasgram 400 KV S/s [PG] and Rajarhat 400kV S/s [PG]. These EHV sub-stations are catering power to the various 220kV and 132kV substations in and

around Kolkata. In many occasions, there is no N-1 contingency for the lines and in case of outage of anyone, the entire part of the district and/or the state capital may be out of power for prolonged time.

Accordingly, the matter was deliberated in the 49th CMETS-ER held on 30-01-2026 and it was agreed to Reconductoring of Jeerat (WBSETCL) – Rajarhat (POWERGRID), Jeerat (WBSETCL) – Subhasgram (POWERGRID), and Rajarhat (POWERGRID) – Subhasgram (POWERGRID) 400kV S/c lines with HTLS shall be taken up under “ERES-48: Jeerat – Rajarhat – Subhasgram reconductoring” with a commissioning schedule of 31-03-2028.

Details of the scheme is tabulated below at **Table 7-9** and Schematic is at **Figure 7-3**

Table 7-9: Scope of works of ERES-48: Jeerat – Rajarhat – Subhasgram reconductoring

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1.	Reconductoring of Jeerat (WBSETCL) – Rajarhat (POWERGRID) 400kV S/c line (Twin ACSR Moose) line with Twin HTLS conductor (with ampacity of single HTLS as 1516A)	41ckm
2.	Reconductoring of Jeerat (WBSETCL) – Subhasgram (POWERGRID) 400kV S/c line (Twin ACSR Moose) line with Twin HTLS conductor (with ampacity of single HTLS as 1516A)	65ckm
3.	Reconductoring of Rajarhat (POWERGRID) – Subhasgram (POWERGRID) 400kV S/c line (Twin ACSR Moose) line with Twin HTLS conductor (with ampacity of single HTLS as 1516A)	34ckm
4.	Upgradation of 400kV bay equipment at Jeerat (WBSETCL) S/s	CT, Wavetrap and Isolator of Bay No 9 of Jeerat (WBSETCL) – Rajarhat (POWERGRID) 400kV S/c line to be upgraded commensurate with rating of HTLS line (2x1516A)
5.	Upgradation of 400kV bay equipment at Rajarhat (POWERGRID) S/s	- Wave trap of Bay No. 408 of Jeerat (WBSETCL) – Rajarhat (POWERGRID) 400kV S/c line to be upgraded commensurate with rating of HTLS line (2x1516A) - Wave trap of Bay No. 401 of Rajarhat (POWERGRID) – Subhasgram

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
		(POWERGRID) 400kV S/c line to be upgraded commensurate with rating of HTLS line (2x1516A) - Replacement of jack bus, jumpers, clamp connectors etc. of Bay no. 401 and 408 commensurate with rating of HTLS line (2x1516A)
6.	Upgradation of 400kV bay equipment at Subhasgram (POWERGRID) S/s	- CB, CT, Wave trap and Isolator of Bay no. 404 of Rajarhat (POWERGRID)-Subhasgram (POWERGRID) 400kV S/c line to be upgraded commensurate with rating of HTLS line (2x1516A) - CB, CT and Isolator of Bay no. 401 of Jeerat (WBSETCL) – Subhasgram (POWERGRID) 400kV S/c line to be upgraded commensurate with rating of HTLS line (2x1516A) - CB, CT and Isolator of Bay no. 402, 403, 405 & 406 at Subhasgram (POWERGRID) S/s end to be upgraded commensurate with rating of HTLS line (2x1516A) for complete diameter upgradation - Replacement of jack bus, jumpers, clamp connectors etc. of Bay no. 401, 402, 403, 404, 405 & 406 commensurate with rating of HTLS line (2x1516A)

Note:

1. WBSETCL to provide unconditional access to the ISTS licensee free of any costs for upgradation of identified bay equipment at Jeerat (WBSETCL) S/s.
2. WBSETCL shall implement the upgradation of associated equipment of TBC at Jeerat (WBSETCL) S/s commensurate with the rating of the HTLS lines (2x1516A) in matching timeframe.

Implementation Timeframe: 31-03-2028

Estimated Cost: ₹336 Cr

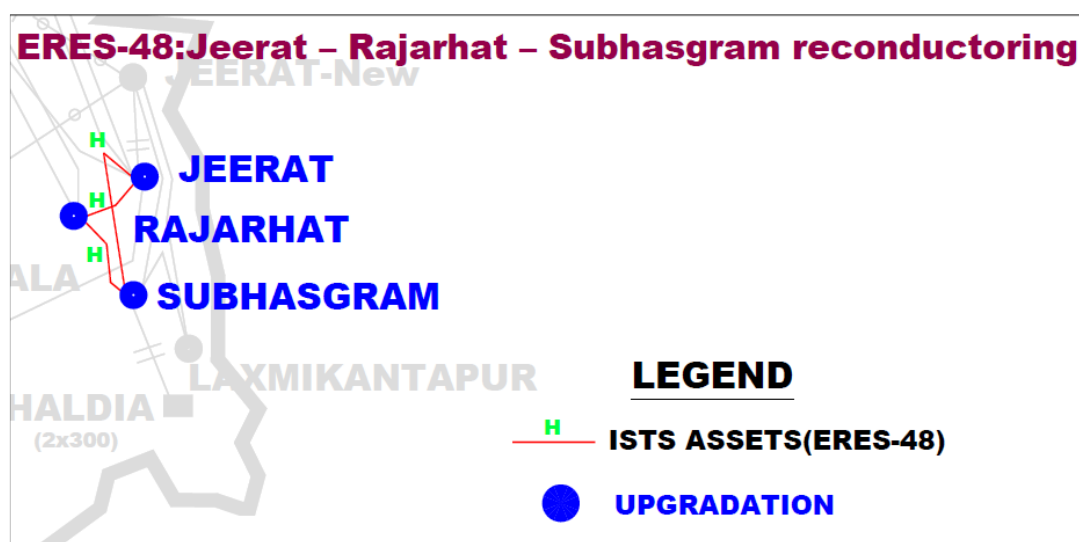


Figure 7-3: ERES-48: Jeerat – Rajarhat – Subhasgram reconductoring

(ii) **Eastern Region Bay Scheme-III (ERBS-III): Maithon bays for Dendua**

In view of load growth in the Burdwan(W) and upcoming industrial load of 250MW WBSETCL had proposed establishment of a new 220/132kV Dendua (WBSETCL) S/s through Maithon (POWERGRID) – Dendua 220kV D/c (HTLS) line.

Based on the deliberation in various CMETS meeting of ER, it was suggested that to establish a new 220/132kV S/s in Dendua area to meet the growing demand of Dendua/ Asansol and nearby areas and it was agreed to allocate space for two nos. 220kV line bays to WBSETCL at Maithon (POWERGRID) S/s for termination of their planned intra-state Maithon – Dendua 220kV HTLS D/c line (ampacity of HTLS-1100A) from planned 220kV Dendua S/s. Further, WBSETCL had requested for construction of 02 nos. of 220kV lines bays under ISTS citing the following reasons:

- POWERGRID is maintaining centralized control system at present to their various sub-stations and within a very short period they will go for distributed control system for enhanced reliability.
- Matching with the various protocols between PG and WBSETCL will be difficult and convergence for construction of bays inside their sub-stations will be time taking.

Same was deliberated in the 48th CMETS-ER held on 30-10-2025 wherein it was agreed that 02 nos of line bays [Bay no 201 & 211] at Maithon (POWERGRID) shall be implemented under ISTS scheme namely ERBS-III: Maithon bays for Dendua line

Details of the scheme is tabulated below at **Table 7-10**. Schematic is at **Figure 7-4**.

Table 7-10: Scope of works of ERBS-III: Maithon bays for Dendua line

Sl. No.	Scope of Works	Capacity (MVA) / Line length (km)/ Nos.
1.	Extension at Maithon (POWERGRID) 400/220kV S/s	- 220kV line bays [201 & 211]: 2 nos. (for termination of Dendua – Maithon (POWERGRID) 220kV D/c HTLS line of

Sl. No.	Scope of Works	Capacity (MVA) / Line length (km)/ Nos.
		WBSETCL Line is under the scope of WBSETCL)

Implementation Timeframe: 31-12-2028

Estimated Cost: ₹11.45 Cr

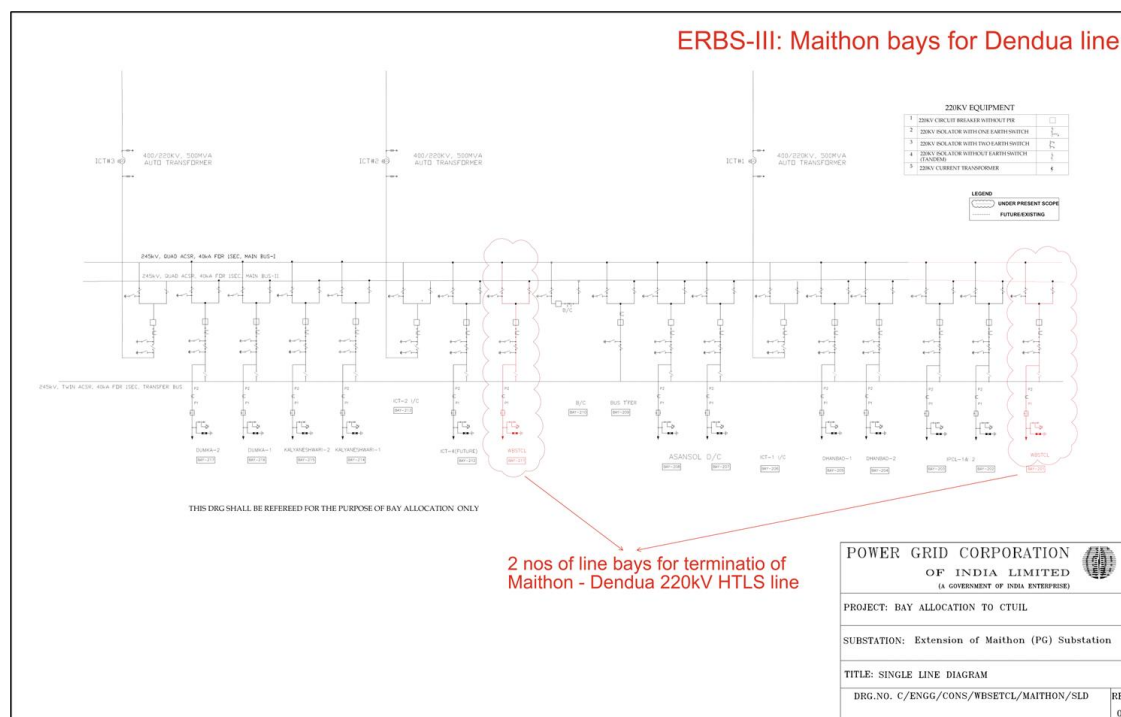


Figure 7-4: Schematic of ERBS-III: Maithon bays for Dendua

7.4.4 Odisha

(i) Eastern Region Expansion Scheme-49: Jeypore Bus Reactor

The ± 450 MVAr STATCOM was commissioned and charged at existing 400/220kV Jeypore (POWERGRID) S/s in July 2018. The STATCOM consists of two voltage source converters (VSCs), each rated at ± 100 MVAr, along with two Mechanically Switched Reactors (MSRs) rated at $(-)$ 125 MVAr each and two Mechanically Switched Capacitors (MSCs) rated at 125 MVAr each.

The matter was deliberated in the 48th CMETS-ER held on 30-10-2025 and it was agreed to install a new 125MVAr, 420kV bus reactor at 400/220kV Jeypore (POWERGRID) along with associated bay using Outdoor GIS. Details of the scheme is tabulated below at **Table 7-11**. Schematic is also given at **Figure 7-5**.

Table 7-11: Scope of works of ERES-49: Jeypore Bus Reactor

Sl. No.	Scope of Works	Capacity (MVA) / Line length (km)/ Nos.
1.	Installation of a new 420kV, 125MVA bus reactor at Jeypore (POWERGRID) S/s	- 420kV, 1x125MVA Bus Reactor: 1 no. - 400kV Bus reactor bay: 1 no (bay no 421 in Outdoor GIS) - GIS bus duct: 200m

Implementation Timeframe: 24 months from allocation

Estimated Cost: ₹29.53 Crs.

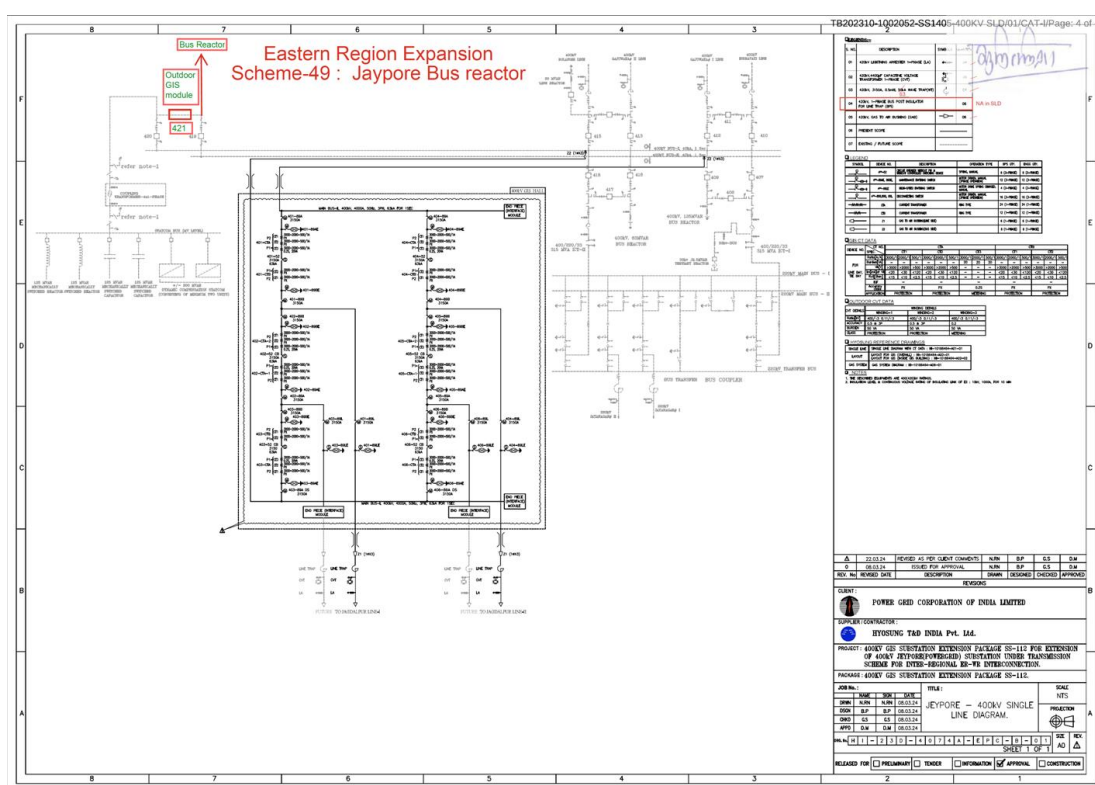


Figure 7-5: Schematic of ERES-49: Jeypore Bus Reactor

(ii) Eastern Region Expansion Scheme-50: Spare Reactor at Sundargarh

765 kV Sundargarh-Raipur#1&2 along with their respective 240MVA (3x80MVA) switchable Line Reactors were commissioned on 29th & 30th March 2019. Presently, there is no provision for Hot Spare for Switchable Line Reactors of 765 kV Sundargarh-Raipur #1 & 2 line. However, Hot Spare of Line reactors are available at Raipur end for the same line.

The matter regarding the requirement of additional hot spare reactor at Sundargarh (POWERGRID) 765/400kV S/s was deliberated in 228th OCC meeting wherein it was observed that the proposed reactor was not envisaged in the original scope of work during the planning stage. However, the same might be required at present. Accordingly, OCC advised that the matter may be referred to CMETS to establish its present requirement. Further, in 54th TCC & ERPC Meeting held on 23rd & 24th June 2025, ERPC agreed to forward the proposal to CMETS-ER for necessary actions.

The same was deliberated in the 49th CMETS-ER held on dated 27-11-2025, it was agreed that based on the outcome of the meeting convened by CEA under the chairmanship of Member (PS), CEA on 04-12-2025, The matter was discussed in the said meeting wherein it was agreed to an additional one no. 765 kV, 80 MVAR single phase hot spare reactor at existing Sundargarh s/s may be installed.

Details of the scheme is tabulated below at **Table 7-12** and Schematic is also given at **Figure 7-6**

Table 7-12: Scope of works of ERES-50: Spare Reactor at Sundargarh

Sl. No.	Scope of Works	Capacity (MVA) / Line length (km) / Nos.
1.	Extension at Sundargarh (POWERGRID) 765/400kV S/s	765kV, 1x80MVAR, spare reactor along with necessary switching arrangement: 1 no. (to be utilized with switchable line reactors of Sundargarh-Raipur Pool 765kV D/c line)

Implementation Timeframe: 21 months from date of allocation

Estimated Cost: ₹17.91 Cr

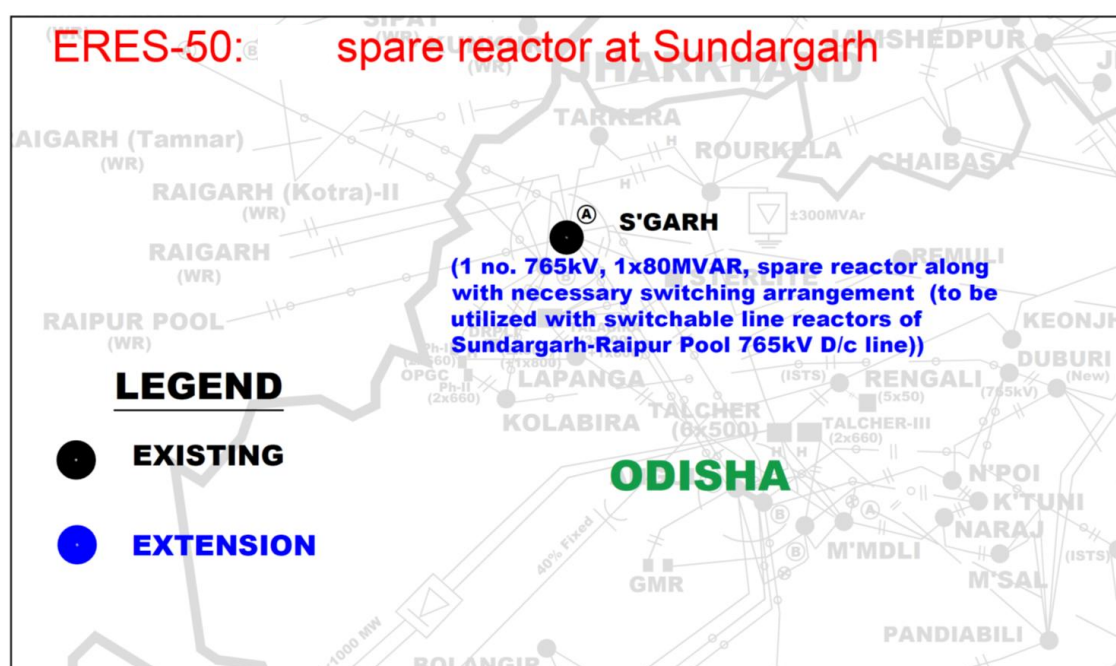


Figure 7-6: ERES-50: Spare Reactor at Sundargarh

7.4.5 Bihar

(i) Eastern Region Expansion Scheme-52: Purnea 220/132kV 4th ICT

Bihar State Power Holding Company Limited (BSPHCL) vide letter dated 06-10-2025 had mentioned that power supply in the Purnea and Katihar district of Bihar is completely dependent on the feeders from Purnea Old (POWERGRID) 220/132kV S/s. Further,

Purnea Old (POWERGRID) is connected to Purnea-New (POWERGRID) S/s through 220kV D/c (HTLS) line.

The matter was discussed in the joint meeting among CEA, CTUIL, Grid-India and BSPTCL, wherein it was informed that presently the total peak load on the existing 3x160MVA ICTs is about 400MW, therefore N-1 contingency criteria is not getting complied.

Accordingly, it was decided that installation of additional 220/132 kV, 160 MVA ICT (4th) at Purnea S/s may be taken up for planning by CTUIL under ISTS. After detailed deliberation, scope of works was agreed in the 51st CMETS-ER meeting held from 30-01-2026 to be implemented under ISTS scheme “ERES-52: Purnea 220/132kV 4th ICT” scheme.

Details of the scheme is tabulated below at **Table 7-13**. Schematic is also given at **Figure 7-7**.

Table 7-13: Scope of works of ERES-52: Purnea 220/132kV 4th ICT

Sl. No.	Scope of Works	Capacity (MVA) / Line length (km) / Nos.
1.	Installation of a new 220/132kV, 1x200MVA ICT (4 th) at Purnea (POWERGRID) S/s along with associated bays	- 220/132kV, 1x200MVA ICT: 1 no. - 220kV ICT bay: 1 no. (in AIS) - 132kV ICT bay: 1 no. (through GIS Bus duct (3-ph) of approx.100 m)

Implementation Timeframe: 24 months from date of allocation

Estimated Cost: ₹ 30.20 Cr.

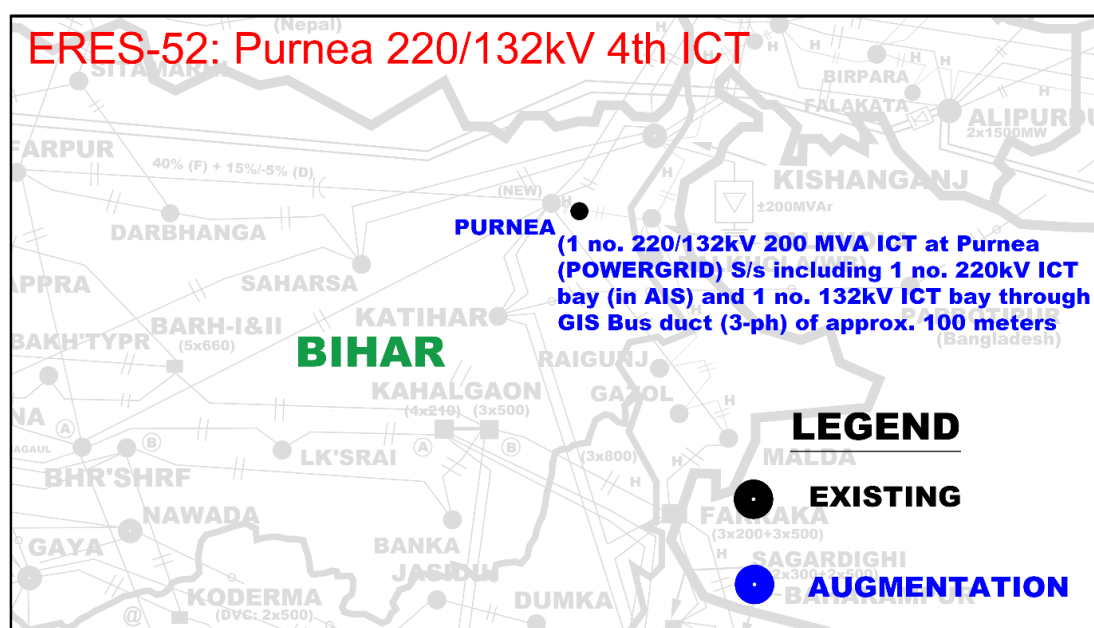


Figure 7-7: Schematic of ERES-52: Purnea 220/132kV 4th ICT

(ii) Pusauli HVDC Upgradation

MoP vide letter no 25-10/66/2024-PG dated 25-09-2025 has granted in-principle approval to POWERGRID to establish a SiC VSC-based HVDC Back-to-Back station in existing Pusauli (Sasaram) under RTM mode and requested CEA & CTUIL to place the Pusauli HVDC project before NCT and furnish its recommendation within 30 days from the date of issuance of this letter.

The proposed scheme was deliberated in the 34th NCT meeting held on 10-11-2025 wherein CTUIL was directed to carry out a detailed study of the scheme, considering the suggestions & feedback deliberated in the meeting. Accordingly, a report has been prepared considering the deliberations & directions of the 34th NCT meeting.

The key highlight of the report is given below:

- i. In view of requirements of large number of HVDC systems, as well as limited number of HVDC suppliers it would be prudent to undertake indigenous development on future ready technology like SiC MOSFET-based power modules. Further, the Submodules design is specific to high power requirement of HVDC application and as such the SiC based MOSFETs being used in BESS Inverter application are not suitable for HVDC applications.
- ii. Since SiC MOSFET-based power modules for HVDC technology are still in the Research and Development (R&D) phase and considering the criticality of Gazuwaka BTB HVDC system as already confirmed by Grid India, it is not recommended to experiment indigenous SiC MOSFET-based power modules at Gazuwaka upgradation.
- iii. The developmental HVDC works are still in the research and development phase hence its placements should be avoided at locations that may have technical & commercial implications like timely evacuation of power from RE generators or critical corridors that may have adverse impact on grid security and stability. Further, the developmental works should preferably be undertaken at an existing HVDC back-to-back station where land, civil works another logistics are readily available.
- iv. The OEM supplier of Pusauli HVDC i.e. GE Vernova has already consented for indigenous development of SiC MOSFET-based power modules jointly with M/s L&T.
- v. Considering present and future bidirectional power transfer requirements between ER & NR, upgradation of existing 500 MW HVDC BTB at Pusauli to 1000 MW, utilizing indigenously developed SiC MOSFET-based power modules appears to be the most preferred option.

- vi. SiC MOSFET-based HVDC at Pusauli would pave the way for development of VSC based HVDC in India under “Aatmanirbhar Bharat” initiative of Government of India.

In view of the above, the matter was deliberated and agreed in the 36th NCT meeting held on 30-12-2025. Accordingly, it was deliberated and agreed in 51st CMETS-ER held on 30-01-2026.

Details of the scheme is tabulated below at **Table 7-14**. Schematic is also given at **Figure 7-8**.

Table 7-14: Pusauli HVDC Upgradation

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1.	Upgradation of existing 500MW LCC based HVDC Back-to-Back (BTB) at Pusauli (Sasaram) to 1000MW VSC based HVDC Back-to-Back	1000MW VSC based HVDC

Note:

1. Silicon Carbide (SiC) MOSFETs based Power Modules are to be used for 1000MW HVDC VSC Back to Back.
2. All the terms & conditions of MoP vide letter no 25-10/66/2024-PG dated 25-09-2025 may be fulfilled by the TSP.

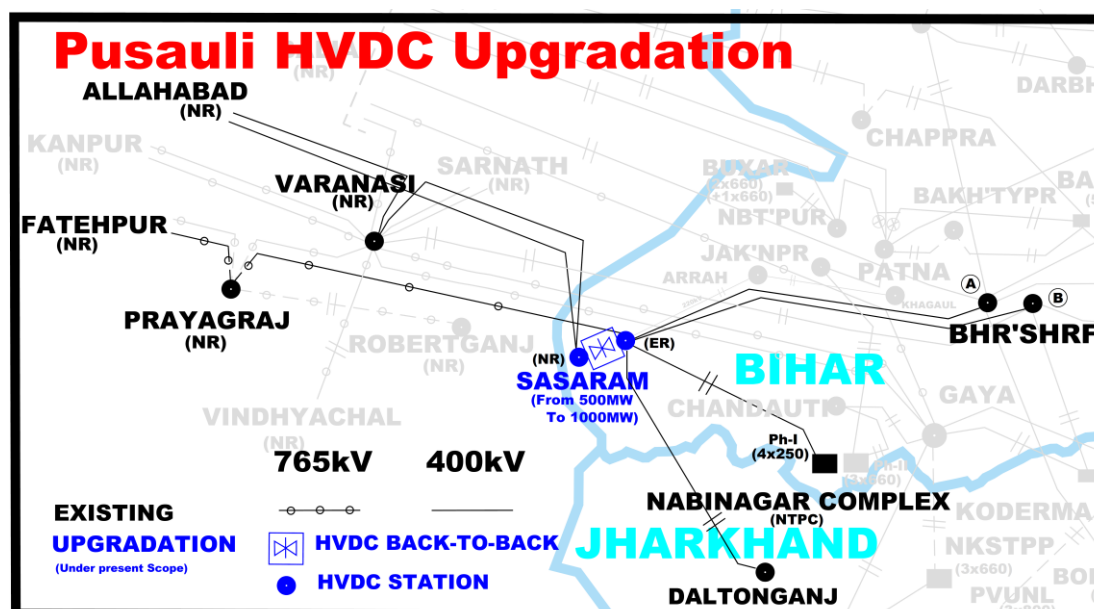


Figure 7-8: Pusauli HVDC Upgradation

Implementation timeframe: 60 months from date of allocation

Estimated Cost: ₹3440 Cr

7.5 System Study Results and Analysis

Based on the load-generation scenarios as elaborated in **section 7.3**, various system studies have been carried out in PSSE. Planned/ Under implementation Transmission system that are expected to be commissioned in 2030-31 timeframe are considered for conducting these studies. Results of these studies were analysed and the same are deliberated below-

7.5.1 Power Flow Analysis

a) Transmission lines

In the base case file prepared for 2030-31 timeframe, no lines are having loading more than 70% of the thermal limit of the line.

b) Transformers

In the base case file prepared for 2030-31 timeframe, transformers at 1 no of 765/400kV and 2 nos. of 400/220kV substations are having loading more than 70% of the ICT rating. Scenarios where loading is more than 70% of rating and maximum loading hit by these transformers in the simulation studies are tabulated below at **Table 7-15**

Table 7-15 Transformer Loading in the Base Cases

(All Fig in MW)

Sl. No.	Name of ICT	Capacity (MVA)	Scenario No.	Owner	Maximum Loading per ICT	% Loading
1.	Dubri 765/400kV	2x1500	1,2,4	OPTCL	1297	86%
2.	Kerpa New 400/220kV	3x500	2	BSPTCL	362	72%
3.	Rangpo 400/220kV	5x315	5	ISTS	249	79%

c) Voltage Analysis

PU voltages of all 400kV and above buses were observed in all the nine scenarios. Maximum and minimum voltage of each bus were identified from the bus voltages in the nine number of scenarios. It has been observed that all buses at 400kV and above are having voltage between 0.95 pu and 1.05pu. However, Voltage at Chapra New, Dumka New, Naubatpur and Buxar is observed to be about near 1.05pu in some scenarios. STUs may take suitable reactive compensation at above substations to mitigate this issue.

7.5.2 Contingency Analysis

Contingency analysis has been performed on all the 765kV & 400kV transmission lines, and 765/400kV & 400/220kV transformers to ascertain the loading levels under outage of any other 765kV or 400kV transmission element. Results of the analysis are discussed below:

a) Transmission Lines

ISTS lines loaded beyond 100% of thermal rating under N-1 contingency are summarized below at **Table 7-16**.

Table 7-16: ISTS Transmission lines not meeting N-1 Criteria in ER

(All Fig in MW)

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	Rating	% Loading
1.	Jeypore - Gazuwaka 400kV line-1	Jeypore - Gazuwaka 400kV line-2	3,5,6,7,8	ISTS	438	902	850	106%
2.	Rourkela – Chaibasa 400kV line-1	Rourkela – Chaibasa 400kV line-2	4	ISTS	910	1187	850	140%

From the above, it can be seen that the above-mentioned lines are violating N-1 contingency limit. This is due to high injection of renewable generations leading of less thermal generations in ER in the Jharkhand, DVC and West Bengal area. These overloadings may be minimized with switching of some of the generations in these areas. Further, the Gazuwaka HVDC has only feed from Jeypore – Gazuwaka 400kV D/c line which leads to overloading under N-1 contingency.

STU lines loaded beyond 100% of thermal rating under N-1 contingency are summarized below at **Table 7-17**.

Table 7-17: STU Transmission lines not meeting N-1 Criteria in ER

(All Fig in MW)

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	Rating	% Loading
1.	Purulia New – Purulia PS 400kV Line-1	Purulia New – Purulia PS 400kV Line-2	1,4,7	WBSETCL	543	1080	850	127%

WBSETCL may initiate action to control the overloading of the line in 2030-31 timeframe.

b) Transformers

ISTS ICTs loaded beyond 100% of MVA rating under N-1 contingency are summarized below at **Table 7-18**

Table 7-18: ISTS ICTs not meeting N-1 Criteria in ER

(All Fig in MW)

Sl. No.	Name of the Element	Scenario No.	Owner	Base Case Flow	Loading of ICT under N-1	Rating (MVA)	% Loading
1.	765/400kV, 2x1500MVA at Ranchi New	4	ISTS	1165	1685	1500	112%

Sl. No.	Name of the Element	Scenario No.	Owner	Base Case Flow	Loading of ICT under N-1	Rating (MVA)	% Loading
2.	765/400kV, 2X1500 MVA ICTs at Jamshedpur New-New	4	ISTS	1008	1516	1500	101%

Requirement of additional transformation augmentation wherever necessary would be planned subsequently in coordination in the CMETS-ER meeting and the same would be included in the subsequent Rolling Plan.

ICTs of STU(s) loaded beyond 100% of MVA rating under N-1 contingency are summarized below at **Table 7-19**

Table 7-19: STU ICTs not meeting N-1 Criteria in ER

(All Fig in MW)

Sl. No.	Name of the Element	Scenario No.	Owner	Base Case Flow	Loading of ICT under N-1	Rating (MVA)	% Loading
1.	765/400kV, 2x1500MVA ICTs at Kolabira	7	OPTCL	760	1522	1500	102%
2.	765/400kV, 2x1500MVA ICTs at Duburi-765	1,2,4,7	OPTCL	1320	1937	1500	129%
3.	400/220kV, 3x500MVA ICTs at Kerpa New	2	BSPTCL	366	504	500	101%
4.	400/220kV, 2x315MVA ICTs at Waria	8	DVC	173	378	315	120%

From the above, it is observed that 2 nos. of S/s of OPTCL and 1 no. of S/s of BSPTCL and 1 no. of S/s of DVC are not complying N-1 criteria in 2030-31 timeframe. Some of them are violating the limits in present timeframe. STUs may initiate action to control the overloading of the ICTs in 2030-31 timeframe.

7.5.3 Short Circuit Analysis

Short circuit level was calculated for all 765kV and 400 kV buses of Eastern Region and buses having fault level more than the design rating under any scenario were identified. From analysis, it has emerged that 2 no. of 400kV ISTS S/s and 1 no. of 400kV ISGS S/s in ER have crossed their designed fault level rating.

Details of the buses exceeding the designed fault level under different scenario are tabulated below at **Table 7-20**.

Table 7-20: ISTS Buses Exceeding Designed Fault Level in ER

(All Fig in kA)

Sl. No.	Substation Name	Owner	Scenario No.	Highest Fault level	Designed Rating
1.	400kV Farakka	NTPC	All	47	40
2.	400kV Purnea New	ISTS	All	47	40
3.	400kV Siliguri PG	ISTS	All	42	40

The fault level control measures for Farakka have been implemented. The maximum fault level at Farakka, Purnea New and Siliguri have marginally crossed its design limits. Detailed studies are being carried out for these stations and the same would be discussed in the upcoming CMETS-ER meeting and the corrective measures shall be proposed.

Chapter 8: North Eastern Region

North Eastern Region is the eastern-most region of India. It comprises seven states, the contiguous Seven Sister States. The region shares an international border with several neighbouring countries, China in the north, Myanmar in the east, Bangladesh in the south-west and Bhutan in the north-west. The NER has immense natural resources, accounting for 34% of the country's water resources and almost 40% of India's hydropower potential. The states in NER are well connected through EHV transmission links at 400kV level. The NER grid is further connected to other parts of the National Grid through 400kV HVAC lines as well as ± 800 kV, 6000MW Multi terminal Biswanath Chariali – Alipurduar – Agra HVDC link. During wet season (Monsoon period) hydro power is imported from Bhutan and during dry season (Winter period), surplus power is exported to meet their energy requirement. Cross-border interconnection with Bangladesh & Myanmar in North Eastern region helps these countries in meeting their energy requirement throughout the year.

8.1 Power Supply Scenario as on Jan'26

As on Jan'26, total Installed Capacity (IC) of North Eastern Region was 5555MW and the peak demand met was 3914MW. The state-wise breakup of installed capacity and peak demand is summarised at **Table 8-1** below:

Table 8-1: NER Installed Capacity and Peak Demand as on Jan'26

(All Fig in MW)

State	Generation								Peak Demand
	Fossil			Non Fossil				Grand Total	
	Thermal	Gas	Total	Nuclear	Hydro	RES (MNRE)	Total		
Assam	403	742	1144	-	577	510	1087	2232	2687
Arunachal Pradesh	37	47	84	-	613	156	769	853	198
Meghalaya	52	110	161	-	429	73	502	664	408
Tripura	56	487	543	-	80	51	132	674	386
Manipur	32	82	114	-	98	23	121	235	269
Nagaland	32	74	106	-	73	36	109	215	188
Mizoram	31	60	92	-	105	79	184	276	168
Central unallocated	113	64	176	-	214	0	214	391	0
NER	771	1665	2436		2190	929	3119	5555	3914

Source: CEA monthly report

8.2 Envisaged Power Supply Scenario by 2030-31

As per the 20th EPS, North Eastern Region demand for 2030-31 timeframe is expected to increase to 6176MW. As per the inputs received from various stakeholders, total installed capacity of North Eastern Region for 2030-31 is expected to be 11714MW. The state wise bifurcation of installed capacity and peak demand is summarized below at **Table 8-2**.

Table 8-2: NER Installed Capacity and peak demand (2030-31)

(All Fig in MW)

(All Fig in MW)

State	Generation								Peak Demand	
	Fossil			Non Fossil				E S S		Grand Total
	Thermal	Gas	Total	Nuclear	Hydro	RES	Total			
Arunachal Pradesh	0	0	0	-	244	0	244	-	244	734
Assam	0	307	307	-	285	3458	3743	25	4074	4772
Manipur	0	0	0	-	0	0	0	-	0	443
Meghalaya	0	0	0	-	365	0	365	-	365	542
Mizoram	0	0	0	-	28	0	28	-	28	312
Nagaland	0	0	0	-	32	0	32	-	32	382
Tripura	0	162	162	-	0	0	0	-	162	557
Central	750	1254	2004	-	4056	750	4806	-	6810	-
NER	750	1722	2472	-	5009	4208	9217	25	11714	7529

There is a massive growth in peak demand of North Eastern Region from present timeframe 2025-26 to 2030-31 with a CAGR of 14%. The state wise peak demand growth is given at **Table 8-3**.

Table 8-3: Increase in Peak Demand of Various States of NER

(All Fig in MW)

State	2025-26	2030-31	Increase in demand	CAGR
Assam	2687	4772	2085	12.2%
Arunachal Pradesh	198	734	536	30.0%
Meghalaya	408	542	134	5.8%
Tripura	386	557	171	7.6%
Manipur	269	443	174	10.5%
Nagaland	188	382	194	15.2%
Mizoram	168	312	144	13.2%
NER	3914	7529	3615	14.0%

From the above data it is observed that the CAGR growth of peak demand is maximum for Arunachal Pradesh (30.0%) and minimum for Meghalaya (5.8%). The CAGR of demand of NER is about 14% which is more than the National Average of 7.5%. In addition to above, 160MW demand of Bangladesh is also considered as a part of North Eastern Region for study purpose.

8.3 Load Generation Balance for 2030-31 timeframe

In the chapter 3, All India Load Generation Balance (LGB) for identified nine scenarios was prepared as per the methodology finalized in consultation with CTU, CEA and Grid India. This section elaborates the North Eastern Region Load Generation Balance (LGB) for 2030-31 timeframe. For North Eastern Region also, three points on the daily load curve i.e. Solar max (afternoon), Peak load (evening) and Off-peak load (night) for three seasons viz. Monsoon (August), Summer (June) and Winter (February) have been considered. Load generation balance has been prepared considering the generation despatch factors as mentioned at **Table 8-4** for the 9 scenarios. Further, thermal generators have been despatched as per the merit order, as elaborated in the Chapter-3 section-3.1.

Table 8-4: North Eastern Region Generation Dispatch and Demand Factors

Scenario No & Name	Generation Dispatch Factors			Demand Factors
	Hydro	Solar	Gas	
1-Aug Solar Max	70%	75%	0%	68%
2-Aug Peak Load	90%	0%	50%	90%
3-Aug Night Off Peak	70%	0%	50%	62%
4-Jun Solar Max	70%	85%	0%	78%
5-Jun Peak Load	90%	0%	50%	84%
6-Jun Night Off Peak	70%	0%	50%	69%
7-Feb Solar Max	30%	90%	0%	48%
8-Feb Peak Load	60%	0%	50%	55%
9-Feb Night Off Peak	30%	0%	30%	40%

The despatch from thermal generations have been done considering merit order despatch. Based on the LGB, import/export of NER and the inter-regional flow through various corridors is summarised in **Table 8-5**. Further, both maximum and minimum is also highlighted in table below.

Table 8-5: Import / Export of North Eastern Region

(All Fig in MW)

State / UTs	Import / Export of North Eastern Region								
Scenario No Corridors	Aug'30 Timeframe			Jun'30 Timeframe			Feb'31 Timeframe		
	1 (Solar Max)	2 (Peak Load)	3 (Off Peak)	4 (Solar Max)	5 (Peak Load)	6 (Off Peak)	7 (Solar Max)	8 (Peak Load)	9 (Off Peak)
NER-ER	1199	-1073	44	435	-634	-485	1951	119	197
NER-NR	0	0	0	0	0	0	-600	0	0
NER-Cross Border	62	-39	26	41	-11	20	169	56	102
North Eastern Region (net)	1261	-1112	70	476	-645	-465	1520	175	299

From the above, it is observed that for 2030-31 timeframe, NER is exporting power in all scenarios except scenarios 2,5 & 6. Out of these nine scenarios, Scenario-7 and Scenario-2 corresponds to two extreme cases with export requirement of North Eastern Region i.e. Maximum export (1520MW) and Maximum import (1112MW) scenarios respectively.

Considering the above LGB for nine scenarios, load flow cases were prepared for 2030-31 timeframe. Detailed system studies have been carried out on the finalized load flow cases. The study results are discussed in subsequent sections.

8.4 ISTS Network Expansion Schemes evolved from Feb/Mar'25 to Jan'26

Various transmission schemes have been discussed/finalized in the Consultative Meeting for Evolution of Transmission System of North Eastern Region (CMETS-NER) from Feb/Mar'25 to Jan'26. The details of the schemes are summarized below in **Table 8-6**:

Table 8-6: Approved Transmission Schemes in this Rolling Plan

Sl. No.	Name of the Transmission Scheme	Expected Timeframe	Quantum (in MW)	Scheme Type (RE/Conventional/ Drawal incl strengthening)	Tentative Cost (in ₹Cr.)
Arunachal Pradesh					
1.	NERES-XXIII (1x31.5MVA 2 nd ICT at Ziro (POWERGRID))	24 months from date of allocation		Strengthening	-
Arunachal Pradesh & Assam					
2.	NERGS-III Siang Basin	30-09-2029	426	Hydro	2009.23
Total			426		~2009.23

8.4.1 Arunachal Pradesh

(i) NERES-31 (1x31.5MVA 2nd ICT at Ziro (POWERGRID))

DoP, Arunachal Pradesh has informed that due to over loading of 3x5 MVA, 132/33 kV ICT of PGCIL at Ziro, the concerned electrical division has to resort to load shedding of one number of 11 kV feeders at 33/11 kV substation at Ziro on rotational basis during peak hours. It is informed that maximum power drawl of Ziro feeder has been set at 200 A approximately at 33 kV level. Hence, any increase in load beyond 12 MW causes tripping of 33 kV old Ziro feeder. Shutdowns during evening peak hours is creating a lot of public resentment and badly affecting the tourism sector of Ziro. The matter was deliberated in the 221st OCC meeting held on 17-12-2024 where PGCIL apprised the forum that the load at Ziro is expected to rise in the coming time. The forum noted that the 15 MVA ICT at Ziro is not sufficient to meet the load requirement at Ziro. POWERGRID clarified that there is one 33kV feeder (with CT rating of 200A), which is drawing around 11MW and balance two 33kV feeders are drawing about 2MW each simultaneously. The total drawl is of about 16-17MW at Ziro (POWERGRID) S/s. Further, POWERGRID also mentioned that at times the ICTs are feeding about 317A current at 33kV side, resulting in overloading of ICTs. Therefore, augmentation of transformation capacity is required at Ziro (POWERGRID) S/s

The matter was deliberated and agreed in the 43rd CMETS-NER meeting held from 29.05.2025 to be implemented as North Eastern Region Expansion Scheme-31 (NERES-31). Further, A meeting was convened among officials from CEA, CTUIL, NERPC, NERLDC and DoP, Arunachal Pradesh on 04-12-2025. In the meeting, it was informed that installation of new 132/33kV, 31.5MVA ICT is not feasible with Single Main and Transfer Bus scheme. CEA mentioned that as per CEA (Technical standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Main and Transfer bus scheme or double bus scheme shall be adopted at 132 kV level. Further, representative of NERLDC stated that bus scheme as per CEA standard needs to be adopted to ensure reliability. Accordingly, it was decided that proposal of installation of

new 31.5MVA ICT at Ziro (POWERGRID) S/s shall be re-examined by CEA in consultation with CTUIL and Arunachal Pradesh considering planning perspective.

Details of the scheme is tabulated below at **Table 8-7**. Schematic is also given at **Figure 8-1**.

Table 8-7: Scope of works of NERES-31

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1	Installation of 1x31.5MVA, 3-Phase 132/33kV 2 nd ICT at Ziro (POWERGRID) S/s along with associated GIS bays at both ends	- 132/33kV, 31.5MVA ICT: 1 no. - 132kV ICT bay (Outdoor GIS with Single Bus Arrangement): 1 no. - 33kV ICT bay: 1 no. (Indoor GIS) - 132kV GIS duct (3-Phase): Approx. 50 meters - Associated 33kV cable & accessories for interconnection from ICT LV to 33kV indoor switchgear: (1R, 3Cx400 Sq.mm): 500 meters

Implementation Timeframe: 24 months from date of allocation

Estimated Cost: under finalisation

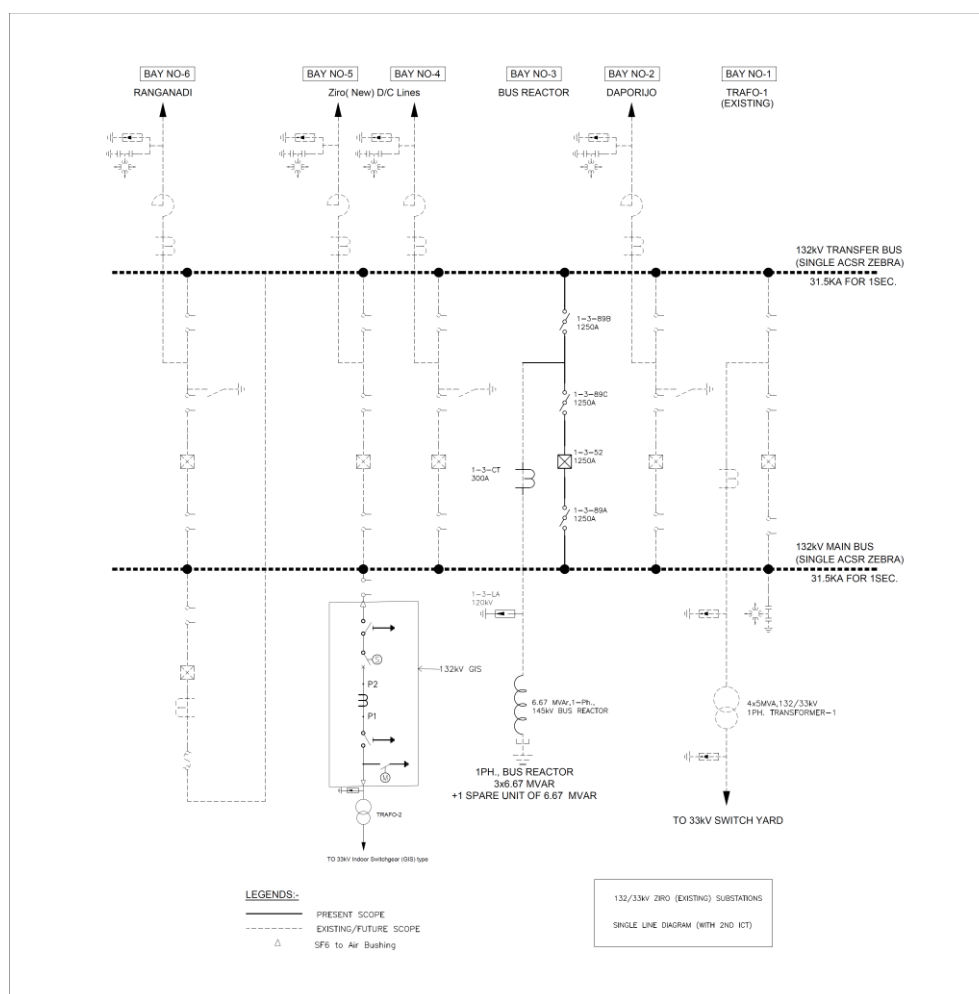


Figure 8-1: Schematic of NERES-31

8.4.2 Arunachal Pradesh & Assam

(i) NERGS-III Siang Basin

North Eastern Electric Power Corporation Ltd (NEEPCO) had applied for ISTS Connectivity of 426MW for its Heo Hydro Electric Project (3x80 MW) and Tato-I Hydro Electric Project (3x62 MW) in Shi-Yomi, Arunachal Pradesh. These two power houses are planned in a master slave relationship, the Tato-I HEP & Heo HEP may be considered a single power house with six generating units for the purpose of connectivity. Tato-I shall be the lead generator. Based on multiple meetings among CEA, CTU, hydro project developers and NER states, a draft of the Master Plan Report for power evacuation from potential HEPs in Brahmaputra basin has been prepared by CEA. The said draft Master Plan includes the said HEPs as well. Considering the expected potential of about 5604MW including Heo and Tato-I HEPs in the Siang sub-basin by 2035, evacuation system has been planned.

Based on the evacuation system mentioned in the draft Master Plan, the said 426MW connectivity application was agreed to be granted ISTS Connectivity in the 42nd and 44th CMETS-NER held on 29-04-2025 and 26-06-2025 respectively and 32nd, 34th and 37th NCT meeting held on 12-08-2025, 10-10-2025 and 19-01-2026 respectively with NERGS-III Siang Basin to be implemented under ISTS as common augmentation for subject and potential HEPs in Siang basin.

Details of the scheme is tabulated below at **Table 8-8**. Schematic is also given at **Figure 8-2**

Table 8-8: Scope of works of NERGS-III Siang Basin

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
1.	Establishment of new 2x500MVA, 400/220kV GIS Pooling station at Kaying in Arunachal Pradesh Additional space for future expansion: - 400/220kV, 2x500MVA ICTs along with associated ICT bays at both voltage levels - 420kV, 1x80MVA bus reactor along with associated bay - 10 Nos. of 400kV line bays (along with space for switchable line reactor) for future lines - 8 Nos. of 220kV line bays for future lines	- 420kV, 80MVA bus reactor: 2 Nos. - 400kV GIS Bus reactor bays: 2 Nos. - 400/220kV, 500MVA ICT: 2 nos - 400kV GIS ICT bays: 2 Nos. - 220kV GIS ICT bays: 2 Nos. - 220kV bus coupler bay: 1 No. - 400kV GIS line bays: 2 Nos. [for Kaying PS – Niglok PS 400kV D/c (Quad) line] - 220kV GIS line bays: 2 Nos. [for termination of DTL of 1840A or more per circuit] - 420kV, 50MVA switchable line reactor with GIS bays: 2 Nos. [one in each circuit of Kaying PS – Niglok PS 400kV D/c (Quad) line]

Sl. No.	Scope of works	Capacity (MVA) / Line length (km)/ Nos.
	- 400kV bus sectionaliser bay: 1 set - 220kV bus sectionaliser bay :1 set - 220kV bus coupler bay: 1 no	
2.	Establishment of new 400/220kV GIS substation at Niglok in Arunachal Pradesh (with a provision for 6000MW LCC HVDC station) Additional space for future expansion: - Establishment of ± 800 kV, 6000 MW, Niglok (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard & all associated equipment (incl. filters)/bus extension, etc. - 400/220kV, 2x500MVA ICTs along with associated ICT bays at both voltage levels - 420kV, 1x80MVA bus reactor along with associated bays - 12 Nos. of 400kV line bays (along with space for switchable line reactor) for future lines - 6 Nos. of 220kV line bays for future lines - 400kV bus sectionaliser bay: 1 set - 220kV bus sectionaliser bay :1 set - 220kV bus coupler bay: 1 no.	- 400/220kV, 500MVA ICT: 2 nos - 400kV GIS ICT bays: 2 Nos. - 220kV GIS ICT bays: 2 Nos. - 420kV, 80MVA bus reactor: 2 Nos. - 400kV GIS Bus reactor bays: 2 Nos. - 400kV GIS line bays: 4 Nos. [2 for Kaying PS – Niglok PS 400kV D/c (Quad) line & 2 for Niglok PS – Gogamukh 400kV D/c (Quad) line] - 420kV, 50MVA switchable line reactor with GIS bays: 2 Nos. [one in each circuit of Niglok PS – Gogamukh 400kV D/c (Quad) line] - 220kV GIS line bays: 2 Nos. [for termination of Niglok (ISTS) – Niglok (new) (DoP, AP) 220kV D/c line] - 220kV bus coupler bay: 1 no.
3.	Extension at Gogamukh 400/220/132kV (ISTS) substation	400kV line bays: 2 nos. [for Niglok PS – Gogamukh PS 400kV D/c (Quad) line]
4.	Kaying PS – Niglok PS 400kV D/c (Quad) line	100km
5.	Niglok PS – Gogamukh 400kV D/c (Quad) line	125km

Implementation Timeframe: 30-09-2029

Estimated Cost: ₹2009.23 Crs.

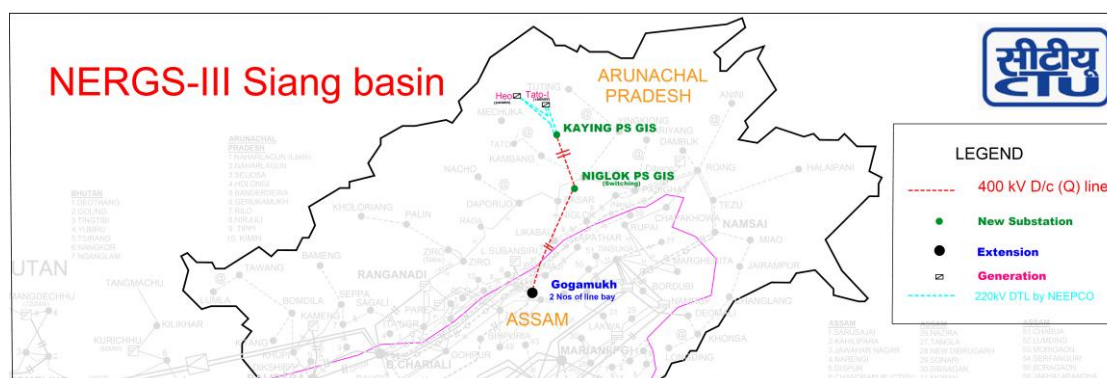


Figure 8-2: Schematic of NERGS-III

8.5 System Study Results and Analysis

Based on the load-generation scenarios as elaborated in **section 8.3**, various system studies have been carried out in PSSE. Planned/ Under implementation Transmission system that are expected to be commissioned in 2030-31 timeframe are considered for conducting these studies. Results of these studies were analysed and the same are deliberated below-

8.5.1 Power Flow Analysis

a) Transmission lines

In the base case file prepared for 2030-31 timeframe, 4 nos. of 132kV & 2 nos. of 220kV lines are having loading more than 70% of the thermal limit of the line. Scenarios where loading is more than 70% of rating and maximum loading obtained on these transmission lines in the simulation studies are tabulated below at **Table 8-9**.

Table 8-9 Transmission Lines Loading in the Base Cases

(All Fig in MW)

Sl. No.	Name of the Line	Scenario No.	Owner	Maximum Loading	Rating	% Loading
1.	Bilasipara – Khudigaon 132kV S/c line	1,4,7	AEGCL	71	84	85%
2.	Bilasipara – Kokrajhar 132kV D/c line	4	AEGCL	64	84	76%
3.	Bomdila – Khupi 132kV S/c line	2,5	DoP, Arunachal Pradesh	62	84	74%
4.	Gerukamukh – Likhali 132kV D/c line	2,5	DoP, Arunachal Pradesh	63	84	75%
5.	Danguapra – Rangia New 220kV S/c line	1,4,7	AEGCL	204	250	82%
6.	Jamuguri – Khumtai 220kV S/c	1,4,7	AEGCL	206	250	82%

b) Transformers

In the base case file prepared for 2030-31 timeframe, no transformers at 400kV & 220kV levels are having loading more than 70% of the ICT rating.

c) Voltage Analysis

PU voltages of all 132kV and above buses were observed in all the nine scenarios and Maximum & Minimum voltage of each bus were identified from the bus voltages in these scenarios. It has been observed that there is no under voltage buses less than 0.92pu for 132kV, 0.90pu for 220kV & 0.95pu for 400kV & above buses in line with CEA's Manual Planning Criteria 2025. Similarly, no overvoltage is observed beyond 1.11pu for 220kV & 1.05pu for 400kV & above buses. However, list of substations where overvoltage above 1.1pu for 132kV is observed is given at **Table 8-10**.

Table 8-10 List of substations with Voltage greater than 1.1pu in North Eastern Region

Sl. No.	Bus Name	Voltage level (kV)	Owner	V _{max} (pu)	Scenario
1.	Saiha	132	P & E Department, Mizoram	1.16	9
2.	Kawmzawl	132	P & E Department, Mizoram	1.15	9
3.	Hnahthial	132	P & E Department, Mizoram	1.12	9
4.	Khawzawl	132	P & E Department, Mizoram	1.11	9
5.	E Lungdar	132	P & E Department, Mizoram	1.11	9
6.	Serchip-bukp	132	P & E Department, Mizoram	1.12	9
7.	Chawngte	132	P & E Department, Mizoram	1.16	9
8.	S. Bungtlang	132	P & E Department, Mizoram	1.16	9
9.	Lunglei-khaw	132	P & E Department, Mizoram	1.15	9
10.	Champhai	132	P & E Department, Mizoram	1.11	9
11.	Lungsen	132	P & E Department, Mizoram	1.16	9
12.	Ngopa	132	P & E Department, Mizoram	1.11	9
13.	Lawngtlai	132	P & E Department, Mizoram	1.16	9
14.	S Khawbung	132	P & E Department, Mizoram	1.11	9
15.	Thingsulthli	132	P & E Department, Mizoram	1.11	9
16.	Vankal	132	P & E Department, Mizoram	1.10	9

From the above, 16 nos. of 132kV substations owned by P & E Department, Mizoram are violating the nominal voltage limits as defined under CEA's Planning Criteria 2025. P & E Department, Mizoram may take necessary action.

8.5.2 Contingency Analysis

Contingency analysis has been performed on all the 400kV, 220kV and 132kV transmission lines, and 400/220kV, 400/132kV & 220/132kV transformers to ascertain the loading levels under outage of any other transmission element. Results of the analysis are discussed below:

a) Transmission Lines

Transmission lines loaded beyond 100% of thermal rating under N-1 contingency are summarized below at **Table 8-11**.

Table 8-11: Transmission lines not meeting N-1 Criteria in NER

(All Fig in MW)

Sl. No.	Name of the Line	Contingency	Scenario No.	Owner	Base case Loading	Loading under N-1	Rating	% Loading
1.	Rangia – Motanga 132kV S/c	Salakati – Gelephu 132kV	2,5	ISTS	96	113	84	135%
2.	Salakati – Gelephu 132kV	Rangia – Motanga 132kV	2,3,5,6	ISTS	114	148	84	176%
3.	Kokrajhar – Bilasipara 132kV line-1	Kokrajhar – Bilasipara 132kV line-2	1,4	AEGCL	65	110	84	131%
4.	Gerukamukh - Likabali 132kV line-1	Gerukamukh - Likabali 132kV line-2	1,2,3,4,5,6	DoP, Arunachal Pradesh	64	106	84	126%
5.	Zuangtui – Saitul 132kV	Zuangtui – thingsulthli 132kV	2,5,7,8	P & E Department, Mizoram	47	165	84	196%
6.	Khawzawl – E lungdar 132kV	Zuangtui – thingsulthli 132kV	2,5,8	P & E Department, Mizoram	19	200	84	238%
7.	Serchip – E lungdar 132kV	Zuangtui – thingsulthli 132kV	5,8	P & E Department, Mizoram	12	180	84	214%
8.	Serchip – thingsulthli 132kV	Saitul – Vankal 132kV	8	P & E Department, Mizoram	105	205	84	244%
9.	Khawzawl – Lunglei 132kV	Zuangtui – thingsulthli 132kV	8	P & E Department, Mizoram	74	140	84	166%
10.	Saitul – Vankal 132kV	Zuangtui – thingsulthli 132kV	1,2,4,5,7,8	P & E Department, Mizoram	70	246	84	293%

From the above, it can be seen that 2 nos. ISTS line, 1 line of AEGCL, 1 line of DoP Arunachal Pradesh and 6 lines of DoP Mizoram are violating the N-1 contingency.

Respective STU / entities may initiate actions to mitigate the overloading on their respective lines. The ISTS line are cross border line of India – Bhutan. Reconductoring of the same line is already under discussion with CEA and Bhutan.

b) Transformers

From the analysis, it is observed that no ICTs at 400kV & 220kV level is loaded beyond 100% of MVA rating under N-1 contingency.

8.5.3 Short Circuit Analysis

Short circuit level was calculated for all 132 kV & above buses of North Eastern Region and buses having fault level more than the design rating under any scenario were identified. It is observed that the fault level at these substations is within its design limit.

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Chapter 9: Cross-Border Interconnection

Due to geographical location, India shares its boundaries with many South Asian countries and can play an important role in exchange of power to these countries for optimal utilisation of resources in particular and development of economy in general. Transmission of power is economical than transportation of fuel. Towards this, it is important to establish electrical interconnections with neighbouring countries which would be beneficial in meeting growing power demand, sharing of various types of energy resources, decreasing operational cost through better resource management, utilizing renewable energy resources and deferring investment by optimizing spinning reserve.

The details of existing cross border links with Bangladesh, Bhutan, Myanmar, Nepal are as under:

9.1 India-Bangladesh

Present interconnection

- *Baharampur (India) – Bheramara (Bangladesh) 400kV 2xD/c line along with 2x500MW HVDC Back-to-Back terminal at Bheramara.*
- *Surajmaninagar (India) – Comilla (Bangladesh) 400kV D/c radial interconnection (operated at 132kV).*

9.2 India-Bhutan

Present interconnection

- *Tala HEP – Siliguri 400kV (3 circuits)*
- *Malbase – Siliguri 400kV (1 circuit)*
- *Chukha HEP – Birpara 220kV D/c line*
- *Malbase – Birpara 220kV S/c line*
- *Gelephu – Salakati 132kV S/c line*
- *Motonga – Rangia 132kV S/c line*
- *Punatsangchuu-I HEP – Alipurduar 400kV D/c line*
- *Punatsangchuu-II HEP – Alipurduar 400kV D/c line*
- *Jigmeling (Bhutan) – Alipurduar 400kV D/c line*

9.3 India-Myanmar

Present interconnection

- *Tamu (Myanmar) - Moreh (India) 11kV radial line*

9.4 India-Nepal

Present interconnection

- *Dhalkebar (Nepal) – Muzaffarpur (India) 400kV D/c line.*
- *Tanakpur HEP-Mahendra Nagar 132 kV S/c line*
- *Kataiya – Kusaha 132 kV line (3 circuits)*
- *Raxaul – Parwanipur 132kV line (2 circuits)*
- *Ramnagar –Surajpura (Nepal) 132 kV S/c line*
- *New Nautanwa – Mainhiya (Nepal) 132 kV D/c line*

The cross-border transmission capacity of India with neighbouring countries in present timeframe and through under construction interconnections is summarized below in **Table 9-1:**

Table 9-1: Cross-border power transfer capacity by 2030-31

(All fig in MW)

Country	Existing	Under Construction (By 2027-28)	Planned (by 2030-31)	Total
India-Bangladesh	1160	0	1000	2160
India-Bhutan	7560	0	0	7560
India-Myanmar	3	0	504	507
India-Nepal	1600	8100	5350	15050
India-Sri Lanka	0	0	500	500
Total	10323	8100	7354	25777

Chapter 10: Conclusion

The installed capacity of generation in Indian grid is expected to increase to about 1012 GW by 2030-31 from 520 GW as on Jan'26. It is expected to witness enhancement in contribution of non-fossil fuel-based energy sources from 52% to 64%, whereas contribution of fossil fuel-based energy source is expected to decline from 48% to 36% in total installed capacity in same timeframe. This will create a pathway for India's commitment in COP26, wherein India is projected to have total installed capacity of non-fossil fuel-based generation of 500GW by the year 2030. Further, by year 2031, the installed capacity of non-fossil fuel is expected to be about 647 GW.

Power scenario of the country is quite diverse and varies continuously. RE integration with grid further enhance its complexity. Large RE complexes are being established in Northern, Western, and Southern regions and are further going to expand by 2030-31 timeframe. The transmission system for integrating the same into the grid has already been planned and is currently under various stages of approval/implementation. As substantial solar generation addition has been envisaged in Rajasthan, this has resulted in NR becoming exporter of power around noon solar max period and importer during the evening peak demand period. Further due to large RE integration in SR, it is expected to export RE power in all scenarios except winter season. Similar situations have been witnessed in other regions as well i.e. the region is surplus under certain load-generation scenario and deficit in other. To study the seasonal and diurnal variations of generations including demand, load generation balance has been prepared for three seasons (Monsoon, Summer, and Winter) in a year with three load conditions (Solar max, Evening peak demand, and Night off-peak demand) of daily load curve for each season. All India maximum and minimum demand of 382 GW and 184 GW after accounting an additional demand of about 40 GW including Green Hydrogen/Ammonia as direct drawl from ISTS has been considered while working out the LGBs for 2030-31 timeframe.

Thus, cumulatively by 2030-31, transmission schemes comprising of 77,228 ckm of transmission lines and transformation capacity of 6,97,647 MVA at estimated cost of Rs 5,41,481 Cr. is expected to be added in the grid.

Brief of transmission systems evolved for each region are as below:

Northern Region (NR)

The total installed generation capacity of NR as on Jan'26 is about 152.1 GW which constitute capacity from fossil sources (44% share) & balance from non-fossil sources in which (54.6%) contribution in total regional IC is from renewable generation capacity including hydro and balance (1.4%) is from nuclear.

NR is connected to WR and ER through 765kV & 400kV high-capacity corridors and HVDC Back-to-Back / HVDC Bipole links. The thermal generating stations of NR are predominantly located in Uttar Pradesh, Punjab, Rajasthan and Haryana, whereas hydro generation is

concentrated in Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Further, Rajasthan is a RE rich state comprising of large Solar & Wind capacity.

To meet the growing demand, NR is continuously progressing in generation capacity addition majorly through hydro and non-conventional/renewable sources. As per the 20th EPS, NR demand for 2030-31 timeframe is expected to increase to about 122 GW. As per the inputs received from various stakeholders, total installed capacity of NR for 2030-31 is expected to be about 258 GW.

Various transmission schemes i.e. Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-5: 6 GW) [Barmer Complex], Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-6 :6 GW) [Bikaner Complex], augmentation of transformation capacity at various stations of Northern Region have been planned in the Consultation Meeting for Evolution of Transmission System in Northern Region (CMETS-NR) from Mar'25 to Feb'26 for implementation. In this Rolling Plan, 16 nos. of transmission schemes of about 7,366 ckm of transmission lines and 50,315 MVA of transformation capacity has been formulated at an estimated cost of Rs. 55,681 Cr.

During the system studies for 2030-31 timeframe, Short Circuit issues observed in various substations in Northern region due to large interconnections have been highlighted. Further, some transformers are also observed to be loaded beyond limit majorly in Rajasthan, Haryana & Uttar Pradesh. Some of the transmission lines are critically loaded in Rajasthan & Uttar Pradesh under base case / N-1 contingency. New network expansions schemes and mitigation measures to address above issues in Northern Region are being taken up on a continuous basis and would be taken up in the subsequent rolling plan after detailed analysis.

Thus, cumulatively by 2030-31, transmission schemes comprising of 29,063 ckm of transmission lines and transformation capacity of 1,95,935 MVA at estimated cost of Rs 1,88,297 Cr. is expected to be added in the grid.

Western Region (WR)

The total installed generation capacity of WR as on Jan'26 is about 178GW which constitute capacity from fossil sources (47.4% share) & balance (52.6% share) from non-fossil sources comprising of nuclear, renewable generation capacity including hydro.

Western Region is connected to Northern, Southern and Eastern Regions through 765kV & 400kV high-capacity corridors and Back-to-Back HVDCs and Bi-Pole HVDC links. The thermal generating stations of Western Regions are predominantly concentrated in the coal rich states of Chhattisgarh, Eastern part of Maharashtra and Madhya Pradesh. Further, Gujarat, Maharashtra and Madhya Pradesh are RE rich states comprising of large Solar & Wind capacity. Western part of Maharashtra, southern Gujarat and DD & DNH have high demand and less internal generation.

To meet the growing demand, Western region is continuously progressing in generation capacity addition majorly through thermal and non-conventional/renewable sources. The peak

demand of Western Region for 2030-31 timeframe is expected to increase to about 123.4 GW. In addition to above, the demand of about 20 GW corresponding to green hydrogen/ green ammonia, bulk consumer / distribution licensees are expected to be added to the grid by 2030-31. As per the inputs received from various stakeholders, total installed capacity of Western Region for 2030-31 is expected to be about 356.1 GW.

Various transmission schemes from Feb'25 to Jan'26 have been identified & approved such as Transmission System for Evacuation of power from various potential renewable energy zone in Khavda area for cumulative capacity of 14 GW which includes Jam Khambhaliya phase-II (5.5GW), Jamnagar phase-I (1GW) & Lakadia phase-II (7.5GW). Network Expansion scheme in Western Region to cater to pumped storage potential near Satara (up to 4500MW) has been identified which is expected to play a major role in meeting the load requirement during non-solar hours. Transmission scheme for drawl of power in South Kalamb area has also been planned which will cater the RE generation of western as well as Northern region to full fill the demand of future projected loads in Maharashtra area. Additionally, transmission system to cater to thermal generation requirement of the Chhattisgarh area in Western Region by 2031 has also been planned as a part of the system strengthening of the national grid.

In this Rolling Plan, 14 nos. of transmission schemes of about 3752 ckm of transmission lines and transformation capacity of 47,500 MVA have been formulated at an estimated cost of Rs.30882.99 Cr which will cater to evacuation/drawl of 22,070 MW power from various RE/Conventional/GH in WR. These schemes either have been approved or are under various stages of approval. Further, new network expansions in Western Region are being taken up on a continuous basis for smooth, reliable and secure grid operation to facilitate supply of quality power to stakeholders/consumers.

Thus, cumulatively by 2030-31, transmission schemes comprising of 20,211 ckm of transmission lines and transformation capacity of 2,17,500 MVA at an estimated cost of Rs 1,65,206 Cr. is expected to be added in the WR ISTS grid.

Southern Region (SR)

The total generation installed capacity of SR as on Jan'26 is 146 GW which comprises of 42 % from fossil fuel sources & 58% from non-fossil sources.

Southern Region is connected to Western and Eastern Regions through high capacity 765kV AC links, Back-to-Back HVDC and Bi-pole HVDC links. The thermal generating stations of Southern Region are predominantly concentrated in the States of Tamil Nadu, Karnataka, and Andhra Pradesh. Further, Tamil Nadu, Karnataka and Andhra Pradesh are RE rich states comprising of large-scale Solar & Wind capacity. Southern part of Karnataka (Bangalore), Kerala and Central part of Telangana (Hyderabad) has high demand and less internal generation.

It is observed that Southern Region demand is growing at a rapid pace of about 9% on annual basis and similar growth in demand is expected in future as well. Southern Region demand is

expected to increase to about 102 GW by 2030-31. Further, a large number of Green Hydrogen / Green Ammonia based loads are also envisaged in Southern Region. Out of projected 24 GW of GH/GA loads, 13 GW has been considered by 2030-31 for which transmission system has been identified & are at various stages of bidding/approval. To meet such growing demand, Southern Region is continuously adding generation capacity predominantly from renewable energy sources. Further, thermal based generation projects to meet the peak demand are also envisaged. As per the inputs received from various stakeholders, total installed capacity of Southern Region for 2030-31 is expected to be about 300 GW.

To facilitate integration and evacuation of power within and outside the Southern Grid, transmission system is being identified in consultation with stakeholders through regularly held Consultation Meeting for Evolution of Transmission System (CMETS). Various transmission systems have been identified through Consultation Meeting for Evolution of Transmission System in SR (CMETS-SR) from Feb'25 to Jan'26 for implementation. These schemes are under various stages of implementation/bidding/under approval.

Transmission system for integration of RE of about 30 GW in Krishnagiri, Ananthapur, Kadapa, Davanagere, Bellary, Tumkur and Karur has been identified during this period. The proposed scheme shall facilitate in integration and evacuation of RE of Karnataka, Andhra Pradesh and Tamil Nadu which are under various stages of approval. Further, transmission system for 11 GW has been evolved for facilitating integration of green hydrogen/ Green ammonia based bulk consumers in Vizag (Pendurthi) and Ramayapatnam area. In addition to the above schemes for RE based generation and GH projects, system strengthening of ISTS transmission system in the form of ICT augmentations at Kalivanthapattu, Thrissur VSC HVDC, Hyderabad etc have been identified for addressing constraints and reliable supply of power. Further, reconductoring of various ISTS lines viz., Tirunelveli – Udumalpet and Pugalur – Madurai 400kV D/c, Gooty – Tumkur (Pavagada) 400kV D/c, conversion of Udumalpet – Madurai 400kV S/c line to Udumalpet – Madurai 400kV (quad) D/c line has also been approved to strengthen the SR network.

In this Rolling Plan, 25 nos. of transmission schemes of about 9,900 ckm of transmission lines and transformation capacity of 93,500 MVA have been formulated at an estimated cost of about Rs. 52,800 Cr. These schemes are under various stages of implementation/approval. Further, the identification of network expansion is a continuous process and being undertaken for smooth, reliable and secure grid operation to facilitate supply of quality power to stakeholders/consumers.

In addition to the existing ISTS network in Southern Region, about 19,000 ckm of transmission lines and transformation capacity of about 2,60,000 MVA at estimated cost of about Rs 1,14,000 Cr. is expected to be added in the SR ISTS grid by 2030-31.

Eastern Region (ER)

The total installed generation capacity of ER as on Jan'26 is about 38.7GW which constitute capacity from fossil sources (80% share) & balance (20% share) from non-fossil sources comprising of renewable generation capacity including hydro.

Eastern Region is connected to all other regions through 765kV & 400kV high-capacity corridors and HVDC Back-to-Back/ HVDC Bipole links. The thermal generating stations of ER are predominantly located in Bihar, Jharkhand and Odisha whereas hydro generation are concentrated primarily in Sikkim. Eastern region is also connected to other countries such as Nepal, Bhutan and Bangladesh through high-capacity AC and HVDC links.

To meet the growing demand, Eastern region is continuously progressing in generation capacity addition majorly through thermal and hydro generation sources. The peak demand of Eastern Region for 2030-31 timeframe is expected to increase to about 48.1 GW. In addition to above, the demand of about 6.3GW corresponding to bulk consumer / distribution licencees is expected to be added to the grid by 2030-31. As per the inputs received from various stakeholders, total installed capacity of Eastern Region for 2030-31 is expected to be about 82.5 GW (including 3.2GW in Nepal and 4.5GW in Bhutan), which constitute capacity from fossil sources (71% share) & balance (29% share) from non-fossil sources.

Various transmission schemes such as Pusauli HVDC Upgradation, New WR-ER Inter-Regional Network, New 765kV corridor viz. Nawada – Durgapur – Jeerat (New), Reconductoring of 400kV lines viz. Jeerat – Rajarhat – Subhasgram, Bus reactor at Jeypore, Spare reactor at Sundargarh, 220kV Bays at Maithon (POWERGRID) for termination of Dendua – Maithon 220kV line and ICT augmentation at Purnea (POWERGRID) S/s have been evolved in the Consultation Meeting for Evolution of Transmission System in Eastern Region (CMETS-ER) from Feb/Mar'25 to Jan'26.

In this Rolling Plan, 10 nos. of transmission schemes of about 2,488 ckm of transmission lines and 13,200 MVA of transformation capacity and Pusauli HVDC Upgradation have been formulated at an estimated cost of Rs. 16,571.72 Cr. These schemes are at various stages of implementation/bidding/approval. Further, new network expansions in Eastern Region are being taken up on a continuous basis and the mitigation measures identified would be taken up for detailed analysis in the subsequent rolling plan.

Thus, cumulatively by 2030-31, transmission schemes comprising of 6,805 ckm of transmission lines and transformation capacity of 19,700 MVA at estimated cost of Rs 58,072 Cr. is expected to be added in the grid.

North Eastern Region (NER)

The total installed generation capacity of NER as on Jan'26 is about 5.6GW which constitute capacity from fossil sources (44% share) & balance (56% share) from non-fossil sources comprising of renewable generation capacity including hydro.

Northeastern Region is connected to Eastern Region and North Region through 400kV high-capacity corridors along with multi-terminal HVDC. The thermal generating stations of Northern Eastern Region are located in Assam, gas generations are situated in Assam and Tripura whereas hydro generation is concentrated primarily in Arunachal, Manipur & Meghalaya.

To meet the growing demand, NER is continuously progressing in generation capacity addition majorly through hydro generation sources. The peak demand of North Eastern Region for 2030-31 timeframe is expected to increase to about 7.5 GW. As per the inputs received from various stakeholders, total installed capacity of Northern Eastern Region for 2030-31 is expected to be about 11.7 GW, which constitute capacity from fossil sources (21% share) & balance (79% share) from non-fossil sources.

Various transmission schemes i.e. installation of 31.5MVA ICT at Ziro (POWERGRID) and transmission system for evacuation of power from Siang basin viz. establishment of New GIS pooling S/s at Kaying & Niglok have been approved in the Consultation Meeting for Evolution of Transmission System in North Eastern Region (CMETS-NER) from Feb/Mar'25 to Feb'26. In this Rolling Plan, 2 nos. of transmission schemes of about 450 ckm of transmission lines and augmentation of 2031.5MVA of transformation capacity have been formulated at an estimated cost of Rs. 2009 Cr. These schemes have either been approved or are under various stages of approval.

Thus, cumulatively by 2030-31, transmission schemes comprising of 2,276 ckm of transmission lines and transformation capacity of 3,482 MVA at estimated cost of Rs 15,900 Cr. is expected to be added in the grid.

Further, evacuation of power from future hydro projects primarily in Arunachal Pradesh would be planned after firm commission schedule and significant progress in the hydro generation projects. New network expansion schemes in Northeastern Region are being taken up on a continuous basis and the mitigation measures identified would be taken up for detailed analysis in the subsequent rolling plan.

Cross Border Interconnections (CB)

The existing cross-border interconnections facilitate power transfer of about 10,323MW (7560MW: Bhutan, 1160MW: Bangladesh, 1600MW: Nepal and 3MW: Myanmar) with the neighbouring countries. With the commissioning of under-construction cross-border interconnections which are expected in 3-4 years, the power transfer would enhance by about 8100MW resulting in total of about 18,423MW (7560MW: Bhutan, 1160MW: Bangladesh, 9700MW: Nepal and 3MW: Myanmar).

Annexures

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Annex-1.1

Data Collection

For initiating Rolling plan associated activities for upcoming cycle i.e., Oct'25 to Mar'26 for 2030-31 timeframe, a letter dated 06.10.2025 from CTUIL was sent to all the concerned stakeholders and the same was also published on CTUIL website for providing necessary inputs for preparation of Rolling plan report in this cycle. Status of inputs received from stakeholders is as under:

NR	Inputs received from Rajasthan, Himachal Pradesh, Haryana
WR	Inputs received from Gujarat, Maharashtra, MP, Chhattisgarh & Goa
SR	Inputs received from all States
ER	Inputs received WB, Odisha & DVC
NER	Inputs received from all States

Further the updated list of nominations of nodal officers received from various stakeholders along with nodal officers of CTUIL for association in preparation of Rolling plan report are as under:

Sr. No	State/Organisation	Name (Sh./Smt.)	Designation
NR			
1.	CTUIL	Shyam Sundar Goyal	Chief Manager
2.	CTUIL	Madhusudan Meena	Engineer
3.	Rajasthan/RVPN	Sona Shishodia	SE (P&P)
4.	Rajasthan/RVPN	Om Prakash Mahela	XEN-2 (P&P)
5.	Haryana/HVPN	Sanjay Verma	SE (Planning)
6.	Haryana/HVPN	Ramesh Chand	XEN (SS)
7.	Punjab/PSTCL	Nitin Kumar	Sr. XEN (Planning)
8.	Uttar Pradesh/UPPTCL	Satyendra Kumar	SE (Planning)
9.	Uttarakhand/PTCUL	Lalit Kumar	SE
10.	Uttarakhand/PTCUL	Ashok Kumar	Executive Engineer
11.	Himachal Pradesh/HPPTCL	Rohit Sharda	GM (C&D)
12.	Himachal Pradesh/HPPTCL	Parikshit Pal	Dy. Manager
13.	Himachal Pradesh/HPPTCL	Sahil Verma	Dy. Manager
14.	J&K/JKPTCL	Ehtisham Andrabi	Assistant EE

Sr. No	State/Organisation	Name (Sh./Smt.)	Designation
15.	J&K/JKPTCL	K. K. Thappa	SE
16.	Delhi/DTL	Dinesh	Manager (Planning)
WR			
1.	CTUIL	Shashank Shekhar	Manager
2.	CTUIL	Aditya Ranjan	Engineer
3.	Gujarat/GETCO	Dharmesh H Kalsaria	Deputy Engineer (STU)
4.	Madhya Pradesh /MPPTCL	S.K. Gaikwad	Chief Engineer (Planning & Design)
5.	Madhya Pradesh /MPPTCL	Hitesh Tiwari	Executive Engineer
6.	Chhattisgarh /CSPTCL	Manoj Verma	Executive Engineer O/o ED (Planning & Project)
7.	Chhattisgarh /CSPTCL	C.K.S. Thakur	Executive Engineer O/o CE (C&RA)
8.	Maharashtra/MSETCL	Peeyush Sharma	Chief Engineer
9.	Maharashtra/MSETCL	Vinay Khedekar	ADEE, STU
10.	Goa	Stephen Fernandes	Chief Electrical Engineer
SR			
1.	CTUIL	Ankush Patel	Ch. Manager
2.	CTUIL	Venkatesh Gorli	Ch. Manager
3.	Andhra Pradesh	L. Pardha Sarathi	DEE4/SS1
4.	Andhra Pradesh	CH Laxmi Kantaiah	DEE3/SS2
5.	Karnataka	Girish V	Senior Executive Engineer
6.	Karnataka	Raghu M	Executive Engineer
7.	Karnataka	Divya Prabha	Asst. Executive Engineer
8.	Tamil Nadu	L. Porchelvi	Asst. Executive Engineer
10.	Tamil Nadu	J. Kalaiselvi	Asst. Executive Engineer
11.	Telangana	P Srinivasu	ADE
12.	Telangana	P. Saritha Kumari	ADE
13.	Telangana	G. Rajeswari	CE/PS
14.	KSEB	Amritha Sasi	AEE (PSE)
15.	KSEB	Saji Alex	EE (PSE)
16.	KSEB	Abul Khays	AE (PSE)

Sr. No	State/Organisation	Name (Sh./Smt.)	Designation
17.	Puducherry	T.A. Arun	EE
ER			
1.	CTUIL	Amit Kumar	Engineer
2.	CTUIL	Ayush Das	Engineer
3.	ERPC	Sh. N. S. Mondal	MS, ERPC
4.	ERPC	P.P. Jena	EE
5.	ERPC	Agniva Chatterjee	Asst Director
6.	Bihar	Sunil Agrwal	Director (Projects)
7.	Bihar	Kumar Prasant	CE (P&E), BSPTCL
8.	Bihar	Pervez Alam	CE (STU), BSPTCL
9.	Bihar	Rakesh Kumar	ESE(P&E), BSPTCL
10.	Bihar	Abhishek Kumar	EEE(P&E), BSPTCL
11.	Jharkhand	Manoj Karmali	Director (Project)
12.	Jharkhand	Ajit Kumar Bhagat	Sr Mgr (C&M)
13.	Jharkhand	Atilesh Gautam	Sr Mgr (STU)
14.	Jharkhand	shailesh	DGM SLDC
15.	Jharkhand	Rishi Nandan	GM comm
16.	West Bengal	Debashis Chaki	Chief Engineer
17.	West Bengal	Ranjan Das	Addl. CE
18.	Odisha	S.K.Panigrahi	CGM (CP)
19.	Odisha	A.K. Banerjee	DGM (CP)
20.	Sikkim	Sunil Rai	Chief Engineer (Transmission)
21.	Sikkim	Ashish Lamichaney	AE (EHV)
22.	Sikkim	Sonam Wongchuk Lepcha	AE (SLDC)
23.	DVC	Jayanta Dutta	Sr. GM, Engineering
24.	DVC	Sushil Kumar	Senior Manager(E), SPM
25.	DVC	Amiyaranjan Swain	Manager(E), SPM
26.	DVC	Preetosh Ghosh	Dy. Manager(E), SLDC
27.	ERLDC	Surajit Banerjee	ED
28.	ERLDC	Shyamal Konar	GM

Sr. No	State/Organisation	Name (Sh./Smt.)	Designation
29.	ERLDC	Bilash Achari	DGM
30.	ERLDC	Manas Das	DGM
31.	ERLDC	Rakesh Kumar Pradhan	Chief Manager
32.	ERLDC	Saibal Ghosh	Manager
33.	ERLDC	Shabari Pramanick	Manager
NER			
1.	CTUIL	Amit Kumar	Engineer
2.	CTUIL	Ayush Das	Engineer
3.	NERPC	K.B.Jagtap	Member Secretary
4.	NERPC	S.M. Aimol	Director
5.	NERPC	Abhijit Agrawal	DD
6.	NERPC	Vikash Shankar	AD
7.	NERLDC	Amaresh Mallick	CGM(I/C)
8.	NERLDC	S C De	Sr. GM (SO-II)
9.	NERLDC	Biswajit Sahu	Sr. GM (MO)
10.	Assam	Debasish Choudhury,	DGM(Operation), SLDC
11.	Assam	Tarali Deka	AGM(T), AEGCL
12.	Assam	Neelkamal Sarma	DM (P&D), AEGCL
13.	Assam	Anup Dutta	AM (T), AEGCL
14.	Arunachal Pradesh	T. K. Tara	Chief Engineer (Power), TP&MZ
15.	Arunachal Pradesh	Zomba Nasho	Superintending Engineer (E), Commercial
16.	Arunachal Pradesh	Hibu Bama	Executive Engineer (E), Transmission
17.	Arunachal Pradesh	Purik Buchi	Assistant Engineer (E), SLDC
18.	Arunachal Pradesh	Moli Kamki	Assistant Engineer (E), Transmission
19.	Meghalaya	J. Hynniewta	C.E.(Trans)
20.	Meghalaya	H.F.Shangpliang	A.C.E.(Trans.)
21.	Meghalaya	W. Wanrieh	A.C.E.(P&D)
22.	Meghalaya	T.Gidon	S.E.(SLDC)
23.	Meghalaya	B Nikhla	CE D EZ MePDCL

Sr. No	State/Organisation	Name (Sh./Smt.)	Designation
24.	Nagaland	S.I. Asangba Tikhir	E.E.(Trans)
25.	Nagaland	P Tiakaba Yimchunger	JE
26.	Manipur	Thokchom Tina Devi	DGM (Trans Planning)
27.	Tripura	Ranjan Debbarman	GM(Trans.) TPTL
28.	Tripura	Nirupam Guha	AGM
29.	Tripura	Anil Debbarma	DGM(SLDC)
Others			
1	CTUIL	VMS Prakash Yerubandi	DGM
2	CTUIL	Mritunjay Kumar	Chief Manager

Annex-2.1

Load Generation Balance (LGB)

Monsoon (Aug'30)

Scenario 1 : Solar Max Aug 2029	Region	Thermal Central	Thermal State	Thermal IPP	Thermal	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas	Total	EPS Peak Demand	App. Peak Demand	ISTS Demand	GH Load
	NR	11880	52944	0	64824	3020	26333	130534	7048	1360	21306	3583	258007	122134	106129	0	0
	WR	24420	41580	39972	105972	3240	6078	154077	61241	0	15336	10139	356083	123381	107212	10642	9250
	SR	15270	34298	4780	54348	5820	12270	116157	83343	2119	23851	1512	299418	102379	88963	0	13250
	ER	29920	23794	4850	58564	0	19520	5583	0	0	3182	0	86848	48131	41824	5583	1450
	NER	750	0	0	750	0	5009	4208	0	0	25	1722	11714	7529	6542	0	0
		82240	152615	49602	284457	12080	69209	410559	151632	3479	63699	16955	1012070	350670	350670	16225	23950
		284457					634879						403554		390845		
Scenario 2 : Peak load Aug 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF		
	NR	26%	20%	0%	14%	80%	70%	75%	50%	0%	-100%	0%		84%	85%		
	WR	19%	21%	21%	14%	80%	40%	75%	50%	0%	-100%	0%		85%	86%		
	SR	4%	18%	0%	14%	80%	40%	75%	50%	0%	-100%	0%		80%	81%		
	ER	15%	18%	27%	14%	80%	70%	75%	0%	0%	-100%	0%		73%	74%		
	NER	40%	0%	0%	14%	80%	70%	75%	0%	0%	-100%	0%		67%	68%		
		16%	19%	20%	14%									94%	329391		
Availability	Central	State	IPP	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability	Net Demand	ISTS Demand
NR	3048	10709	0	17736	2416	18433	80164	3524	114132	-21306	0	61395	102081	-40686	82701	102081	0
WR	4584	8565	8532	20935	2592	2431	94622	30621	114623	-15336	0	136611	125095	11516	151947	105203	19892
SR	640	6116	0	15783	4656	4908	71335	41671	91885	-23851	0	105476	95173	10303	129326	81923	13250
ER	4568	4342	1304	759	0	13664	3428	0	45667	-3182	0	24125	42153	-18028	27307	35120	7033
NER	300	0	0	572	0	3506	2584	0	4586	-25	0	6365	5064	1301	6390	5064	0
Total	13140	29732	9836	55785	9664	42942	252134	75816	370892	-63699	0	333972	369566	-35594	397671	329391	40175
	56% StateTh		52708				370892						333698				
Scenario 2 : off peak load Aug 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Thermal	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas	0	National DF	Regional DF		
	NR	48%	46%	0%	47%	80%	95%	0%	70%	0%	60%	50%		82%	83%		
	WR	42%	46%	47%	41%	80%	70%	0%	75%	0%	60%	50%		84%	85%		
	SR	9%	40%	0%	23%	80%	70%	0%	75%	0%	60%	50%		74%	75%		
	ER	20%	41%	60%	38%	80%	90%	0%	0%	0%	60%	50%		83%	84%		
	NER	40%	0%	0%	48%	80%	90%	0%	0%	0%	60%	50%		89%	90%		
		29%	44%	44%	40%									93%	325936		
Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Availability	Demand	ISTS Demand
NR	5673	24096	0	30256	2416	25016	0	4934	53330	12783	1791	76710	100577	-23867	76710	100577	0
WR	10314	19271	18966	43720	2592	4254	0	45931	53560	9202	5069	115599	114142	1457	115599	103500	10642
SR	1440	13761	0	12721	4656	8589	0	62507	42935	14310	756	106019	75378	30641	106019	75378	0
ER	5968	9770	2934	22132	0	17568	0	0	21339	1909	0	38149	45379	-7230	38149	39796	5583
NER	300	0	0	3666	0	4508	0	0	2143	15	861	5684	6685	-1001	5684	6685	0
Total	23695	66898	21900	112493	9664	59935	0	113371	173307	38219	8478	342161	342161		342161	325936	16225
	59% StateTh		112493				173307						330117				
Scenario 3 : off peak load Aug 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Thermal	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF		
	NR	48%	21%	0%	20%	80%	70%	0%	60%	0%	40%	50%		57%	57%		
	WR	41%	25%	39%	26%	80%	40%	0%	65%	0%	40%	50%		60%	61%		
	SR	9%	26%	0%	29%	80%	40%	0%	65%	0%	40%	50%		64%	65%		
	ER	20%	32%	34%	34%	80%	70%	0%	0%	0%	40%	50%		69%	70%		
	NER	40%	0%	0%	26%	80%	70%	0%	0%	0%	40%	50%		61%	62%		
		29%	25%	35%	28%									70%	247018		
Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability	Net Demand	ISTS Demand
NR	5673	10962	0	12946	2416	18433	0	4229	43435	8522	1791	52027	69111	-17084	52027	69111	0
WR	10064	10452	15460	27540	2592	2431	0	39807	43622	6134	5069	92009	84958	7051	92009	74316	10642
SR	1440	9056	0	15824	4656	4908	0	54173	34969	9540	756	84528	65745	18783	84528	65745	0
ER	5968	7706	1654	20195	0	13664	0	0	17379	1273	0	30265	38848	-8583	30265	33265	5583
NER	300	0	0	1965	0	3506	0	0	1745	10	861	4677	4581	96	4677	4581	0
Total	23445	38175	17114	78471	9664	42942	0	98208	141150	25480	8478	263506	263243	263	263506	247018	16225
	48% StateTh		78734				141150						250915				

Summer (Jun'30)

Scenario 4 : Solar Max Jun 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF			
	NR	40%	27%	0%	23%	80%	70%	85%	50%	0%	-100%	0%		97%	98%			
	WR	26%	21%	24%	23%	80%	40%	85%	50%	0%	-100%	0%		80%	80%			
	SR	4%	19%	0%	23%	80%	40%	85%	50%	0%	-100%	0%		74%	75%			
	ER	17%	27%	27%	23%	80%	70%	85%	0%	0%	-100%	0%		88%	88%			
	NER	40%	0%	0%	23%	80%	70%	85%	0%	0%	-100%	0%		78%	78%			
	21%		24%	22%	23%	97%										341797		
	Availability	Central	Thermal State	Thermal Private	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability	Net Demand	ISTS Demand
	NR	4752	14503	0	30460	2416	18433	80494	3524	114450	-21306	0	102816	118897	-16081	124122	118897	0
	WR	6392	8565	9788	35954	2592	2431	95011	30621	114943	-15336	0	140064	118505	21559	155400	98613	19892
SR	640	6436	0	27106	4656	4908	71628	41671	92142	-23851	0	106089	89439	16649	129939	76189	13250	
ER	4964	6434	1304	1303	0	13664	3442	0	45794	-3182	0	26627	49287	-22659	29809	42254	7033	
NER	300	0	0	982	0	3506	2595	0	4599	-25	0	6376	5844	532	6401	5844	0	
Total	17048	35938	11092	95805	9664	42942	253170	75816	371928	-63699	0	381972	381972	0	445671	341797	40175	
56%		State Th		64079		371928							344154					
Scenario 5 : Peak Load Jun 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Thermal	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF			
	NR	62%	62%	0%	73%	80%	95%	0%	70%	0%	50%	50%		94%	95%			
	WR	59%	46%	52%	40%	80%	70%	0%	75%	0%	50%	50%		82%	82%			
	SR	9%	42%	0%	27%	80%	70%	0%	75%	0%	50%	50%		73%	74%			
	ER	27%	61%	60%	48%	80%	90%	0%	0%	0%	50%	50%		95%	96%			
	NER	40%	0%	0%	438%	80%	90%	0%	0%	0%	50%	50%		84%	84%			
	39%		53%	48%	48%	98%										343067		
	Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability	Net Demand	ISTS Demand
	NR	7377	32633	0	47033	2416	25016	0	4934	53330	10653	1791	84820	115223	-30403	84820	115223	0
	WR	14382	19271	20955	42497	2592	4254	0	45931	53560	7668	5069	120122	111386	8736	120122	100744	10642
SR	1440	14481	0	14866	4656	8589	0	62507	42935	11925	756	104354	75139	29215	104354	75139	0	
ER	8194	14477	2934	28310	0	17568	0	0	21339	1591	0	44764	51239	-6475	44764	45656	5583	
NER	300	0	0	3288	0	4508	0	0	2143	13	861	5682	6305	-623	5682	6305	0	
Total	31693	80861	23889	135994	9664	59935	0	113371	173307	31849	8478	359742	359292	450	359742	343067	16225	
59%		State Th		136444		173307							345729					
Scenario 6 : Off peak Load Jun 2029	Availability factor	Thermal Central	Thermal State	Thermal IPP	Thermal	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF			
	NR	68%	40%	0%	46%	80%	70%	0%	60%	0%	1%	50%		64%	64%			
	WR	59%	32%	55%	33%	80%	40%	0%	65%	0%	1%	50%		62%	62%			
	SR	9%	35%	0%	44%	80%	40%	0%	65%	0%	1%	50%		63%	64%			
	ER	35%	37%	60%	40%	80%	70%	0%	0%	0%	1%	50%		73%	74%			
	NER	40%	0%	0%	333%	80%	70%	0%	0%	0%	1%	50%		68%	69%			
	42%		36%	50%	40%	74%										258188		
	Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability	Net Demand	ISTS Demand
	NR	8037	21062	0	29849	2416	18433	0	4229	43435	213	1791	56181	77704	-21523	56181	77704	0
	WR	14382	13341	22023	35212	2592	2431	0	39807	43622	153	5069	99798	86649	13150	99798	76007	10642
SR	1440	11993	0	23780	4656	4908	0	54173	34969	239	756	78164	64399	13764	78164	64399	0	
ER	10548	8743	2934	23145	0	13664	0	0	17379	32	0	35921	40556	-4636	35921	34973	5583	
NER	300	0	0	2498	0	3506	0	0	1745	0	861	4668	5105	-437	4668	5105	0	
Total	34707	55139	24957	114484	9664	42942	0	98208	141150	637	8478	274731	274413	318	274731	258188	16225	
48%		State Th		114802		141150							261530					

Winter (Feb'31)

Scenario 7 : Solar max Feb 2030	Availability factor	Thermal Central	Thermal State	Thermal IPP	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	Other RE	ESS	Gas		National DF	Regional DF	
	NR	31%	18%	0%	12%	80%	30%	90%	10%	0%	-100%	0%		72%	73%	
	WR	31%	33%	34%	12%	80%	20%	90%	10%	0%	-100%	0%		91%	93%	
	SR	40%	36%	40%	12%	80%	20%	90%	0%	0%	-100%	0%		96%	98%	
	ER	17%	19%	27%	12%	80%	30%	90%	0%	0%	-100%	0%		63%	64%	
	NER	40%	0%	0%	12%	80%	30%	90%	0%	0%	-100%	0%		47%	48%	
		28%	26%	34%	12%									95%	332948	
	Availability	Thermal Central	Thermal State	Thermal Private	Additional Bess Requirement	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability
	NR	3648	9695	0	15353	2416	7900	102127	705	101987	-21306	0	105186	88016	17170	126491
Scenario 8 : Peak Load Feb 2030	WR	7672	13901	13681	18123	2592	1216	120547	6124	102426	-15336	0	150396	132779	17617	165732
	SR	6108	12260	1912	13662	4656	2454	90879	0	82108	-23851	0	94419	111335	-16916	118269
	ER	5188	4518	1304	657	0	5856	4368	0	40807	-3182	0	18052	37469	-19417	21234
	NER	300	0	0	495	0	1503	3292	0	4098	-25	0	5070	3524	1546	5095
	Total	22916	40374	16897	48290	9664	18928	305669	6829	331426	-63699	0	373122	373123	0	436821
		80187						331426						339359		
	50% State Th															
	Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability
	NR	6933	21815	0	29138	2416	15800	0	2467	21307	21306	1791	72527	75957	-3430	72527
	WR	17262	31277	30782	73794	2592	2431	0	12248	21398	15336	5069	116997	118190	-1192	116997
Scenario 9 : Off peak Load Feb 2030	SR	7545	27585	3702	43679	4656	4908	0	16669	17154	23851	756	89671	90095	-425	89671
	ER	11673	10166	2934	22635	0	11712	0	0	8525	3182	0	39667	34343	5324	39667
	NER	300	0	0	2276	0	3005	0	0	856	25	861	4191	4018	173	4191
	Total	43713	90842	37418	171523	9664	37856	0	31384	69240	63699	8478	323053	322603	450	323053
		171973						69240						313043		
	53% State Th															
	Availability	Thermal Central	Thermal State	Thermal Private	Reqd Thermal	Nuclear	Hydro	Solar	Wind	RE RPO	ESS	Gas	Total availability	Demand	Surplus/Deficit	Net Availability
	NR	6273	11251	0	15954	2416	7900	0	705	9810	8522	1075	38141	37777	364	38141
	WR	13152	19125	22773	49718	2592	1216	0	12248	9853	6134	3042	80281	71339	8942	80281
	SR	6908	15812	1912	27397	4656	2454	0	0	7898	9540	454	41736	49945	-8209	41736
Scenario 9 : Off peak Load Feb 2030	ER	6588	6604	1654	17861	0	5856	0	0	3925	1273	0	21974	23059	-1085	21974
	NER	300	0	0	1153	0	1503	0	0	394	10	517	2329	2074	255	2329
	Total	33221	52791	26339	112084	9664	18928	0	12953	31881	25480	5087	184462	184195	267	184462
		112351						31881						241243		
	47% State Th															

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Annex-2.2

Inter-Regional AC transmission Lines Flow

From Name	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	Thermal Limit
ASANA	NAWADA 765KV	765	270	-3	68	434	-230	-11	501	-144	3	0
ASANA	NAWADA 765KV	765	270	-3	68	434	-230	-11	501	-144	3	0
BHANPURA-2	MODAK	220	153	62	35	193	138	41	-137	-365	-289	267
BHANPURA-2	SAKATPUR	220	49	9	-24	67	48	-6	-87	-192	-157	267
GELEPHU1	SALAKATI	132	49	112	75	61	97	77	-10	57	32	84
KANKROLI	ZERDA	400	-830	-155	-222	-791	-309	-286	-507	768	492	857
KANKROLI	ZERDA	400	-606	-113	-163	-578	-226	-209	-370	562	359	857
KARAMNASHA NW	SAHUPU N	220	140	-235	-113	78	103	126	15	-106	-74	200
MOTANGA	RANGIA	132	50	90	62	60	77	64	0	48	27	84
NAREND-4	XELDEM4	400	579	1614	1125	750	1536	1059	-186	938	266	2186
NARENDRA NW	PUNE-III	765	1597	3340	2293	2088	3214	2170	126	2132	324	3500
NARENDRA NW	PUNE-III	765	1597	3340	2293	2088	3214	2170	126	2132	324	3500

Note: Highlighted cell indicates Power flow > 70% of Thermal limit

HVDC Transmission Lines Flow

Area	From Name	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9
EAST	SASARAM-ER	SASARAM-NR	70	502	502	502	502	502	502	502	502	502
IR	AGRA	BISWANATH-CH	800	0	0	0	0	0	0	300	0	0
IR	AGRA	BISWANATH-CH	800	0	0	0	0	0	0	300	0	0
IR	ALIPURDUAR	AGRA	800	1504	2260	1504	1504	1806	1303	0	1504	601
IR	ALIPURDUAR	AGRA	800	1504	2260	1504	1504	1806	1303	0	1504	601
NORTH	BAL74-PG	BHIWADI	1	0	1006	501	0	1006	501	0	501	501
NORTH	BAL74-PG	BHIWADI	1	0	1005	501	0	1006	501	0	501	501
IR	BARMER-II HV	MURBAD400	800	3019	300	300	250	250	300	3019	300	300
IR	BARMER-II HV	MURBAD-SPT2	800	3021	300	300	250	250	300	3019	300	300
NORTH	BHADLA-3 HVD	FATEH VSC	800	2999	300	300	1505	300	300	2999	300	300
NORTH	BHADLA-3 HVD	FATEH VSC	800	2999	300	300	1505	300	300	2999	300	300
IR	BHADR4	CHANDRAPR-SR	70	0	0	0	0	0	0	502	502	0
IR	BHADR4	CHANDRAPR-SR	70	0	0	0	0	0	0	502	502	0
NORTH	BHIWADI	BAL74-PG	500	1006	0	0	1006	0	0	1006	0	0
NORTH	BHIWADI	BAL74-PG	500	1006	0	0	1006	0	0	1006	0	0
NORTH	BIKANER-3	BATHINDA	800	0	0	0	0	0	0	0	0	0
NORTH	BIKANER-3	BATHINDA	800	0	0	0	0	0	0	0	0	0
IR	BIKANER-V	BEGUNIA HVDC	800	0	0	0	0	0	0	0	0	0
IR	BIKANER-V	BEGUNIA HVDC	800	0	0	0	0	0	0	0	0	0
IR	BISWANATH-CH	ALIPURDUAR	800	500	751	500	500	300	300	0	300	300
IR	BISWANATH-CH	ALIPURDUAR	800	500	751	500	500	300	300	0	300	300
IR	CHAMP POOL A	KURUKSHETR	800	501	3018	3018	3019	3018	3018	501	3018	3018
IR	CHAMP SPLT B	KURUKSHETR	800	501	3018	3018	3019	3018	3018	501	3018	3018
IR	CHANDRAPR-SR	BHADR4	70	502	502	502	502	502	502	0	0	502
IR	CHANDRAPR-SR	BHADR4	70	502	502	502	502	502	502	0	0	502

Area	From Name	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9
WEST	CHANDRAPUR I	PADGH4	480	702	702	702	702	702	702	702	702	702
WEST	CHANDRAPUR I	PADGH4	480	702	702	702	702	702	702	702	702	702
NORTH	FATEHG-5	MODIPURAM(PG	800	0	0	0	0	0	0	0	0	0
NORTH	FATEHG-5	MODIPURAM(PG	800	0	0	0	0	0	0	0	0	0
IR	GAZUWAKA-ER	GAZU-SR	70	0	0	0	0	0	0	428	428	251
IR	GAZUWAKA-ER	GAZU-SR	70	0	0	0	0	0	0	428	428	251
IR	GAZU-SR	GAZUWAKA-ER	70	428	428	428	428	428	428	0	0	0
IR	GAZU-SR	GAZUWAKA-ER	70	428	428	428	428	428	428	0	0	0
WEST	KHAVDA-II	NAGPUR-B	800	3018	0	0	3018	0	0	3018	0	0
WEST	KHAVDA-IIS	NAGPUR-A	800	3018	0	0	3018	0	0	3018	0	0
WEST	KUDUS	ARAY-220	320	1000	1000	1000	1000	1000	1000	1000	1000	1000
SOUTH	KURN HVDC	VIZAG HVDC	800	0	0	0	0	0	0	0	0	0
SOUTH	KURN HVDC	VIZAG HVDC	800	0	0	0	0	0	0	0	0	0
WEST	KUDUS	AAREY400	500	1000	1000	1000	1000	1000	1000	1000	1000	1000
WEST	DOLVI	SEWRI400	320	1500	1500	1500	1500	1500	1500	1500	1500	1500
IR	MERTA-II	BEGUNIA HVDC	800	0	0	0	0	0	0	0	0	0
IR	MERTA-II	BEGUNIA HVDC	800	0	0	0	0	0	0	0	0	0
IR	MAHIN HV	MUNDRA-APL	500	626	0	0	0	0	0	626	0	0
IR	MAHIN HV	MUNDRA-APL	500	626	0	0	0	0	0	626	0	0
IR	MUNDRA-APL	MAHIN HV	500	0	1254	1003	1254	1254	1003	0	1003	1003
IR	MUNDRA-APL	MAHIN HV	500	0	1254	1003	1254	1254	1003	0	1003	1003
IR	PUGALUR-NEW	RAIGARH POOL	800	1505	1505	1505	1505	1505	1505	0	0	1505
IR	PUGALUR-NEW	KOTRA SPLT	800	1505	1505	1505	1505	1505	1505	0	0	1505
SOUTH	PUGALUR-NEW	TCR-HVDC	600	1003	1003	1003	1003	1003	1003	1003	1003	1003
SOUTH	PUGALUR-NEW	TCR-HVDC	600	1003	1003	1003	1003	1003	1003	1003	1003	1003
IR	RAIGARH POOL	PUGALUR-NEW	800	0	0	0	0	0	0	3018	3018	0
IR	KOTRA SPLT	PUGALUR-NEW	800	0	0	0	0	0	0	3018	3018	0

Area	From Name	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9
WEST	RAPAR4	ALEPHAT-SPT	800	3018	500	500	3018	500	500	2714	501	500
WEST	RAPAR4	ALEPHAT 400	800	3018	500	500	3018	500	500	2714	501	500
NORTH	RIHAN-HV	DADR-HVD	500	753	753	753	753	753	753	753	753	753
NORTH	RIHAN-HV	DADR-HVD	500	753	753	753	753	753	753	753	753	753
IR	TALCHER	KOLAR	500	577	577	577	577	577	577	1005	1005	577
IR	TALCHER	KOLAR	500	577	577	577	577	577	577	1005	1005	577
IR	VINDH 1-2-3	VINDHYBT	70	125	251	125	251	251	125	125	125	125
IR	VINDH 1-2-3	VINDHYBT	70	125	251	125	251	251	125	125	125	125

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Annex-3.3

765 kV Transmission Line loadings above 70% of thermal limit

Area	From Name	To Name	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	Thermal Limit
EAST	ANGUL-A	ANGUL-B	2177	2052	2232	1699	2159	3085	2773	3405	3837	4000
IR	ASANA	NAWADA 765KV	270	-3	68	434	-230	-11	501	-144	3	0
IR	ASANA	NAWADA 765KV	270	-3	68	434	-230	-11	501	-144	3	0
WEST	AURANG-CHTPM	DHULE-STER	-367	292	-386	-478	293	-436	-1609	-479	-1080	874
WEST	AURANG-CHTPM	PADGHEGIS	3	599	18	213	612	399	321	1882	1005	874
WEST	BAGODRA7	SAYKHA7	1025	339	443	1050	333	425	1211	151	296	874
WEST	BAGODRA7	SAYKHA7	1025	339	443	1050	333	425	1211	151	296	874
WEST	BLPSR WR	DHARAMJAIGAR	1796	2045	1873	2675	1885	1488	1354	226	288	3500
WEST	KOTRA SPLT	RAIGARH_KOTR	1977	848	322	3866	1515	1503	-387	-2178	-1154	3500
IR	NARENDRA NW	PUNE-III	1597	3340	2293	2088	3214	2170	126	2132	324	3500
IR	NARENDRA NW	PUNE-III	1597	3340	2293	2088	3214	2170	126	2132	324	3500
EAST	TALABIRA ST	TALABIRA-NLC	-391	-380	-286	-683	-222	-38	-208	340	312	0

Note: Highlighted cell indicates Power flow > 70% of Thermal limit

400kV Transmission Line loadings above 70% of thermal limit

Area	From Name	To Name	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	Thermal Limit
NORTH	AGRA	AGRAUP4	935	1029	693	1053	783	479	448	521	131	857
WEST	AKOLA-I	WARDHA SPLT	432	-141	-77	473	-128	-81	602	-120	46	857
WEST	AKOLA-I	WARDHA SPLT	432	-141	-77	473	-128	-81	602	-120	46	857
WEST	ALEPHAT 400	ALEPHAT-SPT	-1426	-498	-523	-1406	-493	-601	-1544	-725	-674	2100
NORTH	ALIGARH-PG	KHURJA TPS	561	333	210	656	339	174	558	165	21	857
NORTH	ALIGARH-PG	KHURJA TPS	561	333	210	656	339	174	558	165	21	857
WEST	ALKUD	ALKUD NEW	-627	-66	-74	-634	-69	-69	-735	28	-4	857
WEST	ALKUD	KOLHAPUR	1270	219	243	1283	244	287	1408	-40	124	857
WEST	ASOJ4	WANAKBORI	-439	-197	-77	-356	-189	-109	-610	-282	-226	857
WEST	AURANGABD-II	AURANGBD-I	404	-290	-283	460	-253	-179	742	7	191	857
WEST	AURANGABD-II	AURANGBD-I	404	-290	-283	460	-253	-179	742	7	191	857
NORTH	BABAI	NEEMR-PG	573	179	120	560	235	81	611	90	-49	857
NORTH	BAL74-PG	MAU4	745	-335	-141	683	-55	-33	584	-206	-239	857
NORTH	BEHMNJSINGH4	TALWNDISABO4	-292	-627	-315	-288	-571	-462	-256	-595	-283	857
SOUTH	BELLARY TPP	RAIC	606	1020	766	694	975	808	167	373	192	850
WEST	BHATP4	KNTPC	-263	-472	-531	-262	-454	-536	-420	-636	-623	857
NORTH	BHILWA-4	CHITTOR4	-643	-399	-324	-736	-545	-332	-267	338	300	857
NORTH	BHIWADI	KHUSKHERA4	5	933	624	89	976	703	-169	621	478	857
NORTH	BHIWADI	KHUSKHERA4	5	933	624	89	976	703	-169	621	478	857
NORTH	BIKANE-4	SIKAR	492	118	87	512	131	47	606	84	4	857
NORTH	BIKANE-4	SIKAR	492	118	87	512	131	47	606	84	4	857
SOUTH	CHANDANVALLY	KETHIREDDYPA	-1649	-946	-1064	-1624	-954	-1053	-1496	-567	-669	2186
NORTH	CHIT-NEW	CHITTOR4	1222	203	108	1450	438	336	865	-648	-476	1714
NORTH	CHIT-NEW	CHITTOR4	1222	203	108	1450	438	336	865	-648	-476	1714
NORTH	CHITTOR4	UDAIPUR4	643	45	37	710	148	188	531	-269	-149	857

Area	From Name	To Name	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	Thermal Limit
SOUTH	CUDP	FSC-4	704	679	307	744	651	277	170	90	47	948
WEST	DEVRI-BALOD	RAIPUR	103	-91	-33	146	-104	-149	30	-257	-168	250
WEST	DEVRI-BALOD	RAIPUR	103	-91	-33	146	-104	-149	30	-257	-168	250
WEST	DHAMTARI	JAGADALPUR	262	19	17	293	-10	31	617	189	260	857
WEST	DHAMTARI	JAGADALPUR	262	19	17	293	-10	31	617	189	260	857
WEST	DHARAVI400	SEWRI400	-261	-233	-469	-349	-268	-436	-202	-213	-626	857
WEST	DOLVI	MURBAD-SPT3	-478	-539	-625	-448	-549	-650	-534	-557	-658	857
WEST	DOLVI	NAGOTHANE	-718	-1599	-1471	-747	-1566	-1363	-657	-1630	-1366	2100
NORTH	FATEHABAD	MOGA SPLT4	507	-10	-22	644	123	-57	754	20	-5	857
SOUTH	FSC-4	NSAGAR	704	679	307	744	651	277	170	90	47	948
WEST	GANCS4	SUGEN	507	-65	-125	465	-84	-117	610	-52	-5	857
WEST	GANCS4	VAV4	507	-68	-19	464	-93	-29	638	-87	-63	857
SOUTH	GAZU-SR	GAZW	-855	-855	-855	-855	-855	-855	844	844	498	1000
WEST	GHATKOPARSW	VIKROLI400	-241	592	694	-195	607	683	-263	583	769	857
SOUTH	GOOT	KURNOOL4	905	731	641	995	714	646	522	150	117	874
SOUTH	GUTTURNW	PMPDSTRG	658	-117	-44	524	-72	138	468	-271	-180	852
SOUTH	GUTTURNW	PMPDSTRG	658	-117	-44	524	-72	138	468	-271	-180	852
NORTH	HINDAU-4	KUMHER4	524	409	276	635	491	275	627	263	71	857
SOUTH	KAMALAPADU 4	TALARICH	-475	-475	-475	-1225	-475	-475	-1225	263	-475	1365
SOUTH	KAMALAPADU 4	TALARICH	-475	-475	-475	-1225	-475	-475	-1225	263	-475	1365
IR	KANKROLI	ZERDA	-830	-155	-222	-791	-309	-286	-507	768	492	857
IR	KANKROLI	ZERDA	-606	-113	-163	-578	-226	-209	-370	562	359	857
EAST	KODERMA 2 ST	KODERMA P2	-16	-211	-167	-91	-289	-192	51	-142	-12	0
EAST	KODERMA P2	KODERMA-DVC	-16	-211	-167	-91	-289	-192	51	-142	-12	0
SOUTH	KURNOOL4	SSLBPH4	1116	598	624	1072	586	591	757	169	108	874
NORTH	KURUKSHETR	MALERKOTLA4	328	361	343	684	450	330	453	379	356	857
NORTH	KURUKSHETR	MALERKOTLA4	328	493	468	684	612	449	453	517	486	857

Area	From Name	To Name	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	Thermal Limit
SOUTH	MNRB	RAIC	499	673	555	568	640	493	111	108	34	852
NORTH	MOHALI	PANCHKULA-PG	-67	-790	-732	-184	-658	-788	244	-577	-458	857
WEST	MURBAD-SPT3	NAVI-MUM	603	450	257	510	420	250	578	421	99	857
IR	NAREND-4	XELDEM4	579	1614	1125	750	1536	1059	-186	938	266	2186
NORTH	NOIDA-SEC123	NOIDA-148	-576	-350	-211	-667	-459	-251	-627	-261	-100	857
NORTH	NOIDA-SEC123	NOIDA-148	-576	-350	-211	-667	-459	-251	-627	-261	-100	857
WEST	PALANPUR74	RADHNESDA4	-656	0	0	-667	0	0	-839	0	0	857
WEST	PALANPUR74	RADHNESDA4	-656	0	0	-667	0	0	-839	0	0	857
EAST	RAGHU P2 ST	RAGHUNATH P2	-23	-168	-99	80	149	75	103	1	73	0
EAST	RAGHUNATH P2	RAGHUNATHPS	-23	-168	-99	80	149	75	103	1	73	0
SOUTH	RAIC	VELTOOR	2029	1749	1628	2112	1706	1546	1480	887	654	2186
EAST	RANCHI	RNC-SIPT FSC	-362	-287	-208	-454	-279	-188	-202	111	105	0
EAST	RANCHI	RNC-SIPT FSC	-362	-287	-208	-454	-279	-188	-202	111	105	0
WEST	SAMI4	SAMI4	-316	-58	-59	-484	-50	-54	-417	59	-24	0
WEST	SAMI4	SAMI4	-316	-58	-59	-484	-50	-54	-417	59	-24	0
SOUTH	SIMHADRI	SIMHD-II	-409	-132	-161	-399	-130	-145	-617	-303	-246	852
EAST	TALCHER-III	TALCHR3-ST	190	202	206	100	184	245	62	158	22	0
SOUTH	VEMAG-II	VEMAGIR4	633	-25	79	492	19	182	687	89	32	874
SOUTH	VEMAG-II	VEMAGIR4	633	-25	79	492	19	182	687	89	32	874
EAST	WARIA ST	WARIA-400	-90	-64	-53	-169	-111	-96	-128	-95	47	0

Note: Highlighted cell indicates Power flow > 70% of Thermal limit

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Annex-3.4

765/400 kV ICT loadings above 80% of MVA rating

Area	From Name	Voltage	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	MVA Rating
EAST	DUBURI765_4	400	DUBURI_765	765	-1132	-1132	-942	-1297	-942	-710	-947	-395	-312	1500
EAST	DUBURI765_4	400	DUBURI_765	765	-1132	-1132	-942	-1297	-942	-710	-947	-395	-312	1500
SOUTH	RAIC-NEW	400	RAIC800	765	508	1330	930	669	1250	826	-180	679	86	1500
SOUTH	RAIC-NEW	400	RAIC800	765	508	1330	930	669	1250	826	-180	679	86	1500

Note: Highlighted cell indicates Power flow > 80% of MVA rating

400/220 kV ICT loadings above 80% of MVA rating

Area	From Name	Voltage	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	MVA Rating
NORTH	BAWANA	220	BAWANA	400	-214	-209	-145	-252	-240	-162	-188	-158	-85	315
NORTH	BHINM-PG	220	BHINMAL	400	-303	-103	-67	-374	-150	-126	-285	-15	-8	315
NORTH	BHINM-PG	220	BHINMAL	400	-303	-103	-67	-374	-150	-126	-285	-15	-8	315
NORTH	BHINM-PG	220	BHINMAL	400	-303	-103	-67	-374	-150	-126	-285	-15	-8	315
NORTH	BHIWADI	220	BHIWADI	400	-163	-230	-142	-182	-256	-147	-135	-146	-71	315
WEST	CENGUJ42	220	CENTGUJ4	400	333	0	0	339	0	0	429	0	0	500
WEST	CENGUJ42	220	CENTGUJ4	400	333	0	0	339	0	0	429	0	0	500
WEST	CENGUJ42	220	CENTGUJ4	400	333	0	0	339	0	0	429	0	0	500
SOUTH	CHINAKAMPALL	220	CUDP	400	-224	-71	-84	-210	-75	-81	-307	-121	-50	315
SOUTH	CHINAKAMPALL	220	CUDP	400	-224	-71	-84	-210	-75	-81	-307	-121	-50	315
SOUTH	CHINAKAMPALL	220	CUDP	400	-356	-113	-134	-334	-120	-129	-487	-192	-80	500
NORTH	CHITTOR-42	220	CHITTOR4	400	-387	-49	-28	-430	-106	-110	-342	116	65	315
NORTH	CHITTOR-42	220	CHITTOR4	400	-387	-49	-28	-430	-106	-110	-342	116	65	315
NORTH	CHITTOR-42	220	CHITTOR4	400	-614	-77	-45	-682	-168	-175	-543	185	102	500
WEST	HINDALCO	220	HINDALCO	400	-354	-354	-354	-354	-354	-354	-354	-354	-354	315
WEST	HINDALCO	220	HINDALCO	400	-354	-354	-354	-354	-354	-354	-354	-354	-354	315
NORTH	KANKR-PG	220	KANKROLI	400	-369	-39	-43	-388	-90	-122	-315	137	70	315
NORTH	KANKR-PG	220	KANKROLI	400	-369	-39	-43	-388	-90	-122	-315	137	70	315
NORTH	KANKR-PG	220	KANKROLI	400	-369	-39	-43	-388	-90	-122	-315	137	70	315
NORTH	KANKR-PG	220	KANKROLI	400	-585	-62	-68	-616	-142	-194	-500	217	111	500
NORTH	KANPU-PG	220	KANPUR	400	-251	-188	-135	-284	-205	-133	-220	-104	-26	315
NORTH	KANPU-PG	220	KANPUR	400	-251	-188	-135	-284	-205	-133	-220	-104	-26	315
NORTH	KOTA	220	KOTA	400	-327	-193	-133	-360	-198	-153	-275	-83	-53	315
NORTH	KOTA	220	KOTA	400	-327	-193	-133	-360	-198	-153	-275	-83	-53	315
WEST	MUNDRA-APL	220	MUNDRA-APL	400	51	303	263	241	311	273	-87	51	118	315
WEST	MUNDRA-APL	220	MUNDRA-APL	400	51	303	263	241	311	273	-87	51	118	315

Area	From Name	Voltage	To Name	Voltage	P-Sc1	P-Sc2	P-Sc3	P-Sc4	P-Sc5	P-Sc6	P-Sc7	P-Sc8	P-Sc9	MVA Rating
NORTH	NAGGAL	220	PANCHKULA-PG	400	-239	-187	-134	-284	-230	-140	-225	-148	-73	315
NORTH	NAGGAL	220	PANCHKULA-PG	400	-239	-187	-134	-284	-230	-140	-225	-148	-73	315
NORTH	NAGGAL	220	PANCHKULA-PG	400	-380	-297	-213	-450	-365	-222	-356	-234	-116	500
NORTH	PIPALKOTI SW	220	PIPALKOTI SW	400	170	232	172	171	230	174	73	151	73	240
NORTH	PIPALKOTI SW	220	PIPALKOTI SW	400	170	232	172	171	230	174	73	151	73	240
WEST	RADHANESD42	220	RADHNESDA4	400	333	0	0	339	0	0	429	0	0	500
WEST	RADHANESD42	220	RADHNESDA4	400	333	0	0	339	0	0	429	0	0	500

Note: Highlighted cell indicates Power flow > 80% of MVA rating

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Annex-3.5

Over Voltage Nodes

765kV and 400kV Bus Voltage >1.05 PU

Area Name	Bus Name	Base kV	V-Sc1	V-Sc2	V-Sc3	V-Sc4	V-Sc5	V-Sc6	V-Sc7	V-Sc8	V-Sc9	Max
NORTH	BADAUN	400.00	1.02	1.02	1.02	1.01	1.00	1.03	1.03	1.03	1.06	1.06
EAST	BUXAR	400.00	1.04	1.02	1.02	1.00	1.00	1.00	1.05	1.04	1.04	1.05
EAST	CHAPRA NEW	400.00	1.03	1.03	1.03	1.03	1.01	1.02	1.05	1.05	1.06	1.06
SOUTH	CPETA800	765.00	1.03	1.05	1.05	1.02	1.05	1.04	1.04	1.06	1.04	1.06
EAST	DUMKA-NE400	400.00	1.02	1.04	1.00	1.05	1.01	1.00	1.04	1.03	1.01	1.05
NORTH	FARRUKHABAD	400.00	1.02	1.02	1.02	1.01	1.00	1.04	1.03	1.03	1.06	1.06
SOUTH	KAKINADA PS	765.00	1.04	1.05	1.05	1.03	1.05	1.05	1.05	1.05	1.04	1.05
SOUTH	KHAMMAM NEW	765.00	1.03	1.05	1.05	1.02	1.05	1.03	1.04	1.05	1.04	1.05
EAST	NAUBATPUR	400.00	1.04	1.02	1.02	1.02	1.00	1.01	1.05	1.04	1.04	1.05
SOUTH	PALASA_AP_4	400.00	1.04	1.05	1.05	1.03	1.05	1.06	1.04	1.04	1.05	1.06
NORTH	ROSA-TP2	400.00	1.02	1.01	1.03	1.01	1.00	1.02	1.03	1.03	1.06	1.06
SOUTH	SAGAR	765.00	1.03	1.05	1.05	1.02	1.05	1.06	1.05	1.06	1.04	1.06
NORTH	SAHUPU_N	400.00	1.01	1.00	1.02	1.00	0.99	1.03	1.01	1.00	1.06	1.06
SOUTH	SRI_POOL	400.00	1.04	1.05	1.05	1.03	1.05	1.05	1.04	1.04	1.05	1.05
SOUTH	SRI_POOL	765.00	1.05	1.06	1.06	1.04	1.06	1.06	1.04	1.04	1.04	1.06
SOUTH	VEM-II80	765.00	1.04	1.05	1.05	1.03	1.05	1.05	1.04	1.05	1.04	1.05

Highlighted cell indicates Bus Voltage >1.05 P.U.

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Annex-3.6

N-1 Contingency of 765 kV Transmission Lines

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
378901 PUNE-III 765.00 528002 NARENDRA NW 765.00 1	SING OPN LIN 491 378901-528002(2)	3363.49	4496.5	3500	128.47	SC 2
378901 PUNE-III 765.00 528002 NARENDRA NW 765.00 2	SING OPN LIN 490 378901-528002(1)	3363.49	4496.5	3500	128.47	SC 2
318029 RAIGARH_KOTR765.00 318998 DHARAM SPL 765.00 1	OPEN LINE FROM BUS 318029 [RAIGARH_KOTR765.00] TO BUS 318998 [DHARAM SPL 765.00] CKT 2	2757	4180	3500	119.43	SC 4
318029 RAIGARH_KOTR765.00 318998 DHARAM SPL 765.00 2	OPEN LINE FROM BUS 318029 [RAIGARH_KOTR765.00] TO BUS 318998 [DHARAM SPL 765.00] CKT 1	2757	4180	3500	119.43	SC 4

N-1 Contingency of 400 kV Transmission Lines

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
174400 AGRAUP4 400.00 174922 AGRA 400.00 2	SING OPN LIN 1312 174414-174922(2)	1307.97	1608.95	857	187.74	SC 1
374013 KOLHAPUR 400.00 374101 ALKUD 400.00 1	SING OPN LIN 2268 374040-374101(1)	1272.71	1444.14	857	168.51	SC 1
504013 KURNOOL4 400.00 514011 SSLBPH4 400.00 1	SING OPN LIN 2977 514023-524003(1)	1122.25	1199.53	874	137.25	SC 1
174414 AGRANew 400.00 174922 AGRA 400.00 2	SING OPN LIN 1275 174400-174922(2)	721.13	1114.29	857	130.02	SC 1
174479 VARANASI 400.00 414492 SASARAM-NR 400.00 1	SING OPN LIN 1403 174474-414492(1)	674.99	1001.47	857	116.86	SC 1
504008 GOOT 400.00 504013 KURNOOL4 400.00 1	SING OPN LIN 2782 504008-504028(1)	912.46	1068.13	874	122.21	SC 1
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 1	SING OPN LIN 2643 444074-444075(2)	520.87	1035.38	850	121.81	SC 1
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 2	SING OPN LIN 2642 444074-444075(1)	520.87	1035.38	850	121.81	SC 1
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2917 514001-514009(2)	503.81	1034.53	874	118.37	SC 1
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2916 514001-514009(1)	503.81	1034.53	874	118.37	SC 1
164418 KANKROLI 400.00 354019 ZERDA 400.00 1	SING OPN LIN 1099 164418-354019(3)	866.16	1008.31	857	117.66	SC 1
504084 KAKINADA SEZ400.00 504085 U SILER PSP4400.00 P1	SING OPN LIN 2897 504084-504085(P2)	937.66	1934.45	1749	110.60	SC 1
504084 KAKINADA SEZ400.00 504085 U SILER PSP4400.00 P2	SING OPN LIN 2896 504084-504085(P1)	937.66	1934.45	1749	110.60	SC 1
504017 VEMAGIR4 400.00 504092 VEMAG-II 400.00 1	SING OPN LIN 2822 504017-504092(2)	638.19	972.4	874	111.26	SC 1
504017 VEMAGIR4 400.00 504092 VEMAG-II 400.00 2	SING OPN LIN 2821 504017-504092(1)	638.19	972.4	874	111.26	SC 1
524170 PMPDSTRG 400.00 524303 GUTTURNW 400.00 1	SING OPN LIN 3225 524170-524303(2)	659.68	857	852	100.59	SC 1
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	SING OPN LIN 2558 424054-424099(2)	416.23	851.25	850	100.15	SC 1
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	SING OPN LIN 2557 424053-424099(3)	416.23	851.25	850	100.15	SC 1

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
174400 AGRAUP4 400.00 174922 AGRA-PG 400.00 2	SING OPN LIN 1312 174414-174922(2)	1041.79	1287.66	857	150.25	SC 2
524003 RAIC 400.00 524082 BELLARY TPP 400.00 1	SING OPN LIN 3070 524002-524003(1)	1024.84	1127.05	850	132.59	SC 2
504006 GAZW 400.00 504010 GAZU-SR 400.00 1	TALCHR-KOLR1	1144.64	1200.45	1000	120.05	SC 2
134406 RAJPURA TH4 400.00 134407 RAJPURA4 400.00 1	SING OPN LIN 812 134406-134407(2)	529.11	1009.79	857	117.83	SC 2
134406 RAJPURA TH4 400.00 134407 RAJPURA4 400.00 2	SING OPN LIN 811 134406-134407(1)	529.11	1009.79	857	117.83	SC 2
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2917 514001-514009(2)	502.45	1025.85	874	117.37	SC 2
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2916 514001-514009(1)	502.45	1025.85	874	117.37	SC 2
144401 KHEDAR 400.00 144403 KIRORI 400.00 T1	SING OPN LIN 861 144401-144403(T2)	481.73	926.86	857	108.15	SC 2
144401 KHEDAR 400.00 144403 KIRORI 400.00 T2	SING OPN LIN 860 144401-144403(T1)	481.73	926.86	857	108.15	SC 2
174414 AGRANEW 400.00 174922 AGRA-PG 400.00 2	SING OPN LIN 1275 174400-174922(2)	596.39	906.81	857	105.81	SC 2
524016 GULBRG 400.00 524172 YALWAR 400 400.00 1	SING OPN LIN 3138 524016-524172(2)	534.67	956.45	948	100.89	SC 2
524016 GULBRG 400.00 524172 YALWAR 400 400.00 2	SING OPN LIN 3137 524016-524172(1)	534.67	956.45	948	100.89	SC 2
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	SING OPN LIN 2558 424054-424099(2)	415.62	851.25	850	100.15	SC 2
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	SING OPN LIN 2557 424053-424099(3)	415.62	851.25	850	100.15	SC 2
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	SING OPN LIN 2563 424054-424099(2)	419.36	1354.57	850	159.36	SC 3
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	SING OPN LIN 2562 424053-424099(3)	419.36	1354.57	850	159.36	SC 3
504006 GAZW 400.00 504010 GAZU-SR 400.00 1	TALCHR-KOLR1	1277.1	1320.94	1000	132.09	SC 3
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2922 514001-514009(2)	502.44	1025.06	874	117.28	SC 3
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2921 514001-514009(1)	502.44	1025.06	874	117.28	SC 3

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
174400 AGRAUP4 400.00 174922 AGRA-PG 400.00 2	SING OPN LIN 1317 174414-174922(2)	698.54	862.66	857	100.66	SC 3
504033 KAMALAPADU 4400.00 504083 TALARICH 400.00 P2	OPEN LINE FROM BUS 504033 [KAMALAPADU 4400.00] TO BUS 504083 [TALARICH 400.00] CKT P1	1232.35	2478.66	1365	181.59	SC 4
504033 KAMALAPADU 4400.00 504083 TALARICH 400.00 P1	OPEN LINE FROM BUS 504033 [KAMALAPADU 4400.00] TO BUS 504083 [TALARICH 400.00] CKT P2	1232.36	2478.64	1365	181.59	SC 4
374013 KOLHAPUR 400.00 374101 ALKUD 400.00 1	OPEN LINE FROM BUS 374040 [SOLAPUR-PG 400.00] TO BUS 374101 [ALKUD 400.00] CKT 1	1284.02	1460.6	857	170.43	SC 4
174400 AGRAUP4 400.00 174922 AGRA 400.00 2	OPEN LINE FROM BUS 174414 [AGRANew 400.00] TO BUS 174922 [AGRA 400.00] CKT 2	1046.96	1266.97	857	147.84	SC 4
504008 GOOT 400.00 504013 KURNOOL4 400.00 1	OPEN LINE FROM BUS 504008 [GOOT 400.00] TO BUS 504028 [KURL-NEW 400.00] CKT 1	995.7	1163.1	874	133.08	SC 4
504013 KURNOOL4 400.00 514011 SSLBPH4 400.00 1	OPEN LINE FROM BUS 514023 [VELTOOR 400.00] TO BUS 524003 [RAIC 400.00] CKT 1	1071.97	1152.15	874	131.82	SC 4
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 1	OPEN LINE FROM BUS 444074 [PPSP_NEW 400.00] TO BUS 444075 [PURULIAPS 400.00] CKT 2	543.31	1079.69	850	127.02	SC 4
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 2	OPEN LINE FROM BUS 444074 [PPSP_NEW 400.00] TO BUS 444075 [PURULIAPS 400.00] CKT 1	543.31	1079.69	850	127.02	SC 4
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 2	504.29	1036.32	874	118.57	SC 4
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 1	504.29	1036.32	874	118.57	SC 4
174475 BAL74-PG 400.00 174486 MAU4 400.00 2	OPEN LINE FROM BUS 174475 [BAL74-PG 400.00] TO BUS 174498 [RASRA(MAU) 400.00] CKT 1	751.1	1021.81	857	119.23	SC 4
164418 KANKROLI 400.00 354019 ZERDA 400.00 1	OPEN LINE FROM BUS 164418 [KANKROLI 400.00] TO BUS 354019 [ZERDA 400.00] CKT 3	804.68	930.73	857	108.60	SC 4
174402 BARELI4 400.00 174410 BAREL-PG 400.00 1	OPEN LINE FROM BUS 174402 [BARELI4 400.00] TO BUS 174410 [BAREL-PG 400.00] CKT 2	504.93	916.98	857	107.00	SC 4
174402 BARELI4 400.00 174410 BAREL-PG 400.00 2	OPEN LINE FROM BUS 174402 [BARELI4 400.00] TO BUS 174410 [BAREL-PG 400.00] CKT 1	504.93	916.98	857	107.00	SC 4
514023 VELTOOR 400.00 524003 RAIC 400.00 1	OPEN LINE FROM BUS 524013 [RAIC-NEW 400.00] TO BUS 528003 [RAIC800 765.00] CKT 1	2114.66	2212.19	2186	101.20	SC 4
374014 AURANGBD-I 400.00 374047 AURANGABD-II400.00 1	OPEN LINE FROM BUS 374014 [AURANGBD-I 400.00] TO BUS 374047 [AURANGABD-II400.00] CKT 2	459.81	873.33	857	101.91	SC 4
374014 AURANGBD-I 400.00 374047 AURANGABD-II400.00 2	OPEN LINE FROM BUS 374014 [AURANGBD-I 400.00] TO BUS 374047 [AURANGABD-II400.00] CKT 1	459.81	873.33	857	101.91	SC 4
354031 RAJG-FS2 400.00 354211 HALOL-2-NEW 400.00 1	OPEN LINE FROM BUS 354030 [RAJG-FS1 400.00] TO BUS 364015 [RAJGARH-4 400.00] CKT 1	710.61	1169.04	857	136.41	SC 4

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	OPEN LINE FROM BUS 424054 [JEYP GAZ F2 400.00] TO BUS 424099 [GAZUWAKA-ER 400.00] CKT 2	416.23	851.25	850	100.15	SC 4
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	OPEN LINE FROM BUS 424053 [JEYP GAZ F1 400.00] TO BUS 424099 [GAZUWAKA-ER 400.00] CKT 3	416.23	851.25	850	100.15	SC 4
354021 KASOR4 400.00 354211 HALOL-2-NEW 400.00 1	OPEN LINE FROM BUS 354021 [KASOR4 400.00] TO BUS 354211 [HALOL-2-NEW 400.00] CKT 2	718.28	1049.22	857	122.43	SC 4
354021 KASOR4 400.00 354211 HALOL-2-NEW 400.00 2	OPEN LINE FROM BUS 354021 [KASOR4 400.00] TO BUS 354211 [HALOL-2-NEW 400.00] CKT 1	718.28	1049.22	857	122.43	SC 4
364003 SATPURA 400.00 374009 KORADI-I 400.00 1	OPEN LINE FROM BUS 314004 [BHI4 400.00] TO BUS 374009 [KORADI-I 400.00] CKT 1	755.72	881.18	857	102.82	SC 4
378901 PUNE-III 765.00 528002 NARENDRA NW 765.00 1	SING OPN LIN 496 378901-528002(2)	3234.72	4329.88	3500	123.71	SC 5
378901 PUNE-III 765.00 528002 NARENDRA NW 765.00 2	SING OPN LIN 495 378901-528002(1)	3234.72	4329.88	3500	123.71	SC 5
524003 RAIC 400.00 524082 BELLARY TPP 400.00 1	SING OPN LIN 3075 524002-524003(1)	978	1074.7	850	126.44	SC 5
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2922 514001-514009(2)	502.5	1023.4	874	117.09	SC 5
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2921 514001-514009(1)	502.5	1023.4	874	117.09	SC 5
174400 AGRAUP4 400.00 174922 AGRA-PG 400.00 2	SING OPN LIN 1317 174414-174922(2)	779.95	947.12	857	110.52	SC 5
134406 RAJPURA_TH4 400.00 134407 RAJPURA4 400.00 1	SING OPN LIN 817 134406-134407(2)	497.48	944.74	857	110.24	SC 5
134406 RAJPURA_TH4 400.00 134407 RAJPURA4 400.00 2	SING OPN LIN 816 134406-134407(1)	497.48	944.74	857	110.24	SC 5
144401 KHEDAR 400.00 144403 KIRORI 400.00 T1	SING OPN LIN 866 144401-144403(T2)	470.3	901.92	857	105.24	SC 5
144401 KHEDAR 400.00 144403 KIRORI 400.00 T2	SING OPN LIN 865 144401-144403(T1)	470.3	901.92	857	105.24	SC 5
524016 GULBRG 400.00 524172 YALWAR 400 400.00 1	SING OPN LIN 3143 524016-524172(2)	531.98	951.19	948	100.34	SC 5
524016 GULBRG 400.00 524172 YALWAR 400 400.00 2	SING OPN LIN 3142 524016-524172(1)	531.98	951.19	948	100.34	SC 5
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	SING OPN LIN 2563 424054-424099(2)	415.37	851.25	850	100.15	SC 5
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	SING OPN LIN 2562 424053-424099(3)	415.37	851.25	850	100.15	SC 5

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	OPEN LINE FROM BUS 424054 [JEYP GAZ F2 400.00] TO BUS 424099 [GAZUWAKA-ER 400.00] CKT 2	419.36	1348.53	850	158.65	SC 6
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	OPEN LINE FROM BUS 424053 [JEYP GAZ F1 400.00] TO BUS 424099 [GAZUWAKA-ER 400.00] CKT 3	419.36	1348.53	850	158.65	SC 6
504006 GAZW 400.00 504010 GAZU-SR 400.00 1	BLOCK TWOTERMDC TALCHR-KOLR1	1360.89	1365.29	1000	136.53	SC 6
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 2	502.84	1020.62	874	116.78	SC 6
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 1	502.84	1020.62	874	116.78	SC 6
524003 RAIC 400.00 524082 BELLARY TPP 400.00 1	OPEN LINE FROM BUS 524002 [MNRB 400.00] TO BUS 524003 [RAIC 400.00] CKT 1	808.05	881.42	850	103.70	SC 6
544016 PUGALUR-NEW 400.00 544033 KARUR II 400.00 1	OPEN LINE FROM BUS 544016 [PUGALUR-NEW 400.00] TO BUS 544033 [KARUR II 400.00] CKT 2	1293.42	2189.27	2186	100.15	SC 6
544016 PUGALUR-NEW 400.00 544033 KARUR II 400.00 2	OPEN LINE FROM BUS 544016 [PUGALUR-NEW 400.00] TO BUS 544033 [KARUR II 400.00] CKT 1	1293.42	2189.27	2186	100.15	SC 6
174400 AGRAUP4 400.00 174922 AGRA 400.00 2	SING OPN LIN 1312 174414-174922(2)	1307.72	1607.5	857	187.57	SC 7
504033 KAMALAPADU 4400.00 504083 TALARICH 400.00 P2	SING OPN LIN 2863 504033-504083(P1)	1232.28	2478.6	1365	181.58	SC 7
504033 KAMALAPADU 4400.00 504083 TALARICH 400.00 P1	SING OPN LIN 2864 504033-504083(P2)	1232.28	2478.59	1365	181.58	SC 7
374013 KOLHAPUR 400.00 374101 ALKUD 400.00 1	SING OPN TIE 5287 374171-378071(1)	1411.39	1501.88	857	175.25	SC 7
374014 AURANGBD-I 400.00 374047 AURANGABD-II400.00 1	SING OPN LIN 2206 374014-374047(2)	742.9	1411.46	857	164.70	SC 7
374014 AURANGBD-I 400.00 374047 AURANGABD-II400.00 2	SING OPN LIN 2205 374014-374047(1)	742.9	1411.46	857	164.70	SC 7
174414 AGRANew 400.00 174922 AGRA 400.00 2	SING OPN LIN 1275 174400-174922(2)	717.54	1111.29	857	129.67	SC 7
174479 VARANASI 400.00 414492 SASARAM-NR 400.00 1	SING OPN LIN 1403 174474-414492(1)	735.75	1002.05	857	116.93	SC 7
504017 VEMAGIR4 400.00 504092 VEMAG-II 400.00 1	SING OPN LIN 2822 504017-504092(2)	692.37	1053.95	874	120.59	SC 7
504017 VEMAGIR4 400.00 504092 VEMAG-II 400.00 2	SING OPN LIN 2821 504017-504092(1)	692.37	1053.95	874	120.59	SC 7
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2917 514001-514009(2)	497.06	998.26	874	114.22	SC 7

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2916 514001-514009(1)	497.06	998.26	874	114.22	SC 7
424053 JEYP GAZ F1 400.00 424099 GAZUWAKA-ER 400.00 3	SING OPN LIN 2469 424004-424054(1)	438.47	912.4	850	107.34	SC 7
424054 JEYP GAZ F2 400.00 424099 GAZUWAKA-ER 400.00 2	SING OPN LIN 2468 424004-424053(1)	438.47	912.4	850	107.34	SC 7
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	SING OPN LIN 2469 424004-424054(1)	438.47	901.08	850	106.01	SC 7
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	SING OPN LIN 2468 424004-424053(1)	438.47	901.08	850	106.01	SC 7
314050 DHAMTARI 400.00 314051 JAGADALPUR 400.00 1	SING OPN LIN 1701 314050-314051(2)	638.07	892.76	857	104.17	SC 7
314050 DHAMTARI 400.00 314051 JAGADALPUR 400.00 2	SING OPN LIN 1700 314050-314051(1)	638.07	892.76	857	104.17	SC 7
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 1	SING OPN LIN 2643 444074-444075(2)	441.68	877.5	850	103.24	SC 7
444074 PPSP_NEW 400.00 444075 PURULIAPS 400.00 2	SING OPN LIN 2642 444074-444075(1)	441.68	877.5	850	103.24	SC 7
504013 KURNOOL4 400.00 504028 KURL-NEW 400.00 1	SING OPN LIN 2795 504013-504028(2)	1128.63	2051.5	2029	101.11	SC 7
504013 KURNOOL4 400.00 504028 KURL-NEW 400.00 2	SING OPN LIN 2794 504013-504028(1)	1128.63	2051.5	2029	101.11	SC 7
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 2	498.67	996.34	874	114.00	SC 8
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	OPEN LINE FROM BUS 514001 [RAMGUNDM STP400.00] TO BUS 514009 [CHANDRAPR-SR400.00] CKT 1	498.67	996.34	874	114.00	SC 8
134406 RAJPURA_TH4 400.00 134407 RAJPURA4 400.00 1	OPEN LINE FROM BUS 134406 [RAJPURA_TH4 400.00] TO BUS 134407 [RAJPURA4 400.00] CKT 2	513.13	976.02	857	113.89	SC 8
134406 RAJPURA_TH4 400.00 134407 RAJPURA4 400.00 2	OPEN LINE FROM BUS 134406 [RAJPURA_TH4 400.00] TO BUS 134407 [RAJPURA4 400.00] CKT 1	513.13	976.02	857	113.89	SC 8
424053 JEYP GAZ F1 400.00 424099 GAZUWAKA-ER 400.00 3	OPEN LINE FROM BUS 424004 [JEYPORE 400.00] TO BUS 424054 [JEYP GAZ F2 400.00] CKT 1	438.15	908.16	850	106.84	SC 8
424054 JEYP GAZ F2 400.00 424099 GAZUWAKA-ER 400.00 2	OPEN LINE FROM BUS 424004 [JEYPORE 400.00] TO BUS 424053 [JEYP GAZ F1 400.00] CKT 1	438.15	908.16	850	106.84	SC 8
424004 JEYPORE 400.00 424053 JEYP GAZ F1 400.00 1	OPEN LINE FROM BUS 424004 [JEYPORE 400.00] TO BUS 424054 [JEYP GAZ F2 400.00] CKT 1	438.15	901.94	850	106.11	SC 8
424004 JEYPORE 400.00 424054 JEYP GAZ F2 400.00 1	OPEN LINE FROM BUS 424004 [JEYPORE 400.00] TO BUS 424053 [JEYP GAZ F1 400.00] CKT 1	438.15	901.94	850	106.11	SC 8

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
164418 KANKROLI 400.00 354019 ZERDA 400.00 1	OPEN LINE FROM BUS 164418 [KANKROLI 400.00] TO BUS 354019 [ZERDA 400.00] CKT 3	768.51	893	857	104.20	SC 8
364029 CHEGAON 400.00 364030 MALWA 400.00 1	OPEN LINE FROM BUS 364029 [CHEGAON 400.00] TO BUS 364030 [MALWA 400.00] CKT 2	559.31	864.64	857	100.89	SC 8
364029 CHEGAON 400.00 364030 MALWA 400.00 2	OPEN LINE FROM BUS 364029 [CHEGAON 400.00] TO BUS 364030 [MALWA 400.00] CKT 1	559.31	864.64	857	100.89	SC 8
374017 TAPS4 400.00 374070 VELGAON4 400.00 1	OPEN LINE FROM BUS 374017 [TAPS4 400.00] TO BUS 374070 [VELGAON4 400.00] CKT 2	520.06	873.53	857	101.93	SC 8
374017 TAPS4 400.00 374070 VELGAON4 400.00 2	OPEN LINE FROM BUS 374017 [TAPS4 400.00] TO BUS 374070 [VELGAON4 400.00] CKT 1	520.06	873.53	857	101.93	SC 8
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 1	SING OPN LIN 2922 514001-514009(2)	513.11	1046.18	874	119.70	SC 9
514001 RAMGUNDM STP400.00 514009 CHANDRAPR-SR400.00 2	SING OPN LIN 2921 514001-514009(1)	513.11	1046.18	874	119.70	SC 9
374017 TAPS4 400.00 374070 VELGAON4 400.00 1	SING OPN LIN 2224 374017-374070(2)	524.23	880.38	857	102.73	SC 9
374017 TAPS4 400.00 374070 VELGAON4 400.00 2	SING OPN LIN 2223 374017-374070(1)	524.23	880.38	857	102.73	SC 9

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Annex-3.7

N-1 Contingency of 765/400 kV Transformers

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 1	SING OPN TIE 5476 424024-428024(2)	1183.99	1733.6	1500	115.57	SC 1
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 2	SING OPN TIE 5475 424024-428024(1)	1183.99	1733.6	1500	115.57	SC 1
514053 SHADNGR 400.00 518053 SHADNGR_765 765.00 1	SING OPN TIE 5872 514053-518053(2)	1216.54	1520.69	1500	101.38	SC 1
514053 SHADNGR 400.00 518053 SHADNGR_765 765.00 2	SING OPN TIE 5871 514053-518053(1)	1216.54	1520.69	1500	101.38	SC 1
514053 SHADNGR 400.00 518053 SHADNGR_765 765.00 3	SING OPN TIE 5871 514053-518053(1)	1216.54	1520.69	1500	101.38	SC 1
514053 SHADNGR 400.00 518053 SHADNGR_765 765.00 4	SING OPN TIE 5871 514053-518053(1)	1216.54	1520.69	1500	101.38	SC 1
524013 RAIC-NEW 400.00 528003 RAIC800 765.00 1	SING OPN TIE 5984 524013-528003(2)	1367.24	1988.91	1500	132.59	SC 2
524013 RAIC-NEW 400.00 528003 RAIC800 765.00 2	SING OPN TIE 5983 524013-528003(1)	1367.24	1988.91	1500	132.59	SC 2
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 1	SING OPN TIE 5480 424024-428024(2)	1145.19	1680.04	1500	112.00	SC 2
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 2	SING OPN TIE 5479 424024-428024(1)	1145.19	1680.04	1500	112.00	SC 2
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 1	OPEN LINE FROM BUS 424024 [DUBURI765_4 400.00] TO BUS 428024 [DUBURI_765 765.00] CKT 2	1320.37	1937.33	1500	129.16	SC 4
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 2	OPEN LINE FROM BUS 424024 [DUBURI765_4 400.00] TO BUS 428024 [DUBURI_765 765.00] CKT 1	1320.37	1937.33	1500	129.16	SC 4
474499 JAMSHEDPUR N400.00 478009 JAMSHEDPUR N765.00 1	OPEN LINE FROM BUS 474499 [JAMSHEDPUR N400.00] TO BUS 478009 [JAMSHEDPUR N765.00] CKT 2	1008.05	1515.93	1500	101.06	SC 4
474499 JAMSHEDPUR N400.00 478009 JAMSHEDPUR N765.00 2	OPEN LINE FROM BUS 474499 [JAMSHEDPUR N400.00] TO BUS 478009 [JAMSHEDPUR N765.00] CKT 1	1008.05	1515.93	1500	101.06	SC 4
524013 RAIC-NEW 400.00 528003 RAIC800 765.00 1	SING OPN TIE 5997 524013-528003(2)	1288.01	1873.86	1500	124.92	SC 5

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
524013 RAIC-NEW 400.00 528003 RAIC800 765.00 2	SING OPN TIE 5996 524013-528003(1)	1288.01	1873.86	1500	124.92	SC 5
374105 PARLI_M_765 400.00 378058 PARLI_M_765 765.00 1	SING OPN TIE 5284 374105-378058(2)	1093.25	1714.81	1500	114.32	SC 7
374105 PARLI_M_765 400.00 378058 PARLI_M_765 765.00 2	SING OPN TIE 5283 374105-378058(1)	1093.25	1714.81	1500	114.32	SC 7
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 1	SING OPN TIE 5477 424024-428024(2)	1041.2	1527.47	1500	101.83	SC 7
424024 DUBURI765_4 400.00 428024 DUBURI_765 765.00 2	SING OPN TIE 5476 424024-428024(1)	1041.2	1527.47	1500	101.83	SC 7
424600 KOLABIRA400 400.00 428300 KOLABIRA765 765.00 1	SING OPN TIE 5510 424600-428300(2)	759.44	1521.76	1500	101.45	SC 7
424600 KOLABIRA400 400.00 428300 KOLABIRA765 765.00 2	SING OPN TIE 5509 424600-428300(1)	759.44	1521.76	1500	101.45	SC 7
504093 NEL-POOL 400.00 508093 NELL-POL 765.00 1	OPEN LINE FROM BUS 504093 [NEL-POOL 400.00] TO BUS 508093 [NELL-POL 765.00] CKT 2	1105.41	1763.57	1500	117.57	SC 8
504093 NEL-POOL 400.00 508093 NELL-POL 765.00 2	OPEN LINE FROM BUS 504093 [NEL-POOL 400.00] TO BUS 508093 [NELL-POL 765.00] CKT 1	1105.41	1763.57	1500	117.57	SC 8

N-1 Contingency of 400/220 kV Transformers

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
544026 KANAPATT 400.00 542148 KANARP42 230.00 1	SING OPN TIE 6219 544026-542148(2)	336.82	675.93	315	214.58	SC 1
164428 CHITTOR4 400.00 162228 CHITTOR-42 220.00 1	SING OPN TIE 3891 164428-162228(3)	385.89	545.28	315	173.10	SC 1
524006 TALAGUP4 400.00 522006 TLGP 220.00 1	SING OPN TIE 5961 524006-522006(2)	345.57	526.97	315	167.29	SC 1
164428 CHITTOR4 400.00 162228 CHITTOR-42 220.00 3	SING OPN TIE 3889 164428-162228(1)	612.53	750.53	500	150.11	SC 1
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	SING OPN TIE 4423 194054-192054(2)	171.5	343.99	240	143.33	SC 1
164420 KOTA 400.00 162919 KOTA 220.00 1	SING OPN TIE 3878 164420-162919(2)	325.99	417.35	315	132.49	SC 1
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 1	SING OPN TIE 3841 164405-162914(2)	302.6	406.92	315	129.18	SC 1
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	SING OPN TIE 5237 374058-372357(2)	427.94	584.82	500	116.96	SC 1
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4513 314013-312013(2)	176.87	358.46	315	113.80	SC 1
174431 KANPUR 400.00 172103 KANPU-PG 220.00 1	SING OPN TIE 4217 174431-172103(2)	276.84	350.53	315	111.28	SC 1
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	SING OPN TIE 5998 524034-522144(2)	366.51	545.27	500	109.05	SC 1
354148 KESHOD4 400.00 352320 KESHOD42 220.00 1	SING OPN TIE 4752 354148-352320(2)	314.85	539.62	500	107.92	SC 1
374022 AKOLA-I 400.00 372045 AKOLA220 220.00 1	SING OPN TIE 5135 374022-372045(4)	241.14	333.7	315	105.94	SC 1
144460 PANCHKULA-PG400.00 142285 NAGGAL 220.00 1	SING OPN TIE 3695 144460-142285(3)	242.69	321.04	315	101.92	SC 1
524006 TALAGUP4 400.00 522006 TLGP 220.00 2	SING OPN TIE 5960 524006-522006(1)	345.57	526.97	315	167.29	SC 1
164420 KOTA 400.00 162919 KOTA 220.00 2	SING OPN TIE 3877 164420-162919(1)	325.99	417.35	315	132.49	SC 1
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 2	SING OPN TIE 3840 164405-162914(1)	302.6	406.92	315	129.18	SC 1

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	SING OPN TIE 5236 374058-372357(1)	427.94	584.82	500	116.96	SC 1
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4512 314013-312013(1)	176.87	358.46	315	113.80	SC 1
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	SING OPN TIE 5997 524034-522144(1)	366.51	545.27	500	109.05	SC 1
354148 KESHOD4 400.00 352320 KESHOD42 220.00 2	SING OPN TIE 4751 354148-352320(1)	314.85	539.62	500	107.92	SC 1
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	SING OPN TIE 6002 524034-522144(2)	758.64	1145.77	500	229.15	SC 2
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	SING OPN TIE 4419 194054-192054(2)	234.82	472.65	240	196.94	SC 2
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 1	SING OPN TIE 4628 354015-352015(2)	305.86	415.84	315	132.01	SC 2
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4508 314013-312013(2)	176.87	358.46	315	113.80	SC 2
524012 KAIGA 400.00 522012 KAIG 220.00 1	SING OPN TIE 5982 524012-522012(2)	326.86	557.93	500	111.59	SC 2
524047 NAREND-4 400.00 522047 NARENDRA 220.00 1	SING OPN TIE 6013 524047-522047(2)	402.06	541.25	500	108.25	SC 2
194491 JAULJIVI 400.00 192227 JAULJIVI 220.00 1	SING OPN TIE 4437 194491-192227(2)	179.95	338.33	315	107.41	SC 2
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	SING OPN TIE 5240 374058-372357(2)	385.9	526.92	500	105.38	SC 2
504133 URVKND 400.00 502133 URAVAKONDA 220.00 1	SING OPN TIE 5795 504133-502133(2)	385.98	521.44	500	104.29	SC 2
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 1	SING OPN TIE 3705 144483-142287(2)	421.43	520.43	500	104.09	SC 2
174058 ORAI 400.00 172124 ORAI 42 220.00 3	SING OPN TIE 4140 174058-172124(2)	162.13	242.21	240	100.92	SC 2
414598 KERPA NEW 400.00 412598 KERPA NEW 220.00 1	SING OPN TIE 5441 414598-412598(2)	366.6	504.21	500	100.84	SC 2
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	SING OPN TIE 6001 524034-522144(1)	758.64	1145.77	500	229.15	SC 2
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 2	SING OPN TIE 4418 194054-192054(1)	234.82	472.65	240	196.94	SC 2

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 2	SING OPN TIE 4627 354015-352015(1)	305.86	415.84	315	132.01	SC 2
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4507 314013-312013(1)	176.87	358.46	315	113.80	SC 2
524012 KAIGA 400.00 522012 KAIG 220.00 2	SING OPN TIE 5981 524012-522012(1)	326.86	557.93	500	111.59	SC 2
524047 NAREND-4 400.00 522047 NARENDRA 220.00 2	SING OPN TIE 6012 524047-522047(1)	402.06	541.25	500	108.25	SC 2
194491 JAULJIVI 400.00 192227 JAULJIVI 220.00 2	SING OPN TIE 4436 194491-192227(1)	179.95	338.33	315	107.41	SC 2
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	SING OPN TIE 5239 374058-372357(1)	385.9	526.92	500	105.38	SC 2
504133 URVKND 400.00 502133 URAVAKONDA 220.00 2	SING OPN TIE 5794 504133-502133(1)	385.98	521.44	500	104.29	SC 2
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 2	SING OPN TIE 3704 144483-142287(1)	421.43	520.43	500	104.09	SC 2
414598 KERPA NEW 400.00 412598 KERPA NEW 220.00 2	SING OPN TIE 5440 414598-412598(1)	366.6	504.21	500	100.84	SC 2
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	SING OPN TIE 6015 524034-522144(2)	547.25	822.38	500	164.48	SC 3
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	SING OPN TIE 4424 194054-192054(2)	173.27	347.58	240	144.83	SC 3
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 1	SING OPN TIE 4633 354015-352015(2)	264.71	360.19	315	114.35	SC 3
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4513 314013-312013(2)	176.87	358.46	315	113.80	SC 3
374057 DOLVI 400.00 372244 JSW 220.00 1	SING OPN TIE 5251 374057-372244(2)	241.55	500.33	500	100.07	SC 3
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	SING OPN TIE 6014 524034-522144(1)	547.25	822.38	500	164.48	SC 3
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 2	SING OPN TIE 4423 194054-192054(1)	173.27	347.58	240	144.83	SC 3
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 2	SING OPN TIE 4632 354015-352015(1)	264.71	360.19	315	114.35	SC 3
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4512 314013-312013(1)	176.87	358.46	315	113.80	SC 3

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 2	OPEN LINE FROM BUS 164405 [BHINMAL 400.00] TO BUS 162914 [BHINM-PG 220.00] CKT 1	380.53	511.43	315	162.36	SC 4
164420 KOTA 400.00 162919 KOTA 220.00 2	OPEN LINE FROM BUS 164420 [KOTA 400.00] TO BUS 162919 [KOTA 220.00] CKT 1	360.74	463.01	315	146.99	SC 4
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	OPEN LINE FROM BUS 524034 [KUDGI-NT 400.00] TO BUS 522144 [KUDGI-NTPC 220.00] CKT 1	475.05	712.84	500	142.57	SC 4
524006 TALAGUP4 400.00 522006 TLGP 220.00 2	OPEN LINE FROM BUS 524006 [TALAGUP4 400.00] TO BUS 522006 [TLGP 220.00] CKT 1	290.15	441.97	315	140.31	SC 4
144460 PANCHKULA-PG400.00 142285 NAGGAL 220.00 2	OPEN LINE FROM BUS 144460 [PANCHKULA-PG400.00] TO BUS 142285 [NAGGAL 220.00] CKT 3	292.12	386.83	315	122.80	SC 4
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	OPEN LINE FROM BUS 374058 [LONIKANDII 400.00] TO BUS 372357 [LONIKANDII2 220.00] CKT 1	444.84	609.79	500	121.96	SC 4
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 1	176.87	358.46	315	113.80	SC 4
154497 DWARKA 400.00 152287 DWARKA-II 220.00 4	OPEN LINE FROM BUS 154497 [DWARKA 400.00] TO BUS 152287 [DWARKA-II 220.00] CKT 3	397.54	546.33	500	109.27	SC 4
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 2	OPEN LINE FROM BUS 144483 [KURUKSHETR 400.00] TO BUS 142287 [KURUKSHETRA 220.00] CKT 1	433.79	535.31	500	107.06	SC 4
134323 DHANANSU4 400.00 132324 DHANANSU42 220.00 2	OPEN LINE FROM BUS 134323 [DHANANSU4 400.00] TO BUS 132324 [DHANANSU42 220.00] CKT 1	397.33	527.76	500	105.55	SC 4
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 2	OPEN LINE FROM BUS 354015 [MUNDRA-APL 400.00] TO BUS 352015 [MUNDRA-APL 220.00] CKT 1	242.93	330.44	315	104.90	SC 4
544026 KANAPATT 400.00 542148 KANARP42 230.00 1	OPEN LINE FROM BUS 544026 [KANAPATT 400.00] TO BUS 542148 [KANARP42 230.00] CKT 2	338.26	679.16	315	215.61	SC 4
164428 CHITTOR4 400.00 162228 CHITTOR-42 220.00 1	OPEN LINE FROM BUS 164428 [CHITTOR4 400.00] TO BUS 162228 [CHITTOR-42 220.00] CKT 3	432.11	611.86	315	194.24	SC 4
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 1	OPEN LINE FROM BUS 164405 [BHINMAL 400.00] TO BUS 162914 [BHINM-PG 220.00] CKT 2	380.53	511.43	315	162.36	SC 4
164420 KOTA 400.00 162919 KOTA 220.00 1	OPEN LINE FROM BUS 164420 [KOTA 400.00] TO BUS 162919 [KOTA 220.00] CKT 2	360.74	463.01	315	146.99	SC 4
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	OPEN LINE FROM BUS 194054 [PIPALKOTI SW400.00] TO BUS 192054 [PIPALKOTI SW220.00] CKT 2	171.83	344.66	240	143.61	SC 4
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	OPEN LINE FROM BUS 524034 [KUDGI-NT 400.00] TO BUS 522144 [KUDGI-NTPC 220.00] CKT 2	475.05	712.84	500	142.57	SC 4
524006 TALAGUP4 400.00 522006 TLGP 220.00 1	OPEN LINE FROM BUS 524006 [TALAGUP4 400.00] TO BUS 522006 [TLGP 220.00] CKT 2	290.15	441.97	315	140.31	SC 4

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
144460 PANCHKULA-PG400.00 142285 NAGGAL 220.00 1	OPEN LINE FROM BUS 144460 [PANCHKULA-PG400.00] TO BUS 142285 [NAGGAL 220.00] CKT 3	292.12	386.83	315	122.80	SC 4
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	OPEN LINE FROM BUS 374058 [LONIKANDII 400.00] TO BUS 372357 [LONIKANDII2 220.00] CKT 2	444.84	609.79	500	121.96	SC 4
174431 KANPUR 400.00 172103 KANPU-PG 220.00 1	OPEN LINE FROM BUS 174431 [KANPUR 400.00] TO BUS 172103 [KANPU-PG 220.00] CKT 2	289.89	367.58	315	116.69	SC 4
174058 ORAI 400.00 172124 ORAI 42 220.00 3	OPEN LINE FROM BUS 174058 [ORAI 400.00] TO BUS 172124 [ORAI 42 220.00] CKT 2	185.65	276.91	240	115.38	SC 4
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 2	176.87	358.46	315	113.80	SC 4
374022 AKOLA-I 400.00 372045 AKOLA220 220.00 1	OPEN LINE FROM BUS 374022 [AKOLA-I 400.00] TO BUS 372045 [AKOLA220 220.00] CKT 4	256.8	355.54	315	112.87	SC 4
144460 PANCHKULA-PG400.00 142285 NAGGAL 220.00 3	OPEN LINE FROM BUS 144460 [PANCHKULA-PG400.00] TO BUS 142285 [NAGGAL 220.00] CKT 1	463.69	548.24	500	109.65	SC 4
154497 DWARKA 400.00 152287 DWARKA-II 220.00 3	OPEN LINE FROM BUS 154497 [DWARKA 400.00] TO BUS 152287 [DWARKA-II 220.00] CKT 4	397.54	546.33	500	109.27	SC 4
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 1	OPEN LINE FROM BUS 144483 [KURUKSHETR 400.00] TO BUS 142287 [KURUKSHETRA 220.00] CKT 2	433.79	535.31	500	107.06	SC 4
174467 SHAHJ-PG 400.00 172107 SHAHJAHAN4 220.00 1	OPEN LINE FROM BUS 174467 [SHAHJ-PG 400.00] TO BUS 172107 [SHAHJAHAN4 220.00] CKT 2	225.55	332.75	315	105.63	SC 4
134323 DHANANSU4 400.00 132324 DHANANSU42 220.00 1	OPEN LINE FROM BUS 134323 [DHANANSU4 400.00] TO BUS 132324 [DHANANSU42 220.00] CKT 2	397.33	527.76	500	105.55	SC 4
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 1	OPEN LINE FROM BUS 354015 [MUNDRA-APL 400.00] TO BUS 352015 [MUNDRA-APL 220.00] CKT 2	242.93	330.44	315	104.90	SC 4
174058 ORAI 400.00 172124 ORAI 42 220.00 2	OPEN LINE FROM BUS 174058 [ORAI 400.00] TO BUS 172124 [ORAI 42 220.00] CKT 3	243.76	325.47	315	103.32	SC 4
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	SING OPN TIE 6015 524034-522144(2)	722.18	1089.64	500	217.93	SC 5
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	SING OPN TIE 4424 194054-192054(2)	232.15	467.21	240	194.67	SC 5
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 1	SING OPN TIE 4633 354015-352015(2)	314.67	427.84	315	135.82	SC 5
174058 ORAI 400.00 172124 ORAI 42 220.00 3	SING OPN TIE 4145 174058-172124(2)	194.69	291.63	240	121.51	SC 5
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4513 314013-312013(2)	176.87	358.46	315	113.80	SC 5

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
524012 KAIGA 400.00 522012 KAIG 220.00 1	SING OPN TIE 5995 524012-522012(2)	319.1	544.53	500	108.91	SC 5
174058 ORAI 400.00 172124 ORAI 42 220.00 2	SING OPN TIE 4146 174058-172124(3)	255.63	342.27	315	108.66	SC 5
524047 NAREND-4 400.00 522047 NARENDRA 220.00 1	SING OPN TIE 6026 524047-522047(2)	386.1	519.82	500	103.96	SC 5
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 1	SING OPN TIE 3710 144483-142287(2)	416.62	514.57	500	102.91	SC 5
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	SING OPN TIE 5253 374058-372357(2)	376.59	514	500	102.80	SC 5
504133 URVKND 400.00 502133 URAVAKONDA 220.00 1	SING OPN TIE 5808 504133-502133(2)	380.13	513.33	500	102.67	SC 5
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	SING OPN TIE 6014 524034-522144(1)	722.18	1089.64	500	217.93	SC 5
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 2	SING OPN TIE 4423 194054-192054(1)	232.15	467.21	240	194.67	SC 5
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 2	SING OPN TIE 4632 354015-352015(1)	314.67	427.84	315	135.82	SC 5
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4512 314013-312013(1)	176.87	358.46	315	113.80	SC 5
524012 KAIGA 400.00 522012 KAIG 220.00 2	SING OPN TIE 5994 524012-522012(1)	319.1	544.53	500	108.91	SC 5
524047 NAREND-4 400.00 522047 NARENDRA 220.00 2	SING OPN TIE 6025 524047-522047(1)	386.1	519.82	500	103.96	SC 5
144483 KURUKSHETR 400.00 142287 KURUKSHETRA 220.00 2	SING OPN TIE 3709 144483-142287(1)	416.62	514.57	500	102.91	SC 5
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	SING OPN TIE 5252 374058-372357(1)	376.59	514	500	102.80	SC 5
504133 URVKND 400.00 502133 URAVAKONDA 220.00 2	SING OPN TIE 5807 504133-502133(1)	380.13	513.33	500	102.67	SC 5
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 2	OPEN LINE FROM BUS 524034 [KUDGI-NT 400.00] TO BUS 522144 [KUDGI-NTPC 220.00] CKT 1	494.63	740.56	500	148.11	SC 6
374057 DOLVI 400.00 372244 JSW 220.00 2	OPEN LINE FROM BUS 374057 [DOLVI 400.00] TO BUS 372244 [JSW 220.00] CKT 1	328.51	738.32	500	147.66	SC 6
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 2	OPEN LINE FROM BUS 194054 [PIPALKOTI SW400.00] TO BUS 192054 [PIPALKOTI SW220.00] CKT 1	174.94	350.96	240	146.23	SC 6

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 2	OPEN LINE FROM BUS 354015 [MUNDRA-APL 400.00] TO BUS 352015 [MUNDRA-APL 220.00] CKT 1	275.31	374.64	315	118.93	SC 6
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 1	176.87	358.48	315	113.80	SC 6
524034 KUDGI-NT 400.00 522144 KUDGI-NTPC 220.00 1	OPEN LINE FROM BUS 524034 [KUDGI-NT 400.00] TO BUS 522144 [KUDGI-NTPC 220.00] CKT 2	494.63	740.56	500	148.11	SC 6
374057 DOLVI 400.00 372244 JSW 220.00 1	OPEN LINE FROM BUS 374057 [DOLVI 400.00] TO BUS 372244 [JSW 220.00] CKT 2	328.51	738.32	500	147.66	SC 6
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	OPEN LINE FROM BUS 194054 [PIPALKOTI SW400.00] TO BUS 192054 [PIPALKOTI SW220.00] CKT 2	174.94	350.96	240	146.23	SC 6
354015 MUNDRA-APL 400.00 352015 MUNDRA-APL 220.00 1	OPEN LINE FROM BUS 354015 [MUNDRA-APL 400.00] TO BUS 352015 [MUNDRA-APL 220.00] CKT 2	275.31	374.64	315	118.93	SC 6
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 2	176.87	358.48	315	113.80	SC 6
544026 KANAPATT 400.00 542148 KANARP42 230.00 2	SING OPN TIE 6219 544026-542148(1)	350.08	703.61	315	223.37	SC 7
164428 CHITTOR4 400.00 162228 CHITTOR-42 220.00 2	SING OPN TIE 3891 164428-162228(3)	337.25	477.4	315	151.56	SC 7
374022 AKOLA-I 400.00 372045 AKOLA220 220.00 2	SING OPN TIE 5136 374022-372045(4)	314.85	435.72	315	138.32	SC 7
504007 CUDP 400.00 502216 CHINAKAMPALL220.00 2	SING OPN TIE 5676 504007-502216(3)	309.6	428.38	315	135.99	SC 7
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 2	SING OPN TIE 3840 164405-162914(1)	284.33	382.04	315	121.28	SC 7
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	SING OPN TIE 5237 374058-372357(1)	435	594.91	500	118.98	SC 7
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4512 314013-312013(1)	176.87	358.46	315	113.80	SC 7
174431 KANPUR 400.00 172103 KANPU-PG 220.00 2	SING OPN TIE 4216 174431-172103(1)	278.14	353.47	315	112.21	SC 7
544132 KAMUTHI4 400.00 542130 KAMUDHI42 230.00 2	SING OPN TIE 6320 544132-542130(1)	178.65	352.87	315	112.02	SC 7
164420 KOTA 400.00 162919 KOTA 220.00 2	SING OPN TIE 3877 164420-162919(1)	272.6	348.97	315	110.78	SC 7
544026 KANAPATT 400.00 542148 KANARP42 230.00 1	SING OPN TIE 6220 544026-542148(2)	350.08	703.61	315	223.37	SC 7

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
164428 CHITTOR4 400.00 162228 CHITTOR-42 220.00 1	SING OPN TIE 3891 164428-162228(3)	337.25	477.4	315	151.56	SC 7
374022 AKOLA-I 400.00 372045 AKOLA220 220.00 1	SING OPN TIE 5136 374022-372045(4)	314.85	435.72	315	138.32	SC 7
504007 CUDP 400.00 502216 CHINAKAMPALL220.00 1	SING OPN TIE 5676 504007-502216(3)	309.6	428.38	315	135.99	SC 7
374022 AKOLA-I 400.00 372045 AKOLA220 220.00 4	SING OPN TIE 5134 374022-372045(1)	502	608.27	500	121.65	SC 7
164405 BHINMAL 400.00 162914 BHINM-PG 220.00 1	SING OPN TIE 3841 164405-162914(2)	284.33	382.04	315	121.28	SC 7
504007 CUDP 400.00 502216 CHINAKAMPALL220.00 3	SING OPN TIE 5674 504007-502216(1)	491.57	595.6	500	119.12	SC 7
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	SING OPN TIE 5238 374058-372357(2)	435	594.91	500	118.98	SC 7
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4513 314013-312013(2)	176.87	358.46	315	113.80	SC 7
174431 KANPUR 400.00 172103 KANPU-PG 220.00 1	SING OPN TIE 4217 174431-172103(2)	278.14	353.47	315	112.21	SC 7
544132 KAMUTHI4 400.00 542130 KAMUDHI42 230.00 1	SING OPN TIE 6321 544132-542130(2)	178.65	352.87	315	112.02	SC 7
164420 KOTA 400.00 162919 KOTA 220.00 1	SING OPN TIE 3878 164420-162919(2)	272.6	348.97	315	110.78	SC 7
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 2	OPEN LINE FROM BUS 194054 [PIPALKOTI SW400.00] TO BUS 192054 [PIPALKOTI SW220.00] CKT 1	151.46	303.51	240	126.46	SC 8
454412 WARIA ST 400.00 452012 WARIA-DTPS 220.00 2	OPEN LINE FROM BUS 444422 [DURGAPUR-B 400.00] TO BUS 454012 [WARIA-400 400.00] CKT 1	172.66	377.69	315	119.90	SC 8
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 1	176.87	358.46	315	113.80	SC 8
314004 BHI4 400.00 312004 BHILAI 220.00 2	OPEN LINE FROM BUS 314004 [BHI4 400.00] TO BUS 312004 [BHILAI 220.00] CKT 1	285.06	348.34	315	110.58	SC 8
374043 AURANG-CHTPM400.00 372340 PG-AURANGABD220.00 2	OPEN LINE FROM BUS 374043 [AURANG-CHTPM400.00] TO BUS 372340 [PG-AURANGABD220.00] CKT 1	249.59	346.77	315	110.09	SC 8
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 2	OPEN LINE FROM BUS 374058 [LONIKANDII 400.00] TO BUS 372357 [LONIKANDII2 220.00] CKT 1	368.94	506.25	500	101.25	SC 8
194054 PIPALKOTI SW400.00 192054 PIPALKOTI SW220.00 1	OPEN LINE FROM BUS 194054 [PIPALKOTI SW400.00] TO BUS 192054 [PIPALKOTI SW220.00] CKT 2	151.46	303.51	240	126.46	SC 8

Monitored Element	Contingency	Base Flow	Flow Under Contingency	Rate	% Loading	Scenario
454412 WARIA ST 400.00 452012 WARIA-DTPS 220.00 1	OPEN LINE FROM BUS 444422 [DURGAPUR-B 400.00] TO BUS 454012 [WARIA-400 400.00] CKT 1	172.66	377.69	315	119.90	SC 8
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	OPEN LINE FROM BUS 314013 [JINDAL-B2 400.00] TO BUS 312013 [JINDAL-B2 220.00] CKT 2	176.87	358.46	315	113.80	SC 8
314004 BHI4 400.00 312004 BHILAI 220.00 1	OPEN LINE FROM BUS 314004 [BHI4 400.00] TO BUS 312004 [BHILAI 220.00] CKT 2	285.06	348.34	315	110.58	SC 8
374043 AURANG-CHTPM400.00 372340 PG-AURANGABD220.00 1	OPEN LINE FROM BUS 374043 [AURANG-CHTPM400.00] TO BUS 372340 [PG-AURANGABD220.00] CKT 2	249.59	346.77	315	110.09	SC 8
374058 LONIKANDII 400.00 372357 LONIKANDII2 220.00 1	OPEN LINE FROM BUS 374058 [LONIKANDII 400.00] TO BUS 372357 [LONIKANDII2 220.00] CKT 2	368.94	506.25	500	101.25	SC 8
374057 DOLVI 400.00 372244 JSW 220.00 2	SING OPN TIE 5250 374057-372244(1)	299.17	642.05	500	128.41	SC 9
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 2	SING OPN TIE 4512 314013-312013(1)	176.87	358.48	315	113.80	SC 9
374057 DOLVI 400.00 372244 JSW 220.00 1	SING OPN TIE 5251 374057-372244(2)	299.17	642.05	500	128.41	SC 9
314013 JINDAL-B2 400.00 312013 JINDAL-B2 220.00 1	SING OPN TIE 4513 314013-312013(2)	176.87	358.48	315	113.80	SC 9

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Annex 3.8

765kV Buses Exceeding Design Fault Current

Area	BusName	Sc-1	Sc-2	Sc-3	Sc-4	Sc-5	Sc-6	Sc-7	Sc-8	Sc-9	Max	Design Level	Remark
WEST	AHMDABAD PG 765.00	55	46	45	55	46	45	54	47	47	55	50	ISTS
NORTH	AJMER-NW 765.00	44	40	40	43	41	41	44	41	41	44	40	ISTS
NORTH	ALIGARH 765.00	52	49	48	52	50	50	51	49	48	52	40	ISTS
SOUTH	KURL800 765.00	63	58	59	63	59	60	66	64	63	66	40	ISTS
SOUTH	RAIC800 765.00	55	51	52	55	52	53	58	56	53	58	40	ISTS
WEST	AURANG-CHTPM765.00	43	42	42	43	42	42	44	41	42	44	40	ISTS
NORTH	BHADLA-2 765.00	47	39	39	47	40	40	47	39	39	47	40	ISTS
SOUTH	MAHESHWARAM 765.00	54	51	52	54	52	52	56	56	55	56	40	ISTS
NORTH	BIKANER-NW 765.00	47	40	40	47	41	41	47	40	40	47	40	ISTS
WEST	BINA-PG-7 765.00	43	43	42	43	44	43	44	44	44	44	40	ISTS
WEST	BLPSR WR 765.00	46	47	46	46	47	46	49	49	48	49	40	ISTS
WEST	BOISAR-II 765.00	55	52	52	54	52	52	54	53	53	55	50	ISTS
SOUTH	KURNOOL-III 765.00	52	47	48	52	48	48	53	51	50	53	50	ISTS
SOUTH	KURN5_7 765.00	50	45	46	50	46	47	53	50	47	53	50	ISTS
SOUTH	TIRUVLM 765.00	43	40	40	44	41	41	48	47	46	48	40	ISTS
SOUTH	CUDP800 765.00	45	42	43	45	43	43	47	46	45	47	40	ISTS
SOUTH	WARANGAL NEW765.00	44	43	44	44	44	44	46	47	46	47	40	ISTS
NORTH	GNOIDAUP 765.00	44	42	41	45	44	44	42	41	41	45	40	STU
WEST	GWALIOR 765.00	43	42	42	43	43	43	44	43	42	44	40	ISTS
WEST	INDORE-7 765.00	43	42	41	43	43	43	44	43	43	44	40	ISTS
NORTH	JAIPUR 765.00	54	50	50	53	51	51	54	51	51	54	40	STU
NORTH	JHATI-PG 765.00	43	41	40	43	42	41	43	41	41	43	40	ISTS
WEST	LAKADIA 765 765.00	54	44	43	54	44	43	54	44	44	54	50	ISTS
WEST	PADGHEGIS 765.00	49	47	47	49	47	47	49	47	47	49	40	ISTS

WEST	SIPAT	765.00	43	43	42	43	43	43	44	44	44	44	40	ISTS
WEST	VADODARA	765.00	53	49	48	53	49	48	53	49	49	53	50	ISTS
NORTH	VARNASI8	765.00	44	43	43	44	43	43	44	43	43	44	40	ISTS
WEST	VATAMAN	765.00	56	49	48	56	49	48	56	49	49	56	50	ISTS
WEST	WARDHA	765.00	43	43	43	43	43	43	44	43	43	44	40	ISTS

400kV Buses Exceeding Design Fault Current

Highlighted cell indicates 400 kV Bus Fault Current > Design level

Area	BusName	Sc-1	Sc-2	Sc-3	Sc-4	Sc-5	Sc-6	Sc-7	Sc-8	Sc-9	Max	Design Level	Remark
NORTH	ABDULLAP 400.00	55	53	52	55	54	53	53	52	52	55	40	ISTS
SOUTH	KURL-NEW 400.00	80	75	76	82	75	76	83	80	78	83	50	ISTS
SOUTH	DODDABALAPUR400.00	78	68	69	78	69	70	80	73	74	80	63	STU
NORTH	AGRA 400.00	62	61	60	62	61	61	62	61	60	62	40	ISTS
NORTH	AGRANEW 400.00	48	47	46	49	48	48	48	47	46	49	40	STU
SOUTH	KURNOOL-III 400.00	74	66	67	74	67	68	75	70	69	75	63	ISTS
NORTH	ALIGARH 400.00	43	42	41	45	44	44	42	41	41	45	40	ISTS
SOUTH	KURNOOL4 400.00	71	67	68	73	68	68	74	72	70	74	40	STU
NORTH	ALLAHABA 400.00	58	56	55	58	56	56	54	52	52	58	40	ISTS
SOUTH	KGLAYOUT 400.00	66	60	61	67	61	61	67	63	64	67	63	STU
SOUTH	MADHUGI4 400.00	65	58	59	66	59	58	67	62	63	67	50	ISTS
SOUTH	KHAMMAM 400.00	60	60	61	60	61	61	64	65	64	65	40	ISTS
SOUTH	NELMANG4 400.00	62	57	56	62	57	57	62	58	59	62	40	STU
SOUTH	BIDADI 400.00	61	56	56	61	56	56	61	58	59	61	40	ISTS
SOUTH	SMNH 400.00	61	57	56	61	57	57	61	59	59	61	40	ISTS
NORTH	ANPARA-D 400.00	42	41	41	42	42	42	42	41	41	42	40	GEN
NORTH	ANPARA4 400.00	46	45	45	47	46	46	46	45	45	47	40	GEN
NORTH	ANPARAC 400.00	45	44	44	46	45	45	45	44	44	46	40	GEN
NORTH	ANTA-4 400.00	42	41	42	43	43	43	44	43	43	44	40	STU
SOUTH	NARDR-NW 400.00	49	45	46	49	45	46	60	57	58	60	50	ISTS
WEST	ATHENA 400.00	46	47	43	27	50	46	48	48	46	50	40	GEN
WEST	AURANG-CHTPM400.00	57	54	54	56	54	53	57	53	54	57	50	ISTS
WEST	AURANGABD-II400.00	49	44	44	49	44	43	50	44	45	50	40	STU

WEST	AURANGBD-I 400.00	51	45	45	50	45	45	52	46	47	52	40	STU
NORTH	BABAI 400.00	49	47	46	48	47	47	49	47	47	49	40	STU
WEST	BABLESWAR 400.00	44	41	41	44	42	41	44	41	42	44	40	STU
WEST	BACHAU 400.00	47	44	44	47	44	44	47	45	45	47	40	ISTS
NORTH	BAL74-PG 400.00	49	49	48	49	49	49	49	49	48	49	40	ISTS
NORTH	BALLABHG 400.00	50	49	47	50	49	48	49	48	48	50	40	ISTS
WEST	BANASKANTHA 400.00	63	54	54	63	54	54	64	55	56	64	50	ISTS
NORTH	BARA 400.00	56	53	53	56	54	54	53	50	50	56	40	STU
NORTH	BAREILY 400.00	59	57	52	59	58	53	53	52	52	59	50	ISTS
NORTH	BAREL-PG 400.00	59	58	52	59	58	53	53	52	52	59	50	ISTS
NORTH	BARELI4 400.00	44	43	39	44	43	39	39	39	38	44	40	STU
NORTH	BASSI 400.00	61	58	58	60	59	59	61	59	58	61	40	ISTS
NORTH	BAWANA 400.00	54	53	52	51	55	54	54	53	53	55	40	STU
NORTH	BAWANA-G 400.00	54	53	52	51	54	54	54	53	52	54	40	STU
SOUTH	UDMP 400.00	53	50	50	54	50	50	57	55	54	57	40	ISTS
SOUTH	TIRUNEL4 400.00	52	48	48	53	48	48	57	54	54	57	40	ISTS
NORTH	BHADLA 400.00	55	45	45	54	45	45	55	45	45	55	40	STU
NORTH	BHADLA PG 400.00	61	48	48	60	48	48	60	48	49	61	50	ISTS
NORTH	BHADLA-2 400.00	63	49	49	61	50	50	62	50	50	63	50	ISTS
WEST	BHADR4 400.00	41	40	40	40	40	40	46	45	45	46	40	ISTS
NORTH	BHIWADI 400.00	62	59	58	61	60	59	61	60	59	62	40	ISTS
NORTH	BHIWANI-PG 400.00	59	55	54	59	56	55	58	55	54	59	50	ISTS
WEST	BHOPAL-4 400.00	46	45	44	45	45	44	46	44	44	46	40	STU
SOUTH	CPETA400 400.00	52	53	53	52	53	54	55	56	55	56	50	ISTS
SOUTH	KUDGI-NT 400.00	44	40	42	44	41	42	56	53	54	56	50	ISTS
SOUTH	NSAGAR 400.00	54	55	53	54	55	53	55	56	55	56	40	ISTS
NORTH	BIKANER-3 400.00	89	67	66	87	68	67	88	67	67	89	63	ISTS
NORTH	BIKANER-II 400.00	73	56	55	72	56	55	73	56	56	73	50	ISTS

NORTH	BIKANER-IV 400.00	73	57	56	71	57	56	72	56	57	73	63	ISTS
NORTH	BIKANER-NW 400.00	68	54	54	67	55	54	67	54	54	68	50	ISTS
WEST	BIL-POOL 400.00	51	52	51	51	52	51	54	55	54	55	40	ISTS
SOUTH	CNHALLI 400.00	54	49	50	54	50	51	55	52	53	55	40	STU
WEST	BINA-4 400.00	43	42	42	44	44	44	45	45	44	45	40	STU
WEST	BINA-PG-74 400.00	43	42	42	44	45	44	45	45	45	45	40	ISTS
WEST	BOISAR 400.00	50	49	49	49	49	49	49	48	49	50	40	ISTS
SOUTH	RAIC-NEW 400.00	50	48	49	50	48	49	55	54	54	55	50	ISTS
WEST	CGPL 400.00	49	47	46	49	47	46	49	47	47	49	40	GEN
SOUTH	NYVL TS 2 400.00	40	38	38	44	39	39	54	53	50	54	40	ISTS
SOUTH	PUGALUR-NEW 400.00	51	47	47	52	47	43	54	52	51	54	50	ISTS
WEST	CHANDRAPUR I 400.00	46	45	45	46	45	45	52	50	51	52	40	GEN
WEST	CHANDRPR-II 400.00	46	45	45	46	45	45	52	51	51	52	40	GEN
SOUTH	KETHIREDDYPA 400.00	51	51	51	51	51	51	53	53	52	53	50	STU
NORTH	CHIT-NEW 400.00	46	44	44	44	44	44	45	43	44	46	40	ISTS
WEST	CHNDPUR_SW 400.00	44	44	43	44	44	43	50	48	48	50	40	GEN
WEST	CHORN4 400.00	46	44	43	46	44	43	46	44	45	46	40	STU
SOUTH	PUGALUR4 400.00	49	46	46	50	46	42	53	50	50	53	40	ISTS
SOUTH	DHANLLI 400.00	52	48	48	52	48	49	52	50	51	52	40	STU
SOUTH	VIJ-AP 400.00	48	49	49	48	49	50	51	52	52	52	40	STU
SOUTH	VIZPOOL 400.00	41	41	42	40	42	42	51	51	51	51	40	STU
SOUTH	VELTOOR 400.00	48	47	48	48	48	48	50	50	49	50	40	STU
NORTH	DADR-HVD 400.00	55	57	55	60	63	62	53	56	56	63	40	GEN
NORTH	DADR-NCR 400.00	56	58	56	61	64	64	54	57	57	64	40	GEN
NORTH	DAULATABAD4 400.00	50	49	47	53	52	51	53	51	51	53	40	STU
WEST	DB POWER 400.00	34	35	33	38	43	41	43	43	42	43	40	GEN
WEST	DEHGM4 400.00	45	43	42	45	43	42	45	43	43	45	40	ISTS
SOUTH	SIMHADRI 400.00	39	40	40	39	40	41	50	50	49	50	40	ISTS

NORTH	DHANONDA	400.00	61	59	58	62	60	60	61	59	59	62	40	STU
WEST	DHARIWAL	400.00	39	39	39	39	39	38	44	43	43	44	40	GEN
WEST	DHARIWAL	400.00	39	39	39	39	39	38	44	43	43	44	40	GEN
SOUTH	DICHPAL4	400.00	46	46	46	46	46	46	49	49	48	49	40	STU
WEST	DHULE4	400.00	44	40	40	44	40	39	44	39	40	44	40	STU
SOUTH	NEY_IIEEX	400.00	37	35	35	40	36	36	49	48	46	49	40	ISTS
SOUTH	SIMHD-II	400.00	39	40	40	39	40	40	49	49	49	49	40	ISTS
SOUTH	NAGAPTNM4	400.00	40	38	38	41	39	39	49	48	47	49	40	ISTS
SOUTH	GAZU-SR	400.00	39	39	40	39	40	40	48	48	48	48	40	ISTS
SOUTH	GAZW	400.00	39	39	40	39	40	40	48	48	48	48	40	ISTS
EAST	FARAKKA	400.00	42	43	42	47	47	47	42	42	42	47	40	ISTS
NORTH	FATEH-PG	400.00	53	51	47	54	53	49	48	47	46	54	50	ISTS
NORTH	FATEHG-2	400.00	60	45	46	59	45	46	60	45	46	60	50	ISTS
NORTH	FATEHG-3	400.00	64	47	46	60	47	46	63	47	47	64	50	ISTS
SOUTH	GAJWEL4	400.00	44	44	44	43	44	44	47	48	47	48	40	STU
WEST	GANCS4	400.00	56	57	56	56	57	56	55	56	57	57	40	GEN
NORTH	GAZIABAD	400.00	50	48	47	50	49	49	49	48	48	50	40	STU
SOUTH	HYDERABAD	400.00	44	44	44	44	44	44	46	47	46	47	40	ISTS
NORTH	GHATAM400	400.00	39	37	37	42	41	41	38	37	37	42	40	STU
NORTH	GNOIDA4	400.00	59	59	57	62	62	62	57	58	57	62	40	STU
NORTH	GNOIDAUP	400.00	63	62	60	66	65	64	61	61	60	66	40	STU
SOUTH	YELAHNKA	400.00	46	43	44	46	44	44	46	45	46	46	40	ISTS
NORTH	GOPAL PUR	400.00	46	46	45	46	47	46	45	46	45	47	40	STU
SOUTH	RAMGUNDM STP400.00		32	32	32	32	32	32	45	46	45	46	40	ISTS
SOUTH	VEMAGIR4	400.00	43	44	44	43	44	44	45	46	45	46	40	STU
NORTH	GURGAON	400.00	53	51	50	54	53	52	54	52	52	54	50	ISTS
NORTH	HAPUR	400.00	44	43	42	44	44	44	44	43	43	44	40	STU
SOUTH	MAMIDIPALLY	400.00	44	44	44	44	44	44	45	45	45	45	40	STU

NORTH	HERAPU-4	400.00	43	42	41	42	41	41	43	42	42	43	40	STU
SOUTH	ALMATI4	400.00	38	38	38	39	38	38	44	44	44	44	40	STU
SOUTH	SALE	400.00	42	41	41	42	41	41	44	43	44	44	40	ISTS
SOUTH	ARSUR4	400.00	42	40	40	42	40	39	44	43	43	44	40	STU
WEST	INDORE-4	400.00	43	43	42	42	43	42	43	42	43	43	40	STU
WEST	ITARSI-4	400.00	43	43	43	43	43	43	44	43	43	44	40	ISTS
WEST	JABALPR-POOL	400.00	49	48	48	48	49	48	56	55	55	56	50	ISTS
WEST	JABALPUR-4	400.00	45	44	44	44	44	44	49	48	48	49	40	ISTS
NORTH	JAIPUR_PG	400.00	45	43	43	44	43	43	45	44	43	45	40	ISTS
NORTH	JAIPUR_RS	400.00	63	60	60	62	61	61	63	61	61	63	40	STU
NORTH	JAISALMER-2	400.00	44	36	36	44	36	36	44	36	36	44	40	STU
NORTH	JALANDHAR4	400.00	45	43	44	45	44	44	44	44	44	45	40	ISTS
SOUTH	VALLUR TPS	400.00	35	35	35	35	35	35	44	43	44	44	40	ISTS
WEST	JEJ4	400.00	46	43	44	45	43	43	46	43	45	46	40	STU
NORTH	JHAJAR_N	400.00	50	48	48	50	49	49	49	48	48	50	40	GEN
NORTH	JINDPG	400.00	49	47	47	49	48	48	47	46	46	49	40	ISTS
NORTH	KABULPUR	400.00	46	45	45	46	46	46	46	45	45	46	40	STU
SOUTH	GMR_VMGR4	400.00	41	42	42	41	42	42	43	43	43	43	40	STU
SOUTH	HINDJ-OA	400.00	36	37	37	36	37	37	43	43	43	43	40	STU
NORTH	KAITHAL	400.00	44	43	43	44	44	43	43	43	43	44	40	ISTS
SOUTH	MADURAI4	400.00	40	37	37	40	37	37	43	41	41	43	40	ISTS
SOUTH	TIRUVLM SE-B	400.00	41	40	40	41	40	40	42	42	42	42	40	ISTS
NORTH	KANPRNEW	400.00	52	52	50	53	53	52	50	50	50	53	50	ISTS
WEST	KARAD4	400.00	45	42	44	45	42	42	46	42	45	46	40	STU
NORTH	KARCHNA	400.00	44	43	42	44	43	43	43	41	41	44	40	STU
WEST	KHARGAR	400.00	44	43	43	43	43	42	43	42	43	44	40	STU
NORTH	KHETRI	400.00	52	49	48	51	49	49	51	49	49	52	50	ISTS
WEST	LONIKAND I	400.00	51	48	49	50	49	49	51	48	49	51	40	STU

NORTH	LUCK4-PG 400.00	60	60	55	60	61	56	55	55	55	61	40	ISTS
NORTH	LUCK74-P 400.00	57	57	53	57	58	54	53	52	52	58	40	ISTS
NORTH	MAINPURIUP 400.00	46	44	41	46	45	42	42	41	41	46	40	STU
NORTH	MANDOLA 400.00	55	54	53	56	56	56	53	54	53	56	40	ISTS
NORTH	MEERUT 400.00	70	68	65	70	70	67	66	65	65	70	40	ISTS
NORTH	MEJA 400.00	57	55	54	57	56	55	51	49	49	57	40	GEN
NORTH	MUNDKA 400.00	41	40	39	42	43	42	43	42	42	43	40	STU
WEST	MUNDRA-APL 400.00	26	25	24	26	25	24	44	43	43	44	40	GEN
WEST	NAGDA-4 400.00	44	45	44	44	45	44	45	45	45	45	40	STU
NORTH	NEEMR-PG 400.00	61	58	57	61	59	59	61	59	58	61	40	ISTS
NORTH	NOIDA-SEC123400.00	48	47	46	49	48	48	48	47	47	49	40	STU
NORTH	NOIIDA-148 400.00	54	53	52	55	54	54	53	53	52	55	40	STU
WEST	PADGH4 400.00	45	44	44	44	44	44	44	43	44	45	40	STU
WEST	PADGHEGIS 400.00	55	53	53	54	54	53	54	53	53	55	50	ISTS
NORTH	PANCHKULA-PG400.00	52	50	50	52	51	51	51	50	51	52	40	ISTS
NORTH	PATIALA4 400.00	49	47	47	49	48	48	47	47	47	49	40	ISTS
WEST	PUNE-PG-AIS 400.00	50	48	49	50	48	48	50	48	49	50	40	ISTS
WEST	PUNE-PG-GIS 400.00	54	51	52	53	52	51	54	51	52	54	50	ISTS
EAST	PURNEA-NW-PG400.00	46	46	45	47	47	46	46	46	45	47	40	ISTS
WEST	RANCHODPURA 400.00	45	42	42	45	42	42	45	43	43	45	40	STU
NORTH	REWA 400.00	46	45	44	46	45	45	44	42	42	46	40	STU
NORTH	SARNATH4 400.00	46	45	45	46	45	45	46	45	45	46	40	STU
WEST	SEONIPG-4 400.00	44	45	42	43	45	42	42	42	41	45	40	ISTS
NORTH	SIKANDERABAD400.00	44	43	42	46	45	45	43	43	42	46	40	STU
NORTH	SIKAR 400.00	50	47	46	49	47	47	49	47	47	50	40	ISTS
EAST	SILIGURI-PG 400.00	42	42	40	42	42	41	41	42	41	42	40	ISTS
WEST	SOJA4 400.00	47	44	43	47	44	43	47	44	45	47	40	STU
NORTH	SONAROAD 400.00	44	42	41	43	42	42	43	42	42	44	40	STU

WEST	TAPS4	400.00	47	47	47	47	47	46	47	46	47	47	40	GEN
NORTH	TIKRI KHURD	400.00	48	47	46	45	48	47	48	47	46	48	40	STU
WEST	UJJAIN-4	400.00	42	42	41	41	42	41	43	42	43	43	40	STU
NORTH	UNNAO4	400.00	44	43	39	44	44	40	40	40	39	44	40	STU
WEST	VADODARA	400.00	57	55	54	57	55	54	57	55	55	57	50	ISTS
NORTH	VARANASI	400.00	53	52	52	53	52	52	53	52	52	53	50	ISTS
WEST	ZERDA	400.00	43	37	37	43	37	37	45	38	39	45	40	STU

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Annex 3.9

ISTS Network Expansion Plan upto 2030-31

1. Transmission lines

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
1.	2026-27	NER	Gogamukh (ISTS) – Gerukamukh (Arunachal Pradesh) 132kV D/c (Zebra) line	132	D/c	60		
2.	2026-27	NER	LILO of one D/c (ckt-1 & ckt-2 of line-1) of Lower Subansiri – Biswanath Chariali 400kV (Twin Lapwing) 2xD/c lines at Gogamukh S/s	400	2*D/c	30		
3.	2026-27	ER	Angul (POWERGRID) –Paradeep 765 kV D/c line along with 765kV, 1x330 MVar switchable line reactor with 500 ohm NGR (with NGR bypass arrangement) at Paradeep end in both circuits	765	D/c	358		330
4.	2026-27	ER	Paradeep – Paradeep (OPTCL) 400 kV D/c(Quad) line	400	D/c	26		330
5.	2026-27	NER	LILO of both circuits of Misa (POWERGRID) – New Mariani (POWERGRID) 400 kV D/c line at Bokajan switching station along with 420 kV, 50 MVar switchable line reactor (one in each circuit) in Bokajan – New Mariani 400 kV D/c line at Bokajan formed after above LILO	400	D/c	24		100
6.	2027-28	ER	LILO of both circuits of Angul – Sundargarh (Jharsuguda) 765 kV 2xS/c lines at NLCTalabira generation switchyard	765	2*S/c	100		
7.	2027-28	ER	Angul – Gopalpur 765 kV D/c line	765	D/c	356		330
8.	2027-28	ER	Gopalpur – Gopalpur (OPTCL) 400kV D/c (Quad) line@	400	D/c	26		330
9.	2028-29	NER	LILO of both circuits of existing Bongaigaon (POWERGRID) –Balipara (POWERGRID) 400 kV D/c (Quad) line at Bornagar(ISTS)	400	D/c	54		126
10.	2028-29	NER	Disconnection of Alipurduar (POWERGRID) – Bongaigaon (POWERGRID) 400 kV D/c (Quad) line from Bongaigaon (POWERGRID) end and extension of the line for termination at Bornagar (ISTS) S/s so as to form Alipurduar(POWERGRID) – Bornagar(ISTS) 400 kV D/c (Quad) line	400	D/c	176		160
11.	2028-29	NER	Kaying PS – Niglok PS 400 kV D/c (Quad) line	400	D/c	200		
12.	2028-29	NER	Niglok PS – Gogamukh 400 kV D/c (Quad) line	400	D/c	250	100	
13.	2025-26	NER	One (1) new 132kV line bay at Melriat (GIS) (POWERGRID) S/s (of rating commensurate with rating of HTLS viz. 900A) for shifting of Melriat (GIS) (POWERGRID) – Zuangtui (Mizoram) 132kV HTLS line from existing bay and termination of the HTLS	132	S/c	1		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
			line in the new bay (0.5km including approx. 5 nos. towers)					
14.	2026-27	ER	Shifting of Ranchi (POWERGRID) – Raghunathpur (DVC) 400kV D/c (Quad) line to bays 431 and 434 in diameters 431-432-433 and 434-435-436 at Ranchi (POWERGRID) end: about 1.27km new line section (refer note a).	400	D/c	3		
15.	2027-28	NER	Stringing of 2nd circuit of Pasighat (Arunachal Pradesh) – Roing (POWERGRID) 132kV S/c on D/c line with ACSR Panther conductor commensurate with rating and maximum operating temperature of 1st circuit	132	S/c	103		
16.	2027-28	NER	Stringing of 2nd circuit of Roing (POWERGRID) – Tezu (POWERGRID) 132kV S/c on D/c line with ACSR Panther conductor commensurate with rating and maximum operating temperature of 1st circuit	132	S/c	73		
17.	2027-28	NER	Stringing of 2nd circuit of Tezu (POWERGRID) – Namsai (POWERGRID) 132kV S/c on D/c line with ACSR Panther conductor commensurate with rating and maximum operating temperature of 1st circuit	132	S/c	95		
18.	2025-26	SR	Gadag PS - Koppal PS 400 kV (high capacity equivalent to quad moose) D/C Line	400	D/c	100		
19.	2026-27	SR	Narendra New (GIS) – Pune (GIS) 765kV D/c line with 1x330MVar switchable line reactor(SLR) on each ckt at both ends	765	D/c	636	330	330
20.	2026-27	SR	Bidar PS – Maheshwaram (PG) 765 kV D/C line	765	D/c	480	240	
21.	2026-27	SR	Koppal-II PS – Narendra (New) 765 kV D/c line with 240 MVar SLR at Koppal-II PS end	765	D/c	237	240	
22.	2026-27	SR	Gadag-II PS – Koppal-II PS 400 kV (Quad Moose) D/c line	400	D/c	77		
23.	2026-27	SR	Koppal-II PS – Raichur 765 kV D/c line with 330 MVar SLR at Koppal-II PS end	765	D/c	293	330	
24.	2026-27	SR	LILO of Narendra New – Madhugiri 765kV D/c line at Davanagere / Chitradurga 765/400kV PS (~40 km) {with 240 MVar SLR at both ends on Narendra New – Davanagere section (~280 km) and 330 MVar SLR at Davanagere end on Davanagere – Madhugiri section (~200 km)}	765	D/c	160	480	660
25.	2027-28	SR	Bellary PS – Davanagere / Chitradurga 400kV (Quad ACSR moose) D/c line	400	D/c	200		
26.	2026-27	SR	Bijapur PS – Raichur New 400kV (Quad ACSR moose) D/c line	400	D/c	276		
27.	2026-27	SR	KNPP 3&4 – Tuticorin-II GIS PS 400 kV (quad) D/c line (~120 km) {Line & bays at Tuticorin-II GIS under ISTS scope and bays at KNPP under NPCIL scope}	400	D/c	206		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
28.	2026-27	SR	• Tumkur-II – Tumkur(Pavagada) 400 kV (Quad ACSR moose) D/c line	400	D/c	53		
29.	2027-28	SR	Gadag-II PS – Koppal-II PS 400 kV (Quad) 2nd D/c line	400	D/c	90		
30.	2025-26	SR	Mangalore (Udupi PCL) –Kasargode 400kV D/c line	400	D/c	232		
31.	2026-27	SR	Kurnool-III PS – Chilakaluripeta 765 kV D/c line with 240 MVAR switchable line reactors at both ends	765	D/c	520	240	240
32.	2026-27	SR	Kurnool-IV – Bidar 765 kV D/c line (about 330 kms) with 330 MVAR SLR (convertible) at both ends on both circuits	765	D/c	388	330	330
33.	2026-27	SR	Kurnool-IV – Kurnool-III PS 765 kV D/c line (about 150 kms) with 240 MVAR SLR (convertible) at Kurnool-IV end on both circuits	765	D/c	240	240	
34.	2026-27	SR	LILO of Vijayawada-Nellore 400 kV D/c line at C'Peta (about 20 kms)	400	D/c	64		
35.	2026-27	SR	Ananthapuram-II – Davangere 765 kV D/c line (about 150km) with 240 MVAR SLR (convertible) at Ananthapuram-II end on both circuits	765	D/c	236	240	240
36.	2026-27	SR	Ananthapuram-II – Cuddapah 765 kV D/c line (about 200km) with 330 MVAR SLR (convertible) at Ananthapuram-II end on both circuits	765	D/c	565	330	
37.	2028-29	SR	Tuticorin PS – Tuticorin (GH) 765 kV D/c line	765	D/c	100		
38.	2028-29	SR	Ananthapuram-II PS – CN'Halli 765 kV D/c line (about 180 km) with 330 MVAR SLR at Ananthapuram-II end on both circuits	765	D/c	362	330	
39.	2028-29	SR	LILO of one circuit of Talaguppa - Neelmangala 400 kV D/c line at CN'Halli (25 km)	400	D/c	38		
40.	2027-28	SR	LILO of Vemagiri – Srikakulam 765 kV D/c line at Kakinada substation (~20 km) {with 240 MVAR SLR at Kakinada GH end on Srikakulam – Kakinada section (~334 km)}	765	D/c	80	240	
41.	2028-29	SR	LILO of Kurnool-IV – Bidar 765 kV D/c line at Doma (about 20 km)	765	D/c	80		
42.	2028-29	SR	Doma – Shadnagar (TGTRANSCO) 400 kV Twins HTLS D/c line (about 40 km) {TGTRANSCO to upgrade Shadnagar (TGTRANSCO) to 400 kV in matching time frame}	400	D/c	80		
43.	2028-29	SR	Doma – Kethiredipally (TGTRANSCO) 400 kV Twins HTLS D/c line (about 50km)	400	D/c	100		
44.	2028-29	SR	i) LILO at CN'Halli of already LILOed section of one circuit of Talaguppa - Neelmangala 400 kV line at Hassan (25 km)	400	S/c	71		
45.	2028-29	SR	Angul – Srikakulam 765 kV 2nd D/c line (about 275 km) with 240 MVAR SLR at both ends on both circuits	765	D/c	482		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
46.	2027-28	SR	Parli New – Bidar 765 kV D/c line (about 120 km) with 240 MVAR SLR at Bidar end on both circuits	765	D/c	218		
47.	2027-28	SR	Tumkur-II – Madhugiri 400 kV (Quad) D/c line (~ 100 km)	400	D/c	200		
48.	2028-29	SR	Krishnagiri– Doma 765 kV D/c line (about 240 km) with 240 MVAR SLR (convertible) at both ends on both circuits	765	D/c	480		
49.	2028-29	SR	Krishnagiri – Raichur New 765 kV D/c line (about 150 km) with 240 MVAR SLR (convertible) at Raichur New end on both circuits	765	D/c	300		
50.	2028-29	SR	Krishnagiri – Sagar 765 kV D/c line (about 240 km) with 240 MVAR SLR (convertible) at both ends on both circuits	765	D/c	480		
51.	2028-29	SR	Sagar – Nagarjunasagar 400 kV quad D/c line (about 25 km)	400	D/c	50		
52.	2028-29	SR	Pendurthi (Vizag) – Srikakulam 765 kV D/c line (about 200 km) with 330 MVAR SLR (convertible) at Srikakulam end on both circuits 1x330 MVAR bus reactor (ii) Space provision for 2nd ± 300 MVAR STATCOM with 2x125 MVAR MSC at Pendurthi (Vizag) GIS	765	D/c	400		
53.	2028-29	SR	LILO of Kalpakka – Maradam 400 kV (quad) D/c line at Pendurthi (about 20 km)	400	D/c	80		
54.	2028-29	SR	Khammam-II – Warangal New 765 kV D/c line (about 100 km)	765	D/c	200		
55.	2028-29	SR	Khammam-II – Pendurthi (Vizag) 765 kV D/c line (about 350 km) with 330 MVAR SLR (convertible) at both ends on both circuits	765	D/c	700		
56.	2028-29	SR	Khammam-II – Khammam (existing) 400 kV (quad) D/c line (about 20 km)	400	D/c	40		
57.	2029-30	SR	Avaraikulam Onshore PS – Tuticorin PS 400 kV D/c quad line	400	D/c	200		
58.	2029-30	SR	Offshore substation 1 (OSS-1) – Avaraikulam Onshore PS 2 nos. 230kV(atleast 300 MVA capacity) Submarine cables (~35 - 40 km) with 2x50MVAR switchable line reactors at OSS-1 end	230	S/c	80	100	
59.	2026-27	WR	KPS2 (GIS) - Halvad 765 kV D/c line	765	D/c	492	320	240
60.	2026-27	WR	LILO of Lakadia – Ahmedabad 765 kV D/c line at Halvad	765	D/c	68		
61.	2026-27	WR	Dhule PS – Dhule (BDTCL) 400 kV D/c (Quad ACSR/AAAC/AL59 Moose equivalent)	400	D/c	131		
62.	2026-27	WR	LILO of Satna-Gwalior 765 kV S/c line at Karera	765	S/c	85	330	
63.	2026-27	WR	LILO of one circuit of Jabalpur - Orai 765 kV D/c line at Ishanagar 765 kV S/s (New)	765	S/c	35		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
64.	2025-26	WR	Pachora PS – Ujjain (MPPTCL) 400 kV D/c line (Quad ACSR/AAAC/AL59 Moose equivalent)	400	D/c	118		
65.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 9x500 MVA, 400/220kV ICTs at Krishnagiri PS ii) Krishnagiri – Nellore 765 kV D/c line (240 km) 1x240 MVAr SLR (convertible) at both ends on both circuits iii) Khammam-II – Sagar 765 kV D/c line (150 km) 1x240 MVAr SLR (convertible) at Khammam-II end on both circuits	765	D/c	400		
66.	2029-30	SR	i) Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station along with 2x330 MVAr bus reactor ii) $\pm$ 300 MVAr STATCOM at Kadapa-II iii) Kadapa-II – Thiruvelam 765kV D/c line (250 km) 1x240 MVAr SLR (convertible) at both ends on both circuits iv) Ananthapuram-III – Kadapa-II 765kV D/c line (220 km) with 1x330 MVAr SLR (convertible) at Ananthapuram-III end on both circuits	765	D/c	940	480	480
67.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station ii) Upgradation of Nagapattinam GIS to 765 kV level with 2x1500 MVA, 765/400kV ICTs iii) Thiruvelam – Nagapattinam 765kV D/c line (250 km) 1x240 MVAr SLR (convertible) at both ends on both circuit	765	D/c	500	660	
68.	2029-30	SR	Transmission System for Integration of Anantapur-III REZ (Ph-I)			880		
69.	2029-30	SR	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-II)	765		830		
70.	2029-30	SR	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-II)			860		
71.	2028-29	SR	Reconductoring of Gooty – Tumkur (Pavagada) 400kV D/c line with HTLS conductor	400	D/c	105		
72.	2026-27	WR	Solapur PS – Solapur (PG) 400 kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent)	400	D/c	80		
73.	2026-27	WR	KPS3 (GIS) – Lakadia (AIS) 765 kV D/C line	765	D/c	404	330	
74.	2026-27	WR	KPS1 (GIS)– Bhuj PS 765 kV 2nd D/C line	765	D/c	217		
75.	2026-27	WR	Vadodara (GIS) –South Olpad (GIS) 765 kV D/C line	765	D/c	266	240	
76.	2026-27	WR	LILO of Gandhar – Hazira 400 kV D/c line at South Olpad (GIS) using twin HTLS conductor with minimum capacity of 1700MVA per ckt at nominal voltage	400	D/c	8		
77.	2026-27	WR	Ahmedabad – South Olpad (GIS) 765 kV D/c line	765	D/c	456	240	240

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
78.	2026-27	WR	South Olpad (GIS) – Boisar-II (GIS) 765kV D/c line	765	D/c	465	240	240
79.	2026-27	WR	LILO of Navsari (New) – Padghe (PG) 765 kV D/c line at Boisar-II	765	D/c	51		
80.	2026-27	WR	Boisar-II (Sec-II) – Velgaon (MH) 400 kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line	400	D/c	50		
81.	2026-27	WR	LILO of Babhaleswar – Padghe (M) 400 kV D/c line at Boisar-II (Sec-I) using twin HTLS conductor with a minimum capacity of 1700 MVA per ckt at nominal voltage	400	D/c	116	80	
82.	2026-27	WR	Boisar-II – Pune-III 765 kV D/c line	765	D/c	456	330	
83.	2026-27	WR	LILO of Narendra (New) – Pune (GIS) 765 kV D/c line at Pune-III	765	D/c	171	330	
84.	2026-27	WR	LILO of Hinjewadi-Koyna 400 kV S/c line at Pune-III (GIS) S/s	400	S/c	17	80	
85.	2029-30	WR	±800 kV HVDC Bipole line (Hexa lapwing) between KPS2 (HVDC) and Nagpur (HVDC) (1200 km) (with Dedicated Metallic Return) (capable to evacuate 6000 MW with overload as specified)	±800 kV	Bipole	2407		
86.	2029-30	WR	LILO of Wardha – Raipur 765 kV one D/c line (out of 2xD/c lines) at Nagpur	765	D/c	58	240	
87.	2029-30	WR	KPS3 – KPS3 (HVDC) 400 kV 2xD/c (Quad ACSR/AAAC/AL59 moose equivalent) line along with the line bays at both substations	400	2*D/c	4		
88.	2029-30	WR	±500 kV HVDC Bipole line between KPS3 (HVDC) and South Olpad (HVDC) (with Dedicated Metallic Return) (capable to evacuate 2500 MW)	±500 kV	Bipole	1200		
89.	2026-27	WR	Mandsaur PS – Indore(PG) 765 kV D/c Line	765	D/c	338	330	
90.	2026-27	WR	Halvad – Jamnagar 765 kV D/c line	765	D/c	340		330
91.	2026-27	WR	LILO of Jam Khambhaliya PS – Lakadia 400 kV D/c (triple snowbird) line at Jamnagar.	400	D/c	20	50	
92.	2026-27	WR	Jamnagar – Jam Khambhaliya 400 kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line	400	D/c	100		
93.	2026-27	WR	LILO of CGPL – Jetpur 400kV D/c (triple snowbird) line at Jamnagar.	400	D/c	260	80	
94.	2026-27	WR	LILO of both ckts of Kalavad – Bhogat 400kV D/c line (Twin AL-59) at Jam Khambhaliya PS	400	D/c	40		
95.	2026-27	WR	LILO of Bhuj-II – Lakadia 765 kV D/c line at Navinal(Mundra) (GIS) S/s with associated bays at Navinal (Mundra) (GIS) S/s	765	D/c	257	330	
96.	2027-28	WR	LILO of Pune-III – Boisar-II 765 kV D/c line at South Kalamb S/s with associated bays at South Kalamb S/s	765	D/c	8		240

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
97.	2027-28	WR	Mahan (existing bus) – Rewa PS (PG) 400 kV D/c (Quad ACSR/AAAC/AL59 equivalent) line	400	D/c	220		
98.	2027-28	WR	Raghnesda (GIS) – Banaskantha (PG) 765 kV D/c line	765	D/c	155		
99.	2027-28	WR	Navinal(Mundra) (GIS) – Bhuj 765 kV D/c line	765	D/c	140		
100.	2027-28	WR	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	400	D/c	370	50	50
101.	2027-28	WR	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	400	D/c	442	50	50
102.	2027-28	WR	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	400	D/c	428	50	50
103.	2027-28	WR	LILo of Khandwa (PG) – Itarsi (PG) 400 kV D/c (Twin Moose) line at Handiya S/s	400	D/c	120		
104.	2028-29	WR	Halvad – Kandla(GIS) 765 kV D/c line	765	D/c	280		
105.	2025-26	WR	LILo of Pirana (PG) – Pirana (T) 400 kV D/c line at Ahmedabad S/s with twin HTLS alongwith reconductoring of Pirana (PG) – Pirana (T) line with twin HTLS conductor with OPGW for both main line and LILo section	400	D/c	67		
106.	2027-28	WR	LILo of Nagothane – Padghe 400 kV D/c line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	400	D/c	40		
107.	2027-28	WR	LILo of Pune(AIS) – Navi Mumbai 400 kV line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	400	S/c	20		
108.	2027-28	WR	LILo of Pune(AIS) – Vikhroli 400 kV line at South Kalamb with Quad ACSR/AAAC/AL59 moose equivalent conductor	400	S/c	20		
109.	2027-28	WR	Bypassing of Raigarh (Tamnar) – Dharamjaygarh (Sec-B) 765 kV D/c line & Raigarh (Kotra) – Raigarh (Tamnar) 765 kV D/c line at Raigarh (Tamnar) S/s so as to form Raigarh (Kotra) – Dharamjaygarh (Sec-B) 765 kV D/c line	765	D/c	20		
110.	2027-28	ER	LILo of Dharamjaygarh (Sec-B) – Jharsuguda (Sec-A) 765 kV D/c line at Raigarh (Kotra)-II S/s	765	D/c	80		
111.	2027-28	WR	Raigarh (Tamnar)@ – Raigarh (Kotra)-II S/s 765 kV D/c line	765	D/c	100		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
112.	2027-28	ER	Raigarh (Tamnar)@ – Jamshedpur (New) 765 kV D/c line	765	D/c	630		
113.	2027-28	ER	LILO of Ranchi (New) – Medinipur 765 kV D/c line at Jamshedpur (New)	765	D/c	200		
114.	2027-28	ER	LILO of Ranchi (New) – New PPSP 400 kV D/c line at Jamshedpur (New) (a) Jamshedpur (New) to LILO section towards Ranchi (New) needs to be implemented with Twin Moose (b) Jamshedpur (New) to LILO section towards New PPSP needs to be implemented with Twin HTLS (ampacity of single HTLS as 1574A at nominal voltage)	400	D/c	252		
115.	2028-29	ER	Jamshedpur (New) – Balasore 400 kV D/c (Quad) line	400	D/c	348		
116.	2026-27	WR	Vindhyachal IV – Vindhyachal PS 400kV 1 st D/c (quad) line (of POWERGRID) and Vindhyachal PS – Sasan 400kV D/c (twin) line (of POWERGRID) to be bypassed at Vindhyachal PS and interconnected with each other at outskirts of Vindhyachal PS (Under scope of ISTS) so as to form Vindhyachal IV (2x500MW) – Sasan 400kV D/c line.	400	D/c	6		
117.	2027-28	WR	Vindhyachal IV – Vindhyachal PS 400kV 2 nd D/c (quad) line (of CWRTL) shall be disconnected at Vindhyachal-IV and shall be terminated / extended up to Singrauli III so as to form Singrauli III – Vindhyachal PS 400kV D/C (Quad) line	400	D/c	3		
118.	2026-27	NR	Fatehgarh 3 - Bhadla-3 400kV D/c line(Quad) along with 63 MVar Switchable line reactor for each circuit at both ends of Fatehgarh 3- Bhadla-3 400kV D/c line	400	D/c	446	63	63
119.	2025-26	NR	Bhadla-3 PS — Sikar-II 765 kV D/c line along with 330 MVar Switchable line reactor for each circuit at each end of Bhadla-3 — Sikar-II 765 kV D/c line	765	D/c	650	330	330
120.	2025-26	NR	Ramgarh — Bhadla-3 765 kV D/c line (180 km) along with 240 MVar switchable line reactor at each circuit at Ramgarh end of Ramgarh — Bhadla- 3 765kV D/c line	765	D/c	372	240	240
121.	2026-27	NR	Sikar-II – Khetri 765 kV D/c line	765	D/c	145		
122.	2026-27	NR	Sikar-II — Narela 765 kV D/c line along with 240 MVar Switchable line reactor for each circuit at each end of Sikar-II — Narela 765 kV D/c line	765	D/c	473	240	240
123.	2025-26	NR	LILO of both circuit of Ajmer-Chittorgarh 765 kV D/c at Beawar	765	D/c	136		
124.	2025-26	NR	LILO of 400kV Kota –Merta line at Beawar	400	S/c	66		
125.	2025-26	NR	Fatehgarh-3– Beawar 765 kV D/c along with 330 MVar Switchable line reactor for each circuit at each end of Fatehgarh-3– Beawar 765 kV D/c line	765	D/c	635	330	330

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
126.	2025-26	NR	Fatehgarh-3– Beawar 765 kV D/c (2nd) along with 330 MVAR Switchable line reactor for each circuit at each end of Fatehgarh-3 – Beawar 765 kV D/c line	765	D/c	635	330	330
127.	2026-27	NR	400 kV Khandukhal (Srinagar) - Rampura (Kashipur) D/c line	400	D/c	384		
128.	2026-27	NR	LILO of both ckts of 400kV Bikaner (PG)-Bikaner-II D/c line(Quad) at Bikaner-III PS	400	D/c	74		
129.	2026-27	NR	Bikaner-II PS – Bikaner-III PS 400 kV D/c line (Quad)	400	D/c	62		
130.	2026-27	NR	Bikaner-III - Neemrana-II 765 kV D/c line along with 330 MVAR switchable line reactor for each circuit at each end	765	D/c	682	330	330
131.	2026-27	NR	Neemrana-II -Kotputli 400 kV D/c line (Quad)	400	D/c	87		
132.	2026-27	NR	LILO of both ckts of 400 kV Gurgaon (PG) - Sohna Road (GPTL) D/c line (Quad) at Neemrana-II S/s	400	D/c	395		
133.	2026-27	NR	Bikaner-III - Neemrana-II 765 kV D/c line (2nd) along with 330 MVAR switchable line reactor for each circuit at each end	765	D/c	692	330	330
134.	2026-27	NR	Neemrana-II- Bareilly (PG) 765 kV D/c line along with 330 MVAR switchable line reactor for each circuit at each end	765	D/c	666	330	330
135.	2029-30	NR	Bhadla-3 – Bhadla (HVDC) 400 kV 2xD/c quad moose line along with the line bays at both substations	400	2*D/c	8		
136.	2029-30	NR	±800 kV HVDC line (Hexa lapwing) between Bhadla (HVDC) & Fatehpur (HVDC) (with Dedicated Metallic Return)	±800 kV	Bipole	1910		
137.	2029-30	NR	LILO of both ckts of 765 kV Varanasi – Kanpur (GIS) D/c line at Fatehpur - (30 km)	765	D/c	94		
138.	2026-27	NR	Fatehgarh-IV (Section-2) PS – Bhinmal (PG) 400 kV D/c line (Twin HTLS*) along with 50 MVAR switchable line reactor on each ckt at each end	400	D/c	369	50	50
139.	2026-27	NR	LILO of both ckts of 765 kV Fatehgarh-III- Beawar D/c line at Fatehgarh-IV (Section-2) PS along with 330 MVAR switchable line reactor at Fatehgarh-IV PS end of each ckt of 765 kV Fatehgarh-IV- Beawar D/c line (formed after LILO)	765	D/c	31	330	330
140.	2026-27	NR	Fatehgarh-IV (Section-2) PS – Sirohi PS 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at each end	765	D/c	413	240	240
141.	2026-27	NR	Sirohi PS-Chittorgarh (PG) 400 kV D/c line (Quad) along with 80 MVAR switchable line reactor for each circuit at Sirohi PS end	400	D/c	445	80	

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
142.	2026-27	NR	Beawar- Mandsaur PS 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at each end	765	D/c	553	240	240
143.	2026-27	NR	Sirohi PS- Rishabdeo 765 kV D/c line along with 330 MVAR switchable line reactor for each circuit at Sirohi end	765	D/c	421	330	
144.	2028-29	NR	LILO of 400 kV D/c Amargarh (Kunzer)- Samba line at 400/220 kV Siot S/s	400	D/c	30		
145.	2026-27	NR	Rishabdeo - Mandsaur PS 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at Rishabdeo end	765	D/c	250	240	
146.	2028-29	NR	Nange (GIS) Pooling Station – Koldam 400 kV D/c line (Triple snowbird) (only one circuit is to be terminated at Koldam while second circuit would be connected to bypassed circuit of Koldam – Ropar/Ludhiana 400kV D/c line)	400	D/c	100		
147.	2026-27	NR	LILO of one circuit of 765 kV Chittorgarh- Banaskanta D/c line at Rishabdeo S/s (20 km)	765	D/c	25		
148.	2027-28	NR	Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line (Quad)	400	D/c	111		
149.	2027-28	NR	Barmer-I PS– Sirohi PS 765 kV D/c line along with 240MVAR switchable line reactor for each circuit at each end	765	D/c	416	240	240
150.	2026-27	NR	Mandsaur – Kurawar 765 kV D/c line	765	D/c	402		
151.	2026-27	NR	LILO of Indore – Bhopal 765 kV S/c line at Kurawar	765	S/c	52		
152.	2026-27	NR	Kurawar – Ashtha 400 kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line	400	D/c	112		
153.	2026-27	NR	LILO of one circuit of Indore – Itarsi 400kV D/c line at Astha	400	D/c	112		
154.	2026-27	NR	Shujalpur – Kurawar 400 kV D/c (Quad ACSR/AAAC/AL59 moose equivalent) line	400	D/c	59		
155.	2026-27	NR	Bhadla-III – Bikaner-III 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at Bhadla-III end (line length~150 km) as well as associated 2 Nos. of 765kV line bay(s) at each at Bhadla-III & BikanerIII end	765	D/c	254	240	
156.	2028-29	NR	LILO of one circuit of Jhansi PS – Wangtoo (HPPTCL) 400 kV D/c (Quad) line\$ at generation switchyard of Shongtong HEP	400	D/c	2		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
157.	2026-27	NR	LILO of both ckts of Bikaner II PS Bikaner III PS (Quad) direct line at Bikaner-IV PS	400	D/c	86		
158.	2026-27	NR	Bikaner-IV PS – Siwani 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at each end	765	D/c	486	240	240
159.	2026-27	NR	Siwani– Fatehabad (PG) 400 kV D/c line (Quad)	400	D/c	165		
160.	2026-27	NR	Siwani – Patran (Indi Grid) 400 kV D/c line (Quad) along with 80 MVAR switchable line reactor for each circuit at Siwani S/s end	400	D/c	281	80	
161.	2026-27	NR	Bikaner-IV PS – Siwani 765 kV D/c (2nd) line along with 240 MVAR switchable line reactor for each circuit at each end	765	D/c	482	240	240
162.	2026-27	NR	Siwani – Sonipat (PG) 400 kV D/c line (Quad) along with 63 MVAR switchable line reactor for each circuit at Siwani S/s end	400	D/c	273	63	
163.	2026-27	NR	Siwani – Jind (PG) 400 kV D/c line (Quad)	400	D/c	194		
164.	2026-27	NR	Fatehgarh-IV PS (Sec-2) – Barmer-I PS 400kV D/c line (Quad)	400	D/c	90		
165.	2026-27	NR	Dausa - Ghiror 765 kV D/c line along with 330MVAR switchable line reactor at Ghiror end and 240 MVAR switchable line reactor at Dausa end for each circuit of Dausa - Ghiror 765 kV D/c line	765	D/c	548	240	330
166.	2026-27	NR	LILO of both ckt of 765 kV Aligarh (PG) Orai (PG) D/c line at Ghiror S/s along with 240 MVAR switchable line reactor for each circuit at Ghiror S/s end of 765 kV Ghiror Orai (PG) D/c line	765	D/c	52	240	
167.	2026-27	NR	LILO of one ckt of 765kV Agra (PG) – Fatehpur (PG) 2xS/c line at Ghiror along with 240 MVAR switchable line reactor at Ghiror end of 765 kV Ghiror -Fatehpur (PG) line	765	2*S/c	50	240	
168.	2026-27	NR	400kV Ghiror-Firozabad (UPPTCL) D/c line (Quad)	400	D/c	97		
169.	2026-27	NR	Barmer-I PS – Merta-II 765 kV D/c line along with 330 MVAR switchable line reactor for each circuit at each end of Barmer-I PS – Merta-II 765 kV D/c line	765	D/c	686	330	330
170.	2026-27	NR	Merta-II – Beawar 400 kV D/c line (Quad)	400	D/c	143		
171.	2026-27	NR	Merta-II – Dausa 765 kV D/c line along with 240 MVAR switchable line reactor for each circuit at each end of Merta-II – Dausa 765kV D/c line	765	D/c	494	240	240
172.	2026-27	NR	LILO of 400 kV Kishenpur- Dulhasti line (Twin) at Kishtwar S/s along with associated bays at Kishtwar S/s	400	S/c	4		
173.	2026-27	NR	400 kV Kishenpur-Samba D/c line (Quad) (only one circuit is to be terminated at Kishenpur utilizing 1 no. of 400 kV vacated line bay at Kishenur S/s (formed with bypassing of one ckt of 400 kV Kishtwar – Kishenpur 400 kV D/c line (Quad) at Kishenpur) while second circuit	400	D/c	70		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
			would be connected to bypassed circuit of 400 kV Kishtwar – Kishenpur line (Quad))					
174.	2026-27	NR	400 kV Samba- Jalandhar D/c line(Quad) (only one circuit is to be terminated at Jalandhar utilizing 1 no. of 400 kV vacated line bay at Jalandhar S/s (formed with bypassing of 400 kV Jalandhar – Nakodar line (Quad) at Jalandhar) while second circuit would be connected to bypassed circuit of Jalandhar –Nakodar 400 kV line (Quad))	400	D/c	299		
175.	2026-27	NR	Sirohi – Mandsaur PS 765 kV D/c line along with 240 MVA switchable line reactor at Sirohi end and 330 MVA switchable line reactor at Mandsaur PS end for each circuit of Sirohi –Mandsaur PS 765KV D/c line	765	D/c	621	240	330
176.	2026-27	NR	Mandsaur PS – Khandwa (New) 765 kV D/c line along with 240 MVA switchable line reactor for each circuit at each end of Mandsaur PS –Khandwa (New) 765kV D/c line	765	D/c	535	240	240
177.	2027-28	NR	LILO of 765 kV Fatehpur-Varanasi S/c line at Prayagraj	765	S/c	145	330	
178.	2027-28	NR	LILO of 765 kV Fatehpur-Sasaram S/c line at Prayagraj	765	S/c	138		
179.	2027-28	NR	765 kV Vindhyachal Pool - Prayagraj D/c line along with 330 MVA line reactor (switchable) at Prayagraj end on each ckt of 765 kV Vindhyachal Pool - Prayagraj D/c line	765	D/c	440	330	330
180.	2027-28	NR	Bypassing of both ckts of 765 kV Sasan – Vindhyachal Pool 2xS/c line at Vindhyachal Pool and connecting it with 765 kV Vindhyachal Pool - Prayagraj D/c line, thus forming 765 kV Sasan - Prayagraj D/c line	765	2*S/c	1		
181.	2029-30	NR	ISTS system for RE interconnection at Pang:			14		
182.	2029-30	NR	ISTS system for RE interconnection at Pang:			54		
183.	2029-30	NR	ISTS system for RE interconnection at Pang:			82		
184.	2029-30	NR	HVDC System:			960		
185.	2029-30	NR	ISTS system to provide reliable power supply to Ladakh:			158		
186.	2026-27	NR	Jhatikara – Dwarka 400kV D/c line (Twin HTLS*): (17km)[Monopole/Narrow Base/Normal towers]	400	D/c	36		
187.	2026-27	NR	Bypassing both ckts of 400 kV Kishenpur – Samba D/c line (Twin) & 400 kV Samba	400	D/c	1		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
			– Jalandhar D/c line (Twin) at Samba and connecting them together to form 400 kV Kishenpur– Jalandhar D/c direct line (Twin) (4 Nos. of vacated 400 kV line bays at Samba S/s will be utilized for 400 kV Kishenpur-Samba D/c line (Quad) & 400 kV Samba- Jalandhar D/c line(Quad),					
188.	2026-27	NR	400 kV Bareilly (765/400 kV) – Bareilly (PG) D/c line (Quad) (2nd)	765	D/c	8		
189.	2030-31	NR	LILO of both circuits of 765 kV VaranasiGaya 2xS/c line at Robertsganj PS along with 240 MVar switchable line reactor at each ckt of Robertsganj PS end of 765 kV Robertsganj PS - Gaya 2xS/c line (after LILO)	765	2*S/c	280	240	
190.	2030-31	NR	Robertsganj PS – Prayagraj S/s 765 kV D/c line along with 330 MVar line reactor at each circuit of Robertsganj end of Robertsganj PS – Prayagraj S/s 765 kV D/c line	765	D/c	370	330	
191.	2030-31	NR	LILO of both ckts of 400 kV Fatehgarh-IV PS - Barmer-I PS at Barmer-II PS	400	S/c	40		
192.	2030-31	NR	400 kV Barmer-II PS - Barmer-I PS D/c line (Quad)	400	D/c	60		
193.	2030-31	NR	±800 kV HVDC Bipole line (Hexa lapwing) between Barmer-II (HVDC) & South Kalamb (HVDC) (with parallel Dedicated Metallic Return) (capable to evacuate 6000 MW) [with 100% reverse power capability]	±800 kV	Bipole	1800		
194.	2025-26	SR	Ananthpuram PS-Kurnool-III PS 400 kV (Quad Moose) D/c Line	400	D/c	171		
195.	2025-26	SR	Ananthpuram PS-Cuddapah 400 kV (Quad Moose) D/c Line	400	D/c	371	80	
196.	2025-26	SR	Kurnool –III PS – Kurnool(new) 765 kV D/c line.	765	D/c	226		
197.	2025-26	SR	Kurnool –III PS – Maheshwaram (PG) 765 kV D/c Line	765	D/c	507	240	240
198.	2026-27	WR	Halvad – Vataman 765 kV D/c line	765	D/c	255	330	330
199.	2026-27	WR	LILO of Lakadia – Vadodara 765 kV D/c line at Vataman 765 kV switching station	765	D/c	55		
200.	2026-27	WR	Vataman switching station – Navsari (New) (GIS) 765 kV D/c line	765	D/c	495		330
201.	2026-27	WR	LILO of both circuits of Parli(M) – Karjat(M)/Lonikand-II (M) 400 kV D/c line (twin moose) at Kallam PS	400	D/c	54	63	
202.	2026-27	WR	LILO of one ckt. of Narendra (existing) - Narendra (New) 400kV D/c line at Xeldem	400	D/c	210		
203.	2026-27	WR	Navsari (new) (South Gujarat) (GIS)-Kala (GIS) 400 kV D/c line (conductor with minimum capacity of 2100 MVA/Ckt at nominal voltage) with 63MVar switchable line reactor on each ckt at Navsari (new) (GIS) end.	400	D/c	91	63	
204.	2026-27	WR	Navsari(New) (South Gujarat) (GIS) — Magarwada (GIS) 400 kV	400	D/c	368		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
			D/c line (conductor with minimum capacity of 2100 MVA/Ckt at nominal voltage)					
205.	2026-27	WR	Navsari (New) (South Gujarat) (GIS) — Padghe (GIS) 765 kV D/c line with 330 MVA _r , 765 kV Switchable line reactor on each ckt at Navsari(New) (South Gujarat) end.	765	D/c	452	330	
206.	2025-26	NR	LILO of both circuits of Jaipur(Phagi)-Gwalior 765 kV D/c at Dausa along with 240 MVA _r Switchable line reactor for each circuit at Dausa end of Dausa – Gwalior 765 kV D/c line	765	D/c	67	240	
207.	2025-26	NR	LILO of both circuits of Agra – Jaipur(south) 400kV D/c at Dausa along with 50 MVA _r Switchable line reactor for each circuit at Dausa end of Dausa – Agra 400kV D/c line	400	D/c	44	50	
208.	2025-26	NR	Beawar – Dausa 765 kV D/c line (240 km) along with 240 MVA _r Switchable line reactor for each circuit at each end	765	D/c	474	240	240
209.	2030-31	NR	LILO of one double ckt of 400kV Bikaner II PS- Khetri (Twin HTLS) 2xD/c line at Bikaner-V PS along with 50 MVA _r switchable line reactor for each circuit at Bikaner-V PS end of 400kV Bikaner-V-Khetri section	400	2*D/c	112	100	
210.	2030-31	NR	765 kV Bikaner-V PS – Pallu 2xD/c line	765	D/c	540		
211.	2030-31	NR	LILO of both ckts of 765kV Bikaner – Moga D/c line at Pallu S/s along with 240MVA _r switchable line reactor for each circuit at Pallu S/s end of 765kV Pallu-Moga D/c line	765	D/c	40	480	
212.	2030-31	NR	400 kV Pallu – Hanumangarh (RVPN) D/c (Quad) line	400	D/c	184		
213.	2030-31	NR	765 kV Pallu-Panipat 2xD/c line along with 240 MVA _r switchable line reactor for each circuit at each end	765	D/c	1040	960	960
214.	2030-31	NR	LILO of one circuit of 400kV Patiala-Panchkula D/c line at Mohali along with reconductoring of 400kV Patiala – Mohali section with twin HTLS line (2100MVA)	400	D/c	40		
215.	2030-31	NR	400 kV Panipat S/s – Mohali D/c (Quad Moose) line along with 80 MVA _r (420kV) switchable line reactor for each circuit at Mohali end (155km)	400	D/c	320		160
216.	2030-31	NR	400 kV Panipat S/s – Mandola D/c (Quad) line	400	D/c	140		
217.	2030-31	NR	765 kV Panipat- Bulandshahr 2xD/c line along with 240 MVA _r switchable line reactor for each circuit at Bulandshahr end	765	D/c	620		960
218.	2030-31	NR	LILO of 765kV Aligarh – Gr. Noida line at Bulandshahr S/s (Lilo length-30km)	765	S/c	70		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
219.	2030-31	NR	765kV Bulandshahr - Noida sec-148 (UPPTCL) D/c line	765	D/c	130		
220.	2030-31	NR	765 kV Bulandshahr – Lucknow-II D/c line along with 330 MVar switchable line reactor for each circuit at each end	765	D/c	660	660	660
221.	2030-31	NR	400 kV Lucknow-II – Gonda D/c (Quad Moose) line	400	D/c	300		
222.	2030-31	NR	765 kV Lucknow-II-Asana D/c line along with 330 MVar switchable line reactor for each circuit at each end	765	D/c	700	660	660
223.	2030-31	NR	LILO of both ckts of 400kV Varanasi – Biharsharif D/c line at Asana S/s along with 80 MVar switchable line reactor for each circuit at Asana end of 400kV Asana-Biharsharif section	400	D/c	140	160	
224.	2030-31	NR	Asana – Nawada 765kV D/c line along with 240MVar switchable line reactors in each circuits at both ends	765	D/c	430	480	480
225.	2029-30	NER	Dibang - Gogamukh 400kV 2xD/c line	400	2xD/c	860	252	252
226.	2029-30	NER	Gogamukh- Lower Subansiri 400kV D/c line	400	D/c	350	160	
227.	2029-30	ER	Paradeep (HVDC) - Andaman HVDC interconnection (Undersea Cable)	±500 kV	Bipole	2300		
228.	2029-30	ER	Andaman - Nicobar HVDC interconnection (Undersea Cable)	±500 kV	Bipole	1100		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
229.	2029-30	ER	Paradeep (HVDC) - Paradeep (ISTS) 400kV D/c line	400	D/c	24		
230.	2028-29	WR	(i) LILO of Tarapur/Velgaon – Padghe (M) 400kV D/c line at Kudus(M) S/s in following manner so as to form Padghe(PG)(GIS) – Padghe(M) 400kV D/c line and Tarapur/Velgaon - Kudus(M) 400kV D/c line: 1. Line-out portion for interconnection of Padghe(M) with Kudus(M) S/s to be constructed with twin HTLS conductor with minimum capacity of 2100MVA per ckt at nominal voltage and terminated directly into Padghe(PG)(GIS) – Kudus(M) 400kV D/c (quad) line at outskirts of Kudus(M) S/s (with bypassing at Kudus(M) end) so as to form Padghe(PG)(GIS) – Padghe(M) 400kV D/c line(2 nos. 400kV bays at Kudus(M) shall get vacated with above arrangement). (Length ~10km.) 2. Reconductoring of Padghe(M) – Kudus (outskirt) 400kV D/c balance line section (i.e. of existing line portion upto the proposed LILO point) with twin HTLS conductor with minimum capacity of 2100MVA per ckt at nominal voltage (Length : ~20km.) 3. Line-in portion for interconnection of Tarapur/Velgaon with Kudus(M) S/s to be terminated into 2 nos. bays vacated at Kudus (M) S/s (at Sl. 1 above) (Length ~10km.) 3. (ii) Shifting of Padghe(PG)(GIS) – Padghe(M) 400kV D/c line from 400kV Section A to Section B(GIS) at Padghe(M) end and termination into 2 nos. 400kV line bays to be constructed at Padghe(M) Section B(GIS) under ISTS	400	D/c	40		
231.	2027-28	WR	Navinal-II (Mundra) (GIS) – Bhuj-II (GIS) 765kV D/c line	765	D/c	160		
232.	2027-28	WR	LILO of KPS3 (GIS) – Lakadia 765kV D/c line at Navinal-II (Mundra) (GIS) S/s	765	D/c	280		
233.	2029-30	SR	Mangalore GH – Davanagare / Chitradurga 765 kV D/c line (~280 km) with 240 MVar SLR at both ends on both circuits	765	D/c	560	480	480

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
234.	2027-28	ER	LILO of one circuit of Chaibasa (POWERGRID) – Kharagpur (WBSETCL) 400kV D/c ISTS line at OMIPL generation switchyard	400	S/c	18		
235.	2029-30	SR	Nagapattinam – Bahoor 230kV S/c high capacity line (70 km)	230	S/c	140		
236.	2029-30	SR	Nagapattinam – Karaikal 230kV S/c high capacity line (60 km)	230	S/c	120		
237.	2029-30	SR	Nagapattinam – Villianur 230kV S/c high capacity line (85 km)	230	S/c	170		
238.	2029-30	SR	Nagapattinam – Thondamanatham 230kV S/c high capacity line (85 km)	230	S/c	170		
239.	2029-30	SR	Ramayapatnam – Kadapa-II 765 kV D/c line (220 km) 1x330 MVar SLR at Kadapa-II end on both circuits	765	D/c	440		660
240.	2029-30	SR	Ramayapatnam – Sagar 765 kV D/c line (200 km) 1x330 MVar SLR at Ramayapatnam end on both circuits	765	D/c	400	660	
241.	2028-29	SR	Karur PS – Pugalur HVDC 400kV (Quad) 2nd D/c line	400	D/c	120		
242.	2029-30	SR	LILO of Kurnool-V – Nellore PS 765 kV D/c line at Ramayapatnam (50 km)	765	D/c	100		
243.	2028-29	ER	ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor	765	S/c	984		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
244.	2029-30	WR	Kalyanpur (GIS) – Jamnagar (GIS) 765 kV D/c line	765	D/c	190		
245.	2029-30	WR	Kalyanpur (GIS) – Saurashtra (near Rajkot) (GETCO) 765 kV D/c line	765	D/c	450		
246.	2029-30	WR	LILO of Halvad – Kandla 765kV D/c line at Lakadia-II	765	D/c	88		
247.	2029-30	WR	Lakadia-II – Ahmedabad 765kV D/c line	765	D/c	380		
248.	2029-30	WR	Lakadia-II – Vataman 765kV D/c line (220km.)	765	D/c	440		
249.	2029-30	WR	Vadodara(GIS) – Halvad 765kV D/c line to be terminated into Lakadia – Halvad 765kV D/c line (near Halvad S/s) so as to form Lakadia – Vadodara (GIS) 765kV D/c line	765	D/c	500		
250.	2029-30	WR	South Olpad (GIS) – Nasik 765kV D/c line (240km.)	765	D/c	480		
251.	2029-30	WR	Nasik – Pimpalgaon (MSETCL) 400kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent) (Line to be routed from near Sinner TPP / Raymond i.e. from eastern side of Nasik).	400	D/c	160		
252.	2029-30	WR	Alephata – Lonikand-I 400kV D/c line (Quad ACSR/AAAC/AL59 moose equivalent) (~70km.)	400	D/c	140		
253.	2029-30	WR	LILO of Aurangabad – Pune (Shikrapur) (GIS) 765kV S/c line and Padghe (GIS) – Pune (Shikrapur) (GIS) 765kV S/c line at Alephata S/s (LILO route length ~ 20km.)	765	S/c	80		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
254.	2029-30	WR	Nasik – Alephata 765kV D/c line (~100km.)	765	D/c	200		
255.	2030-31	WR	Installation of 2x500MVA, 400/220kV ICTs (5th & 6th) at Solapur PS 6 Nos. 220kV line bays on 220kV Sec-2 at Solapur PS for 220kV downstream lines of MSETCL Creation of New 400kV Bus Section-2 and 220kV Bus Section-3 with 400kV and 220kV Bus Sectionalizers at Solapur PS along with 3 nos. 220kV line bays on new Bus Section-3 & 1 no. 400kV bay for RE Interconnection 400/220 kV, 3x500 MVA ICT augmentation (8th ,9th & 10th) at Solapur PS on New 400kV Bus Section-2 and 220kV Bus Section-3 Solapur PS (Sec-II) – Jejuri (MSETCL) 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) 400kV line bays at Solapur PS (Sec-2) as well as Jejuri(MSETCL) for Solapur PS (Sec-II) – Jejuri (MSETCL) 400 kV D/c line Jejuri (M) – Pune-III 400 kV D/c line (Quad ACSR/ AAAC/ AL59 Moose equivalent) (~20km.)	400	D/c	520		
256.	2030-31	WR	Establishment of 765/400 kV, 8x1500MVA, KPS4 (GIS) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor KPS4 – KPS2 765kV D/c line ~20km 2 Nos. 765 kV line bays at KPS2 (GIS) S/s Establishment of 765 kV KPS5 (GIS) with 2x330 MVAR 765kV bus reactor Creation of 400kV level at KPS5 along with establishment of 765/400 kV, 4x1500MVA ICTs and 2x125 MVAR 400kV bus reactor. KPS4 – KPS5 765kV 2xD/c line ~10km ±400 MVar STATCOM on each 400kV Bus section of KPS5. KPS5 – Lakadia-II 765kV 2xD/c line (220km.) 765kV, 330MVar Switchable line reactors on each circuit at Lakadia-II end of KPS5 – Lakadia-II 765kV 2xD/c line	765	D/c	960		
257.	2030-31	WR	Establishment of 6000 MW (2 nos. 3000MW Bipole configuration), ± 800 kV Lakadia-II (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard Establishment of 6000 MW (2 nos. 3000MW Bipole configuration), ± 800 kV Alephata (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard	± 800 kV	Bipole	1450		

Sr. No.	Time Frame	Region	Transmission Line	Voltage level (kV)	S/c, D/c, M/c	Line length (ckm)	From end reactor	To end reactor
			±800 kV HVDC Bipole line (Hexa lapwing) between Lakadia-II (HVDC) and Alephata (HVDC) Installation of additional 3x1500 MVA, 765/400 kV ICTs at Alephata S/s					
258.	2029-30	WR	Creation of 765kV level at Kolhapur (PG) GIS with Installation of 2x1500MVA, 765/400kV ICTs at Kolhapur (PG) S/s along with upgradation of Kolhapur (PG) S/s to 765kV level. Establishment of 765/400 kV Satara Substation with 765/400 kV, 3x1500 MVA ICTs, 765kV 2x330 MVAR bus reactors and 400 kV 1x125 MVAR bus reactor LILO of Pune-III – Pune (East) 765kV D/c line at Satara. Creation of 400kV Bus Section-II and augmentation of transformation capacity at 765/400 kV Satara S/s by 765/400 kV, 1x1500MVA ICT (4th) along with 1x125 MVAR 400kV bus reactor (on Bus Section-II) Kolhapur (PG) – Satara 765kV D/c line 765 kV line bays for Kolhapur (PG)– Satara 765kV D/c line 765kV, 240MVA Switchable line reactors on each circuit at Satara end of Kolhapur (PG) – Satara 765kV D/c line	765	D/c	560	330	240
259.	2028-29	WR	Reorientation of existing Narendra (New) – Kolhapur (PG) 765kV D/c line (presently charged at 400kV) and its termination into 765kV bays, including all associated works required for charging the line at 765kV level	765	D/c	4		
260.	2028-29	SR	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Kakinada area (Phase-II)			790		
261.	2028-29	SR	Augmentation of transformation capacity by 1*500 MVA , 400/220kV ICT(6th) at N P kunta PS in andhra pradesh			200		

2. Transformers

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
1.	2026-27	NER	Establishment of Gogamukh 400/220/132kV substation	400/220/132	2	500	1000
2.	2026-27	NER	Establishment of Gogamukh 400/220/132kV substation	400/220/132	2	200	400
3.	2026-27	ER	Establishment of Paradeep 765/400 kV, 2x1500MVA GIS substation	765/400	2	1500	3000
4.	2027-28	ER	Establishment of new 765/400kV, 2x1500MVA GIS substation at Gopalpur in Odisha	765/400	2	1500	3000
5.	2028-29	NER	Establishment of new 2x500 MVA, 400/220 kV GIS Pooling station at Kaying in Arunachal Pradesh	400/220	2	500	1000
6.	2028-29	NER	Establishment of new 400 kV GIS Switching station at Niglok in Arunachal Pradesh (with a provision for 400/220 kV level and 6000 MW LCC HVDC station)	400/220	2	500	1000
7.	2025-26	ER	Installation of 400/220 kV, 2x500 MVA ICTs along with associated bays at Lakhisarai (POWERGRID) 400/132 kV S/s	400/220	2	500	1000
8.	2026-27	ER	Installation of 400/220kV, 1x500MVA ICT (3rd) along with associated bays at Rajarhat GIS (POWERGRID) 400kV S/s	400/220	1	500	500
9.	2027-28	ER	Installation of new 1x500MVA, 400/220kV (3rd) ICT at Pandiabili (POWERGRID) S/s along with associated bay at 220kV level [using the bay no. 413 at 400kV level, which is already under implementation under ERBS-I scheme]	400/220	1	500	500
10.	2026-27	NER	Installation of new 1x50MVA, 132/33kV (3rd) ICT at Namsai (POWERGRID) S/s along with associated bays.	132/33	1	50	50
11.	2025-26	SR	400/220kV, 3x500MVA ICT Augmentation at Gadag PS	400/220	3	500	1500
12.	2026-27	SR	Upgradation of Narendra (New) (GIS) to its rated voltage of 765 kV level along with 4x1500 MVA transformer and 2x330 MVar Bus Reactor(BR).	765/400	4	1500	6000
13.	2026-27	SR	Establishment of 765/400 kV 3x1500 MVA, 400/220 kV 5x500 MVA pooling station at	765/400 & 400/220	3	1500	4500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			suitable border location near Bidar with 765 kV (1x240 MVAR) and 400 kV (1x125 MVAR) Bus Reactor				
14.	2026-27	SR	Establishment of 765/400 kV 3x1500 MVA, 400/220 kV 5x500 MVA pooling station at suitable border location near Bidar with 765 kV (1x240 MVAR) and 400 kV (1x125 MVAR) Bus Reactor	765/400 & 400/220	5	500	2500
15.	2026-27	SR	Establishment of 765/400 kV 2x1500 MVA, 400/220 kV, 2x500 MVA Koppal-II (Phase- A) Pooling Station with provision of two (2) sections of 4500 MVA each at 400 kV level and provision of four (4) sections of 2500 MVA each at 220 kV level	765/400 & 400/220	2	1500	3000
16.	2026-27	SR	Establishment of 765/400 kV 2x1500 MVA, 400/220 kV, 2x500 MVA Koppal-II (Phase- A) Pooling Station with provision of two (2) sections of 4500 MVA each at 400 kV level and provision of four (4) sections of 2500 MVA each at 220 kV level	765/400 & 400/220	2	500	1000
17.	2026-27	SR	Establishment of 400/220 kV, 2x500 MVA Gadag-II (Phase -A) Pooling Station	400/220	2	500	1000
18.	2026-27	SR	Augmentation by 2x1500 MVA, 765/400 kV ICTs at Koppal-II PS	765/400	2	1500	3000
19.	2026-27	SR	Augmentation by 2x500 MVA, 400/220 kV ICTs at Koppal-II PS.	400/220	2	500	1000
20.	2026-27	SR	Establishment of 765/400kV 4x1500 MVA, 400/220kV 4x500 MVA Pooling Station near Davanagere / Chitradurga, Karnataka with provision of two (2) sections of 4500 MVA each at 400kV level and provision of four (4) sections of 2500 MVA each at 220kV level	765/400 & 400/220	4	1500	6000
21.	2026-27	SR	Establishment of 765/400kV 4x1500 MVA, 400/220kV 4x500 MVA Pooling Station near Davanagere / Chitradurga, Karnataka with provision of	765/400 & 400/220	4	500	2000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			two (2) sections of 4500 MVA each at 400kV level and provision of four (4) sections of 2500 MVA each at 220kV level				
22.	2026-27	SR	Upgradation of Madhugiri {Tumkur(Vasantnarsapura)} to its rated voltage of 765kV level alongwith 3x1500 MVA, 765/400kV ICTs and 2x330 MVA, 765kV bus reactors (Upgradation of Madhugiri {Tumkur(Vasantnarsapura)} to its rated 765kv level was earlier allocated to POWERGRID for implementation through RTM route vide MOP OM No.15/3/2018-Trans-Pt(1) dated 23.01.2020)	765/400	3	1500	4500
23.	2027-28	SR	Establishment of 4x500 MVA, 400/220kV Pooling Station near Bellary area (Bellary PS), Karnataka	400/220	4	500	2000
24.	2026-27	SR	Establishment of 400/220 kV, 5x500 MVA Pooling Station near Bijapur (Vijayapura), Karnataka	400/220	5	500	2500
25.	2026-27	SR	• Establishment of 400/220 kV 4x500 MVA Pooling Station near Tumkur, Karnataka	400/220	4	500	2000
26.	2027-28	SR	• Augmentation of 3x1500 MVA 765/400 kV ICTs (5th, 6th & 7th) at Koppal-II PS	765/400	3	1500	4500
27.	2027-28	SR	• Augmentation of 5x500 MVA 400/220 kV ICTs (5th, 6th, 7th, 8th & 9th) at Koppal-II PS	400/220	5	500	2500
28.	2027-28	SR	Augmentation of 7x500 MVA 400/220 kV ICTs (3rd, 4th, 5th, 6th, 7th, 8th & 9th) at Gadag-II PS	400/220	7	500	3500
29.	2025-26	SR	2x500MVA, 400/220 kV Kasargode	400/220	2	500	1000
30.	2026-27	SR	Augmentation of transformation capacity by 3x1500 MVA, 765/400 kV ICTs at Kurnool-III PS	765/400	3	1500	4500
31.	2026-27	SR	Augmentation of 1x1500 MVA 765/400 kV ICT (7th) at	400/220	1	1500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			Kurnool-III PS				
32.	2026-27	SR	Establishment of 4x1500 MVA, 765/400 kV & 4x500 MVA, 400/220 kV Kurnool-IV Pooling Station near Kurnool, Andhra Pradesh along with 2x330 MVA (765 kV) bus reactors at Kurnool-IV PS with provision of two (2) sections of 4500 MVA each at 400 kV level	765/400 & 400/220	4	1500	6000
33.	2026-27	SR	Establishment of 4x1500 MVA, 765/400 kV & 4x500 MVA, 400/220 kV Kurnool-IV Pooling Station near Kurnool, Andhra Pradesh along with 2x330 MVA (765 kV) bus reactors at Kurnool-IV PS with provision of two (2) sections of 4500 MVA each at 400 kV level	765/400 & 400/220	4	500	2000
34.	2026-27	SR	Augmentation of 1x1500 MVA, 765/400 kV ICT (3rd) at C'Peta	400/220	1	1500	1500
35.	2026-27	SR	Establishment of 4x1500 MVA, 765/400 & 6x500 MVA, 400/220 kV Ananthapuram-II Pooling Station near Kurnool, Andhra Pradesh along with 2x330 MVA (765 kV) bus reactors at Ananthapuram-II PS with provision of two (2) sections of 4500 MVA each at 400 kV level	765/400 & 400/220	4	1500	6000
36.	2026-27	SR	Establishment of 4x1500 MVA, 765/400 & 6x500 MVA, 400/220 kV Ananthapuram-II Pooling Station near Kurnool, Andhra Pradesh along with 2x330 MVA (765 kV) bus reactors at Ananthapuram-II PS with provision of two (2) sections of 4500 MVA each at 400 kV level	765/400 & 400/220	6	500	3000
37.	2027-28	SR	Augmentation of transformation capacity of 1x1500 MVA (4th), 765/400 kV ICT at Bidar PS	765/400	1	1500	1500
38.	2027-28	SR	Augmentation of transformation capacity by 3x500 MVA, 400/220 kV ICTs (6th – 8th) at Bidar PS	400/220	3	500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
39.	2028-29	SR	Augmentation of Ananthapuram-II PS by 400/220 kV, 1x500 MVA ICT	400/220	1	500	500
40.	2028-29	SR	Augmentation of Ananthapuram-II PS by 765/400 kV, 2x1500 MVA and 400/220 kV, 6x500 MVA ICTs	765/400 & 400/220	2	1500	3000
41.	2028-29	SR	Augmentation of Ananthapuram-II PS by 765/400 kV, 2x1500 MVA and 400/220 kV, 6x500 MVA ICTs	765/400 & 400/220	6	500	3000
42.	2028-29	SR	Establishment of 3x1500 MVA, 765/400 kV Tuticorin (GH) S/s with 1x240 MVAR bus Reactor	765/400	3	1500	4500
43.	2028-29	SR	Upgradation of Tuticorin PS to its rated voltage of 765 kV level alongwith 3x1500 MVA, 765/400 kV ICTs and 1x330 MVAR, 765 kV bus reactors	765/400	3	1500	4500
44.	2028-29	SR	Upgradation of Dharmapuri (Salem New) to its rated voltage of 765 kV level alongwith 3x1500 MVA, 765/400 kV ICTs and 1x330 MVAR, 765 kV bus reactor	765/400	3	1500	4500
45.	2028-29	SR	Establishment of 3x1500 MVA, 765/400 kV CN'Halli Station with 2x330 MVAR (765 kV) bus reactors	765/400	3	1500	4500
46.	2027-28	SR	Establishment of Kakinada 765/400 kV, 3x1500 MVA substation (GIS) alongwith 240 MVAR bus reactor Future Space Provisions: > 765/400 kV, 1500 MVA, ICTs – 3 Nos. > 765 kV ICT bays – 3 Nos. > 400 kV ICT bays – 3 Nos. > 765 kV line bays – 8 Nos. (with provision for SLR) > 400 kV line bays – 12 Nos. (with provision for SLR) > 400 kV Bus Sectionalizer : 1 set	765/400	3	1500	4500
47.	2028-29	SR	Augmentation of Kurnool-IV PS by 400/220 kV, 4x500 MVA ICTs	400/220	4	500	2000
48.	2028-29	SR	Augmentation of Kurnool-IV PS by 765/400 kV, 2x1500 MVA and 400/220 kV, 6x500 MVA ICTs	765/400 & 400/220	2	1500	3000
49.	2028-29	SR	Augmentation of Kurnool-IV PS by 765/400 kV, 2x1500 MVA and 400/220 kV, 6x500 MVA ICTs	765/400 & 400/220	6	500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
50.	2028-29	SR	Establishment of 4x1500 MVA, 765/400 kV Doma Station with 2x330 MVar (765 kV) bus reactors with space provision for establishment of 220 kV switchyard	765/400	4	1500	6000
51.	2027-28	SR	Augmentation of transformation capacity by 4x500 MVA, 400/220kV ICTs (5th – 8th at Davanagere PS	400/220	4	500	2000
52.	2027-28	SR	Augmentation of Davanagere / Chitradurga PS by 765/400kV, 1x1500 MVA ICTs	765/400	1	1500	1500
53.	2027-28	SR	Augmentation of transformation capacity by 2x1500 MVA, 765/400 kV ICTs (6th & 7th) at Davanagere PS	765/400	2	1500	3000
54.	2027-28	SR	Augmentation of Bellary PS by 400/220 kV, 6x500 MVA ICTs	400/220	6	500	3000
55.	2025-26	SR	Augmentation by 1x1500 MVA, 765/400 kV ICT at Maheshwaram(PG) S/s	765/400	1	1500	1500
56.	2025-26	SR	Augmentation of 1x1500 MVA (3rd), 765/400kV transformation capacity at Kurnool New S/s.	765/400	1	1500	1500
57.	2025-26	SR	Augmentation of Transformation Capacity at 400/220 kV Gadag PS in Karnataka by 400/220 kV, 1x500 MVA ICT (6th)	400/220	1	500	500
58.	2026-27	SR	Augmentation of transformation capacity at 400/230kV Tuticorin-II GIS PS in Tamil Nadu by 500 MVA, 400/230kV ICT (6th)	400/220	1	500	500
59.	2026-27	SR	Augmentation of transformation capacity at 400/220kV NP Kunta PS by 1x500 MVA, 400/220kV ICT (5th)	400/220	1	500	500
60.	2026-27	SR	Augmentation by 2x500 MVA, 400/220 kV transformation capacity at Tumkur (Pavagada) PS	400/220	2	500	1000
61.	2027-28	SR	Augmentation of Tumkur-II PS by 400/220 kV, 3x500 MVA ICTs (5th to 7th)	400/220	3	500	1500
62.	2027-28	SR	Augmentation of Tumkur-II PS by 400/220 kV, 3x500 MVA ICTs (8th to 10th)	400/220	3	500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
63.	2028-29	SR	Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Krishnagiri Pooling Station near Kodumur in Kurnool district along with 2x330 MVA (765 kV) bus reactors at Krishnagiri PS with provision of two (2) sections of 4500 MVA each at 400kV level	765/400 & 400/220	5	500	2500
64.	2028-29	SR	Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Krishnagiri Pooling Station near Kodumur in Kurnool district along with 2x330 MVA (765 kV) bus reactors at Krishnagiri PS with provision of two (2) sections of 4500 MVA each at 400kV level	765/400 & 400/220	4	1500	6000
65.	2028-29	SR	Establishment of 3x1500 MVA, 765/400 kV Sagar substation with 2x330 MVA (765 kV) bus reactors with space provision for establishment of 220 kV switchyard	765/400	3	1500	4500
66.	2028-29	SR	Establishment of 4x1500 MVA, 765/400 kV Pendurthi (Vizag) GIS substation with 1x330 MVA (765 kV) bus reactor with space provision for establishment of 220 kV switchyard	765/400	4	1500	6000
67.	2028-29	SR	Establishment of 3x1500 MVA, 765/400 kV Khammam-II substation with 1x330 MVA (765 kV) bus reactor with space provision for establishment of 220 kV switchyard	765/400	3	1500	4500
68.	2026-27	SR	Augmentation of 2x500 MVA, 400/230 kV transformation capacity (3rd & 4th ICTs) at Karur PS	400/220	2	500	1000
69.	2029-30	SR	Establishment of 2x500 MVA, 400/230 kV Onshore Pooling Station(GIS) near Avaraikulam, Tirunelveli District in Tamil Nadu with provision of expansion upto 5GW	400/220	2	500	1000
70.	2029-30	SR	Establishment of 2x315 MVA, 230/66kV Off-Shore Substation-1(GIS) with 10 nos. of 66kV line bays for RE integration	230/66	2	315	630
71.	2026-27	SR	i. Augmentation of transformation capacity by 2x500	400/220	2	500	1000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			MVA (9th & 10th), 400/220 kV ICTs at Tumkur (Pavagada) 400/220 kV Pooling Station ii. Additional land of about 100 m (width) x 540 m (length) on right side of the Tumkur (Pavagada) PS for expansion of Tumkur (Pavagada) PS with 2 Nos. of additional 500 MVA ICTs & 220 kV line bays				
72.	2026-27	SR	Augmentation of transformation capacity at 400/220kV Yelahanka (GIS) S/s in Karnataka by 1x500 MVA, 400/220kV ICT (3rd)	400/220	1	500	500
73.	2026-27	SR	Augmentation of transformation capacity at 400/220kV Bidadi (GIS) S/s in Karnataka by 1x500 MVA, 400/220kV ICT (3rd)	400/220	1	500	500
74.	2026-27	SR	Augmentation of 1x500 MVA, 400/230 kV ICT (7th) at Tuticorin-II GIS Sub Station	400/220	1	500	500
75.	2027-28	SR	Augmentation of transformation capacity with 400/220kV, 1x500 MVA ICT (4th) at Nagarjunasagar 400/220kV substation	400/220	1	500	500
76.	2026-27	SR	Augmentation of transformation capacity at 400/220kV Kozhikode S/s by 1x500 MVA ICT (4th)	400/220	1	500	500
77.	2026-27	SR	Augmentation of transformation capacity at 400/220kV Trivandrum S/s by 1x500 MVA ICT (4th)	400/220	1	500	500
78.	2026-27	SR	Augmentation / replacement of existing 400/230kV, 315 MVA ICT-2 with 400/230kV, 500 MVA ICT at Udumalpet 400/230kV S/s	400/220	1	500	500
79.	2027-28	SR	Augmentation of 1x500 MVA, 400/220KV ICT (3rd) at Thrissur VSC HVDC station along with 33kV tertiary power supply and associated ICT bays	400/220	1	500	500
80.	2027-28	SR	Augmentation of Transformation capacity by 1x500 MVA, 400/220 kV ICT (3rd) at Narendra (existing) S/s.	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
81.	2027-28	SR	Augmentation of Transformation capacity by 1x500 MVA, 400/230 kV ICT (4th) at Kalivanthapattu S/s in Tamil Nadu.	400/220	1	500	500
82.	2026-27	WR	Establishment of 4x500 MVA, 400/220 kV Pooling Station near Dhule along with 2x125 MVar (420 kV) Bus Reactors.	400/220	4	500	2000
83.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV and 2x500 MVA, 400/220 kV S/s at Karera (near Datiya) along with 1x330MVar 765 kV bus reactor & 1x125MVar, 420 kV bus reactor	765/400 & 400/220	2	1500	3000
84.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV and 2x500 MVA, 400/220 kV S/s at Karera (near Datiya) along with 1x330MVar 765 kV bus reactor & 1x125MVar, 420 kV bus reactor	765/400 & 400/220	2	500	1000
85.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV and 2x500 MVA, 400/220 kV S/s at Ishanagar (New) along with 1x330 MVar, 765 kV & 1x125 MVar, 420 kV bus reactor	765/400 & 400/220	2	1500	3000
86.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV and 2x500 MVA, 400/220 kV S/s at Ishanagar (New) along with 1x330 MVar, 765 kV & 1x125 MVar, 420 kV bus reactor	765/400 & 400/220	2	500	1000
87.	2025-26	WR	400/220 kV, 3x500 MVA ICT augmentation (4th, 5th and 6th) at Pachora PS	400/220	3	500	1500
88.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 9x500 MVA, 400/220kV ICTs at Krishnagiri PS	765/400 & 400/220	5	1500	7500
89.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 9x500 MVA, 400/220kV ICTs at Krishnagiri PS	765/400 & 400/220	9	500	4500
90.	2029-30	SR	i) Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station along with 2x330 MVar bus reactor	765/400 & 400/220	4	1500	6000
91.	2029-30	SR	i) Establishment of 4x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station along with 2x330 MVar bus reactor	765/400 & 400/220	5	500	2500
92.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 5x500	765/400 & 400/220	2	1500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			MVA, 400/220kV Kadapa-II Pooling Station				
93.	2029-30	SR	i) Augmentation of 2x1500 MVA, 765/400 kV and 5x500 MVA, 400/220kV Kadapa-II Pooling Station	765/400 & 400/220	5	500	2500
94.	2029-30	SR	Transmission System for Integration of Anantapur-III REZ (Ph-I)				4500
95.	2029-30	SR	i) Augmentation of 3x1500 MVA, 765/400 kV and 7x500 MVA, 400/220kV ICTs at Ananthapuram-III PS ii) Establishment of 2x1500 MVA, 765/400 kV GIS substation near Malur with 1x240 MVAR (765 kV) bus reactor with space provision for establishment of 220 kV switchyard at Malur	765/400 & 400/220	3	1500	4500
96.	2029-30	SR	i) Augmentation of 3x1500 MVA, 765/400 kV and 7x500 MVA, 400/220kV ICTs at Ananthapuram-III PS ii) Establishment of 2x1500 MVA, 765/400 kV GIS substation near Malur with 1x240 MVAR (765 kV) bus reactor with space provision for establishment of 220 kV switchyard at Malur	765/400 & 400/220	7	500	3500
97.	2029-30	SR	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Vizag area, Andhra Pradesh (Phase-II)				7500
98.	2026-27	WR	Establishment of 400/220 kV, 4x500 MVA Solapur PS alongwith 2x125 MVAR, 420 kV Bus Reactors	400/220	4	500	2000
99.	2026-27	WR	Creation of 765 kV bus section-II at KPS3 (GIS) along with 765 kV Bus Sectionalizer & 1x330 MVAR, 765 kV Bus Reactors on Bus Section-II Bus section – II shall be created at 765 kV & 400 kV level both with 3x1500MVA, 765/400 kV ICTs at Bus Section-II	765/400	3	1500	4500
100.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV GIS S/s at a suitable location South of Olpad (between Olpad and Ichhapore) with 2x330 MVAR, 765 kV &	765/400 & 400/220	2	1500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			1x125 MVAR, 420 kV bus reactors				
101.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV GIS S/s at a suitable location South of Olpad (between Olpad and Ichhapore) with 2x330 MVAR, 765 kV & 1x125 MVAR, 420 kV bus reactors	765/400 & 400/220	2	500	1000
102.	2026-27	WR	Establishment of 4x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV Boisar-II (GIS) S/s with 2x330 MVAR, 765 kV bus reactors and 2x125 MVAR, 420 kV bus reactors. (2x1500 MVA, 765/400 kV ICTs shall be on each 400 kV section and 2x500 MVA, 400/220 kV ICTs shall be on 400 kV Bus Section-II. 2x125 MVAR Bus reactors shall be such that one bus reactor is placed on each 400 kV bus section. 400 kV Bus Sectionalizer to be kept under normally OPEN condition)	765/400 & 400/220	4	1500	6000
103.	2026-27	WR	Establishment of 4x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV Boisar-II (GIS) S/s with 2x330 MVAR, 765 kV bus reactors and 2x125 MVAR, 420 kV bus reactors. (2x1500 MVA, 765/400 kV ICTs shall be on each 400 kV section and 2x500 MVA, 400/220 kV ICTs shall be on 400 kV Bus Section-II. 2x125 MVAR Bus reactors shall be such that one bus reactor is placed on each 400 kV bus section. 400 kV Bus Sectionalizer to be kept under normally OPEN condition)	765/400 & 400/220	2	500	1000
104.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV & 3x500 MVA, 400/220 kV Pune-III (GIS) S/s with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor.	765/400 & 400/220	2	1500	3000
105.	2026-27	WR	Establishment of 2x1500 MVA, 765/400 kV & 3x500 MVA, 400/220 kV Pune-III (GIS) S/s with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor.	765/400 & 400/220	3	500	1500
106.	2026-27	WR	Augmentation of transformation capacity at KPS2 (GIS) by 2x1500 MVA,	765/400	4	1500	6000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			765/400 kV ICT on Bus section-I (5th & 6th) & 2x1500 MVA, 765/400 kV ICT on Bus section-II (7th & 8th) & 2 Nos. 400 kV bays at Bus Section-I for RE interconnection and 3 Nos. 400 kV bays at Bus Section-II for RE interconnection				
107.	2029-30	WR	Establishment of 6x1500 MVA, 765/400 kV ICTs at Nagpur S/s along with 2x330 MVAR (765 kV) & 2x125 MVAR, 420 kV bus reactors along with associated interconnections with HVDC Switchyard*. The 400 kV bus shall be established in 2 sections through 1 set of 400 kV bus sectionaliser so that 3x1500 MVA ICTs are placed in each section. The bus sectionaliser shall be normally closed and may be opened based on Grid requirement.	765/400	6	1500	9000
108.	2026-27	WR	Establishment of 3x1500 MVA, 765/400 kV & 5x500 MVA, 400/220 kV Mandsaur Pooling Station along with 2x330 MVAR (765 kV) Bus Reactors & 2x125 MVAR, 420 kV Bus Reactor	765/400 & 400/220	3	1500	4500
109.	2026-27	WR	Establishment of 3x1500 MVA, 765/400 kV & 5x500 MVA, 400/220 kV Mandsaur Pooling Station along with 2x330 MVAR (765 kV) Bus Reactors & 2x125 MVAR, 420 kV Bus Reactor	765/400 & 400/220	5	500	2500
110.	2026-27	WR	Establishment of 2x1500 MVA 765/400 kV Jamnagar (GIS) PS with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 420 kV bus reactor.	765/400	2	1500	3000
111.	2026-27	WR	Establishment of 4x1500 MVA, 765/400 kV Navinal (Mundra) S/s (GIS) with 2x330 MVAR, 765 kV & 1x125MVar, 420 kV bus reactors	765/400	4	1500	6000
112.	2027-28	WR	•Augmentation of transformation capacity at Jam Khambhaliya PS (GIS) by 2x500MVA, 400/220 kV ICT (5th & 6th) (terminated on New 220kV Bus section-II)	400/220	2	500	1000
113.	2027-28	WR	•Augmentation of transformation capacity at Jam Khambhaliya PS (GIS) by 1x500MVA, 400/220kV ICT (7th) (terminated on New 220kV bus section-II)	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
114.	2027-28	WR	Augmentation of transformation capacity at Jam Khambhaliya PS (GIS) by 1x500MVA, 400/220kV ICT (8th) (terminated on New 220kV bus section-III)	400/220	1	500	500
115.	2027-28	WR	Augmentation of transformation capacity at Jam Khambhaliya PS (GIS) by 1x500MVA, 400/220kV (9th) ICT terminated on New 220kV bus section-III	400/220	1	500	500
116.	2027-28	WR	Establishment 2x1500 MVA, 765/400 kV Substation near South of Kalamb with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	765/400	2	1500	3000
117.	2027-28	WR	Installation of 2x500 MVA, 400/220 kV ICTs (3rd & 4th) at Lakadia PS along with associated ICT bays	400/220	2	500	1000
118.	2027-28	WR	2x500MVA ICTs (5th & 6th)	400/220	2	500	1000
119.	2027-28	WR	1x500MVA ICT (7th)	400/220	1	500	500
120.	2027-28	WR	1x500MVA ICT (8th)	400/220	1	500	500
121.	2027-28	WR	Augmentation of transformation capacity at Lakadia PS by 1x1500 MVA, 765/400 kV ICTs (3rd)	765/400	1	1500	1500
122.	2027-28	WR	Establishment of 4x1500 MVA, 765/400 kV Substation near Raghnesda (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	765/400	4	1500	6000
123.	2027-28	WR	Creation of 220 kV switchyard (Bus Sec-I) at Raghnesda PS (GIS) along with installation of 2x500 MVA, 400/220 kV ICTs	400/220	2	500	1000
124.	2027-28	WR	Augmentation of Transformation capacity at 765/400 kV Navinal(Mundra) S/s (GIS) by 2x1500 MVA ICTs along with 2x330 MVAR, 765 kV & 2x125MVA, 420 kV bus reactors on Bus Section- II and 1x125MVA, 420 kV bus reactor on Bus Section-I. This will involve creation of 765 kV & 400 kV Bus Sections 2 through sectionalization arrangement. The 400	765/400	2	1500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			kV and 765 kV Sectionalizer shall be normally closed.				
125.	2026-27	WR	Augmentation of transformation capacity at Banaskantha (Raghnesda) PS (GIS) by 2x500 MVA 400/220 kV ICTs (3rd & 4th)	400/220	2	500	1000
126.	2026-27	WR	Augmentation of transformation capacity at KPS1(GIS) by 1x1500 MVA, 765/400 kV ICT on Bus section-II (9th)	765/400	2	1500	3000
127.	2027-28	WR	Creation of New 220 kV Bus Section (3rd) with 220 kV Bus Sectionalizer and 400/220 kV, 3x500 MVA ICT augmentation (7th, 8th & 9th) at Pachora PS terminated on 220 kV Bus Section (3rd)	400/220	3	500	1500
128.	2027-28	WR	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	400/220	3	500	1500
129.	2027-28	WR	Establishment of 2x500 MVA, 400/220 kV S/s at Handiya along with 2x125 MVA 420 kV Bus Reactors	400/220	2	500	1000
130.	2027-28	WR	Augmentation of Transformation capacity by 1x1500 MVA, 765/400 kV ICT (4th) (Terminated at 400 kV & 765 kV Bus Section-II)	765/400	1	1500	1500
131.	2027-28	WR	Augmentation of Transformation capacity by 1x500 MVA, 400/220 kV ICT (6th) (Terminated on 400 kV Bus Section-I & 220 kV Bus Section-II)	400/220	1	500	500
132.	2027-28	WR	Augmentation of Transformation capacity by 1x500 MVA, 400/220 kV ICT (7th) (Terminated on 400 kV Bus Section-II & 220 kV Bus Section-III) at Mandsaur PS	400/220	1	500	500
133.	2028-29	WR	Establishment of 3x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV Morena PS (South of Sabalgarh) with 2x330 MVA 765 kV bus	765/400	3	1500	4500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			reactor and 2x125 MVar 420 kV bus reactor				
134.	2028-29	WR	Establishment of 3x1500 MVA, 765/400 kV & 2x500 MVA, 400/220 kV Morena PS (South of Sabalgarh) with 2x330 MVar 765 kV bus reactor and 2x125 MVar 420 kV bus reactor	765/400	2	500	1000
135.	2028-29	WR	Augmentation of 400/220 kV transformation capacity at 765/400/220 kV Karera (near Datia) S/s (Sec-I) by 1x500 MVA ICT (3rd)	765/400/220	1	500	500
136.	2025-26	WR	Installation of 1x500MVA, 400/220 kV ICT (4th) along with associated ICT bays at Satna (PG)	400/220	1	500	500
137.	2028-29	WR	Establishment of 3x1500 MVA, 765/400 kV Kandla(GIS) with 2x330 MVAR 765 kV bus reactor and 2x125 MVAR 420 kV bus reactor.	765/400	3	1500	4500
138.	2025-26	WR	Creation of 220 kV level at 765/400 kV Jabalpur PS with installation of 2x500 MVA, 400/220 kV ICTs along with associated ICT bays,	400/220	2	500	1000
139.	2026-27	WR	Augmentation of transformation capacity at Navsari (New) 765/400 kV S/s by 1x1500 MVA (ICT-IV)	765/400	1	1500	1500
140.	2025-26	WR	Augmentation of transformation capacity at KPS3 (GIS) by 1x1500 MVA, 765/400 kV ICT (7th) on Bus section-I	765/400	1	1500	1500
141.	2025-26	WR	Augmentation of transformation capacity at Padghe (PG) (GIS) by 1x1500 MVA, 765/400 kV ICT (4th)	765/400	1	1500	1500
142.	2026-27	WR	Augmentation of Transformation capacity at 400/220kV Magarwarda GIS S/s by 400/220kV 1x500MVA ICT (3rd)	400/220	1	500	500
143.	2026-27	WR	Augmentation of Transformation Capacity at 400/220kV Rajgarh (PG) S/s by 400/220kV, 1x500MVA ICT (3rd) (terminated on the sectionalized 220kV bus)	400/220	1	500	500
144.	2025-26	WR	Augmentation of Transformation capacity at 400/220kV Boisar S/s in Maharashtra by 400/220kV 1x500MVA ICT (5th)	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
145.	2025-26	WR	Installation of 2x500 MVA, 400/220 kV ICTs (1st & 2nd) at Lakadia PS along with associated ICT bays	400/220	2	500	1000
146.	2026-27	WR	Augmentation of Transformation Capacity at 765/400/220kV Vadodara (GIS) S/s in Gujarat by 400/220kV, 1x500MVA ICT (3rd)	765/400/220	1	500	500
147.	2026-27	WR	Creation of 220 kV switchyard along with Installation of 2x500 MVA, 400/220 kV ICTs at Vataman (AIS)	400/220	2	500	1000
148.	2026-27	WR	Augmentation of Transformation capacity at 400/220kV Rajgarh S/s by 1x500MVA ICT (4th) (terminated on the sectionalized 220kV bus)	400/220	1	500	500
149.	2026-27	WR	Augmentation of transformation capacity at 400/220kV Bhuj PS in Gujarat by 1x500 MVA, 400/220kV ICT (10th) along with associated transformer bays	400/220	1	500	500
150.	2026-27	WR	Augmentation of transformation capacity at Bhuj-II PS (GIS) by 2x500 MVA, 400/220 kV ICT (5th & 6th) and by 1x1500 MVA, 765/400 kV ICT (3rd)	765/400 & 400/220	2	500	1000
151.	2026-27	WR	Augmentation of transformation capacity at Bhuj-II PS (GIS) by 2x500 MVA, 400/220 kV ICT (5th & 6th) and by 1x1500 MVA, 765/400 kV ICT (3rd)	765/400 & 400/220	1	1500	1500
152.	2026-27	WR	Augmentation of transformation capacity at Bhuj-II PS (GIS) by 3x500 MVA, 400/220 kV ICT (7th, 8th & 9th)	400/220	3	500	1500
153.	2026-27	WR	Augmentation of transformation capacity at Bhuj-II PS (GIS) by 1x1500 MVA, 765/400 kV ICT (4th)	765/400	1	1500	1500
154.	2027-28	WR	Creation of New 765 kV Bus Sections-II & III & 400 kV Bus Sections-II & III through 765 kV Sectionalization bay: 2 set & 400 kV Sectionalization bay: 2 set along with 2x330 MVAR, 765 kV bus reactor & 2x125 MVAR, 420 kV bus reactor on Section-III. 400 kV Sectionalizer between Sections-I & II & between sections-II & III to be normally open. Further, 765	765/400	3	1500	4500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			kV sectionaliser between Sections-I & II & between II & III shall be kept normally closed. The 400 kV sectionalisers can be closed under contingency conditions. Installation of 3x1500 MVA, 765/400 kV ICTs at South Kalamb S/s (400 kV Sec-III & 765 kV Section-III)				
155.	2027-28	ER	Establishment of 2x1500 MVA, 765/400 kV S/s at Jamshedpur (New) in Jharkhand	765/400	2	1500	3000
156.	2027-28	ER	Establishment of 2x1500 MVA, 765/400 kV S/s at Jamshedpur (New) in Jharkhand	765/400	2	1500	3000
157.	2027-28	WR	B. Establishment of 3x1500 MVA, 765/400 kV S/s (on 765 kV Bus section-II & 400 kV Bus Section-II) at Raigarh (Kotra)-II S/s in Chhattisgarh with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor (on 765 kV Bus section-II & 400 kV Bus Section-II)	765/400	4	1500	6000
158.	2027-28	ER	Installation of new 765/400 kV, 1x1500 MVA (3x500 MVA single phase units) ICT (3rd) at Jeerat (New) S/s of M/s POWERGRID Medinipur Jeerat Transmission Limited (PMJTL) along with associated bays at both ends	765/400	1	1500	1500
159.	2026-27	WR	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	765/400	1	1500	1500
160.	2027-28	WR	Creation of 220 kV switchyard (Bus Sec-I) at Navinal (Mundra) S/s (GIS) along with installation of 1x500MVA, 400/220 kV ICT at Navinal (Mundra) S/s (GIS).	400/220	1	500	500
161.	2027-28	WR	Augmentation of Transformation capacity at 400/220 kV Navi Mumbai (GIS) (PG) S/s by 400/220 kV 1x500MVA ICT (3rd) along with associated bays at both ends.	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
162.	2027-28	WR	Augmentation of Transformation capacity at 400/220kV Raipur (PG) S/s by 400/220kV 1x500MVA ICT (4th) along with associated bays at both ends.	400/220	1	500	500
163.	2027-28	WR	Augmentation of Transformation capacity at Pirana (PG) S/s in Gujarat by 400/220 kV, 1x500 MVA (3rd) ICT along with associated bays at both ends	400/220	1	500	500
164.	2025-26	WR	Creation of 400 kV switchyard along with Installation of 2x1500 MVA, 765/400 kV ICTs at Vataman (AIS) with 2x125 MVA (420 kV) Bus Reactors	765/400	2	1500	3000
165.	2025-26	NR	Establishment of 2x1500 MVA, 765/400kV & 3x500 MVA, 400/220kV pooling station at Bhadla-3 along with 2x330 MVA (765kV) Bus Reactor & 2x125 MVA (420kV) Bus Reactor	765/400 & 400/220	2	1500	3000
166.	2025-26	NR	Establishment of 2x1500 MVA, 765/400kV & 3x500 MVA, 400/220kV pooling station at Bhadla-3 along with 2x330 MVA (765kV) Bus Reactor & 2x125 MVA (420kV) Bus Reactor	765/400 & 400/220	3	500	1500
167.	2025-26	NR	Establishment of 2x1500 MVA, 765/400kV & 2x500 MVA, 400/220 kV pooling station at Ramgarh along with 2x240 MVA (765kV) Bus Reactor	765/400 & 400/220	2	1500	3000
168.	2025-26	NR	Establishment of 2x1500 MVA, 765/400kV & 2x500 MVA, 400/220 kV pooling station at Ramgarh along with 2x240 MVA (765kV) Bus Reactor	765/400 & 400/220	2	500	1000
169.	2025-26	NR	Establishment of 2x1500MVA, 765/400kV Substation at suitable location near Beawar along with 2x330 MVA 765kV Bus Reactor & 2x125 MVA 420kV Bus Reactor	765/400	2	1500	3000
170.	2026-27	NR	Establishment of 6x1500 MVA (along with one spare unit of 500 MVA), 765/400 kV & 5x500 MVA 400/220 kV Bikaner-III Pooling Station along with 2x330 MVA (765kV) Bus Reactor (along with one spare unit of 110	765/400 & 400/220	6	1500	9000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			MVar) & 2x125 MVar (420kV) Bus Reactor at a suitable location near Bikaner				
171.	2026-27	NR	Establishment of 6x1500 MVA (along with one spare unit of 500 MVA), 765/400 kV & 5x500 MVA 400/220 kV Bikaner-III Pooling Station along with 2x330 MVar (765kV) Bus Reactor (along with one spare unit of 110 MVar) & 2x125 MVar (420kV) Bus Reactor at a suitable location near Bikaner	765/400 & 400/220	5	500	2500
172.	2026-27	NR	Establishment of 765/400 kV, 4x1500 MVA (along with one spare unit of 500MVA) Neemrana-II S/s along with 2x330 MVar (765kV) Bus Reactor (along with one spare unit of 110 MVar) & 2x125 MVar (420kV) Bus Reactor at a suitable location near Neemrana	765/400	4	1500	6000
173.	2029-30	NR	Establishment of 5x1500 MVA, 765/400 kV ICTs at Fatehpur (HVDC) along with 2x330 MVar (765kV) bus reactor	765/400	5	1500	7500
174.	2026-27	NR	Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA, 400/220 kV Fatehgarh-IV (Section-2) Pooling Station along with 2x240 MVAR (765 kV) Bus Reactor & 2x125 MVAR (420 kV) Bus Reactor [Future space provisions already approved at Fatehgarh-IV in 8th NCT meeting dated 25.03.22 would be utilized for the present scheme]	765/400 & 400/220	4	1500	6000
175.	2026-27	NR	Establishment of 4x1500 MVA, 765/400 kV & 5x500 MVA, 400/220 kV Fatehgarh-IV (Section-2) Pooling Station along with 2x240 MVAR (765 kV) Bus Reactor & 2x125 MVAR (420 kV) Bus Reactor [Future space provisions already approved at Fatehgarh-IV in 8th NCT meeting dated 25.03.22 would be utilized for the present scheme]	765/400 & 400/220	5	500	2500
176.	2026-27	NR	Establishment of 2x1500 MVA, 765/400 kV Substation at suitable location near Sirohi along with 2x240 MVAR (765 kV) & 2x125 MVAR (420 kV) Bus Reactor	765/400	2	1500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformati on Capacity (MVA)
177.	2028-29	NR	Establishment of 7x105 MVA, 400/220kV S/s with 1x80 MVAR (420 kV) bus reactors	400/220	2	315	630
178.	2028-29	NR	Establishment of 7x105 MVA, 400/220kV Nange GIS Pooling Station alongwith 125 MVAR (420kV) Bus Reactor at Nange (GIS) PS(1-Ph units along with one spare unit)	400/220	3	315	945
179.	2027-28	NR	Establishment of 3x1500 MVA, 765/400 kV & 2x500MVA, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAR (765 kV) Bus Reactor & 2x125 MVAR (420 kV) Bus Reactor	765/400 & 400/220	3	1500	4500
180.	2027-28	NR	Establishment of 3x1500 MVA, 765/400 kV & 2x500MVA, 400/220 kV Barmer-I Pooling Station along with 2x240 MVAR (765 kV) Bus Reactor & 2x125 MVAR (420 kV) Bus Reactor	765/400 & 400/220	2	500	1000
181.	2026-27	NR	Establishment of 765/400 kV (2x1500 MVA), 400/22 kV (2x500 MVA) & 220/132 kV (3x200 MVA) Kurawar S/s with 2x330 MVAR 765 kV bus reactor and 1x125 MVAR, 420 kV bus reactor.	765/400 & 400/220 & 220/132	2	1500	3000
182.	2026-27	NR	Establishment of 765/400 kV (2x1500 MVA), 400/22 kV (2x500 MVA) & 220/132 kV (3x200 MVA) Kurawar S/s with 2x330 MVAR 765 kV bus reactor and 1x125 MVAR, 420 kV bus reactor.	765/400 & 400/220 & 220/132	2	500	1000
183.	2026-27	NR	Establishment of 765/400 kV (2x1500 MVA), 400/22 kV (2x500 MVA) & 220/132 kV (3x200 MVA) Kurawar S/s with 2x330 MVAR 765 kV bus reactor and 1x125 MVAR, 420 kV bus reactor.	765/400 & 400/220 & 220/132	3	200	600
184.	2026-27	NR	Establishment of 6x1500 MVA, 765/400 kV & 6x500 MVA, 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors at a suitable location near Bikaner	765/400 & 400/220	6	1500	9000
185.	2026-27	NR	Establishment of 6x1500 MVA, 765/400 kV & 6x500 MVA, 400/220 kV Bikaner-IV Pooling Station along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors at a suitable location near Bikaner	765/400 & 400/220	6	500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
186.	2028-29	NR	Establishment of 2x315 MVA (7x105 MVA 1-ph units including a spare unit) 400/220 kV GIS Pooling Station at Jhangi	400/220	2	315	630
187.	2026-27	NR	Establishment of 765/400kV, 6x1500 MVA S/s at suitable location near Siwani (Distt. Bhiwani) along with 2x240 MVar (765kV) Bus Reactor & 2x125 MVar (420kV) Bus Reactor	765/400	6	1500	9000
188.	2026-27	NR	Augmentation of 2x500 MVA (4th & 5th), 400/220 kV ICTs at Bhadla-III PS	400/220	2	500	1000
189.	2026-27	NR	Augmentation of 2x1500 MVA, 765/400kV (3rd & 4th) ICTs at Bhadla-III	765/400	2	1500	3000
190.	2026-27	NR	Augmentation with 765/400 kV, 2x1500 MVA Transformer (4th& 5th) at Barmer-I PS	765/400	2	1500	3000
191.	2026-27	NR	Augmentation of 5x500 MVA (5th to 9th), 400/220 kV ICTs at Barmer-I PS	400/220	5	500	2500
192.	2026-27	NR	Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Ghiror (Distt. Mainpuri) along with 2x240 MVar (765kV) & 2x125 MVar (420kV) bus reactor at Ghiror S/s (UP)	765/400	2	1500	3000
193.	2026-27	NR	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Merta (Merta-II Substation) along with 2x240 MVar (765 kV) & 2x125 MVar (420 kV) bus reactor at Merta-II S/s	765/400	2	1500	3000
194.	2026-27	NR	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Merta (Merta-II Substation) along with 2x240 MVar (765 kV) & 2x125 MVar (420 kV) bus reactor at Merta-II S/s	400/220	5	500	2500
195.	2026-27	NR	4x500 MVA, 400/220 kV ICTs at Sirohi S/s along with transformer bays	400/220	4	500	2000
196.	2026-27	NR	Augmentation with 765/400 kV, 1x1500 MVA Transformer (7th) at	765/400	1	1500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			Fatehgarh-II PS along with associated transformer bays				
197.	2026-27	NR	Augmentation with 400/220 kV, 3x500 MVA (6th, 7th & 8th) ICTs at Fatehgarh-IV PS(Section-II) along with associated transformer bays	400/220	3	500	1500
198.	2026-27	NR	Augmentation with 400/220 kV, 2x500 MVA (3rd & 4th) ICTs at Barmer-I PS along with associated transformer bays	400/220	2	500	1000
199.	2025-26	NR	Augmentation of 3x1500 MVA 765/400kV & 2x500 MVA 400/220 kV pooling station at Fatehgarh-3 (new section)	765/400 & 400/220	3	1500	4500
200.	2025-26	NR	Augmentation of 3x1500 MVA 765/400kV & 2x500 MVA 400/220 kV pooling station at Fatehgarh-3 (new section)	765/400 & 400/220	2	500	1000
201.	2029-30	NR	HVDC System:				630
202.	2029-30	NR	HVDC System:				4500
203.	2025-26	NR	Augmentation of transformation capacity at Amargarh (GIS) S/s by 1x315 MVA, 400/220kV ICT (3rd) (three single phase units of 105MVA) along with associated transformer bays.*	400/220	1	315	315
204.	2025-26	NR	Augmentation of Transformation Capacity at 400/220kV Allahabad (PG) substation by 400/220kV, 1x500MVA (4th) ICT along with associated transformer bays (AIS) and 220kV Cable for ICT bay termination	400/220	1	500	500
205.	2025-26	NR	Augmentation with 400/220kV, 1x500MVA Transformer at Fatehgarh-III PS (5th ICT at Section-1) along with associated transformer bays* *1 no. of 400kV (AIS) (including associated tie bay) and 1 no. of	400/220	1	500	500
206.	2025-26	NR	Augmentation of 765/400 kV, 1500 MVA transformer at Bhiwani S/s (4th) (3rd in	765/400	1	1500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			Section-I which have 2x1000 MVA ICTs) along with associated ICT bays				
207.	2026-27	NR	Augmentation of Transformation Capacity at 400/220kV Kankroli (PG) S/s in Rajasthan by 400/220kV 1x500MVA ICT(4th) along with associated 220 kV transformer bay* *incl. extension of 220 kV side of ICT through 220 kV Cable/GIB	400/220	1	500	500
208.	2027-28	NR	Augmentation of Transformation Capacity at 400/220kV New Wanpoh (PG) S/s in Jammu & Kashmir by 400/220kV, 1x315 MVA ICT (3rd) (3x105MVA single phase units) along with associated transformer bays.	400/220	1	185	185
209.	2026-27	NR	Augmentation of Transformation Capacity at 400/220kV Bassi (PG) S/s in Rajasthan by 400/220kV 1x500MVA ICT(4th) along with associated transformer bays	400/220	1	500	500
210.	2026-27	NR	Augmentation of Transformation Capacity at 400/220kV Malerkotla(PG) S/s in Punjab by 400/220kV, 1x500MVA ICT (4th) along with associated transformer bays*	400/220	1	500	500
211.	2026-27	NR	Augmentation of Transformation capacity at 765/400/220kV Bikaner PS in Rajasthan by 400/220kV, 1x1500 MVA ICT (4th) along with associated transformer bays	765/400/220	1	500	500
212.	2026-27	NR	Augmentation of Transformation capacity at 400/220kV Bhiwadi(PG) S/s in Rajasthan by 400/220kV, 1x1500 MVA ICT (4th) along with associated transformer bays	400/220	1	500	500
213.	2026-27	NR	Augmentation of Transformation capacity at 400/220kV Bikaner-II PS in Rajasthan by 400/220kV, 1x1500 MVA ICT (9th) along with associated transformer bays	400/220	1	500	500
214.	2026-27	NR	Augmentation of Transformation capacity at Bhadla-II PS (Section-I) by 1x500MVA, 400/220kV ICT	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			(6th) along with associated bays				
215.	2026-27	NR	Augmentation of 400/220 kV, 1x500 MVA (4th) ICT at Hissar (PG) S/s along with associated transformer bays	400/220	1	500	500
216.	2026-27	NR	Augmentation of transformation capacity at 400/220kV Samba (PG) S/s by 1x500 MVA, 400/220kV ICT (4th) along with associated bays	400/220	1	500	500
217.	2026-27	NR	Augmentation of transformation capacity at 765/400/220kV Bikaner-III by 1x500 MVA, 400/220kV ICT (6th) along with associated bays	765/400/220	1	500	500
218.	2026-27	NR	Augmentation of transformation capacity at 400/220kV Bikaner-II by 1x500 MVA, 400/220kV ICT (10th) along with associated bays	400/220	1	500	500
219.	2026-27	NR	Augmentation of transformation capacity at 765/400/220kV Agra (PG) S/s by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays.	765/400/220	1	500	500
220.	2026-27	NR	Augmentation of transformation capacity at 400/220kV Mandola (PG) S/s by 1x500 MVA, 400/220kV ICT (5th) along with associated bays.	400/220	1	500	500
221.	2026-27	NR	Augmentation of transformation capacity at 765/400/220kV Bhadla-II PS in Rajasthan by 1x500 MVA, 400/220kV ICT (4th in Section-1A) along with associated bays	765/400/220	1	500	500
222.	2026-27	NR	Augmentation with 1x1500 MVA, 765/400 kV ICT (3rd) at Bareilly (765/400 kV) S/s	765/400	1	1500	1500
223.	2027-28	NR	Augmentation of transformation capacity at 400/220kV Maharani Bagh (PG) S/s (GIS) in Delhi by 1x500 MVA, 400/220kV ICT (5th)	400/220	1	500	500
224.	2030-31	NR	Establishment of 4x1500 MVA 765/400 kV Robertsganj Pooling Station near Robertsganj area in Sonbhadra distt. (Uttar Pradesh) along with 2x240 MVA 765 kV & 2x125 MVA 400 kV bus reactors.	765/400	4	1500	6000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
225.	2030-31	NR	Establishment of 400/220 kV, 6x500 MVA S/s at suitable location near Barmer (Barmer-II Substation) along with 2x125 MVAR bus reactor	400/220	6	500	3000
226.	2030-31	NR	Augmentation of South Kalamb S/s# by 4x1500 MVA, 765/400 kV ICTs (3 on 400 kV & 765 kV Section-II & 1 No. on 400 kV & 765 kV Section-I) along with 2x330 MVAR, 765 kV bus reactor & 2x125 MVAR, 420 kV bus reactor on Section-II. The Section-II will be established under a different network expansion scheme in WR as per details given below* (2x1500 MW HVDC Bipole-I to be terminated on 400 kV Sec-I & 2x1500 MW HVDC Bipole-II to be terminated on 400 kV Sec-II of South Kalamb S/s & 765 kV bus sectionalizer to be kept normally closed & 400 kV bus sectionalizer to be kept normally open)	765/400	4	1500	6000
227.	2026-27	NR	Augmentation of transformation capacity at 400/220kV Jaipur South (PG) S/s by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays	400/220	1	500	500
228.	2026-27	NR	Augmentation of transformation capacity at 400/220kV Neemrana (PG) by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays	400/220	1	500	500
229.	2027-28	NR	Augmentation of transformation capacity at 400/220kV Lucknow (PG) S/s by 1x500 MVA, 400/220kV ICT (3rd) along with associated bays	400/220	1	500	500
230.	2026-27	NR	Augmentation of 400/220 kV, 2x500 MVA (7th & 8 th) ICTs at Bikaner-IV PS along with associated transformer bays	400/220	2	500	1000
231.	2027-28	NR	Augmentation of Transformation capacity by 400/220 kV, 1x500 MVA (4th) ICT at 400/220kV Sikar (PG) S/s along with transformer bays.	400/220	1	500	500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
232.	2025-26	SR	Establishment of 400/200 kv, 7*500 MVA pooling station at suitable border location between ananthpuram & kurnool distt with 400kv (2*125MVAR) bus reactor future provision	400/220	7	500	3500
233.	2025-26	SR	Establishment of 765/400/220kV 3x1500 MVA, 10x500 MVA (incl 1 no. spare) ICT at Kurnool-III PS with 1x330MVAR (765kV) & 1x125MVAR (400kV) Bus Reactors.	765/400/200	3	1500	4500
234.	2025-26	SR	Establishment of 765/400/220kV 3x1500 MVA, 10x500 MVA (incl 1 no. spare) ICT at Kurnool-III PS with 1x330MVAR (765kV) & 1x125MVAR (400kV) Bus Reactors.	765/400/200	9	500	4500
235.	2026-27	WR	2x500MVA, 400/220kV Xeldem	400/220	2	500	1000
236.	2026-27	WR	Establishment of 765/400/220 kV Navsari (new) (South Gujarat) Sis (GIS)	765/400/200	9	500	4500
237.	2026-27	WR	Augmentation of transformation capacity at Padghe (GIS) 765/400 kV substation by 1x1500 MVA ICT.	765/400	1	1500	1500
238.	2026-27	WR	Augmentation of transformation capacity at Navsari(new) (GIS) 765/400 kV substation by 1x1500 MVA ICT (3rd) along with its associated bays	765/400	1	1500	1500
239.	2025-26	NR	Establishment of 2x1500 MVA 765/400kV substation at suitable location near Dausa along with 2x330 MVA, 765 kV Bus Reactor & 2x125 MVA, 420 kV bus Reactor	765/400	2	1500	3000
240.	2026-27	NR	1. Augmentation with 400/220kV, 1x500MVA Transformer (11th) at Fatehgarh-II PS (5th ICT in Fatehgarh-II section-II)	400/220	1	500	500
241.	2026-27	NR	2. Augmentation with 765/400kV, 1x1500MVA Transformer (5th) at Bhadla-2 PS	765/400	1	1500	1500
242.	2026-27	NR	3. Augmentation with 765/400kV, 1x1500MVA Transformer (3rd) at Bikaner (PG)	765/400	1	1500	1500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
243.	2026-27	NR	4. Augmentation of 1x1500 MVA ICT (3rd), 765/400kV ICT at Jhatikara Sub Station (Bamnoli/ Dwarka section)	765/400	1	1500	1500
244.	2025-26	NR	Augmentation by 765/400 kV, 1x1500 MVA ICT (4th) at Bikaner (PG)	765/400	1	1500	1500
245.	2025-26	NR	Augmentation by 400/220 kV, 1x500 MVA ICT (3 rd) at Kotputli (PG)	400/220	1	500	500
246.	2025-26	NR	Augmentation by 400/220 kV, 5x500 MVA ICT at Bikaner-II PS	400/220	5	500	2500
247.	2030-31	NR	Establishment of 765/400 kV, 6x1500 MVA & 400/220 kV, 10x500 MVA Bikaner-V Pooling Station along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors at a suitable location near Bikaner	765/400	6	1500	9000
248.	2030-31	NR	Establishment of 765/400 kV, 6x1500 MVA & 400/220 kV, 10x500 MVA Bikaner-V Pooling Station along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors at a suitable location near Bikaner	400/220	10	500	5000
249.	2030-31	NR	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Pallu (Distt. Hanumangarh) along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors	765/400	2	1500	3000
250.	2030-31	NR	Establishment of 765/400 kV, 3x1500 MVA S/s at suitable location near Panipat (Distt. Panipat) along with 2x240 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors	765/400	3	1500	4500
251.	2030-31	NR	Establishment of 400/220kV, 4x500 MVA S/s at suitable location near Mohali (Distt. Mohali district) along with 2x125 MVar (420kV) Bus Reactors	400/220	4	500	2000
252.	2030-31	NR	Establishment of 765/400 kV, 2x1500 MVA Lucknow-II S/s at suitable location near Lucknow along with 2x330 MVar (765kV) & 2x125 MVar (420kV) Bus Reactors	765/400	2	1500	3000
253.	2030-31	NR	Establishment of 765/400 kV, 2x1500 MVA S/s at suitable location near Asana Village (Chandauli District) along with 2x330 MVar (765kV) &	765/400	2	1500	3000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			2x125 MVA (420kV) Bus Reactors				
254.	2025-26	WR	Augmentation of transformation capacity at Pune (GIS) 765/400 kV substation by 1x1500 MVA ICT (3rd)	765/400	1	1500	1500
255.	2027-28	WR	Establishment of 6x1500 MVA, 765/400 kV Navinal-II (Mundra) S/s (GIS) with 2x330 MVAR, 765 kV & 2x125MVA, 420 kV bus reactors (In 2 bus sections)	765/400	6	1500	9000
256.	2029-30	SR	Establishment of 230kV level at Nagapattinam 765/400kV GIS (presently charged at 400kV) with 3x500 MVA, 400/230kV ICTs	400/230	3	500	1500
257.	2029-30	SR	Establishment of 230kV level at Nagapattinam 765/400kV GIS (presently charged at 400kV) with 3x500 MVA, 400/230kV ICTs	400/230	3	500	1500
258.	2029-30	SR	Establishment of 3x1500 MVA, 765/400 kV Ramayapatnam substation with 1x330 MVA bus reactor and space provision for establishment of 400/220 kV switchyard	765/400	3	1500	4500
259.	2028-29	SR	Augmentation of transformation capacity by 1x500 MVA, 400/220kV ICT (5th) at Hyderabad (Ghanapur) S/s in Telangan	400/220	1	500	500
260.	2027-28	NER	Installation of 1x31.5MVA, 3-Phase 132/33kV 2nd ICT at Ziro (POWERGRID) S/s along with associated GIS bays at both ends	132/33	1	31.5	31.5
261.	2027-28	WR	400/220kV, 1x500MVA ICT (3rd) at Pirana (PG) S/s along with associated bays at both ends	400/220	1	500	500
262.	2027-28	WR	Augmentation of Transformation capacity at Champa Sec-B by 765/400kV 1500MVA ICT (7th) (on Sec-B) with associated ICT bays including 500MVA single phase spare ICT bank	765/400	1	1500	1500
263.	2028-29	WR	Creation of 400kV Sec- B at D'jaigarh S/s along with Augmentation of Transformation capacity at D'jaigarh S/s by 3x1500MVA ICTs (on Sec-B) (with associated ICT bays)	765/400	3	1500	4500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
264.	2029-30	SR	Augmentation of 2x1500 MVA, 765/400 kV ICTs at Ramayapatnam	765/400	2	1500	3000
265.	2028-29	NR	Augmentation of 400/220 kV, 5x500 MVA (6th to 10th) ICTs at 765/400/220kV Bhadla-III PS	400/220	5	500	2500
266.	2028-29	NR	Augmentation of 765/400 kV, 2x1500 MVA (3rd & 4th) ICTs at 765/400kV Ramgarh PS	765/400	2	1500	3000
267.	2028-29	NR	Augmentation of 400/220 kV, 2x500 MVA (3rd & 4th) ICTs at 765/400kV Ramgarh PS	400/220	2	500	1000
268.	2028-29	NR	Augmentation of 765/400 kV, 1x1500 MVA (3 rd) ICT at 765/400kV Kanpur (PG) substation	765/400	1	1500	1500
269.	2028-29	ER	ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor	765/400	2	1500	3000
270.	2028-29	ER	ERES-47: Nawada – Durgapur – Jeerat (New) 765kV corridor	400/220	2	500	1000
271.	2030-31	ER	Installation of a new 220/132kV, 1x200MVA ICT (4th) at Purnea (POWERGRID) S/s along with associated bays	220/132	1	200	200
272.	2029-30	WR	Establishment 4x1500 MVA, 765/400 kV & 10x500MVA, 400/220kV Substation near Kalyanpur (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	765/400 & 400/220	10	500	5000
273.	2029-30	WR	Establishment 4x1500 MVA, 765/400 kV & 10x500MVA, 400/220kV Substation near Kalyanpur (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	765/400 & 400/220	4	1500	6000
274.	2029-30	WR	Creation of 220kV switchyard along with Installation of 3x500MVA, 400/220kV ICTs at Jamnagar (GIS) S/s	400/220	3	500	1500
275.	2029-30	SR	Mangalore GH – Davanagare / Chitradurga 765 kV D/c line (~280 km) with 240 MVar SLR at both ends on both circuits	765/400 & 400/220	3	1500	4500

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
276.	2028-29	SR	Karur PS – Pugalur HVDC 400kV (Quad) 2nd D/c line	765/400 & 400/220	2	500	1000
277.	2029-30	WR	Establishment of 765/400 kV, 6x1500MVA & 10x500MVA, 400/220kV Lakadia-II (Near Chitrod) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor.	765/400 & 400/220	10	500	5000
278.	2029-30	WR	Establishment of 765/400 kV, 6x1500MVA & 10x500MVA, 400/220kV Lakadia-II (Near Chitrod) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor.	765/400 & 400/220	6	1500	9000
279.	2030-31	WR	Installation of 2x500MVA, 400/220kV ICTs (5th & 6th) at Solapur PS	400/220	5	500	2500
280.	2030-31	WR	Establishment of 765/400 kV, 8x1500MVA, KPS4 (GIS) with 2x330 MVAR 765kV bus reactor and 2x125 MVAR 400kV bus reactor	765/400	8	1500	12000
281.	2030-31	WR	Establishment of 6000 MW (2 nos. 3000MW Bipole configuration), $\pm$ 800 kV Lakadia-II (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard Establishment of 6000 MW (2 nos. 3000MW Bipole configuration), $\pm$ 800 kV Alephata (HVDC) [LCC] terminal station (4x1500 MW) along with associated interconnections with 400 kV HVAC Switchyard $\pm$ 800 kV HVDC Bipole line (Hexa lapwing) between Lakadia-II (HVDC) and Alephata (HVDC) Installation of additional 3x1500 MVA, 765/400 kV ICTs at Alephata S/s				4500
282.	2029-30	WR	Creation of 765kV level at Kolhapur (PG) GIS with Installation of 2x1500MVA, 765/400kV ICTs at Kolhapur (PG) S/s along with upgradation of Kolhapur (PG) S/s to 765kV level. Establishment of 765/400 kV Satara Substation with 765/400 kV, 3x1500 MVA	765/400	6	1500	9000

Sr No	Time Frame	Region	Transformers	Voltage Ratio (kV)	No. of Transformer	Rating Of Transformer (MVA)	Total Transformation Capacity (MVA)
			ICTs, 765kV 2x330 MVAR bus reactors and 400 kV 1x125 MVAR bus reactor LILO of Pune-III – Pune (East) 765kV D/c line at Satara. Creation of 400kV Bus Section-II and augmentation of transformation capacity at 765/400 kV Satara S/s by 765/400 kV, 1x1500MVA ICT (4th) along with 1x125 MVAR 400kV bus reactor (on Bus Section-II)				
283.	2028-29	SR	Transmission system for proposed Green Hydrogen / Green Ammonia projects in Kakinada area (Phase-II)	765/400	6	1500	9000
284.	2028-29	SR	Augmentation of transformation capacity by 1*500 MVA , 400/220kV ICT(6th) at N P kunta PS in andhra pradesh	400/220	1	500	500

3. Bus Reactors

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
1.	2027-28	WR	Establishment of 1x125MVAR Bus Reactor at Xeldem S/s	1	125	125
2.	2026-27	SR	2X63 MVAR bus reactors at Kasargode Ss	2	63	126
3.	2025-26	WR	2x330 MVAR (765kV) bus reactor at Navsari (New) South Gujarat (GIS) S/s	2	330	660
4.	2025-26	WR	125 MVAR (400kV) bus reactor at Navsari (New) South Gujarat (GIS) S/s	1	125	125
5.	2026-27	SR	2x330 MVAR (765kV) bus reactor at Narendra (New) (GIS)	2	330	660
6.	2026-27	SR	1x240 MVAR Bus Reactor at Bidar	1	240	240
7.	2026-27	SR	1x125 MVAR Bus Reactor at Bidar	1	125	125
8.	2028-29	NR	Establishment of 2x315MVA, 400/220kV Siot(Rajouri) S/s with 1x125 MVAR (420 kV) bus reactors	1	80	80
9.	2026-27	NR	2x330 MVAR(765 kV) Bus Reactor at Beawar	2	330	660
10.	2026-27	NR	2x125 MVAR(400 kV) Bus Reactor at Beawar	2	125	250
11.	2026-27	NR	2x330 MVAR(765 kV) Bus Reactor at Dausa	2	330	660
12.	2026-27	NR	2x125 MVAR(400 kV) Bus Reactor at Dausa	2	125	250
13.	2026-27	NER	2x125 MVAR, 400 kV Bus reactors at Gogoamukh	2	125	250
14.	2026-27	WR	Establishment of 125MVAR, 420kV Bus Reactor at Solapur PP (near Mohol)	1	125	125
15.	2029-30	NR	2x330MVAR (765kV) bus reactor at Fatehpur	2	330	660
16.	2028-29	NR	125 MVAR (420kV) Bus Reactor at Nange (GIS) PS (1-Ph units along with one spare unit)	1	125	125
17.	2028-29	NR	125 MVAR (420kV) Bus Reactor at Koldam S/s (1-Ph units along with one spare unit)	1	125	125
18.	2026-27	SR	2X330 MVAR Bus Reactors at 765kV Koppal-II	2	330	660
19.	2026-27	SR	2X125 MVAR Bus Reactors at 400kV Koppal-II	2	125	250
20.	2026-27	SR	2X125 MVAR Bus Reactors at 400kV Gadag-II	2	125	250
21.	2026-27	NR	2X330 MVAR Bus Reactors at 765kV Bikaner-III	2	330	660
22.	2026-27	NR	2X125MVAR Bus Reactors at 765kV Bikaner-III	2	125	250
23.	2026-27	NR	2X330 MVAR Bus Reactors at 765kV Neemrana-2	2	330	660
24.	2026-27	NR	2X125MVAR Bus Reactors at 765kV Neemrana-2	2	125	250
25.	2026-27	SR	2X330MVAR Bus Reactors at 765kV Davangere/Chitradurga	2	330	660

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
26.	2026-27	SR	2X330MVar Bus Reactors at 765kV Madhugiri (upgradatoin)	2	330	660
27.	2026-27	SR	2X125MVar Bus Reactors at 400kV Tumkur-II	2	125	250
28.	2026-27	SR	2X125MVar Bus Reactors at 400kV Bijapur	2	125	250
29.	2027-28	SR	2X125MVar Bus Reactors at 400kV Bellary-II	2	125	250
30.	2026-27	SR	2X330MVar Bus Reactors at 765kV Kurnool-IV	2	330	660
31.	2026-27	SR	2X330MVar Bus Reactors at 765kV Anantapur-II	2	330	660
32.	2026-27	NR	2X240MVar Bus Reactors at 765kV Fatehgarh- IV (Section-2)	2	240	480
33.	2026-27	NR	2X125MVar Bus Reactors at 765kV Fatehgarh- IV (Section-2)	2	125	250
34.	2027-28	NR	2X240MVar Bus Reactors at 765kV Barmer-I PS	2	240	480
35.	2027-28	NR	2X125MVar Bus Reactors at 400kV Barmer-I PS	2	125	250
36.	2026-27	NR	2X240MVar Bus Reactors at 765kV Sirohi PS	2	240	480
37.	2026-27	NR	2X125MVar Bus Reactors at 400kV Sirohi PS	2	125	250
38.	2027-28	ER	2X125MVar Bus Reactors at 400kV Paradeep GIS substation	2	125	250
39.	2027-28	ER	2X330MVar Bus Reactors at 765kV Paradeep GIS substation	2	330	660
40.	2028-29	NR	1X125MVar Bus Reactors at 400kV Jhangi	1	125	125
41.	2026-27	WR	1x330 MVar 765 kV bus reactor at Karera (near Datiya)+1 spare unit	1	330	330
42.	2026-27	WR	1x330 MVar , 765 kV Bus reactor with 1 spare unit of 110MVar at Ishanagar (New)	1	330	330
43.	2026-27	WR	Establishment of 765kV Mandsaur Pooling Station along with 2x330MVar (765kV) Bus Reactor	2	330	660
44.	2026-27	WR	Establishment of 2x125MVar 765kV bus reactor at Mandsaur	2	125	250
45.	2026-27	NR	Establishment of 1x125MVar 420kV bus reactor at Kurawar	1	125	125
46.	2026-27	NR	Establishment of 2x330MVar, 765kV Bus reactor at Kurawar	2	330	660
47.	2026-27	WR	Establishment of 765 kV Halvad switching station with 765 kV, 2x330 MVar bus reactors [with 110 MVar & 80 MVar 765kV single phase reactor (spare unit for bus/line reactors at Halvad)]	2	330	660
48.	2026-27	WR	Establishment of 765 kV switching station near Vataman with 2x330MVar, 765 kV bus reactor [with 110 MVar 765 kV single phase reactor (spare unit for bus/line reactor)]	2	330	660
49.	2026-27	WR	Establishment of 2x125MVar, 420kV bus reactors at pooling station near Dhule, Maharashtra.	2	125	250

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
50.	2027-28	ER	2X125MVA Bus Reactors at 400kV Gopalpur GIS substation	2	125	250
51.	2027-28	ER	2X330MVA Bus Reactors at 765kV Gopalpur GIS substation	2	330	660
52.	2026-27	WR	2X330MVA Bus Reactors at 765kV Jamnagar GIS substation	2	330	660
53.	2026-27	WR	2X125MVA Bus Reactors at 400kV Jamnagar GIS substation	2	125	250
54.	2026-27	WR	1x330MVA Bus Reactor at KPS-3 (GIS) Section-II	1	330	330
55.	2026-27	WR	1x125MVA Bus Reactor at KPS-3 (GIS) Section-II	1	125	125
56.	2026-27	WR	2x330MVA Bus Reactor at South Olpad	2	330	660
57.	2026-27	WR	1x125MVA Bus Reactor at at South Olpad	1	125	125
58.	2026-27	WR	2x330MVA Bus Reactor at Boisar-II (GIS) SS	2	330	660
59.	2026-27	WR	2x125MVA Bus Reactor at Boisar-II (GIS) SS	2	125	250
60.	2027-28	WR	2x330MVA Bus Reactor at Pune-III (GIS) SS	2	330	660
61.	2027-28	WR	2x125MVA Bus Reactor at Pune-III (GIS) SS	2	125	250
62.	2029-30	WR	2x330MVA Bus Reactor at Nagpur SS	2	330	660
63.	2029-30	WR	2x125MVA Bus Reactor at Nagpur SS	2	125	250
64.	2029-30	WR	2x125MVA Bus Reactor at KPS3 (HVDC)	2	125	250
65.	2025-26	WR	Replacement of 420kV, 63 MVA Bus reactor with 420kV, 125MVA bus reactor at Jabalpur (PG) S/s along with associated civil works	1	125	125
66.	2026-27	NR	2x240 MVA (765kV) Bus Reactor at Bikaner-IV PS	2	240	480
67.	2026-27	NR	2x125 MVA (420kV) Bus Reactor at Bikaner-IV PS	2	125	250
68.	2026-27	NER	1x125MVA Bus Reactor at 400kV Bongaigaon	1	125	125
69.	2026-27	NER	Decommissioning of 2x50MVA Bus Reactor at 400kV Bongaigaon	-2	50	-100
70.	2027-28	NR	2x240 MVA bus reactor at Merta-II S/s	2	240	480
71.	2027-28	NR	2x125 MVA bus reactor at Merta-II S/s	2	125	250
72.	2027-28	WR	Installation of 1x330MVA 765kV Bus Reactor (2nd) along-with associated bay	1	330	330
73.	2026-27	WR	Installation of 2x330MVA, 765kV Bus Reactor at Navinal (Mundra) S/s (GIS)	2	330	660
74.	2026-27	WR	Installation of 1x125MVA, 420kV Bus Reactor at Navinal (Mundra) S/s (GIS)	1	125	125
75.	2026-27	WR	Installation of 1x330MVA, 765kV switchable line reactor on each ckt at Navinal end of Lakadia – Navinal 765 kV D/c line formed after LILO	1	330	330

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
76.	2026-27	NR	2x240 MVAR (765kV) bus reactor at Ghiror S/s (UP)	2	240	480
77.	2026-27	NR	2x125 MVAR (420kV) bus reactor at Ghiror S/s (UP)	2	125	250
78.	2026-27	NER	Decommissioning of existing 420kV, 50MVAR (Bus Reactor-1) and installation of new 420kV, 125MVAR bus reactor in its place along with replacement of associated main and tie bay equipment at Balipara (POWERGRID) S/s	1	125	125
79.	2027-28	NER	Installation of new 420 kV, 1x125 MVAR, 3-Ph Variable Shunt Reactor (VSR) having variable range from 63MVAR to 125MVAR (with at least 25 tap positions) along with associated GIS bay at Misa (POWERGRID) S/s	1	125	125
80.	2026-27	NER	Installation of new 420kV, 125MVAR Bus Reactor at Biswanath Chariali (POWERGRID) S/s along with associated bays	1	125	125
81.	2026-27	WR	Creation of 400kV switchyard along with Installation of 2x1500 MVA, 765/400 kV ICTs at Vataman (AIS) with 2x125 MVAR (420 kV) Bus Reactors	2	125	250
82.	2027-28	WR	Establishment 3x1500 MVA, 765/400 kV Substation near Raghnesda (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	2	330	660
83.	2027-28	WR	Establishment 3x1500 MVA, 765/400 kV Substation near Raghnesda (GIS) with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor	2	125	250
84.	2028-29	WR	Establishment of 3X1500 MVA 765/400 kV Kandla (GIS) with 2X330 MVAR 765 kV bus reactor and 2X125 MVAR 420 kV bus reactor	2	330	660
85.	2028-29	WR	Establishment of 3X1500 MVA 765/400 kV Kandla (GIS) with 2X330 MVAR 765 kV bus reactor and 2X125 MVAR 420 kV bus reactor	2	125	250
86.	2027-28	WR	Establishment of 6x1500 MVA, 765/400 kV Navinal-II (Mundra) S/s (GIS) with 2x330 MVAR, 765 kV & 2x125MVAR, 420 kV bus reactors (In 2 bus sections)	2	330	660
87.	2027-28	WR	Establishment of 6x1500 MVA, 765/400 kV Navinal-II (Mundra) S/s (GIS) with 2x330 MVAR, 765 kV & 2x125MVAR, 420 kV bus reactors (In 2 bus sections)	2	125	250
88.	2027-28	WR	Establishment 2x1500 MVA, 765/400 kV Substation near South of Kalamb with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor.	2	330	660
89.	2027-28	WR	Establishment 2x1500 MVA, 765/400 kV Substation near South of Kalamb with 2x330 MVAR, 765 kV bus reactor and 2x125 MVAR, 420 kV bus reactor.	2	125	250
90.	2027-28	WR	Installation of 1x125 MVAR, 420 kV bus reactor at Pachora PS (400kV Bus Section-II)	1	125	125

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
91.	2028-29	SR	1x330 MVAR, 765kV bus reactor (3rd) at Angul Substation	1	330	330
92.	2028-29	SR	2x330 MVar Bus reactor at 765/400 kV Shadnagar Station	2	330	660
93.	2029-30	SR	1x240 MVar Bus reactor at 765/400kV Mangalore	1	240	240
94.	2027-28	SR	2x330 MVar (765 kV) bus reactors at CN'Halli	2	330	660
95.	2028-29	SR	1x240 MVar Bus reactor at 765/400kV Kakinada GH GIS	1	240	240
96.	2027-28	SR	1x240 MVar Bus reactor at 765/400kV Tuticorin GH GIS	1	240	240
97.	2027-28	SR	1x330 MVar (765 kV) bus reactors at Tuticorin PS	1	330	330
98.	2027-28	SR	1x330 MVar (765 kV) bus reactors at Dharmapuri (Salem New)	1	330	330
99.	2027-28	WR	2x330 MVAR, 765 kV bus reactor Substation near Kalyanpur (GIS)	2	330	660
100.	2027-28	WR	2x125 MVAR, 420 kV bus reactor Substation near Kalyanpur (GIS)	2	125	250
101.	2027-28	WR	2x330 MVAR 765kV bus reactor Lakadia-II (Near Chitrod)	2	330	660
102.	2027-28	WR	2x125 MVAR 400kV bus reactor Lakadia-II (Near Chitrod)	2	125	250
103.	2027-28	WR	2x330 MVAR 765kV bus reactor Nasik S/s (towards South of Nasik)	2	330	660
104.	2027-28	WR	2x125 MVAR 400kV bus reactor Nasik S/s (towards South of Nasik)	2	125	250
105.	2027-28	WR	2x330 MVAR 765kV bus reactor Alephata S/s	2	330	660
106.	2027-28	WR	2x125 MVAR 400kV bus reactor Alephata S/s	2	125	250
107.	2027-28	WR	2x330 MVAR, 765 kV bus reactor Substation near Raghnesda (GIS)	2	330	660
108.	2027-28	WR	2x125 MVAR, 400 kV bus reactor Substation near Raghnesda (GIS)	2	125	250
109.	2027-28	WR	2x330 MVAR 765 kV bus reactor Morena PS (South of Sabalgarh)	2	330	660
110.	2027-28	WR	2x125 MVAR 400kV bus reactor Morena PS (South of Sabalgarh)	2	125	250
111.	2027-28	NR	2x240 MVar 765 kV & 2x125 MVar 400 kV bus reactors at Robertsganj Pooling Station	2	240	480
112.	2027-28	NR	2x240 MVar 765 kV & 2x125 MVar 400 kV bus reactors at Robertsganj Pooling Station	2	125	250
113.	2027-28	NR	2x330 MVar 765 kV Bus reactors at Prayagraj Substation	2	330	660
114.	2030-31	NR	2x125 MVar 400 kV Bus reactor at Bamer-II PS	2	125	250
115.	2030-31	NR	2x330 MVAR 765 kV Bus reactor & 2x125 MVAR 400 kV Bus reactor on Section-II at South Kalamb S/s.	2	330	660
116.	2030-31	NR	2x330 MVAR 765 kV Bus reactor & 2x125 MVAR 400 kV Bus reactor on Section-II at South Kalamb S/s.	2	125	250
117.	2028-29	SR	± 300 MVAR STATCOM at Tumkur-II PS with switching arrangement of under implementation 2x125 MVar bus reactors.	2	125	250

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
118.	2028-29	SR	2x330 MVAR (765 kV) bus reactors at Kurnool-V PS	2	330	660
119.	2028-29	SR	2x330 MVAR (765 kV) bus reactors at Sagar S/s	2	330	660
120.	2028-29	SR	2x330 MVAR (765 kV) bus reactors at Ananthapuram-III PS	2	330	660
121.	2028-29	SR	1x330 MVAR (765 kV) bus reactor at Pendurthi (Vizag)	1	330	330
122.	2028-29	SR	1x330 MVAR (765 kV) bus reactor at Khammam-II	1	330	330
123.	2029-30	SR	2x330 MVAR (765 kV) bus reactors at Kadapa-II PS	2	330	660
124.	2028-29	NER	420kV, 80MVAR bus reactor: 2 nos at Kaying	2	80	160
125.	2028-29	NER	420kV, 80MVAR bus reactor: 2 nos at Nigllok	2	80	160
126.	2027-28	ER	2x330 MVAR, 765 kV bus reactor at Raigarh (Kotra)-II S/s in Chhattisgarh (765kV Bus section-II)	2	330	660
127.	2027-28	ER	2x125 MVAR, 420 kV bus reactor at Raigarh (Kotra)-II S/s in Chhattisgarh (on 400kV Bus Section-II)	2	125	250
128.	2027-28	WR	2x330 MVAR, 765 kV bus reactor at South Kalamb S/s (765kV Bus section-III)	2	330	660
129.	2027-28	WR	2x125 MVAR, 420 kV bus reactor at South Kalamb S/s (400kV Bus section-III)	2	125	250
130.	2028-29	WR	Installation of 2x330 MVAR 765kV bus reactors at Kolhapur	2	330	660
131.	2029-30	NR	2x240 MVAR (765kV) Bus Reactors at Bikaner-V PS	2	240	480
132.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Bikaner-V PS	2	125	250
133.	2029-30	NR	2x240 MVAR (765kV) Bus Reactors at Pallu	2	240	480
134.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Pallu	2	125	250
135.	2029-30	NR	2x240 MVAR (765kV) Bus Reactors at Panipat	2	240	480
136.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Panipat	2	125	250
137.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Mohali	2	125	250
138.	2029-30	NR	2x330 MVAR (765kV) Bus Reactors at Bulandshahr	2	330	660

Sr No	Time frame	Region	Bus Reactors	No of Reactor	Rating of Reactor	Total reactive compensation (MVAR)
139.	2029-30	NR	2x330 MVAR (765kV) Bus Reactors at Lucknow-II	2	330	660
140.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Lucknow-II	2	125	250
141.	2029-30	NR	2x330 MVAR (765kV) Bus Reactors at Lucknow-II	2	330	660
142.	2029-30	NR	2x125 MVAR (420kV) Bus Reactors at Lucknow-II	2	125	250
143.	2027-28	ER	Installation of a new 420kV, 125MVAR bus reactor at Jeypore (POWERGRID) S/s	1	125	125
144.	2028-29	ER	420kV, 2X125MVAR, bus reactor at Nawada S/s	2	125	250
145.	2028-29	ER	765kV, 2x330MVAR bus reactor (7x110MVAR single phase units including one spare unit) at Nawada S/s	2	330	660
146.	2028-29	ER	765kV, 2x330MVAR bus reactor (7x110MVAR single phase units including one spare unit) at Durgapur(New) S/s	2	330	660
147.	2026-27	NR	2x240 MVAR (765kV) Bus Reactor Bus Reactor at Siwani	2	240	480
148.	2026-27	NR	2x125 MVAR (420kV) Bus Reactor at Siwani	2	125	250
149.	2026-27	NR	2X240MVAR Bus Reactors at 765kV Rishabdeo	2	240	480

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Annex 3.10

Inter-Regional Transmission Capacity (MW)

Transmission line	Present	Capacity at the End of 2031
EAST - NORTH		
Dehri/Sasaram - Sahupuri 220kV S/c	130	130
Sasaram HVDC back-to-back	500	500
Muzaffarpur - Gorakhpur 400kV D/c (with Series Comp.+TCSC)	2000	2000
Patna - Balia 400kV D/c (Quad)	1600	1600
Biharshariff - Balia 400kV D/c (Quad)	1600	1600
Barh/Patna - Balia 400kV D/c (Quad)	1600	1600
Gaya - Balia 765kV S/c	2100	2100
Sasaram bypassing (additional capacity)	500	500
Sasaram - Fatehpur 765kV S/c	2100	2100
Barh-II/Motihari - Gorakhpur 400kV D/c (Quad)	1600	1600
Gaya-Varanasi 765kV 2xS/c	4200	4200
Biharsharif-Varanasi 400kV D/c (Quad)	1600	1600
LILO of Biswanath Chariali - Agra ± 800 kV HVDC Bipole at new pooling station in Alipurduar and addition of 3000MW module	3000	3000
Sub-total	22,530	22,530
EAST - WEST		
Budhipadar-Korba 220kV S/c	130	130
Budhipadar-Korba 220kV D/c	260	260
Rourkela/Jharsuguda - Raigarh/Raipur 400kV D/c (with Series Comp.+TCSC)	1400	1400
Ranchi - Sipat 400 kV D/c with series comp.	1200	1200
Rourkela/Jharsuguda - Raigarh/Raipur 400kV (2nd) D/c (with Series Comp.)	1400	1400
Ranchi - Dharamjayagarh/WR Pooling Station 765kV S/c	2100	2100
Ranchi - Dharamjayagarh 765kV (2nd) S/c	2100	2100
Jharsuguda - Raigarh Kotra-II 765kV D/c (LILO of Jharsuguda - Dharamjayagarh 765kV D/c)	4200	4200
Jharsuguda - Dharamjayagarh 765kV (2nd) D/c	4200	4200
Jharsuguda - Raipur Pool 765kV D/c	4200	4200
Jeypore-Jagdarpur 400 kV D/c	1600	1600
Raigarh (Tamnar) - Jamshepur 765kV D/c		4200
Sub-total	22,790	26,990
EAST - SOUTH		
Balimela - Upper Sileru 220kV S/c	130	130
Gazuwaka HVDC back-to-back	1000	1000
Talcher - Kolar HVDC bipole	2000	2000
Upgradation of Talcher-Kolar HVDC Bipole	500	500
Angul - Srikakulam 765kV D/c	4200	4200
Angul - Srikakulam 765kV 2nd D/c		4200
Sub-total	7,830	12,030
EAST - NORTH EAST		
Birpara/Alipurduar - Salakati 220kV D/c	350	350
Siliguri - Bongaigaon 400kV D/c	1600	1600
Siliguri/Alipurduar - Bongaigaon 400kV D/c (Quad)	1600	1600
Sub-total	3,550	3,550
NORTH EAST - NORTH		
Biswanath Chariali - Agra ± 800 kV HVDC Bipole with 3000MW converter	3000	3000
Sub-total	3,000	3,000
WEST - NORTH		
Auriya - Malanpur 220kV D/c	260	260
Kota - Ujjain 220kV D/c	260	260
Vindhyachal HVDC back-to-back	500	500
Gwalior - Agra 765kV 2xS/c	4200	4200
Zerda - Kankroli 400kV D/c	1000	1000
Gwalior - Dausa 765kV 2xS/c (Lilo of Gwalior - Jaipur Phagi at Dausa)	4200	4200
Adani (Mundra) - Mahendranagar ± 500 kV HVDC bipole	2500	2500
RAPP - Sujalpur 400kV D/c	1000	1000
Champa Pool - Kurukshetra ± 800 kV HVDC Bipole	4500	4500

Transmission line	Present	Capacity at the End of 2031
Jabalpur - Orai 765kV S/c & Orai-Ishanagar 765kV S/c (Lilo of one ckt of Jabalpur - Orai 765kV D/c at Ishanagarh)	4200	4200
LILLO of Satna - Gwalior 765kV S/c line at Orai(Orai-Satna 765kV S/c & Orai - Gwalior 765kV S/c)	4200	4200
Upgradation of Champa Pool - Kurukshetra ± 800 kV HVDC Bipole	1500	1500
Banaskantha - Chittorgarh 765kV S/c	2100	2100
Banaskantha - Rishabhdeo 765kV S/c(LILO of one ckt of Banaskantha – Chittorgarh D/c at Rishabhdeo*)	2100	2100
Vindhyachal - Varanasi 765kV D/c	4200	4200
Neemuch-Chittorgarh 400 kV D/c	1,600	1600
Mandsaur PS - Rishabhdeo 765 kV D/c		4200
Mandsaur PS -Beawar 765 kV D/c		4200
Sirohi (Rajasthan) – Mandsaur (MP) 765kV D/c line		4200
Sasan- Prayagraj 765kV D/c (Bypassing at Prayagraj)		4200
Barmer-II (Rajasthan) – South Kallam (Maharashtra) 800 kV HVDC line		6000
Sub-total	38,320	61,120
WEST - SOUTH		
Chandrapur HVDC back-to-back	1000	1000
Kolhapur - Belgaum 220kV D/c	260	260
Ponda - Nagajhari 220kV D/c	260	260
Raichur - Sholapur 765kV S/c	2100	2100
Raichur - Sholapur 765kV (2nd) S/c	2100	2100
Narendra - Kolhapur 765kV D/c (Operated at 400kV)	2200	2200
Wardha - Nizamabad 765kV D/c	4200	4200
Warora Pool - Warangal (New) 765kV D/c	4200	4200
Raigarh - Pugulur ± 800 kV HVDC Bipole	6000	6000
LILLO of Narendra - Narendra (New) 400kV (Quad) line at Xeldam (Goa)		1600
Narendra-Pune-III 765 kV D/c		4200
Parli - Bidar 765kV D/c line		4200
"Jagdalpur new – Vizag new 765kV D/c line or		
Nagpur – Adilabad 765kV D/c line"		4200
Narendra - Kolhapur 765kV D/c (Upgradation at 765kV)		2000
Sub-total	22,320	38,520
TOTAL	1,20,340	1,67,740
* Banaskantha-Chhitorgarh is presently 765 D/c out of which one ckt is proposed to be LILLOed at Rishabhdeo by 2027.		

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“To succeed in your mission, you must have single-minded devotion to your goal”

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