



MAHATRANSCO

Maharashtra State Electricity Transmission Co. Ltd.

Annual Operations and Performance Report - 2025



Maharashtra State Load Despatch Centre, Airoli

Annual Operations and Performance Report – 2025

Prepared by: Maharashtra State Load Despatch Centre

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Contributors to Annual Operations and Performance Report – 2025 (Maharashtra State Load Despatch Centre)

Advisory Team:

Shri Shashank Jewalikar, Executive Director, MSLDC

Shri Girish Pantoji, Chief Engineer, MSLDC

Technical Inputs:

Shri Umesh Bhagat, Superintending Engineer (Energy Accounting)

Shri Dinesh Patil, Executive Engineer (Market Operation)

Shri Ashish Karale, Executive Engineer (System Operation)

Shri Sachin Lomate, Executive Engineer (I/C), (REMC Operation)

Data inputs:

Md. Imran Khan, Additional Executive Engineer (Metering)

Dipali Sonar, Additional Executive Engineer (Metering)

Rahul Mandlik, Additional Executive Engineer (Protection).

Satyendra Tripathi, Additional Executive Engineer (Outage Management)

Harshali Kakde, Additional Executive Engineer (REMC Operation)

Avainash Dhawde, Deputy Executive Engineer (Market Operation)

Saurabha Kulkarni, Deputy Executive Engineer (Protection)

Abhishek Samant, Deputy Executive Engineer (Outage Management)

Ganesh Ozare, Deputy Executive Engineer (Data Management)

Vijay Kamble, Assistant Engineer (Market Operation)

Compiled, analyzed, and prepared by:

Snehal Mahajan, Deputy Executive Engineer, Data Management

Shivakumar Gaurishetti, Deputy Executive Engineer



Preface

The Maharashtra power system is among the largest and most complex intra-State power systems in the country and operates as an integral part of the Western Region synchronous grid. Secure and reliable operation of such a system requires continuous coordination with regional entities, while managing a diverse generation portfolio, a large and geographically dispersed demand base, and an evolving transmission network. The responsibility for real-time operation of the State power system rests with the Maharashtra State Load Despatch Centre (SLDC), in accordance with its statutory mandate under the Electricity Act, 2003, and the provisions of the applicable Indian and State Grid Codes.

During Calendar Year 2025, system operations were carried out under highly dynamic and, at times, stressed operating conditions. The year witnessed record levels of State demand exceeding 30 GW, with sustained pressure on the system during the summer months and renewed stress during the post-monsoon and winter periods. In parallel, the power system experienced a significant increase in renewable energy penetration, including a substantial rise in solar generation embedded within the distribution network, which remains largely outside real-time visibility and direct operational control of the SLDC. While this transition supports long-term sustainability objectives, it has added complexity to net demand estimation, scheduling, and real-time balancing.

The month-wise operational experience of CY-2025, as documented in this report, highlights the increasing interdependence between demand growth, renewable variability, transmission adequacy, system flexibility, and observability of the grid. Several periods during the year were characterised by critical transmission constraints, particularly in key corridors supplying major load centres, necessitating special operating measures such as load trimming, network reconfiguration, and reliance on fast-responding resources. Major grid disturbances and weather-related events further tested system resilience and restoration preparedness.

A defining operational theme of CY-2025 was the growing importance of ramping capability and reserve availability. Detailed analyses presented in this report demonstrate that while aggregate declared capacity may appear adequate, the effective operational flexibility available to the system operator is often constrained by ramp-rate limitations, scheduled operating positions of generating units, minimum technical limits, network-driven dispatch requirements, and limited participation of certain resources in system-level balancing. In addition, lower levels of Declared Capacity (DC) from certain fleets of intra-State thermal generating stations during parts of the year further constrained the availability of operational reserves and ramping flexibility, particularly during high-demand and stressed operating conditions. Both ramp-up and ramp-down shortages were observed across multiple

time blocks during the year, reflecting the increasing challenge of managing rapid changes in net demand under high renewable penetration.

In addition to resource and network constraints, limitations in real-time observability of the grid emerged as a significant operational challenge. A large number of intra-State substations continue to have partial or limited SCADA visibility, restricting situational awareness during stressed conditions and contingencies. Further, the inadequate deployment of ‘Phasor Measurement Units’ (PMUs) across the State network limits wide-area visibility of dynamic system behaviour, voltage stability margins, and oscillatory conditions. These observability gaps increase reliance on conservative operating practices and manual interventions, particularly during fast-evolving events, thereby constraining the ability to fully exploit available system flexibility.

Fast-responding intra-State hydro resources—particularly Koyna Hydro and Tata Hydro—continued to play a critical role in supporting system security, including during periods of steep ramp-up requirements, contingencies, and transmission stress. However, operational experience also showed that hydro generation is at times required to be despatched primarily for network security and voltage stability enhancement, which can necessitate backing down of other intra-State thermal units to manage State periphery deviations. Such interactions reduce the available downward margins of thermal resources and further constrain overall system flexibility. In addition, limited participation of certain captive intra-State generating stations in system-level ramping obligations restricted the pool of flexible resources available to the system operator.

This Annual Operation Report for Calendar Year 2025, prepared by the SLDC Operations team, presents a comprehensive and data-driven assessment of these operational experiences. The report draws upon actual scheduling and dispatch records, time-block-wise ramping and margin analyses, month-wise system operation highlights, grid event reviews, and control room observations. It is intended to serve as a technical reference and decision-support document for stakeholders across Generation, Transmission, and Distribution, as well as for planners, regulators, and policymakers.

It is recognised that some analyses presented in this report are preliminary in nature and rely on aggregated indicators and averages to identify broad trends. The operational insights from CY-2025 clearly indicate the need for more granular, block-wise studies to quantify flexibility and reserve requirements in terms of volume, timing, and duration, consistent with evolving mandates on reserves and ancillary services. Future planning studies, Resource Adequacy assessments, and Integrated Resource Planning exercises should explicitly incorporate such block-level operational realities, including ramp-rate constraints, minimum technical limits, transmission interactions, renewable uncertainty, and grid observability limitations, to ensure that long-term resource and network planning adequately supports secure system operation.

In parallel with managing these operational challenges, CY-2025 also witnessed important institutional achievements and capacity-building initiatives at the SLDC. The year saw continued strengthening of operational processes, improved coordination with regional and State stakeholders, and successful handling of several complex system events under stressed conditions. Focused training and knowledge-enhancement programmes were undertaken for SLDC personnel, covering areas such as grid operation under high renewable penetration, ramping and reserve management, system restoration, and use of analytical tools. These efforts have contributed to improving operational preparedness, situational awareness, and the ability of control room engineers to respond effectively to evolving grid conditions.

Beyond technical operations and capacity building, year-2025 also saw concerted efforts towards strengthening SLDC as an institution by fostering a positive and inclusive organisational environment. Participation and achievements in sports and cultural activities, including drama and other creative pursuits, provided valuable platforms for teamwork, stress management, and holistic development of personnel. The year also witnessed visits and interactions with eminent dignitaries, senior officials, and sector experts, which offered opportunities for knowledge exchange and broader perspective on power system challenges and reforms. Such initiatives have contributed to building a more cohesive, motivated, and professionally enriched workforce, supporting SLDC's objective of evolving not only as a technically competent organisation but also as a progressive institution that encourages overall development of its people.

I commend the SLDC Operations team for proactively documenting the operational learnings of CY-2025 in a structured, transparent, and analytical manner. It is my expectation that the insights presented in this report will contribute meaningfully to informed technical discussions and coordinated actions aimed at strengthening system flexibility, observability, resilience, and reliability of the Maharashtra power system in the years ahead.



Shashank Jewalikar

**Executive Director
Maharashtra State Load Despatch Centre
Airoli**

Year at a Glance

Key System Events and Operational Conditions: Month-wise Summary

Month	System Demand Scenario	Important Constraints	Important Disturbance	Important Achievements	Remarks
Jan-25	<p>Max State Demand: around 29800 MW.</p> <p>Average State Demand: around 28500 MW.</p> <p>Max Mumbai Demand: around 3200 MW.</p> <p>Average Mumbai Demand: around 2950 MW.</p>	<p>TPCL Unit-5 (500 MW) under forced shutdown since 22 September 2024 following a fire in the cable vault.</p>	--	<p>HTLS upgradation of 400 kV Kalwa–Padghe Circuit-I was completed on 14 January 2025. With both circuits upgraded, the double-circuit corridor transmission capacity increased to 4,000 MW.</p>	<p>Demand showed an increasing trend towards the end of the month due to the weakening winter effect and increased agricultural load across the State.</p>
Feb-25	<p>Max State Demand: around 30100 MW.</p> <p>Average State Demand: around 29200 MW.</p> <p>Max Mumbai Demand: around 3530 MW.</p> <p>Average Mumbai Demand: around 3075 MW.</p>	<p>Overloading of the 400 kV Talegaon–Chakan line was observed during the month, and Koyna Stage-IV generation was utilized to control the loading.</p>	<p>On 07 February 2025 at 13:12 hrs, the 400 kV Nagothane Substation went into blackout resulting in a load loss of 541 MW. On 23 February 2025 at 19:09 hrs, fire near towers 27–28 caused tripping of 400 kV Talegaon–Lonikand-1 line, activating LTS (316 MW) and additional DLS (186 MW) to</p>	<p>125 MVAR Bus Reactors charged at 400 kV Taptitanda and 400 kV Babhleshwar substations on 21 Feb 2025 and 24 Feb 2025 respectively.</p>	<p>TPCL Unit-5 (500 MW) was revived on 05 Feb 2025.</p>

			control loading.		
Mar-25	<p>Max State Demand: around 30675 MW.</p> <p>Average State Demand: around 29120 MW.</p> <p>Max Mumbai Demand: around 3760 MW.</p> <p>Average Mumbai Demand: around 3380 MW.</p>	<p>Overloading of the 400 kV Talegaon–Chakan line & 220 kV Urse – Chinchwad was observed throughout the month. Under voltages prevailed in Pune region. DLS was sometimes carried out in Pune region to control loading. Koyna Stage-IV generation was utilized to control transmission constraints.</p>	<p>A major grid disturbance occurred on 12 March 2025 at 14:55 hrs due to multiple transmission line and generator trippings in South Gujarat, causing severe voltage collapse across Mumbai, MMR, Pune, Nashik, Boisar, and Nagothane. To stabilize the grid, statewide load shedding of 3,922 MW was implemented, enabling gradual system restoration.</p>	<p>New 400/220 kV ICTs were charged at 400 kV Padghe and Kharghar substations on 31 Mar 2025. At 400 kV kodus substation, downstream 220 kV Lines were charged on 31-Mar-2025. 220 kV AIS Kalwa Interconnector replaced by GIS bays with high capacity on 24 Mar 2025. After 2007, for the first time in recent years, Bhira PSU trial in pumping mode was carried on 16 Mar-25.</p>	<p>High State Demand Month of the Year 2025.</p> <p>LTS Stage I & Stage II (At 400kV Lonikand & Chakan s/s) Twice in the month due to 400 kV infeed line tripping to Pune region, on 15th & 26th Mar 2025.</p>
Apr-25	<p>Max State Demand: around 30660 MW.</p> <p>Average State Demand: around 29260 MW.</p> <p>Max Mumbai Demand: around 4160 MW.</p> <p>Average Mumbai Demand: around 3775 MW.</p>	<p>Overloading of the 400 kV Talegaon–Chakan line was observed throughout the month. Under voltages prevailed in Pune region. Koyna Stage-IV generation was utilized to control transmission constraints.</p>	<p>DLS was carried out to control Under voltages in Pune region on 8th, 16th, 22nd, 23rd, 24th April 2025. DLS was carried out in Pune region to control loading og 400kV Talegaon –Chakan on 2nd, 15th, 22nd, 23rd, 25th & 28th April25. LTS Stage I & Stage II (At 400kV Lonikand & Chakan s/s)</p>	--	<p>High State Demand & Mumbai Demand Summer Month of the Year 2025.</p>

			On 5 th April 2025 due to 400 kV line tripping.		
May-25	<p>Max State Demand: around 29100 MW.</p> <p>Average State Demand: around 25600 MW.</p> <p>Max Mumbai Demand: around 4025 MW.</p> <p>Average Mumbai Demand: around 3630 MW.</p>	Demand eased in May 2025, reducing transmission constraints in State.	<p>On 06.05.2025, tripping of 400 kV Talegaon PG–Lonikand-1 led to LTS Stages I–II, curtailing 603 MW load; restored 16:52 hrs.</p> <p>On 07.05.2025, 400 kV Kharghar bus tripped CT failure without load loss; on 24.05.2025, Nagothane bus tripping affected 530 MW.</p>	Additional 4 TMC for water year 2024-25 was allotted for fulfillment of electricity demand in the State.	<p>In view of Operation Sindoor, SLDC ensured heightened vigilance, 24×7 staffing, outage deferment, coordination with RLDC/NLDC, and secure grid operations.</p> <p>From mid-May 2025, Maharashtra experienced widespread pre-monsoon rainfall with thunderstorms, causing strong winds, and power system operational challenges including RE curtailment.</p>
June-25	<p>Max State Demand: around 25600 MW.</p> <p>Average State Demand: around 24450 MW.</p> <p>Max Mumbai Demand: around 3925 MW.</p>	On 30 th , 31 st May & on 1 st & 17 th June 2025, RE generation were curtailed to control high system frequency and heavy underdrawal conditions.	On 10.06.2025, CVT failure at 400 kV Warora caused multiple trippings, affecting 600 MW APML generation; on 13.06.2025, 220 kV Pirangut–Kandalgaoon tripping impacted 199 MW load	Bhira pumping started in June 2025 along with power management by Mumbai DISCOMS on 27 th and 29 th June 2025, during lean demand period.	Monsoon Period. RE curtailment was carried out.

	Average Mumbai Demand: around 3550 MW.		briefly.		
July-25	Max State Demand: around 26450 MW. Average State Demand: around 24600 MW. Max Mumbai Demand: around 3700 MW. Average Mumbai Demand: around 3435 MW.	Tripping of 400 kV MUMML lines in Mumbai/ MMR area has led to N-3 contingency in Grid.	On 16.07.2025, Nagothane outages affected 546 MW; on 28.07.2025, Kalwa bus insulator failure impacted 122 MW load.	---	---
Aug-25	Max State Demand: around 26730 MW. Average State Demand: around 24250 MW. Max Mumbai Demand: around 3670 MW. Average Mumbai Demand: around 3300 MW.	MUMML 400 kV lines were restored by 5 th Aug-2025, thereby eliminating N-3 contingency. On 15 th & 20 th Aug 2025, RE generation were curtailed to control high system frequency and heavy underdrawal conditions.	On 15.08.2025, VIPL Bus-I LBB operation caused multiple trippings, affecting 223 MW generation due to unavailable evacuation path.	400/220 kV Kudus ICTs were loaded with strengthening of downstream network till Borivali substation on 3 Aug 2025. Mumbai ATC/TTC has improved to 3300 MW / 3200 MW respectively.	---
Sep-25	Max State Demand: around 25690	---	On 06.09.2025, CT burst at Chandrapur	125MVAr Bus Reactor charged at 400 kV Deepnagar	---

	<p>MW.</p> <p>Average State Demand: around 24230 MW.</p> <p>Max Mumbai Demand: around 3620 MW.</p> <p>Average Mumbai Demand: around 3350 MW.</p>		<p>caused 762 MW generation loss without load impact; on 26.09.2025, storms tripped Amravati circuits, affecting 445 MW generation.</p>	<p>substation on 27th Sept 2025.</p>	
Oct-25	<p>Max State Demand: around 27280 MW.</p> <p>Average State Demand: around 24770 MW.</p> <p>Max Mumbai Demand: around 3920 MW.</p> <p>Average Mumbai Demand: around 3400 MW.</p>	<p>On 2nd Oct 2025, RE generation were curtailed to control high system frequency and heavy under drawal conditions.</p>	<p>On 08.10.2025, 220kV Main Bus-II at Uran ss tripped; 228 MW generation was lost.</p> <p>On 21.10.2025, 400kV Chandrapur Bus-I tripped (Y-phase IPS tube failure), causing 1280 MW generation loss.</p>		--
Nov-25	<p>Max State Demand: around 27325 MW.</p> <p>Average State Demand: around 25640 MW.</p> <p>Max Mumbai</p>	<p>Due to outage of 220 kV Urse – Chinchwad for HTLS works, important Pune region 220 kV substations were</p>	<p>On 14.11.2025 at 02:22 hrs, 220 kV Uran GTPS Bus-1 and Bus-2 tripped (R-phase CT failure), causing 424 MW generation and 26 MW load loss; restored by</p>	<p>220 kV Parvati – Phursungi line HTLS works completed by 02 Nov-25.</p>	<p>Annual HVDC Pole1, Pole2 and Bi-Pole important outages completed in Nov-2025</p>

	<p>Demand: around 3530 MW.</p> <p>Average Mumbai Demand: around 3150 MW.</p>	operating in radial mode.	03:43.		
Dec-25	<p>Max State Demand: around 28600 MW.</p> <p>Average State Demand: around 27375 MW.</p> <p>Max Mumbai Demand: around 3275 MW.</p> <p>Average Mumbai Demand: around 2980 MW.</p>	---	At 22:19 hrs on 29.12.25, LBB protection operated on the 220kV Paras-Balapur circuit 3 at Paras Substation, causing a 137 MW generation loss.	Anjur HVDC earth electrode station relocated to Malegaon due to Bullet Train project; Padghe–Malegaon electrode line commissioned in Dec-25 after testing outages. 220 kV Use – Chinchwad line HTLS works completed by 08 Dec-25.	---

Source: MSLDC DSR for Demand data

Abbreviations: LTS - Load Trimming Scheme, DLS – Demand Load Shedding

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PART-I

Maharashtra Power System: Overview and Operating Context

Chapter 1: System Operations Overview -2025

The Maharashtra power system is one of the largest and most complex intra-State power systems in the country, forming an integral part of the Western Region synchronous grid. The State system is electrically interconnected with the regional network through multiple inter-State transmission corridors and operates in close coordination with the Regional Load Despatch Centre to maintain grid security, reliability, and discipline. The operational performance of the Maharashtra system therefore has a direct bearing not only on intra-State security but also on the stability and reliability of the Western Region grid.

The responsibility for real-time operation, monitoring, and control of the Maharashtra power system rests with the Maharashtra State Load Despatch Centre (MSLDC). The functions and duties of the SLDC are statutory in nature, as defined under the provisions of the Electricity Act, 2003, and include ensuring integrated operation of the State power system, scheduling and despatch of electricity within the State, monitoring grid parameters, facilitating open access, and complying with directions issued by the Regional Load Despatch Centre in the interest of overall grid security. These responsibilities are discharged in accordance with the Indian Electricity Grid Code, the Maharashtra Electricity Grid Code, and applicable regulatory and operational frameworks.

During Calendar Year 2025, system operations were carried out in an environment characterised by rising demand, increasing penetration of renewable energy, evolving transmission constraints, and tightening operational margins. In addition to utility-scale renewable capacity additions, the year witnessed a significant increase in solar generation embedded within the distribution network, which remains largely outside the real-time visibility and direct operational control of the SLDC. While this growth contributes positively to energy availability and sustainability objectives, it introduces additional uncertainty in net demand estimation and real-time system balancing.

The operational envelope of the State system during the year was shaped by multiple interrelated factors. These included limited real-time visibility of certain elements of the intra-State transmission network, variability in the availability and performance of intra-State generating resources, forecasting errors associated with renewable generation, and the inherent intermittency of wind and solar resources. Further, the total absence of real-time visibility of distributed generation within the distribution network, combined with the absence of a structured reserve and ancillary services mechanism at the State level, constrained the operational flexibility available to the system operator for managing real-time imbalances and contingencies.

Transmission constraints and limitations in reactive power (MVar) resources also played a significant role in influencing system operations. Congestion in specific transmission corridors feeding critical areas narrowed operational margins forcing utilization of precious hydro resources. In some instances, voltage management required the imposition of active power constraints due to inadequate reactive power support, thereby adding to the complexity of real-time grid operation.

Within this constrained operating environment, fast-responding intra-State hydro resources—particularly the Koyna hydro stations and Tata hydro generation—continued to serve as vital operational reserves, repeatedly supporting system security during contingencies, renewable variability, transmission constraints, and stressed operating conditions. Particularly Koyna Hydro resources remained the primary sources of rapid flexibility available to the State system. At the same time, the increasing incidence of high renewable generation periods underscored the growing importance of downward reserve margins, highlighting the need for further reduction in minimum technical turndown

levels of intra-State thermal generating units and for developing appropriate frameworks to integrate out-of-merit despatchable resources into formal reserve and ancillary service arrangements.

Against this backdrop, this **Annual Operation Report for Calendar Year 2025** presents a consolidated assessment of the Maharashtra power system from an operational perspective, within the context of its integration with the Western Region grid. The report is based on actual operating data, scheduling and despatch records, grid event analyses, and control room observations, and documents observed system behaviour, operational constraints, and control actions adopted during the year to maintain secure and reliable operations.

The report is intended to serve as a technical reference and decision-support document for stakeholders across Generation, Transmission, and Distribution, as well as for planners, regulators, and policymakers. While the analysis presented is descriptive and observational in nature, several sections identify areas where deeper analytical studies, enhanced coordination, and institutional strengthening will be required to address emerging operational challenges and to support secure grid operations in an increasingly renewable-dominated and regionally integrated power system.

Key characteristics of Maharashtra System

Generation profile during CY 2025	
Generation installed Capacity	Maximum Generation during CY 2025
Intra State Thermal – 20890 MW	Intra State Thermal – 15693 MW
Intra State Gas – 1240 MW	Intra State Gas – 475 MW
Intra State Hydro –2941 MW	Intra State Hydro – 2788 MW
Intra State Wind – 5325 MW	Intra State Wind – 3536 MW
Intra State Solar – 6305 MW	Intra State Solar – 5567 MW
Intra State Other RE – 3377 MW	Intra State Other RE – 1250 MW
Central Sector Share -8346 MW	Central Sector Receipt (Including Inter State Bilateral power) -12488 MW

Demand profile during CY 2025	
State Peak Demand 30,307 MW	37 % of WR Demand
	12 % of National Demand
	62% Demand met through internal generation
MSEDCL Peak Demand	26206 MW
Mumbai Demand	3916 MW
Other Discom Demand	764 MW

Maximum Energy Catered during CY 2025	
State Energy catered – 672.5 MUs	Intra State Thermal – 332.86 MUs
MSEDCL Energy catered –585 MUs	Intra State Gas – 10.39 MUs
Mumbai Energy catered – 77.6 MUs	Intra State Hydro – 42.73 MUs
Other Discom Energy catered – 14.28 MUs	Intra State Wind – 78.58 MUs
	Intra State Solar – 40.19 MUs
	Intra State Other RE – 29.19 MUs

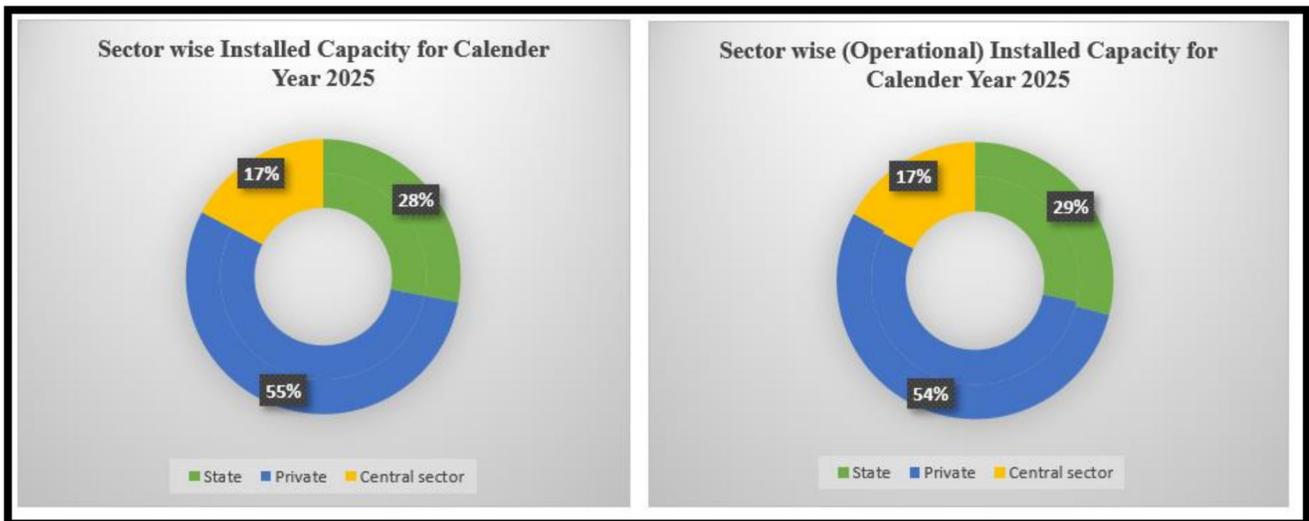
Transmission	Market
Substations – 804 Nos	Major Distribution licensees – 4
Lines – 57029 km	Deemed Distribution Licensees – 14
Transformation capacity -165928 MVA	Sellers – 228
	Transmission Licensees - 10

Chapter 2: Intra State Transmission Network and Generation Resources - 2025

2.1 Generation Installed Capacity:

2.1.1 Sector wise Installed Capacity:

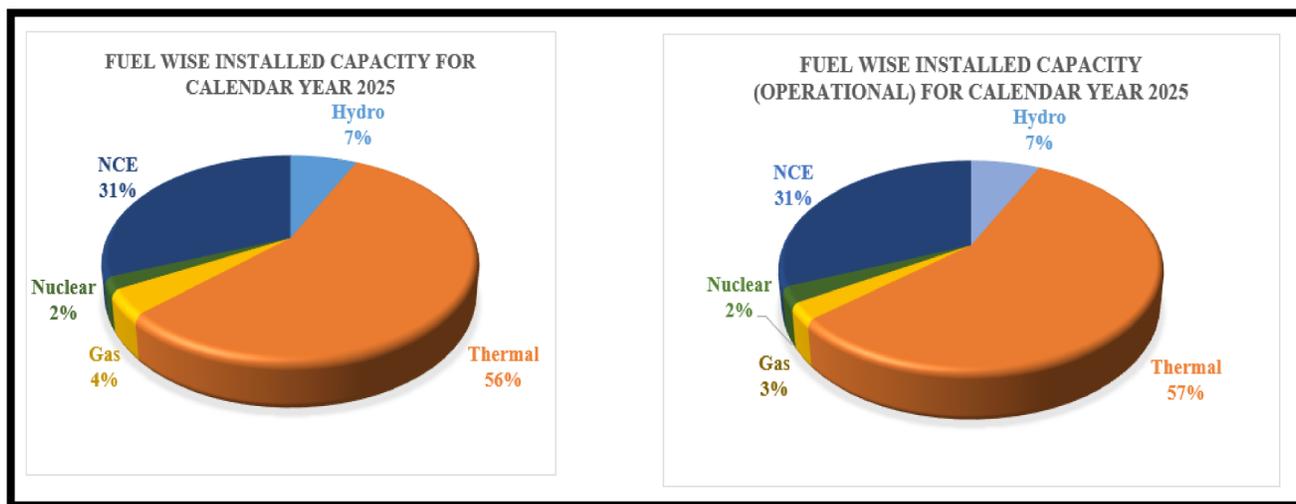
Sector wise Installed Capacity				
Sector	Calendar Year 2025		Calendar Year 2025 (Operational)	
	MW	%	MW	%
State Sector	13552	28%	13552	28%
Private Sector	26526	55%	26138	54%
Central sector Share	8346	17%	8346	17%
Total Installed Capacity	45902		44914	



2.1.2 Fuel wise Installed Capacity:

Calendar Year: 2025		Hydro	Thermal	Gas	Nuclear	NCE
	MW	3386	27196	1645	1191	15007
	Percentage	7%	56%	4%	2%	31%

Calendar Year: 2025 (Operational)		Hydro	Thermal	Gas	Nuclear	NCE
	MW	3386	27196	1257	1191	15007
	Percentage	7%	57%	3%	2%	31%



2.1.3 Installed Capacity addition in Calendar Year 2025:

Sr. No.	InSGS/ISGS	Station Name	Unit No.	Date of COD	Capacity added (In MW)
1.	InSGS	Bhusawal TPS	6	21.02.2025	660
Total Installed Capacity addition					660

2.2 Transmission Infrastructure:

During Calendar Year 2025, 13 Nos of EHV substations, 3860 MVA of transformation Capacity and 959 Ckt. km of transmission lines was added in Maharashtra State Transmission System. The transmission infrastructure of Maharashtra State for Calendar Year 2025 is tabulated below:

Transmission Licensee	Calendar Year 2025		
	EHV Substation (Nos)	Transformation Capacity (MVA)	EHV Lines (Ckt. km)
Maharashtra State Electricity Transmission Company Ltd. (MSETCL)	760	1,43,433	52,807
Tata Power Company Ltd. (TPCL)	27	11,494	1,269
Adani Electricity Mumbai Ltd. (AEML)	9	3,500	594
Jaigad Power Transmission Co. Ltd. (JPTL)	1	0	330
Adani Transmission India Ltd. (ATIL)	0	0	436
Amravati Power Transmission Co. Ltd. (APTCL)	1	0	220
Sinnar Power Transmission Co. Ltd. (SPTCL)	1	0	104
Maharashtra Eastern Grid Power Transmission Co. Ltd. (MEGPTCL)	3	6,000	1,220
Vidarbha Industries Pvt. Ltd (VIPL)	1	0	6
Kharghar Vikhroli Transmission Ltd. (KVTL)	1	1500	69
Total	804	1,65,927	57,055

2.3 Network Addition in Calendar Year 2025:

Sr. No	Name of substation	Element Details	Date
1	HVDC Padghe	33kV Padghe - Malegaon electrode line charged at 22:23 Hrs (Earlier 33kV Padghe - Anjur line converted into Padghe - Malegaon)	06.12.2025
2	400 kV Warora	400/220/33kV 501 MVA ICT I charged at 00:17 hrs	07.01.2025
3	400 kV Kalwa - Padghe ckt-1	400 kV Kalwa - Padghe Ckt-1 after completion of HTLS work charged at 22:45 hrs	14.01.2025
4	400 kV Busawal II	400/220 kV 105 MVA Spare ICT II charged at 21:48 hrs	16.01.2025
5	400 kV Warora	400/220 kV 167 MVA Spare ICT charged at 17:10 hrs	18.01.2025
6	400 kV Taptitanda	125 MVAR Bus Reactor charged at 22:12 hrs	21.02.2025
7	400 kV Babbleshwar	125 MVAR Bus Reactor charged at 18:42 hrs	24.02.2025
8	400 kV Kudus	220 kV Boisar - Kudus line charged at 11:58 Hrs	30.03.2025
9	400 kV Kudus	220 kV Kudus - Ghodbunder line charged at 12:41 Hrs	30.03.2025
10	400 kV Kharghar	400/220/33 kV, 3x167 MVA ICT 4 charged at 09:26 Hrs	31.03.2025
11	400 kV Padghe	3x167 MVA 400/220/33 kV, ICT 6 charged at 17:43 Hrs	31.03.2025
12	400kV Lonikand-2	132kV, 2*15 MVAR capacitor bank charged at 14:42 hrs.	22.08.2025
13	400kV Deepnagar	125MVAr Bus Reactor charged 17:02 Hrs.	27.09.2025
14	400kV Nagothane	400/220kV, 500 MVA, ICT-4 charged from HV side only 18:41 Hrs.	30.11.2025
15	400kV Taptitanda	400/220kV,501 MVA ICT-3 at Taptitanda at 18:44 Hrs	04.12.2025
16	220 kV Jalna	220/33kV 100 MVA T/f II charged by replacing 220/33 kV 50 MVA T/f II at 00:39 hrs	01.01.2025
17	220 kV Tilawani	110 kV Tilwani - Rukadi Ckt-II charged at 17:09 hrs	06.01.2025
18	220 kV Tilawani	110 kV Tilwani - Rukadi Ckt-I charged at 17:48 hrs	06.01.2025
19	220 kV Tuljapur	132 kV Tuljapur - Barul Ckt charged at 20:22 hrs	15.01.2025
20	220 kV Bhenda	M/s Swami Samarth Sugar and Agro 12 MW cogen synchronised at 16:08 hrs	23.01.2025

21	220 kV Century Enka	220 kV PT bay-1 charged at 16:15 hrs	23.01.2025
22	220KV-NASIK-Reliance Life science GIS (Akarle)-1	220 kV Mani Bay 204 & 205 charged at 18:53 hrs & 17:15 hrs respectively.	23.01.2025
23	220KV-NASIK-Reliance Life science GIS (Akarle)-1	220 kV Reliance Life science GIS - Nashik OCR charged at 17:17 hrs	23.01.2025
24	220KV-NASIK-Reliance Life science GIS (Akarle)-1	220 kV Reliance Life science GIS - Navsari charged at 18:55 hrs	23.01.2025
25	220KV-NASIK-Reliance Life science GIS (Akarle)-1	220KV-NASIK-Reliance Life science GIS Bus coupler charged at 19:15	23.01.2025
26	220 kV Wani	33 kV Ukani WCL Bay charged at 18:15 hrs	28.01.2025
27	220 kV Jalkot	132 kV TS Wind Bay chaged at 17:21 hrs	29.01.2025
28	220 kV Jalkot	132 kV Jalkot - TS Wind Ckt chaged at 17:21 hrs	29.01.2025
29	220 kV Ghatodi	220 kV Cyclic Energy End Bay charged at 21:16 hrs	30.01.2025
30	220 kV Ghatodi	220 kV Ghatodi - Cyclic Energy Ckt charged at 21:16 hrs	30.01.2025
31	220 kV Rajur	132 kV Bhokardhan Ckt-II bay charged at 19:00 hrs	06.02.2025
32	220 kV Chakur	132 kV Chakur - Chakur TSS Ckt charged at 20:32 hrs	18.02.2025
33	220 kV Hinjewadi	220/22 kV, 50 MVA PTR-I charged at 18:43 hrs	26.02.2025
34	220 kV Chembur	220 kV Chembur - BKC Ckt-I & II charged at 00:01 hrs & 00:05 hrs respectively	28.02.2025
35	220 kV BKC (AEML)	220 kV Bus Coupler charged at 01:15 Hrs	03.03.2025
36	220 kV Jalna	132 kV Hybrid Bus Sectionaliser Charged at 18:53 Hrs	03.03.2025
37	220 kV Aarey (AEML)	220 kV Bay-24 HVDC -1 charged at 01:56 Hrs	09.03.2025
38	220 kV Aarey (AEML)	220 kV Bay-24 HVDC -2 charged at 02:05 Hrs	09.03.2025
39	220 kV Anandnagar	220/22 kV, 100 MVA T/F-III charged at 23:10 Hrs	10.03.2025
40	220 kV Jalna	220 kV Hybrid GIS Bus Sectionaliser Charged at 15:00 Hrs	17.03.2025

41	220 kV Nagewadi	220 kV Chikhali - Nagewadi Ckt charged by making LILO of 220kV Chikhali - Jalna Ckt II at 0:07 Hrs	20.03.2025
42	220 kV Nagewadi	220 kV Chikhali Ckt End Bay at 220kV Nagewadi charged at 0:07 Hrs	20.03.2025
43	220 kV Nagewadi	220 kV Jalna - Nagewadi Ckt charged by making LILO of 220kV Chikhali - Jalna Ckt II at 0:41 Hrs	20.03.2025
44	220 kV Nagewadi	220 kV Jalna Ckt End Bay at 220kV Nagewadi charged at 0:41 Hrs	20.03.2025
45	220 kV New Found GIS	220 kV New Found GIS - Kharghar line at 07:47 Hrs	20.03.2025
46	220 kV New Found GIS	220 kV New Found GIS - Sonkhar line at 08:02 Hrs	20.03.2025
47	220 kV Chitegaon	132 kV Hybrid Bus Sectionaliser Charged at 23:56 Hrs	21.03.2025
48	220 kV Five Star MIDC	220/33 kV, 100 MVA , T/F-4 charged at 13:54 Hrs	24.03.2025
49	220 kV Five Star MIDC	220/33 kV, 50 MVA , T/F charged at 20:01 Hrs	24.03.2025
50	220 kV Kurunda GIS	220 kV Kurunda GIS - Kumbhargaon (400kV Nanded) Ckt I charged at 16:00 Hrs	25.03.2025
51	220 kV Kurunda GIS	220 kV Kurunda GIS - Kumbhargaon (400kV Nanded) Ckt II charged at 16:03 Hrs	25.03.2025
52	220 kV Bhosari	220/22 kV 50 MVA PTR charged at 20:28 Hrs	25.03.2025
53	220 kV Colourchem	220/22 kV 100 MVA PTR charged at 19:51 Hrs	25.03.2025
54	220 kV Gadchandur	220 kV Dalmai End Bay charged at 18:45 Hrs	26.03.2025
55	220 kV Gadchandur	220 kV Gadchandur - Dalmia Ckt charged at 18:45 Hrs	26.03.2025
56	220 kV Mahalaxmi (TPC)	Hitachi make, 220 KV, 125 MVAR Reactor charged at 22:52 Hrs	26.03.2025
57	220 kV Ichalkaranji (Tilwani)	220/33 kV , 100 MVA , PTR-3 charged at 16:57 Hrs	28.03.2025
58	220 kV Parly	125 MVAr Bus Reactor charged by replacing existing 50MVAr Bus Reactor at 00:06 Hrs	29.03.2025
59	220 kV Partur	132 kV Ghansawangi End Bay charged at 02:41 Hrs	29.03.2025
60	220 kV Partur	132 kV Partur - Ghansawangi Ckt charged by making LILO on 132kV Ambad - Ghansawangi Ckt at 02:41 Hrs	29.03.2025
61	220 kV Partur	132 kV Ambad End Bay charged at 03:53 Hrs	29.03.2025
62	220 kV Partur	132 kV Partur - Ambad Ckt charged by making LILO on 132kV Ambad - Ghansawangi Ckt at 03:53 Hrs	29.03.2025

63	220 kV Kalmeshwar	220 kV Kalmeshwar - Warud Ckt I charged at 19:09	30.03.2025
64	220 kV Dalmia	220 kV Gadchandur End Bay charged at 14:23 Hrs	31.03.2025
65	220 kV Georai	132 kV SAEL RE Power End Bay charged at 19:15 Hrs	31.03.2025
66	220 kV Georai	132 kV Georai - SAEL RE Power Ckt charged 19:15 Hrs	31.03.2025
67	220 kV Jambhul	220/22 kV, 50 MVA T/F-II charged at 20:41 Hrs	31.03.2025
68	220 kV Chinchwad 1	220/132 kV, 100 MVA ICT-7 charged at 22:10 Hrs	31.03.2025
69	220 kV Chandrapur	220kV End Bay of VMEPL Ckt charged at 22:32 Hrs	01.04.2025
70	220 kV Chandrapur	220kV MIDC Chandrapur - VMEPL Ckt charged at 22:32 Hrs	01.04.2025
71	220 kV VMEPL	220kV VMEPL Bus charged at 19:45 Hrs	02.04.2025
72	220 kV CPRI	220 kV CPRI - Reliance Life Science line charged at 20:41 Hrs	28.04.2025
73	220 kV CPRI	220 kV CPRI S/s charged at 20:41 Hrs with LILO arrangement on 220 kV Reliance Life Science - Nashik OCR line.	28.04.2025
74	220 kV CPRI	220 kV CPRI - Nashik OCR line charged at 21:44 Hrs	28.04.2025
75	220kV Bhugaon	132kV Bhugaon - Seloo Ckt II charged at 21:25 Hrs.	07.05.2025
76	220kV Virur	220kV Konsari Ckt End Bay charged at 13:12hrs.	09.05.2025
77	220kV Virur	220kV Virur - Konsari Ckt charged at 13:12Hrs.	09.05.2025
78	220kV Konsari	220kV Virur Ckt End Bay charged at 13:12Hrs.	09.05.2025
79	220kV Gadchiroli	220kV Konsari Ckt End Bay charged at 13:21hrs.	09.05.2025
80	220kV Gadchiroli	220kV Gadchiroli - Konsari Ckt charged at 13:21hrs.	09.05.2025
81	220kV Konsari	220kV Gadchiroli Ckt End Bay charged at 13:21hrs.	09.05.2025
82	220kV Konsari	220kV Bus Section charged at 14:16Hrs.	09.05.2025
83	220kV Tadali	33kV Chaman Merallic Ckt End Bay charged at 18:53Hrs.	15.05.2025

84	220kV Tadali	33kV Tadali - Chaman Merallic Ckt charged at 18:53Hrs.	15.05.2025
85	220kV Konsari	220kV LMAEL Metering Bay I charged at 22:57Hrs.	16.05.2025
86	220kV Konsari	220kV LMAEL Metering Bay II charged at 22:58hrs.	16.05.2025
87	220kV Nagbhid	220kV Nagbhid - Umred Ckt I charged at 18:18Hrs.	20.05.2025
88	220kV Nagbhid	220kV Nagbhid - Umred Ckt II charged at 18:21Hrs.	20.05.2025
89	220kV Uppalwadi	220kV Uppalwadi - Pardi Ckt I charged at 09:10Hrs.	21.05.2025
90	220kV Konsari	220/132kV 100 MVA ICT I charged at 14:55Hrs.	22.05.2025
91	220kV Konsari	220/132kV 100 MVA ICT II charged at 15:21Hrs.	22.05.2025
92	220kV Shivajinagar	220kV Ampyre Solar End Bay charged at 22:00Hrs.	27.05.2025
93	220kV Shivajinagar	220kV Shivajinagar - Ampyre Solar Ckt charged at 22:00Hrs.	27.05.2025
94	220kV Ashti	132kV Ashti - Konsari Ckt charged at 19:10Hrs.	28.05.2025
95	220kV Allapalli	132kV Allapalli - Konsari Ckt charged at 18:04Hrs.	28.05.2025
96	220kV Karanja	220kV Juniper Solar End Bay charged at 21:00Hrs.	29.05.2025
97	220kV Karanja	220kV Karanja - Juniper Solar Ckt charged 21:00Hrs.	29.05.2025
98	220kV Chitegaon	33kV MTIL Ckt I End Bay charged at 18:28Hrs.	31.05.2025
99	220kV Chitegaon	33kV Chitegaon - MTIL Ckt I charged 18:28Hrs.	31.05.2025
100	220kV Chitegaon	33kV MTIL Ckt II End Bay charged 18:28Hrs.	31.05.2025
101	220kV Chitegaon	33kV Chitegaon - MTIL Ckt II charged 18:28Hrs.	31.05.2025
102	220kV Baramati	132/33kV, 50MVA, T/F charged at 23:55Hrs.	05.05.2025
103	220kV Century Enka	220kV Main Bus To Microsoft GIS incomer- I Cable was charged at 19:42Hrs.	06.05.2025
104	220kV Century Enka	220kV Main Bus To Microsoft GIS incomer- II Cable was charged at 19:59Hrs.	06.05.2025

105	220kV South Solapur (Kumbhari)	220kV Sri. Maruti Wind Park line charge at 15:52Hrs.	21.05.2025
106	220kV Bhokar	33kV Enrich Solar End Bay charged at 16:51Hrs.	05.06.2025
107	220kV Bhokar	33kV Bhokar - Enrich Solar Ckt charged at 16:51Hrs	05.06.2025
108	220kV Century Enka	220kV Microsoft Ckt-1 charged at 16:00Hrs.	16.06.2025
109	220kV Century Enka	220kV Microsoft Ckt-2 charged at 16:01Hrs.	16.06.2025
110	220kV Surya Achegaon solar park	220/33kV, 160MVA, T/F charged at 18:33 Hrs.	29.06.2025
111	220kV Trombay (TATA)	125MVAR bus reactor charged at 19:49Hrs.	29.06.2025
112	220kV PDG and 220kV NTT Neon	220kV Datascape charged at 22:04 Hrs.	30.06.2025
113	220kV Hingoli	220kV TATA Power Solar End Bay charged at 02:23 Hrs.	01.07.2025
114	220kV Hingoli	220kV Hingoli - TATA Power Solar Ckt charged at 02:23 Hrs.	01.07.2025
115	220kV Kanhan	220kV Kanhan - Pachgaon Ckt charged at 17:39 Hrs.	04.07.2025
116	220kV Umred	220kV Umred - Pachgaon Ckt charged at 17:39 Hrs.	04.07.2025
117	220kV TATA Power Hingoli	220kV Bus Charged at newly commissioned 220kV TATA Power Hingoli at 01:01 Hrs.	05.07.2025
118	220kV TATA Power Hingoli	220/33kV 110MVA Power Transformer charged at 01:01 Hrs.	05.07.2025
119	220kV Shendra AIS	33kV Shendra AIS - MITL Ckt I End Bay charged at 18:20 Hrs.	18.07.2025
120	220kV Shendra AIS	33kV Shendra AIS - MITL Ckt II End Bay charged at 18:20 Hrs.	18.07.2025
121	220kV Kalwa	220kV Kalwa-GTPL charged at 19:50 Hrs.	18.07.2025
122	220kV parvati	132kV Merto bay-2 charged at 20:07 Hrs.	25.07.2025
123	220kV parvati	132kV Merto bay-1 charged at 20:23 Hrs.	25.07.2025
124	220kV Amalner	220kV Amalner - JPL Ckt II Metering Bay charged at 16:01 Hrs.	27.07.2025
125	220kV Pachgaon	220kV Bus Charged at newly commissioned 220kV Pachgaon at 19:32 Hrs.	29.07.2025
126	220kV Pachgaon	220kV Kanhan End Bay charged at 19:32 Hrs.	29.07.2025

127	220kV Pachgaon	220kV Umred End Bay charged at 19:32 Hrs.	29.07.2025
128	220kV Pachgaon	220/33kV 25MVA TF I charged at 19:32 Hrs.	29.07.2025
129	220kV Pachgaon	220/33kV 25MVA TF II charged 19:32 Hrs.	29.07.2025
130	220kV Pachgaon	33kV Bus charged at 19:32 Hrs.	29.07.2025
131	220kV GTPL S/S	220/11-11kV, 100 MVA, T/F-1 charged at 16:52 Hrs.	31.07.2025
132	220kV Pardi	132kV Pardi - Jattarodi Ckt II charged at 13:17 hrs.	07.08.2025
133	220kV Pardi	132kV Pardi - Jattarodi Ckt I charged at 13:29 hrs.	07.08.2025
134	220kV gramercy Tech Park Ltd (GTPL)	220kV Print house bay with cable upto CTT tower charged at 15:27 hrs.	07.08.2025
135	220kV Microsoft	220/33kV, 90MVA T/F-1,2 HV side charged at 22:30 & 22:39 hrs respectively.	07.08.2025
136	220kV Nandgaonpeth	220kV Jupiter Solar End bay charged at 13:34 hrs.	14.08.2025
137	220kV Nandgaonpeth	220kV Nangaopeth - Jupiter Solar Ckt charged at 13:34 hrs.	14.08.2025
138	220kV Hinganghat	220/132kV 100MVA ICT I charged after augmentation at 19:45 hrs.	16.08.2025
139	220kV Kathapur	132kV, 30MVAR capacitor bank charged at 18:36 hrs.	21.08.2025
140	220kV Bhenda	220kV Wishwind Ckt-1, from Bhenda upto gantry of Wishwind charged at 23:55 hrs.	30.08.2025
141	220kV Bhenda	220kV Wishwind Ckt-1, from Bhenda upto gantry of Wishwind charged at 20:39 hrs.	30.08.2025
142	220kV Theur	15 MVAR capacitor bank charged at 17:57 Hrs.	06.10.2025
143	400/220kV Ionikand	220kV, 2*30 MVAR capacitor charged at 12:22 Hrs.	07.10.2025
144	220kV Pardi	33kV Maa Umiya ckt charged at 17:05 nHrs.	07.10.2025
145	220kV SICOM	33Kv Ashtabhujja ckt charged at 21:04 hrs.	07.10.2025
146	220kv Sayne	33 kV Sun infra solar line charged at 13:39 Hrs, on Dt.14.10.2025	14.10.2025
147	220kV Bhaveghar	20 MVAR capacitor bank charged at 14:36 Hrs.	17.10.2025
148	220kV Bhosari1	220kV Microsoft Ckt-2 Cable charged from Microsoft end at 13:17 Hrs.	30.10.2025

149	220kV NTT Estella	220kV Mankoli charged at 20:05 Hrs.	31.10.2025
150	220kV NTT Bapgaon	220kV Mankoli charged at 20:53 Hrs.	31.10.2025
151	220kV Mankoli	220/22kV, 50MVA, T/F-1 charged on no load at 20:45 Hrs. load taken at 13:22 Hrs on 18.11.2025	05.11.2025
152	220kV Nanded City	220/22kV, 50MVA, T/F charged at 13:50 Hrs.	08.11.2025
153	220kV Jupiter (Nandgaopeth)	220/33kV 105MVA TF charged at 21:04 Hrs.	13.11.2025
154	220kV Gadchiroli	220/132kV 100 MVA ICT charged by replacing 50MVA ICT 18:48 hrs.	17.11.2025
155	220kV Umred	220/33kV 50 MVA TF 2 charged by replacing 25MVA TF 22:57 Hrs.	18.11.2025
156	220kV Vankushwade	220kV New Bus-Bar protection taken in service at 17:10 Hrs.	20.11.2025
157	220kV Phursing	220/22kV, 80MVA, T/F-1 charged on no load, load taken at 17:45 hrs on 23.11.2025	22.11.2025
158	220kV Colourchem	220/22kV, 100MVA T/F-1, charged at 23:40 Hrs.	22.11.2025
159	220kV Butibori 3	1 No of 33kV Bay charged 18:01 Hrs.	26.11.2025
160	220kV Lonideokar	2x15 MVAr capacitor bank charged at 11:17 Hrs	05.12.2025
161	220kV Urse	220kV Urse - Chinchwad ckt HTLS work completed and charged at 16:55 Hrs	07.12.2025
162	220kV Lote	220/33 kV 50 MVA TF-3 @ Lote charged at 15:50 Hrs	12.12.2025
163	220kV Vasai	40 MVAr Capacitor Bank charged at 15:20 Hrs	18.12.2025
164	220kV Telco	220kV TMPVL GIS - Telco ckt - 1 & ckt - 2 charged at 14:40 Hrs & 14:46 Hrs respectively	19.12.2025
165	220kV Karanjade	220/33 kV 125 MVA Transformer - 1 at Karanjade charged at 14:48 Hrs	19.12.2025
166	220kV Century Enka	220kV Century Enka - Microsoft ckt - 1 & ckt - 2 charged at 20:49 Hrs & 21:04 Hrs respectively	19.12.2025
167	220kV Amalner	220kV Amalner - Vikhran Ckt charged by making LILO on 220kV Amalner - Dondaicha Ckt at 21:07 Hrs	24.12.2025
168	220kV Vikhran	220kV Vikhran Main Bus along with 220kV Amalner End Bay charged at 220kV Vikhran SS at 21:07 Hrs	24.12.2025
169	220kV Dondicha	220kV Dondaicha - Vikhran Ckt charged by making LILO on 220kV Amalner - Dondaicha Ckt at 21:32 hrs	24.12.2025

170	220kV Vikhran	220/33kV 100 MVA TF 3 and Dondaicha End Bay charged at 220kV Vikhran SS at 21:32 hrs	24.12.2025
171	220kV Kawlewada	220/33kV 50 MVA TF 1 charged by replacing 220/33kV 25MVA TF 1 at 18:25 Hrs	30.12.2025
172	220kV Krushnoor	33kV Kunturkar Sugar and Agro Pvt Ltd End Bay charged at 16:43 Hrs	31.12.2025
173	132 kV Sri Maruti Wind Park	100 MW Hybrid Power Park PSS connected to 132 kV level at Narangwadi 220/132/33 kV EHV MSETCL Substation charged at 23:35 hrs	09.01.2025
174	132 kV Ujani	132 kV Ujani - Barul Ckt charged at 20:25 hrs	15.01.2025
175	132 kV Barul	132 kV Barul S/s charged LILO on 132 kV Tuljapur-Ujani Ckt at 20:37 hrs	15.01.2025
176	132 kV Bhoom	33 kV Energevo Spark Bay charged at 17:50 hrs	23.01.2025
177	132 kV Bhoom	33 kV Bhoom - Energevo Spark Ckt charged at 17:50 hrs	23.01.2025
178	132 kV Jalna MIDC	132kV PT Bay charged at 15:45 hrs	25.01.2025
179	132 kV Rashin	M/s Ambalika Sugar Metering Bay charged at 13:07 hrs	31.01.2025
180	132 kV Amabalika	M/s Ambalika Sugar additional 18 MW Cogen synchronised at 16:55 hrs	31.01.2025
181	132 kV Mohol	10 MW Solar Park of M/s. Solar Park 10MW B R Dalave Patil Renewable Pvt ltd Solar bay and feeder charged at 00:08 hrs	01.02.2025
182	132 kV Ganeshkhind	132 kV Ganeshkhind-Chinchwad line (conversion of O/H to U/G cable) charged at 17:42 hrs	12.02.2025
183	132 kV Ganeshkhind	132 kV Ganeshkhind-Rahatani line (conversion of O/H to U/G cable) charged at 15:05 hrs	13.02.2025
184	132 kV Harangul	132 kV Harangul - Chakur TSS ckt charged at 19:40 hrs	18.02.2025
185	132 kV Chakur TSS	132 kV Chakur TSS bus charged at 19:40 hrs	18.02.2025
186	132 kV Karmala	4.72 MW Solar Power plant of M/s Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd in 25 MW Solar Power Park of M/s. Sorigin RE Services Pvt Ltd synchronised at 23:35 hrs	27.02.2025
187	132 kV Allapalli	132 kV Etapalli End Bays charged at 19:18 Hrs	09.03.2025
188	132 kV Allapalli	132 kV Allapalli - Etapalli line charged at 19:18 Hrs	09.03.2025
189	132 kV Etapalli	132 kV Allapalli End Bays charged at 132kV Etapalli SS. 132kV Etapalli SS charged for the First time at 19:18 Hrs	09.03.2025

190	132 kV Etapalli	132/33kV 25 MVA TF I charged at 20:54 Hrs	09.03.2025
191	132 kV Etapalli	2 Nos. of 33kV Bays charged at 20:54 Hrs	09.03.2025
192	132 kV Lakhandur	5 MVAR 33kV Capacitor Bank charged at 17:04 Hrs	12.03.2025
193	132 kV Asgaon	5 MVAR 33kV Capacitor Bank charged at 14:03 Hrs	13.03.2025
194	132 kV Nimbhora	132 kV Raver Ckt End Bay charged at 18:09 Hrs	15.03.2025
195	132 kV Nimbhora	132 kV Nimbhora - Raver Ckt charged by making LILO of 132kV Deepnagar - Nimbhora - Raver Tap Ckt at 18:09 Hrs	15.03.2025
196	132 kV Hingna I	132 kV Hingna I - Hingna II Ckt II charged at 19:15 Hrs	17.03.2025
197	132 kV Hingna I	132 kV Hingna I - Hingna II Ckt I charged at 13:12 Hrs	19.03.2025
198	132 kV Asgaon	5 MVAR 33kV Capacitor Bank charged at 17:42 Hrs	19.03.2025
199	132 kV Karajgaon	132 kV Chandurbazar - Karajgaon Ckt charged by making LILO on 132kV Chandurbazar - Achalpur Ckt at 19:27 Hrs	21.03.2025
200	132 kV Karajgaon	132 kV Chandurbazar End Bay charged at 19:27 Hrs	21.03.2025
201	132 kV Karajgaon	132 kV Achalpur - Karajgaon Ckt charged by making LILO on 132kV Chandurbazar - Achalpur Ckt at 19:28 Hrs	21.03.2025
202	132 kV Karajgaon	132 kV Achalpur End Bay charged at 19:28 Hrs	21.03.2025
203	132 kV Karajgaon	132/33kV 25 MVA TF I charged at 19:54 Hrs	21.03.2025
204	132 kV Karajgaon	132/33kV 25 MVA TF II charged at 19:55 Hrs	21.03.2025
205	132 kV Karajgaon	15 MVAR 132kV Capacitor Bank charged at 20:42 Hrs	21.03.2025
206	132 kV Raimoha	33 kV End Bay of Grada Solar charged at 13:53 Hrs	26.03.2025
207	132 kV Raimoha	33 kV Raimoha - Grada Solar Ckt charged at 13:53 Hrs	26.03.2025
208	132 kV Erandol	33 kV Sunsire Power End bay charged at 14:13 Hrs	28.03.2025
209	132 kV Erandol	33 kV Erandol - Sunsire Power Ckt charged at 14:13 Hrs	28.03.2025
210	132 kV Morgaon Arjuni	5 MVAR 33kV Capacitor Bank charged at 22:00 Hrs	29.03.2025

211	132 kV Chincholikati	33 kV Balaji Amines (20 MW Solar) line & bay charged at 21:25 Hrs	31.03.2025
212	132 kV Lonand	132 kV Lonand- Phaltan MIDC line charged at 22:05 Hrs	31.03.2025
213	132 kV Amgaon	10MVAR, 33kV Capacitor Bank charged at 20:50 Hrs	04.04.2025
214	132 kV Jalna MIDC	132/33kV 50 MVA TF III charged at 20:20 Hrs	09.04.2025
215	132kV Malegaon	132kV Mehkar Ckt II End Bay charged at 18:08hrs.	09.05.2025
216	132kV Kinwat	132kV Ambari TSS Ckt End Bay charged at 17:21Hrs.	13.05.2025
217	132kV Kinwat	132kV Kinwat - Ambari TSS Ckt charged at 17:21Hrs.	13.05.2025
218	132kV Malegaon	132kV Malegaon - Mehkar Ckt II charged at 19:27Hrs.	16.05.2025
219	132kV Etapalli	132kV Suarjgarh Ckt I End Bay charged at 19:23Hrs.	19.05.2025
220	132kV Etapalli	132kV Etapalli - Suarjgarh Ckt I charged at 19:23Hrs.	19.05.2025
221	132kV Etapalli	132kV Suarjgarh Ckt II End Bay charged at 19:24Hrs.	19.05.2025
222	132kV Etapalli	132kV Etapalli - Suarjgarh Ckt II charged at 19:24Hrs.	19.05.2025
223	100kV Digital Edge	100kV Digital Edge S/s charged at 21:49 Hrs.	05.05.2025
224	100kV Digital Edge	100/11kV, 25MVA T/F-2 charged at 16:17Hrs.	09.05.2025
225	132kV Malkapur	33kV Malkapur - Kalpak Ckt II charged at 19:00Hrs.	02.06.2025
226	132kV Malkapur	33kV Malkapur - Kalpak Ckt I charged at 18:20hrs.	03.06.2025
227	132kV Ralegaon	132kV Amplus Power End Bay charged at 21:41Hrs	11.06.2025
228	132kV Ralegaon	132kV Ralegaon - Amplus Power Ckt charged at 21:41Hrs.	11.06.2025
229	132kV Niwali	33kV Sunsire Solar End Bay charged 15:00 Hrs.	14.07.2025
230	132kV Niwali	33kV Niwali - Sunsire Solar End Bay charged at 15:00 Hrs.	14.07.2025
231	132kV Narayangaon	30 MVAR capacitor bank charged at 11:28 Hrs.	31.07.2025
232	132kV Jattarodi	132kV Bus charged at 13:34 hrs.	08.08.2025

233	132kV Jattarodi	132/33kV 50MVA T/f II charged at 14:00 hrs.	08.08.2025
234	132kV Jattarodi	132/33kV 50MVA T/f I charged at 14:04 hrs.	08.08.2025
235	132kV Jattarodi	33kV Bus charged at 16:36 hrs.	19.08.2025
236	132kV Jattarodi	4 Nos of 33kV GIS Bays charged at 16:36 hrs.	19.08.2025
237	132kV Akhadabalapur	132kV Nandapur TSS End bay charged at 20:47 hrs.	22.08.2025
238	132kV Akhadabalapur	132kV Akhadabalapur - Nandapur TSS Ckt charged at 20:47 hrs.	22.08.2025
239	132kV Mauda	Mauda - NTPC Mauda Ckt I charged at 13:00 Hrs.	12.09.2025
240	132kV Mauda	Mauda - NTPC Mauda Ckt II charged at 13:05 Hrs.	12.09.2025
241	132kV Ashti	132kV TSS End Bay charged 20:03 Hrs.	12.09.2025
242	132kV Ashti	132kV Ashti - TSS Ckt charged 20:03 Hrs.	12.09.2025
243	132kV Chakur	33kV Suryalok Energy End Bay charged at 13:50 Hrs.	20.09.2025
244	132kV Chakur	33kV Chakur - Suryalok energy Ckt charged at 13:50 Hrs.	20.09.2025
245	132kV Chettinad	132kV Chettinad-Zuari line charged at 20:29 Hrs.	24.09.2025
246	132kV Akhadbalapur	33kV Ravindra Energy End Bay charged 18:51 Hrs.	30.09.2025
247	132kV Ghatanji	132kV CMES Jupiter End Bay charged at 22:33 Hrs.	30.09.2025
248	132kV Ghatanji	132kV Ghatanji - CMES Jupiter Ckt charged 22:33 Hrs.	30.09.2025
249	132kV Chakur	33kV Suryalok ckt charged at 18:12 Hrs.	1.10.2025
250	132kV Ghatanji	132kV CMES Jupiter Ckt charged at 17:45 Hrs.	10.10.2025
251	132kV Mahol	33kV Surolite line charged at 21:15 Hrs.	16.10.2025
252	132kV Pandharpur	132kV Bohali TSS-Sangola2 line charged at 19:10 Hrs.	20.10.2025
253	132kV Deoli	33kV Ortusum renewable power ltd ckt charged at 18:50 Hrs.	24.10.2025
254	132kV Amgaon	5 Nos of 33kV GIS Bays charged at 19:24 Hrs.	01.11.2025

255	132kV Amgaon	33kV PT charged at 19:24 Hrs.	01.11.2025
256	132kV Pardi	33kV Gumthala End Bay charged at 13:22 Hrs.	03.11.2025
257	132kV Pardi	33kV Pardi - Gumthala Ckt charged at 13:22 Hrs.	03.11.2025
258	132kV Gangapur	132kV Gangapur - Panchganga Sugar Ckt charged at 22:44 Hrs.	07.11.2025
259	132kV Vaijapur	132kV Vaijapur - Panchganga Sugar Ckt charged at 22:48 Hrs.	07.11.2025
260	132kV Panchganga Sugar	132kV Main Bus charged by making LILO on 132kV Gangapur - Vaijapur Ckt charged at 23:15 Hrs.	07.11.2025
261	132kV Deulgaon Mahee	132/33kV 25 MVA TF charged 17:18 Hrs.	20.11.2025
262	132kV Nimboni	132kV Nimboni-Prozeal green line charged at 20:16 Hrs.	20.11.2025
263	132kV Prozeal green	132/33kV, 50MVA, T/F charged at 21:15 Hrs.	20.11.2025
264	132kV Ashti	2 Nos of 33kV Bays charged at 15:03 Hrs.	22.11.2025
265	132kV Risod	33kV Baradari Ckt 1 End Bay charged at 21:35 Hrs.	28.11.2025
266	132kV Risod	33kV Baradari Ckt 2 End Bay charged at 21:35 Hrs.	28.11.2025
267	132kV Mahol	33kV Dalve Patil solar feeder-2 charged at 23:50 Hrs,	28.11.2025
268	132kV Nardhane	132kV Murli Solar End Bay charged at 20:00 Hrs.	29.11.2025
269	132kV Nardhane	132kV Nardhane - Murli Solar Ckt charged at 20:00 Hrs.	29.11.2025
270	132kV Risod	33kV Risod - Baradari Ckt 1 charged at 16:37 Hrs.	30.11.2025
271	100kV Padghe	100/22 kV 25 MVA Transformer - 4 at padghe charged at 16:28 Hrs	16.12.2025
272	132kV Madrup	132kV Mandrup - Karjgi (LILO at Lokshakti sugar) charged at 20:50 Hrs	26.12.2025
273	132kV Khapri	132/33kV 50 MVA TF 1 charged by replacing 132/33kV 25MVA TF at 20:04 Hrs	02.12.2025
274	132kV Jam	132kV Ravindra Energy End Bay & ckt charged at 19:55 Hrs	04.12.2025
275	132kV Pardi	132/33kV 50 MVA TF 4 charged at Pardi at 16:09 Hrs	16.12.2025
276	132kV Durgwada	132kV Durgwada - SPH Solar Ckt charged by making LILO on 132kV Anjangaon - Durgwada Ckt at 01:42 Hrs	25.12.2025

277	132kV SPH Solar	132kV SPH Solar Main Bus with Durgwada End bay charged at 132kV SPH Solar SS at 01:42 Hrs	25.12.2025
278	132kV Anjangaon	132kV Anjangaon - SPH Solar Ckt charged by making LILO on 132kV Anjangaon - Durgwada Ckt at 01:53 Hrs	25.12.2025
279	132kV SPH Solar	132kV Anjangaon End bay charged at 132kV SPH Solar SS at 01:53 Hrs	25.12.2025
280	132kV SPH Solar	132kV Bus Sectionaliser charged at 132kV SPH Solar SS at 02:00 Hrs	25.12.2025
281	110 kV Karanjade (TPC)	110/33 kV , 90 MVA T/F with Bay 1 &2 charged at 16:32 Hrs	19.03.2025
282	33kV Deoli	50 MW (25 MW Conventional Thermal + 25 MW WHR-Based Co-generation) at 00:04Hrs.	19.05.2025

PART-II
Generation Resource Behavior & Reserves

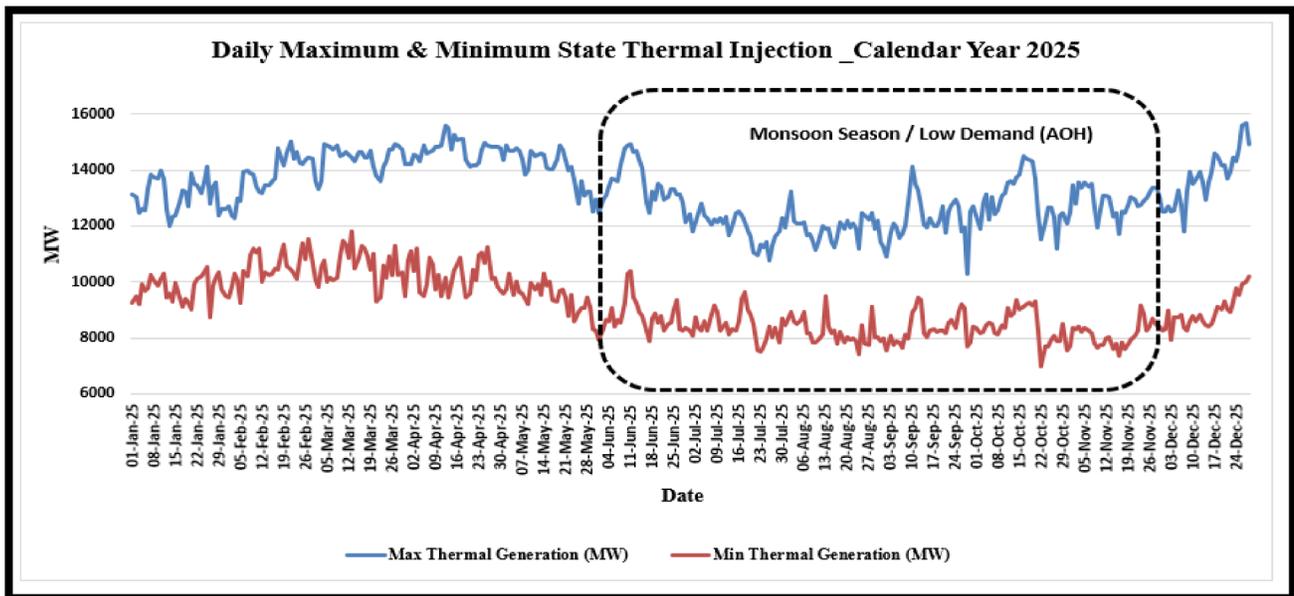
Chapter 3: Generation Profile of the State

3.0 Thermal Generation:

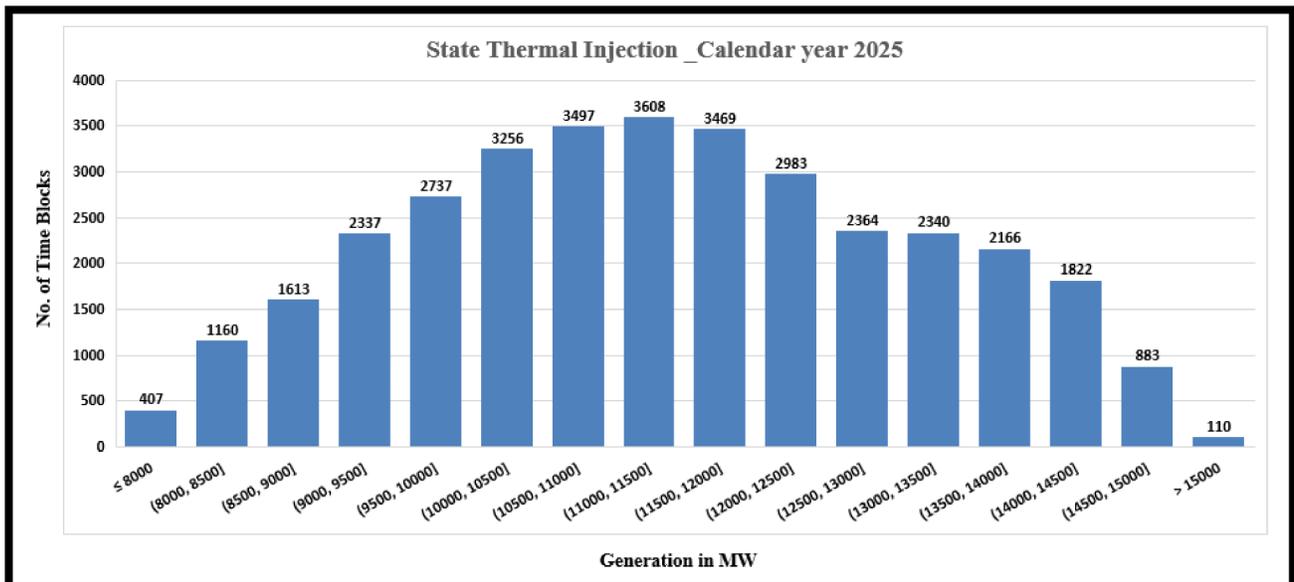
3.1.1 Injection Patterns:

Maharashtra State Power Generation Company Ltd. (MSPGCL) is the major Generation Utility having total Thermal generation installed capacity of 10200 MW. There are other Private generating companies in the State having total installed capacity of 10690 MW.

The Daily Maximum & Minimum injection pattern of the thermal generation in the State is shown below.



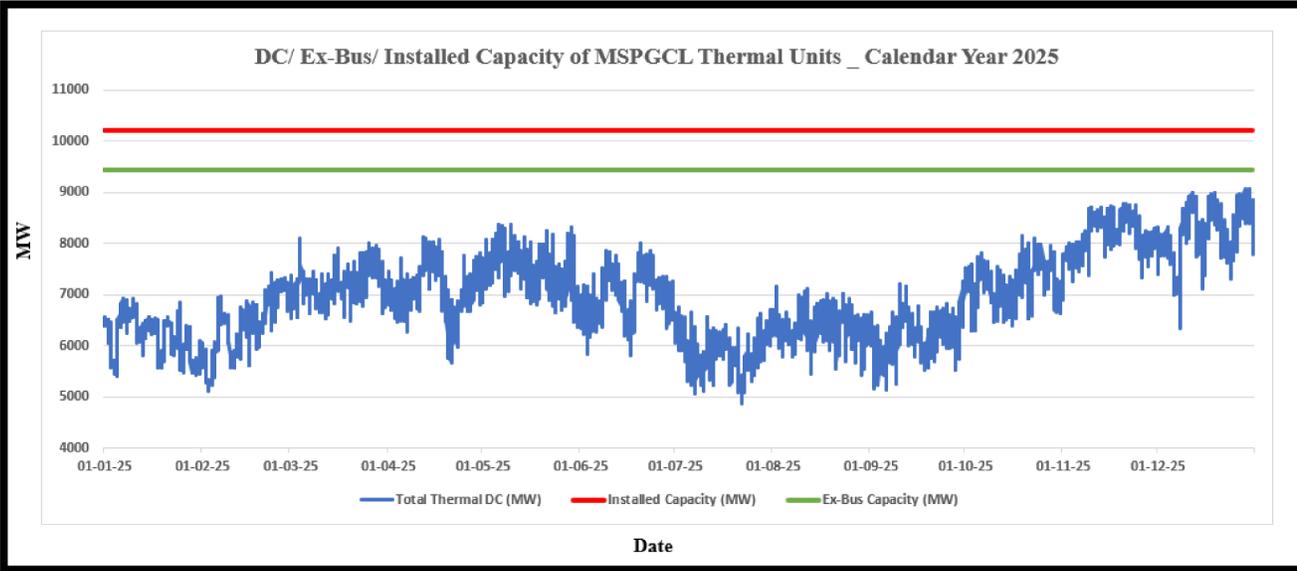
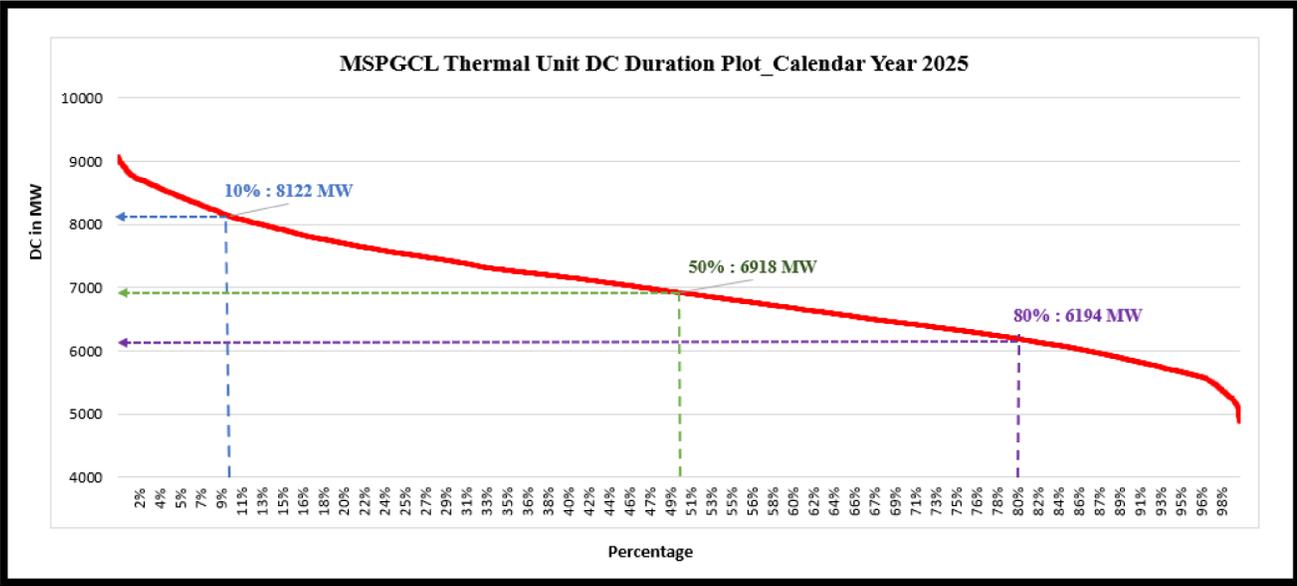
From the above, it is observed that the total injection from Thermal units is ranging from 15693 MW to 7010 MW. Further, maximum daily variation is 6031 MW.

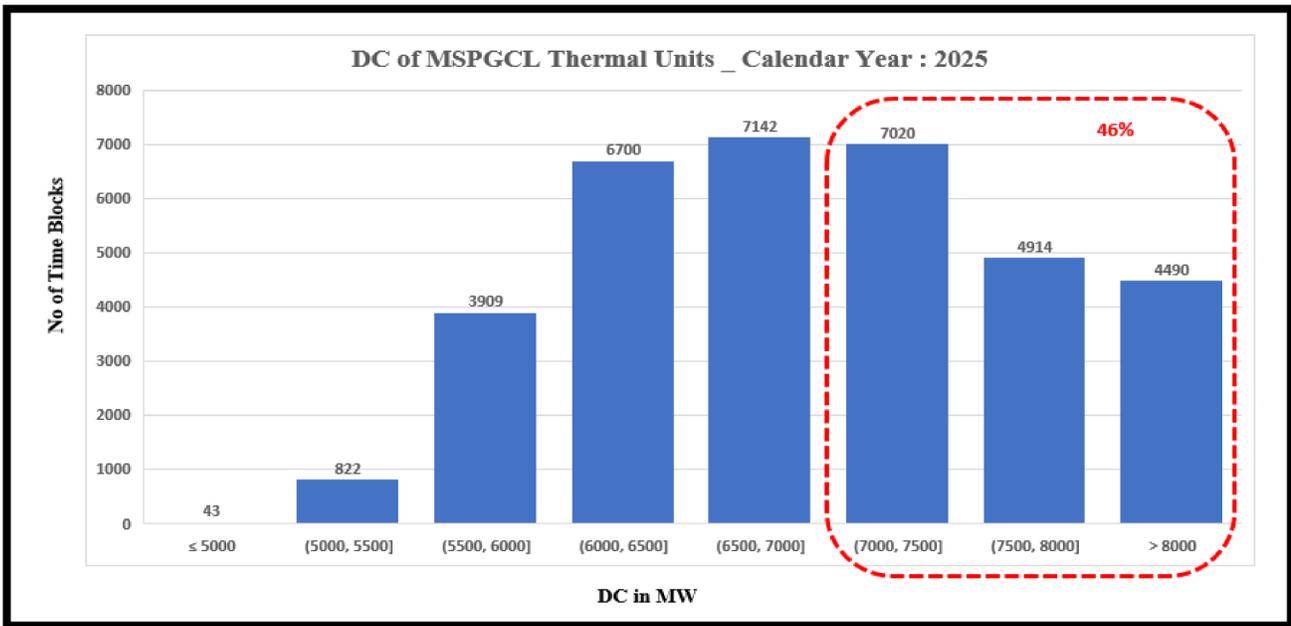


From the above, graph, it is observed that for 42 % of the period, injection from Thermal generation is below 11000 MW. Similarly, injection is above 13500 MW only for 14 % of the period. For remaining 44 % of the period, thermal injection is between 11000 MW to 13500 MW.

3.1.2 Declared Capacity (DC) of MSPGCL Thermal Generation:

The total installed capacity of Thermal units of MSPGCL is 10200 MW. After deduction of auxiliary consumption, the Ex-Bus Capacity is 9432 MW.

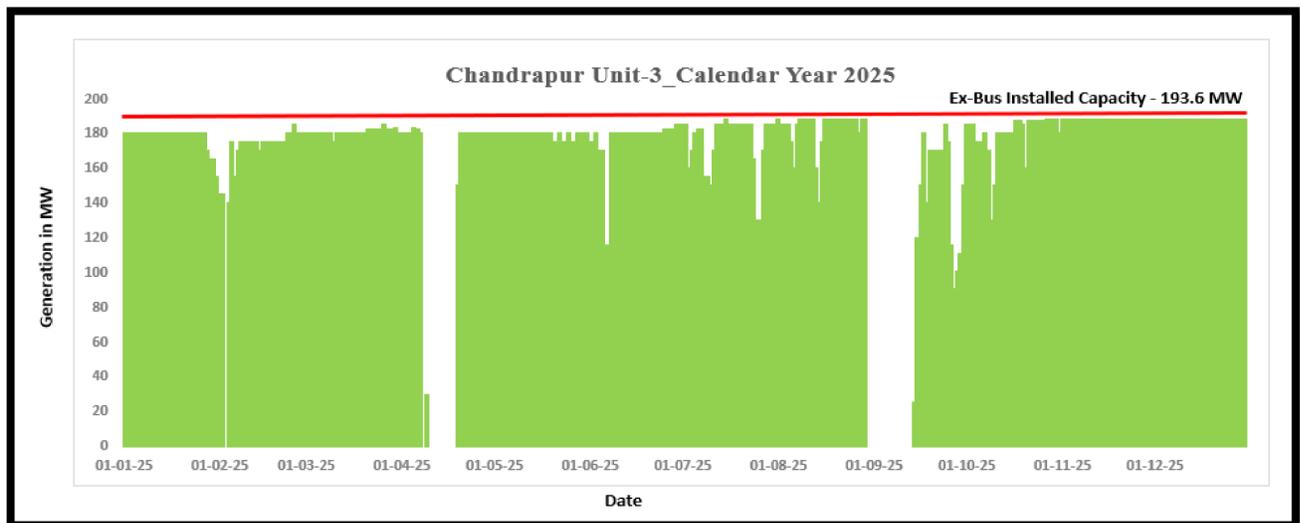




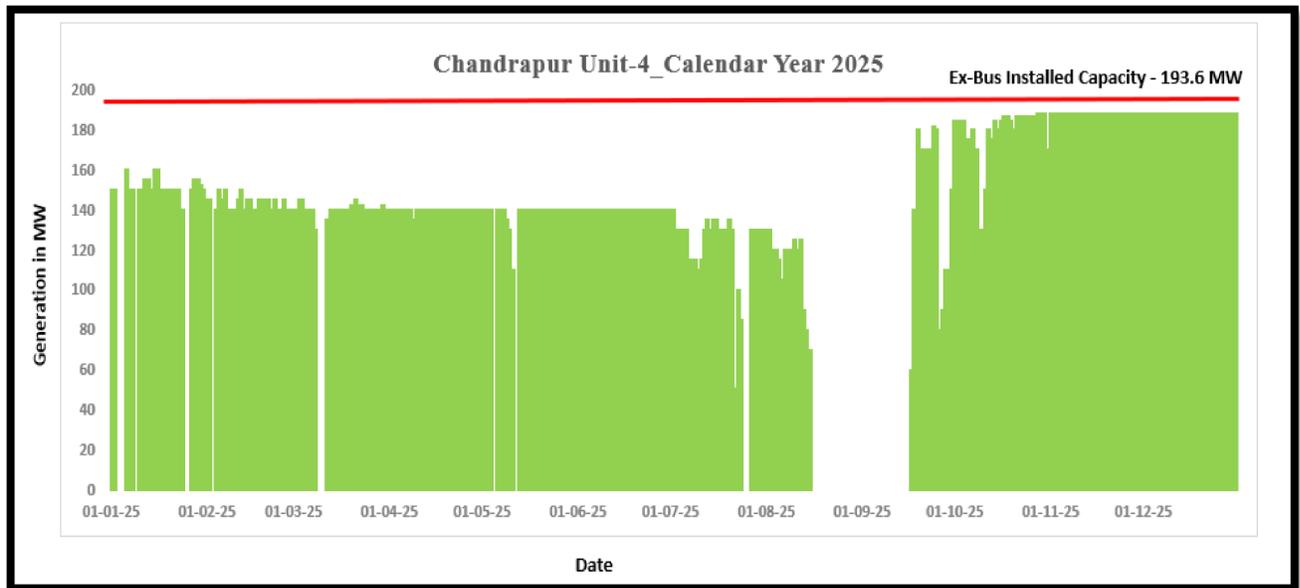
From the above graph, it is observed that the Declared Capacity (DC) remains above 7000 MW for nearly half of the observed period (46%). However, DC exceeds 8000 MW only for a limited duration (13% of the period), despite a total Ex-Bus installed capacity of 9432 MW. This indicates that the system is operating significantly below the maximum available Ex-Bus capacity for most of the time, reflecting constraints such as unit outages, derating, fuel limitations, or operational restrictions.

The unit-wise DC analysis for the CY: 2025 is as below:

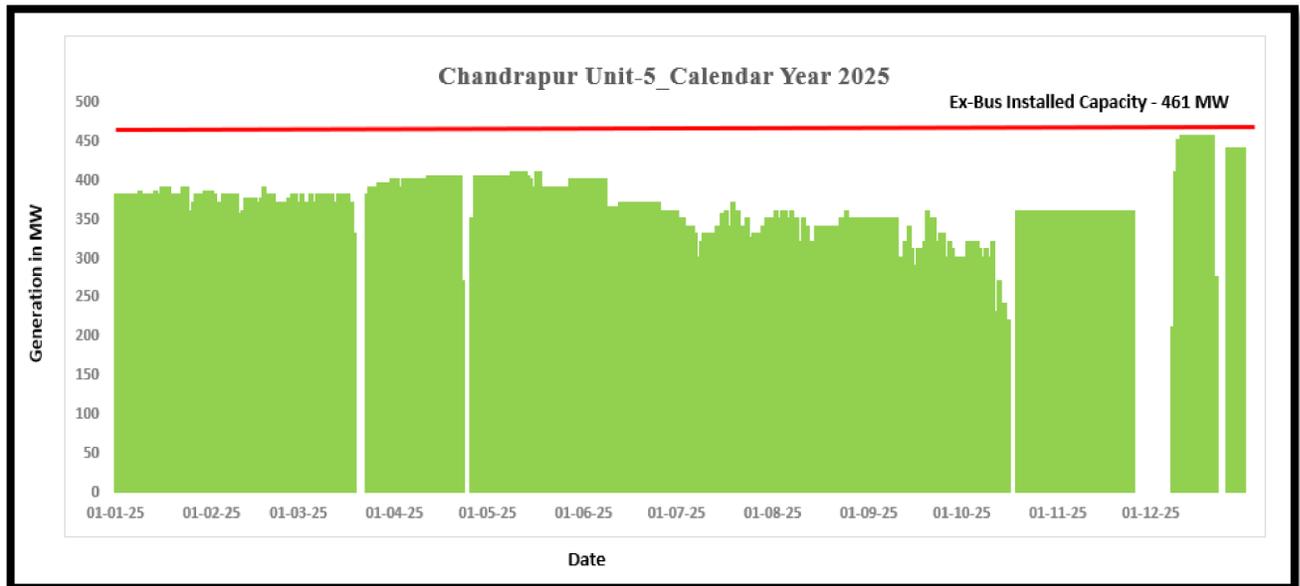
- Chandrapur Thermal Power Complex: (2920 MW)**
 U-3 to 4: 210 MW each (Ex-bus – 193.62 MW)
 U-5 & 7: 500 MW each (Ex-bus – 461 MW)
 U-6: 500 MW each (Ex-bus – 456.65 MW)
 U-8 & 9: 500 MW each (Ex-bus – 470 MW)



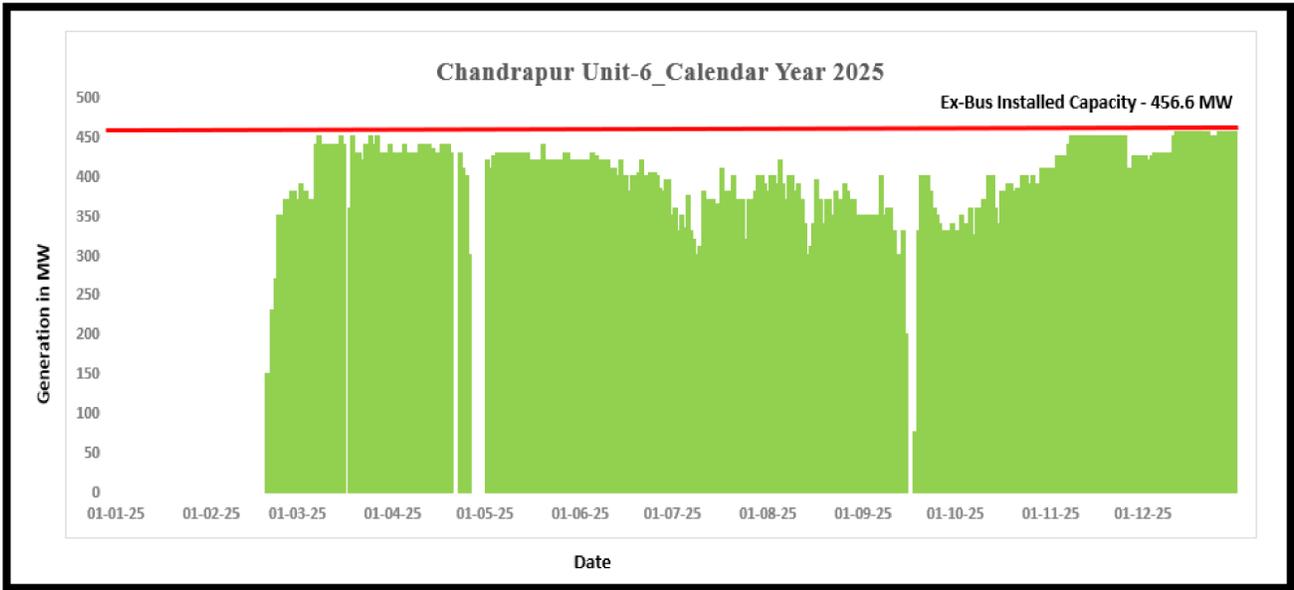
Chandrapur unit 3 was under forced shutdown for 12 days in the month of April '25 and for 16 days in the month of September '25



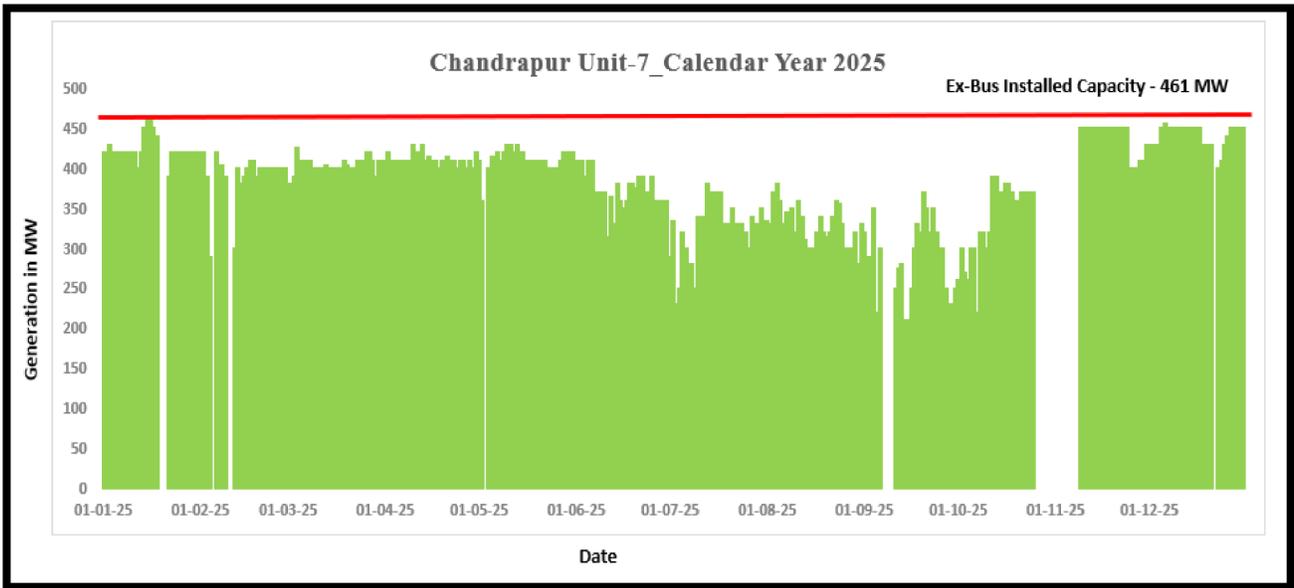
Chandrapur unit 4 was under AoH for the period 15.08.2025 to 17.09.2025.



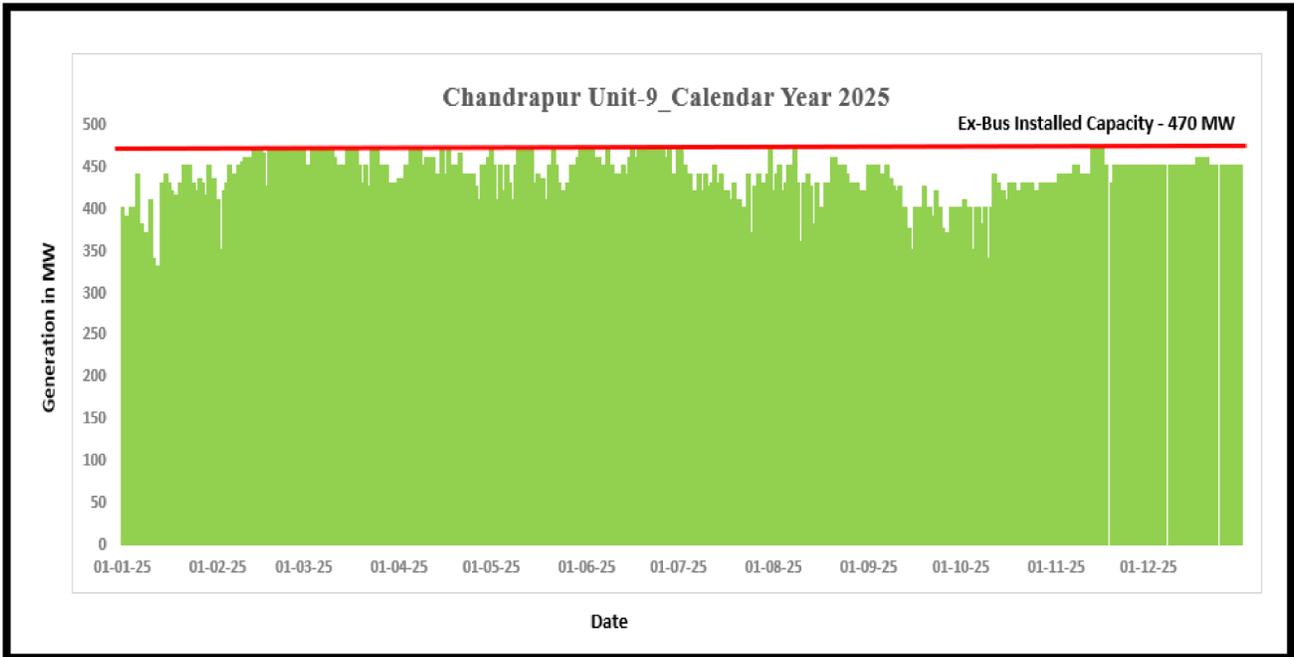
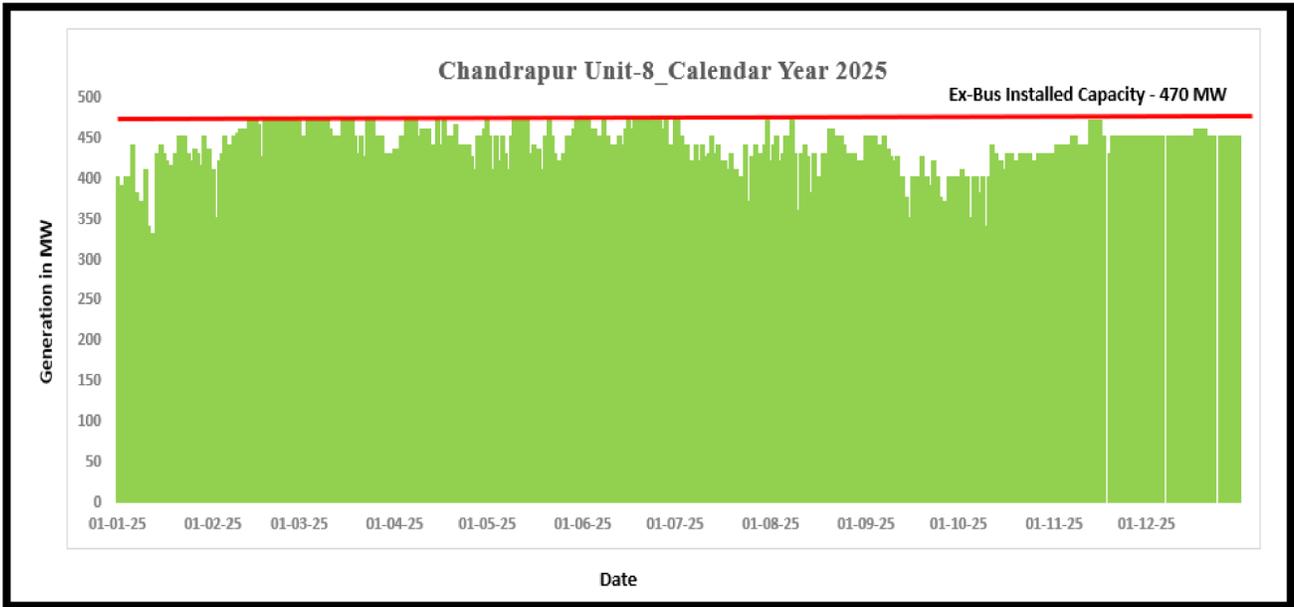
Chandrapur unit 5 was under planned shutdown for 12 days to carry out Boiler validity work.



Chandrapur unit 6 was under CoH from 14.12.2024 to 19.02.2025.



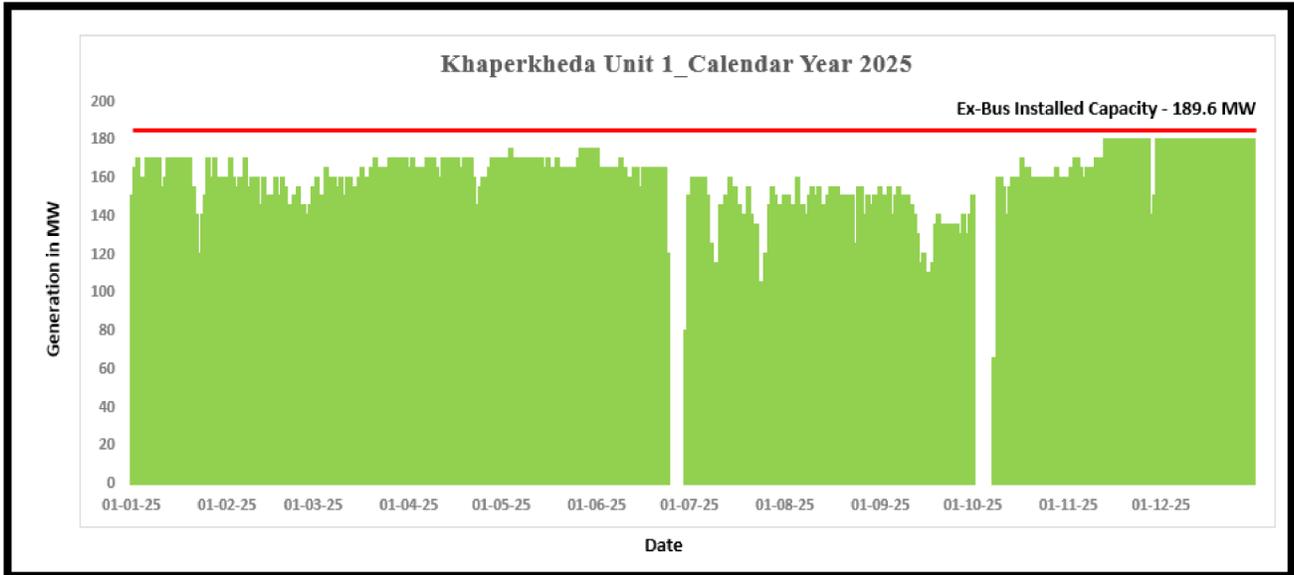
Chandrapur unit 7 was under planned shut down for 14 days from 16.10.25 to 09.11.25 to attend the issue of Boiler feed pump



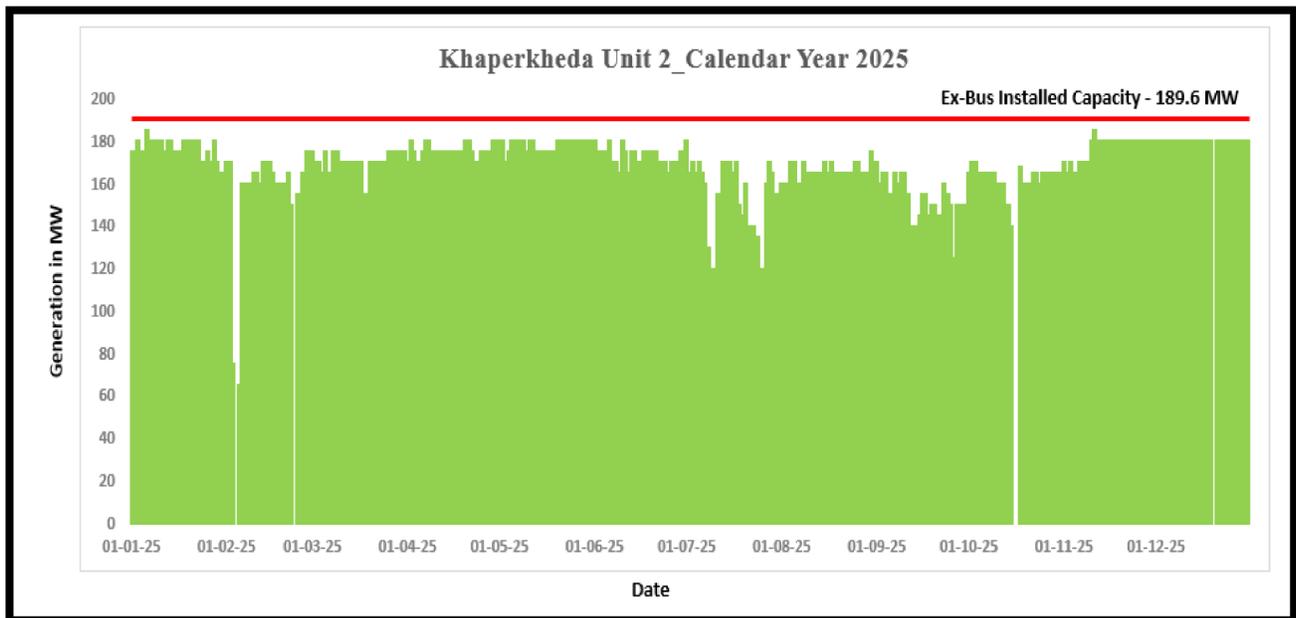
- **Khaperkheda Thermal Power Complex: (1340 MW)**

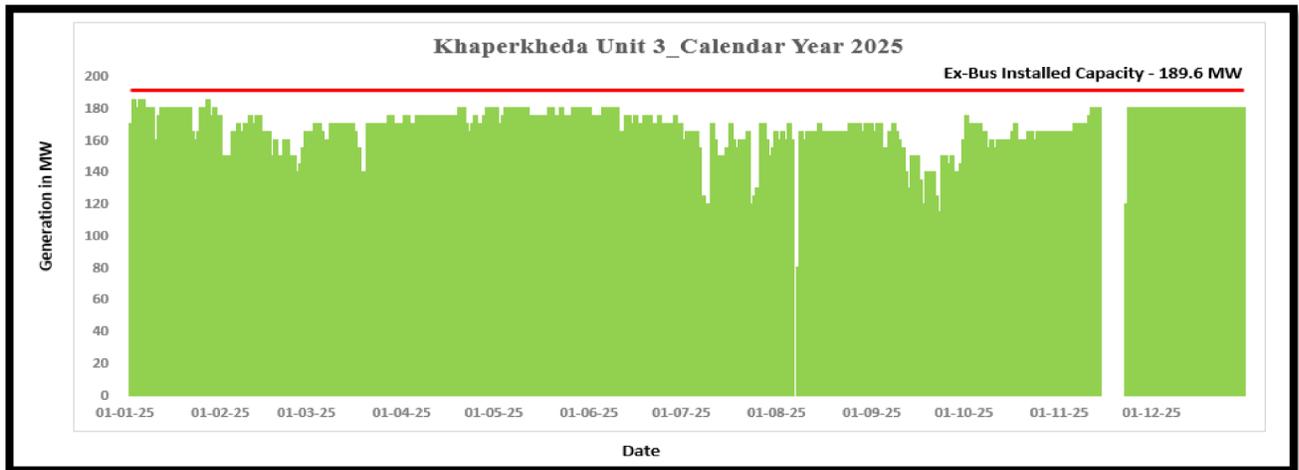
U-1 to 4: 210 MW each (Ex-Bus – 189.63 MW)

U-5: 500 MW (Ex-Bus – 470 MW)

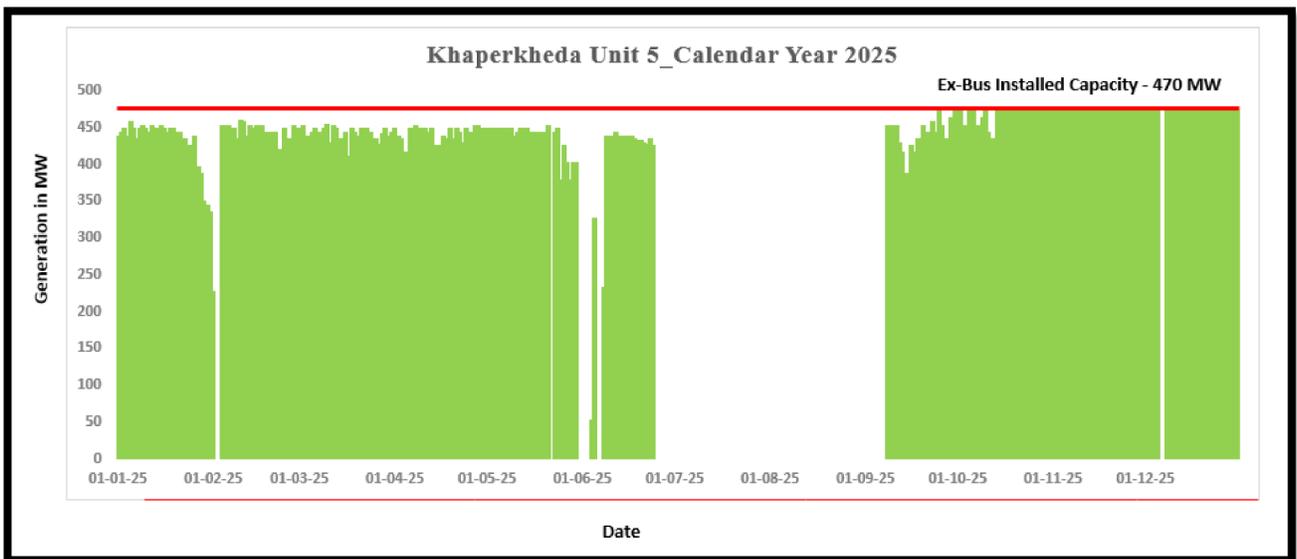
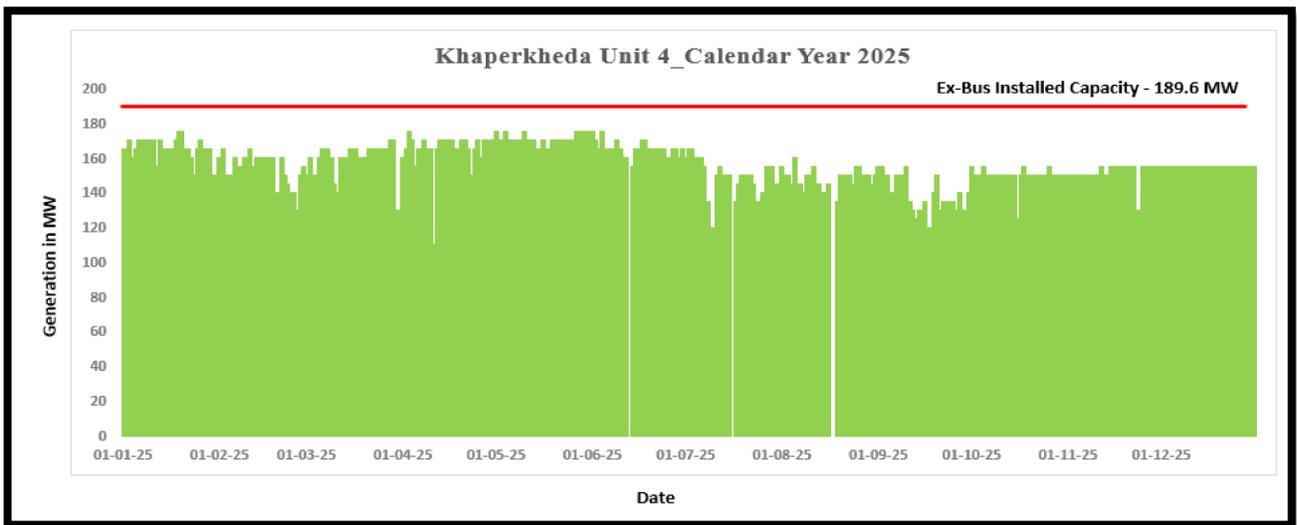


Khaperkheda Unit-1 was under forced shutdown for 6 days in the month of June '25 and for 7 days in the month of October '25





Khaperkheda Unit-3 was under forced shutdown for 9 days in the month of November '25

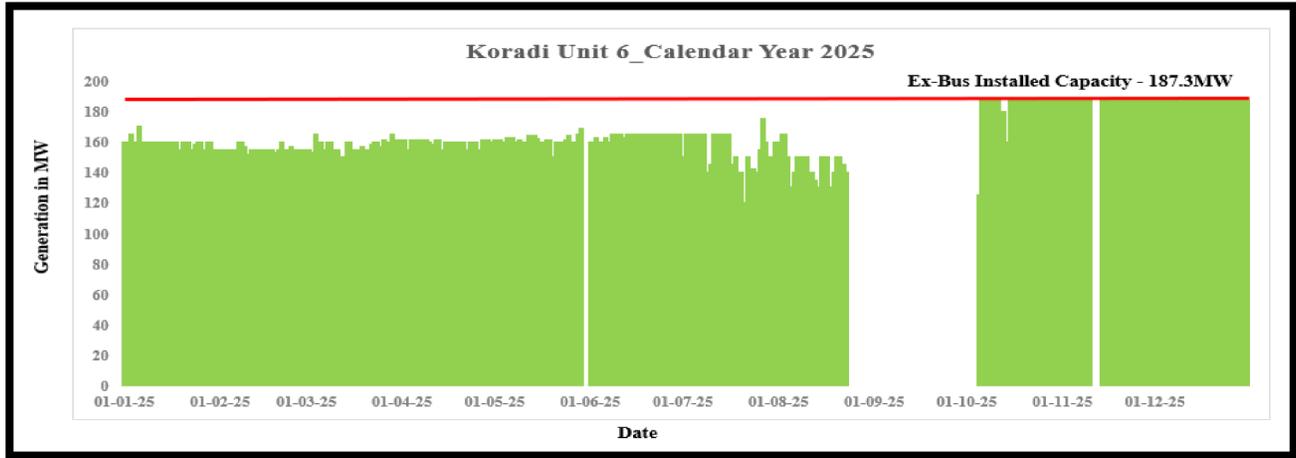


Khaperkheda Unit-5 was under COH for the period 25.06.2025 to 08.09.2025.

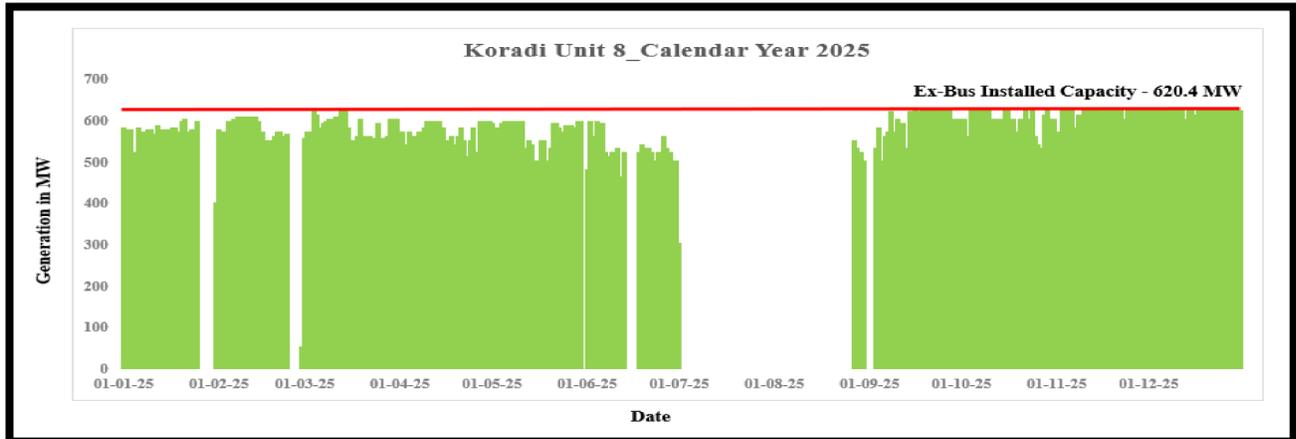
- **Koradi Thermal Power Complex: (2190 MW)**

U-6: 210 MW (Ex-Bus – 187.3 MW)

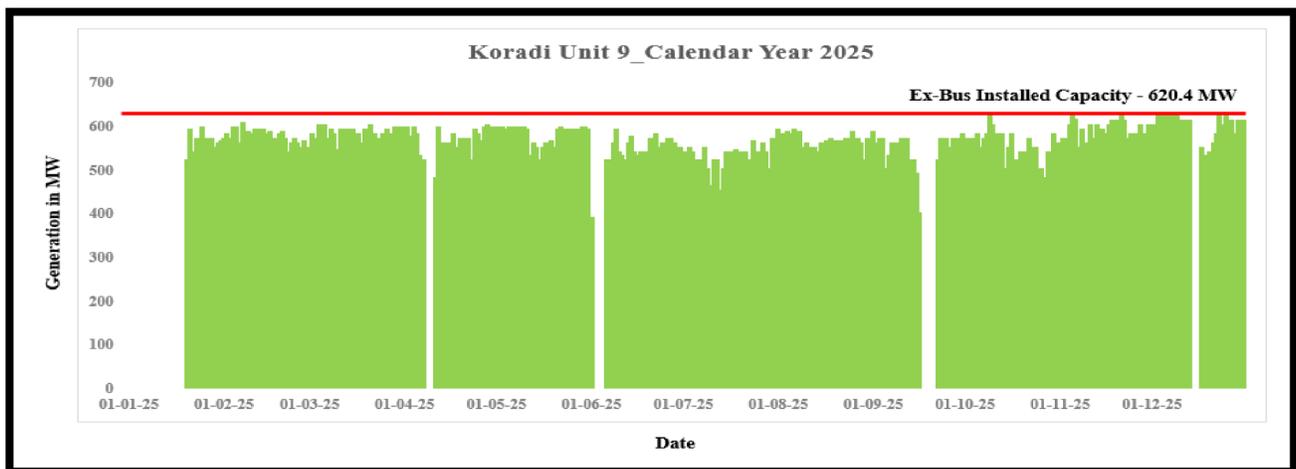
U-8 to 10: 660 MW each (Ex-Bus – 620.4 MW)



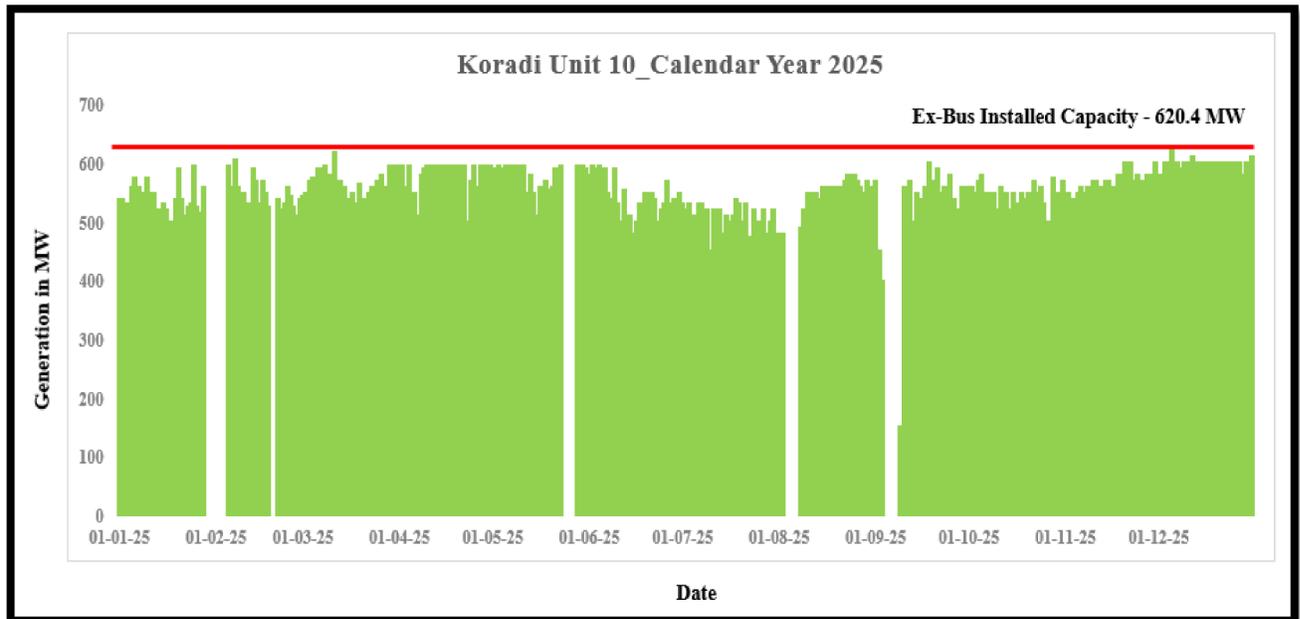
Koradi Unit-6 was under AOH for the period 23.08.2025 to 05.10.2025.



Koradi Unit-8 was under COH for the period 01.07.2025 to 27.08.2025.

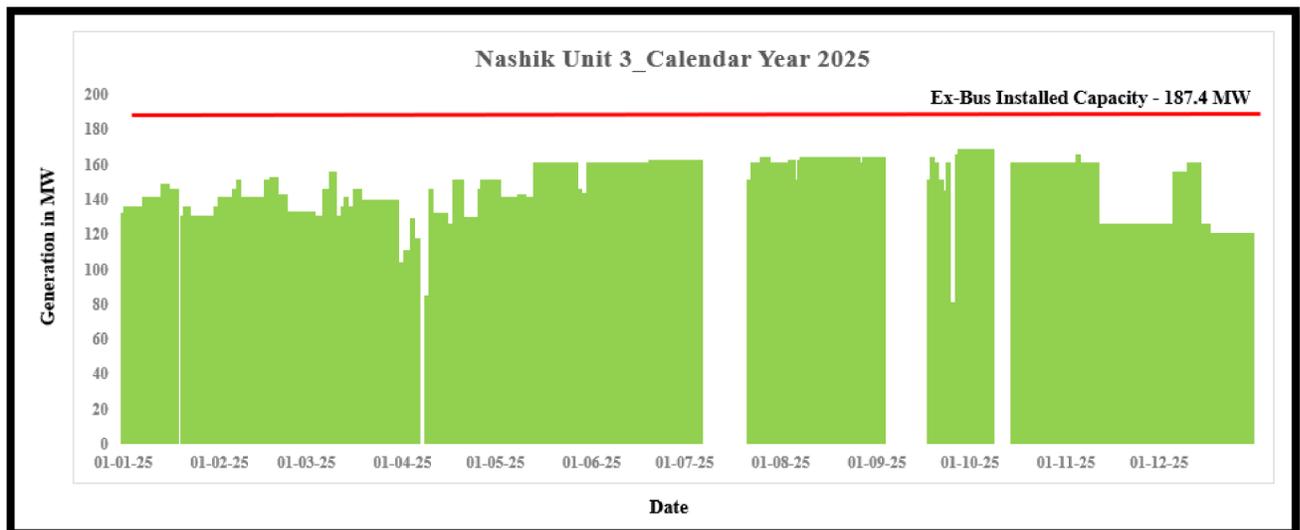


Koradi Unit-9 was under forced shutdown for 21 Days in the month of January '25 to attend FD fan problem

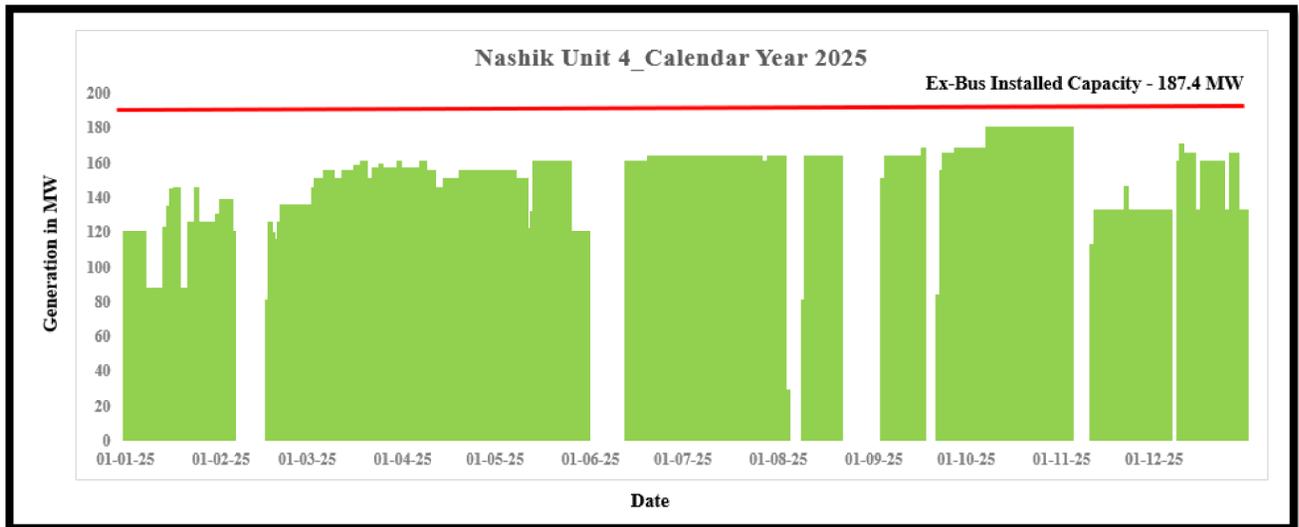


- **Nashik Thermal Power Complex: (630 MW)**
 U-3 to 5: 210 MW each (Ex-Bus – 187.425 MW)

MSPGCL is implementing coal flexibilization as per MOP guidelines under case 4 with IEPL for net capacity of 180 MW and this implementation is for any one unit out of four unit (viz. Nashik TPS Unit no. 3,4,5 and Bhusawal TPS Unit no.3 All units of 210 MW)

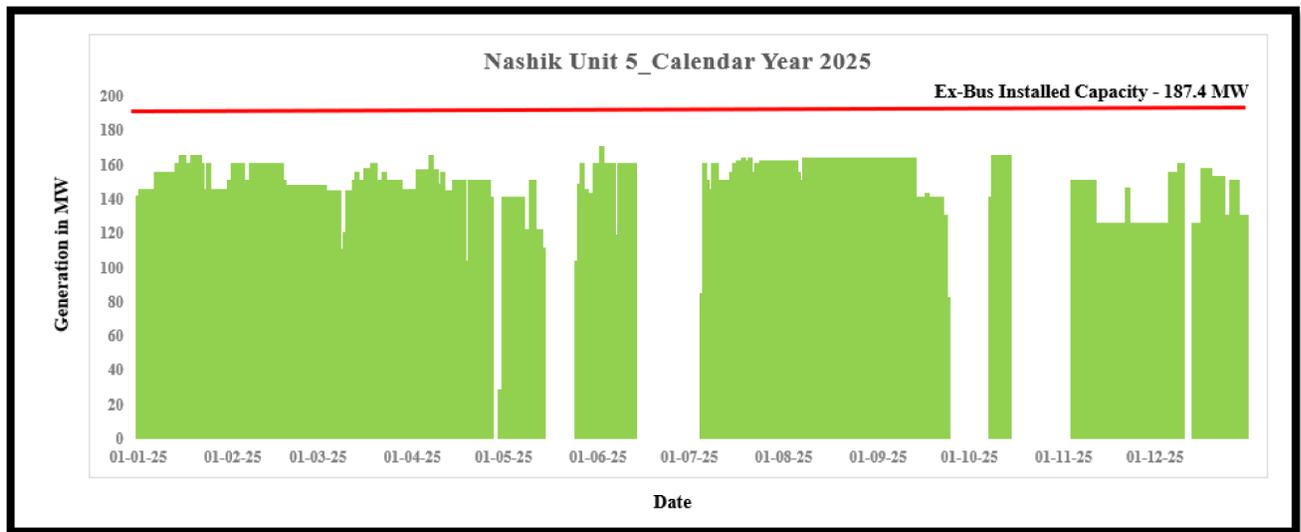


Nashik Unit – 3 was under tolling agreement with IEPL from 06.07.2025 – 22.07.2025 & from 04.09.2025 – 18.09.2025



Nashik Unit – 4 was under forced shutdown for 11 days in February’2025 for Boiler work

Nashik Unit – 4 was under tolling agreement with IEPL from 01.06.2025 – 13.06.2025 & from 22.08.2025 – 04.09.2025



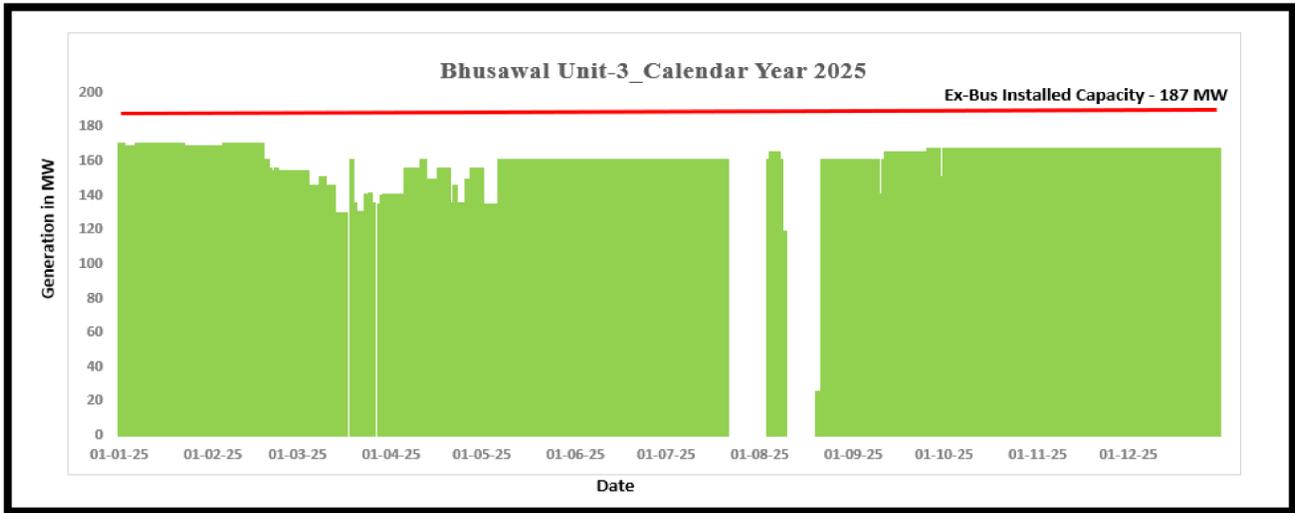
Nashik Unit – 5 was under forced shutdown for 11 days in May’2025 for attending generator oil leakage

Nashik Unit – 5 was under tolling agreement with IEPL from 14.06.2025 – 05.07.2025, from 24.09.2025 – 08.10.2025 & from 22.10.2025 – 04.11.2025

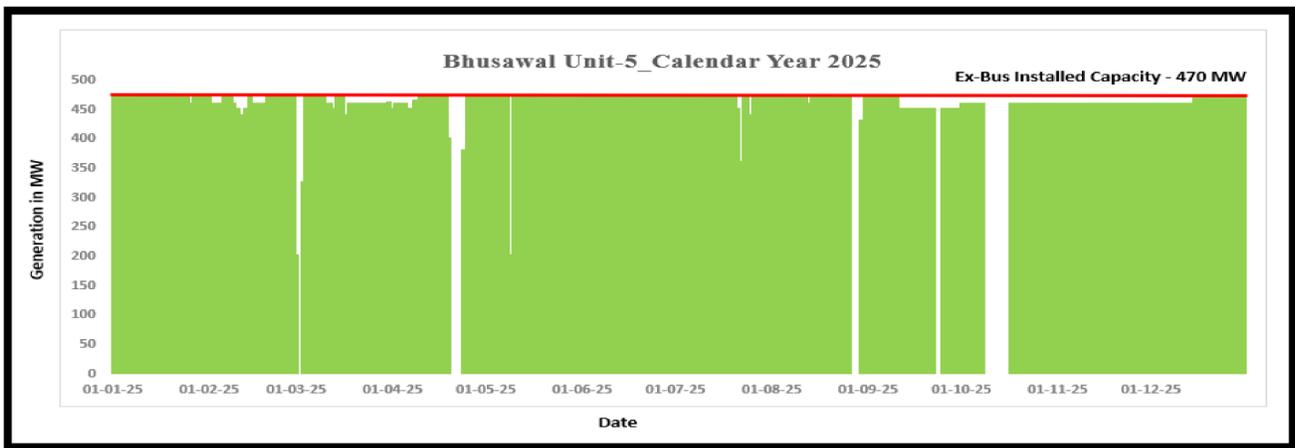
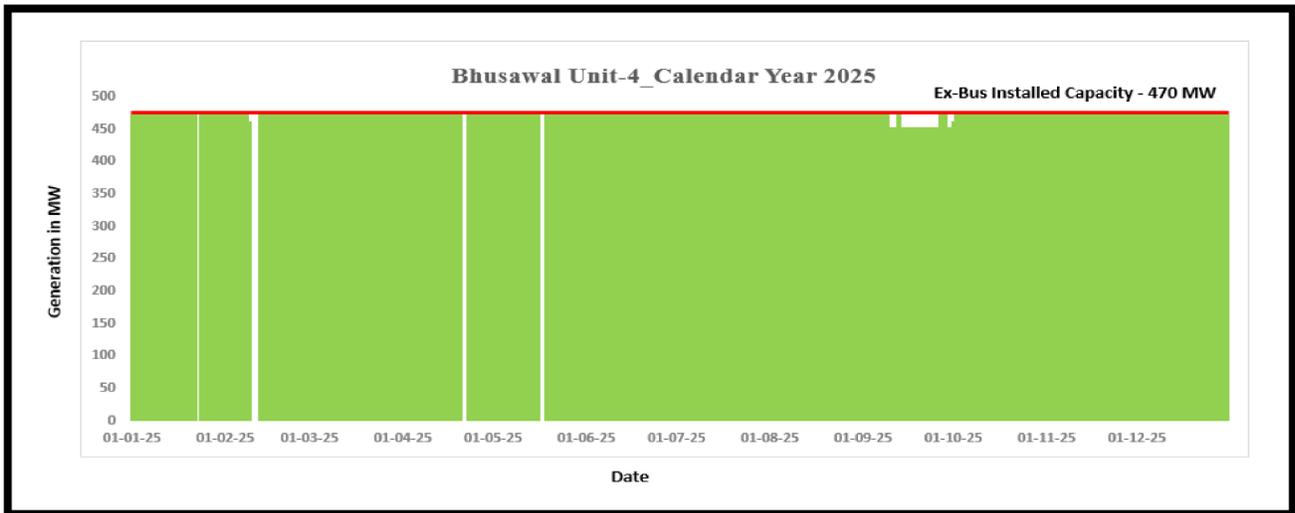
- Bhusawal Thermal Power Complex: (1210 MW)**

U-3: 210 MW (Ex-Bus – 187 MW)

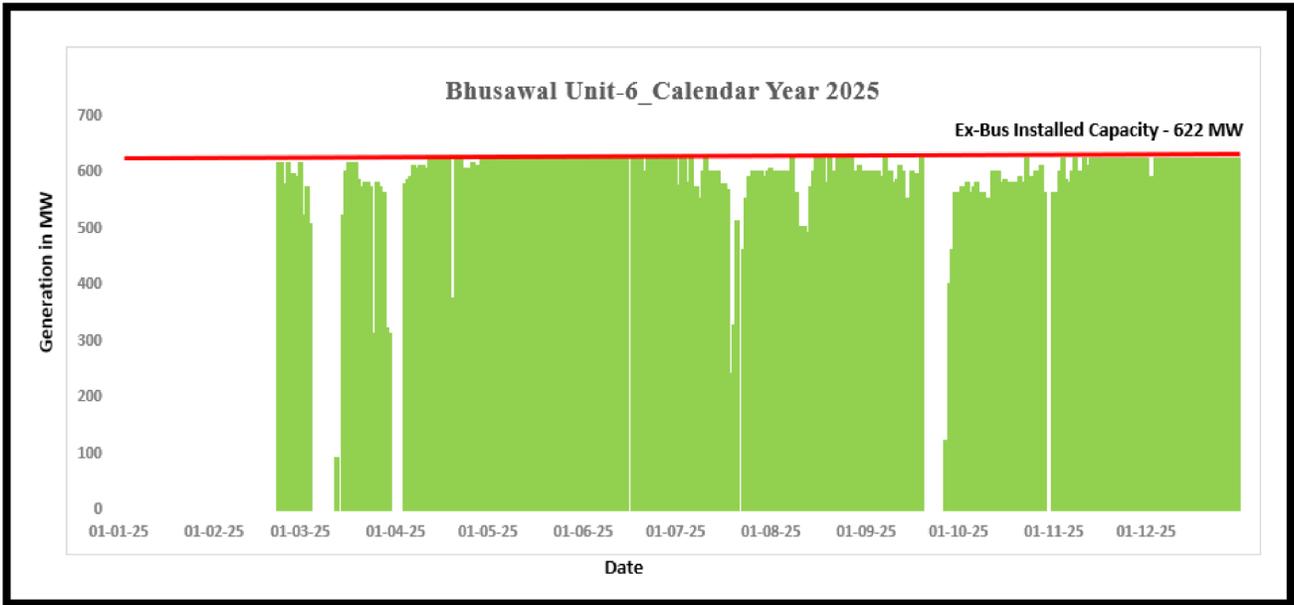
U-4 & 5: 500 MW each ((Ex-Bus – 470 MW)



Unit-3 was under forced shut down outage for 14 days in the month of July'25

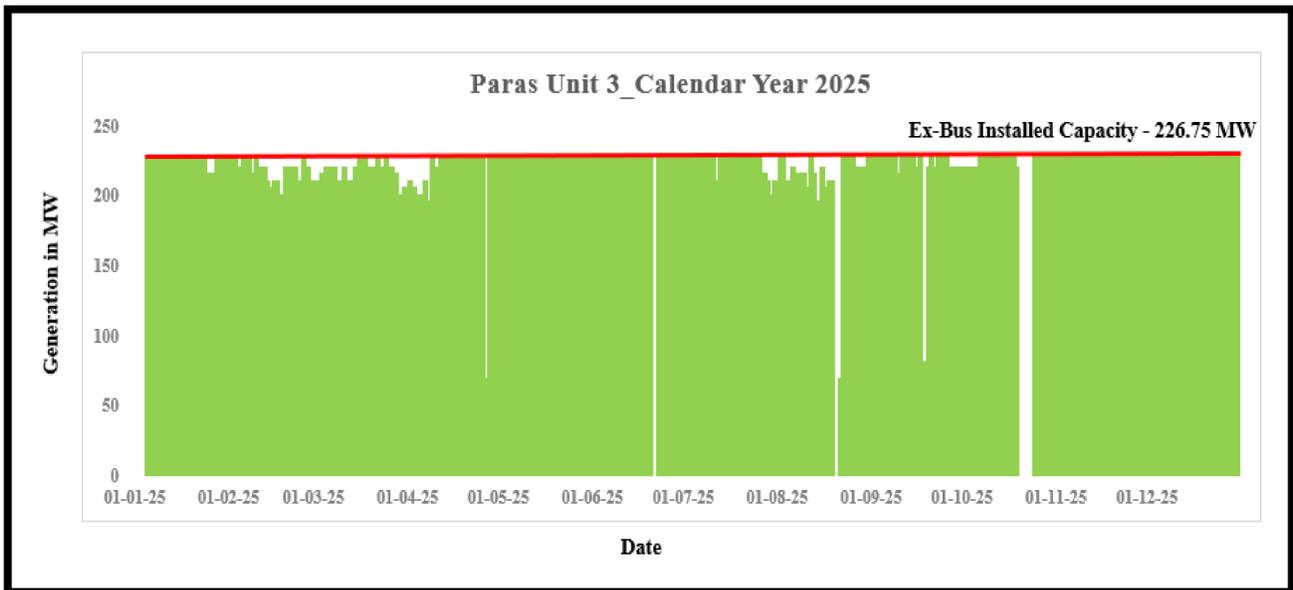


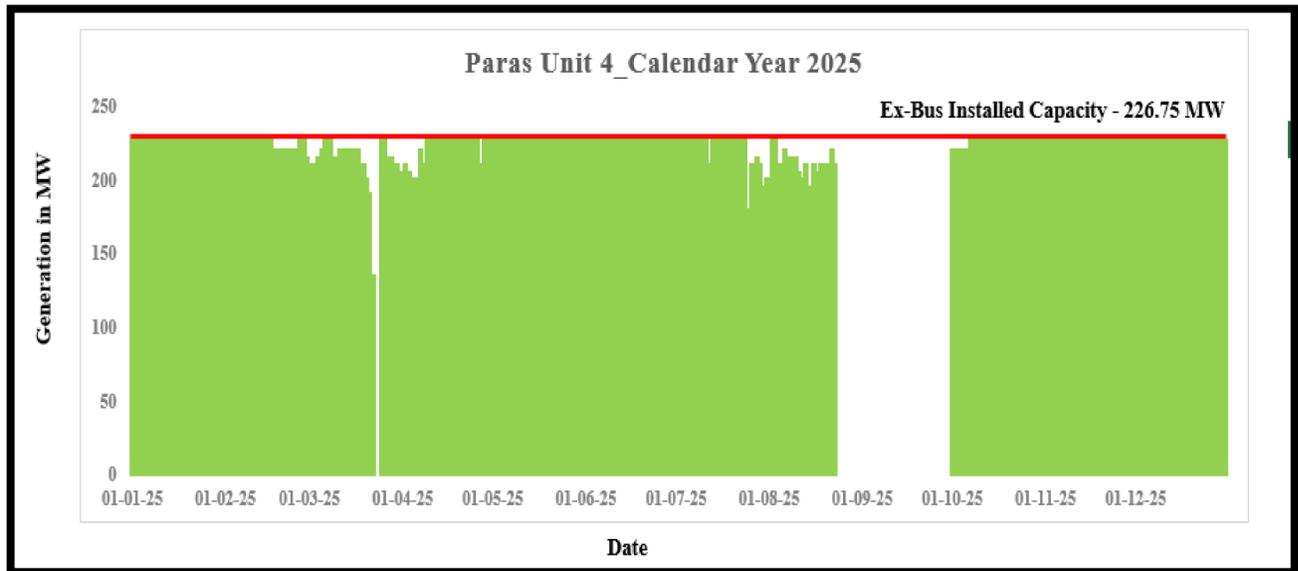
Unit-5 was under forced outage for 8 days in the month of October'25 for Boiler validity extension



Unit-6 was declared COD on 21.02.2025 and remained under forced shutdown for 10 days, 5 days, and 9 days during the months of March 2025, April 2025, and September 2025, respectively

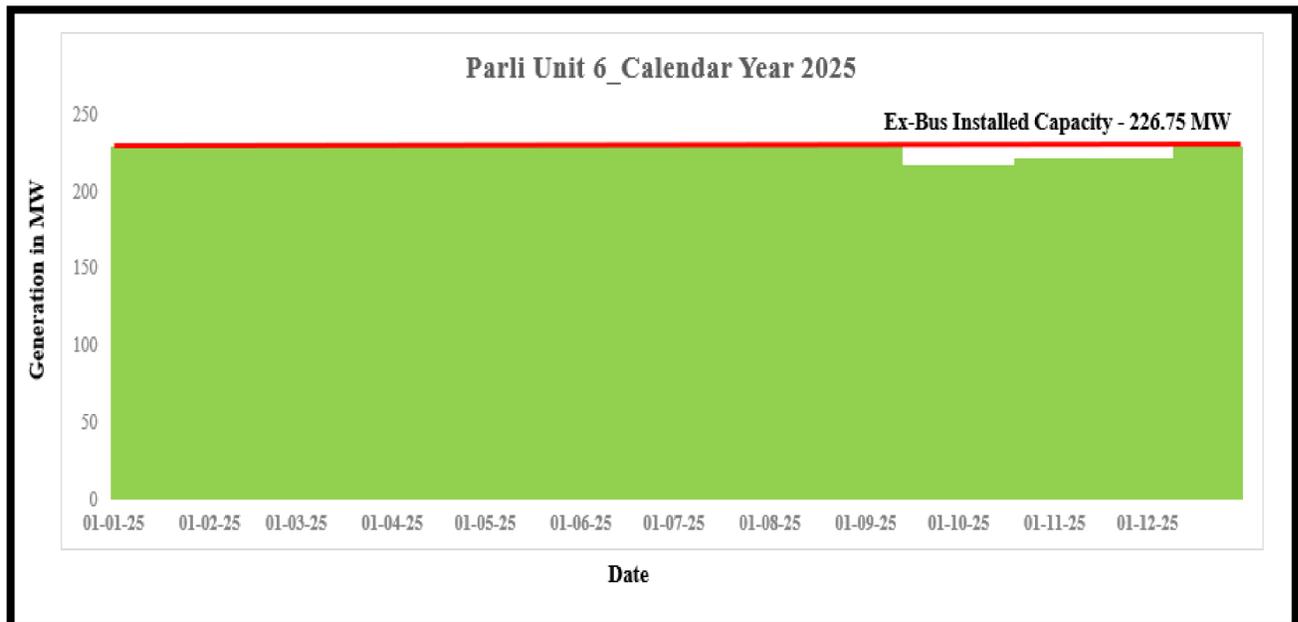
- **Paras Thermal Power Complex: (500 MW)**
U-3 & 4: 250 MW each (Ex-Bus: 226.75 MW)

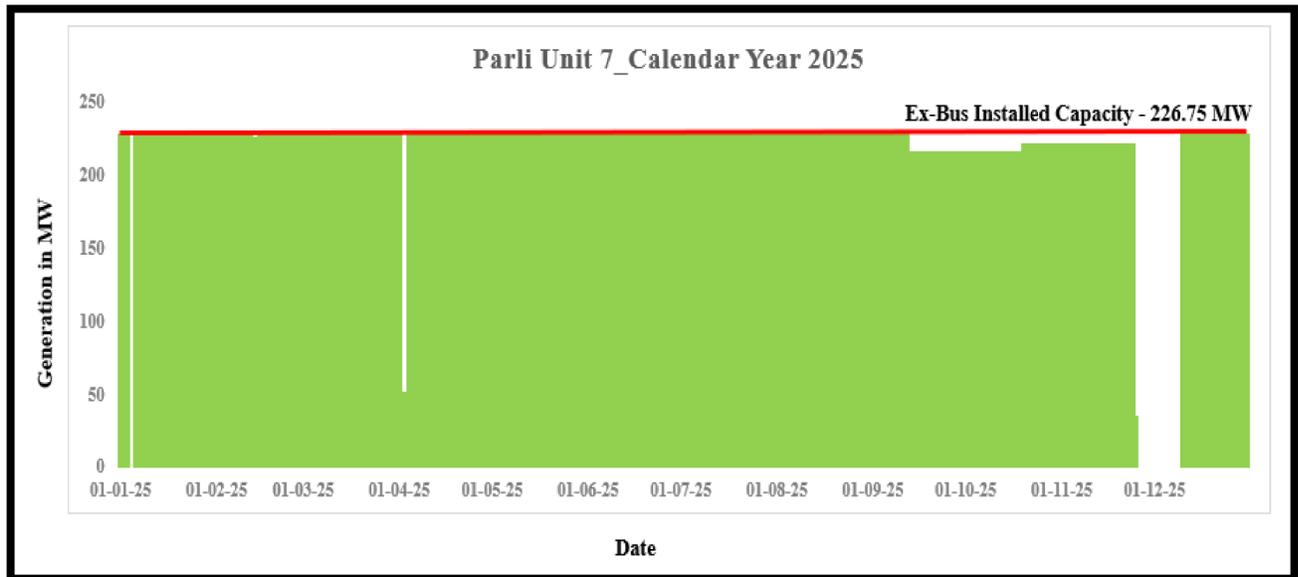




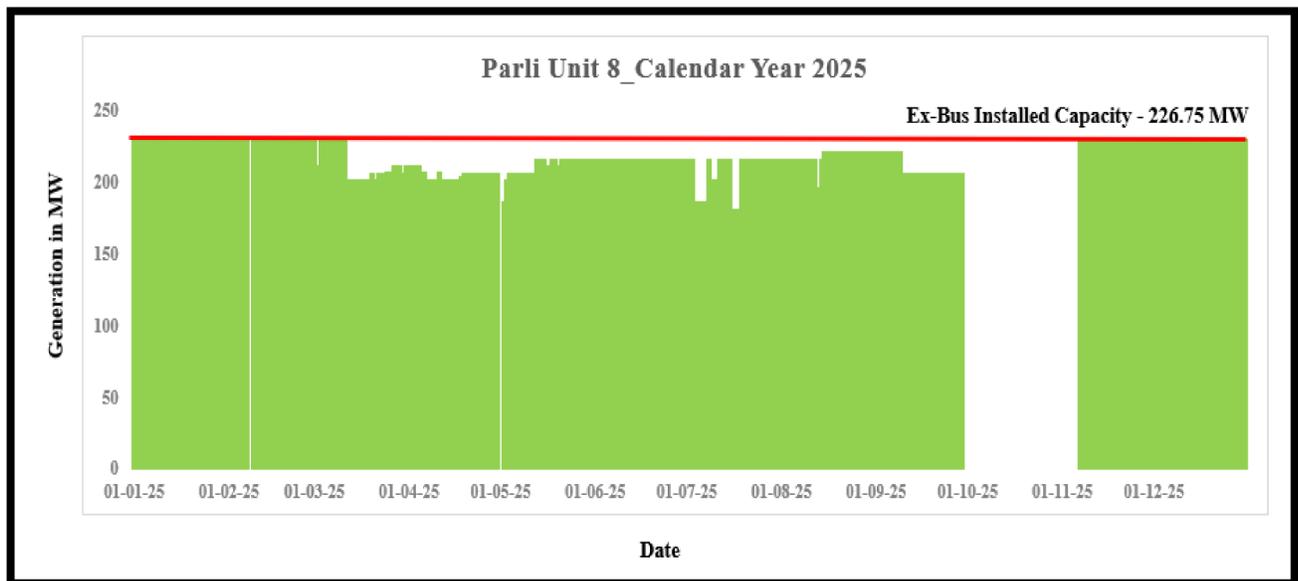
Paras Unit-4 was under COH for 39 days i.e. from the period 23.08.2025 to 01.10.2025.

- **Parli Thermal Power Complex: (750 MW)**
U-6 to 8: 250 MW each (Ex-Bus: 226.75 MW)





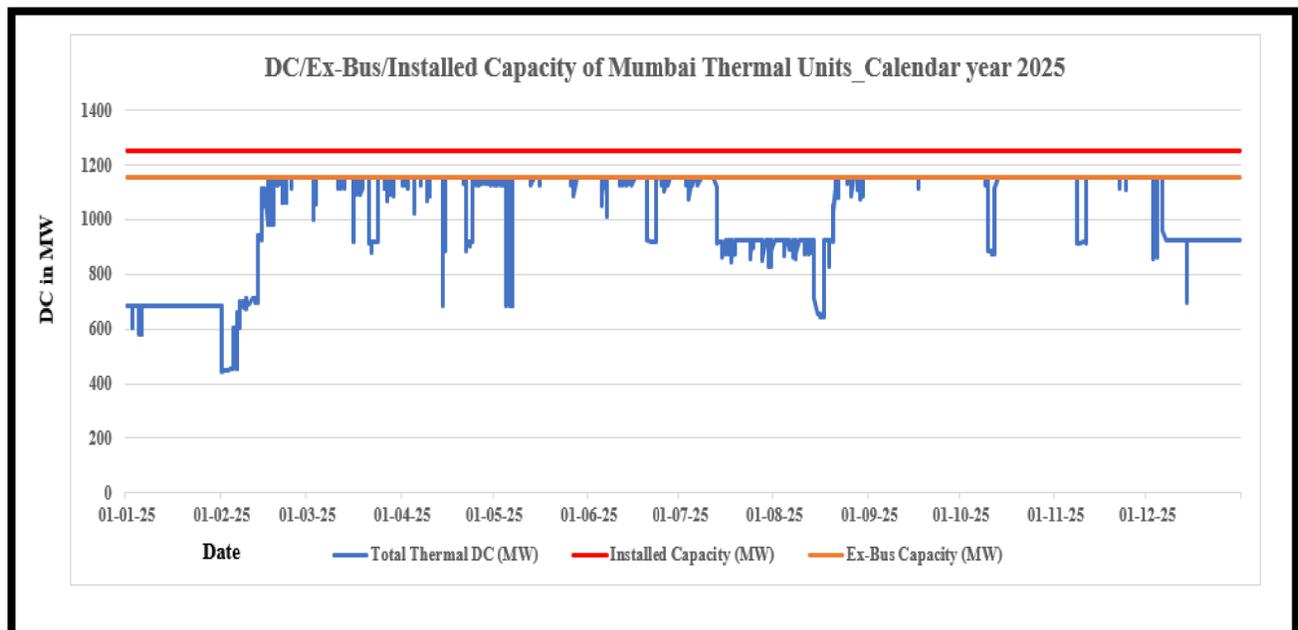
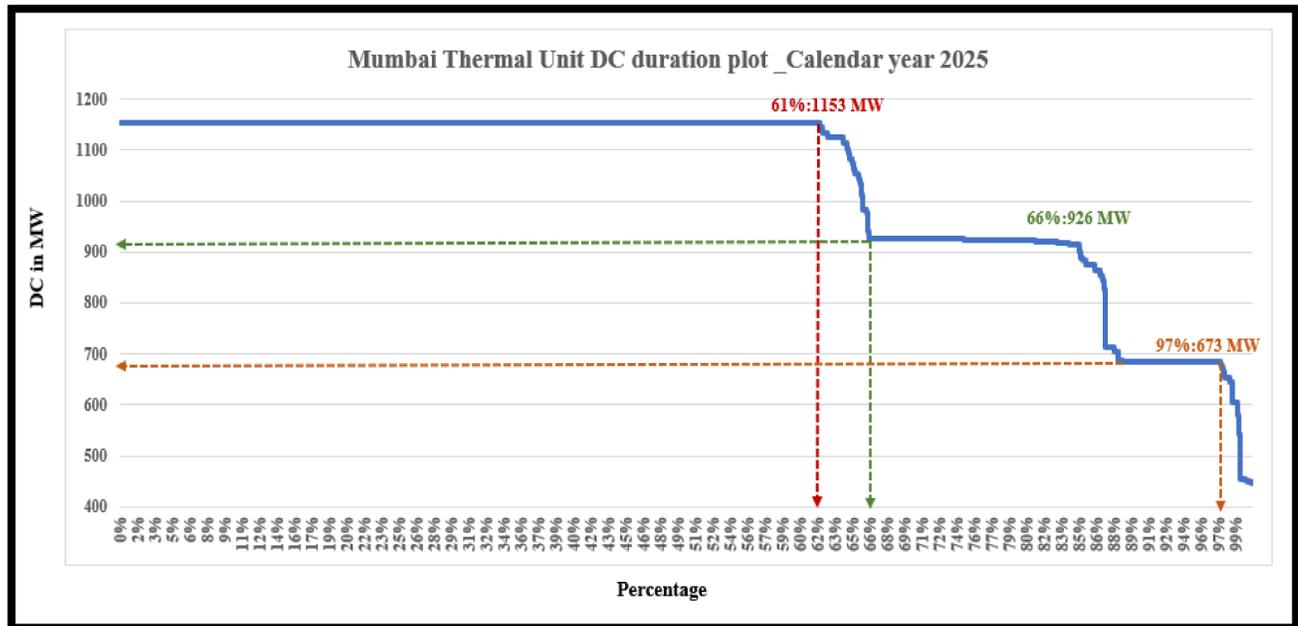
Parli Unit-7 was under planned outage for 15 days from 25.11.2025 to 10.12.2025 for Boiler validity work

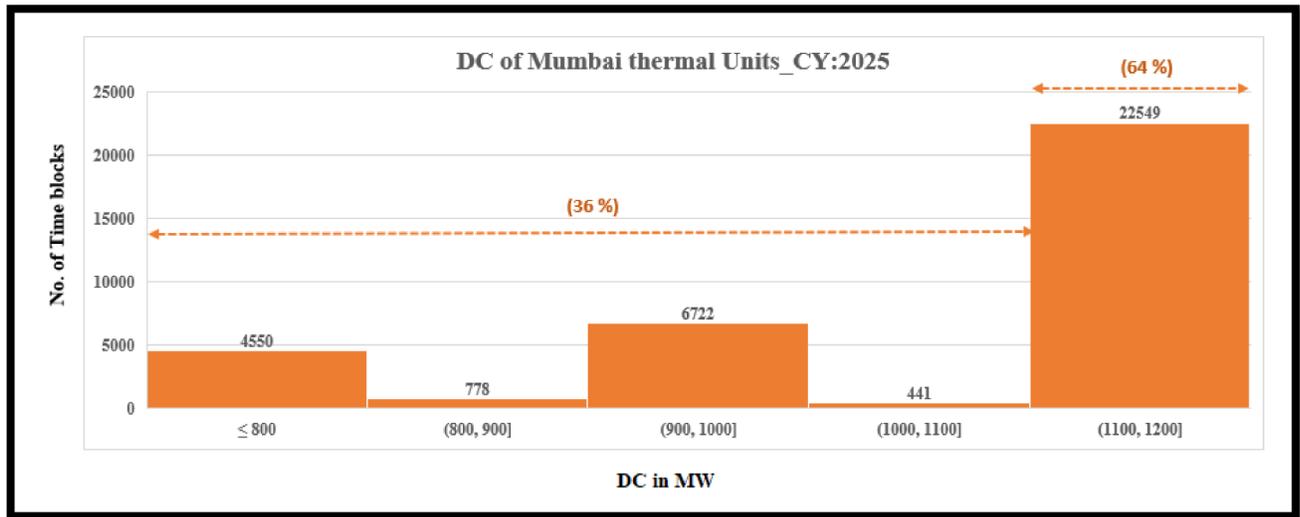


Parli Unit-8 was under planned outage for 39 days from 29.09.2025 to 07.11.2025 for COH & Boiler validity work

3.1.3 Declared Capacity (DC) of Mumbai Thermal Generation:

The total installed capacity of Thermal units embedded in Mumbai is 1250 MW. After deduction of auxiliary consumption, the Ex-Bus Capacity is 1153 MW.

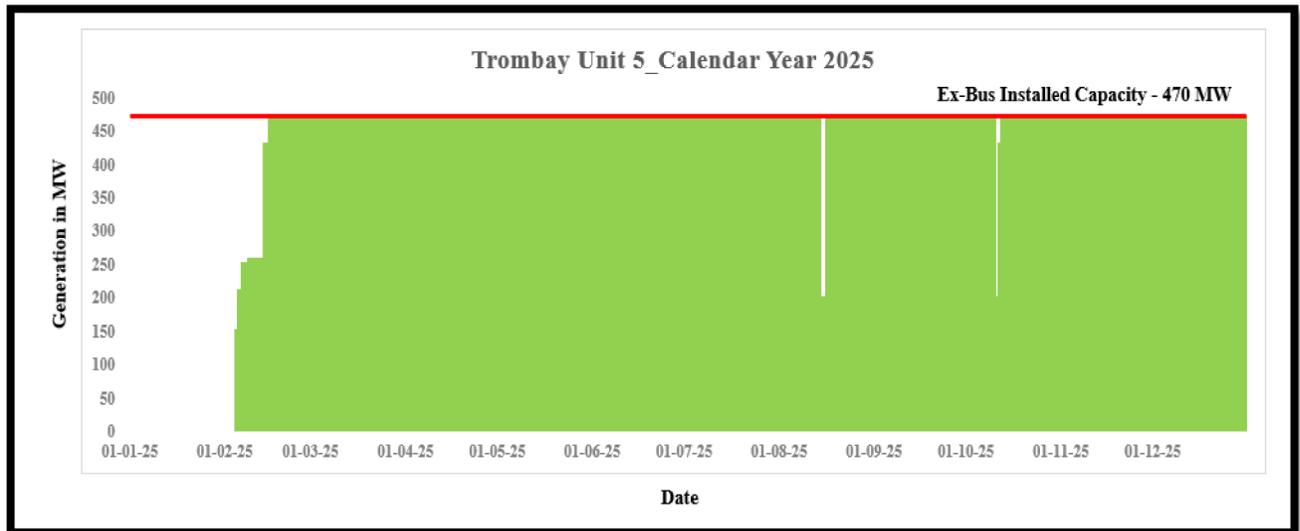




From the above graph, it is observed that the DC of Mumbai embedded thermal generators is above 1100 MW for 64 % of the time.

The individual unit-wise DC is shown below:

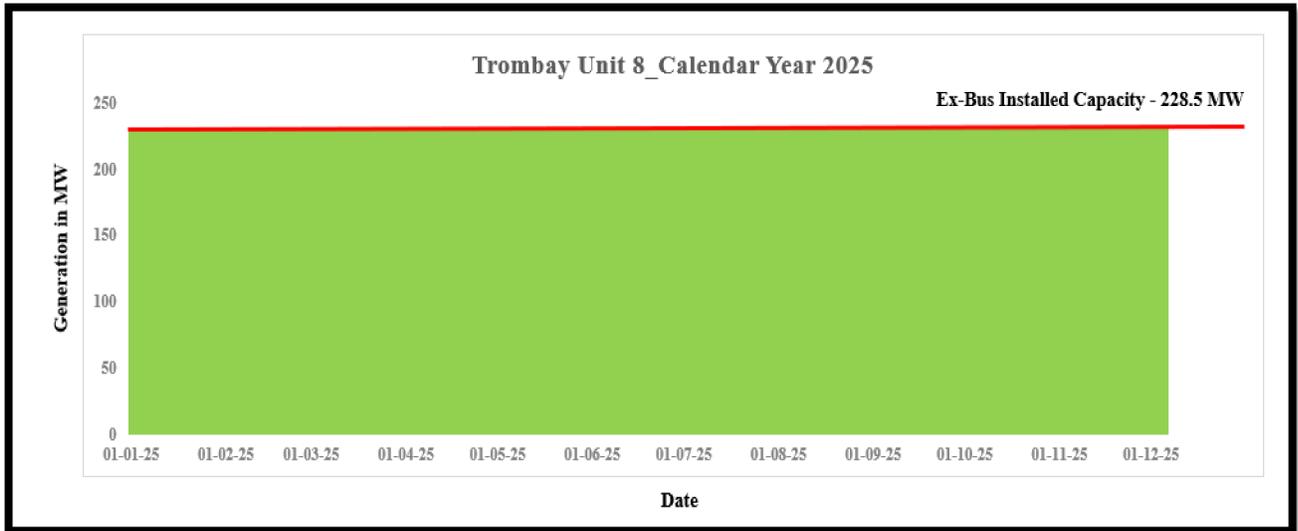
- **Trombay Unit-5 (500 MW)**
Ex-Bus Capacity: 470 MW



Unit-5 was emergency withdrawn from 22.09.2024 to 05.02.2025 due to fire in cable vault.

- **Trombay Unit-8 (250 MW)**

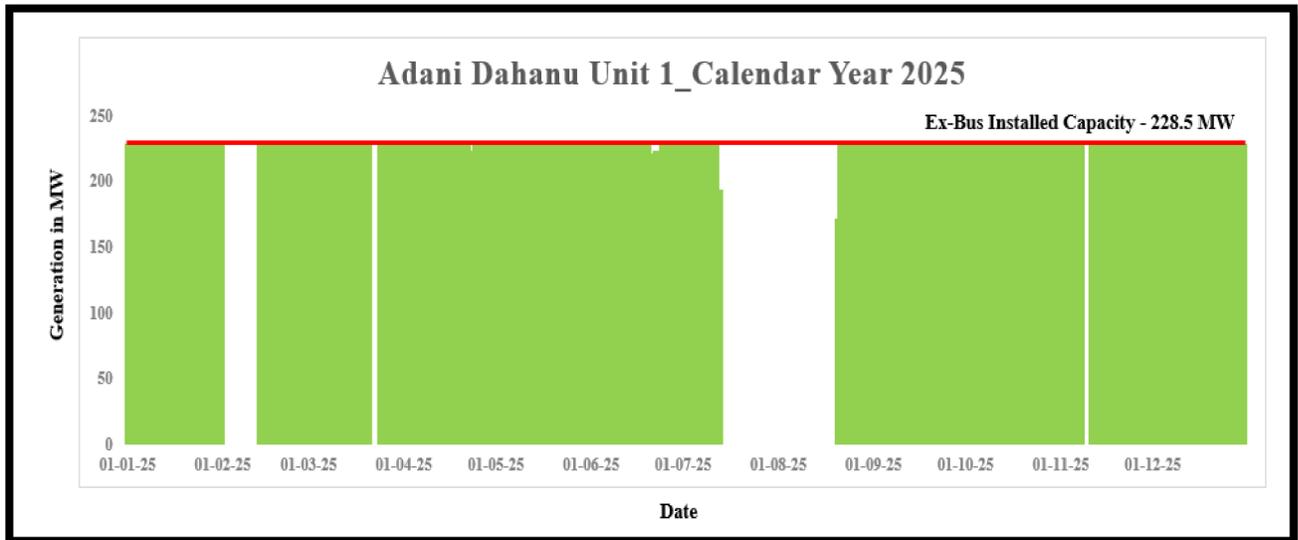
Ex-Bus Capacity: 228.5 MW



Unit-8 was under major Overhaul & boiler recertification for the period 07.12.2025 to 03.01.2024.

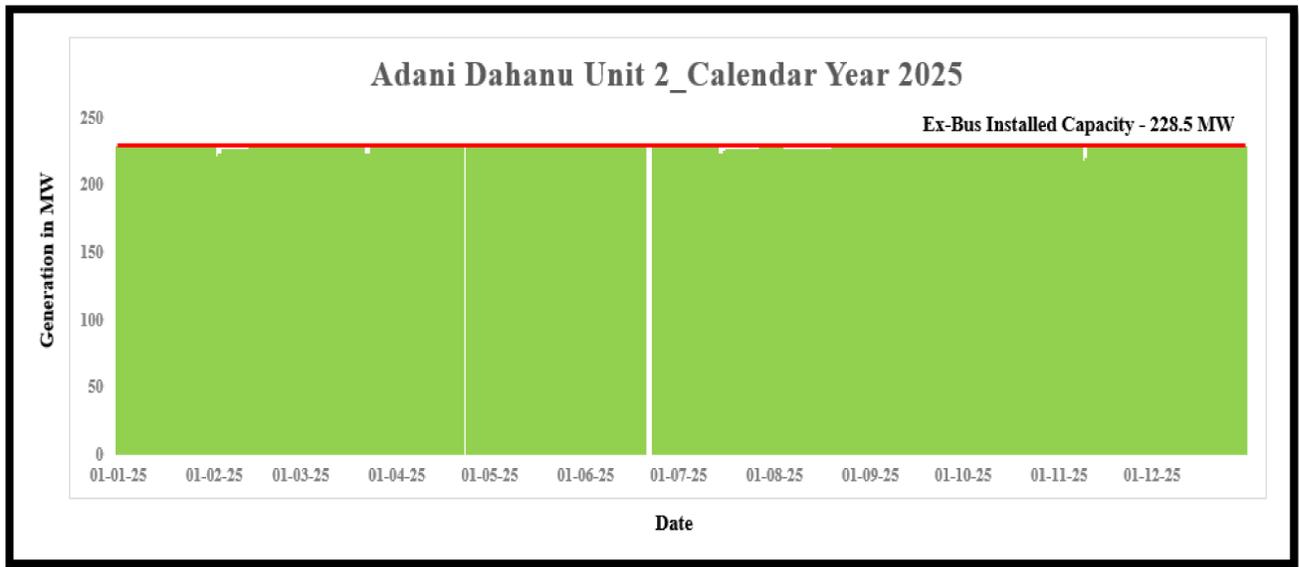
- **Dahanu Unit-1 (250 MW)**

Ex-Bus Capacity: 228.5 MW



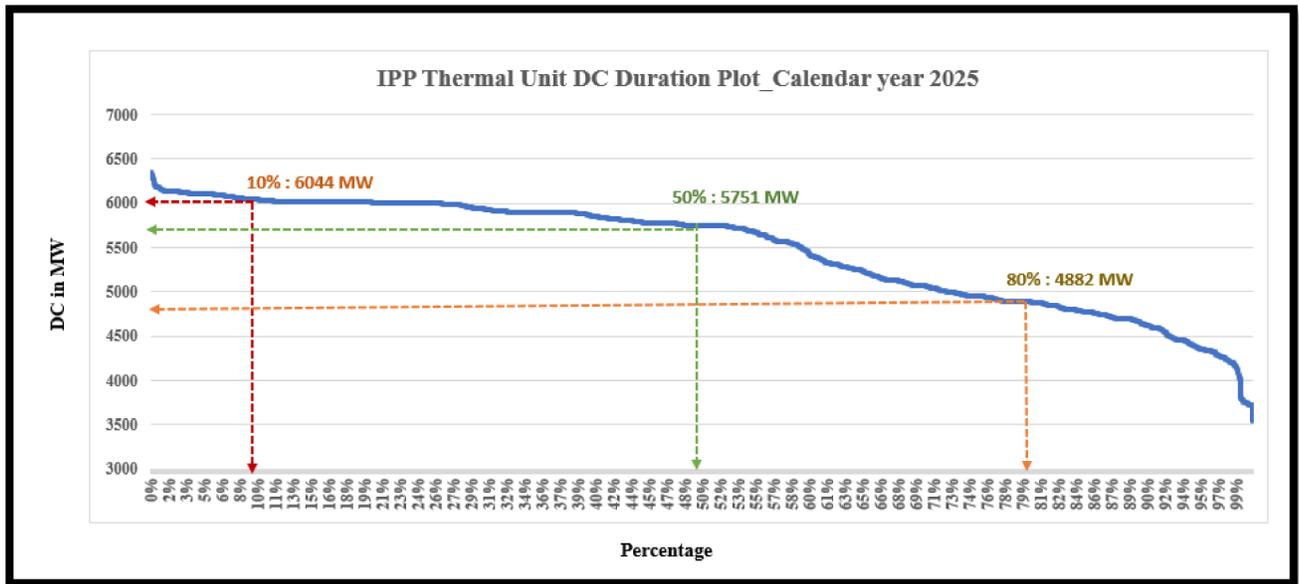
Adani Unit-1 was under forced outage for 12 days in the month of February '25 and under CoH for the period 13.07.2025 to 20.08.2025.

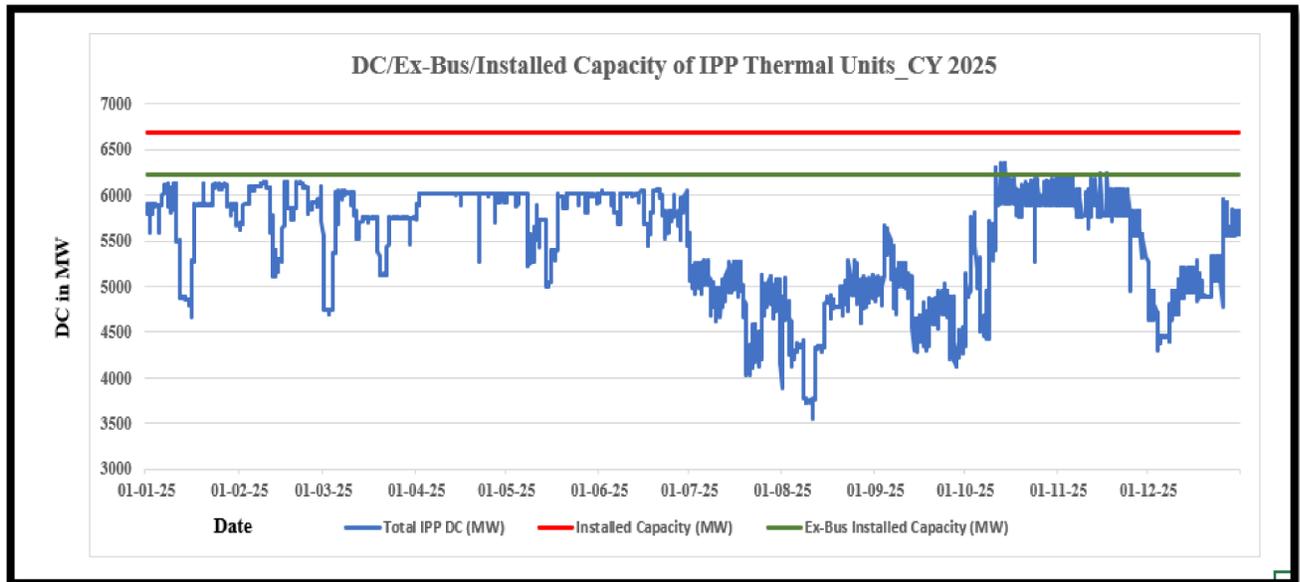
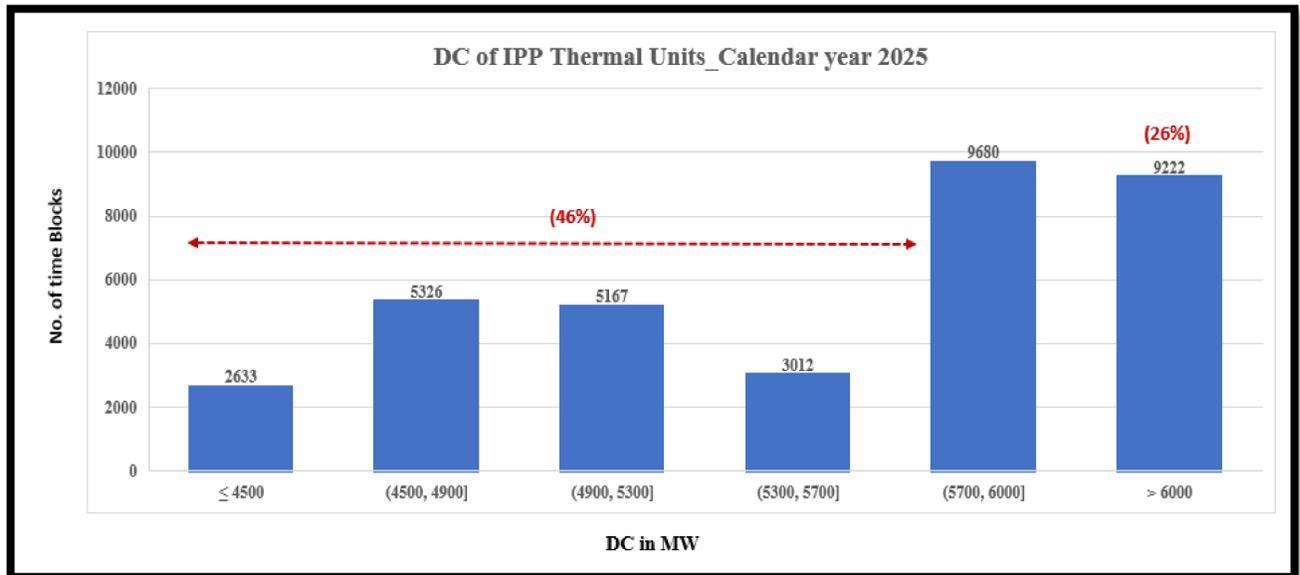
- **Dahanu Unit-2 (250 MW)**
Ex-Bus Capacity: 228.5 MW



3.1.4 Declared Capacity (DC) of IPP Thermal Generators:

The total installed capacity of IPP Thermal Generating units is 6690 MW. After deduction of auxiliary consumption, the Ex-Bus Capacity is 6394 MW.

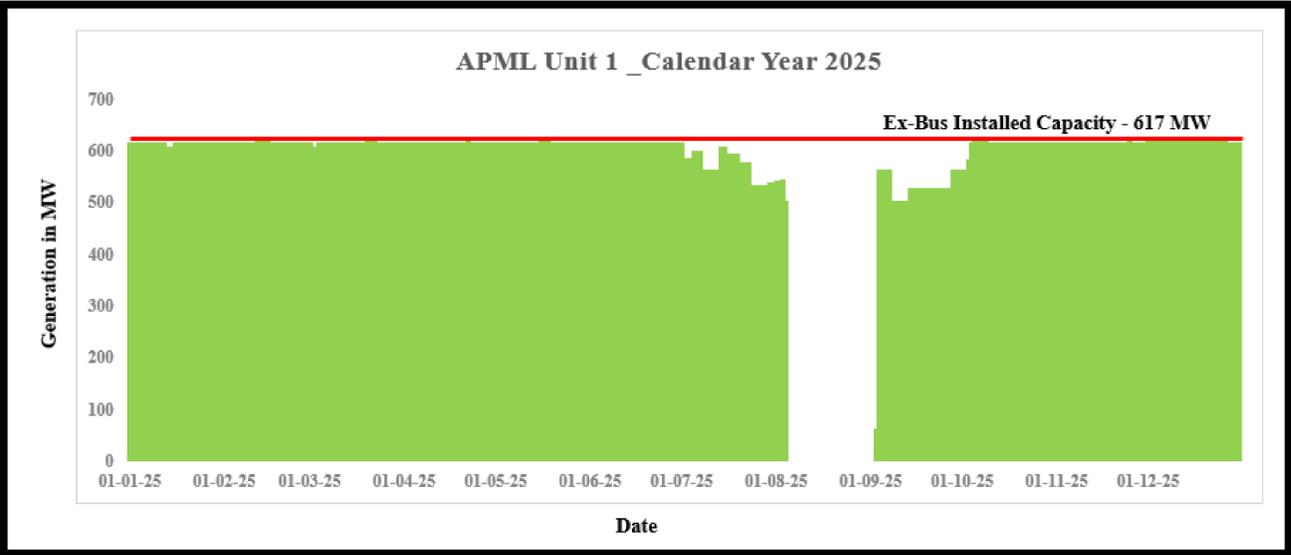




From the above, it is observed that for 54% of the period, DC of IPP Thermal units is above 5700 MW. For 26% of the period, DC is above 6000 MW against the Ex-Bus capacity of 6216 MW.

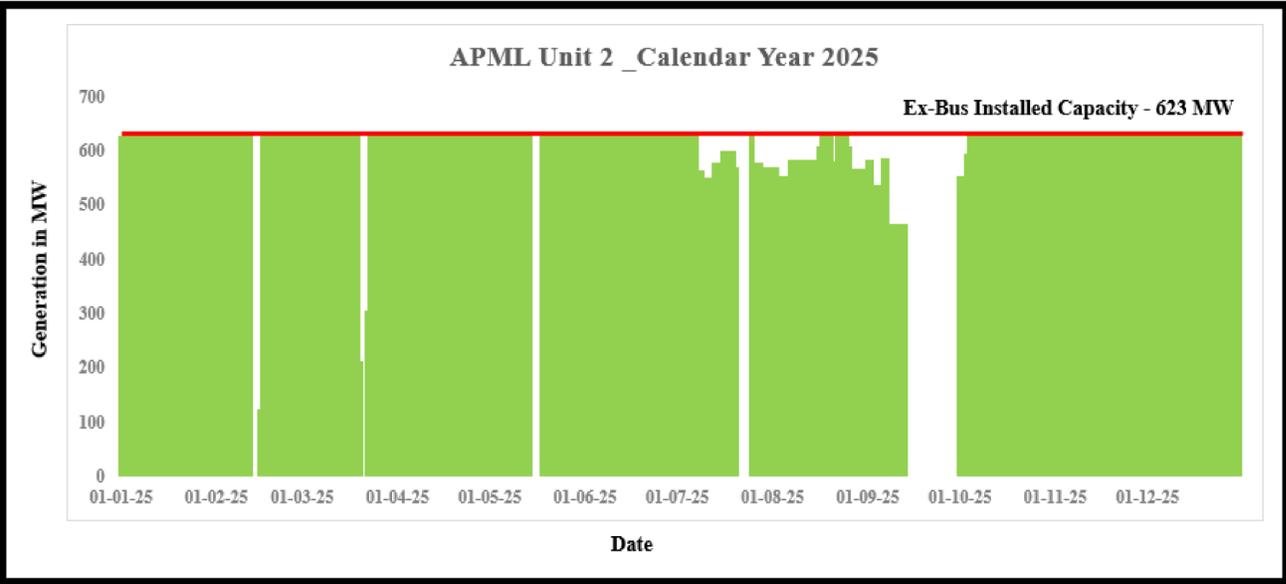
The individual unit-wise analysis is shown below:

- **APML Unit-1 (660 MW)**
Ex-Bus capacity :617 MW



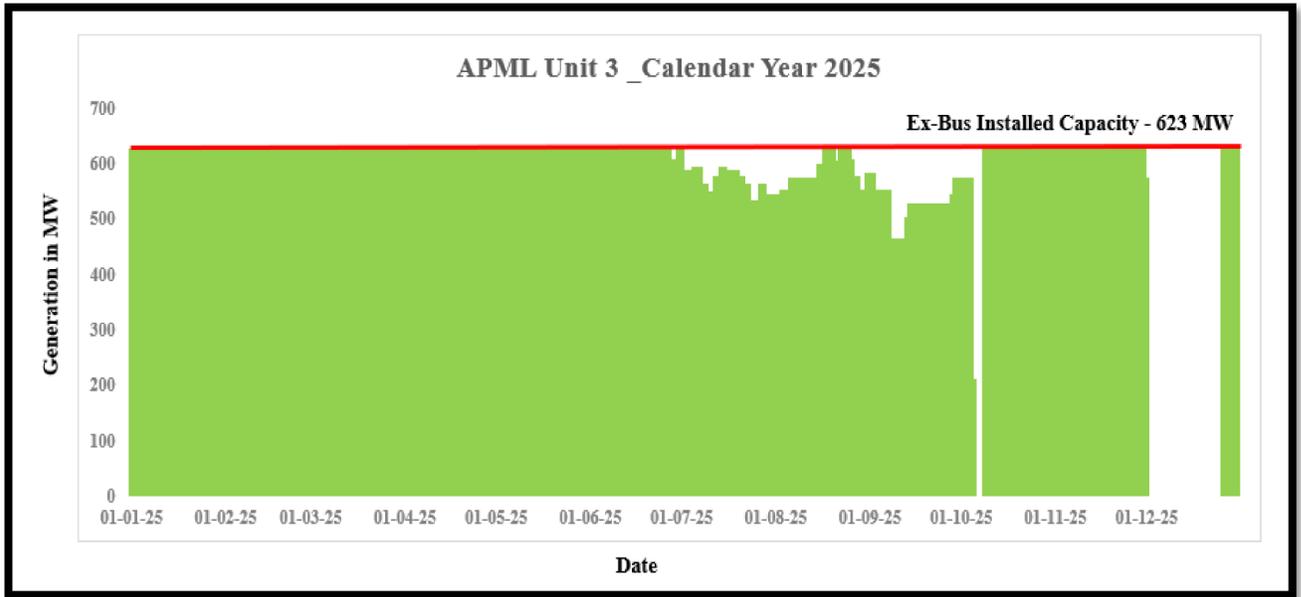
APML Unit-1 was under COH for the period 04.08.2025 to 03.09.2025

- **APML Unit-2 (660 MW)**
Ex-Bus Capacity: 623 MW



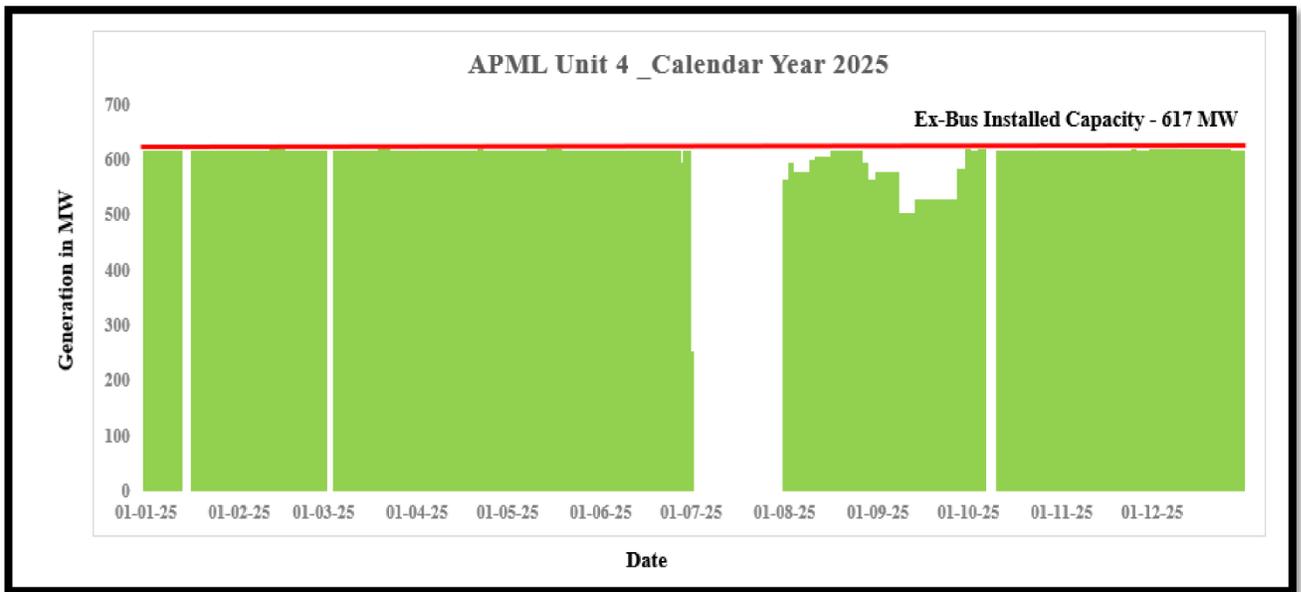
APML Unit-2 was under forced outage from 13.09.2025 to 01.10.2025 due to coal shortage

- **APML Unit-3 (660 MW)**
Ex-Bus Capacity: 623 MW



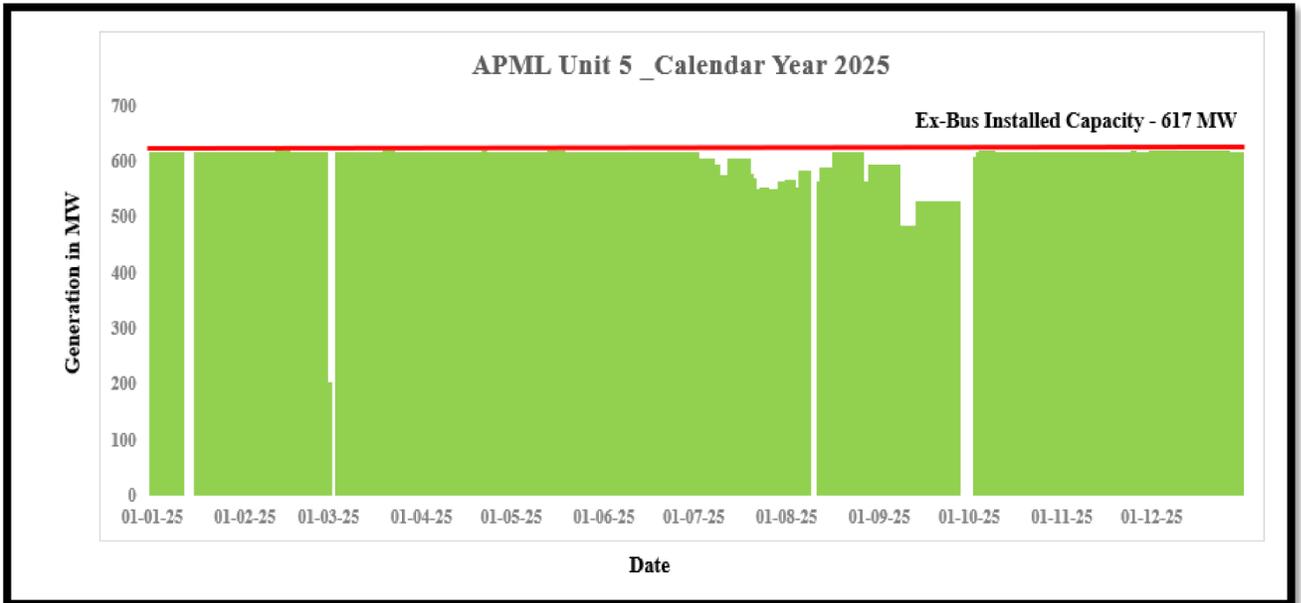
APML Unit-3 was under AOH for the period 01.12.2025 to 26.12.2025.

- **APML Unit-4 (660 MW)**
Ex-Bus Capacity: 617 MW

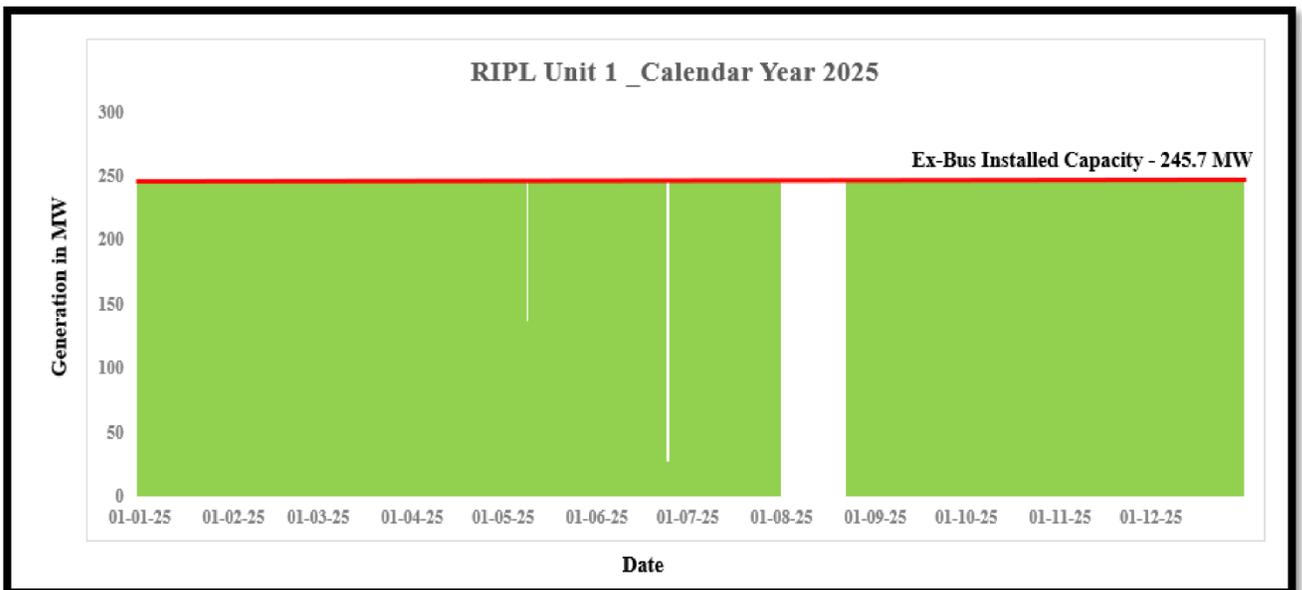


APML Unit-3 was under AOH for the period 01.07.2025 to 01.08.2025.

- **APML Unit-5 (660 MW)**
Ex-Bus Capacity: 617 MW



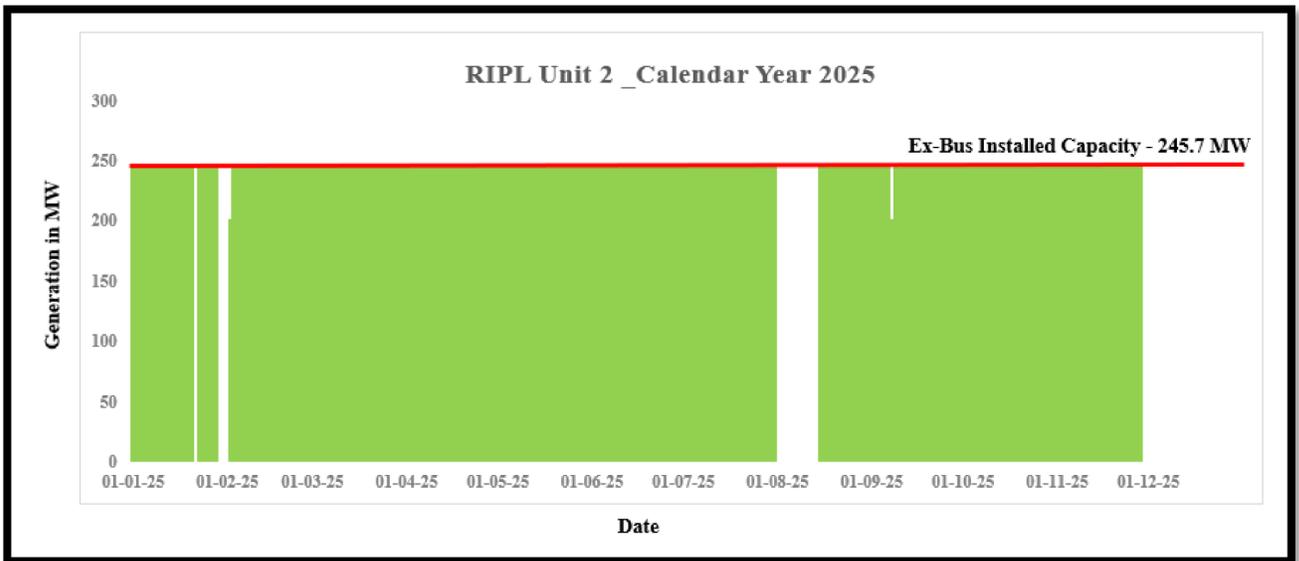
- **RIPL Unit-1 (270 MW)**
Ex-Bus Capacity: 245.7 MW



RIPL Unit-1 was under forced shutdown for 23 days from 31.07.2025 to 23.08.2025 due to bottom ash evacuation problem.

- **RIPL Unit-2 (270 MW)**

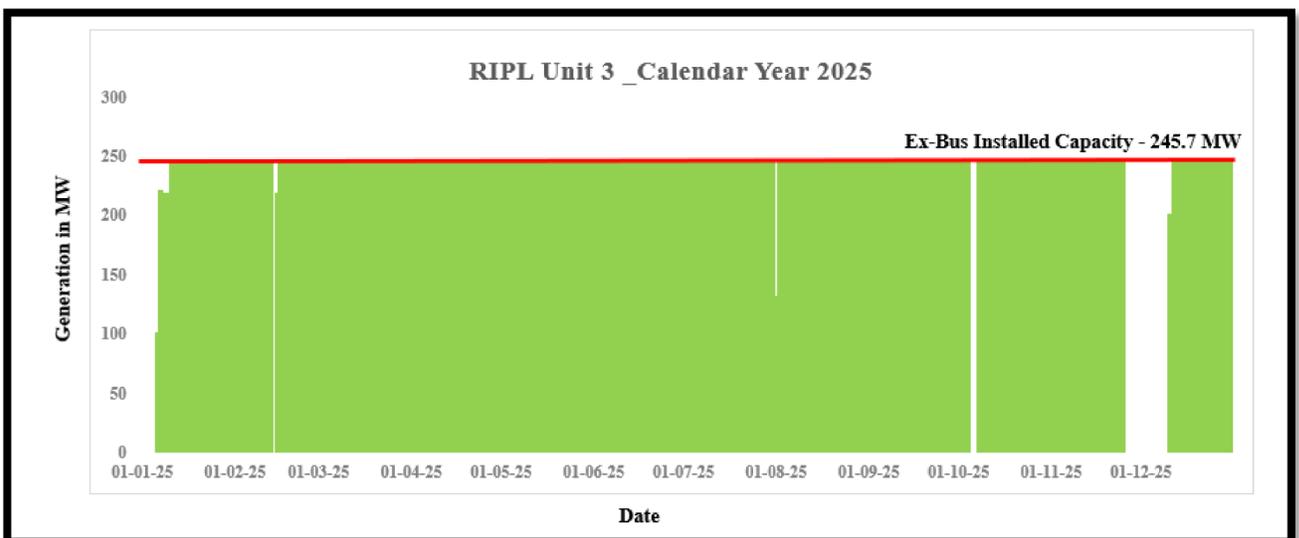
Ex-Bus Capacity: 245.7 MW



RIPL Unit-2 was under forced shut down for 15 days from 31.07.2025 to 15.08.2025. Also, unit was under AOH from 29.11.2025 to 02.01.2026.

- **RIPL Unit-3 (270 MW)**

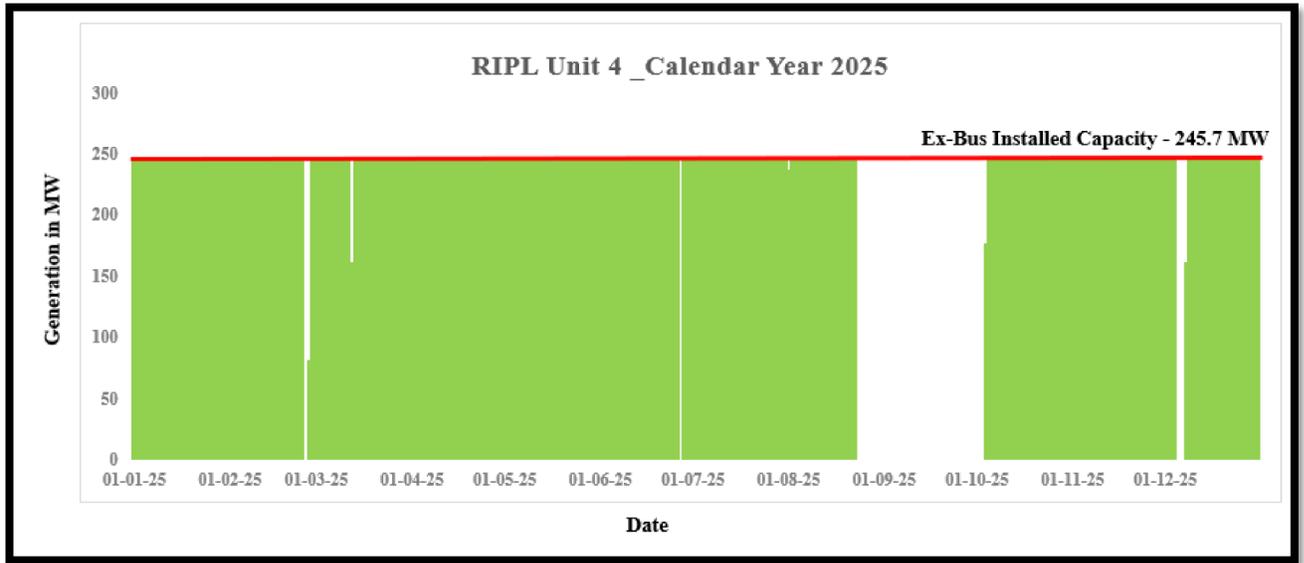
Ex-Bus Capacity: 245.7 MW



RIPL Unit-3 was under forced shutdown turbine tube oil supply line leakage from 25.11.2025 to 11.12.2025

- **RIPL Unit-4 (270 MW)**

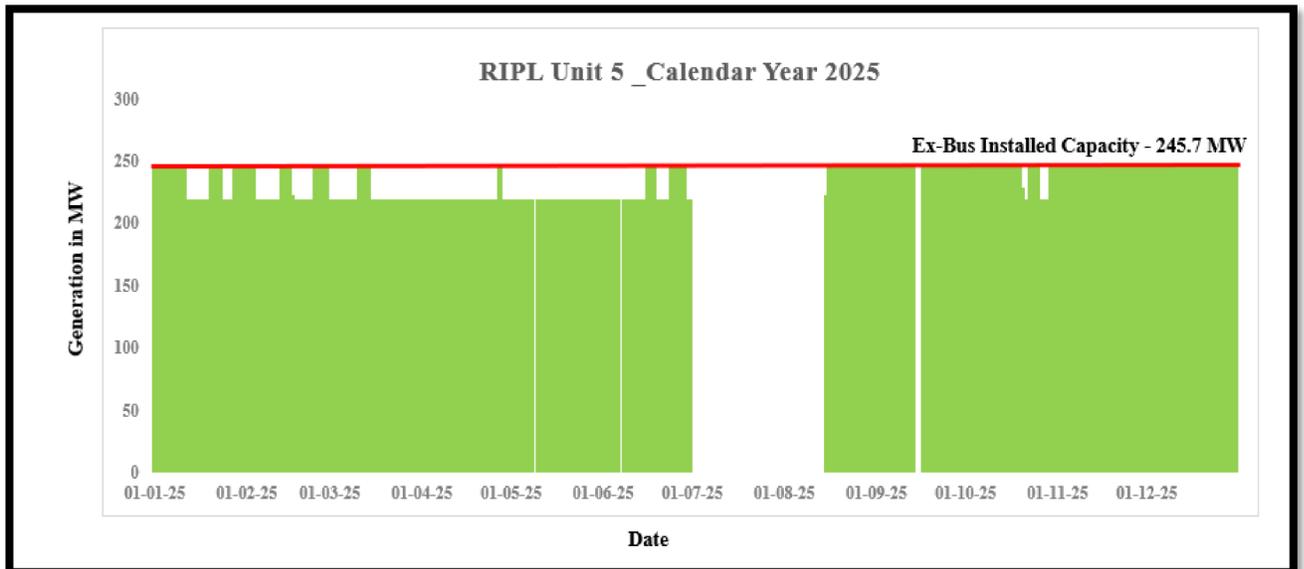
Ex-Bus Capacity: 245.7 MW



RIPL Unit-4 was under COH for 42 days from 23.08.2025 to 04.10.2025

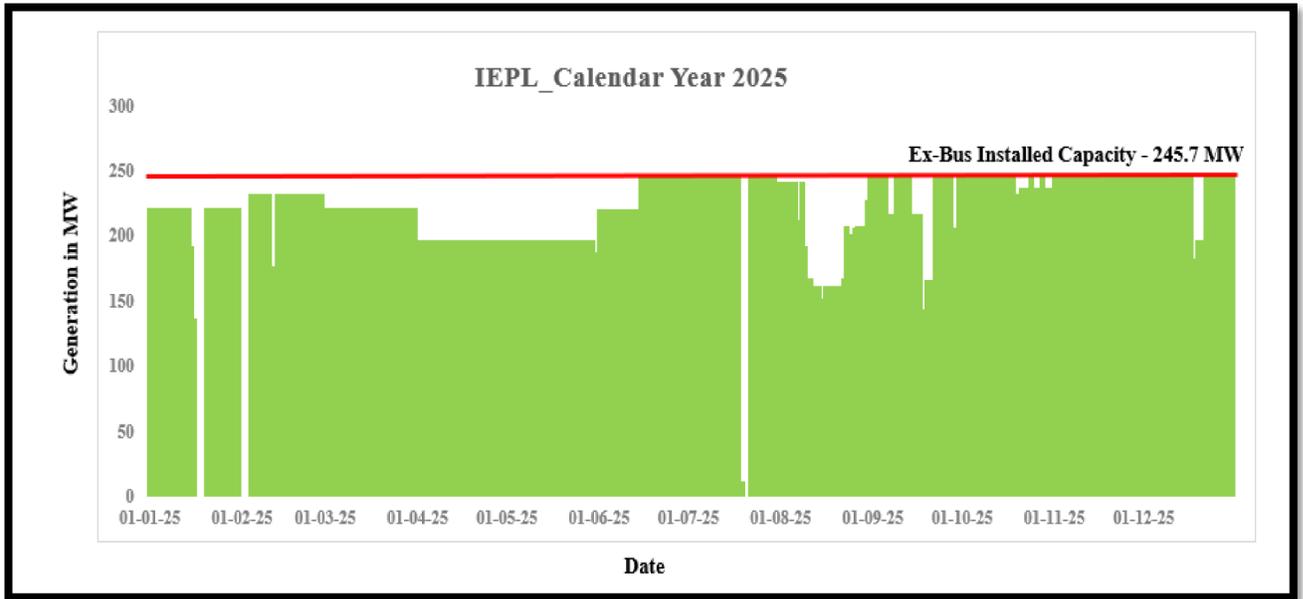
- **RIPL Unit-5 (270 MW)**

Ex-Bus Capacity: 245.7 MW

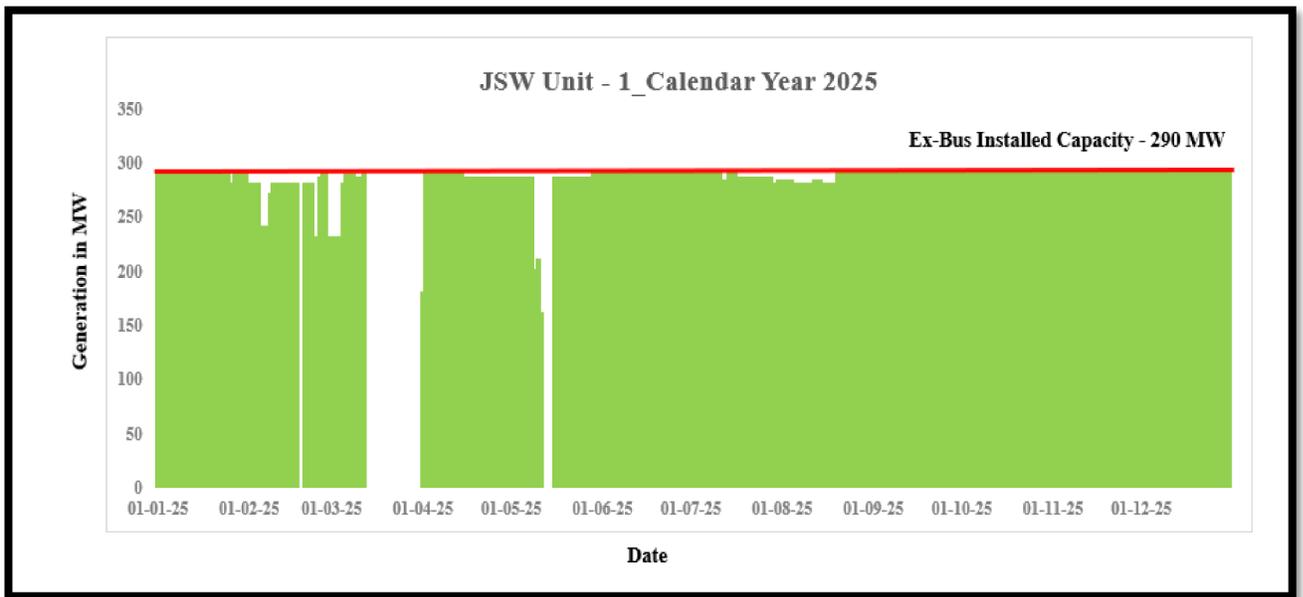


RIPL Unit-5 was under COH for 46 days from 30.06.2025 to 15.08.2025

- **IEPL (270 MW)**
Ex-Bus Capacity: 245.7 MW



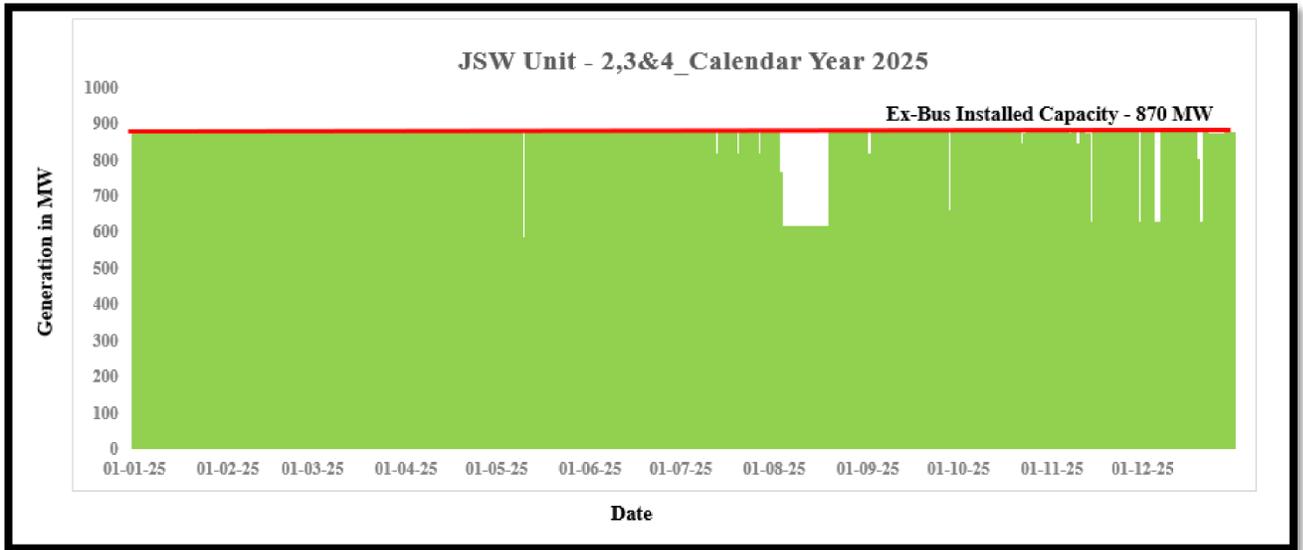
- **JSW Unit-1 (300 MW)**
Ex-Bus Capacity: 290 MW



JSW Unit-1 was under forced outage due to Turbine vibration from 12.03.2025 to 01.04.2025.

- **JSW Unit-2, 3 & 4 (900 MW)**

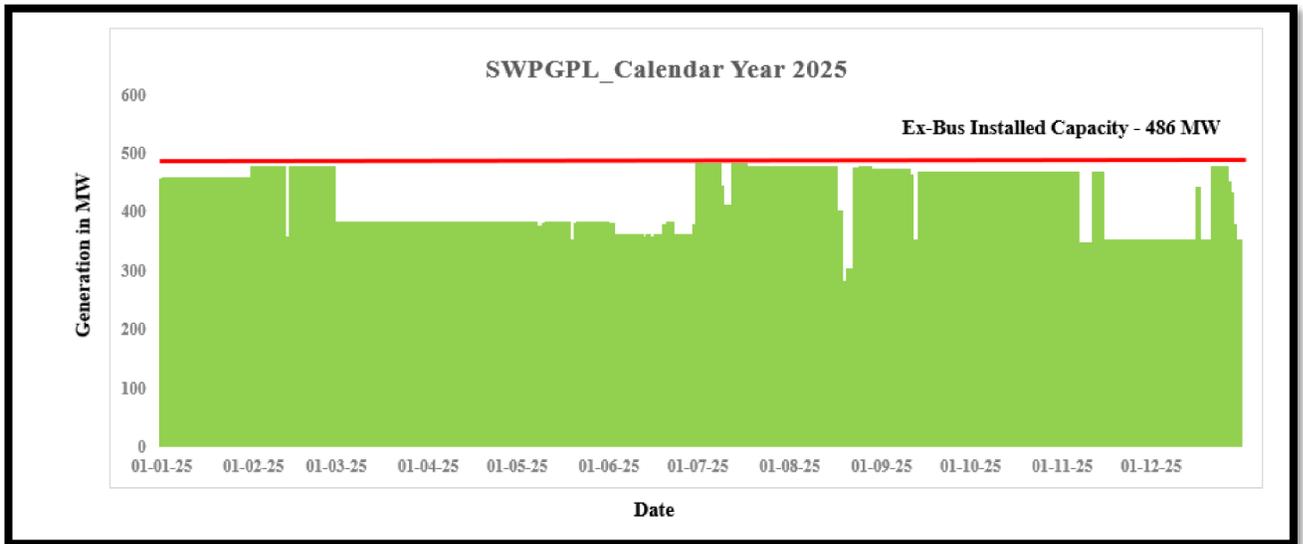
Ex-Bus capacity: 870 MW



JSW Unit – 3 was under AOH from 04.08.2025 – 20.08.2025 and JSW Unit-4 was under forced shutdown from 16.07.2025 – 31.07.2025 due to Turbine vibration

- **SWGPL Unit-1 to 4 (540 MW)**

Ex-Bus capacity: 486 MW



3.1.5 Yearly % Availability of Thermal Units:

- In accordance with the MERC MYT Regulations, 2019, all the Thermal Generating Units are required to maintain yearly availability. The relevant regulations are reproduced below:

46 Operational Norms for Thermal Generating Stations

46.1 Target Availability for full recovery of Annual Fixed Charges shall be **85 per cent for all thermal Generating Stations**, except those covered under Regulation 46.2.

46.2 Target Availability for full recovery of Annual Fixed Charges for the following Generating Stations of Maharashtra State Power Generation Company Ltd. (MSPGCL) shall be:

Particulars	Target Availability (%)
Koradi TPS excluding Unit No. 8, 9 and 10	72.00
Chandrapur TPS excluding Unit No. 8 and 9	80.00
Nashik TPS	80.00

Particulars	Target Availability (%)
Bhusawal TPS excluding Unit No. 4 and 5	80.00
Parli TPS excluding Unit No. 6, 7 and 8	80.00

Provided that the Commission may revise the Availability norms for these Generating Stations in case any Renovation & Modernisation is undertaken.

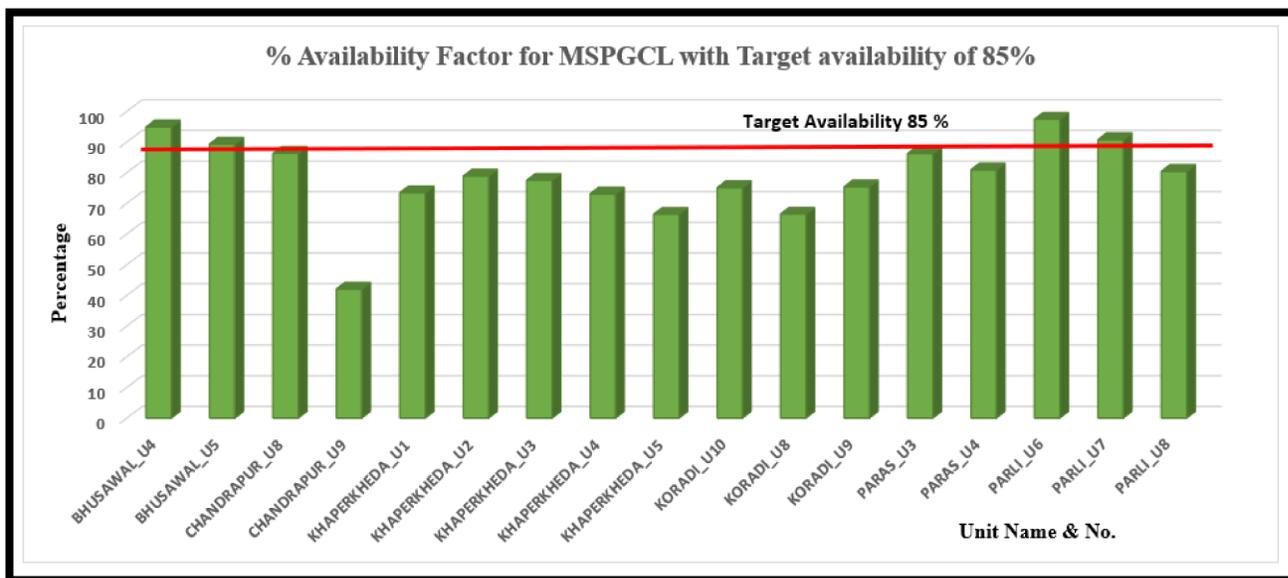
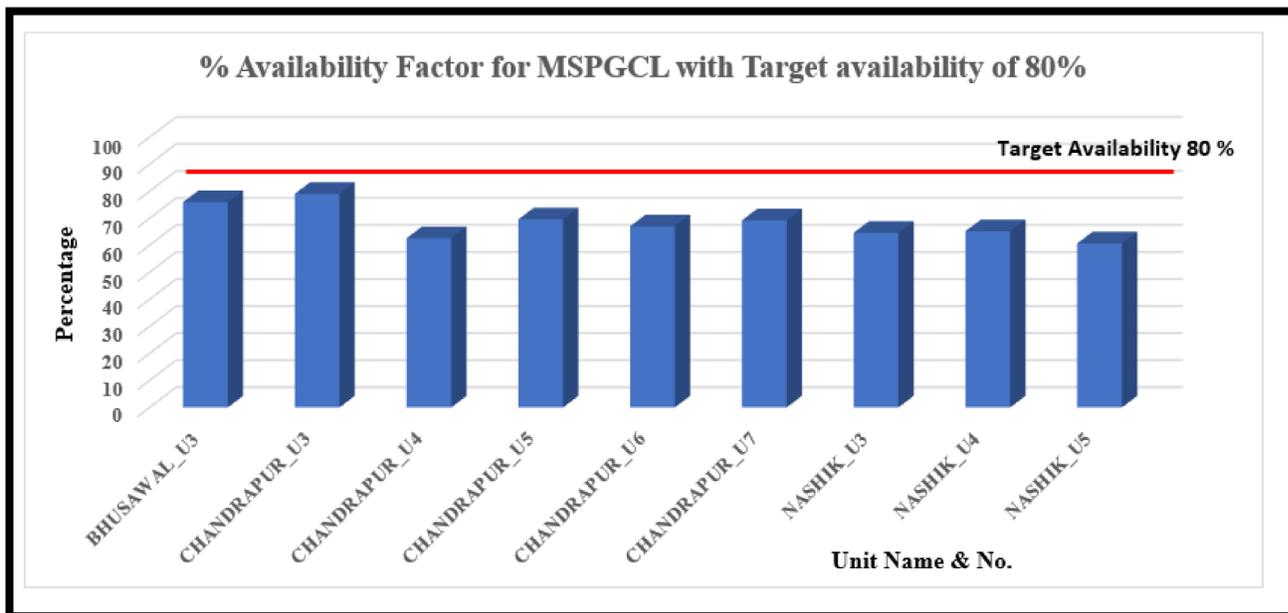
46.3 Target Plant Load Factor for incentive for thermal Generating Stations/Units shall be **85 per cent**.

- Thus, it is necessary for all the thermal units to maintain the availability as per the MYT Regulations, 2019. Hence, the availability of various thermal units was calculated for the period Calendar Year 2025. The details are as below:
- **Availability of MSPGCL Thermal Units:**

Unit Name/No.	% Availability
Parli-7	90.74 %
Parli-8	80.40 %
Khaperkheda-5	66.44 %
Parli-6	97.38 %
Paras-4	80.90 %
Bhusawal-5	89.29 %
Khaperkheda-4	73.07 %
Bhusawal-4	94.87 %
Chandrapur-5	69.60 %
Koradi-9	75.36 %
Koradi-10	75.07 %
Chandrapur-9	42.02 %
Paras-3	86.19 %
Koradi-8	66.50 %

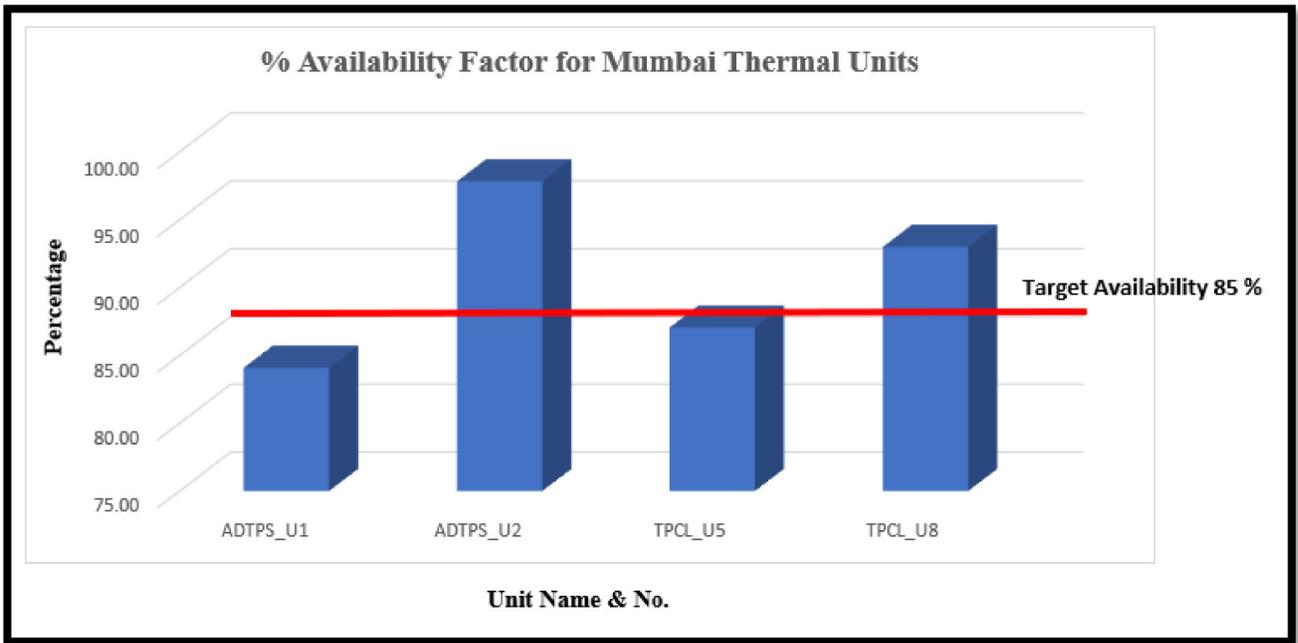
Unit Name/No.	% Availability
Khaperkheda-2	78.87 %
Koradi-6	69.67 %
Chandrapur-8	86.27 %
Nashik-4	65.21 %
Bhusawal-3	75.99 %
Khaperkheda-1	73.41 %
Chandrapur-4	62.64 %
Chandrapur-7	69.23 %
Chandrapur-3	79.06 %
Khaperkheda-3	77.47%
Chandrapur-6	67.06 %
Nashik-5	60.72 %
Nashik-3	64.64%

From the above, it is observed that the availability of MSPGCL Thermal units is much lower compared to the target as per the MYT Regulations.



- Availability of Mumbai Thermal Units:**

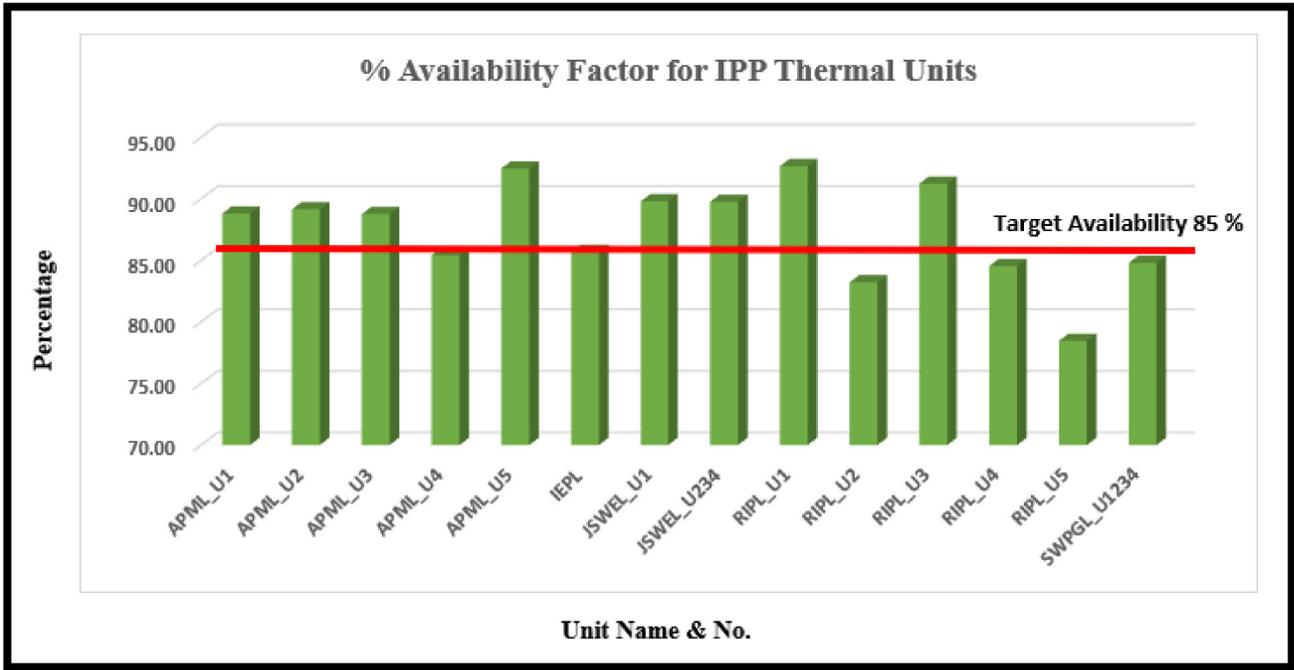
Unit Name/No	% Availability
Dahanu-1	84.08 %
Dahanu-2	97.83 %
Trombay-5	87.05 %
Trombay-8	93 %



From the above, it is observed that the availability of Mumbai embedded Thermal units is above the target as per the MYT Regulations.

- Availability of IPP Thermal Units:**

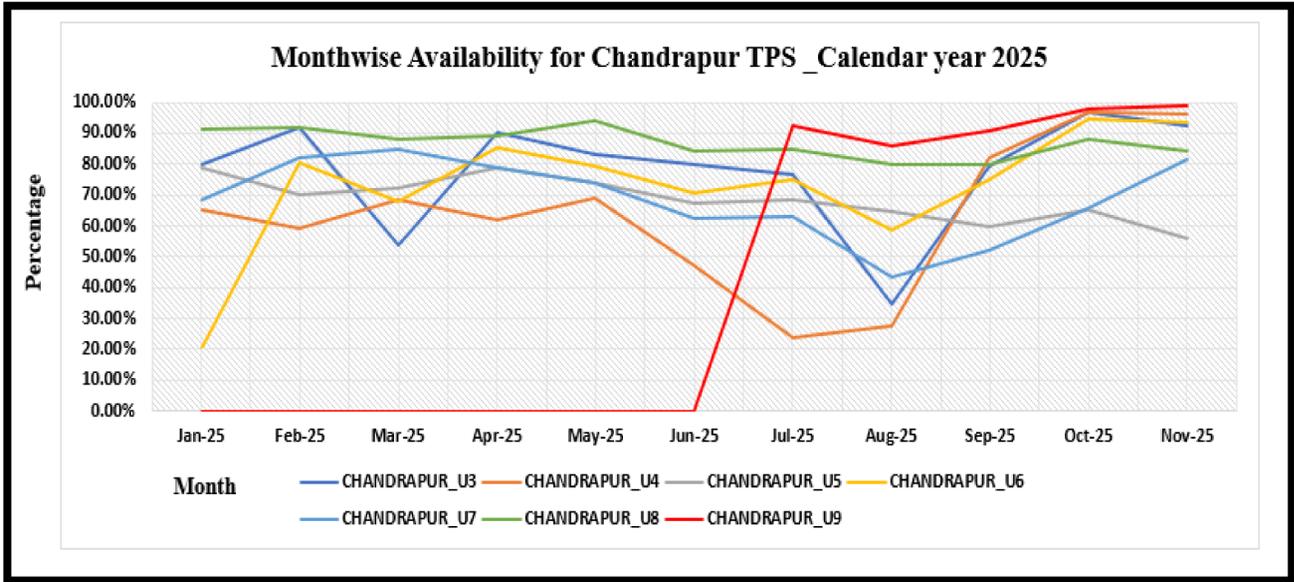
Unit Name/No	% Availability
APML-1	88.79 %
APML-2	89.14 %
APML-3	88.75 %
APML-4	85.43 %
APML-5	92.47 %
JSW-1	89.81 %
JSW-234	89.75 %
RIPL-1	92.65 %
RIPL-2	83.22 %
RIPL-3	91.22 %
RIPL-4	84.53 %
RIPL-5	78.46 %
SWGPL	84.79 %
IEPL	85.69 %

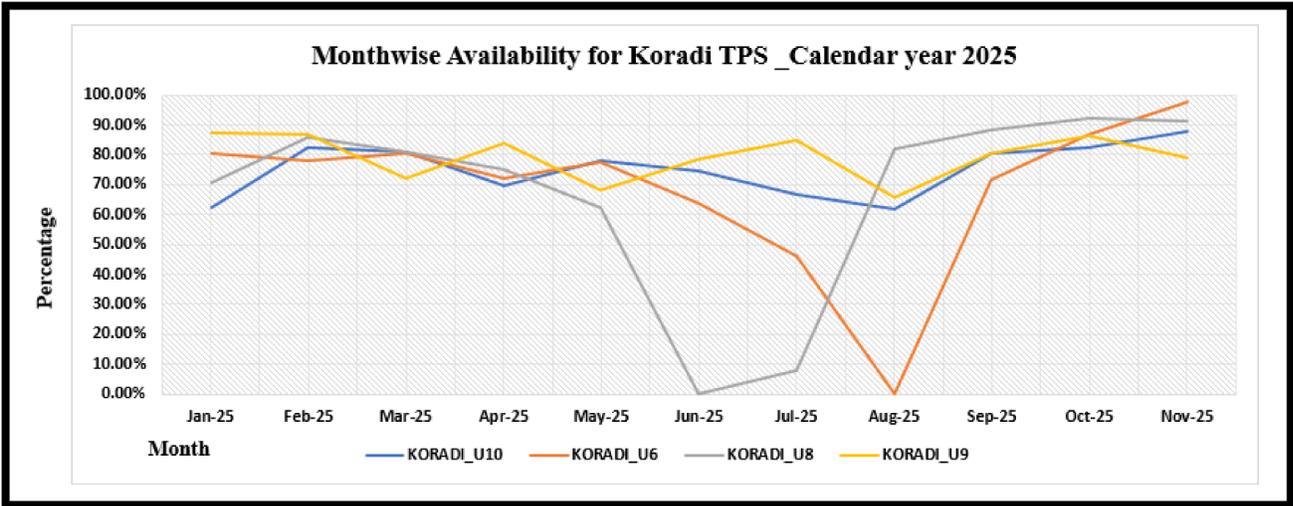
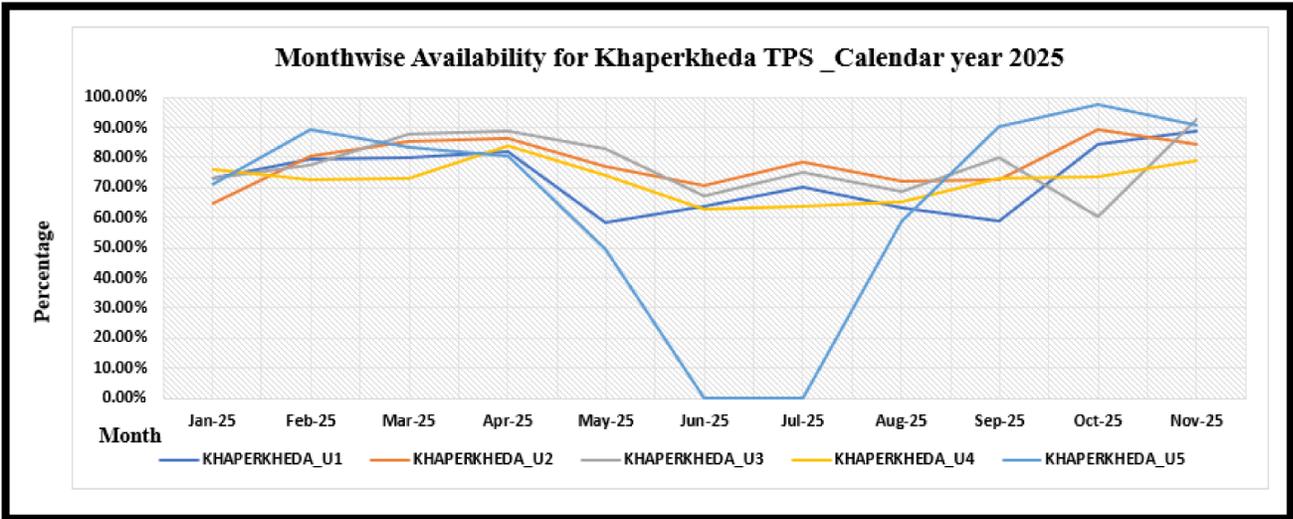
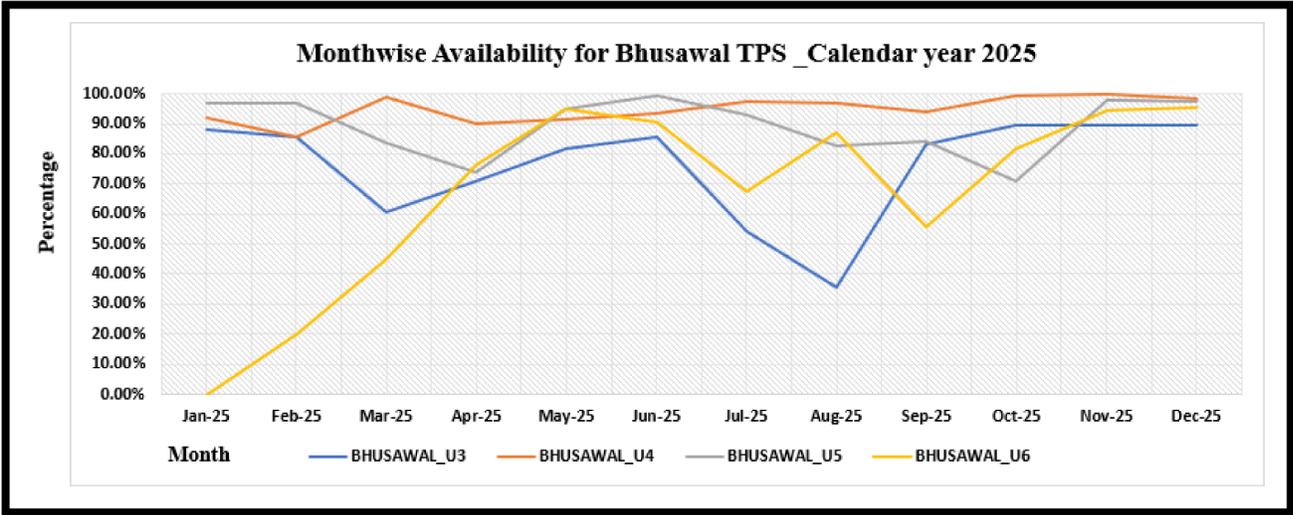


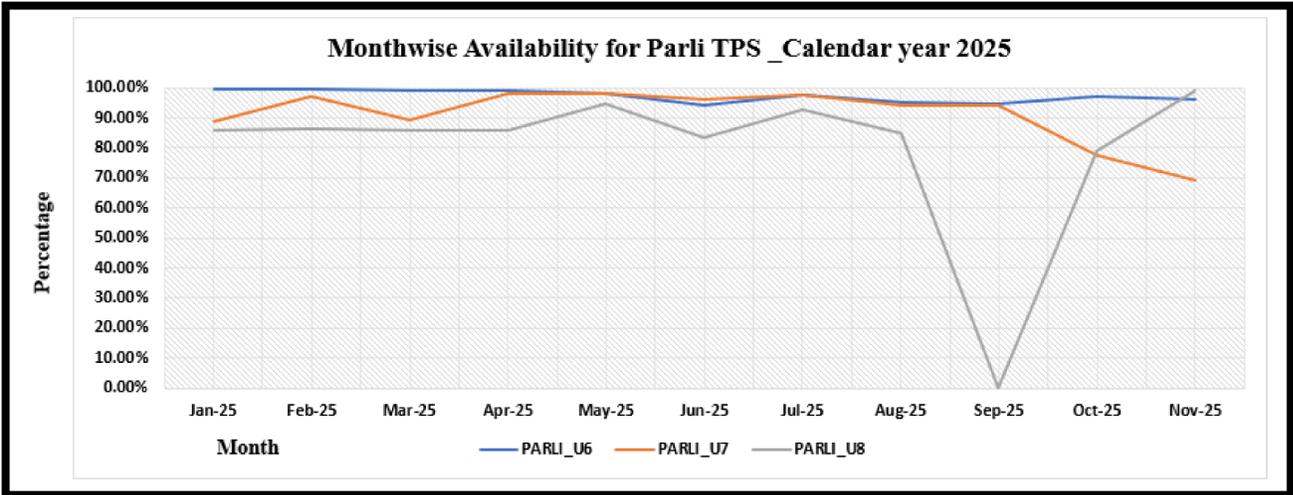
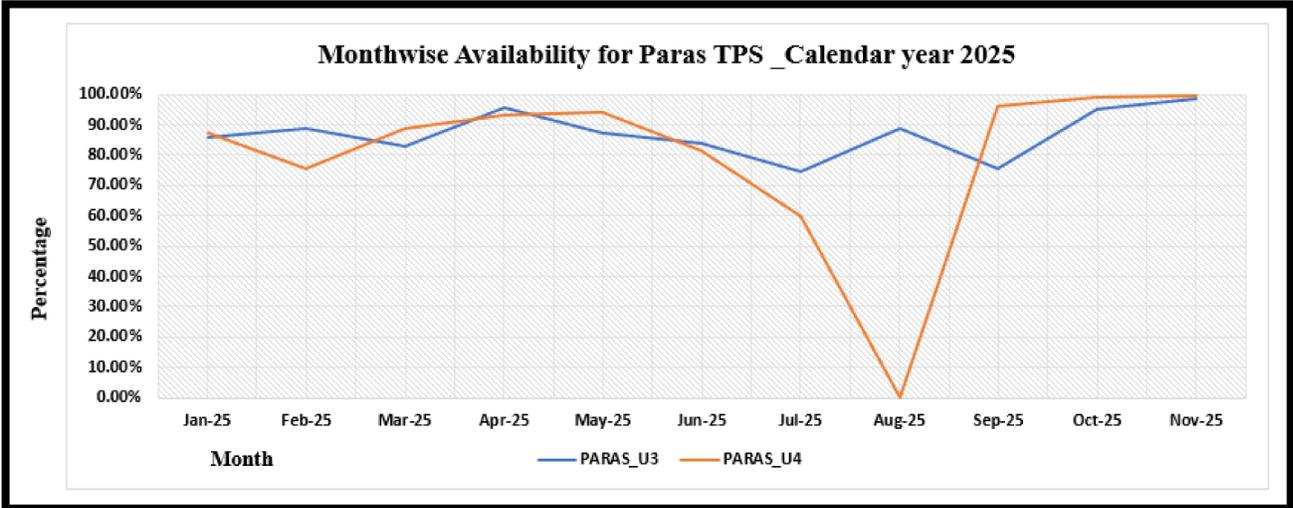
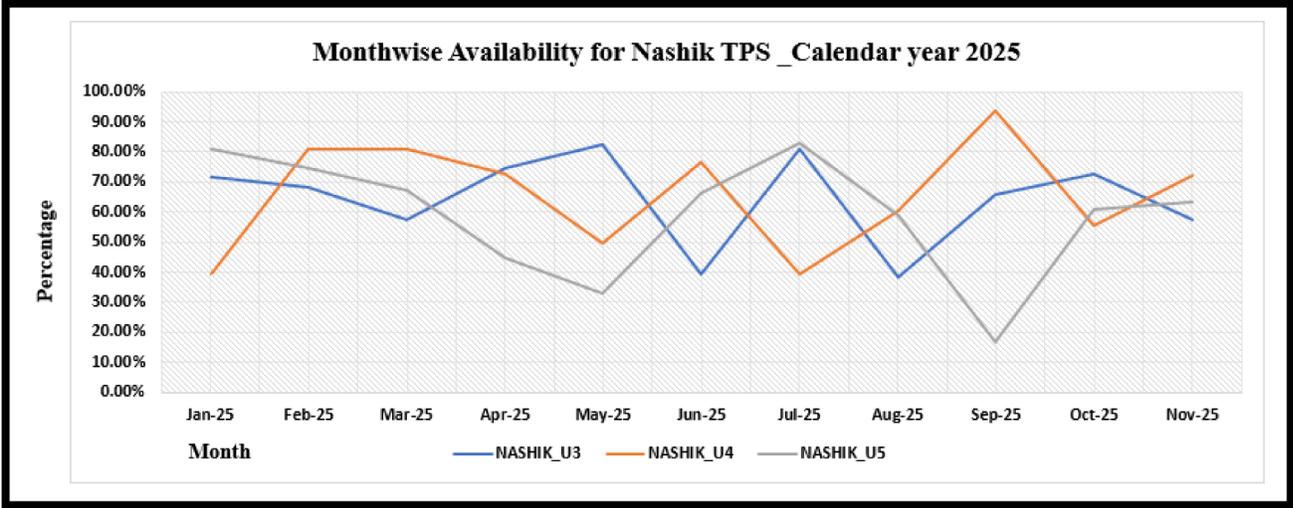
From the above, it is observed that RIPL U-2 & U-5 are not maintaining the availability as per the MYT Regulations.

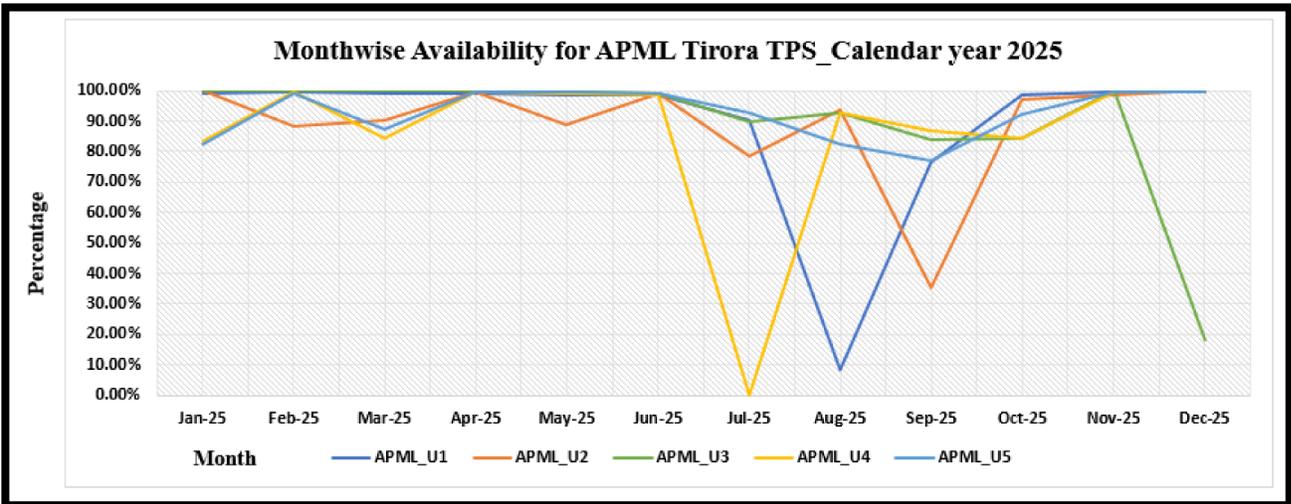
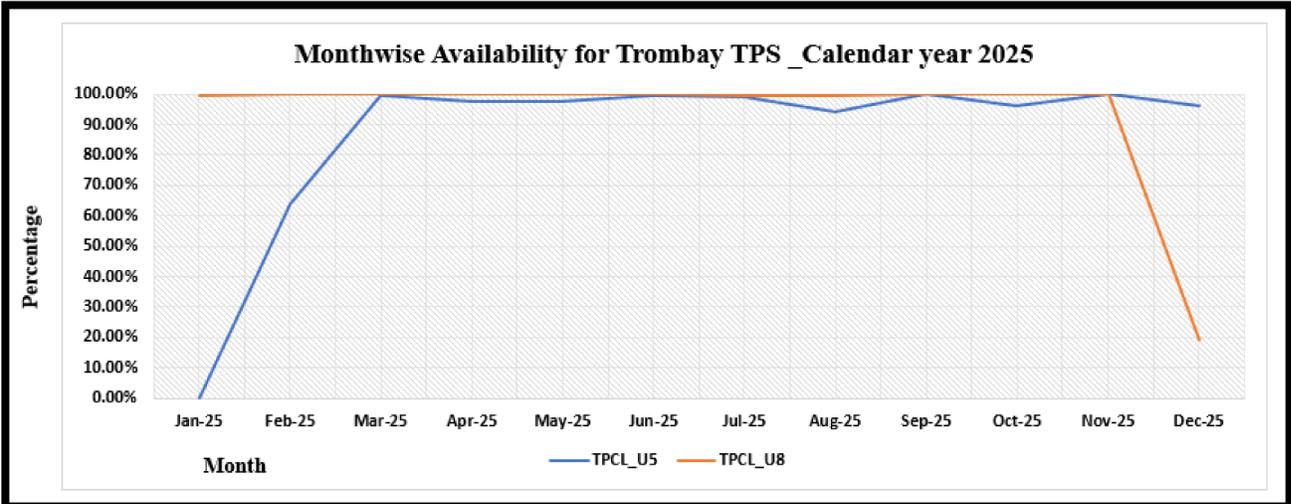
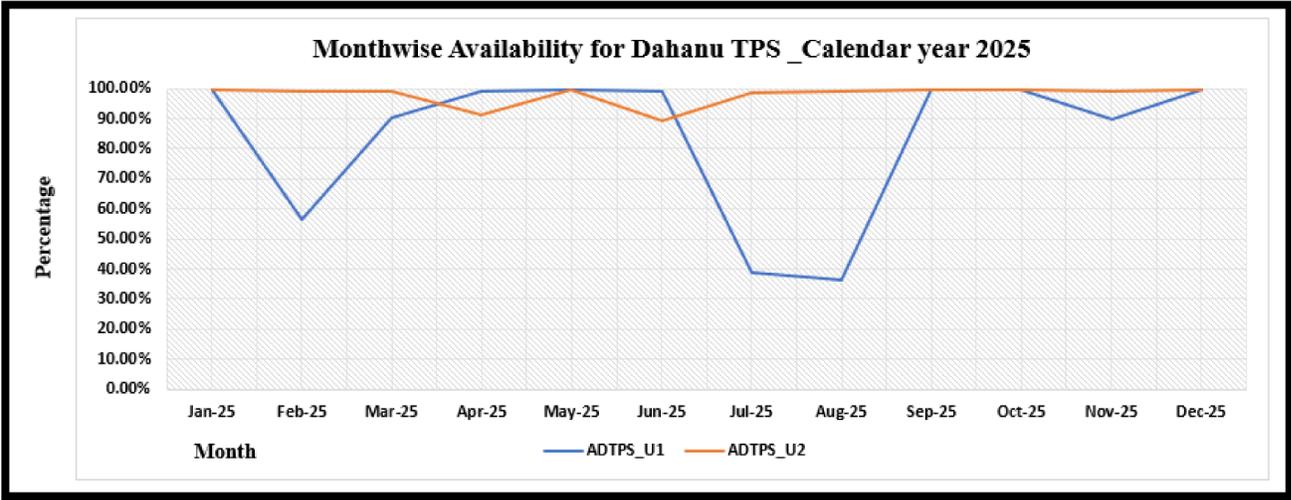
3.1.6 Monthly Availability of Thermal Generators:

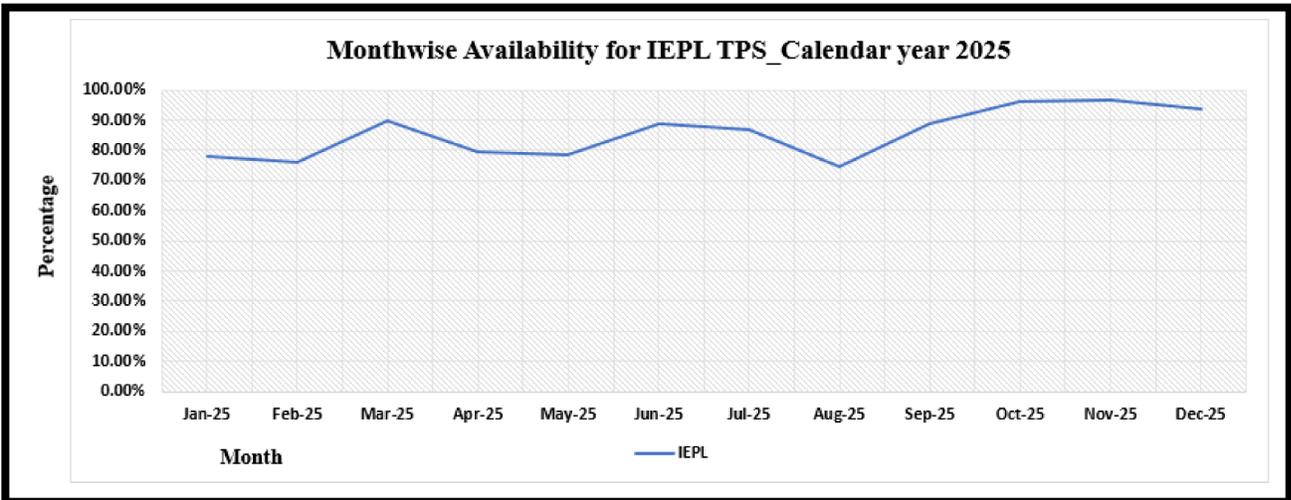
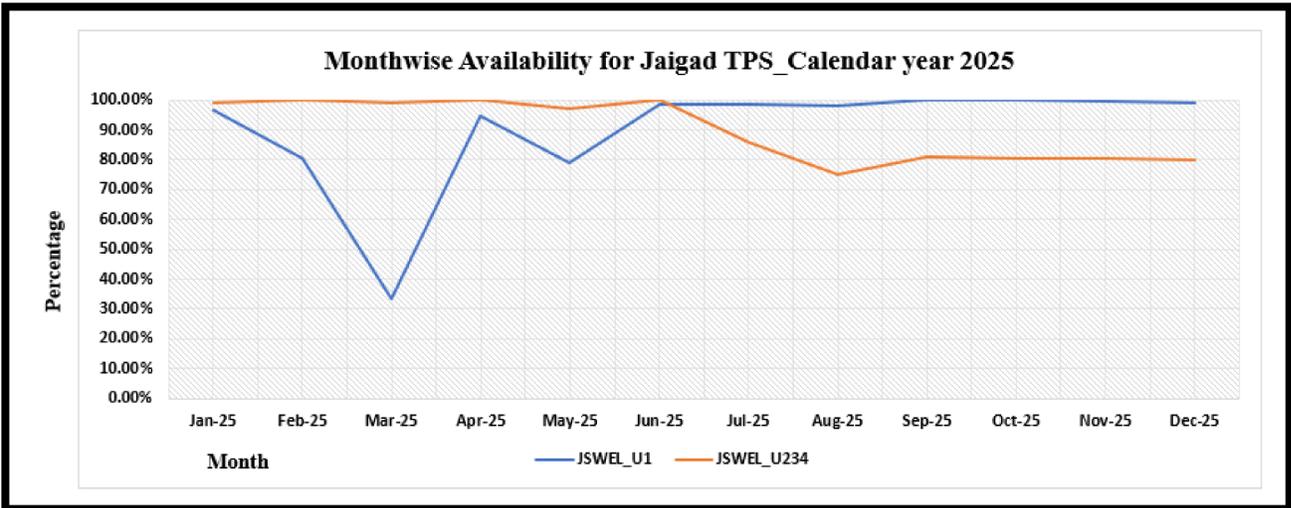
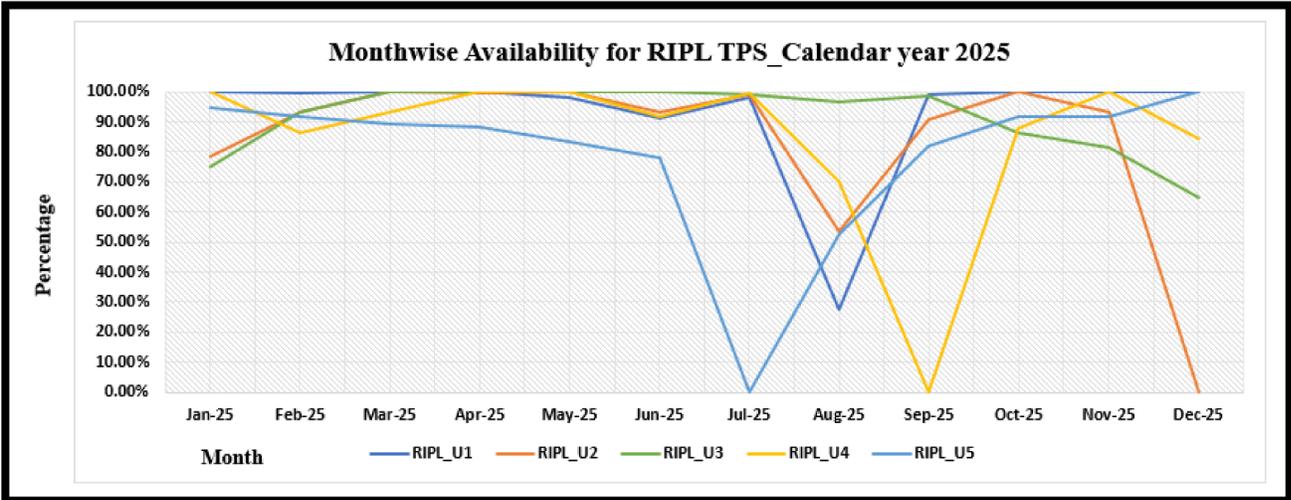
Availability of Thermal units is an important requirement from reliable Grid Operations; hence, unit-wise monthly availability is shown below:











3.1.7 Non-availability of Thermal Generating units in CY 2025:

There are 2 main reasons for non-availability of any Generating units, Technical and Commercial. Commercially, the unit can be withdrawn from the Grid either by SLDC under 'RSD' or under Zero Schedule by contracted Discom. Hence, the unit-wise & reason-wise non-availability of generating units is tabulated below:

MSPGCL Thermal Units

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
MSPGCL	Bhusawal TPS	Bhusawal Unit 3	16	22	171
		Bhusawal Unit 4	11	13	67
		Bhusawal Unit 5	14	26	67
	Chandrapur TPS	Chandrapur Unit 3	11	37	27
		Chandrapur Unit 4	21	61	31
		Chandrapur Unit 5	14	27	35
		Chandrapur Unit 6	19	85	17
		Chandrapur Unit 7	13	32	19
		Chandrapur Unit 8	8	8	0
		Chandrapur Unit 9	7	205	0
		Khaparkheda TPS	Khaparkheda Unit 1	3	14
	Khaparkheda Unit 2		10	10	0
	Khaparkheda Unit 3		13	24	0
	Khaparkheda Unit 4		12	16	0
	Khaparkheda Unit 5		13	101	0
	Koradi TPS	Koradi Unit 6	12	51	0
		Koradi Unit 8	11	80	0
		Koradi Unit 9	6	39	0
		Koradi Unit 10	10	29	0
	Nashik TPS	Nashik Unit 3	19	15	0
		Nashik Unit 4	11	35	0
		Nashik Unit 5	11	28	0
	Paras TPS	Paras Unit 3	16	29	0
		Paras Unit 4	10	43	0
Parli TPS	Parli Unit 6	13	1	111	
	Parli Unit 7	13	23	95	
	Parli Unit 8	14	46	96	

Mumbai Generating Units:

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
Adani, Dahanu	ADTPS	AEML Unit 1	5	56	0
		AEML Unit 2	2	5	0

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
TPC-G	Trombay	Trombay 5	5	137	0
		Trombay 7A	10	22	16
		Trombay 7B	13	35	5
		Trombay 8	1	27	0

IPP Thermal Units:

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
Adani, Tirora	APML	Adani U-1	2	30	0
		Adani U-2	7	31	0
		Adani U-3	2	29	0
		Adani U-4	6	45	0
		Adani U-5	5	18	0
Jaigad TPS	JSWEL	JSW (J) U1	4	28	27
		JSW (J) U2	3	10	0
		JSW (J) U3	6	25	0
		JSW (J) U4	9	23	0
Rattan India, Amravati	RPL AMT	RPL(AMT) U-1	3	25	0
		RPL(AMT) U-2	7	61	0
		RPL(AMT) U-3	7	191	0
		RPL(AMT) U-4	6	53	0
		RPL(AMT) U-5	9	57	0
Sai wardha	SWPGPL	SWPGPL U-1	7	12	0
		SWPGPL U-2	5	13	0
		SWPGPL U-3	4	27	0
		SWPGPL U-4	9	43	0

3.1.8 Coal position in Calendar Year 2025:

All InSGS thermal power stations in Maharashtra state to maintain coal stocks regularly as per CEA norms on coal stocks of thermal generators dtd. 06.12.2021 to ensure resource adequacy in the state. Accordingly, MSLDC is monitoring the Coal Positions maintained at every plant and in case of default, notices are issued to such generating companies.

The details of month-wise coal position are tabulated below:

Coal Stock less than 3 days	
Power Station	Calendar year 2025
	No. of Days
APML, TIRORA	65
Bhusawal Unit 4	15
Bhusawal Unit 5	15
Bhusawal Unit 6	4
Chandrapur Unit 3 to 7	77
Chandrapur Unit 8 and 9	77

Coal Stock less than 7 days	
Power Station	Calendar year 2025
	No. of Days
ADTPS	13
APML, TIRORA	127
Bhusawal Unit 4	116
Bhusawal Unit 5	116
Bhusawal Unit 6	115
Chandrapur Unit 3 to 7	123
Chandrapur Unit 8 and 9	123
Khaparkheda Unit 1 to 4	3
Khaparkheda Unit 5	1
Koradi Unit 6	14
Koradi Unit 8 to 10	72
Parli Unit 6 and 7	107
RPL (AMT)	27

Coal Stock less than 15 days	
Power Station	Calendar year 2025
	No. of Days
ADTPS	124
APML, TIRORA	134
Bhusawal Unit 4	233
Bhusawal Unit 5	233
Bhusawal Unit 6	194
Chandrapur Unit 3 to 7	165
Chandrapur Unit 8 and 9	165
Khaparkheda Unit 1 to 4	304
Khaparkheda Unit 5	228
Koradi Unit 6	273
Koradi Unit 8 to 10	241
Nasik	57
Paras	190
Parli Unit 6 and 7	226
Parli Unit 8	96
RPL (AMT)	232
SWPGPL	42
TPCL	43

In case of default, notices are issued to the concerned generating companies. Accordingly, MSLDC has issued 77 notices to MSPGCL for improvement in coal stock position. Further, 62 notices have been issued to APML (Tiroda) for maintaining coal stock as per the prescribed norms.

3.2 Hydro Generation:

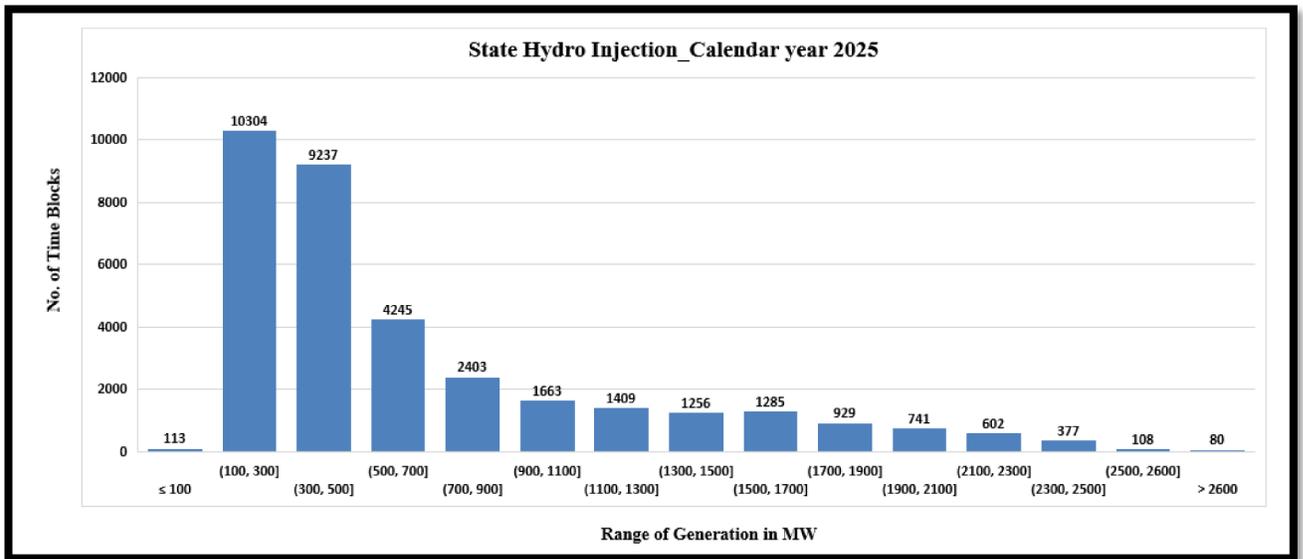
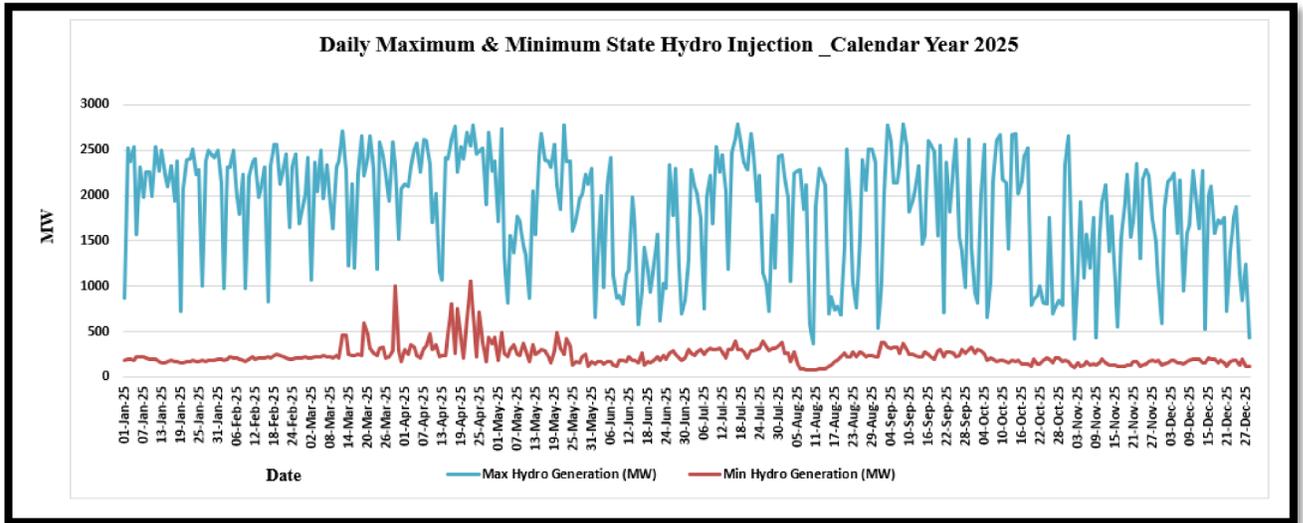
3.2.1 Injection Patterns:

Koyna is the largest hydro-electric plant in the State owned by MSPGCL having total installed capacity of 1920 MW having 4 stages viz. Stage-I (MW), Stage-II (MW), Stage-III (MW) & Stage-IV (1000 MW). MSPGCL is having 250 MW (2 x 125 MW) Pumped Storage Units at Ghatghar.

Also, TPCL is having 3 hydro plants viz. Bhira (150 MW), Bhivpuri (74 MW) & Khopoli (74 MW) and one Pumped Storage Plant at Bhira (150MW).

Apart from above capacity, there are small hydal plants across the State such as Vaitarna, Bhira Tailrace, Mahati, Bhandardara, Tillari, Ujani, Paithan, Bhatsa, etc. Thus, total installed capacity of Hydro Plants is 2941 MW including Koyna Generation.

The Daily Maximum & Minimum injection pattern of the Hydro generation in the State is shown below.



From the above, it is observed that the hydro generation is used as a peaking generation. For 88 % of time period, hydro generation is used below 1500 MW, whereas only for 12 % of the period, hydro generation is used above 1500 MW capacity.

3.2.2 Non-availability of Hydro Generating units in Calendar Year 2025:

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available
MSPGCL	Ghatghar HPS	Ghatghar Unit-1	14	62
		Ghatghar Unit-2	15	156
	Koyna HPS	Koyna STG-IV Unit-1	11	0

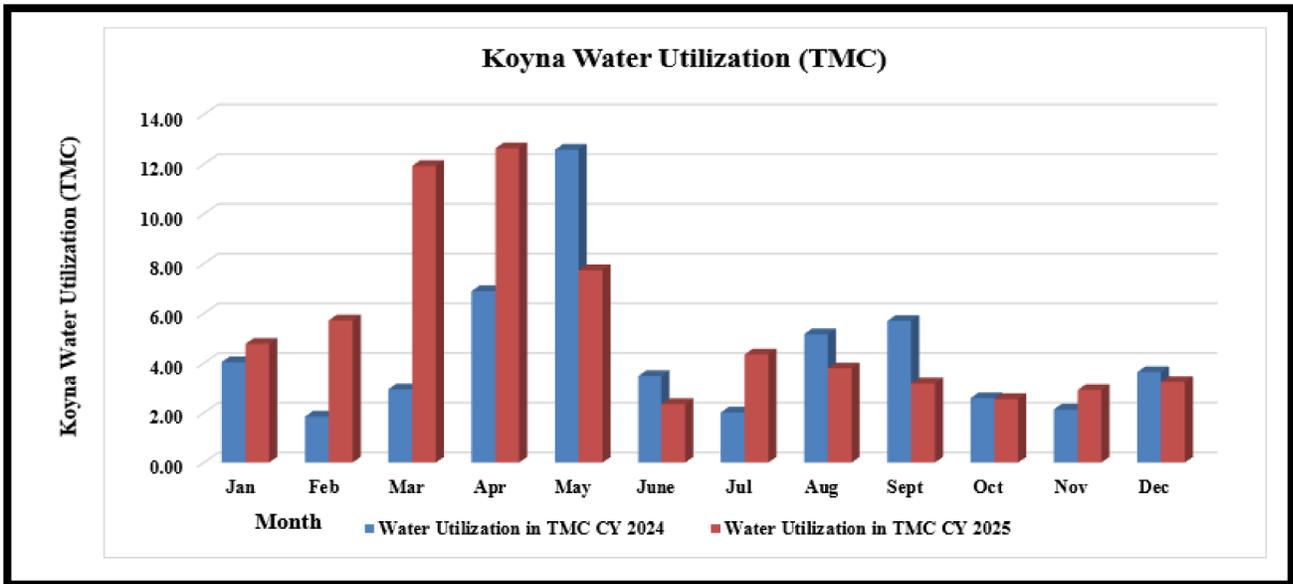
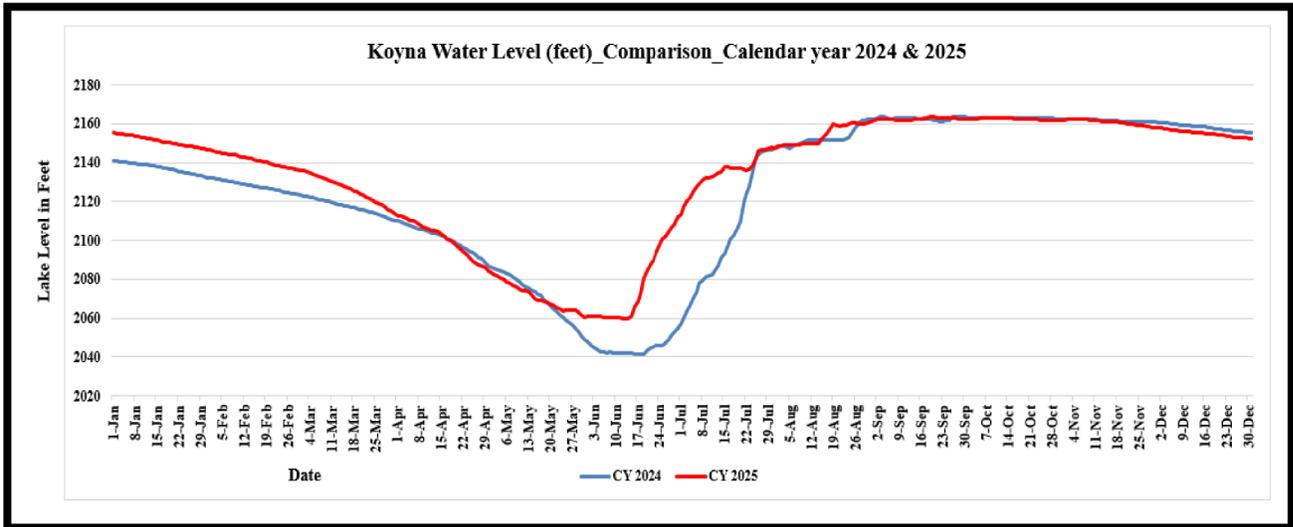
		Koyna STG-IV Unit-2	4	0
		Koyna STG-IV Unit-3	5	1
		Koyna STG-IV Unit-4	10	2
		Koyna Unit 1	4	20
		Koyna Unit 2	2	20
		Koyna Unit 3	4	55
		Koyna Unit 4	2	20
		Koyna Unit 5	5	48
		Koyna Unit 6	5	49
		Koyna Unit 7	5	26
		Koyna Unit 8	5	50
		Koyna Unit 9	7	31
		Koyna Unit 10	6	31
		Koyna Unit 11	4	2
		Koyna Unit 12	6	8

- ❖ Bhira PSU was taken under outage from 01.11.2025 for carrying out Annual Overhauling (AOH) and refurbishment of the spherical valve. The units are expected to be on bar up to 28.02.2026.
- ❖ Ghatghar Unit-2 was under forced shutdown from 26.05.2024 to 10.04.2025 due to a stator earth fault and is again under planned shutdown from 11.11.2025 till date for PLC and SCADA system upgradation work.
- ❖ Koyna Units 1 to 8 were taken under long-term shutdown from 17.12.2025 to carry out repair works at the Head Race Tunnel, Surge Well, and Emergency Valve Tunnel. The units are expected to be on bar up to 19.02.2026.

3.2.3 Koyna Lake level:

The Water allocation for Maharashtra Koyna Generating Plant is 67.5 TMC for a Water year starting from June to May. The water utilized by Koyna St-I & II and Stage-IV is utilized for generation at Koyna Stage-III. Hence, the water utilized at Koyna Stage-III is not considered in the TMC utilization quota.

The comparison of Lake level of Koyna in feet for Calendar Year 2024 & Calendar Year 2025 is shown below:



Calendar Year 2024:

As per the MSPGCL Letter vide CE/KGSC/TECH/MSLDC/No.0015 Dated 03.02.2024 the westward water quota was reduced by 8.644 TMC for water year 2023-24 due to less rain fall and low dam storage. Hence total TMC allocated for water year 2023-24 was 58.856 out of which 0.69 TMC remains unutilized.

Calendar Year 2025:

In Water Year 2024–25, an additional 4 TMC was allotted. Out of this, 2.67 TMC remains unutilized.

Bhira BPSU Pumping details for Calendar year 2025 are as follows:

BPSU Pumping Details				
Sr No	Date	From	To	Total Water Pumped (in MCM)
1	22-Jun-25	12:30	13:30	0.0168
2	29-Jun-25	12:30	13:30	0.1120
3	13-Jul-25	12:30	13:30	0.1198
4	15-Aug-25	12:15	14:00	0.1647
5	17-Aug-25	11:00	14:30	0.3800
6	23-Aug-25	11:00	14:00	0.3370
7	27-Aug-25	11:00	14:30	0.3894
8	31-Aug-25	10:30	15:30	0.5597
9	03-Sep-25	12:00	15:00	0.3021
10	04-Sep-25	12:00	15:00	0.2576
11	05-Sep-25	12:00	15:00	0.3035
12	06-Sep-25	12:30	16:00	0.3561
13	07-Sep-25	12:00	15:00	0.3030
14	02-Oct-25	10:30	15:30	0.3956

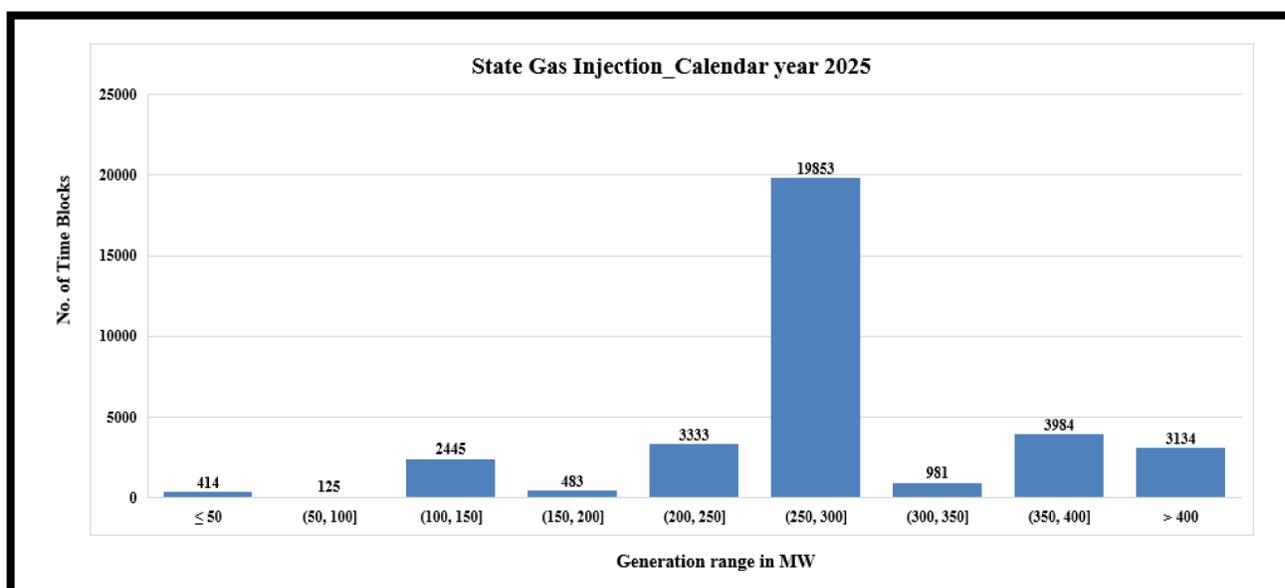
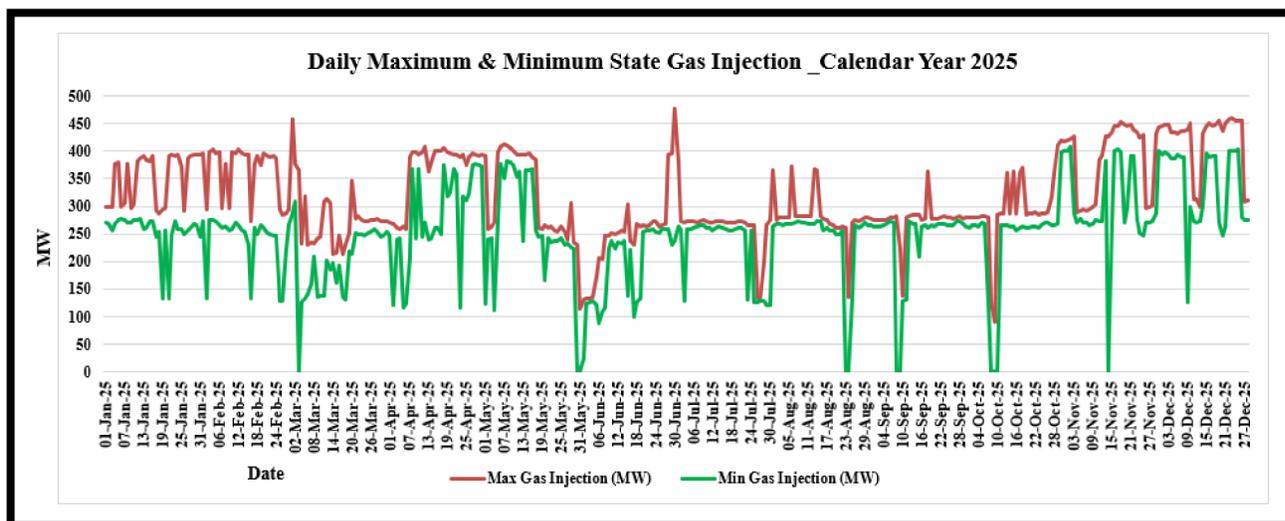
3.3 Gas Generation:

3.3.1 Injection Patterns:

Uran Gas based generating plant located in Raigad district is having total installed capacity of (672) MW. It has 4 x 108 MW & 2 x 120 MW units. Also, TPCL has gas-based plant at Trombay having total capacity of 180 MW.

The generation from gas-based plants depends up on availability of APM gas. Hence, based on the gas availability, these units are despatched. Sometimes TPCL Unit-7 is operated through RLNG gas to meet out contingencies under emergency situations.

The Daily Maximum & Minimum injection pattern of the Gas-based generation in the State is shown below.



From the above, it is observed that against the total installed capacity of 852 MW, the injection remains between 100 MW and 400 MW for about 89% of the period. For less than 9% of the period, i.e., for 3,134 time blocks out of 34,752-time blocks, the generation exceeds 400 MW. This indicates that nearly 50% of the installed capacity has remained stranded due to the non-availability of APM gas.

3.3.2 Non-availability of Gas Generating units in Calendar Year 2025:

The Uran Gas Turbine Power Station (GTPS), operated by Maharashtra State Power Generation Company (MAHAGENCO), is a Combined Cycle Gas Turbine (CCGT) power plant has an installed capacity of 672 MW, comprising four gas turbines (Units 5 to 8) of 108 MW each and two steam turbines (Units A0 and B0) of 120 MW each.

Operational Configuration:

- Unit A0 operates in combined cycle mode when Units 5 and 6 are online.
- Unit B0 operates in combined cycle mode when Units 7 and 8 are online.

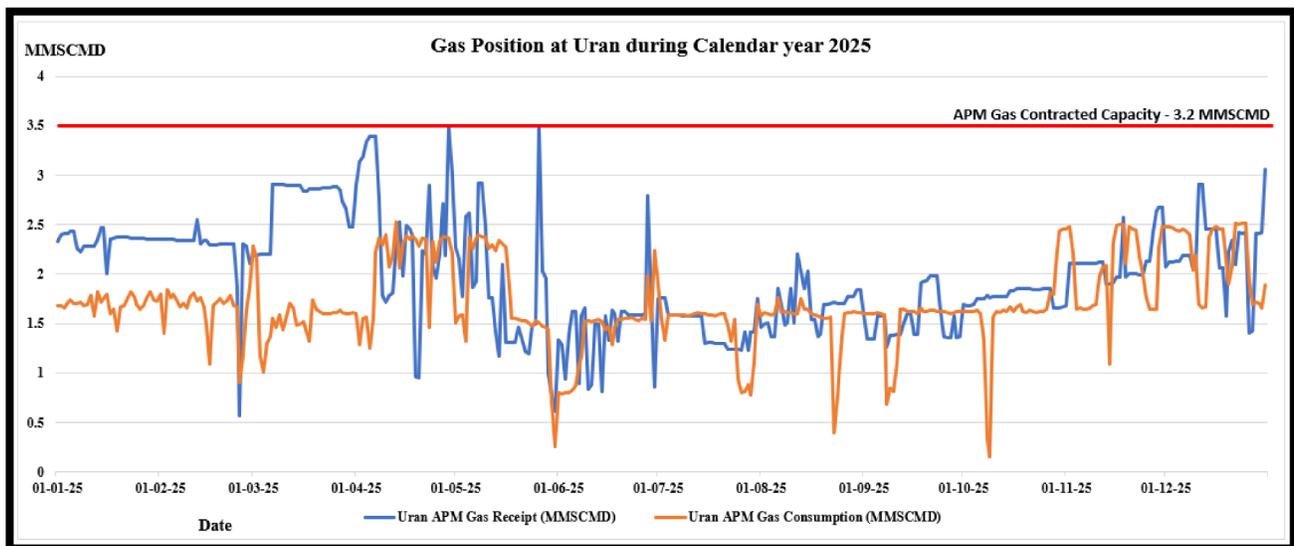
Operational Challenges:

- Unit A0 remained non-operational for 67 days due to technical issues and for 162 days due to fuel shortage.
- Unit 5 remained non-operational for 207 days during the year due to fuel shortage.
- Unit 6 remained non-operational for 165 days during the year due to fuel shortage.
- Unit 7 remained non-operational for 103 days due to technical issues.

These challenges have impacted the plant's availability and its ability to improve congestion in the Mumbai Metropolitan Region's power network.

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
MSPGCL	Uran GTPS	Uran Unit 5	43	223	76
		Uran Unit 6	71	170	60
		Uran Unit 7	19	117	0
		Uran Unit 8	23	24	0
		Uran Unit A0	25	244	0
		Uran Unit B0	13	19	0

Gas position at Uran GTPS during Calendar year 2025:



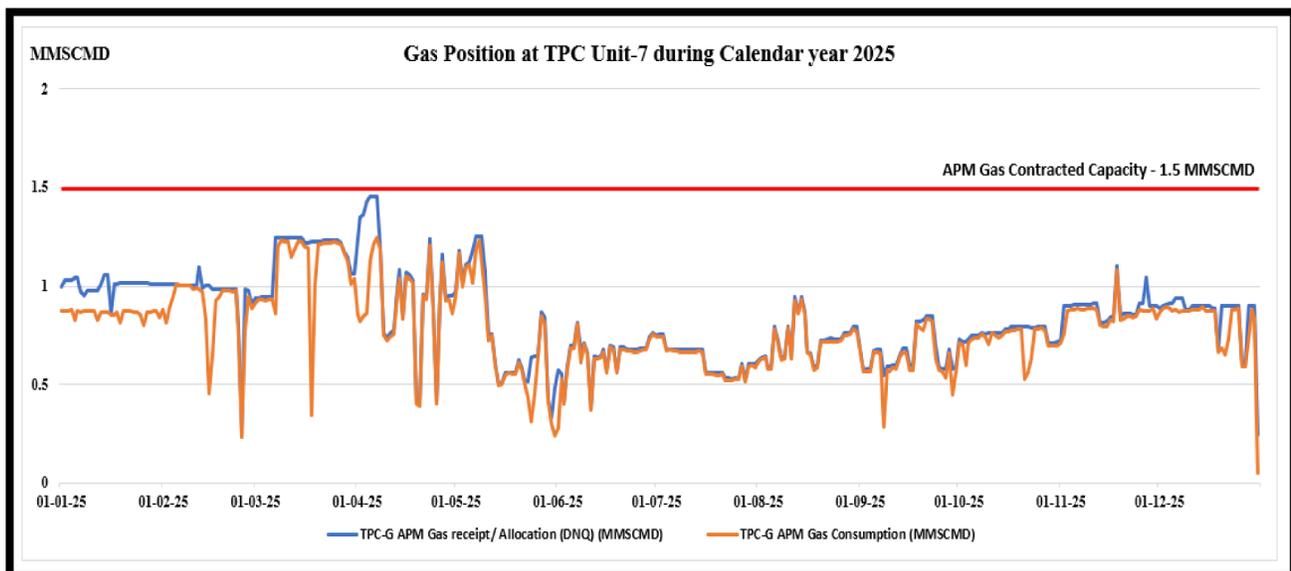
Trombay Unit-7 is a gas-based thermal generating unit located at the Trombay Thermal Power Station, Mumbai, and is owned and operated by Tata Power Company Limited. The unit is an important source of flexible and fast-ramping generation for the Mumbai power system and plays a significant role in maintaining grid reliability and operational security.

Owner	Station	Name of Unit	No. of Times under shut down	No. of Days not available	No. of Days under zero schedule
TPCL	Trombay GTPS	Trombay Unit 7A	14	22	16
		Trombay Unit 7B	14	22	16

Operational Challenges:

Unit 7A & 7B remained non-operational for 6 days during the year due to fuel shortage.

Gas position at Trombay TPC Unit -7 during Calendar year 2025:



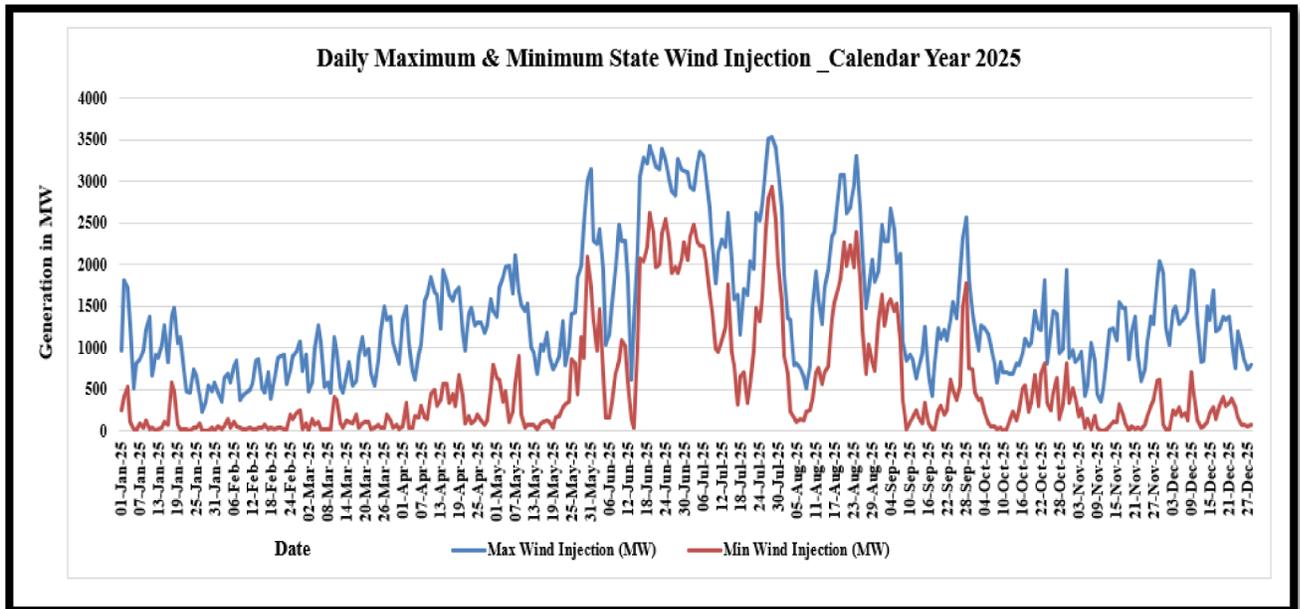
Chapter 4: Generation Profile of RE Sources

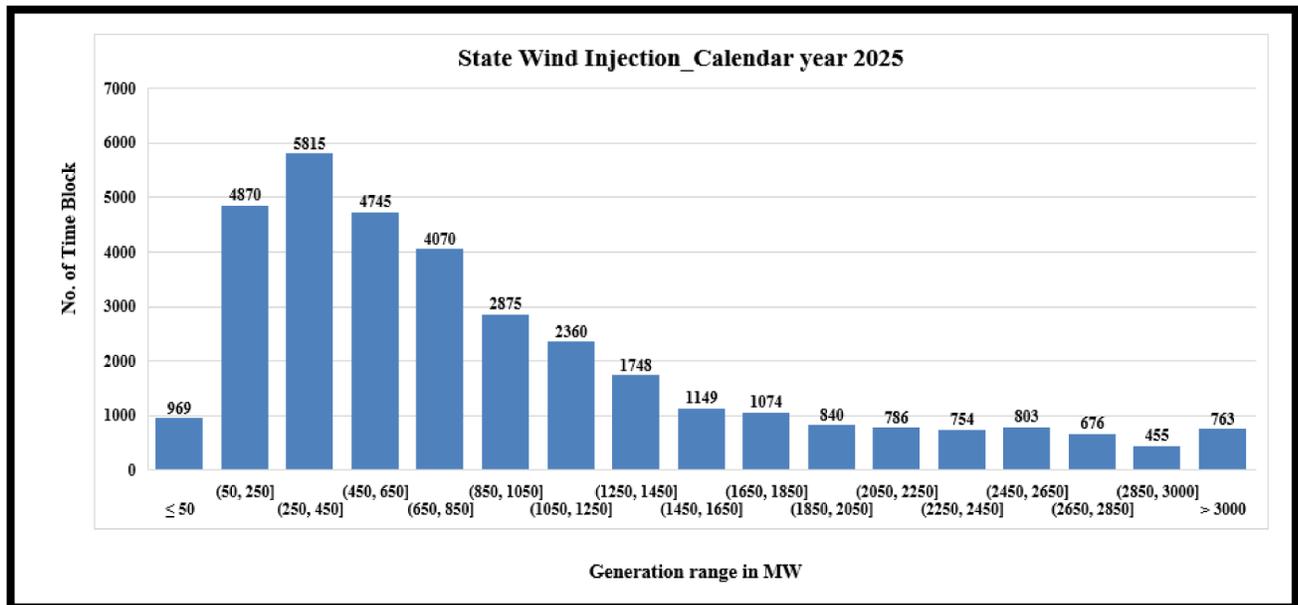
4.1 Wind & Solar Generation:

The details of month-wise Capacity addition in Wind & Solar Generation during CY: 2025 is tabulated below.

Sr No.	Month	Capacity (MW)		
		Wind	Solar	Total
1	Jan-25	5268	4725	9993
2	Feb-25	5274	4818	10092
3	Mar-25	5274	5078	10352
4	Apr-25	5266	5140	10406
5	May-25	5286	5350	10636
6	Jun-25	5286	5794	11080
7	Jul-25	5289	5839	11128
8	Aug-25	5292	5919	11211
9	Sep-25	5321	5956	11277
10	Oct-25	5321	6028	11349
11	Nov-25	5321	6121	11442
12	Dec-25	5325	6305	11630

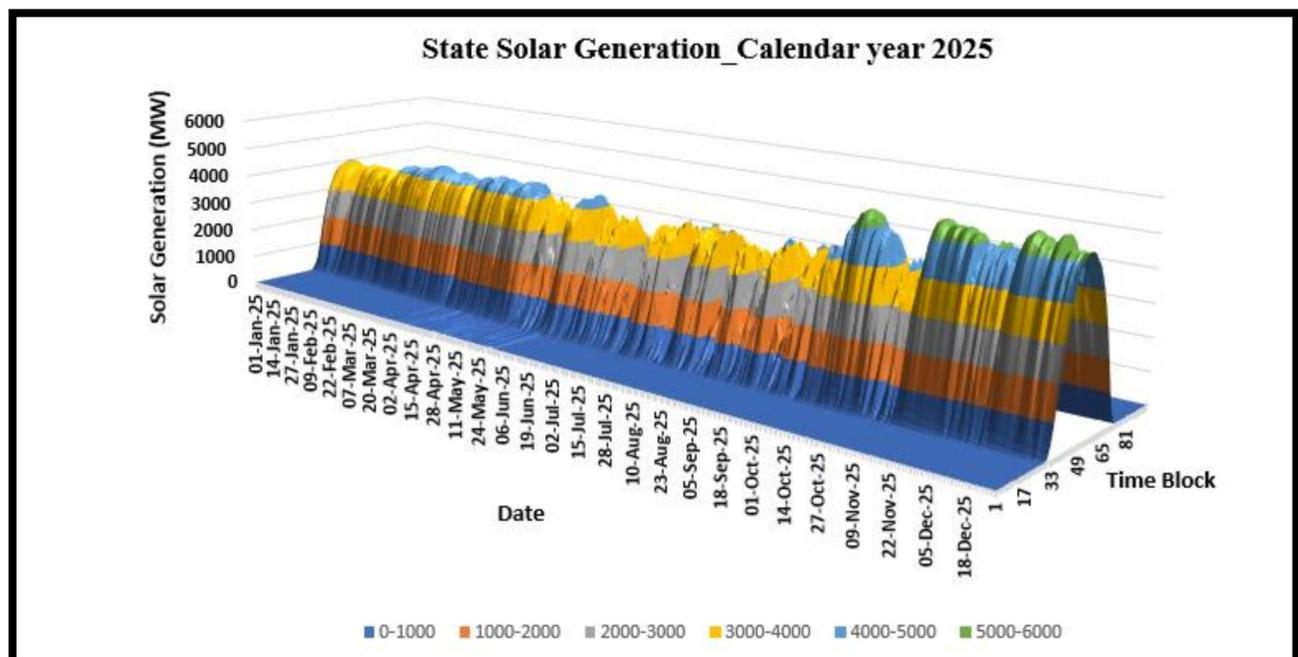
4.1.1 Injection Pattern of Wind Generation:

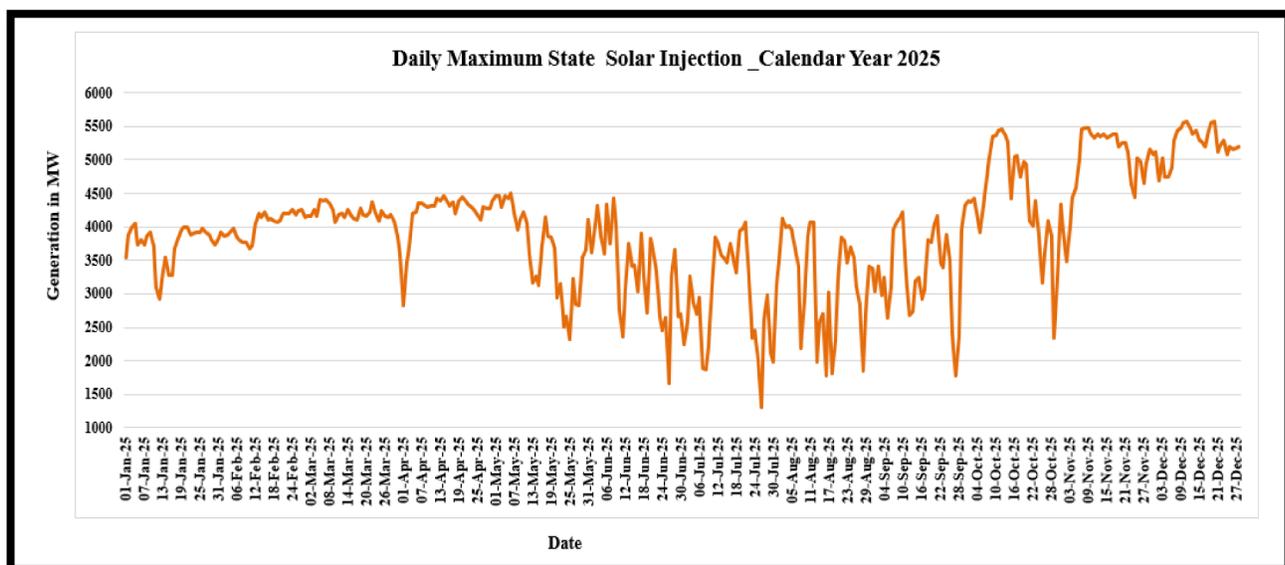
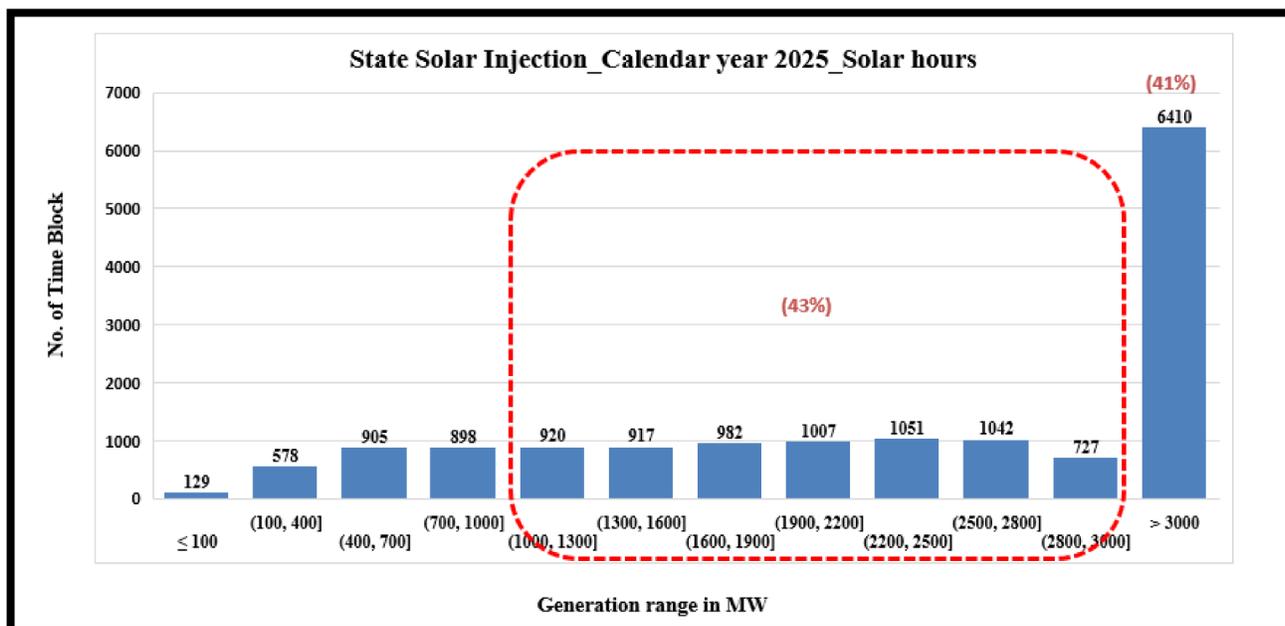




From the above, it is observed that for 44 % of the time Wind Generation is between 100 MW to 700 MW. Also, Wind injection is above 2100 MW only for 12 % of the period.

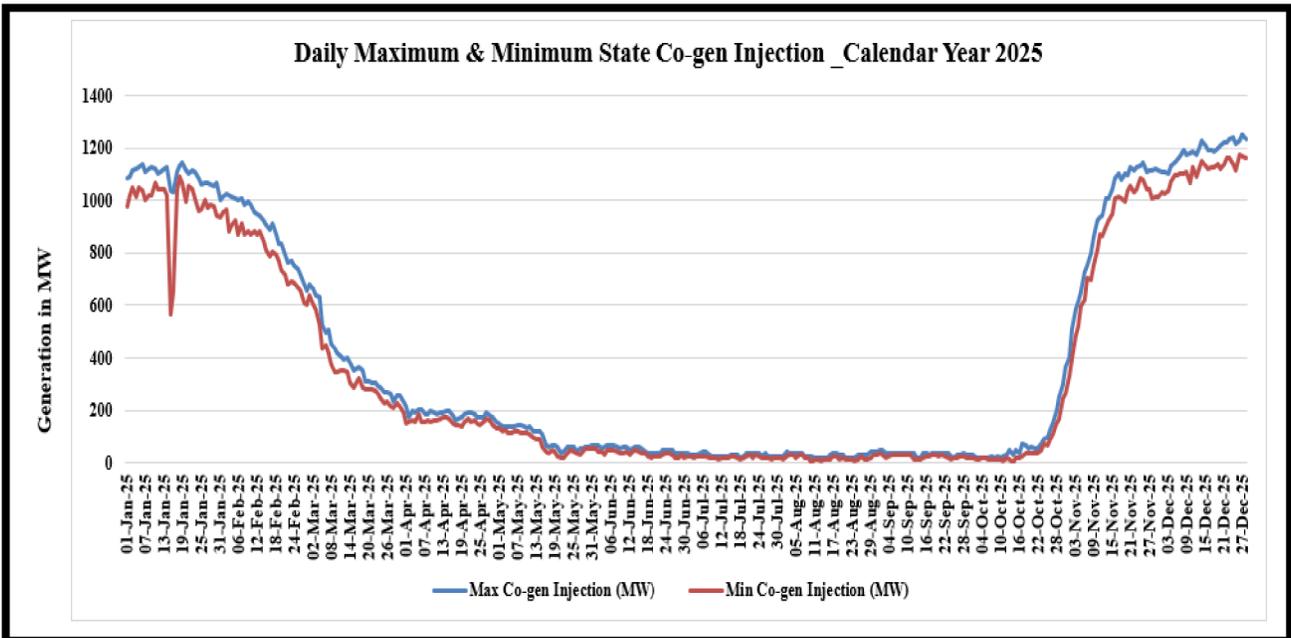
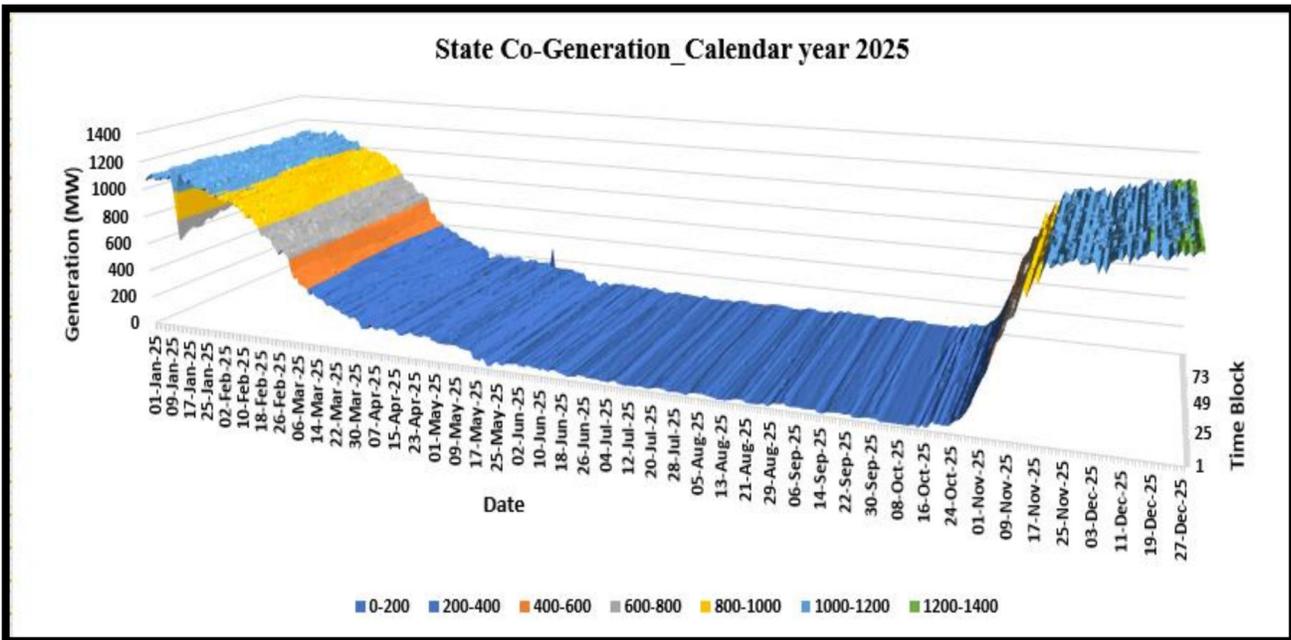
4.1.2 Injection Pattern of Solar Generation:

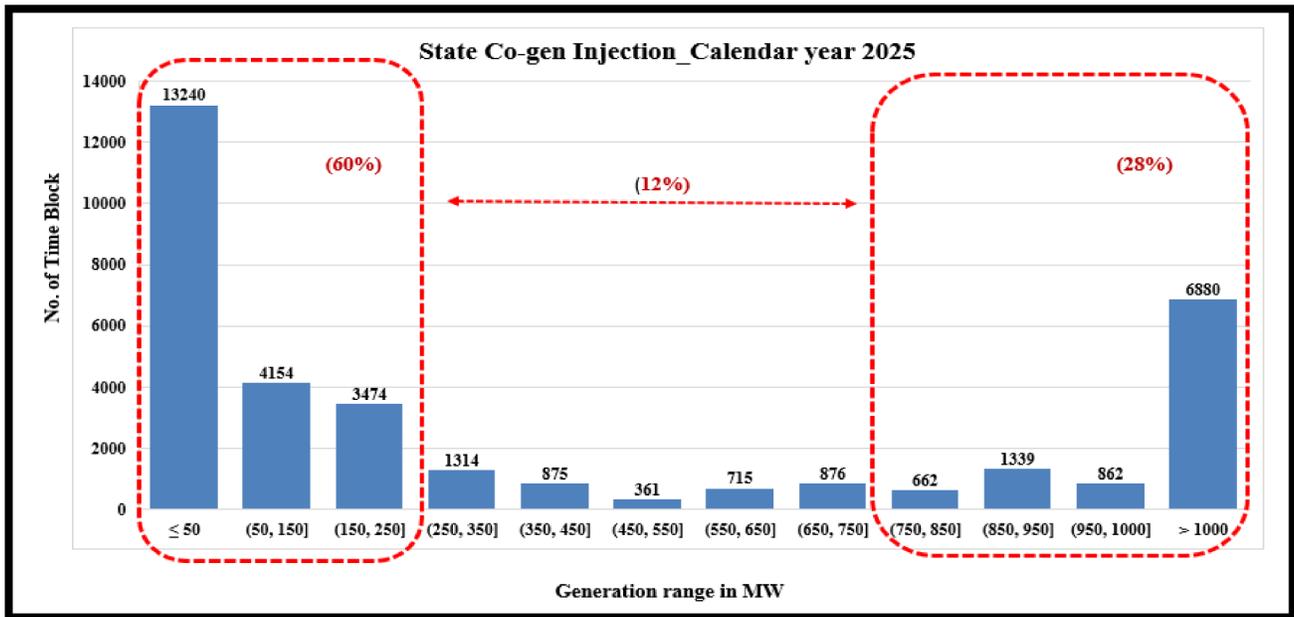




From the above, it is observed that during Solar hours i.e. between 06:00 to 18:00 hrs, for 43 % of the time Solar Generation is between 1000 MW to 3000 MW. Also, Solar injection is above 3000 MW for 41 % of the period.

4.2 Bagasse/Biomass Generation:





Generation from Bagasse-based generation is seasonal & depends up on Sugarcane crushing which starts normally in September or October & is available till April/May. It is observed that against the total installed capacity of around 2700 MW, for 28 % of the period, injection is above 750 MW. Whereas for 60 % of the time, injection is below 250 MW.

Chapter 5: Reserve Monitoring

Maharashtra operates one of the largest and most complex power systems in India comprising of 18 distribution companies and catering to a maximum system demand around 30GW. Each distribution company is required to ensure a continuous balance between load and generation. With the increasing demand and higher penetration of renewable energy sources, ramp management has become a critical operational requirement.

Considering the importance of ramping capability, MSLDC analyzed the ramping margins available in the system during the Calendar Year (C.Y.) 2025. This ramp reserve assessment has been carried out for thermal generating stations which are despatched by SLDC as per the scheduling and despatch code of Maharashtra state following the principles of merit order despatch. whose schedules are optimized through Merit order stack and dispatched by MSLDC.

For the purpose of this assessment, Gas-based generation, hydro generation and pumped storage projects have not been considered. The analysis therefore reflects the ramping capability available from thermal resources alone under prevailing operating conditions during 2025.

Behaviour of Demand Ramping

During Calendar Year (CY) 2025, the State's actual drawal (system demand) varied from a minimum of 18,037 MW, recorded on 21.12.2025 during Time Block 96, to a maximum of 30,307 MW, recorded on 24.04.2025 during Time Block 63.

5.1 Ramp Behaviour around Minimum Demand

At the minimum demand level of 15,510 MW, the instantaneous ramp-down requirement was 5 MW per 15-minute time block. On the same day, the maximum observed ramp-down requirement was 365 MW, while the maximum ramp-up requirement was 600 MW within a 15-minute time block.

The corresponding net drawal, excluding Central Sector generation and renewable energy sources (wind and solar), was 8,151 MW. For this net drawal, the required ramp-down rate was 90 MW per 15-minute time block, with a maximum ramp-down requirement of 700 MW and a maximum ramp-up requirement of 900 MW observed during the day.

5.2 Ramp Behaviour around Maximum Demand

At the maximum demand level of 30,307 MW on 24.04.2025, the instantaneous ramp-up requirement was 260 MW per 15-minute time block. On the same day, the maximum ramp-down requirement observed was 543 MW, while the maximum ramp-up requirement was 507 MW.

The corresponding net drawal, excluding Central Sector generation and renewable energy sources (wind and solar), was 15,091 MW. For this net drawal level, the ramp-up requirement was 280 MW per 15-minute time block, with a maximum ramp-down requirement of 717 MW and a maximum ramp-up requirement of 765 MW observed during the day.

5.3 Demand Side Ramp and Available System Ramp

The following figure illustrates the relationship between demand-side ramping requirements and the maximum available ramping capability of on-bar generating units, evaluated without consideration of operating schedules. (i.e. Max available ramp in system = Sum (Per block ramping capacity of all onbar units))

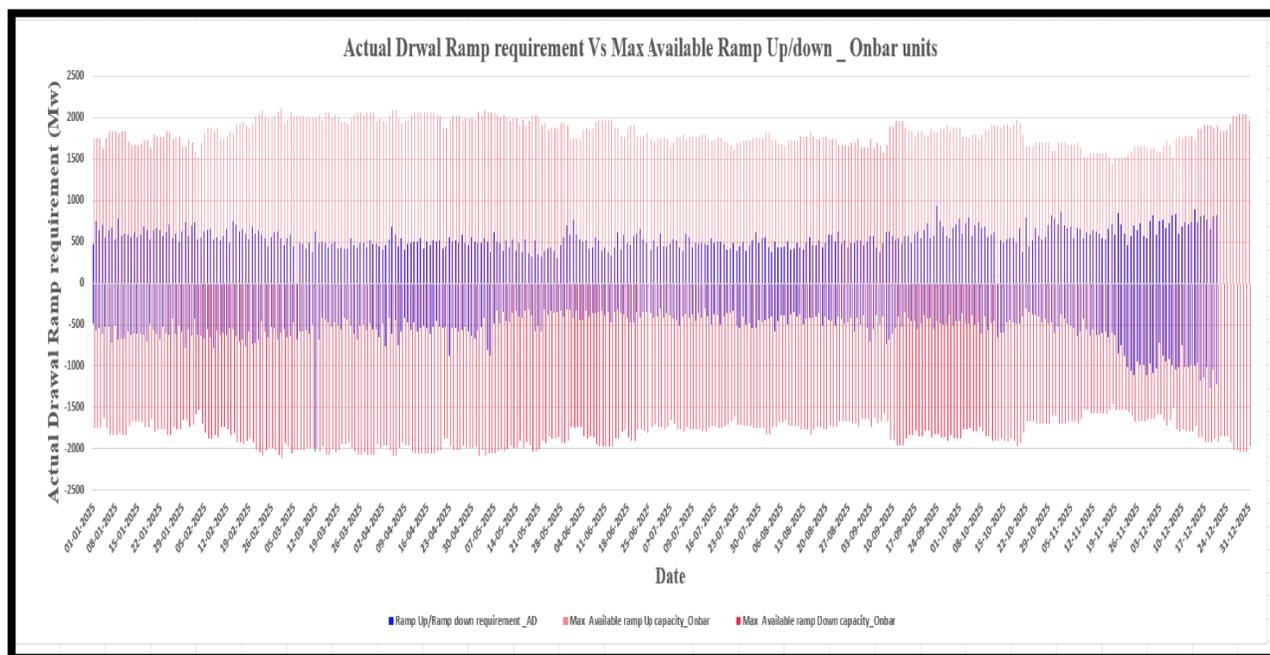


Figure -1 Demand side ramp and Max System Ramp during Calendar year 2025 (Upto 21.12.25)

Observations:

The maximum ramp-up requirement of system demand at the level of actual drawal was observed on 24.09.2025 during Time Block (TB) 75, amounting to 929 MW per 15-minute time block. The maximum available ramp-up capacity of on-bar intra-State generating units at the corresponding time was 1,800 MW. Accordingly, no ramp-up shortfall was observed under actual drawal conditions.

In contrast, the maximum ramp-down requirement at the level of actual drawal was 2,035 MW, observed on 12.03.2025 during Time Block (TB) 61. At this time, the maximum available ramp-down capacity of on-bar units was 1,897 MW, resulting in a ramp-down shortfall of approximately 150 MW.

5.4 Net Demand ramp and available system ramp

For operational analysis, Net Drawal represents the actual State drawal after excluding must-run and non-dispatchable resources, including solar generation, wind generation, power exchange transactions, and Central Sector schedules. Since the ramping requirements corresponding to Net Drawal are required to be met by intra-State generating stations, the ramping assessment has also been extended to Net Drawal conditions to evaluate the adequacy of intra-State ramping capability under realistic dispatch constraints.

The following figure illustrates the relationship between net demand-side ramping requirements and the maximum available ramping capability of on-bar generating units, evaluated without consideration of operating schedules.

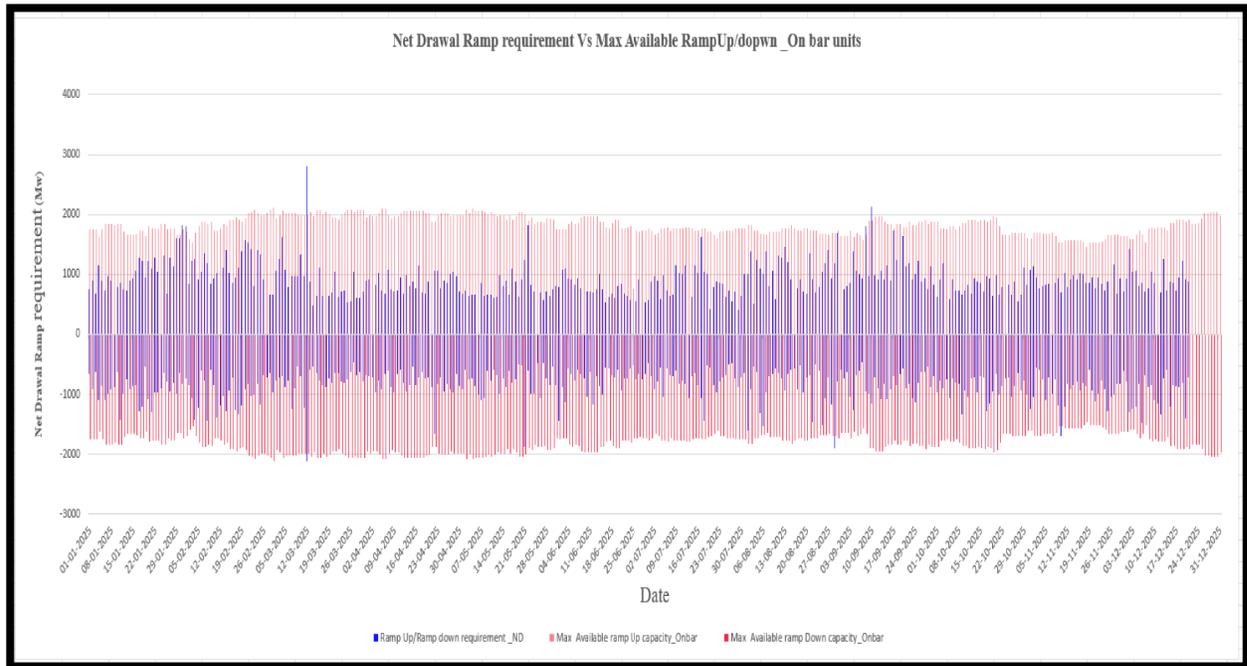


Figure 2 - Net Demand side ramp and Max System ramp during Calendar year 2025 (Upto 21.12.25)

Observations:

The maximum ramp-up requirement based on Net Drawal was 2,796 MW, observed on 12.03.2025 during Time Block (TB) 67. At the corresponding time, the maximum available ramp-up capability of on-bar intra-State generating units was limited to 1,852 MW, resulting in a significant ramp-up shortfall of 944 MW.

Similarly, the maximum ramp-down requirement based on Net Drawal was 2,120 MW, observed on 12.03.2025 during Time Block (TB) 61. Against this requirement, the maximum available ramp-down capability of on-bar units was 1,897 MW, leading to a system ramp-down shortfall of approximately 223 MW.

5.5 Demand Side Ramp and Available Constrained System Ramp

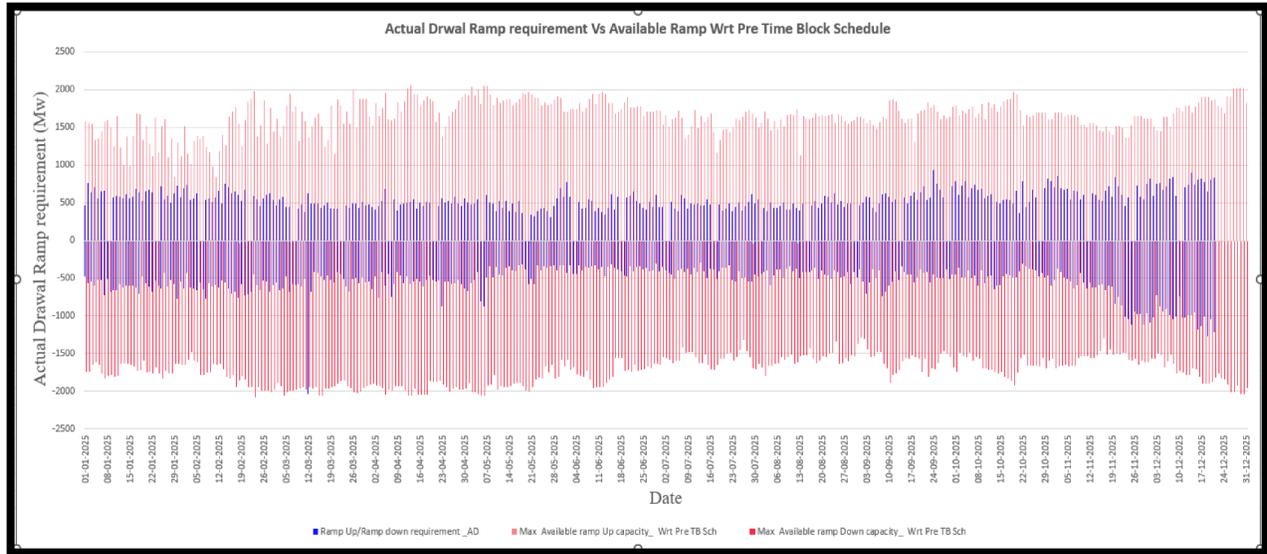


Figure 3- Demand side ramp and Max Constrained System ramp during Calendar year 2025 (Upto 21.12.25)

The maximum ramp-up requirement based on actual drawal was 929 MW, observed on 24.09.2025 during Time Block (TB) 75. However, the available ramp-up capability, when assessed with reference to the scheduled generation level in the preceding time block, was limited to 159 MW. As a result, a significant ramp-up shortfall of 770 MW was observed.

Similarly, the maximum ramp-down requirement based on actual drawal was 2,035 MW, observed on 12.03.2025 during Time Block (TB) 61. At the corresponding time, the available ramp-down capability, evaluated with respect to the scheduled generation position in the previous time block, was limited to 1,198 MW, resulting in a ramp-down shortfall of 837 MW.

5.6 Net Demand Side Ramp and Available Constrained System Ramp

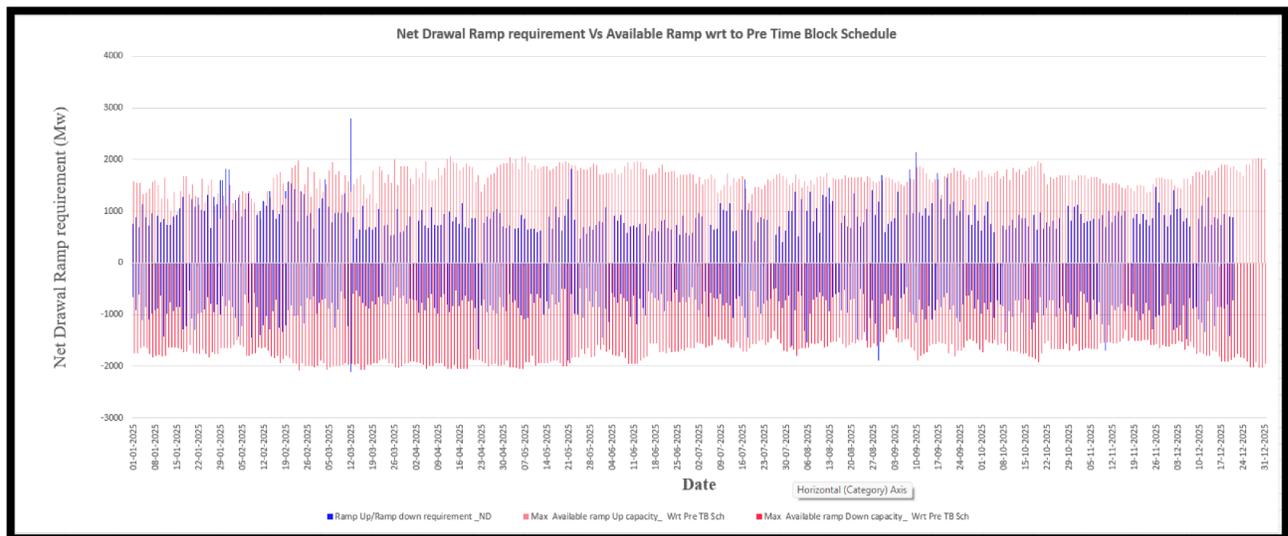


Figure -4 Net Demand side ramp and Max Constrained System ramp during Calendar year 2025 (Upto 21.12.25)

The maximum ramp-up requirement based on Net Drawal was 2,796 MW, observed on 12.03.2025 during Time Block (TB) 67. However, the available ramp-up capability, when assessed with reference to the scheduled generation position in the preceding time block, was limited to 458 MW. Consequently, a significant ramp-up shortfall of 2,338 MW was observed.

Similarly, the maximum ramp-down requirement based on Net Drawal was 2,120 MW, observed on 12.03.2025 during Time Block (TB) 61. Against this requirement, the available ramp-down capability, evaluated with respect to the scheduled generation level in the previous time block, was limited to 1,198 MW, resulting in a system ramp-down shortfall of 922 MW.

5.7 Shortage & Surplus of Constraint Ramp corresponding to Net demand

During Calendar Year (CY) 2025, the Maharashtra power system experienced ramp-up shortages during approximately 10–11% of the total time blocks (around 3,700 time blocks). The maximum ramp-up shortfall, of the order of 2,300 MW, was observed on 12.03.2025 during Time Block (TB) 67. These ramp-up shortages were largely managed through the deployment of fast-ramping hydro generating stations, particularly MSPGCL Koyna Hydro and TPCL Hydro, which provided critical operational support during periods of steep demand increase.

In addition, the system experienced ramp-down shortages during approximately 4–5% of the total time blocks (around 1,500 time blocks). The maximum ramp-down shortfall observed was of the order of 1,000 MW. Such ramp-down constrained periods pose significant operational challenges, as they limit the ability of the system to absorb excess generation during high renewable output conditions. These observations highlight the need for demand side management, energy storage systems, and enhanced downward flexibility of available thermal generators to effectively manage surplus generation and to improve overall system flexibility.

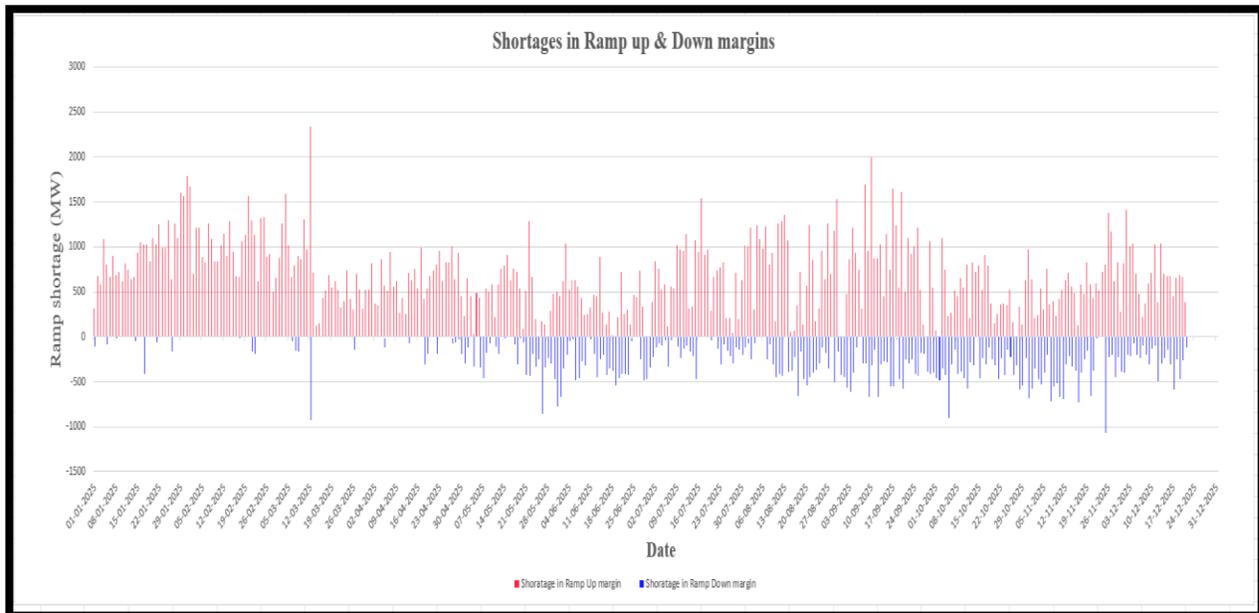


Figure -5 Shortages in system ramp requirement considering net demand 2025 during Calendar year 2025 (Upto 21.12.25)

5.8. Available margin time blocks on intra state generators C.Y.-2025

In this report, the ramping and margin analysis is carried out for major intra-State thermal generating stations that are optimised, scheduled, and dispatched by SLDC through the decentralised and centralised merit order dispatch framework. Approximately 50 intra-State generating units have been considered for this analysis, as listed in Table 5.1.

The assessment indicates that intra-State thermal generating stations maintained available upward margins during approximately 10% to 75% of the total time blocks over Calendar Year 2025. The availability of margins varied across units and time blocks, depending on operating schedules, technical limits, and dispatch positions.

A detailed breakdown of margin availability—including unscheduled upward margin, unscheduled ramp-limited upward margin, downward margin, and ramp-limited downward margin—is presented in Table 5.1. These metrics provide insight into the effective operational flexibility available from intra-State thermal resources under prevailing system conditions.

Table-5.1: Available Margin time blocks in Intrastate Generator

S.No.	Name of the generator	% of Un-Scheduled Up margin	% of Down margin	% of Ramp limited Up Margin	% of Ramp limited Down Margin
1	ADTPS_U1	66%	45%	65%	44%
2	ADTPS_U2	75%	56%	74%	55%
3	APML_U1	72%	62%	43%	54%
4	APML_U2	42%	71%	41%	70%
5	APML_U3	44%	68%	44%	68%
6	APML_U4	71%	58%	50%	58%
7	APML_U5	75%	62%	48%	53%
8	BHUSAWAL_U3	76%	18%	28%	17%
9	BHUSAWAL_U4	70%	38%	47%	34%
10	BHUSAWAL_U5	67%	37%	45%	33%
11	BHUSAWAL_U6	30%	53%	28%	50%
12	CHANDRAPUR_U3	51%	44%	44%	44%
13	CHANDRAPUR_U4	45%	37%	36%	37%
14	CHANDRAPUR_U5	51%	44%	41%	44%
15	CHANDRAPUR_U6	49%	35%	45%	35%
16	CHANDRAPUR_U7	47%	40%	41%	40%
17	CHANDRAPUR_U8	43%	66%	39%	62%
18	CHANDRAPUR_U9	28%	23%	25%	21%
19	IEPL	64%	91%	40%	91%
20	JSWEL_U1	50%	53%	38%	49%
21	KHAPERKHEDA_U1	33%	64%	33%	64%
22	KHAPERKHEDA_U2	36%	67%	35%	67%
23	KHAPERKHEDA_U3	34%	67%	33%	67%
24	KHAPERKHEDA_U4	34%	66%	34%	66%

25	KHAPERKHEDA_U5	14%	65%	12%	62%
26	KORADI_U10	22%	79%	21%	76%
27	KORADI_U6	29%	60%	28%	60%
28	KORADI_U8	17%	68%	16%	66%
29	KORADI_U9	21%	78%	20%	75%
30	NASHIK_U3	57%	32%	57%	30%
31	NASHIK_U4	53%	33%	52%	32%
32	NASHIK_U5	50%	34%	49%	32%
33	PARAS_U3	48%	54%	48%	54%
34	PARAS_U4	44%	50%	44%	50%
35	PARLI_U6	80%	30%	49%	30%
36	PARLI_U7	75%	29%	48%	29%
37	PARLI_U8	69%	26%	39%	23%
38	RIPL_U1	11%	90%	11%	90%
39	RIPL_U2	11%	80%	11%	80%
40	RIPL_U3	12%	88%	12%	88%
41	RIPL_U4	11%	82%	10%	82%
42	RIPL_U5	21%	81%	10%	80%
43	SWPGL_U1234	79%	98%	50%	97%
44	TPCL_U5	79%	28%	76%	23%
45	TPCL_U7APM	0%	89%	0%	0%
46	TPCL_U7NAPM	40%	0%	0%	0%
47	TPCL_U8	81%	63%	79%	43%
48	URAN_STG_2	0%	99%	0%	0%
49	URAN_WHRP	0%	98%	0%	0%
50	JSWEL_U234	100%	92%	0%	0%

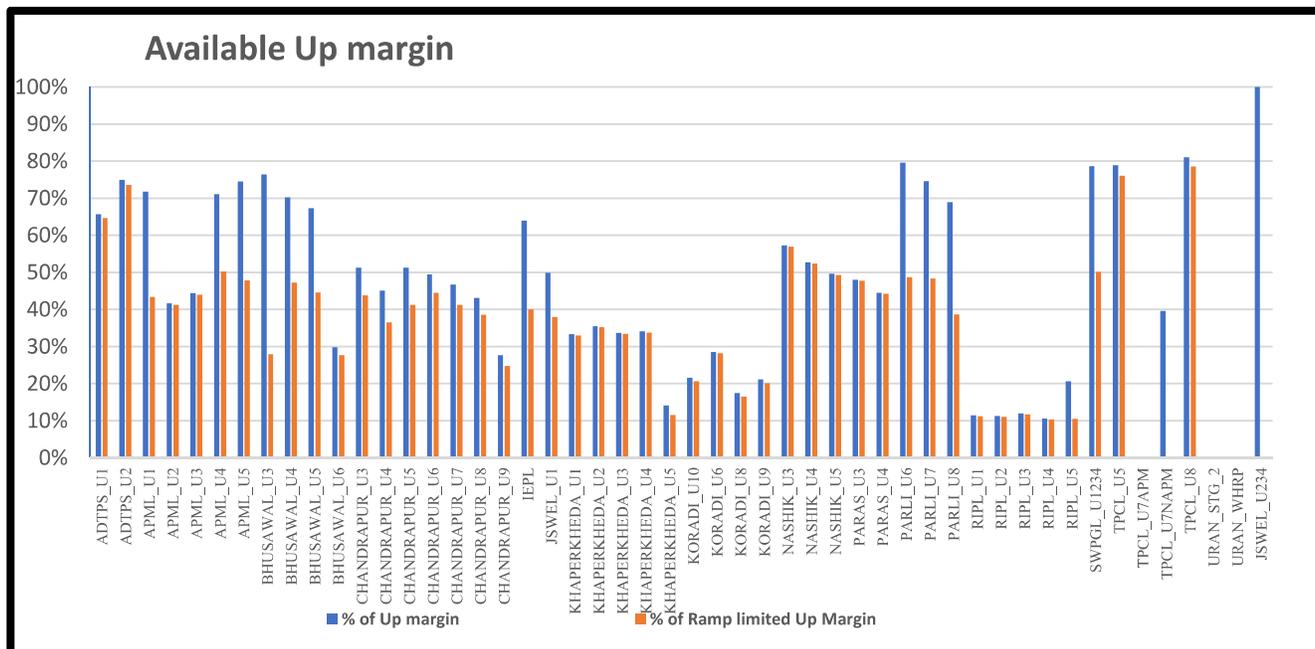


Figure -6 Unitwise available up margin time blocks

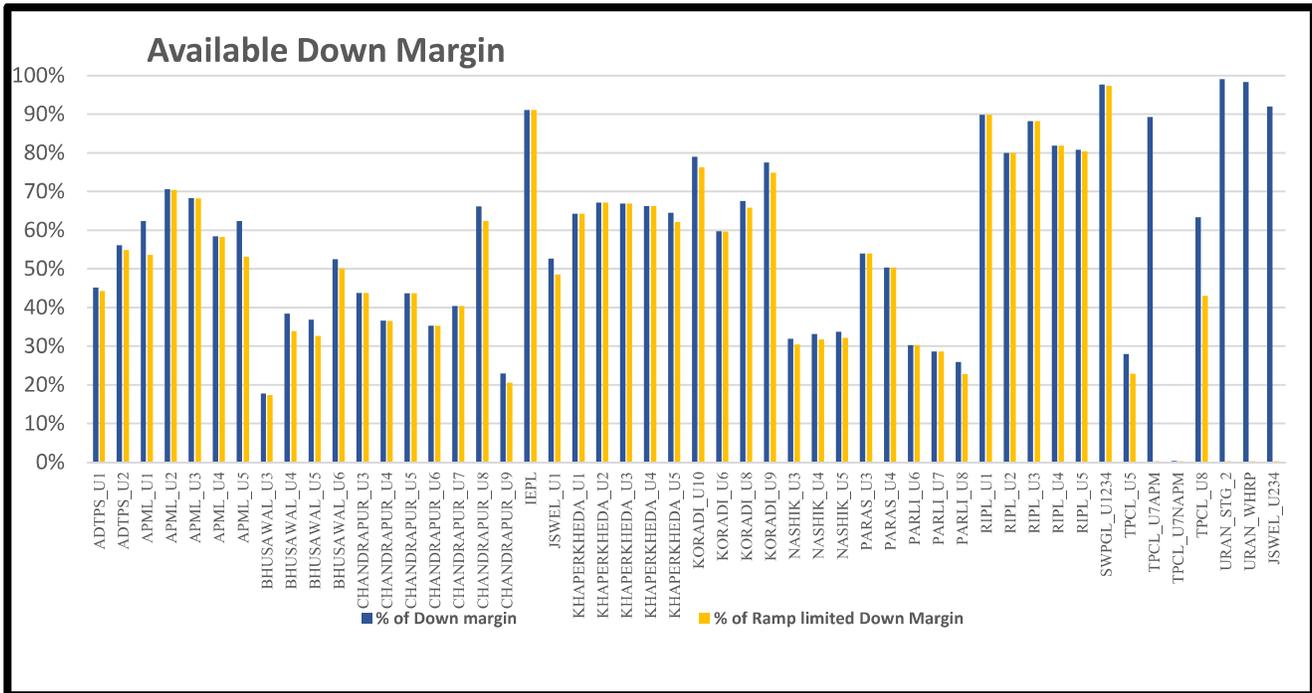


Figure -7 Unitwise available down margin time blocks

5.9 Analysis of Available un-despatched Ramp Up capacity

During Calendar Year (CY) 2025, an assessment of upward and downward reserve margins for the Maharashtra power system was carried out based on the declared capacities and scheduled generation of intra-State generating stations. The analysis focuses on evaluating the availability of operational flexibility from intra-State resources under prevailing dispatch conditions.

The unscheduled upward reserve margin for each generating unit or station has been computed on a time-block-wise basis as the difference between the Declared Capacity (DC) and the scheduled generation of the unit for the corresponding time block. Further, monthly averages of time-block-wise unscheduled upward reserve margins have been calculated to assess seasonal and diurnal trends in reserve availability.

Based on the analysis, the following observations have been made:

- During solar hours (06:00–18:00 hrs), the maximum unscheduled upward reserve margins were observed during November 2025, May 2025, and June 2025, with values ranging from approximately 7,789 MW to 5,694 MW. The minimum unscheduled upward reserve margins during solar hours were observed during January 2025 and February 2025.
- During non-solar hours (18:00–06:00 hrs of the following day), the maximum unscheduled upward reserve margins were again observed during November 2025, May 2025, and June 2025, ranging from approximately 6,907 MW to 2,752 MW. The minimum unscheduled upward reserve margins during non-solar hours were also observed during January 2025 and February 2025.
- Time-block-wise analysis indicates that the Maharashtra power system experiences surplus conditions predominantly during Time Blocks 43 to 52, whereas low or negligible unscheduled

upward reserve margins are typically observed during Time Blocks 75 to 81, corresponding to periods of high net demand and increased operational stress.

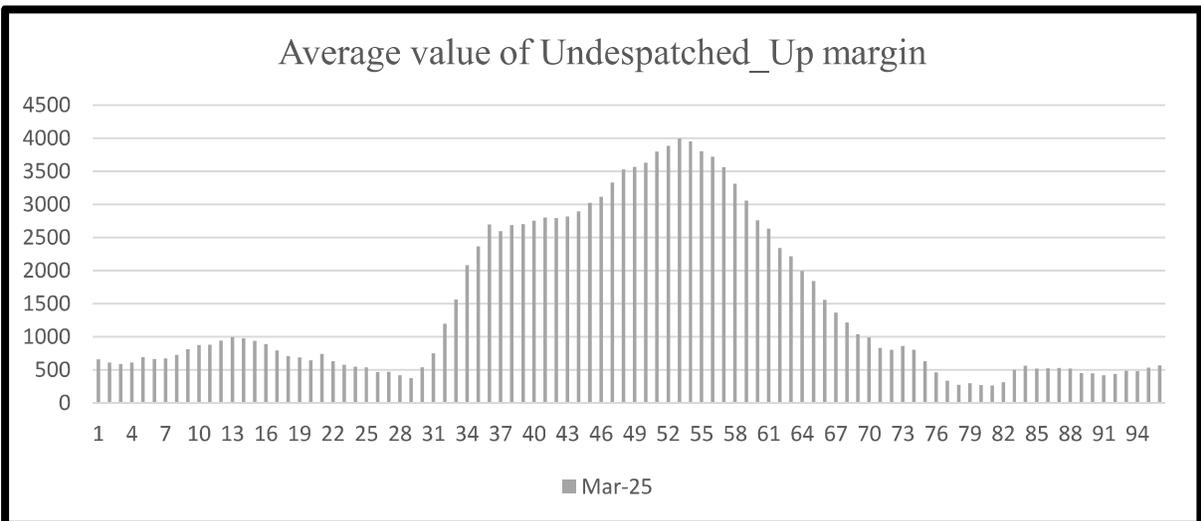
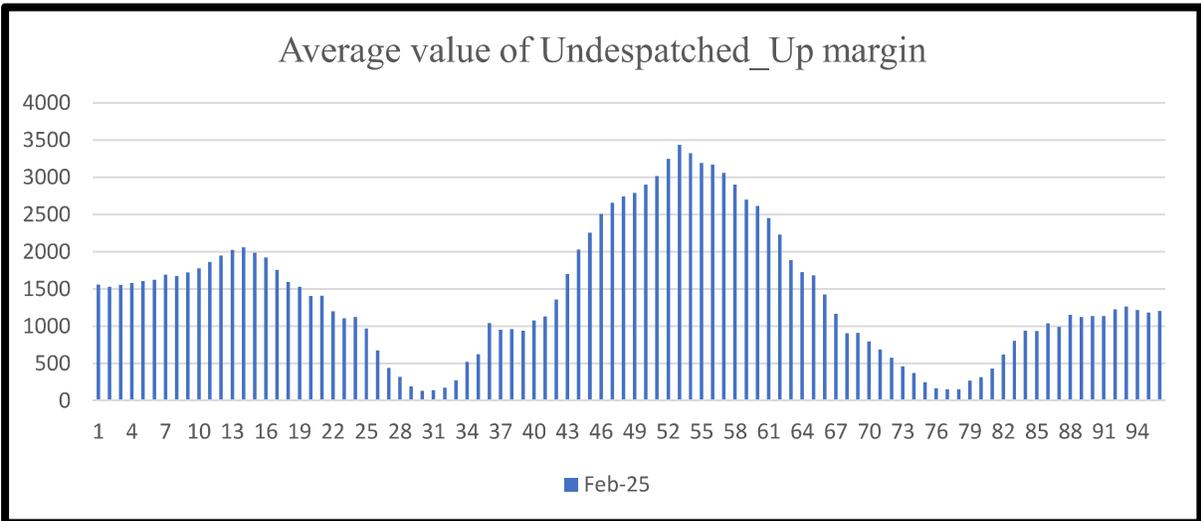
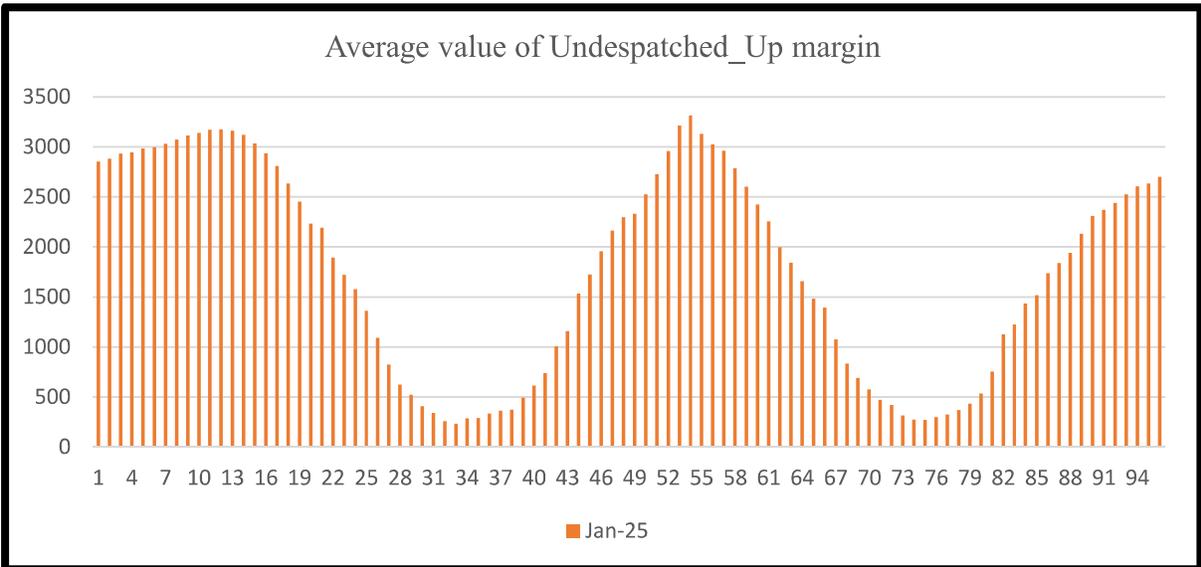
The overall time-block-wise average unscheduled upward margins for each month are summarised in Table 5.2, providing a consolidated view of reserve availability patterns across the year.

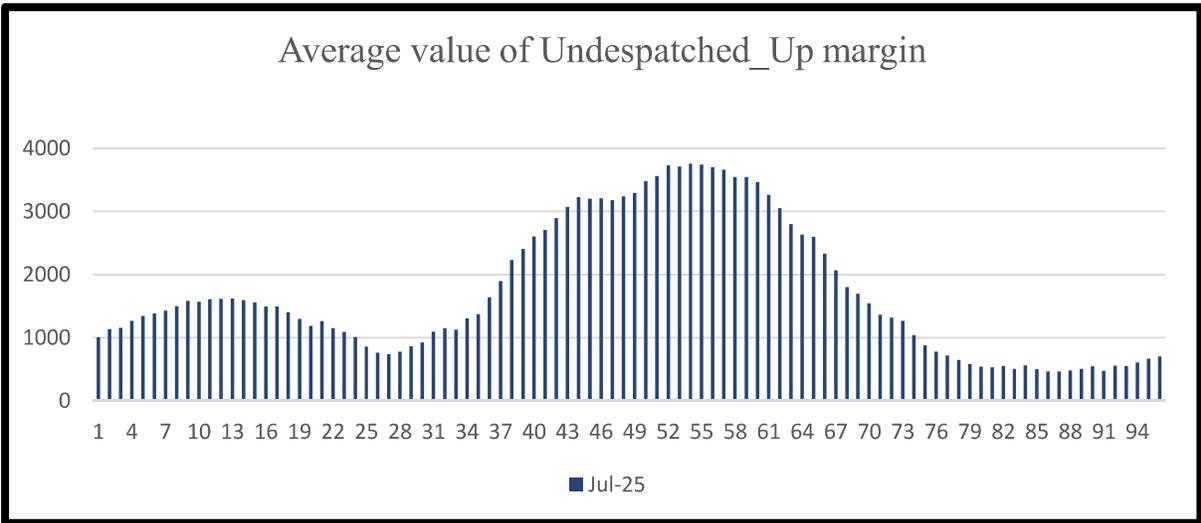
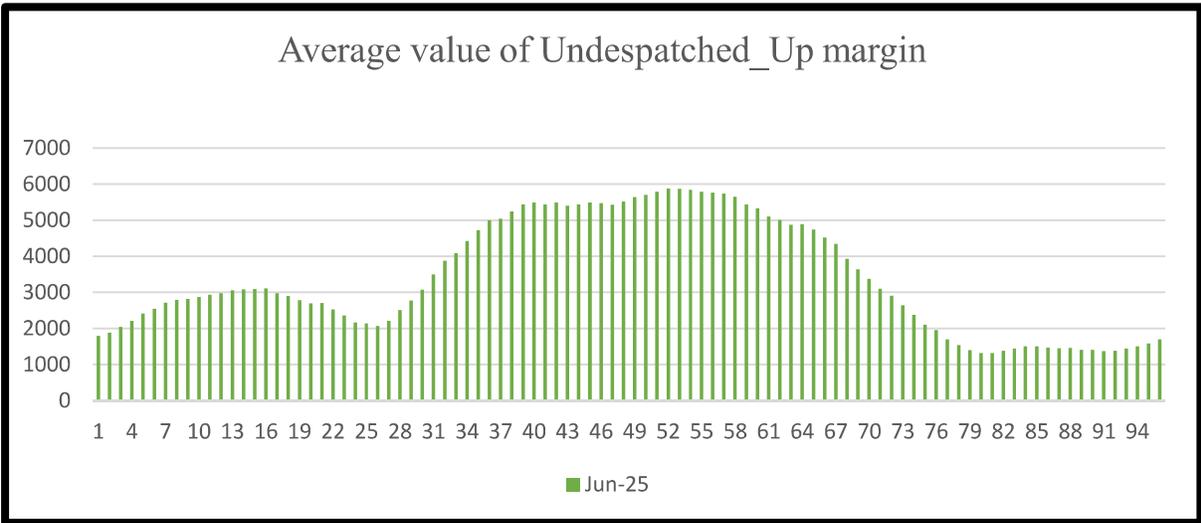
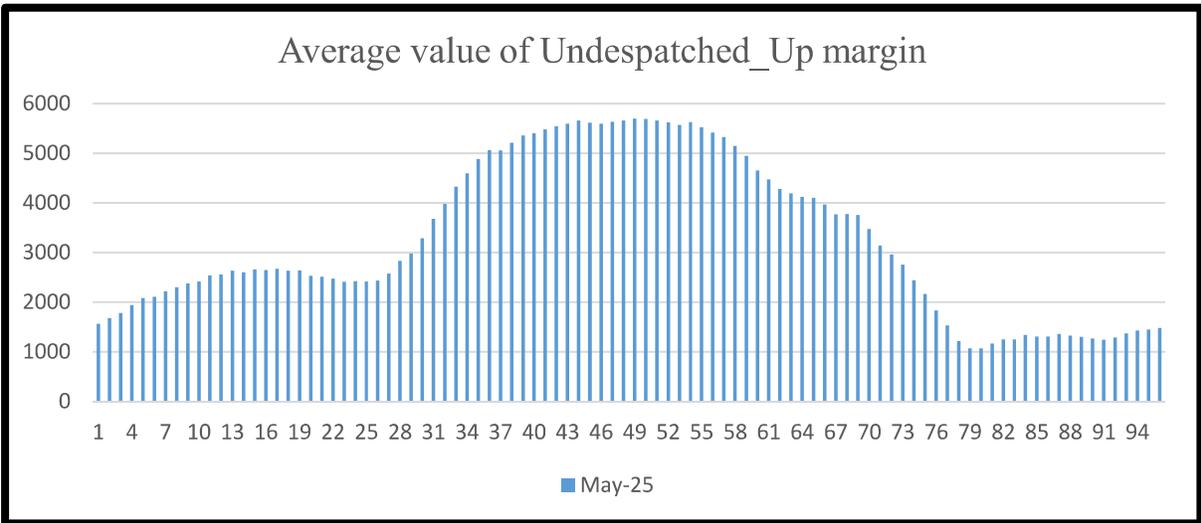
Table-5.2: Average value of Undespached Up margin (MW)

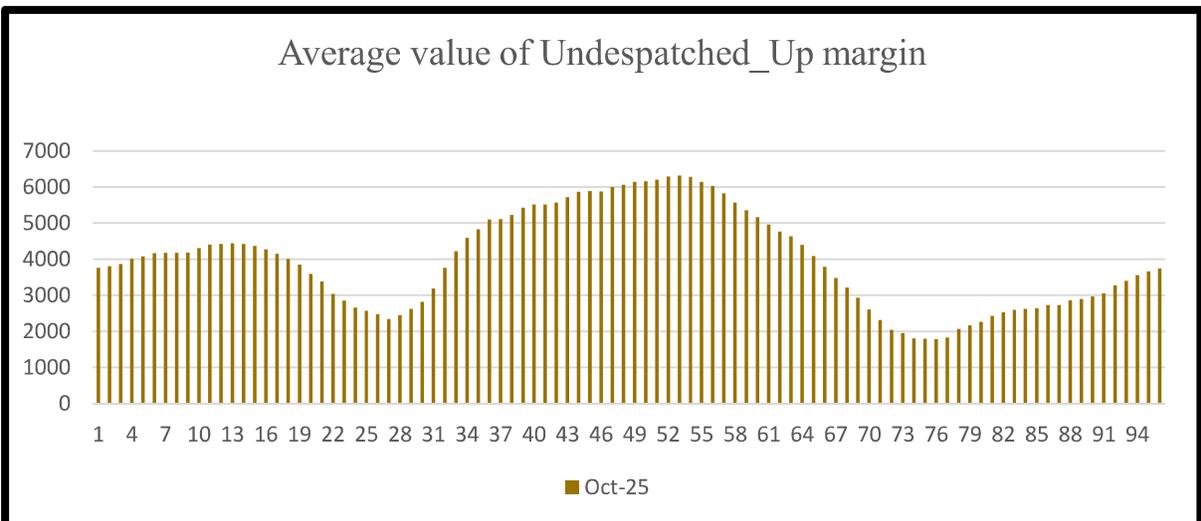
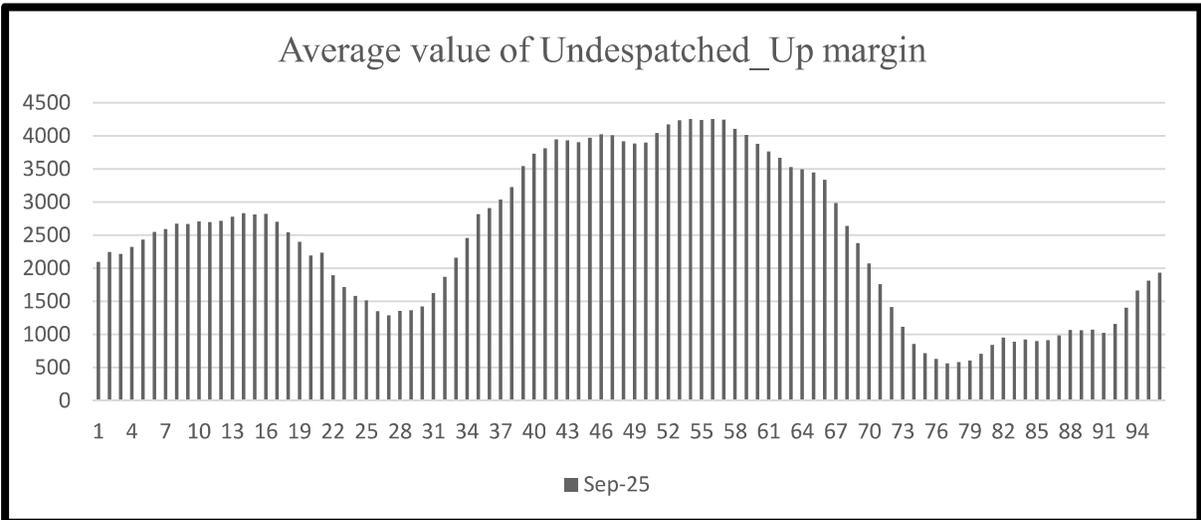
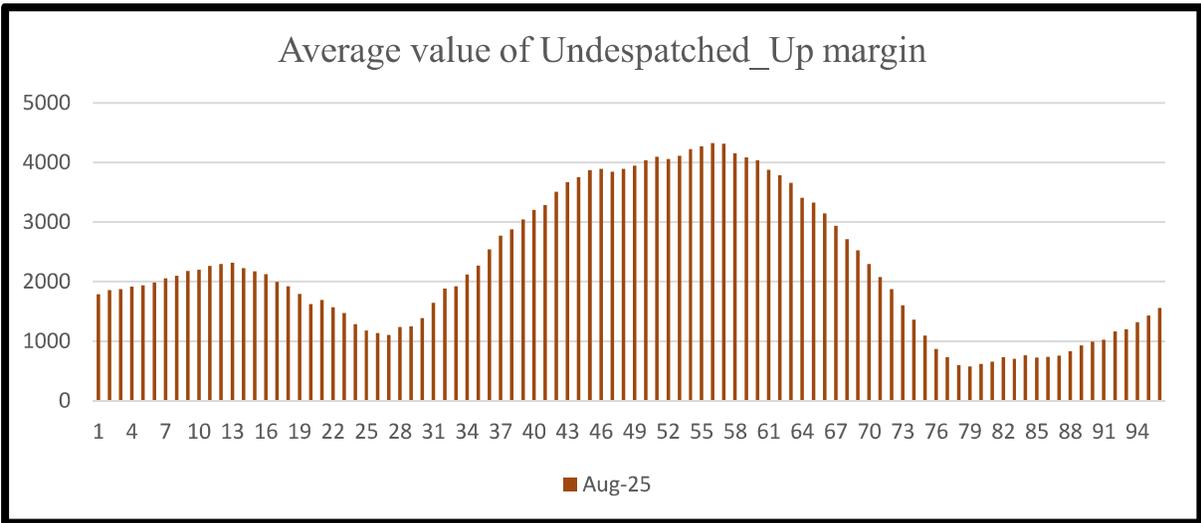
Time Block	Average value of Undespached_Up margin (MW)												Min	Max
	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25		
1	2854	1560	658	318	1561	1796	1007	1791	2097	3758	6508	5391	318	6508
2	2883	1529	612	330	1679	1883	1137	1858	2244	3805	6584	5468	330	6584
3	2933	1557	588	320	1784	2040	1155	1874	2215	3861	6621	5447	320	6621
4	2945	1582	611	397	1941	2209	1266	1917	2324	4004	6732	5468	397	6732
5	2982	1609	694	448	2082	2410	1341	1938	2431	4073	6773	5487	448	6773
6	2998	1626	661	498	2108	2548	1384	1985	2548	4164	6778	5533	498	6778
7	3031	1695	674	530	2214	2709	1431	2058	2593	4173	6808	5600	530	6808
8	3071	1675	725	564	2297	2791	1497	2099	2674	4172	6843	5682	564	6843
9	3113	1725	811	551	2374	2818	1586	2180	2666	4186	6825	5735	551	6825
10	3141	1776	874	589	2417	2875	1570	2200	2706	4305	6841	5710	589	6841
11	3171	1864	879	594	2539	2936	1612	2264	2697	4402	6907	5654	594	6907
12	3174	1948	944	634	2558	2975	1614	2299	2717	4426	6895	5715	634	6895
13	3163	2028	994	646	2630	3056	1619	2315	2778	4437	6893	5666	646	6893
14	3120	2059	976	685	2601	3083	1592	2227	2833	4423	6847	5590	685	6847
15	3035	1989	939	694	2656	3091	1561	2173	2814	4369	6834	5479	694	6834
16	2938	1925	890	734	2646	3109	1493	2127	2821	4269	6755	5401	734	6755
17	2809	1756	791	738	2674	2981	1493	1997	2700	4151	6560	5187	738	6560
18	2634	1596	707	694	2631	2894	1401	1924	2542	4005	6320	4837	694	6320
19	2454	1530	686	649	2636	2786	1298	1795	2399	3850	6107	4679	649	6107
20	2234	1408	646	640	2531	2692	1188	1623	2194	3589	5838	4391	640	5838
21	2192	1411	742	621	2511	2700	1261	1692	2237	3378	5656	4067	621	5656
22	1893	1202	632	574	2476	2531	1149	1571	1896	3037	5256	3642	574	5256
23	1720	1109	576	526	2409	2362	1089	1474	1718	2854	4972	3324	526	4972
24	1579	1124	549	482	2423	2163	1010	1288	1581	2656	4677	2944	482	4677
25	1361	971	540	496	2417	2143	860	1180	1513	2567	4528	2608	496	4528
26	1093	675	466	474	2432	2073	763	1138	1353	2469	4239	2192	466	4239
27	825	439	471	477	2576	2210	737	1106	1290	2342	4011	1882	439	4011
28	626	322	416	585	2831	2507	780	1240	1354	2443	3926	1651	322	3926
29	523	193	377	642	2979	2771	864	1251	1364	2625	3911	1508	193	3911
30	407	134	541	1072	3287	3073	923	1387	1425	2812	4065	1406	134	4065
31	342	144	749	1657	3680	3500	1096	1645	1628	3189	4323	1420	144	4323
32	258	175	1198	2405	3981	3876	1150	1886	1872	3763	4880	1503	175	4880

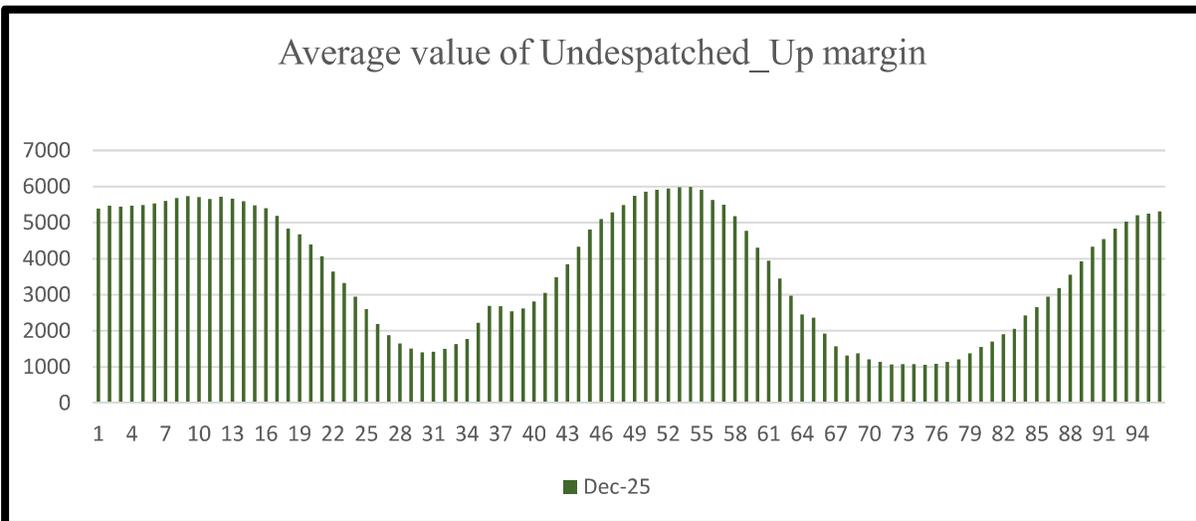
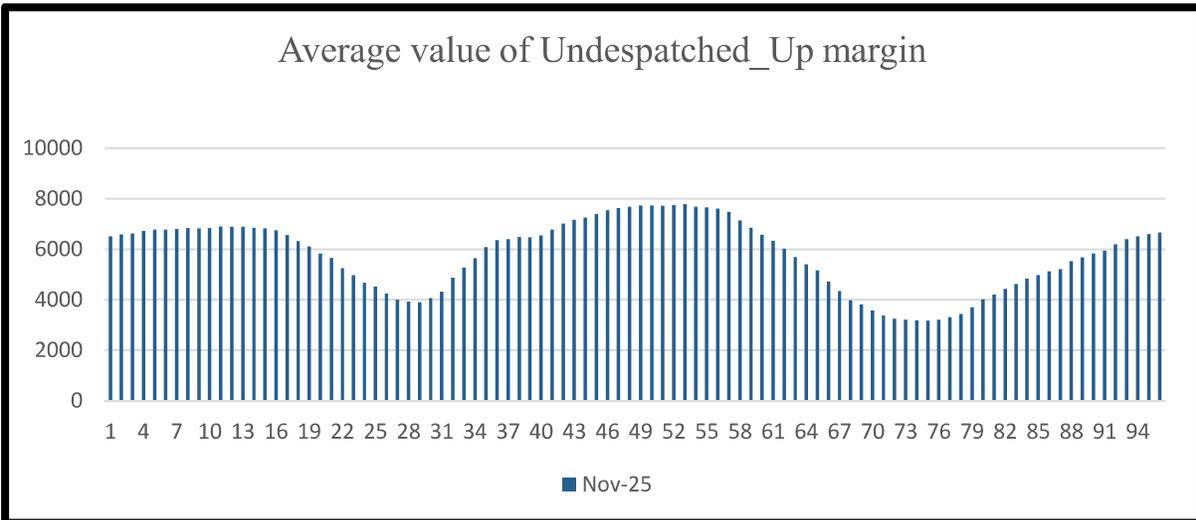
33	232	273	1564	2883	4325	4086	1126	1921	2159	4222	5274	1637	232	5274
34	288	521	2083	3252	4596	4424	1306	2119	2458	4587	5647	1778	288	5647
35	289	625	2363	3439	4886	4720	1375	2269	2819	4830	6079	2222	289	6079
36	335	1043	2696	3571	5062	4998	1640	2543	2910	5102	6367	2690	335	6367
37	362	953	2598	3475	5059	5040	1897	2772	3037	5108	6404	2681	362	6404
38	373	964	2687	3549	5212	5244	2229	2879	3225	5224	6485	2545	373	6485
39	495	940	2701	3608	5359	5437	2406	3046	3545	5426	6476	2620	495	6476
40	614	1078	2755	3634	5400	5488	2602	3202	3729	5516	6545	2812	614	6545
41	739	1133	2802	3706	5476	5438	2709	3286	3812	5514	6776	3052	739	6776
42	1007	1358	2791	3737	5544	5490	2894	3507	3949	5568	7023	3487	1007	7023
43	1157	1703	2817	3828	5591	5405	3069	3669	3931	5715	7163	3851	1157	7163
44	1533	2029	2895	3931	5656	5442	3227	3753	3906	5869	7255	4330	1533	7255
45	1726	2257	3025	4039	5614	5492	3203	3870	3971	5889	7397	4809	1726	7397
46	1957	2510	3117	4094	5593	5476	3208	3893	4023	5872	7540	5100	1957	7540
47	2165	2658	3330	4257	5635	5432	3176	3844	4008	6003	7640	5281	2165	7640
48	2297	2743	3527	4357	5659	5516	3239	3896	3917	6062	7683	5488	2297	7683
49	2331	2789	3566	4563	5694	5642	3292	3948	3883	6140	7733	5746	2331	7733
50	2525	2903	3628	4676	5688	5702	3481	4037	3897	6162	7733	5858	2525	7733
51	2727	3019	3797	4663	5656	5790	3561	4099	4042	6202	7729	5912	2727	7729
52	2959	3248	3887	4651	5621	5884	3731	4057	4173	6295	7744	5944	2959	7744
53	3211	3438	3995	4618	5572	5869	3713	4110	4237	6320	7789	5979	3211	7789
54	3315	3325	3951	4537	5628	5843	3757	4227	4256	6280	7689	5989	3315	7689
55	3131	3192	3801	4294	5526	5791	3743	4275	4239	6140	7654	5915	3131	7654
56	3026	3170	3719	4069	5418	5764	3701	4326	4256	6023	7608	5627	3026	7608
57	2960	3063	3560	3856	5325	5736	3663	4317	4244	5821	7485	5496	2960	7485
58	2787	2901	3313	3449	5145	5650	3546	4155	4105	5564	7148	5176	2787	7148
59	2603	2701	3058	3201	4948	5437	3547	4088	4016	5358	6857	4774	2603	6857
60	2425	2618	2761	2889	4654	5329	3464	4038	3880	5164	6576	4306	2425	6576
61	2255	2453	2634	2579	4473	5107	3261	3876	3765	4956	6340	3941	2255	6340
62	1999	2232	2343	2332	4278	5005	3052	3788	3668	4762	6018	3451	1999	6018
63	1842	1890	2215	2095	4189	4874	2799	3657	3528	4637	5690	2978	1842	5690
64	1657	1727	1995	1867	4123	4892	2632	3406	3497	4394	5408	2455	1657	5408
65	1484	1686	1839	1763	4104	4738	2597	3325	3448	4085	5164	2370	1484	5164
66	1393	1428	1557	1565	3968	4519	2329	3144	3337	3788	4720	1922	1393	4720
67	1076	1166	1367	1430	3770	4343	2071	2936	2984	3476	4350	1568	1076	4350
68	834	905	1215	1245	3774	3930	1800	2713	2642	3212	3981	1317	834	3981
69	690	912	1041	1176	3756	3635	1693	2527	2378	2929	3819	1375	690	3819
70	577	795	988	1093	3476	3373	1543	2296	2074	2607	3575	1208	577	3575
71	471	690	830	1129	3140	3101	1364	2080	1759	2312	3373	1141	471	3373
72	421	579	804	1162	2958	2908	1319	1876	1412	2041	3244	1069	421	3244
73	315	462	858	1196	2752	2641	1269	1600	1118	1950	3213	1079	315	3213
74	276	371	802	997	2442	2376	1040	1361	858	1799	3183	1075	276	3183

75	270	249	629	811	2166	2108	879	1094	717	1791	3177	1061	249	3177
76	300	169	463	572	1833	1958	780	871	632	1783	3210	1082	169	3210
77	326	153	338	439	1531	1697	717	730	562	1827	3316	1144	153	3316
78	368	155	276	334	1216	1542	647	599	581	2063	3433	1209	155	3433
79	435	269	296	310	1066	1396	582	575	607	2164	3698	1374	269	3698
80	535	315	270	382	1071	1318	539	617	706	2261	4012	1552	270	4012
81	755	432	263	445	1168	1316	531	654	841	2424	4211	1703	263	4211
82	1126	619	315	489	1246	1378	552	729	952	2523	4437	1905	315	4437
83	1225	804	500	469	1246	1439	505	706	888	2595	4627	2055	469	4627
84	1434	941	563	468	1338	1506	561	766	923	2623	4832	2428	468	4832
85	1516	938	517	415	1306	1507	502	729	900	2644	4979	2658	415	4979
86	1737	1040	523	425	1309	1470	465	736	914	2730	5127	2948	425	5127
87	1838	992	528	447	1359	1454	466	760	984	2731	5221	3184	447	5221
88	1940	1153	518	467	1325	1463	478	833	1068	2862	5530	3556	467	5530
89	2131	1124	452	486	1299	1410	508	930	1064	2899	5680	3926	452	5680
90	2308	1137	446	459	1267	1407	545	994	1072	2966	5836	4335	446	5836
91	2370	1136	417	443	1242	1370	477	1023	1026	3054	5943	4547	417	5943
92	2441	1229	440	332	1285	1380	556	1162	1158	3278	6198	4838	332	6198
93	2526	1266	487	314	1369	1439	549	1200	1403	3396	6396	5029	314	6396
94	2607	1219	479	299	1425	1508	606	1316	1663	3556	6508	5205	299	6508
95	2633	1186	535	254	1449	1581	665	1430	1814	3662	6599	5248	254	6599
96	2701	1206	566	261	1478	1700	704	1557	1933	3739	6659	5309	261	6659
Min	232	134	263	254	1066	1316	465	575	562	1783	3177	1061	134	3177
Max	3315	3438	3995	4676	5694	5884	3757	4326	4256	6320	7789	5989	3315	7789
Solar Min	232	134	377	474	2417	2073	737	1106	1290	2041	3244	1069	134	3244
solar Max	3315	3438	3995	4676	5694	5884	3757	4326	4256	6320	7789	5989	3315	7789
Non-Solar Min	270	153	263	254	1066	1316	465	575	562	1783	3177	1061	153	3177
Non-Solar Max	3174	2059	994	1196	2752	3109	1619	2315	2833	4437	6907	5735	738	6907









5.10 Analysis of Available constrained un-despatched Ramp Up capacity

During Calendar Year (CY) 2025, an assessment of ramp-limited un-despatched upward margins for the Maharashtra power system was carried out based on the declared ramp rates and despatched generation of intra-State generating stations.

The Ramp-Limited Upward Margin for each generating unit or station has been computed on a time-block-wise basis as the difference between the Declared Ramp Rate of the generator and the Scheduled Ramp for the corresponding time block.

The Scheduled Ramp has been calculated as follows:

Scheduled Ramp = Scheduled Generation in Current Time Block – Scheduled Generation in Previous Time Block

Further, monthly averages of the time-block-wise Ramp-Limited Upward Margins have been computed to assess diurnal and seasonal variations in ramping flexibility.

Based on the analysis, the following observations have been made:

- During solar hours (06:00–18:00 hrs), the maximum Ramp-Limited Upward Margins were observed during May 2025, December 2025, and June 2025, with values ranging from approximately 1,818 MW to 1,735 MW.
The minimum Ramp-Limited Upward Margins during solar hours were observed during January 2025 and February 2025.
- During non-solar hours (18:00–06:00 hrs of the following day), the maximum Ramp-Limited Upward Margins were observed during December 2025, November 2025, and May 2025, ranging from approximately 1,636 MW to 872 MW.
The minimum Ramp-Limited Upward Margins during non-solar hours were also observed during January 2025 and February 2025.
- Time-block-wise analysis indicates that the Maharashtra power system experiences surplus conditions predominantly during Time Blocks 35 to 53, whereas low or negligible ramp-limited upward reserve margins are typically observed during Time Blocks 70 to 81, corresponding to periods of high net demand and increased operational stress.

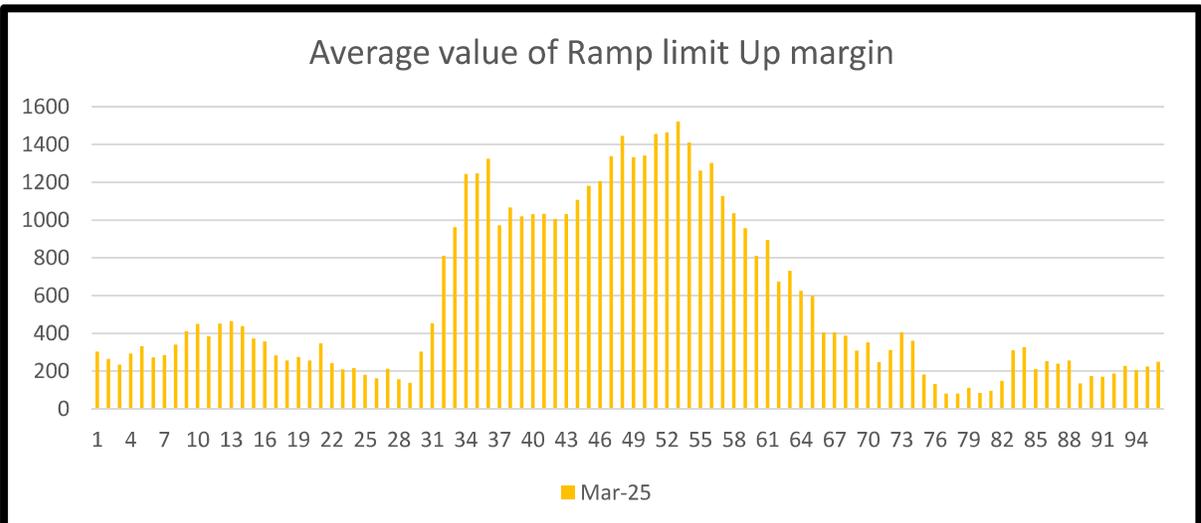
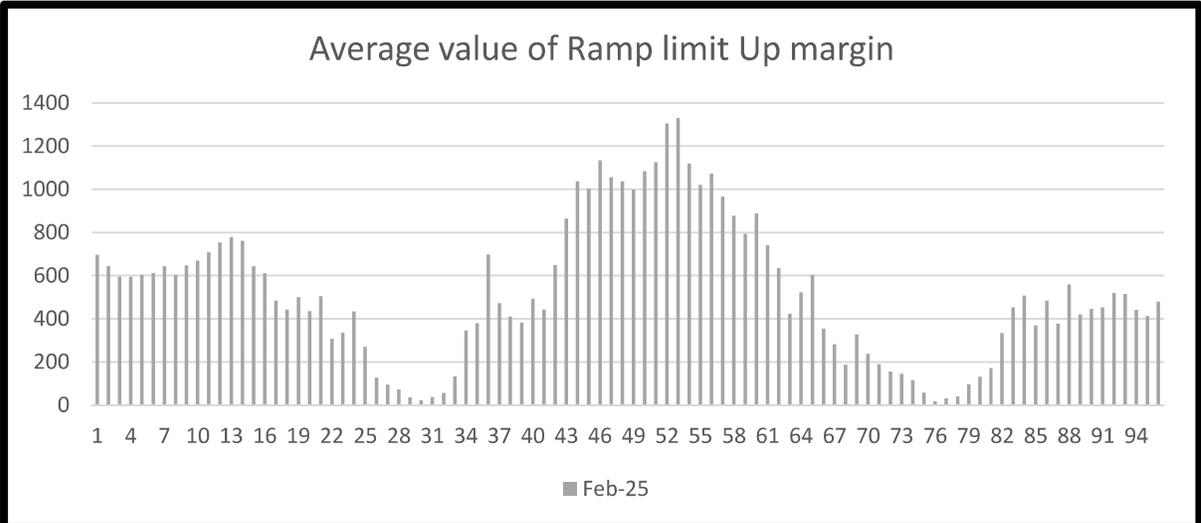
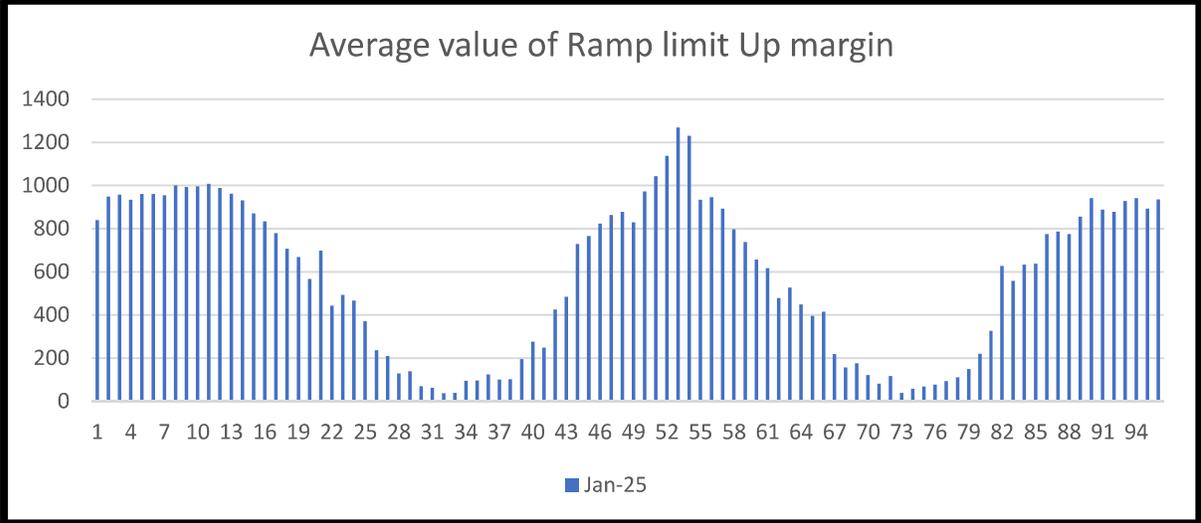
The overall time-block-wise average Ramp-Limited Upward Reserve Margins for each month are summarised in Table 5.3, providing a consolidated view of the availability of ramping flexibility across the year.

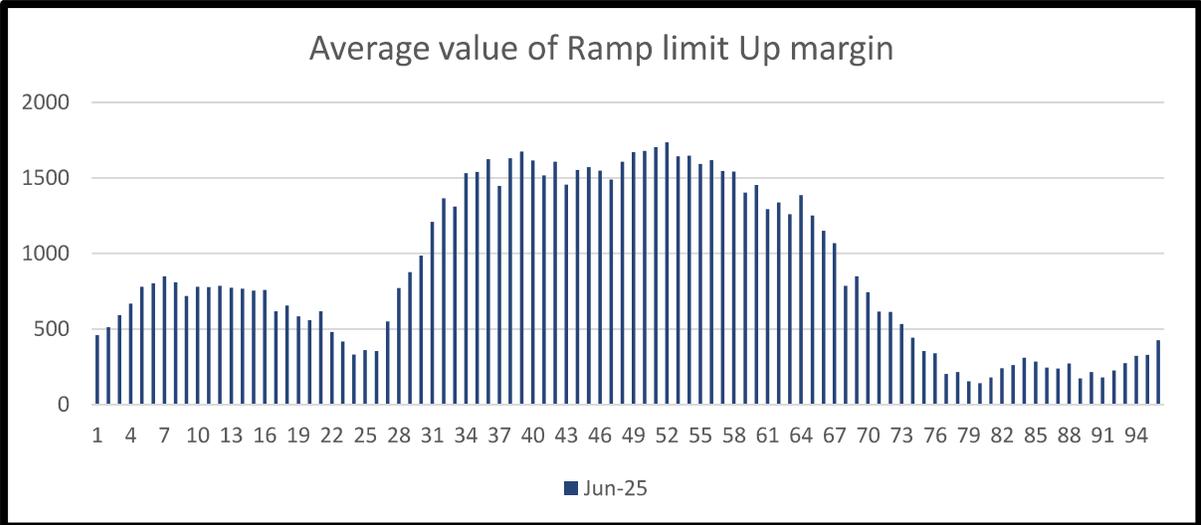
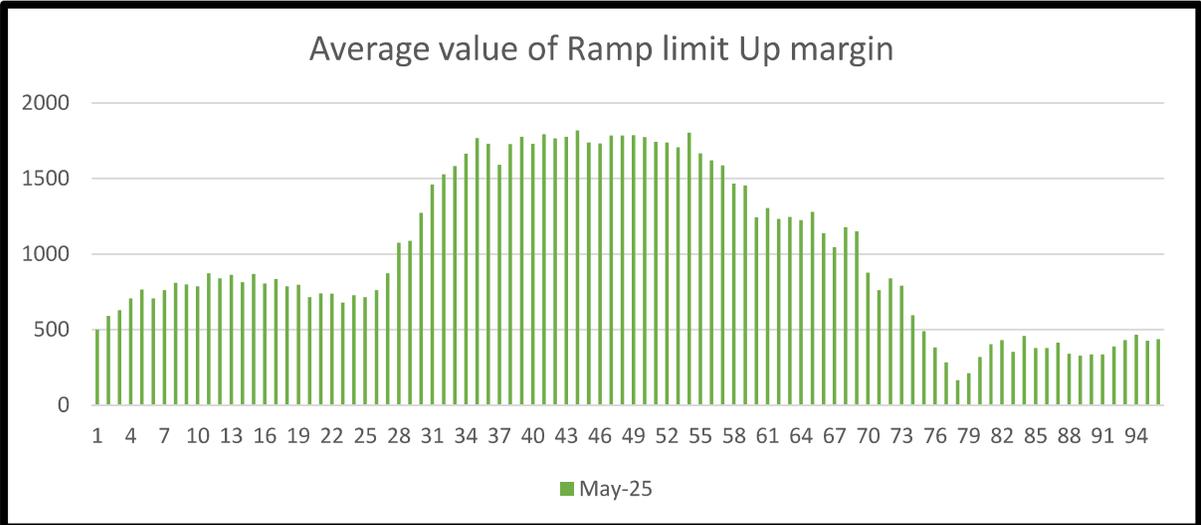
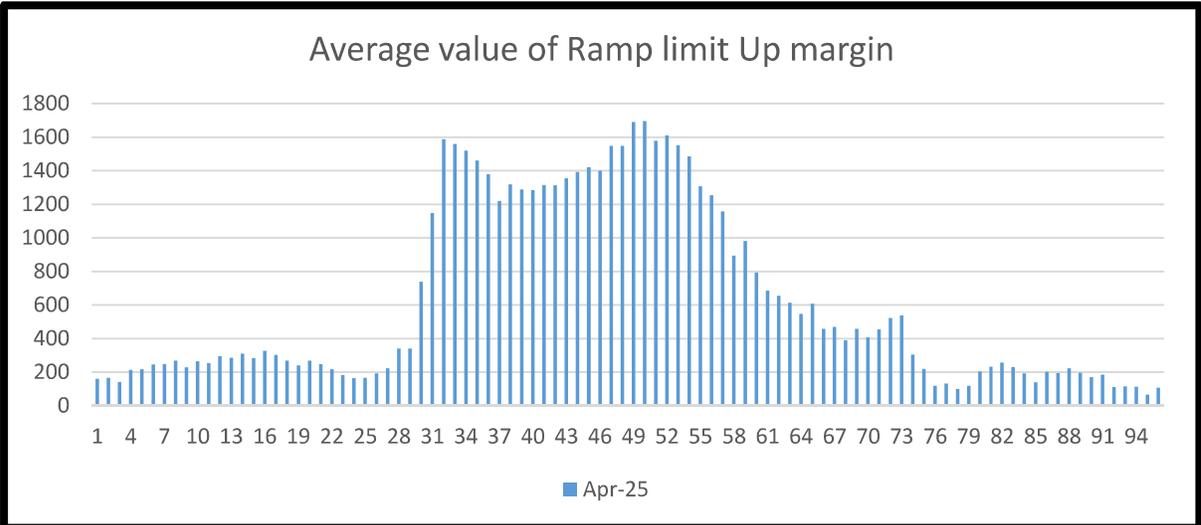
Table-5.3: Monthly Average value of Constrained Un-despatched Up margin (MW)

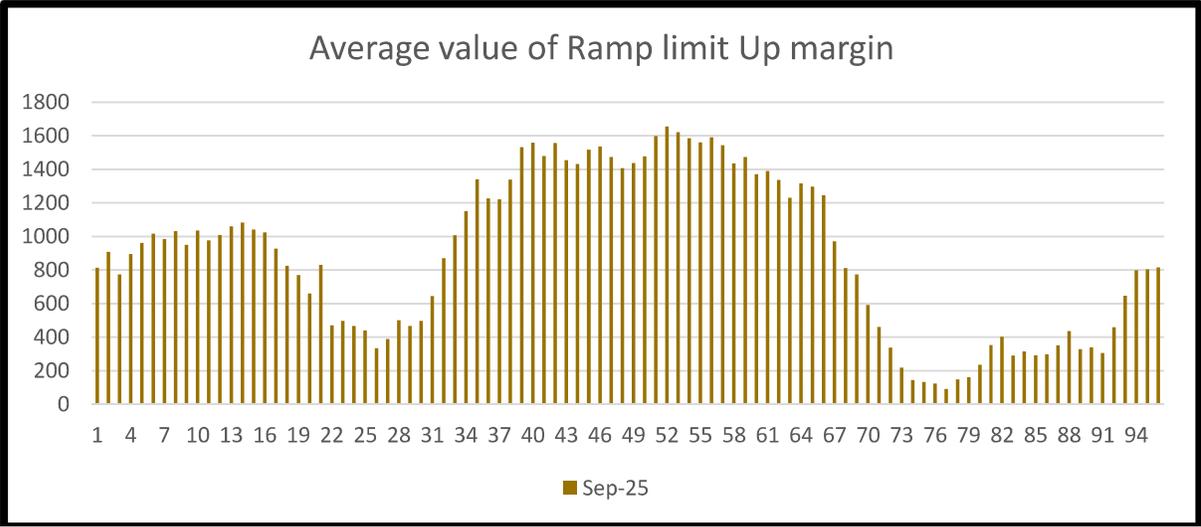
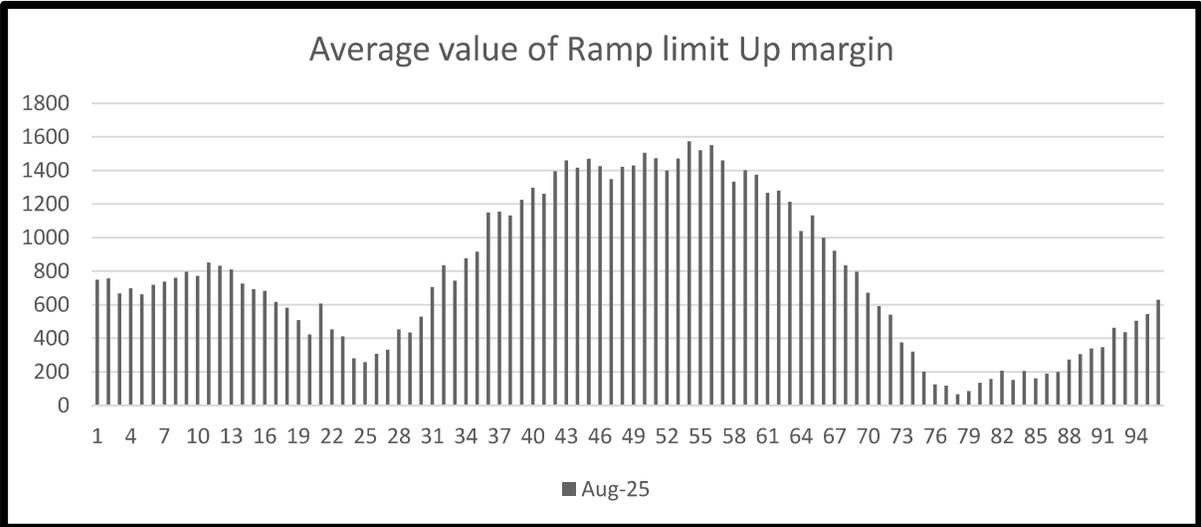
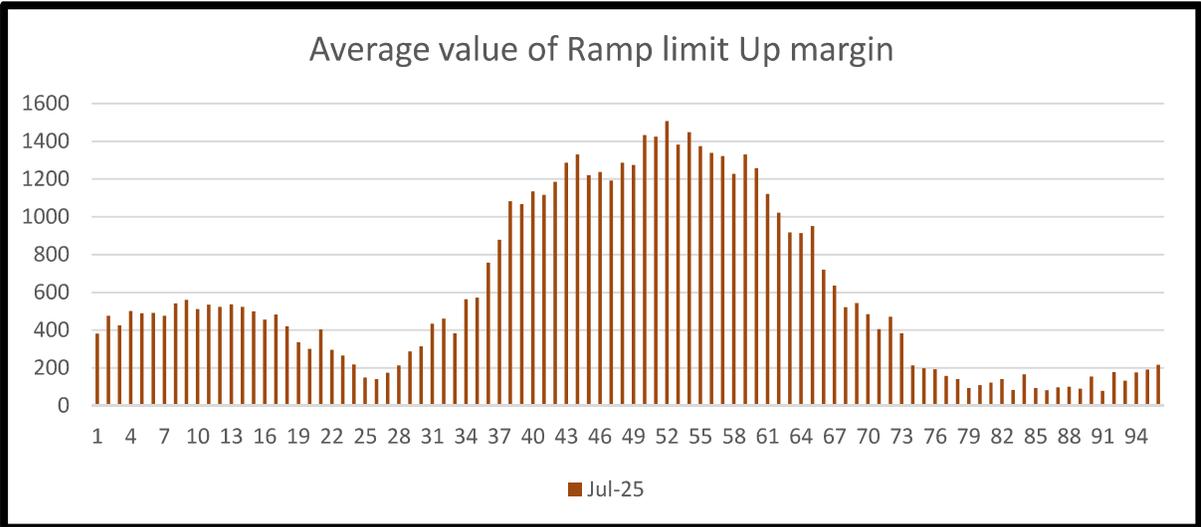
Time Block	Average value of Ramp Limit Up margin (MW)												Min	Max
	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25		
1	839	696	303	160	499	458	382	750	814	1001	1139	1509	160	1509
2	948	645	265	167	591	511	476	757	908	1058	1250	1578	167	1578
3	958	596	234	142	628	592	426	669	774	1031	1256	1501	142	1501
4	934	594	293	214	705	668	501	697	895	1128	1334	1501	214	1501
5	961	603	333	217	766	779	490	662	962	1094	1292	1496	217	1496
6	961	612	272	245	706	802	491	719	1017	1142	1286	1557	245	1557
7	954	644	285	247	760	850	477	739	985	1076	1298	1580	247	1580
8	1001	603	341	268	809	809	541	760	1031	1075	1312	1623	268	1623
9	994	648	410	228	798	719	561	796	951	1079	1292	1636	228	1636
10	997	670	449	265	787	780	512	772	1035	1197	1293	1564	265	1564
11	1008	708	385	254	872	777	535	852	977	1192	1336	1517	254	1517
12	988	754	451	295	839	786	523	832	1010	1187	1296	1623	295	1623
13	962	779	466	285	863	774	537	810	1060	1146	1280	1519	285	1519
14	931	761	439	311	813	767	523	727	1082	1121	1242	1463	311	1463
15	871	643	373	283	868	754	500	692	1041	1068	1251	1401	283	1401
16	834	611	357	328	804	758	455	683	1023	1003	1191	1434	328	1434
17	779	484	283	302	835	617	482	617	927	956	1073	1276	283	1276
18	707	443	257	268	787	655	420	582	825	890	977	1083	257	1083
19	668	500	275	240	797	583	336	509	770	819	950	1193	240	1193

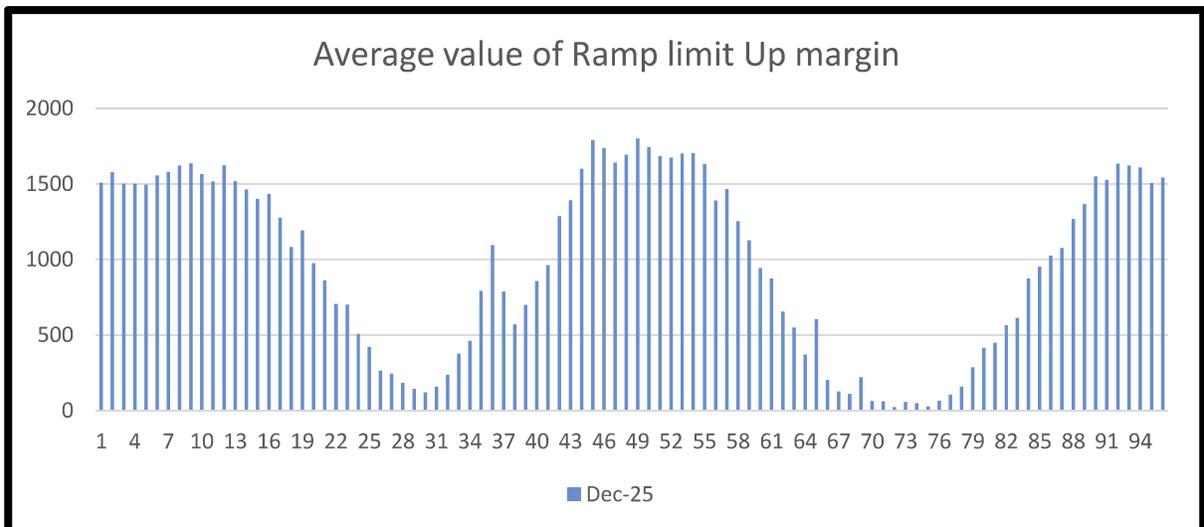
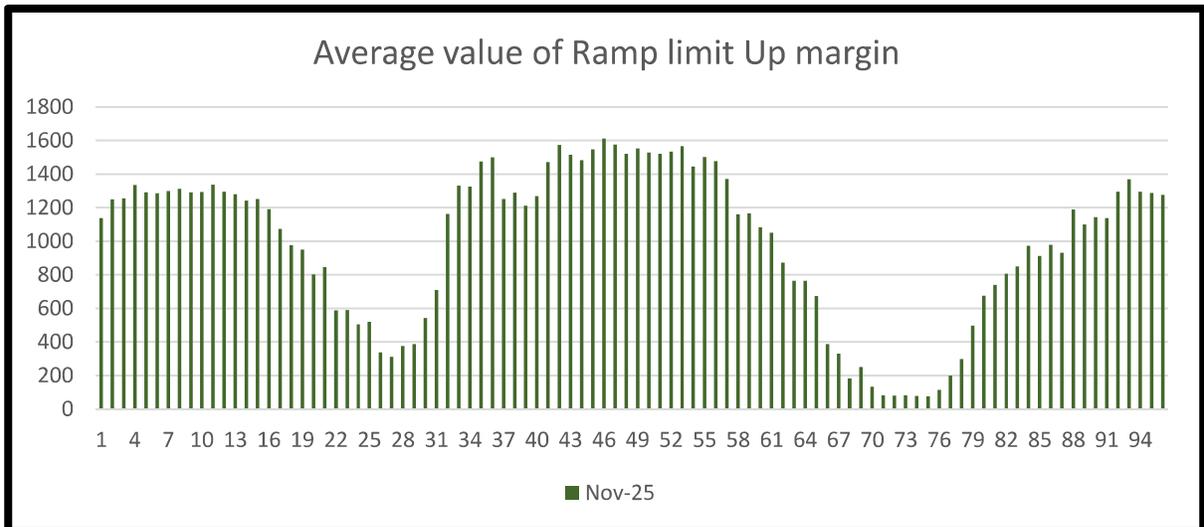
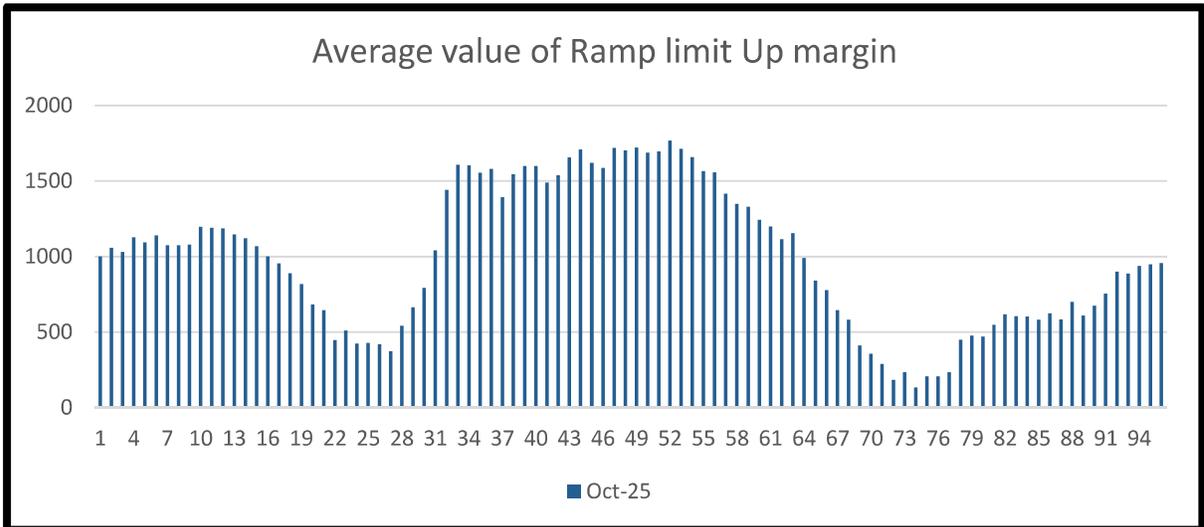
20	567	435	257	268	715	557	301	424	661	683	803	976	257	976
21	698	505	347	248	741	618	404	608	832	646	846	861	248	861
22	443	308	242	218	737	481	296	453	471	449	588	706	218	737
23	493	335	210	182	679	418	265	413	498	511	591	702	182	702
24	467	434	216	163	728	330	219	281	467	424	504	507	163	728
25	371	270	180	167	714	360	150	258	441	430	521	422	150	714
26	237	127	162	193	761	353	141	309	334	421	338	263	127	761
27	210	95	212	223	872	550	174	333	389	374	312	245	95	872
28	129	72	157	340	1075	771	213	453	500	543	376	182	72	1075
29	140	36	137	340	1088	876	287	435	467	664	388	143	36	1088
30	70	22	303	739	1273	985	315	529	496	793	542	119	22	1273
31	62	37	453	1148	1460	1208	434	706	645	1042	709	157	37	1460
32	38	56	811	1589	1528	1365	460	836	871	1441	1163	235	38	1589
33	38	134	962	1559	1583	1311	383	744	1006	1608	1331	376	38	1608
34	95	345	1244	1519	1664	1530	563	876	1152	1604	1326	462	95	1664
35	97	379	1247	1460	1768	1539	573	916	1341	1556	1475	791	97	1768
36	125	697	1325	1380	1729	1625	757	1149	1228	1581	1500	1096	125	1729
37	100	471	972	1220	1590	1447	878	1154	1222	1393	1251	788	100	1590
38	102	411	1067	1318	1729	1631	1083	1132	1338	1546	1290	571	102	1729
39	195	383	1019	1287	1777	1675	1067	1226	1532	1599	1211	700	195	1777
40	276	494	1031	1284	1730	1615	1135	1297	1559	1600	1268	857	276	1730
41	248	442	1034	1314	1792	1516	1117	1261	1479	1490	1471	963	248	1792
42	426	650	1007	1313	1765	1606	1186	1396	1557	1539	1573	1288	426	1765
43	484	864	1031	1355	1777	1456	1287	1461	1454	1656	1515	1393	484	1777
44	730	1037	1107	1393	1818	1553	1331	1416	1431	1709	1482	1601	730	1818
45	766	1003	1181	1421	1739	1572	1221	1469	1517	1621	1547	1791	766	1791
46	823	1134	1207	1401	1731	1549	1237	1426	1535	1588	1611	1737	823	1737
47	863	1057	1338	1548	1786	1489	1192	1349	1474	1721	1575	1640	863	1786
48	878	1037	1446	1549	1785	1608	1286	1422	1407	1703	1520	1693	878	1785
49	829	998	1332	1690	1787	1670	1274	1430	1438	1723	1552	1802	829	1802
50	973	1083	1341	1695	1775	1679	1433	1506	1478	1687	1528	1744	973	1775
51	1044	1126	1456	1579	1743	1704	1425	1474	1598	1696	1522	1684	1044	1743
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58	798	877	1036	894	1466	1542	1227	1333	1435	1349	1162	1253	798	1542
59	738	794	957	981	1454	1404	1331	1402	1474	1330	1167	1127	738	1474
60	657	887	811	794	1243	1453	1258	1375	1371	1244	1084	944	657	1453
61	618	740	895	685	1305	1293	1122	1268	1390	1200	1052	873	618	1390

62	479	634	675	655	1232	1337	1023	1281	1336	1116	872	656	479	1337
63	528	424	732	614	1246	1259	918	1214	1231	1156	765	550	424	1259
64	448	522	625	547	1224	1386	914	1040	1317	991	764	370	370	1386
65	396	604	598	607	1278	1251	951	1133	1296	843	674	604	396	1296
66	415	354	405	458	1137	1151	721	999	1245	778	388	202	202	1245
67	219	283	404	469	1044	1068	636	922	971	646	331	126	126	1068
68	157	188	387	390	1179	785	522	836	812	582	183	109	109	1179
69	176	327	309	458	1152	849	544	797	774	412	251	221	176	1152
70	122	238	352	406	876	743	485	671	592	357	133	63	63	876
71	81	189	247	455	760	615	405	592	461	289	82	60	60	760
72	117	155	312	522	838	613	470	540	337	183	80	23	23	838
73	39	146	407	538	791	534	384	376	218	235	81	56	39	791
74	58	116	360	304	595	443	214	321	143	133	79	49	49	595
75	69	58	181	219	490	353	199	201	133	208	76	28	28	490
76	78	19	131	118	381	338	193	127	123	207	114	66	19	381
77	94	31	82	132	282	202	158	117	91	234	199	105	31	282
78	111	40	80	99	166	215	141	67	149	449	298	158	40	449
79	149	96	111	119	210	154	94	86	161	477	497	286	86	497
80	221	131	85	205	319	141	108	135	235	471	675	416	85	675
81	327	172	96	232	403	179	122	159	353	549	739	448	96	739
82	628	334	148	257	431	241	141	206	402	618	807	564	141	807
83	559	453	310	230	352	262	84	152	290	606	849	612	84	849
84	633	507	328	193	458	310	166	205	314	604	974	874	166	974
85	638	369	210	139	378	285	93	162	292	583	912	953	93	953
86	774	483	252	201	377	244	81	190	298	626	979	1027	81	1027
87	787	378	240	194	414	239	97	200	351	584	931	1077	97	1077
88	774	559	256	223	341	271	100	273	436	700	1189	1269	100	1269
89	856	421	135	197	327	174	90	305	327	610	1100	1367	90	1367
90	941	446	174	170	335	214	155	339	340	676	1143	1551	155	1551
91	888	453	170	186	336	179	79	348	305	756	1138	1528	79	1528
92	878	520	187	110	387	226	177	464	458	901	1295	1635	110	1635
93	929	514	228	115	430	275	132	437	648	888	1369	1622	115	1622
94	941	441	206	113	467	323	177	505	798	940	1295	1610	113	1610
95	892	413	224	66	427	327	191	544	803	949	1287	1506	66	1506
96	936	479	249	107	436	425	217	629	816	958	1277	1541	107	1541
Min	38	19	80	66	166	141	79	67	91	133	76	23	19	282
Max	1269	1331	1521	1695	1818	1735	1507	1574	1656	1769	1611	1802	1269	1818
Solar Min	38	22	137	167	714	353	141	258	334	183	80	23	22	714
solar Max	1269	1331	1521	1695	1818	1735	1507	1574	1656	1769	1611	1802	1269	1818
Non-Solar Min	39	19	80	66	166	141	79	67	91	133	76	28	19	282
Non-Solar Max	1008	779	466	538	872	850	561	852	1082	1197	1369	1636	328	1636









5.11 Analysis of Available un-despatched Ramp Down capacity

During Calendar Year (CY) 2025, an assessment of un-despatched downward capacity margins for the Maharashtra power system was carried out based on the declared technical minimum levels and scheduled generation of intra-State generating stations.

The Downward Margin for each generating unit or station has been computed on a time-block-wise basis as the difference between the scheduled generation and the declared technical minimum generation level of the unit for the corresponding time block. This metric represents the extent to which a generating unit can reduce output while remaining within technical operating limits.

Further, monthly averages of the time-block-wise Downward Margins have been calculated to assess diurnal and seasonal variations in downward flexibility available to the system.

Based on the analysis, the following observations have been made:

- During solar hours (06:00–18:00 hrs), the maximum downward margins were observed during December 2025, April 2025, and March 2025, with values ranging from approximately 5,779 MW to 5,674 MW.
The minimum downward margins during solar hours were observed during October 2025 and November 2025.
- During non-solar hours (18:00–06:00 hrs of the following day), the maximum downward margins were observed during April 2025, March 2025, and December 2025, ranging from approximately 6,014 MW to 5,803 MW.
The minimum downward margins during non-solar hours were also observed during October 2025 and November 2025.
- Time-block-wise analysis indicates that the Maharashtra power system experiences shortfall conditions predominantly during Time Blocks 73 to 82, whereas low or negligible downward margins are typically observed during Time Blocks 50 to 58, corresponding to periods of high renewable generation and reduced ability to back down conventional units.

The overall time-block-wise average Downward Margins for each month are summarised in Table 5.4, providing a consolidated view of the downward flexibility available across the year.

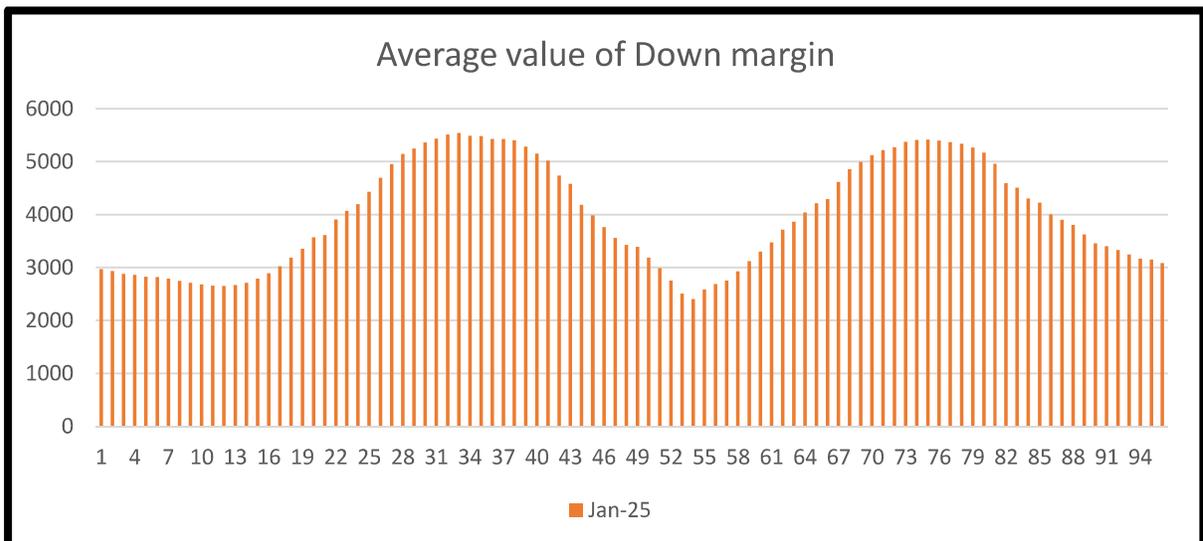
Table -5.4: Monthly Average Down margin (MW)

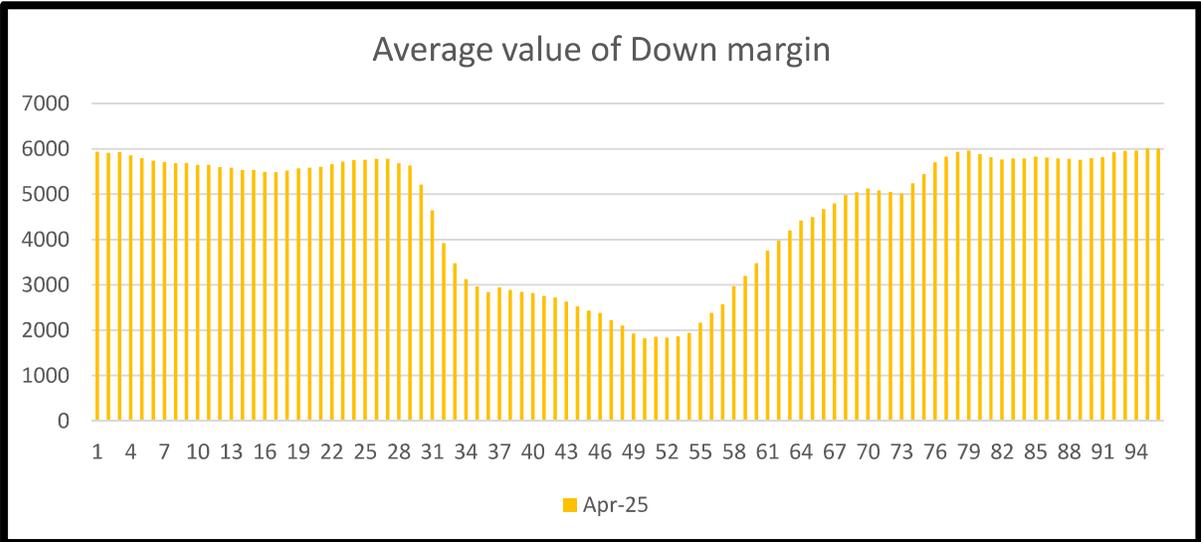
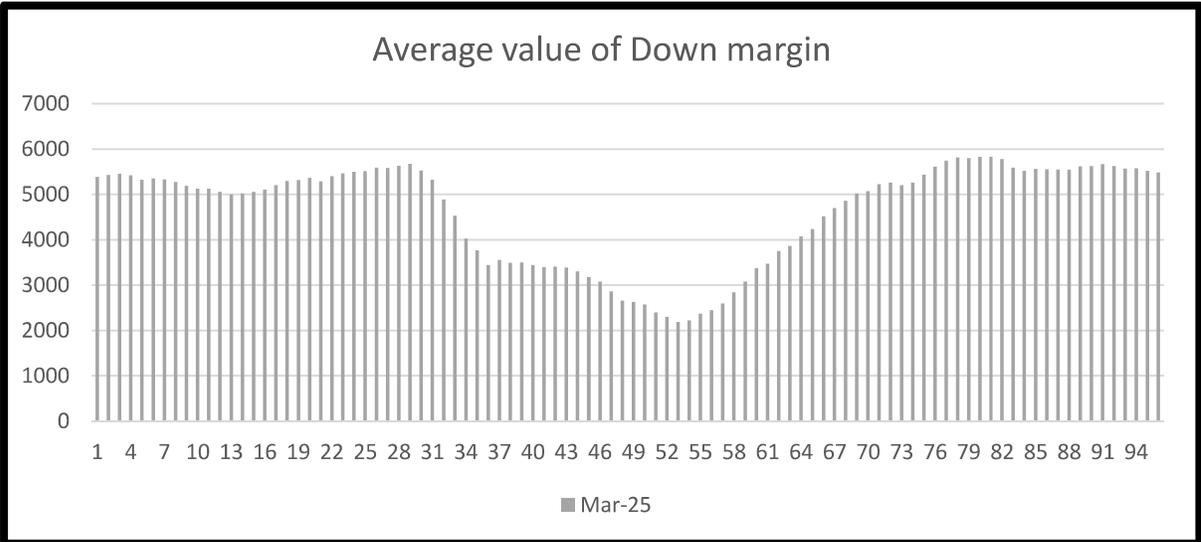
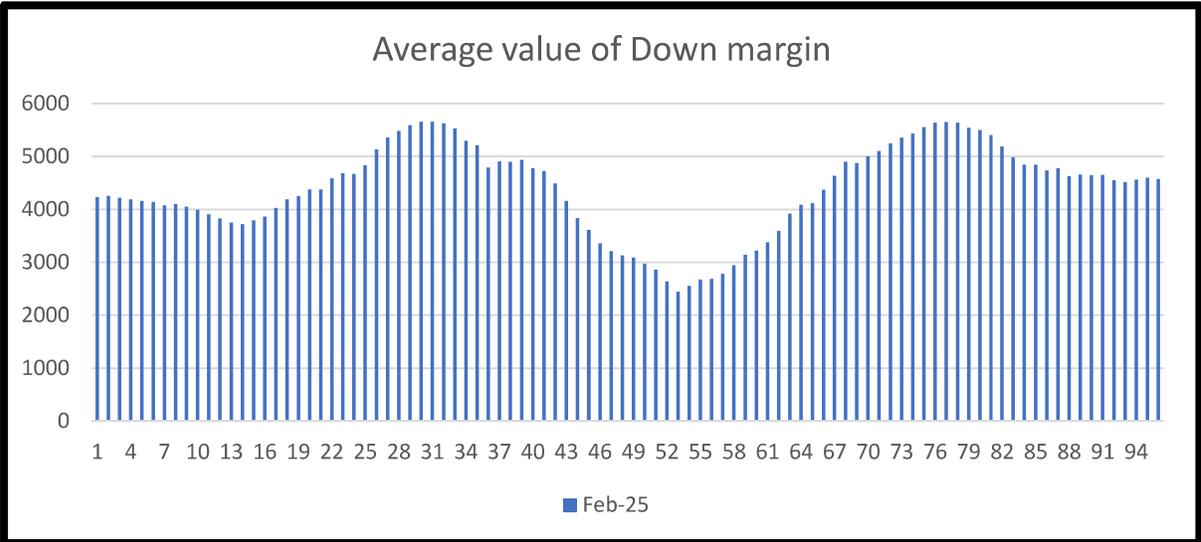
Time Block	Average Down margin (MW)												Min	Max
	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25		
1	2973	4234	5391	5937	4807	4555	3836	3119	2820	2795	1935	1680	1680	5937
2	2933	4257	5433	5917	4691	4468	3691	3058	2693	2759	1865	1611	1611	5917
3	2881	4223	5460	5926	4594	4316	3662	3049	2730	2715	1830	1620	1620	5926
4	2864	4191	5421	5856	4436	4155	3543	3003	2594	2572	1727	1591	1591	5856
5	2824	4162	5322	5797	4298	3960	3462	2976	2485	2511	1677	1556	1556	5797
6	2820	4143	5353	5742	4275	3816	3419	2924	2366	2422	1679	1503	1503	5742
7	2789	4074	5335	5712	4162	3651	3368	2855	2330	2415	1648	1440	1440	5712

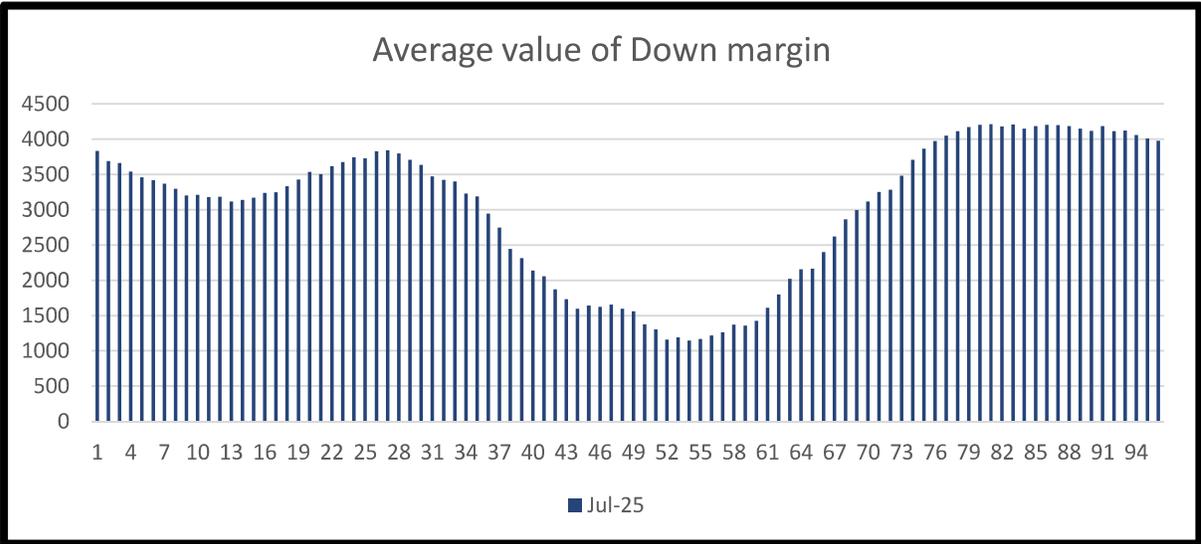
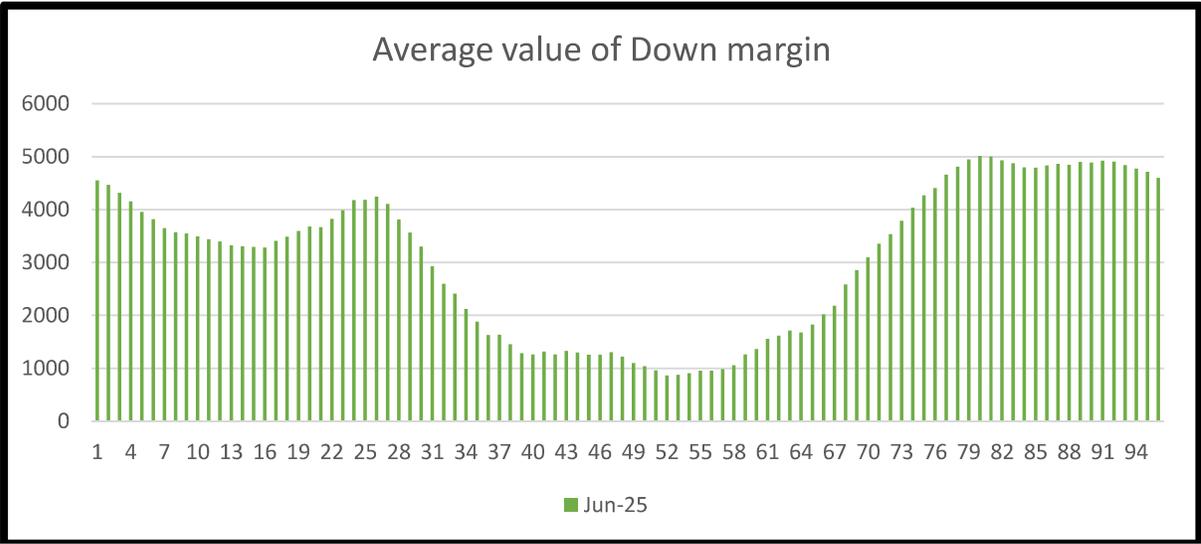
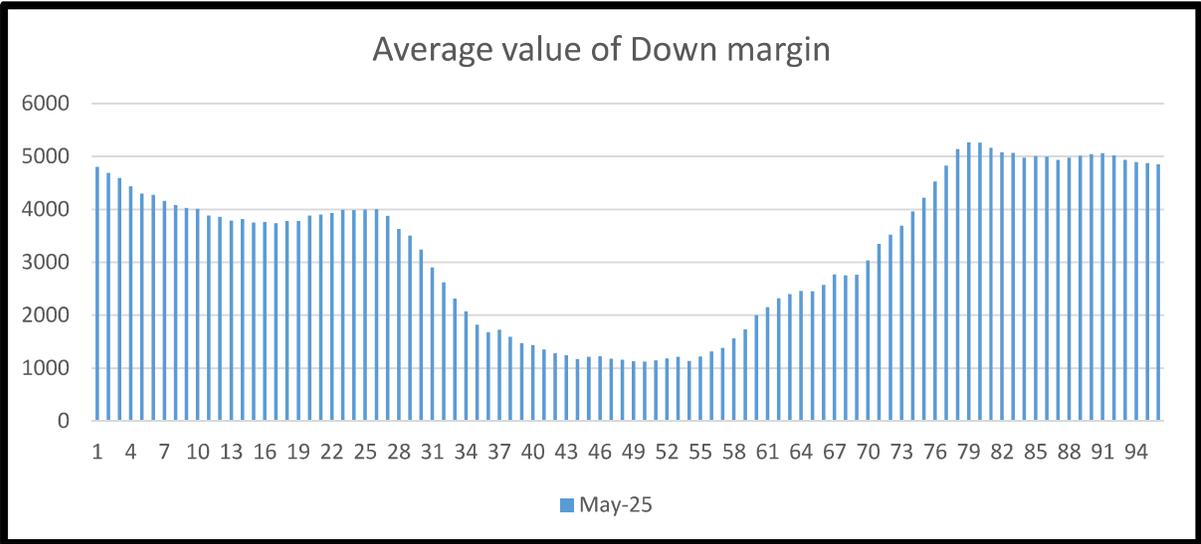
													0	2
8	2746	4103	5279	5679	4081	3573	3297	2812	2249	2424	1609	1361	1361	5679
9	2711	4053	5193	5692	4029	3548	3203	2723	2261	2415	1615	1308	1308	5692
10	2682	3995	5131	5646	4009	3493	3212	2703	2227	2301	1603	1343	1343	5646
11	2656	3908	5126	5645	3884	3440	3179	2637	2236	2212	1540	1406	1406	5645
12	2651	3829	5061	5600	3859	3399	3186	2600	2213	2193	1546	1351	1351	5600
13	2667	3749	5004	5588	3786	3323	3115	2585	2044	2183	1548	1396	1396	5588
14	2711	3723	5025	5538	3815	3307	3139	2674	1992	2198	1589	1463	1463	5538
15	2792	3794	5061	5532	3749	3296	3172	2730	2016	2256	1598	1557	1557	5532
16	2893	3865	5106	5494	3762	3280	3240	2775	2019	2365	1665	1627	1627	5494
17	3022	4031	5206	5484	3739	3410	3250	2898	2138	2485	1835	1816	1816	5484
18	3188	4192	5296	5521	3781	3490	3333	2963	2291	2626	2054	2145	2145	5521
19	3357	4251	5318	5571	3781	3595	3430	3085	2435	2769	2242	2286	2286	5571
20	3574	4376	5367	5584	3887	3680	3535	3238	2632	3019	2489	2557	2557	5584
21	3613	4378	5293	5605	3900	3667	3507	3160	2572	3217	2652	2891	2891	5605
22	3907	4586	5402	5663	3929	3826	3620	3268	2893	3537	3045	3313	3313	5663
23	4074	4685	5468	5716	3993	3987	3676	3359	3048	3706	3312	3611	3611	5716
24	4200	4672	5502	5754	3988	4179	3745	3541	3168	3897	3582	3967	3967	5754
25	4431	4832	5514	5761	3997	4187	3731	3661	3220	3973	3861	4382	4382	5761
26	4698	5135	5588	5779	4001	4243	3830	3684	3364	4064	4153	4784	4784	5779
27	4957	5358	5584	5780	3878	4108	3843	3710	3416	4182	4373	5062	5062	5780
28	5147	5481	5636	5686	3629	3810	3797	3564	3337	4079	4458	5279	5279	5686
29	5248	5593	5674	5631	3505	3565	3708	3539	3319	3915	4479	5406	5406	5674
30	5367	5659	5525	5216	3240	3300	3635	3402	3261	3741	4316	5502	5502	5659
31	5437	5658	5322	4647	2906	2927	3475	3166	3067	3391	4062	5488	5488	5658
32	5515	5626	4892	3925	2621	2596	3422	2950	2830	2846	3512	5416	5416	5626
33	5547	5533	4534	3477	2317	2413	3400	2936	2576	2390	3003	5262	5262	5533
34	5487	5295	4029	3130	2071	2120	3228	2771	2303	2071	2664	5110	5110	5295
35	5482	5211	3766	2965	1821	1881	3189	2676	1978	1867	2255	4642	4642	5211
36	5432	4792	3445	2842	1679	1630	2947	2433	1918	1640	1993	4174	4174	4792
37	5427	4904	3559	2948	1727	1636	2747	2256	1845	1663	1975	4161	4161	4904
38	5408	4898	3493	2894	1596	1455	2447	2172	1690	1573	1910	4318	4318	4898
39	5288	4933	3502	2851	1470	1290	2314	2040	1404	1385	1939	4248	4248	4933
40	5155	4783	3448	2822	1437	1265	2139	1902	1245	1295	1892	4056	4056	4783
41	5021	4724	3394	2758	1354	1315	2058	1833	1185	1307	1678	3829	3829	4724
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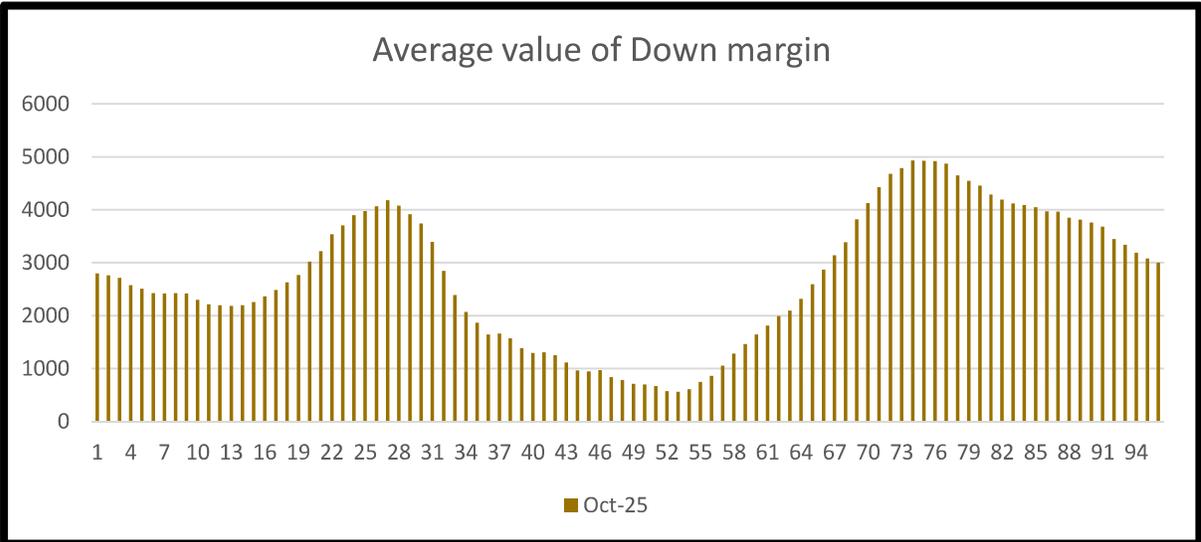
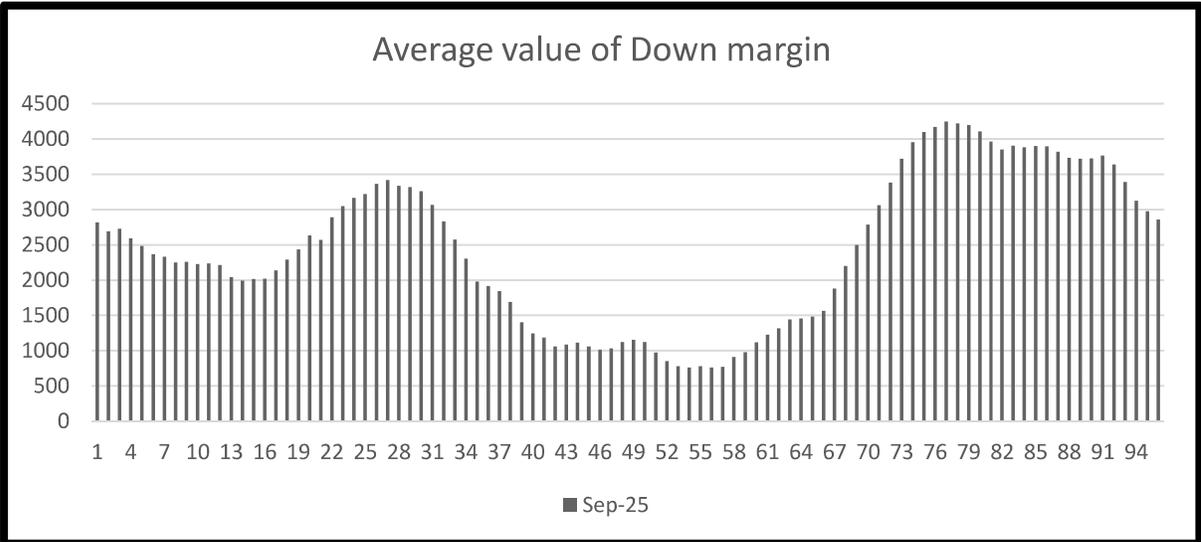
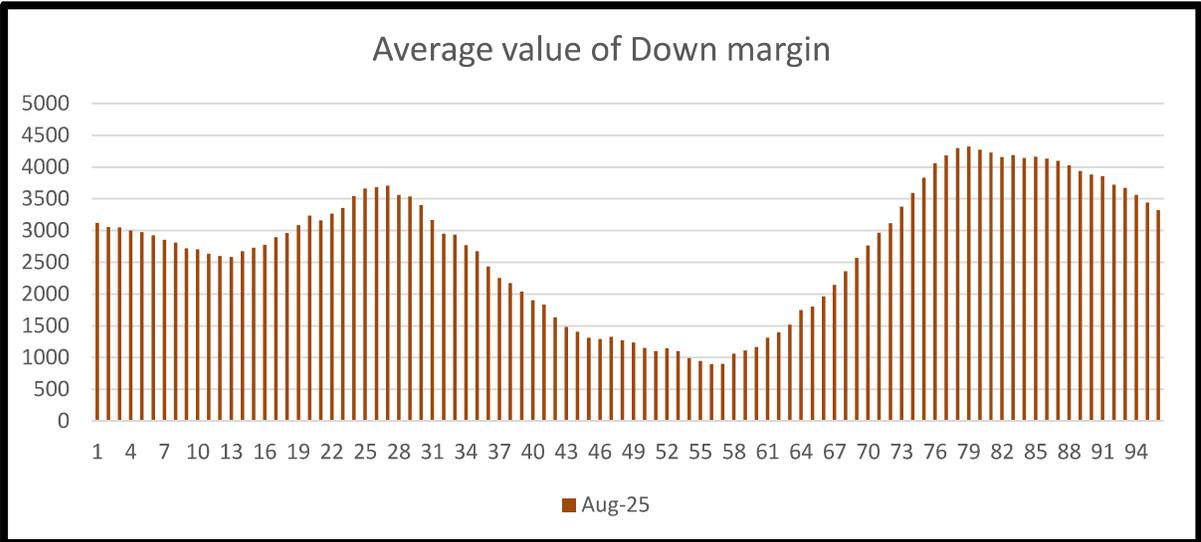
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45	3989	3616	3176	2432	1213	1256	1641	1310	1061	944	1114	2158	944	3989
46	3764	3359	3083	2386	1226	1258	1625	1292	1014	967	976	1882	967	3764
47	3561	3210	2861	2223	1178	1306	1657	1329	1031	835	887	1718	835	3561
48	3426	3133	2659	2107	1159	1222	1599	1272	1121	785	840	1536	785	3426
49	3393	3089	2631	1927	1127	1099	1559	1238	1153	713	788	1292	713	3393
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51	2987	2863	2401	1858	1147	961	1306	1102	975	667	779	1136	667	2987
52	2755	2642	2298	1842	1182	867	1158	1148	853	575	769	1107	575	2755
53	2506	2447	2187	1866	1212	880	1190	1103	780	561	725	1065	561	2506
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66	4294	4372	4516	4675	2575	2022	2399	1963	1567	2866	3595	4934	1567	4294
67	4616	4637	4699	4796	2768	2181	2621	2143	1880	3141	3964	5280	1880	4616
68	4858	4902	4858	4980	2755	2588	2866	2357	2202	3385	4401	5530	2202	4858
69	4998	4877	5026	5048	2764	2854	2995	2569	2498	3818	4667	5495	2498	4998
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76	5397	5638	5613	5701	4527	4405	3976	4056	4171	4917	5211	5777	4171	5397
77	5367	5649	5743	5833	4831	4660	4049	4183	4248	4872	5107	5720	4248	5367
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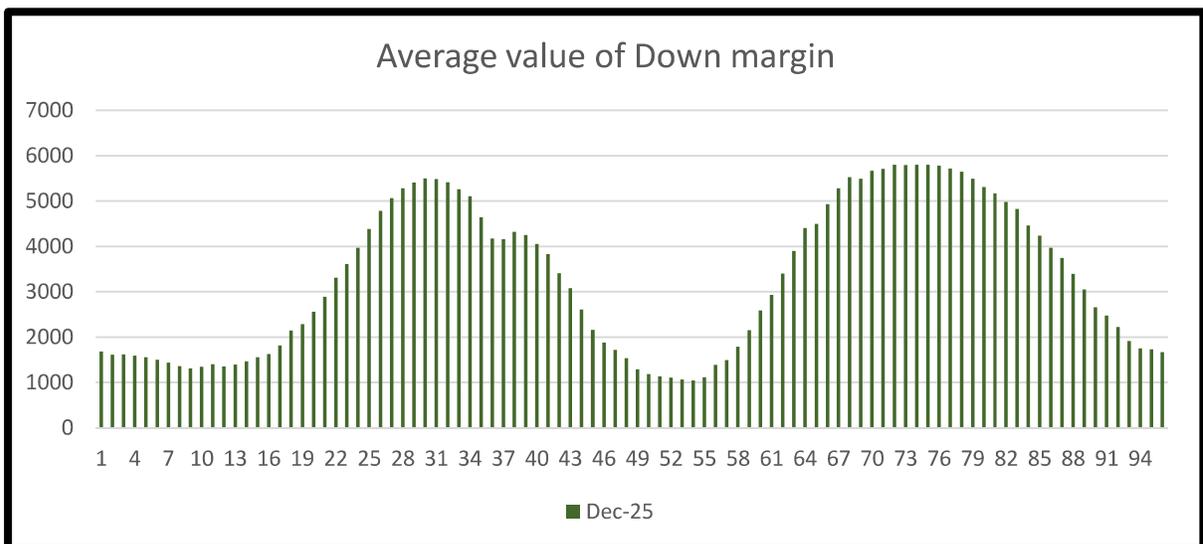
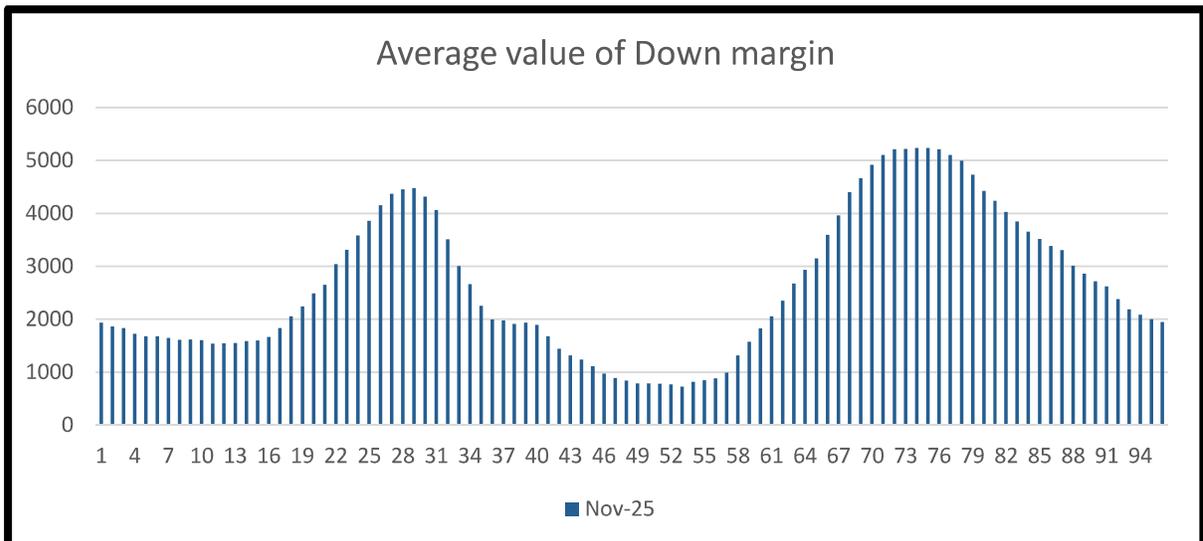
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82	4597	5190	5780	5766	5078	4933	4180	4158	3851	4190	4026	4979	3851	5780
83	4507	4984	5588	5788	5067	4877	4208	4189	3905	4120	3845	4827	3845	5788
84	4306	4847	5524	5787	4976	4797	4148	4142	3883	4090	3653	4461	3653	5787
85	4226	4847	5564	5828	5008	4795	4185	4161	3903	4050	3518	4234	3518	5828
86	4002	4739	5557	5812	4995	4834	4204	4135	3898	3969	3387	3969	3387	5812
87	3901	4780	5551	5791	4937	4867	4198	4096	3821	3963	3305	3745	3305	5791
88	3807	4627	5551	5779	4981	4850	4185	4027	3733	3847	3011	3397	3011	5779
89	3625	4658	5618	5761	5014	4898	4150	3936	3722	3815	2865	3051	2865	5761
90	3456	4647	5628	5797	5046	4890	4117	3881	3724	3761	2718	2658	2658	5797
91	3402	4653	5668	5816	5063	4922	4186	3858	3766	3679	2623	2479	2479	5816
92	3331	4554	5630	5929	5022	4907	4113	3720	3638	3448	2383	2220	2220	5929
93	3249	4518	5571	5954	4933	4842	4121	3673	3392	3337	2186	1911	1911	5954
94	3171	4564	5575	5962	4891	4773	4061	3561	3126	3186	2083	1755	1755	5962
95	3149	4598	5525	6014	4877	4715	4010	3444	2977	3082	2002	1734	1734	6014
96	3084	4577	5485	6005	4849	4597	3977	3323	2861	3004	1945	1670	1670	6005
Min	2405	2447	2187	1825	1124	867	1146	896	762	561	725	1048	561	2506
Max	5547	5659	5829	6014	5267	5013	4213	4323	4248	4933	5237	5803	4171	6014
Solar Min	2405	2447	2187	1825	1124	867	1146	896	762	561	725	1048	561	2506
solar Max	5547	5659	5674	5780	4001	4243	3843	3710	3416	4682	5210	5799	3416	5799
Non-Solar Min	2651	3723	5004	5019	3694	3280	3115	2585	1992	2183	1540	1308	1308	5484
Non-Solar Max	5419	5649	5829	6014	5267	5013	4213	4323	4248	4933	5237	5803	4171	6014











5.12 Analysis of Available constrained Ramp Down capacity

During Calendar Year (CY) 2025, an assessment of ramp-limited downward reserve margins for the Maharashtra power system was carried out based on the declared ramp rates and scheduled generation profiles of intra-State generating stations.

The Ramp-Limited Downward Margin for each generating unit or station has been computed on a time-block-wise basis as the difference between the Declared Ramp-Down Rate of the generator and the Scheduled Ramp for the corresponding time block.

The Scheduled Ramp is defined as:

Scheduled Ramp = Scheduled Generation in Current Time Block – Scheduled Generation in Previous Time Block

Further, monthly averages of the time-block-wise Ramp-Limited Downward Margins have been calculated to assess diurnal and seasonal variations in downward ramping flexibility available to the system.

Based on the analysis, the following observations have been made:

- During solar hours (06:00–18:00 hrs), the maximum Ramp-Limited Downward Margins were observed during December 2025, March 2025, and April 2025, with values ranging from approximately 1,914 MW to 1,854 MW.
The minimum Ramp-Limited Downward Margins during solar hours were observed during October 2025 and November 2025.
- During non-solar hours (18:00–06:00 hrs of the following day), the maximum Ramp-Limited Downward Margins were observed during April 2025, March 2025, and May 2025, ranging from approximately 2,042 MW to 1,993 MW.
The minimum Ramp-Limited Downward Margins during non-solar hours were observed during July 2025 and November 2025.
- Time-block-wise analysis indicates that the Maharashtra power system experiences ramp-down constrained or shortfall conditions predominantly during Time Blocks 73 to 82, whereas low or negligible ramp-limited downward margins are typically observed during Time Blocks 52 to 53, corresponding to periods of high renewable generation and limited ability of conventional units to back down rapidly.

The overall time-block-wise average Ramp-Limited Downward Margins for each month are presented in Table 5.4, providing a consolidated view of the downward ramping flexibility available across CY-2025.

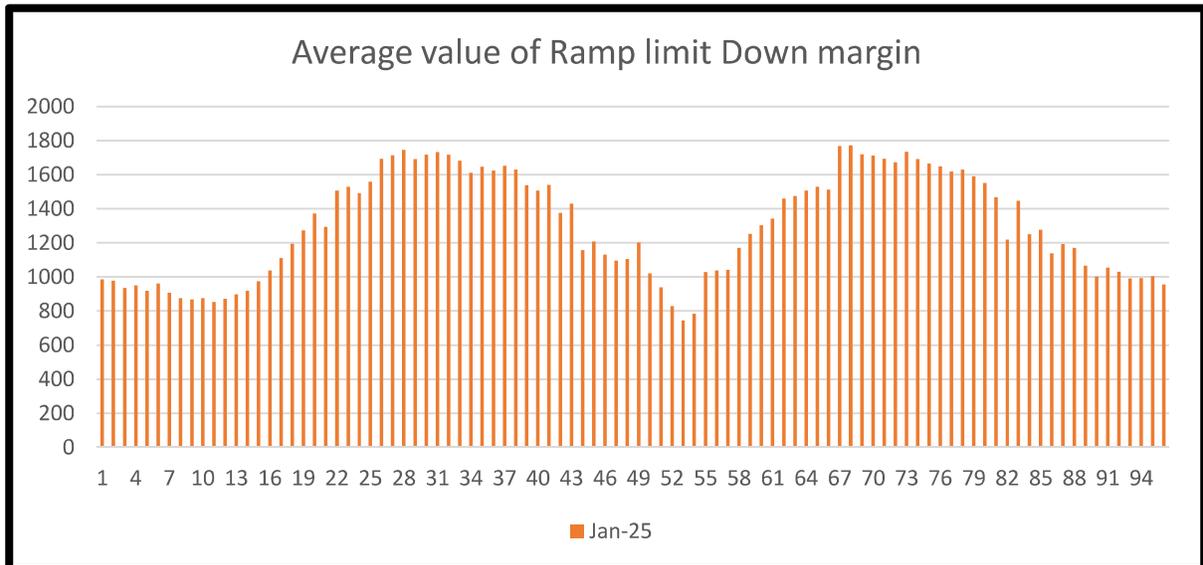
Table 5.4: Monthly Average value of Ramp Limit down Margin (MW)

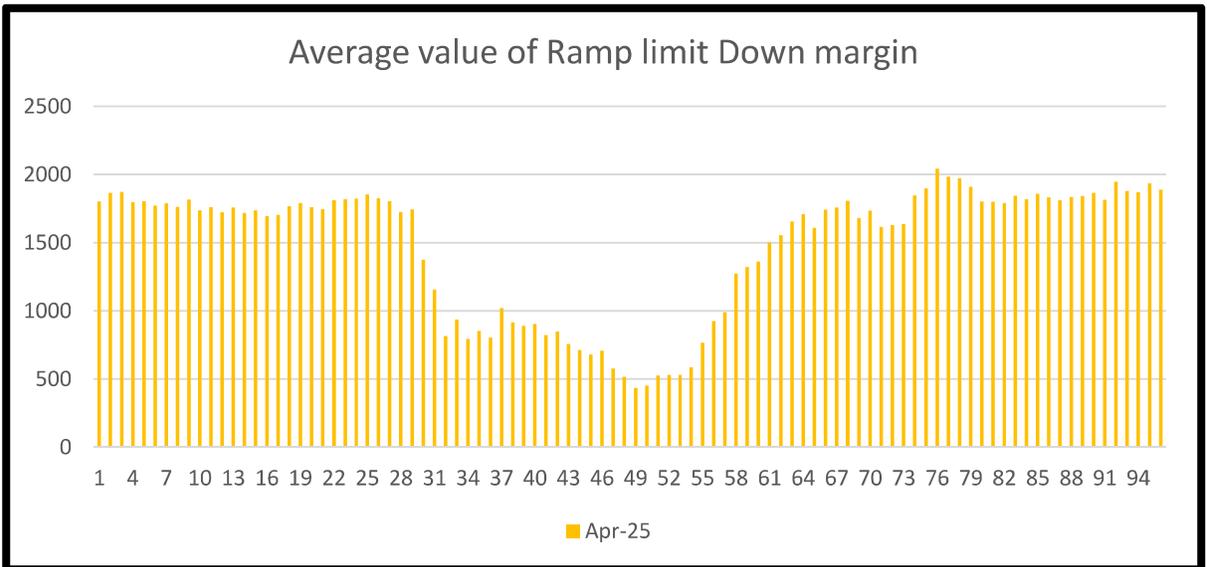
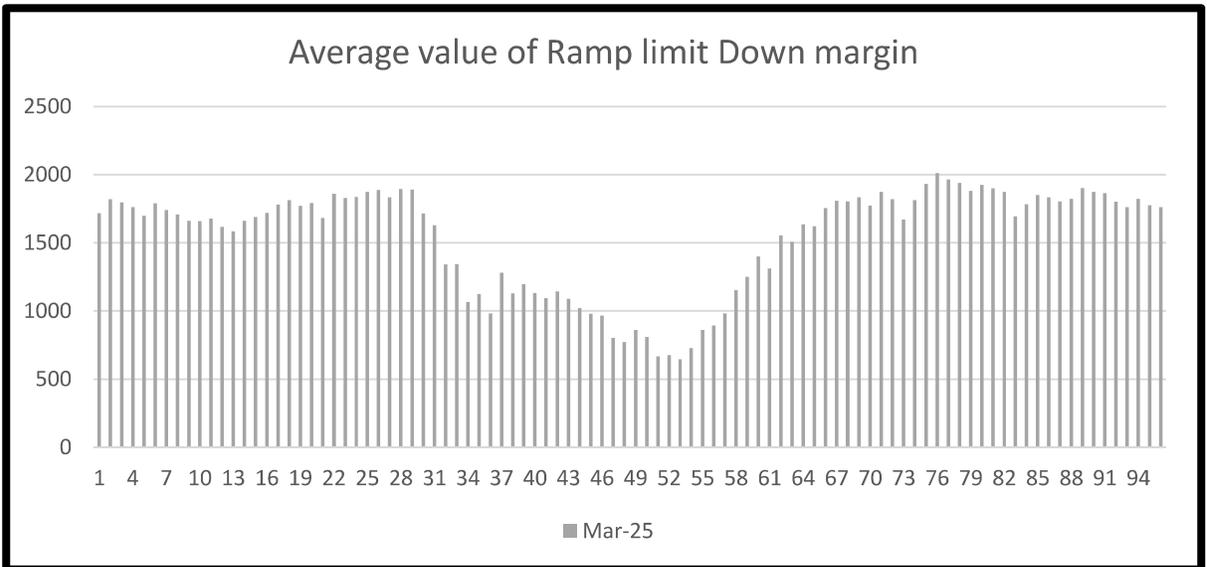
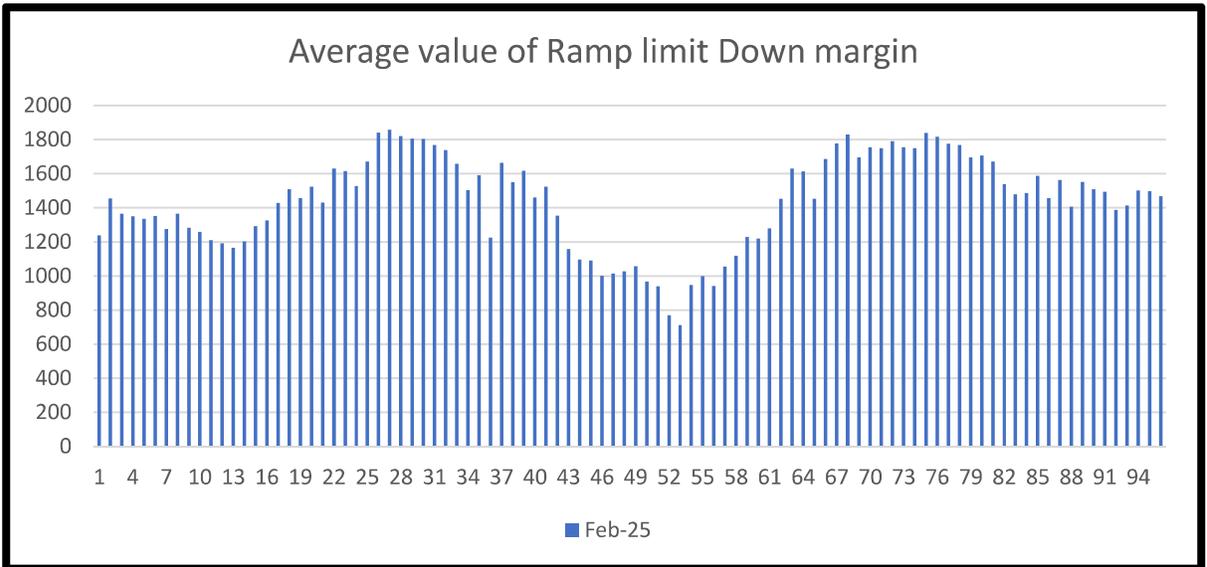
Time Block	Average value of Ramp Limit down Margin (MW)												Min	Max
	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25		
1	986	1239	1716	1804	1533	1447	1271	978	970	839	575	434	434	1804
2	978	1454	1821	1866	1501	1417	1226	1060	880	936	490	410	410	1866
3	936	1365	1797	1873	1482	1310	1267	1051	982	849	443	420	420	1873
4	951	1351	1762	1798	1361	1256	1179	1036	861	767	375	386	375	1798
5	918	1336	1699	1805	1336	1180	1183	1045	794	789	414	384	384	1805
6	961	1351	1789	1773	1403	1173	1191	1011	755	727	433	347	347	1789
7	906	1275	1741	1788	1315	1111	1147	961	778	767	409	324	324	1788
8	876	1365	1707	1762	1332	1139	1118	971	714	793	378	278	278	1762
9	868	1284	1661	1815	1299	1191	1055	915	783	759	429	266	266	1815
10	876	1259	1660	1737	1301	1133	1125	943	738	675	413	352	352	1737
11	853	1210	1676	1760	1181	1152	1090	885	758	628	362	377	362	1760
12	872	1191	1616	1723	1227	1122	1088	866	722	671	407	301	301	1723
13	898	1165	1585	1758	1169	1133	1049	873	660	681	385	353	353	1758

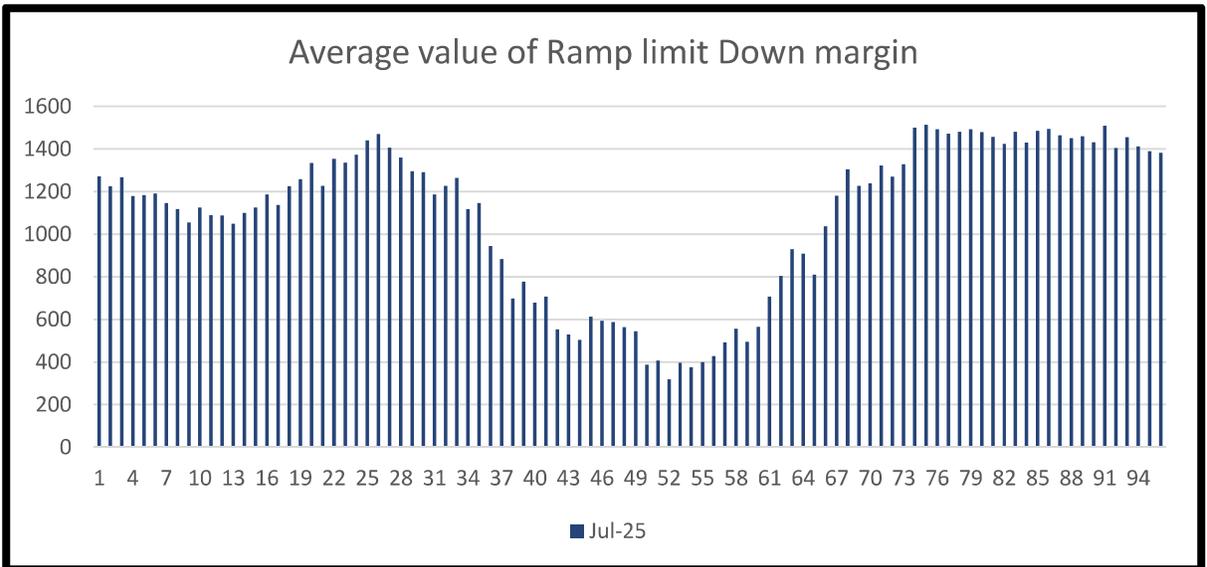
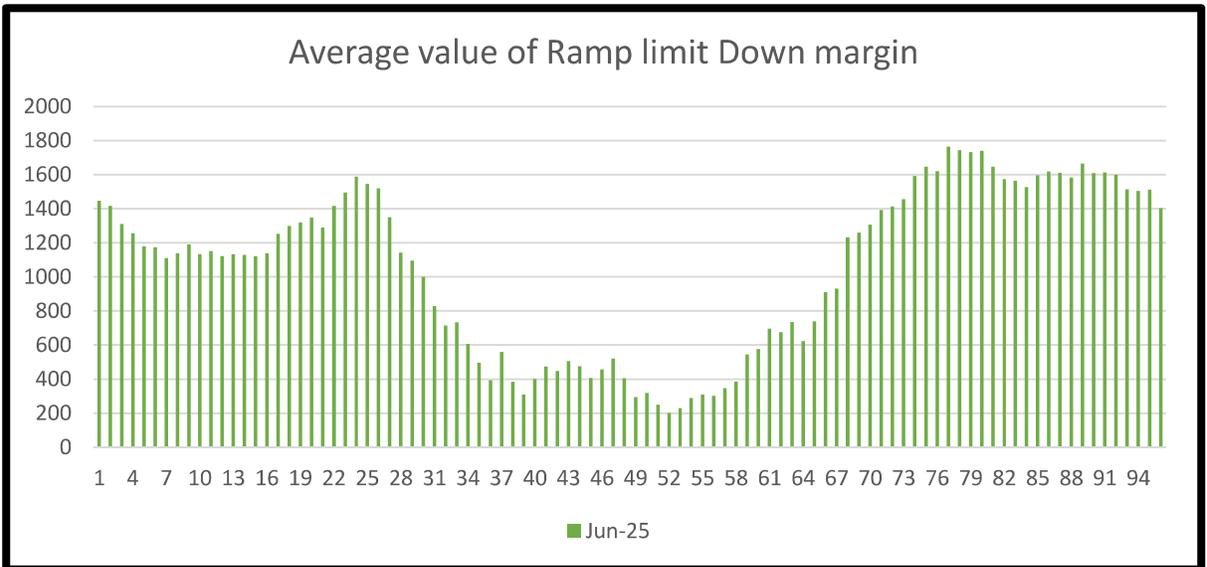
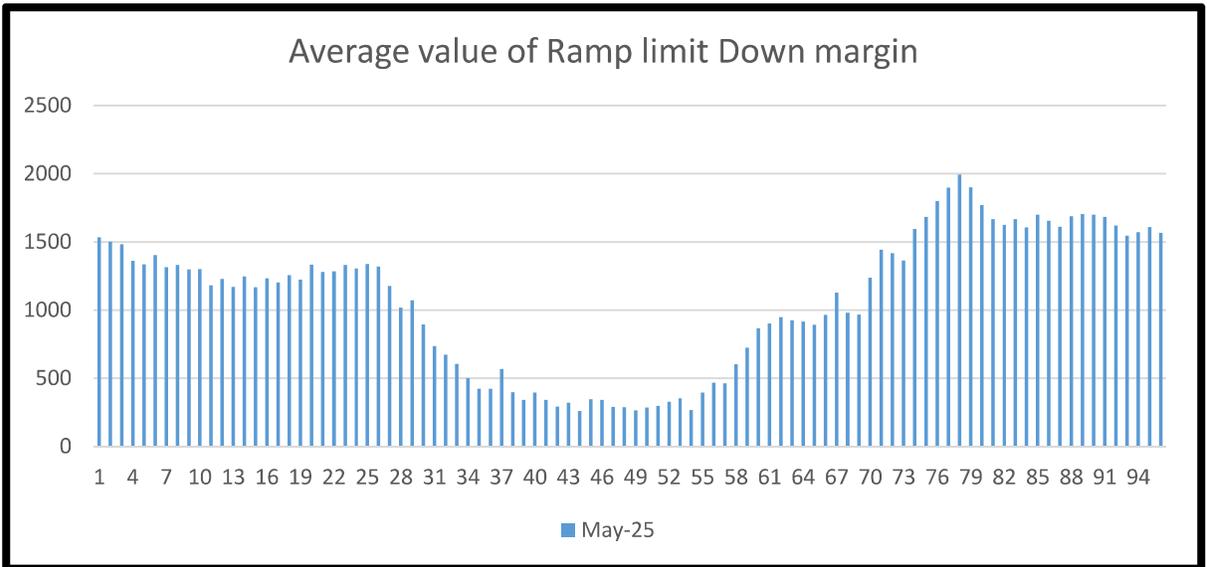
14	919	1204	1661	1718	1247	1129	1101	990	644	708	428	403	403	1718
15	974	1292	1690	1737	1168	1122	1125	992	709	755	422	478	422	1737
16	1038	1327	1720	1695	1232	1139	1187	994	712	848	489	525	489	1720
17	1110	1428	1780	1705	1203	1252	1137	1116	818	901	618	641	618	1780
18	1195	1509	1813	1768	1256	1298	1225	1078	921	964	793	868	793	1813
19	1274	1457	1770	1791	1225	1320	1258	1178	991	1034	836	900	836	1791
20	1372	1524	1792	1761	1332	1347	1334	1267	1100	1194	970	993	970	1792
21	1293	1431	1682	1748	1279	1290	1227	1120	945	1266	992	1155	945	1748
22	1507	1631	1860	1813	1284	1416	1354	1228	1248	1430	1227	1382	1227	1860
23	1529	1616	1830	1819	1331	1494	1336	1233	1310	1441	1298	1393	1233	1830
24	1492	1528	1837	1823	1305	1589	1373	1386	1281	1439	1306	1509	1281	1837
25	1559	1671	1874	1854	1338	1546	1441	1435	1259	1415	1313	1630	1259	1874
26	1692	1841	1887	1825	1319	1519	1471	1363	1348	1418	1434	1813	1319	1887
27	1714	1858	1834	1806	1176	1349	1406	1343	1335	1453	1450	1776	1176	1834
28	1745	1820	1894	1726	1019	1142	1360	1174	1192	1290	1385	1766	1019	1894
29	1692	1805	1889	1744	1072	1095	1296	1247	1257	1172	1317	1757	1072	1889
30	1718	1805	1716	1375	895	1001	1292	1138	1178	1135	1137	1757	895	1716
31	1733	1769	1629	1155	735	830	1187	1025	1032	920	1049	1691	735	1629
32	1717	1738	1341	817	672	715	1227	917	919	590	674	1607	590	1738
33	1682	1659	1344	936	606	733	1264	1050	817	559	660	1525	559	1659
34	1612	1504	1067	794	500	606	1118	908	702	516	613	1505	500	1067
35	1646	1591	1124	852	423	496	1146	880	545	506	419	1132	419	1124
36	1624	1226	982	804	424	394	944	714	671	404	420	1025	394	982
37	1651	1664	1280	1020	567	559	884	680	633	569	572	1382	559	1280
38	1631	1551	1130	915	396	384	698	682	529	544	525	1454	384	1130
39	1539	1617	1197	891	342	309	777	608	349	336	580	1275	309	1197
40	1506	1461	1132	904	394	400	679	560	354	358	529	1103	354	1132
41	1540	1524	1094	822	342	474	707	583	383	423	341	1038	341	1094
42	1376	1355	1142	849	292	447	553	424	309	402	270	803	270	1142
43	1430	1158	1089	757	320	506	529	401	396	255	260	760	255	1089
44	1158	1097	1022	713	259	476	504	404	407	197	294	526	197	1097
45	1208	1091	979	679	346	407	613	380	345	267	212	383	212	979
46	1132	1001	967	709	341	457	594	420	326	301	159	429	159	967
47	1096	1013	801	576	289	521	588	464	368	173	158	422	158	801
48	1104	1027	771	517	288	405	563	399	470	180	145	355	145	771
49	1202	1057	862	435	265	295	544	394	471	139	100	201	100	862

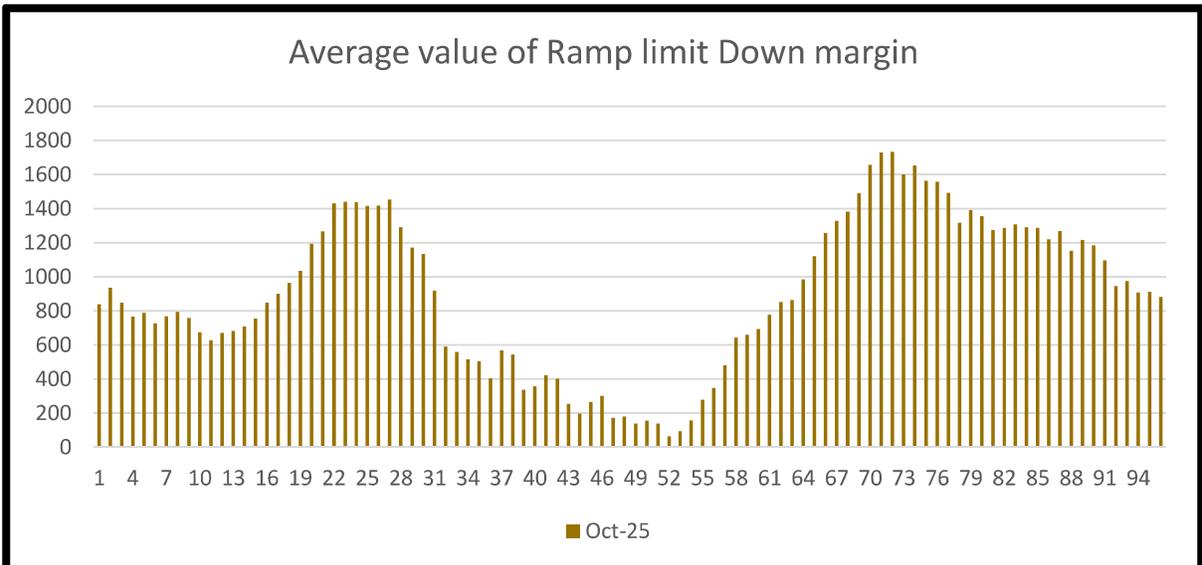
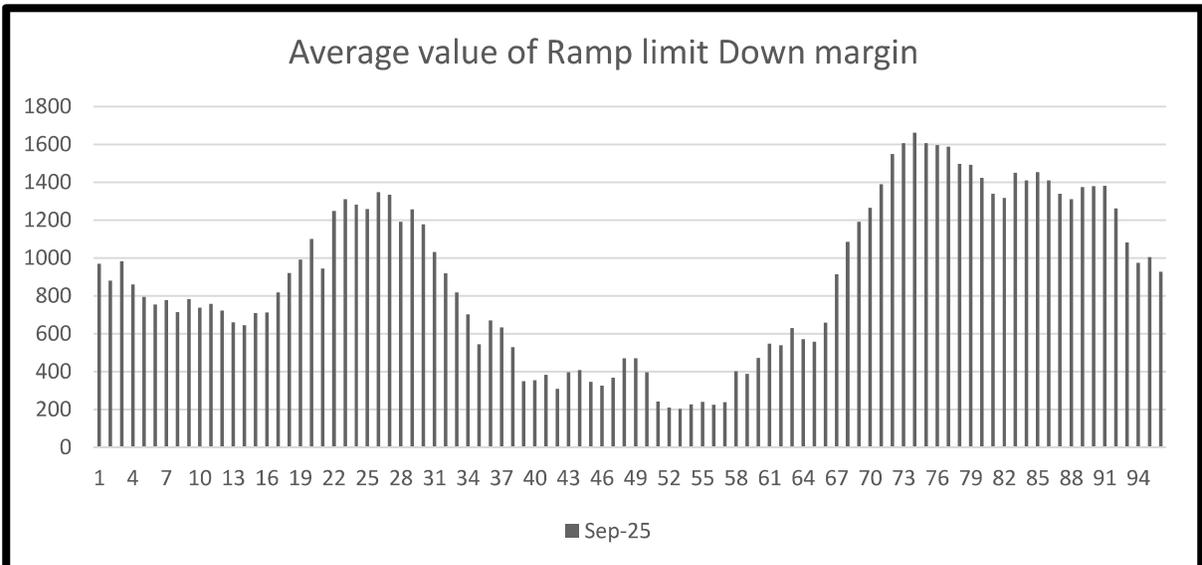
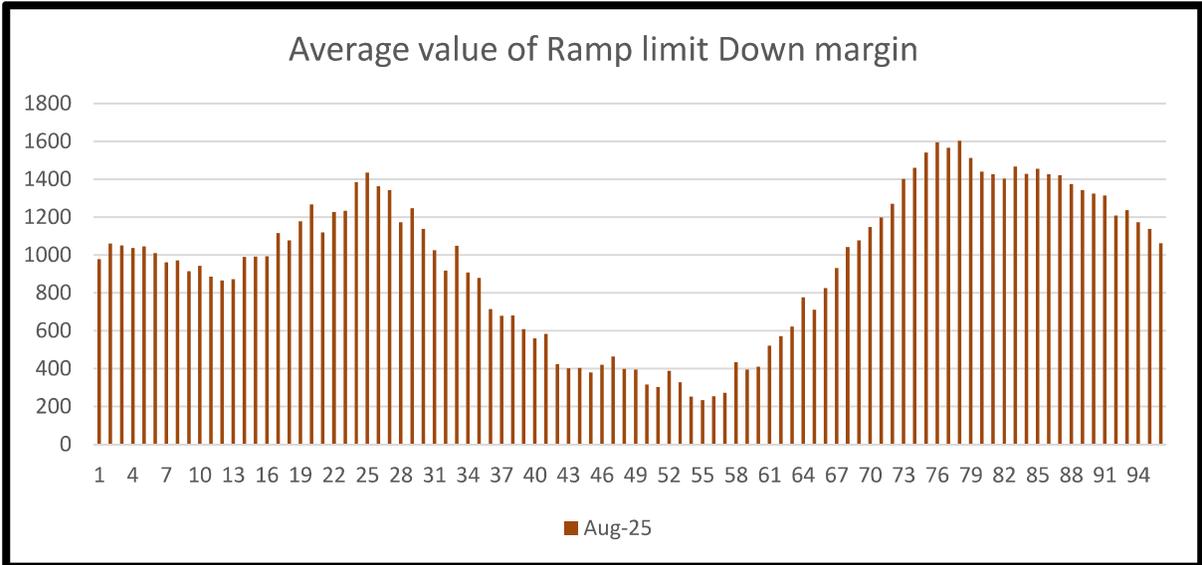
50	1022	968	809	451	286	319	388	317	396	156	140	250	140	1022
51	938	939	667	526	298	251	406	302	241	139	149	240	139	939
52	829	769	677	531	327	201	319	389	209	64	123	233	64	829
53	744	712	646	530	354	229	397	327	202	94	91	220	91	744
54	785	947	728	587	266	289	376	252	226	158	192	236	158	947
55	1028	1000	862	766	396	310	399	234	240	279	207	310	207	1028
56	1038	942	893	925	468	302	428	254	225	347	217	539	217	1038
57	1041	1055	982	992	462	347	492	272	238	480	293	577	238	1055
58	1170	1118	1153	1272	603	387	556	433	401	643	586	778	387	1272
59	1253	1229	1249	1321	724	545	494	395	388	660	720	966	388	1321
60	1303	1219	1401	1361	867	576	565	411	472	694	811	1200	411	1401
61	1342	1280	1310	1500	900	695	706	521	547	778	830	1268	521	1500
62	1459	1453	1553	1556	947	676	804	573	540	852	994	1510	540	1556
63	1474	1630	1506	1657	925	736	930	621	630	863	1186	1703	621	1703
64	1506	1614	1637	1709	916	623	909	777	571	984	1170	1837	571	1837
65	1530	1454	1622	1608	892	739	811	712	557	1120	1112	1510	557	1622
66	1512	1687	1755	1741	965	911	1037	825	658	1257	1459	1863	658	1863
67	1769	1778	1809	1759	1128	931	1180	932	914	1328	1554	1926	914	1926
68	1772	1830	1804	1807	981	1231	1305	1043	1085	1383	1654	1941	981	1941
69	1720	1695	1834	1681	968	1260	1227	1078	1191	1491	1614	1663	968	1663
70	1712	1755	1773	1735	1237	1307	1239	1148	1265	1657	1647	1875	1148	1875
71	1693	1750	1874	1615	1444	1392	1322	1198	1390	1729	1660	1794	1198	1794
72	1673	1791	1820	1630	1416	1413	1270	1270	1550	1733	1613	1814	1550	1814
73	1734	1755	1672	1637	1364	1456	1328	1401	1606	1601	1514	1748	1606	1748
74	1691	1750	1814	1848	1595	1593	1501	1461	1661	1653	1560	1767	1661	1767
75	1665	1840	1932	1898	1683	1647	1514	1541	1605	1563	1533	1761	1605	1761
76	1649	1817	2012	2042	1800	1621	1493	1595	1596	1557	1492	1735	1596	1735
77	1619	1776	1965	1984	1898	1764	1472	1567	1588	1492	1429	1699	1588	1699
78	1629	1769	1939	1973	1993	1744	1481	1604	1496	1317	1377	1667	1496	1667
79	1591	1697	1880	1911	1901	1732	1492	1513	1493	1392	1220	1558	1493	1558
80	1551	1707	1924	1803	1769	1740	1479	1441	1424	1356	1099	1518	1424	1518
81	1468	1672	1899	1800	1667	1646	1456	1426	1339	1275	1109	1497	1339	1497
82	1218	1539	1873	1791	1626	1574	1424	1403	1317	1288	998	1383	998	1383
83	1446	1479	1694	1844	1668	1564	1480	1467	1451	1308	948	1373	948	1373
84	1251	1487	1782	1819	1607	1526	1430	1429	1410	1290	927	1077	927	1077
85	1277	1587	1851	1859	1699	1596	1485	1455	1454	1287	906	1157	906	1157
86	1139	1456	1834	1833	1656	1618	1495	1427	1409	1221	853	1009	853	1009

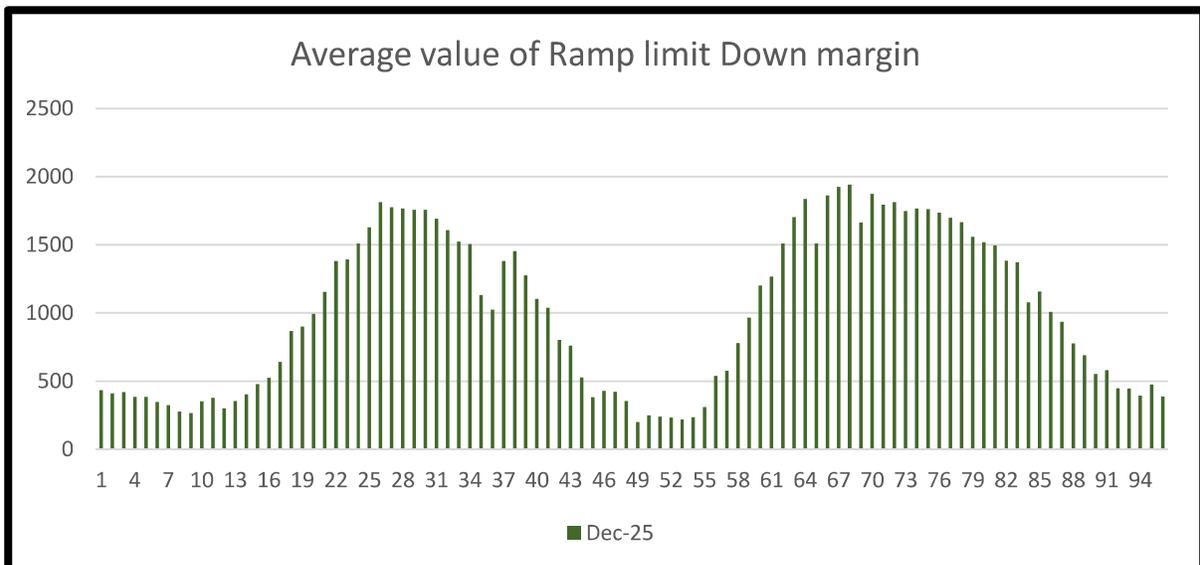
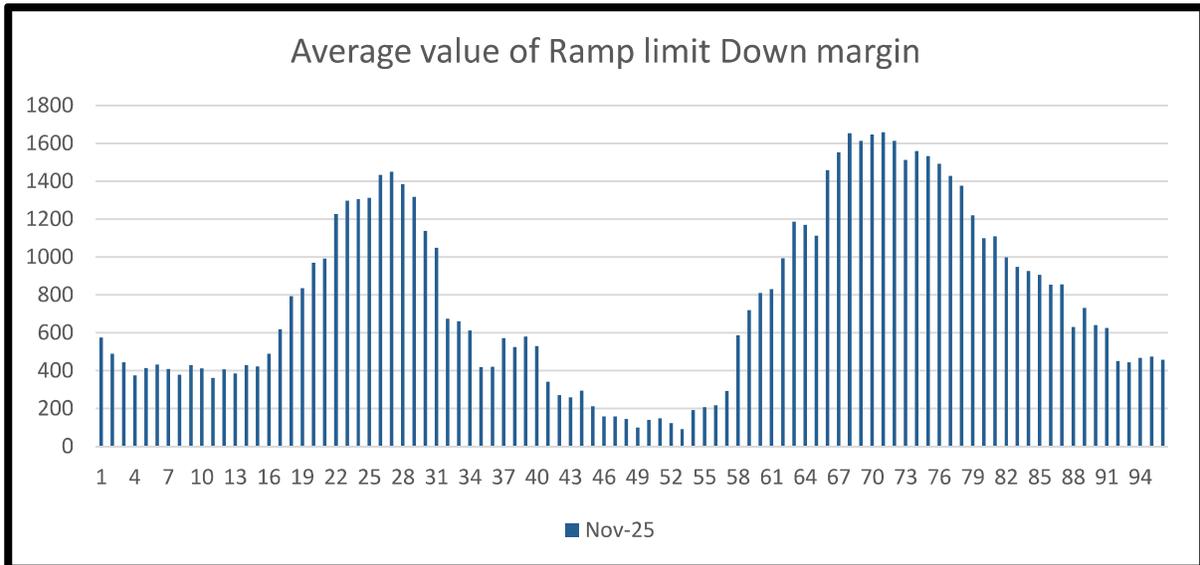
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87	1192	1562	1805	1811	1612	1612	1465	1421	1339	1268	856	935	856	1811
88	1171	1407	1822	1836	1687	1583	1450	1375	1311	1154	631	777	631	1836
89	1066	1552	1901	1843	1704	1666	1459	1343	1375	1216	731	689	689	1901
90	1003	1510	1873	1866	1699	1609	1431	1324	1379	1184	640	552	552	1873
91	1054	1494	1865	1815	1682	1612	1510	1314	1381	1096	625	580	580	1865
92	1031	1388	1802	1947	1619	1599	1405	1209	1261	945	451	449	449	1947
93	992	1414	1761	1879	1545	1515	1455	1238	1081	974	444	445	444	1879
94	994	1501	1822	1869	1572	1505	1413	1173	974	909	468	393	393	1869
95	1005	1498	1776	1935	1608	1513	1389	1138	1005	912	474	476	474	1935
96	955	1468	1761	1889	1567	1404	1382	1062	927	882	457	388	388	1889
Min	744	712	646	435	259	201	319	234	202	64	91	201	64	744
Max	1772	1858	2012	2042	1993	1764	1514	1604	1661	1733	1660	1941	1514	2042
Solar Min	744	712	646	435	259	201	319	234	202	64	91	201	64	744
solar Max	1772	1858	1894	1854	1444	1546	1471	1435	1550	1733	1660	1941	1319	1941
Non-Solar Min	853	1165	1585	1637	1168	1111	1049	866	644	628	362	266	266	1718
Non-Solar Max	1734	1840	2012	2042	1993	1764	1514	1604	1661	1653	1560	1767	1514	2042











5.13 Integrated Interpretation of Ramping Behavior and Constraints

The combined assessment of unconstrained and ramp-limited ramp-up and ramp-down capabilities during Calendar Year 2025 highlights the distinction between theoretical flexibility based on declared capacities and effective operational flexibility available to the system operator under real-time scheduling and dispatch constraints.

The analysis of unconstrained ramping margins indicates that, in aggregate, the Maharashtra power system possesses sufficient installed and declared capacity to meet a large share of observed ramping requirements. However, when the actual scheduled operating positions of generating units are considered, the effective ramping capability reduces significantly, particularly during periods of high net demand and steep demand transitions. This divergence is most pronounced in the case of ramp-up requirements during evening peak periods, where units operating close to their upper limits exhibit limited headroom despite adequate declared ramp rates.

Similarly, the assessment of ramp-down capability reveals that while declared downward margins appear adequate during several periods, the ramp-limited downward margins become constrained during mid-day surplus conditions, when multiple generating units are already operating near their technical minimum levels. These conditions restrict the system's ability to absorb excess generation arising from high renewable output, leading to operational stress during specific time blocks.

The temporal distribution of ramping constraints shows a clear pattern. Ramp-up constraints are predominantly observed during evening peak time blocks, corresponding to high net demand and reduced upward flexibility, while ramp-down constraints are concentrated during mid-day time blocks, coinciding with high solar generation and limited downward manoeuvrability of conventional units. These recurring patterns underline the increasing operational challenge of managing bi-directional flexibility in a system with rising renewable penetration.

The analysis further demonstrates that fast-responding hydro resources, particularly Koyna Hydro and Tata Hydro, continue to play a critical role in mitigating ramp-up shortages and maintaining system security under constrained conditions. The Maharashtra power system operation heavily relies particularly on Koyna hydro under constrained system operation conditions.

Overall, the ramping analysis for CY-2025 underscores that system flexibility is increasingly constrained not by installed capacity, but by scheduling positions, ramp-rate limitations, and minimum technical operating limits of generating units. These findings highlight the need for continued focus on enhancing both upward and downward operational flexibility through improved through reduction in minimum technical limits, integration of flexible resources such as pumped storage and energy storage systems, and development of structured reserve and ancillary service mechanisms to support secure and reliable system operation in an increasingly renewable-dominated environment.

Transmission Constraints affecting system flexibility

The ramping capability available to the Maharashtra power system during CY-2025 was influenced not only by generation characteristics but also by network-related constraints and participation limitations of certain generating resources. Key transmission constraints affecting the ramping capability observed during the year are summarised below.

A. Transmission Constraints in Nashik Region

Transmission constraints in the Nashik region necessitated operation of certain generating stations at fixed or relatively higher generation levels to manage loading on critical transmission corridors and maintain network security. As a result, these generators had limited headroom for both ramp-up and ramp-down operations, thereby reducing their effective contribution to system-level ramping and absorption requirements.

The constrained operating regime of these generating stations restricted their operational flexibility and limited their ability to respond dynamically to system ramping needs, particularly during periods of rapid demand variation or renewable generation fluctuations.

B. No Participation of Captive Intra-State Generators in system flexibility

Certain intra-State generating stations, such as JSWEL Units 2, 3, and 4 and SWPGL, primarily operate to meet the requirements of their captive consumers. Consequently, the availability of upward and

downward margins from these units is largely determined by captive demand patterns, and their response to system-level ramping requirements remains limited.

In general, these generators prioritise serving captive loads and participate minimally in system-wide ramping support. Enabling structured participation of such captive intra-State generators in system ramping and flexibility obligations, subject to technical feasibility and regulatory provisions, has the potential to significantly enhance overall system flexibility and improve the ability of the system operator to manage ramping requirements more effectively.

C. Koyna Hydro operation for transmission constraints affecting system flexibility

In addition, during periods when Koyna Hydro generation is scheduled or picked up to address transmission constraints, its dispatch is primarily driven by network security considerations rather than system balancing needs. In such situations, to manage State periphery deviations and maintain overall system balance, other intra-State thermal generating units are required to be backed down.

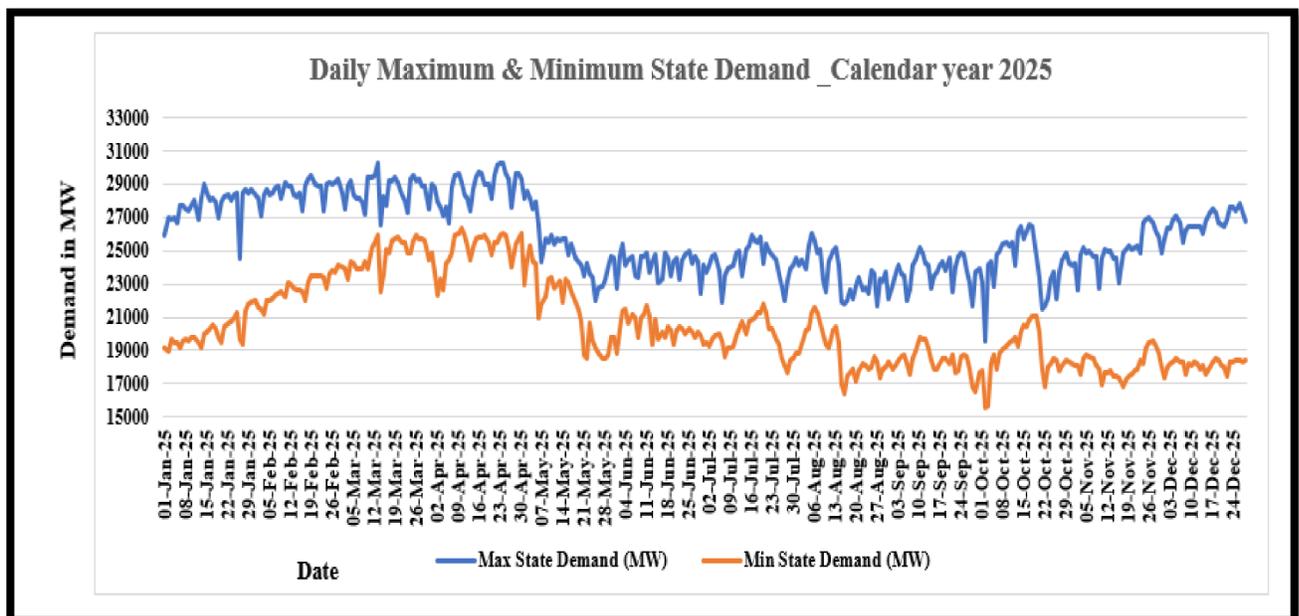
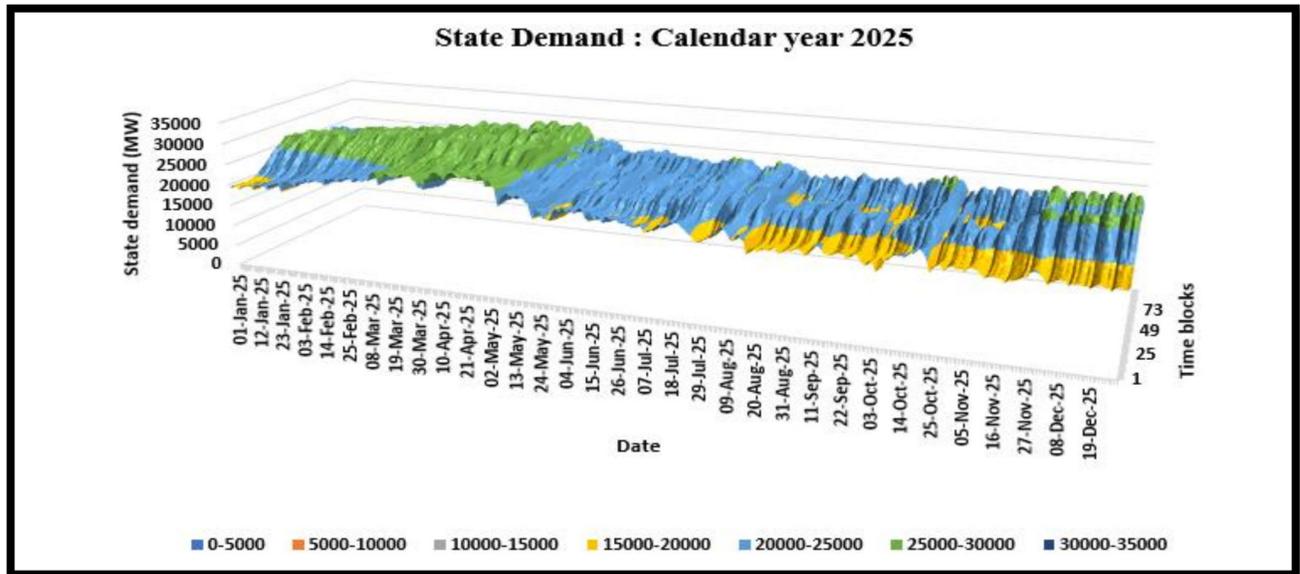
This operational adjustment leads to a reduction in the available downward margin of these thermal units, particularly when they approach their minimum technical operating limits. As a result, the overall downward flexibility of the system is further constrained, thereby reducing the ability of the system to absorb additional surplus generation or respond effectively to subsequent ramp-down requirements. These interactions between transmission-driven hydro despatch and thermal generation backing-down illustrate the interlinked nature of network constraints and generation flexibility, and their combined impact on system-level ramping capability.

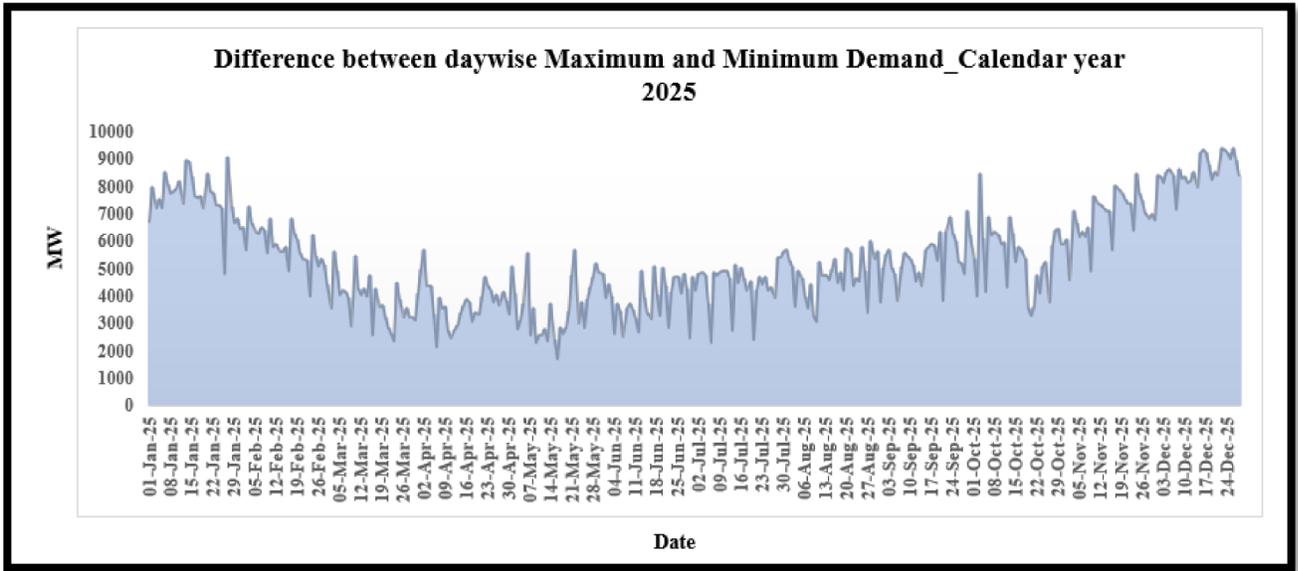
PART-III
SYSTEM DEMAND PROFILE

Chapter 6: Demand & Energy Profile of the State

6.1 Demand Profile for the State:

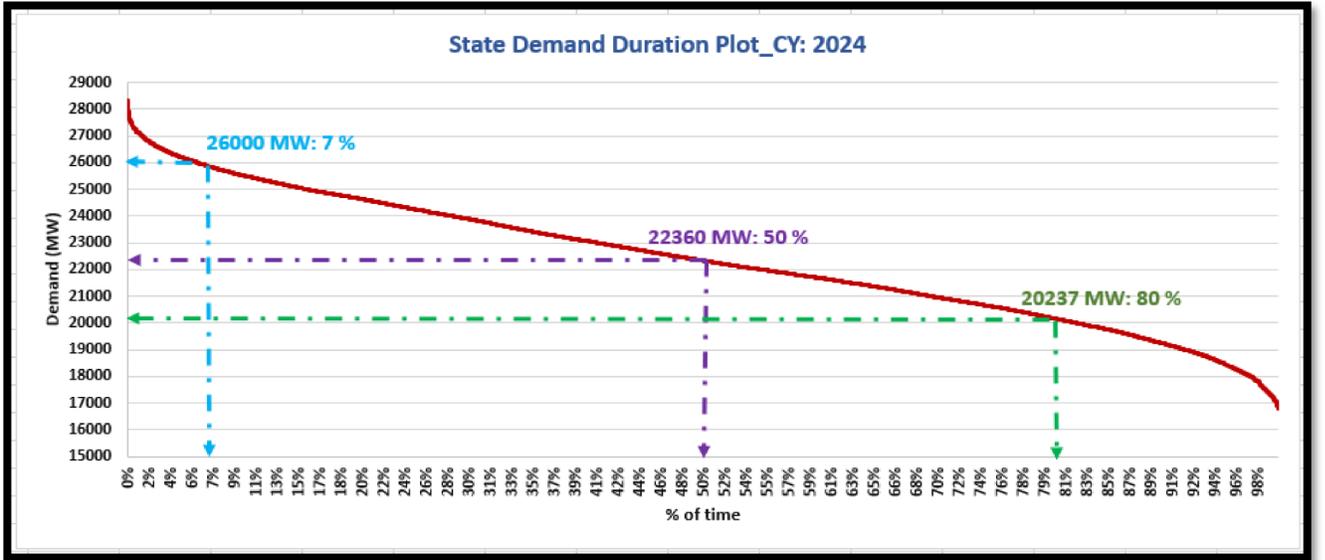
Maharashtra State demand is around 37 % of the Western Region and 11 % of the National Demand. The following graphs indicates the daily & seasonal variations in the State Demand for the complete year.

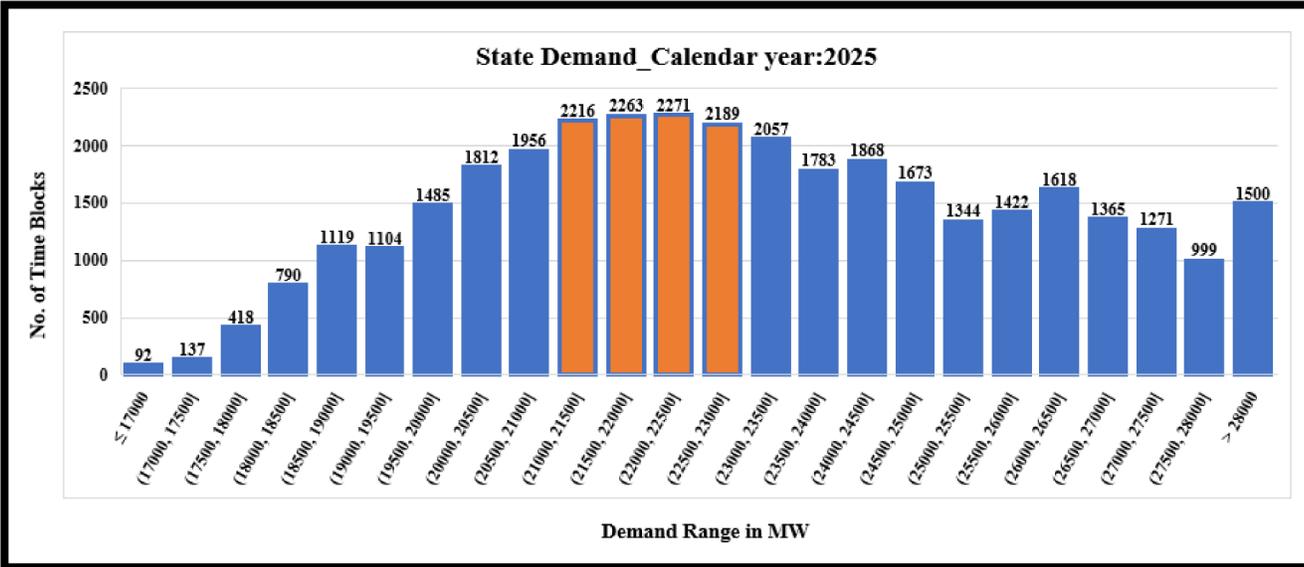
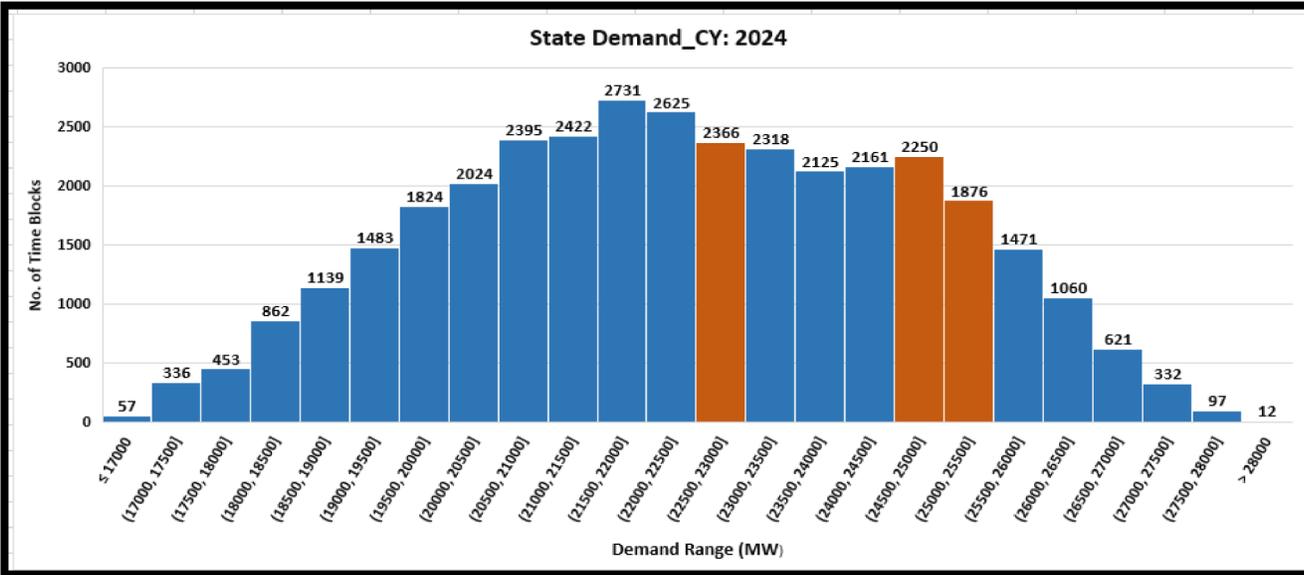
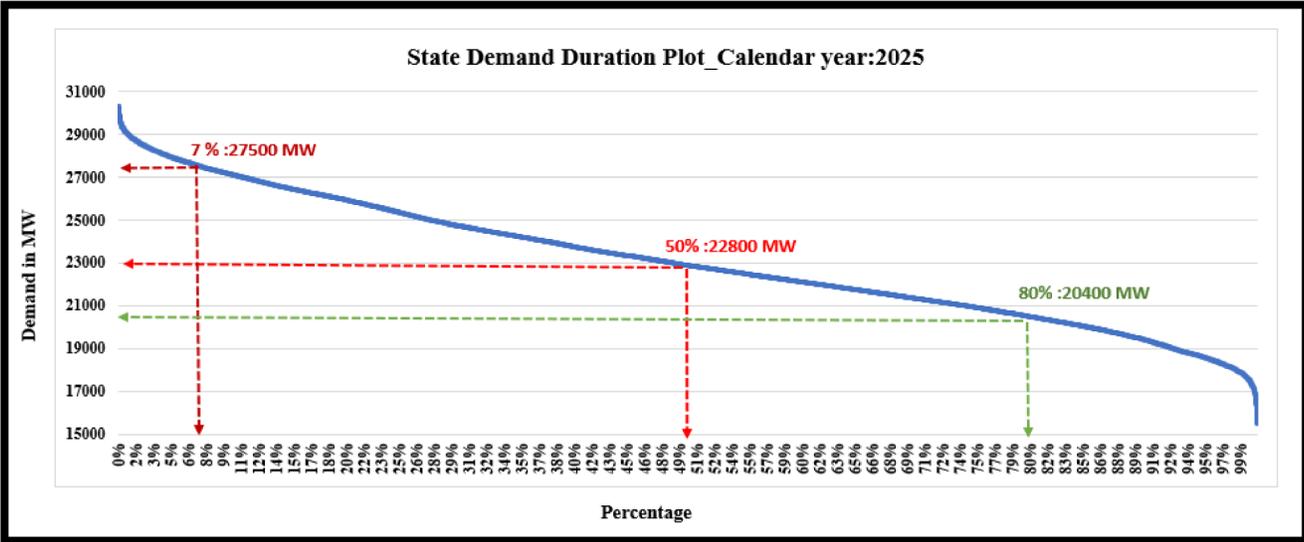




From the above graphs, it is observed that there are variations in State Demand throughout the day as well as seasonal. The maximum seasonal demand variation in the State is to the tune of around 12000 MW whereas the maximum daily demand variation is around 9420 MW.

The duration plots of the State Demand for Calendar year 2023 & 2024 are shown below.

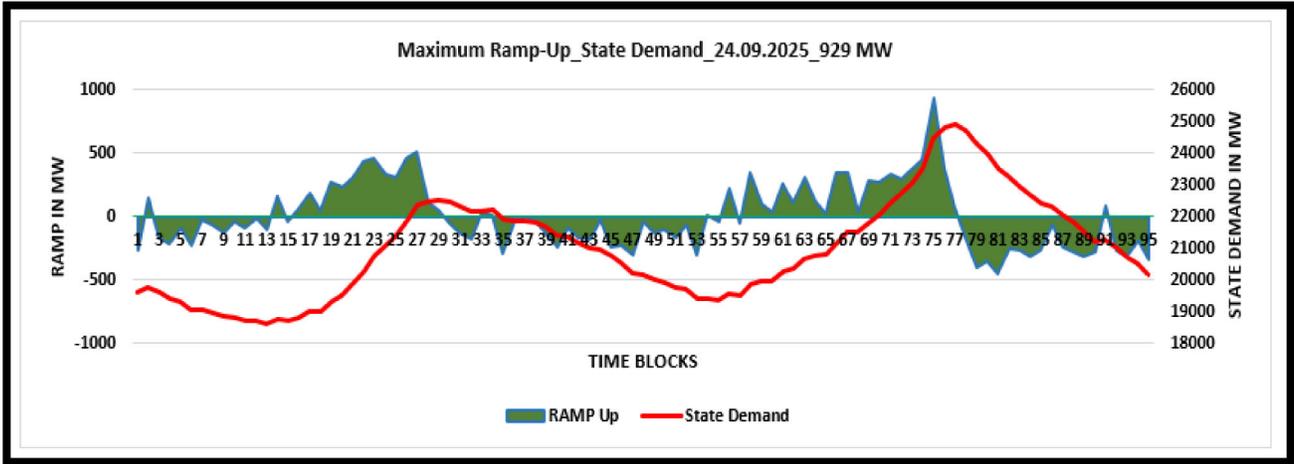




Upon comparing demand plots for both the years, some key observations are as below:

- a) For 80 % of the period, State demand was 20000 MW in Calendar Year 2024 which increased to 20400 MW in Calendar Year 2025.
- b) In Calendar Year 2025, State demand increased from 22360 MW to 22800 MW from Calendar Year 2024 with increment of around 440 MW and the demand was for 50 % of the period.
- c) In Calendar Year 2024, State demand was 26000 MW for 7 % of the period whereas in Calendar Year 2025, it was 27500 MW for 7 % of the period.

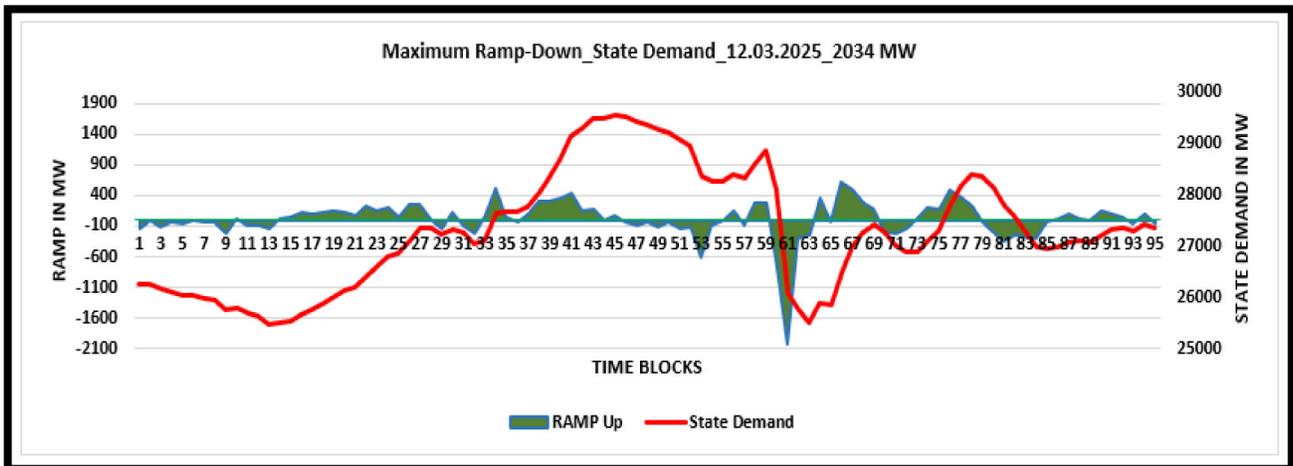
State Demand Ramping-Up/Down Requirements:



It is observed that the State Demand ramping Up & Ramping Down requirements for Calendar Year 2025 was within a range of 929 MW to 2034 MW respectively.

The maximum Ramping-Up requirement of 929 MW was observed on 24.09.2025 at 75th time block i.e. between 18:30 to 18:45 hrs. During this time, the State Demand increased from 23521 MW to 24450 MW. On the same day, a Ramp-Down of 456 MW was observed at 81th time block, when State demand reduced from 23952 MW to 23495 MW.

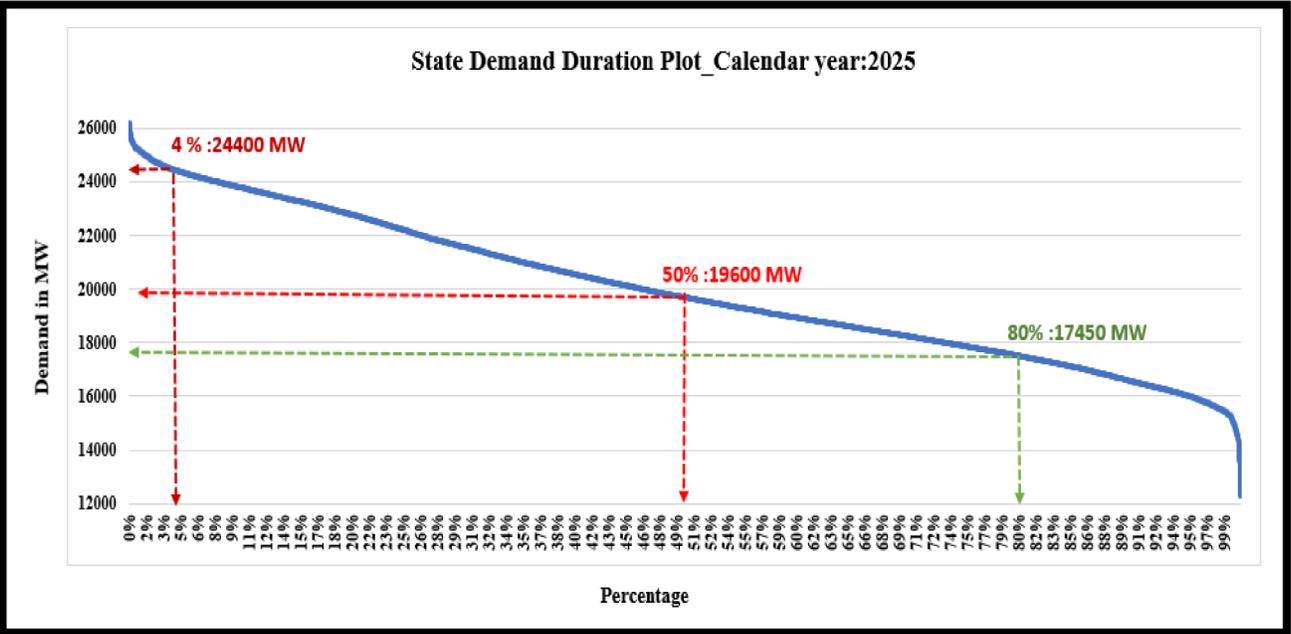
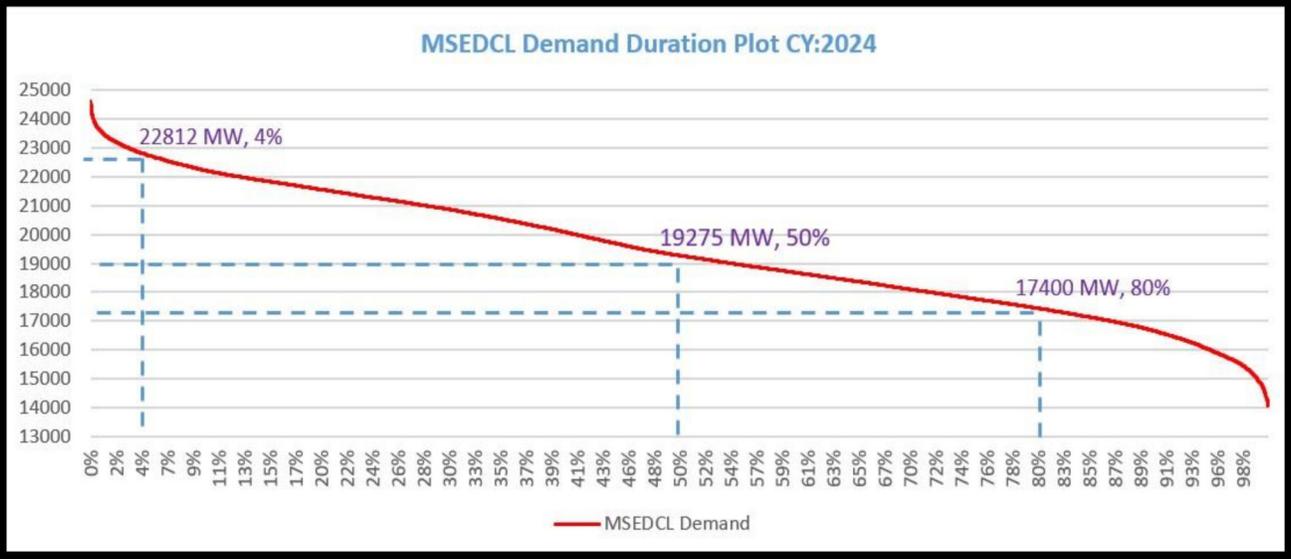
The maximum Ramping-Down requirement of 2034 MW was observed on 12.03.2025 at 61st time block i.e. between 15:00 to 15:15 hrs. During this time, the State Demand decreased from 28093 MW to 26098 MW.

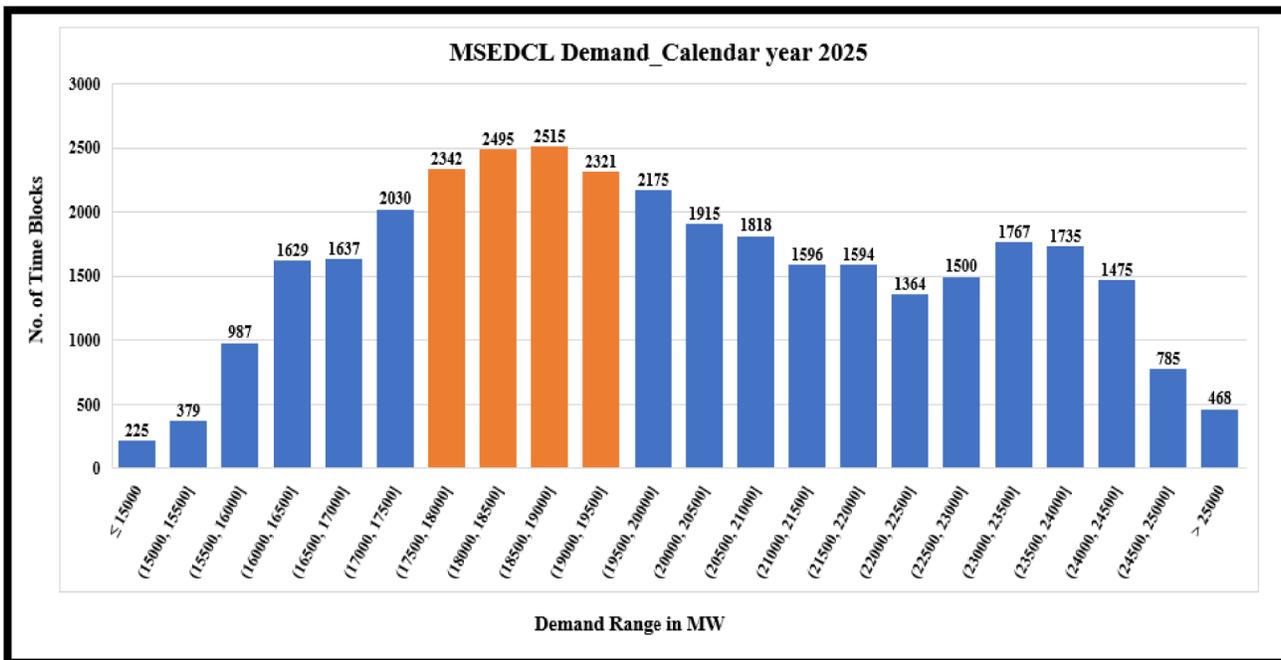
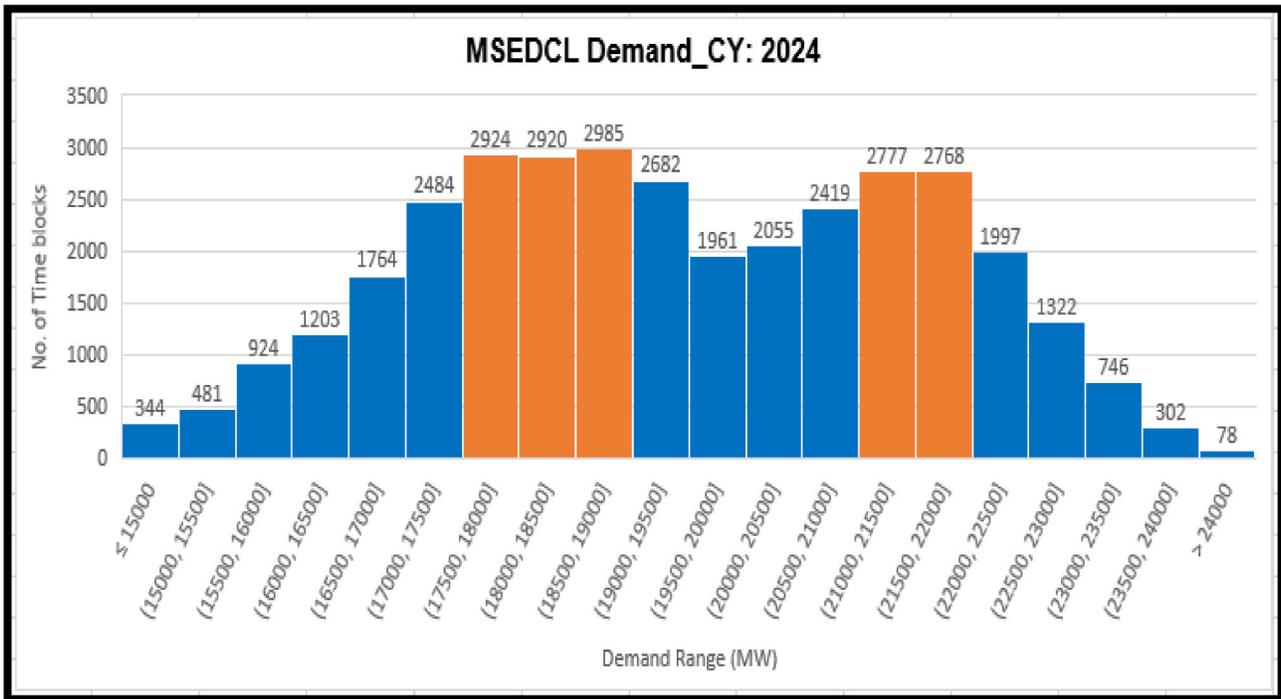


Thus, within 15 minutes, State Demand ramped down by 2034 MW (61st time block). It is observed that the said demand ramping down requirement was mainly managed through ISTS drawl. The ISTS drawl decreased by 2702 MW, from 10702 MW to 8000 MW.

6.2 Demand Profile of MSEDCL:

MSEDCL is the largest Distribution Licensee in the State which contributes to more than 70 % of the total State Demand.





Upon comparing demand plots for both the years, some key observations are as below:

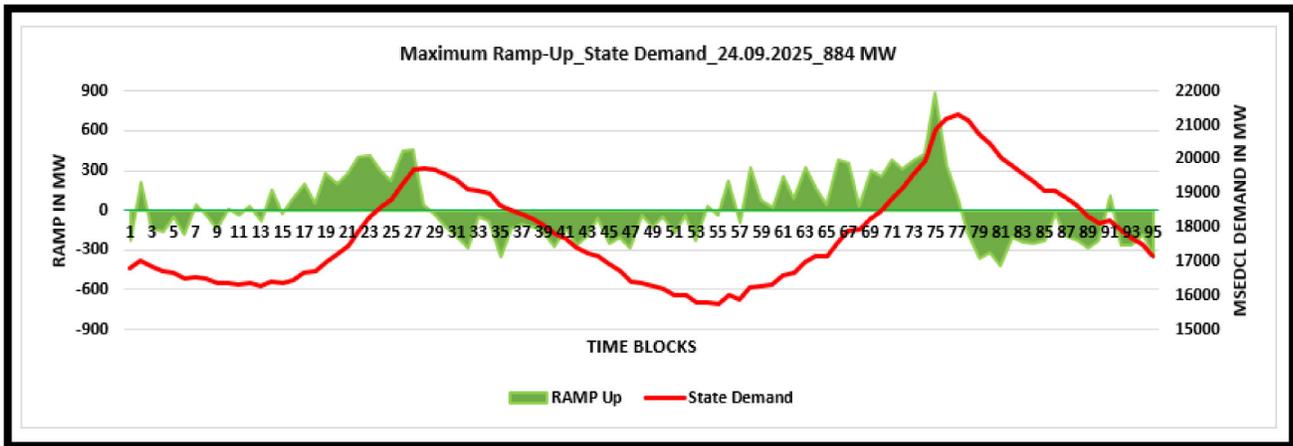
- For 80 % of the period, MSEDCL demand was 17400 MW in Calendar Year 2024 which increased to 17450 MW in Calendar Year 2025.
- In Calendar Year 2025, MSEDCL demand increased from 19275 MW to 19600 MW of Calendar Year 2024 with increment of around 325 MW and the demand was for 50 % of the period.
- For 4 % of the period, MSEDCL demand was above 22800 MW in Calendar Year: 2024 which

increased by 1600 MW in Calendar Year 2025.

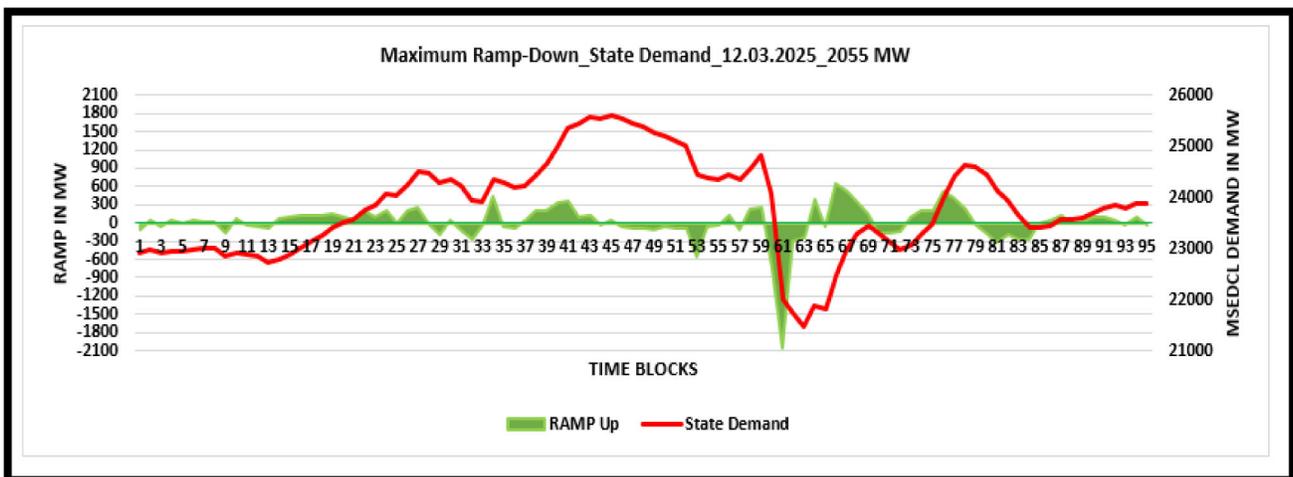
MSEDCL Demand Ramping-Up/Down Requirements:

It is observed that the MSEDCL Demand Ramping Up & Ramping Down requirements for Calendar Year 2025 was within a range of 884 MW to 2055 MW respectively.

The maximum Ramping-Up requirement of 884 MW was observed on 24.09.2025 at 75th time block i.e. between 18:30 to 18:45 hrs. During this time, the MSEDCL Demand increased from 19972 MW to 20856 MW. On the same day, a Ramp-Down of 417 MW was observed at 81st time block, when MSEDCL demand reduced from 20436 MW to 20018 MW.



The maximum Ramping-Down requirement of 2055 MW was observed on 12.03.2025 at 61st time block i.e. between 15:00 to 15:15 hrs. During this time, the MSEDCL Demand decreased from 24068 MW to 22013 MW.

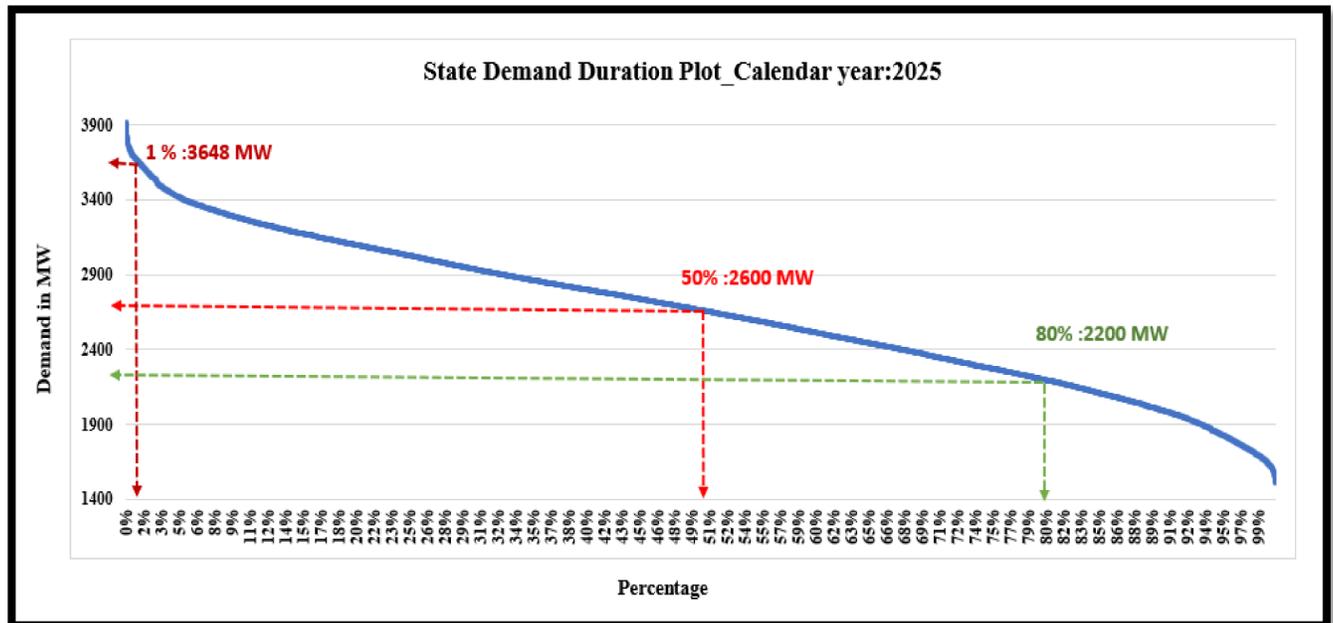
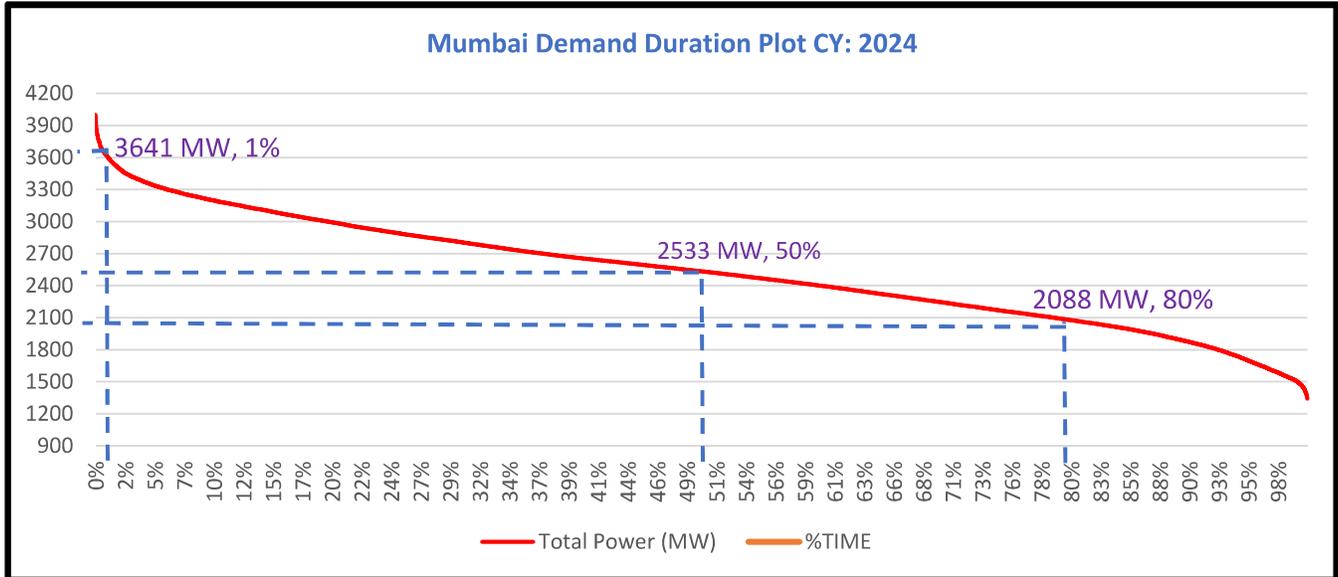


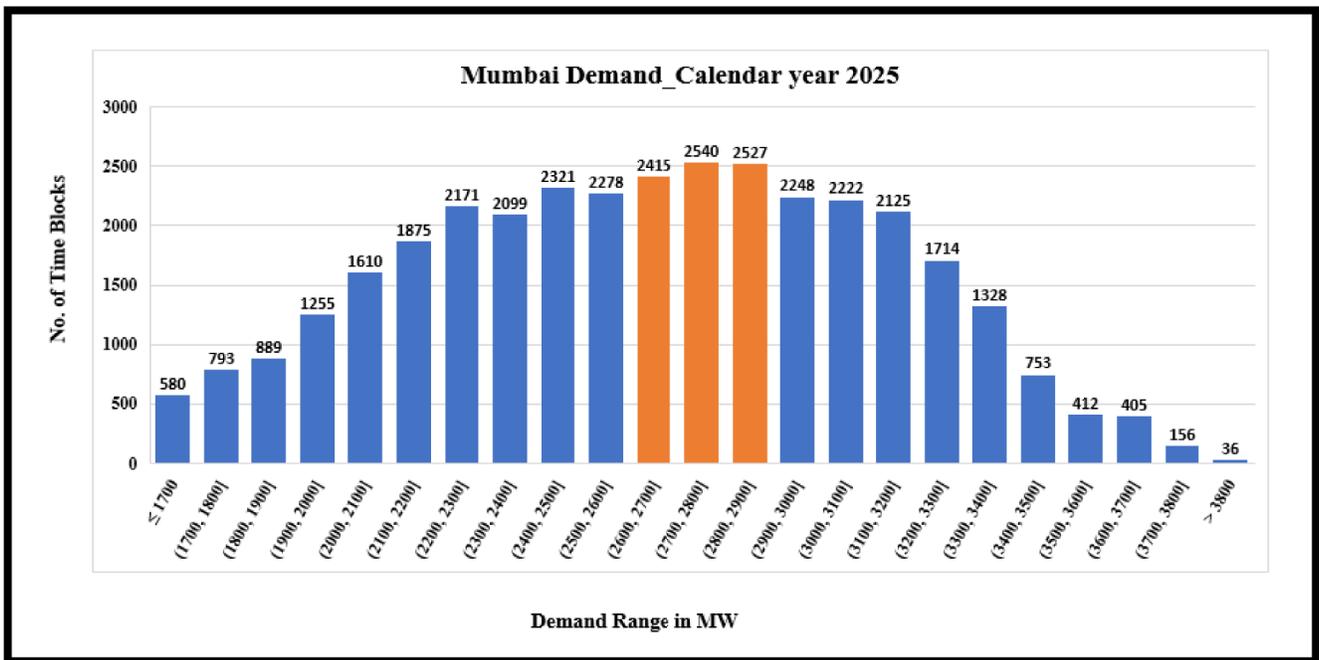
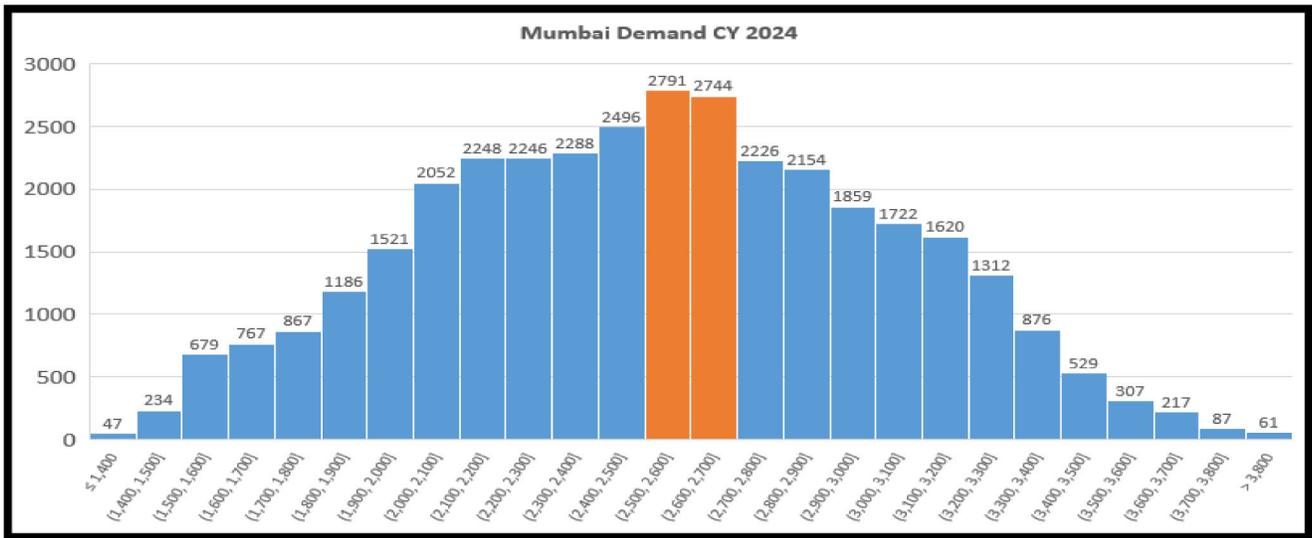
Thus, within 15 minutes, MSEDCL Demand ramped down by 2055 MW. It is observed that the said demand ramping down requirement was mainly managed through ISTS drawl. The ISTS drawl decreased by 2702 MW, from 10702 MW to 8000 MW.

6.3 Demand Profile of Mumbai Area:

Mumbai is a financial capital of India. The loads in Mumbai are catered by three Distribution licensees viz. TPC, AEML & BEST. Small quantum of load is fed by MSEDCL. Also, Indian Railways also fed supercritical traction load in Mumbai area.

The overall load pattern of Mumbai is different due to large commercial establishments & residential loads.





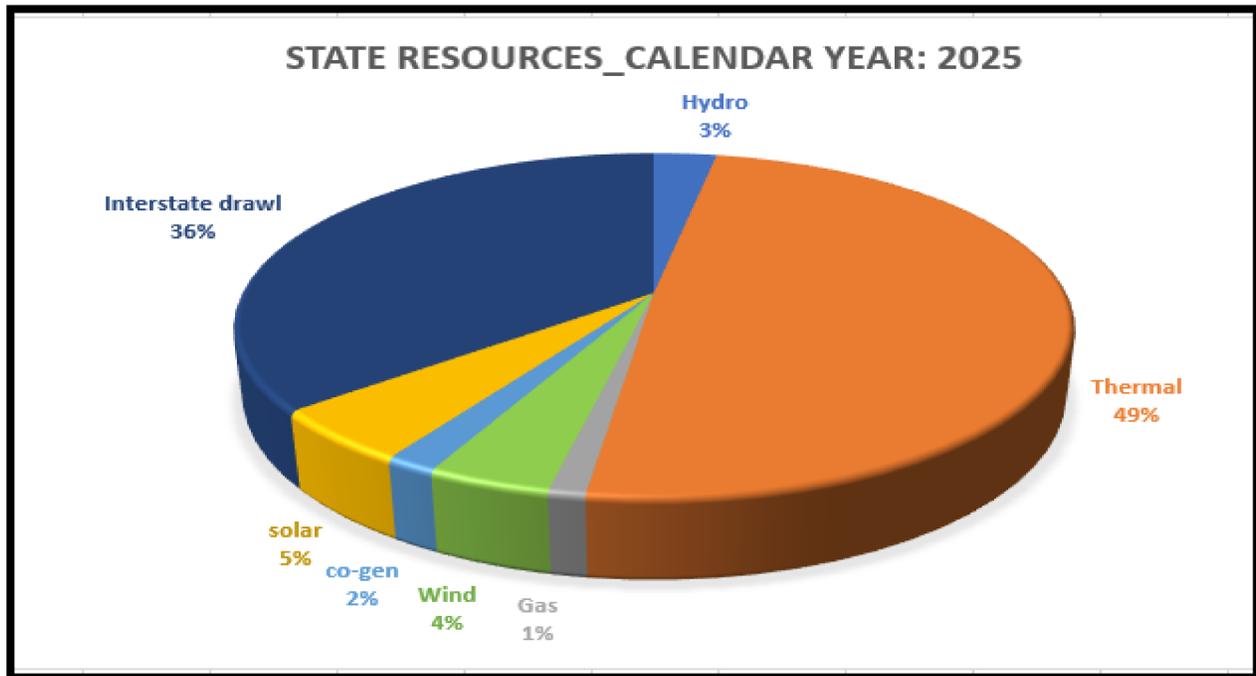
Upon comparing demand plots for both the years, some key observations are as below:

- a) For 80% of the period, Mumbai demand was 2088 MW in Calendar Year 2024 which increased to 2200 MW in Calendar Year 2025.
- b) In Calendar Year 2025, Mumbai demand increased to 2600 MW from 2533 MW from Calendar Year 2024 with for 50 % of the period.
- c) For 1% of the period, Mumbai demand was above 3641 MW in Calendar Year 2024 which increased by 7 MW in Calendar Year 2025.

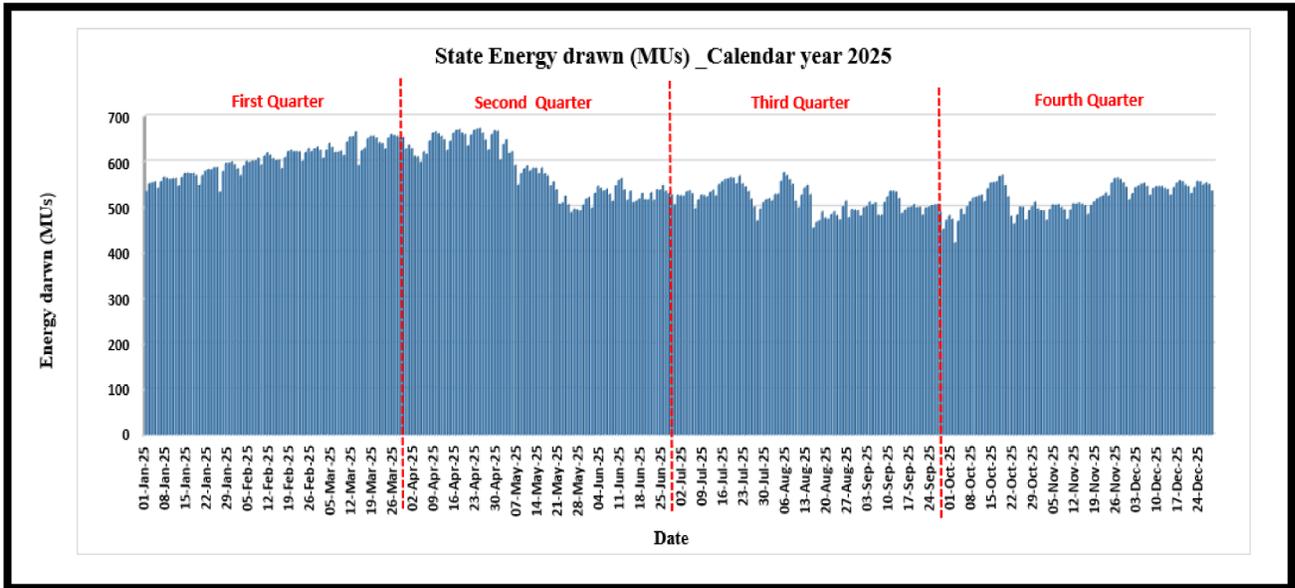
6.4 Energy Profile of the State:

The total Energy catered by the State for the Calendar Year 2025 and its contribution through different sources of generation is shown below:

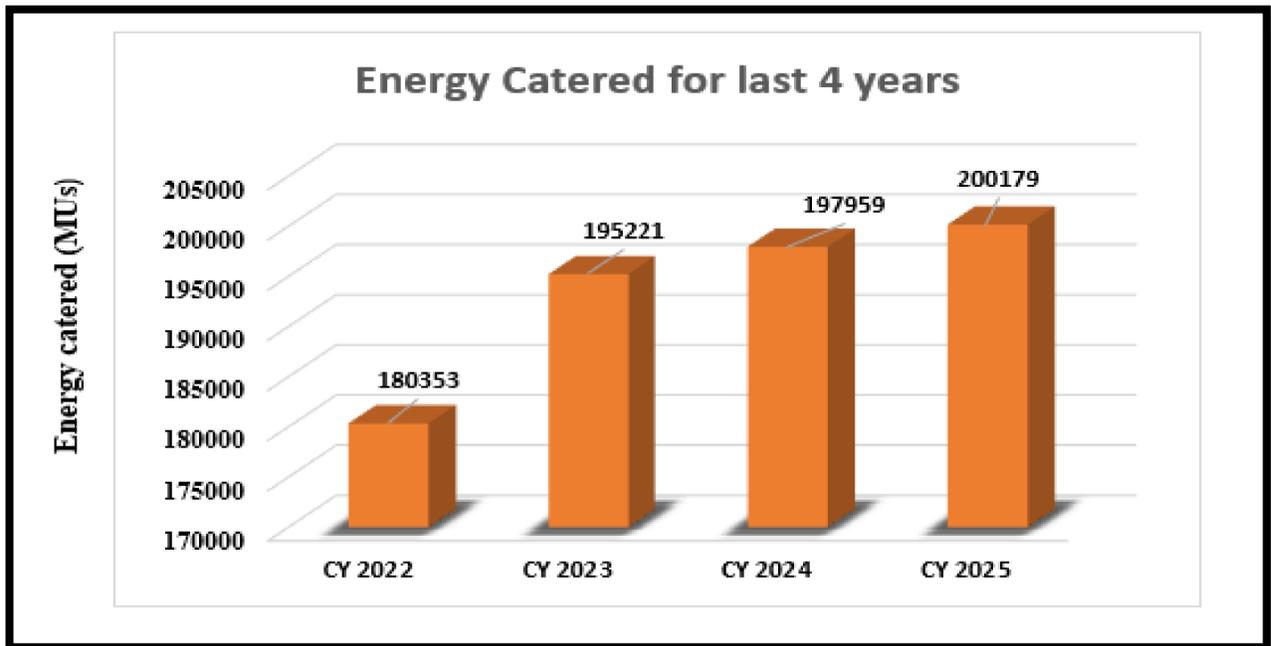
Calendar Year 2024	Source	Hydro	Thermal	Gas	Wind	Co-gen	Solar	Inter State Drawl	Total MUs
	MUs	5831	98905	2449	8162	3378	10081	71912	200719
	%	3	49	1	4	2	5	36	



From the above graph, it is observed that the total annual contribution of Thermal generation in mitigating State Energy requirements is 49% which excludes the thermal energy used from ISGS resources. The contribution of VRE i.e. Wind & Solar generation is only 9 %.



Maximum energy to the tune of around 54438 MU's was catered in the 1st quarter of the Calendar Year 2025 whereas Second quarter catered with 52599 MU's.



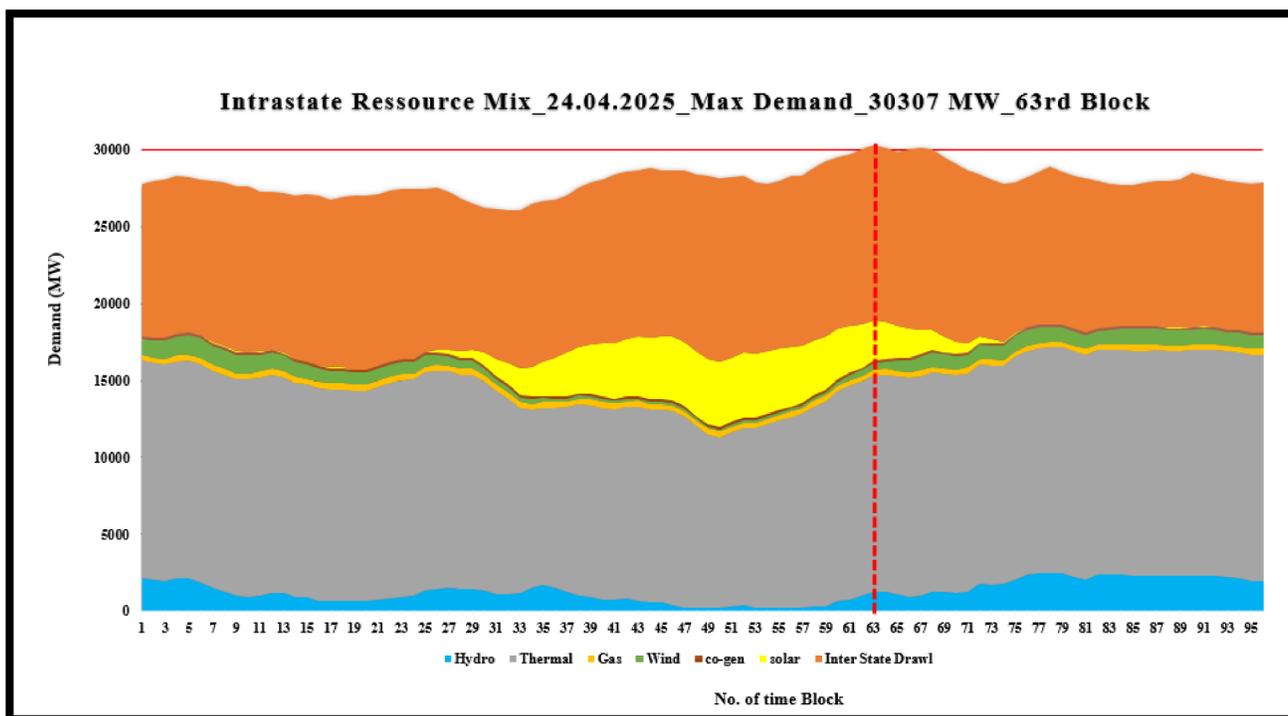
The total energy catered in Calendar Year 2025 is increased by 1.12, & 10.99 % as compared to the total energy catered in Calendar Year 2024 & in Calendar Year 2022 respectively.

6.5 Resources Mix at different Demands:

6.5.1 State Peak Demand Scenario:

The maximum Demand catered by the State was 30307 MW on 24.04.2025 at 63rd time block i.e. at 15:45 hrs. This demand was met by various Intra as well as Inter-State resources. The source-wise contribution in meeting maximum demand is tabulated below.

Source	Injection (MW)	Contribution (%)
State Thermal	14052	46%
Gas	374	1%
Hydro	1263	4%
Co-Gen	162	1%
Solar	2636	9%
Wind	425	1%
Interstate Drawl (ISTS)	11396	38%



From the above, it is seen that the contribution of VRE in mitigating State Peak Demand is only 10 % and State is mainly relying on the thermal generation for meeting peak demand.

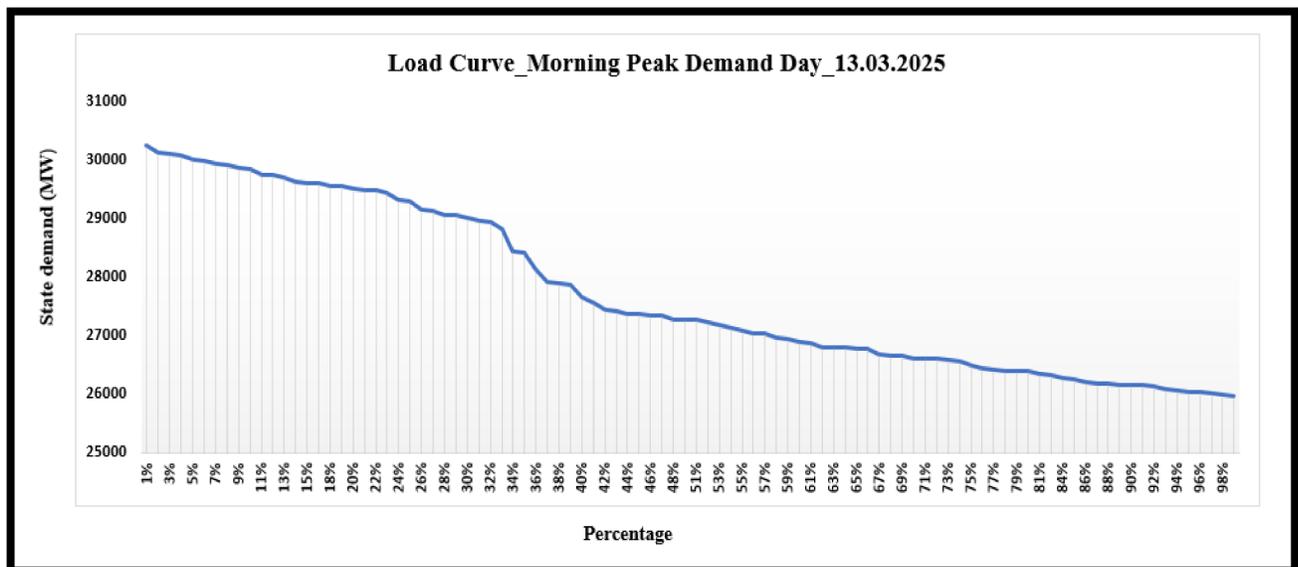
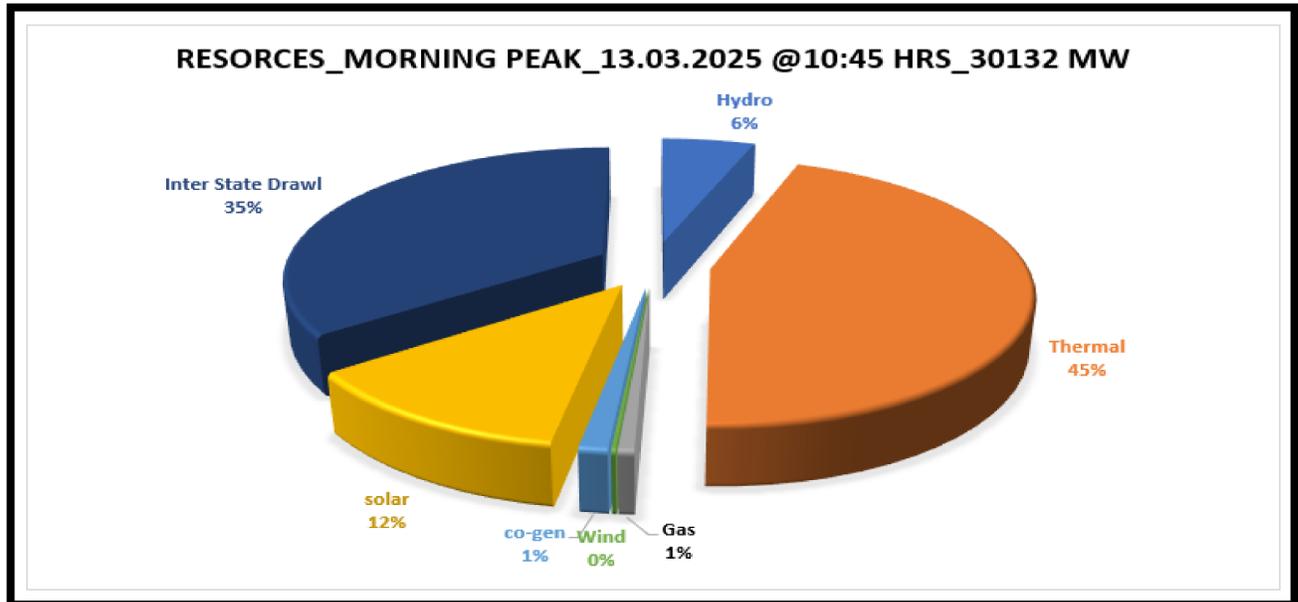
6.5.2 State Demand Resources at 4 cardinal points:

State Demand varies throughout the day. Hence, it is pertinent to check the Load-Generation resources at four cardinal points viz. Day Peak, Morning Peak, Evening Peak & Night Off-Peak. Hence, based on such cardinal points, the maximum demand resources for Peak scenarios of Solar/Morning & Non-Solar hours and minimum demand during night off-peak hours is shown below.

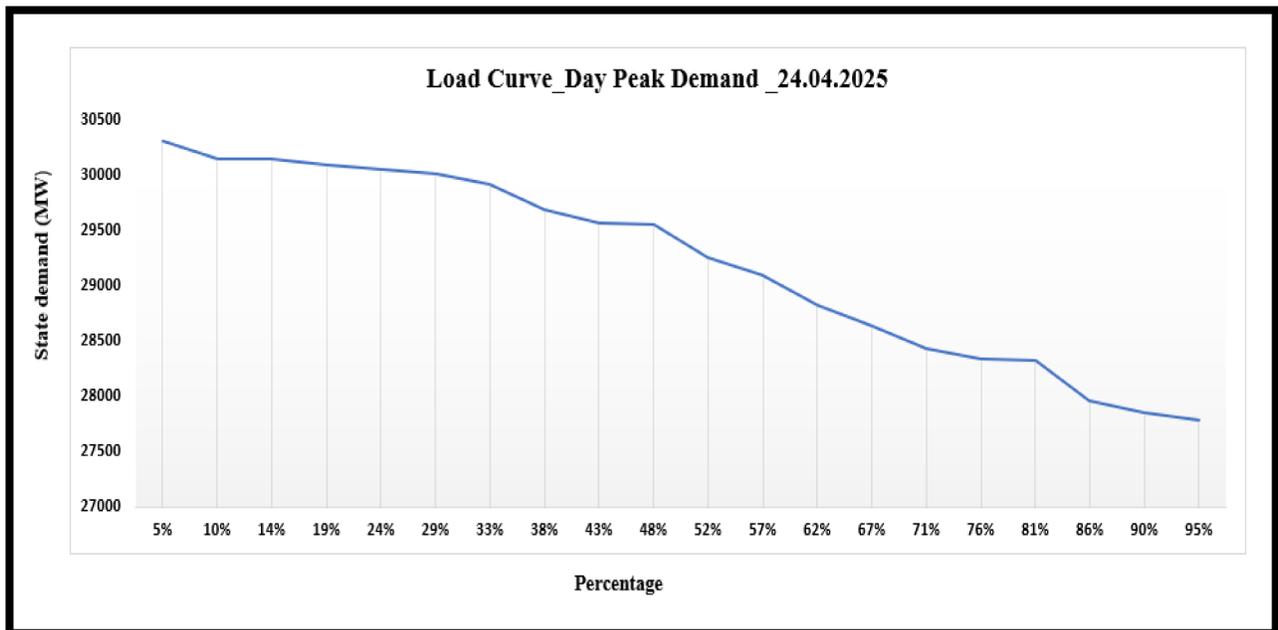
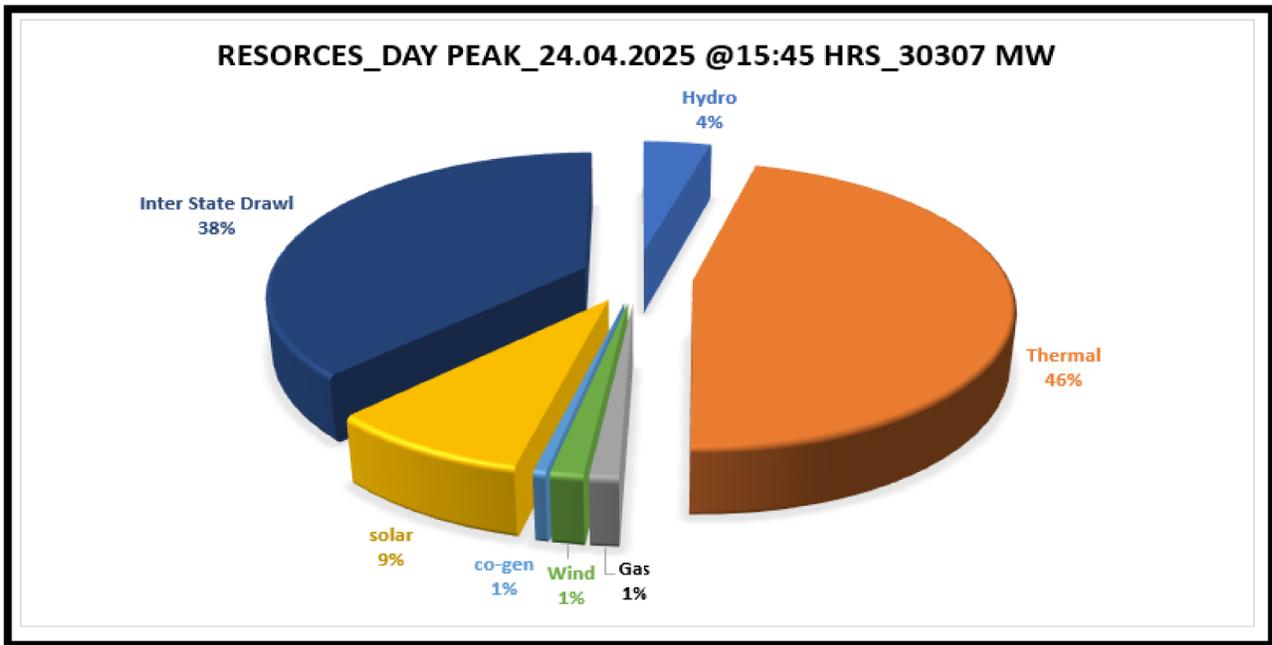
The timing for selection of 4 cardinal points is tabulated below:

Scenario/Time	From Hrs	To Hrs	From TB	To TB
Morning Peak	7:00	13:00	29	52
Day Peak	13:00	18:00	53	72
Evening Peak	18:00	22:00	73	88
Night Off-Peak	22:00	07:00	89	28

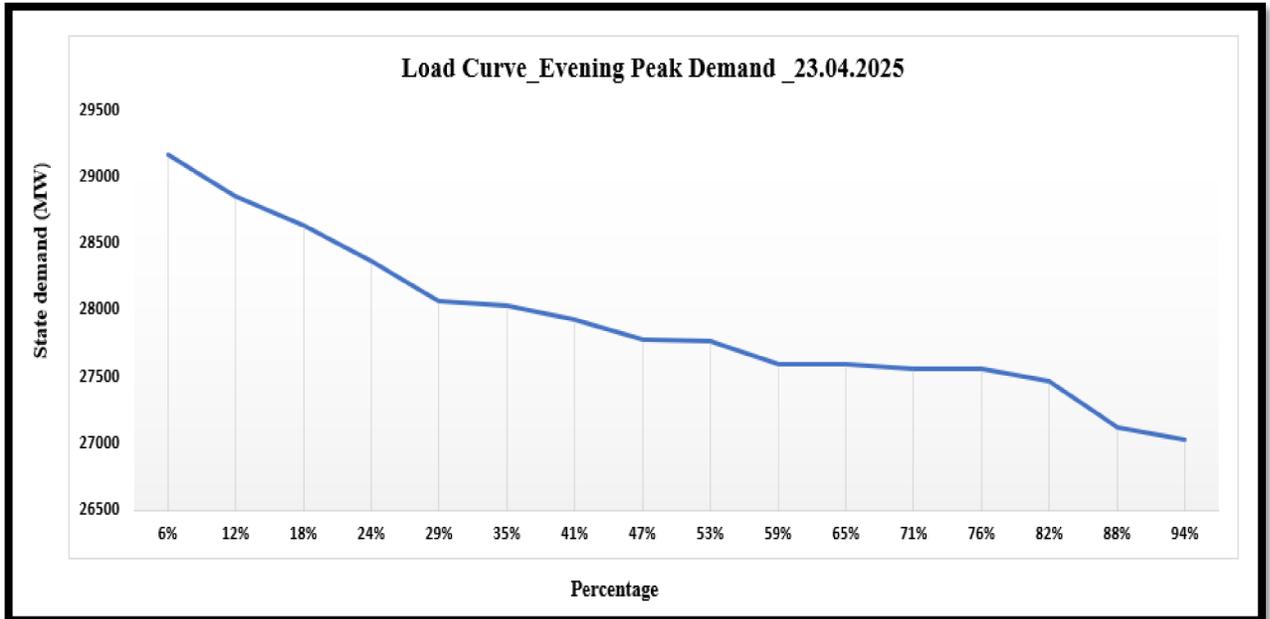
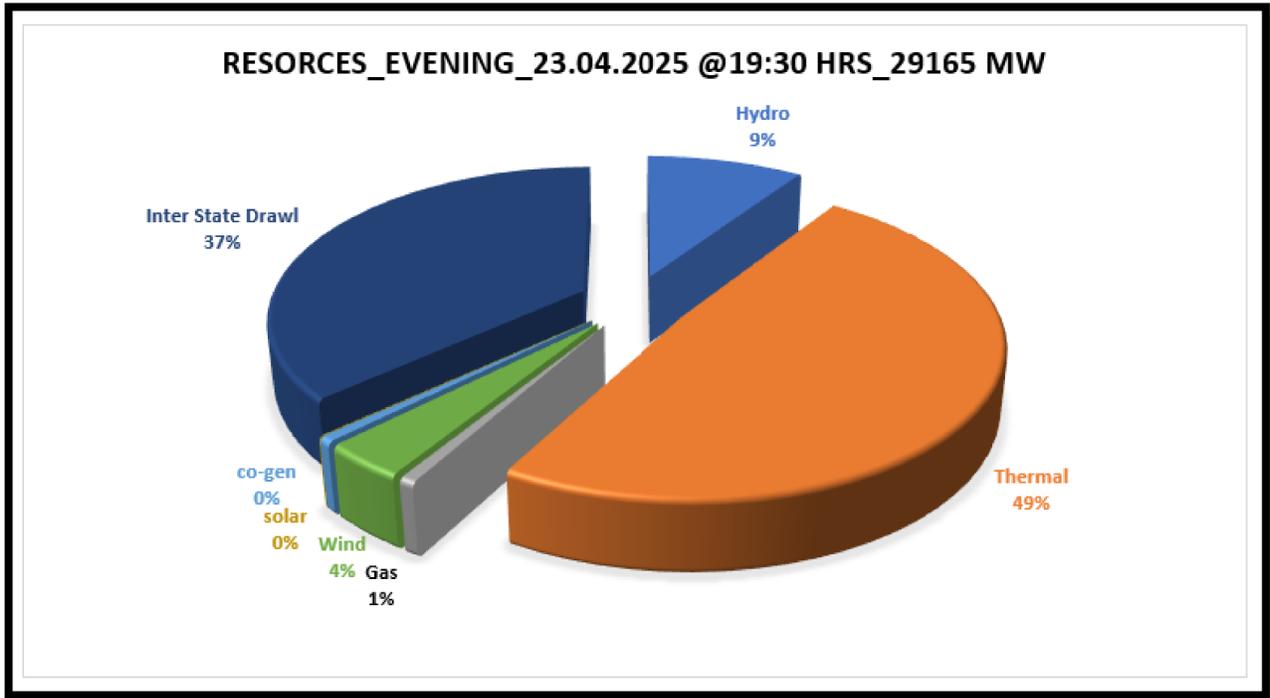
a) State Demand Scenario Morning Peak:



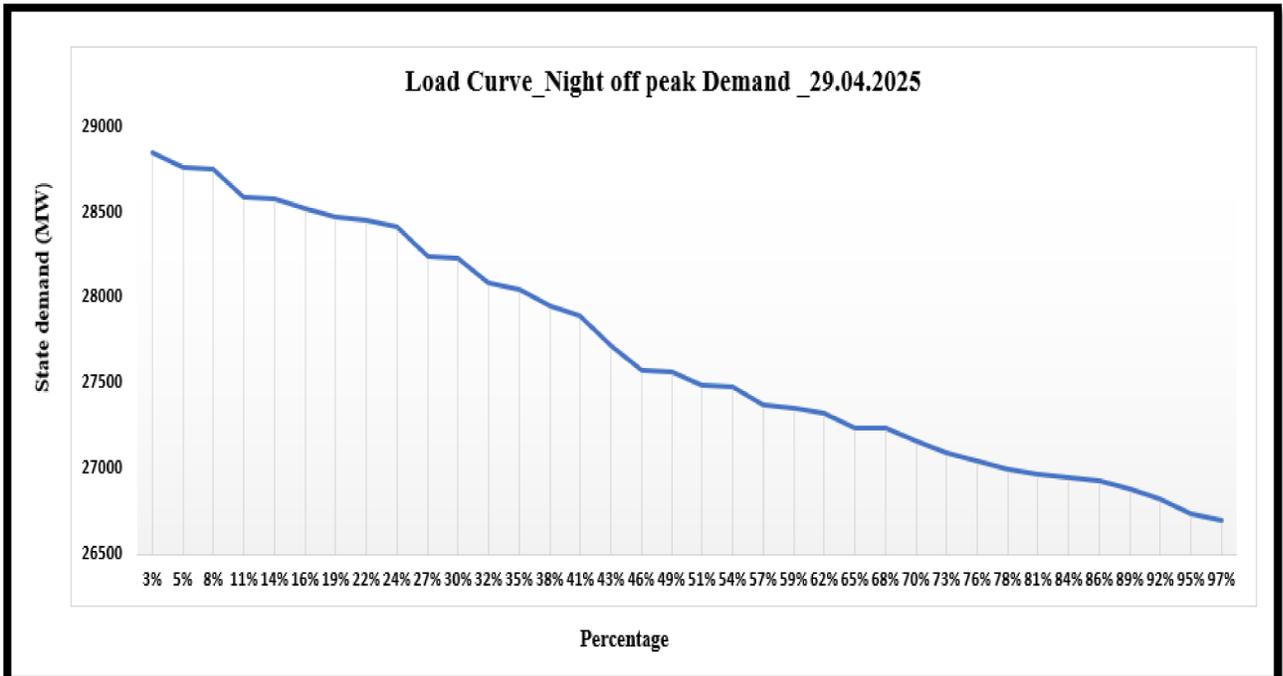
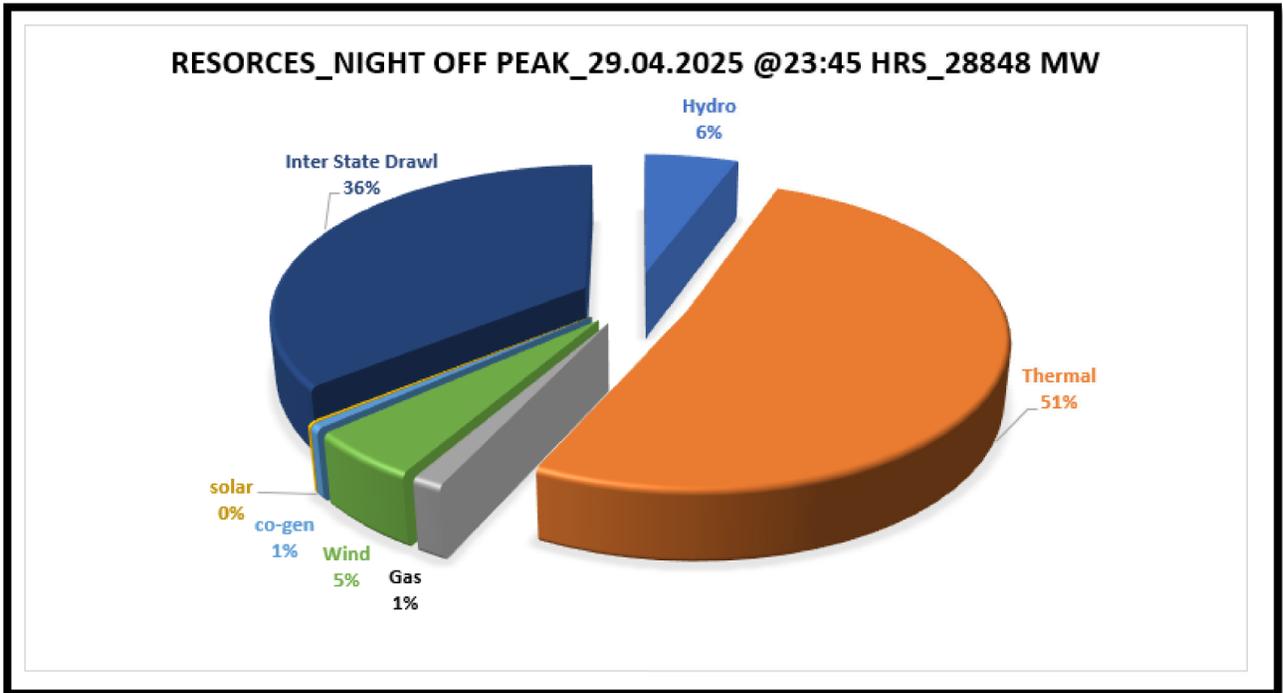
b) State Demand Scenario in day Peak:



c) State Demand Scenario Evening Peak:



d) State Demand Scenario Night Off-Peak:

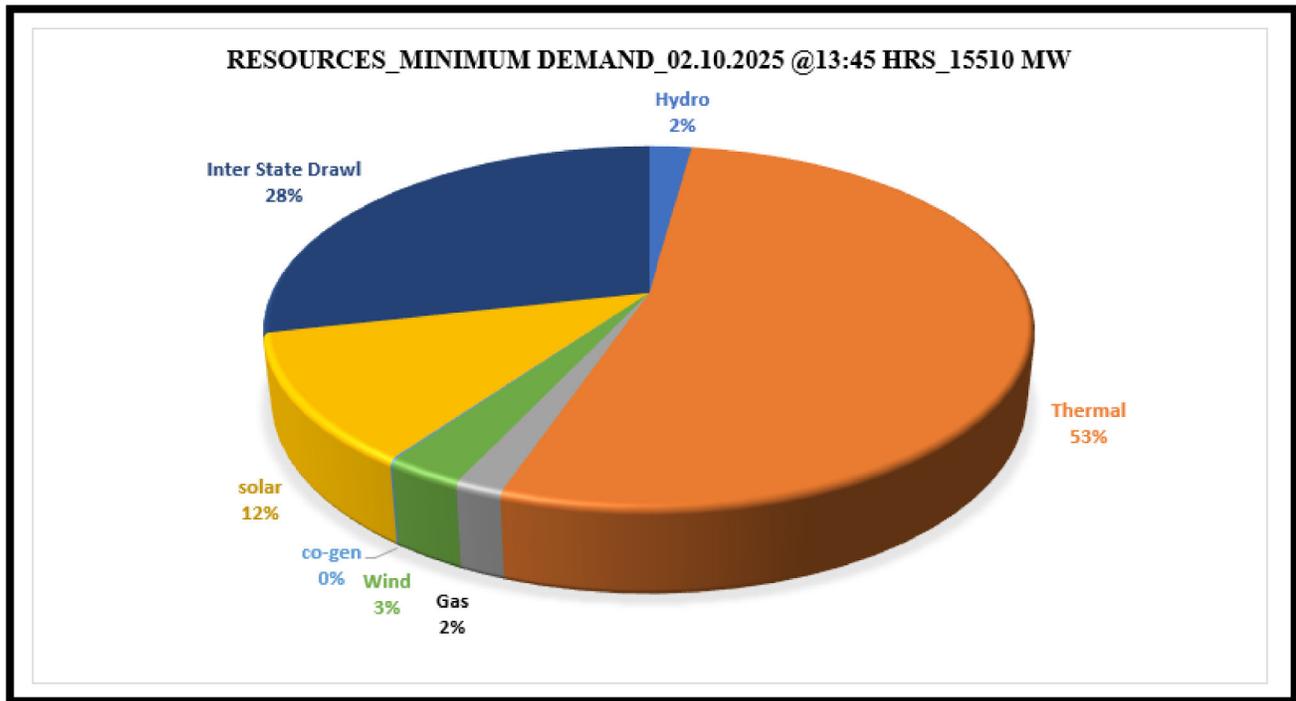


6.5.3 State Minimum Demand Scenario:

The minimum Demand catered by the State was 15510 MW on 02.10.2025 at 55th time block i.e. at 13:45 hrs. This demand was met by various Intra as well as Inter-State resources.

The source-wise contribution in meeting maximum demand is tabulated below.

Source	Injection (MW)	Contribution (%)
State Thermal	8238	53%
Gas	266	1%
Hydro	335	2%
Co-Gen	15	0%
Solar	1800	12%
Wind	433	3%
Central sector Receipt (ISTS)	4424	29%



PART-IV
GRID OPERATIONS & NETWORK PERFORMANCE

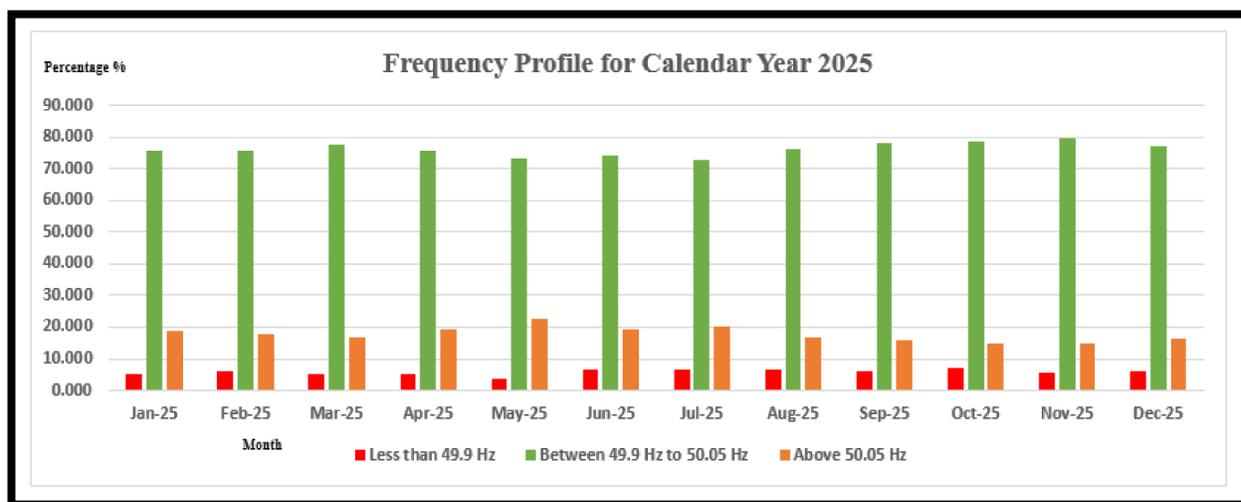
Chapter 7: Grid Parameters of the State:

7.1 Frequency Profile:

In accordance with the IEGC' 2023, the permissible band of Frequency is 49.90 Hz to 50.05 Hz. Thus, for 76.27 % of the period, the System Frequency was within permissible band. The Maximum frequency of 50.47 Hz was recorded in June 2025 whereas Minimum Frequency was recorded was 49.41 Hz in September 2025.

The Month wise frequency profile for the Calendar Year 2025 is mentioned as below:

Month	Less than 49.9 Hz	Between 49.9 Hz to 50.05 Hz	Above 50.05 Hz
Jan	5.282	75.815	18.902
Feb	6.150	75.836	18.013
Mar	5.329	77.708	16.962
Apr	5.160	75.778	19.063
May	3.687	73.423	22.890
Jun	6.706	74.081	19.213
Jul	6.786	72.802	20.412
Aug	6.651	76.308	17.041
Sep	6.070	78.266	15.664
Oct	6.857	78.430	14.695
Nov	5.750	79.449	14.801
Dec	6.261	77.287	16.452



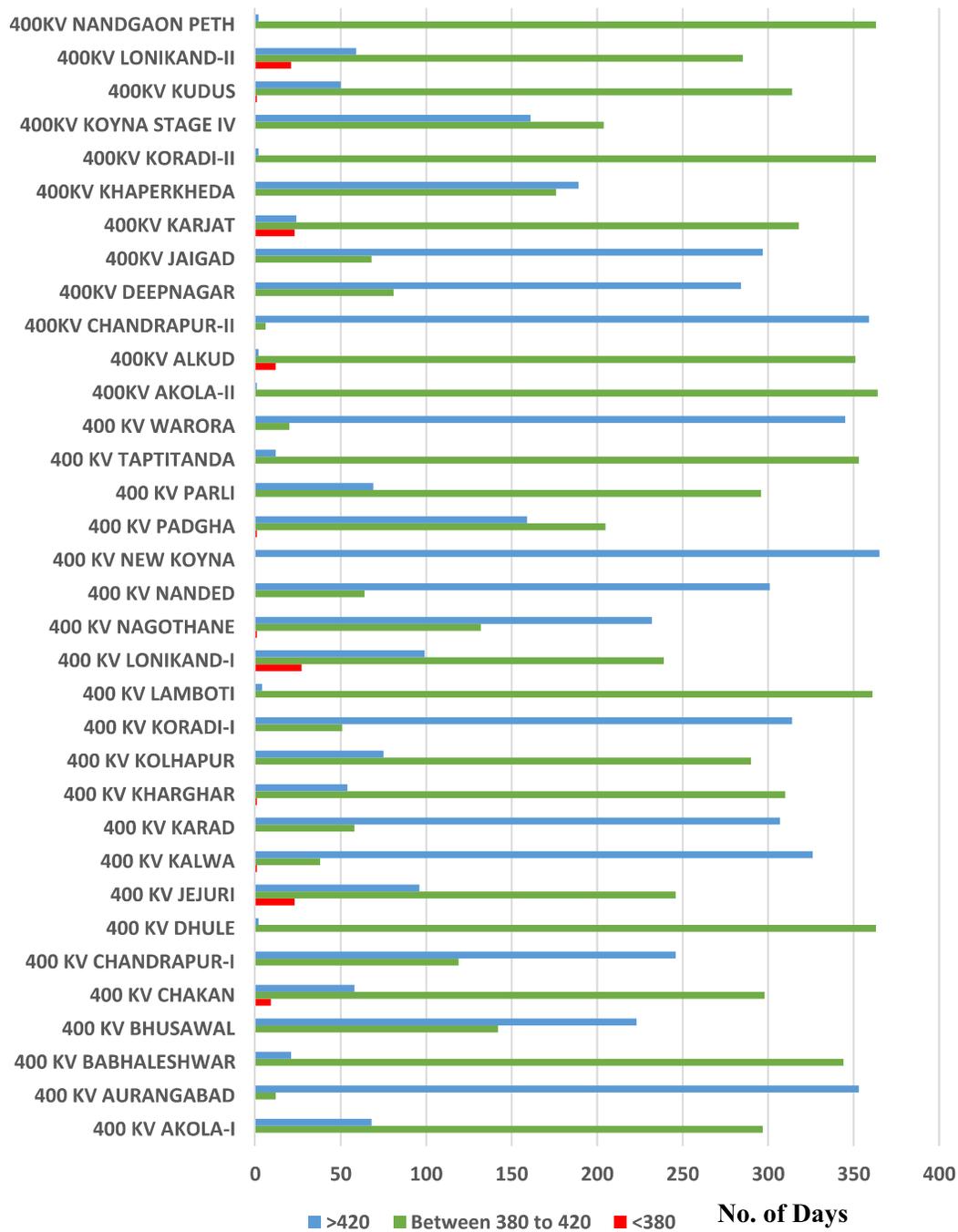
From the above, it is observed that the average frequency for the complete year was 50.00 Hz. Also, the frequency was within the band (49.9-50.05 Hz) for 76.27% times, above 50.05 Hz. for average 17.84% of times and frequency was below 49.90 Hz for 5.89 % of times.

7.2 Voltage Profile:

Day wise Maximum and Minimum voltages of 400kV substations are recorded at MSLDC. The voltage profile of 400kV Substations in Calendar Year 2025 is shown as below:

Name of 400 KV Substation	< 380	380kV - 420kV	> 420
400 KV AKOLA-I	0	297	68
400 KV AURANGABAD	0	12	353
400 KV BABHALESHWAR	0	344	21
400 KV BHUSAWAL	0	142	223
400 KV CHAKAN	9	298	58
400 KV CHANDRAPUR-I	0	119	246
400 KV DHULE	0	363	2
400 KV JEJURI	23	246	96
400 KV KALWA	1	38	326
400 KV KARAD	0	58	307
400 KV KHARGHAR	1	310	54
400 KV KOLHAPUR	0	290	75
400 KV KORADI-I	0	51	314
400 KV LAMBOTI	0	361	4
400 KV LONIKAND-I	27	239	99
400 KV NAGOTHANE	1	132	232
400 KV NANDED	0	64	301
400 KV NEW KOYNA	0	0	365
400 KV PADGHA	1	205	159
400 KV PARLI	0	296	69
400 KV TAPTITANDA	0	353	12
400 KV WARORA	0	20	345
400KV AKOLA-II	0	364	1
400KV ALKUD	12	351	2
400KV CHANDRAPUR-II	0	6	359
400KV DEEPNAGAR	0	81	284
400KV JAIGAD	0	68	297
400KV KARJAT	23	318	24
400KV KHAPERKHEDA	0	176	189
400KV KORADI-II	0	363	2
400KV KOYNA STAGE IV	0	204	161
400KV KUDUS	1	314	50
400KV LONIKAND-II	21	285	59
400KV NANDGAON PETH	0	363	2

Voltage Profile for Calendar Year 2025



7.3 Violations in ISTS Drawl:

Presently, ATC / TTC for the Maharashtra State is as below:

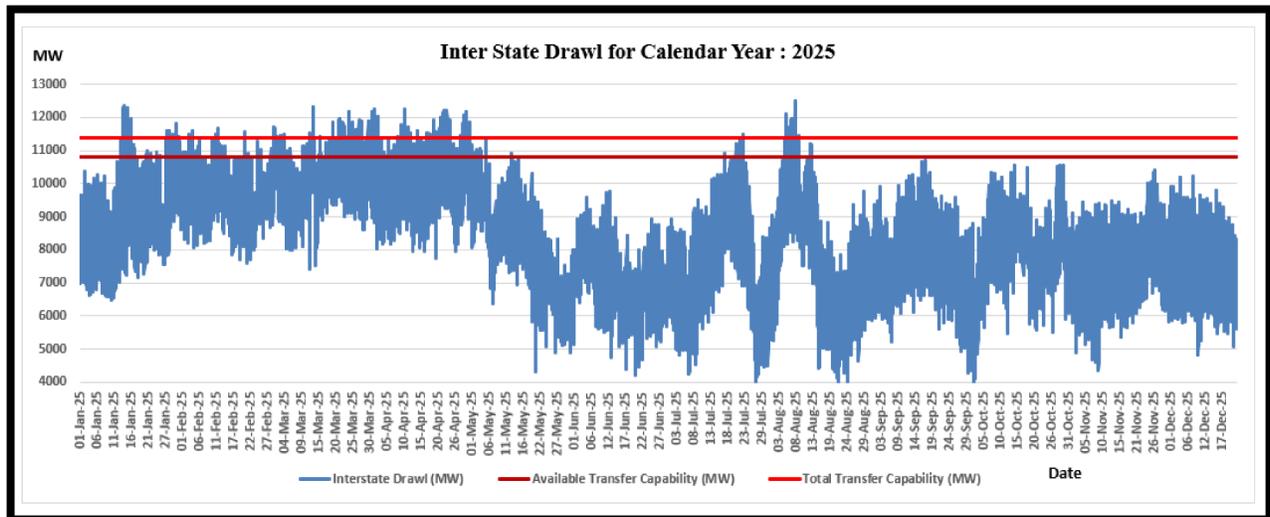
Total Transfer Capability (TTC): - 11400 MW

Transmission reliability Margin (TRM): - 600 MW

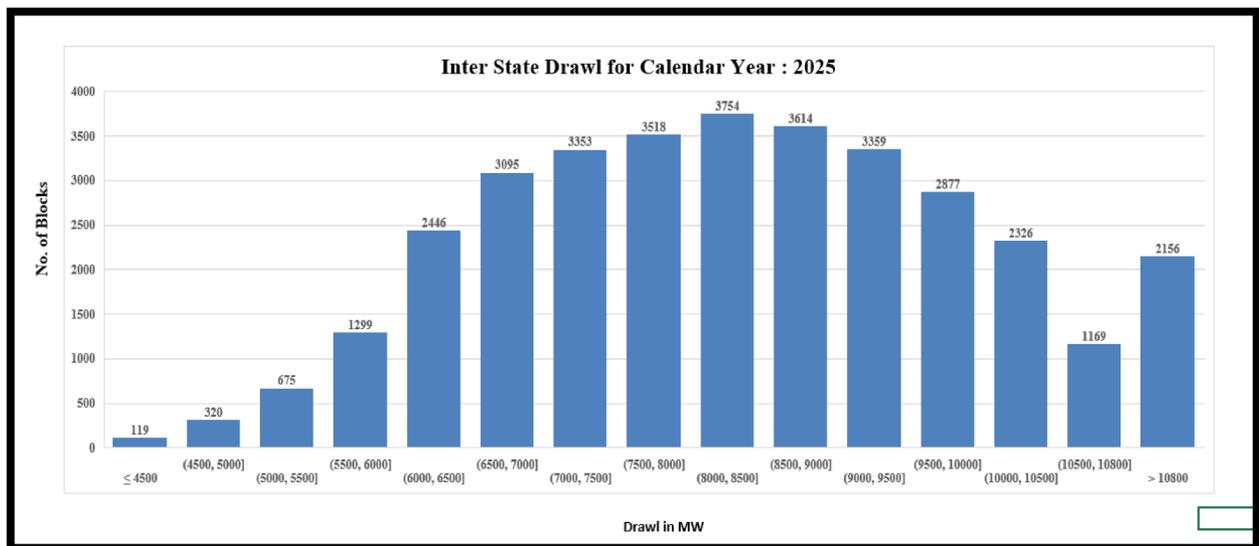
Available Transfer Capability (ATC): - 10800 MW

- The State is permitted to schedule & draw power from ISTS inter-connection points up to ATC limit.
- During the violation of ATC, to control the Over drawl, Load shedding is required to carried out.

Inter State Drawl for Calendar Year 2025 is shown as below:



Analysis was carried out to identify the instances of violations of the ATC limit during Calendar Year 2025. The details are as below:



From the above, It has been observed that for 2156 No. of time blocks, i.e. for 6% of the time, State has violated the ATC limit. Further, for 50 % of the period, ISTS Drawl is between 8000 MW to 10000 MW. Further, for 36 % of the period, ISTS drawl is between 6000 MW to 8000 MW.

System Constraints:

MSLDC is regularly submitting the operational feedback of State Transmission Utility (STU) on quarterly basis which includes Transmission Constraints, ICT, Low/High Voltage constraints, grid event details, Reactive compensation required to contain high voltage, Line loading, ICT loading and other important grid security related issues.

The System Constraints of Maharashtra State are classified in two major parts viz. Generation Constraints & Transmission Constraints. Each constraint is detailed below:

7.4 Generation Constraints:

7.4.1 Low DC & Availability of Thermal Generators:

As per the analysis indicated above in 3.1.2, the DC declared by the Thermal Generators is always on lower side. Also, the % Availability of the MSPGCL thermal units is not up to the target set in the MERC MYT Regulations, 2019. Hence, due to low DC & availability, even though the installed capacity of InSGS is high, it is becoming difficult for MSLDC to manage Load-Generation on day ahead as well as in real time. As complete InSGS is scheduled, no reserve capacity is available to mitigate any contingencies. Many times, Koyna Generation is required to be picked-up to meet demand which is resulting in to additional usage of water.

7.4.2 Non-contracted Generation Capacity:

The details of non-contracted generating plants are shown below.

Name of Unit	Capacity (MW)	Date Trip	Time Trip	Date Sync	Time Sync	Reason
PGPL U2	262	07-02-2017	17.3	Continued.		No Schedule.(NO PPA)
PGPL U1	126	07-02-2017	17.3	Continued.		No Schedule (NO PPA)
RPL SINNER U1	270	--	--	--		No Schedule (NO PPA)
RPL SINNER U2	270	--	--	--		No Schedule (NO PPA)
Total Capacity	928					

It has been observed that 928 MW capacity is not contracted. All these plants are presently out from the grid. The generation from this capacity will be beneficial for managing Grid.

7.4.3 Low availability of APM Gas:

MSPGCL's Uran (672 MW) & TPCL's Trombay U-7 (180 MW) are gas-based generating plants. APM gas provided is on lower side compared to it sanctioned allocated quota. Due to low availability of APM gas, the generation is very low against the installed capacity. Considering location of these plants, any increase in the generation capacity of these plants will reduce the congestion in the 400 kV lines in MMR & Mumbai. Use of RLNG gas is very costly and hence, the power is to be scheduled under 'VSE' which is additional burden on the State DSM Pool. Hence,

efforts need to be made in increasing the supply of APM gas as per sanctioned allocations.

7.4.4 Generation capacity under long outage:

From the below mentioned table, it is observed that some of the units are under long outage. All these outages are either due to major overhaul or due to technical faults. The details are tabulated below:

Name of Unit	Date Trip	Time Trip	Date Sync	Time Sync	Reason
Tarapur 1	08-01-2020	10:37		Continued.	Refueling. While refueling preparation, some repair works identified which are being executed before refueling.
Tarapur 2	13-07-2020	04:38		Continued.	For cleaning of clogged basket strainer of cooling water system due to heavy ingress of debris from sea. The outage extended for repair and re-fueling.

As these units are under long outage, the capacity of 320 MW is not being utilized for the System. Hence, the generating companies need to expedite the works to bring back these units on bar on priority.

7.5 Transmission Constraints in Maharashtra Grid: -

Following transmission constraints are observed in Calendar Year 2025.

A) Strengthening of Pune Ring Main (PRM):

Existing 220 kV Pune Ring Main (PRM) is critically loaded. Any tripping or outages of any element makes the PRM vulnerable. Due to loading constraints, issuing planned as well as forced outages are very difficult. It is necessary to strengthen the PRM on priority

400kV Talegaon PG-Chakan line:

The loading on the 400 kV Chakan–Talegaon (PG) circuit has been consistently exceeding 800 MW. In the event of any contingency, activation of the Load Trimming Scheme (LTS) and Distress Load Shedding (DLS) in the Pune region becomes necessary.

Furthermore, voltage levels at key substations in Pune—namely Chakan, Lonikand-1, Lonikand-2, and Jejuri—have been observed to around 380 kV during solar generation hours. At times, voltages at Lonikand have dropped to 376 kV. Grid alert reports are being issued periodically due to the high loading on the 400 kV Talegaon (PG)–Chakan line, under-voltage conditions, and the use of Koyna water to manage line loading.

MSEDCL has raised concerns regarding the continuous usage of Koyna Stage IV generation to mitigate the transmission constraints, particularly for controlling the loading on the 400 kV Talegaon (PG)–Chakan line. Additionally, Koyna Stage I and II generations are being utilized to improve regional voltage levels during this quarter.

To deliberate on the matter, a meeting was convened on 06.03.2025 at MSLDC, Kalwa, chaired by the Respected Director (Operations), MSETCL. The discussions focused on the high loading of the Chakan–Talegaon (PG) line and the continued use of Koyna Stage IV generation for system support.

Following schemes have been proposed for strengthening:

Due to high import at 400kV Talegaon PG from Pune PG and Aurangabad PG, loading of this line increases: HTLS conductor of 400 kV Talegaon (PG) - Chakan and 400 kV Lonikand – Chakan.

Target date February 2026

a. **400 kV Pune GIS (Shikrapur) - Pune AIS (Talegaon) Q/C lines:**

220kV M/C line from 765/400kV Shikrapur PGCIL SS to LILO point (400kV Babhaleshwar SS to 220kV Ranjangaon SS)
220kV DC line from 765/400kV Shikrapur PGCIL SS to 220kV Khed city SS
Reorientation of 220kV Babhaleshwar- Ranjangaon & Lonikand- Ranjangaon at 220kV Khed City SS (Target COD – Dec. 2025)

b. **High loading on 220kV Phursungi – Parvati:**

Radial operation of 3 substations 220kV Kondhwa, Nanded city & Flagship from Parvati side in case of tripping/outage on Jejuri-Kondhwa line. To avoid overloading, HTLS is proposed: 220kV Paravati-Phursungi HTLS considered in STU 3 Year rolling plan in the year 2026-27

HTLS work is completed in November'25

c. **Overloading of Babhaleshwar – Ranjangaon & Babhaleshwar – Alephata lines:**

HTLS of 220kV Alephata-Babhleshwar line considered in STU 3 Year rolling plan in the year 2026-27

d. 220 kV Network for loading of 400/220 KV ICTs at **Talegaon (PG)** is incomplete which needs to be expedited for evacuation of power at local level : **220 kV Talegaon PG – Chakan MIDC D/C lines (STU Plan – 2026-27)**

e. **Overloading of 220kV Chinchwad-Urse S/C line**

220kV Urse-Chinchwad is one of the main source lines to 220kV Chinchwad S/s carrying approx. 260MW continuously. It has frequent LTS operations at Chinchwad-l s/s to avoid the tripping of this line. Due to the overloading problem, distress load shedding needs to be implemented as per system conditions. For controlling the loading on the 220kV Urse-Chinchwad line, it is required to hand trip the 220kV Chinchwad-Hinjewadi -l line. Due to this all EHV s/s under Hinjewadi MIDC pocket & Pirangut s/s are fed radially through 220kV Kandalgaon s/s. The work of the 220kV Chinchwad-Urse S/C line into the M/C line is in progress. For this work completion, there is a shutdown constraint on the 220kV Chinchwad-Urse line as a load of around 260MW could not be managed on the 220kV Chinchwad-Chakan line and other lines in the Pune Ring main.

HTLS work of 220kV Urse – Chinchwad ckt completed.

- f. **Proposed 220kV Talegaon PG – Chakan ph II D/C ckt.:** This connection will support 220 kV bus of 400 kV Chakan and thereby relieve the loading of 400 kV PG-Chakan line & 220kV Urse- Chinchwad line.
- g. **Establishment of 400/220kV Hinjewadi S/s:** Work of construction of 400kV DC line from 400 kV Jejuri S/stn to proposed 400 kV Hinjewadi S/stn – 105 kms. (Under TBCB) STU Plan – 2026-27
- h. **HTLS of conductor** of 220 kV Lonikand II- Bhosari I, Chakan – Bhosari-I, Chakan – Chinchwad-II, Lonikand II- VSNL: Considered in STU 3 Year rolling plan in the year 2025-26
- i. **HTLS of conductor** of 220 kV VSNL- Khadki- Century Enka- Bhosari-I, 220 kV Bhosari- I - Bhosari II Line, of 220 kV Jejuri – Kondhwa, 220 kV Talegaon Ambi to PGCIL-I & II line, 220 kV Urse-Talegaon ckt-I & Talegaon ckt-II line : Considered in STU 3 Year rolling plan in the year 2026-27.
- j. **220kV Downstream network of 765kV Pune –III PGCIL S/s** (Considered in Three Year STU rolling plan for the year 2026-27

LILO of both ckt of 220 kV Jejuri (M) – Phursungi (M) D/C line along with HTLS conductor at 765/400/220 kV Pune-III PGCIL S/s under Western Region Expansion scheme

220kV Pune III to 220kV Nanded city D/C line:

- k. **400/220 kV Saswad S/s:** (Considered in STU Plan New Corridor Scheme for the year 2026-27

Establishment of 400/220kV Saswad S/s

LILO on 400kV Lonikand –Koyna line at Saswad S/s

400 kV Pune- III to Saswad D/C line.

LILO on 220kV Theur - Phursungi line at 400kV Saswad

220kV Saswad to 220kV Jejuri (old) D/C line.

- l. **400 kV Solapur Pooling (CTUIL) to Jejuri D/C line :** Considered Under ISTS – Year 2026-27
- m. **Requirement of multi-source to 400 kV Network of Pune District by Establishment of 765kV-400kV Ring Network for Pune District: (Considered in STU Plan New Corridor Scheme for the year 2026-27 & 2027-28)**

1) Establishment of 765kV Pune (East) S/s by making LILO on 765kV Solapur PG-Aurangabad PG D/C line.

2) 765kV Pune-III PGCIL S/s to 765kV Pune (East) D/C line

3) LILO on one ckt of 765kV Boisar-II - Pune-III D/C S/s to 765kV Pune (West) D/C line

4) 765 kV line from Pune (West) – Shikrapur S/C line

5) 400kV Pune (East) to 400kV Lonikand –I D/C line

The delayed execution of 220kV evacuation network from Shikrapur and 220kV Talegaon PG-Chakan Ph-II will be affecting the Pune region in high loading season. Apart from the planned 765 & 400kV network a thorough review of Pune 220kV ring and 132kV network for long term.

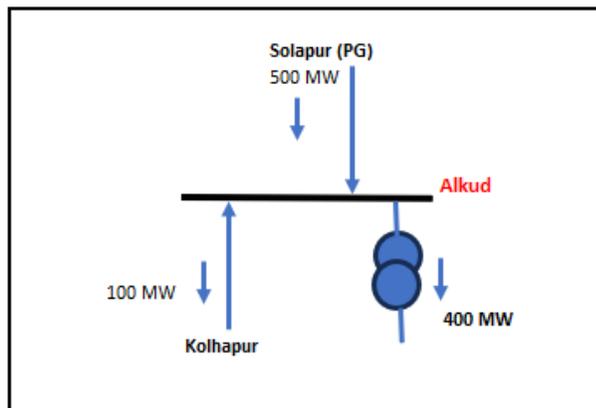
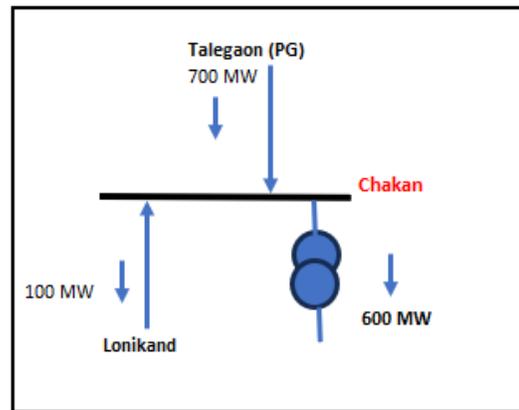
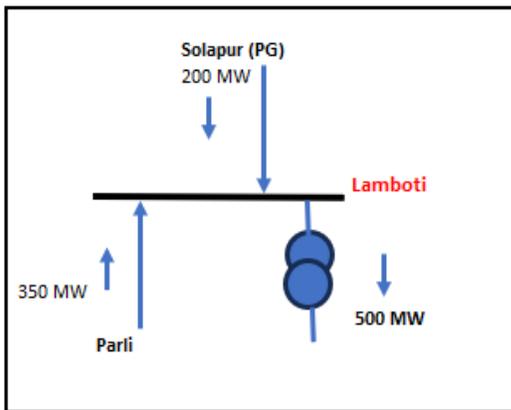
B) ICTs at various 400/220 KV Sub-stations:

An Additional 400/220 KV ICTs at Kudus S/s and at Alkud S/s (500 MVA., 400/220kV) is incomplete which also needs to be expedited for evacuation of power at local level.

C) Requirement of multi-source to 400 kV Sub-Stations:

3 Nos. of 400 kV Sub-Stations viz Chakan, Alkud & Lamboti are fed through only two sources. In case of tripping of outage on any one 400 kV line, the other line is overloaded. Also, ‘N – 1’ criterion is not fulfilled, and voltage profile is degraded. In view of the same, it is necessary to provide additional Source for these 400 kV Sub-Stations on priority.

The details are depicted below.



D) Requirement of additional source & ICT at 400 kV Alkud S/s:

400/220 kV Alkud S/s has been commissioned by making LILO on one ckt of 400 kV Solapur (PG) – Kolhapur D/C line. The existing transformation capacity is 1 x 500 MVA.

It is seen that with the commissioning of 400 kV Alkud S/s along with 220 kV inter-connections, the loads in Miraj, Sangli area is fed through Alkud S/s which was previously fed through 400 kV Karad & 220 kV Ichalkaranji (400 kV Talandage). In case of tripping or non-availability of any 400 kV line, the other line connected to 400 kV Alkud S/s is critically overloaded. Also, the 400/220 kV ICT at 400 kV Alkud S/s is not 'N-1' compliant.

Even though the 220 kV network connected to Alkud S/s is in the wind prone area, the wind generation being infirm, is not reliable considering overloading of the 400 kV lines & non-availability of 400/220 kV ICT.

In view of above, it is necessary to provide additional source to the 400 kV Alkud S/s along with additional 1 x 500 MVA 400/220 kV ICT.

Hence, the possibility of making LILO of remaining 400 kV Solapur (PG) – Kolhapur D/C line at Alkud S/s may be explored.

Transmission constraints in MMR due to use of EHV cables-

- 1) 220kV Ulwe - Waghivali ckt II is under forced shut down due to cable fault from 25.06.2024. Following the commissioning of the 400/220 kV Navi Mumbai PG substation, the issue of loading of 220kV Ulwe – Waghivali ckt – 1 has increased. 220kV Waghivali-TATA-1 & 2 are kept hand tripped from 30.12.2024 to control the loading of 220kV Ulwe Waghivali ckt I.
- 2) Following the commissioning of the 400/220 kV Navi Mumbai PG substation, loading on 220kV Kalwa–Apta and Kalwa–Taloja lines has increased therefore, 220kV Kalwa- Panchanand and Printhouse- Navi Mumbai are kept Handtripped from 17.10.2024 and 05.12.2024 respectively to control the loading. To resolve this issue HTLS of 220kV Kalwa Apta and 220kV Kalwa Taloja line is to be completed at the earliest.
- 3) 220kV Boisar(M)- Ghodbunder (AEML) and 220kV Ghodbunder (AEML)- Borivali (M) lines are important link lines of Mumbai grid. In past 220kV Boisar- Borivali MSETCL line is made LILO at 220kV Ghodbunder s/s owned by AEML. The cable ratings of LILO portion of 220kV Boisar _Ghodbunder-Borivali corridor is less than the capacity of the overhead line portion. Also, 220kV Boisar(M)- Ghodbunder (AEML) is made LILO at 400/220kV Kudus s/s. After this LILO arrangements and 400/220 kV ICTs are taken in service at Kudus, the loading on 220kV Kudus- Borivali ckt 1 & 2 is increased. Kudus-Borivali ckt 2 is temporarily formed due to cable fault of 220kV Kudus- Ghodbunder line at Ghodbunder end. But after removal of the cable fault, the low cable rating of the LILO portion, will have constraint for evacuation of power from Kudus s/s, via 220kV Ghodbunder s/s.

- 4) Also, 220kV Mulund- Bhandup GIS and Bhandup GIS- Mulund lines are important link lines between Kalwa and Borivali MSETCL substations. The cable rating at LILO portion at Bhandup GIS is low compared to overhead lines. Thus, due to lower cable capacity at LILO portion, the complete overhead conductor capacity is not utilized.

MSLDC suggestions regarding use of Underground EHV cables in Transmission network-

Considering the above bottlenecks due to use of cables in MMR and requirement of long duration for restoration cable fault MSLDC suggests-

- 1) LILO of existing overhead grid lines for connectivity to Data center, EHV consumer through underground EHV cable shall be completely eliminated.
- 2) Wherever LILO arrangements are required, GIS (Gas Insulated Substation) duct systems with gantry structures shall be used instead of underground EHV cables so as to minimize the faults & early restoration of any fault.
- 3) For diversion of existing overhead corridor monopole towers, or insulated cross arms shall to be used instead of underground EHV cables.
- 4) The use of underground EHV cables in the transmission network should be considered only as a last option, when no feasible alternative (such as overhead lines with monopoles or GIS ducts) is available.

▪ **Transmission constraints causing load curtailment due to under voltage at following Substations:**

- 400kV Chakan
- 400kV Jejuri
- 400kV Lonikand 1
- 400kV Lonikand 2
- 400kV Karjat
- 400kV Kharghar
- 400kV Padghe

7.5.1 LTS Operation & ELR:

Sr. No	Name of Element	Congestion reason	Area	No. of Events	Remedial Measures to release congestion
1.	400 kV Chakan – Talegaon PG	1) R required to be carried out due to overloading of 400kV Chakan – Talegaon PG. Due to injection of power from Solapur PG ParliPG/Aurangabad PG at Talegaon PG the loading of this line increases.	Pune	Frequent	1) 220kV M/C line from 765/400kV Shikrapur PGCIL SS Target Date: Sept' 2025 2) HTLS conductor of 400 kV Talegaon (PG) - Chakan (Target Date – Mar'26) 3) HTLS conductor of 400 kV Lonikand – Chakan (Target Date – Mar'26)
2.	Low Voltage issue	DLS carried out due to undervoltage dropped to 372kV	Pune/Vashi/Nashik	Frequent	STU has planned to install STATCOMs at 10 locations viz. (1) 400 kV Karad (2) 400 kVJejuri (3)400kVDhule(4)400kVKa1waQ)400kVPadghe(6)220kV Borivali (7) 220 kV Boiser (8) 220 kV Aarey (9) 400 kV Chakan & (10) 400 kV Lonikhand. Accordingly, STU have prioritized installation of 3 nos of STATCOM at the following locations in first stage: <ul style="list-style-type: none"> • 400 kVJejuri/Lonikhand • 400 kV Dhule • 220 kV Boiser/220 kV Borivali
3.	220 kV Nashik GCR – Babhale shwar DC	1) These lines are source to Nashik city. 1) Both the line carries load of around 230 MW each with two MSPGCL units (2x210	Nashik	Frequent	a. 400/220 kV Pimpalgaon S/s along with transmission system was planned by MSETCL (Target Date: Oct'26)

		<p>MW) of Nashik on Bar. During tripping or non-availability of one unit causes operation of LTS or required emergency load shedding.</p> <p>2) To manage the load on these lines, Ranwad load required to be shifted on Manmad s/s and 220kV Nashik – AKP and 220kV Padghe – Nashik required to Hand tripped.</p> <p>3) Emergency Load shedding carried out to avoid overloading of both the lines.</p>			<p>b. Utilisation of 400 kV Babhaleshwar – Rattanindia (Sinner) D/C line and 1x315 MVA, 400/220 kV ICT at Rattanindia (Sinner) S/s</p> <p>c. HTLS for 220kV Babhaleshwar - Nashik D/C lines</p>
4.	132kV Rahuri – Babhaleshwar ckt	At 132kV Rahuri s/s, LTS operated & ELR required to be carried out due to overloading of 132kV Rahuri – Babhaleshwar ckt	Nashik	Frequent	132 kV Bhabhleshwar-Rahuri- A'nagar (GEC) 39 ckm planned in five-year plan. (132kV Rahuri – Ahmadnagar MIDC line charged from 132kV Rahuri s/s at loc. No. 147 on 05.11.2023@17:43 Hrs) – Length 15.85km
5.	132kV Sangamner – Babhaleshwar ckt	At 132kV Sangamner, 132kV Akole s/s & 132kV Rajur s/s, ELR required to be carried out due to overloading of 132kV Sangamner – Babhaleshwar ckt	Nashik	Frequent	Conversion of 132kV Sangamner – Babhaleshwar SCSC line into DCDC – 34Km planned in five-year plan

7.5.2 Line Hand tripped due to overloading:

Following lines are required to hand tripped to control the overloading:

To control Overloading of	Name of Line required to hand tripped
220kV Nashik – Babhaleshwar D/C	220kV Eklahare (GCR) – Airoli Knowledge Park
	220kV Eklahare (OCR) – Navsari ckt – 2
	220kV Eklahare (OCR) – Padghe
	220kV Ghatghar - Jindal
220kV Alephata - Babhaleshwar	220kV Alephata - Kathapur
220kV Urse - Chinchwad	220kV Chinchwad - Hinjewadi
400 kV Chakan – Talegaon (PG)	Any one or Both circuits of 400 kV Aurangabad (PG) – Pune GIS (PG) D/C are handtripped.

7.5.3 ‘N-1’ Non-Compliant Elements:

The possible congestion and remedial measures to release the congestion in Transmission System is tabulated below, where long term measures are mentioned and needs to be implemented with top priorities.

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
765KV				
1.	765KV	Ektuni 765KV /400KV 1500MVA ICT 1 /2	ICT loading around 1600-1800 MW and N-1 non-compliant	<p>1)Reduction of generation at Upstream i.e. APML Tiroda, RIPL Nandgaonpeth, Koradi 2 the sensitivity of generation reduction for APML (765KV level) is 17%, for APML (400KV Level) is 13%, RIPL 10% and Koradi 2 is 13%</p> <p>2) Opening of EHV lines at downstream has very less effect i.e</p> <p>A) Opening of Ektuni-Babhaleshwar SC opening releases congestion only 6.38 %</p> <p>B) Opening of Taptitanda one ICT releases congestion by only 2.2%</p> <p>C) Ektuni-Taptitanda DC opening releases congestion by 16.77% but increases loading on 400KV Akola-Bhusawal S/C.</p> <p>Remark- As the above measures are temporary, long-term measures are required.</p> <p>Permanent Solution: Additional 1500 MVA ICT is planned (Target: FY 2025-26)</p>
500KV				
1.	500KV	HVDC Bipole/ Pole 1/Pole 2	HVDC Bipole / Pole1 /pole 2 trips/outage	<p>1)ATC/TCC reduction of state by WRLDC</p> <p>2) Monitoring loading of 400KV Talegaon PG-Kharghar and 400KV Talegaon PG-Kalwa and require to increase Mumbai embedded generation</p> <p>3) If loading on above 400KV lines persists load curtailment required to be carried out.</p> <p>Remark- As the above measures are temporary, long-term measures are required.</p> <p>Upgradation of existing HVDC Capacity: During Grid Disturbance in Maharashtra Grid on 12.03.2025: + 500 kV, 1500 MW Chandrapur – Padghe HVDC played important role in providing additional power</p>

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
				at 400 kV Padghe bus when high export started from Padghe to Tarapur & Boisar (PG) and limiting the loading on 400 kV Babhaleshwar – Padghe D/C lines. Considering severely low voltages at multiple locations in MMR & Pune area, VSC based HVDC can provide reactive power support. Hence, the option of upgrading the existing Chandrapur – Padghe HVDC to 3000 MW VSC based HVDC needs to be explored on top priority. It is learnt that the existing line capacity is adequate for 3000 MW capacity. Hence, upgradation of terminal stations only will be required. This aspect should be verified by STU on priority.
400KV				
1.	400kV	Lonikand 1 ICTs	220KV Interconnector with Lonikand- 2 need to be made ON	This results into increase in loading of 220kV Urse-Chinchwad line hence strengthening is required. Remedial Measure: Commissioning of 2x500 MVA, 400/220 kV Hinjewadi S/s and associated transmission system
2.	400kV	Alkud ICT	only one ICT and N-1 non-compliant (wind injection)	Long term measure; - Second ICT is required.
3.	400kV	Nanded ICT's	N-1 non-compliance loading around 550 MW	Long term measure; - Considering the load growth redundancy needs to be explored.
4.	400kV	Taptitanda ICT's	N-1 non-compliance loading around 550 MW	Long term measure; - Considering the load growth redundancy needs to be explored.
5.	400KV	Chandrapur II-Nanded ckt 1 /2	In case of full generation at Chandrapur switching and Dhariwal and less requirement of HVDC power.	It is observed that loading on Chandrapur II-Nanded ckt 1 /2 increases depending upon HVDC Bhadravati power flow. Generation reduction at Chandrapur 8 & 9 unit may be required under contingencies.
6.	400KV	Babhaleshwar-Padghe	Tripping /Outage	The remaining line gets loaded

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
		ckt 1 /2	on either ckt When total loading is above 1300 MW, lines become N-1 non-complaint	according to HVDC power flow. Opening of Dhule-Babhaleshwar S/C Remedial Measures: 400kV Babhleshwar-Kudus D/c (Target date: Jun'25) LILO of 220kV Tarapur-Borivali & Boisar-Ghodbandar at Kudus. (Charged on 29.03.2025) LILO of 220kV Padghe-Wada and Kolshet-Wada (Target date :Jun'25)
7.	400KV	Chakan-Talegaon PG	Due to high import at 400kV Talegaon PG from Pune PG and Aurangabad PG, loading of this line increases.	1. 220kV M/C line from 765/400kV Shikrapur PGCIL SS Target Date: Sept' 2025 2. HTLS conductor of 400 kV Talegaon (PG) - Chakan (Target Date – Mar'26) 3. HTLS conductor of 400 kV Lonikand – Chakan (Target Date – Mar'26)
8.	400KV	Parli(M)-Karjat-Lonikand 2 ckt 1/ 2	Not N-1 Compliant	Increasing of Koyna IV generation. Hence, explore the possibility of additional circuit or strengthening of lines by HTLS
9.	400kV	400kV Pune(GIS)-Pune (PG)-Q/c lines	Not N-1 Compliant	Interim Measures: Presently managed with load trimming scheme for overloading of any of the 4 ckts above 1200 A. Permanent Solution: Creation of 220kV level at Pune (PG)(GIS) and Installation of 2x500MVA, 400/220kV ICTs at Pune (PG)(GIS) & LILO of both ckts of 220kV Khed City - Ranjangaon D/c line at Pune GIS with high capacity conductor LILO of one ckt of Lonikand-I-Jejuri 400 kV D/c line at Pune (PG)(GIS) with high-capacity conductor along with re-conductoring of Lonikand-I -Jejuri line section. SCOD: Apr'25.

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
220kV				
1.	220kV	Borivali-Adani Ghodbunder	De-rated capacity of line due to lower rating of cables as compared to the lines at LILO sections	220kV EHV cables which are used at various LILO sections of the interconnecting lines feeding Mumbai have ratings lower than the capacity of the overhead line. Matter to be taken up with AEML for strengthening the EHV cables and the associated bays at AEML end in MMR network.
	220kV	Boisar-Kudus-Ghodbunder		
	220kV	Borivali-Bhandup GIS		
	220kV	Mulund-GIS Bhandup		
2.	220kV	Kalwa 2 - Colorchem	Radial operation of Colorchem in case of tripping of 220kV Padghe – Temghar – Colorchem corridor.	Long term measures- Upgradation with HTLS conductor on 220kV Temghar – Colorchem – Kalwa corridor. Additional source to Colourchem substation required.
3.	220kV	Kalwa– Temghar ckt	High loaded line, requires switching ON 220kV interconnector at Kalwa.	HTLS to be done on priority
4.	220kV	Padghe – Wada	Radial operation of 3 substation in case of outage/Tripping	LTS to be provided to avoid overloading of 220 kV Kolshet – Kamba line.
5.	220kV	Padghe – Nalasopara (Tap to Vasai)	Overloading of line in case of tripping of 220kV Nalasopara – Boisar (PG)	Separate source at Vasai substation to be explored. 220kV Kamba – Vasai & 220kV Vasai – PGCIL planned (Target: FY 2025-26)
6.	220kV	Padghe - Jambhul	Radial operation of 4 substations in case of outage/Tripping	To avoid overloading of remaining lines, HTLS to be done & LTS to be provided.
7.	220kV	Padghe - Pal	Radial operation of 4 substations in case of outage/Tripping	To avoid overloading of remaining lines, HTLS to be done & LTS to be provided.
8.	220kV	Urse – Chinchwad 1	Loaded line, during peak hrs load to be shifted from Chinchwad to Kandalgaon. This Single circuit line is an important	Opening of 220kV Chinchwad – Hinjewadi line provided all other lines to Kandalgaon to be in service. Shifting of Chinchwad load on Lonikand. Long term measures- Upgradation of line with HTLS

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
			<p>source for Pune Ring Main (PRM) and is carrying more than 200 MW. PRM is at risk in the event of tripping of this line. During normal operations, it is very difficult to approve planned as well as forced outages due to loading constraints. To control the line loading, 220kV Hinjewadi – Infosys load required to shift on Kandalgaon and due to this these substations remain radial.</p>	<p>conductor. HTLS work is in progress Commissioning of proposed 220kV Talegaon – Chakan Ph II D/C (Target: FY 2027-28)</p>
9.	220kV	Talegaon (Ambi) – Talegaon (PG) ckt 1/2	Loaded line feeding Pune 250MW	Long term measures- Upgradation of line with HTLS conductor
10.	220kV	Talegaon (Ambi) - Urse	Loaded line feeding Pune 230MW	Long term measures- Upgradation of line with HTLS conductor
11.	220kV	Chakan - Chinchwad	Overloading during tripping of Urse – Chinchwad line or outage on 220kV Chakan – Bhosari line.	Long term measures- Upgradation of line with HTLS conductor
12.	220kV	Phursungi - Parvati	Radial operation of Jejuri-Kondhwa-Nanded City-Flagship	<p>Long term measures-</p> <p>1.Upgradation of line with HTLS conductor</p> <p>2. LTS to be provided on Jejuri-Kondhwa line.</p> <p>HTLS work completed in Nov'25</p>
13.	220kV	Jejuri - Kondhwa	Radial operation of Kondhwa-Nanded city-flagship -	Long term measures- 1.Upgradation of line with HTLS conductor

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
			Parvati	2. LTS to be provided on the Phursungi - Parvati line.
14.	220kV	Nashik – Babhaleshwar ckt 1/2	Source to Nashik city, loaded lines 280MW each, when only one-unit at Nashik is running	1. 400/220 kV Pimpalgaon S/s along with transmission system was planned by MSETCL (Target Date: Oct'26) 2. Utilisation of 400 kV Babhaleshwar – Rattanindia (Sinner) D/C line and 1x315 MVA, 400/220 kV ICT at Rattanindia (Sinner) S/s 3. HTLS for 220kV Babhaleshwar - Nashik D/C lines.
15.	220kV	220kV Badnera-Wardha (PG) and 220kV Dhamangaon-Badnera	In case of tripping of either 220kV Badnera-Wardha (PG) or 220kV Dhamangaon-Badnera the other ckt gets overloaded (depending on Paras generation and Akola (Apatapa) ICT loading)	Long term measures- To relieve the congestion exploring the possibilities of providing 500MVA ICT at 400kV Nandgaonpeth (Rattan India) with evacuation to Badnera.
132kV				
1	132KV	Kanhan-Mansar	Radial feeder	Commissioning of By-pass isolator at 132kV Pench S/s so that second source could be made available at Mansar through 132kV Kanhan-Pench-Mansar. In case of tripping of Kanhan Mansar line, solar generation at Mansar is affected.
2	132KV	Bhandara-Kardha D/c Line	In case of tripping of either ckt's the other ckt gets overloaded.	Implementation of HTLS Scheme for Bhandara-Kardha D/c Line. Or Exploring possibilities of second source to either 132kV Kardha S/s or 132kV Sakoli S/s.
3	132KV	Chikhali-Dhad	Radial feeder	Expedite second source works from Bokardhan S/s.
4	132KV	Dharni S/s	Radial S/s	Explore the possibilities for providing second source.
5	132KV	Padegaon-Canpack (new)-SAT	Radial feeder	Explore the possibilities for providing second source.

Sr. No	Voltage Level	Name of Element	Possible congestion reasons	Remedial Measures to release congestion
6	132KV	Jalna-Ambad-Ghansawangi	Radial feeder	Explore the possibilities for providing second source to both Ambad S/s and Ghansawangi S/s
7	132KV	Parbhani-Pathri	Radial feeder	Explore the possibilities for providing second source at Pathri S/s. In case of tripping of Parbhani-Pathri line, solar generation at Pathri is affected.
8	132KV	Telgaon-Majalgaon	Radial feeder	Explore the possibilities for providing second source at Majalgaon S/s.

Constraints in Nagpur Ring main system:

Sr.No.	Voltage Level	Name of Element/ICT/Line	Possible congestion reasons	Remedial measures to release congestion
1	220 kV	220KV Kanhan s/s	220kV Kanhan is sourced from 220kv Kanhan-Suryalakshmi – Khaparkheda and 400kv Khaperkheda-Kanhan ckt. Each ckt is loaded above 190 MW each. In case of tripping of any of the sources result in tripping of another source on overload. Outage constraints are there.	Presently LTS scheme is in service for both the ckts. Also the load of 132kv Mansar s/s shifted on 132kv Pench hydro bus. <u>STU Plan</u> :- 220kV Kanhan – New Khaperkheda ckt and K'kheda GCR – Suryalaxmi-Kanhan ckt existing conductor replacement by High Ampacity conductor planned in yr 2025 – 2026.... Necessary outages are being planned for execution of the work.
2	220kV	220KV Kalmeshwar s/s	220kV Kalmeshwar ss is sourced from 220kv Khaparkheda GCR ss and 220kv Ambazari ss. Both these source lines are loaded upto 150MW each. In case of tripping of either ckt, the LTS will trigger and if further and may lead to tripping on overload protection. Outage constraints are there.	Kalmeshwar s/s bus load increased due to Pandhurna ckt power export. Time being load is managed by Hingna-2 s/s load shifted on Ambazari s/s as per requirement. <u>STU Plan</u> : 132kV Kalmeshwar – Ambazari High Ampacity proposed for 2023 – 2024.....work yet not started.
3	220Kv	220Kv Butibori-1 s/s	2x100MVA ICTs are carrying about 95MW each after synchronization of VIPL Butibori Unit 1 & 2, causing outage constraints. One ICT outage/ tripping may lead to LTS operation and further tripping of other ICT on overload. Outage constraints are there.	<u>STU Plan</u> : Upgradation of 2*100MVA ICT to 2*200MVA ICT for 2025 - 2026.

4	132Kv	132KV Khapri	132kv Khapri – Butibori D/C lines also carrying 95MW each ckt. Outage constraints are there.	LTS has been provided which leads to load loss. STU Plan :- Replacement of existing conductor by High Ampacity conductor planned in Yr 2026-27.
5	132kv	132KV Besa-Pardi ckt	132kv Besa SS load (about 160 MW) can not be fed through this line during outage on 132kv Khapri-Besa (HTLS Conductor) ckt. Outage constraints on 132kv Khapri-Besa line.	STU Plan:- Replacement of existing conductor by High Ampacity conductor planned in yr 2025-26.
6	132KV	132KV Kalmeshwar-Katol ckt.	1) This ckt load reaches above 90MW during non-solar hours, being a major source to 132kv Katol, Bharsingi, Warud s/s, Katol railway, alongwith solar Gen at Katol s/s. 2) During Daytime due to variable RE and intermittent traction load ckt. gets overloaded. Outage constraints are there during Non-solar hours.	LTS is provided on this line but due to increase in variable traction and discom load, possibility of load loss takes place. <u>STU Plan:</u> 132kV Kalmeshwar – Katol High Ampacity proposed for 2025 – 2026 and 132kV Bharsinghi – Warud and 132kV Bharsinghi – Katol High Ampacity proposed for 2024 – 2025. Second Ckt :- 132 kV Katol-Bharsingi and 132 kV Bharsingi-Warud line planned in yr. 2025-26
7	132KV	132Kv Kanhan - Mansar	Operating in Radial mode	Presently Mansar s/s load shifted on 132kv Pench hydro bus to reduce load on 220kv incomer ckts to Kanhan s/s. Regular Second ckt arrangement is to be made.
8	220kv	220kv Pardi	2 x 100MVA 220/132KV ICTs getting overloaded to feed the load, hence 132kv	Additional ICT of 200MVA or Upgradation of

			Pardi SS load cannot be fed through ICTs.	existing ICT capacity to 200MVA capacity is recommended.
9	220kV	220/132kv, 100MVA ICT 1 & 2 Uppalwadi ss	220/132kv, 100MVA ICT 1 & 2 at 220kV Uppalwadi ss got overloaded during commissioning hence kept running to feed load of 132kv Uppalwadi SS radially.	Upgradation of Existing 100MVA ICT's by 200 MVA capacity ICT or addition of 200MVA ICT is recommended.
10	132kv	132kv Kalmeshwar-Ambazari-Hingna II	132KV Ambazari-Hingna II line get loaded upto 85MW.	Replacement of Existing conductor by High Ampacity conductor is recommended.
11	132kv	132kv (220kv Pardi)- Pardi Interconnector	Primary studies shows overloading of Interconnector hence 132kv Pardi SS load cannot be taken on it.	2 nd Interconnector is Required on priority.
Constraints in VKM region				
EHV O&M Circle, Nagpur				
12	132KV	132Kv Bhandara - Kardha D/C Line.	Each ckt. is loaded upto 95ME each. In case of tripping of either circuit, LTS operates and further leads to tripping of the other circuit on overload. Outage constraints are there.	LTS scheme taken in service for both the ckts. <u>STU Plan:</u> 132kV Kardha – Bhandara D/C existing conductor replacement by High Ampacity conductor is proposed for Yr 2025 – 2026.
13	220kV	220kv Kawalewada SS	2 X 200MVA 220/132KV ICTs get loaded to the tune of 120MW each. Outage constraints are there during Agriculture load period.	Addition of 200MVA ICT is recommended for redundancy.
Chandrapur EHV O&M Circle				
1.	132kv	132kv Gadchiroli-Mul ckt	This line get loaded to the tune of 75MW during outage/tripping on 132kv Virur-Ashti line. Outage constraints are there.	<u>STU Plan:</u> 132kV Sicom – Mul Link Line in 2025-26 and 132kV Mul – Ashti Link Line in 2024-25. Second Ckt:- 132kV Bhramapuri – Sindewahi line for 2025-26 and 132kV Sindewahi - Mul

				proposed for 2025 – 2026.
2	132Kv	132kv Alapalli-Etapalli line	Radial line	<u>STU Plan:-</u> Second ckt:- Planned for yr 2026-27.
3	132Kv	132Kv Mul-Sindewahi ckt	Line loaded upto 90MW. Outage Constraints are there.	LTS has been provided. <u>STU Plan:-</u> Second ckt :- 132kV Sindewahi - Mul proposed for 2025 – 2026.
Akola EHV O&M Circle				
1	400kv	400kv Akola SS	2 X 315 MVA + 500MVA 400/220KV ICTs total load reached to 700MW during non-availability of Paras TPS units. Tripping of 500MVA ICT may trigger LTS operation.	<u>STU Plan: -</u> Replacement of First 3x105MVA ICT by 3x167 MVA (501MVA) 400/220/33 kV ICT at 400kV Akola SS (NEW in Plan 2023-24 to 2032- 33)
2	220KV	220Kv Malkapur	2x100MVA 220/132KV ICTs are carrying load about 70MW each ICT during non-solar hours. Any one ICT tripping leads to tripping of other ICT. However, load manages on other grid substations. Outage constraints are there.	<u>STU Plan:</u> Addition of 1*100MVA ICT 3 rd for 2026 - 2027
3	220Kv	220Kv Paras EXT-Chikhali D/C	Both ckts are carrying 170MW each due to Paras TPS generation and extra load of Jalna s/s. One ckt tripping may lead to tripping of other ckt on over load. Outage constraints are there.	LTS/LMS to be commissioned on line. <u>STU Plan:-</u> Replacement of existing conductor by HTLS for 220kV Paras- Chikhali Ckt-1 for yr- 2025-25
4	132Kv	132kv Malegaon-Risod ckt	Due to old conductor and loading above 60MW, 132Kv Risod-Eldari ckt kept H/T from one end for load management. Outage constraints are	<u>STU Plan:-</u> Interconnection Between 132 KV Hingoli -Sengaon CKT-1 & 132 KV Yeldari- Risod planned

			there.	in yr 2025-26 Existing conductor replacement by High Ampacity conductor is recommended.
5	132kv	132kv Motala-Malkapur ckt and Motala-Buldhana ckt	132kv Motala SS, being connected with 100MW Cyclic Solar park, power evacuation problem can be developed due to tripping of any one line.	Replacement of existing conductor of 132kv Motala-Malkapur ckt and Motala-Buldhana ckt by High Ampacity conductor is recommended.
6	132kv	132kv Malkapur-Tighra-Khadka line and 132kv Malkapur-Sant muktai-Deepnagar line	Due to Solar Generators connected substations, power evacuation problem may develop due to tripping of any of the line.	LTS is provided. <u>STU Plan:-</u> 132kV Malkapur-Khadka line HTLS proposed in yr 2025-26
7	132Kv	132Kv Balapur-Akot-Anjangaon line	This line feeds load of Akot+Hiwarkhed SS load of about 80MW during nonsolar hours.	Tripping may occur during Agriculture load period. <u>STU Plan:-</u> Second ckt:- Planned in yr 2027-28.
Amravati EHV O&M Circle				
1	220Kv	220kv Badnera – Ner – Aavada (100MW Solar)	Radial Feeder. AVAADA Solar Gen about 100MW capacity is radially connected to Bandera via Ner.	<u>STU Plan:</u> 2 nd Ckt Stringing for 2025 – 2026 with HTLS conductor and 220 kV Badnera-Ner Ckt-I HTLS for yr- 2026-27
2	132kv	Dharni-Nepanagar	Radial feeder	Due to heavy forest area, ROW issues are there. However Dharni load can be fed through 33kv discom network as it was feeding earlier. <u>STU Plan:-</u> Second ckt proposed for 2025-26
3	132kv	132Kv Yawatmal-Ralegaon-Pandharkawda line	In view of 100MW Amplus solar connectivity at Ralegaon SS. Tripping of any one ckt may overload other line.	HTLS of 132Kv Yawatmal-Ralegaon-Pandharkawda line is recommended.
4	132kv	132KV Ghatodi-	Due to RE connected at	<u>STU Plan:-</u> HTLS of

		Arni -Digras line	Arni SS, tripping of any one line may cause power evacuation problem.	132KV Ghatodi- Arni -Digras line proposed for yr 2027-28.
5	132kv	132kv Warud(220kv)-Warud line	This line may get overloaded during tripping of 132kv Kalmeshwar-Katol line during non-solar hours.	LTS is provided on 132Kv Warud-Bharsingi line. <u>STU Plan:-</u> HTLS planned for yr-2025-26.
Chhatrapati Sambhaji Nagar EHV O&M Circle				
1	765Kv	765kv Ektuni	2x 1500MVA 7650/400KV ICTs are carrying about 1100MW each during full Gen of APML, RPL and Koradi 2 feeding load to Babhaleshwar and Thaptitanda. Outage constraints are there.	LTS is provided on ICTs. <u>STU Plan:</u> 1500MVA ICT 3 rd proposed for 2025– 2026.
2	400Kv	400kv Thaptitanda	2x500MVA 400/220KV ICTs are carrying about 300MW due to increased load of JALNA, NAGEWADI, PARTUR s/s. Outage constraints are there.	LTS is provided on ICTs. <u>STU Plan:</u> STU Plan: Proposed 500MVA ICT -3 for 2025 – 2026.
3	220KV	220Kv Waluj-Bhenda ckt and 220kv Waluj-Devgaonrangari ckt	220Kv Waluj-Bhenda ckt carries about 170MW and 220kv Waluj-Devgaonrangari ckt carries about 150MW. Outage constraints are there due to loadings on Babhaleshwar ICTs.	3 rd line to 220kv Bhenda s/s is required. <u>STU Plan:-</u> 220kv Bhenda - Vishwind DC (GEC)-70km (WIP) (spill Over) proposed in 2025-26.
4	132kv	132KV Jalna - Jalna(MIDC) - Nagewadi ckt	Outage constraint on this ckt due to industrial load about 80MW. Outage constraints are there.	<u>STU Plan:-</u> 132kv Jalna - Jalna(MIDC) and 132kv Jalna(MIDC) - Nagewadi High Ampacity proposed for 2025 – 2026.
5	132KV	Padegaon-Canpack (new)-SAT	Radial feeder	<u>STU Plan:</u> 132KV Gangapur – SAT planned for 2025 – 2026
Parli EHV O&M Circle				
1	400Kv Girawali	400Kv Girawali-Karjat D/C	Both ckts are loaded continuously to the tune of 600MW each. Outage	Outages are being facilitated in Night hours. N-1 criteria not

			constraints are there.	fulfill.
2	400Kv Nanded (Kumbhargaoon)	400kv Nanded-Chandrapur2 D/C	Both ckts are loaded to the tune of 450 MW each. Outage constraints are there.	<u>STU Plan:-</u> 3 rd ICT 500MVA capacity is proposed in yr 2026-27
3	220kv	220kV Dharashiv (Osmanabad) – Parly PG –Bale Ckt.	Being a major source to Dharashiv, line loading reaches to 170 MW. This ckt tripping may lead to load loss of Partial Dharashiv, Beed district load loss.	STU Plan: Interconnection between 220KV Murud -Tuljapur and Barshi Dharashiv proposed for 2025-2026 and 220kV Jeur – Paranda Link Line D/C for 2024 – 2025.
4	132Kv	132Kv Beed-Telgaon-Majalgaon ckt	This ckt gets overloaded in evening hours (non-solar hours) due to increase loading and non-availability of solar gen, co-gen.	132kV Pathri - Majalgaon ckt kept H/T for load management. <u>STU Plan:</u> 2 nd ckt stringing for 132kV Majalgaon – Telgaon proposed for 2022 – 2023.
5	132Kv	132kV Girawali – Yedeshwari – Kaij	This ckt loaded upto 105MW carrying load of Kaij, Kallam, Bhoom Tahsils.	LTS provide to isolate 132kv Kaij-Kallam load. Conductor to be replaced with HTLS conductor.
6	220Kv	220kv Paranda	2x100MVA 220/132kv ICTS got overloaded due to Kurduwadi load. Both ICTS were carrying 70MW each.	132kV Ashti – Kharda D/C H/T for load management. <u>STU Plan:</u> Addition of 1*100MVA ICT 3 rd at 220kV Paranda for 2026 – 2027.
7	132KV	Ahmednagar-Ashti	Radial feeder	132kv Ashti-Kharda D/C are commissioned but due to this Paranda S/s ICTs gets overloaded. Hence kept in radial mode.
8	220Kv	220kv Parly OLD GCR	100MVA 220/132KV IBT gets loaded upto 95MW during non solar hours.	LTS provided on IBT. 2 nd ICT is required on Priority for redundancy.
9	132kv	132Kv Waghdari-Naldurg-Bale ckt and 132kv	Line loading reaches to 100MW during solar hours.	<u>STU Plan:-</u> HTLS planned in yr 2025-26

		Naldurg-Tuljapur line		
10	132Kv	132kv Tuljapur-JSW – Ujani line	Line is made LILO at JSW Wind power.	<u>STU Plan:-</u> For power evacuation of JSW Wind and RE at Tuljapur, HTLS planned in yr 2025-26
11	132Kv	132kv Waghala-Kandhar-Gangakhed line	Line loading reaches to 70MW. Due to old conductor, limit set to 50MW.	HTLS of the line is recommended.
12	132Kv	132kv Parli-Pangri-Telgaon ckt	This ckt loaded upto 60MW. Being RE connected substations, power evacuation problem may develop during any line tripping due to old conductor and low voltage issues.	HTLS of the conductor is recommended.
13	132kv	132kv Ujani- Koral – Killari line	Being a Wind Generation (125MW at Koral) connected line, power evacuation problem may develop during full wind generation and any one line tripping being an old conductor.	HTLS of the line is recommended.
Bhusawal EHV O&M Circle				
1	400kv	400Kv Dhule	315MVA + 2 X 500MVA ICTs gets overloaded to the tune of 1000MW in absence of wind gen and load growth. Outage constraints are there.	LTS is provided for load curtailment. <u>STU Plan:-</u> Upgradation of 315MVA ICT with 500MVA ICT for 2025 – 2026.
2	400kv	400Kv Deepnagar	Total load on ICTs increased as 650MW after synchronisation of Bhusawal Unit 6 (660MW). Outage constraints are there.	3 rd ICT of 500MVA capacity is recommended for redundancy.
3	220Kv	220kv Dhule – Malegaon – Sayane – Chalisgaon and 220kv Dhule – Dondaicha - Amalner	Both lines loaded to the tune of 180MW and above. Outage constraints are there.	<u>STU Plan:</u> 400kv Malegaon Substation along with its 220kv Lines for 2025 – 2026. 220kv Dhule-Malegaon line HTLS planned in yr 2025-26.

4	132Kv	132Kv Deepnagar-Supreme ckt. and 132kV Deepnagar-Khedi ckt	Both ckt. got loaded upto 100MW each when connected to Chalisgaon and Soygaon s/s.	For load management 132 kV Supreme-Pahur ckt and 132kV Khedi-Pachora Ckts are kept H/T. HTLS is recommended.
5	132kV	Deepnagar-Nimbhora	Radial feeder	Explore the possibilities for providing second source at Nimbhora S/s.
6	132kV	Amalner-Parola	Radial feeder	<u>STU Plan:</u> LILO of One circuit of 132kV Amalner - Nardane D/C line on 132kV Amalner - Parola line for 2025 - 2026.)
7	132kv	132kv Deepnagar GCR-Khadka ckt 3	Loading reaches to 80MW during non availability of Bhusawal Unit 3 9210MW0	LTS provided. HTLS is recommended.
8	132Kv	132kV Chalisgaon-Manmad D/C via Pimperkhed	Both lines are getting loaded upto 70MW each.	STU Plan:- HTLS of conductor is proposed in Yr 2025-26 and Manmad must has other strong source.
9	132Kv	132kv Bhambori-Jalgaon MIDC	Line loading reaches 60MW. For load management, it is being fed radially.	HTLS of the line is recommended.
10	220Kv	220kv Deepnagar-Viroda ckt and Deepnagar-Bambhori ckt	Line loading reaches to 130MW Each. In case of any line tripping, other may trip.	LTS provided. HTLS of these lines is recommended in view of increased generation at Bhusawal TPS.

List of elements were out for long duration and their respective current status as follows:

Sr.No.	Name of Line	Outage / Tripped Date	Outage / Tripped Time (Hrs)	Reason of outage / Tripping and current status
1	220kV Waghivali (MSETCL) - Ulwe GIS Ckt - 2	25-06-2024	08:05	Tripped on differential protection. 8 times unsuccessful Trial has been taken till date.
2	220kV Kalwa - Panchanand	17-10-2024	12:10	For replacement of of existing conductor with HTLS conductor on 220kV Kalwa-Apta Corridor. Work Completeion Status: 1) 220kV Panchanand-Kalwa line: 10.351 Ckm /14.816 Ckm. 2) 220kV Taloja-Panchanand line: 0.000 Ckm /6.365 Ckm.
3	220 kV Print House - Navi Mumbai (PG)	05-12-2024	23:09	For replacement of of existing conductor with HTLS conductor on 220kV Kalwa-Apta Corridor. Work Completeion Status: 1) 220kV Print House-Kalwa line: 2.956 Ckm /3.097 Ckm. 2) 220kV Print House-Navi Mumbai line: 10.351 Ckm /15.083 Ckm.
4	220 kV Padghe - Nalasopara - Vasai (T)	20-07-2025	10:32	For replacement of of existing conductor with HTLS conductor of 220 kV Padghe- Nalasopara -Vasai Tap.
5	220 kV Borivali - Boisar II Line		11:13	1.Under Panvel circle: -16.757 / 31.017 km. Time required for balance work completion - 1 to 1.5 months depending on ROW problems and Outage availability of upper 220KV line on same M/C tower.
6	220 kV Kudus- Ghodbunder		12:46	2. Under Boisar division work status- 220 kV Boisar - Nalasopara line: 50.561 / 50.561 km. 220 kV Padgha nalasopara line: 14.579 km / 24.579 km

				220 kV Boisar (PG) -Vasai line: 60.132 km / 62.934 km 220 kV Kamba vasai line : 6.905 km / 19.139 km
7	220kV Apta - Navi Mumbai (PG) Ckt - 1	17-08-2025	09:00	<p>Replacement of existing 0.35 ACSR sheep conductor by High performance conductor (HPC) under LES scheme from 584 to 625</p> <p>1) 220 kV Apta -PG 1 Outage Taken and availed from 17.08.2025. Work: R phase conductor stringing work completed of 2.03 KM.</p> <p>2) On Dated 31.08.2025 during stringing Y Phase conductor, Tower L.N 619, Damaged and work Stop. Both Line trip same Day 220 kv Apta PG 2-line charges by connecting jumpers and stay to existing Tower</p> <p>3) Tower Replacement work started with delay due to ROW issue and Jsk agency (16.09.2025)</p> <p>4) During this period some Locations Stringing work completed of 2.19 km / Out of 39 KM</p> <p>5) Now 220 Kv Apta PG 1 line is Under Breakdown due to Tower Damaged and work of foundation and Erection of Tower 2 section completed</p> <p>6) Outage 7 Days required on Both line 220 kV Apta PG 1 & 220 kv Apta PG 2 line for remaining HTLS Work.</p>
8	220kV Kalwa - GIS DCHI	01-11-2025	14:17	<p>for replacement of existing conductor with HTLS conductor. Work Completion Status:</p> <p>1) 220 kV Kalwa-Colourchem line : 0.211 Ckm /13.323 Ckm.</p> <p>2) 220 kV Kalwa-Temghar line : 0.00 Ckm /15.090 Ckm.</p> <p>3) 220 kV Colourchem-Temghar line : 0.00 Ckm /15.067 Ckm.</p>

7.5.4 Constraint in evacuation of Solar Generation:

Solar generation connected to 132kV Wagdari & Naldurg s/s:

A total 208 MW Solar Generation is connected to 132 kV Wagdari & Naldurg S/s, 149 MW & 59 MW Solar Generation respectively.

The said generation is evacuated through 132 kV Ujani-Naldurg S/C, 132 kV Bale – Naldurg S/C & 132 kV Wagdari – Akkalkot S/C line. 132 kV Naldurg & 132 kV Wagdari S/s are interconnected through S/C line. Out of these three evacuating lines, 132 kV Ujani- Naldurg S/C & 132 kV Bale – Naldurg S/C lines are old more than 30 years.

In case of tripping of any line, the solar generation required to backed down so as to avoid tripping of remaining lines on overload.

- The details of RE curtailment are as follows:

Sr. No	Date	Wind Curtailment		Solar Curtailment		Reason for Curtailment
		Max MW	Energy (MU)	Max MW	Energy (MU)	
1	02-02-25	NIL	NIL	8.83	0.015	Overloading of 132KV Naldurg Bale line . O/C Setting 540 Amp for 2 Sec
2	03-02-25	NIL	NIL	13.08	0.032	Overloading of 132KV Naldurg Bale line . O/C Setting 540 Amp for 2 Sec
3	04-02-25	NIL	NIL	15.23	0.02	Overloading of 132KV Naldurg Bale line . O/C Setting 540 Amp for 2 Sec
4	05-02-25	NIL	NIL	75.28	0.15	Tripping of 132 kV Bale South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line
5	06-02-25	NIL	NIL	116.00	0.32	Tripping of 132 kV Bale - South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line
6	07-02-25	NIL	NIL	81.34	0.42	Tripping of 132 kV Bale South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line
7	08-02-25	NIL	NIL	28.70	0.16	Tripping of 132 kV Bale - South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line
8	09-02-25	NIL	NIL	111.48	0.48	1)Tripping of 132 kV Bale - South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line. 2)Overloading of 132KV Naldurg Bale line . O/C Setting 540 Amp for 2 Sec

9	10-02-25	NIL	NIL	111.48	0.48	1)Tripping of 132 kV Bale - South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line. 2)Overloading of 132KV Naldurg Bale line . O/C Setting 540 Amp for 2 Sec
10	11-02-25	NIL	NIL	127.20	0.70	Tripping of 132 kV Bale - South Solapur line on overload, Overloading of 132 kV Wagdari Naldurg line. Overloading of 132 kV Akkalkot Karajgi line.Increased loading on 132KV Wagdari Akkalkot ckt-1 and 132KV Wagdari Akkalkot ckt-2,
11	12-02-25	NIL	NIL	70.08	0.20	Overloading of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line, Tripping of 132 kV Bale South Solapur line on overload, GTS Operated
12	13-02-25	NIL	NIL	67.02	0.17	Overloading of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line
13	14-02-25	NIL	NIL	95.04	0.49	Overloading of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line
14	15-02-25	NIL	NIL	42.76	0.14	Overloading of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line, Overloading of 132 kV Wagdari Naldurg line
15	16-02-25	NIL	NIL	121.47	0.47	Tripping of 132 kV Bale South Solapur & 132 kV Wagdari Naldurg line Overloaded, Increased loading on 132KV Naldurg-Wagdari Line Over 570 Amp, Overloading of 132 kV Naldurg Bale line upto 540Amp & GTS operation at 132KV Naldurg SS
16	17-02-25	NIL	NIL	68.44	0.39	Tripping of 132 kV Bale South Solapur & 132 kV Wagdari Naldurg line Overloaded, Overloading of 132 kV Naldurg Bale line upto 540Amp & GTS operation at 132KV Naldurg SS
17	18-02-25	NIL	NIL	94.35	0.38	Overloading of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line , tripping of 132 kV Bale South Solapur line, Overloading of 132 kV Naldurg Bale line upto 540Amp & GTS operation at 132KV Naldurg SS
18	19-02-25	NIL	NIL	80.44	0.34	Overloading Trip of 132 kV Bale South Solapur line , Overloading of 132 kV Wagdari Naldurg line,
19	20-02-25	NIL	NIL	118	0.47	Increased loading on 132KV Naldurg-Wagdari Line Over 570 Amp, tripping of 132 kV Bale South Solapur line, Overloading of 132 kV Naldurg Bale line upto 540Amp & GTS operation at 132KV Naldurg SS,

20	04-04-25	NIL	NIL	70.53	0.135	GTS Operated At 132kv Wagadri and 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
21	21-04-25	NIL	NIL	70.03	0.13	GTS Operated At 132kv Wagadri and 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
22	07-05-25	NIL	NIL	20.33	0.02	GTS Operated At 132kv Wagadri and 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
23	16-05-25	NIL	NIL	11.04	0.011	GTS Operated At 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
24	17-05-25	NIL	NIL	13.69	0.014	GTS Operated At 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
25	21-05-25	NIL	NIL	102.62	0.308	GTS Operated at 132kv Wagadri and 132kv Hasapur due to overloading (570 Amp) on 132kV Wagdari- Naldurg line
26	22-05-25	NIL	NIL	11	0.030	GTS Operated at 132kV Hasapur due to overloading (570 Amp) on 132kV Wagdari-Naldurg line
27	30-05-25	359.27	0.77	152	0.410	To control high frequency (50.30Hz) and heavy underdrawal (1800MW)
28	31-05-25	NIL	NIL	805.8	2.54	To control high frequency(50.30Hz) and heavy underdrawal (1300MW)
29	01-06-25	NIL	NIL	775.35	3.44	To control high frequency and heavy underdrawal (1500MW)
30	02-06-25	NIL	NIL	5.20	0.01	GTS Operated at 132kv Hasapur due to increase in loading of Naldurg-Wagdari Line 570Amp.
31	04-06-25	NIL	NIL	6.62	0.01	GTS operation at 132 kV Wagdari.Increased loading on 132KV Naldurg-Wagdari Line Over 570 Amp due to outage of 132 kV Mandrup - Karajgi line
32	17-06-25	NIL	NIL	386.73	0.63	1)To control high frequency and heavy underdrawal (1289MW) 2)0.03 Mus At Tuljapur 220/132kV ITC I & II Overloaded.
33	22-06-25	NIL	NIL	22.42	0.04	GTS Operated at 132kv Naldurg due to overloading Of 132kv Naldurg Solapur Line (540 Amp)
34	24-06-25	NIL	NIL	25.00	0.05	ICT -II LV R Phase LA Burst, ICT Trip at Tuljapur
35	06-08-25	NIL	NIL	30.00	0.05	132KV Wagdari-Naldurg Line GTS Stage 1 & 2 optd. Stage 1: 570Amp, 1sec. Stage 2: 570Amp, 2sec.
36	10-08-25	NIL	NIL	30.11	0.04	132KV Wagdari-Naldurg Line GTS Stage 1 & 2 optd. Stage 1: 570Amp, 1sec. Stage 2: 570Amp, 2sec.

37	11-08-25	NIL	NIL	13.25	0.01	GTS-Operated at 132KV Wagdari-Naldurg Line GTS Stage 1 optd.1sec
38	15-08-25	172.69	0.31	243.47	0.33	To control heavy underdrawal (1652MW) at high frequency.
39	20-08-25	63.50	0.12	377.98	0.73	To control heavy underdrawal (1565MW) at high frequency.
40	22-08-25	NIL	NIL	30.90	0.03	GTS operated at 132KV Wagdari and Hasapur PSS due to overloading of 132kV Hasapur -bale line.
41	03-09-25	NIL	NIL	3.79	0.01	132KV Hasapur - Bale Line GTS Stage-1 operated
42	08-09-25	NIL	NIL	2.95	0.003	132KV Hasapur - Bale Line GTS Stage-1 operated
43	21-09-25	NIL	NIL	18.70	0.04	132KV Hasapur - Bale Line GTS Stage-1 Operated. 132KV Wagdari-Naldurg Line GTS Stage 1 & 2 Operated. Stage 1 & 2: 570Amp,
44	24-09-25	NIL	NIL	75.93	0.18	132 kV Soregaon Mandrup line is under break down because of tower collapsed. Hence 132 kV Hasapur Solar to Bale line gets overloaded which results in GTS operation.
45	02-10-25	364.65	1.53	2495	10.45	To control heavy underdrawal (1891MW) at high frequency.
46	11-10-25	NIL	NIL	40.44	0.04	Due to tripping of 132kv Chetak-Bale line, 132KV Wagdari-Naldurg Line GTS Stage 1 & Stage 2 Operated.
47	31-10-25	NIL	NIL	20.14	0.02	132Kv Khadka-Tighra line GTS-1 Stage-1 of 480A (1.3Sec) operated.
48	04-11-25	NIL	NIL	6.94	0.02	132kV Bodwad- Malkapur line was under outage.132kV Tigra- Khadka line tripped on O/c prot. GTS Stage 1, 480A 1.3Sec, operated.
49	01-12-25	NIL	NIL	2.17	0.002	132kV Hasapur(Chetak)-Bale Line GTS Stage-1 operated.

Transmission constraints in generation evacuation (connected GTS details)

Transmission constraints in generation evacuation (connected GTS details)					
Sr No	Name of Zone	Name of substation	Name of element	Generator trimming scheme for	purpose
1	Nashik	132KV Erondol S/s (SPS)	132KV Erondol - BAmbhori Ckt	33KV 20MW Sunsure Solar Park Generation Feeder	To avoid line overloading
			132/33 KV 25 MVA PTF-1		To avoid PTF-1 overloading

		132/33 KV 25 MVA PTF-2		To avoid PTF-2 overloading
2	220KV Shivajinagar S/s	220KV Shivajinagar Malegaon Ckt	SPS FOR AMPYR SOLAR GENERATION	To avoid line overloading
		200KV Shivajinagar- Gangapur Ckt		To avoid line overloading
		220/132KV 100MVA ICT-1		
		To avoid ICT-1 overloading		
3	220KV Shivajinagar S/s	To avoid ICT-2 overloading	SPS FOR HUOBON SOLAR GENERATION	To avoid ICT-1 overloading
		220/132KV 100MVA ICT-2		To avoid ICT-2 overloading
4	220kV Shuvajinagar s/s	220KV Shivajinagar Malegaon Ckt	SPS FOR Godrej 33kV Feeder no 331 & 332 generation	To avoid line overloading
		200KV Shivajinagar- Gangapur Ckt		To avoid line overloading
		220/33/33KV PTF-1		To avoid PTF overloading
5	132KV Huoban S/s	132KV Huoban- SAKRI Ckt	SPS FOR HUOBON SOLAR GENERATION	To avoid PTF overloading
6	220KV Gangapur S/s	220KV Gangapur- Valve Ckt	SPS FOR 220 KV SHIVAJINAGAR SS AMPYR SOLAR GENERATION	To avoid line overloading
		220KV Gangapur- Satana Ckt		To avoid line overloading
7	132KV Sakri S/s	132KV Sakri-Dhule Ckt	SPS FOR 220 KV SHIVAJINAGAR SS AMPYR SOLAR GENERATION	To avoid line overloading
8	220KV SHIVAJINAGAR S/s	220 KV SHIVAJINAGAR- MALEGAON CKT	SPS FOR 220 KV GANGAPUR SS NEW 33 KV SUZLON 20 MW GENERATION	To avoid line overloading
9	220KV Gangapur S/s	220KV Gangapur- Valve Ckt	NEW 33 KV SUZLON 20 MW GENERATION	To avoid line overloading
		220KV Gangapur- Satana Ckt		To avoid line overloading
		220KV Gangapur- Shivajinagar Ckt		To avoid line overloading

10		220KV Jamde S/s	220KV Jamde-Dondaicha Ckt-1	SPS for NEW 33 KV SUZLON 20 MW GENERATION AT 220 KV GANGAPUR S/S	To avoid line overloading
			220KV Jamde-Dondaicha Ckt-2		To avoid line overloading
11		132KV Deepnagar GCR s/s	132KV Deepnagar-Muktainagar Ckt	27 MW Kalpak solar 33KV x2 feeder at 132KV Malkapur s/s	To avoid line overloading
12	Amravati	132kV Motala s/s	132 kV Juniper Solar- Varangian Tap- Khadka line	132 kV Cyclic Solar Park 100MW	To avoid line overloading
13		132kV Naldurga s/s	132kV Naldurga-Bale	1) 132kV Waghdari incomer 2) 33kV FDIPL 1 3) 33kV FDIPL 2 4) 33kV ESSL 1 5) 33kV ESSL 2 6) 33kV Parampujya Solar Total- 45 MW	To avoid line overloading
			132kV Naldurga-Tuljapur		
14	CSN	220kV Narangwadi	132kV killari	Stage1-To Trim 20MW Generation. of M/s Maruti Wind SS at RemoteStage2-To Trim 30MW additional Generation. of M/s Maruti Wind SS at RemoteStage3-To Trim total generation (100MW) by tripping 132KV Maruti WindPower Project Generation bay at 220KV Narangwadi SS.	To avoid line overloading
			132kV Nilanga		
			220/132KV 100MVA ICT-1 LV		
15		132kV JSW	220/132KV 100MVA ICT-2 LV	Stage 1-To Trim 20MW Generation of M/s JSW Stage 2-To Trim additional 30MW Generation of M/s JSW Stage 3-To Trim total generation (100MW) by tripping 132KV Generation (Metering) bay.	To Avoid line overloading
			132KV Tuljapur		
		132KV Ujani			
		132kV Umari SS-40MW Enrich Solar power park	33kV feeder I &II	Stage 1- 25MW to trim generation of Enrich Solar power park	To avoid TF overloading

16	Pune	220kV South solapur s/s	132kV south solapur- Bale	132kV Bale line	To avoid line overloading (out of service)
17		132kV Waghdari s/s	132kv Waghdari-Naldurga	1) stage 1- 33kV solar feeder at chetak s/s(26.5 MW) 2) stage 2 - 132kV Tata power 2(58MW) 3) 33kV swami samarth 2 (15MW) 4) stage 2 33kV solar feeder at chetak s/s(23.5MW) 5) stage 2 - 33kV LREHL-2(25MW)	To avoid line overloading
18		132kV Waghdari s/s	132kV Akkalkot ckt 1	1) 132kV Tata power 1(62MW) 2) 33kV LREHL-1(25MW)	To avoid line overloading
19		132kV Waghdari s/s	132kV Akkalkot ckt 2	1) 132kV Tata power 1(62MW) 2) 33kV LREHL-1(25MW)	To avoid line overloading
20		132kV Waghdari s/s	132kv Akkalkot ckt 1& 2	1) 132kV Tata power 1(62MW) 2) 33kV LREHL-1 (25MW)	To avoid line overloading
21		132kV Waghdari s/s	132/33kV 25MVA TF1	33kv swami samarth 1&2 30MW	To avoid line overloading
22		132kv Karajgi s/s	132kv Mandrup line	1) stage 1- 33kV Enrich feeder1 (25MW) 2) stage 2 - 33KV Enrich feeder 2(25MW) 3) stage 2 132kV Gokul mauli (15MW) 4) 132kv Jayhind (30MW)	To avoid line overloading
23		132kV Mandrup s/s	132kV Soregaon line	1) stage1 132kV at mandrup 2) 33kV Enrich solar 1 3) 33kV Enrich solar 2 Total- 50MW	To avoid line overloading
24		132kV Chetak s/s	132kV Gokul sugar	1) solar feeder 1& 2 at 132kV chetak s/s(50MW) 2) at 132kV Waghdari s/s (62MW) 3) LREHL 1(25MW)	To avoid line overloading

25		132kV Gokul sugar	132kV south solapur- Bale	1) solar feeder 1& 2 at 132kV chetak s/s(50MW) 2) at 132kV Waghdari s/s (62MW) 3) LREHL 1(25MW)	To avoid line overloading
26		132kV Akkalkot	132kV Karajgi line	1) 132kV Tata power 1(62MW) 2) 33kV LREHL 1(25 MW)	To avoid line overloading
27		132kV Sangola	132kV Pandharpur line	Maruti wind (30MW)	To avoid line overloading
28		132kV Sangola	132kV Digachi line	Maruti wind (30MW)	To avoid line overloading
29	Nagpur	220KV Butibori-1	220/132 kV 100 MVA ICT-1	Generation backdown at stage-1 : 60MW Stage-2 :60MW at M/S VIPL	To avoid ICT overloading
30			220 kV Butibori 1 – Abhijeet circuit	Generation backdown 30MW at M/S VIPL	To avoid line overloading
31		220KV Butibori-3	220 kV Buttibori 3 – Wardha circuit	Generation backdown 30MW at M/S VIPL	To avoid line overloading
32		220KV Karanja SS	220/33 kV 25 MVA TF1	33KV Swami Samarth Solar Feeder 01 backdown of 6.98MW	To avoid TF overloading
33			220/33 kV 25 MVA TF2	33KV Swami Samarth Solar Feeder 02 backdown of 6.98MW	To avoid TF overloading
34			132kV Ambazari – Karanja CKT I & II	33kV Avaada Solar Feeder at 132kV Talegaon Substation backdown of 25 MW	To avoid line overloading
35		400/220KV Koradi II	400 kV Koradi-wardha PGCIL	presently on alrming , mode only	To avoid line overloading
36		220kV Wardha (MS)	220kV Wardha Yeotmal Ckt	SPS Implemented for overloading of 400kV outgoing lines from 400kV Koradi-II s/stn: - 1) stage-I:- loading of any one outgoing line more than or equal to 926MW for more than 3 Se	To avoid line overloading

7.5.5 Change in nature of Mumbai / MMR Constraints impacting Mumbai Generation:

After commissioning of MUML Lines i.e. 400 kV Padghe PG- Kharghar & 400 kV Padghe PG-Navi Mumbai PG lines, Mumbai TTC/ATC has been improved to 3300 MW / 3200 MW respectively.

Now, the importance of 765/400 kV Padghe PG substation has increased for catering Loads of Mumbai, MMR, Boisar area and South Gujarat. Hence, in case of any contingency at Padghe PG substation or lines emitting from Padghe PG substation, MSLDC directs TPCL & AEML to keep Mumbai embedded generators on bar.

7.5.6 Inter State ATC/TTC Constraint:

Presently, ATC / TTC for the Maharashtra State is as below:

Total Transfer Capability (TTC): - 11400 MW

Transmission reliability Margin (TRM): - 600 MW

Available Transfer Capability (ATC): - 10800 MW

During the violation of ATC, to control the Over drawl, Load shedding is required to carried out.

7.5.7 Line Hand tripped due to overvoltage:

Following lines are hand tripped to control the overvoltage in CY: 2025

Name of Line	No. of Times Hand tripped
400kV Jaigad – Karad ckt. - 1	32
400kV Jaigad – Karad ckt. - 2	35
400kV Khadka – Aurangabad (Waluj)	52
400kV Padghe - Nagothane Ckt - 1	2

7.6 Transmission constraints affecting Generation:

7.6.1 Nashik TPS Generation constraints:

It has been observed that the grid voltages in Nashik area drops below 205 KV as against 220KV. This reduction is mainly due to high reactive power requirement. To meet out the high MVAR requirement in Nashik area & maintain voltages within limits, Nashik Units are continuously sharing high MVAR. MSPGCL has informed that such high injection of reactive power is resulting in to increase of generator winding temperature. The rotor temperature increases up to 115⁰C. Also, an Excitation current has reached its maximum limit of 2600 Amperes resulting in huge stress on the insulation of Generator. To maintain the winding temperature at safe limits, generation is restricted which is causing loss in generation. Further, sudden drop in Grid Voltage results in generation reduction of around 40-50 MW for the running unit causing commercial loss MSPGCL. Further, reduction in generation (active power

sacrificed due to MVAR requirement) results in reduction of availability of the units to be maintained as per Hon'ble MERC Regulations. Further, as per the present regulations, there is no provision of compensation for such reduction in availability due to MVAR requirements.

The issue was discussed in OCC & GCC meetings. STU, MSLDC & Nashik field office has carried out detailed studies for providing adequate reactive power compensation in Nashik area. **Thus, 160 MVAR reactive power compensation has been planned and the same is being implemented.**

7.6.2 Backing Down of APML (Tiroda) & Koradi-II Generation:

The generation of APML (Tiroda) & MSPGCL's Koradi-II is evacuated through 765 kV network through 765/400 kV Ektuni S/s. The transformation capacity at 765/400 kV Ektuni S/s is 2 x 1500 MVA. Both the ICTs are loaded to more than 60 % of its installed capacity. There is no redundancy available in the transformation capacity. In case of tripping or outage on any one ICT, the remaining ICT is either loaded to full rated capacity or above permissible capacity. Hence to maintain the loading within permissible limits, the generation at Tiroda & Koradi-II is required to be backed down. It is difficult for MSLDC to approve outage on these ICTs. To avoid tripping on overload due to tripping or outage on any ICT, SPS is installed which is providing alarm at both the generating stations & generation is backed down manually as per MSLDC's instructions. Hence, it is necessary to provide additional 1 x 1500 MVA 765/400 kV ICT at Ektuni S/s.

7.6.3 Koyna water utilization:

Koyna Generation is utilized by MSLDC as per the schedule issued by MSEDCL. Further, the dispatch is dependent up on the availability of other resources arranged by MSEDCL for meeting its demand. Hence, majority of water is utilized for meeting MSEDCL Demand.

However, Koyna generation is utilized by the MSLDC under some contingent conditions described below:

- To control over-drawl by the State above 200 MW when all the State thermal generation is exhausted. This action is carried out to avoid hefty penalties at State Periphery.
- To support the Grid frequency when frequency-profile is at lower side, mainly below 49.85 Hz.
- To control overloading of 400 KV lines viz., Talegaon (PG) –Chakan ckt which normally loaded above 750 MW.
- To support the grid during system emergencies such as tripping of any generating unit and evacuating grid lines, HVDC pole, multiple tripping of important grid elements, to operate grid securely & reliably.
- During the power shortfall conditions, till actual effect of load shedding is visible.

As there are restrictions in water utilization, it is important to utilize Koyna Generation judiciously.

7.6.4 Constraint affecting Ghatghar generation:

EHV voltages around Ghatghar HPS are generally low (below 215kV) in day time period. Hence, Ghatghar Units are not available for pumping mode, in Solar hours

7.6.5 Reactive Power Requirement in Boisar area:

It has been informed by ADTPS in the OCC & GCC meeting that the reactive power sharing through the 220 kV Dahanu – Viraj line is on higher side. In peak hours the sharing of reactive power by Dahanu generators increases. Due to this high MVAR injection, the active power needs to be reduced. ADTPS units have been commissioned in 1995 and are old. Due to mechanical vibration issue in the Turbines, it is not possible to provide Reactive power support without reducing active power even within Capability curve.

Hence, adequate reactive power compensation needs to be planned & implemented in Boisar area.

Chapter 8: Outage Planning

MSLDC is carrying out important function of managing outages of 765 kV, 400 kV & 220 kV level through Outage Management System (OMS) - web-based software.

Outage abstract for Year 2025								
Month	Total proposed Outages (Nos)	Total Deferred Outages			Total Approved Outages (Nos)	Total Aailed Outages (Nos)	Total Not Aailed Outages (Nos)	%
		Deferred from site (Nos)	Deferred by SLDC (Nos)	Deferred by WRLDC (Nos)				Approved / Aailed
JAN	1836	456	108	36	1236	822	414	66.50%
FEB	1652	371	164	74	1043	638	405	61.17%
MAR	1723	404	220	16	1083	689	394	63.62%
APR	2050	500	103	13	1434	1163	271	81.10%
MAY	1675	523	106	16	1030	694	336	67.38%
JUN	1233	405	100	29	699	467	232	66.81%
JUL	1201	90	9	414	688	472	187	68.60%
AUG	1177	112	24	334	707	473	217	66.90%
SEP	1339	107	13	405	814	601	216	73.83%
OCT	767	102	7	336	322	222	61	68.94%
NOV	990	65	78	444	403	318	85	78.91%
DEC	941	48	51	403	439	354	85	80.64%
TOTAL	16584	3183	983	2520	9898	6913	2903	69.84%

The details of outages processed at ALDC, Ambazari are tabulated below:

Details of Outages processed at ALDC, Ambazari						
Year	PLANNED			FORCED		
	220 KV	132 KV	TOTAL	220 KV	132 KV	TOTAL
CY 2025	1269	1439	2708	251	259	510

Note: Outages of 220 kV & below network in VKM area are processed at ALDC, Ambazari.

To discuss the monthly transmission outages in the State and to assess the feasibility of proposed outages, a meeting is conducted at MSLDC, Kalwa on a monthly basis.

The following State Coordination Meetings (SOCM) were carried out during the Calendar Year 2025:

Sr. No.	State Outage Coordination Meeting (SOCM)	Date & Time
1	5th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of February'25	03.01.2025 @ 15:00 hrs
2	6th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of March'25	04.02.2025 @ 15:00 hrs

3	7th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of April'25	04.03.2025 @ 15:00 hrs
4	8th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of May'25	02.04.2025 @ 15:00 hrs
5	9th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of June'25	02.05.2025 @ 11:00 hrs
6	10th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of July'25	03.06.2025 @ 15:00 hrs
7	11th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of August'25	03.07.2025 @ 14:30 hrs
8	12th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of September'25	04.08.2025 @ 15:30 hrs
9	13th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of October'25	03.09.2025@ 15:00 hrs
10	14th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of November'25	03.09.2025@ 15:00 hrs
11	15th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of December'25	04.11.2025@ 14:30 hrs
12	16th State Outage Co-ordination Meeting (SOCM) to discuss monthly transmission outage list for the month of January'26	04.12.2025 @ 14:00 hrs

Similarly, to discuss the monthly Mumbai & MMR transmission outages and to assess the feasibility of proposed outages, a meeting is conducted at MSLDC, Kalwa on a monthly basis.

The following Mumbai outage Coordination Committee Meetings (MOCM) were carried out during the Calendar Year 2025:

Sr. No.	Mumbai outage Coordination Committee Meetings (MOCM)	Date & Time
1	32rd MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Feb '25	30-Jan-25 @ 14:30 hrs
2	33rd MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Mar'25	27-Feb-25 @ 15:00 hrs
3	34th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Apr'25	27-Mar-25 @ 15:00 hrs

4	35th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of May'25	28-Apr-25 @ 14:30 hrs
5	36th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of June'25	30-May-25 @ 14:30 hrs
6	37th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of July'25	25-Jun-25 @ 14:30 hrs
7	38th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Aug'25	29-Jul-25 @ 14:30 hrs
8	39th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Sept'25	25-Aug-25 @ 15:00 hrs
9	40th MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Oct '25	25-Sep-25 @ 11:00 hrs
10	41st MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Nov '25	29-Oct-25 @ 15:00 hrs
11	42nd MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Dec '25	27-Nov-25 @ 15:30 hrs
12	43rd MOCM Meeting to discuss Monthly outage plan in MMR and Mumbai system for the month of Jan '26	26-Dec-25 @ 15:00 hrs

Hon. Director (Operations), MSETCL has directed for Optimization of Transmission Element Outages and Zonal Coordination in MSETCL through Circular No 01 dated 25-Sept-2025.

This circular from aims to improve how power line maintenance outages are planned and coordinated. Poor coordination in scheduling these outages is causing problems for grid security and stability. Common issues include late requests, poor communication between teams, and last-minute rushes to submit plans. These lapses make accurate grid planning difficult and can lead to denied outages or increased risk.

To solve this, a new role of "Zonal Coordinator" is being created in each regional maintenance zone. This coordinator will be responsible for ensuring all outage requests from their zone are submitted properly and on time. They will act as the main point of contact, coordinating between different local teams and with state and regional grid operators. The coordinator must also confirm that sites are ready for work and provide updates after maintenance is completed. Furthermore, engineers must now explore and confirm if outages can be avoided by using alternative methods like live-line washing. The circular orders strict compliance with these new instructions to enhance the overall reliability of the power transmission network.

Critical and Important Outages which resulted in strengthening of Maharashtra Grid.

Sr. No	Name of substation	Element Charged Details	Sync. Date
1	500 HVDC kV	Padghe - Malegaon electrode line charged. (Earlier 33kV Padghe - Anjur line converted into Padghe - Malegaon)	06.12.2025
2	400kV Taptitanda	400/220kV,501 MVA ICT-3 at Taptitanda at 18:44 Hrs	04.12.2025
3	400kV Deepnagar	125MVAR Bus Reactor charged 17:02 Hrs.	27.09.2025
4	220kV Urse	220kV Urse - Chinchwad ckt HTLS work completed and charged at 16:55 Hrs	07.12.2025
5	220kV Parvati	220kV Parvati – Phursungi ckt HTLS work completed and charged	31.10.2025
6	220kV Kalwa	Strengthening of 220kV Interconnector by GIS with Isolator replacement at Kalwa has been completed,	24.03.2025
7	400kV Kalwa	400 kV Kalwa - Padghe Ckt-1 after completion of HTLS work charged at 22:45 hrs	14.01.2025
8	220kV Kudus	The 220 kV Kudus substation has made a LILO arrangement on the 220 kV Ghodbunder–Boisar circuit and successfully charged.	30.03.2025
9	220kV Boisar II	HTLS of Main Bus – 2 at Boisar II s/s is carried out	20.12.2025- 22.12.2025
10	220kV Padghe	Multiple outages carried out on 220kV Main Bus -1 & 2 at Padghe for conductor replacement	05.04.2025 09.08.2025 22.08.2025- 23.08.2025
11	400kV Padghe	Outage carried out on 400/220/33 KV 600 MVA ICT - 4 at Padghe for replacement of B-ph unit	04.12.2025- 20.12.2025
12	400kV Chandrapur HVDC	Replacement of interrupter with pir & complete overhauling of breaker pole of pole-1 rph converter breaker at Chandrapur HVDC	07.05.2025- 08.05.2025
13	220kV Bale	HTLS work carried out on 220kV Bale – Solapur (PG) 1 & 2	19.06.2024- 02.03.2025

Major outages undertaken during the Calendar Year 2025 leading to network strengthening and network additions are listed below.

- The Chandrapur–Padghe HVDC bipole link is a vital element of the Maharashtra power grid. The earth electrode station at Chincholi, near Chandrapur, is located at a distance of 25 km from the Chandrapur terminal station, while the earth electrode station at Anjur, near Padghe, is located at a distance of 22.5 km from the Padghe terminal station.

The MSETCL HVDC earth electrode station at Anjur, Taluka Bhiwandi, District Thane, falls under the proposed alignment of the Mumbai–Ahmedabad High-Speed Rail (Bullet Train) project being executed by National High Speed Rail Corporation Ltd. (NHSRCL). Accordingly, NHSRCL proposed the relocation of the earth electrode station at village Anjur, District Thane.

After finalization of the Malegaon location for the relocated earth electrode station and detailed discussions held in several coordination meetings, an outage on both HVDC poles was availed during annual maintenance. The associated works were completed and the 33 kV Padghe–Malegaon earth electrode line was charged on 06.12.2025. Further, Outage was given for major work from 06.12.2025 to 18.12.2025 for testing of Malegaon electrode station erected due to relocation of Anjur electrode station

The earlier 33 kV Padghe–Anjur earth electrode line was accordingly converted to the Padghe–Malegaon earth electrode line, following the erection of the Malegaon earth electrode station as part of the relocation of the Anjur earth electrode station for the 500 kV Chandrapur–Padghe HVDC bipole link.

- In the event of tripping or outage of the 220 kV Jejuri–Kondhwa line, the 220 kV Kondhwa, Nanded City, and Flagship substations operate radially from the Parvati side. Under this condition, the 220 kV Phursungi–Parvati circuit gets overloaded.
- To avoid overloading, HTLS work was proposed on the 220 kV Phursungi–Parvati circuit. Accordingly, the **HTLS work of the Phursungi–Parvati circuit was completed in November 2025.**

Chapter 9: System Protection, Disturbance & Recommendations

9.1 Incident / Disturbance Analysis:

During the **Calendar Year 2025**, multiple **grid disturbances** occurred due to various system contingencies and operational conditions. Each incident was analyzed in detail to identify the root cause and assess its impact on system operation. The details of these disturbances are **tabulated below** for reference.

Sr. No.	Substation / Area involved	Description	Date and Time of Incidence	Protection Operated / Incidence	Reason
1	Mumbai, MMR, Pune, Nashik, Boisar, and Nagothane	Report on Voltage Collapse on 12.03.2025 in Maharashtra.	12.03.2025, 14:55 Hrs	LTS and UVLS, Multiple Line/ICTs Tripping, Load shading	Multiple transmission lines and generators tripping in South Gujarat led to excessive power flow from Maharashtra to Gujarat.
2	400 kV Warora ss	System disturbance due to Multiple line trippings at 400 kV Warora ss on 10.06.2025;	10.06.2025, 00:25 Hrs	Multiple line trippings	400 kV APML Ckt 2 CVT failure and Multiple line tripping at 400 kV Warora ss
3	400 kV Karad ss	Occurance report at 400 kV Karad ss due to non-operation of 220 kV RADSS make bus bar scheme on 29.06.2025 at 05:25 hrs	29.06.2025, 05:25 Hrs	Non operation of 220 kV BusBar protection	During Bus fault at 220 kV Oglewadi bay, 220 kV Busbar protection failed to operate.
4	220 kV Bhosari ss	Occurance report of 220 kV busbar bar protection operation at 220 kV Bhosari 1 ss during FTC of 220 kV GIS Microsoft Bay 210 on 18.06.2025.	18.06.2025, 20:04 Hrs	Bus bar Protection	220 kV busbar bar protection operated at 220 kV Bhosari 1 ss during FTC of 220 kV GIS Microsoft Bay 210 on 18.06.2025.
5	400 kV Nagothane ss	Occurrence report of multiple line tripping at 400 kV Nagothane ss on 16.06.2025	16.06.2025, 15:52 Hrs	Simultaneous 220 kV Lines tripping while bay shifting operations	PT selection scheme issues.
6	220 kV VIPL ss	Occurrence report of 220 kV LBB protection operation at 220 kV VIPL ss along with multiple lines	15.08.2025, 19:00 Hrs	LBB protection, Distance	Y ph pole stuck up of CB of 220 kV VIPL - ButiBori 1

		tripping on 15.08. 2025..		protection, BU protection, HT	ckt-4
7	400 kV Padghe ss	Occurance report of 100 kV LBB protection operation at 220 kV VIPL ss alongwith multiple lines tripping on 15.08. 2025..	29.07.2025 and 13.08.2025	LBB protection	100 kV CBs of 100 kV Bhiwandi-1 and 100 kV Bhiwandi-2 line failed to clear the line faults.
8	400KV GCR Chandrapur ss	Occurrence report of 400 kV Main Bus-II Busbar Protection Operation at 400KV GCR Chandrapur on 06.09.2025.	06.09.2025 05:14 Hrs	Busbar Protection	Failure of the Y-phase Current Transformer (CT) of the 400kV HVDC Circuit-2 Bay
9	400 kV Nagothane ss	Occurrence report of 400 kV Main Bus-1 Busbar Protection Operation at 400KV Nagothane ss on 10.09.2025	10.09.2025; 23:36 Hrs	Busbar Protection	A failure and decapping of the extended B-phase bus insulator string
10	400 kV Deepnagar ss	Occurrence report of 400 kV Main Bus-II Busbar Protection Operation at 400KV Deepnagar substation on 19.09.2025	19.09.2025; 04:25 Hrs	Busbar Protection	Bursting of R-ph line CT of 400 kV Deepnagar – Khadka Ckt-1.
11	400kV Chandrapur-2 S/S	Occurrence report of 400 kV Bus-1 bus bar protection operation at 400kV Chandrapur-2 S/S and multi-line tripping.	21.10.2025; 20:02 hrs	Busbar Protection	400 kV Chandrapur (SW) Ckt-2` s Y-phase IPS tube between the bus isolator and circuit breaker got detached from the Main Bus-1 isolator and came into the vicinity of the circuit breaker structure.
12	220 kV Uran ss	Report of multiple occurrences on 220 kV Busbars at 220 kV Uran substation on 09.09.2025, 08.10.2025 & 14.11.2025.	09.09.2025, 08.10.2025 & 14.11.2025.	Busbar Protection; LBB Protection	On 09.09.2025, the R-phase pole of the GT Unit-8 circuit breaker got burst. On 08.10.2025, LBB command was initiated from GTPS end of

					Generation B0 unit bay. On 14.11.2025, R-phase CT of the 220 kV Bus-Coupler burst.
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9.2 Key Recommendations:

During major grid occurrences, MSLDC promptly implemented operational controls, load management, and network reconfiguration to maintain system stability. Remedial measures included rescheduling generation, controlled load shedding, outage coordination, and real-time monitoring. Post-event analysis was carried out to prevent recurrence and enhance grid reliability.

Based on the analysis of each grid disturbance, specific recommendations have been provided and are listed below.

1. Voltage Collapse event on 12.03.2025 in Maharashtra

1.1 Short-Term Measures

1 System Strengthening

To improve system reliability in the Mumbai, MMR and Pune areas, the following transmission schemes shall be completed on priority as per their targeted timelines:

Construction of 220 kV D/C lines from 765 kV Shikrapur PG to Khed City and Ranjangaon substations.

Re-orientation of 220 kV Babhaleshwar–Ranjangaon and Lonikand–Ranjangaon circuits at Khed City.

Implementation of HTLS conductors on identified 400 kV and 220 kV corridors including Lonikand–Chakan, Talegaon–Chakan and Talegaon–Lonikand lines.

Execution of 400 kV LILO schemes and new 220 kV corridors under Western Region Network Expansion schemes.

These schemes are essential to reduce congestion, improve load transfer capability, and enhance voltage stability in high-load pockets.

To address persistent low-voltage conditions in MMR, Pune and Nashik areas, commissioning of planned reactive power compensation of about 1425 MVAR at Pune, 170 MVAR at Vashi, and 160 MVAR at Nashik shall be ensured on priority.

2 Protection

Review and provision of Under Voltage Load Shedding (UVLS) schemes at all identified 400 kV substations where such schemes are presently not available.

Review of existing UVLS scheme at 400 kV Babhaleshwar to ensure effective load relief instead of network element tripping.

Provision of Load Trimming Scheme (LTS) on 220/132 kV ICTs at Nashik.

Verification and correction of protection settings of the 220 kV Bus Coupler at Nashik OCR.

Review of LTS implementation on all 400 kV ICTs to ensure availability on each individual transformer.

3 Automation and Communication

MSLDC has joined the ULDC scheme of Grid-India for implementation of the new SCADA system. WRLDC is requested to expedite execution so that commissioning at MSLDC can be completed at the earliest.

All LTS schemes provided on major transmission elements such as ICTs and 400 kV lines shall be integrated with MSLDC and ALDC SCADA systems.

A dedicated alarm and display screen for LTS operations shall be provided at MSLDC and ALDC control rooms for better situational awareness.

STU has already communicated the list of substations in MMR and Mumbai for PMU installation to TPCL and AEML. All concerned utilities shall expedite PMU installation and ensure their integration with the MSLDC URTDSM system.

4 Procedural Review

A state-wide list of critical and non-critical loads/feeders shall be prepared for all substations. A uniform Load Trimming Protocol, similar to the one implemented for MMR and Mumbai, shall be prepared for the entire State to enable faster and error-free implementation during emergencies. This list shall be reviewed and updated at least once every six months.

All LTS, SPS and UVLS schemes shall be periodically reviewed by the Protection Committee (PCC). Healthiness and correctness of these schemes shall be ensured by respective transmission licensees, and compliance reports shall be submitted to MSLDC.

Periodic testing and trial operation of LTS, SPS and UVLS schemes shall be carried out by transmission licensees, and test reports shall be submitted to MSLDC.

1.2. Short-Term Measures

1 Grid Strengthening

(a) Integrated Resource Planning for Mumbai–MMR–Pune Cluster

Nearly 15,000 MW of load is concentrated in Mumbai, MMR and Pune region.

The area has limited embedded generation, constrained transmission capacity and inadequate reactive power support.

An integrated resource planning study for this region shall be undertaken by STU, considering future demand growth.

The study shall ensure availability of adequate synchronous generation to provide inertia, reactive power support, and active power during islanding or contingency conditions.

(b) Reactive Power Planning and Compensation

Reactive power requirement studies shall be carried out annually by STU.

Dynamic reactive compensation such as STATCOMs and SVCs shall be planned for high-load and rapidly changing load areas, especially considering increasing penetration of data centres and metro loads.

With large-scale solar capacity addition (~25 GW) in the State, thermal generation will increasingly operate in cycling mode, reducing available reactive support. Hence, adequate reactive capability from renewable and grid-side compensation systems must be ensured.

Timely commissioning of planned reactive compensation schemes shall be strictly monitored.

(c) Upgradation of HVDC Capacity

During the disturbance, the ± 500 kV, 1500 MW Chandrapur–Padghe HVDC link played a crucial role in supporting voltage and power transfer.

Considering widespread low-voltage conditions, VSC-based HVDC with reactive power control capability would significantly enhance grid support.

Upgradation of the existing Chandrapur–Padghe HVDC to 3000 MW VSC-based configuration should be examined on priority.

As the transmission line corridor is reportedly adequate, only terminal station upgrades may be required, which should be verified by STU.

2 Protection, Communication and Automation

- a) Enhancing system visibility at MSLDC
- b) Full visibility of 765 kV and 400 kV substations is available at MSLDC; however, visibility below 220 kV is presently limited.
- c) Planned schemes for extending visibility of 220 kV and lower voltage levels shall be expedited to achieve comprehensive system monitoring.
- d) Expansion of Optical Fibre Communication Network
- e) PMU-based analysis during the disturbance proved valuable.
- f) Expansion of optical fibre infrastructure is essential to support PMU deployment at all critical substations and generating stations.
- g) State Estimator and ADMS Implementation
- h) Under the ULDC scheme, advanced applications such as State Estimator and ADMS are planned.
- i) Grid-India is requested to expedite issuance of LoI and execution so that commissioning at MSLDC can be achieved at the earliest.
- j) Wide Area Measurement System (WAMS) Expansion
- k) At present, PMUs are available at limited 400 kV substations.
- l) In Phase-I, PMUs shall be installed at all identified critical substations in MMR and across all 400 kV substations.
- m) In Phase-II, PMUs should be extended to strategic locations including RE pooling stations.
- n) MSLDC shall install Phasor Data Concentrators (PDCs) with advanced analytics and decision-support capabilities.

3. Integrated Data Handling Platform

During post-disturbance analysis, challenges were observed in handling large volumes of heterogeneous data from SCADA, PMUs, meters, protection systems and scheduling tools.

An integrated data handling platform capable of multi-source data integration and analytics is therefore essential.

MSLDC has completed a Proof of Value (PoV) in February 2025 for such a platform.

Implementation of this platform shall be expedited to improve operational analysis, decision-making and overall grid reliability.

1.3. Regulatory Framework Support

To strengthen grid disturbance management, the following regulatory measures are required:

Establishment of a mechanism for ensuring availability of spinning reserves within the intra-State system.

Introduction of Security Constrained Economic Dispatch (SCED) and Security Constrained Unit

Commitment (SCUC) at the State level.

In line with the recommendations of the High-Level Committee constituted by Hon'ble MERC after the 12.10.2020 disturbance, MSLDC has undertaken detailed studies on SCED/SCUC implementation in collaboration with IIT Bombay using GAMS-based optimization tools.

Implementation of these mechanisms will significantly enhance secure, economic and reliable operation of the Maharashtra power system.

2.2. System disturbance at 400 kV Warora ss on 10.06.2025

To avoid recurrence of such events, verification of relay unblocking logic under VT fuse failure, review of carrier-aided tripping at IEPL, and rationalization of Zone-2 and reverse zone time delays at 400 kV Warora are essential in line with protection guidelines.

Time coordination of HV/IV protections of ICT-1 & 2 shall be reviewed considering prevailing fault levels. A comprehensive protection audit of 400 kV Warora substation should be carried out at the earliest to ensure overall system reliability and compliance.

Strengthening of evacuation capability at 400 kV APML end through provision of an additional 765/400 kV ICT is recommended to address transmission constraints.

2.3. System disturbance at 400 kV Karad ss due to non-operation of 220 kV bus bar scheme on 29.06.2025

To prevent recurrence of such incidents, time coordination between ICT-1, ICT-2 and ICT-3 HV high-set protections and bus-coupler protections shall be verified and revised wherever required. The HV and IV OC/EF relay settings of ICT-1, 2 and 3, for both high-set and normal inverse characteristics, shall be reviewed in line with prevailing bus fault levels and protection coordination guidelines.

The non-operation of the distance relay at 220 kV Kadegaon end for the Karad–Kadegaon line shall be analyzed in detail. The existing old RADSS busbar protection shall be replaced with a modern numerical busbar protection scheme.

During busbar testing, auxiliary CT knee-point testing and primary resistance measurement shall also be carried out to ensure reliable protection performance.

2.4. Disturbance in MMR area (especially in Dombivali, Ambarnath, Badlapur region) in view of tripping of 220 kV Padghe Pal Line on 04.07.2025. & Long duration load loss in Pune region.

Frequent failures of EHV cables at multiple locations have resulted in long-duration load losses, mainly due to the extended time required for fault localization, excavation, joint repair, and restoration. Considering the prolonged restoration time associated with cable faults, the existing practice of extensive EHV cable laying needs to be reviewed.

It is also observed that, with the adoption of underground cables, the available overhead transmission corridor is permanently lost, thereby reducing operational flexibility and availability

of alternate power flow paths. In this context, the faulty portion of the 220 kV Padghe–Pal line requires urgent attention and early restoration.

Further, the existing EHV cable corridors in Mumbai, MMR, and PMR regions require regular condition monitoring, diagnostic measurements, and preventive maintenance, including periodic testing to detect insulation degradation and incipient faults.

In view of increasing load, network complexity, and upcoming transmission projects, the following system-level measures are recommended in Pune region:

A redundant 220 kV corridor between Chinchwad, Hinjewadi-1, Hinjewadi-2, and Hinjewadi-3 should be planned to improve reliability and meet contingency requirements for this high-load corridor.

A redundant 220 kV evacuation corridor between 400 kV Hinjewadi-3 and 220 kV Hinjewadi-2 should also be planned, considering upcoming projects associated with the 400 kV Hinjewadi-3 / Jejuri corridor.

A comprehensive review of the 220 kV network planning around Pune should be undertaken in view of the proposed and upcoming 400 kV and 765 kV transmission network, to ensure adequate redundancy, coordination, and long-term system reliability.

Efforts should be made to minimize the use of EHV underground cables, particularly where overhead corridors already exist or are technically feasible. Replacement of overhead lines with cables should be avoided to the extent possible, as cable-based networks involve longer restoration times and higher dependency risks during failures.

HTLS conversion of existing heavily loaded overhead corridors in Mumbai, MMR and PMR regions should be taken up on priority, as it enhances power transfer capability without requiring additional right-of-way and reduces dependence on underground cable systems.

2.5. Occurrence report of 220 kV busbar protection operation at 220 kV Bhosari 1 ss during FTC of 220 kV GIS Microsoft Bay 210 on 18.06.2025.

Protection-related information was not submitted to SLDC along with the FTC proposal under Format-3 (Protection Healthiness), which is a mandatory requirement. The same needs to be ensured for all future FTC submissions.

2.6 Occurrence of 220 kV LBB protection operation at 220 kV VIPL ss along with multiple lines tripping on 15.08.2025.

The existing PT selection scheme, being of old design and vintage, has exhibited repeated operational issues. It is recommended to replace the existing PT selection relays with new and reliable numerical relays and to provide isolator selector switches for all bays. Immediate corrective action is also required to resolve the PT secondary mixing issue, to ensure proper functioning of the PT selection scheme and overall protection reliability at the substation.

All Disturbance Records (DRs) shall be properly GPS time-synchronized to enable accurate sequence-of-events analysis and correlation, in compliance with MEGC 2020, Clause 25.1.

A third-party protection audit of 400/220 kV Nagothane Substation should be carried out at the earliest, to comprehensively assess protection schemes, logic, settings, and implementation gaps.

2.7. Occurrence of 220 kV LBB protection operation at 220 kV VIPL ss along with multiple lines tripping.

The line differential protection for VIPL–Butibori-1 Circuits-3 & 4 shall be reliable and continuously available. M/s VIPL shall attend fibre-optic communication issues on top priority. Redundant communication channels (PLCC / alternate paths) shall be provided to ensure dependable protection.

Since 220 kV VIPL Substation remained out of service for a prolonged period and instances of stuck CBs were observed, CB overhauling and regular maintenance shall be carried out for all circuit breakers as per OEM recommendations. Post-overhauling CB diagnostic test reports shall be verified by ACIP and PAC Circle.

A third-party protection audit, including protection coordination review as per PCM and PCC-WRPC guidelines, shall be carried out for all substations involved in the occurrence within six (06) months, to prevent recurrence of similar incidents.

Reliable voice communication systems (VoIP / Hotline PLCC / Dial-up PLCC) shall be established between 220 kV Butibori-1, 220 kV Butibori-3, and 220 kV VIPL Substations, and with MSLDC and ALDC, for effective real-time coordination during contingencies.

The existing SPS scheme for ICT overloading at 220 kV Butibori-1, associated with 220 kV Abhijit Line and 220 kV Wardha Line, is presently operating in manual mode. The scheme, designed to back down 60 MW generation at VIPL in two stages, shall be automated to ensure timely and reliable operation.

220 kV Koradi-II (400 kV) – Butibori-3 Circuits-I & II and 220 kV Butibori-1 – Butibori-3 lines are presently hand-tripped to control overloading of 2×100 MVA, 220/132 kV ICT-I & II at Butibori-1. Capacity enhancement / addition of ICTs shall be expedited to ensure reliable system operation (already included in STU Plan 2025-26).

Backup UPS supply shall be provided to all SCADA equipment (HMI, network switches, routers, etc.) at 220 kV Butibori-1, 220 kV Butibori-3, and 220 kV VIPL Substations, as SCADA visibility was affected during the incident.

2.8. Occurrence of 400 kV Main Bus-II Busbar Protection Operation at 400KV GCR Chandrapur on 06.09.2025.

It is observed that the failed CT was commissioned in 1998 and has completed 27 years of service. Ageing EHV equipment such as CTs, CVTs, PTs, and circuit breakers are susceptible to insulation degradation, which can result in sudden catastrophic failures without prior warning. Even when periodic diagnostic tests (Tan Delta, Capacitance, IR, etc.) indicate normal results, hidden deterioration mechanisms may still lead to insulation breakdown. Such aged EHV assets shall be identified and prioritized for replacement. It is noted that the Life Extension (LE) scheme proposal for ageing EHV equipment is under process, which needs to be expedited on top priority.

Regular thermographic scanning of EHV switchyard equipment including CTs, CVTs, LAs, bushings, transformers, and bus conductors is essential to detect hotspots arising from loose joints, increased contact resistance, or insulation deterioration. Thermography is particularly effective for ageing equipment, where latent defects may not manifest during routine electrical tests. This practice enables early detection and failure prediction, thereby improving system reliability.

In the existing busbar configuration, Bus-1 is connected with 11 bays and Bus-2 with 10 bays. Any operation of busbar protection or Local Breaker Backup (LBB) may therefore lead to the simultaneous outage of a large number of critical bays, posing a significant risk to system reliability and operational continuity. To mitigate the impact of such contingencies, it is recommended to examine the feasibility of subdividing the existing busbars into multiple sections by providing bus sectionalisers and bus couplers. This will help in restricting faults to smaller segments, reducing the disturbance area, improving fault isolation, and enhancing overall system flexibility and resilience.

The tripping of GTR-5 (296 MW) and GTR-7 (213 MW), which were connected to Bus-1, requires detailed investigation. Corrective measures shall be implemented to prevent recurrence of such tripping events.

The auxiliary supply changeover scheme shall be reviewed for adequacy and reliability. Further, the 400 kV STN Transformer-3, which has been unavailable since 01.03.2025, shall be restored at the earliest, as its non-availability adversely impacts the reliability of auxiliary power supply to generating units.

2.9. Occurrence of 400 kV Main Bus-1 Busbar Protection Operation at 400KV Nagothane ss on 10.09.2025

It is observed that the failed insulator string was part of the extended 400 kV bus and was energized for the first time. Random sampling, healthiness checks, and acceptance testing of such insulators shall be mandatorily confirmed prior to charging. A thorough inspection and testing of all insulator strings and associated bus hardware shall be carried out before energizing any new or extended bus section.

The Quality Control / Design Section, C.O. Mumbai, shall analyze the quality performance of disc insulators prior to supply. Any similar failures within the network shall be investigated, and corrective and preventive measures shall be finalized to avoid recurrence of such failures in future.

2.10. Occurrence report of 400 kV Main Bus-II Busbar Protection Operation at 400KV Deepnagar substation on 19.09.2025.

Review and suitably modify the trip logic for IV-side tripping of ICTs, so as to avoid unnecessary transformer tripping during busbar faults when adequate isolation from the faulty bus exists.

2.11. Occurrence at 400 kV Bus-1 bus bar protection operation at 400kV Chandrapur-2 S/S and multi-line tripping.

The delayed operation of the 400 kV Main Busbar protection scheme (ABB REB500) needs

detailed investigation. The scheme was last tested in March 2024. Further, it is observed that Disturbance Records (DRs) were not generated in the Central Unit (CU) of the busbar relay due to a lower firmware version. The firmware shall be upgraded at the earliest to ensure proper DR generation and reliable post-fault analysis.

All Disturbance Recorders (DRs) at substations involved in the occurrence shall be GPS time-synchronized and configured in line with ACIP guidelines, in compliance with MEGC 2020, Clause No. 25.1, to ensure accurate sequence-of-events analysis and correlation.

Regular thermographic scanning of EHV switchyard equipment such as CTs, CVTs, LAs, bushings, transformers, circuit breakers, isolators, bus conductors, and IPS tubes is essential to detect hotspots due to loose joints, increased contact resistance, or insulation deterioration. Thermography enables early failure prediction and improves asset reliability

In view of higher system voltage and long line lengths, the line reactors of 400 kV Chandrapur-2 – Nanded Ckt-1 & 2, and 400 kV Chandrapur GCR – Parli shall be taken into service, as per system requirements, to control over-voltage and improve voltage profile.

2.12. Multiple occurrences on 220 kV Busbars at 220 kV Uran substation on 09.09.2025, 08.10.2025 & 14.11.2025.

At GTPS Uran, single Siemens numerical relays are presently used for multiple protection functions, including LBB protection. It is recommended to provide stand-alone dedicated LBB relays for all bays at the generation end. LBB settings shall be reviewed and revised as per Ramkrishna Committee guidelines to ensure dependable and selective operation.

9.3 Defense Mechanisms in Maharashtra State:

The system defense mechanism schemes include following schemes

- Under Frequency relay scheme.
- DF/DT relay scheme.
- Islanding schemes.
- Load shedding using Under Voltage relay.

UFR /FTR schemes-

The UFR/FTR schemes are important grid defense mechanisms and serve to keep grid healthy by providing adequate load relief during low frequency conditions, when the frequency drops below set threshold due to generation-load imbalance.

MSLDC is monitoring monthly healthiness of UFR/FTR schemes. The monthly healthiness report of UFR/FTR for is received from each PAC circle in approved formats.

WRPC has conveyed the following quantum of load shedding in respect of Maharashtra state through stages of UFR.

Sr. No	Maharashtra state	Stage-1 (49.4Hz)	Stage-2 (49.2Hz)	Stage-3 (49.0Hz)	Stage-4 (48.8Hz)
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1.	Target quantum of load relief for FY 2025-26	1313 MW	1576 MW	1839 MW	1839 MW
2.	Implemented quantum of load relief	1313 MW	1576 MW	1839 MW	1209 MW

Maharashtra STU has informed that it will take approximately six months to complete the stage 4 target. The relays are under procurement at head office.

MSLDC scrutinizes the healthiness report of UFR/FTR on monthly basis received from each MSETCL PAC circles to this office. Some discrepancies observed in submitted data and observations on UFR/FTR scheme were notified thorough a letter as below (ref:MSLDC/TECH/OP/ No 01476 dt 11/07/2025) to all PAC circles.

Islanding schemes-

The islanding scheme intentionally isolates and saves the island from external grid during wide spread grid disturbance to avoid possible black out.

MSLDC is monitoring monthly healthiness of Mumbai and Uran islanding schemes in the formats given by WRPC.

Mumbai Islanding Scheme:

Mumbai islanding scheme operates in following sequence-

At frequency 48.4 Hz load- generation balance is done in respective systems of TPC and Adani by shedding excessive load.

At frequency 47.9 Hz TPC & AEML grid gets isolated from MSETCL grid.

At frequency 47.6 Hz both TPC and AEML grid gets separate from each other.

For Mumbai islanding schemes healthiness is received from TPC and AEML on monthly basis.

Uran Islanding Scheme:

During Stage-1 (Area islanding: UFR-47.9Hz with 100msec time delay or df/dt-0.6Hz/sec, base freq. 48.5Hz with time delay 500msec) operation, Generation Unit 5, 6 and A0 or Unit 7, 8 and B0 (i.e. total 336 MW) will be available to feed the max. Load of 220-277MW. Considering available generation of 277 MW in stage-1, following s/s load is to be considered for successful operation of stage-1 islanding scheme.

Name of sub-station	Load (MW)
1. 400 kV Kharghar (4 X 50MVA TF)	120 MW

2. 220 kV Uran (2 X 50MVA TF)	30 MW
3. 220 kV JNPT	20 MW
4. 220 kV ONGC (Uran)	50 MW
5. 220 kV Ulwe (2 X 50MVA TF)	15 MW
6. 220 kV Timber mart (2 X 50MVA TF)	25 MW
7. 220 kV TSS	10 MW
Total	270 MW

- 1) During Stage-2 (Local bus islanding with available local load UFR-47.6Hz with 500 msec time delay) operation, expected generation with only one GT (i.e. 108 MW) remain on bus to feed the load of following substations

Name of sub-station	Load (MW)
1. 220 kV Uran (2 X 50MVA TF)	30 MW
2. 220 kV JNPT	20 MW
3. 220 kV ONGC (Uran)	50 MW
Total	100 MW

- 2) Revised approval of Uran Islanding Scheme is received from WRPC (as mentioned in minutes 164th PCM dt 05.09.2025) Considering the network upgradation around the Uran generating station.
- 3) For Uran islanding schemes healthiness is received from MSETCL.

Load shedding using under voltage relay-

The under-voltage load shedding (UVLS) is a critical defense mechanism the disconnects specific loads when system voltage drops below threshold to prevent wide are voltage collapse.

In following substations UVLS scheme is provided in MSETCL

Sr No	Name of substation	Setting adopted	Targeted load relief
1	400 kV Padgha s/s	Stage 1- 370kV, with 5 sec delay Stage 2- 370kV, with 10 sec delay	Stage 1- 302 MW Stage 2- 447 MW
2	400 kV Babhaleshwar s/s	Stage 1-371 kV with 5 sec delay	436 MW
3	400 kV Lonikand-I s/s	Stage 1- 370kV, with 3 sec delay Stage 2- 370kV, with 5 sec delay	Stage 1-149 MW Stage 2- 126 MW
4	400 kV Jejuri s/s	Stage 1- 370kV, with 3 sec delay Stage 1- 370kV, with 5 sec delay	Stage 1-100 MW Stage 2-117 MW
5	400 kV Lamboti s/s	Stage 1- 370kV, with 5 sec delay	100 MW

During the Grid disturbance event on 12.03.2025 UVLS schemes had operated and effectively safeguard the system.

New UVLS schemes proposed through Grid disturbances report dt 12.03.2025 & LTS MOM letter dt 17.06.2025 in following s/s-

- 1) 400kV kalwa s/s
- 2) 400kV Nagothane s/s.
- 3) 400kV Kharghar s/s.
- 4) 400kV Lonikand-2 s/s.
- 5) 400kV Chakan s/s.
- 6) 400kV Talegaon PG s/s.
- 7) 400kV Kudus s/s.

9.4 Grid Alert & Reporting:

Grid Alerts are issued by MSLDC to proactively communicate potential grid security concerns and emerging operational risks to all concerned stakeholders. These alerts are based on real-time system conditions, contingency analysis, operational experience, and disturbance trends.

Grid Alerts highlight issues such as overloading of transmission elements, voltage instability, generation inadequacy, protection concerns, and operational constraints. The alerts also include recommended preventive and corrective measures to be implemented by utilities to avoid grid disturbances and ensure secure and reliable system operation.

Timely issuance and adherence to Grid Alerts contribute significantly to preventing major grid incidents and enhancing overall grid reliability.

The following Grid Alerts were issued during the Calendar Year 2025:

Sr. No.	Date	Grid Alerts issued for
1	28.02.2025	High loading of 400kV Talegaon PG - Chakan line is around 850 -860 MW with all 04 nos. Koyna Hydro machines (1000 MW) & koyna 1 -2 stage: 300 MW engaged since morning.
2	07.03.2025	At 15:45 hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (850MW)
3	08.03.2025	At 15:45 hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (882MW)
4	20.03.2025	At 14:00 hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (850MW)
5	21.03.2025	At 10:45 hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (849MW)
6	24.03.2025	High Loading of 400 kV Talegaon (PG) – Chakan line (848MW). LTS stage-1 operated at 400KV Chakan SS at 13:48hrs, due to overlading of 400KV Chakan-Talegaon PG line loading (220KV Urse-Chinchwad line tripped at 13:48hrs at Chinchwad end only. 220KV Urse-Chinchwad line charged at 14:03hrs).
7	26.03.2025	GRID Alert in Nashik region: 220kV GCR side bus isolator B phase bypass jumper of bus section 1 is snapped Actions Taken: a).NTPS Nashik all units 1,2,3 are running at full capacity b). 220 kV Nashik OCR Raymond is HT and Nashik OCR - Navsary ckt 1,2 are already HT to avoid export from Nashik OCR for reducing load on bus section 1.
8	27.03.2025	At 06:39 hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (890MW)
9	28.03.2025	At 07:45hrs. High loading 400KV TALEGAON PG - CHAKAN LINE (861MW)
10	28.03.2025	At 14:23 hrs. State demand was 28462MW & Mumbai Demand was 3434MW: (Talegaon PG - Chakan : 862MW).
11	31.03.2025	At 14:45 hrs. State demand was 29825MW & Mumbai Demand was 3376MW: (Talegaon PG - Chakan : 865MW).
12	01.04.2025	At 15:37 hrs. State demand was 29635MW & Mumbai Demand was 3551MW: (Talegaon PG - Chakan : 859MW).
13	02.04.2025	400KV Parali Karjat Circuit 2 is tripped at 15:04 hrs. Loading on 400KV Talegaon PG line -Chakan reached upto 936MW (1440A).

14	07.04.2025	a). 400KV Padghe Boisar PG line is under tripping since 14:57 hrs. B). 765KV Pune GIS- Solapur line taken under Plan outage at 11:56hrs. C). 400KV Dabhol-New Koyna Circuit 1 taken under planned oputage at 12:27 hrs.
15	08.04.2025	a). Under Voltages in Mumbai, MMR, Nashik & Pune Region On Dt. 08.04.2025 at 15:30 hrs.: (400KV Lonikand 1 : 376.9KV , 400KV Jejuri : 382.2, 400KV Kharghar : 381.8KV, 400KV Karjat : 375.7KV).
16	13.04.2025	220 KV BUS A AT PADGHE OUTAGE AVAILED BY HOT LINE METHOD: Line loading of 400KV Talegaon (PG) -Chakan Line is 795 MW
17	15.04.2025	At 13:45 hrs. 400KV Talegaon (PG) -Chakan Line is 847 MW, Mumbai Demand : 3720
18	16.04.2025	a). Under Voltages in Mumbai, MMR, Nashik & Pune Region On Dt. 16.04.2025 at 14:40 hrs.: (400KV Lonikand 1 : 374.9KV , 400KV Jejuri : 376.9, 400KV Kharghar : 380.9KV, 400Kv Karjat : 376.9KV).
19	21.04.2025	a). Under Voltages in Mumbai, MMR, Nashik & Pune Region On Dt. 21.04.2025 at 10:40 hrs.: (400KV Lonikand 1 : 380.8KV , 400KV Jejuri : 383.7, 400KV Kharghar : 389.7KV, 400Kv Karjat : 379.9KV)
20	06.05.2025	At 12:56 Hrs. 400KV Chakan Bus Coupler open to save Koyna Hydro water utilization, the 400KV Grid & 220KV Grid in Pune region is vulnerable.
21	04.05.2025	The Line loading of 400KV Talegaon (PG) -Chakan Line is 871 MW on at 16:50hrs.
22	28.04.2025	a). Under Voltages in Mumbai, MMR, Nashik & Pune Region On Dt. 28.04.2025 at 10:37 hrs.: (400KV Lonikand 1 : 377.3KV , 400KV Jejuri : 377.8, 400KV Kharghar : 386.7KV, 400Kv Karjat : 377.2KV)
23	26.04.2025	a). Under Voltages in Mumbai, MMR, Nashik & Pune Region On Dt. 26.04.2025 at 14:42 hrs: (400KV Lonikand 1 : 378.3KV , 400KV Jejuri : 379.3, 400KV Kharghar : 386.7KV, 400Kv Karjat : 378.6KV)
24	25.07.2025	a). 400 KV Padghe-Babaleshwar Ckt 1&2 is in breakdown. b). HVDC bipole power restricted to 850 MW due to Pole-1 base filter issue.
25	30.07.2025	a). 400 KV PADGHA PG-NAVI MUMBAI PG tripped at 03:45 Hrs on Dt. 30.07.2025. b). 400 KV Padgha PG -Kharghar line tripped at 12 :20 Hrs on Dt. 30.07.2025 c). 400 KV Navi Mumbai - Vikroli line also tripped at 03:24 hrs on Dt. 31.07.2025 d). one of AEML Unit 1 is already in plan outage.

26	24.11.2025	HVDC bi-pole was under outage with effect from 23.11.2025 and state demand was showing the steep rise (26000 MW).
27	30.12.2025	On 30.12.2025 at 19:56 hrs 765KV Aurangabad PG–Padghe PG Circuit and 765/400KV ICT-3 at 765KV Padghe PG Substation tripped.

The following State Grid Alert Reports were issued to all concerned stakeholders during the Calendar Year 2025:

Sr. No.	Substation/ Area involved	Discription	Date and Time of Incidence	Protection Operated / Incidence	Reason
1	400 kV Talegaon PG (Pune AIS)	State Grid Alert Report : Pune Region;	06.05.2025, 16:30 Hrs	Distance Protection, LTS	400 kV Talegaon PG (Pune AIS) - Lonikand1 Line tripped at Lonikand 1 end only on distance Protection and A/R operated at 400 kV Talegaon PG end. Due to this tripping ICTS at 400 kV Chakan and 400 kV Chakan- Talegaon Line got overloaded resulting in operation of LTS schemes.
2	220 kV Padghe ss	Disturbance in MMR area (especially in Dombivali, Ambarnath, Badlapur region) in view of tripping of 220 kV Padghe Pal Line on 04.07.2025.	04.07.2025; 13:12 Hrs	Distance Protection, LTS	220 kV Padghe Pal Line tripped on Rph -E due to EHV cable Failure and breakdown. Also on 10.07.2025 at 18:54 hrs 220 kV Padghe - Jambhul line hand tripped due to heavy sparking observed.
3	220 kV Pegasis - Infosis Line and 220 kV Pirangut - Hingewadi 2 Line	Long Duration Load Loss in Pune Region	02.07.2025 to 06.06.2025	Distance Protection	220 kV Pirangut - Hingewadi 2 Line and 220 kV Pegasis - Infosis Line tripped due to EHV cable Failure and breakdown.
4	400 kV PadghaPG- Navi Mumbai PG line, 400 kV Padghe	State Grid Alert Report: Mumbai and MMR region	30.07.2025	Distance Protection	400 kV PadghaPG- Navi Mumbai PG line, 400 kV Padghe PG - Kharghar Line tripped due failure of line

	PG - Kharghar Line,				insulators on 30.07.2025 pushing of Mumbai and MMR region grid in alert mode.
5	400 kV PadghaPG- Navi Mumbai PG line, 400 kV Padghe PG - Kharghar Line, 400 kV Navi MumbaiPG - Vikroli Line	State Grid Alert Report: Mumbai and MMR region	30.07.2025 and 31.07.2025	Distance Protection	400 kV PadghaPG- Navi Mumbai PG line, 400 kV Padghe PG - Kharghar Line, 400 kV Navi MumbaiPG - Vikroli Line line tripped due failure of line insulators on 30.07.2025 and 31.07.2025 increasing criticality of Mumbai and MMR region.

Chapter 10: Reactive Power Compensation

10.1 Inductive Compensation:

The Bus Reactors status in Calendar Year 2024 is tabulated below:

Voltage Level	Installed Capacity (In MVAR)	Out of Service Capacity (In MVAR)	Available Capacity (In MVAR)
765kV	960	0	960
400kV	3290	435	3725
220kV	575	0	575
Total	4825	435	5260

The Line Reactors status in Calendar Year 2025 is tabulated below:

Voltage Level	Installed Capacity (In MVAR)	Out of Service Capacity (In MVAR)	Available Capacity (In MVAR)
765kV	1440	0	1440
400kV	950	330	620
Total	2390	330	2060

The list Commissioned Bus Reactors in Calendar year 2025 is tabulated below:

Sr. No.	Name of the Line Reactors	MVAR	Commissioned Date
1	400 kV Thaptitanda	125	21.02.2025
2	400 kV Babhaleshwar	125	24.02.2025
3	400 kV Parli	125	29.03.2025
4	400 kV Deepnagar	125	27.09.2025
5	220kV Trombay (TPC)	125	29.06.2025

It has been observed that around Reactors to the tune of 510 MVAR are out of service since long period due to technical reasons. The details are tabulated below:

Sr. No.	Name of the Line Reactors	MVAR	Date of failure	In/Out	STATUS as on Dec-2025
1	400kV Chandrapur 1-Parli 3 (Chandrapur 1 end)	50	21.09.2016	OUT OF SERVICE	M/s CGL has requested for charging the Reactor for taking Acoustic PD test. The request is forwarded to TCC circle Nagpur for according the permission. PD Test done. M/s CG transported the Reactor to factory for rectification works.
2	400kV Chandrapur 2-Nanded ckt 1	50	29.01.2018	OUT OF SERVICE	M/s CGL has requested for charging the Reactor for taking Acoustic PD test. The request is forwarded to TCC circle Nagpur for according the permission. After successful corrective action on 50 MVAR Reactor of Parali 3 reactor above line of action for rectification of this reactor will be decided.
4	400kV Dhule S/S-SSP-1 (CSR)	50	23.12.2016	OUT OF SERVICE (faulty)	A meeting was conveyed by Dir (Ops) with M/s BHEL representatives on 22.08.24 & as per MOM M/s BHEL has to submit the action plan for rectification work but till date the action plan is awaited from M/s BHEL. Further work is held up due to no response from M/s BHEL. Vide e mail on Dt. 06.03.2025, M/S BHEL informed that,
5	400kV Dhule S/S-SSP-2 (CSR)	50	27.05.2017	OUT OF SERVICE (faulty)	'review this and finalise the solution, our team comprising of executives from BHEL Bhopal, Corp R&D & TBG would like to have a meeting at Karad site and discuss the way forward. Tentative dates shall be 18-22 March 2025. For the

					CSRs installed at 400kV Dhule site, material as per MOM dated 25 May 2023 has already been supplied and is available at site.
6	400kV Karad – Lonikand (CSR)	80	14.09.2017	OUT OF SERVICE (faulty)	BHEL R&D team has submitted following system study report to EE 400 kv Karad on Dt. 30.09.2025 & asked for feedback in order to identify real cause of temperature rise in CSR Karad: Electromagnetic thermal analysis of 80 MVAR CSR Electromagnetic thermal analysis of CSR LV Busbar Study of shunt-controlled shunt reactor Energization study of fixed shunt reactor Reply given by EE 400 kV Karad SS to inform the next line of action.
7	400kV Khadka Bus Reactor	50	10.11.2018	OUT OF SERVICE (faulty)	Revised Proposal after Re-Negotiations placed in 176th Board Meeting held on Dtd.26.09.2025 vide Agenda No. 30. However, deferred due to paucity of time. _Approved vide BR 177/15 received on 27.10.2025. _Approval for Implementation of BR is awaited.
8	400kV Nagothane Bus Reactor	80	23.11.2021	OUT OF SERVICE (faulty)	The proposal is returned on 05.04.2023 to field office for compliance, the same is awaited from field office. As per ON.No.CE.(Trans. O&M)/50 Dtd.17.04.2025 M/s BHEL make 400kV, 80 MVAr Bus Reactor at Babhaleshwer Ss of Nashik Zone is released for 400kV Nagothane Ss under Vashi Zone.

10.2 Capacitive Compensation:

Existing Capacitor bank details as on 31st Dec 2025

Constituent	Installed Capacity (MVar)
MSETCL EHV Level	3525
MSETCL HV Level	2598
MSEDCL HV Level	6811.78
TATA Power EHV & HV Level	514.5
AEML HV Level	1761.50
BEST HV Level	207.70
Other Deemed Discoms / SEZ	63
Total	15481.48

List of newly commissioned Capacitor Bank in Calendar year 2025 are as follows:

Sr. No.	Name of Substation	KV	Scope of work	MVAR	Remark
Pune Zone					
1	220kV Ranjangaon	132	1x30	30	02.04.2025
2	132kV Andralake	132	1 X 30	30	04.04.2025
3	132 kV Kuruli	132	2x15	30	04.04.2025

4	400kV Jejuri	220	2x30	60	08.04.2025
5	132kV Kamthadi	132	1 X 30	30	24.04.2025
6	400kV Lonikand 1	220	2x30	60	30.04.2025
7	400kV Lonikand 2	132	2x15	30	30.04.2025
8	132kV Narayangaon	132	1x30	30	30.04.2025
9	220kV Theur	132	1 X 15	15	04.06.2025
10	220kV Kathapur	132	1x30	30	26.06.2025
11	132kV Narayangaon	132	1x30	30	31.07.2025
12	132 kV Kuruli	132	2x15	30	04.08.2025
13	220kV Kathapur	132	1x30	30	21.08.2025
14	132/33/22 Yawat	132	2x15	30	26.09.2025
15	220kV Theur	132	1 X 15	15	06.10.2025
16	132/33/22 Yawat	132	2x15	30	10.12.2024
17	220/132/33 Loni Deokar	132	2x15	30	12.12.2024
Capacity Addition				540	
Vashi Zone					
18	220/33-22kV Bhaveghar	220	1x20	20	17.10.2025
19	220/100/22kV Vasai	220	1x40	40	18.12.2025
Capacity Addition				60	

Chapter 11: Disaster Management

For smooth & reliable Grid Operations, it is necessary to maintain disaster management plan ready. Further, timely mock trials need to be carried out so as to enhance the skills of the personnel & to identify the lacunae in the processes & smoothen the entire process. Accordingly, under the Disaster Management Plan, SLDC is operating Area Load Despatch Centre (ALDC) located at Ambazari, Dist. Nagpur as Back-up control Centre. Also, Black-start mock drills of various gas-based & Hydel units is carried out.

The details of such activities carried out under Disaster Management are detailed below:

11.1 Black Start Mock Drills Coordination:

Black start resource is “a generating unit(s) and its associated set of equipment which has the ability to be started without support from the System or is designed to remain energized without connection to the remainder of the System, with the ability to energize a bus, meeting the Transmission Operator's restoration plan needs for Real and Reactive Power capability, frequency and voltage control, and that has been included in the Transmission Operator's restoration plan.

“Black Start Procedure” means the procedure necessary to recover from a partial or a total blackout in the State; [MEGC Regulations,2020 & IEGC]

The Black start mock drill is mandatory to enhance the system resilience. Coordinators were assigned for each black start stations in Maharashtra State. The coordinators had to update the details (contact number, DG capacity, Station capacity, SCADA display, report of the past drills etc.). Black-Start Mock Drill of 8 Nos. of stations were conducted in Maharashtra State during CY 2024. The details of the Black-Start Mock Drill are as below:

Sr. No	Power Station	Capacity (MW)	Type	DG Set Capacity	Sub-System	Connectivity at/Voltage level	Last Testedon
1	Bhivpuri HPS	3 x 24 + 2 x 1.5 + 2 x 12	Hydro	250 kW	Mumbai island	110 kV	09.11.2025
2	Khopoli HPS	3 x 24 + 2 x 12	Hydro	250 kVA	Mumbai-island	110 kV	09.11.2025
3	Bhira HPS	6 x 25	Hydro	250 kVA	Mumbai-island	110 kV	09.11.2025
4	Uran (Gas)	4 x 108 (GT) + 2 x 120 [Waste Heat Recovery (WHR)units]	Gas	4 MW, PH1:412kVA, PH2:450kVA, WH:520kVA	West	220 kV	16.12.2025

5	Koyna I & II(Pophali) HPS	4 x 70 + 4 X 80	Hydro	2 MVA HG set	West	220 kV	08.12.2025
6	Ghatghar HPS	2 x 125	Hydro	2x1250 kVA	West	220 kV	Both units were under shutdown in Nov'25 & Dec'25
7	*Trombay - (7A&7B)	1 x 120 + 1 x 60	Gas	2.5 MW	Mumbai island	220 kV	14.09.2025
8	Pench	2 x 80	Hydro	250 KVA	East	132 kV	29.01.2025

It may be seen from above that there are 2 tested black start sources in Western Maharashtra and 4 in Mumbai sub-system while there are no black start resources in Eastern Maharashtra subsystem (except . As informed by MSPGCL, the feasibility of black start capability at Koyna-III and Koyna-IV has to be studied. Although RGPPL is a gas power station it does not have a black start capability. So, the thermal generators located in Eastern Maharashtra subsystem viz. APML Tiroda, NTPC Mouda, Chandrapur, Koradi, Khaparkheda, Rattan India (Amrawati), Dhariwal, Parli, GMR Warora etc. would have to avail start-up power from neighboring states (Madhya Pradesh, Chhattisgarh) or neighboring Region (SR) if they survive/buildup their subsystem. Also considering the path lengths involved in reaching these power stations, it may take longer to feed start-up supply to these power stations post a black out in Maharashtra.





11.2 Back-up Control Operation through ALDC:

As per the directions of MOP & CABIL report under the category of Decision support systems, for fail-safe operation of LDCs even in case of a disaster, the back-up LDC should be planned and maintained as Main-I / Main-II rather than Main and Back-up. The LDC functions shall be carried out from Main I and Main II at periodic intervals.

Also, as per CABIL Report under human resource adequacy, it is desirable that one of the sub-LDCs act as the Main-II (or back up) control center and be capable to taking up the functions of the Main-I control center in the event of a disaster.

- **Mock operation from BCC is performed on 23-12-2025 (from 10:00Hrs to 17:00Hrs) to ensure smooth functionality of BCC during any contingency.**
- Physical Shift operation, where all real time grid operations is done only from BCC during testing.
- Functionalities at BCC
 - SCADA Siemens Make Sinaut Spectrum 4.5.1 Available

- A WhatsApp group is to be formed by SLDC Airoli for coordination related to BCC activities.
- Links and login credentials for scheduling activities were made available and verified.
- Contact information of WRLDC higher authorities was kept ready in both soft and hard formats.
- Contact numbers of field higher authorities and Mumbai-based utilities were reconfirmed to ensure effective coordination during real-time contingencies.



B) Preparedness of Operation, Scheduling desk before actual start of BCC operation:

- Checked the availability of Separate Desk for Shift In charge,
- Outage Desk and Scheduling Desk which was arranged for Backup Control Centre.
- Confirmed the internet accessibility through LAN/Wi-fi connection to all the PC's.
- Flash news of BCC activity at ALDC Ambazari was displayed from Dt. 22.12.2025 on the MSLDC Web page, OMS Page and REMC scheduling portal front page.
- Tested the operation of Mobile phones, IP phones, Landline Phones checked by dialing the phone numbers of stakeholders.
- Information given to all the stakeholders through email on dtd.30.11.2024 about BCC operation date, time, and BCC contact numbers during the activity.
- Checked the list of the all the major Discom and Generators with their control room contact numbers and email addresses available in soft as well as in hard copy.
- Checked the list of contact number & email addresses of all utilities/buyers available in soft as well as in hard copy.

- Checked the list of Nodal with their contact no's available in the soft as well hard form.
- Checked the list of Contact numbers of field Higher Authorities, Mumbai utilities available to tackle real time contingencies.
- Register for Shift In charge, Outage Engineer and Scheduling Engineer made available to note Real Time incidences.
- WhatsApp group formed by SLDC Airoli for BCC operation related activities.

C) Preparedness of SCADA, IT and REMC Desk before actual start of BCC Operation:

- Confirmed the availability of SCADA system for shift In-charge and Outage Desk.
- Confirmed The availability of PC for Shift In charge, Outage Desk and Scheduling Desk.
- The VPN/Remote access of one of the REMC(Op) PCs in MSLDC, Airoli was provided by the IT department for the REMC Operation department. The same is tested before the actual start of the BCC operation.
- Tested the operation of Mobile phones, IP phones, Landline Phones checked by dialing the phone numbers of some stakeholders.
- Links regarding scheduling activities kept available with login credentials.
- The intimation regarding the back up control centre operation and the SOP was conveyed to all the OEMs of the respective systems i.e., SCADA, REMC and URTDSM. They were instructed to be available at both sites and be vigilant during the entire operations.
- All the stake holders including WRLDC, TATA, AEML, Discoms, Genco's etc. were informed about this operation and were requested to provide uninterrupted real time data and informed to be ready in order to meet any eventuality during the course of the operations.
- All the PAC divisions/Circles of MSETCL were informed to maintain the healthiness of communication links/Data Concentrators/RTUs for real time SCADA data visibility at SLDC/ALDC Control centres.
- Before Starting the operation, the healthiness of SCADA servers/UIs/VPS and DCs placed at control centres were assured.
- Healthiness of multisite/ICCP/BCC links were assured before starting and during operation of the BCC.
- Dedicated VoIP telephone channel was established between LM Cell of DISCOM and ALDC.
- Confirmed Internet accessibility though Reliable LAN/Wi-Fi connection to all the PC's.

D) Real Time activities carried out during BCC operation: -

Operation Desk: - (23.12.2025)

- All the preparations done on dtd 22.12.2025 were re-checked before starting of BCC operation on dtd 23.12.2025.
- WRLDC Code no. 4549 received at 09:59hrs from SLDC main control room to start real time operations from BCC centre, ALDC Ambazari.
- Message sent on WhatsApp group formed for BCC operation regarding Starting of SLDC BCC operation at ALDC Ambazari from 1000 hrs.
- WRLDC Code-4550 issued to 400kV Kolhapur SS for discharging of 400kV Bus reactor(80MVAR) due to system low voltages.
- SLDC Code-1624 and 1627 issued to 400KV JSW and 400kV Vikhroli (AEML) Substations respectively, for discharging of 400kV Bus reactors due to system low voltages.

- WRLDC Code -4553 issued for AR Out on 400kV Karad-Solapur PG line. AR out at 10:38hrs.
- SLDC code- 1626 issued for planned outage on 220KV Sawantwadi- Talandge ckt. Outage availed at 10.25hrs for diagnostic testing works.
- SLDC Code- 1630 issue for planned outage on 220KV Adlab - Pedambe ckt Outage availed at 10.38hrs and restored at 15.34hrs vide SLDC Code- 1645 after isolator maintenance work.
- SLDC code – 1631 issued for planned outage on 220KV Karad - Mudshingi ckt 4. Outage is availed at 11.08hrs for Quarterly maintenance work.
- SLDC Codes- 1628, 1629 issued for planned outages on 220KV Alkud - Mendhegiri ckt 1 and ckt 2. Outages availed at 10.27hrs to 16.40hrs respectively for Measurement for checking background Harmonics.
- SLDC Code- 1632 issued for planned outage at AEML 220kV Versova s/s on 220kV Bus coupler. Outage is availed at 10.25hrs for maintenance work.
- SLDC Code- 1634 issued for planned outage at 220KV Satara MIDC ss on 220KV/132KV 100MVA ICT 1. Outage is availed at 10.52hrs for Tan Delta Testing of ICT Bushings, Windings & HV & LV CT's, HV & LV CB Timing CRM Testing work.
- SLDC code-1635 issued for planned outage for Replacement of Jump (between line Isolator & CB, B-phase) By Agency & Attending Hotspot at 220KV Alephata ss on 220KV/132KV 100MVA ICT 2. outage availed at 11.18 hrs
- WRLDC Codes- 4568, 4566 issued on 400kV Karad-JSW ckt 1 and 2 for AR out to carry out PID work. Lines AR out at 11:03hrs.
- WRLDC Code- 4573 issued for planned outage on 400kV New Koyna-Dabhol ckt 1. outage availed at 11:46hrs for maintenance work.
- SLDC Code- 1637 issued for AR out on 400kV Lonikand-Jejuri ckt 1 for Hotline work. Line AR out at 12:00hrs.
- WRLDC Codes- 4586, 4585 issued on 400kV Karad-JSW ckt 1 and 2 for taking AR in service after PID work. Lines AR taken in service at 14:23hrs.
- SLDC Code- 1636 issued for Emergency outage on 220kV Malegaon- Sayane ckt for attending hot spot. Outage availed at 11:54 hrs.
- SLDC Code- 1638 issued for planned outage on 220kV Mahape- STT Global ckt. Outage availed at 12:39hrs.
- SLDC Code- 1641 issued for planned outage on 100MVA 220/132KV ICT 2 at 220kV 220kV South Solapur SS. Outage is availed at 14:38hrs.
- SLDC Code- 1642 issued for Emergency outage on 400kV Karad-New Koyna ckt 2. outage is availed at 15:25 hrs.
- SLDC Code- 1644 issue for Hand tripping of 220kV Alephata-Kathapur line for load management due to overloading on 400kV Babbleshwar ICTs.
- SLDC Code- 1646 issued for taking AR in service of 400kV Lonikand-Jejuri ckt 1 after Hotline work. Line AR taken in service at 15:30hrs
- WRLDC Code- 4596 issued for charging of 400kV New Koyna-Dabhol ckt 1 after planned outage.
- SLDC Code- 1647 issued for Hand tripping of 220kV Malegaon-Satana line for load management due to 220kV Dhule-Malegaon line over loading. Line H/T at 15:46hrs.
- SLDC Code- 1650 issued for Emergency outage on 220kV Sahara-Bombay Dyeing line for urgent tree cutting work. Outage is availed at 16:20hrs.
- SLDC Code- 1651 issued for charging of 220kV Bus-coupler at AEML 220kV Versova s/s after planned outage
- SLDC Code- 1652 issued for charging of 220kV Malegaon- Sayane ckt after attending hot spot. Line is charged at 16:37hrs.

- SLDC Codes- 1653, 1654 issued for normalisation of AR of 220KV Alkud - Mendhegiri ckt 1 and ckt 2. AR take in service at 16:39hrs and 16:44hrs respectively.
- SLDC Code- 1655 issued for charging of 220kV Malegaon-Satana line. Line taken in service at 16:54hrs.

Scheduling Desk: -

- At 10:10 hrs, system operation was changed from centralised to decentralised mode.
- At 10:45 hrs, hydro generation was withdrawn as per operational and system requirements.
- At 11:31 hrs, the system operation was reverted to centralised mode to control under drawl.
- Chandrapur Unit-7 was synchronised at 13:21 hrs, and the event was recorded in the logbook.
- At 15:30 hrs, system operation was again changed to decentralised mode as system normalised
- At 16:00 hrs, the system operation was changed back to centralised mode to control under drawl.
- From 16:00 hrs onwards, a transmission constraint was imposed on Nashik Units 4 and 5.
- The constraint was applied to control loading of the 220 kV Nashik-Babhleshwar transmission line, ensuring safe operation of the network.
- At 16:30 hrs, the system operation was once again changed to decentralised mode.
- At 16:30 hrs, three machines of Koyna Stage-IV were taken into service to meet system demand to control over drawl.
- Two (02) Day-Ahead Short-Term Open Access (STOA) contracts were processed for delivery date 24-12-2025.
- The contracts were processed for Hindalco and Apollo.
- Necessary checks regarding transmission availability, system security, and regulatory compliance were completed prior to approval.
- Continuous coordination was maintained with SLDC, generating stations, transmission utilities, and other stakeholders.
- All actions were taken in accordance with applicable grid codes, Open Access regulations, and operational procedures.
- System frequency, transmission loading, and grid security were closely monitored throughout the shift.

REMC Desk:

- Confirmed REMC PC VPN/Remote connection successfully.
- Confirmed access of REMC scheduling software through VPN.
- Confirmed access of REMC forecasting software through VPN. The real time graphs of Solar & Wind with schedule, actual & forecast displayed.
- External scheduling portal link checked and found normal.
- Landline healthiness checked and found ok.
- Vide code 4549, The BCC operations were resumed and the same is communicated in the WhatsApp group of stakeholders.
- Week Ahead & Day Ahead schedule submission was done.
- Email were sent to all QCAs to avoid overscheduling every two-hour basis.
- Final RE schedules for 22-12-2025 approved.
- REMC daily report files (Final implemented schedule & Final Day Ahead schedule) for 22-12-2025 sent to scheduling team.
- No Real time revision received from any QCA.
- Monitored real time schedule, forecast and actual RE generation and extended support to the scheduling shift engineer for real time demand-generation balancing.

- Contract updating for Dt. 24.12.2025 for M/s. Erandol done in REMC scheduling software.

Infrastructure provided for Data Visibility:

- 1 Exceed for EE desk.
- 1 Exceed for scheduling desk.
- 1 Exceed on BARCO screen.
- VPN connectivity for RE.
- Separate screen for DSM sheet was provided.
- 3 Nos. of laptops were provided.
- Stable data of Maharashtra State power system was provided during BCC drill

Communication during BCC:

- 4 IP phones with programmed hot keys.
- • 1 Analog phones BSNL with voice recording.
- • DASSCOM communication with one landline (400 KV and 220 KV sub-stations not available on VOIP were programmed with one touch keys)
- • 3 Nos of mobile phone with inbuilt voice recording.
- • Hot line communication between ALDC & MSLDC over 2 Mbps Sify link.
- • Hot line communication with TATA Power, Dharavi, Mumbai.
- • Hot line communication with AEML, Mumbai.
- • LM Cell communication on VOIP.
- • Hot line communication with WRLDC, Mumbai.

Facilities at BCC for operation from BCC:

- 4 number of SCADA workstations
- 1 No. of VPS display (4x2 configuration)
- 5 number of hotline phones and 3 Nos. Landline (STD)/ 3 Nos. Mobile phones
- 2 Nos. of Desktops/laptops for IT functionality (mail/scheduling/reporting)

Resource Adequacy Desk:

- Resource Adequacy (RA) Monitoring for the Day Ahead was carried out for 24-12-2025.
- RA Reports for the day 24-12-2025 were received by 10:00 hrs from five utilities:

MSEDCL, AEML, TATA Power, BEST, Central Railway.

Each report contained

- Forecasted demand
- Forecasted generation availability
- Shortages & surplus for each time block
- The RA reports of all five utilities were combined into a single file to calculate Day Ahead Forecast Demand Availability of Maharashtra State for 24-12-2025.
- The consolidated RA Analysis Report was mailed to Grid-India at 10:58 hrs.

- A detailed Load Generation Balance (LGB) Report was generated for the state, indicating:
 - Anticipated maximum, minimum & average demand and generation.
 - Surplus & shortfall analysis
 - Sources during maximum surplus & shortfall
 - Maximum demand during solar & non-solar hours
 - Surplus/shortfall & sources during solar & non-solar hours
 - All parameters were represented time-block wise through graphs.
- Maharashtra State LGB Report (Excel file) for 24-12-2025 and Abstract of RA for 23 12-2025. These were mailed to SLDC, ALDC, and EE Shift at 12:45 hrs.

E) Suggestion from Control Room Shift Desk and Scheduling Desk:

- The Hydro generation resources (Koyna Stage-1 4*70=280MW and Stage-2 4*80=320 Total 600MW, Ghatghar 2*125 MW) were not available.
- Demand estimation under Resource Adequacy work to be given at ALDC Ambazari in line with MSLDC Airoli
- SCADA data visibility and Speech communication of Western region, Mumbai region, MMR region EHV stations, generating stations and RE stations to be kept in healthy condition at both MSLDC and ALDC end for immediate takeover of BCC operation during disaster scenario.
- Separate Screen should be available at ALDC for DSM schedule and REMC.
- Hot line communication with Tata PSCC and AEML control centre was made available on express communication at BCC centre.
- ALDC Ambazari teams will require quarterly training on MSLDC control room operation and understanding power system under Mumbai, MMR, Pune area network for load / contingency management.
- PMU data access systems made available at back up control centre ALDC Ambazari.
- Real time scheduling work to be given to ALDC Ambazari during any of the SLDC control shift at least twice in a month.
- ALDC Ambazari operation team to be involved during meetings related with Mumbai, MMR, Pune region related matters.
- Real time scheduling work to be given to ALDC Ambazari during any of the SLDC control shift at least twice in month.

F) Suggestions from REMC Desk:

- Stable connection of Any desk connection observed throughout the BCC operations as compared to last BCC.
- One dedicated REMC PC with dual LAN need to be provided for REMC real time operation. The REMC scheduling software & forecasting software need to be accessed directly from server.
- Real time display for Wind & Solar Graphs for RE forecast, schedule and actual generation need to be provided in ALDC control room on permanent basis.
- At least two engineers from ALDC, Ambazari need to be deputed to SLDC, Airoli on regular basis for real time operation training before next BCC operation.

G) Suggestions from Resource Adequacy Desk:

- A software development prototype is currently in progress to automate RA reporting. Key features of the upcoming system:
- Utility login credentials (ID & password) for secure RA report uploads.
- Automated generation of Maharashtra State LGB Report from uploaded data.
- Software Development work is being carried out by the ALDC Team in coordination with SLDC Team.

H) Suggestions from SCADA Desk:

- Single Reporting IPP/CPP/RE stations are required to be reported to both the control centres.
- Permanent M/s Siemens site engineer at ALDC Ambazari

I) Similarities, Differences & Improvements from BCC 2024 to BCC 2025

❖ Real-Time Activities – Shift In-Charge & Outage Desk:

Similarities:

- 1) All 400kV/765kV substation data was available during BCC operations.
- 2) SLD diagrams of KTRT region were made at ALDC

Differences:

- 1) WRLDC code book was accessed first time for requesting and generation of outage/restoration codes pertaining to WRLDC.
- 2) RA report generated was accessed first time.
- 3) Koyna sage- 1 & 2 (8nos.) machines were not available due to annual maint work.
- 4) Ghatghar (2 x 125MW) HPS machines were not available due to maintenance activities
- 5) Bhira PSU unit was also not available

❖ Real-Time Activities – REMC Desk:

Similarities:

- 1) VPN access for real-time renewable energy monitoring. Confirmation of REMC scheduling software accessibility.
- 2) Coordination with QCAs for scheduling accuracy.
- 3) In BCC 2024, due to non-availability of direct server access for REMC scheduling, the computer at MSLDC was accessed through VPN.
- 4) Variations in solar and wind generations observed.

Differences:

- 1) 2025 reported an observed shortfall in solar and wind generation.
- 2) More detailed real-time monitoring of renewable energy variations in 2025.
- 3) 1 No VPN discontinuity issues observed. Also, the time of VPN connections was extended.

❖ **Real-Time Activities – REMC Desk:**

Similarities:

- 1) Backup Control Centre operations of MSLDC were carried out from ALDC Ambazari, similar to the previous year.

Differences:

- 1) DSM Data Monitoring Earlier, the DSM sheet was updated at 5-minute intervals. This year, it was updated at 1 minute intervals, enabling near real-time monitoring.
- 2) System Flexibility This year, 8 units of Koyna Stage-I & II and Ghatghar PSP were out, resulting in reduced system flexibility.
- 3) Forecast & Analysis Tools This year, there was a need for availability of forecasted and actual solar and wind generation graphs for effective monitoring and analysis.
- 4) WRLDC Portal Access A new WRLDC WBEES portal was introduced. However, ALDC IP was not initially whitelisted, leading to access issues.

❖ **SCADA/IT/Communication Infrastructure Readiness:**

Similarities:

Infrastructure provided for data visibility and speech communication. Stable VPN connectivity ensured real-time data monitoring. Dedicated hotline communication channels established.

Differences:

- 1) Dedicated Screen for DSM sheet was provided. With refresh rate of 1 Minute.
- 2) Real time URTDSM (PMU) terminal was provided in control room.
- 3) TATA, AEML, Adani E NOC, LM Cell and VIPL was made available on VOIP.
- 4) Circle wise Single Line Diagram of Pune, Kalwa, Panvel, Nashik, Solapur, Vashi and Karad was designed and provided in Hard Copies to Control Room.

Chapter 12: Key Achievements

12.1 Award:

To encourage and appreciate innovation in the Indian power sector, IPPAI began awarding best performers in the sector in 2012. After over a decade of operations, the IPPAI Power Awards have emerged as the leading technical award in the Indian Power Sector and the premier platform for improving visibility within the industry. They recognize the contributions and achievements of individuals, public and private commercial entities, States, Regulatory bodies, and researchers who have contributed to the development of the power sector in India. Whether such contributions are in improving transmission or generation efficiency, R&D in BESS, or proactive planning for Green Hydrogen and Ammonia initiatives, the IPPAI Power Awards are the platform to showcase the achievements and initiatives to other industry leaders, policymakers, and regulators.

For the year 2025, Maharashtra SLDC has received two awards;

1. “Best Load Despatch Centre (SLDC)”
2. “Easiest access to open access (SLDC)”



12.2 Appreciation for Handling the Emergency and avoiding a larger collapse:

On 12-Mar-2025, the Maharashtra system faced an emergency state with severe under voltage conditions at multiple 400 kV **substations**. Thanks to the prompt actions of the SLDC control room engineers, well supported by the entire operations team, the system was successfully stabilized and restored to its normal state. Swift and decisive response of the whole operations team in managing this incident played a crucial role in ensuring system stability and preventing further disruptions.

The Board was appraised about the exceptional works carried out by the SLDC Operations team during the Grid disturbance resulting into avoidance of a wide spread grid disturbance.

 MAHATRANSCO Maharashtra State Electricity Transmission Co. Ltd.	MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO.LTD (CIN No. U40109MH2005SGC153646) COMPANY SECRETARY DEPARTMENT Phone No. (022) 26595301 Prakashganga, Plot No. C-19, "E" Block, Fax:- (022)26592316 2 nd Floor, Bandra-Kurla Complex, Email :cs@mahatransco.in Bandra (E), Mumbai-400 051. Website: www.mahatransco.in
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CERTIFIED TRUE COPY OF THE RESOLUTION PASSED AT THE 174th BOARD MEETING OF THE BOARD OF DIRECTORS OF MAHARASHTRA STATE ELECTRICITY TRANSMISSION COMPANY LIMITED HELD ON THURSDAY, JUNE 12, 2025 AT 3.00 P.M. TO 5.00 P.M. AT CONFERENCE HALL, THIRD FLOOR, HSBC BUILDING, FORT, MUMBAI-400001

ITEM NO. 21: To apprise the Board of Directors about the Submission of Annual Report of Maharashtra Power System for the year 2024.

Resolution No. 174/21 dtd. 12/06/2025

Director (Operations) & ED (SLDC) apprised the Board of Directors about the Submission of Annual Report of Maharashtra Power System.

The Board was informed about the Annual Operation Report of Maharashtra power system prepared by SLDC for the period Jan 2024 to Dec 2024. The report contained following aspects of Maharashtra System performance:

1. Generation profile of the state
2. Generation profile of RE sources
3. Grid parameter behavior
4. The Generation and Transmission constraints
5. The outage planning
6. Reactive Power compensation
7. The disaster management activities
8. SLDC Achievements

The Board was apprised about the exceptional works carried out by the SLDC Operations team during the Grid disturbance on 12.03.2024 resulting into avoidance of a wide spread grid disturbance. The Board was also apprised about the two national level awards received in two categories namely Best Load Despatch Centre and Easiest access to Open access.

The Board appreciated the work done by SLDC.

For Maharashtra State Electricity Transmission Co. Ltd.

Date : 27/06/2025
Place: Mumbai


Vineeta Shrivani
CS, MSETCL

12.3 Paper Presentation:

MSLDC's paper on Instate SCED: dispatch using Linear Programming Optimization in Maharashtra state case study has been selected for presentations and publication in IEEE, at International Conference on Power Systems ICPS 2025, IIT Hyderabad.

On 08-Dec-2025, The SCED paper and the dashboard presentation by MSLDC received very encouraging feedback at the IEEE PES Conference in Hyderabad. The analysis, modelling effort, dashboard development, and the countless iterations reflect the SCED team's dedication and hard work over a long learning path.



12.4 Signing of MoU between IIT Bombay & MSETCL:

On 03.09.2025, Indian Institute of Technology (IIT), Bombay and Maharashtra State Electricity Transmission Company Ltd. (MSETCL) have signed an MoU to strengthen ongoing collaboration for secure, stable and reliable Maharashtra State electricity grid. The MoU signing event was attended by Hon'ble Dr. Sanjeev Kumar, IAS (CMD, MSETCL) and Mr. Shashank Jewalikar (ED, MSLDC).

Prof. Zakir Hussain Rather from Grid integration Lab, IIT Bombay is leading the initiative from IIT Bombay. Under this MoU, various focus areas include renewable energy integration, distributed generation, strengthening generation scheduling, electric vehicles, resource adequacy, forecasting, dynamic modelling, real-time inertia monitoring, cyber security, ancillary services, and the use of AI and data analytics for grid operation.



12.5 Various Committee Meetings:

During the calendar year 2025, MSLDC conducted six (6) Grid Coordination Committee (GCC) meetings, three (3) Operation Coordination Committee meetings, one (1) MSPC meeting, and one (1) MSPC Sub-Committee meeting. The details are tabulated below.

Sr.No.	Name of committee	Date
Grid co-ordination committee (GCC) Meeting:		
1	11 th Grid co-ordination committee (GCC) Meeting	29.01.2025
2	12 th Grid co-ordination committee (GCC) Meeting	25.03.2025
3	13 th Grid co-ordination committee (GCC) Meeting	22.04.2025
4	14 th Grid co-ordination committee (GCC) Meeting	28.07.2025
5	15 th Grid co-ordination committee (GCC) Meeting	08.10.2025
6	16 th Grid co-ordination committee (GCC) Meeting	29.10.2025
Operation Co-ordination committee (OCC) Meeting		
1	9 th Operation Co-ordination committee (OCC) Meeting	16.05.2025
2	10 th Operation Co-ordination committee (OCC) Meeting	03.09.2025
3	11 th Operation Co-ordination committee (OCC) Meeting	17.11.2025
MSPC Meeting		
1	4 th MSPC Meeting	10.06.2025
2	MSPC Sub-Committee Meeting	28.03.2025

12.6 Review of MEGC 2020, existing Grid code:

As per the Hon'ble MERC's public notice dated 2nd August 2025, the Hon'ble Commission invited comments, suggestions, and objections on the following draft regulations:

1. Draft MERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2025
2. Draft MERC (State Grid Code) (First Amendment) Regulations, 2025

With reference to the above public notice, the 10th Operation Coordination Committee (OCC) meeting and the 15th Grid Coordination Committee (GCC) meeting were convened on 03rd September 2025 & 8th October 2025 respectively at MSLDC, Airoli, exclusively to review and deliberate on the Draft MERC (State Grid Code) (First Amendment) Regulations, 2025, along with other proposed amendments to the Maharashtra Electricity Grid Code (MEGC), 2020 by SLDC and STU.

During the meeting, the GCC Core Group discussed the modifications proposed by SLDC and STU. The GCC extensively deliberated on various provisions, including Clause 2 (Definitions), Chapter A (General), Chapter E (Scheduling and Despatch Code), and Annexure 4 (Mechanism for Compensation for Degradation of Heat Rate), among others, as the draft MEGC 2025 proposes changes to these provisions. The GCC finalized its recommendations on the draft MEGC 2025 for submission to the Hon'ble MERC.

After due consideration and consultation with the GCC Core Group members, the GCC finalized its recommendations and comments on the draft MEGC 2025 and submitted the same for the kind consideration of the Hon'ble Commission on 14th October 2025.

12.7 Various Visits at MSLDC:

- On 09-Feb-2025, Hon'ble Member, CERC visited MSLDC. WRLDC along with other state SLDC members were also present.



- On 15-Apr-2025, Hon'ble Chairman & Managing Director, Mahagenco along with Mahagenco and MSETCL directors visited SLDC.

- On 10-Jan-2025, CE-SLDC Karnataka visited MSLDC for courtesy visit.



- On 21-May-2025, Executive Director (HR), MSETCL has visited to MSLDC



- On 20-Jun-2025, Officials from KSRC and KPTCL visited ALDC during their meeting of (Forum of Regulators) FOR.



12.8 Other Achievements:

- On 09-Jan-2025, SLDC bagged a total of 8 awards in its very first attempt in Inter Zonal Drama Competition in MSETCL at Nashik.



- On 08-Mar-2025, Women engineers handed power system operations at MSLDC Airoli & ALDC Ambazari on occasion of International Women's Day.



- On 20-Dec-2025, WRPC has hosted the Inter PSU Cricket Tournament on 20.12.2025 at Airoli. Team SLDC won the Mumbai power sector cricket tournament.



- On 15-Jun-2025, Successful annual day cultural event of MSLDC was a display of creativity and passion on stage, greatly supported by all the hard work and dedication at back stage.



- On 22-Jan-2025, Excellent program in respect of "Marathi Bhasha Sanwardhan Din", celebrated at MSLDC.



- On 10 March 2025, on the eve of International Women’s Day, a lecture was delivered by Adv. Dr. Kirti Kulkarni, Chief Legal Advisor, MSETCL



12.9 Employee Training & Capacity Building:

The organization places strong emphasis on continuous employee training and capacity building to enhance technical knowledge, professional skills, and overall performance. Various training programmes, workshops, and awareness sessions were conducted to upgrade employee competencies, ensure compliance with statutory requirements, and promote efficient and safe work practices. These initiatives contribute to improved productivity, adaptability, and organizational effectiveness.

Details of the training sessions are tabulated below.

Sr. No.	Name of Training	Period of Training		No. of Employees trained
		From Date	To Date	
1	1 st Batch Training program on ‘Team Building’ at Lonavala	18.10.2024	19.10.2024	26
2	2 nd Batch Training program on ‘Team Building’ at Lonavala	13.11.2024	14.11.2024	32
3	3 rd Batch Training program on ‘Team Building’ at Lonavala	10.12.2024	11.12.2024	31

4	"National Level Critical Information Infrastructure (CII) Security Exercise CII-SECEX 2025" (Cyber Security Training & Operational Exercise	11.04.2025	20.04.2025	1
5	"National Level Critical Information Infrastructure (CII) Security Exercise CII-SECEX 2025" Advanced Operational Exercise	18.04.2025	20.04.2025	1
6	45 day "Induction Level Training Program"	21.04.2025	12.06.2025	1
7	Training Program on "Basics Of Power System Operation (Knowledge Sharing Session)	19.05.2025	28.05.2025	10
8	Six days Induction Level Training Batch for LDC (HR)	19.05.2025	24.05.2025	2
9	"Power Next 3.0: Management Development Program	16.06.2025	18.06.2025	3
10	Unified Centralized Network Management System (UNMS System)	17.06.2025	21.06.2025	1
11	One day Workshop on "E-Office	18.06.2025		4
12	HRD Workshop on "IEGC with Focus on Demand & RE Forecasting & Procedure for First Time Integration & Energisation of New Elements"	25.06.2025	27.06.2025	5
13	Training/Workshop on Intelligent Forecasting Tool For Electricity Load (iForeTEL) Platform	25.06.2025		2
14	Intimation of demonstration of Rapid s/w development Platform	03.07.2025	04.07.2025	1
15	Workshop on Resource Adequacy Grid Path by PRAYAS Group	16.07.2025	16.07.2025	11
16	Regulatory & Policy Framework in Indian Power Sector	24.07.2025	26.07.2024	5
17	O&M Summit-2025	07.08.2025	08.08.2025	2

18	Cyber Security Training Program for Power Sector Professionals	18.08.2025	23.08.2025	4
19	Basic Level Training & Certification Program on Cyber Security	18.08.2025	22.08.2025	2
20	Power Market Specialist (Specialist Level)	01.09.2025	06.09.2025	2
21	Power Next 3.0: Management Development Program "Train the Trainer"	02.09.2025	04.09.2025	3
22	Capacity Building for Security Constrained Economic Dispatch (SCED) at IIT Bombay	08.09.2025	10.09.2025	18
23	Data Contractors	08.09.2025	12.09.2025	3
24	Regulatory & Policy Framework in the Power Sector	11.09.2025	13.09.2025	5
25	Power Market Specialist (Specialist Level)	15.09.2025	20.09.2025	2
26	Workshop on Cyber Security Awareness for Power Sector Professionals	19.09.2025		4
27	Metering Philosophy & Settlement of Accounts & Different Pool Accounts	22.09.2025	23.09.2025	6
28	Training-Capacity Building Program on "Power Market"	06.10.2025	08.10.2025	4
29	First Time Charging (FTC) & Resource Adequacy (RA)- Procedures Compliance & Planning	19.11.2025	21.11.2025	4
30	Employee Empowerment Program	05.01.2026	06.01.2026	38

- Workshop on Resource Adequacy Grid Path by PRAYAS Group on 16.07.2025



- Employee Empowerment Program at Lonavla on 05.01.2026 & 06.01.2026



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Maharashtra State Load Despatch Centre, Airoli

 <https://www.mahatransco.in/>

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