भारत सरकार

Government of India

I.S.O.: 9001: 2015

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

तापीय परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग

Thermal Projects Renovation & Modernisation Division

CEA-JCOAL Workshop FY23

Quarterly Review Report
Renovation & Modernisation of Thermal Power Stations

Quarter: January-March, 2026

Foreword

Renovation & Modernization (R&M)/Life Extension (LE) has been recognized as one of the cost effective options for obtaining the additional generation and better outputs from the existing old thermal power units. The R&M of such units is very essential for performance improvement of the units as well as to comply with the stricter environmental norms for improving environmental conditions. On the other hand, the Life Extension (LE) of the old thermal power units is carried out with an aim to extend their useful life 15 to 20 years beyond the original design economical life.

The Thermal Projects Renovation & Modernization (TPR&M) Division is entrusted with the responsibility of monitoring the progress of R&M/LE activities in thermal power generating units in the country under Section 73(f) of the Electricity Act, 2003. Based on the interaction and information received from various utilities, the Quarterly Review Report (QRR) is prepared highlighting the latest status of the physical progress of R&M/LE works at various thermal units.

A committee comprising representatives from NTPC, CEA, GSECL and BHEL was constituted to study various aspects of Life extension and R&M of coal based thermal power stations including guidelines for choosing candidate plants for R&M, objectives of R&M, viable business model, guiding principle for preparation of bidding document. The final report was approved by MOP and the same was circulated with soft and physical copies.

A MOU signed between the Central Electricity Authority (CEA) of India and the Japan Coal Frontier Organization (JCOAL) , aims to enhance efficiency and environmental standards in thermal power generation. The cooperation, initiated in 2010, focuses on implementing technological solutions for sustainable, stable, and low-carbon power supply. Key areas of collaboration include environmental technology, operational flexibility, biomass co-firing, and clean fuel exploration. Through joint studies, workshops, and training programs, both parties seek to advance clean coal technologies and address emerging challenges in the power sector.

A MOU on India-Denmark Energy Cooperation was signed between the two governments in June 2020. TPRM Division, CEA is coordinating the following areas/activities under this cooperation: i. Transfer of technology for emission control from Thermal Power plants, ii. Waste heat recovery from Thermal power plants, iii. Flexibility in operation of power plants for RE integration. Flexible operation test has been successfully conducted in thermal generating units of Unit #7, 500MW Ramagundam TPS of NTPC and Unit #3, 210 MW Raichur TPS of KPCL under India-Denmark cooperation.

In Dec, 2015 the Ministry of Environment, Forest & Climate Change (MoEF&CC) had notified “Environment (Protection) Amendment Rules, 2015’’ for thermal power stations specifying new norms for stack emissions of SPM, NOx and SO2. TPRM Division is monitoring the implementation of pollution control equipment for compliance with the new norms.

A MOU between CEA and IIT Delhi was signed on 12.12.2022 to survey ambient atmospheric SO2 concentrations in different category of cities based on their vicinity to thermal power plants (TPPs). Phase I, Phase II and Phase III of the study has been completed. Final report is completed and sent to MoEF&CC/CPCB by MoP for consideration. As per MoEF&CC gazette notification dated 11.07.2025, SO2 emission norms are applicable on Category A units and Category B units on case-to-case basis. Category C units are exempted from SO2 emission norms.

India aims to achieve 40% of installed renewable capacity by 2030, posing challenges to grid stability due to the intermittency of solar and wind power. Flexible operation of existing coal-fired plants becomes crucial for ensuring power supply security and grid stability while integrating renewable energy sources. With thermal generation constituting the majority of the country's energy output, flexibility in its operation is essential to manage the variability of renewables and meet energy demand reliably. In February 2023, a report on "Flexibilisation of coal-fired power plants" outlines a roadmap for achieving 40% technical minimum load was published. In March 2023, an SOP & training curriculum at 55% minimum technical load was published, aiding utilities in preparing for enhanced operational flexibility.

Finally, I would like to express my sincere thanks and gratitude to the Utilities and other stakeholders for following CEA’s guidelines during implementation of R&M/LE works at old thermal power plants, furnishing status of R&M activities, status of compliance of CEA regulations regarding flexibilization of thermal units and installation of FGD/upgradations of ESP to comply with new environmental norms thus helping us to prepare & publish quarterly review report.

Dated: 31.03.2026

(Surata Ram)
CE (TPRM,CEA)

Highlights

1. Phasing Plan of R&M/LE implementation (01.01.2024 to 30.06.2046)

CEA prepared a phasing plan for 223 units with total capacity of 63440 MW in nine phases up to 2046 as a potential candidate for R&M/LE intervention for extending life of existing coal based thermal power plants. The summary of phasing plan along with timelines is given as under:

Phase	Timeline	Central Sector Units	Central Sector Capacity	State Sector Units	State Sector Capacity	Private Sector Units	Private Sector Capacity	Total Units	Total Capacity
Phase 1	01-01-2024 to 30-06-2026	11	2230	25	5230	1	500	37	**7960**
Phase 2	01-07-2026 to 31-12-2028	18	5170	12	3140	0	0	30	**8310**
Phase 3	01-01-2029 to 30-06-2031	12	2810	12	2560	0	0	24	**5370**
Phase 4	01-07-2031 to 31-12-2033	8	2550	15	3730	2	500	25	**6780**
Phase 5	01-01-2034 to 30-06-2036	5	1630	17	4330	3	750	25	**6710**
Phase 6	01-07-2036 to 31-12-2038	12	5420	8	2175	0	0	20	**7595**
Phase 7	01-01-2039 to 30-06-2041	5	2000	16	4590	4	1000	25	**7590**
Phase 8	01-07-2041 to 31-12-2043	5	1740	9	2655	9	2660	23	**7055**
Phase 9	01-01-2044 to 30-06-2046	5	2490	2	460	7	3120	14	**6070**
Total	**Overall**	**81**	**26040**	**116**	**28870**	**26**	**8530**	**223**	**63440**

2. Phase I of R&M/LE implementation(01.01.2024 to 30.06.2026)

	Phase 1	
Sector	**Unit**	**Capacity**
Central Sector	11	2230
State Sector	25	5230
Private Sector	1	500
Total	**37**	**7960**

3. Completed R&M and LE Projects during (2017 - 22)

Sl. No.	Particulars	LE/R&M works completed No. of units & capacity (MW)		Total (State Sector + Central Sector) MW
		State Sector	Central Sector	
1	LE	05(1020)	--	05(1020)
2	R&M	01(210)	03(177)	04(387)
Total		06(1230)	03(177)	9(1407)

4. Flexible Operation of Thermal Power Stations

The report, “Flexible operation of Thermal Power Plant for integration of Renewable Generation: was published in January 2019, considering renewable installed capacity of 175 GW in the year 2021-22. The report suggested utilizing existing thermal capacity for flexible grid considering large penetration of RE in addition to other options like Pump Storage, Gas Based, Hydro , Battery Storage systems etc.

Another report titled, "Flexibilisation of Coal-Fired Power Plants: A roadmap for achieving 40% Technical Minimum Load" was released in February 2023, addressing the imperative need for thermal power plants to adapt to the anticipated operational changes, notably the shift towards an average minimum load of 40%. Led by a committee chaired by Sh. B. C. Mallick, Chief Engineer, TPRM Division, CEA, the report offers comprehensive guidelines for utilities, covering the necessity and challenges of flexibilisation. It delves into key requirements, operational procedures, necessary modifications, associated costs and impact on tariff, providing a roadmap for enhancing flexibility in thermal power plants. This report serves as a crucial resource for utilities navigating the evolving energy landscape, particularly in light of increasing renewable energy integration.

Subsequently , A report titled, "Operating Procedure and Training Curriculum at 55% Minimum Technical Load of Thermal Generating Units," was released in March 2023, emphasizing the critical need for flexible operation of existing coal-fired power plants to ensure grid stability amidst the integration of large-scale renewable energy sources. This report underscores the country’s commitment to addressing technical challenges and developing operating manuals and training curriculum for thermal power plant personnel to achieve a technical minimum load of 55%. This initiative is vital for enhancing the reliability and security of power supply while maximizing renewable energy integration.

Flexible operation (up to 40% load) test has been conducted at DSTPS, Andal of DVC and MPL, Maithon (Unit-2) of TATA Power under IGEF from 22-23 July, 2021. Another test was conducted between 28.03.2022 to 01.04.2022 at DSTPS, Andal of DVC under IGEF. Flexible operation test has been successfully conducted in thermal generating units of Unit #7, 500MW Ramagundam TPS of NTPC and Unit #3, 210 MW Raichur TPS of KPCL in March, 2023.

5. External Co-operation for R&M/LE of TPS

The status of activities under external co-operation for R&M/LE of TPS is furnished below: -

Indo-Japan Co-operation for Project on Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity of Coal Fired Stations.

Under Clean Coal Technology (CCT) Training Programme study tours to Japan have been organized in which representatives from MoP, CEA and different power utilities have participated. The participants visited the latest USC power stations and updated about various applicable technologies and equipment as well as O&M technique. During the FY22, 50 participants have undergone the Virtual CCT Training Programme from 31st Oct. 2022 to 2nd Nov., 2022.

Under Indo-Japan Cooperation, a one-day Workshop on "Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" organized jointly by CEA and JCOAL on 14th December, 2023.

Since 2018 when air pollution incurred by open biomass burning has come to be highlighted as one of the major environmental issues to be addressed, CEA and JCOAL embarked on a biomass utilization study under the Cooperation. A Viability Study on co-firing technology of Agricultural Waste and Coal was also conducted by JCOAL in GHTP(Guru Hargobind Thermal Power Plant, Punjab), PSPCL (Punjab) for Air Pollution Control in India in Feb, 2020. In the report they have mentioned that up to 30% biomass co firing is found to be the most feasible by installation of biomass pelletizing technology, converting biomass into curl chip. The GCV of curl chip is about 4000 KJ/KG which is similar to Indian coal and generation cost is expected to roughly equal to the current generation cost of GHTP.

Indo-Denmark Co-operation

A MOU on India-Denmark Energy Cooperation was signed between the two governments in June 2020. TPRM Division, CEA is coordinating the following areas/activities under this cooperation:

i. Transfer of technology for emission control from Thermal Power plants,
ii. Waste heat recovery from Thermal power plants,
iii. Flexibility in operation of power plants for RE integration.

Flexible operation test has been successfully conducted in thermal generating units of Unit #7, 500MW Ramagundam TPS of NTPC and Unit #3, 210 MW Raichur TPS of KPCL under India-Denmark cooperation.

Quarterly Review Report on Renovation, Modernisation and Life Extension of Thermal Power Plants

1.0 Introduction

At the time of independence, the total installed capacity in the power sector was 1362 MW of which steam power plants contributed 756 MW. The installed generation capacity has since grown manifold. The total installed capacity as on 31.03.2026 is 5,32,740 MW of which thermal power plants contributed 2,49,272 MW (46.79%). The contribution of Coal, Gas and Diesel based thermal power plants of total installed capacity is 42.90%, 3.78% and 0.11% respectively.

Renovation & Modernization (R&M) is seen as a cost-effective option for additional generation from the existing thermal power stations and better asset management due to its low cost and short gestation period. Besides generation improvement and improvement in availability, other benefits achieved from R&M / LE include life extension, improved safety, reliability & environmental conditions.

Many of the thermal power plants are not operating to their full potential and large numbers of thermal units including 200/210 MW units are old and outlived their normal economical design life. The 66 LMZ units of 200/210 MW Capacity are potential targets for Energy Efficiency R&M (EE R&M).

2.0 Objective of R&M Programme

The main objective of Renovation & Modernisation (R&M) of thermal generating units is to make the operating units well equipped with modified / augmented with latest technology with a view to improve their performance in terms of output, reliability, availability, reduction of outage time, ease of maintenance and minimizing inefficiencies.

3.0 Objective of Life Extension Programme

The R&M programme is primarily aimed at generation sustenance and overcoming problems. The life extension (LE) programme on the other hand focuses on plant operation beyond their original design life after carrying out specific life assessment studies of critical components with an aim to increase the life beyond the design economic life of 25 years.

4.0 Renovation and Modernisation (R&M) and Life Extension Programme (LEP) from 7th Plan to 12th Plan and onwards

R&M Programme in a structured manner was initiated in 1984 as a centrally sponsored programme during 7th Plan and the programme continued during the two Annual Plans 1990-91 & 1991-92. The Plan wise details is attached as Annexure-IV –

5.0 R&M/ LE Programme & Achievements during (2017 – 22)

The Summary of R&M/ LE Programme to be implemented during 2017-22 is given below. The status of implementation of the R&M/LE works at various units is furnished at Annexure-V

	Name of the TPS	Unit No.	Date of S/D	Capacity (MW)	Utility	Sector	Date of Achievement
1. 2017-18							
LE	Ukai TPS	4	07-12-2016	200	GSECL	State	17.05.2017
	Wanakbori TPS	3	25-07-2017	210	GSECL	State	27-11-2017
R&M	Kathalguri CCGT	3	19-06-2017	33.5	NEEPCO	Central	20-07-2018
	Kathalguri CCGT	6	19-03-2018	33.5	NEEPCO	Central	31-03-2018
Sub Total		**4 (Units)**		**477.00**			
2. 2018-19							
LE	Koradi TPS	6	25-08-2015	210	MAHAGENCO	State	16-07-2018(oil firing) 20-08-2018(coal firing)
	Obra TPS	12	01-10-2016	200	UPRVUNL	State	24-09-2018
R&M	--	--		--	---	--	--
Sub Total		**02(unit)**		**410**			
3. 2021-22							
LE	**---**	**--**	**--**	**--**	--	--	--
R&M							
4. 2022-23							
LE	Obra TPS	13	16-05-2018	**200**	UPRVUNL	State	27-09-2022
R&M	Barauni TPS	6	15-11-2009	**110**	NTPC	Central	31-05-2022
5. 2024-25							
LE	--	--	--	**--**	--	--	--
R&M	Kolaghat	3	28-02-2024	**210**	WBPDCL	State	28-02-2024

Total LE	**05 (1020)**	**State**	**05(unit)**	**1020**
		Centre	--	--
Total R&M	**04 (387)**	**State**	**01(unit)**	**210**
		Centre	**03(unit)**	**177**
Grand Total			**09(units)**	**1407.0**

5.1 New R&M Guidelines 2023

Ministry of Power constituted a High level committee on 16.03.2022 to study the various aspects of R&M/LE works in coal based thermal power plants. A comprehensive report has been prepared with the contribution of committee members from various organizations. The committee report would guide and help all the stakeholders eg. central, state & private utilities to plan and complete R & M activities in a much systematic and efficient way in thermal generating units.

The report comprises of total six chapters which tries to covers the various important issues in detail. The chapter-1 "Background", which throws the light on need of new guidelines for giving impetus in R&M activities. The chapert-2 "Guidelines for choosing the candidate plants for R&M/LE" elaborates on the guidelines for selecting candidate thermal unit for R&M activities along with prerequisites. The chapter-3, "Objective of R&M and Viable business model" describes the objective of R&M activities to be carried out after selecting candidate thermal unit, guiding principles and viable business models for R&M works. The guiding principles for preparation of biding documents of R&M works including commercial and technical aspects, time taken/schedule for completion of R&M works and do's & don'ts in bidding process has been discussed in the chapter-4 "Preparation of Bidding Documents for R&M". In chapter-5 "Case Study of Successful Implementation", two recent cases of successful R&M activities completed in Unit #3 (200 MW)

of NTPC, Ramagundam Stage-I and Unit #3 (210MW) of Wanakbori TPS, GSECL has been given along with showing substantial improvement achieved in the turbine heat rate (in the range of 150-300 Kcal/KWhr) with LE and uprating. The chapter-6 "Annexures" discusses in detail, various options for carrying out R&M and sector & year wise segregation of potential candidate thermal units identified for R&M from 2022 to 2030.

5.2 Potential Thermal Generating Units for R&M and LE (2024-2046)

CEA has identified 223 units with total capacity of 63440 MW as potential candidates for R&M/LE works with age oder than 20 years as on December, 2022. R&M/LE works in these units have to be implemented in nine phases to avoid any major energy demand- supply gap.

Therefore, the phasing plan of 223 units along with tentative timelines for implementation of R&M/LE intervention have been prepared and proposed to be implemented in nine phases given as under:

Phase	Timeline	Central Sector Units	Central Sector Capacity	State Sector Units	State Sector Capacity	Private Sector Units	Private Sector Capacity	Total Units	Total Capacity
Phase 1	01-01-2024 to 30-06-2026	11	2230	25	5530	1	500	37	**7960**
Phase 2	01-07-2026 to 31-12-2028	18	5170	12	3140	0	0	30	**8310**
Phase 3	01-01-2029 to 30-06-2031	12	2810	12	2560	0	0	24	**5370**
Phase 4	01-07-2031 to 31-12-2033	8	2550	15	3730	2	500	25	**6780**
Phase 5	01-01-2034 to 30-06-2036	5	1630	17	4330	3	750	25	**6710**
Phase 6	01-07-2036 to 31-12-2038	12	5420	8	2175	0	0	20	**7595**
Phase 7	01-01-2039 to 30-06-2041	5	2000	16	4590	4	1000	25	**7590**
Phase 8	01-07-2041 to 31-12-2043	5	1740	9	2655	9	2660	23	**7055**
Phase 9	01-01-2044 to 30-06-2046	5	2490	2	460	7	3120	14	**6070**
Total	**Overall**	**81**	**26040**	**116**	**28870**	**26**	**8530**	**223**	**63440**

6. Implementation of Phasing Plan for Compliance with New Environmental Norms notified by MoEF&CC on 7th Dec. 2015.

Ministry of Environment, Forest & Climate Change (MoEF&CC) had notified "Environment (Protection) Amendment Rules, 2015'' for thermal power stations on 07.12.2015. All existing thermal generating stations including new stations and stations under construction were required to comply with the new Standards within 2 years (i.e. by Dec. 2017). However, due to limited vendor capability and installation time of about 48 to 52 months as well as import challenges and exorbitant high prices the TPPs were unable to meet the timeline. Subsequently, MOEF&CC vide gazette notification dated 05.09.2022 has categorized thermal power plants in three categories having different timelines along with the environment compensation for non-compliance as follows:

Category	Location/area	Timelines for compliance (Non-retiring units)		Last date for retirement of units for exemption from compliance	
		Parameters other than SO2 emissions	SO2 emissions	Parameters other than SO2 emissions	SO2 emissions
A	With l0 km radius of National Capital Region or cities having million plus population	Up to Dec, 2022	Up to Dec, 2027	Up to Dec, 2022	Up to Dec, 2030
B	With l0 km radius of Critically Polluted Areas or Non-attainment cities	Up to Dec, 2023	Up to Dec, 2028	Up to Dec, 2025	
C	Other than those included in Category A and B	Up to Dec, 2024	Up to Dec, 2029	Up to Dec, 2025	

In case of non-compliance with the aforementioned timelines, MoEF&CC has mandated that penalty may be levied as per the table given below:

Non-Compliant operation beyond the Timeline	Environmental Compensation (Rs. per unit electricity generated)
0-180 days	0.20
l8l-365 days	0.30
366 days and beyond	0.40

6.1 CEA-IIT D study-

CEA prepared a paper on location specific norms for thermal power plants and suggested a graded action plan for FGD implementation in TPP. To explore such a feasibility, the 24hr avg.(max) SO2 ground based measured levels (CPCB, 2018 data) were categorized into 5 distinct levels:

i. Level I : above 40 µg/m3
ii. Level II : 31-40 µg/m3
iii. Level III : 21-30 µg/m3
iv. Level IV : 11-20 µg/m3
v. Level V: 0-10µg/m3.

An MOU between CEA and IIT Delhi was signed on 12.12.2022 to survey ambient atmospheric SO2 concentrations in different category of cities based on their vicinity to thermal power plants (TPPs). Baseline

survey of ambient SO2 concentration will be conducted in three category of cities-

Category-1: City with no coal based TPP,
Category-2: City with a coal based TPP in which FGD has not been installed and the TPP is located within 10km from the city boundary
Category-3: City with a coal based TPP in which FGD has been installed and the TPP is located within a distance of 10km from the boundary of the city.

Further, an additional study (Phase II) on the direction of Hon'ble Minister where simultaneous measurements of ambient atmospheric SO2 concentrations at two different locations in three different category of cities namely, Gautam Buddha Nagar, Kota and Lucknow based on their vicinity to coal based thermal power plants (TPPs) is to be conducted and the status of FGD installation in these TPPs.

As per direction of Hon'ble Minister of Power in meeting dated 26.09.2023, IIT Delhi was asked to conduct further survey/study during Phase-III in same cities with addition to few comparable towns/cities with and without FGD in winter months (November, 2023 to February,2024) to clarify the actual impact of FGD after normalizing with other sources of SO2. Final report is completed and sent to MoEF&CC/CPCB by MoP for consideration.

Subsequently, based upon the recommendations of CEA, the timelines for implementation of FGD installation for compliance with SO_2 norms were extended in every category vide MoEF&CC gazette notification dated 30.12.2024. However, the timelines for compliance of parameters other than SO_2 remained unchanged. The revised timelines for installation of FGD in various category TPPs is as under:
Category A - Timeline for compliance with SO2 norms: 31.12.2027
Category B - Timeline for compliance with SO_2 norms: 31.12.2028
Category C - Timeline for compliance with SO_2 norms: 31.12.2029

Further, on the recommendation of PSA (based on above scientific studies), MoEF&CC has notified amendment on 11.07.2025 where applicability of SO2 emission standards in thermal power plants has been revised based on their location/category.

As per MoEF&CC gazette notification dated 11.07.2025, SO2 emission norms are not applicable on Category C units provided they comply with original stack height criteria as notified by MoEF&CC, GoI. Similarly, Category B units may apply for exemption from SO2 norms, and their cases will be reviewed on case-to-case basis by Expert Appraisal Committee.

7.0 Flexible Operation of Thermal Power Stations

India's Intended Nationally Determined Contributions (INDCs) include a reduction in the emissions intensity of its GDP by 45 percent by 2030 from 2005 level, the target on cumulative electric power installed capacity from non-fossil fuel-based energy resources has been enhanced to 50% by 2030 and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent. Generating power from renewable sources of energy is of cardinal importance if India is to meet its INDC targets. With the aim to ensure future security & reliability of power supply and stability of electricity grids while maximizing generation from renewables, flexibilization of existing coal-fired power plants is an important measure.

7.1 A committee headed by Chief Engineer (TPRM), CEA was constituted to oversee the implementation of

measures for flexible operation of TPPs on the basis of the pilot test. Based on the findings of CEA's flexibilisation report, the committee identified the thermal units in consultation with State/ Central utilities for the flexibilisation. The identified units shall undergo the pilot tests to ascertain their capability, do gap analysis and carry out modifications, if required.

BHEL has conducted flexible operation pilot tests at Mauda TPS of NTPC and Sagardighi TPS of WBPDCL. Another flexible operation study has been organized by CEA and carried out by BHEL at Ukai Thermal Power Station Unit # 6 (500MW), GSECL on 04.03.2020. Minimum load of 40% with ramp rate of 3% was successfully achieved. Flexible operation (up to 40% load) test has been conducted at Unit#2, 500MW MPL, Maithon (Unit-2) of JV DVC & TATA Power under IGEF from 22-23 July, 2021. Another test conducted between 28.03.2022 to 01.04.2022 at DSTPS, Andal of DVC under IGEF. Flexible operation (40%) test has been successfully conducted in thermal generating units of Unit #7, 500MW Ramagundam TPS of NTPC and Unit #3, 210 MW Raichur TPS of KPCL under Indo –Denmark Cooperation.

7.2 With the anticipated 500 GW of RE Capacity by 2030, it has been targeted to adapt the total installed fleet of Thermal power plants to operate at 55% Minimum Technical Load (MTL). In this regard , CEA has notified a Regulation regarding Flexible operation of coal based Thermal Power Generating Units on 30.1.2023.As per the regulation :

1.The 55% minimum load and 2% & 3% ramp rate operating requirement shall have to be implemented by all thermal generating units (Central/State/Pvt) within one year of the notification of the regulation.

2.Power plants shall implement measures, if required, as per the phasing plans by the respective power plants owners to operate thermal unit at 40% minimum load with following ramp rate:

1% per minute - 40% to 55% and 55% to 40% load
2% per minute - 55% to 70% and 70% to 55% load
3% per minute - 70% to 100% and 100% to 70% load

3.The implementation of the flexible operation shall be as per the phasing plan already notified in the Gazette of India

7.3 CEA has also notified phasing plan for achieving 40% minimum technical load and same was published in Gazette of India on 15th December , 2023.

7.4 The summary of the phasing plan is as below:

- Pilot Phase (10 units, **5850** MW) : To be completed by March, 2024
- Phase 1 (91 units, 51080 MW) : July 2024 - June 2026
- Phase 2 (100 units, 46825 MW) : July 2026 - June 2028
- Phase 3 (101 units, 37215 MW) : July 2028 - December 2029
- Phase 4 (191 units, 55767 MW) : January 2030 - December 2030

7.5 In the pilot phase, 10 units of Central/State/Pvt sector shall be taken for refurbishment. The experience gained in pilot phase shall be useful for future planning. The Current Status of the Phasing Plan is attached as Annexure VIII.

KPI Targets vis-à-vis Achievement as on 31.03.2026

S. N.	Initiative	Scheme /Program	Parameters	Requires change in law (yes/no)	Unit of measurement	Key Performance Indicators (KPI)					
						2020	2021	2022	2023	2024	
1	**Flexible Generation:** Reduction in Technical minimum limits and improvement in Ramp rates	Flexibilisation of Thermal Power Plants by CEA	Modifica-tions in Thermal Power Plants to achieve Technical minimum up to 55% and Ramp rates	Yes, the CERC regulation need changes to reimburse the additional costs to generators for flexible operations	% fleet of installed capacity	20%	30%	45%	50%	60%	Target
						20%	30.4 %	45.12 %	50.29 **%**	**75%** (Upto 31.03. 2026)	Achieve-ment

Summary of Flexibilisation of Thermal power plants as on 31.03.2026:-

S. No	Utility	Capacity which achieved 55% MTL (GW)	Achievement (%)
1	NTPC + JV	52.48	25.0
2	Other Utilities (Period April 2020 to Sept 2020)	7.64	3.6
3	Other Utilities (Period Oct 2020 to Dec 2020)	4.84	2.3
4	Other Utilities (Period Jan 2021 to Mar 2021)	8.18	3.9
5	Other Utilities (Period April 2021 to 30.09.2025)	83.34	40.2
Total achievement (%) **75%**			

*List of thermal power plants operating at 55% Minimum Technical Load is given in **Annex-VII**

“SOP and Training curriculum at 55% technical minimum load”

A committee headed by chief engineer (TPRM), CEA was constituted in order to prepare the operating manual for attaining/operating at 55% minimum technical load of thermal power plant and a training curriculum for technical operators for the same.

The committee came up with standard operating procedures in Mar, 2023 which addresses the challenges of flexibilization and achieve the target of minimum technical load.

The standard operating procedure specified the prerequisites for reducing minimum technical load stable load to 55%, procedure, operational issues faced by ball and tube mills, long term concerns and measures in detail.

The committee identified that for 55% minimum load operation the ramp rates (up/down) shall be less than 2% for stable combustion. However, in future the proposed new regulation shall have to be followed regarding the ramp rates.

The committee also identified the simulator capacity and capability of different utilities in order to train and assess operators in plant operation such as start-up and shut-down, supervision, monitoring and control during normal, emergency situations and in safety procedures. It was also recommended that plant Operators/Trainers must train on the simulator for 55% Load operation with desired ramp rate and without oil support.The batch size and training duration is also specified with focus areas including cold and warm start up conditions, 55% Operation (Manual) –Ramp Up with ramp rate, 55% Operation (Manual) -Ramp down with ramp rate, 55% Operation (Auto) –Ramp Up with ramp rate, 55% Operation (Auto) -Ramp down with ramp rate, Emergencies & Malfunctions, Unit Stable Operation, Critical Equipment Changeover etc. A detailed training material was prepared by NPTI for both 500 MW and 210MW simulator for lower load operation at 55% modeling critical parameters in order to familiarize the operators.

The Report titled "Flexibilisation of Coal Fired Power Plant: A roadmap for achieving 40% Technical Minimum Load" was published in February, 2023. The gist of report is given below:

The Government of India has set an ambitious target of achieving 500 GW of renewable energy generation by 2029-30, with an interim target of 175 GW by the end of 2022. However, due to delays caused by the COVID-19 pandemic, it is projected that the short-term target may be achieved by the end of 2023. This delay has significant implications for the operation of thermal power plants, as they are expected to operate at an average minimum load of 40% in the near future.

To address this challenge, a committee was constituted under the leadership of Sh. B. C. Mallick, Chief Engineer, TPRM Division, Central Electricity Authority (CEA), with members from various organizations. The committee has prepared a comprehensive report with eleven chapters that cover various important issues in detail in Feb,2023. These chapters include the need for flexibilization, key requirements for operation, studies conducted so far, challenges faced, operating procedures, modifications required, and cost considerations.

The report provides guidance to central, state, and private utilities on selecting thermal generating units and conducting low load tests to achieve flexibility in their operations. It also discusses the impact of flexibilization on plant life, operation, maintenance, efficiency, and operating procedures that need to be upgraded. Additionally, the report describes the procedures for low load tests, including parameters to be observed carefully during the test to identify measures for implementing in the generating unit. It also highlights various options for modification to improve performance and the associated costs for adopting these measures.
In summary, the committee's report aims to provide a comprehensive guide to help thermal power plants in India meet the changing demands of the power sector and achieve flexibility in their operations, considering the challenges posed by the delayed achievement of renewable energy targets and the need for low load operation.

Flexibilisation study/test:

Central Electricity Authority (CEA) has constituted a committee under the Chairmanship of Chief Engineer,

TPRM Division, for assessing flexible power and ramp rate to be required for integration of solar and wind capacity into grid. Accordingly a road map has to be prepared for integration of generation from RES in the year, 2030. The committee will also be assessing the ramp rate required for the integration of 500 GW to maintain secure and stable grid.

In the first meeting of the committee which was held in October, 2022, objectives and strategy was discussed. It was decided to collect the various data such as thermal capacity enhancement , hydro capacity addition, limiting factors in grid operation installed capacity of all types of generation, etc. which was to be collected from various divisions/organizations and forwarded to IRP ,CEA for hourly generation projection of 365 days for the year 2030.

The salient outcome of the pilot tests are as follows:

A) Mouda TPS, NTPC, Nagpur, Maharashtra:

i) Test Date : 29-05-2019
ii) Unit No. : 2
iii) Capacity : 500 MW
iv) Following tests were conducted:

Test	Target	Achieved
a. Minimum Load Test at 40%	200MW	200MW
b. Ramp up Test (3%)	3%/min	~ 1.14%/min
c. Ramp down Test (3%)	3%/min	~ 1.68%/min
d. Ramp up Test (1%)	1%/min	~ 0.85%/min
e. Ramp down Test (1%)	1%/min	~ 0.9%/min

The list of important parameters was logged and taken by BHEL for further analysis and recommendation.

B) Sagardighi TPS, WBPDCL, Musheerabad, West Bengal:

i) Test Date : 27-06-2019
ii) Unit No. : 3
iii) Unit Capacity : 500 MW
iv) Following tests were conducted:

Test	Target	Achieved
a. Minimum Load Test at 40%	200 MW	200 MW
c. Ramp Down Test (3%)	3%/ min	~1.6%/min
d. Ramp UpTest (3%)	3%/ min	~1.1%/min

The flexibilisation test was conducted by BHEL team and was witnessed by representative from TPRM Division, CEA. BHEL will submit the detailed report after analyzing the test result.

C) Vindhyachal STPS, NTPC, Singrauli, Madhya Pradesh :

JCOAL selected NTPC's Vindhyachal Super Thermal Power Station (VSTPS) for flexibilisation study, based on the recommendation of Ministry of Power and Central Electricity Authority. JERA Co., Inc and Mitsubishi Research Institute, Inc have investigated concerning improvement of operational flexibility of No.11 unit

i) Test Date : 06-03-2019
ii) Unit No. : 11
iii) Capacity : 500 MW

Following tests were conducted:

Test	Target	Achieved
a. Minimum Load Test at 40%	200 MW	275 MW
b. Ramp Up Test (3%)	3%/ min	~1.25%/min
c. Ramp Down Test (3%)	3%/ min	~1.67%/min
d. Ramp UpTest (3%)	1.5%/ min	~1.0%/min
e. Ramp Down Test (3%)	1.5%/ min	~0.7%/min

D)Anpara B TPS, Sonbhadra, Uttar Pradesh :

Study on Flexibilization has been carried out by JCOAL during the year 2018-19 at Anpara B (Unit 4&5 of 2*500MW) power plant of UPRVUNL in the state of Uttar Pradesh as a model of the possibility of introducing a system that can improve the efficiency of electric power infrastructure in India by utilizing IoT / AI which demonstrated the superiority of Japanese technology. JCOAL team visited Anpara from 28th-30th May and 25th -27th Dec,2018

E) Ukai Unit# 6 (500 MW),GSECL, Gujarat:

Flexible operation study has been organized by CEA and carried out by BHEL at Ukai Thermal Power Station Unit # 6 (500MW), GSECL on 04.03.2020. Minimum load of 40% with ramp rate of 3% was successfully achieved. The list of important parameters was logged and taken by BHEL for further analysis and recommendation. The final analysis and recommendations are under finalization with BHEL.

i) Test Date : 04-03-2020
ii) Unit No. : 6
iii) Capacity : 500 MW

Following tests were conducted:

Test	Target	Achieved

i) Minimum Load Test at 40%	200 MW	200 MW
ii) Ramp Test (3%)	3%/min	1.6%-2%/min
iii) Ramp Test (1%)	1%/min	~1.0%/min

F) Maithon RBTPP Unit#2 (525 MW), MPL:

Flexible operation test has been conducted by IGEF at 525 MW Unit #2, 525MW at Maithon RB TPP between 19-29th July,2021 targeting stable operation of unit on coal at 40% minimum load and higher ramp rate.

i) Test Date : 22-27,July, 2021
ii) Unit No. : 2
iii) Capacity : 525 MW

Test	**Target**	**Achieved**
Minimum Load Test (40%)	210MW	210MW 190MW (36%)* *achieved for short duration of 10min.
Ramp Up/Down Test	1%/min	

The ramp rates achieved were as follows:

	Upward direction	**Downward direction**
290 MW – 525 MW	0.95%/min	1.52%/min
MW – 290 MW	do	0.95%/min
210 MW – 225 MW	do	0.38%/min

G) Durgapur Steel TPS
Unit# 1 (500 MW) , DVC

i) Test Date :28-01, Mar,2022
ii) Unit No. : 1
iii) Capacity : 500 MW

34% achieved (1.5hrs), 2% ramp up and 2% ramp down.

H) Ramagundum,TPS Unit#7 (500 MW) NTPC :

DEA delegates visited Ramagundam , NTPC for low load trial in Aug , 2022 under which historical data , design data , coal data , water consumption data , etc. was collected and then analysed by them before the actual test. A virtual meeting was also held to discuss the preliminary findings.

i) Test Date : 27.02.2023-02.03.2023
ii) Unit No. : 7
iii) Capacity : 500 MW

Test		Target	Achieved
Minimum Load Test (40%)		200 MW	200 MW
Ramp Up/Down Test	(70-100%)	3%/min	2.6 %/min
	(70-55%)	2 %/min	1.6%/min
	(55-40%)	1%/min	0.8%/min

I) Raichur TPS, Unit#3 (210 MW) KPCL :

DEA delegated visited Raichur , KPCL for low load trial in Aug , 2022 under which historical data , design data , coal data , water consumption data , etc. was collected and then analysed by them before the actual test. A virtual meeting was also held to discuss the preliminary findings

i) Test Date : 04.03.2023-07.03.2023
ii) Unit No. : 3
iii) Capacity : 210 MW

Test		Target	Achieved
Minimum Load Test (40%)		84MW	84MW
Ramp Up/Down Test	(70-100%)	3%/min	3.57 %/min
	(70-55%)	2 %/min	0.88%/min
	(55-40%)	1%/min	2.5%/min

8. Japan-India Co-operation for Study on Efficiency and Environmental Improvement of Coal Fired Stations

A MOU between Central Electricity Authority and Japan Coal Energy Centre (JCOAL) for preliminary study of Efficiency and Environment improvement study in coal fired power plants was signed on 30.4.2010 to carryout necessary diagnostic activities in few coal-fired power plants pertaining to Energy Efficient Renovation & Modernisation works and suggest measures to overcome barriers for promoting R&M, measurement for environmental improvement of coal-fired power plants in India

The 2nd Phase MOU between CEA and JCOAL was signed on 11.06.2012 for carrying out detail diagnostic study for energy efficiency oriented R&M activities in three nos. of units. JCOAL team visited Badarpur TPS and Unchahar TPS of NTPC during December, 2012. The final study report for energy efficiency oriented R&M activities was submitted on 15th April, 2013.

The 3rd Memorandum of Understanding (MoU) on India – Japan Cooperation for Project on Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity was signed on 22nd January, 2016.

The 4th MoU between CEA and JCOAL has been signed on 16th December, 2019 for Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity Following activities to be carried out under 4th MoU:

- Update on the current and future policy trend in the Indian power sector and consideration of the identified issues/barriers to find out those which could be addressed through mutual collaboration.
- Identification of issues to be addressed regarding both existing and upcoming facilities, and also operation and maintenance.
- Implementation of studies with priorities, but not limited to environmental technologies for coal fired power generation Flexibilization measures and biomass utilization are also of high priority
- Biomass study on Co firing of biomass pellets and Waste to Energy technologies and Coal GCV loss in power plant and its remedies
- Implementation of an annual workshop in India and CCT Training Programme in Japan
- Holding a joint meeting to discuss issues that have arisen or may arise in the course of implementation of the Cooperation

One-day workshop on " Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" was held on 11th Nov, 2016 , 10th Nov 2017, 10th Nov 2018 and 8th Nov 2019, 25th January 2021 , 12th Nov,2021 , 13th Jan , 2023 and 14th December , 2023 at New Delhi by CEA and JCOAL. Various stake holders from Central/State/Private in power sector participated in the workshop.

Under Clean Coal Technology (CCT) Training Programme study tours to Japan have been organized in which representatives from MoP, CEA and different power utilities have participated. The participants visited the latest USC power stations and updated about various applicable technologies and equipment as well as O&M technique. During the year 2020-21 also, one group of 10 participants have undergone the CCT Training Programme from 19th Jan 2021 to 21st Jan., 2021. In FY21, group participants have undergone the CCT Training Programme from 27th Oct. 2021 to 29th Oct., 2021. During the FY22, 50 participants have undergone the Virtual CCT Training Programme from 31st Oct. 2022 to 2nd Nov., 2022.

Efficiency test at Mouda Thermal Power Station, NTPC has been conducted between 06.01.2020 to 10.01.2020 under Indo Japan Energy Dialogue by TEPCO Power Grid Inc. and JERA under the observation of CEA. Thermal Efficiency at different loading conditions was obtained for Units #3 and #4. Performance test report was submitted.

Under Indo-Japan Cooperation, a one-day Workshop on "Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" organized jointly by CEA and JCOAL on 14th December, 2023.

Indo-Denmark Co-operation

A MOU on India-Denmark Energy Cooperation was signed between the two governments in June 2020. TPRM Division, CEA is coordinating the following areas/activities under this cooperation:

i. Transfer of technology for emission control from Thermal Power plants,
ii. Waste heat recovery from Thermal power plants,

iii. Flexibility in operation of power plants for RE integration.

Flexible operation test has been successfully conducted in thermal generating units of Unit #7, 500MW Ramagundam TPS of NTPC and Unit #3, 210 MW Raichur TPS of KPCL under India-Denmark cooperation.

Annexure-I

As on 31.03.2026

Details of Thermal Power Units where the R&M/Life Extension (LE) Works have been Completed During 2017-22

Sl. No.	Name of the TPS	Unit No.	Capacity MW	Utility	State/Central Sector	Date of Synchroni-sation after LE Works
1	Ukai	4	200	GSECL	State Sector	17-05-2017
2	Wanakabori	3	210	GSECL	State Sector	27-11-2017
3	Koradi	6	210	MAHAGENC O	State Sector	20-08-2018
4	Obra	12	200	UPRVUNL	State Sector	24-09-2018
5	Obra	13	200	UPRVUNL	State Sector	27-09-2022
6	Kolaghat	3	210	WBPDCL	State Sector	30-12-2025

Total (State) - 06 Units 1230.00 MW

Annexure-II

As on 31.03.2026

Details of Thermal Power Units where the R&M Works have been Completed During 2017-22

Sl. No.	Name of the TPS	Unit No.	Capacity MW	Utility	State/Central Sector	Date of completion of R&M works
1	Kathalguri CCGT	6	33.5	NEEPCO	Central	31-03-2018
2.	Kathalguri CCGT	3	33.5	NEEPCO	Central	20-07-2018
3.	Barauni TPS	6	110	NTPC	Central	31-05-2022

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Total (Central) - 03 Unit 177.00 MW

Annexure III

Phase I Status of R&M/LE implementation (01.01.2024 to 30.06.2026)

Central Sector

S.No	Utility	Name of Station	Unit No.	Year of Comm	Cap. (MW)	Status
1	DVC	MEJIA TPS	1	1996	210	RLA of Boiler-11.03.2022, RLA of Turbine-27.05.2022, RLA of Generator-26.12.2024. LOA for prepration of DPR has been awarded to M/S NTPC Ltd. on 29th of Sep. 2023. DPR has been submitted by M/s NTPC for R&M of the MTPS U#1,2&3 in the month FEB-2026. **Boiler:** As per prelimenary Report. 1-Change of ID fan transmission from Voith Coupling to VFD Motor. 2-Change of ECO Intermediate Header C 3-Replacement of Lub Oil Cooling Water Pipeline. 4-Conversion of Manual Valves into Automatic Valves and Replacement of Automatic Valves, 5-Replacement of Expansion Joints. **Turbine Generator:** As per prelimenary Report. 1.Replace LP rotor, IP inner casing and HP Inner casing next available opportunity. 2.Replace studs & cap nuts of HP inner casing and IP inner casing immediately. 3.Procure spares such as valve internal, journal bearings, compensators, seal rings etc. for meeting exigency in future. **Electrical & Instrumentation :** As per prelimenry Report the generator design data (part of RLA report R 01dated Dec'2023) for Unit#1 generator, the temperature rise is limited to Insulation class B and insulation class has been indicated as Class F. The spare generator procured is already having insulation Class-F. In view of above, it is suggested to upgrade the Insulation system of the running Generators of Unit#1,2&3 to Class F which would help the generators to run at full load in a sustained way without getting impacted by thermal deterioration. **BOP:** As per prelimenary Report. 1-In view of the lesser CW flow, CW head and reduction in pump efficiency, it is suggested to replace the existing pumps with the new pump of same design flow and head i.e. 12600 m3/hr @ 25.17 mWC.
2	DVC	MEJIA TPS	2	1997	210	RLA of Boiler-11.03.2022, RLA of Turbine-27.05.2022, RLA of Generator-26.12.2024. LOA for prepration of DPR has been awarded to M/S NTPC Ltd. on 29th of Sep. 2023. DPR has been submitted by M/s NTPC for R&M of the MTPS U#1,2&3 in the month FEB-2026. **Boiler:** As per prelimenary Report. 1-Change of ID fan transmission from Voith Coupling to VFD Motor. 2-Change of ECO Intermediate Header C 3-Replacement of Lub Oil Cooling Water Pipeline. 4-Conversion of Manual Valves into Automatic Valves and Replacement of Automatic Valves, 5-Replacement of Expansion Joints. **Turbine Generator:** As per prelimenary Report. 1.Replace LP rotor, IP inner casing and HP Inner casing next available opportunity. 2.Replace studs & cap nuts of HP inner casing and IP inner casing immediately. 3.Procure spares such as valve internal, journal bearings, compensators, seal rings etc. for meeting exigency in future. **Electrical & Instrumentation :** As per prelimenry Report the generator design data (part of RLA report R 01dated Dec'2023) for Unit#1 generator, the temperature rise is limited to Insulation class B and insulation class has been indicated as Class F. The spare generator procured is already having insulation Class-F. In view of above, it is suggested to upgrade the Insulation system of the running Generators of Unit#1,2&3 to Class F which would help the generators to run at full load in a sustained way without getting impacted by thermal deterioration. **BOP:** As per prelimenary Report. 1-In view of the lesser CW flow, CW head and reduction in pump efficiency, it is suggested to replace the existing pumps with the new pump of same design flow and head i.e. 12600

						m3/hr @ 25.17 mWC.
3	DVC	MEJIA TPS	3	1998	210	RLA of Boiler-11.03.2022, RLA of Turbine-27.05.2022, RLA of Generator-26.12.2024. LOA for prepration of DPR has been awarded to M/S NTPC Ltd. on 29th of Sep. 2023. DPR has been submitted by M/s NTPC for R&M of the MTPS U#1,2&3 in the month FEB-2026. **Boiler:** As per prelimenary Report. 1-Change of ID fan transmission from Voith Coupling to VFD Motor. 2-Change of ECO Intermediate Header C 3-Replacement of Lub Oil Cooling Water Pipeline. 4-Conversion of Manual Valves into Automatic Valves and Replacement of Automatic Valves, 5-Replacement of Expansion Joints. **Turbine Generator:** As per prelimenary Report. 1.Replace LP rotor, IP inner casing and HP Inner casing next available opportunity. 2.Replace studs & cap nuts of HP inner casing and IP inner casing immediately. 3.Procure spares such as valve internal, journal bearings, compensators, seal rings etc. for meeting exigency in future. **Electrical & Instrumentation :** As per prelimenry Report the generator design data (part of RLA report R 01dated Dec'2023) for Unit#1 generator, the temperature rise is limited to Insulation class B and insulation class has been indicated as Class F. The spare generator procured is already having insulation Class-F. In view of above, it is suggested to upgrade the Insulation system of the running Generators of Unit#1,2&3 to Class F which would help the generators to run at full load in a sustained way without getting impacted by thermal deterioration. **BOP:** As per prelimenary Report. 1-In view of the lesser CW flow, CW head and reduction in pump efficiency, it is suggested to replace the existing pumps with the new pump of same design flow and head i.e. 12600 m3/hr @ 25.17 mWC.
4	NTPC	SINGRAULI STPS	1	1982	200	R&M / LE activities using special allowance are planned to be completed without needing any specific unit shut down as per the timeline proposed by CEA.
5	NTPC	SINGRAULI STPS	2	1982	200	
6	NTPC	SINGRAULI STPS	3	1983	200	
7	NTPC	SINGRAULI STPS	4	1983	200	
8	NTPC	SINGRAULI STPS	5	1984	200	
9	NTPC	RAMAGUNDEM STPS	1	1983	200	
10	NTPC	KORBA STPS	1	1983	200	
11	NTPC	KORBA STPS	2	1983	200	
Total				**2230 (MW)**		

State Sector

S .No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	M.P	Satpura TPS,	6	1979	200	1) These units have been retired on dtd. 30.09.2024. 2) Order for dismantling of these units has been issued on dtd. 05.11.2025
2	M.P	Satpura TPS,	7	1980	210	
3	M.P	Satpura TPS,	8	1983	210	

4	M.P	Satpura TPS,	9	1984	210	3) NTPC has prepared DPR for installation of 660 MW Unit at the land to be vacated after dismantling of the Units. 4) NTPC found feasible to installation of 660 MW Unit on vacated land by dismantling of the Units. Accordingly, they are prepared DPR for installation of 660 MW Unit No. 13. BoD of MPPGCL has provisionally accepted the DPR of new Unit No.13.
5	Karnataka	Raichur TPS	1	1985	210	**Boiler & Aux,Turbine & Aux, C&I, Bunker restoration** Unit#1 restoration work is under progress. **A) Stacker B) Common Control Room** A). All major materials have been supplied by Agency. Erection & Commissioning activities will be carried after line clearance of S/R-1 is obtained. B).All major materials have been supplied by Agency. Erection & Commissioning activities will be carried after line clearance.
6	Karnataka	Raichur TPS	2	1986	210	**Boiler and Aux:** Received Budgetary offer for Conditional assesment of Unit-2 ducts of Boiler. **Mills and Aux:** Conversion of 6 Nos. of volumetric feeders to rotary type Gravimetric feeders, Budget Approval is awaited.
7	Gujarat	Ukai TPS	3	1979	200	(1) **ESP R&M:** Retrofitting of Electrostatic Precipitators (ESPs) (100% completed) (2) **Ash Plan**t: Combine ash slurry pump house for UTPS unit No. 3, 4 & 5 for enhancing capacity completed in May-2022. **TG**: TG: Complete replacement of HP, IP casings and internals and replacement of internals in LP turbines with modification in steam path (80%) **Boiler** -Boiler back pass & Flexible Operation: Modification of Boiler for flexible unit of operation to run unit at 40% load without oil support also back pass modification work and APH replacement work (90%). **C&I:** Up-gradation of 2x200 MW Ukai Unit -3&4. Completed in April-2016. Expected/Actual date of start of Work 04.08.2025.
8	Gujarat	Ukai TPS	5	1985	210	**ESP R&M**: Retrofitting of Electrostatic Precipitators (ESPs) **Boiler** -Modification of Boiler for flexible unit of operation to run unit at 40% load without oil support also back pass modification work and APH replacement work (%) Work Not started. **TG-**Complete replacement of HP, IP casings and internals and replacement of internals in LP turbines with modification in steam path. (%) Work Not started. **C&I**-Up-gradation of existing Siemens makes DCS system by latest DCS system for TG and central DCS (%) Work Not started. **Ash Plant:** Combine ash slurry pump house for UTPS unit No. 3, 4 & 5 for enhancing capacity.- completed in May-2022.

9	Gujarat	Wanakbori TPS	1	1982	210	**ESP R&M**: Retrofitting of Electrostatic Precipitators (ESPs) **Boiler-**Modification of Boiler for flexible unit of operation to run unit at 40% load without oil support also back pass modification work and APH replacement work (%) Work Not started. **TG** - Complete replacement of HP, IP casings and internals and replacement of internals in LP turbines with modification in steam path. (%) Work Not started.
10	Gujarat	Wanakbori TPS	2	1983	210	**ESP R&M**: Retrofitting of Electrostatic Precipitators (ESPs) **Boiler-**Modification of Boiler for flexible unit of operation to run unit at 40% load without oil support also back pass modification work and APH replacement work (%) Work Not started. **TG** - Complete replacement of HP, IP casings and internals and replacement of internals in LP turbines with modification in steam path. (%) Work Not started.
11	Chhattisgarh	Korba (West)	1	1983	210	**Turbine**-completed in unit 1,3 &4 **Boiler-**Inspection of Headers of PSH, FSH, LTSH & RH coils MPI, Boroscopy, NDT, DP, Thickness Measurement, Hardness & Metallurgy test etc. to be carried out during RLA. **C&I-**Replacement of old RCF panels with upgraded panels Supply, installation & commissioning of Field Dozing.
12	Chhattisgarh	Korba (West)	2	1984	210	
13	Chhattisgarh	Korba (West)	3	1985	210	
14	Odisha	IB VALLEY TPS	1	1994	210	Ongoing R&M and LE study
15	Odisha	IB VALLEY TPS	2	1995	210	Ongoing R&M and LE study
16	West Bengal	KOLAGHAT TPS	3	1984	210	R&M completed Within time frame. Ash Plant:- Augmentation of Ash Plant capacity, complete change of Bottom Ash Hopper internals, vacuum pumps, Ash conveying system, Silo unloading system, vent fan, vent filter etc. Installation of FAE Tower. ESP Unit 3:- Complete new ESP installation. Height increase of ESP to 15M, change of all electrodes, HFTR and TR sets along with new control panels, control room etc. DSI for Unit 3:- Installation of new DSI system, viper mills, SBC conveying pipelines to APH I/L, SBC Silo's and new SOX monitoring system.
17	Tamil Nadu	TUTICORIN TPS	1	1979	210	Ongoing Need based R&M Procurement of 1No. spare Primary Air Fan Motor of 6.6KV, 900KW, 1490RPM with antifriction bearings for unit-I PA fan locations at TTPS. Replacement of 2nos. 16MVA,15.75KV/7KV Unit

						auxiliary transformers in units - I at TTPS.
18	Tamil Nadu	TUTICORIN TPS	2	1980	210	Ongoing Need based R&M Procurement of 1No. spare Primary Air Fan Motor of 6.6KV, 900KW, 1490RPM with antifriction bearings for unit-I PA fan locations at TTPS. Replacement of 2nos. 16MVA, 15.75KV/7KV Unit auxiliary transformers in units - II TTPS.
19	Tamil Nadu	TUTICORIN TPS	3	1982	210	Ongoing Need based R&M Distributed Digital Control Monitoring and Information System (DDCMIS) in Unit III. Design, Manufacture, Supply, Erection, Testing & Commissioning of Economizer coil Assembly, LTSH Supply Tubes & Bends and straight tube panels for Super Heater Rear wall near Economizer complete for 210MW.
20	Maharashtra	Bhusawal TPS	3	1982	210	Need based R&M
21	Maharashtra	CHANDRAPUR STPS	3	1985	210	Need based R&M
22	Maharashtra	CHANDRAPUR STPS	4	1986	210	Need based R&M
23	Maharashtra	NASIK TPS	3	1979	210	Need based R&M
24	Maharashtra	NASIK TPS	4	1980	210	Need based R&M
25	Maharashtra	NASIK TPS	5	1981	210	Need based R&M
Total				**5230 (MW)**		

PRIVATE SECTOR

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	status
1	Maharashtra	TROMBAY TPS	5	1984	500	do not intend to carry out R & M as PPA is only for 5 years with minimum allowed capex

Annexure IV

S. No.	Five Year Plan	Year	No. of TPS / No. of Units	Capacity (MW)	Additional Generation Achieved MU/ Annum*	Equivalent MW**
1	7th Plan & 2 Annual Plans	85-86 to 89-90 & 90-91, 91-92	**34 / 163**	**13570**	100 00	2000
2	8th Plan (R&M) (LEP)	1992 to 1997	**44 / 198** 43/(194) 1 /(4)	**20869** (20569) (300)	5085	763
3	9th Plan (R&M) (LEP)	1997 to 2002	**37 / 152** 29/ (127) 8/ (25)	**18991** (17306) (1685)	14500	2200
4	10th Plan (R&M) (LEP)	2002 to 2007	**9/25** 5/(14) 4/(11)	**3445** (2460) (985)	2000	300
5	11th Plan (R&M) (LEP)	2007 to 2012	**21/72** 15/(59) 6/(13)	**16146** (14855) (1291)	5400	820
6	12th Plan (R&M) (LEP)	2012 to 2017	**18/37** 8/16 10/21	**7202.5** 4560.50 2641.76	----	----

Annexure V

The Summary of R&M/ LE completed during (2017-2022) Projects is given below:

Year	LE No. of units (MW)		R & M No. of units (MW)		Total (state + central) No. of units (MW)		Total LE and R&M No. of units (MW)
	State	Central	State	Central	State	Central	
2017-18	02(410)	--	--	02(67)	02(410)	02(67)	04(477)
2018-19	02(410)	--	--	--	2(410)	--	02(410)
2019-22	--	--					
2022-23	01(200)	--	--	01(110)	01(200)	01(110)	02(310)
2024-25	--	--	01(210)	--	01(210)	--	01(210)
Total No. of units (MW)	05(1020)	--	01(210)	03(177)	06(1230)	03(177)	09(1407)
	05(1020)		4(387)		**09(1407)**		

Annexure VI

List of NTPC & JV thermal plants operating at 55% Minimum Technical Load:

	NTPC Coal Stations	Commercial Capacity MW	Capacity achieving 55% MTL
1	Singrauli	2000	2000
2	Rihand	3000	3000
3	Unchahar	1550	1550
4	Tanda	1100	1100
5	Dadri coal	1820	1820
6	Mouda	2320	2320
7	Korba	2600	2600
8	Vindhyachal	4760	4760
9	Sipat	2980	2980
10	Ramagundam	2600	2600
11	Simhadri	2000	2000
12	Farakka	2100	2100
13	Kahalgaon	2340	2340
14	Barh	1320	1320
15	Talcher kaniha	3000	3000
16	Bongaigaon	750	750
17	Kudgi	2400	2400
18	Solapur	1320	1320
19	Gadarwara	1600	1600
20	Lara	1600	1600

21	Barauni	360	360
22	Darlipalli	800	800
23	Khargone	1320	1320
	NTPC COAL TOTAL	**45640**	**45640**

	JV Coal Stations	**Commercial Capacity MW**	**Capacity achieving 55% MTL**
1	Bhilai PP III	500	500
2	Kanti**	610	610
3	Jhajjar	1500	1500
4	Vallur	1500	1500
5	BRBCL	750	750
6	NPGCL	660	660
7	Meja	1320	1320
	JV COAL TOTAL	**6840**	**6840**
	NTPC+JV Total* **	**52480**	**52480**

** Kanti Stage 1, comprising of two units of 110 MW capacity, is unable to achieve 1% Ramp up & down.

*** JV Captive Coal plants totaling 314 MW are not considered

List of thermal plants (Non NTPC) operating at 55% Minimum Technical Load:

S. No.	Region	State	Sector	Organisation	Name of Project	Location District	Fuel used	Unit No.	Total Capacity (MW)
1	NR	Rajasthan	State Sector	RRVUNL	CHHABRA TPP	Baran	Coal	5	660
2	NR	Rajasthan	State Sector	RRVUNL	CHHABRA TPP	Baran	Coal	6	660
3	NR	Rajasthan	State Sector	RRVUNL	KOTA TPS	Kota	Coal	1	110
4	NR	Rajasthan	State Sector	RRVUNL	KOTA TPS	Kota	Coal	2	110
5	WR	Gujarat	State Sector	GSECL	UKAI TPS	Tapi	Coal	6	500
6	WR	Chhattisgarh	Private Sector	JPL	OP JINDAL TPS	Raigarh	Coal	2	250
7	WR	Chhattisgarh	Private Sector	JPL	OP JINDAL TPS	Raigarh	Coal	4	250
8	WR	Chhattisgarh	Private Sector	JPL	TAMNAR TPP	Raigarh	Coal	1	600
9	WR	Madhya Pradesh	Private Sector	JHAPL	SEIONI TPP	Seoni	Coal	1	600
10	SR	Tamil Nadu	Private Sector	ITPCL	ITPCL TPP	Cuddalore	Coal	1	600
11	SR	Tamil Nadu	Private Sector	ITPCL	ITPCL TPP	Cuddalore	Coal	2	600
12	SR	Tamil Nadu	Private Sector	CEPL	MUTHIARA TPP	Thoothukudi	Coal	1	600
13	SR	Tamil Nadu	Private Sector	CEPL	MUTHIARA TPP	Thoothukudi	Coal	2	600
14	SR	Tamil Nadu	Central Sector	NTPL	TUTICORIN (JV) TPP	Thoothukudi	Coal	1	500
15	SR	Tamil Nadu	Central Sector	NTPL	TUTICORIN (JV) TPP	Thoothukudi	Coal	2	500
16	ER	Jharkhand	Central Sector	DVC	KODERMA TPP	Koderma	Coal	1	500
17	ER	Orrisa	State Sector	OPGC	IB VALLEY TPS	Jharsuguda	Coal	3	660
18	ER	Orrisa	State Sector	OPGC	IB VALLEY TPS	Jharsuguda	Coal	4	660
19	SR	Andhra Pradesh	Private Sector	SEIL	PAINAMPURAM TPP	SPSR Nellore	Coal	1	660
20	SR	Andhra Pradesh	Private Sector	SEIL	PAINAMPURAM TPP	SPSR Nellore	Coal	2	660
21	SR	AndhraPradesh	State Sector	APGENCO	RAYALASEEMA TPS	YSR Kadapa	Coal	6	600
22	SR	Andhra Pradesh	State Sector	APPDCL	DAMODARAM SANJEEVAIAH TPS	SPSR Nellore	Coal	1	800
23	SR	Andhra Pradesh	State Sector	APPDCL	DAMODARAM SANJEEVAIAH TPS	SPSR Nellore	Coal	2	800
24	NR	Uttar Pradesh	Private Sector	LPGCL	LALITPUR TPS	Lalitpur	Coal	1	660

25	NR	Uttar Pradesh	Private Sector	LPGCL	LALITPUR TPS	Lalitpur	Coal	2	660
26	NR	Uttar Pradesh	Private Sector	LPGCL	LALITPUR TPS	Lalitpur	Coal	3	660
27	NR	Uttar Pradesh	Private Sector	BEPL	BARKHERA TPS	Pilibhit	Coal	1	45
28	NR	Uttar Pradesh	Private Sector	BEPL	BARKHERA TPS	Pilibhit	Coal	2	45
29	NR	Uttar Pradesh	Private Sector	BEPL	KHAMBARKHERA TPS	Kheri	Coal	1	45
30	NR	Uttar Pradesh	Private Sector	BEPL	KHAMBARKHERA TPS	Kheri	Coal	2	45
31	NR	Uttar Pradesh	Private Sector	BEPL	KUNDARKI TPS	Gonda	Coal	1	45
32	NR	Uttar Pradesh	Private Sector	BEPL	KUNDARKI TPS	Gonda	Coal	2	45
33	NR	Uttar Pradesh	Private Sector	BEPL	MAQSOODPUR TPS	Shahjahanpur	Coal	1	45
34	NR	Uttar Pradesh	Private Sector	BEPL	MAQSOODPUR TPS	Shahjahanpur	Coal	2	45
35	NR	Uttar Pradesh	Private Sector	BEPL	UTRAULA TPS	Balrampur	Coal	1	45
36	NR	Uttar Pradesh	Private Sector	BEPL	UTRAULA TPS	Balrampur	Coal	2	45
~~37~~	~~NR~~	~~Uttar Pradesh~~	~~State Sector~~	~~UPRVUNL~~	~~PARICHHA TPS~~	~~Jhansi~~	~~Coal~~	~~1~~	~~110~~
~~38~~	~~NR~~	~~Uttar Pradesh~~	~~State Sector~~	~~UPRVUNL~~	~~PARICHHA TPS~~	~~Jhansi~~	~~Coal~~	~~2~~	~~110~~
40	NR	Uttar Pradesh	State Sector	UPRVUNL	PARICHHA TPS	Jhansi	Coal	3	210
41	NR	Uttar Pradesh	State Sector	UPRVUNL	PARICHHA TPS	Jhansi	Coal	4	210
42	NR	Uttar Pradesh	State Sector	UPRVUNL	PARICHHA TPS	Jhansi	Coal	5	250
43	NR	Uttar Pradesh	State Sector	UPRVUNL	PARICHHA TPS	Jhansi	Coal	6	250
44	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	4	210
45	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	5	210
46	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	1	210
47	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	2	210
48	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	3	210
49	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	4	500
50	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	5	500
51	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	6	500
52	NR	Uttar Pradesh	State Sector	UPRVUNL	ANPARA TPS	Sonbhadra	Coal	7	500
53	NR	Punjab	Private Sector	NPL	RAJPURA TPP	Patiala	Coal	1	700

54	NR	Punjab	Private Sector	NPL	RAJPURA TPP	Patiala	Coal	2	700
55	WR	Maharashtra	Private Sector	TATA PCL	TROMBAY TPS	Mumbai	Coal	5	500
56	NR	Uttar Pradesh	State Sector	UPRVUNL	OBRA TPS	Sonbhadra	Coal	9	200
57	NR	Uttar Pradesh	State Sector	UPRVUNL	OBRA TPS	Sonbhadra	Coal	10	200
58	NR	Uttar Pradesh	State Sector	UPRVUNL	OBRA TPS	Sonbhadra	Coal	11	200
59	SR	Karnataka	State Sector	RPCL	Yermarus TPS	Raichur	Coal	1	800
60	SR	Karnataka	State Sector	RPCL	Yermarus TPS	Raichur	Coal	2	800
61	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	6	210
62	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	7	210
63	NR	Punjab	Private Sector	TSPL	TALWANDI SABO TPP	Mansa	Coal	1	660
64	NR	Punjab	Private Sector	TSPL	TALWANDI SABO TPP	Mansa	Coal	2	660
65	NR	Punjab	Private Sector	TSPL	TALWANDI SABO TPP	Mansa	Coal	3	660
66	SR	Karnataka	State Sector	KPCL	BELLARY TPS	Bellary	Coal	1	500
67	SR	Karnataka	State Sector	KPCL	BELLARY TPS	Bellary	Coal	2	500
68	SR	Karnataka	State Sector	KPCL	BELLARY TPS	Bellary	Coal	3	700
69	ER	Jharkhand	Private Sector	MPL	MAITHON RB TPP	Dhanbad	Coal	1	525
70	ER	Jharkhand	Private Sector	MPL	MAITHON RB TPP	Dhanbad	Coal	2	525
71	ER	West Bengal	Private Sector	HEL	HALDIA TPP	Purba Medinipur	Coal	1	300
72	ER	West Bengal	Private Sector	HEL	HALDIA TPP	Purba Medinipur	Coal	2	300
73	NR	Uttar Pradesh	State Sector	UPRVUNL	HARDUAGANJ TPS	Aligarh	Coal	7	105
74	NR	Uttar Pradesh	State Sector	UPRVUNL	HARDUAGANJ TPS	Aligarh	Coal	8	250
75	NR	Uttar Pradesh	State Sector	UPRVUNL	HARDUAGANJ TPS	Aligarh	Coal	9	250
76	WR	Gujarat	State Sector	GMDCL	AKRIMOTA LIG TPS	Kutch	Lignite	1	125
77	WR	Gujarat	State Sector	GMDCL	AKRIMOTA LIG TPS	Kutch	Lignite	2	125
78	WR	Maharashtra	Private Sector	DIPL	DHARIWAL TPP	Chandrapur	Coal	1	300
79	WR	Maharashtra	Private Sector	DIPL	DHARIWAL TPP	Chandrapur	Coal	1	300
80	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MH.) TPS	Chandrapur	Coal	5	500
81	WR	Gujarat	Private Sector	CGPL	MUNDRA UMTPP	Kutch	Coal	1	800

82	WR	Gujarat	Private Sector	CGPL	MUNDRA UMTPP	Kutch	Coal	2	800
83	WR	Gujarat	Private Sector	CGPL	MUNDRA UMTPP	Kutch	Coal	3	800
84	WR	Gujarat	Private Sector	CGPL	MUNDRA UMTPP	Kutch	Coal	4	800
85	WR	Gujarat	Private Sector	CGPL	MUNDRA UMTPP	Kutch	Coal	5	800
86	NR	Uttar Pradesh	Private Sector	PPGCL	Prayagraj TPP	Allahabad	Coal	2	660
87	WR	Maharashtra	State Sector	MAHAGENCO	Khaperkheda TPS	Nagpur	Coal	1	210
88	WR	Maharashtra	State Sector	MAHAGENCO	Khaperkheda TPS	Nagpur	Coal	2	210
89	WR	Maharashtra	State Sector	MAHAGENCO	Khaperkheda TPS	Nagpur	Coal	3	210
90	WR	Maharashtra	State Sector	MAHAGENCO	Khaperkheda TPS	Nagpur	Coal	4	210
91	WR	Maharashtra	State Sector	MAHAGENCO	Khaperkheda TPS	Nagpur	Coal	5	500
92	WR	Maharashtra	State Sector	MAHAGENCO	Koradi TPS	Nagpur	Coal	8	660
94	ER	West Bengal	Central Sector	DVC	Mejia TPS	Bankura	Coal	7	500
95	ER	West Bengal	Central Sector	DVC	Mejia TPS	Bankura	Coal	8	500
96	ER	West Bengal	Central Sector	DVC	Koderma TPS	Koderma	Coal	2	500
97	ER	West Bengal	Central Sector	DVC	DURGAPUR STEEL TPS	Barddhaman	Coal	1	500
98	ER	West Bengal	Central Sector	DVC	DURGAPUR STEEL TPS	Barddhaman	Coal	2	500
99	ER	West Bengal	Central Sector	DVC	BOKARO TPS `A` EXP	BOKARO	Coal	1	500
1000	WR	Maharashtra	State Sector	MAHAGENCO	Koradi TPS	Nagpur	Coal	9	660
1001	WR	Maharashtra	State Sector	MAHAGENCO	Koradi TPS	Nagpur	Coal	10	660
1002	ER	Jharkhand	Central Sector	DVC	CHANDRAPURA(DVC) TPS	Bokaro	Coal	7	250
1003	ER	West Bengal	Central Sector	DVC	Raghunathpur	Purulia	Coal	1	600
1004	NR	Haryana	State Sector	HPGCL	YAMUNA NAGAR TPS	Yamuna Nagar	Coal	1	300
1005	NR	Haryana	State Sector	HPGCL	YAMUNA NAGAR TPS	Yamuna Nagar	Coal	2	300
1006	NR	Haryana	State Sector	HPGCL	RAJIV GANDHI TPS	Hisar	Coal	1	600
1007	NR	Haryana	State Sector	HPGCL	RAJIV GANDHI TPS	Hisar	Coal	2	600

108	WR	Maharashtra	Private Sector	RATTAN INDIA	Amravati TPS	Amravati	Coal	1	270
109	WR	Maharashtra	Private Sector	RATTAN INDIA	Amravati TPS	Amravati	Coal	2	270
110	WR	Maharashtra	Private Sector	RATTAN INDIA	Amravati TPS	Amravati	Coal	3	270
111	WR	Maharashtra	Private Sector	RATTAN INDIA	Amravati TPS	Amravati	Coal	4	270
112	WR	Maharashtra	Private Sector	RATTAN INDIA	Amravati TPS	Amravati	Coal	5	270
113	WR	Chhattisgarh	Private Sector	JPL	OP JINDAL TPS	Raigarh	Coal	1	250
114	WR	Chhattisgarh	Private Sector	JPL	OP JINDAL TPS	Raigarh	Coal	3	250
115	ER	West Bengal	Central Sector	DVC	RAGHUNATHPUR TPP	Purulia	Coal	2	600
116	SR	Tamil Nadu	State Sector	TANGEDCO	METTUR TPS-II	Salem	Coal	1	600
117	WR	Madhya Pradesh	State Sector	MPPGCL	SHREE SINGAJI TPP	Khandwa	Coal	3	660
118	WR	Gujarat	Private Sector	TOR. POW. (UNOSUGEN)	SABARMATI (D-F STATIONS)	Ahmedabad	Coal	2	120
119	WR	Gujarat	Private Sector	TOR. POW. (UNOSUGEN)	SABARMATI (D-F STATIONS)	Ahmedabad	Coal	3ta	121
120	WR	Gujarat	Private Sector	TOR. POW. (UNOSUGEN)	SABARMATI (D-F STATIONS)	Ahmedabad	Coal	4	121
121	WR	Chhattisgarh	Private Sector	JPL	TAMNAR TPP	Raigarh	Coal	2	600
122	SR	Tamil Nadu	State Sector	TANGEDCO	NORTH CHENNAI TPS	Thiruvallur	Coal	1	210
123	SR	Tamil Nadu	State Sector	TANGEDCO	NORTH CHENNAI TPS	Thiruvallur	Coal	4	600
124	WR	Chhattisgarh	Private Sector	DBPCL	BARADARHA TPS	Janjgir Champa	Coal	1	600
125	WR	Madhya Pradesh	State Sector	MPPGCL	SHREE SINGAJI TPP	Khandwa	Coal	1	600
126	WR	Chhattisgarh	Private Sector	JPL	TAMNAR TPP	Raigarh	Coal	3	600
127	SR	Tamil Nadu	State Sector	TANGEDCO	NORTH CHENNAI TPS	Thiruvallur	Coal	2	210

128	WR	Madhya Pradesh	State Sector	MPPGCL	SHREE SINGAJI TPP	Khandwa	Coal	2	600
129	WR	Madhya Pradesh	State Sector	MPPGCL	SHREE SINGAJI TPP	Khandwa	Coal	4	660
130	WR	Chhattisgarh	Private Sector	DBPCL	BARADARHA TPS	Janjgir Champa	Coal	2	600
131	WR	Chhattisgarh	Private Sector	JPL	TAMNAR TPP	Raigarh	Coal	4	600
132	SR	Tamil Nadu	State Sector	TANGEDCO	NORTH CHENNAI TPS	Thiruvallur	Coal	5	600
133	WR	Madhya Pradesh	Private Sector	ESSARPMPL	MAHAN TPP	Singrauli	Coal	2	600
134	WR	Madhya Pradesh	Private Sector	ESSARPMPL	MAHAN TPP	Singrauli	Coal	1	600
135	WR	Chhattisgarh	Private Sector	TRNE	NAWAPARA TPP	Raigarh	Coal	2	300
136	ER	West Bengal	State Sector	WBPDC	BAKRESWAR TPS	Birbhum	Coal	1	210
137	ER	West Bengal	State Sector	WBPDC	BAKRESWAR TPS	Birbhum	Coal	2	210
138	ER	West Bengal	State Sector	WBPDC	BAKRESWAR TPS	Birbhum	Coal	3	210
139	ER	West Bengal	State Sector	WBPDC	BAKRESWAR TPS	Birbhum	Coal	5	210
140	ER	West Bengal	State Sector	WBPDC	SAGARDIGHI TPS	Murshidabad	Coal	3	500
141	ER	Bihar	Central Sector	NPGCL	NABINAGAR STPP	Aurangabad	Coal	3	660
141	ER	Bihar	Central Sector	NPGCL	NABINAGAR STPP	Aurangabad	Coal	4	250
142	ER	West Bengal	Private Sector	CESC	BUDGE BUDGE TPS	South Parganas	Coal	3	250
143	WR	Maharashtra	Private Sector	APL	TIRORA TPS	Gondia	Coal	5	660
144	WR	Maharashtra	Private Sector	APL	TIRORA TPS	Gondia	Coal	4	660
145	WR	Maharashtra	Private Sector	APL	TIRORA TPS	Gondia	Coal	3	660
146	NR	Rajasthan	Private Sector	APL	KAWAI TPS	Baran	Coal	1	660
147	NR	Rajasthan	Private Sector	APL	KAWAI TPS	Baran	Coal	2	660

148	WR	Maharashtra	Private Sector	APL	TIRORA TPS	Gondia	Coal	2	660
149	WR	Chhattisgarh	State Sector	CSPGCL	MARWA TPS	Janjgir Champa	Coal	2	500
150	WR	Maharashtra	Private Sector	APL	TIRORA TPS	Gondia	Coal	1	660
151	WR	Chhattisgarh	Private Sector	GCEL/ADANI	RAIKHEDA TPP	Raipur	Coal		685
152	WR	Chhattisgarh	Private Sector	GCEL/ADANI	RAIKHEDA TPP	Raipur	Coal		685
153	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	8	800
154	WR	Gujarat	State Sector	GSECL	UKAI TPS	Tapi	Coal	3	200
155	WR	Maharashtra	State Sector	MAHAGENCO	BHUSAWAL TPS	Bhusawal	Coal	5	500
156	WR	Maharashtra	State Sector	MAHAGENCO	BHUSAWAL TPS	Bhusawal	Coal	4	500
157	ER	Bihar	Central Sector	NTPC	BARH I	Patna	Coal	1	660
158	ER	Bihar	Central Sector	NTPC	NABINAGAR STPP	Aurangabad	Coal	2	660
159	ER	Odisha	Private Sector	JITPL	DERANG TPP	Angul	Coal	1	600
160	NR	Haryana	Private Sector	JhPL(HR)	MAHATMA GANDHI TPS	Jhajjar	Coal	1	660
161	NR	Haryana	Private Sector	JhPL(HR)	MAHATMA GANDHI TPS	Jhajjar	Coal	2	660
162	WR	Madhya Pradesh	State Sector	MPPGCL	SATPURA TPS	Betul	Coal	11	250
163	WR	Gujarat	State Sector	GSECL	SIKKA REP. TPS	Jamnagar	Coal	3	210
169	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	9	660
170	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	8	660
171	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	7	660
172	WR	Madhya Pradesh	State Sector	MPPGCL	SATPURA TPS	Betul	Coal	10	250
173	WR	Chhattisgarh	Private Sector	KWPCL	AVANTHA BHANDAR	Raigarh	Coal	1	600

174	WR	Madhya Pradesh	State Sector	MPPGCL	AMARKANTAK EXT TPS	Anuppur	Coal	3	210
175	WR	Madhya Pradesh	Private Sector	MBPMPL	ANUPPUR TPP	Anuppur	Coal	2	600
176	WR	Madhya Pradesh	Private Sector	MBPMPL	ANUPPUR TPP	Anuppur	Coal	1	600
177	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	9	500
178	NR	Uttar Pradesh	Private Sector	PPGCL (Jaypee)	PRAYAGRAJ TPP	Allahabad	Coal	1	660
179	NR	Uttar Pradesh	Private Sector	PPGCL (Jaypee)	PRAYAGRAJ TPP	Allahabad	Coal	3	660
180	SR	Andhra Pradesh	Private Sector	SEIL	SGPL TPP	SPSR Nellore	Coal	2	660
181	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	6	660
182	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	5	660
183	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	4	330
184	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	3	330
185	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	2	330
186	WR	Gujarat	Private Sector	APL	MUNDRA TPS	Kutch	Coal	1	330
187	ER	West Bengal	Private Sector	CESC	BUDGE BUDGE TPS	South Parganas	Coal	2	250
188	ER	West Bengal	Private Sector	CESC	BUDGE BUDGE TPS	South Parganas	Coal	1	250
189	WR	Gujarat	State Sector	GSECL	SIKKA REP. TPS	Jamnagar	Coal	4	210
190	WR	Gujarat	Private Sector	GIPCL	SURAT LIG. TPS	Surat	Lignite	4	125
191	WR	Gujarat	Private Sector	GIPCL	SURAT LIG. TPS	Surat	Lignite	3	125
192	WR	Gujarat	Private Sector	GIPCL	SURAT LIG. TPS	Surat	Lignite	1	125
193	WR	Gujarat	Private Sector	GIPCL	SURAT LIG. TPS	Surat	Lignite	2	125
194	WR	Gujarat	State Sector	GSECL	GANDHI NAGAR TPS	Gandhi Nagar	Coal	5	210

195	WR	Gujarat	State Sector	GSECL	GANDHI NAGAR TPS	Gandhi Nagar	Coal	4	210
196	WR	Gujarat	State Sector	GSECL	GANDHI NAGAR TPS	Gandhi Nagar	Coal	3	210
197	WR	Gujarat	State Sector	GSECL	UKAI TPS	Tapi	Coal	5	210
198	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	3	210
199	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	2	210
200	WR	Gujarat	State Sector	GSECL	WANAKBORI TPS	Kutch	Coal	1	210
201	WR	Gujarat	State Sector	GSECL	UKAI TPS	Tapi	Coal	4	200
202	ER	Jharkhand	Central Sector	NTPC	NORTH KARANPURA STPP	Chatra	Coal	1	660
203	ER	Odisha	Private Sector	JITPL	DERANG TPP	Angul	Coal	2	600
204	SR	Karnataka	State Sector	KPCL	RAICHUR TPS	Raichur	Coal	3	210
205	WR	Maharashtra	State Sector	MAHAGENCO	PARLI TPS	Beed	Coal	8	250
206	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	8	500
207	WR	Maharashtra	State Sector	MAHAGENCO	PARAS TPS	Akola	Coal	2	250
208	WR	Maharashtra	State Sector	MAHAGENCO	PARLI TPS	Beed	Coal	7	250
209	WR	Maharashtra	State Sector	MAHAGENCO	PARAS TPS	Akola	Coal	1	250
210	WR	Maharashtra	State Sector	MAHAGENCO	PARLI TPS	Beed	Coal	6	250
211	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	7	500
212	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	6	500
213	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	4	210
214	WR	Maharashtra	State Sector	MAHAGENCO	CHANDRAPUR(MAHARASHTRA) STPS	Chandrapur	Coal	3	210
215	WR	Maharashtra	State Sector	MAHAGENCO	BHUSAWAL TPS	Bhusawal	Coal	3	210

216	SR	Andhra Pradesh	Private Sector	SEIL	SGPL TPP	SPSR Nellore	Coal	1	660
217	NR	Rajasthan	State Sector	RRVUNL	SURATGARH STPS		Coal	8	660
218	NR	Rajasthan	State Sector	RRVUNL	SURATGARH STPS		Coal	7	660
219	SR	Tamil Nadu	State Sector	TANGEDCO	NORTH CHENNAI TPS	Thiruvallur	Coal	3	210
220	SR	Telangana	State Sector	TSGENCO	KOTHAGUDEM TPS (STAGE-7)	Bhadradri Kothagudem	Coal	12	800
221	SR	Telangana	State Sector	TSGENCO	KOTHAGUDEM TPS (NEW)	Bhadradri Kothagudem	Coal	11	500
222	NR	Uttar Pradesh	State Sector	UPRVUNL	HARDUAGANJ TPS		Coal	10	660
223	NR	Uttar Pradesh	Central Sector	NTPC	TANDA TPS		Coal	6	660
224	WR	Chhattisgarh	Private Sector	TRNE	NAWAPARA TPP	Raigarh	Coal	1	300
225	SR	Karnataka	Private Sector	UPCL	UDUPI TPP	Udupi	Coal	2	600
226	SR	Karnataka	Private Sector	UPCL	UDUPI TPP	Udupi	Coal	1	600
227	ER	West Bengal	State Sector	WBPDC	SANTALDIH TPS	Purulia	Coal	6	250
228	ER	West Bengal	State Sector	WBPDC	SANTALDIH TPS	Purulia	Coal	5	250
229	ER	West Bengal	State Sector	WBPDC	BAKRESWAR TPS	Birbhum	Coal	4	210
230	ER	West Bengal	State Sector	WBPDC	SAGARDIGHI TPS	Murshidabad	Coal	2	300
231	ER	West Bengal	State Sector	WBPDC	SAGARDIGHI TPS	Murshidabad	Coal	1	300
232	ER	West Bengal	State Sector	WBPDC	KOLAGHAT TPS	Purba Medinipur	Coal	4	210
233	ER	West Bengal	State Sector	WBPDC	KOLAGHAT TPS	Purba Medinipur	Coal	6	210
234	ER	West Bengal	State Sector	WBPDC	KOLAGHAT TPS	Purba Medinipur	Coal	5	210
235	ER	West Bengal	State Sector	WBPDC	KOLAGHAT TPS	Purba Medinipur	Coal	3	210
236	ER	West Bengal	State Sector	WBPDC	BANDEL TPS	Hugly	Coal	5	210

237	SR	Andhra Pradesh	State Sector	APPDCL	DAMODARAM SANJEEVAIAH TPS	SPSR Nellore	Coal	3	800
238	NR	Rajasthan	State Sector	RRVUNL	KALISINDH TPS	Jhalawar	Coal	1	600
239	SR	Tamil Nadu	State Sector	TANGEDCO	TUTICORIN TPS	Thoothukudi	Coal	5	210
240	WR	Chhattisgarh	Private Sector	ACB	KASAIPALLI TPP	Korba	Coal	2	135
241	WR	Chhattisgarh	Private Sector	ACB	KASAIPALLI TPP	Korba	Coal	1	135
242	WR	Chhattisgarh	Private Sector	SCPL	RATIJA TPS	Korba	Coal	2	50
243	WR	Chhattisgarh	Private Sector	ACB	CHAKABURA TPP	Korba	Coal	2	30
244	WR	Chhattisgarh	Private Sector	SCPL	RATIJA TPS	Korba	Coal	1	50
245	WR	Chhattisgarh	Private Sector	SVPPL	SVPL TPP	Korba	Coal	1	63
246	WR	Chhattisgarh	Private Sector	MCCPL	BANDAKHAR TPP	Korba	Coal	1	300
247	NR	Uttar Pradesh	Private Sector	RPSCL	ROSA TPP Ph-I	Shahjahanpur	Coal	4	300
248	NR	Uttar Pradesh	Private Sector	RPSCL	ROSA TPP Ph-I	Shahjahanpur	Coal	3	300
249	NR	Uttar Pradesh	Private Sector	RPSCL	ROSA TPP Ph-I	Shahjahanpur	Coal	2	300
250	NR	Uttar Pradesh	Private Sector	RPSCL	ROSA TPP Ph-I	Shahjahanpur	Coal	1	300
251	SR	Andhra Pradesh	State Sector	APGENCO	RAYALASEEMA TPS	YSR Kadapa	Coal	4	210
252	SR	Andhra Pradesh	State Sector	APGENCO	RAYALASEEMA TPS	YSR Kadapa	Coal	3	210
253	SR	Karnataka	State Sector	KPCL	RAICHUR TPS	Raichur	Coal	8	250
254	SR	Karnataka	State Sector	KPCL	RAICHUR TPS	Raichur	Coal	6	210
255	SR	Karnataka	State Sector	KPCL	RAICHUR TPS	Raichur	Coal	5	210
256	SR	Telangana	State Sector	TSGENCO	BHADRADRI TPP		Coal	4	270
257	SR	Telangana	State Sector	TSGENCO	BHADRADRI TPP		Coal	3	270

258	SR	Telangana	State Sector	TSGENCO	BHADRADRI TPP		Coal	2	270
259	SR	Telangana	State Sector	TSGENCO	BHADRADRI TPP		Coal	1	270
260	SR	Telangana	State Sector	SCCL	SINGARENI TPP	Mancherial	Coal	2	600
261	SR	Telangana	State Sector	TSGENCO	KAKATIYA TPS	Jayashankar Bhupalapally	Coal	2	600
262	SR	Telangana	State Sector	TSGENCO	KAKATIYA TPS	Jayashankar Bhupalapally	Coal	1	500

Annexure VII

Current Status of Phasing Plan of Flexible operation:

As of 30.09.2025, there is a delay in implementation of phasing plan. The 10 units totaling 5850 MW under pilot phase are at different stages of execution of pilot phase. A summary of same is provided below.

Organization	Name of Project	Unit No.	Capacity (MW)	40% status
NTPC	MAUDA TPS	1	500	NTPC reported that 40% MTL operation was tested in a controlled environment for 2-3 hours. Currently, only a 2% ramp rate has been achieved.
NTPC	SIMHADRI	3	500	
NTPC	DADRI	6	490	
DVC	MEJIA TPS	8	500	DVC reported that Mejia TPS Unit 8 **Achieved 40% MTL along with the required ramp rates** as of 18.12.2024.
NEYVELI LIGNITE	NEYVELI NEW TPP	2	500	NLC reported that a tender for achieving 40% MTL has been floated, and the tender under progress. Tender evaluation under process

KPCL	YERMARUS TPS	1	800	KPCL reported that the Performance Guarantee (PG) test has been completed, and the report for 40% MTL has been submitted. The unit is in the process of capturing data to ensure smooth operation at reduced loads.
GSECL	WANAKBORI TPP	6	800	40% MTL is achieved but for ramp rates technical and budgetary offers from OEM has been requested. The technical offer is under consideration.
RRVUNL	SURATGARH SCTPP	8	660	RRVUNL informed that BHEL has attended to boiler defects and carried out the PG test. However, the PG test at 40% MTL is still pending.BHEL informed that tests at 40% MTL have been conducted for both units & protocol is available.BHEL informed that Flexibilisation of units is outside the contract with RRVUNL & RRVUNL has not approached BHEL for the same. Repeat test for operation at MTL of 40% was successfully done in Unit-8 on 20 Feb 2025(informed later).
WBPDC	SAGARDIGHI TPS	3	500	Achieved 40% MTL
APL	RAIGARH TPS	2	600	-