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Central Electricity Authority

तापीय परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग
Thermal Projects Renovation & Modernisation Division



4th MoU between CEA and JCOAL signed on 16th Dec, 2019

Quarterly Review Report
Renovation & Modernisation of Thermal Power Stations

Quarter: Apr-Jun., 2021

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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 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.

R&M/LE works in 06 units of capacity of 887 MW have been completed upto 30-06-2021. At present, 3 coal based generating units with aggregate capacity of 410 MW are under shut down for carrying out the R&M/LE works.

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. The purpose of this MoU is to address issues and barriers in expediting sustainable, stable and low carbon thermal power development by means of studies, training program and knowledge-sharing activities, outcomes of which are to be conducive to overall power development in India as well as to expedite relevant policy implementation by the Government of India. Biomass co-firing (up to 30%) study at Ropar thermal power plant, Punjab is being conducted by JCOAL under the Indo-Japan Co-operation.

FY 2020-21 Clean Coal Technology (CCT) Training Program (Virtual) under Indo-Japan Cooperation has been organized between 19-21 Jan., 2021. A virtual workshop has also been organized on 25.01.2021 comprising participants from major Japanese and Indian utilities/manufacturers.

To ensure compliance of the new Environmental Norms notified by Ministry of Environment, Forest & Climate Change (MoEF&CC) on 7th Dec. 2015, phasing plan for FGD installation/ ESP –upgradation have prepared and concerned utilities are requested to furnish the details of action taken for timely compliance of these norms.

A committee has been constituted under the aegis of CEA to oversee pilot tests for flexible operation of coal- fired power plant. BHEL has conducted flexible operation pilot tests at Mauda TPS of NTPC and Sagardighi TPS of WBPDC. Further, the flexibilisation study has also been conducted at Vindhyachal STPS, NTPC and at Anpara B TPS, UPRVUNL by JCOAL, Japan. Further, flexible operation study at Unit # 6 (500 MW), Ukai Thermal Power Station, GSECL was arranged by CEA and the same was carried out by BHEL on 04.03.2020. An efficiency test at Mouda Thermal Power Station, NTPC has been conducted between 06.01.2020 to 10.01.2020 by TEPCO Power Grid Inc. and JERA, Japan under the observation of CEA. Presently, Flexible operation (up to 40% load) test is to be conducted at DSTPS, Andal of DVC and MPL, Maithon (Unit-2) of TATA Power under IGEF from 22-23 July, 2021.

An updated “Guidelines for R&M/LE works for Coal/Lignite based Thermal Power Stations 2020” has been prepared and uploaded on CEA’s website. CEA has also published a paper on “Plant Location Specific Emission Standards” on CEA’s website and the same is also enclosed in Annexure-7.

Finally, I would like to express my sincere thanks and gratitude to the Utilities and other stakeholders for obeying CEA’s guidelines during implementation of R&M/LE works at old thermal power plant and furnishing status of R&M. I would also like to thank for timely submission of status of installation of FGD/ upgradations of ESP to comply with new environmental norms thus helping us to prepare & publish quarterly review report.

Dated: 30-06-2021



(B.C. Mallick)
CE (TPR&M)

Highlights

1. LE/ R&M Achievements during 12th Plan (2012-17)

Sl. No.	Particulars	State Sector		Central Sector		Total (State + Central)	
		No. of units	Capacity (MW)	No. of units	Capacity (MW)	No. of units	Capacity (MW)
A)	LE works						
1.	Completed during 12 th Plan	10	1380	11	1261.76	21	2641.76
B)	R&M works						
2.	Completed during 12 th Plan	05	850	11	3710.5	16	4560.5
	TOTAL	15	2230	22	4972.26	37	7202.26

2. LE / R&M Programme during (2017 - 22)

Category	LE/R&M works identified during 2017-22 No. of units & capacity (MW)		Total (State Sector + Central Sector)
	State Sector	Central Sector	
LE	34 (7570)	--	34 (7570)
R&M	30 (7135)	07 (224)	37 (7359)
Total	64 (14705)	07 (224)	71 (14929)

3. Achievements of R&M and LE Projects upto 30-06-2021

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	04(820)	--	04(820)
2	R&M	--	02(67)	02(67)
Total		04(820)	02(67)	6(887)

No R&M/LE project has been completed during this quarter.

4. Flexible Operation of Thermal Power Stations

A committee has been constituted in CEA under the chairmanship of Chief Engineer (TPRM) to find out the level of flexibilization required from thermal power stations and future roadmap for integration of 175 MW RES generation capacity into Indian grid by 2022. The committee has come up with the findings of the quantum of flexibilization, minimum thermal load, and ramp rate required in its interim report in June 2018. The final report of the committee was released by Secretary (Power) on 18th March 2019. The report has been shared with the stakeholders of power sector. A pilot test of 40% minimum load operation and 3% ramp up/ ramp down (i.e. 15 MW/ Min) has been successfully conducted in Dadri TPS of NTPC. Study at Anpara-B TPS of UPRVUNL and Vindhyachal TPS of NTPC has been conducted by JCOAL to improve the flexibility of the plants. BHEL has conducted flexible operation pilot tests at Mauda TPS of NTPC, Sagardighi TPS of WBPCL and Ukai TPS, GSECL.

Presently, Flexible operation (up to 40% load) test is to be conducted at DSTPS, Andal of DVC and MPL, Maithon (Unit-2) of TATA Power under IGEF from 22-23 July, 2021.

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 year 2020-21 also, one group of 10 participants have undergone the CCT Training Programme from 19th Jan 2021 to 21st Jan., 2021.

Under Indo-Japan Cooperation, a one-day Workshop (Virtual) on “Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity” has been organized jointly by CEA and JCOAL on Monday, 25th January 2021.

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

1. 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 30.06.2021 is 384115.94 MW of which thermal power plants contributed 231590.72 MW (61.7%) The contribution of Coal, Gas and Diesel based thermal power plants of total installed capacity is 52.58%, 6.48 % and 0.14 % 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 target 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 onwards till 12th Plan

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 are given below: -

S. No.	Five Year Plan	Year	No. of TPS / No. of Units	Capacity (MW)	Additional Generation Achieved MU/ Annum*	Equivalent MW**
1	7 th Plan & 2 Annual Plans	85-86 to 89-90 & 90-91, 91-92	34 / 163	13570	10000	2000

2	8 th Plan (R&M) (LEP)	1992 to 1997	44 / 198 43/(194) 1 /(4)	20869 (20569) (300)	5085	763
3	9 th Plan (R&M) (LEP)	1997 to 2002	37 / 152 29/ (127) 8/ (25)	18991 (17306) (1685)	14500	2200
4	10 th Plan (R&M) (LEP)	2002 to 2007	9/25 5/(14) 4/(11)	3445 (2460) (985)	2000	300
5	11 th Plan (R&M) (LEP)	2007 to 2012	21/72 15/(59) 6/(13)	16146 (14855) (1291)	5400	820
6	12 th Plan (R&M) (LEP)	2012 to 2017	18/37 8/16 10/21	7202.5 4560.50 2641.76	----	----

*Tentative figure.

** Equivalent MW has been worked out assuming PLF prevailing during that period.

5.0 R&M/ LE Programme 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-1.

Category	LE/R&M works identified during 2017-22 No. of units & capacity (MW)		Total (State Sector + Central Sector)
	State Sector	Central Sector	
LE	34 (7570)	--	34 (7570)
R&M	30 (7135)	07 (224)	37 (7359)
Total	64 (14705)	07 (224)	71 (14929)

The Summary of achievements of R&M/ LE Projects is given below:

As on 30.06.2021

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)
Total No. of units (MW)	04(820)	--	--	02(67)	04(820)	02(67)	06(887)
	04(820)		02(67)		06(887)		

5.1 Details Achievements of LE and R&M Programme during 2017-22 upto 30.06.2021.

	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. 2019-20							
LE	---	--	--	--	--	--	--
R&M	---	--	--	--	--	--	--
Total LE	04 (820)	State	04(unit)	820			
		Centre	--	--			
Total R&M	02 (67)	State	--	--			
		Centre	02(unit)	67			
Grand Total		06(units)		887.00			

Details of thermal power units where the R&M/ LE Works have been completed during 2017-22 up to 30.06.2021 are given at Annexure 2& 3.

5.2 Details of thermal units under shut down for R&M and LE works

The following 3 units are under shut down for R&M and Life Extension works.

Sl.No.	Name of Project	Utility	State	Unit No.	Capacity (MW)	Shutdown Date
1.	Obra TPS	UPRVUNL	U.P.	7	100	01-07-2010
2.	Barauni TPS	BSPGCL	Bihar	6	110	15-11-2009
3.	Obra TPS	UPRVUNL	U.P.	13	200	16-05-2018
Total					410	

5.3 Status of R&M activities under Backward Region Grant Fund (BRGF) Scheme.

Under RSVY (now BRGF), Planning Commission in a meeting held on 10.05.2005 identified Barauni TPS, units 6&7 and Muzaffarpur TPS units 1&2 for carrying out Life Extension (LE) works. Subsequently, a five party agreement between the Government of India, Govt. of Bihar, BSEB, BHEL and NTPC was signed on 29.5.2006.

Planning Commission vide their letter dated 16.11.2009 approved Rs. 1053 crores including consultancy charges under the Special Plan for Bihar for LE works of Barauni TPS (Unit 6&7) and Muzaffarpur TPS (Unit 1&2) as per details given below:

Barauni TPS Unit (6&7)	:	Rs. 554.16 crores
Muzaffarpur TPS (1&2)	:	Rs. 471.80 Crores
Consultancy charges to NTPC(for Barauni TPS only):	:	Rs. 27.04 Crores
TOTAL	:	Rs. 1053.00 Crores

Details of Funds released by Planning Commission upto 2014-15:

i)	BHEL	:	Rs. 725.07 crores
ii)	KBUNL	:	Rs. 180.00 crores
iii)	NTPC	:	Rs. 20.13 crores
	Total	:	Rs. 925.18 crores

The remaining amount of Rs. 127.80 Crs has been released by the Govt. of India to BSPGCL. Now BSPGCL is releasing money directly to the vendors.

(A) Balance Amount Rs. 127.80 Cr.

- i. BHEL: Rs. 838.92 Cr. – Rs. 725.07 Cr. = Rs. 113.85 Cr.
- ii. NTPC: Rs. 27.04 Cr. – Rs. 20.13 Cr. = Rs. 06.91 Cr.
- iii. KBUNL: Rs. 187.04 Cr. – Rs. 180 Cr. = Rs. 07.04 Cr

(B) Amount Released from Rs. 127.80 Cr. by BSPGCL:

- i. BHEL: Rs. 39,20,84,459/-.
- ii. NTPC: Rs. 3,39,07,715/-.

Name of TPS	Unit No.	Zero Date	Contractual Completion Date	Anticipated Completion Date	Present physical status as on 30.06.2021
Barauni TPS	7	15.11.2009	15.11.20011	Completed	<p>Unit was synchronized on 03.08.2016.</p> <p><i>COD of Unit no. 7 achieved on 04.11. 2016.. Unit # 7 resynchronised on 12 .05.2019 and generated 8.88MU in May. Available coal is exhausted. Load could not be raised above 60 MW due to Condenser Vacuumproblem. . Scaling of condenser tubes is observed. Acid cleaning of condenser is planned in July. ECL coal agreement is pending due to ECL pending claims for 21.91Cr</i></p> <p>First synchronization after takeover by NTPC 23.05.2020</p>
	6	15.11.2009	15.06.2012	31-10-2019	<p><i>Unit # 6 TG rolling was done by BHEL/BSPGCL in July 2018. BHEL has stopped further works. The progress of work by BHEL after payment of 8 Cr. on 20.03.2019 , 5.18 Cr on 26.08.2020 & 4.04 Cr on 31.12.2020 is very poor for further balance works for synchronization, trial run and commercial operation schedule of Unit no. 6</i></p>

					<p><i>Following works are pending in CHP area a) Dust suppression system b) Belt Weigher c) Chute flap gate operation d) Zero speed switches to be commissioned e) Fire sprinkler to conveyors</i></p> <p><i>Following works are pending in AHP a) Unit # 6 AHPPlc and UPS commissioning b) 3 nos of Vacuum Pumps 3) Dry Ash Buffer hopper evacuation system</i></p> <p><i>Fire Detection system and Protection works is pending.PG tests for both units are to be completed.</i></p>
Muzaffarpur TPS	1	15.04.2010	15.04.2012	Completed	Unit synchronised on 05.07.2013.
	2	15.04.2010	15.08.2012	Completed	Unit synchronised on 30.09.2014.

6. Implementation of Phasing Plan for FGD installation/ ESP upgradation in respect of new Environmental Norms notified by MoEF&CC on 7th Dec. 2015.

Ministry of Environment, Forest & Climate Change (MoEF&CC) notified “Environment (Protection) Amendment Rules, 2015” for thermal power stations on 07.12.2015. All existing stations are required to comply with the new Standards within 2 years (i.e. by Dec. 2017) and the new stations including all station presently under construction are required to meet the new norms by 01-01-2017. To review the various issues arising out of new environmental norms for thermal power stations, a meeting was held on 01.09.2017 in MoEF&CC among Secretary MoEF & CC, Secretary, MoP and Chairperson, CEA and it was decided that the action plan submitted by

MoP to MoEF & CC extending up- to 2024 should commence from 2018 and implemented before 2022. The MOEFCC gave its concurrence to the revised implementation plan for FGD installation/ESP upgradation vide letter no. F. No. Q-15017/40/2007-CPW dated 07.12.2017. Further, it has been decided that the target date for environmental compliance in respect of thermal plant located in NCR is December, 2019. The progress report of installation of measures of 11 nos. thermal power plant situated in NCR region is given separately.

It is to be mentioned that the timeline for meeting the new emission norms (Dec 2015) has been revised by MOEF&CC vide gazette notification dated 31.03.2021 which has categorized thermal power plants in three categories having different timelines along with the environment compensation for non-compliance as follows:

Category A - Within 10 km radius of NCR or cities having million plus population as per 2011 census of India. Completion timeline 31.12.2022

Category B - Within 10 km radius of critically polluted areas or Non-Attainment cities as defined by CPCB. Completion timeline 31.12.2023

Category C - Other than those included in category A and B. Completion timeline 31.12.2024

Based on the March 2021 notification, MOEF&CC has constituted a task force comprising of representative from MOEF&CC, MOP, CEA and CPCB to categorize the thermal power plants in above mentioned three categories. The finalization of aforementioned categorization is still under progress presently. The timelines and category of all power plant may be decided only after finalization of above categorization process.

The implementation plan including units commissioned up- to 30.06.2021 is enclosed at Annexure 5. The year-wise FGD Phasing Plan and ESP Upgradation Plan are given below.

i) Year wise FGD Phasing Plan

Year	No. of Units	Capacity (MW)
2019	39	16410
2020	47	22310
2021	170	62297.5
2022	184	65454.5
Grand Total	440 *440	166742 as on 30-09-2019 *167922 as on 30-06-2021

*Now the total capacity for monitoring the implementation of FGD as on 30-06-2021 is 167922 MW & no. of units are 438 after including the new commissioned units. Latest report is available in CEA's website.

ii) Year wise ESP Upgradation Plan

Year	No. of Units	Capacity (MW)
2018	1	500
2019	2	1300
2020	27	10405
2021	97	23495
2022	93	27725
Total	220	63425

To ensure compliance of the new Environmental Norms, letters have been issued to concerned utilities for furnishing the details of action taken till date and further plan for FGD installation/ ESP – upgradation.

In view of the above CEA has started the monitoring of the implementation of the revised plan and collecting monthly status report of installation of FGD and ESP upgradation from each and every power plant under Central, State and Private sector.

6.1 Summary of Current Status of Implementation of phasing plan for FGD Installation

General Summary

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	54800	54800	54800	54800	54800	47740	840
2	State Sector	53085	53085	51885	37195	32075	4320	0
3	Private Sector	60037	58127	55047	50092	45292	17200	1320
	Total	167922	166012	161732	142087	132167	69260	2160

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	143	143	143	143	143	114	4
2	State Sector	164	164	162	108	87	12	0
3	Private Sector	131	127	117	104	95	31	2
	Total	438	434	422	355	325	157	6

500 MW Critical Units

Units > 500 MW & located in areas either critically polluted or having population density > 400/km2

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	29320	29320	29320	29320	29320	28320	0
2	State Sector	13980	13980	12780	12280	12280	2600	0
3	Private Sector	13510	13510	12910	10670	8270	4970	1320
	Total	56810	56810	55010	52270	49870	35890	1320

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	57	57	57	57	57	55	0
2	State Sector	25	25	23	22	22	4	0
3	Private Sector	22	22	21	17	13	8	2
	Total	104	104	101	96	92	67	2

NCR Summary

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	3320	3320	3320	3320	3320	3320	840
2	State Sector	4770	4770	4770	3850	3350	0	0
3	Private Sector	4700	4700	4700	4700	4700	4700	1320
	Total	12790	12790	12790	11870	11370	8020	2160

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Spec Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	9	9	9	9	9	9	4
2	State Sector	17	17	17	13	11	0	0
3	Private Sector	7	7	7	7	7	7	2
	Total	33	33	33	29	27	16	6

6.2 FGD- ESP Phasing Plan of Thermal Power Plants located in Delhi NCR

Sl. No	Name of Thermal Power Station	Timeline for FGD	Current Status
1	Dadri (NCTPP), U.P Unit 1-4 (210X4 MW) NTPC	31.12.2019	FGD: Commissioned DE-NOx: Meeting norms. ESP: Meeting norms.
	Dadri (NCTPP), U.P Unit 5-6 (490X2 MW) NTPC	30.04.2020 28.02.2020	FGD: Awarded. Work in progress DE-NOx: Meeting norms. ESP: Meeting norms.
2	GHTP (Lehra Mohabbat), Punjab Unit 1-4 (210X2 & 250X2 MW) PSPCL	30.04.2022 30.04.2022 28.02.2022 28.02.2022	FGD: Ongoing bidding process cancelled due to very low PLF. Retendering to be done for DSI. ESP: Meeting norms. De-NOx: Matter being taken up with BHEL.
3	Harduaganj, U.P Unit-8&9 (250X2 MW) UPRVNL	31.12.2021 31.10.2021	FGD: Tender has been cancelled due to exorbitant L1 pricing. Retendering to be done. ESP: Meeting norms. De-NOx: Combustion modification planned by March-21
4	Indira Gandhi STPP, Haryana Unit 1-3 (500X3 MW) NTPC	31.10.2020 30.04.2020 29.02.2020	FGD: Bid awarded ESP: Meeting norms.. De-NOx: Bid Awarded
5	Mahatma Gandhi TPP, Haryana Unit-1-2 (660x2 MW) CLP	31.12.2019	FGD: Operation of FGD started. ESP: Meeting norms. De-NOx: Meeting norms.
6	Panipat TPS, Haryana Unit-6 (1X210 MW) HPGCL	30.04.2020	FGD: NIT issued. ESP: Meeting norms. De-NOx: Combustion modification planned by 31.12.2022
	Panipat TPS, Haryana Unit-7-8 (2X250 MW) HPGCL	28.02.2021 31.12.2020	FGD: NIT issued. ESP: Meeting norms. De-NOx: Combustion modification planned by 31.12.2022
7	Rajiv Gandhi TPS, Hisar, Haryana Unit-1 (2X600 MW) HPGCL	30.04.2022 28.02.2022	FGD: NIT issued. ESP: Meeting norms. De-NOx: Combustion modification planned by 31.12.2022
8	Yamunanagar (DCTPS), Haryana Unit-1 (2X300 MW) HPGCL	31.12.2021 31.10.2021	FGD: NIT issued. ESP: Meeting norms. De-NOx: Combustion modification planned by 31.12.2022
9	Talwandi Sabo TPS, Mansa, Punjab Unit-1-3(660x3 MW) TSPL	28.02.2021 31.12.2020 31.10.2020	FGD: Bid awarded ESP: Meeting norms. De-NOx: Meeting norms.
10	Nabha Power Ltd, Rajpura, Punjab Unit-1-2(700x2 MW) GMR	30.04.2021 28.02.2021	FGD: Bid awarded ESP: Meeting norms. De-NOx: Meeting norms.
11	GGSTP Ropar (4x210 MW) PSPCL	31/12/2022	FGD: NIT issued ESP: Meeting norms. De-NOx: Meeting norms.
	Total	12790 MW	

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 33 to 35 percent by 2030 from 2005 level, 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 has been constituted in CEA to find out the level of flexibilization required from thermal power stations and future roadmap for integration of 175 MW RES generation into Indian grid by 2022. The committee has come up with the findings of the quantum of flexibilization, minimum thermal load, and ramp rate required in its interim report in June 2018. The final report of the committee was released by Secretary (Power) on 18th March 2019. The report has been shared with the stakeholders of power sector. A pilot test of 40% minimum load operation and 3% ramp up/ ramp down (i.e. 15 MW/ Min) has been successfully conducted in Dadri TPS of NTPC. Study at Anpara-B TPS of UPRVUNL and Vindhyachal TPS of NTPC is being conducted by JCOAL to improve the flexibility of the plants.
- 7.2** Another 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 shall identify the thermal units in consultation of 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 Mouda TPS of NTPC and Sagardighi TPS of WBPDC. 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.

The salient outcome of the pilot tests are as follows:

A) Mouda TPS, NTPC, Nagpur, Maharashtra:

- i) Test Date : 29-09-2019
- ii) Unit No. : 2
- iii) Capacity : 500 MW
- iv) Following tests were conducted:

<u>Test</u>	<u>Target</u>	<u>Achieved</u>
a. Minimum Load Test at 40%	200 MW	200 MW
b. Ramp Test (3%)	3%/ mini	~1.1%/min
c. Ramp Test (1%)	1%/ mini	~0.55%/min

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.

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

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

<u>Test</u>	<u>Target</u>	<u>Achieved</u>
a. Minimum Load Test at 40%	200 MW	200 MW
b. Ramp Up Test (3%)	3%/ mini	~1.6%/min
c. Ramp Down Test (3%)	3%/ mini	~2.6%/min
d. Ramp UpTest (3%)	1%/ mini	~1.1%/min
e. Ramp Down Test (3%)	1%/ mini	~0.67%/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:

<u>Test</u>	<u>Target</u>	<u>Achieved</u>
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

Anpara B power plant was operated at a load ramp rate of 0.47 to 1%. On the other hand, there is also a record of 23 MW/min (4.6%/min.) at the time of load down from the operation data. At the time of load up, confirmation including auxiliary equipment is necessary, but it has the potential to achieve 15 MW/min. (3%/min.), and the IoT/AI technology can extract the potential safely by applying it. In this clause, as a system stabilization measure of the power grid assumed to be necessary along with the increase of renewable energy in India, the feasibility of Plant loading (startup/ramping/shutdown) optimization technology using IoT/AI is examined. The plant load ramp rate at the Anpara B power plant has been proved at the time of construction at 1%/min, but since then 1%/min load ramp rate was not necessary in the subsequent base load

operation. Considering the current state of plant deterioration, it is recommended to use IoT / AI technology to confirm and operate with sufficient safety even though design capability is possible.

In addition, for application of load ramp rate 3%/min target, safety confirmation including auxiliaries such as mill and boiler feed water pump is necessary. The condition monitoring under IoT/AI technical monitoring can support the sufficient confirmation including design specifications.

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:

<u>Test</u>	<u>Target</u>	<u>Achieved</u>
a. Minimum Load Test at 40%	200 MW	200 MW
b. Ramp Up Test (3%)	3%/ min	~3.00%/min
c. Ramp Down Test (3%)	3%/ min	~3.00%/min

8.1 “Coal-Fired Generation Rehabilitation Project-India” funded by World Bank.

The World Bank has financed the “Coal-Fired Generation Rehabilitation Project-India” for demonstrating Energy Efficiency Rehabilitation & Modernization (EE R&M) at coal fired generating units through rehabilitation of 640 MW of capacity across three States-West Bengal, Haryana and Maharashtra. The capacity comprising Bandel TPS Unit-5(210 MW) of WBPCL, Koradi TPS Unit-6(210 MW) of Mahagenco and Panipat TPS Unit-3&4 (2x110 MW) of HPGCL. The World Bank has earmarked US \$ 180 million of IBRD loan and US \$ 37.9 million of GEF grants.

Also the World Bank has earmarked US \$ 7.5 million GEF grant for the Technical Assistance to CEA and Utilities aimed at providing support in implementation of EE R&M pilots, developing a pipeline of EE R&M interventions, addressing barriers to EE R&M projects and strengthening institutional capacities of implementing agencies for improved operation and maintenance practices.

8.2 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. Accordingly, generating units are selected from Ukai and Wanakbori TPS (GSECL), Ramagundem STPS (NTPC) and Vijaywada TPS (APGENCO) for pre – primary studies. After Pre-Primary Studies, JCOAL finalized 3 units

viz., Vijaywada TPS Unit-1 (210MW) of APGENCO, Wanakbori TPS Unit-1 (200 MW) of GSECL and Kahelgaon STPS Unit-2 (210 MW) of NTPC for full-fledged diagnosis. The final report had been submitted in December 2012.

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. Durgapur TPS unit no.4 (210 MW LMZ Unit) of DVC and one unit each from Badarpur TPS and Unchahar TPS of NTPC were selected for studies during the 2nd phase. JCOAL team visited these stations 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.

Under CEA- JCOAL Co-operation a study on replacement of old units of Badarpur TPS by highly efficient super critical units of higher size has been carried out. JCOAL team has carried out three site surveys and investigations in the month of Nov, 2015, Jan, 2016 and in March, 2016. The report on the study has been submitted in June, 2016 by JCOAL.

JCOAL has also carried out feasibility study on replacement of Singrauli STPS Stg. I & II units (5x200 MW+2x200 MW) of NTPC between December, 2016 to March, 2017.

Unit-3 of Dadri TPS of NTPC was identified for implementation of full-fledged diagnosis study i.e. Residual Life Assessment (RLA) study. JCOAL team has conducted RLA/Diagnostic Study at Unit-

3 Dadri TPS of NTPC from 30th November, 2015 to 10th of December, 2015. The report on RLA/CA study of Unit-3 of Dadri TPS has been submitted by JCOAL. The objective of the RLA Study is to identify the remaining life and the current condition of Unit -3, to constitute the base for formulation of the plan of R&M implementation.

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 at New Delhi by CEA and JCOAL. Various stake holders from Central/State/Private in power sector participated in the workshop.

A Meeting on Study on O&M enhancement of existing units of DSTPS, DVC under CEA-JCOAL Cooperation was held among NEDO, JCOAL, CEA and DVC on 13th October 2017 at Kolkata in order to share O&M and safety related best practices. The expert team from Japan also visited DSTPS, DVC and collected required data for the purpose of O&M Study from 11.12.2017 to 14.12.2017. Report was submitted in May 2018.

Mini-workshops were organized on 30-01-2018 at GSECL(Gujrat) and on 01-02-2018 at APGENCO (Andhra Pradesh) respectively for the year 2017-18 under CEA-JCOAL Cooperation for the project on Efficiency and Environment improvement of Coal Fired Power Stations in India.

Under CEA- JCOAL Co-operation a study is being carried out by JCOAL on adoption of available technologies to meet new environment standards and the economic viability of using such technologies in existing power plants. Combustion test of Indian Coal has been done at Japan. The Report of Combustion test of Indian Coal has been submitted. SCR Pilot test at NTPC's Sipat TPS is being carried out to meet the NO_x level in the flue gas as per new environmental norms. A diagnostic study for optimal environmental measures at Dadri TPS was conducted in February, 2018 and debriefing meeting was held in June 2018.

Study on Flexibilisation has been carried out by JCOAL during the year 2018-19 at the following thermal power stations to enhance the flexible operation of the unit.

1. Anpara-B TPS of UPRVUNL: Unit 4&5 (2x 500 MW) in November and December 2018

2. Vindhyachal STPS of NTPC: Kick-off was held on 04-03-2019. Study carried out from 04-03-2019 to 09-03-2019.

Study report in respect of Anpara-B TPS of UPRVUNL was submitted on 4th of July 2019 by JCOAL. A Debriefing meeting on flexibilisation Study at VSTPS, NTPC was held at NTPC Bhawan on 12th of June 2019. Report was submitted by the JCOAL.

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.

Under Indo-Japan Cooperation, a one-day Workshop (Virtual) on “Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity” has been organized jointly by CEA and JCOAL on Monday, 25th January 2021.

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. The purpose of this MoU is to address issues and barriers in expediting sustainable, stable and low carbon thermal power development by means of studies, training program and knowledge-sharing activities, outcomes of which are to be conducive to overall power development in India as well as to expedite relevant policy implementation by the Government of India. 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

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.

Status of units where Life Extension/ Renovation & Modernisation works have been taken up for implementation during 2017-22

STATE SECTOR LE Works

(as on 30.06.2021)

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1.	U.P.	Obra	12	1981	200	Unit is under s/d since 01-10-2016 for R&M works. LE Works started on 01.10.2016. Unit- 12 is synchronized on 24-09-2018. (Runs nearly at 125 MW, ESP pass-B incomplete) Due to fire incidence on 14-10-2018 in Obra TPS, unit #12 was under shut down. Restoration of the unit is done by BHEL. Synchronized on 22-01-2020. Supply-227.02 Cr. Work-49.15 Cr
2.	U.P.	Obra	13	1982	200	Date of commissioning earlier given by M/s. BHEL was 31-12-2018. Revised date of commissioning given by BHEL is 15-05-2020 (Due to major fire incidence took place on 14-10-2018). R&M works started from 17-05-2018. Unit is under s/d from 16-05-2018. Synchronization is expected in Nov 2020 Boiler: 99% work completed. Boiler light up is expected on 11-03-2020. Turbine: 95% work completed. HP rotor blades to be replaced and likely to be dispatched from Haridwar by 1 st week of Nov. Generator: 95% work completed. ESP: Pass A: 90%. BHEL has started mechanical erection on 11-10-2019. UNL told that there was no space constraint and requested to augment manpower and work in 2 shifts to meet the schedule. Pass B: 99% work completed. Manpower increased to 92 nos. and resources are already augmented, expected to complete by mid Dec,19. Ash Handling: 550% work completed. Switchyard 400 kV CB: 90% work completed WTP: 99% work completed CHP: 94% work completed Due to Covid 19 and lockdown work progress has been slowed down
3.	U.P.	Anpara TPS	1	1986	210	LE works yet to be decided by the utility
4.	U.P.	Anpara TPS	2	1987	210	LE works yet to be decided by the utility
5.	U.P.	Anpara TPS	3	1988	210	LE works yet to be decided by the utility
6.	Gujarat	Ukai	3	1979	200	<u>ESP R&M</u> : ESP retrofitting of unit-3 has been completed and unit lit up on 26-04-2016.PG test has been carried out and guarantee parameter achieved. Turbine & Boiler R&M : Tender for turbine R&M is floated on 08.12.2020 and last date for submission is 11.02.2021 C&I Up-gradation : - Order of awarded for C&I upgradation to BHEL on 18.06.2015. C&I upgradation of Unit-3 has been completed and unit lit up 26-04-2016. Ash slurry pump house: - LOI issued to M/s Deccan Mechanical & Chemical Industries Pvt. Ltd., Pune on 29-

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						05-2018 at the cost of Rs. 13.87 Crs .was cancelled. Tender re-invited for subject work, offers received. Technical scrutiny completed and price bid opened on 24-04-2019. Order awarded to M/s Mecgale Pneumatics Pvt. Ltd., Nagpur. Geo-technical survey completed and design engineering work is under progress.
7.	Gujarat	Ukai	4	1979	200	<p>Ukai TPS Unit -4 was taken under S/D on 07-12-2016, unit lit up on 04-05-2017 and synchronised on 17.05.2017 and COD achieved on 24.05.2017.</p> <p>PG test for retrofitted ESP, Boiler after modification and retrofitted Turbine was completed on 17-06-2017, 23-08-2017 and 02-11-2017 respectively. Guaranty parameters achieved.</p> <p><u>Boiler Back Pass Modification:</u> Order awarded to BHEL for availability & efficiency improvement through modification in Boiler Back Pass and replacement of APH. Work completed and unit lit up on 04-05-2017 and synchronized on 17-05-2017. PG test carried out and guaranty parameter achieved.</p> <p><u>C&I Upgradation by utilizing R&M material of 2x120 MW GTPS unit no. 1&2:</u> Order awarded to BHEL on 18-06-2015. Work completed and unit lit up on 04-05-2017. LOI issued to M/s Deccan Mechanical & Chemical Industries Pvt. Ltd., Pune on 29-05-2018 at the cost of Rs. 13.87 Crs .was cancelled. Tender re-invited for subject work, offers received. Technical scrutiny completed and price bid opened on 24-04-2019. Order awarded to M/s Mecgale Pneumatics Pvt. Ltd., Nagpur. Geo-technical survey completed and design engineering work is under progress.</p>
8.	Gujarat	Ukai	5	1985	200	<p><u>ESP R&M:</u> ESP retrofitting of Ukai unit-5 completed and unit lit up on 29-03-2017. PG test of ESP has been completed.</p> <p><u>Turbine & Boiler R&M</u> Tender for turbine R&M is floated on 08.12.2020 and last date for submission is 11.02.2021</p> <p>Boiler back pass Modification work of UTPS unit#5 is dropped.</p> <p>LOI issued to M/s Deccan Mechanical & Chemical Industries Pvt. Ltd., Pune on 29-05-2018 at the cost of Rs. 13.87 Crs .was cancelled. Tender re-invited for subject work, offers received. Technical scrutiny completed and price bid opened on 24-04-2019. Order awarded to M/s Mecgale Pneumatics Pvt. Ltd., Nagpur. Geo-technical survey completed and design engineering work is under progress.</p>
9.	Gujarat	Wanakbori	1	1982	210	<p>For implementation of DeNOx system, GSECL is awaiting the results of pilot projects of NTPC.</p> <p><u>ESP R&M:</u> The order for retrofitting is issued to BHEL on 18.03.2016 and Zero date started from 14-01-2016. ESP retrofitting of unit-1 &2 completed and units lit up on 07-03-2017 and 07-04-2018 respectively. PG test of WTPS units#1&2 completed.</p> <p><u>Turbine & Boiler R&M:</u> Turbine & boiler R&M work of UTPS Unit#1&2 has been dropped.</p> <p><u>C&I Upgradation:</u> Energy efficiency Improvement done through up-gradation of C&I in unit#1&2. C&I work completed on 11-03-2017 in unit#1 and 17-07-2012 in unit#2.</p>
10.	Gujarat	Wanakbori	2	1983	210	

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>Boiler back pass Modification work of UTPS unit#1&2 has been dropped.</p> <p>Meanwhile, GSECL has initiated feasibility study for replacement of WTPS 2x 210 MW Units by 1x800 MW Super Critical Units.</p> <p>Pending work of Unit-1&2, Bus coupler will be carried out in available shutdown.</p>
11.	Gujarat	Wanakbori	3		210	<p>LE work completed and unit synchronised on 05-12-2017.</p> <p>ESP Retrofitting work Shutdown of WTPS Unit No. 3 is commenced from 25.07.2017. ESP retrofitting unit -3 completed and unit lit up on 27-11-2017. PG test completed and guaranty parameters achieved.</p> <p>Turbine R&M:- Order awarded to M/s NASL Noida on 29-04-2015 and zero date started from 10.03.2015. Turbine R&M of Wankbori Unit -3 completed and unit lit up 27-11-2017 and 72 hrs. Trial run on full load completed successfully on 5-12-2017. PG test carried out on 10-03-2018 and guaranteed parameters achieved.</p> <p>Boiler Back Pass Modification: - Order awarded to M/s BHEL for availability & efficiency improvement through modification in Boiler back pass and replacement of APH. Boiler back pass modification and APH replacement work completed and unit lit up on 27-11.2017 and synchronized on 01.12.2017. PG test carried out on 09-03-2018 and guaranteed parameters achieved.</p>
11.	Maharashtra	Koradi	6	1982	210	<p>LE work completed and unit synchronised on 16-07-2018 with oil & 20-08-2018 with coal.</p> <p>The unit is being taken up by WB funded project. The total cost of the project including IDC is 636.93 crores. The unit is under shutdown since 25th August, 2015</p> <p>BTG Package: Mahagenco issued the Letter of Award to BHEL on May 31, 2013. The contract was signed on December 18, 2013. Overall 99.25% material has been supplied at site. Overall (physical progress) 99% work of BTG package completed. Approximately 98.34% of the material (on Amount basis) is supplied by BHEL at site & further supply is in progress. Major BTG works are completed except CPU erection and commissioning (50 T capacity), SWAS System, EHG/ ATRS/ PAO demonstration and works identified as punch points such as grating, railings, drains etc. Civil work of ESP 98% completed.</p> <p>C&I/Electrical System: UPS- 98% completed. 24V charger& battery work is 95% completed & Pre-commissioning of system/ auxiliaries, BLU through new DCS.</p> <p>Electrical Package: Mahagenco issued the Letter of Award to M/s ABB Ltd on March 19, 2012 and the final contract</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>was signed on May 25, 2012. Later on the package price escalation issue was resolved & M/s ABB restarted the work at site from 07.10.2015. Overall 92% work of Electrical package completed. Approximately 92% of the material (on Amount basis) is supplied by M/s ABB at site & further supply is in progress. Following works are balance:</p> <ul style="list-style-type: none"> - HT Motor 4/29 balance (supply balance 1 no.), LT motors Supply balance 3 Nos. - Replacement of 9 LT is balance. - Illumination works-Boiler: 90% completed, Turbine Floor area: 80% completed. Turbine Hall lower elevations: 30% completed. - Supply & installation of Hoists for PA and FD Fans is balance. <p>BOP Package: Letter of Award (LOA) for Cooling Tower Plant Package, Ash Handling Plant package and Fire Detection, Protection & Inert Gas System Package are issued and contract is signed on 23.09.2016, 26.10.2016 & 05.11.2016 respectively. BOP Package work is completed except minor works of Ash Handling plant.</p> <p>DM Plant & Pre-Treatment System Package Need based refurbishment of 2 streams of DM Plant is carried out from various agencies with order value of @Rs. 87.27 Lakh.</p> <p>Under Cooling Tower Plant Package overall 95% work completed and 99.67% of overall material has been supplied at site. PG test of Cooling Tower and Aux. Tower completed from 19-04-2019 to 26-04-2019. Design Engg. work is completed of Ash Handling Plant. Work has been completed. For Fire Detection, Protection & Inert Gas System Package, overall material supplied at site is 100% and Installation and civil works completed. Dump Test of Inert Gas System at PCR (as required by FA&CFO) is balance.</p>
12.	Maharashtra	Koradi	7	1983	210	R&M/LE study not carried out
13.	Maharashtra	Bhusawal	2	1979	210	<p>All studies Completed, Final DPR received from M/s Energo Engg Ltd has been approved by MSPGCL Board in May, 2016. Further, MSPGCL Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6.</p> <p>This unit is permanently decommissioned on 01-04-2017.</p>
14.	Maharashtra	Bhusawal	3	1982	210	RLA/ Feasibility study for EER&M has not been carried out.
15.	Maharashtra	Nashik	3	1979	210	<p>DPR finalised, Govt. of Maharashtra has approved 20% equity. The unit-3 was to be taken up under KfW funded project. All studies completed, and DPR has been prepared. Also Tender documents have been prepared. But Nasik Unit-3 R&M project withheld and Nasik Unit -4 R&M shall be taken up on priority. Further, MSPGCL Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6.</p>
16.	Maharashtra	Nashik	4	1980	210	<p>All studies Completed, Final DPR is submitted by M/s Steag. MSPGCL Board approved the DPR. Nasik Unit -4 R&M shall be taken up on priority. Further, MSPGCL Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6.</p>
17.	Maharashtra	Nashik	5	1981	210	<p>All studies Completed, Final DPR is submitted by M/s Steag. MSPGCL. Board approved the DPR. MSPGCL Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6.</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
18.	Maharashtra	Parli	4	1985	210	RLA/Feasibility study for EER&M not carried out. This unit is permanently decommissioned on 30.11.2019.
19.	Maharashtra	Parli	5	1987	210	RLA/Feasibility study for EER&M not carried out. This unit is permanently decommissioned on 30.11.2019.
20.	Maharashtra	Chandrapur	3	1983	210	RLA/Feasibility study for EER&M not carried out.
21.	Maharashtra	Chandrapur	4	1984	210	RLA/Feasibility study for EER&M not carried out.
22.	Maharashtra	Chandrapur	5	1983	500	Feasibility study for EER&M not carried out.
23.	Maharashtra	Chandrapur	6	1984	500	Feasibility study for EER&M not carried out.
24.	Maharashtra	Khaperkheda	1	1989	210	RLA/Feasibility study for EER&M not carried out.
25.	Maharashtra	Khaperkheda	2	1990	210	RLA/Feasibility study for EER&M not carried out.
26.	Bihar	Barauni	6	1983	110	<p>BTPS has been transferred to NTPC on 15-12-2018.</p> <p>COD of unit#7 achieved on 04-11-2016. Equipment Trails and recommissioning is in progress. ECL coal agreement is pending due to ECL pending claims for 21.91 Cr.</p> <p>Unit # 6 TG rolling was done by BHEL/BSPGCL in July 2018. BHEL has stopped further works. The progress of work by BHEL is very poor regarding balance works for synchronization and trial run of Unit no. 6</p> <p>Following Major works pending by BHEL in Unit # 6</p> <p>1)Unit # 6 , Offsite area Lighting works and DC light works are pending</p> <p>2)Second source of Electrical supplies and Standby transformer commissioning is pending due to bus duct problems , numerical relays problem and electrical modules problem</p> <p>3)CW pump 6B commissioning is pending</p> <p>4)CT fans 1 nos Commissioning and 1 No CT cell erection are pending</p> <p>5)Soot blower and SWAS commissioning is pending</p> <p>Following works are pending in CHP area a) Dust suppression system b) Belt Weigher c)Chute flap gate operation d) Zero speed switches to be commissioned e) Fire sprinkler to conveyors</p> <p>Following Major works pending by BHEL in Offsite Area</p> <p>BHEL has not started CHP and AHP area works</p> <p>Following works are pending in CHP area 1) Dust suppression system 2)Chute flap gate operation 4) Zero speed switches to be commissioned 5) Fire sprinkler to conveyors</p> <p>Following works are pending in AHP 1) Unit # 6 AHP Plc and UPS commissioning 2) 3 nos of Vacuum Pumps 3) Dry Ash Buffer hopper evacuation system</p> <p>Fire Detection system and Protection works</p> <p>Switchyard 2 nos of bay commissioning and energy monitoring system</p> <p>PG tests for both units are to be completed.</p>
27.	W.Bengal	Kolaghat	1	1990	210	DPR has been prepared and accepted. After successful completion of the unit-3 work the R&M works of the Unit -1&2 will be taken up.
28.	W.Bengal	Kolaghat	2	1985	210	DPR has been prepared and accepted. After successful completion of the unit No. 3 work the R&M works of the Unit No 1&2 will be taken up.
29.	W.Bengal	Kolaghat	3	1984	210	<p>Estimated cost of L.E.of Unit# 1,2&3: 1090 Crs</p> <p>U# 1, 2 & 3: There are 3 packages (ESP, AHP & BTG).</p> <p>ESP (1,2,3) : LOA placed on M/s KCIN. Starting date is 22.03.17. (Schedule is 35 months from LOA).</p> <p>ESP (unit- 3): Mechanical erection work is in progress.</p> <p>ESP (unit- 1): Dismantling work under progress.</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status																												
						<p>AHP (1,2,3): LOA placed on M/s Indure. Starting date 26/07/2017. (schedule is 29 months from LOA) .U #3- Commissioning done in wet mode Unit#3 Dismantling work is completed.</p> <p>BTG (1,2,3): WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled.</p> <p>Boiler & Auxiliary System: - DPR is ready. WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled. Re-tendering is under process.NIT floated</p> <p>BOP: - Clarifloculator:- WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled. Under preparation of bid documents.</p> <p>ESP: U#3: Hot gas commissioning was done on 14-09-2019. Further tuning and stabilization cannot be done due to boiler tube package.</p> <p>U#1: Dismantling work completed. Civil pile work (FAE tower) along with raft work completed.</p> <p>AHP: U#3: Commissioning done in wet mode. U#1: Civil pile work (FAE tower) completed .Pile cap work is completed U#6- Hot gas commissioning was done on 11-09-2019. Action for PG test is initiated. Electrical and Instrumentation: - Technical bids are submitted on 03-01-2018.</p> <table><tr><th colspan="2">Electrical</th></tr><tr><td>1</td><td>GPR and 2 breaker Relay</td></tr><tr><td></td><td>WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled.</td></tr></table> <table><tr><th colspan="2">Instrumentation</th></tr><tr><td>1</td><td>ESP</td></tr><tr><td></td><td>Engg. going on. C&I : No material has been received at site and no erection has been started.</td></tr><tr><td>2</td><td>AHP</td></tr><tr><td></td><td>-do-</td></tr><tr><td>3</td><td>Governing System</td></tr><tr><td></td><td>WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled.</td></tr><tr><td>4</td><td>Upgradation/ replacement of instrumentation system as per mechanical scope of work.</td></tr><tr><td></td><td>-do-</td></tr><tr><td>5</td><td>Incorporation of ATRS</td></tr><tr><td></td><td>-do-</td></tr></table> <p>NOTE: Shutdown of ESP and AHP shall be matched. BTG package of Unit-1 and 2 shall be matched with respective ESP and AHP. BTG Package of unit-3 shall start last if situation permits.</p> <p>Total estimated cost of R & M / L E works is Rs. 1090 Crs for unit-1,2 & 3.</p> <p>Financial progress: ESP (unit#1,2&3)- Payment of Rs 54.50 crore was made for ESP up to 31/12/2019 AHP (unit#1,2&3)- Payment of Rs. 33.40 crore was made for AHP till 31-12-2019.</p>	Electrical		1	GPR and 2 breaker Relay		WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled.	Instrumentation		1	ESP		Engg. going on. C&I : No material has been received at site and no erection has been started.	2	AHP		-do-	3	Governing System		WBPDC Board has approved for retendering of new BTG package with higher capacity mills. Accordingly, earlier NIT is cancelled.	4	Upgradation/ replacement of instrumentation system as per mechanical scope of work.		-do-	5	Incorporation of ATRS		-do-
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30.	W.Bengal	Kolaghat	5	1991	210	Estimated cost of LE of Unit#4, 5&6 is 25 Crs. U# 4, 5 & 6 : Only 1 package for ESP																												

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>ESP Package: LOA is placed on M/s Soil & Enviro Industries Pvt. Ltd to achieve ESP O/L dust burden to 50mg/Nm³ from 200mg/Nm³ by replacement of controller/ TR Set and addition of filter column.</p> <p>ESP#6- Payment of Rs. 7.43 crore was made for AHP till 31-12-2019.. Hot gas commissioning was done on 11-09-2019.</p>
31.	Karnataka	Raichur	1	1985	210	<p>Actual date of start of R&M/LE (unit#1,2&3) is 2017-18 and expected to be completed in 48 months from start of work. LE works to be carried out in following two phases:</p> <p>Phase 1: BTG, Retrofitting of ESP & Electrical package</p> <p>Phase-2: BOP- Non BHEL package.</p> <p>Replacement of APH module, TG (C&I) and station (C&I) works completed.</p> <p>DPR is being revised, duly incorporating additional works in the R&M/LE scope of work is put up for Head Office approval. Once the DPR is approved, same will be submitted to KERC for approval. Project cost is Rs. 1240.18 crores (for phase 1,2&3). Expenditure incurred till date is 261.208 Crs. However, all the efforts are being made to reduce the R&M expenditure to minimum considering essential works required for enhancing performance/ Heat Rate.</p> <p>KPCL has engaged a consultant to explore the technologies/ possibilities to meet the new environmental norms. Consultant has submitted feasibility reports/DPR. The same has been put up to HO. After finalization of DPR, KPCL will take decision on comprehensive R&M Works of unit 1&2 according to the recommendations of DPR.</p> <p>FGD tender was published in Karnataka e-portal website on 21-12-2018 and 09.03.2019.</p> <p>LoA issued on 14.08.2020</p> <p>R&M of unit #1&2: Letter of award for retrofitting of 03Nos. Microprocessor Controller based Rotary Type Gravimetric Coal Feeder for RTPS, 2X210 MW issued on 01-03-2019.</p>
32.	Karnataka	Raichur	2	1986	210	
33.	Karnataka	Raichur	3	1991	210	<p>M/s Energo Engineers Projects limited., Gurgaon is appointed as consultant for conducting Feasibility studies, Preparation of DPR, Technical Specifications & Bid Document and assisting KPCL in selection of EPC contractor for R&M of 210 MW Coal fired TPS Unit-3, at RTPS. As a part of Comprehensive R&M of unit-3 consultant conducted Energy Audit during the month of Feb-17 & Condition assessment during the month of March-17, and carried out RLA studies of Boiler in month of June-2017. Awaiting for EA & RLA reports from the consultant. The reports will be submitted by the firm after completing some of the pending works of Energy Audit.</p> <p>M/s. Energo Engineers, Gurgaon has not completed the work as per the contract terms and conditions. Also, it is learnt from Public Announcement that M/s. Energo Engineers was declared insolvency on 21-08-2018 and referred to National Company Law Tribunal (NCLT), New Delhi.</p> <p>Therefore, offers were obtained from CEA empaneled</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						agencies for conducting RLA/ CA studies of BTG etc. The offers are under scrutiny. NIT issued on 22.12.2020 for R&M works for Unit Heat Rate improvement. LOA has been placed for R&M of I&C system pertaining of BTG package.
Sub Total State Sector (LE)			34		7570	

**STATE SECTOR
(R&M Programme)**

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1.	U.P.	Obra	7	1974	100	<p>- Work is being executed by BHEL.</p> <p>-Unit is under shutdown since 01-07-2010 for R&M works.</p> <p>- Zero date of the scheme is 04.12.2009. Unit was scheduled on 23 months from zero date i.e Nov 2011. The revised cost of R&M scheme for unit 7 is 144.11 crores.</p> <p>All mechanical works completed. Light up of unit was withheld due to fire in 6.6 kV breaker in Nov., 2016. BHEL and Scheider experts are called to assess the extent of damage and submit list of required spares for revival of switchgear of the unit.</p> <p>Erection work has been completed.</p> <p>Boiler: 100% work completed (steam blowing done).</p> <p>Turbine: 100% work completed (Only rolling pending).</p> <p>Generator: 99% work completed (Only H₂ filling pending)</p> <p>BoP: 100% work completed (only mill-7A trial pending. Reserve supply required)</p> <p>Restoration of electrical supply in S/G room is under progress.</p>
2.	U.P.	Anpara'B	4	1993	500	<p>R&M works is being executed by BHEL & M/s MITSUI & Toshiba OEM, Japan. – Both the units are currently running. Total cost of scheme is Rs. 6 91.97 cr. Total expenditure upto 31.03.2019 is 485.00 crs.</p> <p>Boiler: Nearly 85% work completed.</p> <p>TG: Nearly 85% work completed.</p> <p>Electrical +& Instrumentation: Nearly 85% work completed.</p> <p>BoP: Nearly 85% work completed.</p> <p>- The R&M work would be carried out in AOH and are likely to be completed by 30-09-2019. Utility decided to carry out Feasibility Study to meet the environmental norms.</p>
3.	U.P.	Anpara'B	5	1994	500	
4.	Punjab	Ropar	1	1984	210	<p>Retired from 01-01-2018</p>
5.	Punjab	Ropar	2	1985	210	
6.	Punjab	Ropar	5	1992	210	
7.	Punjab	Ropar	6	2001	210	<p>Both the units are currently running</p> <p>RLA/CA Study already stands conducted. The consultant M/S NTPC had prepared the DPR on the basis of RLA/CA study & submitted it to GGSSTP, Rupnagar. Further GGSSTP has submitted the same to the erstwhile PSEB for approval of the major R&M/LE Works.</p> <p>Both the units are currently running.</p> <p>R&M scheme are categorised into four groups as under:</p> <p>Breakers have been fitted & commissioned in the 220KV Switch yard. Work New Replacement of steam & water analysis system have been installed & commissioned on unit 1-6. All the requisitioned valves have been retrofitted & commissioned, while on unit-2, 90% of valves has been retrofitted. The electro Mechanical Vibratory Feeders at ERH in CHP has been installed & commissioned in units 3 to 6. Upgradation of wagon Trippler No.3 in coal handling plant of GGSSTP, magnetic separators on conveyors in CHP has been installed & commissioned. Replacement of High impedance bus bar protection with numerical type relays. Material has been supplied by BHEL for the replacement of existing APH with modified design24 Sector APH on unit 1 & 2. But due to Punjab Govt. decision to permanently close unit 1& 2 of Ropar TPS,</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						APH would be installed on unit 6 during next overhauling in November & December 2019. Phase-II Migration of WDPF System to Ovation system on Unit-5 completed. Replacement of minimum oil circuit breakers (MOCBs) with vacuum circuit breakers of units 3,4,5 &6 would be carried out during the Year 2018-19. Replacement of Fire Detection & Annunciation system at various locations including cable galleries of Ropar TPS would be carried out in the year 2020-21. Replacement of ESP controllers of stage 3 would be taken up in 2019-20. Replacement of MCC Panels & Control Desks of 3 Nos. of stacker Reclaimers of CHP would be carried out in 20120-21. Procurement, Installation and commissioning of Air Born Dust Suppression system based on water mist technology for Wagon tripper 1&2 will taken up in 2020-21. Erection & commissioning of cooling water supply system for Air Compressors installed for dry fly ash handling system & to provide DM water will be taken up in 2019-20.
8.	Punjab	GH TPS (Leh. Moh.)	1	1997	210	Both the units are currently running. PSPCL has intimated that none of 4 units of GHTP, Lehra Mohabbat has been included in the list of potential units requiring R&M/ LE during 2017-22. FGD: Order for consultancy for preparation of tender specification has been placed on NTPC, Noida on 18-10-2018. Consultant has submitted DFR and on this basis agenda is being prepared for the administrative approval of BODs. Estimated cost: 840 Cr.
9.	Punjab	GH TPS (Leh. Moh.)	2	1997	210	
10.	Rajasthan	Kota	3	1988	210	Unit #3 and #4 are running while unit #4 is currently under shutdown for R&M works. Total 14 activities sanctioned for R&M. Estimated cost of R&M is Rs. 356.13 crores. Expenditure incurred till date is Rs.196 Crs. - 11 nos of works fully completed. - R&M work of CHP system is under progress. Order placed to M/s. Energo Engineering Projects Ltd. is terminated. Preparation of NIT is in progress for balance work of CHP- R&M. - Installation of Vacuum pump is under progress, placed to M/s. Millenium Impex Pvt. Ltd. - 01 no. work of Air Compressor replacement has been dropped due to technical reasons. - E- Tender for VFD cancelled due to technical reasons. <u>Proposal for additional capitalisation during the year 2017-22 amounting to approx. Rs. 24 Crores under approval of BOD.</u> - Replacement of existing BHEL make Procontrol P-13 SG-TG system of unit#5. (12.97 Crs) -Supply and ETC of variable frequency drive on ID fan motor(4nos.) of unit#6&7 (8.75 Crs.) - Supply, Design, installation, testing and ommissioning of online energy accounting and management system of KSTPS (22.4 Crs.)
11.	Rajasthan	Kota	4	1989	210	
12.	Rajasthan	Kota	5	1994	195	
13.	Rajasthan	Suratgarh TPS	1	1998	250	All 4 unit are currently shutdown for R&M works. Estimated cost of RLA of Boilers of unit 1-5 is .291 Crs.. Executing agency is IRC Engineering Services India Pvt. Ltd., New Delhi. Total 16 activities sanctioned for R&M/ LE works. - 13 activities have been completed. - Old NIT is dropped & New NIT will be floated for providing Dense Phase Conveying System from existing intermediate Silo System of ESP.
14.	Rajasthan	Suratgarh TPS	2	2000	250	
15.	Rajasthan	Suratgarh TPS	3	2001	250	
16.	Rajasthan	Suratgarh TPS	4	2002	250	

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status												
						<ul style="list-style-type: none">- Activity dropped for Valve Less Auto-wash Gravity Filter & Automatic self-cleaning Filter for unit No. 1&2.- Activity dropped for Installation of Belt Wash System of conveyer of CHP.-Modification in ACW system of Unit 1& 2 has been completed on 28.01.2017.-Augmentation of DMCCW system of Unit 1 &2 completed in September, 2016-Blow down system for cooling Tower of Unit 2,3, 4&5 completed in 2015.-Replacement of LR beam of ESO on Unit-1 completed in financial year 2018-19.-SOx, NOx & CO Analyser for Unit 2,3 &4 has been completed on 15.02.2017-Upgradation of HMI system of unit 2 completed on 06.09.2016.-Upgradation of workshop completed.												
17.	Chhattisgarh	Korba (West)	1	1983	210	<p>All 4 units are currently running.</p> <p>CSPGCL has taken-up need based R&M for life extension on the basis of R&LA studies and also taken up R&M plan for compliance of new environmental norms. The CSERC in its order dated 61-03-2016 has approved such scheme under capital investment plan for financial year 2016-17 to 2020-21.</p> <p>RLA studies done by M/s Evonik. Scope of work of Boiler, Turbine, Electrical Instrumentation, Civil and BOP is being finalised.</p> <table><tr><td>1.</td><td>Augmentation, Renovation & Up-gradation of ESPs to maintain the stack Emission level 50mg/Nm³</td><td><p>Unit No.2: R&M work has been completed, PG Test is to be carried out.</p><p>Unit No. 1: R&M work of CD Pass has been completed and erection work of 1 AB Pass is under progress.</p><p>Unit No. 3: Civil work has been completed & erection of new ESP is under progress.</p><p>Unit No. 4: Civil work has been completed. Erection of new ESP is under progress.</p></td></tr><tr><td>2.</td><td>Augmentation of DDCMIS</td><td>Detailed order issued to BHEL for supply & services. Detailed Engineering work is under progress. Supply commenced site mobilization started from 29-08-2019.</td></tr><tr><td>3.</td><td>Fire Protection System of Transformer & Oil handling tanks areas</td><td>LOI has been issued on 03-04-2019. Detailed order has been issued on dated 04-05-2019.Retendering to be done.</td></tr><tr><td>4.</td><td>Installation of FGD System</td><td>DPR prepared. Detailed order has been issued to M/S. DCPL, as consultant for preparation of Tender Specifications. NIT Expected by 20-10-2019.</td></tr></table>	1.	Augmentation, Renovation & Up-gradation of ESPs to maintain the stack Emission level 50mg/Nm ³	<p>Unit No.2: R&M work has been completed, PG Test is to be carried out.</p> <p>Unit No. 1: R&M work of CD Pass has been completed and erection work of 1 AB Pass is under progress.</p> <p>Unit No. 3: Civil work has been completed & erection of new ESP is under progress.</p> <p>Unit No. 4: Civil work has been completed. Erection of new ESP is under progress.</p>	2.	Augmentation of DDCMIS	Detailed order issued to BHEL for supply & services. Detailed Engineering work is under progress. Supply commenced site mobilization started from 29-08-2019.	3.	Fire Protection System of Transformer & Oil handling tanks areas	LOI has been issued on 03-04-2019. Detailed order has been issued on dated 04-05-2019.Retendering to be done.	4.	Installation of FGD System	DPR prepared. Detailed order has been issued to M/S. DCPL, as consultant for preparation of Tender Specifications. NIT Expected by 20-10-2019.
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20.	Chhattisgarh	Korba (West)	4	1986	210													
21.	M.P.	Sanjay Gandhi	1	1993	210	<p>Unit-1 –The unit is currently under shutdown for R&M works while unit 2 is presently running. The consultant has completed RLA/CA Studies of unit#1 & 2 in Dec 2014 and August 2016 respectively submitted the DPR in March 2015 and January 2017.</p> <p>Executing Agency will be finalised through open tendering process in due course of time. The R&M work has been divided into 4 no of packages.</p> <ol style="list-style-type: none">1. Boiler2. TG3. BOP4. R&M of Electrical & C&I <p>To capitalise the expenditure proposed to be incurred in these R&M works of SGTPS, Birsingpur, a petition was filed before Hon’ble MPERC in the month of April 2017. After exchange of various correspondences, the Hon’ble commission vide order dated 27-12 2017</p>												
22.	M.P.	Sanjay Gandhi	2	1994	210													

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>refused to consider the proposal because of various objections raised by stake holders. However, the commission stated in the order that MPPGCL is at liberty to approach them with a fresh proposal considering the objection & observation of stake holders. After details analysis, a proposal was submitted before BOD of MPPGCL in the meeting held on 12-09-2018 for dropping the proposal of carrying out comprehensive R&M work in 210 MW units of SGTPS and availing the special allowance till MoE&F permits. After detailed deliberations, the BoD resolved to constitute a committee to analyse the above proposal. Accordingly, a sub-committee has been formed. A meeting of committee was held on 11-01-2019 at Jabalpur. Next meeting will be held shortly. After deliberations, the committee will submit its recommendations. The BoD of MPPGCL in its meeting on 23.12.2019 has decided that LE of around 10 years may be carried out in Unit no 1 and 2 of SGTPS through R&M based on necessary feasibility study with new CEA's guideline. Further action in the matter will be taken up upon receipt of new guidelines.</p> <p>M/s FICHTNER consulting Engineers (India) Ltd. appointed as consultant to carry out feasibility study and preparation of tender document for installation of FGD & other equipment in April 2018. Recommendation cum DPR submitted by consultant. Has been accepted by MPPGCL. Technical and commercial specification are under preparation. Placement of order will be done by June 2019 and installation of FGD completed by September 2021-March 2022.</p> <p>i) Boiler- Replacement of Pendent Reheater coils and APH tubes with plates, replacement of all safety valves and hangers, re-insulation work after replacement/repairing of boiler pressure parts.</p> <p>ii) TG- Replacement of HP, IP and LP Turbine modules with new improved design.</p> <p>iii) BOP- Replacement of Hydrogen Generation Plant, Complete rehabilitation of almost one non-working stream and refurbishment of damaged parts of one working stream in Ash Handling System, rehabilitation of Fire Fighting system piping, CW System, ACW System, Raw Water System and Fuel oil handling system etc.</p> <p>iv) Electrical and CI-Retrofitting of old 6.6kV SF₆ CB, SFU of LT boards with draw based protection etc. Replacement of 6.6kV energy efficient motors for coal mills and PA Fans. Replacement of complete of complete C&I system to DCS from old analog system.</p>
23.	Maharashtra	Chandrapur	7	1997	500	RLA/Feasibility study for EER&M not carried out. The unit is currently running.
24.	Maharashtra	Khaperkheda	3	2000	210	RLA/Feasibility study for EER&M not carried out. The unit is currently running
25.	Maharashtra	Khaperkheda	4	2001	210	RLA/Feasibility study for EER&M not carried out. The unit is currently running.
26.	Tamil Nadu	Tuticorin TPS	1	1978	210	<p>1st and 2nd RLA already completed. Under shutdown for R&M works.</p> <p>T.G.: - . Strengthening of weak insulation of Boiler work completed (1066 m²) during 2018-19, balance work (650 m²) will carried out during 2019-20. All diaphragm in HP, IP & LP had been renewed & work completed during 2009-10.</p> <p>Electrical & C&I: - Existing 3 nos. single phase GT were replaced by new one during 2012-13.</p> <p>BOP: -Replacement of complete ESP internals.</p> <p>Modification of APH sealing system by double sealing</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>completed during 2009-10.</p> <p>Complete replacement of economizer coils assembly, LTSH supply tubes and straight tubes panels for super heater rear wall near economizer- P.O. placed on Micro Spares, Chennai on 21-08-2018. Delivery period is within 60 days and erection will be done within 20 days from handing over of site. Supply of material completed on 05-01-2019. Works completed on 22-08-2019.</p> <p>P O placed to BHEL for Retrofitting of condenser on 25-05-2018. Delivery period is within 8 months and erection will be done within 60 days from the date of handing over of site (July to August 2019). Material supply has been completed. Erection works under progress from 26-07-2019. Work completed on 23.10.2019</p> <p>Administrative approval for Distributed Digital Control Monitoring and Information System (DDCMIS) accorded on 29-12-2015. P.O. proposal sent to HQ on 14-05-2019. Reply to remarks of sent to HQ on 21-06-2019. P.O issued Vide P.O.No.6760-S, dt.19.09.19. Erection works completed on 23.12.2020 and commissioned on 24.12.2020.</p> <p>Approval accorded on 05-03-2019 for installation of FGD. Letter of acceptance sent to M/s. MECON Ltd., Ranchi on 16-04-2019 for consultancy. Inspection done for feasibility study for installation of FGD. Report awaited.</p> <p>Administrative approval accorded on 29-12-2018 for Augmentation of ESP. Tender specification sent to HQ on 04-03-2019 for BLTC approval. Administrative approval was accorded on 29.12.2018. As it is proposed to install Semi Dry FGD system to comply SOx emission norms, which will also take over the additional dust burden, ESP augmentation is not warranted. Hence, ESP retrofitting proposal is withheld at present. After watching the performance of FGD, further action will be taken</p> <p>Administrative approval accorded for Replacement of 2 nos of Primary Air Fan motors with journals bearing by new motors with antifriction bearings in units I, II & III. Tender opened on 03-07-2018. Price bid open on 20-02-2019. Purchase order issued on 21.06.2019. Materials received on 28.09.2020. 1 No. Motor erected on 10.12.2020 and commissioned on 23.12.2020.</p> <p>P O issued on 21-06-2019. Supply of materials: 4 months from the date of receipt of P O. Erection: within 60 days from the date of handing over of site.</p> <p>Purchase order issued to BHEL, Chennai on 25-05-2018 for retrofitting of 210 MW, LMW surface condenser in any one of the unit-1, 2 & 3 TPS. Material to be supplied. Delivery period is 8 months.</p> <p>Replacement of unit auxiliary transformer in unit 1&2 - Administrative approval proposal is under process.</p> <p>Replacement of existing 6.6KV PILC cables into latest version 6.6KV XLPE FRLS cable for HT motors and HT transformers. P O issued on 05-03-2019. Materials</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>received on 29-07-2019. Erection under progress.</p> <p>Replacement of 2nos. 15MVA, 15.75 KV/7KV UAT. Tender opened on 12-12-2018. Tender lodged ion 03-04-2019. Re- tender to be floated. Under process.</p> <p><u>R&M work common to Station</u></p> <ul style="list-style-type: none"> - Installation of 10 MLD Desalination plant: DPR prepared by M/s. Fichner, Chennai on 19-07-2018 which is under scrutiny Study on environmental impact assessment is under progress. - Retrofitting of HP/ IP/ LP rotor of 210 MW LMW turbine: Proposal sent to HQ for approval on 22-04-2019. Clarification received from HQ, reply to be sent. - Common effluent treatment Plant: M/s/ TWIC is preparing DPR. Letter issued on 25-06-2019. - Erection of 1000 MT Ash Silo unit#1 to 5: Budgetary offers received from 3 firms. Revised proposal sent to HQ on 03-05-2019 for approval, which under progress. - R&M of ESP: Administrative approval accorded on 29-12-2018. Approval for tender specification under process.
27.	Tamil Nadu	Tuticorin TPS	2	1980	210	<p>Following R&M Works to be carried out during 2017-22 at unit#2. Unit is presently running.</p> <ul style="list-style-type: none"> - Strengthening of weak insulation of Boiler work completed during 2018-19. - Replacement of unit Auxiliary Transformer (2019-20) -Tender proposal has been lodged on 03-04-2019.Fresh indent raised . Tender specification with modified BQR sent to HQ on 23.12.2019 - Replacement of existing Journal bearing FD fan 3 Nos. motorsin to antifriction bearing fan motors in boiler (2021-22) - Administrative approval accorded for Replacement of 2 nos of Primary Air Fan motors with journals bearing by new motors with antifriction bearings in units I, II &III. Tender opened on 03-07-2018. Price bid open on 20-02-2019. Tender evaluation is under progress. PO placed on M/s Shree Ram Eng, dt 21.06.2019 - Provision of Flue GAS Desulphurization Plant, FGD (2020-21) - Approval accorded on 05-03-2019 for installation of FGD. Tendering is under progress. - Upgradation of operating system along with PGP and computer. (2019-20) - Tender opening extended to 24.04.2019 -Approcal for installation of semi dry FGD has benn accorded on 24.12.2019 - Replacement of existing HT Mill motors by Energy efficient motors (7 NOS). (2021-22). - Augmentation of ESP to meet the new environmental norms of MoEF&CC.(2020-21) - Administrative approval accorded on 29-12-2018 for Augmentation of ESP. Tender specification sent to HQ on 04-03-2019 for BLTC approval. - Erection of 1 no 1000 MT Ash Silo at Unit1, 2 &3 1 no at unit 4&5. - Budgetary offer received from 3firms proposal for getting Administrative approval under preparation. - Main Condensate Pump Motor 220 KW/6.6KV (2021-22) <p>R&M of ESP: Adm. approval accorded on 03-07-2019. Preparation of technical specification under process at TTPS.</p> <p><u>R&M work common to Station</u></p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<ul style="list-style-type: none"> - Installation of 10 MLD Desalination plant: DPR prepared by M/s. Fichner, Chennai on 19-07-2018 which is under scrutiny Study on environmental impact assessment is under progress. - Retrofitting of HP/ IP/ LP rotor of 210 MW LMW turbine: Proposal sent to HQ for approval on 22-04-2019. Clarification received from HQ , reply to be sent.
28.	Tamil Nadu	Tuticorin TPS	3	1982	210	<p>1st and 2nd RLA already completed. Under shutdown for R&M works. Following R&M Works to be carried out during 2017-22 at unit#3.</p> <ol style="list-style-type: none"> 1. Strengthening of weak insulation of Boiler work completed during 2017-18. 2. 3rd RLA study of Boiler -(2020-21) 3. Augmentation of ESP to meet the new environmental norms of MoEF&CC. (2020-21) - Administrative approval accorded on 29-12-2018 for Augmentation of ESP. Tender specification sent to HQ on 04-03-2019 for BLTC approval 4. Complete replacement of platen water wall tubes and bends in boiler (2020-21) 5. Retrofitting of condenser (2020-21) 6. Augmenting the capacity of air evacuation system of condensers by replacing the existing steam ejectors by vacuum pumps (2020-21) 7. Retrofitting of HP/IP/LP rotor in 210 mw LMW Turbine” (2020-21) - Budgetary offers were requested from M/s. GE Power India Ltd., M/s. Doosan Power System India Ltd. And M/s. TOSHIBA JSW Power System India Ltd. Reply awaited. 8. Provision of Flue Gas Desulphurization Plant (FGD) (2020-21) 9. Replacing of 3 nos 1100KW, 6.6KV FD fan motors. (2019-20) 10. Distributed Digital Control Monitoring Information System (DDCMIS). (2020-21). Administrative approval proposal is to be revised based on Unit 1 DCS approved rates. <p>Administrative approval accorded for Replacement of 2 nos of Primary Air Fan motors with journals bearing by new motors with antifricition bearings in units I,II &III. Tender opened on 03-07-2018. Price bid open on 20-02-2019. Tender evaluation is under progress.</p> <p><u>R&M work common to Station</u></p> <ul style="list-style-type: none"> - Installation of 10 MLD Desalination plant: DPR prepared by M/s. Fichner, Chennai on 19-07-2018 which is under scrutiny Study on environmental impact assessment is under progress. - Retrofitting of HP/ IP/ LP rotor of 210 MW LMW turbine: Proposal sent to HQ for approval on 22-04-2019. Clarification received from HQ , reply to be sent. <p>R&M of ESP in Unit# 3, 4&5: Budgetory offers called from GE Power, Chennai, L&T Boilers, Vadodara, TATA Projects, BHEL, Chennai and M/s. K.C. Cottrell India, Gurgaon. Offers not yet received. Reminders sent to firms on 30-04-2019.</p>
29	Tamil Nadu	Tuticorin TPS	4	1992	210	<p>Following R&M Works to be carried out during 2017-22 at unit#4. Unit is presently running.</p> <ol style="list-style-type: none"> 1. Modification of SWAS System.(2021-22) 2. Replacement of existing outdated static type FSSS and SBC (Soot Blower Controls) system and its allied components into latest version system (2020-21) 3. Upgradation of Pro- control system (STC, SADC,

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>PRDS& EAST) & Iskamatic (Turbine Control System).(2020-21)</p> <p>4. Complete replacement of Hot Re- heater Coil (2019-20)- P.O. Placed to BHEL, Chennai on 30-05-2019. Erection will be done within 20 days of handing over of site. Works to be carried out during annual overhaul in 2020</p> <p>5. RLA study of Hot Reheater in Boiler (2019-20)</p> <p>6. Augmentation of ESP to meet the new environmental norms of MoEF &CC (2020-21)</p> <p>7. Provision of Flue Gas Desulphurization Plant (FGD) (2021-22)</p> <p><u>R&M work common to Station</u></p> <p>- Installation of 10 MLD Desalination plant: DPR prepared by M/s. Fichner, Chennai on 19-07-2018 which is under scrutiny Study on environmental impact assessment is under progress.</p> <p>- Retrofitting of HP/ IP/ LP rotor of 210 MW LMW turbine: Proposal sent to HQ for approval on 22-04-2019. Clarification received from HQ , reply to be se</p> <p>R&M of ESP in Unit# 3, 4&5: Budgetory offers called from GE Power, Chennai, L&T Boilers, Vadodara, TATA Projects, BHEL, Chennai and M/s. K.C. Cottrell India, Gurgaon. Offers not yet received. Reminders sent to firms on 30-04-2019. nt.</p>
30.	Tamil Nadu	Tuticorin TPS	5	1991	210	<p>Ist RLA completed. Under shutdown for R&M works. Following R&M Works to be carried out during 2017-22 at unit#5.</p> <p>Work of retrofitting of 6.6 KV MOCB by SF6 breaker at AHP Stage-I has been completed and commissioned on16-07-2018.</p> <p>1. Modernization of raw coal feeder system (2020-21)</p> <p>2. Modernization of FSSS, SBC, SADC, PRDS& Scanners. (2019-20)</p> <p>- Tender opened on 04-05-2018. Price opened on 26-02-2019. Unit rate called for from othermal stations.</p> <p>3. Replacement of Steam Water Analysis System.(2019-20). Retender floated and lodged on 25-02-2019. Retender floated and opened on 10-07-2019.</p> <p>4. Chemical cleaning of boiler (2020-21)</p> <p>5. 2nd RLA study of Boiler & Turbine(2020-21)</p> <p>6. Augmentation of ESP to meet the new environmental norms of MoEF&CC.(2021-22)</p> <p>7. Retrofitting of 6.6KV HT breaker system with new advanced Breaker.(2020-21)</p> <p>8. Complete replacement of Hot Reheater coil (2020-21)- P.O. placed on BHEL, Chennai, on 30-05-2019.</p> <p>- Material supply will be completed within 60 days from the date of receipt of this order.</p> <p>- Erection: within 20 days from the date of handing over of site.</p> <p>9.Provision of Flue Gas Desulphurization Plant (FGD) (2021-22)</p> <p>10. Complete replacement of Hot Re-heater Assembly. Order issued to M/s/ NDE Inspections, Trichy. Works under progress from 04-09-2019. Report received on 27.11.2019. I has been suggested to replace the HRH during forthcoming COH</p> <p><u>R&M work common to Station</u></p> <p>- Installation of 10 MLD Desalination plant: DPR prepared by M/s. Fichner, Chennai on 19-07-2018</p>

S.No.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
						<p>which is under scrutiny Study on environmental impact assessment is under progress.</p> <p>- Retrofitting of HP/ IP/ LP rotor of 210 MW LMW turbine: Proposal sent to HQ for approval on 22-04-2019. Clarification received from HQ, reply to be sent.</p> <p>R&M of ESP in Unit# 3, 4&5: Budgetary offers called from GE Power, Chennai, L&T Boilers, Vadodara, TATA Projects, BHEL, Chennai and M/s. K.C. Cottrell India, Gurgaon. Offers not yet received. Reminders sent to firms on 30-04-2019.</p> <p>P.O proposal for replacement of existing outdated Pro-control system in FSSS, SBC, APRDS, STC, SADC and scanner system by latest version of DCS in unit#5 sent to HQ on 17-05-2019. Reply to queries sent to HQ on 21-06-2019. Proposal for placing of PO approved by BLTC of TANGEDCO. PO issued dated 22.10.19. Drawing approval accorded on 27.12.2019</p>
Sub Total State Sector (R&M)				30	7135	
	Total State Sector (LE+R&M)			64	14705	

CENTRAL SECTOR R&M (Gas Based)

S.No.	Utility	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	NEEPCO	Kathalguri CCGT	GT-1	1995	33.50	<p>Gt#1 (a) Order for supply of M/s MHI make MEGAC V, Diasys Netmation System for Up gradation and replacement of old controller MACTUS 620 sequencer and MEGAC III analog Governor already placed with the OEM, M/s MHI, Japan on 26.03.2015. Work completed on 15-02-2017.</p> <p>(b) The new vibration monitoring system procured against unit-1 has installed in unit-4 due to available s/d and requirement of the unit. Vibrating monitoring system of GT, unit#1 has been commissioned on 19-06-2019.</p> <p>(c) Order for Compressor Rotor Refurbishment (CRR) and Comprehensive Rotor Inspection (CRI) for unit#1 to unit #4 have already been placed with the OEM, M/s MHI, Japan on 28.05.2013 and unit is planned in 2021-22 as per the maintenance schedule of OEM.</p>
2		Kathalguri CCGT	GT-2	1995	33.50	<p>GT#2 : (a) Order for supply and commissioning of M/s MHI make MEGAC V, Diasys Netmation System for Up gradation and replacement of old controller MACTUS 620 sequencer and MEGAC III analog Governor already placed with the OEM, M/s MHI, Japan on 26.03.2015. The upgradation of controller already commissioned on 31-07-2016.</p> <p>(b) Vibrating monitoring system of GT, unit#1 has been commissioned on 20-06-2019.</p> <p>(c) Order for Compressor Rotor Refurbishment (CRR) and Comprehensive Rotor Inspection (CRI) for unit#1 to unit #4 have already been placed with the OEM, M/s MHI, Japan on 28.05.2013 and this GT of unit#1 is planned in 2019-20 (October 2019) as per the maintenance schedule of OEM. .</p>
3		Kathalguri CCGT	GT-3	1995	33.50	<p>(a) Up gradation and replacement of old controllers MACTUS 620 sequencer and MEGA III analog Governor of M/s MHI make Gas Turbine unit# 3&4 by MEGAC V, Diasys Netmation System have already been completed in 12-11-2013.</p> <p>(b) Compressor Rotor Refurbishment (CRR) and comprehensive Rotor Inspection of MHI is completed on 20-07-2017.</p> <p>(c) Order for Compressor Rotor Refurbishment (CRR) and Comprehensive Rotor Inspection (CRI) for unit#1 to unit #4 have already been placed with the OEM, M/s MHI, Japan on 28.05.2013 and the rotor after CRR/CRI in Japan already reached the Plant site. The above works for GT 3 executed w.e.f. 19-06-2017 and completed on 20-07-2017.</p> <p>The order for procurement of new vibration monitoring system is already placed and installed in July 2017 along with major overhauling of Gas Turbine planned in July 2017.</p>
4		Kathalguri CCGT	GT-6	1996	33.5	<p>Upgradation and replacement of Mark IV control system M/s. BHEL make Gas Turbine Unit 6 with Mark Vie Control System has been completed on 31-03-2018.</p>
5		Kathalguri CCGT	ST-1	1998	30.00	<p>a) Upgradation of Programmer/ EPROM writer for Procontrol-13 Control System: already completed.</p> <p>b) Upgradation of AVR (Automatic Voltage Regulator): LOI for upgradation of AVR is placed on M/s.ABB. Upgradation of AVR to DVAR completed and commissioned on 26-09-2018.</p> <p>c) P.O. for upgradation of Vibration and Temperature monitoring System placed on 22-11-2018. Material received. Commissioned September 2019.</p> <p>d) The OEM, M/s. BHEL has been requested to study the Governor system and submit a comprehensive offer for upgradation of the system. Got delayed as the new available system with the OEM, M/s. BHEL is not compatible for retrofitting into the existing system. Expected execution of the works by 2020-21.</p> <p>e) Up gradation of Electro-hydraulic governor (SR-IV)</p>

S. No.		Name of Stn.	Unit No.	Year of Comm .	Cap. (MW)	Status
6		Kathalguri CCGT	ST-2	1998	30.00	Upgradation of 3300-series, BENTLEY-NEVADA- make vibration system: P.O. for upgradation of Vibration and Temperature monitoring System placed on 22-11-2018. Commissioned in Oct,2019 P.O. placed on 23-11-2018 for Upgradation of AVR (Automatic Voltage Regulator) to to DVAR. Commissioned in April 2019. Process for Upgradation of Vibration and Temperature monitoring system completed on 12.12.2020.
7		Kathalguri CCGT	ST-3	1998	30.00	a) Upgradation of 3300-series, BENTLEY-NEVADA- make vibration system: Commissioned in October 2019. b) PO placed for upgradation of AVR on M/s.ABB. Upgradation of AVR (Automatic Voltage Regulator) to to DVAR is completed and commissioned on 11-09-2018.
Total Central Sector- Gas (R&M)			7		224	
Total R&M/LE (State+ Centre)			70		14929	

Annexure-2**As on 30.06.2021****Details of Thermal Power Units where the 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 Synchronisation after LE Works
	Ukai	4	200	GSECL	State Sector	17-05-2017
	Wanakabori	3	210	GSECL	State Sector	27-11-2017
	Koradi	6	210	MAHAGENC O	State Sector	20-08-2018
	Obra	12	200	UPRVUNL	State Sector	24-09-2018

Total (State) - 04 Units 820.00 MW

Annexure-3
As on 30.06.2021

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

Total (Central) - 02 Unit 67.00 MW

Details of Thermal Power Units where the Renovation & Modernisation (R&M)/Life Extension (LE) Works have been Completed During 12th Plan

Sl. No.	Name of the TPS	Unit No.	Capacity MW	Utility	State/Central Sector	Date of Synchronisation after LE Works
Units where Life Extension Works completed during 12 th Plan						
	Bathinda	3	110	PSPCL	State Sector	05.08.2012
	Kawas	GT-1A	106	NTPC	Central Sector	21.01.2013
	Parichha	2	110	UPRVUNL	State Sector	05.05.2013
	Muzafarpur	1	110	KBUNL	Joint venture of BSPGCL & NTPC	05.07.2013
	Kawas	GT-1B	106	NTPC	Central Sector	28.08. 2013
	Gandhar	GT – 3	131	NTPC	Central Sector	29.09. 2013
	Kawas	GT-2B	106	NTPC	Central Sector	05.03.2014
	Bathinda	4	110	PSPCL	State Sector	10.07. 2014
	Muzafarpur	2	110	KBUNL	Joint venture of BSPGCL & NTPC	30.09.2014
	Auraiya	GT-1	111.19	NTPC	Central Sector	22.06. 2014
	Gandhar	GT-1	131	NTPC	Central Sector	06.07.2014
	Kawas	GT-2A	106	NTPC	Central Sector	22.08.2014
	Auraiya	GT-2	111.19	NTPC	Central Sector	28.10.2014
	Auraiya	GT-3	111.19	NTPC	Central Sector	25.12.2014
	Auraiya	GT-4	111.19	NTPC	Central Sector	02.03.2014
	Harduaganj	7	110	UPRVUNL	State Sector	01.05. 2015
	Bandel	5	210	WBPDCCL	State Sector	21.09.2015
	Gandhar	GT-2	131	NTPC	Central Sector	15.04.2015
	Obra	10	200	UPRVUNL	State Sector	08.04.2016
	Barauni	7	110	BSPGCL	State Sector	03.08.2016
	Obra	11	200	UPRVUNL	State Sector	31.12.2016
Total State Sector		10 units	1380.00 MW			
Total Central Sector		11 units	1261.76 MW			
Total LE (Central +State)		21 units	2641.76 MW			
Units where Renovation & Modernisation Works completed during 12 th Plan						
	DPL	6	110	WBPDCCL	State Sector	07.05.2012
	Patratu	10	110	JSEB	State Sector	24.05.2012
	Anpara’A	1	210	UPRVUNL	State Sector	21.03.2013
	Anpara’A	2	210	UPRVUNL	State Sector	21.03.2013
	Anpara’A	3	210	UPRVUNL	State Sector	21.03.2013

	Tanda	2	110	NTPC	Central Sector	15.09.2012
	Kathalguri	GT-3	33.5	NTPC	Central Sector	31.03.2014
	Kathalguri	GT-4	33.5	NTPC	Central Sector	31.03.2014
	Kathalguri	GT-5	33.5	NTPC	Central Sector	31.03.2014
	Simhadri	1	500	NTPC	Central	31.03.2016
	Simhadri	2	500	NTPC	Central	31.03.2016
	Ramagundam	4	500	NTPC	Central	March, 2017
	Ramagundam	5	500	NTPC	Central	March, 2017
	Ramagundam	6	500	NTPC	Central	March, 2017
	Rihand STPS	1	500	NTPC	Central	March, 2017
	Rihand STPS	2	500	NTPC	Central	March, 2017
Total R&M State Sector		05 units	850.00 MW			
Total R&M Central Sector		11 units	3710.50 MW			
Total R&M (Central +State)		16 units	4560.50 MW			
Total (R&M+LE)		37 units	7202.26			

Summary of implementation for phasing plan for FGD installation/ESP Upgradation (upto 30.06.2021)

Sl. No.	Description	Capacity (MW)	Units
1.	Total Capacity Considered	208329.5	594
2.	Capacity identified for retirement	1092.5	9
3.	Capacity after Retirement (1-2)	207237	585
4.	Newly commissioned units	15937	28
5.	Capacity already having FGD capable of meeting new Sox norms	8290	20
6.	Capacity with CFBC Boilers	5824	50
7.	Capacity taken for analysis (3-4-5-6)	177276	487
8.	FGD Implementation Plan		
a)	Capacity which claims to be Sox complaint	4885	20
b)	Balance Capacity (7-8 (a))	172391	467
c)	Capacity where FGD has been planned (Annexure-6)	167922	438
d)	Capacity where FGD implementation plan available	167922	438
9.	ESP IMPLEMENTATION PLAN		
(i)	Capacity which is SPM non- complaint	72659	273
(ii)	Capacity which would be Sox non- complaint	6344	38
(iii)	Capacity FGD installation being Explored	390	4
(iv)	Balance Capacity (i-ii-iii) where ESP upgradation considered	65925	231
(v)	Capacity where ESP Implementation plan available	64525	222
(vi)	Capacity where ESP Implementation plan not submitted by developer	1400	9

Annexure-6

Status of Installation of FGD

Developer	Name of Project	Sector	State	Region	Unit No	Unit Capacity	Date of Commissioning	FGD Status
NTPC	BARH II	Central	Bihar	ER	4	660	20-11-13	Bid Awarded
NTPC	BARH II	Central	Bihar	ER	5	660	04-03-15	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	1	210	31-03-92	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	2	210	17-03-94	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	3	210	24-03-95	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	4	210	18-03-96	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	5	500	31-03-07	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	6	500	16-03-08	Bid Awarded
NTPC	KAHALGAON TPS	Central	Bihar	ER	7	500	31-07-09	Bid Awarded
NTPC	NABI NAGAR TPP	Central	Bihar	ER	1	250	20-03-16	Bid Awarded
NTPC	NABI NAGAR TPP	Central	Bihar	ER	2	250	04-04-17	Bid Awarded
NTPC & Bihar	MUZAFFARPUR TPS	Central	Bihar	ER	1	110	31-03-85	NIT issued
NTPC & Bihar	MUZAFFARPUR TPS	Central	Bihar	ER	2	110	17-03-86	NIT issued
NTPC & Bihar	MUZAFFARPUR TPS	Central	Bihar	ER	3	195	31-03-15	NIT issued
NTPC & Bihar	MUZAFFARPUR TPS	Central	Bihar	ER	4	195	24-03-17	NIT issued
Adhunik Power&Natural Resources Ltd	MAHADEV PRASAD STPP	Private	Jharkhand	ER	1	270	19-11-12	Complies with new Norms
Adhunik Power&Natural Resources Ltd	MAHADEV PRASAD STPP	Private	Jharkhand	ER	2	270	29-03-13	Complies with new Norms
D.V.C	BOKARO `A` TPS	Central	Jharkhand	ER	1	500	22-03-16	Bid Awarded
D.V.C	CHANDRAPURA(DVC)	Central	Jharkhand	ER	7	250	04-11-09	Bid opened
D.V.C	CHANDRAPURA(DVC)	Central	Jharkhand	ER	8	250	31-03-10	Bid opened
D.V.C	KODARMA TPP	Central	Jharkhand	ER	1	500	20-07-11	Bid Awarded
D.V.C	KODARMA TPP	Central	Jharkhand	ER	2	500	15-02-13	Bid Awarded
TATA Power Co.	JOJOBBERA TPS	Private	Jharkhand	ER	2	120	02-01-01	Bid Awarded
TATA Power Co.	JOJOBBERA TPS	Private	Jharkhand	ER	3	120	02-01-02	Bid Awarded
TATA Power Co. MPL	MAITHON RB TPP	Private	Jharkhand	ER	1	525	01-09-11	Bid Awarded
TATA Power Co.MPL	MAITHON RB TPP	Private	Jharkhand	ER	2	525	24-07-12	Bid Awarded
TenughatVN Ltd	TENUGHAT TPS	State	Jharkhand	ER	1	210	14-04-94	Feasibility Study Completed
TenughatVN Ltd	TENUGHAT TPS	State	Jharkhand	ER	2	210	10-10-96	Feasibility Study Completed
GMR	KAMALANGA TPS	Private	Odisha	ER	1	350	29-03-13	Bid opened
GMR	KAMALANGA TPS	Private	Odisha	ER	2	350	28-09-13	Bid opened
GMR	KAMALANGA TPS	Private	Odisha	ER	3	350	21-03-14	Bid opened
Ind barath	IND BARATH TPP	Private	Odisha	ER	1	350	25-02-16	Feasibility Study started
JIPL	DERANG TPP	Private	Odisha	ER	1	600	10-04-14	Tender specification made
JIPL	DERANG TPP	Private	Odisha	ER	2	600	24-01-15	Tender specification made
NTPC	TALCHER STPS	Central	Odisha	ER	1	500	19-02-95	Bid Awarded
NTPC	TALCHER STPS	Central	Odisha	ER	2	500	27-03-96	Bid Awarded
NTPC	TALCHER STPS	Central	Odisha	ER	3	500	21-02-03	Bid Awarded
NTPC	TALCHER STPS	Central	Odisha	ER	4	500	25-10-03	Bid Awarded
NTPC	TALCHER STPS	Central	Odisha	ER	5	500	13-05-04	Bid Awarded
NTPC	TALCHER STPS	Central	Odisha	ER	6	500	06-02-05	Bid Awarded
OPGCLtd	IB VALLEY TPS	State	Odisha	ER	1	210	02-06-94	Feasibility Study Completed
OPGCLtd	IB VALLEY TPS	State	Odisha	ER	2	210	22-10-95	Feasibility Study Completed
Sterlite Energy Ltd	STERLITE TPP	Private	Odisha	ER	2	600	29-12-10	Feasibility Study started
C.E.S.C. Pvt.	BUDGE BUDGE TPS	Private	West Bengal	ER	1	250	16-09-97	NIT issued
C.E.S.C. Pvt.	BUDGE BUDGE TPS	Private	West Bengal	ER	2	250	06-03-99	NIT issued
C.E.S.C. Pvt.	BUDGE BUDGE TPS	Private	West Bengal	ER	3	250	29-09-09	NIT issued
C.E.S.C. Pvt.	SOUTHERN REPL. TPS	Private	West Bengal	ER	1	68	10-04-91	Feasibility Study Completed
C.E.S.C. Pvt.	SOUTHERN REPL. TPS	Private	West Bengal	ER	2	68	12-08-90	Feasibility Study Completed
D.P.L.	D.P.L. TPS	State	West Bengal	ER	7	300	24-11-07	NIT issued
D.P.L.	D.P.L. TPS EXT.	State	West Bengal	ER	8	250	31-03-14	NIT issued

D.V.C	DURGAPUR STEEL TPS	Central	West Bengal	ER	1	500	29-07-11	Bid Awarded
D.V.C	DURGAPUR STEEL TPS	Central	West Bengal	ER	2	500	23-03-12	Bid Awarded
D.V.C	MEJIA TPS	Central	West Bengal	ER	1	210	01-03-96	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	2	210	24-03-97	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	3	210	25-03-98	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	4	210	12-10-04	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	5	250	01-10-07	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	6	250	31-03-07	Bid opened
D.V.C	MEJIA TPS	Central	West Bengal	ER	7	500	30-09-10	Bid Awarded
D.V.C	MEJIA TPS	Central	West Bengal	ER	8	500	26-03-11	Bid Awarded
D.V.C	RAGHUNATHPUR TPP	Central	West Bengal	ER	1	600	24-08-14	Bid Awarded
D.V.C	RAGHUNATHPUR TPP	Central	West Bengal	ER	2	600	18-01-16	Bid Awarded
M/s Haldia Energy Limited	HALDIA TPP	Private	West Bengal	ER	1	300	14-01-15	NIT issued
M/s Haldia Energy Limited	HALDIA TPP	Private	West Bengal	ER	2	300	16-02-15	NIT issued
Bishagarh Power Co.	India Power TPP	Private	West Bengal	ER	1	150	07-06-17	Feasibility Study started
NTPC	FARAKKA STPS	Central	West Bengal	ER	1	200	01-01-86	Bid Awarded
NTPC	FARAKKA STPS	Central	West Bengal	ER	2	200	24-12-86	Bid Awarded
NTPC	FARAKKA STPS	Central	West Bengal	ER	3	200	06-08-87	Bid Awarded
NTPC	FARAKKA STPS	Central	West Bengal	ER	4	500	25-09-92	Bid Awarded
NTPC	FARAKKA STPS	Central	West Bengal	ER	5	500	16-02-94	Bid Awarded
NTPC	FARAKKA STPS	Central	West Bengal	ER	6	500	07-03-11	Bid Awarded
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	1	210	16-01-93	Feasibility Study Completed
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	2	210	13-08-90	Feasibility Study Completed
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	3	210	16-12-85	NIT issued
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	4	210	24-01-84	NIT issued
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	5	210	28-12-93	NIT issued
WBPDC	KOLAGHAT TPS	State	West Bengal	ER	6	210	17-03-91	NIT issued
WBPDC	BAKRESWAR TPS	State	West Bengal	ER	1	210	29-11-00	Bid opened
WBPDC	BAKRESWAR TPS	State	West Bengal	ER	2	210	01-04-01	Bid opened
WBPDC	BAKRESWAR TPS	State	West Bengal	ER	3	210	11-01-01	Bid opened
WBPDC	BAKRESWAR TPS	State	West Bengal	ER	4	210	08-03-09	Bid opened
WBPDC	BAKRESWAR TPS	State	West Bengal	ER	5	210	27-06-09	Bid opened
WBPDC	SAGARDIGHI TPS	State	West Bengal	ER	1	300	20-07-08	Tender specification made
WBPDC	SAGARDIGHI TPS	State	West Bengal	ER	2	300	21-12-07	Tender specification made
WBPDC	SAGARDIGHI TPS	State	West Bengal	ER	3	500	14-12-15	Bid opened
WBPDC	SAGARDIGHI TPS	State	West Bengal	ER	4	500	15-12-16	Bid opened
WBPDC	SANTALDIH TPS	State	West Bengal	ER	5	250	07-11-07	Bid opened
WBPDC	SANTALDIH TPS	State	West Bengal	ER	6	250	29-06-11	Bid opened
CHINA LIGHT POWER	MAHATMA GANDHI TPS	Private	Haryana	NR	1	660	12-01-12	FGD commissioned
CHINA LIGHT POWER	MAHATMA GANDHI TPS	Private	Haryana	NR	2	660	11-04-12	FGD commissioned
HPGCL	PANIPAT TPS	State	Haryana	NR	6	210	31-03-01	Bid opened
HPGCL	PANIPAT TPS	State	Haryana	NR	7	250	28-09-04	Bid opened
HPGCL	PANIPAT TPS	State	Haryana	NR	8	250	28-01-05	Bid opened
HPGCL	RAJIV GANDHI TPS	State	Haryana	NR	1	600	31-03-10	NIT issued
HPGCL	RAJIV GANDHI TPS	State	Haryana	NR	2	600	01-10-10	NIT issued
HPGCL	YAMUNA NAGAR TPS	State	Haryana	NR	1	300	01-11-07	Bid opened
HPGCL	YAMUNA NAGAR TPS	State	Haryana	NR	2	300	29-03-08	Bid opened
NTPC	INDIRA GANDHI STPP	Central	Haryana	NR	1	500	31-10-10	Bid Awarded
NTPC	INDIRA GANDHI STPP	Central	Haryana	NR	2	500	05-11-11	Bid Awarded
NTPC	INDIRA GANDHI STPP	Central	Haryana	NR	3	500	07-11-12	Bid Awarded
GVK Power Ltd.	GOINDWAL SAHIB	Private	Punjab	NR	1	270	14-02-16	Bid opened
GVK Power Ltd.	GOINDWAL SAHIB	Private	Punjab	NR	2	270	15-03-16	Bid opened
L&T Power Development LTD(Nabha)	Nabha TPP (Rajpura TPP)	Private	Punjab	NR	1	700	24-01-14	Bid Awarded

L&T Power Development LTD(Nabha)	Nabha TPP (Rajpura TPP)	Private	Punjab	NR	2	700	06-07-14	Bid Awarded
PSEB	GH TPS (LEH.MOH.)	State	Punjab	NR	1	210	29-12-97	Feasiblity Study Completed
PSEB	GH TPS (LEH.MOH.)	State	Punjab	NR	2	210	16-10-98	Feasiblity Study Completed
PSEB	GH TPS (LEH.MOH.)	State	Punjab	NR	3	250	03-01-08	Feasiblity Study Completed
PSEB	GH TPS (LEH.MOH.)	State	Punjab	NR	4	250	31-07-08	Feasiblity Study Completed
Talwandi Sabo Power Limited	TALWANDI SABO TPP	Private	Punjab	NR	1	660	17-06-14	Bid Awarded
Talwandi Sabo Power Limited	TALWANDI SABO TPP	Private	Punjab	NR	2	660	25-10-15	Bid Awarded
Talwandi Sabo Power Limited	TALWANDI SABO TPP	Private	Punjab	NR	3	660	29-03-16	Bid Awarded
Adani Power Ltd.	KAWAI TPS	Private	Rajasthan	NR	1	660	28-05-13	NIT issued
Adani Power Ltd.	KAWAI TPS	Private	Rajasthan	NR	2	660	24-12-13	NIT issued
RRVUNL	CHHABRA TPP	State	Rajasthan	NR	1	250	30-10-09	Tender specification made
RRVUNL	CHHABRA TPP	State	Rajasthan	NR	2	250	04-05-10	Tender specification made
RRVUNL	CHHABRA TPP	State	Rajasthan	NR	3	250	14-09-13	Tender specification made
RRVUNL	CHHABRA TPP	State	Rajasthan	NR	4	250	30-06-14	Tender specification made
RRVUNL	CHHABRA TPP	State	Rajasthan	NR	5	660	04-04-17	Bid opened
RRVUNL	KALISINDH TPS	State	Rajasthan	NR	1	600	02-05-14	Bid opened
RRVUNL	KALISINDH TPS	State	Rajasthan	NR	2	600	06-06-15	Bid opened
RRVUNL	KOTA TPS	State	Rajasthan	NR	5	210	26-03-94	Tender specification made
RRVUNL	KOTA TPS	State	Rajasthan	NR	6	195	30-07-03	Tender specification made
RRVUNL	KOTA TPS	State	Rajasthan	NR	7	195	30-08-09	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	1	250	10-05-98	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	2	250	28-03-00	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	3	250	29-10-01	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	4	250	25-03-02	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	5	250	30-06-03	Tender specification made
RRVUNL	SURATGARH TPS	State	Rajasthan	NR	6	250	29-08-09	Tender specification made
Lalitpur Power Gen. Co	LALITPUR TPS	Private	Uttar Pradesh	NR	2	660	08-01-16	Bid opened
Lalitpur Power Gen. Co	LALITPUR TPS	Private	Uttar Pradesh	NR	3	660	01-04-16	Bid opened
Lalitpur Power Gen. Co	LALITPUR TPS	Private	Uttar Pradesh	NR	1	660	26-03-16	Bid opened
Lanko Anpara Pow Ltd	ANPARA C TPS	Private	Uttar Pradesh	NR	1	600	12-10-11	Tender specification made
Lanko Anpara Pow Ltd	ANPARA C TPS	Private	Uttar Pradesh	NR	2	600	18-01-12	Tender specification made
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	1	210	21-12-91	FGD commissioned
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	2	210	18-12-92	FGD commissioned
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	3	210	23-03-93	FGD commissioned
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	4	210	24-03-94	FGD commissioned
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	5	490	25-01-10	Bid Awarded
NTPC	DADRI (NCTPP)	Central	Uttar Pradesh	NR	6	490	16-07-10	Bid Awarded
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	1	500	31-03-88	NIT issued
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	2	500	05-07-89	NIT issued
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	3	500	31-01-05	Bid Awarded
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	4	500	24-09-05	Bid Awarded
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	5	500	25-05-12	Bid Awarded
NTPC	RIHAND STPS	Central	Uttar Pradesh	NR	6	500	17-10-13	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	1	200	14-02-82	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	2	200	25-11-82	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	3	200	28-03-83	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	4	200	02-11-83	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	5	200	26-02-84	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	6	500	23-12-86	Bid Awarded
NTPC	SINGRAULI STPS	Central	Uttar Pradesh	NR	7	500	24-11-87	Bid Awarded
NTPC	UNCHAHAR TPS	Central	Uttar Pradesh	NR	1	210	21-11-88	Bid Awarded

NTPC	UNCHAHAH TPS	Central	Uttar Pradesh	NR	2	210	22-03-89	Bid Awarded
NTPC	UNCHAHAH TPS	Central	Uttar Pradesh	NR	3	210	27-01-99	Bid Awarded
NTPC	UNCHAHAH TPS	Central	Uttar Pradesh	NR	4	210	22-10-99	Bid Awarded
NTPC	UNCHAHAH TPS	Central	Uttar Pradesh	NR	5	210	28-09-06	Bid Awarded
NTPC	UNCHAHAH TPS	Central	Uttar Pradesh	NR	6	500	31-03-17	Bid Awarded
Prayagraj Power Generation Company LTD.	PRAYAGRAJ TPP	Private	Uttar Pradesh	NR	1	660	25-12-16	Bid opened
Prayagraj Power Generation Company LTD.	PRAYAGRAJ TPP	Private	Uttar Pradesh	NR	2	660	06-09-15	Bid opened
Prayagraj Power Generation Company LTD.	PRAYAGRAJ TPP	Private	Uttar Pradesh	NR	3	660	22-05-17	Bid opened
Rosa Power Supply Co	ROSA TPP Ph-I	Private	Uttar Pradesh	NR	1	300	10-02-10	Bid Awarded
Rosa Power Supply Co	ROSA TPP Ph-I	Private	Uttar Pradesh	NR	2	300	26-06-10	Bid Awarded
Rosa Power Supply Co	ROSA TPP Ph-I	Private	Uttar Pradesh	NR	3	300	28-12-11	Bid Awarded
Rosa Power Supply Co	ROSA TPP Ph-I	Private	Uttar Pradesh	NR	4	300	28-03-12	Bid Awarded
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	1	210	01-01-87	Bid opened
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	2	210	01-08-87	Bid opened
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	3	210	01-04-89	Bid opened
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	4	500	01-03-94	Bid opened
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	5	500	01-10-94	Bid opened
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	6	500	08-05-16	Bid Awarded
UPRVUNL	ANPARA TPS	State	Uttar Pradesh	NR	7	500	18-10-16	Bid Awarded
UPRVUNL	HARDUAGANJ TPS	State	Uttar Pradesh	NR	8	250	01-02-12	Tender specification made
UPRVUNL	HARDUAGANJ TPS	State	Uttar Pradesh	NR	9	250	10-10-13	Tender specification made
UPRVUNL	OBRA TPS	State	Uttar Pradesh	NR	9	200	15-03-80	Feasiblity Study Completed
UPRVUNL	OBRA TPS	State	Uttar Pradesh	NR	10	200	06-03-79	Feasiblity Study Completed
UPRVUNL	OBRA TPS	State	Uttar Pradesh	NR	11	200	14-03-78	Feasiblity Study Completed
UPRVUNL	OBRA TPS	State	Uttar Pradesh	NR	12	200	29-05-81	Feasiblity Study Completed
UPRVUNL	OBRA TPS	State	Uttar Pradesh	NR	13	200	29-07-82	Feasiblity Study Completed
UPRVUNL	PARICHHA TPS	State	Uttar Pradesh	NR	3	210	24-11-06	Tender specification made
UPRVUNL	PARICHHA TPS	State	Uttar Pradesh	NR	4	210	01-12-07	Tender specification made
UPRVUNL	PARICHHA TPS	State	Uttar Pradesh	NR	5	250	17-07-12	Tender specification made
UPRVUNL	PARICHHA TPS	State	Uttar Pradesh	NR	6	250	18-04-13	Tender specification made
APGENCO	Dr. N.TATA RAO TPS	State	Andhra Pradesh	SR	7	500	08-10-09	Feasiblity Study Completed
APGENCO	RAYALASEEMA TPS	State	Andhra Pradesh	SR	1	210	31-03-94	Feasiblity Study Completed
APGENCO	RAYALASEEMA TPS	State	Andhra Pradesh	SR	2	210	25-02-95	Feasiblity Study Completed
APGENCO	RAYALASEEMA TPS	State	Andhra Pradesh	SR	3	210	25-01-07	Feasiblity Study Completed
APGENCO	RAYALASEEMA TPS	State	Andhra Pradesh	SR	4	210	20-11-07	Feasiblity Study Completed
APGENCO	RAYALASEEMA TPS	State	Andhra Pradesh	SR	5	210	31-12-10	Feasiblity Study Completed
APPDCL	DAMODARAM SANJEEVAIAH TPS	State	Andhra Pradesh	SR	1	800	28-08-14	Feasiblity Study Completed
APPDCL	DAMODARAM SANJEEVAIAH TPS	State	Andhra Pradesh	SR	2	800	17-03-15	Feasiblity Study Completed
HNPCL	VIZAG TPP	Private	Andhra Pradesh	SR	1	520	27-12-15	Feasiblity Study Completed
HNPCL	VIZAG TPP	Private	Andhra Pradesh	SR	2	520	30-03-16	Feasiblity Study Completed
NTPC	SIMHADRI	Central	Andhra Pradesh	SR	1	500	22-02-02	Bid Awarded
NTPC	SIMHADRI	Central	Andhra Pradesh	SR	2	500	24-08-02	Bid Awarded
NTPC	SIMHADRI	Central	Andhra Pradesh	SR	3	500	29-03-11	Bid Awarded

NTPC	SIMHADRI	Central	Andhra Pradesh	SR	4	500	30-03-12	Bid Awarded
Sembcorp Energy India Ltd.	Sembcorp Gayatri P.Ltd.	Private	Andhra Pradesh	SR	1	660	12-11-16	Bid opened
Sembcorp Energy India Ltd.	Sembcorp Gayatri P.Ltd.	Private	Andhra Pradesh	SR	2	660	15-02-17	Bid opened
Sembcorp Energy India Ltd.	PAINAMPURAM TPP	Private	Andhra Pradesh	SR	1	660	07-02-15	NIT issued
Sembcorp Energy India Ltd.	PAINAMPURAM TPP	Private	Andhra Pradesh	SR	2	660	03-09-15	NIT issued
Adani Power Ltd.	UDUPI TPP	Private	Karnataka	SR	1	600	23-07-10	NIT issued
Adani Power Ltd.	UDUPI TPP	Private	Karnataka	SR	2	600	16-04-11	NIT issued
Jindal (Pvt Co)	TORANGALLU TPS EXT	Private	Karnataka	SR	1	300	23-04-09	Feasiblity Study Completed
Jindal (Pvt Co)	TORANGALLU TPS EXT	Private	Karnataka	SR	2	300	24-08-09	Feasiblity Study Completed
KPCL	BELLARY TPS	State	Karnataka	SR	1	500	03-12-07	Bid opened
KPCL	BELLARY TPS	State	Karnataka	SR	2	500	23-03-12	Bid opened
KPCL	BELLARY TPS	State	Karnataka	SR	3	700	01-03-16	Bid opened
KPCL	RAICHUR TPS	State	Karnataka	SR	1	210	29-03-85	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	2	210	02-03-86	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	3	210	30-03-91	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	4	210	29-09-94	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	5	210	31-01-99	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	6	210	22-07-99	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	7	210	11-12-02	Bid Awarded
KPCL	RAICHUR TPS	State	Karnataka	SR	8	250	26-06-10	Bid Awarded
KPCL	YERMARUS TPP	State	Karnataka	SR	1	800	29-03-16	Bid Awarded
KPCL	YERMARUS TPP	State	Karnataka	SR	2	800	29-03-17	Bid Awarded
NTPC	KUDGI	Central	Karnataka	SR	1	800	25-12-16	Bid Awarded
NTPC	KUDGI	Central	Karnataka	SR	2	800	23-03-17	Bid Awarded
NEYVELI LIGNITE	NEYVELI (EXT) TPS	Central	Tamil Nadu	SR	1	210	21-10-02	Bid opened
NEYVELI LIGNITE	NEYVELI (EXT) TPS	Central	Tamil Nadu	SR	2	210	22-07-03	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	1	210	17-01-88	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	2	210	06-02-87	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	3	210	29-03-87	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	4	210	30-03-91	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	5	210	31-12-91	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	6	210	30-10-92	Bid opened
NEYVELI LIGNITE	NEYVELI TPS- II	Central	Tamil Nadu	SR	7	210	19-06-93	Bid opened
NTEC LTD.	VALLUR TPP	Central	Tamil Nadu	SR	1	500	28-03-12	Bid Awarded
NTEC LTD.	VALLUR TPP	Central	Tamil Nadu	SR	2	500	28-02-13	Bid Awarded
NTEC LTD.	VALLUR TPP	Central	Tamil Nadu	SR	3	500	28-02-14	Bid Awarded
NLC + TANGEDCO	TUTICORIN (JV) TPP	Central	Tamil Nadu	SR	1	500	10-03-15	Bid Awarded
NLC + TANGEDCO	TUTICORIN (JV) TPP	Central	Tamil Nadu	SR	2	500	09-07-15	Bid Awarded
TAQA, Neyveli	TAQA, Neyveli	Private	Tamil Nadu	SR	2	250	21-10-02	Bid Awarded
TANGEDCO	NORTH CHENNAI Ext. TPS	State	Tamil Nadu	SR	4	600	09-03-13	Requested for FGD implementation date to be revised as 31.12.2021
TANGEDCO	NORTH CHENNAI Ext. TPS	State	Tamil Nadu	SR	5	600	13-09-13	Requested for FGD implementation date to be revised as 30.09.2022
TANGEDCO	NORTH CHENNAI TPS	State	Tamil Nadu	SR	1	210	25-10-94	Feasiblity Study Completed
TANGEDCO	NORTH CHENNAI TPS	State	Tamil Nadu	SR	2	210	27-03-95	Feasiblity Study Completed
TANGEDCO	NORTH CHENNAI TPS	State	Tamil Nadu	SR	3	210	24-02-96	Feasiblity Study Completed
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	1	200	27-10-83	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	2	200	29-05-84	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	3	200	13-12-84	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	4	500	26-06-88	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	5	500	26-03-89	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	6	500	16-10-89	Bid Awarded
NTPC	RAMAGUNDEM STPS	Central	Telangana	SR	7	500	26-09-04	Bid Awarded

Singareni Collieries Co. Ltd.	SINGARENI TPP	State	Telangana	SR	1	600	25-09-16	NIT issued
Singareni Collieries Co. Ltd.	SINGARENI TPP	State	Telangana	SR	2	600	02-12-16	NIT issued
TSGENCO	KAKATIYA TPS	State	Telangana	SR	1	500	27-05-10	Feasibility Study Completed
TSGENCO	KAKATIYA TPS	State	Telangana	SR	2	600	31-12-15	Feasibility Study Completed
TSGENCO	KOTHAGUDEM TPS (NEW)	State	Telangana	SR	11	500	26-06-11	Feasibility Study Completed
Bharat Aluminium Co. Ltd.	BALCO TPS	Private	Chhatisgarh	WR	1	300	04-06-15	Bid Awarded
Bharat Aluminium Co. Ltd.	BALCO TPS	Private	Chhatisgarh	WR	2	300	24-03-16	Bid Awarded
CSPGCL	MARWA TPS	State	Chhatisgarh	WR	1	500	30-03-14	NIT issued
CSPGCL	MARWA TPS	State	Chhatisgarh	WR	2	500	15-07-16	NIT issued
CSPGCL	DSPM TPS	State	Chhatisgarh	WR	1	250	30-03-07	NIT issued
CSPGCL	DSPM TPS	State	Chhatisgarh	WR	2	250	11-12-07	NIT issued
CSPGCL	KORBA-WEST Ext. TPS	State	Chhatisgarh	WR	5	500	22-03-13	NIT issued
DB Power	BARADARHA TPS	Private	Chhatisgarh	WR	1	600	23-02-14	Bid Awarded
DB Power	BARADARHA TPS	Private	Chhatisgarh	WR	2	600	24-03-15	Bid Awarded
GMR	RAIKHEDA TPP	Private	Chhatisgarh	WR	1	685	24-02-15	GCEL is under stressed assets. No Long Term PPA. Under resolution process for Sale
GMR	RAIKHEDA TPP	Private	Chhatisgarh	WR	2	685	28-03-16	GCEL is under stressed assets. No Long Term PPA. Under resolution process for Sale
KORBA-WEST TPS Pvt Ltd	AVANTHA BHANDAR	Private	Chhatisgarh	WR	1	600	31-03-14	Tender specification made
KSK Mahanadi Power Co Ltd	AKALTARA TPS	Private	Chhatisgarh	WR	1	600	13-08-13	Feasibility Study Completed
KSK Mahanadi Power Co Ltd	AKALTARA TPS	Private	Chhatisgarh	WR	2	600	22-08-14	Feasibility Study Completed
M/s Lanko Amarkantak Ltd,	PATHADI TPP	Private	Chhatisgarh	WR	1	300	04-06-09	Tender specification made
M/s Lanko Amarkantak Ltd,	PATHADI TPP	Private	Chhatisgarh	WR	2	300	25-03-10	Tender specification made
M/s O.P.Jindal	Raigarh TPS	Private	Chhatisgarh	WR	1	250	02-09-07	NIT issued
M/s O.P.Jindal	Raigarh TPS	Private	Chhatisgarh	WR	2	250	10-02-08	NIT issued
M/s O.P.Jindal	Raigarh TPS	Private	Chhatisgarh	WR	3	250	06-03-08	NIT issued
M/s O.P.Jindal	Raigarh TPS	Private	Chhatisgarh	WR	4	250	17-06-08	NIT issued
M/s O.P.Jindal	TAMNAR TPP	Private	Chhatisgarh	WR	1	600	10-03-14	Bid opened
M/s O.P.Jindal	TAMNAR TPP	Private	Chhatisgarh	WR	2	600	30-03-14	Bid opened
M/s O.P.Jindal	TAMNAR TPP	Private	Chhatisgarh	WR	3	600	07-01-15	Bid opened
M/s O.P.Jindal	TAMNAR TPP	Private	Chhatisgarh	WR	4	600	28-03-15	Bid opened
NTPC	KORBA STPS	Central	Chhatisgarh	WR	1	200	28-02-83	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	2	200	31-10-83	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	3	200	17-03-84	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	4	500	31-05-87	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	5	500	25-03-88	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	6	500	26-02-89	Bid Awarded
NTPC	KORBA STPS	Central	Chhatisgarh	WR	7	500	25-11-10	Bid Awarded
NTPC	SIPAT STPS	Central	Chhatisgarh	WR	4	500	20-06-08	NIT issued
NTPC	SIPAT STPS	Central	Chhatisgarh	WR	5	500	01-01-09	NIT issued
NTPC	SIPAT STPS	Central	Chhatisgarh	WR	1	660	01-10-11	Bid Awarded
NTPC	SIPAT STPS	Central	Chhatisgarh	WR	2	660	25-05-12	Bid Awarded
NTPC	SIPAT STPS	Central	Chhatisgarh	WR	3	660	08-01-12	Bid Awarded
NTPC & Sail	BHILAI TPS	Central	Chhatisgarh	WR	1	250	20-04-08	Bid Awarded
NTPC & Sail	BHILAI TPS	Central	Chhatisgarh	WR	2	250	12-07-09	Bid Awarded
RKM Powergen Private Ltd.	UCHPINDA TPP	Private	Chhatisgarh	WR	1	360	28-10-15	Feasibility Study Completed
RKM Powergen Private Ltd.	UCHPINDA TPP	Private	Chhatisgarh	WR	2	360	28-01-16	Feasibility Study Completed
RKM Powergen Private Ltd.	UCHPINDA TPP	Private	Chhatisgarh	WR	3	360	12-09-17	Feasibility Study Completed
SKS Power Gen. (CG Ltd.)	Binjkote TPP	Private	Chhatisgarh	WR	1	300	25-04-17	Bid opened

TRN Energy Private Ltd.	NAWAPARA TPP	Private	Chhatisgarh	WR	2	300	18-04-17	Feasibility Study Completed
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	1	330	04-08-09	NIT issued
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	2	330	17-03-10	NIT issued
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	3	330	02-08-10	NIT issued
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	4	330	20-12-10	NIT issued
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	5	660	26-12-10	NIT issued
Adani Power Ltd.	MUNDRA TPS	Private	Gujarat	WR	6	660	20-07-11	NIT issued
Essar Gujarat	SALAYA TPP	Private	Gujarat	WR	1	600	04-01-12	Tender specification made
Essar Gujarat	SALAYA TPP	Private	Gujarat	WR	2	600	15-06-12	Tender specification made
GSECL	GANDHI NAGAR TPS	State	Gujarat	WR	3	210	20-03-90	NIT issued
GSECL	GANDHI NAGAR TPS	State	Gujarat	WR	4	210	20-07-91	NIT issued
GSECL	GANDHI NAGAR TPS	State	Gujarat	WR	5	210	17-03-98	NIT issued
GSECL	KUTCH LIG. TPS	State	Gujarat	WR	3	75	31-03-97	NIT issued
GSECL	SIKKA REP. TPS	State	Gujarat	WR	3	250	29-03-15	Bid opened
GSECL	SIKKA REP. TPS	State	Gujarat	WR	4	250	25-09-15	Bid opened
GSECL	UKAI TPS	State	Gujarat	WR	3	200	21-01-79	NIT issued
GSECL	UKAI TPS	State	Gujarat	WR	4	200	28-03-79	NIT issued
GSECL	UKAI TPS	State	Gujarat	WR	5	210	30-01-85	NIT issued
GSECL	UKAI TPS	State	Gujarat	WR	6	500	05-03-13	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	1	210	23-03-82	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	2	210	15-01-83	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	3	210	15-03-84	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	4	210	09-03-86	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	5	210	23-09-86	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	6	210	18-11-87	NIT issued
GSECL	WANAKBORI TPS	State	Gujarat	WR	7	210	31-12-98	Feasibility Study Completed
Tata Power (CGPL)	MUNDRA UMTTP	Private	Gujarat	WR	1	800	07-03-12	Bid Awarded
Tata Power (CGPL)	MUNDRA UMTTP	Private	Gujarat	WR	2	800	30-07-12	Bid Awarded
Tata Power (CGPL)	MUNDRA UMTTP	Private	Gujarat	WR	3	800	27-10-12	Bid Awarded
Tata Power (CGPL)	MUNDRA UMTTP	Private	Gujarat	WR	4	800	21-01-13	Bid Awarded
Tata Power (CGPL)	MUNDRA UMTTP	Private	Gujarat	WR	5	800	22-03-13	Bid Awarded
Torrent Power Generation Ltd.,	SABARMATI	Private	Gujarat	WR	1	120	12-10-78	Bid opened
Torrent Power Generation Ltd.,	SABARMATI	Private	Gujarat	WR	2	121	31-12-84	Bid opened
Torrent Power Generation Ltd.,	SABARMATI	Private	Gujarat	WR	3	121	28-09-88	Bid opened
ESSAR power	MAHAN TPP	Private	Madhya Pradesh	WR	1	600	24-02-13	Feasibility study under process
Jaiprakash Power Venture Ltd	NIGRI TPP	Private	Madhya Pradesh	WR	1	660	29-08-14	NIT issued
Jaiprakash Power Venture Ltd	NIGRI TPP	Private	Madhya Pradesh	WR	2	660	27-02-15	NIT issued
Jhabua Power Ltd.	SEIONI TPP	Private	Madhya Pradesh	WR	1	600	22-03-16	Feasibility Study Completed
MB Power	ANUPPUR TPP	Private	Madhya Pradesh	WR	1	600	20-04-15	Bid opened
MB Power	ANUPPUR TPP	Private	Madhya Pradesh	WR	2	600	30-03-16	Bid opened
MPPGCL	AMARKANTAK EXT TPS	State	Madhya Pradesh	WR	5	210	15-06-08	Feasibility Study Completed
MPPGCL	SANJAY GANDHI TPS	State	Madhya Pradesh	WR	1	210	26-03-93	Feasibility Study Completed
MPPGCL	SANJAY GANDHI TPS	State	Madhya Pradesh	WR	2	210	27-03-93	Feasibility Study Completed
MPPGCL	SANJAY GANDHI TPS	State	Madhya Pradesh	WR	3	210	28-02-99	Feasibility Study Completed
MPPGCL	SANJAY GANDHI TPS	State	Madhya Pradesh	WR	4	210	23-11-99	Feasibility Study Completed
MPPGCL	SANJAY GANDHI TPS	State	Madhya Pradesh	WR	5	500	18-06-07	Feasibility Study Completed
MPPGCL	SATPURA TPS	State	Madhya Pradesh	WR	10	250	22-03-13	Feasibility Study Completed
MPPGCL	SATPURA TPS	State	Madhya Pradesh	WR	11	250	25-12-13	Feasibility Study Completed

MPPGCL	SHRI SINGHAJI TPP	State	Madhya Pradesh	WR	1	600	18-11-13	Bid opened
MPPGCL	SHRI SINGHAJI TPP	State	Madhya Pradesh	WR	2	600	15-10-14	Bid opened
MPPGCL	SHRI SINGHAJI TPP	State	Madhya Pradesh	WR	3	660	18-11-18	Bid opened
MPPGCL	SHRI SINGHAJI TPP	State	Madhya Pradesh	WR	4	660	27-03-19	Bid opened
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	1	210	10-10-87	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	2	210	23-07-88	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	3	210	03-02-89	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	4	210	26-12-89	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	5	210	31-03-90	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	6	210	01-02-91	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	7	500	03-03-99	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	8	500	26-02-00	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	9	500	27-07-06	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	10	500	08-03-07	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	11	500	14-06-12	Bid Awarded
NTPC	VINDHYACHAL STPS	Central	Madhya Pradesh	WR	12	500	22-03-13	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	1	660	30-05-13	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	2	660	18-12-13	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	3	660	21-05-14	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	4	660	25-03-14	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	5	660	24-08-14	Bid Awarded
Reliance Power Ltd	SASAN UMTTP	Private	Madhya Pradesh	WR	6	660	19-03-15	Bid Awarded
Adani Power Maharashtra Ltd	TIRORA TPS	Private	Maharashtra	WR	1	660	11-09-12	NIT issued
Adani Power Maharashtra Ltd	TIRORA TPS	Private	Maharashtra	WR	2	660	25-03-13	NIT issued
Adani Power Maharashtra Ltd	TIRORA TPS	Private	Maharashtra	WR	3	660	10-06-13	NIT issued
Adani Power Maharashtra Ltd	TIRORA TPS	Private	Maharashtra	WR	4	660	23-03-14	NIT issued
Adani Power Maharashtra Ltd	TIRORA TPS	Private	Maharashtra	WR	5	660	25-09-14	NIT issued
Dhariwal Infrastructure	DHARIWAL TPP	Private	Maharashtra	WR	1	300	03-11-13	NIT issued
Dhariwal Infrastructure	DHARIWAL TPP	Private	Maharashtra	WR	2	300	28-05-14	NIT issued
GMR emco ENERGY ltd	EMCO WARORA TPS	Private	Maharashtra	WR	1	300	07-02-13	Bid opened
GMR emco ENERGY ltd	EMCO WARORA TPS	Private	Maharashtra	WR	2	300	27-08-13	Bid opened
MAHAGENCO	BHUSAWAL TPS	State	Maharashtra	WR	3	210	18-09-82	Feasiblity Study Completed
MAHAGENCO	BHUSAWAL TPS	State	Maharashtra	WR	4	500	07-03-12	Bid opened
MAHAGENCO	BHUSAWAL TPS	State	Maharashtra	WR	5	500	30-03-12	Bid opened
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	3	210	03-05-85	Feasiblity Study Completed
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	4	210	08-03-86	Feasiblity Study Completed
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	5	500	22-03-91	Bid opened
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	6	500	11-03-92	Bid opened
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	7	500	01-10-97	Bid opened
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	8	500	29-03-15	Bid opened
MAHAGENCO	CHANDRAPUR STPS	State	Maharashtra	WR	9	500	21-03-16	Bid opened
MAHAGENCO	KHAPARKHEDA TPS	State	Maharashtra	WR	1	210	26-03-89	Feasiblity Study Completed
MAHAGENCO	KHAPARKHEDA TPS	State	Maharashtra	WR	2	210	08-01-90	Feasiblity Study Completed

MAHAGENCO	KHAPARKHEDA TPS	State	Maharashtra	WR	3	210	31-05-00	Feasibility Study Completed
MAHAGENCO	KHAPARKHEDA TPS	State	Maharashtra	WR	4	210	07-01-01	Feasibility Study Completed
MAHAGENCO	KHAPARKHEDA TPS	State	Maharashtra	WR	5	500	05-08-11	Bid opened
MAHAGENCO	KORADI TPS	State	Maharashtra	WR	6	210	30-03-82	Feasibility Study Completed
MAHAGENCO	KORADI TPS	State	Maharashtra	WR	7	210	13-01-83	Feasibility Study Completed
MAHAGENCO	KORADI TPS	State	Maharashtra	WR	8	660	30-03-15	Bid opened
MAHAGENCO	KORADI TPS	State	Maharashtra	WR	9	660	15-03-16	Bid opened
MAHAGENCO	KORADI TPS	State	Maharashtra	WR	10	660	28-12-16	Bid opened
MAHAGENCO	NASIK TPS	State	Maharashtra	WR	3	210	26-04-79	Feasibility Study Completed
MAHAGENCO	NASIK TPS	State	Maharashtra	WR	4	210	10-07-80	Feasibility Study Completed
MAHAGENCO	NASIK TPS	State	Maharashtra	WR	5	210	30-01-81	Feasibility Study Completed
MAHAGENCO	PARLI TPS	State	Maharashtra	WR	6	250	16-02-07	Feasibility Study Completed
MAHAGENCO	PARLI TPS	State	Maharashtra	WR	7	250	10-02-10	Feasibility Study Completed
MAHAGENCO	PARLI TPS	State	Maharashtra	WR	8	250	30-03-16	Feasibility Study Completed
NTPC	MOUDA TPS	Central	Maharashtra	WR	1	500	19-04-12	Bid Awarded
NTPC	MOUDA TPS	Central	Maharashtra	WR	2	500	29-03-13	Bid Awarded
NTPC	MOUDA TPS	Central	Maharashtra	WR	3	660	28-03-16	Bid Awarded
NTPC	MOUDA TPS	Central	Maharashtra	WR	4	660	18-03-17	Bid Awarded
NTPC	SOLAPUR	Central	Maharashtra	WR	1	660	07-04-17	Bid Awarded
Ratan Power	NASIK (P) TPS	Private	Maharashtra	WR	1	270	25-02-14	Bid opened
Ratan Power	NASIK (P) TPS	Private	Maharashtra	WR	2	270	15-02-17	Feasibility study under progress
Ratan Power	NASIK (P) TPS	Private	Maharashtra	WR	3	270	14-04-17	Feasibility study under progress
Ratan Power	NASIK (P) TPS	Private	Maharashtra	WR	4	270	19-05-17	Feasibility study under progress
Ratan Power	NASIK (P) TPS	Private	Maharashtra	WR	5	270	30-05-17	Feasibility study under progress
Vidarbha Industries Ltd	BUTIBORI TPP	Private	Maharashtra	WR	1	300	17-08-12	NIT issued
Vidarbha Industries Ltd	BUTIBORI TPP	Private	Maharashtra	WR	2	300	19-03-13	NIT issued
Wardha P C P L	WARDHA WARORA TPP	Private	Maharashtra	WR	1	135	05-06-10	NIT issued
Wardha P C P L	WARDHA WARORA TPP	Private	Maharashtra	WR	2	135	10-10-10	NIT issued
Wardha P C P L	WARDHA WARORA TPP	Private	Maharashtra	WR	3	135	21-01-11	NIT issued
Wardha P C P L	WARDHA WARORA TPP	Private	Maharashtra	WR	4	135	30-04-11	NIT issued
NTPC	KUDGI	Central	Karnataka	SR	3	800	12-03-18	Bid Awarded
NTPC	Lara STPP	Central	Chhatisgarh	WR	1	800	23-03-18	Bid Awarded
NTPC	Meja STPP	Central	Uttar Pradesh	NR	1	660	31-03-18	Bid Awarded
APGENCO	Rayalaseema TPP St-IV	State	Andhra Pradesh	SR	6	600	12-03-18	Feasibility Study Completed
NTPC	Barauni TPS Extn.	Central	Bihar	ER	8	250	11-01-18	NIT issued
NTPC	Barauni TPS Extn.	Central	Bihar	ER	9	250	31-03-18	NIT issued
KSK Mahandi Power Company Ltd.	AKALTARA TPS	Private	Chhatisgarh	WR	3	600	18-01-18	NIT issued
SKS Power Gen. (CG Ltd.)	Binjkote TPP	Private	Chhatisgarh	WR	2	300	28-03-18	Bid opened
Shirpur Power Pvt. Ltd.	Shirpur TPP	Private	Maharashtra	WR	1	150	28-09-17	Feasibility study under progress
India Power Corporation (Haldia) Limited	India Power TPP	Private	West Bengal	ER	2	150	31-12-17	Feasibility study under progress
PSEB	ROPAR TPS	State	Punjab	NR	3	210	31-03-88	NIT issued
PSEB	ROPAR TPS	State	Punjab	NR	4	210	29-01-89	NIT issued
PSEB	ROPAR TPS	State	Punjab	NR	6	210	30-03-93	NIT issued
PSEB	ROPAR TPS	State	Punjab	NR	5	210	29-03-92	NIT issued
NTPC	TANDA TPS	Central	Uttar Pradesh	NR	1	110	21-03-88	Bid Awarded
NTPC	TANDA TPS	Central	Uttar Pradesh	NR	2	110	11-03-89	Bid Awarded
NTPC	TANDA TPS	Central	Uttar Pradesh	NR	3	110	28-03-90	NIT issued
NTPC	TANDA TPS	Central	Uttar Pradesh	NR	4	110	20-02-98	NIT issued
NTPC	KHARGONE STPP	Central	Madhya Pradesh	WR	1	660	29-09-19	Bid Awarded
NTPC	BONGAIGAON	Central	Assam	NER	1	250	22-06-15	Bid Awarded

NTPC	BONGAIGAON	Central	Assam	NER	2	250	22-03-17	Bid Awarded
NTPC	BONGAIGAON	Central	Assam	NER	3	250	23-03-19	Bid Awarded
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Annexure-7

A study report on Location Specific SO₂ norms for Thermal Power Plant considering ambient SO₂ level in the vicinity of about 110 GW thermal capacity.

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1. Introduction

Hon'ble Minister of State (IC) Power & NRE chaired a meeting on 21.01.2020 to review the progress of installation of FGDs in Thermal Power Plants at Shram Shakti Bhawan, New Delhi. The para 4.5 of the above MOM is reproduced as below:

“It was noted that periodicity of pollutants monitoring was not specified by MoEF&CC and there is a need to have different emissions norms for different ambient conditions. CEA shall submit a paper to suggest periodicity of pollutants monitoring as well as plant location specific emission standards with suitable basis to be taken up with MOEF&CC. MOP shall take up the matter with MOEF&CC”

As per the minutes of meeting, CEA is required to submit a paper suggesting the plant location specific emission standards with suitable basis to MOP for further taking up with MoEF&CC.

The use of coal-based power is vital to the country and it needs to be as clean as essential. So far thermal power plants were required to meet the particulate emission norms only and there was no regulation for SO₂, NO_x and mercury emissions. Standards were specified only for the chimney height to ensure the flue gas pollutants were dispersed. Hence, this sector required intervention to monitor and control its impact on the environment. On December 7, 2015, the Ministry of Environment, Forest and Climate Change (MoEF & CC) introduced stricter environmental standards for coal-based TPPs under the Environment (Protection) Act, 1986.

Table 1 New Environmental Norms, December 2015

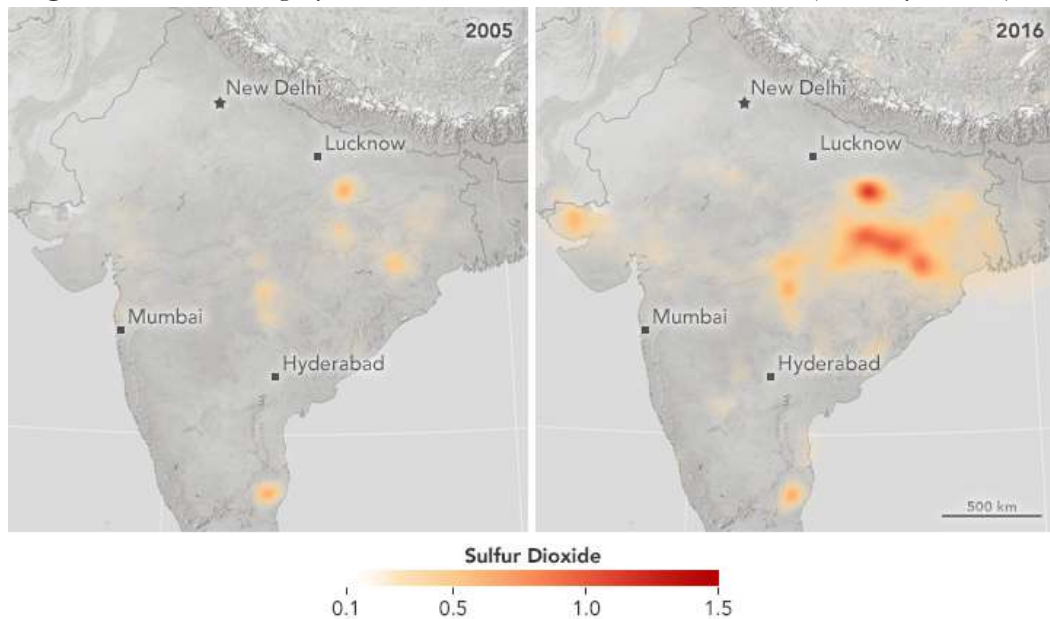
Date of Installation	PM	SO ₂	NO _x	Mercury (Hg)
Before December 2003	100mg/Nm ³	600mg/Nm ³ < 500MW 200mg/Nm ³ ≥ 500MW	600 mg/Nm ³	0.03 mg/Nm ³ for ≥500MW
January 2004 to December 2016	50mg/Nm ³	600mg/Nm ³ < 500MW 200mg/Nm ³ ≥ 500MW	300 mg/Nm ³	0.03 mg/Nm ³
January 2017 onwards	30mg/Nm ³	100 mg/Nm ³	100 mg/Nm ³	0.03 mg/Nm ³

2. Ambient Air Quality (AAQ) Data

The latest ambient air quality (SO₂, NO₂, PM₁₀, PM_{2.5}) data monitored for the 745 stations located across the breadth of country has been published for the year 2018 by CPCB. It is seen from the ambient air quality data that the concentration level of PM is on the higher side in comparison to the SO₂/NO_x emission levels (Annexure I). The data is available for 24 hr. average (min./max.) and annual average for the above mentioned sub-indices. Even if, only 24 hr. average (max.) data is analysed, it can be seen that the SO₂ ground based levels across the country are mostly within a range of 0-40 µg/m³ which is very good as per the MoEF&CC standards and similar trend with some exceptions are seen in the case of NO₂ levels (Annexure I). However, the major cause of concern is the PM₁₀, PM_{2.5} levels which are relatively very high. This suggests that high particulate matter (PM_{2.5}/PM₁₀) levels is a country wide phenomenon and in such a case the particulate matter contributed by all the thermal power plants may have to be controlled necessarily to the new emission standards (Dec 2015). However, power plants located in an area, where quality of air is very good in terms of SO₂/NO_x, can be exempted from installation of additional equipment to control SO₂/NO_x emission from stack. A large number of thermal power stations are located in remote locations away from towns with little habitations around. Thermal power plants located in remote locations, ambient air quality (AQI) can be made as the guiding factor for formulating emission control. This may avoid installation of additional emission control equipment without compromising the air quality. There should be a baseline air emission level for SO₂/NO_x/PM_{2.5}/PM₁₀ which is maintained across the country with pockets where stringent air emission norms shall be implemented. It will ensure the baseline air quality everywhere and norms will be relatively stringent in areas where air quality is critically poor and relatively relaxed where air quality is not so critical. Similar norms for SO₂/NO_x may not be required where the existing ambient air has got substantial environmental capacity. Implementation of same norm across the country will not ensure uniform air quality as environmental air capacity is supposedly different in different geographical areas.

The satellite imagery (Fig 1) gives a bird's eye view of the regions (2016) where high concentration of SO₂ is occurring in the atmosphere. It broadly isolates the problem region which need immediate course correction. The locations can be identified as small

Figure 1 Satellite imagery of SO₂ Emissions observed over India (courtesy NASA)



clusters in the states of Odisha, Jharkhand, Chhattisgarh, Maharashtra, Tamil Nadu and Gujarat. As the satellite image shows the concentration of SO₂ at certain height, the measurement of ground level SO₂ in the same area can play an important role.

In an attempt to explore such a feasibility, the 24hr avg.(max) SO₂ ground based measured levels (CPCB, 2018) were categorized into 5 distinctive levels - *Level I*: >40 $\mu\text{g}/\text{m}^3$, *Level II*: 31-40 $\mu\text{g}/\text{m}^3$, *Level III*: 21-30 $\mu\text{g}/\text{m}^3$, *Level IV*: 11-20 $\mu\text{g}/\text{m}^3$ and *Level V*: 0-10 $\mu\text{g}/\text{m}^3$. It can be seen that the gradation levels adopted as above are more or less correlating with the satellite image data (refer Annexure I, phasing). The gradation would be helpful in prioritizing the installation of emission control equipment in a phased manner.

To achieve tangible results, the SO₂ emission control equipment in the thermal power plants located in *level I* regions should have to be installed on priority basis. The regions

as identified under *level II* can be covered subsequently under the next phases. Presently no action is required for the plant located in region under *level III/IV/V* as the SO₂ present in ambient air of this area is very less and as per CPCB the quality of air is good in regards to SO₂ as shown in the table below:

Table 2 Various SO₂ limit values as per Air Quality Index (AQI), MOEFF&CC

Concentration Range (µg/m ³)	Good	Satisfactory	Moderately polluted	Poor	Very poor	Severe
SO ₂	0-40	41-80	81-380	381-800	801-1600	1600+

MoEF&CC has adopted air quality standards for the country (NAAQS) and also defined the index (AQI) for categorizing the ambient air quality (“good” to “severe”) based on the sub-indices concentration levels. The real time data from the extensive grid of ambient air quality monitoring stations located across the country and elsewhere (thermal power plants) can be indicative of the dispersion taking place over geographical areas and in different weather conditions which can be utilized for the future course correction. The reliability and availability of data from these monitoring stations is of prime importance, on the basis of which, important decision can be taken. At present the availability of these stations is low as can be seen from the CPCB air quality monitoring data (2018).

3. Thermal Power Plant Emissions

One of the important sources of emission, e.g. the thermal power plants is being addressed by adopting new emission norms for the plants located across the country. The thermal power plant emissions have both local and global impact. Global impact is mostly due to the production of greenhouse gases CO₂ and locally (country specific) it contributes large quantity of bottom ash, fly ash (PM) and some emissions of SO₂/NO_x. The greenhouse gas emission levels are being taken care of by reducing the emission intensity of GDP 30% to 35% by year 2030 from the 2015 levels. This is planned to achieve by having 40% of the installed capacity from non-fossil fuel based plants in year 2030.

The present stack height of thermal power plant is designed to take care of the dispersion of SO₂/NO_x emissions from thermal power plants and its impact can be seen from the ambient air quality data compiled from the immediate vicinity of various power plants by monitoring stations (AAQMS). The ambient air quality measurements are ground based.

For ascertaining dispersion of emissions from the stack, the modelling studies and the satellite imagery are useful tools. The satellite imagery (Figure 1) indicates the changes in the vertical column density levels of atmospheric SO₂ in a decade from year 2005 to 2016. It shows that the SO₂ hot spots (2016) are concentrated in small clusters in the states of Odisha, Jharkhand, Chhattisgarh, Maharashtra, Tamil Nadu and Gujarat having large installed capacities of thermal power plant, which would need to be effectively taken care off on priority basis. The long-range transport of thermal plant emissions (SO₂/NO_x/PM) from the stacks, atmospheric drift/dispersion, and their period life shall have to be analyzed exhaustively to find their cumulative influence on the surrounding areas, which shall in turn identify the location specific thermal plants which need immediate attention.

Therefore, the response to different regions at different times for the effective control of emissions can be different. In one of the air quality dispersion modelling study conducted recently by IIT Kanpur for the impact of Talwandi Sabo thermal power plant (District Mansa, Punjab) emissions to the ambient air quality has shown that SO₂ levels of about 45.9µg/m³ at the plant drop significantly to 1µg/m³ at a distance of 40 km (Copy enclosed). Thus, beyond 40 km the impact of SO₂ becomes insignificant. Similar trend is seen in the case of NO_x.

In June 2020, TPRM division, CEA had sent the request to all the thermal generating companies to furnish online ambient air quality data (PM/SO₂/NO_x) at least for one year collected from the AAQ monitoring stations located in their respective plants. Since then, the generating companies/stations which have responded are as mentioned in Annexure II. The data was analyzed for an installed capacity of 110054 MW by CEA and has been tabulated as below.

Thermal power plants are categorized in the table-3 considering the maximum value of SO₂ in the vicinity of thermal power plant and similarly in table-4 considering average value of SO₂ in the vicinity of power plant.

Table 3 SO₂ Levels (max.) in the vicinity of Thermal Power Plants

SO ₂ Level (µg/m ³)	0-10	11-15	16-20	21-25	26-30	31-35	36-40	>40
Thermal Capacity, MW (% of total)	7710 (7.01%)	14410 (13.1%)	9900 (9%)	11706 (10.6%)	7600 (6.9%)	15810 (14.4%)	5777 (5.3%)	37140 (33.8%)

Table 4 SO₂ Levels (avg.) in the vicinity of Thermal Power Plants

SO ₂ Level (µg/m ³)	0-10	11-15	16-20	21-25	26-30	31-35	36-40	>40
Thermal Capacity, MW (% of total)	30700 (27.9%)	24130 (21.9%)	32076 (29.2%)	12300 (11.2%)	2700 (2.5%)	2,520 (2.3%)	3447 (3.1%)	2180 (1.98%)

Therefore, action has to be taken for thermal capacity of 37140 MW immediately and for 21587 MW in next phase as per Table-3. But as per Table-4 these thermal capacities are 2180 MW and 5967 MW for immediate action and in next phase respectively

4. Approach according to AAQ

The installation of the emission control equipment in large fleet of thermal plants should be carried in graded manner, starting with those located near most affected cities/areas where ambient SO₂ level is more than 40µg/m³ (level -I) and in next phase may be after 1 year of commissioning of 1st group, in plants located in areas where ambient SO₂ level is more than 30µg/m³ (level-II). Presently thermal plants located in the area where ambient SO₂ level is less than 30µg/m³ (level-III, VI & V) need not to take any corrective measures. The list of power plant according to their location (level of SO₂ in ambient air) is given at Annexure II. The ambient air quality divided into five regions according to the presence of SO₂ level and the capacity of thermal power plants has been identified as per the data received is shown in the table below.

Table 5 Thermal Capacity based on Ambient Air Quality SO₂ Levels

Region	Ambient Air SO ₂ Concentration Levels	Total Capacity (MW)
1	Level-I (>40µg/m ³)	2,180
2	Level-II (>30µg/m ³ & ≤40µg/m ³)	5,967
3	Level-III (>20µg/m ³ & ≤30µg/m ³)	15,000
4	Level-IV (>10µg/m ³ & ≤20µg/m ³)	56,206
5	Level-V (>0µg/m ³ & ≤10µg/m ³)	30,700

The phasing will help in understanding the impact of these control equipment on their effectiveness and give a time for future course correction. There are different technologies available to control the flue gas emissions and their suitability needs to be ascertained in the Indian conditions. Installing the pollution control equipment in one go in all the thermal power stations may not be the best option to adopt. The implementation of emission control measures in all power plants simultaneously will inevitably lead to the following which is not in the interest of the country;

- i) lack of time for developing indigenous manufacturing facility,
- ii) resorting to import of equipment thus creating market for mainly foreign companies,

- iii) huge investment of over one lakh crore required. Majority of which will lead to the foreign exchange drain for outsourcing of new technology, skilled manpower and equipment as there is lack of time to develop the facility indigenously.

5. International Emission Norms

In 2015 MoEF&CC introduced new emission standards for thermal power plants to address the growing air pollution concerns. The new standards delimited SO₂, NO_x, and mercury (Hg) emissions for the first time and the existing limits on PM emissions were made stringent (Table 1). MoEF&CC has set a deadline to comply with the new standards by the end of 2019 for national capital region, 2021 for critical areas and 2022 for all other thermal units.

Table 6 Emission limit values for Coal fired power plants, China

Pollutants	Location	Emission Limits, mg/m ³
PM	All areas	30
	Key Region	20
SO ₂	New	100/200
	Existing	200/400
	Key Region	50
NO _x	All areas	100/200
	Key Region	100

The SO₂ and NO_x emission standards for coal fired power plants in China were proposed more than two decades earlier in 1996. Emission norms are location specific in some of the countries (China, Australia) which have sizable coal fired power generation. Key

areas in China which includes Beijing City, Tianjin City, Hebei Province, Wuhan City and many more areas have stricter emission standards over the baseline emission levels as shown in the table. Similarly, in Australia, the emission levels for coal fired power plants varies from region to region is shown in the table below.

Table 7 Region wise Emission standards of Australia

Region	PM		SO ₂		No _x	
	Existing	New	Existing	New	Existing	New
Australia ¹ _{NHMRC}	80 mg/m ³		200 mg/m ³		800 ¹ mg/m ³	
Australia ² _{SOUTH}	250 ² mg/m ³		100 ³ mg/m ³		700 ⁴ mg/m ³	
Australia _{TASMANIA}	100 mg/m ³		100 ³ mg/m ³		500 ⁵ mg/m ³	
Australia _{VICTORIA}	500 mg/m ³	250 mg/m ³	200 ⁷ mg/m ³	200 ⁷ mg/m ³	1000 ⁶ mg/m ³	700 ⁴ mg/m ³

1 Power Generating Boilers >30MW

2 Plant Size >100MJ/h

3 Sulphuric acid mist and SO₂

4 Plant Size >250MWe

5 Plant Size <30MWe

6 Plant Size >30MWe

7 SO_x as SO₃

8 Plant Size > 150,000MJ/h

Courtesy: Xing Zhang, Emission Standards and Control of PM_{2.5} from Coal-fired Power Plant, July 2016, IEA Clean Coal Centre UK

Based on actual ground measurements and detailed dispersion studies coal-fired power plants which are found to affect the ambient air quality of cities, towns and areas where

cluster of thermal plants is located should be subjected to the stringent emission standards, similar inline to those adopted in the other countries.

6. Recommendations

There are two ways to go forward to mitigate the challenges faced by the thermal power sector by the new emission norms and both (as mentioned below) can be adopted for improving the situation.

- i. Our target should be to maintain uniform ambient air quality across the country and not the uniform emission norms for thermal power plants. By implementing uniform emission norms of TPS which may in turn result in different air quality at different location. Same norms for thermal power plants located in critically polluted area and other area where air quality is already good doesn't look to be proper as additional costs are involved. Instead we should aim to maintain same air quality throughout the country and accordingly it is proposed to implement FGD for the thermal power plants region-wise as given in the table below.

Table 8 Phasing of FGD Installation based on Ambient Air Quality SO₂ Levels

Region	Ambient Air SO ₂ Levels	Remarks
1	Level-I ($>40\mu\text{g}/\text{m}^3$)	FGD shall be installed immediately
2	Level-II ($>30\mu\text{g}/\text{m}^3$ & $\leq 40\mu\text{g}/\text{m}^3$)	FGD shall be installed in 2 nd phase
3	Level-III ($>20\mu\text{g}/\text{m}^3$ & $\leq 30\mu\text{g}/\text{m}^3$)	FGD is not required at present
4	Level-IV ($>10\mu\text{g}/\text{m}^3$ & $\leq 20\mu\text{g}/\text{m}^3$)	FGD is not required at present
5	Level-V ($>0\mu\text{g}/\text{m}^3$ & $\leq 10\mu\text{g}/\text{m}^3$)	FGD is not required at present

- a) In areas where the development is high, the atmospheric environmental capacity is small and is prone to serious atmospheric pollution problems, strict control of emissions shall be required in such key areas for TPS as categorised under Region 1.
 - b) In next phase FGD to be implemented in the power plant which are under Region 2
 - c) Presently no action is required for power plant those are under Region 3,4 & 5.
- ii. There should be graded action plan for adopting new emission norms for TPS as proposed above rather than adopting a single deadline for large base of power plants across the country. An unworkable time schedule will create market scarcity leading to import, jacked up prices unnecessary burden on power utilities. Graded action plan will help in utilizing the resources in effective manner and it will help in fine tuning the technology for local conditions. If the process of emission control is completed in 10-15 years' time frame, and consider thermal power plants located in critically polluted areas in first phase, it will help in developing indigenous manufacturing base, skilled manpower in the country which shall take care of the local operating conditions.