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केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

तापीय परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग

Thermal Projects Renovation & Modernisation Division



Retrofitting of Moving Electrode Electrostatic Precipitator at Rinhand TPS of NTPC

Quarterly Review Report Renovation & Modernisation of Thermal Power Stations

Quarter: January- March, 2017

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Foreword

Renovation & Modernization (R&M) 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 bringing in improvement in the performance of the units as well as for system upgradation to comply the stricter environmental norms to ensure improved 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 37 units with aggregate capacity of 7202.26 MW have been completed during 12th Plan upto 31-03-2017. At present, 5 coal based generating units with aggregate capacity of 730 MW are under shut down for carrying out the R&M/LE works.

CEA is also carrying out the technical studies related to R&M for addressing barriers to Energy Efficiency R&M in India as a part of Coal Fired Generation Rehabilitation Project funded by the World Bank. Study reports on "*Reduction of Barriers to R&M Interventions in TPS in India*" and "*Developing Markets for Implementation of R&M Schemes in TPS in India*" submitted by Mercados EMI have been circulated to the various stakeholders for their reference and guidance during the implementation of R&M projects. Also, the reports on Review of Procurement Experience, Implementation Experience, Strengthening O&M Practices & Post R&M Experience in O&M have been prepared. Further, to facilitate the implementation of R&M projects model tender documents for R&M of fossil fuel based power plants in India have been prepared under Indo-German Energy Forum (IGEF). The above mentioned reports and tender documents have been shared with stakeholders in Power Sector and have also been hosted on the CEA website.

Under the Indo-Japan Co-operation, 3rd Phase MoU between CEA and JCOAL in the field of efficiency improvement and environmental improvement of coal fired power stations has been signed on 22nd January, 2016. Under the MoU, a 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 jointly by CEA and JCOAL. The Diagnostic activities have been carried out by JCOAL at unit-3 (210 MW) of Dadri TPS. A study on replacement of old units of Badarpur TPS by highly efficient super critical units of higher size has been carried out by JCOAL as a generic study. The feasibility study for Singrauli STPS Stg. I & II units (5x200 MW+2x200 MW) of NTPC is under way. Under Clean Coal Technology (CCT) Programme two study tours to Japan have been implemented from 19th October to 27th October, 2016 and from 11th January to 19th January 2017 during the current year which had participation of 17 engineers from CEA and Central/ State Power Utilities.

In the end, I would like to express my sincere thanks and gratitude to the Utilities and other stakeholders for extending their warm co-operation for preparation of the Quarterly Review Report as well as in our endeavours for facilitation of implementation of the R&M/ LE works at old thermal power units in the country.

Dated : 02-05-2017

(Bhai Lal)
CE (TPR&M)

Highlights

1. LE/ R&M Achievements during 11th Plan (2007 – 12)

Sl. No.	Particulars	State Sctor		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 11 th Plan	10	1024	3	267	13	1291
B)	R&M works						
2.	Completed during 11 th Plan	20	4485	39	10370	59	14855
	TOTAL	30	5509	42	10637	72	16146

2. LE / R&M Programme during 12th Plan (2012 - 17)

Category	LE/R&M works identified during 12 th Plan No. of units & capacity (MW)		Total (State Sector + Central Sector)
	State Sector	Central Sector	
LE	38 (6820)	32 (5246)	70 (12066)
R&M	20 (4150)	45 (13151)	65 (17301)
Total	58 (10970)	77 (18397)	135 (29367)

3. Achievements of R&M and LE Projects during 12th Plan (upto 31.03.2017)

Sl. No.	Particulars	LE/R&M works completed during 12 th Plan No. of units & capacity (MW)		Total (State Sector + Central Sector)
		State Sector	Central Sector	
1	LE	10(1380)	11(1261.76)	21(2641.76)
2	R&M	5(850)	11(3710.5)	16(4560.5)
	Total	15(2230)	22(4972.26)	37(7202.26)

4. 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:-

(A) Phase–II Activity: Development of Tender Procedure and Model Contracts for R&M of Fossil Fuel Based Power Plants in India – funded by KfW.

Lahmeyer International (India) Ltd. was appointed as a Consultant for ‘Development of Tendering Procedures and Model Contract document for R&M of Fossil Fuel Based Power Plants in India’. The Phase-II Activity Report and final Model Documents have

been submitted by Lahmeyer under the consultancy. The Documents have been accepted by CEA and uploaded to CEA website.

(B) 'Technical Assistance to CEA' funded by World Bank under the umbrella project "Coal Fired Generation Rehabilitation Project-India"

The consultants for carrying out the following studies under the above project have been appointed. The status of progress is given below :-

- a) **Study on Reduction of Barriers to R&M Interventions in TPS in India**
Mercados Energy Market India was appointed as a consultant on 02.04.2012. The Study Report submitted by Mercados EMI has been accepted by CEA in January, 2014 and sent to various stakeholders in the power sector.
- b) **Study on Developing Markets for Implementation of R&M in TPS in India**
Mercados Energy Market India was appointed as a consultant on 14.05.2012. The Study Report submitted by Mercados EMI has been accepted by CEA in January, 2014 and sent to various stakeholders in the power sector.
- c) **Review of Institutional Capacity and Capacity Strengthening Interventions in CEA**
KPMG has been appointed to carry out the study on 16-07-2012. KPMG has already submitted reports on As-Is Assessment of Institutional Capacity of CEA and Customer Expectation Survey. The revised Capacity Strengthening plan was submitted by KPMG on 2nd February 2017. A meeting chaired by Chairperson (CEA) was held on 22nd March 2017 for discussion on the Capacity Strengthening Plan for CEA prepared by KPMG. Based on the discussion KPMG has been asked to revise the plan. The revised Capacity Strengthening plan is awaited from KPMG.
- d) **Review of Experience from Pilot R&M Capacity Interventions in TPS in India:**
WAPCOS was appointed as a consultant w.e.f. 23-07-2012. WAPCOS has submitted the final reports on all four activities, namely, Review of Procurement Experience, Implementation Experience, Strengthening O&M Practices & Post R&M Experience in O&M on 15th, 17th and 22nd March 2017 respectively. The reports were accepted by CEA on 29th March 2017. The same have been shared with stakeholders in Power Sector and have also been hosted on the CEA website.

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

The 3rd Memorandum of Understanding (MoU) on Indo – Japan Cooperation for Project on Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity between CEA and JCOAL was signed on 22nd January, 2016. The objective of the MoU is to address issues and barriers in promoting sustainable, stable and low-carbon thermal power development in India. Under this MoU, JCOAL is carrying out feasibility study of replacement of Badarpur TPS by new units based on SC/USC technologies. RLA study at unit-3 (210 MW) of Dadari TPS has been carried out by JCOAL and report is under preparation by JCOAL. The Feasibility studies for replacement of Singrauli STPS Stg. I & II units (5x200 MW+2x200 MW) of NTPC is underway. Under Clean Coal Technology (CCT) Programme two study tours to Japan have been implemented from 19th October to 27th October, 2016 and from 11th January to 19th January 2017 during current year 2016-17.

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

1.0 Introduction

At the time of independence, the total installed capacity in the power sector was 1362 MW of which steam power plants contributed 756 MW. The installed generation capacity has since grown manifold. The total installed capacity as on 31.03.2017 was 319606.3 MW of which thermal power plants contributed 218329.88 MW (68.31 %). The contribution of Coal, Gas and Diesel based thermal power plants of total installed capacity is 60.12 %, 7.93 % and 0.26 % 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 and 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 best potential candidates 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 equipment and systems with a view to improve their performance in terms of output, reliability, availability, reduction in maintenance requirements, 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 11th 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)	92-93 to 96-97	44 / 198 43/(194) 1/(4)	20869 (20569) (300)	5085	763
3	9 th Plan (R&M) (LEP)	97-98 to 2001-02	37 / 152 29/ (127) 8/ (25)	18991 (17306) (1685)	14500	2200
4	10 th Plan (R&M) (LEP)	2002-03 to 2006-07	9/25 5/(14) 4/(11)	3445 (2460) (985)	2000	300
5	11 th Plan (R&M) (LEP)	2007-08 to 2011-12	21/72 15/(59) 6/(13)	16146 (14855) (1291)	5400	820

*Tentative figure.

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

5.0 R&M/ LE Programme during 12th Plan (2012 - 17)

The Summary of R&M/ LE Programme to be implemented during the 12th Plan is given below. The status of implementation of the R&M/LE works at various units is furnished at Annexure-1.

S.No.	Particulars	LE/R&M works identified during 12 th Plan No. of units & capacity (MW)		Total (State Sector + Central Sector)
		State Sector	Central Sector	
1.	LE	38 (6820)	32 (5246)	70 (12066)
2.	R&M	20 (4150)	45 (13151)	65 (17301)
Total		58 (10970)	77 (18397)	135 (29367)

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

As on 31.03.2017

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	
2012-2013	1(110)	1 (106)	5 (850)	1 (110)	6 (960)	2 (216)	8 (1176)
2013-2014	2(220)	3 (343)	0 (0)	3 (100.5)	2 (220)	6 (443.5)	8 (663.5)
2014-2015	2(220)	6(681.76)	0(0)	0(0)	2(220)	6(681.76)	8(901.76)
2015-2016	2 (320)	1(131)	0(0)	2(1000)	2(320)	3(1131)	5(1451)
2016-2017	3(510)	0(0)	0(0)	5(2500)	3(510)	5(2500)	8(3010)
Total No. of units (MW)	10(1380)	11 (1261.76)	5 (850)	11 (3710.5)	15 (2230)	22 (4972.26)	37 (7202.26)
	21(2641.76)		16(4560.5)		37(7202.26)		

5.1 Details Achievements of LE and R&M Programme during 12th Plan upto 31.03.2017.

		Name of the TPS	Unit No.	Capacity (MW)	Utility	Sector	Date of Achievement
1. 2012-2013							
LE		Bathinda	3	110	PSPCL	State	05.08.2012
		Kawas	GT-1A	106	NTPC	Central	21.01.2013
R&M		DPL	6	110	DPL	State	07.05.2012
		Patratu	10	110	NTPC	State	24.05.2012
		Anpara’A	1 to 3	3x210	UPRVUNL	State	21.03.2013
		Tanda	2	110	NTPC	Centre	15.09.2012
Sub Total			8 (units)	1176.00			
2. 2013-2014							
LE		Parichha	2	110		State	05.05.2013
		Muzafarpur	1	110		State	05.07.2013
		Kawas	GT-1B	106	NTPC	Central	28.08. 2013
		Gandhar	GT – 3	131	NTPC	Central	29.09.2013
		Kawas	GT-2B	106	NTPC	Central	31.03.2014
R&M		Kathalguri	GT-3	33.5	NEEPCO	Central	31.03.2014
		Kathalguri	GT-4	33.5	NEEPCO	Central	31.03.2014
		Kathalguri	GT-5	33.5	NEEPCO	Central	31.03.2014
Sub Total			8(units)	663.50			
3. 2014-2015							
LE		Bathinda	4	110	PSPCL	State	10.07.2014.
		Muzafarpur	2	110	BSPGCL	State	30.09.2014
		Auraiya	GT-1	111.19	NTPC	Central	22.06. 2014
		Gandhar	GT-1	131	NTPC	Central	06.07.2014
		Kawas	GT-2A	106	NTPC	Central	22.08.2014
		Auraiya	GT-2	111.19	NTPC	Central	28.10.2014
		Auraiya	GT-3	111.19	NTPC	Central	25.12.2014
		Auraiya	GT-4	111.19	NTPC	Central	02.03.2015
R&M	NIL	-	-	-	-	-	
Sub Total			8 (units)	901.76			
4. 2015-2016							
LE		Harduaganj	7	110	UPRVUNL	State	01.05. 2015
		Bandel	5	210	WBPDC	State	21.09.2015
		Gandhar	GT-2	131	NTPC	Central	15.04.2015
R&M		Simhadri	1	500	NTPC	Central	31.03.2016
		Simhadri	2	500	NTPC	Central	31.03.2016
Sub Total			5 (units)	1451.00			
5. 2016-17							
LE		Obra	10	200	UPRVUNL	State	08.04.2016
		Barauni	7	110	BSPGCL	State	03.08.2016
		Obra	11	200	UPRVUNL	State	31.12.2016
R&M		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
Sub Total			8(unit)	3010			
Total LE	21 (2641.76)	State	10 (units)	1380			
		Centre	11 (units)	1261.76			
Total R&M	16 (4560.50)	State	05 (units)	850			
		Centre	11 (units)	3710.5			
Grand Total			37 (units)	7202.26			

Details of thermal power units where the R&M/ LE Works have been completed during 12th Plan up to 31.03.2017 are given at **Annexure 2& 3.**

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

The following 4 units are under shut down for R&M and Life Extension works.

Sl.No.	Name of Project	Utility	State	Unit No.	Capacity (MW)
1.	Patratu TPS	JSEB	Jharkhand	9	110
2.	Obra TPS	UPRVUNL	U.P.	7	100
3.	Barauni TPS	BSPGCL	Bihar	6	110
4.	Koradi TPS	MSPGCL	Maharashtra	6	210
5.	Obra TPS	UPRVUNL	U.P.	12	200
Total					730

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 Croes
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 31st March, 2017 :

i)	BHEL	:	Rs. 725.07 crores
ii)	KBUNL	:	Rs. 180.00 crores
iii)	NTPC	:	Rs. 20.11 crores
Total		:	Rs. 925.18 crores

Commencement of work and Completion Schedule :

Name of TPS	Unit No.	Zero Date	Contractual Completion Date	Anticipated Completion Date	Present physical status as on 31.12.2015
Barauni TPS	7	15.11.2009	15.11.20011	Completed	Unit was synchronized on 03.08.2016.
	6	15.11. 2009	15.06.2012	31.07.2017	Boiler: Erection of 1615 MT done out of 2900 MT. ESP: 60% work completed. 320 Items awaited from BHEL Ranipet. Fan Erection: FD, ID and PA Fan are to be commissioned. GT: 40% work completed. One no. stator conductor bar sent for repair works. Duct: erection is under progress. 41 items awaited from Trichi and 3 items awaited from Jagdishpur. Mills: erection of 3 mills out of 5 are under progress Anticipated completion of Unit- 6 is 31.07.2017.
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.

6.0 External Co-operation for R&M of TPS

To demonstrate the Energy Efficiency R&M programme in thermal power stations in India, a few pilot R&M projects have been financed by some external funding agencies such as KfW Development Bank-Germany, World Bank, European Union (EU) etc. The soft loans are provided by these external agencies for energy efficiency R&M programmes. Also, KfW & World Bank have provided some grant for technical assistance for preparation of Feasibility Reports/DPRs at selected thermal units and carrying out some R&M related studies. METI (Ministry of Economy, Trade and Industry), Japan and MOP, Govt. of India have agreed to extend their cooperation in sharing of technical expertise as well as in actual implementation of mutually agreed techno-economical R&M solutions. In addition to this, KfW has also financed the project “Development of Tender Procedure and Model Contract for the R&M of Fossil Fuel Based Thermal Power Plants in India”. The details of the above programme are as follows:-

6.1 Development of the Tender Procedures and Model Contract for the R&M of Fossil Fuel Based Power Plants in India.” Funded by KfW Development Bank– Germany.

The Sub-Group-I on “ Efficiency Enhancement in Fossil Based Power Plants” constituted under the Indo-German Energy Forum, in its first meeting held on 12.03.2008 identified the Development of Standard Documents for R&M Projects among the three other issues. The development of Standard Documents was envisaged to be done in two phases as under.

Phase-I Activity

The objective of Phase-I Activity is an assessment of tendering procedures currently being followed by public utilities in India and a review of documents used for standard R&M projects as well as the documents which have already been developed for projects financed particularly by World Bank. The Phase-I Activity was carried out by the consultant-M/s. Evonik Energy Services India appointed and funded by GIZ. M/s. Evonik Energy Services India submitted the report on Phase-I activity in September 2009.

Phase-II Activity

The main objective of Phase-II Activity is the preparation of the model documents/templates for R&M Projects in consultation with Task Force, Power Utilities & financing agencies. It is intended to apply the documents for the Energy Efficiency Programme financed by KfW.

The MoP nominated CEA as Project Implementing Agency in December 2009 to carry out the Phase-II Activity. Lahmeyer International (India) Pvt. Ltd has been appointed as consultant w.e.f 16-03-2012 for “Development of the Tender Procedures and Model Contract for the R&M of Fossil Fuel based Power Plants in India” under Phase-II Activity.

The following R&M model documents and Phase-II Activity Report have been prepared by CEA and uploaded on CEA website.

Sl No.	Description of the Report
1	Model Feasibility Report
2	Model Detail Project Report (DPR)
3	Model RLA/CA Report of R&M projects Model
4	Model Energy Audit Report of R&M projects
5	Model Tender Documents for selection of R&M Contractor
6	Model Tender Documents for selection of R&M Consultant
7	Model Tender Documents for selection of ISC
8	Phase –II Activity Report

6.2 “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 above project has two components:-

Component-1. Energy Efficiency R&M at Pilot Projects

This component would fund implementation of Energy Efficient R&M of 640 MW capacity comprising Bandel TPS Unit-5(210 MW) of WBPDC, 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 for the Component-1.

Component-2. Technical Assistance to CEA and Utilities

The Technical Assistance component of the project is 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. The World Bank has earmarked US \$ 7.5 million GEF grant for the Component-2.

6.2.1 World Bank funded Energy Efficiency Pilot R&M Projects

(A) Bandel TPS (Unit-5, 210 MW)

The total estimated cost of R&M project is around US \$ 107.38 Million comprising of loan of around US \$ 59, GEF Grant of around US \$ 12.45 million. In addition to above, Technical Assistance of US \$ 1.3 million under GEF Grant has been provided for consultancy. Further, additional US\$ 22.21 million comprising of IBRD loan of US\$ 18.01 million and GEF grant of US\$ 4.2 million due to restructuring of funds as a result of cancellation of R&M works in Panipat TPS have also been provided for Bandel TPS.

Status of Physical Progress

Detailed Project Report (DPR) for the R&M project consisting major packages, viz., Main Plant Package (BTG -Boiler, Turbine & Generator), Coal Handling System Package (CHP), Ash Handling Package & Water System Package (AHP & Water), Electrical System Package was prepared by the M/s Evonik Energy Services (Project Design Consultant).

The unit- 5 was taken under S/D for R&M works in November.2013. The zero date for S/D for the R&M works was considered as 02.12.2013. R&M works at BTG, TG Area, Boiler Area, ESP, Coal Handling Plant, Ash Handling Plant, Electrical Packages, Civil works etc. have been completed. Unit has been synchronized on coal on 21st September, 2015. The unit attained a load of 215 MW on 24th November, 2015.

(B) Koradi TPS (Unit-6, 210 MW)

Background

The total estimated cost of the project is around US\$ 110.5 Million and the fund allocation for the Koradi TPS is loan of around US \$ 59 million (Loan)), grant of around US \$ 12.45 million. In addition to above Technical Assistance of US \$ 3.3 million under GEF Grant has been provided for 10 consultancy studies.

The Commercial Operation Date of the unit is 30.03.1982 & the unit is about 34 years old. The estimated cost of the R&M project based on award of contract is Rs. 486 Crore. The zero date for R&M project is 3rd March, 2014. The unit is under shutdown since 20th July, 2015 and targeted oil synchronization date is 30.06.2017.

Status of Physical Progress

- i) **BTG Package:** Mahagenco issued that the Letter of Award to BHEL on May 31, 2013. The contract was signed on December 18, 2013. Approximately 90% of the material (on Amount basis) is supplied by BHEL at site & further supply is in progress. 57% work of new ESP Control Room building at new location is completed. Erection of HP & IP Turbine is 56% completed. LP Turbine modification work is 22% completed. Mill overhauling work is 49 % completed. FD fan overhauling work is 32% completed.
- ii) **Electrical Package:** Mahagenco issued the Letter of Award to M/s ABB Ltd on March 19, 2012 and the final contract 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. Approximately 30% of the material (on Amount basis) is supplied by M/s ABB at site & further supply is in progress. Breaker ON/OFF time test completed. Retrofitting of HT breakers completed. HT/LT Motors overhaul is in progress. Unit Aux. Transformer (UAT) placed in position. DCS panel erection work is 70% completed. Work of PCR Panel Erection is 70% completed.

iii) 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. DM Plant & Pre-Treatment System Package has been cancelled. The need based work of DM Plant & Pre-Treatment System shall be carried out separately by O&M section. Under Cooling Tower Plant Package 30% of overall material has been supplied at site & 50% of the dismantling work has been completed.

Various Revised Milestones for R&M work at Unit-6, Koradi TPS are as under:

S.No.	Milestone	Revised Target Date
1.	Date of Shut Down for R&M	20-07-2015 (Actual)
2.	Synchronization	30.06.2017
3.	Trial Run or Reliability Run	-
4.	P.G. Test	-

C) Panipat TPS (Unit-3&4, 2x110 MW)

The unit 3 &4 of Panipat TPS was initially identified for R&M under World Bank Programme. A loan of 448.36 Crores was assigned under R&M of Unit 3&4, PTPS, Panipat. As per the final TAR of consultant R&M cost was 561.27 Crores which was not found financial viable due to high sensitivity of returns to Station Heat Rate and exceeding of estimated cost against available funds. Therefore, HPGCL requested World Bank for foreclosure of the Loan Agreement.

6.2.2 Technical Assistance to CEA

World Bank has financed the project “India: Coal Fired Generation Rehabilitation Project.” aimed at demonstrating Energy Efficiency Rehabilitation & Modernization (EE R&M) of coal fired generation units through rehabilitation of 640 MW of capacity across three states- West Bengal, Haryana and Maharashtra. The project is funded through IBRD loan of USD 180 million and GEF grants of USD 45.4 million out of which USD 7.5 million have been earmarked for Technical Assistance/Studies. Under sub- component (iii) of component -2 of the coal Fired Generation Rehabilitation Project.

Under Component-2 of the Coal Fired Generation Rehabilitation Project, CEA is implementing the project on “Technical Assistance to CEA for Addressing the Barriers to Energy Efficient R&M of Coal Fired Generating Units in India”. The consultants appointed for the above project are namely, ABPS Infrastructure, KPMG, Mercados Energy Market India and WAPCOS Ltd. Brief Status of various consultancies under Technical Assistance is as given below: -

S.No	Name of Study	Physical Progress As on 31.03.2017
1.	Implementation Support Consultancy (ISC)	ABPS assisted in the review of the Capacity Strengthening Plan for CEA and participated in the review meetings held from time to time.
2.	Review of Institutional Capacity and Implementation of Capacity Strengthening Interventions at CEA	KPMG submitted the revised Capacity Strengthening Plan after changes on 30th September 2016. The same was discussed in the Special Authority Meeting chaired by Chairman, CEA held on 27 th October 2016. The revised Capacity Strengthening plan was submitted by KPMG on 02.02.2017. A meeting chaired by Chairperson (CEA) was held on 22 March 2017 for discussion on the Capacity Strengthening Plan for CEA prepared by KPMG. Based on the discussion KPMG has been asked to revise the plan. The revised Capacity Strengthening Plan is awaited from KPMG.
3.	Reduction of barriers to R&M interventions in thermal power plants in India	The Study Report has been accepted by CEA in January, 2014 and sent to various stakeholders in the power sector. The consultancy was completed in November 2013.
4.	Developing Markets for Implementation of R&M scheme in thermal power stations in India	The Study Report has been accepted by CEA in January, 2014 and sent to various stakeholders in the power sector. The consultancy was completed in November 2013.
5.	Review of experience from Pilot R&M interventions in thermal power stations in India	WAPCOS organised a Workshop on 3 rd Feb 2017 at India Habitat Centre, New Delhi to share the learnings/ findings from the study. The consultant submitted the final reports on the following four aspects covered in the study during March 2017. (i) Procurement Experience at Pilot R&M projects (ii) Implementation Experience at Pilot R&M projects (iii) Post- R&M Experience in O&M of the TPS (iv) Experience in Strengthening O&M practices The reports were accepted by CEA on 29 th March 2017. The copies of the reports have been sent to various stakeholders in Power Sector and have also been hosted on the CEA website.

6.3 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 candidate coal-fired power plants pertaining to Energy Efficient Renovation & Modernisation works and finding out measures to overcome barriers for promoting R&M, towards carrying out efficiency and environmental improvement of coal-fired power plants in India. Accordingly, studies were taken up in 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 report for carrying out study 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.

A 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 at The Claridges, New Delhi by CEA and JCOAL. The Workshop had participation by various stake holders in power sector.

Under Clean Coal Technology (CCT) Programme two study tours to Japan have been organized from 26th January, 2016 to 3rd February, 2016 and 2nd February, 2016 to 10th February, 2016 in which 10 participants from different power utilities have participated. During the current year 2016-17 also, two study tours to Japan, from 19th October to 27th October, 2016 and from 11th January to 19th January 2017 have been implemented, in which 17 officers/engineers from MoP, CEA, NTPC and other utilities participated for exposure to the Japanese technologies for power generation. The total participation is 79 officers from MoP, CEA and different power utilities under CCT Training Programme. The participants visited the latest USC power stations and updated about various applicable technologies and equipment as well as O&M technique.

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. The Talcher TPS (4x60 + 2x110) MW of NTPC and Koradi TPS unit-5 & 7 (2x210) MW of Mahagenco are also offered for study on replacement of old units by Super Critical Units in addition to Singrauli STPS (5x200) MW.

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 the target Unit -3, to constitute the base for formulation of the plan of R&M implementation that is tentatively scheduled in 2018.

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.

Mini-workshops under the CEA-JCOAL Cooperation for the project on Efficiency and Environment improvement of Coal Fired Power Stations in India were organized on 01.03.2017 at TSGENCO and on 03.03.2017 at UPRVUNL.

**Status of units where Life Extension/ Renovation & Modernisation works have been taken up
for implementation during 12th Plan**

STATE SECTOR

LE Works

(as on 31.03.2017)

S.N.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	U.P.	Obra	10	1977	200	Unit was taken under shut down on 23.12.2012. Unit was synchronized on coal on 08.04.2016 and achieved 200 MW load.
2	U.P.	Obra	11	1977	200	Unit was under s/d since 13.07.2011. Unit synchronised on 31-12-2016. Now unit -11 is running at 185 MW and is under stabilisation.
3	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. Boiler: Dismantling is in progress. 10% work completed. Turbine: Work has not been started yet. ESP has been dismantled and ESP foundation work completed in April 2017. Ash Handling: 2% work completed. WTP: 95% work completed CHP: 50% work completed. Expected date of synchronisation is 31-12-2017.
4	U.P.	Obra	13	1982	200	Date of commissioning given by M/s. BHEL is 31-12-2018. Approval from Head Quarter to get s/d for unit-13 is under consideration. The S/D is expected in July 2017.
5	U.P.	Harduaganj	7	1978	110	Unit was taken under shut down on 05-03-201. Unit has been synchronized on 03.04.2015 on coal.
6	U.P.	Parichha	1	1984	110	LE not done during 2012-17. Utility decided to do some R&M activities in BTG area at an estimated cost of Rs. 89.358 crores. 70.58 crores loan has been sanctioned by PFC. Replacement of condenser tube done during revival of the unit. 60% water wall tube replaced and acid cleaning of boiler is also done. After completion of the scheme average PLF of the unit to sustain is near about 75%. To achieve the environmental norms, the old ESP would be replaced by new one. Dismantling of ESP, boiler and turbine site instrument have been completed. LOI for overhauling of mills and RCF has been placed. All works have been stopped as per instruction by UPERC till further instructions. Revised Project Completion date of R&M works is 31-10-2018.
7	U.P.	Parichha	2	1985	110	Unit was synchronised on 05-05-2013.

8	Punjab	Bathinda	3	1978	110	The unit was taken under s/d on 14.01.2010, and synchronised on 05.8.2012.
9	Punjab	Bathinda	4	1979	110	Unit was taken under s/d on 05.11.2012. The unit was synchronised on coal on 10.07.2014.
10	Haryana	Panipat	3	1985	110	LE `not done during 2012-17. The unit 3&4 were identified for World Bank funded project. The R&M of these units were found financially unviable Therefore the scheme of R&M was dropped with the approval of State Govt. and Department of Economic Affairs (DEA), Govt. of India was informed on 30.08.2012 to foreclose Loan agreement with World Bank for R&M of unit 3&4. Units 1- 4 of PTPS, Panipat have been retired / decommissioned w.e.f. December, 2015.
11	Haryana	Panipat	4	1985	110	
12	Maharashtra	Nashik	3	1979	210	LE not done during 2012-17. 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.
13	Maharashtra	Nashik	4	1980	210	LE not done during 2012-17. All studies Completed, Final DPR is submitted by M/s Steag. Approval of DPR is in progress. 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.
14	Maharashtra	Koradi	5	1978	200	LE not done during 2012-17. EER&M feasibility study has not been carried out. The LE works at unit-5 would be started after completion of LE works at unit-6 of Koradi TPS.
15	Maharashtra	Koradi	6	1982	210	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. The project is now in the implementation stage. Date of Shut Down for R&M - 20.07.2015 Synchronization -30.06.2017 Trial Run or Reliability Run -31.07.2017 P.G. Test -31.08.2017 BTG Package: Approximately 90% of the material (on Amount basis) is supplied by BHEL at site & further supply is in progress. 57% work of new ESP Control Room building at new

						location is completed. Erection of HP & IP Turbine is 56% completed. LP Turbine modification work is 22% completed. Mill overhauling work is 49 % completed. FD fan overhauling work is 32% completed. Electrical Package: Approximately 30% of the material (on Amount basis) is supplied by M/s ABB at site & further supply is in progress. Breaker ON/OFF time test completed. Retrofitting of HT breakers completed. HT/LT Motors overhaul is in progress. Unit Aux. Transformer (UAT) placed in position. DCS panel erection work is 70% completed. Work of PCR Panel Erection is 70% completed. BOP Package: Letter of Award for Cooling Tower Plant Package, Ash Handling Plant Package and Fire Detection, Protection System Package are issued and contract is signed on 23.09.2016, 26.10.2016 & 05.11.2016 respectively. DM Plant & Pre-Treatment System Package has been cancelled. The need based work of DM Plant & Pre-Treatment System shall be carried out separately by O&M section. Under Cooling Tower Plant Package 30% of overall material has been supplied at site & 50% of the dismantling work has been completed.
16	Maharashtra	Bhusawal	2	1979	210	LE not done during 2012-17. 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.
17	Maharashtra	Bhusawal	3	1982	210	LE not done during 2012-17. RLA/ Feasibility study for EER&M has not been carried out.
18	Maharashtra	Chandrapur	1	1983	210	LE not done during 2012-17. All studies Completed, DPR prepared by Energo Engg. Ltd. Has been approved by MSPGCL Board. Further, the Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6. Unit-1 &2 decommissioned by Board vide BR dated 18-03-2016.
19	Maharashtra	Chandrapur	2	1984	210	
20	Maharashtra	Parli	3	1980	210	LE not done during 2012-17. All studies Completed, DPR received from M/s Energo Engg Ltd, New Delhi & MSPGCL Board accorded approval for DPR. Further, the Board directed that no other R&M work shall be taken up without monitoring results of Koradi U-6.
21	Chhattisgarh	Korba (West)	1	1983	210	LE not done during 2012-17. CSPGCL has taken-up need based R&M for life extension on the basis of R&LA studies and also plan for compliance of new environmental norms.
22	Chhattisgarh	Korba (West)	2	1984	210	

						RLA studies done by M/s Evonik. Scope of work of Boiler, Turbine, Electrical Instrumentation, Civil and BOP is being finalised. The CSERC in its order dated 61-03-2016 has approved such scheme under capital investment plan. Order placed on BHEL Noida for Augmentation, R&M and up-gradation of ESPs to maintain emission level limit below 50mg/Nm ³ . Tender floated for Augmentation of DCS/ C&I System. Fire protection system of Transformer & Cables Vault Galleries are under process. Other schemes approved by CSERC for financial year 2016-17 to 2020-21 are tendering process.
23	M.P.	Satpura	6	1979	200	LE not done during 2012-17.
24	M.P.	Satpura	7	1979	210	The BoD of MPPGCL has decided that the proposal for comprehensive R&M in unit-6 to 9 of STPS on account of old age and high R&M cost. However, need based R&M works carried out during 2011-11 to 2014-15. As on date to retire the unit no. 6 to 9 in phased manner on account of prolonged age of these units are under active consideration in line with MoM held on 18.08.2015 regarding replacement of old & insufficient sub critical units by super critical units. The Board of Directors has approved the phasing out of the units. The decision of State Govt. is awaited.
25	Tamilnadu	Tuticorin	1	1979	210	LE not done during 2012-17.
26	Tamilnadu	Tuticorin	2	1980	210	Unit: 1 Need based R&M works have been carried out at the unit in TG, ESP, C&I and BoP area. Scope for Boiler R&M works under identification. Work awarded to M/s. NDE Inspections for 3 rd RLA Study of Boiler. RLA to be done during coming COH. Price bid to be open. Administrative approval accorded on 29-12-2015 for DDCMIS. Preparation of Tender specification is under process. Administrative approval for replacement of 3 nos of Primary Fan motors with journal bearing by new motors and replacement of 2 nos unit auxiliary transformers in unit 1 &2 are under process. Technical bid open on 28-01-2016 and approval for price bid opening is under process for complete replacement of economizer coils Assembly, LTSH supply tubes and straight tubes panels for super heaters. Unit:2 Need based R&M works have been carried out in Boiler TG, C&I and BoP. Following works have been completed in unit-2. a) 2 nd RLA Study of Boiler by Power Tech, Noida, UP.

						b) Complete replacement of economizer coils Assembly, LTSH supply tubes and straight tubes panels for super heaters rear wall near economizer by M/s. Sunil Hitech Engineers. c) Conversion of existing Conventional Air preheater to modular Air preheater with 24 sector having double sealing arrangement. Retrofitting of 210 MW LMW surface condenser in any one of the unit-1, 2, or 3.
27	A.P.	Dr. N.T. TPS (Vijaywada)	1	1979	210	LE not done during 2012-17. APGENCO have taken up 78 activities under RLA/LE programme for Dr NTTPS units-1&2. Most of the activities have been completed except few items for unit-2, which will be taken up during the Capital Over Haul of unit-2 in 2017-18.
28	A.P.	Dr. N.T. TPS (Vijaywada)	2	1980	210	
29	Karnataka	Raichur	1	1985	210	LE not done during 2012-17. KPCL informed that they are taking up need based R&M/LE works for Raichur TPS Units-1&2. As such for Unit-1 BTG RLA study and for Unit-2 comprehensive BTG RLA study have been completed by BHEL. Most of the R&M/LE works have been taken up by KPCL: Expected date of start of Phase-I (BTG, Retrofitting of ESP, & Electrical works and Phase-II (BOP, Non BHEL) Package is in 2017-18. Order already placed for replacement of APH module for both the units- 1&2, PLSH, FSH, RH coils, BFP recirculation valves, LPH-3 of unit -1 and C&I of TG & Station. Replacement of HPT module & IPT module and Illumination system of Unit-1 boiler, mills & ESP area. These R&M works are planned to be carried out during Annual Over Haul scheduled in 2017. Other works: Boiler C&I works completed. 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. However, all the efforts are being made to reduce the R&M expenditure to minimum considering essential works required for enhancing performance/ Heat Rate. KPCL has engaged a consultant to explore the technologies/ possibilities to meet the new environmental norms. Consultant is preparing a feasibility report and DPR, same is expected by May- June 2017. After finalization of DPR, KPCL will take decision on R&M Works of unit- 1&2, according to the recommendations of DPR.
30	Karnataka	Raichur	2	1986	210	
31	Bihar	Barauni	6	1983	110	Boiler: 85% work completed, Erection of 1615

						MT done out of 2900 MT. 41 items awaited from BHEL Trichy. ESP: Erection of 675 MT done out of 1400 MT. 60% work completed. 320 items awaited from BHEL Ranipet. Fan Erection: FD, ID and PA fans are to be commissioned. 3 items are awaited from BHEL Jagdishpur. Mills: Erection of 236 MT done out of 400 MT. Erection of 3 mills out of 5 are under progress Anticipated completion date of Unit- 6 is 31.07.2017.
32	Bihar	Barauni	7	1985	110	Unit synchronized on oil firing on 28.02.2016 and synchronized on coal on 03.08.2016.
33	Bihar	Muzaffarpur	1	1985	110	Unit was under s/d since 6.10.2003. Unit was Synchronised on 5th July, 2013.
34	Bihar	Muzaffarpur	2	1986	110	S/d taken on 29.03.2012. Unit was Synchronised on 30th September, 2014.
35	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.
36	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.
37	W.Bengal	Kolaghat	3	1984	210	DPR has been prepared and accepted. The R&M works are planned to be carried out mainly in Combustion System in Coal Mills, APH, ESP and ID Fans to address the coal quality and environmental issues. ESP: LOA placed. Date of start of work is 22.03.2017. AHP: Bid evaluation is under process. BTG: DPR ready Preparation of technical specification is under process. Electrical: 1(GRP) & 2 (breaker Relay): DPR ready Preparation of technical specification is under process. Expected completion of R&M/LE is 30 months from LOA. Total estimated cost of project is Rs. 1073 Crs for unit-1,2 & 3.
38	W.Bengal	Bandel	5	1982	210	World Bank funded project. Contract for BTG pkg. awarded to M/s DHIC and signed on 29.2.2012. Unit was taken under shut down for LE works in November,2013. However, the Zero Date for S/D for R&M works was considered as 02.12.2013. Unit was synchronized on 02.10.2015 on Coal. The unit attained a load of 215 MW on 24.11.2015.
Sub Total State Sector (LE)			38		6820	

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

S.N.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	U.P.	Obra	7	1974	100	- Work is being executed by BHEL. - 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. All mechanical works completed. Lightup 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. Erection work has been completed. Boiler: 100% work completed (steam blowing done). Turbine: 100% work completed (Only rolling pending). Generator: 99% work completed (Only H₂ filling pending) BoP: 100% work completed (only mill-7A trial pending. Reserve supply required) Restoration of electrical supply in S/G room is under progress. Expected to be synchronized in September 2017.
2	U.P.	Anpara	1	1986	210	Estimated cost of R&M is Rs. 68.96 Cr. Financed by PFC and UPRVUNL. The scheme completed in March 2013.
3	U.P.	Anpara	2	1986	210	
4	U.P.	Anpara	3	1988	210	
5	U.P.	Anpara'B	4	1993	500	R&M works is being executed by BHEL & M/s MITSUI & Toshiba OEM, Japan. — Total cost of scheme is Rs. 691.97 cr. Total expenditure upto 31.12.2016 is 387.16 crs. Boiler: Nearly 65% work completed. TG: Nearly 70% work completed. Electrical & Instrumentation: Nearly 58% work completed. BOP: Nearly 70% work completed. - The R&M work would be carried out in AOH and are likely to be completed by September, 2018. Utility decided to carry out Feasibility Study to meet the environmental norms.
6	U.P.	Anpara'B	5	1994	500	Utility decided to do need based R&M at estimated expenditure of Rs. 55 Cr. NTPC prepared the DPR based on the previously conducted RLA/CA Study. Retrofitting of 125 Nos. and 34 nos. ACB's has been completed in unit-1 & 2. Replacement of six Nos. Boiler Feed Booster Pump with more efficient. Replacement of old & obsolete HP Heaters & APH completed in unit-1 & 2. Replacement of existing APH with modified design 24 Sector APH in unit-2 and replacement of complete Reheater assemblies of unit 1&2 have been completed.
7	Punjab	Ropar	1	1984	210	
8	Punjab	Ropar	2	1985	210	

						SF-6 breakers have been fitted & commissioned in 220kV switchyard. Steam & Water Analysis System (SWAS) of unit-1 & 2 has been retrofitted and commissioned. Erection and commissioning will be done during overhauling of unit-1 in February, 2018.
9	Punjab	Ropar	5	1992	210	Utility decided to do need based R&M at estimated expenditure of Rs. 65 Cr. RLA of Unit 5 & 6 has not been carried out till date. Following R&M Works have already been executed. - Phase-II Migration of WDPF System to Ovation System on Unit-5. - Replacement of steam & water analysis system of Stage-III and - Replacement of minimum oil circuit breakers(MOCBs) with vacuum circuit breakers. - Replacement of steam & water analysis system of unit-1 to 6 have been done and new system commissioned in unit-1, 2, 4 & 5, while retrofitting has been carried out in unit-3 & 6. Commissioning would be done when units would be on load. Replacement of MOCBs with vacuum circuit breaker of unit-5 & 6 would be done during 2018-20.
10	Punjab	Ropar	6	2001	210	
11	Haryana	Panipat	5	1989	210	RLA of Boiler pressure parts to be done and then need based R&M will be carried out. SWAS system in units 1-6 will be completed by Dec., 2016.
12	Gujarat	Wanakbori	1	1982	210	Utility decided to do need based R&M. ESP R&M: The order for retrofitting is issued to BHEL on 18.03.2016. ESP retrofitting was completed and unit lit up on 07.03.2017. C&I system: Works for upgrading of C&I system has already been awarded. Most of the materials are received except cable, field instruments and turbovisory. Turbine and Boiler R&M Works: Order for consultancy work considering heat rate (efficiency) improvement with ramping up/down of the load and PG test of ESP is placed on STEAG, Noida on 30.03.2016. After observing the satisfactory performance of Phase-I(Ukai-4) retrofitted unit, the R&M of Phase-II R&M of LMZ turbine will be implemented. GSECL asked consultant to incorporate dual firing system which is compatible to fire Natural Gas, FO or LDO. STEAG made presentation on modifications required to achieve up to 30% low load operation of the boiler without oil support. GSECL asked STEAG to incorporate the same in draft tender specifications. GSECL also asked consultant for providing feasibility of providing NOx & SOx control, FGD & incorporate the same in draft tender specifications.
13	Gujarat	Wanakbori	2	1983	210	Utility decided to do need based R&M.

					Turbine and Boiler R&M Works Phase II: Order for consultancy work considering heat rate (efficiency) improvement with ramping up/down of the load and PG test of ESP is placed on STEAG, Noida on 30.03.2016. After observing the satisfactory performance of Phase-I(Ukai-4) retrofitted unit, the R&M of Phase-II R&M of LMZ turbine will be implemented. GSECL asked consultant to incorporate dual firing system which is compatible to fire Natural Gas, FO or LDO. STEAG made presentation on modifications required to achieve up to 30% low load operation of the boiler without oil support. GSECL asked STEAG to incorporate the same in draft tender specifications. GSECL also asked consultant for providing feasibility of providing NOx & SOx control, FGD & incorporate the same in draft tender specifications. C&I system: Works for upgrading of C&I system has already been completed from 16.06.2012 to 17.07.2012. GSECL proposed to issue final order for turbine in March/ April,2017after observing first unit of Ukai TPS. ESP: : The order for retrofitting is issued to BHEL on 18.03.2016. Approx. 93% material supplied.
14	Gujarat	Ukai	3	1979	200 Utility decided to do need based R&M. ESP R&M Phase-I: Order for Rehabilitation/ Retrofitting of ESP placed on NASL on 28.07.2014. Retrofitting of ESP of unit-3 started on 28.07.2016 and completed on 25.04.2016. Unit lit up on 26-04-2016 & synchronised on 27-04-2016. ESP retrofitting of unit-4 is commenced from 07-12-2016 and 98% work completed Turbine and Boiler R&M Works Phase-II: Order for consultancy work considering heat rate (efficiency) improvement with ramping up/down of the load and PG test of ESP is placed on STEAG, Noida on 30.03.2016. After observing the satisfactory performance of Phase-I(Ukai-4) retrofitted unit, the R&M of Phase-II R&M of LMZ turbine will be implemented. GSECL asked consultant to incorporate dual firing system. Tender preparation for turbine Retrofitting & Boiler R&M is under process. GSECL proposed to issue final order for turbine in March/ April,2017after observing first unit. Boiler Back Pass Modification: Work at unit-3 started after observing performance of unit-4. C&I Up gradation: Order placed to BHEL on 18.06.2015. Work of unit-3 was completed and unit lit up on 26-04-2016 & synchronised on 27-04-2016. The available existing material of Unit 1&2 of Gandhinagar TPS has been used.

						Ash Slurry Pump House: DPR submitted by consultant. The scope include the work of Ash Slurry pump house. Draft tender received.
15	Gujarat	Ukai	4	1979	200	ESP R&M Phase-I: Order for Rehabilitation/ Retrofitting of ESP placed on NASL on 28.07.2014 and contract signed on 25.08.2014. Zero Date started from the placement of order i.e. 28.07.2014. Retrofitting of ESP commenced from 07.06.2016. 98% work is completed. The order value of supply Rs. 37.75 crs and works portion is Rs. 9.0092 crs (Inclusive taxes & duties for both U-3 & U-4). Turbine Works: Order awarded to. NASL, Noida on 29.04.2015 and Zero Date started from 10.03.2015. - HP, IP, LP & Generator shaft alignment completed. - Lube oil, seal oil & HP, LP bypass system oil flushing completed. - 42% of main turbine erection & 90% of auxiliary & piping work completed. - 93% of cable laying work completed. - 95% Hangers & support erection completed. Boiler Back Pass Modification: BHEL submitted the offer and has proposed 1% efficiency improvement on existing parameters through modification in boiler back pass and replacement of APH. S/D commenced from 07-12-2016. Erection work completed and Boiler alkali boil completed. C&I Up gradation: Order placed to BHEL on 18.06.2015. The available existing material of Unit 1&2 of Gandhinagar TPS has been used. 98% work of unit-4 is completed. Ash Slurry Pump House: DPR submitted by consultant. WAPCOS. Draft tender received.
16	Rajasthan	Kota	1	1983	110	RRVUNL has identified 14 nos. schemes at an estimated cost of Rs. 356.13 Cr. The R&M works will be carried out during Annual Shut Down of 2016-17. Actual expenditure till 30.06.2015 is Rs. 158.53 Crores. The present status of these R&M works is as below- - 10 nos. of works fully Completed - 01 no. work of R&M of CHP system is under progress. Work being executed through Elcon EPC Project, Gujarat. - 01 no. work of vacuum pump placed on Millanium Impex Pvt. Ltd is under progress. - 01 no. of work of compressor replacement- Technical Bid opened & evaluated and shortfalls uploaded on 21-09-2015. - 01 no. E-tender for VFD cancelled due to technical reasons and fresh tendering is under process.
17	Rajasthan	Kota	2	1983	110	
18	Jharkhand	Patratu	9	1984	110	Unit was under s/d from 10-08-2006 due to devastating fire in HT switch gear, cable gallery and control room etc. R&M works awarded to BHEL on 26-06-2007. - 1 nos BFP & 2 nos CEP is ready.

						- Boller works completed and TG on Barring gear. - Mechanical & Electrical erection work of ESP is completed, - HT & LT panel- Erection completed, HT mills & CEP & Balance LT motor-Overhauling completed, - GT,UAT,ST Overhauling and testing completed. - HT cable laying- completed. - LT/ Control cable laying-85% completed. - GRP & UCP Erection and testing completed. - Ash Handling System Supply 99% completed. - Patratu TPS has been taken over PVUNL (Patratu Vidyut Utpadan Nigam Ltd.), a joint venture of NTPC and JSEB. - Govt. of Jharkhand has transferred unit-9 to PVUNL on 01.04.2016. BHEL was called to submit offer for completion of remaining activities of Unit-9.M/S BHEL denied to give the offer until/unless the previous dues of JUUNL (approx.30 Crs.) is cleared by JUUNL. - Recently, topmost officials of GOJ and NTPC contemplated that no further investment in unit-9 is to be done. Now PVUNL have proposed decided to retire the Patratu TPS.
19	Jharkhand	Patratu	10	1986	110	Unit was under s/d from 5.8.2006 due to fire incident. Synchronised on 24.05.2012.
20	W. Bengal	DPL	6	1985	110	Synchronised on 07. 05. 2012 after R&M.
Sub Total State Sector (R&M)			20		4150	
Total State sector (LE+R&M)			58		10970	

CENTRAL SECTOR (LE Programme) Coal Based

Sl. No.	Utility	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	DVC	Bokaro 'B'	1	1986	210	Considered under KfW funded project. DPRs were prepared by M/s Evonik. DPRs have been accepted by DVC. It has been decided in the Board Meeting that in view of DVC's financial condition & high investment requirement, instead of a comprehensive R&M as proposed, some R&M activities of 'Must do' nature may be taken. DVC has taken up the job of installing the ducting along with controls for the provision of Tertiary Air to the boiler to reduce the unburnt carbon in bottom ash & fly ash, leading to efficiency enhancement. Also one number coal mill modification for achieving desired coal fineness, along with restoring original design specifications, to accommodate present poor coal quality is under consideration. Erection job of Tertiary Air Damper in Unit-3 is expected to be completed by the end of April. The works would be carried out through O&M Budget.
2	DVC	Bokaro 'B'	2	1990	210	
3	DVC	Bokaro 'B'	3	1993	210	
4	DVC	Durgapur	4	1982	210	Study completed and Reports submitted by JCOAL to DVC in 2014. The R&M works could not be done due to the poor financial condition of DVC. DVC is planning to address the various technical shortcomings through need based work/ overhauling of the unit.
5	NTPC	Badarpur	4	1978	210	a) Major R&M works put under hold. b) ESP: ESP work is awarded to M/s. KC Cottrell. R&M work of ESP in unit-4 & 5 have been completed. PG Test of unit-5 is completed in Feb.,2016.
6	NTPC	Badarpur	5	1981	210	
7	NTPC	Singrauli STPS	1	1986	200	a) CW system scheme - under execution. b) Total PO placed for 18 schemes. c) In view of CERC's reg. 2014-19 new R&M policy guidelines have been approved by NTPC Board. Balance schemes have been approved and under process of tendering/award. d) ESP: Work in progress
8	NTPC	Singrauli STPS	2	1987	200	
9	NTPC	Singrauli STPS	3	1983	200	
10	NTPC	Singrauli STPS	4	1983	200	
11	NTPC	Singrauli STPS	5	1984	200	
12	NTPC	Korba STPS	1	1983	200	a) Total PO's placed till date are 53 Nos. b) In view of CERC's reg. 2014-19 new R&M policy guidelines have been approved by NTPC Board. Balance schemes have been approved and under process of tendering/award. c) ESP: Work in progress. d) DDCMIS works completed in unit -3 and unit-2 in 2014-15 and 2015-16 respectively.
13	NTPC	Korba STPS	2	1983	200	
14	NTPC	Korba STPS	3		200	
15	NTPC	Ramagundam STPS	1	1984	200	a) Total PO's placed till date are 63 Nos. b) In view of CERC's reg. 2014-19 new R&M policy guidelines have been approved by NTPC Board. Balance schemes have been approved and under process of tendering/award. c) TG R&M package awarded to NASL on 14/12/16.
16	NTPC	Ramagundam STPS	2	1984	200	
17	NTPC	Ramagundam STPS	3	1984	200	
Subtotal C. S (LE Coal based)			17		3460	

Central Sector LE (Gas based)

S.N.	State	Name of Station	Unit No	Year of Comm.	Cap. (MW)	Status
1		Dadri GT	GT-1	1991	131	Tender annulled for main plant Package. R&M of C&I System has been awarded to Siemens on 30.09.2015. Module#1 (GT-1 &2, WHRB #1& #2 and ST #1) completed. GT #3 & #4, WHRB #3 & #4 and ST #2 planned in 2017-18.
2		Dadri GT	GT-2	1991	131	
3		Dadri GT	GT-3	1991	131	
4		Dadri GT	GT-4	1991	131	
5		Auraiya GT	GT-1	1989	111.19	LE works of GT 1& ST 1 (Only C&I in ST) completed on 22.06.2014.
6		Auraiya GT	GT-2	1989	111.19	LE works of GT 2 completed on 28.10.2014.
7		Auraiya GT	GT-3	1989	111.19	LE works of GT3 & ST2 (Only C&I in ST) completed on 10.11.2014.
8		Auraiya GT	GT-4	1989	111.19	LE work of GT4 completed on 02.03.2015,
9		Kawas GT	GT-1A	1992	106	LE works of GT # 1A completed on 21.01.2013
10		Kawas GT	GT-1B	1992	106	LE works of GT# 1B completed on 28.08.2013. R&M of of ST-IC(only C&I in ST) complete on 12/08/13.
11		Kawas GT	GT-2A	1992	106	LE works of GT # 2 A & ST # 2C (only C&I in ST) completed on 22.08.2014.
12		Kawas GT	GT-2B	1992	106	LE works of GT # 2B completed on 05.03.2014.
13		Gandhar GT	GT-1	1994	131	LE works of GT# 1 completed on 06.07.2014
14		Gandhar GT	GT-2	1994	131	LE works of GT # 2 completed on 15.04.2015
15		Gandhar GT	GT-3	1994	131	LE work of GT # 3 completed on 29.09.2013.
Sub Total (LE Gas based)			15		1785.8	

R&M Programme Central Sector

Sl. No.	Utility	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Status
1	NTPC	Singrauli STPS	6	1986	500	15 out 17 Schemes have been awarded. 06 schemes merged with DDCMIS packages which has been awarded on 25.06.2012. 10 Scheme have been completed and 01 scheme is partly completed in 4 th quarter of 2016-17.. Balance Schemes under tendering process. DDCMIS of both units completed. ESP: ESP work awarded to BHEL on 14.11.2013. ESP work is in progress.
2	NTPC	Singrauli STPS	7	1987	500	
3	NTPC	Korba STPS	4	1987	500	Against the 9 schemes approved, Purchase Order have been placed for 8 schemes. Work completed in 06 schemes. Balance one Scheme is under review. DDCMIS: DDCMIS work of Unit-4, unit-6 and unit-5 have been completed on 24.08.2014, 20.04.2015 and 28.11.2015 respectively. ESP: Work under progress. Completed in one unit.
4	NTPC	Korba STPS	5	1988	500	
5	NTPC	Korba STPS	6	1988	500	
6	NTPC	Ramagundam STPS	4	1988	500	All schemes awarded and work completed. DDCMIS job of unit-5,6 & 4 completed on 17.06.2014, 21.10.2014 & 19.10.2015 respectively. R&M works completed in March 2017.
7	NTPC	Ramagundam STPS	5	1989	500	
8	NTPC	Ramagundam STPS	6	1989	500	
9	NTPC	Farakka Stage-I	4	1992	500	All 7 schemes awarded. Work completed in 06 schemes. DDCMIS job completed in unit-4 on 03.11.2015.
10	NTPC	Farakka Stage-II	5	1994	500	

						DDCMIS for unit -5 is planned is in progress.
11	NTPC	Tanda	2	1989	110	Synchronised on 15.09 2012
12	NTPC	Unchahar	1	1988	210	All 14 Schemes have been awarded. (01 scheme awarded in quarter 4 of 2016-17) Work completed in 13 schemes. DDCMIS R&M works of unit-2 is completed on 02.10.2014 and unit-1 completed on 26.10.2015. ESP: R&M of one unit completed, 2 nd unit work is in progress.
13	NTPC	Unchahar	2	1989	210	
14	NTPC	Unchahar	3	1999	210	
15	NTPC	Unchahar	4	1999	210	
16	NTPC	Vindhyachal	1	1987	210	16 out of 20 Schemes have been awarded. 02 schemes are under review and 01 Scheme is under tendering process. 01 scheme under retendering. Work completed in 13 schemes. ESP: R&M of one unit completed, Balance work is in progress.
17	NTPC	Vindhyachal	2	1988	210	
18	NTPC	Vindhyachal	3	1989	210	
19	NTPC	Vindhyachal	4	1989	210	
20	NTPC	Vindhyachal	5	1990	210	
21	NTPC	Vindhyachal	6	1991	210	
22	NTPC	Vindhyachal	7	1999	500	
23	NTPC	Vindhyachal	8	2000	500	
24	NTPC	Simhadri	1	2002	500	All schemes awarded & work completed. R&M works completed on 31.03.2016.
25	NTPC	Simhadri	2	2002	500	
26	NTPC	Talchar STPS	1	1995	500	All the 19 schemes have been awarded. Work completed in 16 schemes have been completed. DDCMIS: DDCMIS job completed in unit-2 and unit-1 on 24.09.2014. and 08.10.2015 respectively. ESP: ESP work is awarded to Hitachi. ESP R&M of ESP is under process.
27	NTPC	Talchar STPS	2	1996	500	
28	NTPC	Dadri	1	1991	210	All 19 schemes are awarded. Balance 01 scheme is dropped. Now revised scheme are 18. Work completed in 16 schemes. (01 scheme awarded in 4 th quarter of 2016-17. DDCMIS work completed in unit-2 in 2014-15 and unit-1, 4, and 3 were completed in 2015-16.
29	NTPC	Dadri	2	1992	210	
30	NTPC	Dadri	3	1993	210	
31	NTPC	Dadri	4	1994	210	
32	NTPC	Rihand STPS Ph-III	1	1988	500	All schemes awarded and work completed in March 2017. ESP:R&M of all passes (total 8 for 2x500 MW units) completed.
33	NTPC	Rihand STPS Ph-III	2	1989	500	
34	NTPC	Kahalgaon	1	1992	210	9 schemes out of 10 are awarded. Balance one Scheme is under review. Work completed in 06 schemes in full and 01 scheme in part. DDCMIS: DDCMIS job completed in unit-2 and Unit-4 on 24.02.2016, 11.04.2016 respectively. DDCMIS for unit -3 is completed in 2016-17.
35	NTPC	Kahalgaon	2	1994	210	
36	NTPC	Kahalgaon	3	1995	210	
37	NTPC	Kahalgaon	4	1996	210	
Sub total C.S. (R&M)			37		12890	
Sub total C.S. Coal Based (LE + R&M)			54		16350	

CENTRAL SECTOR R&M (Gas Based)

1	NEEPCO	Kathalguri CCGT	GT-1	1995	33.50	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 Governer already placed with the OEM, M/s MHI, Japan on 26.03.2015. Work completed on 15-02-2017. (b) The new vibration monitoring system procured against unit-1 had to be installed in unit-4 due to available s/d and requirement of the unit. The process for tender for procurement of another new vibration monitoring system is under progress and expected to be completed during 2017-18. (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 2019-20.
2		Kathalguri CCGT	GT-2	1995	33.50	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 materials already received and commissioned on 31.07.2017. (b) The process of tender procurement of new vibration monitoring system is under progress and expected to be completed on or before 31.07.2017. (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 unit is planned in 2018-19.
3		Kathalguri CCGT	GT-3	1995	33.50	GTG -3 completed on 31.03.2014 as per schedule. 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 28.05.2013 and the rotor after CRR/CRI in Japan alresdy reached the Plant site. The above works is planned in July2017. The order for procurement of new vibration monitoring system is already placed and expected to be commissioned in July 2017 along with major overhauling of Gas Turbine.
4		Kathalguri CCGT	GT-4	1995	33.50	GTG -4 completed on 31.03.2014 as per schedule. 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 28.05.2013 and work in this unit started from 22.06.2015 and completed on 25.07.2015. New rotor utilized in this unit.
5		Kathalguri CCGT	GT-5	1996	33.50	GTG- 5 completed on 31.03.2014 as per schedule.
6		Kathalguri CCGT	GT-6	1996	33.50	GT#6: Planned for the FY 2017-18. (Offer from the OEM, M/s BHEL obtained and it is under process)
7		Kathalguri CCGT	ST-1	1998	30.00	Upgradation of Programmer/ EPROM writer has already completed and tender for upgradation of AVR already floated and expected to be commissioned in 2017-18. For others, offers are yet to be obtain from the OEM.
8		Kathalguri CCGT	ST-2	1998	30.00	Offer to be obtained from OEM in due course of time.
Sub Total Gas (R&M)			8		261	
	Sub total Gas in C.S. (LE +R& M)		23		2046.8	
	Total R&M + LE		135		29367	

Details of Thermal Power Units where the 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
1.	Bathinda	3	110	PSPCL	State Sector	05.08.2012
2.	Kawas	GT-1A	106	NTPC	Central Sector	21.01.2013
3.	Parichha	2	110	UPRVUNL	State Sector	05.05.2013
4.	Muzafarpur	1	110	KBUNL	Joint venture of BSPGCL & NTPC	05.07.2013
5.	Kawas	GT-1B	106	NTPC	Central Sector	28.08. 2013
6.	Gandhar	GT – 3	131	NTPC	Central Sector	29.09. 2013
7.	Kawas	GT-2B	106	NTPC	Central Sector	05.03.2014
8.	Bathinda	4	110	PSPCL	State Sector	10.07. 2014
9.	Muzafarpur	2	110	KBUNL	Joint venture of BSPGCL & NTPC	30.09.2014
10.	Auraiya	GT-1	111.19	NTPC	Central Sector	22.06. 2014
11.	Gandhar	GT-1	131	NTPC	Central Sector	06.07.2014
12.	Kawas	GT-2A	106	NTPC	Central Sector	22.08.2014
13.	Auraiya	GT-2	111.19	NTPC	Central Sector	28.10.2014
14.	Auraiya	GT-3	111.19	NTPC	Central Sector	25.12.2014
15.	Auraiya	GT-4	111.19	NTPC	Central Sector	02.03.2014
16.	Harduaganj	7	110	UPRVUNL	State Sector	01.05. 2015
17.	Bandel	5	210	WBPCL	State Sector	21.09.2015
18.	Gandhar	GT-2	131	NTPC	Central Sector	15.04.2015
19.	Obra	10	200	UPRVUNL	State Sector	08.04.2016
20.	Barauni	7	110	BSPGCL	State Sector	03.08.2016
21.	Obra	11	200	UPRVUNL	State Sector	31.12.2016

Sub -total (State)	- 10 Units	1380.00 MW
Sub-total (Central)	- 11 Units	1261.76 MW
Total (LE)	- 21 Units	2641.76 MW

Details of Thermal Power Units where the R&M Works have been Completed During 12th Plan

Sl. No.	Name of the TPS	Unit No.	Capacity MW	Utility	State/Central Sector	Date of completion of R&M works
1.	DPL	6	110	WBPDC	State Sector	07.05.2012
2.	Patratu	10	110	JSEB	State Sector	24.05.2012
3.	Anpara 'A	1	210	UPRVUNL	State Sector	21.03.2013
4.	Anpara 'A	2	210	UPRVUNL	State Sector	21.03.2013
5.	Anpara 'A	3	210	UPRVUNL	State Sector	21.03.2013
6.	Tanda	2	110	NTPC	Central Sector	15.09.2012
7.	Kathalguri	GT-3	33.5	NTPC	Central Sector	31.03.2014
8.	Kathalguri	GT-4	33.5	NTPC	Central Sector	31.03.2014
9.	Kathalguri	GT-5	33.5	NTPC	Central Sector	31.03.2014
10.	Simhadri	1	500	NTPC	Central	31.03.2016
11.	Simhadri	2	500	NTPC	Central	31.03.2016
12.	Ramagundam	4	500	NTPC	Central	March, 2017
13.	Ramagundam	5	500	NTPC	Central	March, 2017
14.	Ramagundam	6	500	NTPC	Central	March, 2017
15.	Rihand STPS	1	500	NTPC	Central	March, 2017
16.	Rihand STPS	2	500	NTPC	Central	March, 2017

Sub -total (State)	- 5 Units	850.00	MW
Sub-total (Central)	- 11 Units	3710.50	MW
Total (R&M)	- 16 Units	4560.50	MW