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केंद्रीय विद्युत प्राधिकरण
Central Electricity Authority

ताप विद्युत परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग
Thermal Projects Renovation & Modernisation Division



Energy Efficiency R&M Works at Unit-5 (210 MW) of Bandel TPS of WBPDC

Quarterly Review Report Renovation & Modernisation of Thermal Power Stations

Quarter : July-September, 2015

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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 up-gradation 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 27 units with aggregate capacity of 3192.26 MW have been completed during 12th Plan upto 30-09-2015. During the quarter July-September 2015, the LE works at unit-5 (210 MW) of Bandel TPS of WBPDCCL have been completed and the unit has been synchronized on 21.09.2015. The unit-5 of Bandel TPS is the Pilot Project under Coal Fired Generation Rehabilitation Project funded by World Bank to demonstrate the benefits of Energy Efficiency R&M. At present, 7 coal based generating units with aggregate capacity of 1040 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 report on “*Reduction of Barriers to R&M Interventions in TPS in India*” and that on “*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 project. The reports are also available on CEA web-site. Further to facilitate the implementation of progress standard tender documents for R&M of fossil fuel based power plants in India have been prepared under Indo-German Energy Forum (IGEF). The final tender documents are under examination in CEA.

Also, under the Indo-Japan Co-operation, energy efficiency related studies have been carried out at some generating units of the utilities. Under Clean Coal Technology (CCT) Programme, four study tours have been organized in which 52 participants from MOP, CEA and power utilities have participated. During the quarter, the draft of the 3rd Phase MoU has been finalised and is under approval of MoP. A kick-off meeting with the JCOAL team and NTPC Dadri was held on 10.09.2015 for carrying out RLA/Diagnostic Study at Dadri TPS.

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 by providing the data/ information 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 : 29.10.2015

(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)	33 (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 30.09.2015)

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	7(870)	11(1261.76)	18(2131.76)
2	R&M	5(850)	4(210.5)	9(1060.5)
	Total	12(1720)	15(1472.26)	27(3192.26)

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. has been 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 final Model Documents and Phase-II Activity Report have been submitted by Lahmeyer under the consultancy. The Documents are under examination in CEA.

(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:

- 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**
M/s KPMG have been appointed to carry out the study on 16-07-2012. KPMG has already submitted report on Customer Expectation Survey which has been accepted by CEA. The draft report on Capacity Strengthening Plan of CEA was submitted on 16.05.2014 which is under finalisation. The Technical Training Programme for CEA officers has been conducted by KPMG from 13.10.2014 to 17.11.2014. KPMG have submitted the revised Plan on 10.06.2015 which under finalisation
- d) **Review of Experience from Pilot R&M Interventions in TPS in India:**
M/s WAPCOS Ltd. has been appointed as a consultant w.e.f. 23-07-2012. They have submitted the revised draft report on Procurement Experience on 03.12.2013. The revised draft reports from WAPCOS on Strengthening of O&M Practices as well as on the Review of Implementation Experience and on Review of Post R&M Experience in O&M from Pilot R&M intervention in thermal power stations in India are under preparation by WAPCOS.

(C) Japan-India Co-operation for Pre-Primary Study of Efficiency and Environmental Improvement of Coal Fired Stations.

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 at various thermal power plant viz Durgapur TPS of DVC, Unchahar & Badarpur TPS on NTPC. Final report for energy efficiency oriented R&M activities was submitted on 15th April, 2013. Under the MoU, three workshops have also been organized. Under Clean Coal Technology (CCT) Transfer Programme four study tours have been organized and total 52 Officers have participated in the study tours.. The draft of 3rd Phase MoU has been finalised and sent to MoP for approval which is still awaited. A kick-off meeting with the JCOAL team and NTPC Dadri was held on 10.09.2015 for carrying out RLA/Diagnostic Study at Dadri TPS.

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 30.09.2015 was 278733.62 MW of which thermal power plants contributed 194199.56 MW (69.67 %). The contribution of Coal, Gas and Diesel based thermal power plants of total installed capacity is 60.7 %, 8.61 % and 0.36 % 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 30.09.2015

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)	0(0)	2(320)	1(131)	3(451)
Total No. of units (MW)	7 (870)	11 (1261.76)	5 (850)	4 (210.5)	12 (1720)	15 (1472.26)	27 (3192.26)
	18(2131.76)		9(1060.50)		27(3192.26)		

5.1 Details Achievements of LE and R&M Programme during 12th Plan upto 30.09.2015

		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			
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)	663.5			
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		Harduagan	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		-	-	-	-	-	-
		-	-	-	-	-	-
Sub Total			3 (units)	451			
Total LE	18 (2131.76)	State	07 (units)	870			
		Centre	11 (units)	1261.76			
Total R&M	09 (1060.50)	State	05 (units)	850			
		Centre	04 (units)	210.5			
Grand Total			27 (units)	3192.26			

Details of thermal power units where the R&M/ LE Works have been Completed During 12th Plan up to 30.09.2015 are given at **Annexure 2& 3**.

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

The following 7 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.	10	200
3.	Obra TPS	UPRVUNL	U.P.	11	200
4.	Obra TPS	UPRVUNL	U.P.	7	100
5.	Barauni TPS	BSPGCL	Bihar	6	110
6.	Barauni TPS	BSPGCL	Bihar	7	110
7.	Koradi TPS	MSPGCL	Maharashtra	4	210
Total					1040

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 30th September 2015 :

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 30.09.2015
Barauni TPS	7	15.11.2009	15.11.20011	December, 2015	EDTA completed on 15.10.2015. Turbine on barring gear, completion expected by 10.10.2015. completion of PA Fans, Mill & Coal feeder Trial run expected by 20.10.2015. Completion of CHP, Coal Bunker and AHP are expected by 31.10.2015. As per BHEL and BSPGCL synchronization on coal is expected on 30.11.2015. Target date for full load & COD is 15.12.2015.
	6	15.11. 2009	15.06.2012	March, 2016	BHEL has informed that Anticipated completion of Unit- 6 is expected by March, 2016 subject to following: • Finalisation of repair order for generator • Arrangement of bearing #2
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 final R&M model documents and final Phase-II Activity Report submitted by Lahmeyer on 29.09.2014 are under examination in CEA.

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, Bandel TPS will also get 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.

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). Original completion date for R&M works was May, 2014 which was then revised to Sept, 2014.

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.

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

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.

M/s Evonik Energy Services (Project design consultant) prepared the DPR. The same was approved and accepted by Mahagenco Board on June 26, 2009. In-principle approval of MERC for capital expenditure was received on May 24, 2010. The R&M project consists of four major packages BTG, Electrical, CHP & other BOP.

Status of Physical Progress

Drawing approval, Vendor approvals, Quality Plan approvals, BBU approvals activities are in process. Actual execution of project is scheduled from 25th Aug2015 to 21st April 2016.

- i) **BTG Package:** Mahagenco issued that the Letter of Award to BHEL Ltd. on 31st May, 2013. The contract was signed on 18th December, 2013. BHEL opened the site office on January 22, 2014 and submitted PERT to MSPGCL on January 24, 2014. The date of completion of the contract is Aug, 2016. The supply of material has been started. Execution of R&M works is scheduled from 25th August 2015. BHEL have commenced dismantling ESP on 20.07.2015. Dismantling of Bag Filters of one path has been completed. Foundation work for new control room has been completed & Construction of ESP control room is under progress, Finalization of civil contractor as well as soil investigation for ESP and ID fan has been completed.
- ii) **Electrical Package:** Mahagenco issued the Letter of Award to M/s ABB Ltd on 19th March, 2012 and the final contract was signed on 25th 2012. The date of completion of the contract is

Aug, 2016. M/s ABB is demanding increase in contract, for which approval of Board is under consideration.

- iii) **BoP Package:** Mahagenco issued the Letter of Award to M/s Tecpro Systems Ltd. on 16th July, 2012. The final contract was signed on 10th August, 2012. The date of completion of the contract is Aug, 2016. However, due to non execution of the works the contract with Tecpro has been terminated on 16.03.2015. MSPGCL has now floated separate tenders for AHP, Cooling Tower, DM Plant and Fire Fighting System.
- vi) **CHP Package:** Mahagenco intimated that due to closing of units 4 x 120 MW, cancellation of CHP package has been approved by Mahagenco's Board. Accordingly, this package has been dropped from R&M works.

Various mile stones for R&M work at unit-6, Koradi TPS are as under:

i)	Boiler Hydro Test	:	06.01.2016
ii)	Boiler Light up	:	28.03.2016
iii)	TG barring gear	:	12.02.2016
iv)	Steam Blowing	:	12.04.2016 to 18.04.2016
v)	Trial Run & Readiness of Mills	:	22.01.2016 to 27.01.2016
vi)	Synchronization of the unit	:	21.04.2016

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 and a DPR was prepared. A loan of 448.36 Crores was assigned under R&M of Unit 3&4, PTPS, Panipat under the pilot project of Gol. 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. Accordingly, Deptt. Of Economic Affairs, Gol was intimated to foreclose world bank loan for R&M of unit 3& 4 PTPS. Therefore, HPGCL has requested World Bank to consider 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. In addition the project also has a Technical Assistance Component. 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.

Under the sub-component "Addressing Barriers to Energy Efficient R&M projects" of Technical Assistance Component, a financial assistance of USD \$ 1.1 million has been provided to CEA to implement the project on "Technical Assistance to CEA for Addressing the Barriers to EE R&M of Coal Fired Generating Units in India". The consultants appointed for the above project are namely, ABPS Infrastructure Advisory Pvt. Ltd., KPMG Advisory Services Pvt. Ltd., Mercados Energy Market India and WAPCOS Ltd.

S.N	Project	Current Status
1	Implementation Support Consultancy (ISC)	CEA has appointed ABPS Infrastructure Advisory Private Limited as Implementation Support Consultant (ISC) on October 28, 2010. ABPS assisted CEA in appointment of consultants and signing of contracts. The consultant is assisting in analysing & providing comments on the outputs of other consultants under the project. ABPS has also assisted in conducting the in-house technical & management training organised by KPMG during Oct 2014 to Feb 2015.
2	Review of Institutional Capacity and Implementation of Capacity Strengthening Interventions at CEA	M/s KPMG have 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 which have been accepted by CEA. The draft report on Capacity Strengthening Plan of CEA was submitted on 16.05.2014 which is under finalisation. The Technical and Management Training Programme for CEA officers was conducted by KPMG from 13.10.2014 to 17.11.2014 and 19.01.2015 to 06.02.2015 respectively. The revised draft of Capacity Strengthening Plan was received by CEA on 10.06.2015 & the consolidated comments of Wing Nodal Officers on the Plan have been sent to KPMG on 14th August 2015. Based on the comment the revised plan is under preparation by 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 stake holders in the power sector. The consultancy has been completed.
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 has been completed.
5	Review of experience from Pilot R&M interventions in thermal power stations in India	WAPCOS have submitted the revised draft report on Procurement Experience on 03.12.2013. The consultant had submitted the revised draft report on Procurement Experience on 03.12.2013. The revised draft reports on Strengthening of O&M Practices and Implementation Experience have also been received in February, 2015. Reports were examined by CEA & the comments on the same have been submitted on 01.05.2015. The draft report on Review of Post R&M Experience in O&M from Pilot R&M intervention in thermal power stations in India is awaited. The formats for getting information from utilities were prepared by WAPCOS and have been sent to NTPC and other utilities for collecting data/information. WAPCOS is currently visiting these utilities/power plants in relation to the project.

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.

Four workshops have been held on “Project on Efficiency and Environmental Improvement of Coal Fired Power Stations – Towards sustainable, stable and low carbon supply of electricity”. Meeting of Electricity Working Group of the Japan India Energy Dialogue was held on 23.8.2013 which was co-ordinated by TRM Division.

Under Clean Coal Technology (CCT) Transfer Programme four study tours have been organized and 52 Officers from MoP, CEA and Power utilities have participated in the study tours.

A draft 3rd Phase MoU was received from JCOAL in January, 2015 and sent to power Utilities for comments. The draft MOU has been finalised and sent to MoP for further necessary action.

A meeting on 11.8.2015 was held in CEA to discuss the cooperation on Study on adoption of available technologies to meet new environment standards and the economic viability under CEA-JCOAL corporation. Annual joint meeting under Memorandum of Understanding on Japan - India Cooperation for the Project on Efficiency and Environmental Improvement of Coal fired Power Stations was held on 25.08.2015 as well as Meeting of Electricity Working Group of the India-Japan was held on 25.08.2015.

A kick-off meeting with the JCOAL team and NTPC Dadri was held on 10.09.2015 at NTPC, Dadri for carrying out Diagnostic Study (RLA/CA) at Dadri TPS.

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**Status of units where Life Extension/ Renovation & Modernisation works have been taken up
for implementation during 12th Plan
STATE SECTOR (LE Works)**

S.N.	State	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Present status
1	U.P.	Obra	10	1977	200	BHEL is executing agency. Contract signed on 02.02.2007. Unit # 10 & 11 taken under S/d since 22.03.2012. The revised scope of supply and services for turbine for name plate rating i.e. 200 MW in place of 216 MW has been finalised at revised total contract price for unit 10 to 13 at 1145.76 Crore. The revised zero date is 25.3.2013. The completion of first unit in 24 months and subsequent units shall be completed with a time interval of 3 month each. Date of commissioning given by M/s. BHEL is 29.01.2016. U#10 : unit under s/d since 22.03.2012. Boiler: Hydro Test completed. Approximately 87 % of Boiler works completed. Turbine: Turbine rotor received from BHEL. 84% work completed. Generator: 92% work completed. ESP: Pass A - 95% work completed. Pass B - 97% work completed. Compressor building House: 82% work completed. AHP: 42% work completed. Switch yard: 100% work completed. WTP: 997% work completed. CHP: 52% work completed. Balance Coal Handling work not started by BHEL.
2	U.P.	Obra	11	1977	200	Date of commissioning given by M/s. BHEL is March, 2016. U#11: unit under s/d since 13.07.2011. Boiler: 62% work completed. Turbine: 57% work completed. Generator: 12% work completed. Generator will be ready by Jan., 2016. Replacement of ceiling girder completed. ESP: Civil Works - 97% work completed. Mech. Works - 27% work completed Compressor building House: E&M Works - 0% (under progress) AHP: 22% work completed. Switch yard: 0% work completed. WTP: 97% work completed. CHP: 52% work completed.

3	U.P.	Obra	12	1981	200	Date of commissioning given by M/s. BHEL is June., 2016 U# 12 Unit -12 will be taken up after completion of unit- 10.
4	U.P.	Obra	13	1982	200	Date of commissioning given by M/s. BHEL is September , 2016 Unit -13 will be taken up after completion of unit- 11.
5	U.P.	Harduaganj	7	1978	110	Unit was under shut down on 05-03-201. Unit has been synchronized on 01.05.2015 on coal.
6	U.P.	Parichha	1	1984	110	LE work in unit-1 dropped.
7	U.P.	Parichha	2	1985	110	Unit was synchronised on 5.5.2013.
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 synchronised on coal on 10.07.2014.
10	Haryana	Panipat	3	1985	110	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.
11	Haryana	Panipat	4	1985	110	
12	Maharashtra	Nashik	3	1979	210	The unit-3 was to be taken up under KfW funded project. All studies completed and DPR has been accepted. Tender document have been prepared but the project would be processed further after the R&M works at unit-4 of Nasik TPS.
13	Maharashtra	Nashik	4	1980	210	To be decided inline with Nashik U#3. Consultant for DPR preparation has been appointed. All studies Completed, Draft Feasibility Study Report received & forwarded to KfW for submitting it to the German government in order to get the approval for the funds earmarked for Unit 3 now for Unit-4.
14	Maharashtra	Koradi	5	1978	200	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. DPR approved by MSPGCL/MERC. The project is now in the implementation stage. - The unit is under forced shut down since 20.07.2015. - Actual execution of project is scheduled from 25th Aug2015 to 21st April 2016. - Approval of MDL, QAP, Drawings/ Documents, Engineering/ Re- engineering works of BTG

						contractors have been completed. - BTG material supply commenced from March, 2015. Turbine material supplied. HP,IP turbine will be supplied soon from BHEL Haridwar. Civil works for construction of new ESP control room is in progress.
16	Maharashtra	Bhusawal	2	1979	210	All studies Completed. Draft DPR prepared from M/s. Energo Engg. Ltd. It is under review at Power Station/ MSPGCL Level.
17	Maharashtra	Bhusawal	3	1982	210	RLA/ Feasibility study for EER&M is not carried out.
18	Maharashtra	Chandrapur	1	1983	210	All studies Completed. Draft DPR prepared from M/s. Energo Engg. Ltd. It is under review at Power Station/ MSPGCL Level.
19	Maharashtra	Chandrapur	2	1984	210	
20	Maharashtra	Parli	3	1980	210	All studies Completed. Draft DPR prepared from M/s. Energo Engg. Ltd. It is under review at Power Station/ MSPGCL Level.
21	Chhattisgarh	Korba (West)	1	1983	210	RLA studies done by M/s Evonik. Scope of work of Boiler, Turbine, Electrical Instrumentation, Civil and BOP is being finalised. After that DPR will be updated and submitted to Board of Directors of CSPGCL and State Regulatory Commission of approval.
22	Chhattisgarh	Korba (West)	2	1984	210	
23	M.P.	Satpura	6	1979	200	These units may be considered to be retired in the span of 3 to 4 years accordingly a proposal for the same has been submitted to BoD of MPPGCL for retirement of unit nos. 6 to 9 of Satpura TPS Sarni. The BoD of MPPGCL has decided that the proposal for comprehensive R&M through PPP mode be dropped and special allowance in tariff as per provision 18.5 of MPERC's Regulation may be awaited..
24	M.P.	Satpura	7	1979	210	
25	Tamilnadu	Tuticorin	1	1979	210	<u>Unit-1:</u> <u>Boiler:</u> • Steam Drum Acid cleaning completed. • Administrative approval accorded to Third RLA Study boiler on 22.09.2015 • Monitoring of Final Super Heater Header done. Tests conducted and found normal while Re inspection done by M/s. CPRI. • Administrative approval accorded to Complete replacement of Economizer coil assembly, <u>ESP:</u> • Replacement of complete ESP internals for the first two rows & overhauling of remaining 12 fields and replacement of 20 Nos Controllers have been completed. <u>TG:</u> • Minor repair works such as attending cracks in HP, IP & LP casings completed. • All Diaphragms in HP,IP & LP had been renewed and the work has been completed. <u>BoP:</u> • Modification of APH sealing system by Double Sealing work completed. <u>Electrical & Instrumentation:</u>
26	Tamilnadu	Tuticorin	2	1980	210	

						- Existing 3 nos single phase GT have been replaced with new one. - Approval under process for DDCMIS Unit-2: Boiler: - Replacement of Reheater Rear pendent Assembly work completed. - Replacement of Z panel tubes work completed. - Boiler structure strengthening work completed. - Checking of Hangers/Supports under Hot/Cold condition completed. - Boiler Structure painting Works completed. TG: - Minor defects noticed in turbine casing, Lines & Steam pipe liner have been attended. - All 11 nos Diaphragms in HP turbine, 8 nos Diaphragms in IP turbine & 2 nos Diaphragms in LP turbine had been renewed. - All the three rotors have been replaced with the reconditioned spare rotors. BoP: - Refurbishment of complete Bottom Ash system work completed. - Modernisation of DCS work completed. - Replacement of existing static AVR by DVR work completed.
27	A.P.	Dr. N.T. TPS (Vijaywada)	1	1979	210	APGENCO have taken up 78 activities under RLA/LE programme for Dr NTTSPS units-1&2. Most of the activities have been completed except few items for unit-2, which will be taken up during the Capital Overhaul of unit-2 .
28	A.P.	Dr. N.T. TPS (Vijaywada)	2	1980	210	
29	Karnataka	Raichur	1	1985	210	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 KPCL:
30	Karnataka	Raichur	2	1986	210	
31	Bihar	Barauni	6	1983	110	Other works: - Boiler C&I works completed. - Station C&I works completed. BHEL has informed that Anticipated completion of Unit- 6 is expected by March, 2016 subject to following: - Finalisation of repair order for generator - Arrangement of bearing #2
32	Bihar	Barauni	7	1985	110	EDTA completed on 15.10.2015. Turbine on barring gear, completion expected by

						10.10.2015. completion of PA Fans, Mill & Coal feeder Trial Run expected by 20.10.2015. Completion of CHP, Coal Bunker and AHP are expected by 31.10.2015. As per BHEL and BSPGCL synchronization on coal is expected on 30.11.2015. Target date for full load & COD is 15.12.2015.
33	Bihar	Muzaffarpur	1	1985	110	Unit was under s/d since 6.10.2003. Unit Synchronised on 5 th July, 2013.
34	Bihar	Muzaffarpur	2	1986	110	S/d taken on 29.03.2012. Unit Synchronised on 30 th September, 2014.
35	W.Bengal	Kolaghat	1	1990	210	DPR has been prepared and accepted.
36	W.Bengal	Kolaghat	2	1985	210	DPR has been prepared and accepted.
37	W.Bengal	Kolaghat	3	1984	210	DPR has been prepared and accepted.
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 under shut down for LE works on 24.11.2013. Unit synchronized on 21.09.2015 on Coal.
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)	Present status
1	U.P.	Obra	7	1974	100	- Work is being executed by M/S BHEL. - Zero date of the scheme is 04.12.2009. Unit was scheduled on 23 months from zero date i.e Nov 2011. Dismanting work is completed. Erection is under process. - Unit 7 is expected to be synchronized by March, 2016. Synchronisation is delaying due to installation of MAX DNA system by IL Kota and non-availability of Coal Mill Liner. - Boiler pressure parts 90 %, structure work 95% and Turbine erection work is 50% completed.
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 M/s BHEL & M/s MITSUI & Toshiba/OEM, Japan. — Total cost of scheme is Rs. 691.97 cr. Total Rs. 298.95 crs drawn so far. Boiler: Nearly 60% work completed. TG: Nearly 65% work completed. Electrical & Instrumentation: Nearly 45% work completed. BOP: Nearly 60% work completed. - Work is scheduled to be completed by March., 2017.
6	U.P.	Anpara'B	5	1994	500	
7	Punjab	Ropar	1	1984	210	Utility decided to do need based R&M at estimated expenditure of Rs. 55 Cr. Retrofitting of 125 Nos. and 34 nos. ACB's has been completed. Replacement of 6six Nos. Boiler Feed Booster Pump with efficient pumps. Replacement of OLD & obsolete HP Heaters & APH.
8	Punjab	Ropar	2	1985	210	
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-I.
10	Punjab	Ropar	6	2001	210	
11	Haryana	Panipat	5	1993	210	RLA studies done. Scope of work finalised.
12	Gujarat	Wanakbori	1	1982	210	Utility decided to do need based R&M. Works for upgrading of C&I system has already been awarded. Unit -1 C&I up gradation supply and work is pending. Likely to be completed by March, 2016. ESP: Tender cancelled due to new norms. Retendering to be done by Dec., 2015. Turbine Works: Tender preparation for

					consultancy works is under process. GSECL proposed to issue final order for turbine in March/ April,2017after observing first unit of Ukai TPS.
13	Gujarat	Wanakbori	2	1983	210 Utility decided to do need based R&M. Works for upgrading of C&I system has already been awarded. Unit -2 C&I up gradation started on 11.06.2012 & work is carried out during AOH. C&I of unit 1-6 carried out from Oct., 2012 to June, 2013. Turbine Works: Tender preparation for consultancy works is under process. GSECL proposed to issue final order for turbine in March/ April,2017after observing first unit of Ukai TPS.
14	Gujarat	Ukai	3	1979	200 a) Utility decided to do need based R&M. b) Order for Rehabilitation/ Retrofitting of ESP placed on NASL on 28.07.2014 and contract signed on 25.08.2014. Zero date started for the from the placement of order i.e. 28.07.2014 95% Engineering works completed.The order value of supply Rs. 37.75 crs and works portion is Rs. 9.0092 crs (Inclusive taxes & duties) Turbine Works: Tender preparation for consultancy works 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 on BHEL Order issued on 18.06.2015. Schedule date of completion is July,2017 Ash Slurry Pump House: DPR submitted by consultant.
15	Gujarat	Ukai	4	1979	200 GSECL is preparing for R&M implementation of LMZ design turbine by high energy efficient turbines. Order for Retrofitting of HP, IP & LP placed on NASL on 29.04.2015 and the works will be carried out after completion of unit-3. 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 95% Engineering works 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: Contract agreement signed on 25.05.2015. Engineering works started from 1 st week of June,2015. Schedule date of completion is July,2017. Boiler Back Pass Modification: M/s. BHEL submitte the the offer and has proposed 1% efficiency improvement on existing parameters. C&I Up gradation: Order placed on BHEL Order issued on 18.06.2015.

						Schedule date of completion is July,2017 Ash Slurry Pump House: DPR submitted by consultant.
16	Rajasthan	Kota	1	1983	110	RRVUNL has identified 17 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. 102.57 Crores. The present status of these R&M works is as below- - 08 nos. of works fully Completed - 06 nos. of works order placed to the execution agency and work under progress - 01 nos. works of Vacuum Pump- LOI placed on 03.10.2015 - 01 no. of work of compressor replacement- Technical Bid opened on 05.08.2015 and is under evaluation. - 01 no. E- tender for VFD cancelled and fresh tendering in progress.
17	Rajasthan	Kota	2	1983	110	
18	Jharkhand	Patratu	9	1984	110	Unit was under s/d from 5.8.2006 due to fire incident. – HP , IP boxed –up and LP ready for box-up for generator rotor and bearings of exciter and generator are awaited.. - 1 not nos BFP & 2 nos CEP is ready. - Boller is ready for hydro test waiting clearance for power supply & TG on Barring gear. - Mechanical & Electrical erection work of ESP is completed, comg U/P. - Panels are erected and ready for charging. - HT & LT panel- Erection completed, commissioning is pending due to unavailability of power supply. - HT mills & CEP & Balance LT motor- Overhauling completed, erection pending due to erection clearance by JSEB. - GT,UAT,ST overhauling- Overhauling and testing completed. Station TRX charging U/P. - HT cable laying- Completed. - LT/ Control cable laying-85% completed. - GRP & UCP Erection and testing completed. - Ash Handling System Supply 99% completed . Civil and E&C is U/P. - Patratu TPS has been taken over by NTPC
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)	Present 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
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 present financial condition of DVC, commitment could not be assured to JCOAL.
5	NTPC	Badarpur	4	1978	210	a. Main plant package (Stage II, 2x210MW)- under process of tendering b. CW System- Under review.
6	NTPC	Badarpur	5	1981	210	
7	NTPC	Singrauli STPS	1	1986	200	a) CW duct scheme - under execution. b) Main Plant- Following 4 CC packages have been awarded. 1. GT, UAT & ST 2. C&I of main plant BOP 3. Switchyard Automation 4. RLA of critical piping
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	Out of revised 47 nos. packages PO/LOI placed for 36 nos. Balance 11 nos. are under various stages of tendering. 03 No. PO/LOI placed in Q2
13	NTPC	Korba STPS	2	1983	200	
14	NTPC	Korba STPS	3	1984	200	
15	NTPC	Ramagundam STPS	1	1984	200	Total Packages CC Regional Site
16	NTPC	Ramagundam STPS	2	1984	200	36 2 9 25 (34 PRs)
17	NTPC	Ramagundam STPS	3	1984	200	PO placed in Q2 0 0 0
Sub total C. S (LE Coal based)			17		3460	Total PO placed 1 5 32

Central Sector LE (Gas based)

S.N.	State	Name of Station	Unit No	Year of Comm.	Cap. (MW)	Present status
1		Dadri GT	GT-1	1991	131	Pkg. awarded on 30.09.2015 in (Q2)
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. LE works of GT 2 completed on 28.10.2014. LE works of GT3 & ST2 (Only C&I in ST) completed 10.11.2014. LE work of GT4 completed 02.03.2015.
6		Auraiya GT	GT-2	1989	111.19	
7		Auraiya GT	GT-3	1989	111.19	
8		Auraiya GT	GT-4	1989	111.19	
9		Kawas GT	GT-1A	1992	106	LE works of GT # 1A completed on 21.01.2013, LE works of GT# 1B completed on 28.08.2013, LE works of ST#1C (only C & I in ST) and of GT # 2B completed on 05.03.2014. LE works of GT # 2 A & ST # 2C (only C&I in ST) completed on 22.08.2014.
10		Kawas GT	GT-1B	1992	106	
11		Kawas GT	GT-2A	1992	106	
12		Kawas GT	GT-2B	1992	106	
13		Gandhar GT	GT-1	1994	131	LE work of GT # 3 completed on 29.09.2013. LE works of GT# 1 completed on 06.07.2014. LE works of GT # 2 completed on 15.04.2015
14		Gandhar GT	GT-2	1994	131	
15		Gandhar GT	GT-3	1994	131	

Sub Total (LE Gas based)	15		1785.8
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R&M Programme Central Sector

Sl. No.	Utility	Name of Station	Unit No.	Year of Comm.	Cap. (MW)	Present status
1	NTPC	Singrauli STPS	6	1986	500	12 Schemes out of 17 are awarded. 06 schemes merged with DDCMIS packages which has been awarded on 25.06.12. One part scheme in re-awarded in Q2. Balance Schemes under tendering process.
2	NTPC	Singrauli STPS	7	1987	500	
3	NTPC	Korba STPS	4	1987	500	8 out of 9 Schemes are awarded. Balance one scheme is under tendering process.
4	NTPC	Korba STPS	5	1988	500	
5	NTPC	Korba STPS	6	1988	500	
6	NTPC	Ramagundam STPS	4	1988	500	All schemes awarded.
7	NTPC	Ramagundam STPS	5	1989	500	
8	NTPC	Ramagundam STPS	6	1989	500	
9	NTPC	Farakka Stage-I	4	1992	500	All schemes awarded
10	NTPC	Farakka Stage-II	5	1994	500	
11	NTPC	Tanda	2	1989	110	Synchronised on 15.09 2012
12	NTPC	Unchahar	1	1988	210	13 out of 14 Schemes are awarded. Balance 01 Scheme is under tendering process.
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 24 Schemes are awarded. Balance 4 Schemes are under tendering process.
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.
25	NTPC	Simhadri	2	2002	500	
26	NTPC	Talchar STPS	1	1995	500	20 out of 21 Schemes are awarded. Balance 01 scheme being re-awarded.
27	NTPC	Talchar STPS	2	1996	500	
28	NTPC	Dadri	1	1991	210	18 out of 19 Schemes are awarded. Balance one Scheme is under tendering process.
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
33	NTPC	Rihand STPS Ph III	2	1989	500	
34	NTPC	Kahalgaoon	1	1992	210	8+01 (part) Schemes out of 10 are awarded. 1 scheme awarded in Q2. Balance Schemes under tendering process.
35	NTPC	Kahalgaoon	2	1994	210	
36	NTPC	Kahalgaoon	3	1995	210	
37	NTPC	Kahalgaoon	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	The scope of work finalised. The proposals are in advance stage of approval for ₹ 102.25 Cr., completion is expected by March, 2015. 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 and expected to be commissioned in 2016-17. (b) The process for procurement of new vibration monitoring system through limited tendering is in progress and expected to be completed on or before 31.03.2016
2		Kathalguri CCGT	GT-2	1995	33.50	GT#2 : (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 and expected to be commissioned in 2016-17. (b) The process for procurement of new vibration monitoring system through limited tendering is in progress and expected to be completed on or before 31.03.2016
3		Kathalguri CCGT	GT-3	1995	33.50	GTG -3 completed on 31.03.2014 as per schedule.
4		Kathalguri CCGT	GT-4	1995	33.50	GTG -4 completed on 31.03.2014 as per schedule.
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 yet to be receive.
7		Kathalguri CCGT	ST-1	1998	30.00	
8		Kathalguri CCGT	ST-2	1998	30.00	
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	WBPDL	State Sector	21.09.2015
18.	Gandhar	GT-2	131	NTPC	Central Sector	15.04.2015

Sub -total (State)	- 07 Units	870 MW
Sub-total (Central)	- 11 Units	1261.76 MW
Total (LE)	- 18 Units	2131.76 MW

Annexure-3
As on 30-09-2015

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	WBPDCCL	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

Sub -total (State) - 5 Units 850 MW
Sub-total (Central) - 4 Units 210.5 MW
Total (R&M) - 9 Units 1060.50 MW