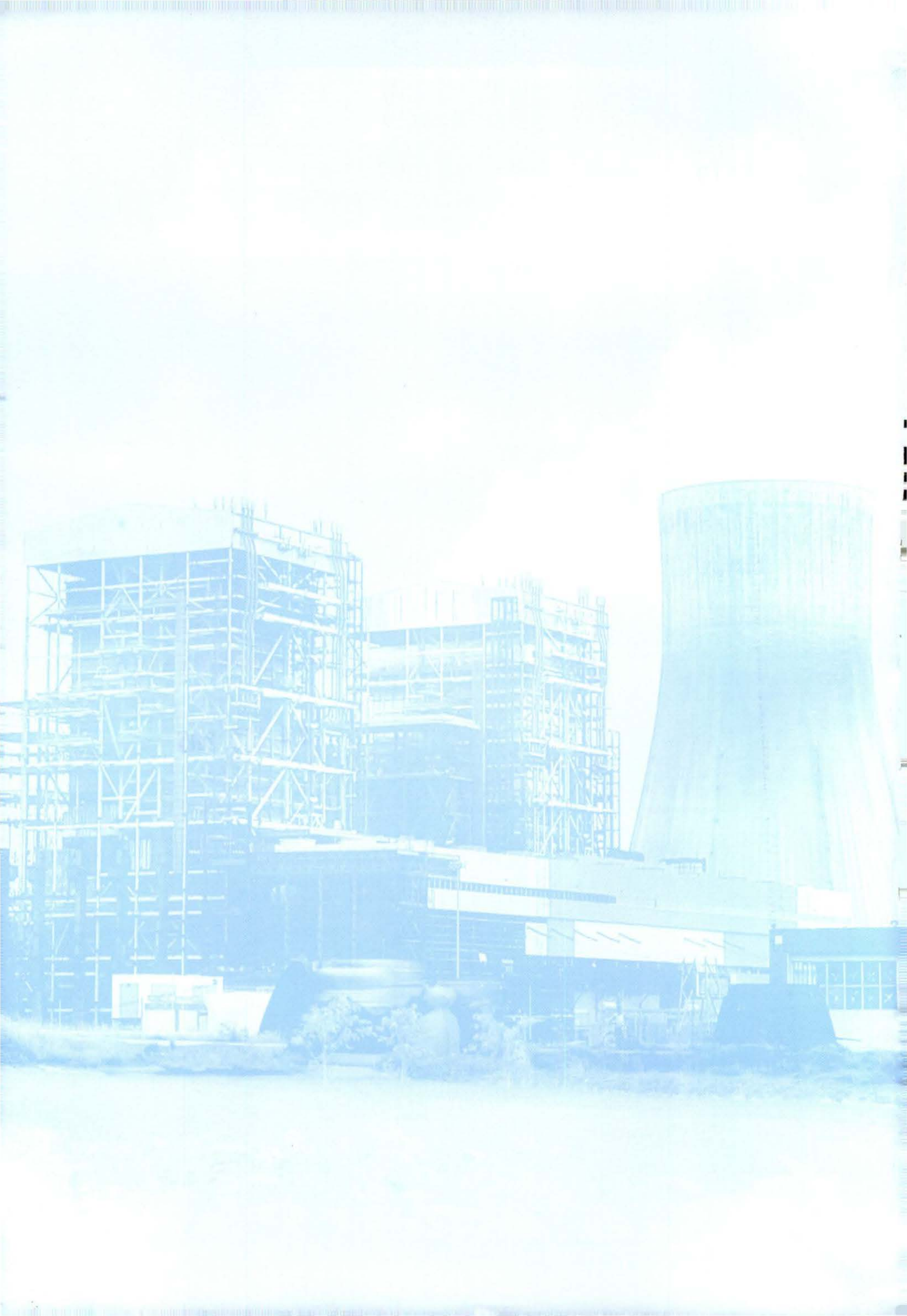
Report of the
Comptroller & Auditor General of India
on
Capacity addition in power generation during 2007-12
by
Damodar Valley Corporation

Union Government (Commercial)
Ministry of Power
No. 22 of 2015
(Performance Audit)



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Preface

Damodar Valley Corporation (Corporation) was set up in July 1948 under the Damodar Valley Corporation Act, 1948 with the objective of securing unified development of the Damodar river valley falling within the states of Bihar and West Bengal. With the formation of the state of Jharkhand in November 2000, the Central Government in exercise of the powers conferred by Section 85 of the Act, amended it by way of Gazette Notification (November 2002) to replace the state of Bihar with Jharkhand.

Apart from flood control and irrigation, the Corporation is mainly engaged in generation and distribution of power. The Corporation planned (February 2009) to add power generation capacity of 6250 MW during XI plan period through five projects of 4700 MW on its own and two projects of 1550 MW through the Joint venture route. In addition to the above, there were ongoing four units of 1000 MW, which were spill over projects of the X Plan. However, during the XI plan period the Corporation could commission only 1025 MW (one unit of 500 MW for its own project and another unit of 525 MW by Joint Venture) resulting in shortfall of 5225 MW. All the spill over projects of the X Plan were commissioned during the XI Plan Period.

In the above backdrop, performance audit was taken up to assess whether the projects and contracts were managed with due economy, efficiency, effectiveness and in compliance with established guidelines. The performance audit also attempts to assess whether the objectives set out in the capacity addition programme were achieved by the Corporation.

The Audit Report has been prepared in accordance with the Performance Audit Guidelines 2014 and Regulations on Audit and Accounts, 2007 of the Comptroller and Auditor General of India.

Audit wishes to acknowledge the co-operation received from the Corporation and Ministry of Power, Government of India at each stage of the audit process.

EXECUTIVE SUMMARY

Executive Summary

Introduction

Damodar Valley Corporation (Corporation) was set up in July 1948 under the Damodar Valley Corporation Act, 1948. The Participating Governments of the Corporation are the Central Government, Jharkhand Government and the Government of West Bengal. To meet the objectives of the National Electricity Policy i.e. to provide "Power for all by 2012", the Central Electricity Authority (CEA), Government of India (GOI) set the capacity addition target of 68,869 MW in the XI Plan of which coal based thermal power project was 46635 MW. The corporation planned to add power generation capacity of 6250 MW during XI Plan period (4700 MW by the Corporation alone and 1550 MW through Joint venture). As on 31 March 2014, it had a total power generation capacity of 5857.2 MW (Thermal 5710 MW and Hydel 147.2 MW).

During the period 2007-12 the Corporation could add only 500 MW i.e. 11 percent of the target of 4700 MW (own projects) with a shortfall of 4200 MW.

[Chapter 1]

Audit coverage

This Performance Audit covered all the activities of the Corporation from conceptualization to implementation of all the power projects for adding capacity of 4700 MW (own projects) during XI Five year plan period (2007-12). Performance of two power projects of 1000 MW (4 x 250 MW) spilled over from the X five year plan was also examined in audit.

[Para 2.1]

Audit objectives

The objectives of the Performance Audit were to assess whether:

- the projects were selected considering economic viability and overall requirement of the policy of GoI;
- the projects and contracts were managed with due economy, efficiency, effectiveness and in compliance with established guidelines;
- effective monitoring mechanism was in existence; and
- the objectives set in the capacity addition programme were achieved.

[Para 2.1]

Major audit findings

X Plan spill over projects

Audit observed that in MTPS Unit # 5 & 6, DPR was prepared without adequate investigation and deficiencies were noticed after finalisation of orders which resulted in delay.

[Para 3.1.1]

Audit observed that in CTPS Unit # 7 & 8, the execution work initially suffered for 26 months due to delay in handing over the land to the contractor, non-availability of storage space for shipment of materials at site, local law and order problems, abnormal rise in price of steel and cement etc.

[Para 3.1.2]

XI Plan projects

Assessment of requirement of coal and linkage thereof

Total coal requirement for capacity addition programme was 22.63 MMTPA against which FSA was entered for only 17.33 MMTPA of coal. The Corporation could develop only one coal block out of three captive coal blocks in its possession.

[Para 3.2.1]

Due to delay in development of the captive coal blocks, the Corporation lost the opportunity to use cheaper coal. Moreover, it had to bear additional cost as PI towards procurement of coal over and above the ACQ.

[Para 3.2.1.4]

Contract Management

There were deficiencies in various stages of contract management and the objective of efficient and timely execution of the contracts remained unfulfilled.

[Para 3.2.2]

As per the manual of the Corporation, a contract should be awarded within 161 days from the date of invitation of tender. Out of 13 contracts, seven contracts were finalised with delays ranging from 12 to 117 days. Further, in respect of four contracts the delays were more than 100 days. The main reasons for delay were extension of bid submission dates and discrepancies in scope of work detected during finalisation of price bids.

[Para 3.2.2]

The awarded value in respect of four contracts was significantly lower than the estimated cost and ranged between 22.78 percent and 46.26 percent. The awarded values of four contracts were higher than the estimated cost by 18.28 to 45.50 percent. It was further, observed that in two cases the estimates were unrealistic and in the remaining two cases, management did not carry out any analysis for ascertainment of such wide variation.

[Para 3.2.2]

Audit observed that due to non-availability of the infrastructure like land, approach road, clear front and sources of water etc., coupled with poor mobilisation of material, manpower and machinery by the contractors, there were delays in execution of all 21 contracts ranging from 15 to 54 months.

[Para 3.2.2]

Project Execution

The Corporation could add only unit of 500 MW in XI Plan period against a target of 4700 MW.

[Para 3.2.3]

Mejia Thermal Power Station (Unit # 7 & 8)

Execution of Main Plant Package was delayed due to non-availability of clear work fronts, coal linkage, water and delay in completion of Coal Handling Plant.

[Para 3.2.3.1.A]

The DPR for MTPS # 7 & 8 did not adequately address the adequacy of capacity of existing ash ponds to hold the entire ash in case of low level of utilisation of dry fly ash.

[Para 3.2.3.1.B]

Durgapur Steel Thermal Power Station (2 x 500 MW)

Lagoon 2 of higher capacity was not constructed due to non-availability of land from Durgapur Steel Plant (SAIL) and the ash generated from both the units was being dumped in the existing lagoon 1 which had almost filled up. Thus, sustained generation from both the units would not be possible unless the second ash pond is constructed.

[Para 3.2.3.2]

Koderma Thermal Power Station (2 x 500 MW)

The Corporation could not construct permanent ash pond due to non-possession of a vast chunk of the required land. Further, diversion of Gramin Sadak Yojana Road passing through ash pond area was also pending. In the absence of permanent ash pond, the Corporation had to construct a temporary ash pond by incurring an extra expenditure of ₹ 36.50 crore in order to meet the exigency of COD.

[Para 3.2.3.3]

Bokaro Thermal Power Station (BTPS 'A' 1 x 500 MW)

The construction of BTPS 'A' was delayed due to delayed dismantling of old units and permanent ash pond as well as non-construction of CHP.

[Para 3.2.3.4]

Raghunathpur Thermal Power Station (RTPS 2 x 600 MW)

The construction of main plant packages, railway corridor and plant water system of RTPS Unit # 1 & 2 could not be completed mainly due to non-acquisition of entire stretch of required land.

[Para 3.2.3.5]

Monitoring Mechanism

The monitoring mechanism of the Corporation was not effective as it did not yield desired result in removing the project impediments. Even controllable factors like delay in handing over of access roads to contractors, issuance of construction drawings etc., were not addressed in time to contain project delays.

[Para 3.3]

Cost overrun

Actual cost of five completed units and one unit in advanced stage was 35 percent higher (₹ 4615 crore) than the original approved cost and the actual cost of remaining three units under execution was 42 percent higher (₹ 2696 crore) than the original approved cost.

[Para 3.4.1]

Surplus power

Audit observed that 39 percent (975 MW) of the capacity of new units commissioned and 33 percent (725 MW) of the capacity of upcoming units under XI Plan project could not be allocated to the prospective consumers resulting in surplus power.

[Para 3.4.2]

Loss of additional Return on Equity

None of power projects earmarked for execution during the XI Plan period were commissioned within the specified timeline resulting in loss of opportunity to earn additional return on equity of ₹ 1011.73 crore.

[Para 3.4.3]

Performance of the units commissioned under XI Plan

The capacity utilisation of all the five units commissioned under XI Plan was lower due to forced outage of the units caused by boiler tube leakages, problems/troubles in Turbo Generator, electrical system and Control & Instrumentation etc. As a result, the Corporation could not generate 2345.27 MU of power and suffered loss of ₹ 476.66 crore towards non-recovery of fixed cost during the period from 2011-12 to 2013-14.

[Para 3.4.4.1]

The auxiliary power consumption and oil consumption in respect of most of the new units were more than the CERC norms resulting in loss of ₹ 20.05 crore and ₹ 88.89 crore respectively.

[Para 3.4.4.2 and 3.4.4.3]

Recommendations

1. *The Corporation may pursue with the concerned Ministry to ensure availability of coal before commissioning of the power projects.*
2. *The Corporation may vigorously pursue with the concerned department of Government of Jharkhand to resolve the problem of acquisition of full stretch of land for ash pond of KTPS.*
3. *The Corporation may take immediate action for installation of SR of CHP of BTPS-A to avoid any further delay.*
4. *The Corporation may take up with the Government of West Bengal for acquisition of required land for railway infrastructure of RTPS.*
5. *The Corporation may vigorously pursue with the concerned department of Government of West Bengal for acquisition of full stretch of land for early completion of plant water system of RTPS.*
6. *The Corporation may pursue with the EPC contractor of RTPS for early completion of the construction of NDCT-1 to avoid any further delay in commissioning of the linked unit.*

CHAPTER 1
INTRODUCTION

1.1 Profile of Damodar Valley Corporation

Damodar Valley Corporation (Corporation) was set up in July 1948 under the Damodar Valley Corporation Act, 1948 (Act) with the objective of securing unified development of Damodar river valley falling within the States of Jharkhand and West Bengal. The Participating Governments of the Corporation are the Central Government, Jharkhand Government and the Government of West Bengal. The Corporation is engaged in generation and distribution of power, flood control, irrigation, soil conservation and other social activities within the Damodar Valley. The Corporation has coal based thermal power stations at 6 locations and hydel stations at 3 locations. As on March 2014, it has a total power generation capacity of 5857.2 MW[1] (Thermal 5710 MW and Hydel 147.2 MW).

Picture: 1 Power plant

1.2 Organisational Set up

The affairs of the Corporation are managed by a Board with the Chairman as the Chief Executive Officer. In addition to the Chairman, the Board comprises of Member (Secretary), Member (Technical), Member (Finance), one representative each from Central Government, Government of West Bengal and Government of Jharkhand and three independent experts, one each from the field of irrigation, water supply and generation or transmission or distribution of electricity.

1.3 Financial Performance

Pursuant to the Electricity Act 2003, the generation and transmission tariff of the Corporation are determined by the Central Electricity Regulatory Commission (CERC) and distribution tariff is determined by the State Electricity Regulatory Commissions (SERCs) i.e. Jharkhand State Electricity Regulatory Commission and West Bengal State Electricity Regulatory Commission. The details of power generated, sold and profit earned after tax for the last seven years ending March 2014 are given below:

[1] MW- Megawatt

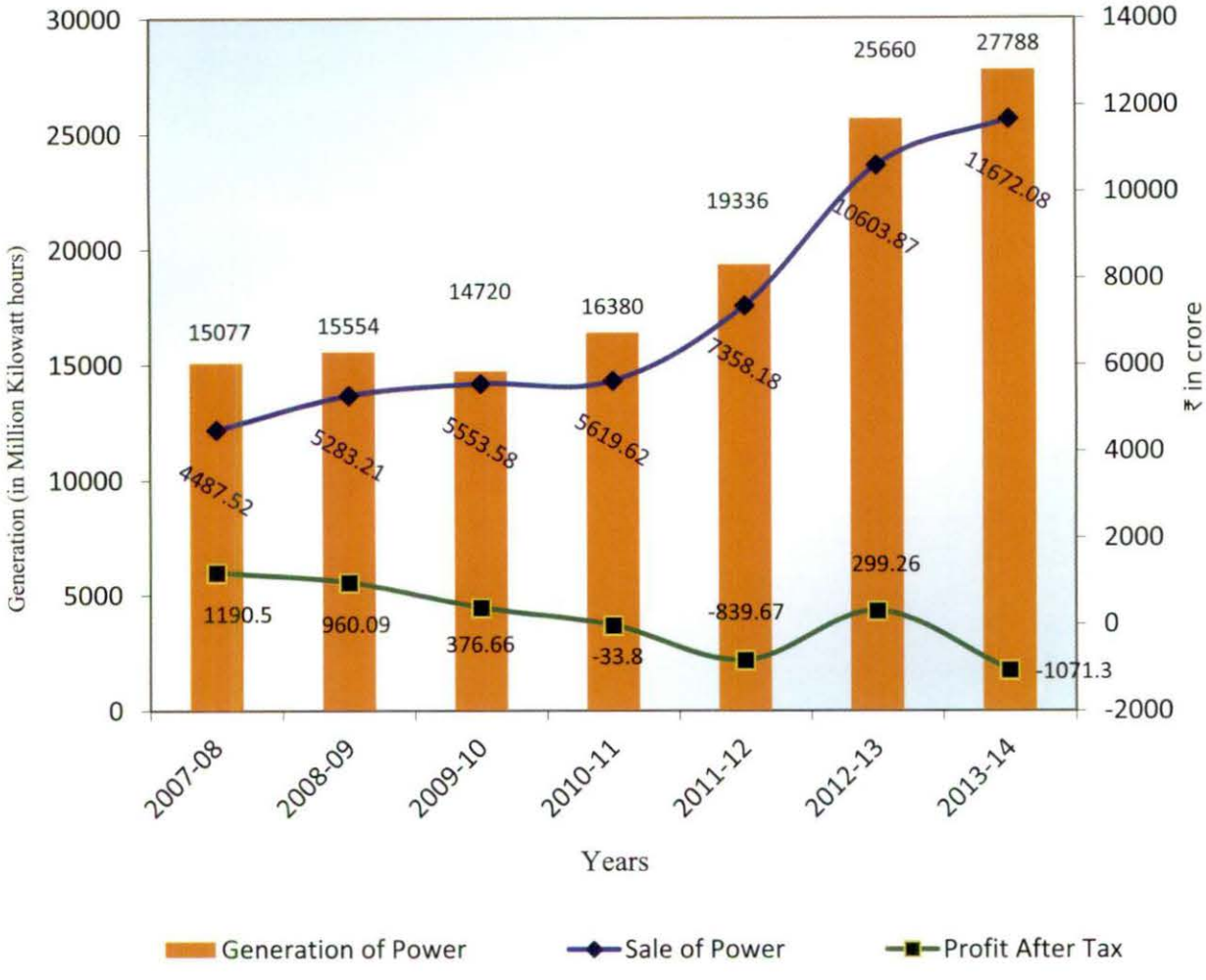


Chart: 1 Performance of the Corporation

1.4 Capacity addition programme and its progress

To meet the objectives of providing "Power for all by 2012", the Ministry of Power (MoP), Government of India (GoI) set the capacity addition target of 68,869 MW in the XI Plan of which coal based thermal power project was 46635 MW. The Corporation planned (February 2009) to add power generation capacity of 6250 MW during XI Plan period (five projects of 4700 MW with nine units[2] on its own and two projects of 1550 MW with four units[3] through the Joint venture route). In addition to the above, there were ongoing four units of 1000 MW, which were spillover projects of the X Plan. However, during the XI Plan period the Corporation could commission only 1025 MW (one unit of 500 MW for its own project and another unit of 525 MW by Joint Venture) resulting in shortfall of 5225 MW as given below.

[2] Mejia Thermal Power Station (MTPS) – II (2 X 500), Koderma Thermal Power Station (KTPS) (2 X 500), Bokaro Thermal Power Station (BTPS) 'A' (1 X 500), Raghunathpur Thermal Power Station (RTPS) (2 X 600), Durgapur Steel thermal Power Station (DSTPS) (2 X 500).

[3] Maithon Power Limited - Joint Venture (MPL-JV) (2 X 525), Bokaro Steel Thermal Power Station – Joint Venture (BSTPS-JV) (2 X 250)

All the spillover projects[4] of the X Plan were commissioned during the XI Plan Period. The status of completion of the projects as on March 2014 is as follows:

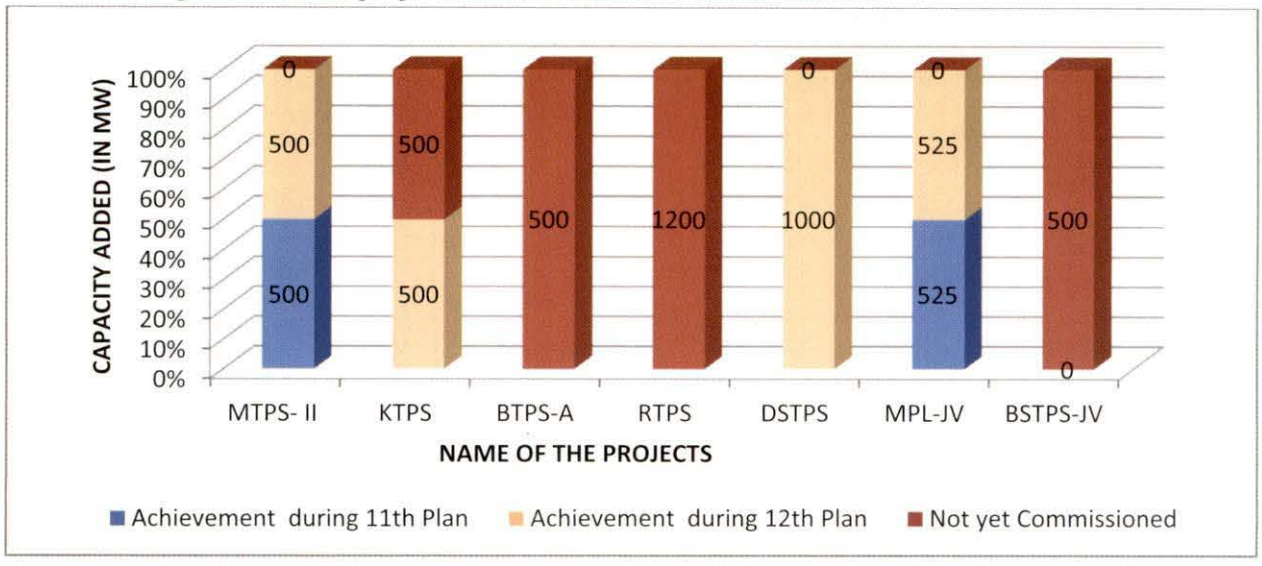


Chart: 2 Status of capacity addition

The reasons for delay in achievement of the above target for the XI Plan were analyzed in the present Performance Audit Report.

[4] Chandrapura Thermal Power Station (CTPS) 7 & 8 (2 X 250), Mejia Thermal Power Station (MTPS) 5 & 6 (2 X 250)

CHAPTER 2
AUDIT APPROACH

2.1 Audit Scope and Objectives

This Performance Audit covers all the activities of the Corporation from conceptualization to implementation of all the power projects planned during the XI Plan. In addition to the above, the activities of the Corporation for commissioning of the spillover projects of the X Plan were also studied.

The objectives of the Performance Audit were to assess:

- Whether the projects were selected considering economic viability and overall requirement of the policy of GoI;
- Whether the projects and contracts were managed with due economy, efficiency, effectiveness and in compliance with established guidelines;
- Whether effective monitoring mechanism was in existence.
- Whether the objectives set in the capacity addition programme were achieved.

In this connection it may be mentioned that a Performance Audit on the "Capacity Addition Programme during the X Plan" by the Corporation was conducted earlier and the findings were included in the C&AG's Audit Report appended with the Annual Report of the Corporation for the year 2007-08. The significant issues highlighted were:

- Delay in execution due to non-availability of land
- Delay in awarding of contract
- Failure to synchronize fuel linkage and transportation
- Non-synchronisation of auxiliary infrastructure with the completion schedule of the main plants
- Scope of work not being decided before placement of order

The Action Taken Note (ATN) on these issues has not been received so far (March 2014).

The present Performance Audit was carried out to assess the extent of remedial measures taken by the Corporation to address the above deficiencies for successful implementation of the XI Plan projects.

2.2 Audit Criteria

The following audit criteria were adopted:

- Guidelines of MoP, Central Electricity Authority (CEA) and CERC
- Feasibility Reports (FRs)/ Detailed Project Reports (DPRs)
- Action Plan, Minutes of the meetings and Memorandum of Understanding (MOU) of the Corporation with various stakeholders/agencies
- Tender Documents, Contract Agreements and Works and Procurement Manual of the Corporation

2.3 Audit methodology and sampling

The Audit examination started with an Entry Conference with the management wherein scope of audit, audit objectives and criteria thereof were discussed. At the end of the field audit work, an Exit Conference with the management was held in order to convey the broad audit observations. The views of the management have been incorporated in the report.

All the major 21 contracts of the projects in respect of the XI Plan were examined during the Performance Audit. However, due diligence/ risk analysis conducted by the corporation before selecting the projects undertaken in joint venture mode could not be verified as the records relating to the same were not made available to audit.

Audit acknowledges the cooperation extended by the management for timely completion of the above audit.

CHAPTER 3
AUDIT FINDINGS

3.1 X Plan spill over projects

The Corporation planned to commission five units[5] of 1210 MW capacity during the X Plan period. However, only one unit i.e. MTPS Unit # 4 (210 MW) was commissioned during such period and the remaining four units were carried over to XI Plan period as detailed below:

Table 1: Status of implementation of X Plan spill over projects

(₹ in crore)

Project	Unit	Scheduled COD	Actual COD	Delay (in months)	Projected cost	Actual Cost upto March 2014
MTPS	5	January 2007	February 2008	13	2012	2172.60
	6	March 2007	September 2008	18		
CTPS	7	January 2007	November 2011	58	2066	2590.68
	8	March 2007	July 2011	52		

3.1.1 Mejia Thermal Power Station Unit # 5 &6 (MTPS 2 X 250 MW)

The order for construction of Main plant package (MPP) and other auxiliaries was awarded (June 2004) to BHEL on Engineering, Procurement & Construction (EPC) basis. The main reasons for delay were change in rating of Generator Transformer by the Corporation after 8 months from the date of placement of order, change in decision to remove vibration isolation system after 7 months of issuance of order, delay in finalization of drawings and construction activities of CHP (14 months).

Management stated (June 2014) that during detailed engineering, various issues related to sizing, rating of equipment like Generator Transformer, TG Vibration Isolation System/Conventional Foundation, etc. cropped up and were finalized after detailed analysis, deliberation and physical verifications etc. It was further stated that changes in layout at engineering stage were unavoidable for these extension units to take care of soil conditions, existing structures/facilities etc., which delayed the construction activities.

It would, thus, be seen that the DPR was prepared without adequate investigation and deficiencies were noticed after finalization of orders which resulted in delays.

Ministry accepted (February 2015) the audit observations.

3.1.2 Chandrapura Thermal Power Station Unit# 7 & 8 (CTPS 2 X 250 MW)

The work of construction of MPP including Ash Handling Plant (AHP) and CHP was also awarded (June 2004) to M/s BHEL on EPC basis at a firm price of ₹ 1701 crore. Audit observed that the execution work initially suffered for 26 months due to delay in handing over the land to BHEL, non-availability of storage space for shipment of materials at site,

[5] MTPS Units # 4, 5 & 6 and CTPS Units # 7 & 8

local law and order problems, abnormal rise in price of steel and cement etc. In a tripartite meeting (November 2008) held among the Corporation, BHEL and CEA, it was decided to revise the milestones considering the initial delay of 26 months and accordingly the revised CODs of Unit # 7 & 8 were fixed as March 2009 and May 2009 respectively. It was subsequently agreed to pay one time compensation of ₹ 13.98 crore to BHEL towards increase in cost of civil works and erection services caused due to the delay.

It was also observed that though Unit # 7 achieved coal synchronization in September 2009, the COD was declared in November 2011 mainly due to the damage of the generator rotor which occurred in May 2010 and got replaced (April 2011) at an additional cost of ₹ 11.50 crore plus taxes. The Corporation formed two Committees at different times to find out the reasons for the rotor failure but was yet to fix the responsibility (March 2014).

Similarly in the case of Unit # 8, though coal synchronization was achieved in March 2010, the COD could be declared in July 2011 due to non-completion of Effluent Treatment Plant (ETP), water recovery system and dry fly ash collection system (DFACS) which delayed the statutory clearance from state pollution control board in addition to various problems encountered during operation such as Electric Hydro Converter (EHC) problems, Generator tripping etc.

The Corporation formed (March 2012) a committee to analyze the reasons for delay in completion of the project and found that out of the net delay of 27 months (excluding the initial delay of 26 months) 14 months is attributable to BHEL in respect of Unit # 7. The reasons for the balance delay could not be ascertained due to non-availability of investigation report of Generator rotor. In case of Unit # 8, the net delay attributable to BHEL was 28 months. However, a joint committee (Corporation and BHEL) had been formed (June 2013) for joint analysis of the reasons for delay in implementation of the project, the report of which was pending (March 2014).The management accepted (June 2014) the audit observations.

Ministry stated (February 2015) that contract reconciliation with BHEL was pending.

3.2 XI Plan Projects

The Corporation planned to commission nine units of 4700 MW capacity during the XI Plan period. However, only one unit i.e. MTPS Unit # 7 (500 MW) was commissioned and the remaining eight units were carried over to XII Plan period as detailed below:

Table 2: Status of implementation of XI Plan projects

Project	Unit	Capacity (MW)	Scheduled COD	Actual COD (upto March 2014)	Delay (in months)	Projected cost (₹ in crore)	Actual Cost upto March 2014 (₹ in crore)
MTPS	7	500	March 2010	August 2011	17	4617	5363
	8	500	June 2010	August 2012	26		
DSTPS	1	500	August 2010	May 2012	21	4457	5862
	2	500	November 2010	March 2013	28		
KTPS	1	500	June 2010	July-2013	37	4212	6676
	2	500	Sept 2010	Not Declared	NA		
RTPS	1	600	November 2010	Not Declared	NA	4122	6597
	2	600	Feb-2011	Not Declared	NA		
BTPS 'A'	1	500	Dec-2011	Not Declared	NA	2260	2481

Audit carried out a study on execution of projects proposed for the XI Plan to find out whether the Corporation had put in place appropriate mechanisms to ensure that the causes which delayed execution of the projects during the X Plan have been eliminated or minimized. Audit findings are discussed in the succeeding paragraphs.

3.2.1 Assessment of requirement of coal and linkage thereof

Based on the assessment of coal requirement, the Corporation explored coal linkage through MoP /CEA for coal supply to its thermal power stations. In addition, the Corporation also considered the availability of coal from its captive coal blocks already allocated by the MoC.

Audit observed that total requirement of coal for its capacity augmentation programme (seven thermal power stations including X Plan spillover projects) was 22.63 Million Metric Tonne per annum (MMTPA) and the Corporation could only enter into Fuel supply agreements (FSAs) for 17.33 MMTPA of coal (Annexure-I). Further, of the three captive coal blocks[6] under its possession, only one coal block[7] could be developed (March 2011). A coal block viz. Gondulpara was subsequently allocated (January 2006) jointly with Tenughat Vidyut Nigam Limited (TVNL) with the condition that the same would be developed and mined by TVNL, the leader, with equal share of production. However, this coal block had not yet been developed (March 2014).

Management stated (June 2014) that the delay in development of Gondulpara coal blocks was due to delay in obtaining various statutory clearances.

3.2.1.1 The DPR of RTPS indicated Barjora (North) and Khagra-Joydev as captive coal blocks which were already allotted by MoC for MTPS and DSTPS in March 2005. Subsequently, the Corporation intimated (November 2007) CEA that they would use the coal block of Saharpur-Jamarpani for RTPS. This coal block could not be developed by the Corporation within stipulated period and was de-allocated (June 2011) by MoC. The de-allocation was, however, withdrawn in January 2012. The Corporation awarded (February 2012) the work order for exploration and preparation of Geological Report (GR). As per the status report sent to CEA, coal production would commence from April, 2016 which seemed to be uncertain as the exploration work could not be started (March 2014). This has a cascading effect on commencement of coal production in the coal block. Meanwhile, the Corporation entered (August & September 2013) into FSA with coal companies for 3.89 MMTPA of coal and it would be diminished within 3 years from the normative date of coal production from the captive coal block. Thus, there would be uncertainty in obtaining coal of required quantity after March 2019 if coal production does not commence from the captive coal block. Management stated (June 2014) that the exploration works of the coal block could not be started due to law & order problem.

Ministry stated (February 2015) that the entire scenario of coal linkage for new units had changed as a result of de-allocation of all coal blocks of the Corporation in view of the order

[6] Barjora (North), Khagra-Joydev, Saharpur-Jamarpani.
[7] Barjora (North)

of the Hon'ble Supreme court and endeavour was being made for fresh allocation of coal blocks to ensure availability of coal.

3.2.1.2 As per DPR, KTPS required 4.69 MMTPA of coal. It was observed that the coal block, originally meant for KTPS, was contemplated for use in RTPS. The Corporation finalized (December 2012) FSA for 4.62 MMTPA after a delay of five years from issue of letter of assurance by Mahanadi Coalfields Limited (MCL). Although Unit # 1 was targeted for commissioning by March 2011, it got delayed due to lack of readiness of railway infrastructure for bringing coal and non-finalization of FSA. In the absence of the above, the commissioning was done (July 2011) by bringing crushed coal of nearby TPSs through road transport. Ultimately, the COD of the unit could be declared in July 2013, after 2 years of commissioning, by diverting coal of other units mainly due to delay in finalization of FSA and readiness of associated infrastructure.

The management accepted (June 2014) the above reasons for the delay. The Ministry, however, contended (February 2015) that MoU with MCL was signed in October 2010 for supply of coal to KTPS. This is not factually correct as MoU was entered in March 2012. Ministry's further contention that the COD of KTPS was not delayed due to delay in signing of FSA is also not acceptable as COD was declared after a delay of more than two years from the target date and that too by diverting coal from other units.

3.2.1.3 According to the DPR, DSTPS required 3.9 MMTPA of coal. The DPR did not mention the exact source from where the coal was to be linked but it was assumed that the coal source would be at a distance of 100 Kms from the exchange yard of the plant premises. Although the DSTPS Unit # 1 was targeted for commissioning in March 2011, the same got delayed due to lack of readiness of railway infrastructure and non-finalization of FSA/MoU. Hence, the commissioning was done (July 2011) by diverting coal from MTPS. The Corporation, however, entered (November 2011) into MoU with Eastern Coalfields Limited (ECL) but was not getting coal since it did not declare private siding of its own upto June 2012. Ultimately, the COD of the unit could be declared in May 2012 and finally FSA could be signed by the Corporation in July 2013 for Unit # 2, and September 2013 for Unit # 1 for a quantity of 3.73 MMTPA.

Management accepted (June 2014) the above reasons for delay in COD. The Ministry, however, contended (February 2015) that COD of DSTPS was not deferred due to delayed signing of FSA. This contention is not tenable as COD was delayed due to lack of readiness of railway infrastructure as well as non-signing of MoU/FSA.

3.2.1.4 The Corporation/DPR assessed total coal requirement of MTPS as 11.50 MMTPA (7.65 MMTPA for Unit # 1 to 6 and 3.85 MMTPA for Unit # 7 & 8) against total coal linkage of 8.27 MMTPA[8] and thus, there was a deficiency of coal linkage of 3.23 MMTPA. Audit observed that during the period 2012-13, Unit # 7 & 8 consumed 3.21 MMT of coal but coal linkage for these units was 2.81 MMT [Barjora (North) supplied 1.84 MMT and MoU was for 0.97 MMT]. For sustaining generation of the units, the Corporation requested (December

[8] 5.60 MMTPA from FSA for Unit # 1 to 6 + 1.7 MMTPA from Barjora (North) since March 2011+ 0.97 MMTPA from MoU (valid up to March 2013) with ECL

2011) ECL for supply of coal to MTPS beyond the Annual Contracted Quantity (ACQ) of FSA. As per the modalities of FSA, coal received in excess of 90 *per cent* of ACQ attracts payment of Performance incentive (PI) to the coal companies. Accordingly, ECL claimed ₹ 299.18 crore[9] as PI during the year 2011-12 and 2012-13 for supply of coal in excess of ACQ, out of which the Corporation paid ₹ 104 crore (March 2014). In this connection, it is worth mentioning that the coal sourced by the Corporation from the captive coal block was cheaper[10] than the coal supplied by coal companies. Thus, due to delay in development of the captive coal blocks, the Corporation lost the opportunity to use cheaper coal. Moreover, it had to bear additional cost as PI towards procurement of coal over and above the ACQ.

The contention of the management (June 2014) that no additional expenditure was incurred on receiving coal on PI against FSA for operation of Unit # 7 & 8 is not tenable as the requirement of coal could have been met without procuring the same on PI, had the allotted captive coal blocks been developed as per schedule and/or FSA for adequate quantity been made.

Ministry stated (February 2015) that the entire scenario of coal linkage for new units had changed as a result of de-allocation of all coal blocks of the Corporation in view of the order of the Hon'ble Supreme court and endeavour was being made for fresh allocation of coal blocks to ensure availability of coal.

Recommendation 1: *The Corporation may pursue with the concerned Ministry to ensure availability of coal before commissioning of the power projects.*

3.2.2 Contract Management

Audit examined in detail the various stages of contract management, *inter-alia,* cost estimate, invitation of bids, receipt and opening of bids, processing and evaluation of bids, pre-award discussion with the recommended bidder, award of contract, and post-award implementation of contract. All the nine units under XI Plan projects were executed by the Corporation through 21 major packages/contracts.

The Corporation had framed guidelines for implementing contracts within a set time frame and at a competitive price. Accordingly, the time frame for various pre-tendering, tendering and post-tendering activities was set out in their manual. As per the manual, a contract should be awarded within 161 days from the date of invitation of tender.

Audit examined 21 contracts since the stage of invitation of tender. It was observed that four contracts were awarded to BHEL, of which two were on nomination basis and the other two on single bid in consultation with CEA. Further, four contracts related to railway infrastructure were awarded to RITES on nomination/single tender basis. Of the remaining 13

[9] ₹ 209.49 crore for 2011-12 and ₹ 89.69 crore for 2012-13

[10] The Corporation sourced the coal supplied by the operating agency of Barjora (North) at a discount of 19.5 *per cent* to 25 *per cent* of the notified price of Coal India Limited.

contracts (including one finalised on single snap bid[11] basis), only six contracts were finalised within the prescribed time frame. The remaining seven contracts were finalised with delays ranging from 12 to 117 days. There were delays of more than 100 days in respect of four contracts (Annexure- II). The main reasons for delay were extension of bid submission dates and discrepancies in scope of work detected during finalisation of price bids.

The cost estimation for each package having various elements is prepared to establish the reasonableness of the cost at which the package could be executed. Therefore, it is essential that the same is worked out in a realistic and objective manner on the basis of prevailing market rates, last purchase price/last work order rate and economic indices for various inputs. In respect of the 13 major contracts executed through tendering process, the work was awarded to the L1 bidders. Audit observed that there were wide variations between the estimated cost and awarded value relating to the nine contracts. The awarded value in respect of four contracts of BTPS 'A' was significantly lower than the estimated cost and ranged between 22.78 *per cent* and 46.26 *per cent*. The awarded values of four[12] contracts were higher than the estimated cost by 18.28 to 45.50 *per cent*. It was further, observed that in two cases the estimates were unrealistic and in the remaining two cases management did not carry out any analysis for ascertainment of such wide variation (Annexure- IV).

Time remains the essence of all major contracts awarded by the Corporation. Management should therefore, ensure availability of all the infrastructure like land, approach road, clear front and sources of water etc. for smooth execution of the project work. As each project was executed through a number of contracts/packages, simultaneous progress of the same in a synchronised and coordinated manner should also be ensured. Active persuasion and interaction with the various contractors and other agencies involved in the projects were required to combat the hindrances arising during execution of work.

Audit observed that there were delays in execution of all the 21 contracts ranging from 15 to 54 months (March 2014) [Annexure – II]. Reasons responsible for delay in execution of contracts were examined in audit. It revealed that such delay of the projects was basically due to the following reasons and are discussed in detail in Para 3.2.3:

- Awarding of contract without ensuring availability of entire stretch of land for greenfield projects (Main plant package, Plant water corridor, Railway infrastructure of RTPS, Ash ponds of both DSTPS & KTPS, and Railway infrastructure of KTPS & DSTPS).
- Non- availability of clear fronts to the contractors in respect of extension projects where the Corporation had entire stretch of land under its possession indicating lack of coordinating action on the part of management (all packages of MTPS and two packages of BTPS).
- Poor mobilisation of manpower and machinery by contractors.

[11] Snap bidding is opted when it is not possible to objectively evaluate the bids received and go for re-tendering. In such bidding system revised/fresh bids are invited only from those bidders who have already participated and submitted a valid bid and qualified for opening of Price bid.

[12] Two contracts of KTPS and one contract each of MTPS Ph-II & DSTPS.

- Delay in supply of materials by contractors.
- Non availability of approach road to the project site.
- Delay in completion of related packages like CHP and PWS.

Audit further observed that though progress review meetings were held between management and the contractors to address various hindrances during execution of work, the same did not give effective results. It is worth mentioning that controllable factors on the part of management like availability of land and work fronts were not properly addressed and sorted out in time.

As per provision of contract, the Corporation reserved the right to recover Liquidated damage (LD) from contractor in case of delay in completion for the reasons attributable to contractor. In case of delay in execution, the decision for time extension and imposition of LD was taken after detailed analysis indicating the reasons and period of the delay attributable to the Corporation as well as the contractor. It was observed that committees were set up to analyze the delay in respect of ten contracts of which reports for six contracts were submitted (August 2014). However, only two reports were approved by the competent authority (Annexure V). In one case (CHP of DSTPS), the delay of 19 months and 27 months for completion of facilities in respect of Unit 1 and 2 respectively was on account of delay in handing over of fronts by the Corporation and an amount of only ₹ 0.7 lakh was imposed as LD on the contractor due to delay in supply of mandatory spares. In the other case (PWS of MTPS), although there was a delay of 32.5 months, LD could not be imposed on the contractor as there was substantial delay on the part of the Corporation towards releasing clear fronts to the contractor. Audit, therefore, observed that there were deficiencies in various stages of contract management and the objective of efficient and timely execution of the contracts remained unfulfilled.

While accepting the audit observations, the Ministry stated (February 2015) that the Corporation would try to follow the guidelines in respect of contract management to minimize the controllable factors like availability of land and work fronts.

3.2.3 Project Execution

One of the major objectives of the National Electricity Policy, as envisaged by the GoI, was to meet the demand for electricity by 2012 i.e. within the XI Plan period. Audit observed that out of the five projects involving nine units (4700 MW), the Corporation had commissioned only one unit with a capacity of 500 MW within the XI Plan Period with a delay of 17 months from the scheduled date of commissioning. Of the remaining eight units, four units with a capacity of 2000 MW were commissioned during the period April 2012 to March 2014 with a delay ranging from 21 to 37 months and balance four units with a total capacity of 2200 MW were still under execution and lagging behind the schedule by 34 to 49 months [(March 2014) Annexure-III].

Audit further observed that only one unit (MTPS Unit # 7) of the project was commissioned within the XI Plan period with a delay of 18 months beyond the norms fixed by the CERC.

During the period from April 2012 to March 2014, another four units were commissioned with a delay of 17 to 41 months from the above CERC norms. The anticipated commissioning dates of the remaining four units which were under construction as on March 2014 were behind the CERC norms by 43 to 56 months (Annexure - III).

The audit findings in respect of execution of the XI Plan projects are discussed below:

3.2.3.1 Mejia Thermal Power Station (MTPS 2 x 500 MW Unit # 7 & 8)

Management considered this project to be a fast track project of XI Plan with the availability of land and other infrastructural facilities within the plant premises. The investment approval of the project was accorded in August 2006 with an estimated cost of ₹ 4617 crore and the actual cost incurred was ₹ 5363.45 crore (March 2014).

A) The details of the packages are as follows:

Table 3: Package wise details of MTPS

(₹ in crore)

Packages	Name of the Contractor	Scheduled Completion	Actual Completion	Delay (in months as on March 2014)	Awarded cost	Actual Expenditure upto March 2014
MPP	BHEL	Unit # 7 March 2010	August 2011	17	3538	3403.11
		Unit # 8 June 2010	August 2012	26		
CHP	Elecon Engineering Company Limited	September 2009	Pending	54	378.51	306.33
PWS	Larsen & Toubro Limited (L&T)	September 2009	May 2012	32.5	93.23	89.73
Railway Infrastructure	RITES	June 2015	Pending	-	158.55	16.36

It was observed that the major reasons for delay of MPP were delayed availability of clear work fronts (Unit # 7 for seven months and Unit # 8 for 17 months), coal linkage, non availability of water and delay in completion of CHP. The CHP was made operational before the COD of the units with the exception of stacker and reclaimer, elevator, electric hoist etc. As per the original schedule of the main plant package, Demineralised (DM) water was to be made available to BHEL by January 2009. Audit observed that as per the work order, DM water production was to be commissioned within 16 months i.e. by May 2009. However, the DM plant was finally brought in to operation in January 2010 i.e. after a delay of seven months mainly due to non availability of work fronts.

While accepting the above delays, the management stated (June 2014) that the delay in COD of Unit # 7 due to delayed commissioning of CHP was not fully correct as the unit was operated on full load in August 2010 by coal feeding through the crusher house of the existing units to the bunker of Unit # 7. It was further stated that the work fronts were not made available to M/s L&T due to stacking of materials and machineries of BHEL and other agencies on the PWS area. The contention of the management is not tenable as the operation of Unit # 7 by coal feeding through contingency route was only for trial run of the unit but

COD was achieved in August 2011 i.e. after one year of full load run when the CHP was made operational. Further, delay in commissioning of PWS could have been avoided by proper planning and earmarking of area for stacking of materials etc. as the required land was already under the possession of the management.

As per the guidelines of the Railways, it is compulsory to construct the Wagon Tippler (WT) along with the Track Hopper (TH) facility in the Thermal Power Plants for unloading of coal brought by the Railways. Incidentally, it may be mentioned that availability of BOXN wagons, which are unloaded through WT, are readily available than BOBR wagons, which are unloaded through TH. All the new projects (500/600 MW) of the Corporation have been provided with WT and TH. Therefore, WT is very much required for sustained power generation of Unit # 7 & 8 as it would improve the availability of coal through BOXN type wagons. It was noted that at the time of giving approval (August 2008) for the DPR of the 3rd TH and additional railway infrastructure in the MTPS Phase-II, the Railway authority directed the Corporation to construct both WT and TH to cater to the need of coal supply for its new 2 X 500 MW units. It was, however, observed that even after a lapse of more than 7 years from the approval of the DPR, the Corporation is yet to construct a WT.

Further, the FR for doubling the railway line between Mejia TPS and Raniganj was submitted by RITES in August 2010 which was subsequently revised in September 2011 to incorporate the requirement of Eastern Railway, for construction of a bypass line to connect Baktarnagar Block Halt with Mejia Captive line avoiding Raniganj station. The Corporation placed (December 2012) the order on RITES for construction of such railway infrastructure. There was no appreciable progress in the work (March 2014).

Management stated (June 2014) that due to land constraint, WT could not be provided and they were exploring possible/suitable location for providing the same. Reply of the management indicated deficiencies in planning which could not be resolved even after a lapse of seven years. Management further stated (June 2014) that engineering scale plan drawing indicating rail alignment for Baktarnagar bypass line was yet to be approved by Railways and for this land acquisition proposal could not be finalized. Further, acquisition of 5 acres of land for Raniganj-MTPS doubling works was also under process.

Ministry stated (February 2015) that order for feasibility study and preparation of DPR was placed on RITES in December 2014.

B) Capacity constraint of ash ponds

The ash ponds in MTPS with an area of 600 acres and holding capacity of 220 lakh m^3 were constructed to meet the requirement of Units # 1, 2 & 3 (3 X 210 MW). Subsequently, Unit # 4 (210 MW) came into operation in February 2005. Further, the Corporation added two more Units # 5 & 6. There was a provision in DPRs of these units that over and above the collection of ash in dry form, the fly ash along with bottom ash would be disposed of in the existing ash pond. It was observed that there was no ash evacuation from the said ash pond till 2008 as a result of which capacity of the ash pond was being stretched. At the time of commencement of ash evacuation, the ash ponds were filled with 175.08 lakh m^3 of ash against the capacity of 220 lakh m^3. Further, the rate of ash evacuation was not commensurate with that of ash accumulation and therefore, deposition of ash in the pond was getting increased. It was envisaged in the DPR of Unit # 7 & 8 (1000 MW) that besides collection of ash in dry form, the fly ash along with bottom ash would be disposed of in the

ash pond. However, the DPR did not assess whether the existing ash pond was capable of holding the entire ash that would be generated from all the eight units (2340 MW) in case of low off-take of dry fly ash.

After commissioning of the new units, the ash generated was dumped in the existing ash ponds. This led to spillage of ash slurry in the nearby paddy fields and dams of West Bengal. Audit observed that precarious condition of ash pond arose due to much delayed action for ash evacuation. Further, capacity addition of Unit # 4 to 8 (1710 MW) without augmenting the capacity of ash pond and non evacuation of entire fly ash in dry form affected the running of all the units at their rated capacity. The management also apprehended (June 2012) that excessive loading of the existing ash pond by disposing ash from all the Units # 1 to 8 might cause disaster at any time. The Corporation took up the matter with CEA only in September 2012 for according approval for acquisition of additional land for construction of additional ash ponds. The same was approved by CEA in April 2013 and finally the Corporation applied (June 2013) to accord permission for acquisition of additional land.

Management stated (June 2014) that during preparation of DPRs of Units # 4 to 8 of MTPS, concept of dry fly ash collection provision (80 *per cent* of the total ash generated) had been incorporated. It was further contended that there was no deficiency in planning stage of Unit #7 & 8 as the original concept was to go for installation of 100 *per cent* dry fly ash evacuation system with zero discharge in ash pond. Management further stated that contemplating for better ash management to take additional care in respect of problems encountered for pond ash evacuation, initiative was taken in September 2012 for acquisition of land.

Ministry stated (February 2015) that persuasion was being made with the concerned authorities for construction of additional ash pond.

3.2.3.2 Durgapur Steel Thermal Power Station (DSTPS 2 x 500 MW)

DSTPS was an XI Plan greenfield project of the Corporation. The investment approval of the project was accorded in April 2007 with an estimated cost of ₹ 4457 crore. The actual expenditure incurred was ₹ 5861.51 crore (March 2014).

Table 4: Package wise details of DSTPS

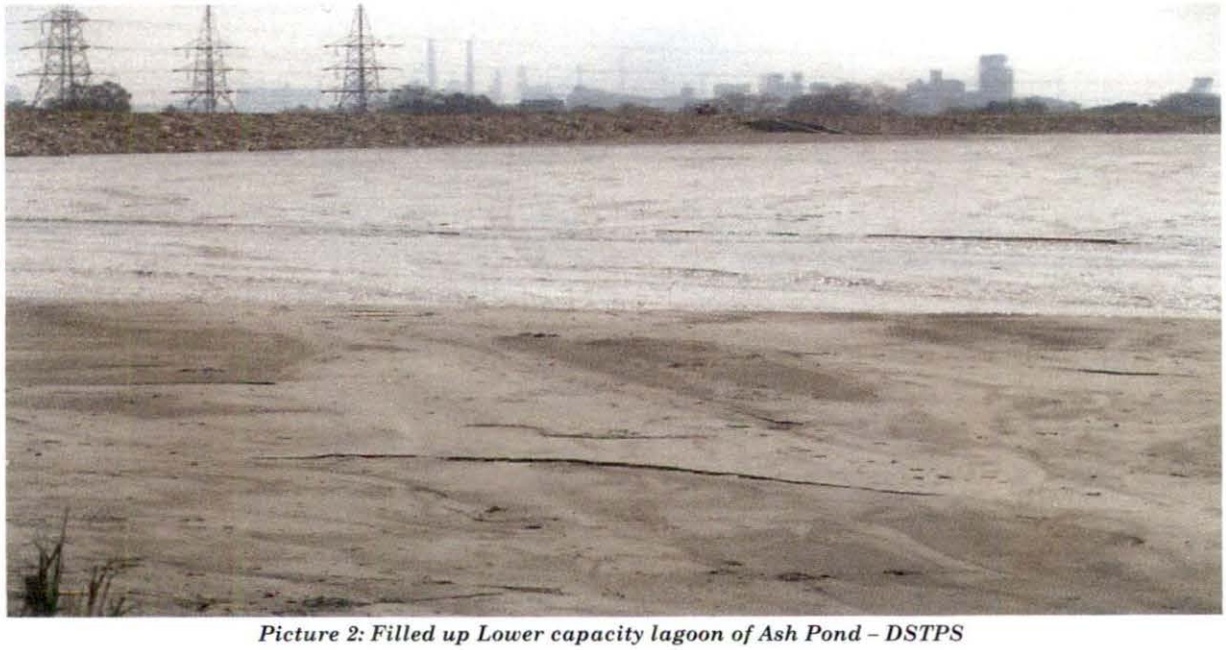
(₹ in crore)

Packages		Name of the Contractor	Scheduled Completion	Actual Completion	Delay in months (as on 31.03. 2014)	Awarded cost excluding taxes & Price variation etc.	Actual Expenditure upto March 2014 including taxes & Price variation etc.
MPP	Unit # 1	BHEL	August 2010	May 2012	21	3228.84	3426.16
	Unit # 2		November 2010	March 2013	28		
PWS		M/s VA TECH WABAG	December 2009	November 2011	23	134.49	147.82
CHP	Unit # 1	M/s ThyssenKrupp Industries India Pvt. Ltd.	June 2010	January 2012	19	430	462.81
	Unit # 2		September 2010	December 2012	27		
Railway Infrastructure		RITES	January 2011	June 2012	17	142.79*	127.77

*Inclusive of taxes etc.

The main reasons for delay of MPP were non-availability of material at site, absence of approach road leading to problem in transporting the material at site, slow progress in structural work for mill bunker and tippler floor casting of Unit # 1, poor mobilization of manpower by BHEL and non-availability of crane for construction of Unit # 2, absence of in-charge for Turbine erection.

The MPP included construction of ash ponds having two lagoons of different capacities for evacuation of ash from the power station. It was observed that lagoon 2 of higher capacity could not be constructed due to non-availability of land from Durgapur Steel Plant (SAIL) and the ash generated from both the units was being dumped in the existing lagoon 1 which had become almost filled up. Thus, sustained generation from both the units would not be possible unless the second ash pond is constructed.



Picture 2: Filled up Lower capacity lagoon of Ash Pond – DSTPS

While accepting the delay in commissioning of the units, the management stated (June 2014) that two third of lagoon 1 was filled with wet ash and there would be no difficulty of wet ash evacuation in near future. This contention of the management is not tenable as two third of the lagoon 1 was filled with wet ash within a period of one and half year of commissioning of both the units and lagoon 1 would not be able to accommodate the entire wet ash generated from both the units.

It could be seen that one of the major facilities of the PWS (DM Plant), scheduled to be completed by August 2009, was actually completed in November 2011 with a delay of 27 months. The main reasons for delay were mismatch in alignment of the water pipeline corridor, delay in finalization of civil drawing and delay in mobilization of mechanical erection contractor at site. Management in its reply also attributed the change in positioning of the railway crossing as one of the major reasons for the delay.

Audit observed that the main reasons for delay of CHP were delay in handing over of different front areas, unavailability of service water to enable operation of integrated system

and testing of utilities, delay in creation of approach road, delay in structural erection and delay in various civil works and occupancy of work fronts by material of other agencies etc.

Management accepted the audit observation (June 2014).

The completion of railway infrastructure (TH and WT) was delayed by 17 and 23 months respectively which contributed to the delay in COD of the units. The reasons for delay were delay in finalization of level crossing within the plant boundary for the passage of railway track, earth work, release of work front and work of Road under Bridge (RuB) etc. Management stated (June 2014) that there was also a delay in obtaining permission from SAIL for merry-go-round system.

Ministry stated (February 2015) that the capacity of ash pond/lagoon 1 was as per the present power generation of the units which was about 40 *per cent* of the total capacity. This is not acceptable as the capacity of ash pond should have been commensurate with total generating capacity of units.

3.2.3.3 Koderma Thermal Power Station (KTPS 2 x 500 MW)

KTPS was an XI Plan greenfield project of the Corporation. The investment approval of the project was obtained in August 2006 with an estimated capital cost of ₹ 4212 crore. The actual expenditure incurred was ₹ 6676.32 crore (March 2014).

Table 5: Package wise details of KTPS

(₹ in crore)

Packages		Name of the Contractor	Scheduled Completion	Actual Completion	Delay in months (as on 31 March 2014)	Awarded cost excluding taxes & Price variation etc.	Actual Expenditure upto March 2014 including taxes & Price Variation etc.)
MPP	Unit # 1	BHEL	June 2010	July 2013	37	3280.52	3412.53
	Unit # 2		September 2010	Pending	42		
CHP	Unit # 1	Larsen & Toubro Ltd. (L&T)	June 2010	April 2013	34	329.88	357.93
	Unit # 2		September 2010	June 2013	33		
PWS		M/s Kirloskar Brothers Ltd (KBL)	February 2010	Pending	49	166.77	170.39
Railway Infrastructure		RITES	April 2011	Pending	35	188.05	175.74

The ash pond under the MPP was scheduled to be completed in April 2010. The Corporation, however, could not get the possession of the vast chunk of land required for the construction of the ash pond due to law and order problem. Further, diversion of Gramin Sadak Yojana Road of Rural Works Department, Government of Jharkhand (GoJ), passing through ash pond area of the Corporation was pending. As the permanent ash pond could not be constructed, the Corporation had to construct a temporary ash pond by incurring an extra expenditure of ₹ 36.50 crore in order to meet the exigency of COD. This apart, while late start of civil works, local disturbance, poor execution by sub vendors, delay in supply of

materials and equipments, delayed execution of plant water system and labour problems, etc. were major reasons for delayed COD of Unit # 1, problems in ash evacuation, failure of tube leakage and fire in TG floor etc. attributed to delay in COD of Unit # 2.

Picture 3: Road under Gramin Sadak Yojana of Rural Works Department, GoJ passing through ash pond area of KTPS

While accepting the problems encountered in acquisition of land, Management stated (June 2014) that the matter relating to the road will be taken up with the GoJ in due course. It was also stated that the Rehabilitation and Resettlement (R&R) policy was under finalization for resolving the land issue.

The main reasons for the delay in completion of CHP were non-handing over of different working fronts as per the contractual schedule, change in the basic plot plan and delay in drawing approval, Quality Assurance Provisions approval, vendor approval and also delay in providing proper access road. Management stated that delay in readiness of the railway track was also one of the reasons for delay in completion of CHP.

The construction of PWS was delayed for which the CODs of the units were also delayed. The main reasons for delay were poor mobilisation of man and machinery from the very beginning, delay in finalization of drawings, finalization of sub vendors for DM plant, delayed supply of materials due to strike by labourers on various occasions and lack of clarity in the scope of the work etc.

The contention of Management/Ministry (June 2014/February 2015) that the commissioning of main plant was not delayed due to non-completion of PWS is not tenable as it was clearly mentioned in the exception/status report placed to the board of the Corporation that one of the reasons for delay of the project was poor execution of the PWS.

Under the railway infrastructure package, the coal rakes started moving in KTPS from September 2012 onwards i.e. after a delay of 16 months from its schedule. However, Junction arrangement and Signaling & Telecommunication (S&T) at Hirodih station and civil, S&T and Overhead electrification works at Larabad section were still pending (March 2014) due to non-availability of some parts of land. This restricted the smooth movement of coal rakes. Management stated (June 2014) that they were pursuing with the railway authorities for

resolving the issues relating to junction arrangement but did not mention the ways to sort out the land acquisition problem.

Recommendation 2: The Corporation may vigorously pursue with the concerned department of Government of Jharkhand to resolve the problem of acquisition of full stretch of land for ash pond of KTPS.

3.2.3.4 Bokaro Thermal Power Station (BTPS 'A' 1 x 500 MW)

Management considered this project to be a fast track project of the XI Plan with the availability of land and other infrastructural facilities within the plant premises. It was also decided (June 2006) to set up this new power station at Bokaro after dismantling the existing BTPS - A units, which were closed down earlier. The original approved project cost was ₹ 2260 crore. The actual expenditure incurred was ₹ 2481 crore (March 2014).

Table 6: Package wise details of BTPS 'A'

(₹ in crore)

Packages	Name of the Contractor	Scheduled Completion	Actual Completion	Delay in months (as on March 2014)	Awarded cost excluding taxes & Price variation etc.	Actual Expenditure upto March 2014 including taxes & Price variation etc.)
MPP	BHEL	December 2011	Pending	27	1840	1896.28
CHP Main	Techpro Systems Ltd	January 2015	Pending	-	146.56	2.69
CHP Stacker Reclaimer (SR)	TRF Ltd	January 2015	Pending	-	31.65	0
PWS – (DM) Plant	VA Tech Wabag	June 2014	Pending	-	21.36	4.13
PWS- (PT) Plant	McNally Bharat Engineering Ltd.	August 2014	Pending	-	48.78	8.47

A MoU was entered into (May 2006) with BHEL for construction of the power plant. However, there was delay in dismantling of the closed units as the contractor to whom work was awarded did not carry out the work. The Corporation subsequently decided (June 2007) to execute the project through International Competitive Bidding (ICB). But NIT, issued in June 2007, did not receive any bid within the scheduled time and was subsequently cancelled. Fresh NIT was issued in October 2007 which received only one bid from Reliance Energy Limited (REL). The offered price of REL was ₹ 3134 crore which was considered higher by the management. REL did not agree to reduce the offered price during negotiation. The Corporation cancelled (May 2008) the tender submitted by REL and decided for negotiation with BHEL on nomination basis. Accordingly, order was placed (June 2008) on BHEL for the main EPC package at a cost of ₹ 1840 crore (excluding taxes etc.) with Price Variation Clause (PVC). The remaining packages viz. CHP, PWS and Switch Yard etc. were awarded separately to other contractors. The scheduled completion of the MPP was 39 months from

zero date (September 2008) i.e. by December 2011. It was decided by the Corporation that the existing switchyard of BTPS-A old plant was to be dismantled and removed within 11 months i.e. by May 2009 for making the space available for constructing Electrostatic Precipitator (ESP) and chimney by BHEL, which were parts of MPP.

Audit observed that clear fronts could be handed over to BHEL for construction of ESP and chimney only in December 2011 (which was the scheduled completion of MPP) after a delay of more than 30 months. The anticipated commissioning of the unit has been fixed in October 2014. The contention of the management that delays in dismantling of the closed units due to its heritage value is not acceptable as it indicates the lack of awareness while planning the project.

The work for construction of CHP was divided into two parts i.e. CHP Main and SR with a completion schedule of 25 months for each package. It was observed that the Corporation did not provide clear fronts to TRF for construction of SR as the space envisaged for storing of coal was not available due to non-stoppage of operation of the temporary ash ponds.

In the meantime, the Ministry of Environment and Forests (MoEF) granted (March 2007) environmental clearance for BTPS-A subject to the condition that the permanent ash pond should be provided with impervious lining. The work for construction of the new ash ponds was awarded (November 2008) to Hindustan Steelworks Construction Limited (HSCL) at a cost of ₹ 48.50 crore with scheduled date of completion of 18 months i.e. by March 2010. However, the above order did not include the work of providing impervious lining in the ash pond as stipulated by MoEF. The work for the construction of ash pond was completed and trial run of ash slurry disposal was done in May 2013 after a delay of 37 months. However, Jharkhand State Pollution Control Board (JSPCB) directed to provide impervious lining in bed and upstream slope of all the ponds of newly constructed ash pond before discharging of ash slurry into the pond. Thus, the new ash ponds could not be made operational unless the impervious lining was provided.

Meanwhile, TRF left the site after serving the notice of termination (September 2013) due to non-availability of site for storage of coal wherein the SR was to be constructed. Audit, therefore, observed that till the completion of the work for impervious lining, the new ash pond would not be made operational and the space for temporary ash ponds would not be available for storage of coal/construction of SR for CHP, which would consequently hamper the commissioning of the main plant. The work for impervious lining was awarded in December 2013 and the same was completed in May 2014. Management stated (June 2014) that the fresh tendering of the SR Package was under process. It was further stated that the clearance from JSPCB for charging of ash pond was awaited.

As per the original schedule, the water was to be made available to BHEL for hydro test by October 2010. Audit, however, observed that the NIT for construction of PT Plant and DM Plant relating to PWS was issued in March 2012 i.e. after a delay of seventeen months from the scheduled date of making available water to BHEL. The orders for PT and DM Plants were actually awarded in December 2012. Based on the availability of water, BHEL

subsequently revised its schedule for main plant and accordingly the revised date of hydro test was February 2014 so that the project could be commissioned in October 2014. The work for both the plants was pending (March 2014). Audit, however, observed that the revised commissioning schedule (October 2014) would not be adhered to as the construction work of the PT and DM Plants has commenced only in quarter ending September 2013.

Management stated (June 2014) that measures were being taken for the availability of DM water & Clarified water as per the requirement of the plant by completing the basic system.

Ministry stated (February 2015) that action had been taken to award the balance package of CHP including SR to BHEL.

Recommendation 3: The Corporation may take immediate action for installation of SR of CHP of BTPS-A to avoid any further delay.

3.2.3.5 Raghunathpur Thermal Power Station (RTPS 2 x 600 MW)

RTPS was an XI Plan greenfield project of the Corporation. The DPR was prepared in February 2007. The original project cost was ₹ 4122 crore. The actual expenditure incurred was ₹ 6597.29 crore (March 2014).

Table 7: Package wise details of RTPS

(₹ in crore)

Packages		Name of the Contractor	Scheduled Completion	Actual Completion	Delay in months (as on March 2014)	Awarded cost inclusive of taxes etc. on Price variation basis.	Actual Expenditure upto March 2014 including taxes, duties & Price variation etc.)
MPP	Unit # 1	REL	November 2010	Pending	40	3725	3728.66
	Unit # 2		February 2011	Pending	37		
CHP	Unit # 1	TRF Limited	October 2010	Pending	41	413.85	381.45
	Unit # 2		January 2011	Pending	38		
PWS		Mackintosh Burn Limited	May 2010	Pending	46	196	141.40
Railway Infrastructure		RITES	December 2012	Pending	15	496.69	100.26

It was observed that the Corporation issued NIT of MPP (May 2007) without having land in its possession and awarded the work in December 2007. However, both the units could not be commissioned (March 2014). The main reasons for the delay were non-handing over of clear site on time, non-availability of materials at site, non-deployment of adequate man power, slow progress in erection work, improper erection causing rectification/modification thereof, non-availability of insulation materials, delay in construction of ash handling system (both dry and wet) etc. As per contract, the Corporation was to hand over the land earmarked for main plant by January 2008 and the balance plant land by March 2008. Audit observed that out of the requirement of main plant land of 928.63 acres, the possession of the first 379.12

acres was taken over by the Corporation in February 2008 and given to the contractor for starting the civil activities. Finally, the last stretch of main plant land was handed over in March 2009 i.e. after a delay of one year. The possession of land for ash dyke and its approach road was handed over in June 2012 and October 2012 i.e. after a delay of more than 4 years. The land for boundary was handed over progressively which delayed construction of the boundary wall and resulted in safety as well as security problems during execution of the project work. Further, the Corporation could not ensure availability of medium and cooling water required for majority of the equipments due to absence of clear land for intake water corridor. There was also delay in arranging coal and resolving interface issues relating to CHP. While agreeing to the audit observations, Management stated (June 2014) that after closing of contract a detailed analysis would be carried out to ascertain the reasons for delay.

The work of construction of two Natural Draft Cooling Towers (NDCTs) - I & II was a part of the EPC contract for MPP awarded to REL. The NDCTs were meant for the two units of RTPS. The supervision and monitoring of the above construction work was done by Tata Consulting Engineers Limited (TCE). The Corporation also carried out the supervision work of NDCT-1 on its own. However, the Corporation carried out supervision work of the construction upto 24th lift and TCE stated to have carried out such supervision work upto 28th lift only through cage ladder. The passenger lift was made available only after the construction of 35th lift and thus, construction work from 29th to 35th lift remained unsupervised. Subsequently it was found that the construction was defective due to discrepancy in reinforcement of steel from 32nd to 35th lift. The construction of deficient part from 35th lift upto top of 28th lift was dismantled by February 2014. The reconstruction work above 28th lift started in April 2014. Thus, COD of one of the units of RTPS would be hampered till the completion of construction of NDCT-I.

Picture 4: Incomplete NDCT-I and Complete NDCT-II at RTPS

Audit observed that despite being aware of the fact that supervision of construction work at NDCT-I beyond 28th lift was not possible for want of passenger lift, the management did not take any step to stop the construction work till the installation of the passenger lift.

Management stated (June 2014) that committees were set up to identify the responsibility for providing lesser quantity of reinforcement in NDCT-I and recommend action to be taken in this regard. It was also stated that M/s TCE had been debarred from participation in tender for consultancy work of RTPS Phase-II.

Audit observed that the completion of CHP was rescheduled to June 2014 as against the original schedule of January 2011 mainly due to non-availability of clear fronts and inadequate safety and security measures at the site. Management accepted the audit observation (June 2014).

It was further observed that the work of PWS could not be completed due to non acquisition of full stretch of land and submerging of intake well (April 2012) on the Panchet reservoir due to cyclone. It was also observed that frequent changes in the design and drawings of the approach bridge of intake well by the Corporation also led to delay in execution of the above work. Due to non-availability of DM water, the hydro testing of Unit # 1 & 2 of RTPS was done in September 2011 and May 2012 respectively by bringing water from MTPS at a cost of ₹ 0.14 Crore. The completion period of PWS has been rescheduled to June 2014.

Management stated (June 2014) that the delay was mainly due to non-acquisition of land, which was beyond the control of the Corporation. The contention of the management is not acceptable as the issues relating to acquisition of land is obvious while implementing the greenfield project like RTPS, and the same should have been taken up at appropriate level with the Government of West Bengal, one of its stakeholders.

As per DPR of RTPS, coal for the project was to be received from mines like Barjora North, Khagra-Joydev and other blocks of ECL and seven to eight rake loads of coal were needed to be transported daily in BOBR wagons. The proposed railway corridor is located 14 Kms away from the plant with connectivity from the two stations i.e. Joychandipahar (JOC) and Bero on either side on Adra-Asansol section of the Railways. It was also envisaged in the DPR that the economics of the railway routes was to be looked into by a competent agency like RITES/IRCON. The Corporation approached (June 2007) M/s RITES Ltd for preparation of DPR for construction of the above proposed rail route from the existing Sanka station of South Eastern Railway. RITES submitted (March 2008) its report with the proposal that the most feasible and economical route was the rail alignment passing through the land owned by West Bengal Industrial Development Corporation which was earmarked for M/s Jay Balaji Industries Limited (JBIL). This proposal also envisaged traffic sharing with JBIL through the proposed railway route. Based on the above proposal, the Corporation issued (June 2010) the LOA to RITES for the work relating to detailed engineering and construction management services for construction of railway system with the completion schedule by December 2012. It was, however, observed that the work was yet to be completed (March 2014). Out of the total land requirement of 396.913 acres, the Corporation could acquire (March 2014) only 206.984 acres and the balance 189.929 acres of land was yet to be acquired from the

Government of West Bengal. Thus, the construction of railway route would not be completed unless the balance land was acquired by the Corporation.

While accepting the audit observation, management/Ministry stated (June 2014/February 2015) that they were pursuing with the state and district authorities for acquisition of the balance land.

Recommendation 4: The Corporation may take up with the Government of West Bengal for acquisition of required land for railway infrastructure of RTPS.

Recommendation 5: The Corporation may vigorously pursue with the concerned department of Government of West Bengal for acquisition of full stretch of land for early completion of plant water system of RTPS.

Recommendation 6: The Corporation may pursue with the EPC contractor of RTPS for early completion of the construction of NDCT-1 to avoid any further delay in commissioning of the linked unit.

3.3 Monitoring Mechanism

The performance of the projects was monitored by the Board of the Corporation by reviewing the exception reports for the capacity addition programme placed before it by the project department. The exception reports contained the project-wise approved schedule and actual achievement including reasons for delay of various activities. These reports were placed before the Board for information. However, such exception reports neither indicated the methodology for arresting the delays nor fixed any accountability for slippages. The Corporation was having a separate Project Planning and Monitoring (PPM) cell whose main task was *inter alia* to prepare the budget, draft status report as required by MoP, preparation of draft action taken reports and presentation for various management committee meetings and assist in preparation of the above exception reports. Audit observed that PPM cell did not carry out any monitoring activities indicating the means for arresting the delay in execution of the projects. Periodical review meetings were held with the EPC/major contractors at the Corporation as well as the plant level. At the execution level, the Chief Engineer responsible for construction of new project was also additionally monitoring the progress of the work. In case of extension projects, the existing Chief Engineer of the power stations was responsible for monitoring the progress of the project work in addition to his core function of generation of power. Thus, there was no independent authority to monitor the progress of the execution of the work at the construction level, rather monitoring was done by the authority responsible for execution of the work. Thus, the bottlenecks in execution of the projects were not addressed in time.

Timely execution of the green field projects like RTPS and KTPS were hampered due to land acquisition problem where the role of the Government of West Bengal and Government of Jharkhand, the stakeholders of the Corporation, was crucial. It was, however, observed that in the meetings of the board of the Corporation the representatives of the above governments were not apprised of such issues for expeditious settlement.

Audit observed that though review meetings were held regularly, these did not have the desired result in that the works could not be completed as scheduled. Even controllable factors like delay in finalization of drawings, delay in resolving interface issues with the contractors, delay in giving clear and marked fronts, delay in bringing the materials at site etc. were not properly addressed and sorted out in time. It was also observed that there was no defined and proper evaluation of the performance of contractors etc.

The Corporation decided (April 2012 i.e. after the end of the XI Plan Period), to form a Committee on Management Control (CMC) with the task of analyzing delays of new projects. The CMC conducted only three meetings during the period from April 2012 to November 2013.

It was, however, observed that the issues identified in the first meeting remained unresolved even in the third meeting (November 2013), thus, highlighting the necessity of strengthening the monitoring mechanism. Further, CMC recommended (August 2012) to form a dedicated project monitoring cell and adoption of modern tools and techniques with a view to strengthening the project monitoring aspect and closely monitor the projects. In this regard, it was observed that though the Corporation created (April 2013) a dedicated project monitoring cell called the Corporate Monitoring Group (CMG), the same was yet to be made functional (March 2014).

The IT based monitoring is a system which enables the management to receive all information about the project to be monitored and programme in real time thereby helping to highlight the critical issues, the cost overruns and other aspects related to be reported at the various levels of management. The system can also alert the authority for appropriate action if the project is not progressing as per schedule, cost overruns etc. CEA also requested (January 2012) the power utilities to utilise the IT based monitoring to track the daily progress of ongoing power projects. It would also expedite the process of getting clearances from various agencies and be helpful in placing orders of equipments on time. It was observed that the Corporation installed (June 2006) Primavera Project Management Software for IT based monitoring of the projects under execution at a cost of ₹ 11.58 crore. However, the system remained unutilized and therefore the Corporation deprived itself of the benefits of the above system. This fact was also pointed out in the Performance Audit Report of the Capacity Addition Programme during the X Plan (Annual Report of the Corporation for 2007-08).

Management in its reply (June 2014) did not offer any comment on the deficient monitoring mechanism for execution of the XI Plan projects as pointed out by audit. It was, however, stated that the Corporation was going to install a project management mechanism for its XII Plan projects wherein a system would be incorporated to cover the project monitoring.

While accepting the audit observations, Ministry stated (February 2015) that the Corporation had taken action for strengthening the project monitoring system including IT based monitoring system.

3.4 Impact Analysis

The Corporation set the target of capacity addition of nine units having capacity of 4700 MW (through its own projects) during XI Plan period (2007-2012). However, only one unit of 500 MW could be added during XI Plan period with a delay of 17 months from the scheduled date of commissioning, which is only 10.6 *per cent* of the target. During the period from April 2012 to March 2014, the Corporation further added four units having capacity of 2000 MW (42.55 *per cent*) with delays ranging from 21 to 37 months from the target date of completion. Power projects with four units having capacity of 2200 MW were under progress (March 2014). These projects were lagging behind their scheduled commissioning date ranging from 34 months to 49 months. The original approved cost of the above nine units was ₹ 19668 crore while the actual cost of the same was ₹ 26979 crore (March 2014) involving cost overrun of ₹ 7311 crore (Annexure-VI).

3.4.1 Cost overrun

The approved cost of the five units already commissioned and one unit (KTPS Unit # 2) in advanced stage of commissioning as on March 2014 was ₹ 13286 crore (excluding margin money). Actual cost incurred against those six units was ₹ 17901 crore upto March 2014 with a cost overrun of ₹ 4615 crore (35 *per cent* of the original approved cost). Analysis of cost overrun revealed that interest during construction (IDC) was increased by ₹ 2366 crore, overhead cost increased by ₹ 450 crore, increase in cost of non-EPC work was ₹ 811 crore, actual cost of EPC contract increased by ₹ 778 crore, increase in cost of land & site development by ₹ 199 crore, while there was decrease of ₹ 11 crore towards other cost. Audit observed that ₹ 1904 crore (41 *per cent*) of the above cost overrun (IDC of ₹ 1771 crore and overhead of ₹ 133 crore) was due to delay in execution of projects. It was further observed that ₹ 500 crore of cost overrun was attributed to wrong estimation of cost of land (₹ 183 crore) and overhead cost (₹ 317 crore) at the time of preparation of cost of projects. It is worth mentioning that the Corporation did not consider the land cost and overhead cost of greenfield projects like KTPS while arriving at the estimated project cost which were ₹ 133 crore and ₹ 317 crore respectively thereby indicating unrealistic assessment. (Annexure VI contd.)

The approved cost of three units under construction was ₹ 6382 crore. The actual cost incurred upto March 2014 was ₹ 9078 crore involving cost overrun of ₹ 2696 crore (42 *per cent* of the original approved cost). The major elements of such cost overrun were IDC of ₹ 1287 crore, land & site development of ₹ 72 crore, cost of EPC contract of ₹ 1262 crore and non-EPC work of ₹ 179 crore. There was a decrease in overhead cost by ₹ 113 crore from the original approved cost. IDC was increased mainly due to delay in execution of the project. The cost of land of Greenfield project (RTPS) was not assessed realistically as the actual cost incurred upto March 2014 was ₹ 112 crore against the original approved cost of ₹ 40 crore (Annexure VI contd.). Further, the cost of essential infrastructure like railway corridor and township etc. of BTPS A and RTPS was estimated on a lower side as against the original approved cost of ₹ 370 crore, the actual cost incurred was ₹ 549 crore and the work was still in progress (March 2014).

Audit, therefore, observed that the project cost increased by ₹ 3078 crore towards IDC (₹ 3058 crore) and overhead (₹ 20 crore) mainly on account of delay in execution of the projects. KTPS and RTPS were the greenfield projects where acquisition of land was one of the primary activities. It was, however, observed that the Corporation did not consider the cost of land of such projects realistically as the original approved project cost of KTPS did not contain the land cost, whereas the land cost of RTPS was assessed abnormally on lower side. Further, the project cost of essential infrastructure like railway corridor and township was also not considered realistically.

Management in its reply (June 2014) indicated the cost over-run by comparing the actual/provisional cost with the revised project cost instead of original approved cost. This is not tenable as the project cost was revised from time to time due to delay in execution and unrealistic assessment of various components of cost. The management, however, did not offer any comment on unrealistic assessment of various components of project cost as pointed out by audit.

Ministry in its reply (February 2015) accepted that the increase in project cost was due to delay in execution.

3.4.2 Surplus power

The Corporation while planning for capacity addition of XI Plan (4700 MW) and X Plan spill over projects (1000 MW) decided to allocate power to Delhi Transco Limited (DTL) – 2500 MW, Jharkhand State Electricity Board (JSEB) - 800 MW and other SEBs/ DISCOMs-2150 MW with surplus power of 250 MW. Accordingly, long term Power Purchase Agreements (PPA) was entered into (March 2006 to May 2007) with DTL and other SEBs / DISCOMs. PPA with DTL specified sale of round the clock power of 2500 MW in phases from December 2006 onwards which was to be supplied by the Corporation from its upcoming new generating units namely, MTPS Unit # 6, 7 & 8, CTPS Unit # 7 & 8, DSTPS Unit # 1 & 2 and KTPS Unit # 1 & 2. As per order (March 2007) of Delhi Electricity Regulatory Commission (DERC), Power purchased by DTL has been allocated to the three Distribution companies (DISCOMs) in the National Capital territory of Delhi, namely, BSES Rajdhani Power Ltd (BRPL), BSES Yamuna power Ltd (BYPL) and North Delhi Power Ltd (NDPL). However, due to delay in commissioning of the projects, the Corporation could not supply power as scheduled in the PPA. Subsequently, considering the heavy local demand in the valley area, the Corporation requested the above three DISCOMs through MoP to surrender the power allocated to them. Consequently, the three DISCOMs surrendered power to the tune of 1980 MW which was confirmed by DERC in May 2012 and November 2012. The Corporation commissioned new generating units with a capacity of 3500 MW during the period from April 2007 to March 2014. The Corporation could, however, allocate 2525 MW only (DTL-520, other SEBs/DISCOMs-1400 MW, Corporation's own load 605 MW) with surplus power of 975 MW. It was observed that this 975 MW surplus power was 39 *per cent* of the capacity (2500 MW) of five new units commissioned under XI Plan project. It was further observed that there was proposed allocation of only 1475 MW (other

SEBs/DISCOMs-750 MW and Corporation's own load 725 MW) of power in respect of the power generating units (2200 MW) yet to be commissioned (March 2014) with a surplus power of 725 MW which is 33 *per cent* of the capacity of such upcoming units (Annexure-VII). As a result of this, the Corporation was not in a position to recover fixed cost ranging from ₹ 1.82 to ₹ 2.40 per unit[13] (kilowatt hour) of power in respect of the generating units already commissioned under XI Plan. Moreover, 39 *per cent* (₹5680 crore) of the total investment (₹14563 crore[14]) made for capacity addition of 2500MW generating units remained unutilized.

The management while accepting the audit observation stated (June 2014) that prospective beneficiaries were being pursued for allocation of surplus power. Ministry also stated (February 2015) that the Corporation had been exploring for allocation of surplus power.

3.4.3 Loss of additional Return on Equity

In terms of CERC Regulation 2009 applicable for the period 2009-2014, an additional return on equity at the rate of 0.5 *per cent* is allowed each year during the life of the projects if they are commissioned within the specified timeline. This guideline is applicable w.e.f. 1st April 2009. It was observed that all the power projects earmarked for execution during the XI Plan period were not commissioned within the timeline as specified. The ongoing projects were also lagging behind such specified timeline. Therefore, the Corporation lost the opportunity to earn additional return on equity of ₹ 1011.73 crore for all the power projects of XI Plan period. [Completed projects ₹ 671.29 crore and ongoing projects ₹ 340.44 crore (Annexure VIII)].

The management stated (June 2014) that the loss of incentive due to delay in execution of projects during the XI Plan Period were beyond the control of the Corporation and could not be termed as foregone additional return on equity. This is not acceptable in view of the fact that various reasons for delay were under the control of the management as discussed in Para 3.2.

Ministry noted (February 2015) the audit observation.

3.4.4 Performance of the units commissioned under XI Plan

3.4.4.1 Capacity utilisation

Audit observed that the capacity utilisation of all the five units commissioned under XI Plan was lower and ranged between 26.59 *per cent* and 68.37 *per cent* upto March 2014 since their respective CODs (excepting MTPS # 7 during 2012-13 where the capacity utilisation was 74.52 *per cent*) (Annexure - IX). It was also observed that the main reason for such low capacity utilisation was forced outage of the units due to boiler tube leakages, problems/troubles in Turbo Generator, electrical system and Control & Instrumentation etc.

[13] MTPS unit # 7 & 8- ₹ 1.82/ unit, DSTPS unit # 1 & 2- ₹ 2.37/ unit and KTPS unit # 1- ₹ 2.40/ unit

[14] MTPS Unit # 7 & 8- ₹ 5363 crore, DSTPS Unit # 1 & 2- ₹ 5862 crore and KTPS Unit # 1- ₹ 3338 crore (50% of ₹ 6676 crore)

The units could not generate 2345.27 MU of power due to the above outages for which the Corporation suffered loss of ₹ 476.66 crore towards non-recovery of fixed cost during the period from 2011-12 to 2013-14 (Annexure - X). The other major reasons for low capacity utilisation of the units were non-availability of prospective customers mainly on account of higher cost of power (refer to para 3.4.2) and shortage of coal.

Ministry in its reply (February 2015) stated that the lower capacity utilisation of the units was due to various operational problems as pointed out by audit.

3.4.4.2 Auxiliary power consumption

The auxiliary power consumption is an important index to determine as to how efficiently a power plant is operating. It is, therefore, essential to reduce the same to acceptable limits. Frequent outages of the power plants resulted in high auxiliary power consumption. Further, inefficient Air Pre-Heating (APH) system also leads to increase in such consumption. CERC fixed the norms for auxiliary power consumption of the power plants depending upon their capacity and expressed as a percentage of the gross energy generated. It was observed that the auxiliary power consumption of Unit # 7 of MTPS in 2011-12, both the units of DSTPS in 2012-13, Unit # 2 of DSTPS and Unit # 1 of KTPS in 2013-14 was more than the CERC norms. Due to such excess auxiliary power consumption (48.47 MU), the Corporation suffered loss of revenue to the extent of ₹ 20.05 crore (Annexure XI). The main reasons for excess auxiliary consumption were inefficient operation of other auxiliary equipments like Induced Draft (ID)/ Primary Air (PA)/ Forced Draft (FD) fans and APH.

Ministry stated (February 2015) that frequent shut down and start-up of the units due to inefficient operation of various auxiliary equipments was the main reason for higher auxiliary power consumption.

3.4.4.3 Fuel consumption

The efficient and economic use of the fuel assumes a very significant role in power generation as the cost of fuel (coal and oil) constitutes about 70 *per cent* of the total cost of power generation. As per CERC regulation, gross station heat rate is fixed for a particular unit as per its capacity. However, consumption of coal depends upon the gross calorific value of the coal received by a particular unit for a particular period. It was observed in audit that the new units maintained the required station heat rate as per CERC norms.

Oil is used for start-up and stabilization processes. CERC fixed norms for consumption of oil for different thermal power units for different periods. The norms for oil consumption of the above five units was 1.0 ml/Kwh. Audit, however, observed that the consumption of oil in respect of two units of DSTPS and one unit of KTPS was more than the norms upto March 2014. As the excess oil consumption was not recoverable through tariff, the Corporation suffered loss of ₹ 88.89 crore being the cost of excess consumption of oil (Annexure - XI). Ministry stated (February 2015) that frequent shut down and start-up of the units due to failure of boiler tubes, inadequate ash pond capacity and shortage of coal were the main reasons for higher oil consumption.

CHAPTER 4
CONCLUSION

Out of the target of 4700 MW (own project), actual accomplishment during XI Plan period was only 500 MW (10.6 *per cent*) with a delay of 17 months. Of the remaining 4200 MW, only 2000 MW were added during April 2012 to March 2014 with delays ranging from 21 to 37 months, while the balance 2200 MW was still under execution (March 2014) which were lagging behind by 34 to 49 months from the scheduled COD.

The Corporation did not sort out the problems associated with availability of land in respect of its three greenfield projects prior to commencement of their execution which adversely affected the main activities of such projects. Further, completion schedule of associated facilities/packages (viz. CHP, PWS) was not fixed in line with the project completion target for which some units could not achieve COD even after the completion of MPPs.

The required coal was not properly linked and/or arranged in time. Railway infrastructure for transporting the required coal was not developed in line with the completion schedule of the projects and the bottlenecks of the existing facilities were not addressed properly. Thus, availability of coal was not ensured.

Facilities for ash disposal were not created properly resulting in evacuation problems as well as environment degradation.

There was no independent authority to monitor the progress of the execution of the work at the construction level; rather the monitoring was done by the authority responsible for execution of the work indicating lack of effective monitoring in execution of projects.

There was a cost overrun of ₹ 7311 crore (37 *per cent* of the original approved cost) of the XI Plan projects, of which ₹ 3078 crore was on account of delay in execution of the projects. Further, the Corporation lost the opportunity to earn additional return on equity due to delay in completion of the projects.

There was surplus power of 1700 MW out of the total 4700 MW capacity addition in respect of XI Plan projects as the Corporation was not able to allocate the same to the consumers.

Thus, failure of the Corporation in achieving its target of capacity addition during the XI Plan period did not fulfill the objectives of National Electricity Policy of GoI to that extent.

It is worth mentioning that the management did not take any effective measures on the deficiencies pointed out in the Performance Audit Report on the Capacity Addition Programme during the X Plan by the Corporation (refer Para 2.1), as similar nature of deficiencies recurred in execution of the XI Plan projects also.

New Delhi
Dated: 17 June 2015

(PRASENJIT MUKHERJEE)
Deputy Comptroller and Auditor General
and Chairman, Audit Board

Countersigned

New Delhi
Dated: 19 June 2015

(SHASHI KANT SHARMA)
Comptroller and Auditor General of India

ANNEXURES

Annexure - I
(Refer to Para 3.2.1)

Project-wise coal requirement and linkage thereof					
Unit (Capacity)	**Coal Requirement as per DPR (MMtPA)**	**Source as envisaged in DPR**	**Allotted Coal Block**	**Linkage with CIL**	**FSA Quantity (MMtPA)**
RTPS U # 1 & 2 (2 x 600)	Although the coal quantity as per DPR was 7.23, the same was reduced to 3.89 considering the grade of coal as per FSA.	Barjora (North), Khagra-Joydev, Pandaveshwar, Samla mines & Mugma blocks of ECL.	SaharpurJamarpani (Not developed so far)	RTPS-I – BCCL (August 2013)	U# 1 =1.76
				RTPS-II – CCL (September 2013)	U# 2 = 2.133
KTPS U # 1 & 2 (2 x 500)	4.69	Sheregara/ Ganeshpur blocks in North Karanpura in Central Coalfields limited (CCL).	-	MCL (December 2012)	U# 1 & 2 =4.62
DSTPS U # 1 & 2 (2 x 500)	3.9	Not stated in DPR.	-	DSTPS I - CCL (September 2013)	U# 1=1.975
				DSTPS II - BCCL (July 2013)	U# 2=1.756
CTPS U # 7 & 8 (2 x 250)	2.19	Existing sources of BCCL & CCL coal fields and middlings from nearby washeries at Dugdha.	Gondulpara (not developed so far)	CCL (December 2012)	U# 7=1.03
					U# 8 = FSA not done
BTPS 'A' (1 x 500)	2.03	CCL	-	CCL (September 2013)	1.97
MTPS U # 7 & 8 (2 x 500)	3.85	Barjora (North), Khagra-Joydev & Kasta (East).	Barjora (North) [Production started since March 2011- Average receipt of coal- 1.7 MMTPA], Khagra-Joydev [not developed so far], [Kasta (East) surrendered]	Short term MoU (October 2011) with ECL for 0.97 MMTPA	FSA not done.
MTPS U # 5 & 6 (2 x 250)	2.08	Mines of ECL and BCCL	-	Combined linkage for MTPS Units # 1 to 6 with ECL, BCCL and MCL for a quantity of 5.6 MMt. Considering capacity of the units FSA quantity arised at 2.09 MMt (5.6/1340MW X 500 MW)	2.09
Total (MMtPA)	**22.63**				**17.334**

Annexure - II

(Refer Para No.- 3.2.2)

Statement showing delay in tendering and execution of the contracts as on March 2014

Plant/Station	Name of the package	Name of the contractor	Mode of Tendering	Date of Award	From NIT to Tender opening (Days)	From Tender opening to Techno commercial approval & price bid opening (Days)	Total time taken from NIT to approval of techno commercial evaluation	Delay in techno commercial evaluation (Days)	From Techno commercial approval & price bid opening to approval of CA for placement of order (Days)	Total time taken from NIT to approval for placement of order (Days)	Delay in tendering from NIT (Days)	Awarded price (Rs in Crore)	Contractual Time for completion (in Months)		Scheduled date of completion		Actual date of completion		Delay in completion from scheduled to actual (in months)	
A	B	C	D	E	F	G	H=F+G	I=H-133	J	K=F+G+J	L=K-161	M	N	O	P	Q	R	S	T	U
Norms as per Works & Procurement Manual of DVC -					**49 days**	**84 days**	**133 days**		**28 days**		**161 days**		**Unit # 1**	**Unit # 2**	**Unit # 1**	**Unit # 2**	**Unit # 1**	**Unit # 2**	**Unit # 1**	**Unit # 2**
MTPS PHII (2x500)	MPP	BHEL	Nomination	January 2007	*Negotiation*							3538	39	42	March 2010	June 2010	August 2011	August 2012	17	26
	CHP	Elecon Engineering Company Ltd.	ICB	July 2007	66	22	88	-45	34	122	-39	378.51	26		September 2009		Pending		54	
	PWS	Larsen & Toubro Ltd.	ICB	January 2008	49	30	79	-54	65	144	-17	93.23	20		September 2009		May 2012		32.5	
	Railways	RITES	Nomination	December 2012	*Nomination/Single Tender*							158.55	30		June 2015		Pending		NA	
KTPS (2X500)	MPP	BHEL	ICB	June 2007	64	**Single bid and finalised in consultation with CEA**						3280.52	35	38	June 2010	Septem-ber 2010	July 2013	Pending	37	42
	CHP	Larsen & Toubro Ltd.	ICB	March 2008	77	53	130	-3	32	162	1	329.88	27	30	June 2010	Septem-ber 2010	April 2013	June 2013	34	33
	PWS	Kirloskar Brothers Ltd.	ICB	April 2008	85	43	128	-5	55	183	22	166.77	22		February 2010		Pending		49	
	Railways	RITES	Nomination	October 2008	*Nomination/Single Tender*							188.05	30		April 2011		Pending		35	

DSTPS (2X500)	MPP	BHEL	ICB	July 2007	74	***Single bid and finalised in consultation with CEA***						3228.8	36#	39#	Augu-st 2010	Novem-ber 2010	May 2012	March 2013	21	28
	CHP	Thyssen-krupp Industries India Pvt. Ltd.	ICB	March 2008	73	23	96	-37	77	173	12	430	27	30	June 2010	Septem-ber 2010	January 2012	Decem-ber 2012	19	27
	PWS	VA Tech Wabag	ICB	April 2008	79	34	113	-20	49	162	1	134.49	20		December 2009		November 2011		23	
	Railways	RITES	Nomination	June 2009	***Nomination/Single Tender***							142.79	30*		January 2011		June 2012		17	
RTPS (2X600)	MPP	Reliance Energy Ltd.	ICB	December 2007	74	*30*	104	-29	101	205	44	3725	35	38	Novem-ber 2010	Febru-a-ry 2011	Pending	Pending	40	37
	CHP	TRF Ltd.	ICB	July 2008	78	34	112	-21	22	134	-27	413.85	27	30	October 2010	Janua-ry201-1	Pending		41	38
	PWS	Mackintos-h Burn Ltd.	ICB	July 2008	92	26	118	-15	23	141	-20	196	22		May 2010		Pending		46	
	Railways	RITES	Nomination	June 2010	***Nomination/Single Tender***							496.69	30		December 2012		Pending		15	
BTPS 'A' (1X500)	MPP	BHEL	Nomination	June 2008	***Negotiation***							1840	39**	NA	Decem-ber 2011	NA	Pend-ing	NA	27	NA
	CHP	Techpro Systems Ltd.	ICB	December 2012	80	92	172	39	106	278	117	146.56	25	NA	January 2015	NA	Pend-ing	NA	NA	NA
	SR	TRF Ltd.	ICB	December 2012	101	78	179	46	99	278	117	31.65	25	NA	January 2015	NA	Pend-ing	NA	NA	NA
	DM	VA Tech Wabag	ICB	December 2012	110	88	198	65	80	278	117	21.36	18	NA	June 2014	NA	Pend-ing	NA	NA	NA
	PT	McNally Bharat Engineer-ing Ltd.	ICB	December 2012	99	97	196	63	73	269	108	48.78	20	NA	August 2014	NA	Pend-ing	NA	NA	NA
***Note**	**1. The dates are calculated on the basis of days mentioned in the DVC Works and Procurement Manual 2006 & 2009 (Revised)**																			
	2. NA - Not applicable																			
	3. CA - Competent Authority																			
	*** Zero date - 30.07.2008, ** Zero date - 16.09.2008 & # Zero date - 03.08.2007**																			

Annexure - III
(Refer to Para 3.2.3)

Delay in commissioning of projects in comparison to CERC norms as well as Corporation's own target as on March 2014												
Name of project		Capacity (MW)	Greenfield/ Extension/ Replacement Projects	Investment Approval	Time frame COD as per CERC Regulations (in months)	Scheduled COD as per CERC Regulations	Scheduled COD Fixed by the Corporation	Delay from CERC COD to Scheduled COD	Actual COD	Anticipated COD	Delays from scheduled COD (in months)	Delays from scheduled COD as per CERC Regulation (in months)
A		B	C	D	E	F = (C + D)	G	H = (G - F)	I		J = (I - G)	K = (I - F)
10th plan spill over	MTPS U#5	250	Extension	August 2005	31	March 2008	January 2007	0	February 2008		13	-1
	MTPS U#6	250	Extension	August 2005	35	July 2008	March 2007	0	September 2008		18	2
	CTPS U#7	250	Extension	August 2005	31	March 2008	January 2007	0	November 2011		58	44
	CTPS U#8	250	Extension	August 2005	35	July 2008	March 2007	0	July 2011		52	36
11th plan projects	MTPS U#7	500	Extension	August 2006	42	February 2010	March 2010	0	August 2011		17	18
	MTPS U#8	500	Extension	August 2006	48	August 2010	June 2010	0	August 2012		26	24
	DSTPS U#1	500	Greenfield	April 2007	44	December 2010	August 2010	0	May 2012		21	17
	DSTPS U#2	500	Greenfield	April 2007	50	June 2011	November 2010	0	March 2013		28	21
	KTPS U#1	500	Greenfield	August 2006	44	April 2010	June 2010	2 Months	July 2013		37	41
	KTPS U#2	500	Greenfield	August 2006	50	October 2010	September 2010	0		June 2014	45	44
	RTPS PH-I U#1	600	Greenfield	April 2007	44	December 2010	November 2010	0		July 2014	44	43
	RTPS PH-I U#2	600	Greenfield	April 2007	50	June 2011	February 2011	0		March 2015	49	45
	BTPS 'A'	500	Replacement	August 2006	42	February 2010	December 2011	22 Months		October 2014	34	56

Annexure - IV

(Refer Para No.-3.2.2)

Statement of cost estimation and awarded value of the contracts

Plant/ Station	Name of the package	Name of the contractor	Departmental Estimate (₹ in Crore)	Awarded price (₹ in Crore)	Deviation from Departmental estimate (₹ in Crore)	Deviation from Departmental estimate (%)	Reasons for delay in tendering	Reasons for variation in Departmental estimate and awarded price
A	B	C	D	E	F	G	H	I
MTPS PH-II (2x500)	MPP	BHEL		3538.00				
	CHP	Elecon Engineering Company Ltd.	320.00	378.51	58.51	18.28	No Delay	Reduced completion period, and evaluated price is not as per fair price and evaluated price was not considered properly.
	PWS	Larsen & Toubro Ltd.	90.00	93.23	3.23	3.59	No Delay	No reason for variation
	Railways	RITES		158.55				
KTPS (2X500)	MPP	BHEL	3464.00	3280.52	-183.48	-5.30		Single bid in consultancy with CEA
	CHP	Larsen & Toubro Ltd.	266.31	329.88	63.57	23.87	No Delay	Linked with commonwealth games and re-tendering takes 2-3 months extra.
	PWS	Kirloskar Brothers Ltd.	125.70	166.77	41.07	32.67	The quote price is higher than estimated cost of the qualified bidders hence, snap bid was called for and delayed the process.	The quoted price was higher than estimated cost of the qualified bidders hence, snap bid was called for and delayed the process. To maintain the stringent time scheduled, and probable time and cost overrun due to sharp rise in price.
	Railways	RITES		188.05				
DSTPS (2X500)	MPP	BHEL	3440.00	3228.80	-211.20	-6.14	In consultancy with CEA	Single bid in consultancy with CEA
	CHP	Thyssenkrupp Industries India Pvt. Ltd.	295.53	430.00	134.47	45.50	Extension of bid submission date	Offer price of L1 was 66% higher than the estimated cost, then snap bid was asked from the bidders during snap bid the L1 price was 46.17%. Finally the work was awarded to L1 with negotiated price of 45.50 % higher than estimated cost. Reasons for higher quoted price accepted were re-tendering will hamper the time schedule of the COD, the cost of borrowed earth of Rs 7.5 crore was not included in the estimate, steel price was hiked around 25-30 % during last 3 months.
	PWS	VA Tech Wabag	145.22	134.49	-10.73	-7.39	No Delay	Quoted price was compared with MTPS PH-II. No reasons mentioned
	Railways	RITES		142.79				

RTPS (2X600)	MPP	Reliance Energy Ltd.	3892.00	3725.00	-167.00	-4.29	Single bid, delay was due to snap bid, extension of bid submission time and seeking clarification and negotiation with REL.	
	CHP	TRF Ltd.	402.00	413.85	11.85	2.95	No Delay	The estimate was prepared on the basis of L1 offered price of KTPS CHP which was latest order at that time.
	PWS	Mackintosh Burn Ltd.	209.00	196.00	-13.00	-6.22	No Delay	Quoted price was compared with MTPS PH-II and KTPS. No reasons mentioned
	Railways	RITES		496.69				
BTPS 'A' (1X500)	MPP	BHEL		1840.00				
	CHP	Techpro Systems Ltd.	191.66	146.56	-45.10	-23.53	Extension of bid submission date by 25 days, clarification regarding scope of work which includes SR part	Due to present market driven forces in the perfect competitive scenario and the price discovery through open tendering is the appropriate indicator of present trend of the price.
	SR	TRF Ltd.	58.90	31.65	-27.25	-46.26	Extension of bid submission date by 15 days.	The L1 bidder quoted a low rate and ultimately agreed to execute the work at that price.
	DM	VA Tech Wabag	27.66	21.36	-6.30	-22.78	Extension of bid submission date by 23 days, clarification regarding scope of work which includes SR part	L1 bidder commissioned DM Plant in MTPS Ph II, DSTPS and KTPS in the recent past, are already mobilised in the valley area and might have quoted at a very competitive price.
	PT	McNally Bharat Engineering limited	67.01	48.78	-18.23	-27.20	Extension of bid submission date by 23 days.	L1 bidder is a running contractor at BTPS, DVC and already has an establishment at BTPS, Therefore, the bidder might have acquainted with the local site conditions, Labour problems etc. and quoted a competitive price.

Note: NA - Not applicable

Annexure - V
(Refer para no-3.2.2)

Statement showing the Delay analysis by the management														
Plant/station	**Name of the package**	**Name of the Contractor**	**Whether committee formed for Delay analysis**	**Whether the committee submitted Delay analysis report**	**Action taken on the Delay analysis report**	**Contractual Time for completion (in Months)**		**Scheduled date of completion**		**Actual date of completion**		**Delay in completion from scheduled to actual/as on March 2014 (in months)**	
A	B	C	D	E	F	G	H	I	J	K	L	M	N
						Unit # 1	Unit # 2	Unit # 1	Unit # 2	Unit # 1	Unit # 2	Unit # 1	Unit # 2
MTPS PHII (2x500)	MPP	BHEL	YES	Submitted	NA	39	42	March 2010	June 2010	August 2011	August 2012	17	26
	CHP	Elecon Engineering Company Ltd.	YES	Report is under process	NA	26		September 2009		Pending		54	
	PWS	Larsen & Toubro Ltd.	YES	Approved	LD not imposed	20		September 2009		May 2012		32.5	
KTPS (2X500)	MPP	BHEL	YES	Submitted	NA	35	38	June 2010	September 2010	July 2013	Pending	37	42
	CHP	Larsen & Toubro Ltd.	YES	Final Report is under process	NA	27	30	June 2010	September 2010	April 2013	June2013	34	33
	PWS	Kirloskar Brothers Ltd.	YES	Report is under process	NA	22		February 2010		Pending		49	
DSTPS (2X500)	MPP	BHEL	YES	Report is on the verge of submission	NA	36#	39#	August 2010	November 2010	May2012	March 2013	21	28
	CHP	Thyssenkrupp Industries India Pvt. Ltd.	YES	Approved	LD imposed	27	30	June 2010	September 2010	January 2012	December 2012	19	27
	PWS	VA Tech Wabag	YES	Report is placed for approval	NA	20		December 2009		November 2011		23	
RTPS (2X600)	MPP	Reliance Energy Ltd.	No	NA	NA	35	38	November 2010	February 2011	Pending	Pending	40	37
	CHP	TRF Ltd.	No	NA	NA	27	30	October 2010	January 2011	Pending		41	38
	PWS	Mackintosh Burn Ltd.	No	NA	NA	22		May 2010		Pending		46	
BTPS 'A' (1X500)	MPP	BHEL	YES	Interim delay analysis report submitted	NA	39**	NA	December 2011	NA	Pending	NA	27	NA
	CHP	Techpro Systems Ltd.	No	NA	NA	25	NA	January 2015	NA	Pending	NA	NA	NA
	SR	TRF Ltd.	No	NA	NA	25	NA	January 2015	NA	Pending	NA	NA	NA
	DM	VA Tech Wabag	No	NA	NA	18	NA	June 2014	NA	Pending	NA	NA	NA
	PT	McNally Bharat Engineering Limited	No	NA	NA	20	NA	August 2014	NA	Pending	NA	NA	NA
Note	**NA - Not applicable**												
	**** Zero date - 16.09.2008 & # Zero date - 03.08.2007**												

Annexure - VI
(Refer to Para 3.4)

Statement of approved cost and actual cost as on March 2014				
				₹ in crore
Name of the project	**Original approved cost**	**Actual cost as on 31st March 2014**	**Cost over run**	**Percentage**
A	**B**	**C**	**D=C-B**	**E**
MTPS U # 7 & 8	4,617	5,363	746	
DSTPS U# 1 & 2	4,457	5,862	1,405	
KTPS U# 1 & 2	4,212	6,676	2,464	
Sub Total (Completed projects)	**13,286**	**17,901**	**4,615**	**35**
RTPS U # 1 & 2	4,122	6,597	2,475	
BTPS 'A'	2,260	2,481	221	
Sub Total (Under construction)	**6,382**	**9,078**	**2,696**	**42**
Grand Total (Completed + Under construction)	**19,668**	**26,979**	**7,311**	**37**
Note: Working capital margin has not been considered in the cost				

contd...

Annexure - VI (contd)
(Refer to Para 3.4.1)

Break up of cost over-run as on 31st March 2014 (₹ in crore)

Projects	Sl.No.	Expenditure	MTPS 7&8 Original	MTPS 7&8 Actual	MTPS 7&8 Increase	MTPS 7&8 Increase due to delay	DSTPS Original	DSTPS Actual	DSTPS Increase	DSTPS Increase due to delay	KTPS Original	KTPS Actual	KTPS Increase	KTPS Increase due to delay	Total increase	Total increase of IDC & OH due to delay	Increase due to wrong estimation
Completed Projects	1	EPC	3820	3801	-19	0	3872	4037	165	0	3309	3941	632		778		
	2	Non-EPC	300	479	179	0	113	425	312	0	427	747	320		811		
	3	Land	0	16	16	0	100	150	50	0	0	133	133		199		183
	4	IDC	275	913	638	346	300	1032	732	429	476	1472	996	996	2366	1771	
	5	Overhead	115	153	38	38	60	155	95	95	0	317	317		450	133	317
	6	Others	107	1	-106	0	12	63	51	0	0	66	66		11		
	7	**Total**	**4617**	**5363**	**746**	**384**	**4457**	**5862**	**1405**	**524**	**4212**	**6676**	**2464**	**996**	**4615**	**1904**	**500**

Note: Increase in overhead of KTPS has been considered as increase due to wrong estimation as no figure was taken in estimation.

Projects	Sl.No.	Expenditure	RTPS Original	RTPS Actual Expenditure	RTPS Increase	RTPS Increase due to delay	BTPS-A Original	BTPS-A Actual Expenditure	BTPS-A Increase	BTPS-A Increase due to delay	Total increase	Total increase of IDC & OH due to delay	Increase due to wrong estimation
Incomplete Projects	1	EPC	2,991	4,247	1,256		1,999	2,005	6	-	1,262		
	2	Non-EPC	300	385	85		70	164	94	-	179		
	3	Land	40	112	72		-	-	-	-	72		72
	4	IDC	630	1,747	1,117	1117	126	296	170	170	1,287	1,287	
	5	Overhead	159	106	-53	-53	65	5	-60	-60	-113	-113	
	6	Others	2	-	-2		-	11	11	11	9		
	7	**Total**	**4,122**	**6,597**	**2,475**	**1064**	**2,260**	**2,481**	**221**	**121**	**2,696**	**1,174**	**72**

Note-1: Working capital margin has not been considered in the cost

Note-2: Increase in IDC and Overhead are due to delay in execution

Annexure - VII
(Refer to Para 3.4.2)

Statement of Power allocation vis-à-vis surplus (figures in MW)							
Name of the Units			**Capacity MW**	**Retained by DTL**	**Other SEBs**	**DVC load**	**Surplus**
A			**B**	**C**	**D**	**E**	**F = B-(C+D+E)**
Completed Projects	**10th Plan spill over projects**	MTPS 5&6	500	100	250	150	0
		CTPS 7&8	500	300	200	0	0
	11th Plan Projects	MTPS 7&8	1000	120	400	180	300
		DSTPS 1&2	1000	0	400	150	450
		KTPS 1	500	0	150	125	225
		Total	**3500**	**520**	**1400**	**605**	**975**
Incomplete Projects	**11th Plan Projects**	KTPS 2	500	0	150	125	225
		RTPS 1&2	1200		400	400	400
		BTPS A	500		200	200	100
Total			**2200**	**0**	**750**	**725**	**725**
Grand Total			**5700**	**520**	**2150**	**1330**	**1700**

Annexure - VIII
(Refer to Para 3.4.3)

Statement of calculation of Additional Return on Equity (RoE)												
Sl No.	**Name of the Project**	**Unit No.**	**Timeline as per CERC Regulation (Months)**	**Date of investment approval**	**Scheduled COD as per CERC**	**Actual COD**	**Whether eligible for additional RoE**	**Completed cost (₹ in crore)**	**Debt @ 70% (₹ in crore)**	**Equity @ 30% (₹ in crore)**	**Rate of additional return on equity**	***Total loss of additional return on equity (₹ in crore**
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J = (I x 70%)**	**K = (I x 30%)**	**L**	**M = (K x L x 25)**
Completed Projects												
1	MTPS	7	42	August 2006	February 2010	August 2011	YES	5363.45	3754.415	1609.035	0.50%	201.13
2	MTPS	8	48		August 2010	August 2012	YES					
3	DSTPS	1	44	April 2007	December 2010	May 2012	YES	5861.51	4103.057	1758.453	0.50%	219.81
4	DSTPS	2	50		June 2011	March 2013	YES					
5	KTPS	1	44	August 2006	April 2010	July 2013	YES	6676.32	4673.424	2002.896	0.50%	250.36
6	KTPS (advanced stage of completion)	2	50		October 2010	Not declared	YES					
												671.30
Ongoing Projects												
7	RTPS	1	44	April 2007	December 2010	Not declared	YES	6597.29	4618.103	1979.187	0.50%	247.40
8	RTPS	2	50		June 2011	Not declared	YES					
9	BTPS 'A'	1	42	August 2006	February 2010	Not declared	YES	2481.00	1736.700	744.300	0.50%	93.03
												340.43
Total Loss of Additional Return on Equity												**1011.73**

* Based on the useful life of 25 years of a thermal power station

Annexure - IX
(Refer Para 3.4.4.1)

Performance of the Units commissioned under 11th Plan														
Unit	**Commercial Operation Date**	**Installed Capacity (MW)**	**Available time hours**			**Actual Power Generation in (MKWH)**			**Capacity Utilisation per MW of installed capacity**			**Percentage of Capacity utilisation to Installed capacity**		
A	**B**	**C**	**D**			**E**			**F = E x 1000/D**			**G = F/C x 100**		
Year			2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
MTPS # 7	August 2011	500	5832	8760	8760	1333.670	3264.000	2994.455	228.68	372.60	341.83	45.74	74.52	68.37
MTPS # 8	August 2012	500		5472	8760		1739.630	2005.019		317.91	228.88		63.58	45.78
DSTPS # 1	May 2012	500		7704	8760		2319.188	2638.225		301.04	301.17		60.21	60.23
DSTPS # 2	March 2013	500		648	8760		86.141	1791.050		132.93	204.46		26.59	40.89
KTPS # 1	July 2013	500			6168			1501.022			243.36			48.67

Annexure - X
(Refer Para 3.4.4.1)

Forced outages and loss due to non-recovery of fixed cost thereof											
Year	**2011-12**	**2012-13**				**2013-14**					**Total**
Units	**MTPS # 7**	**MTPS # 7**	**MTPS # 8**	**DSTPS # 1**	**DSTPS # 2**	**MTPS # 7**	**MTPS # 8**	**DSTPS # 1**	**DSTPS # 2**	**KTPS # 1**	
Description of the trouble	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	**Loss in hrs**	
Boiler Tube leakage	85.37	319.30	272.22	696.93	0	85.83	101.98	140.85	494.28	245.460	
TG & Aux.	74	3.03	246.47	37.00	0	76.35	488.56	0	0	62.553	
Elect. Sys Trouble	886.74	106.74	37.29	344.430	0	0	2058.71	181.98	120.87	255.170	
C & I Trouble	5.93	7.62	0	75.880	0	0	4.9	6.32	4.25	7.500	
Operation/Furnace/ flame	13.88	20.05	4.80	11.850	0	25.93	12.82	6.18	8.95		
AHP				0.000	0			0	0	74.083	
Misc./Others	710.17	0.95	39.03	122.030	0	30.7	0	15.88	131.16	357.050	
Total loss in hours	**1776.09**	**457.69**	**599.81**	**1288.120**	**0**	**218.81**	**2666.97**	**351.21**	**759.51**	**1001.816**	**9120.026**
PLF (%)	45.74	74.52	63.58	60.21	23.16	68.367	45.777	60.23	40.89	48.671	
Total loss in MU	**406.191783**	**170.535294**	**190.679599**	**387.788526**	**0**	**74.79691635**	**610.429428**	**105.766892**	**155.281820**	**243.7969327**	**2345.27**
Fixed cost (₹) /unit	1.82	1.82	1.82	2.37	2.37	1.82	1.82	2.37	2.37	2.4	
Loss in ₹ (Loss in MU x Fixed cost/Unit)	**739269045**	**310374235**	**347036870**	**919058807**	**0**	**136130388**	**1110981560**	**250667533**	**368017912**	**585112638**	**4766648988**

Annexure - XI
(Refer Para 3.4.4.2)

Auxiliary energy consumption vis-a-vis CERC norms								
Year	**Unit**	**CERC Norms (%)**	**Actual (%)**	**Excess (%)**	**Actual Generation (MU)**	**Excess auxiliary consumption over CERC norms in kwh**	**Sale price/kwh (₹)**	**Loss due to excess auxiliaryconsumption (₹)**
A	B	C	D	E = D - C	F	G = (E/100) x F x 1000000	H	I = G x H
2011-12	MTPS # 7	6.00	6.47	0.47	1333.670	6268249	3.93	24634219
2012-13	DSTPS # 1	6.00	6.68	0.68	2319.188	15770478	4.11	64816666
	DSTPS # 2	6.00	8.93	2.93	86.141	2523931		10373358
2013-14	DSTPS # 2	6.00	6.94	0.94	1791.050	16835870	4.21	70879013
	KTPS # 1	6.83	7.301	0.47	1501.022	7069814		29763915
Total								**200467170**

(Refer Para 3.4.4.3)

Secondary fuel oil consumption vis-a-vis CERC norms								
Year	**Unit**	**CERC Norms (%)**	**Actual (%)**	**Excess (%)**	**Actual generation (MU)**	**Excess quantity of oil consumption over CERC norms in KL**	**Avg. Rate of Oil/kl (₹)**	**Loss due to excess oil consumption (₹)**
A	**B**	**C**	**D**	**E = D - C**	**F**	**G = E x F**	**H**	**I = G x H**
2011-12	MTPS # 7	1.00	5.48	4.48	1333.670	5974.8416	49383.36	295057754
2012-13	MTPS # 8	1.00	1.62	0.62	1739.630	1078.5706	55560.00	59925383
	DSTPS # 1	1.00	3.35	2.35	2319.188	5450.0918		302807100
2013-14	MTPS # 8	1.00	1.02	0.02	2005.019	40.1004	56940.17	2283322
	DSTPS # 1	1.00	1.25	0.25	2638.225	659.5563		37555245
	DSTPS # 2	1.00	1.65	0.65	1791.050	1164.1825		66288749
	KTPS # 1	1.00	2.462	1.462	1501.022	2194.4942		124954871
Total								**888872424**
Note : The oil consumption of DSTPS # 2 for 2012-13 has not been considered as the unit was declared COD only in March 2013								

Abbreviations

List of abbreviations used in the Report

Sl. No.	Abbreviation	Full Form
1.	ACQ	Annual Contracted Quantity
2.	AHP	Ash Handling Plant
3.	APH system	Air Pre-Heating system
4.	ATN	Action Taken Note
5.	BRPL	BSES Rajdhani Power Limited
6.	BTPS	Bokaro Thermal Power Station
7.	BYPL	BSES Yamuna Power Limited
8.	C&AG	Comptroller & Auditor General of India
9.	CEA	Central Electricity Authority
10.	CERC	Central Electricity Regulatory Commission
11.	CHP	Coal Handling Plant
12.	CMC	Committee on Management Control
13.	CMG	Corporate Monitoring Group
14.	COD	Commercial Operation Date
15.	CTPS	Chandrapura Thermal Power Station
16.	DERC	Delhi Electricity Regulatory Commission
17.	DFACS	Dry Fly Ash Collection System
18.	DISCOM	Distribution Company
19.	DM	Demineralised
20.	DPR	Detailed Project Report
21.	DSTPS	Durgapur Steel Thermal Power Station
22.	DTL	Delhi Transco Limited
23.	ECL	Eastern Coal Fields Limited
24.	EHC	Electric Hydro Convertor
25.	EPC	Engineering, Procurement and Construction
26.	ESP	Electrostatic Precipitator
27.	ETP	Effluent Treatment Plant
28.	FD fan	Forced Draft Fan
29.	FR	Feasibility Report
30.	FSA	Fuel Supply Agreement
31.	GoI	Government of India
32.	GoJ	Government of Jharkhand
33.	GR	Geological Report
34.	HSCL	Hindustan Steel Construction Limited
35.	ICB	International Competitive Bidding
36.	ID fan	Induced Draft fan

37.	IDC	Interest During Construction
38.	IT	Information Technology
39.	JSEB	Jharkhand State Electricity Board
40.	JSPCB	Jharkhand State Pollution Control Board
41.	KTPS	Koderma Thermal Power Station
42.	KWH	Kilo Watt Hour
43.	LD	Liquidated Damage
44.	MCL	Mahanadi Coalfields Limited
45.	MMT	Million Metric Tonne
46.	MMTPA	Million Metric Tonne Per Annum
47.	MoEF	Ministry of Environment and Forest
48.	MoP	Ministry of Power
49.	MOU	Memorandum of Understanding
50.	MPP	Main Plant Package
51.	MTPS	Mejia Thermal Power Station
52.	MU	Million Unit
53.	MW	Megawatt
54.	NDCT	Natural Draft Cooling Tower
55.	NDPL	North Delhi Power Limited
56.	NIT	Notice Inviting Tender
57.	PA fan	Primary Air fan
58.	PI	Performance Incentive
59.	PPA	Power Purchase Agreement
60.	PPM cell	Project Planning and Monitoring cell
61.	PT Plant	Pre Treatment Plant
62.	PWS	Plant Water System
63.	R&R	Rehabilitation and Resettlement
64.	REL	Reliance Energy Limited
65.	RTPS	Raghunathpur Thermal Power Station
66.	RuB	Road under Bridge
67.	S&T	Signalling & Telecommunication
68.	SEB	State Electricity Board
69.	SERC	State Electricity Regulatory Commission
70.	SR	Stacker Reclaimer
71.	TCE Ltd	Tata Consulting Engineers Limited
72.	TH	Track Hopper
73.	TPS	Thermal Power Station
74.	WT	Wagon Tippler

Glossary of Technical Terms

Glossary of Technical Terms used in the Report

1.	Air Pre-heater	Air preheater is a general term used to describe any device designed to heat air before another process (for example, combustion in a boiler) with the primary objective of increasing the thermal efficiency of the process. An air preheater absorbs waste heat from flue gas, then transfers this heat to incoming cold air.
2.	Annual Contracted Quantity	Annual Contracted Quantity is the specified quantity of coal agreed between the Corporation and the coal supplier for a period of twelve months.
3.	Ash Handling	Ash handling refers to the method of collection, conveying, interim storage and load out of various types of ash residue left over from solid fuel combustion processes.
4.	Ash Pond	An ash pond is an engineered structure for the disposal of bottom ash and fly ash. It consists of a large "pond" and filling it with fly ash slurry, allowing the water to drain and evaporate from the fly ash over a period of time.
5.	Auxiliary Consumption	Power consumed within the premises of the generating units.
6.	Coal Handling	Coal handling refers to a system of properly handling of coal from its receipt to transferring to bunkers.
7.	Demineralization Plant	Demineralization Plant, make up water for the turbine is kept. These water are very pure. But a small pH to 6 is maintained inside the DM plant.
8.	Electrostatic precipitator	Electrostatic precipitator (ESP) is a filtration device that removes fine particles, like dust and smoke, from a flowing gas using the force of an induced electrostatic charge minimally impeding the flow of gases through the unit.
9.	Forced Outage	Forced outage means shutdown of the plant for different reasons like equipment failures, disruption in the fuel supply chain, operator error etc. including the circumstances arising out of non-adherence to the Planned Maintenance Schedule.
10.	Fuel Supply Agreement	As per new Coal Distribution Policy (NCDP), Coal supplies are governed by Legally enforceable agreements between the seller (coal companies) and the consumer under specific terms and conditions. This agreement is called Fuel Supply Agreement.
11.	Kilo Watt Hour	It is a unit of energy. When 1,000 watts of electrical power is utilised for one hour the quantum of energy recorded is one Kilo watt hour
12.	Megawatt	Megawatt means one million watts as a measure of electrical power generated by power stations.
13.	Million Units	Million Units is equivalent to 10,00,000 Kilo Watt Hours.
14.	Natural Draft Cooling Tower	A cooling tower that depends upon natural convection of air flowi ng upward and in contact with the water to be cooled.

15.	Power Purchase Agreement	A power purchase agreement (PPA) is a contract between two parties, one who generates electricity for the purpose (the seller) and one who is looking to purchase electricity (the buyer). The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operation, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination.
16.	Snap Bidding	Snap bidding is opted when it is not possible to objectively evaluate the bids received and go for re-tendering. In such bidding system revised/fresh bids are invited only from those bidders who have already participated and submitted a valid bid and qualified for opening of Price bid.
17.	Stacker Reclaimer	A Stacker Reclaimer is a large machine used in bulk material handling. The function of stacker is to pile bulk material such as coal, limestone, ores etc. on to a stockpile and the reclaimer is used to recover the material.