

Chapter III

Performance Review relating to Statutory Corporation

3. Performance Audit of Power Generation Undertakings in Bihar

Executive Summary

Power is an essential requirement for all facets of life and has been recognised as a basic requirement. In Bihar, the generation of power is carried out by Bihar State Hydroelectric Power Corporation Limited (Company) and Bihar State Electricity Board (Board). As on 31 March 2010, Board had one thermal generation station i.e. Barauni Thermal Power Station and the Company had 11 canal based hydro generation stations with installed capacity of 372.80 MW. The turnover of the Board was ₹ 2795 crore and of the Company was ₹ 6.78 crore in 2009-2010, which were equal to 1.80 per cent and 0.005 per cent respectively of the State Gross Domestic Product. The BTPS employed 586 employees and the Company employed 107 employees as on 31 March 2010.

Capacity Addition and Project Management

As on 31 March 2010, the State sector had total installed power generation capacity of 372.80 MW. Against the peak demand of 2500 MW demand met was 1508 MW leaving a deficit of 992 MW while the actual addition was 8.7 MW (by Company) to meet the energy generation requirement in the State during 2005-10. There was no addition in thermal capacity. Thus the State was not in position to meet the demand as the power generated as well as power purchased fell short to the extent of 2909.58 MUs to 12297.11 MUs during 2005-10.

Contract Management

During 2005-10, 21 contracts valuing ₹ 36.38 crore (of the Company) were executed. Delays were noticed in finalization of tender and awarding the works, which led to increase in project cost by ₹ 7.06 crore in the three projects reviewed in Audit.

Operational Performance

Performance of the existing generation stations depends on efficient use of material, manpower and capacity of the

plants so as to generate maximum energy possible without affecting the long term operations of the plants. Our scrutiny of operational performance revealed the following:

Procurement of fuel

Short receipt of coal (71.41 per cent) against the total linkage approved by Standard Linkages Committee during the four years upto 2008-09 led to shortfall in achievement of the generation targets. In absence of any agreement with the coal companies, the Board paid ₹ 6.29 crore on procurement of 0.43 lakh MT of inferior/ungraded coal which was loss to the Board.

Consumption of fuel

Use of coal having less gross calorific value coupled with high heat rate of station above designed heat rate the Board incurred an extra expenditure of ₹ 48.71 crore on excess consumption of coal during 2005-10.

Deployment of Manpower

The Board had 586 employees as on 31 March 2010 at BTPS which was within the sanctioned strength but exceeded the CEA norms. On the other hand, the Company had 107 employees as on 31 March 2010. The deployment of manpower was not rational as the manpower deployed in the Company was in excess of the norms fixed by CEA resulting in extra expenditure of ₹ 3.98 crore.

Plant Load Factor

The PLF of Hydel plants of the Company and BTPS was below the national PLF in all the years during 2005-10. This resulted in generation loss of 3952.9 MUs. Besides, the Company lost contribution of ₹ 39.59 crore.

Outages

The forced outages remained more than the norms of 10 per cent as prescribed by the

CEA in all the five years (2005-10) ranging from 12.90 to 81.19 per cent. The outages of unit No. 6 of BTPS was 73 percent of the total available hours during 2005-10. During 2006-07, 11817 hours were avoidable out of 13977 hours of planned outages which resulted in loss of generation of 3.49 MUs.

Auxiliary Consumption

The actual auxiliary consumption at BTPS and the Company was more than the norms fixed by CERC during the period under review resulting in loss of generation of 48.97 MUs.

Financial Management

Company's dependence on borrowed funds increased from ₹ 290.26 crore in 2005-06 to ₹ 499.60 crore in 2009-10. Similarly the Board borrowings increased from ₹ 7773.25 crore in 2005-06 to ₹ 12605.44 crore (62.16 per cent) in 2009-10. Nearly two third of the paid up capital of the Company eroded at the end of 2009-10 due to increase in accumulated losses.

Environmental Issues

The Board did not take any action for washing of 7.08 lakh MT of high ash content coal (weighted average of ash ranged between 41.27 and 46.24 per cent) before use. BTPS neither installed adequate silencing equipments nor installed noise monitoring equipment to record noise levels.

Conclusion and Recommendations

The Company could not keep pace with growing demand of power in the State due to non-commencement of commercial production by the newly established hydro generating units as per their scheduled plan. The Board also did not keep pace of the growing demand of power by not executing LE/R &M work (at BTPS) which resulted in further deterioration of the health of the TPS. The project management was ineffective as there were instances of time and cost overrun in all the projects taken up during 2005-10. Operational performance of the plants was adversely affected due to short receipt as well as inferior quality of coal, high heat rate causing excess consumption of coal. Further the plant load factor and plant availability remained lower than the national average level. Heavy capital expenditure coupled with interest commitment on loans without adequate returns due to delay in commercial operation of the plants caused significant increase in cost of operations. The top management did not take corrective measures to ensure adherence to norms/targets in respect of input efficiency parameters. The review contains seven recommendations which include effective planning and monitoring, ensuring consumption of coal within the prescribed norms, minimise forced outages and auxiliary consumption and ensure compliance to environmental laws, etc.

3.1 Introduction

Power is an essential requirement for all facets of life and has been recognized as a basic human need. The availability of reliable and quality power at competitive rates is very crucial to sustain growth of all sectors of the economy. The Electricity Act 2003 provides a framework conducive to development of the Power Sector, promote transparency and competition and protect the interest of the consumers. In compliance with Section 3 of the ibid Act, the Government of India (GOI) prepared the National Electricity Policy (NEP) in February 2005 in consultation with the State Governments and Central Electricity Authority (CEA) for development of the Power Sector based on optimal utilisation of resources like coal, gas, nuclear material, hydro and renewable sources of energy. The Policy aims at, *inter alia*, laying guidelines for accelerated development of the Power Sector. It also requires CEA to frame National Electricity Plan once in five years. The Plan would be short term framework of five years and give a 15 years' perspective.

During 2005-06, electricity requirement in Bihar was assessed as 10293 Million Units (MU) of which only 7383.42 MU were available leaving a shortfall of 2909.58 MU. The total installed power generation capacity in the State of Bihar was 1424.10 Mega Watt¹ (MW). Against the State Sector capacity of 364.10 MW, the effective available capacity was 264.10 MW² while the peak demand was 1175 MW leaving deficit of 910.90 MW. As on 31 March 2010 the comparative figures of requirement and available energy were 21900 MU and 9602.89 MU leaving a deficit of 12297.11 MU. However, total installed power generation capacity was 2932.80 MW. Out of the State Sector capacity of 372.80 MW, effective available capacity was 272.80 MW against the peak demand of 2500 MW, demand met was 1508 MW leaving a deficit of 992 MW. Thus there was a growth in energy requirement of 11607 MU during 2005-10, whereas the capacity addition in the State Sector was only 8.70 MW.

In Bihar, the generation of thermal power is carried out by Bihar State Electricity Board (BSEB) which was incorporated on 1 April 1958 under the Electricity (Supply) Act, 1948 under the administrative control of the Energy Department of the Government of Bihar. Unbundling of the BSEB has not yet been completed (November 2010), however eight companies have been incorporated but they are not yet operational due to financial restructuring. The Board is involved in generation, transmission and distribution of energy. The Bihar State Electricity Board is headed by a Chairman who is assisted by Member (Finance and Revenue), Member (Distribution and Rural Electrification) and Member (Generation and Transmission). The Board had one thermal generation station i.e., Barauni Thermal Power Station (BTPS) with the installed capacity of 320 MW. The turnover of the Board was ₹ 2795.00 crore in 2009-10, which was equal to 53 *per cent* and 1.80 *per cent* of the State PSUs turnover and State Gross Domestic Product respectively. It employed 586 employees in its thermal generation station i.e. Barauni Thermal Power Station (BTPS) as on 31 March 2010.

The generation of hydro power in Bihar is carried out by Bihar State Hydroelectric Power Corporation Limited, (the Company) which was incorporated on 31 March 1982 as a wholly owned State Government Company under the administrative control of the Energy Department of the Government of Bihar. The Management of the Company is vested with a Board of Directors (BoD) comprising not less than four and not more than seven directors, including the Managing Director, who is appointed by the State Government. As on 31 March 2010, there were three directors including the Managing Director. The day-to-day operations are carried out by the Managing Director, who is the Chief Executive of the Company, with the assistance of the Chief Engineer (Electric), Superintending Engineer (Civil), Financial Advisor (post vacant) and the Director (Personnel and Administration). The Company has 11 canal based hydro generation stations with the installed capacity of 52.80 MW as on 31 March 2010. The turnover of

¹ 2x50 MW + 2x110 MW of thermal and 44.10 MW of hydel in State Sector and 1060 MW in Central Sector.

² 2x110 MW of thermal and 44.10 MW of hydel, 2x50 MW remained unoperational.

the Company was ₹ 6.78 crore in 2009-10, which was equal to 0.34 *per cent* and 0.005 *per cent* of the State PSUs turnover and State Gross Domestic Product (for 2009-10), respectively. It employed 107 employees as on 31 March 2010.

A review on the working of the Bihar State Hydroelectric Power Corporation Limited was included in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2007 (Commercial), Government of Bihar. The Report is yet to be discussed by COPU (November 2010).

3.2 Scope and Methodology of Audit

The present review conducted during February 2010 to May 2010 covers the performance of the Bihar State Electricity Board and the Bihar State Hydro electric Power Corporation Limited during the period from 2005-06 to 2009-10 with respect to generation activities. The review mainly deals with Planning, Project Management, Financial Management, Operational Performance, Environmental Issues and Monitoring by Top Management. The audit examination involved scrutiny of records at the Head Office and 5³ (having a total capacity of 364.10MW) out of 12⁴ generating stations (total installed capacity of 372.80MW) selected on the basis of higher capacity and category.

The methodology adopted for attaining the audit objectives with reference to audit criteria consisted of explaining audit objectives to top management, scrutiny of records at Head Office and selected units, interaction with the auditee personnel, analysis of data with reference to audit criteria, raising of audit queries, discussion of audit findings with the Management and issue of draft review to the Management for comments.

3.3 Audit Objectives

The objectives of the performance audit were to assess:

Planning and Project Management

- To assess whether capacity addition programme taken up/ to be taken up to meet the shortage of power in the State is in line with the National Policy of Power for All by 2012;
- To assess whether a plan of action is in place for optimization of generation from the existing capacity;
- To ascertain whether the contracts were awarded with due regard to economy and in transparent manner;

³ 4 hydroelectric power stations at Barun (2x1.65MW), Dehri (4x1.65MW), Kataiya (4x4.8MW) and Valmikinagar (3x5MW) + 1 thermal power station at Barauni (2x50MW + 2x110MW).

⁴ 11 hydroelectric power stations at Agnoor (1MW), Barun (2x1.65MW), Dehri (4x1.65MW), Dhelabagh (1MW), Jainagar (1MW), Kataiya (4x4.8MW), Nasariganj (1MW), Sebari (1MW), Shirkhinda (0.7MW), Triveni (2x1.5MW) and Valmikinagar(3x5MW) + 1 thermal power station at Barauni (2x50MW+2x110MW).

- To ascertain whether the execution of projects were managed economically, effectively and efficiently;

Financial Management

- To ascertain whether the projections for funding the new projects and upgradation of existing generating units were realistic including the identification and optimal utilization for intended purpose;
- To assess the soundness of financial health of the generating undertakings.

Operational Performance

- To assess whether the power plants were operated efficiently and preventive maintenance as prescribed was carried out minimizing the forced outages;
- To assess whether requirements of each category of fuel worked out realistically, procured economically and utilised efficiently;
- To assess whether the manpower requirement was realistic and its utilisation optimal;
- To assess whether the life extension (renovation and modernization) programme were ascertained and carried out in an economic, effective and efficient manner; and
- To assess the impact of Renovation & Modernisation /Life Extension (R&M/LE) activity on the operations performance of the Unit.

Environmental Issues

- To assess whether the various types of pollutants (air, water, noise, hazardous waste) in power stations were within the prescribed norms and complied with the required statutory requirements; and
- To assess the adequacy of waste management system and its implementation.

Monitoring and Evaluation

- To ascertain whether adequate MIS existed in the entity to monitor and assess the impact and utilize the feedback for preparation of future schemes.

3.4 Audit Criteria

The audit criteria adopted for assessing the achievement of the audit objectives were:

- National Electricity Plan, norms/guidelines of Central Electricity Authority (CEA) regarding planning and implementation of the projects;
- standard procedures for award of contract with reference to principles of economy, efficiency and effectiveness;
- targets fixed for generation of power ;

- parameters fixed for plant availability, Plant Load Factor (PLF) etc;
- performance of best achievers in the regions/all India averages;
- prescribed norms for planned outages; and
- Acts relating to Environmental laws.

3.5 Financial Position and Working Results

The financial position of the Company for the five years ending 2009-10⁵ is given below:

Hydel

(₹ in crore)

Particulars	2005-06	2006-07	2007-08	2008-09	2009-10 (provisional)
A. Liabilities					
Paid up Capital	99.04	99.04	99.04	99.04	99.04
Reserve & Surplus (only capital subsidy)	1.72	5.83	11.76	13.40	15.81
Borrowings (Loan Funds)					
Unsecured	290.26	363.35	406.69	440.36	499.60
Current Liabilities & Provisions	9.05	9.99	10.86	11.57	12.00
Total	400.07	478.21	528.35	564.37	626.45
B. Assets					
Gross Block	106.73	126.17	147.72	171.57	202.66
Less: Depreciation	42.41	47.29	52.88	59.26	66.69
Net Fixed Assets	64.32	78.88	94.84	112.31	135.97
Capital works-in- progress	74.96	88.62	95.78	89.12	279.17
Miscellaneous Expenditure ⁶	160.60	171.17	186.24	199.19	4.50
Current Assets, Loans and Advances ⁷	85.29	121.15	124.87	123.44	144.35
Accumulated losses	14.90	18.39	26.62	40.31	62.46
Total	400.07	478.21	528.35	564.37	626.45

It would be seen from the above table that

- the Company's unsecured borrowings increased from ₹ 290.26 crore to ₹ 499.60 crore i.e. 72 per cent. It was mainly due to accrual of interest on State Government /NABARD loan. Due to non-repayment of loan

⁵ Figures appearing in the table from 2005-06 to 2009-10 are based on unaudited annual accounts.

⁶ Included preliminary expenses on projects, interest on loans and development expenditure on projects.

⁷ Included figures of stores & spare parts and short term deposit in banks.

2/3rd of the paid-up capital of the Company eroded at the end of 2009-10 due to increase in accumulated losses.

as well as interest accrued, this figure continuously increased during the review period. Hence, the Debt-Equity ratio of the Company increased continuously from 2.88 in 2005-06 to 4.35 in 2009-10.

- Similarly, accumulated losses of the Company also increased from ₹ 14.90 crore to ₹ 62.46 crore *i.e.* 319.19 *per cent* in last five years ending 2009-10 thereby eroding nearly two-third of the paid up capital of the Company. Further, ₹ 279.17 crore was lying under Capital works-in-progress at the end of the 2009-10 mainly due to non completion of projects in scheduled time.
- While the net worth of the Company in 2009-10 was ₹ 114.85 crore, the accumulated losses were ₹ 62.46 crore. So, the financial position does not reflect a sound position of the Company and needs restructuring.
- Reserves and Surplus consisted of the Capital Subsidy received from the Ministry of New and Renewable Energy (MNRE), Government of India, New Delhi every year.

Thermal

The financial position of the Board covering all activities (generation, transmission and distribution) for the five years ending 2009-10 is given below:

(₹ in crore)

Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
A. Liabilities					
Contribution, Grant and Subsidy towards cost of capital assets (including Capital Grants but excluding Depreciation Reserve)	148.61	152.99	199.91	522.13	652.11
Borrowings (Loan Funds)					
Secured+ Unsecured	7773.25	9253.80	9988.32	11245.52	12605.44
Current Liabilities & Provisions	3400.94	2812.26	3049.34	3302.59	3738.72
Total	11322.80	12219.05	13237.57	15070.24	16996.27
B. Assets					
Gross Block	2516.28	2242.43	2418.34	2556.51	2864.80
Less: Depreciation	1822.99	1630.81	1684.45	1740.85	1800.57
Net Fixed Assets	693.29	611.62	733.89	815.66	1064.23
Capital works-in-progress	606.27	833.97	808.73	934.10	881.20
Investments	349.48	415.02	503.94	899.78	829.57
Current Assets, Loans and Advances	4326.91	4554.47	4702.34	4927.47	5316.13
Accumulated losses	670.10	1424.71	2109.41	3113.97	4525.88
Regulatory Assets	-	60.00	60.00	60.00	60.00
Assets not in use	3.61	3.61	3.61	3.61	3.61
Subsidy receivable from state	4673.14	4315.65	4315.65	4315.65	4315.65
Total	11322.80	12219.05	13237.57	15070.24	16996.27

It would be seen from the above table that

- the Board's borrowings increased from ₹ 7773.25 crore to ₹ 12605.44 crore *i.e.* 62.16 *per cent* mainly due to interest accrued and due on State Government loan of ₹ 2589.04 crore and payment (of installments of State Govt. loan) due on capital liabilities of ₹ 1771.84 crore. The accumulated losses also increased from ₹ 670.10 crore to ₹ 4525.88 crore *i.e.* 575 *per cent* in last five years ending 2009-10 due to increase in cost of purchase of power from other sources, employee cost and interest and finance charges.
- Current liabilities and provision mainly included staff related liabilities (Provision for Pension, Gratuity, GPF etc.) which increased from ₹ 1982 crore in 2005-06 to ₹ 2191 crore in 2009-10.
- Current assets, loans & advances increased mainly due to increase in Cash and Bank balances (by ₹ 264 crore) & Sundry Receivable (by ₹ 263 crore). It also included claims recoverable from Jharkhand State Electricity Board for share of liabilities of erstwhile BSEB⁸.
- Subsidy receivable from the State Government in 2005-06 was ₹ 4673.14 crore which was reduced to ₹ 4315.65 crore in 2006-07 and remained at the same level as the State Government did not decide on payment or otherwise of the outstanding amount till 2009-10. However, subsidy due during 2006-07 to 2009-10 was paid in respective years on cash basis which amounted to ₹ 3416.93 crore.

The details of working results like cost of generation of electricity, revenue realisation, net surplus/loss and earnings and cost per unit of operation in respect of the Company and the Board (in respect of BTPS only as furnished by Management) are given in the *Annexure 12 and 13* respectively.

It was observed from *Annexure – 12* that total generation of the company decreased (52.36 *per cent*) continuously from 72.75 MU in 2005-06 to 34.66 MU in 2009-10. The main reason for low generation of power was non-availability of water discharge in the canals, on which all the running projects of the Company were situated. Further, the heavy reduction in 2009-10 was due to the strengthening and modernisation of Koshi and Gandak River taken up by Water Resource Department, Government of Bihar. Accordingly, the generation revenue also came down from ₹ 13.61 crore in 2005-06 to ₹ 6.78 crore (50.18 *per cent*) in 2009-10. However, the total cost of generation climbed continuously from ₹ 16.30 crore in 2005-06 to ₹ 31.99 crore at the end of 2009-10, *i.e.* an increase of 96.26 *per cent* mainly due to increase in employee cost, administrative & general expenses and interest and finance charges.

Similarly, total generation of the BTPS (*Annexure – 13*) ranged between 37.25 MU and 264.71 MU during 2005-10 whereas total cost per unit generation ranged between ₹ 4.82 and ₹ 12.34 during 2005-10. We observed that due to restoration work undertaken for unit no.6 of the BTPS and unit no.7 undergoing for R&M work, the generation of the plant was reduced to 37.25 MU in 2006-07 whereas, fixed cost of generation increased during the

Climbing cost of generation in the Company was attributable to increase in employee cost, administrative & general expenses and interest and finance charges

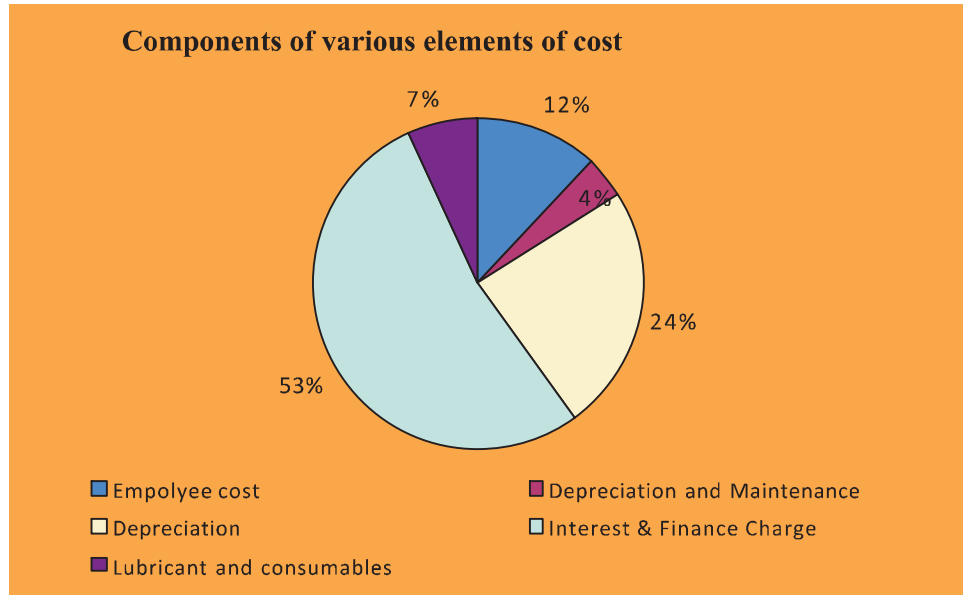
⁸ ₹ 659 crore in 2005-06 & ₹ 855 crore in 2008-09.

same financial year. Thus, the cost of generation reached a high of ₹ 12.34 per unit in 2006-07.

Elements of Cost

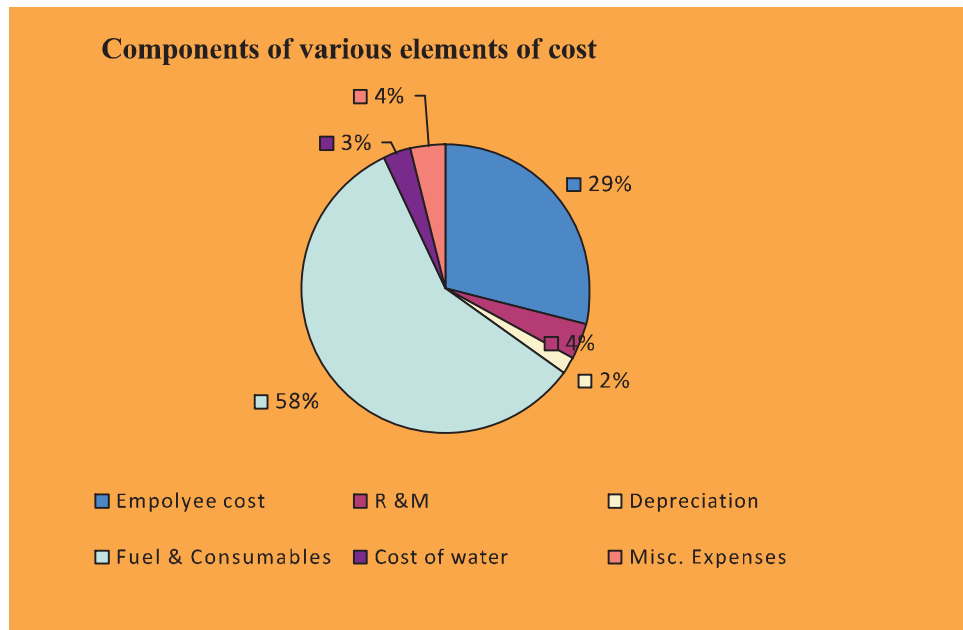
Hydel

Interest & Finance charge and depreciation constitute the major elements of costs. The percentage break-up of costs for 2009-10 is depicted in the pie-chart below.



Thermal

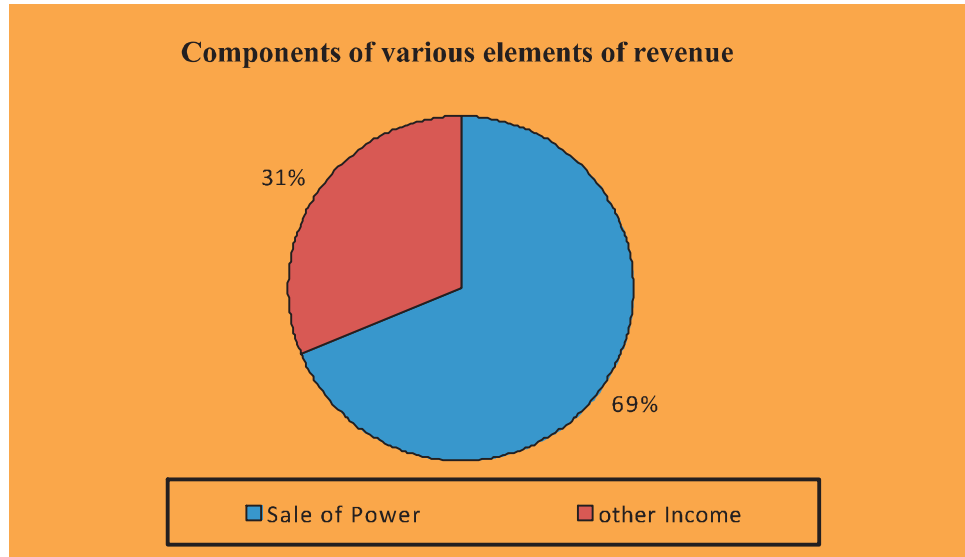
Fuel and Consumables and Employee Cost constitute the major element of costs. The percentage break-up of costs for 2009-10 is given below in the pie-chart.



Elements of revenue

Hydel

Sale of Power constitutes the major element of revenue. The percentage break-up of revenue for 2009-10 is given below in the pie-chart.



Thermal

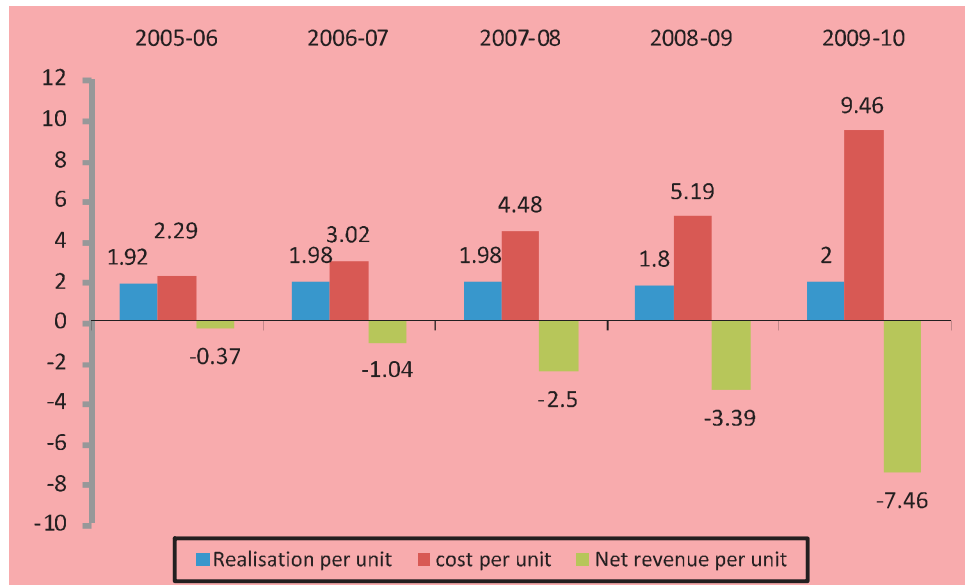
Sale of Power constitutes the major element of revenue for the Board and constituted 99.75 per cent of the total revenue in 2009-10.

Recovery of cost of operations

Hydel

The Company was not able to recover its cost of operations. During the last five years ending 2009-10, the net revenue showed a negative trend as given in the graph below:

The Company failed to recover its cost of operations due to very low generation



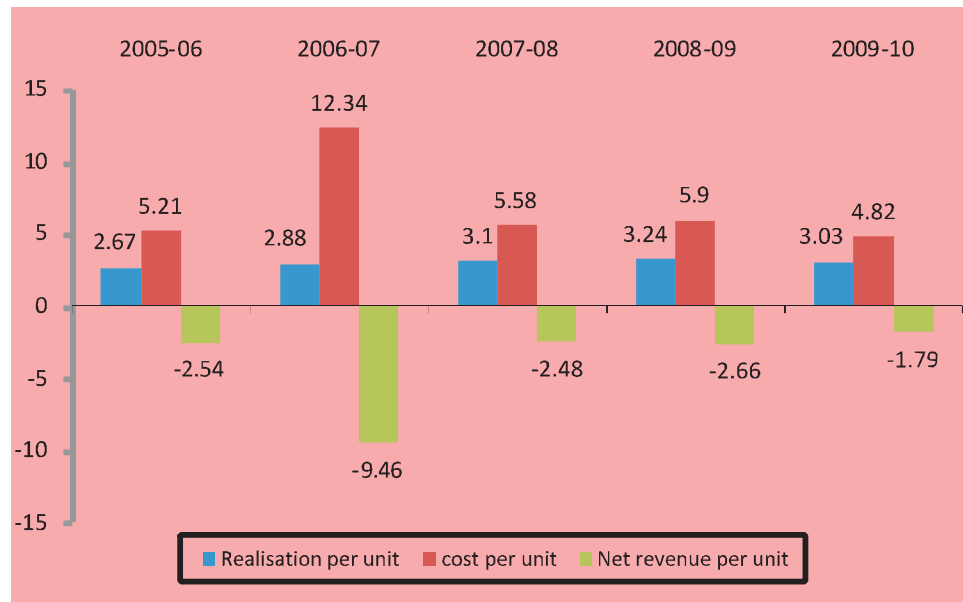
Due to very low generation (34.66 MU) in year 2009-10 and the increase in

cost of generation, the net revenue per unit became negative to ₹ 7.46. Had the total revenue earned by Company been sufficient to cover the cost, an additional amount of ₹ 66.42 crore could have been available for capacity addition/ life extension programmes during the period of review. The main reasons for high cost of generation had been poor capacity utilization corroding the system performance, high level of auxiliary consumption, higher administrative and interest cost, employee cost etc.

Thermal

The BTPS was also not able to recover its cost of operations. During the last five years ending 2009-10, the net revenue remained negative as given in the graph below:

Cost of generation per unit went as high as ₹ 12.34 / unit in 2006-07 due to very low generation



Had the total revenue earned by Board been sufficient to cover the cost, an additional amount of ₹ 142.48 crore could have been available for capacity addition/ life extension programmes during the period of review. Reasons for high cost of generation were poor capacity utilization, higher administrative charges etc.

3.6 Audit Findings

Audit explained the audit objectives to the Company/Board during an 'Entry Conference' held on 16 February 2010. Draft review was issued (July 2010) to Management of Company/Board and the Government for their views. Their replies were received (September/October 2010) and the exit conference was held on 9th November 2010. The views expressed by them have been incorporated suitably.

3.7 Operational Performance

The operational performance of the Company and Board for the five years ending 2009-10 is given in the *Annexure – 14*. The operational performance

of the Company and Board was evaluated on various operational parameters as described below. It was also seen whether the Company / Board was able to maintain pace in terms of capacity addition with the growing demand for power in the State. Audit findings in this regard are discussed in the subsequent paragraphs. These audit findings show that the losses were controllable and there was scope for improvement in performance.

3.8 Planning

National Electricity Policy aims to provide availability of over 1,000 Units of per Capita electricity by 2012. The power availability scenario in the State of Bihar indicating own generation, purchase of power, peak demand and net deficit was as under:

(in MW)					
Year	Total Generation (thermal +hydel)	Average Demand	Peak Demand	Percentage of actual generation to Average Demand	Percentage of actual generation to Peak Demand
2005-06	42.72	950	1175	4.50	3.64
2006-07	37.48	1040	1275	3.60	2.94
2007-08	64.17	1500	1800	4.28	3.57
2008-09	72.15	1600	1900	4.51	3.80
2009-10	56.35	2050	2500	2.75	2.25

Actual generation during the review period was very low ranging from 2.25 to 3.80 per cent of the peak demand and 2.75 to 4.51 per cent of the average demand

As may be seen from the Table above, that during the period 2005-10, the actual generation was substantially less than the peak as well as average demand. The actual generation was only 2.75 to 4.51 per cent of the average demand and 2.25 to 3.80 per cent of the peak demand.

The total supply of electricity available even after import was not sufficient to meet the peak demand, as shown below:

(in MW)

Year	Peak Demand	Peak Demand met	Sources of meeting peak demand		Peak Deficit (Percentage of Peak Demand)
			Own	Import	
2005-06	1175	1095	42.72	1052.28	80 (6.81)
2006-07	1275	1213	37.48	1175.52	62 (4.86)
2007-08	1800	1244	64.17	1179.83	556 (30.89)
2008-09	1900	1348	72.15	1275.85	552 (29.05)
2009-10	2500	1508	56.35	1451.65	992 (39.68)

It may be seen that the peak demand increased substantially over the review period. There remained a shortfall of 62 to 992 MW (4.86 to 39.68 per cent) even after import. Consequently rotational load shedding was forced on the populace of the state.

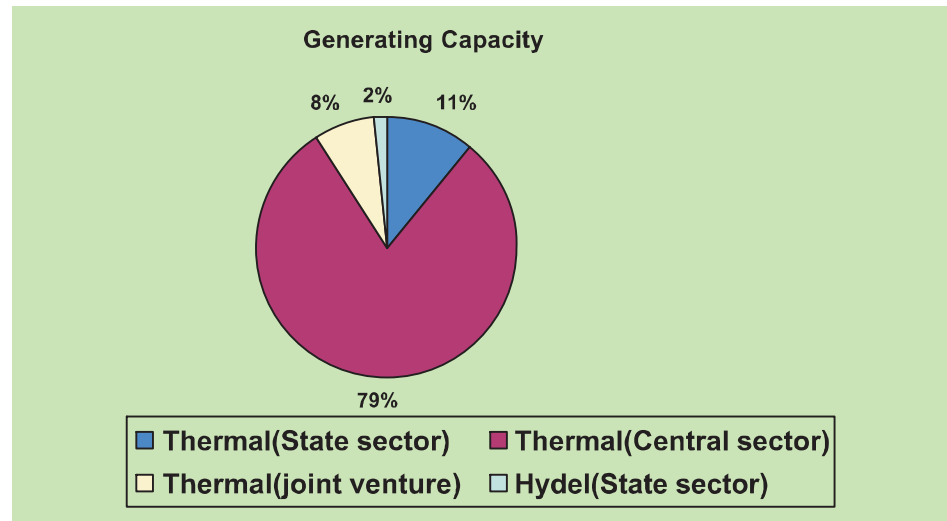
The Board paid penalty of ₹ 473.04 crore for over drawal of energy during 2005-10

The Board had to incur ₹ 7535.72 crore on purchase of 40792.12 MU energy from other sources during 2005-10. Besides, the Board incurred ₹ 473.04 crore on excess drawal of 1170.82 MU energy as penal charges during the period of review. Against this, the own generation of the Company and Board during 2005-10 was only 956.47 MU. This indicates over dependence of power from other sources.

This section deals with capacity additions and optimal utilisation of existing facilities. Environmental aspects have been discussed in subsequent paragraphs at later stage.

Capacity Additions

The generating capacity in the State of Bihar, comprising thermal power stations in Central Sector (of National Thermal Power Corporation i.e. NTPC), in Joint Venture (between NTPC and BSEB), in State Sector (BSEB) and Hydro Power Stations in State Sector (BSHPC) was 2932.80⁹ MW at the end of 31 March 2010 as shown in the pie chart below:



The State of Bihar had total installed capacity of 364.10¹⁰ MW only in state sector (BSEB and BSHPC) at the beginning of 2005-06 which increased to 372.80¹¹ MW at the end of 2009-10.

To meet the energy generation requirement of 21900 MUs in the State, a capacity addition of about 2227.20 MW was required during 2005-10. However, there were no projects under State Sector categorised as 'Projects under Construction' (PUC) and 'Committed Projects'¹² (CP) for capacity addition during review period according to NEP.

Against requirement for capacity addition of 2227.20 MW, actual addition was 8.70 MW during 2005-10

⁹ Thermal Power- {Central Sector (NTPC, Kahalgaon)-2340MW; Joint Venture (NTPC&BSEB, Kanti)-220MW; State Sector (BSEB, Barauni)-320MW} and Hydel Power (State Sector, BSHPC)-52.80MW.

¹⁰ 320 MW Thermal and 44.10 MW Hydel

¹¹ 320 MW Thermal and 52.80 MW Hydel

¹² National Electricity Plan defines Committed Projects as Projects for which the formal approval to take up the same has been granted by the CEA.

The particulars of capacity additions envisaged, actual additions and peak demand vis-a-vis energy supplied during review period are given below.

(Thermal + Hydel)

Sl. No	Description	2005-06	2006-07	2007-08	2008-09	2009-10
1.(a)	Capacity at the beginning of the year (MW) (BSEB + Company)	364.10	364.10	366.10	367.10	371.10
1.(b)	Central PSUs	1060	1060	1060	1060	1060
2.	Additions Planned for the year as per National Electricity Plan (MW)	-	-	396.87	432.59	471.52
3.	Additions planned by the State (MW)	1.00	5.00	3.90	4.50	11.00
4.	Actual Additions in the State Sector (MW)	0.00	2.00 ¹³	1.00 ¹⁴	4.00 ¹⁵	1.70 ¹⁶
5.(a)	Capacity at the end of the year (MW) (1 + 4) (BSEB + Company)	364.10	366.10	367.10	371.10	372.80
5 (b)	Central PSUs	1060	1060	1060	1060	2560
6.	Shortfall in capacity addition in the State sector (MW) (4 – 3)	1.00	3.00	2.90	0.50	9.30
7.	Peak demand (MWs) as furnished by CLDC of BSEB	1175	1275	1800	1900	2500
	Energy Demand (MUs)	10293	11169	15768	16644	21900
8.	Energy supplied (MUs)					
	a) Net energy produced (Hydel + thermal) as per furnished by BSEB ¹⁷	148.73 (52.91+ 95.82)	73.36 (46.76+ 26.60)	159.58 (45.23+ 114.35)	131.75 (41.54+ 90.21)	241.89 (15.29+ 226.60)
	b) Energy Purchased	7234.69	7884.60	7710.00	8601.83	9361.00
	Total	7383.42	7957.96	7869.58	8733.58	9602.89
9.	Shortfall in demand (MUs) (7 – 8)	2909.58	3211.04	7898.42	7910.42	12297.11

It may be observed from the above Table that during the review period actual capacity addition was only 8.7 MW against 25.4 MW as planned by the State (in respect of Hydel power) leaving a shortfall of 16.7 MW. We observed that the Board did not execute any new project (since March 1986). A new Thermal Power Project at Nabinagar was taken up in 2008 under joint venture of the Board and NTPC. The project is scheduled to be completed in 2015-16. Apart from this, extension of 2x250MW project at BTPS is at initial stage and the Detailed Project Report (DPR) for another 1x250MW unit to replace the existing 2x50MW unit (no. 4&5) is being prepared (November 2010).

¹³ Agnoor SHP (1 MW) in August 2006 & Dhelabagh SHP (1 MW) in August 2006.

¹⁴ Nasariganj SHP (1 MW) in August 2007.

¹⁵ Jainagar SHP (1 MW) in January 2009 & Triveni SHP (3MW) in February 2009.

¹⁶ Shirkhinda SHP (0.7MW) in September 2009 & Sebari SHP (1MW) in February 2010 Balance 500 MW in Central sector.

¹⁷ Net energy produced of Hydel (BSHPCL) reported here is different from the figures furnished by the Management to audit and is pending reconciliation between the Company and the Board.

Thus, the State was not in a position to meet the demand as the power generated as well as power purchased fell short to the extent of 2909.58 MUs in 2005-06 which increased to 12297.11 MUs in 2009-10. Further, due to slow execution of the projects, even the Company could not achieve its target of capacity addition of 25.4 MW during the said period. Earlier the Company had proposed capacity addition of 33.90 MW during 10th Five Year Plan (2002-03 to 2006-07) but could add only two¹⁸ MW capacities during the above period.

Optimum Utilisation of existing facilities

In order to cope with the rising demand for power, not only additional capacity need to be created as discussed above, the plan needs to be in place for optimal utilisation of existing facilities and also undertaking life extension programme/ replacement of the existing facilities which are near completion of their age besides timely repair/ maintenance. The details of the power generating units, which fell due for Renovation and Modernisation/ Life extension programmes (as per CEA norms) during the five years ending 2009-2010 vis-à-vis actually taken are indicated in the Table below :

Sl. No.	Name of the Plant	Unit No.	Installed Capacity	Due Date (as per CEA norms)	Date when actually taken up
1.	Barauni Thermal Power Station	4 th	50MW	1989	R&M / LE could not be taken up (under shut down since April 1996)
2.	-do-	5 th	50MW	1991	R&M / LE could not be taken up (under shut down since March 1995)
3.	-do-	6 th	110MW	2003	March 2006 – November 2007 (Restoration work only)
4.	-do-	7 th	110MW	2005	Work-in-progress (November 2010)

The health of the TPS deteriorated due to non-execution of R&M/LE work within the schedule time and consequently two units of 50 MW each were declared economically non-viable

From the above, it may be seen that against the four units due for being taken up for Renovation and Modernisation/ Life extension programmes, no unit was actually taken up within schedule mainly due to non-availability of sufficient funds, inadequate Management control, etc.

Unit no. 4 & 5 of BTPS remained under shut down since 1995-96 for want of refurbishment work. After a delay of about 12 years, the Board approached CEA in June 2008 regarding R&M of these units. The CEA concluded (August 2008) that R&M/LE of these units are not techno-economically viable, as units are very old and lying shut down since long. Under 11th Five Year Plan, the CEA identified (August 2009) these units for retirement by year 2011-12 and the Ministry of Power, Project Monitoring Cell, decided (October

¹⁸ Agnoor SHP (2x0.5 MW) (in August 2006) and Dhelabagh SHP (2x0.5 MW) (in August 2006).

2009) to replace the existing 2x50MW units (no.4&5) of BTPS by 1x250MW unit, with the assistance of the World Bank.

The detailed observations relating to repair/maintenance and life extension programmes are discussed in succeeding paragraphs.

3.9 Project Management

Project management includes timely acquisition of land, effective actions to resolve bottlenecks, obtain necessary clearances from Ministry of Forest and Environment and other authorities etc. Notwithstanding, time and cost overruns were noticed due to absence of coordinating mechanism throughout implementation of the projects during review period as discussed in succeeding paragraphs.

The following Table indicates the scheduled and actual dates of completion of the power stations, date of start of transmission, date of commissioning of power stations and the time overrun.

Time overrun

(In months)

There was cost over run of ₹ 43.46 crore due to time overrun ranging from 6 to 71 months in respect of seven SHPs of the Company

Sl. No.	Phase-wise name of the Unit	Details (Actual date of completion)	As per DPR	Actual time taken	Time overrun
1.	Agnoor SHP (2*0.5MW)	Date of completion of unit (January 2006)	18	79	61
		Date of start of transmission(August 2006)	15	86	71
		Date of commercial operation/ commissioning of unit(August 2006)	18	86	68
2.	Dhelabagh SHP (2*0.5 MW)	Date of completion of unit(August 2006)	24	49	25
		Date of start of transmission(August 2006)	15	49	34
		Date of commercial operation/ commissioning of unit(August 2006)	24	49	25
3.	Nasariganj SHP (2*0.5MW)	Date of completion of unit(June 2007)	24	60	36
		Date of start of transmission(August 2007)	15	62	47
		Date of commercial operation/ commissioning of unit(August 2007)	24	62	38
4.	Jainagar SHP (2*0.5MW)	Date of completion of unit (December 2008)	24	30	6
		Date of start of transmission (January 2009)	15	31	16
		Date of commercial operation/ commissioning of unit (January 2009)	24	31	7

5.	Triveni SHP (2*1.5MW)	Date of completion of unit (February 2009)	48	87	39
		Date of start of transmission (February 2009)	39	87	48
		Date of commercial operation/ commissioning of unit (February 2009)	48	87	39
6.	Shirkhinda SHP (2*0.35MW)	Date of completion of unit (August 2009)	24	50	26
		Date of start of transmission (September 2009)	15	51	36
		Date of commercial operation/ commissioning of unit (September 2009)	24	51	27
7.	Sebari SHP (2*0.5MW)	Date of completion of unit (February 2010)	24	59	35
		Date of start of transmission (January 2010)	15	-	48
		Date of commercial operation/ commissioning of unit (Yet to be done)	24	-	49 (till November 2010)

It would be seen from above that out of seven projects implemented by the Company during review period, none were completed in scheduled time and there were delays ranging between six and 71 months. An analysis of reasons for slippages in time schedule in units selected in Audit revealed that these were avoidable at various stages of implementation and were as under:

- Delay in acquisition of land and handing over of site (Agnoor SHP and Triveni SHP);
- Delay in approval of various drawing (Agnoor SHP);
- Delay in completion of transmission line to evacuate power(Agnoor SHP and Sebari SHP);
- Delay in supply of equipments by contractor (Triveni SHP);

The Management stated (August 2010) that there was no time overrun with respect to Agnoor and Triveni SHP, but, actually it was commissioned before scheduled time. However, this is contrary to the facts and figures furnished to us on record.

A few case studies of individual irregularities in respect of various projects undertaken are given below:

Delay in completion of transmission line to evacuate power

Even though, units of Sebari SHP have been completed in February 2010, the project was yet to be commissioned due to non completion of evacuation facilities (November 2010). This resulted in loss of generation of 4.84 MU power valued at ₹ 1.14 crore for the period February 2010 to November 2010 (10 months).

The Company lost revenue of ₹ 1.14 crore due to delay in completion of transmission line with respect to Sebari SHP

The Management stated (September 2010) that though the project was completed towards the end of 2009, there was no loss of generation as the canal was closed by the Water Resource Department for repair.

Delay in submission of Completion Reports

The Ministry of New and Renewable Energy (MNRE), Government of India, New Delhi sanctioned (October 2004 and March 2007) subsidy of ₹ 10.27 crore for setting-up of seven¹⁹ Small Hydro Projects (SHP) and accordingly released ₹ 7.70 crore. Though, seven projects have been commissioned, the release of last installment of ₹ 2.57 crore i.e. 25 per cent of the sanctioned subsidy was still pending (November 2010) due to non-receipt of ‘Completion Report’. One of the projects, Dhelabagh SHP was completed as back as in August 2006. We observed that although projects had been commissioned, the final bills of the contractors had not been finalised. Further these projects have also not been run and tested at full load of the installed capacity.

The Management stated (September 2010) that the 25 per cent of subsidy would be claimed only when Alternate Hydro Energy Corporation (AHEC), IIT Roorkee (consultant of the Company for these projects) submits performance report in respect of these projects. The AHEC has to conduct these tests after constructing required structures. But, the consulting agency has been changing the design for their structures because of which the test has not been carried out.

The time overrun in the projects led to cost overrun of ₹ 43.46 crore over the estimated cost of the projects as per DPR, resulting in increase in cost of power generation from the envisaged 96 to 162 paise per unit and in the per MW cost from ₹ 4.91 crore in 2005-06 to ₹ 8.97 crore in 2009-10.

The estimated cost of the various power stations executed under different phases, actual expenditure, cost escalation and the percentage increase in the cost are tabulated below:

Cost overrun

(₹ in crore)

Sl. No.	Phase-wise name of the Unit	Estimated cost as per DPR	Awarded Cost	Actual expenditure as on 31 March 2010	Expenditure over and above estimate	Percentage increase as compared to DPR
(1)	(2)	(3)	(4)	(5)	(6) = (5) – (3)	(7)
1.	Agnoor SHP (2*0.5MW)	2.47	7.97	19.60	17.13	693.52
2.	Dhelabagh SHP (2*0.5 MW)	6.87	6.70	11.33	4.46	64.92
3.	Nasariganj SHP(2*0.5MW)	5.44	5.68	9.94	4.50	82.72
4.	Jainagar SHP(2*0.5MW)	5.31	5.30	9.45	4.14	77.97
5.	Triveni	9.15	13.47	19.38	10.23	111.80

¹⁹ SHP at Nasariganj , Triveni, Dhelabagh, Jainagar, Shirkhinda, Sebari and Arwal.

	SHP(2*1.5MW)					
6.	Shirkhinda SHP(2*0.35MW)	4.87	4.97	6.51	1.64	33.68
7.	Sebari SHP(2*0.5MW)	5.68	5.64	7.04	1.36	23.94
	Total	39.79	49.73	83.25	43.46	

It would be seen from above that out of seven projects implemented during review period by the Company, there was cost overrun ranging from 23.94 per cent to 693.52 per cent of the estimated cost of projects. Main reasons for cost overrun as analysed by us in respect of units selected in Audit were as under:

- Cost overrun of ₹ 17.13 crore due to non-finalisation of lay out plan of power house, non-acquisition of private land, delay in approval of drawings and delay in completion of transmission line to evacuate power (Agnoor SHP);
- Lack of effective control over the completion of various packages (Triveni SHP);
- Extra expenditure (₹ 3.62 crore) due to excess use of inputs(Nasariganj SHP, Sebari SHP and Shirkhinda SHP);
- Additional item of works not envisaged in the DPR was executed at a cost of ₹ 1.27 crore (Sebari SHP and Shirkhinda SHP).

However, the Management stated (August 2010) that cost overrun was within permissible limit of 10 per cent of the revised cost of the project. However, cost overrun beyond the DPR led to significant increase in per unit cost of generation as well as per MW cost thereby adversely affecting the economic viability of the projects envisaged while their planning.

Five numbers of case studies of individual irregularities in respect of projects funded by NABARD completed during the last five year ending March 2010 are given in *Annexure-15*.

3.10 Contract Management

Contract management is the process of efficiently managing contract (including inviting bids and award of work) and execution of work in an effective and economic manner. The works is generally awarded on turn key (Composite) basis to a single party involving civil construction, supply of machines and ancillary works. Some of the comments related to the Contract Management on the projects completed during the present review have already been featured in Performance Review on Project Implementation and Generation Performance of Bihar State Hydroelectric Power Corporation Limited included in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2007 (Commercial), Government of Bihar. During review period 21 contracts valuing ₹ 36.38 crore (of the Company) were executed. The agreements related to civil works and other miscellaneous works. Three contracts valued ₹ 9.01 crore were reviewed in audit.

Audit findings in this regards are given below:

Inordinate delay in finalization of tender

For execution of Dehra SHP (2*500 KW) and Sipaha SHP (2*500 KW) at estimated cost of ₹ 5.83 crore and ₹ 5.43 crore, funds of ₹ 4.10 crore and ₹ 3.81 crore respectively were sanctioned (May 2003) by NABARD under Rural Infrastructure Development Fund (RIDF) –VIII. Both the projects were to be completed by March 2005. However, we observed that LOI for Dehra SHP was issued after a delay of 36 months in May 2006. But due to dispute regarding price variation clause, the same was cancelled (March 2007) and fresh agreement was entered into (March 2010) at a cost of ₹ 6.18 crore. Thus, due to delay in finalisation of award for works, the Company failed to avail the sanctioned funds. Similar was the case with Sipaha SHP, where the final agreement was executed in February 2010 at a cost of ₹ 6.97 crore for which the LOI was issued in May 2006.

Thus, due to delay in finalization of tender despite the availability of funds, not only was the completion of both the projects delayed but the project cost also enhanced by ₹ 1.89 crore from the initial cost. Due to failure of the Company in execution of the above projects the State was deprived of capacity addition of 2 MW power and annual generation of 8.76MU.

The Company sought the sanction of the execution of the same project in January 2009 from NABARD under RIDF-XIV, but it was also not granted. Further, for sanction of the said project under RIDF-XV, a fresh proposal was submitted (April 2009) by the Company to NABARD but sanction of the same was yet to be granted (November 2010).

The Management stated (September 2010) that both the agencies to whom LOI were issued for the above two SHPs refused to work. Under the circumstances; aforesaid LOI had to be cancelled. However, we observed that lack of penal clause for refusal of contract and inordinate delay in finalisation of fresh tender delayed the execution of the project abnormally which led to increase in cost.

Delay in awarding the works (Paharma SHP-2*0.5 MW)

For execution of above project at an estimated cost of ₹ 5.55 crore the Company invited (April 2001) tender and issued (June 2004) LOI after a delay of 3 years to an agency. This agency refused to execute the work (September 2005) as no provision was made for cost escalation in the LOI. The Company re-invited (February 2006) tender after a delay of four months and awarded the work to another agency in November 2006. Thus, there was delay of over five years in finalization of tender process which was mainly due to poor management decisions. Due to delay in finalization of tender the cost of the project increased by ₹ 5.17 crore²⁰.

The Management in its reply accepted (September 2010) that despite its best efforts to award the work, it could not succeed because of factors beyond its control.

²⁰ revised cost(April 2007) ₹ 10.72 crore–original estimated cost of ₹ 5.55 crore

3.11 Operational Performance

Operations of Generation Company is dependent on input efficiency consisting of material and manpower and output efficiency in connection with Plant Load Factor, plant availability, capacity utilization, outages and auxiliary consumption. These aspects have been discussed below.

Input Efficiency

Procedure for procurement of coal

The Central Electricity Authority (CEA) fixes power generation targets for thermal power stations (TPS) considering capacity of plant, average plant load factor, and past performance. The Board works out coal requirement on the basis of targets so fixed and past coal consumption trends. The coal requirement so assessed is conveyed to the Standing Linkage Committee (SLC) of the Ministry of Energy (MOE), Government of India, which decides the source and quantity of coal supply to TPSs on quarterly basis. On the basis of linkage source approved by SLC, the Board entered into Coal Supply Agreements with collieries. However, the Government of India notified in October 2007 new coal distribution policy and switched over from the linkage regime to firm fuel supply agreement (FSA) with effect from April 2009. Accordingly, Firm Fuel Supply Agreement (FSA) with effect from April 2009 was made on 6th November 2009 between Eastern Coalfields Limited, Burdwan, West Bengal and BSEB for supply of coal of 340000 MT per year.

The position of coal linkages fixed & coal received during the period from 2005-06 to 2009-10 in respect of BTPS was as under:

Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
Coal Linkage fixed/ FSA(MT)	330000	420000	330000	375000	340000
Quantity of coal received (MT)	160876	46183	142335	67075	291903
Shortfall in coal received (MT)	169124	373817	187665	307925	48097

It would be seen from the Table above that the total linkage of coal for 2005-09 fixed by the SLC was 14.55 lakh MT against which only 4.16 lakh MT of coal was received resulting in short receipt of 10.39 lakh MT. It was observed that this was due to shut down of unit No.6 from March 2006 to November 2007 (for restoration work) and unit No. 7 from 2007-08 onwards. As such BTPS could not utilise even the coal linkages fixed by the SLC

From 2009-10 the FSA became applicable. However, the Management failed to procure agreed quantity of coal (340000MT) during 2009-10. We observed that due to inadequate fuel stock at BTPS unit no. 6 remained under shut down for 966 hours (nearly 40 days) in 2009-10 resulting in loss of generation of 101.50 MU valued at ₹ 30.75 crore, which could have prima facie been controlled by Management.

The Board lost generation revenue of ₹ 30.75 crore due to inadequate fuel stock during 2009-10

Quality of coal

The Board paid ₹ 6.29 crore on procurement of 0.43 lakh MT of inferior/ungraded coal which could have been avoided

Each thermal station is designed for usage of particular grade of coal. Usage of envisaged grade of coal ensures optimizing generation of power and economizing cost of generation. We observed that the grade of coal received from collieries was not always of the specified grade required by the thermal stations and was either inferior or ungraded coal. During 2005-06 to 2009-10, BTPS received 0.43 lakh MT of inferior/ungraded coal, out of 7.08 lakh MT coal received, for which payment was made as per declared/billed grade. This resulted in avoidable payment of ₹ 6.29 crore to the collieries. The Board did not claim any amount towards grade differences as there was no agreement for entertaining such claims.

Consumption of fuel

Excess consumption of coal

The consumption of coal depends upon its calorific value. The norms fixed in the project report for various power generation stations for production of one unit of power in the State vis-a-vis maximum and minimum consumption of coal during the period of five years ending 2009-2010 is depicted in the Table below.

(in Kgs)

Name of the Station	Norms fixed in the project report	Average min consumption during the year	Average max consumption during the year
BTPS unit no.6	0.519	0.954 (2008-09)	1.100 (2005-06)
BTPS unit no.7	0.519	0.954(2005-06)	1.100(2006-07)

(Figures in brackets indicate the year in which the maximum/ minimum consumption was obtained)

Due to procurement of coal of low UHV and high heat rate of TPS, the Board incurred ₹ 48.71 crore on excess consumption of coal during 2005-10

From the above it may be seen that in both the Units, the consumption remained higher than the norms in all the years under review. The consumption above the norms resulted in excess consumption of coal to the tune of 3.17 lakh MT during the review period as detailed in the *Annexure-16*. Thus, the low calorific value, also contributed to excess consumption, which could be prima facie controlled by the Management. The value of this excess consumption of coal worked out in audit amounted to ₹ 48.71 crore as mentioned in the *Annexure-16*. Further analysis revealed that out of 3.17 lakh MT of total excess consumption, 2.37 lakh MT was due to overheat and remaining 0.80 lakh MT due to procurement of coal of low Useful Heat Value (UHV).

3.12 Manpower Management

CEA has prescribed norms for manpower per MW in 10th plan and 11th plan in respect of hydro projects 1.79 (1.53 Technical and 0.26 Non technical staff) and 1.61 (1.38 Technical and 0.23 Non technical staff) respectively. The position of actual manpower, sanctioned strength & manpower as per CEA norms in respect of the company is given below:

Hydel

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
1	Sanctioned strength	457	457	457	457	457
2	Manpower as per the CEA norms	79	83	76	83	85
3	Actual manpower	134	124	118	116	107
4	Excess manpower in respect to CEA norms	55	41	42	33	22
5	Expenditure on salaries (₹ in lakh)	200.00	220.00	249.00	280.00	365.00
6	Extra expenditure with reference to CEA norms (₹ in lakh) [(5/3) x 4]	82.09	72.74	88.63	79.65	75.05
7	Average expenditure on salaries per employee (₹ in lakh)	1.49	1.77	2.11	2.41	3.41

The Company incurred extra expenditure of ₹ 3.98 crore during 2005-10 due to excess manpower

From the above Table it may be seen that actual manpower of the Company declined against the sanctioned strength but remained higher than CEA norm. The expenditure incurred on salaries per employee increased from ₹ 1.49 lakh to ₹ 3.41 lakh i.e. 128.85 *per cent* during the period under review mainly due to revision of pay of the employee under 6th pay commission. The excess manpower as compared to CEA norms resulted in extra expenditure of ₹ 3.98 crore.

Thermal (BTPS)

The position of actual manpower, sanctioned strength and manpower as per CEA norms in respect of the BTPS is given below:

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
1	Sanctioned strength	921	921	921	921	921
2	Manpower as per the CEA norms	564	564	506	506	506
3	Actual manpower	729	777	643	635	586
4	Expenditure on salaries (₹ in crore)	16.43	17.71	19.82	21.72	30.46
5	Average expenditure on salaries per employee (₹ in lakh)	2.25	2.28	3.08	3.42	5.20

It may be seen from the above Table that actual manpower decreased from 729 to 586 under the review period but the sanctioned strength was not regulated nor the employee were transferred elsewhere even though only one unit of 110 MW was in operation at a time during 2006-07 to 2009-10, against the installed capacity of 320 MW.

Despite having excessive manpower, the BTPS was regularly employing temporary/contract staffs for regular jobs such as housekeeping, cleaning of coal handling plant, cleaning of condenser etc. During 2005-10 generating station deployed on an average 208 temporary employees for such jobs by incurring an expenditure of ₹ 2.94 crore. Besides, overtime had regularly been paid to the regular staff. An analysis of the same revealed that yearly overtime paid ranged from 45900 to 56850 hours equivalent to the duty hours of 5737 to 7106 employees during 2005-10. The overtime wages paid by BTPS during the period of review works out to ₹ 3.61 crore. However, no action was taken to rationalise the staff strength or explore ways to utilise them optimally.

The Management stated (October 2010) that in addition to generation, the activities of electrical control of switchyard and maintenance of its feeders are performed with existing manpower.

3.13 Output Efficiency

Shortfall in generation

The targets and shortfall in generation of thermal and hydel power during 2005-06 to 2009-10 is shown in the following table:

Year	Thermal			Hydel		
	Target (MU)	Actual (MU)	Shortfall (MU)	Target (MU)	Actual (MU)	Shortfall (MU)
2005-06	418	120.95	297.05	65.00	72.75	-7.75
2006-07	210	37.25	172.75	63.50	68.61	-5.11
2007-08	315	132.75	182.25	72.75	61.48	11.27
2008-09	310	102.94	207.06	69.53	60.37	9.16
2009-10	360	264.71	95.29	71.00	34.66	36.34
Total	1613	658.60	954.40	341.78	297.87	43.91

Thermal

The targets for generation of thermal power for each year are fixed by the Central Electricity Authority. We observed that the BTPS was able to generate a total of 658.60 MU of energy during 2005-06 to 2009-2010 against a target of 1613 MU fixed. This resulted in a net shortfall of 954.40 MU. Management stated that the targets were being fixed by CEA based on installed capacity and hence they were not realistic given the conditions of the units.

Hydel

The targets for generation of hydro power for each year are fixed by the Company and approved by the Central Electricity Authority. It was observed that the Company was able to generate a total of 297.87 MU of power during 2005-06 to 2009-10 against a target of 341.78 MU fixed. This resulted in a net shortfall of 43.91 MU.

The reasons for shortfall in generation were mainly due to non availability of water in canals, on which hydel units were located, power tripping etc. In

2009-10 actual generation was especially low due to restoration and strengthening work of Koshi & Gandak canals.

The year-wise details of energy to be generated as per design, actual generation, plant load factor (PLF) as per design and actual plant load factor in respect of the power Projects commissioned up to March 2010 are as given in *Annexure- 17 and 18*.

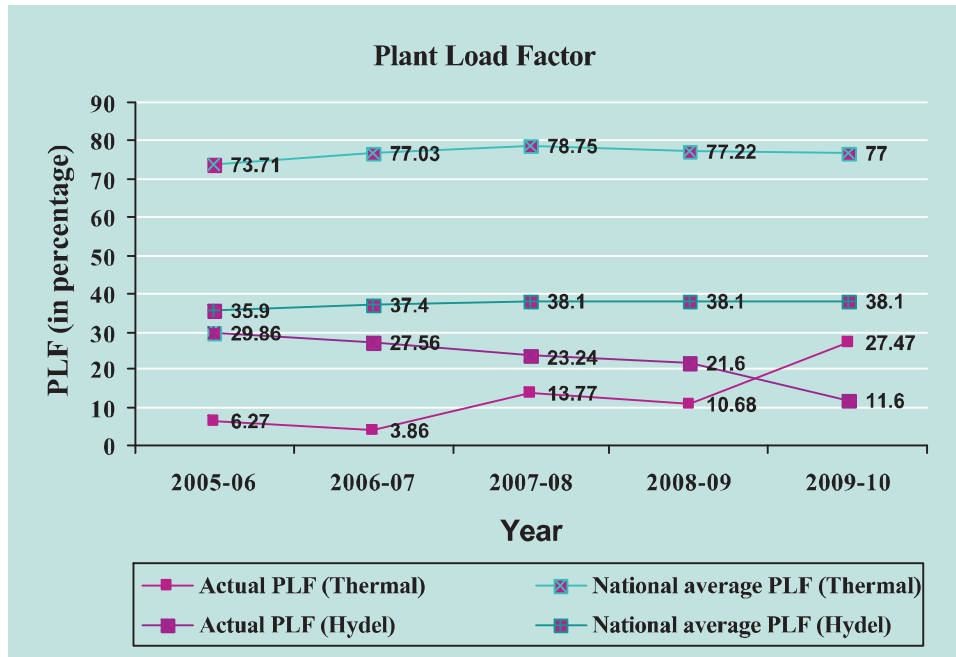
The details in the *Annexure-17 and 18* indicate that:

- The actual generation and actual PLF achieved were far below the energy to be generated and PLF as per design during the five years up to 2009-2010.
- As against the total designed generation of 5781.60 MU and 1321.36 MU of energy in respect of Thermal and Hydro Power during the five years ended 2009-2010 the actual generation was 658.60 MU and 297.87 MU respectively leading to the shortfall of 6146.49 MU .

Low Plant Load Factor (PLF)

Thermal

Plant load factor (PLF) refers to the ratio between the actual generation and the maximum possible generation at installed capacity. According to norms fixed by Central Electricity Regulatory Commission (CERC), the PLF for thermal power generating stations should be 80 per cent , against which the national average was 76.74 per cent.



The PLF of BTPS ranged from 3.86 to 27.47 during the five year ended March 2010 as depicted in line graph above.

Hydel

The national PLF for hydro power generating stations ranged between 35.90 and 38.10 *per cent* during 2005-06 to 2007-08²¹, against which the average PLF of the company declined from 29.86 to 11.60 *per cent* during the five year ended March 2010 as depicted above.

The details of average realization *vis a vis* average cost per unit, PLF achieved, average realization at national PLF, PLF at which average cost would be recovered and the difference of PLF in *per cent* in respect of hydel and thermal are given in the following Table:

Sl. No.	Description	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Average Realisation (Paise per Unit)					
	Hydel	192	198	198	180	200
	Thermal	267	288	310	324	303
2.	Average Cost (Paise per Unit)					
	Hydel	229	302	448	519	946
	Thermal	521	1234	558	590	482
3.	Actual PLF (<i>per cent</i>)					
	Hydel	29.86	27.56	23.24	21.60	11.60
	Thermal	6.27	3.86	13.77	10.68	27.47
4.	National PLF (<i>per cent</i>)					
	Hydel	35.90	37.40	38.10	38.10	38.10
	Thermal	73.71	77.03	78.75	77.22	77
5.	PLF at which average cost stands recovered (<i>per cent</i>) (2/1 X 3)					
	Hydel	35.61	42.04	52.58	62.28	54.87
	Thermal	12.23	16.54	24.79	19.45	43.70
6.	Difference (in <i>per cent</i>) (4 – 3)					
	Hydel	6.04	9.84	14.86	16.50	26.50
	Thermal	67.44	73.17	64.98	66.54	49.53

From the above Table it may be seen that actual PLF of the generating units of the Board and the Company was lower than the national PLF. This resulted in estimated shortfall in thermal generation by 3749.09 MUs (at national PLF) during 2005-06 to 2009-10. Similarly, it could be seen that the estimated shortfall in hydel generation works out to 203.80 MUs (at the national average PLF) during 2005-06 to 2009-10 resulting in loss of contribution amounting to ₹ 39.59 crore.

The main reasons for the low PLF were:

- low plant availability
- low capacity utilisation
- major shut downs and delays in repairs and maintenance

The Board lost generation of 3749.09 MU due to operating below National PLF during 2005-10 while the Board and the Company lost contribution of ₹ 39.59 crore during the same period

²¹ Figures of National PLF for hydro stations were not available for 2008-09 and 2009-10. Therefore, figure of 2007-08 has been considered for comparison purpose only.

- low discharge of water for hydro units
- Shut down of plant due to power tripping etc.

These are discussed in the following paragraphs:

Low plant availability

Plant availability means the ratio of actual hours operated to maximum possible hours available during certain period. The details of total hours available, total hours operated, planned outages, forced outages and overall plant availability in respect of hydel and thermal units are shown below:

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Total hours available					
	(i) Hydel ²²	96360	96360	96624	96360	96360
	(ii) Thermal ²³	17520	17520	8784	8760	8760
1 A	Maximum possible hours ²⁴ for Hydel units (2/3 rd of 1(i))	64240	64240	64416	64240	64240
2.	Operated hours					
	(i) Hydel	33409	32888	28260	26877	16359
	(ii) Thermal	3809	1217	2458	1635	4917
3.	Planned outages (in hours)					
	(i) Hydel	12996	22305	28945	36410	30304
	(ii) Thermal	1565	14043	4578	13	66
4.	Forced outages (in hours)					
	(i) Hydel	17835	9047	7211	953	17577
	(ii) Thermal	12146	2260	1748	7112	3777
5.	Plant availability (<i>per cent</i>)					
	(i) Hydel (2(i)*100/1A)	52.01	51.20	43.87	41.84	25.47
	(ii) Thermal	21.74	6.95	27.98	18.66	56.13

As against the CERC norm of 80 *per cent* plant availability of thermal plant during 2004-09 and 85 *per cent* during 2010-14, the average plant availability of BTPS ranged from 6.95 to 56.13 *per cent* during the five years up to 2009-10.

Similarly, the average plant availability of the Company ranged from 25.47 to 52.01 *per cent* during the five years up to 2009-10.

²² Four hydel plants selected for audit scrutiny (at Barun, Dehri-on-Sone, Kataiya and Valmikinagar) having 11 running units (8760 available hours yearly for each unit) have been taken.

²³ One thermal plant having two running units has been taken. One unit was not in operation during 2007-10.

²⁴ Considering only 2/3 of the total available hours as actual available hours, due to non-availability of water for about four months in a year during closure of canals by Irrigation Department.

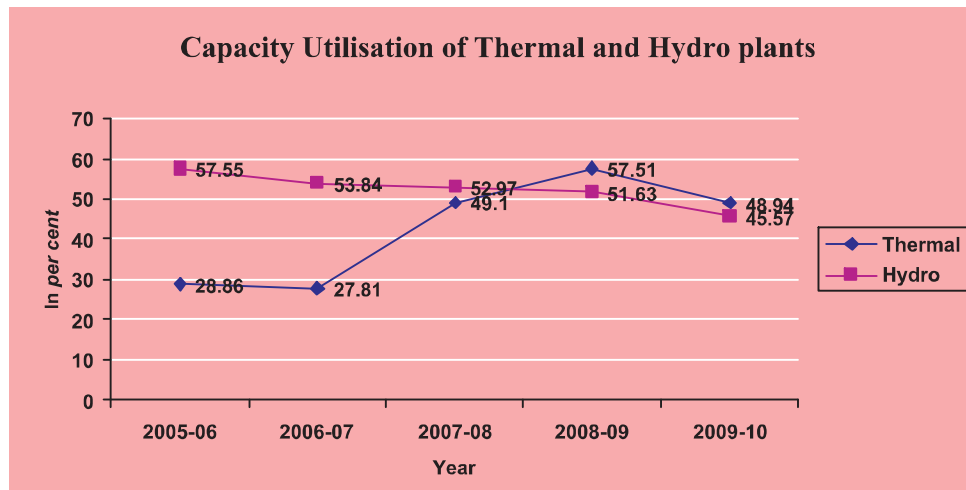
The low availability of thermal Power plants was due to longer duration of outages caused by electric tripping, breakdown of machines, shortage of coal, non-adherence to maintenance schedule of the units and other critical inputs.

An analysis of the outages of unit no. 6, revealed that this unit remained under outages for 31995 hours during 2005-06 to 2009-10 which was 73 *per cent* of the total available hours. Out of these, 14975 hours (34 *per cent*) was under planned outages and 17020 hours (39 *per cent*) was under forced outages. The reason for such a huge outages was attributable to non-adherence of maintenance schedule, extra time taken in carrying out Boiler, Turbo-Generator work (BTG work) and inadequate stock of fuel for operation of unit.

Similarly, the low availability of hydel Power plants was due to longer duration of outages caused by non-availability of water, low discharge of water, electric tripping, breakdown of machines and other critical inputs.

Low Capacity Utilisation

Capacity utilisation means the ratio of actual generation to possible generation during actual hours of operation. The average capacity utilisation of two units of the thermal plant of BTPS and capacity utilisation of four hydel plants during 2005-06 to 2009-10 has been shown in the graph below:



From the above graph it may be seen that the average capacity utilisation of two units of BTPS and four hydro plants of the Company ranged from 27.81 *per cent* to 57.51 *per cent* and 45.57 to 57.55 *per cent* respectively during 2005-10.

The main reasons for the low utilisation of available capacity during 2005-10, as analysed in audit were:-

- Poor health of TPS;
- Running of units with partial load ;
- Constraints on transmission capacity; and
- Non- availability of design discharge of water for hydel units etc.

Outages

Outages refer to the period for which the plant remained closed for attending planned/ forced maintenance. We observed following deficiencies in planned and forced outages:

Thermal

The total number of hours lost due to planned outages remained 1565 hours (for unit no.6&7) in 2005-06 to 66 hours(unit no.6 only) in 2009-10 The forced outages in power stations remained 12146 hours (unit no.6&7) in 2005-06 to 3777(unit no.6 only) hours in 2009-10 of the total available hours in the respective years. The forced outages ranged between 12.90 and 81.19 *per cent* which was more than the norm of 10 *per cent* fixed by CEA in all the five years. Compliance of the CEA norms would have entailed availability of plant for additional hours with consequent generation of 2396.21 MU during the period covered under review. This was mainly due to non-adherence of maintenance schedule and non-execution of R&M/LE work.

Hydel

The total number of hours lost due to planned outages increased from the 12996 hours in 2005-06 to 30304 hours in 2009-10 i.e. from 20.23 *per cent* to 47.17 *per cent* of the total available hours in the respective years. Main reason for planned outages was closure of canals for upkeep.

The forced outages in power stations decreased from 17835 hours in 2005-06 to 17577 hours in 2009-10 i.e. from 27.76 to 27.36 *per cent* of the total available hours in the respective years. The forced outages remained more than the norm of 10 *per cent* fixed by CEA in all the five years ending 31 March 2010. The main reasons for forced outages were non-availability of water, transmission constraints; system disturbances i.e. frequent power tripping, flood in Koshi river and high silt in the Koshi and Gandak rivers etc.

Auxiliary consumption of power

Thermal

Energy consumed by power stations themselves for running their equipments and common services is called auxiliary consumption. The permissible limit of auxiliary consumption was 10 *per cent* of the power generated to be used as per norms fixed by the Management. However, the actual auxiliary consumption of power ranged from 12.37 *per cent* in 2008-09 to 28.59 *per cent* in 2006-07 resulting in excess consumption of 39.17 MU which could not be dispatched to the grid.

Hydel

Bihar Electricity Regulatory Commission (BERC) allowed (December 2009) 0.5 *per cent* of the power generated to be used as auxiliary consumption. However, the actual auxiliary consumption of power stations ranged between 2.43 *per cent* in 2005-06 and 2.42 *per cent* in 2009-10 resulting in excess consumption of 9.80 MU valuing ₹ 1.90 crore.

The Board and the Company sustained loss in generation of 48.97 MU on account of excess auxiliary consumption which could have been avoided during 2005-10. Besides, the Company lost ₹ 1.90 crore due to excess auxiliary consumption

The Management stated (September 2010) that the norm fixed by the BERC of 0.5 *per cent* is true for a big project. But, for a small canal based project it is not possible to achieve due to canal remaining closed for four months. Moreover, canal based SHPs are mostly located in disturbed area, colony lighting is accounted for in auxiliary consumption. However, it may be mentioned here that the company has not filed any objection petition with BERC in this regard

3.14 Repairs & Maintenance

To ensure long term sustainable levels of performance, it is important to adhere to periodic maintenance schedules. Non adherence to schedule carry a risk of the equipment consuming more coal, fuel oil and a higher risk of forced outages which necessitate undertaking R&M works. These factors lead to increase in the cost of power generation due to reduced availability of equipments which affect the total power generated.

We observed that annual maintenance of units of BTPS was not done regularly. For unit no. 6 of BTPS, first and last capital maintenance was done during October 1988 to November 1989. Similarly for unit no. 7, first and last capital maintenance was done during July 1992 to May 1993. Thus, the delayed/irregular maintenance caused continuous deterioration in the condition of machines causing forced outages besides increased consumption of oil, coal and loss of generation of power as discussed in the input performance.

In respect of hydro units, we observed that repair and maintenance work was being done almost on regular basis by the contracted agencies engaged in housekeeping works for which separate work orders were issued to the agencies without inviting tenders.

3.15 Renovation & Modernisation

Renovation & Modernisation (R&M) and refurbishment activities involve identification of the problems of unit of TPS, preparation of techno economic viability reports, preparation of detailed project reports (DPR) to lay down benefits to be achieved from these works.

R&M activities are aimed at overcoming problems in operating units caused due to generic defects, design deficiency and ageing by re-equipping, modifying, augmenting them with latest technology/systems. R&M activities are undertaken in TPS operating at Plant Load Factor (PLF) of 40 *per cent* and below after assessing the performance and requirement of the units.

Thermal

Delay in R&M work of units at BTPS

For Residual Life Assessment/Renovation and Modernization (RLA/R&M) of unit no. 6 & 7 at Barauni TPS, letter of intent (LOI) was placed (July 2005) on M/S BHEL on turnkey basis at a total cost of ₹ 187.00 crore, on the recommendations (May 2005) of Planning Commission, Government of India under (Rastriya Sam Vikas Yojna) RSVY scheme. But, in place of execution of R&M work which is life extension programme for the work, the restoration

The Board lost generation of 3.49 MU on avoidable planned outages of 11817 hours w.r.t. unit 6 while executing restoration work in 2006-07

work (temporary repair and maintenance work for running the plant) of unit No. 6 of BTPS was carried out during March 2006 to November 2007 and in case of unit no.7, the work was started in June 2010 and is still in progress (November 2010). Thus, due to delay in R&M work, generations from unit no. 7 could not be achieved due to shut down /idle since August 2006.

We observed that restoration work of unit no.6 was started in March 2006 and was to be completed within 90 days (2160 Hours). However, the work was completed in November 2007 which increased the planned outages for the unit to 13977 hours, out of which 11817 hours was avoidable. Considering 6.95 per cent plant availability and 3.86 per cent PLF of the station during 2006-07, the loss in generation was 3.49 MU.

The details of delay in taking up of maintenance of Units in BTPS are given in *Annexure – 19*.

Hydel

During 11th Five year plan (2007-08 to 2011-12) the company envisaged construction of escape channels at Dehri SHP (estimated cost ₹ 6.05 crore) and at Valmikinagar SHP (estimated cost ₹ 11.65 crore) and renovation and modernisation of Kataiya SHP (estimated cost ₹ 35.00 crore). But the works were behind the schedule as discussed below.

Loss of generation due to non-construction of escape channel

Dehri (1993) and Valmikinagar (1995) plants were commissioned with minimum essential operating facilities. These plants had the potential to become more viable with incorporation of certain features such as automation of gates, construction of escape channels²⁵ among others. For construction of escape channels, provision was made in the DPR, so that after generation, water may be sent back to the river through such escape channels. But, the company was neither able to generate funds from its own sources nor mobilize funds from other sources.

For construction of escape channels agreements were executed in October 2007 and November 2008 with agencies (M/S Gandak Construction Private Limited, Bagaha, West Champaran for escape channels at Valmikinagar project to be completed in six months and M/S Purochan Construction Company Private Limited, Patna for escape channels at Dehri project to be completed in 12 months) but, the work was yet to be completed (November 2010).

Thus, due to lack of construction of escape channels in these projects, 211.80 MU of energy valued at ₹ 42.36 crore could not be generated during the last five years ending March 2010 (considering closure of canals due to no irrigation demand, for a maximum of four months in two stretches every year, for the above projects).

The Company lost ₹ 42.36 crore on account of generation revenue due to non-construction of escape channel

²⁵Escape channel means the channel constructed and linked to main canal at upstream and to main river in the downstream, so that water flowing in main canal may discharge back to main river after passing through the hydel generating units.

The Management stated (September 2010) that Rural Electrification Corporation (REC) sanctioned loan (2006) for escape channel in Dehri and Valmikinagar but the Government of Bihar did not agree for guarantee. Now loans are being arranged from the NABARD.

Delay in R&M of Kataiya SHP

The company proposed (February 2007) to carry out renovation & modernization of Kataiya SHP with estimated cost of ₹ 35.00 crore (constructed and commissioned during 1970-73 and transferred by BSEB in June 2003). For this a loan of ₹ 32.84 crore was granted (March 2007) to the Company by the State Government. The work was to be completed by March 2010 as per 11th plan. But, the work was yet to be started (November 2010).

The Management stated (September 2010) that LOI issued (May 2008) for the said work was cancelled due to floods in Koshi river. Fresh tender has been invited (November 2009) and LOI has been issued (August 2010). Thus, the reply explicitly admits that there is inordinate delay in finalisation of tenders resulting in delay in R& M of Kataiya SHP.

Operation & Maintenance

The operation and maintenance (O&M) cost includes expenditure on the employees, repair & maintenance including stores and consumables, consumption of capital spares not part of capital cost, security expenses, administrative expenses etc. of the generating stations besides corporate expenses apportioned to each generating stations etc. but exclude the expenditure on fuel.

CERC in its regulation 2009 allowed O&M norm for 2009-10 of ₹ 18.20 lakh per MW in respect of 200-250 MW capacity thermal power units. As thermal units of the Board were of 110MW i.e. below 200MW, the above norm was not applicable. However, the cost of O&M per MW in BTPS ranged from ₹ 42.64 lakh to ₹ 75.81 lakh during 2005-10.

In respect of Hydro generating power stations, O&M expenses per MW for 2009-10 were fixed at ₹ 38.45 lakh. Against the above mentioned norms the total O&M cost per MW incurred by the Company was ₹ 24.65 lakh, ₹ 28.83 lakh, ₹ 30.59 lakh, ₹ 38.60 lakh and ₹ 50.35 lakh from 2005-06 to 2009-10. Audit observed that O&M expenses were higher than the norms fixed by CERC in the year 2008-09 and 2009-10.

3.16 Financial Management

Efficient fund management is the need of the hour in any organisation. This also serves as a tool for decision making, for optimum utilisation of available resources and borrowings at favourable terms at appropriate time.

The main sources of funds were realisations from sale of power, subsidy from State/Central Governments, loans from State Government/Banks/Financial Institutions (FI), etc. These funds were mainly utilised to meet cost of generation, payment of power purchase bills, debt servicing, employee and administrative costs, and system improvement works of capital and revenue nature.

Details of sources and utilisation of resources on actual basis for the Company for the years 2005-06 to 2009-10 are given below:

Hydel

(₹ in crore)

The following is the Cash Flow Statement for the period of review.

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
Cash Inflow						
1.	Net Profit/(loss)	(0.13)	(3.49)	(8.22)	(13.69)	(22.14)
2.	Add: adjustments	8.80	10.12	13.34	15.15	20.65
3.	Operating activities	13.65	13.01	11.81	10.79	7.14
4.	Investing activities (Interest)	0.44	0.97	3.70	3.03	2.69
5.	Financing activities	21.31	71.00	37.81	23.51	45.72
	Total	44.07	91.61	58.44	38.79	54.06
Cash Outflow						
6.	Operating activities	9.98	18.83	16.53	9.73	14.51
7.	Investing activities on projects under constructions	29.11	43.68	43.77	30.14	26.44
8.	Financing activities	-	-	-	-	-
9.	Total	39.09	62.51	60.30	39.87	40.95
	Net increase/decrease in cash/cash equivalent	4.98	29.10	(1.86)	(1.08)	13.11

From the above table it may be seen that the net cash (including cash equivalent) decreased in 2007-08 and 2008-09. This was mainly due to improper financial management. Further detailed analysis of financial position revealed that dependence on borrowed funds increased during review period as the same increased from ₹ 290.26 crore in 2005-06 to ₹ 499.60 crore as at the end of 2009-10. This entailed interest burden of ₹ 50.53 crore during review period ultimately increasing the operating cost of the Company. Therefore, there is an urgent need to optimise internal resource generation by enhancing the PLF and vigorous pursuance of outstanding dues as well as effective recovery of energy bills.

The Company sustained a net loss of interest of ₹ 8.40 crore on borrowed fund invested in 2006-07

It was also observed that the Company could not utilise the available funds for the intended purposes and kept the funds in current account/ short term deposits from time to time. The Company invested funds of ₹ 32.84 crore raised (March 2007) as loan from State Government for Kataiya SHP (R&M works) in short term deposits initially for 50 days and subsequently renewed them from time to time up to a maximum period of 36 months earning interest at rates ranging from 4.50 to 10.50 *per cent* per annum. The Company created an interest liability of ₹ 12.81 crore at the rate of 13 *per cent* on this loan, whereas interest earned on this fund amounted to ₹ 4.41 crore till March 2010 resulting in avoidable expenditure on interest of ₹ 8.40 crore.

The main source of revenue of Board is tariff revenue received from different categories of consumers against the sale of power. The other source of revenue are non tariff revenues i.e. sale of tenders, loans and grants from the State Government. Board also receives subsidy from the State Government as Resource Gap to meet its revenue deficit.

3.17 Claims and Dues

The Generation Company sells energy to Transmission/Distribution Companies at the rates specified by BERC from time to time. BERC fixed the tariff rates after considering various economic and other factors. Generally sale price does not cover the total input costs. The differential amount is either absorbed by the Generation Company or claimed in the form of subsidy from the State Government if supplies are affected at concessional rates.

As the unbundling of the Board had not been done and it continued with the function of generation, transmission and distribution, the Table below gives the details of subsidy claims raised as Resource gap to meet revenue deficit vis-a-vis subsidy realised by the Board for the same during the review period.

(₹ in crores)

Sl. No.	Details	2005-06	2006-07	2007-08	2008-09	2009-10	Total
1.	Subsidy claims raised	844.00	834.87	873.28	798.70	910.08	4260.93
2.	Subsidy received from State Government	-	720.00	720.00	720.00	840.00	3000.00
3.	Difference (1 – 3)	844.00	114.87	153.28	78.70	70.08	1260.93

It would be seen from the above table that during 2005-06 to 2009-10 a total sum of ₹ 4260.93 crore was claimed from the State Government towards subsidy, of which only ₹ 3000.00 crore was reimbursed by the State Government leaving a balance of ₹ 1260.93 crore unreimbursed.

In case of Company, we observed that no differential amount was claimed by the Company in the form of subsidy from the State Government even if supplies were effected at concessional rates.

3.18 Tariff Fixation

The Company/Board is required to file the application for approval of Generation Tariff for each year 120 days before the commencement of the respective year or such other date as may be directed by the Commission. The Commission accepts the application with such modifications /conditions as may be deemed just and appropriate and after considering all suggestions and objections from public and other stakeholders, issue an order containing targets for controllable items and the generation tariffs for the year within 120 days of the receipt of the application.

It was observed that the Company delayed in filing the tariff petition for the year 2009-10. In place of filing the tariff petition on or before 15 November 2008, it was filed on 31 March 2009. The Bihar Electricity Regulatory Commission issued (22 December 2009) the order effective from 1 December 2009. Thus, due to belated submission of tariff petition by the Company it could not be implemented in time and resulted in loss of revenue of ₹ 1.32 crore for the period from April 2009 to November 2009.

We observed that the commission did not allow the penal interest of ₹ 16.89 lakh and interest on Capital of ₹ 95.71 lakh adding to the loss of the Company. However, this expenditure was controllable and could be avoided.

The Company lost revenue of ₹ 1.32 crore due to belated submission of tariff petition during 2009-10

The Board did not file any separate tariff petition pertaining to generation activities. Since BERC was set up in May 2005, no tariff petition for 2005-06 was considered for filing. However the general tariff petition was filed by the Board belatedly in 2006-07. Further, the tariff petition for 2007-08 and 2009-10 were rejected by BERC due to delayed filing.

3.19 Environmental Issues

In order to minimize the adverse impact on the environment, the GOI had enacted various Acts and statutes. At the State level, Bihar Pollution Control Board (BPCB) is the regulating agency to ensure compliance with the provisions of these Acts and statutes. Ministry of Environment and Forests (MoE&F), GOI and Central Pollution Control Board (CPCB) are also vested with powers under various statutes. The Board/ Company did not have an environmental wing at the corporate office.

Our scrutiny relating to compliance with the provisions of various Acts in this regard revealed the following:

3.20 Air Pollution

Clean Development Mechanism

To save the earth from green house gases(GHG) a number of countries including India signed the Kyoto protocol (Protocol), which was adopted (December 1997) in the third conference of parties to the United Nations Framework Convention on Climate Change [UNFCCC]. UNFCCC had set the “standard” level of carbon emission allowed for a particular industry or activity. The extent to which an entity is emitting less carbon (as per standard fixed by UNFCCC) it gets credited for the same. The booking of such saving of GHG is called purchase of certified emission reduction (CER), commonly called carbon credits. This whole system is named clean development mechanism (CDM).

For sale of CER, registration of the power plant is required as a CDM project with UNFCCC. The power plants that commenced operations on or after 1 January, 2000 are eligible for registration by submitting the request with the Ministry of Environment and Forest (MOE&F), Government of India. We observed that the Company earned 49248 CER from 18 projects (17.1 MW) valued at ₹ 23 crore at the end of November 2010. But till date, no CER had been sold by the Company (November 2010).

Non-achievement of specified SPM levels even after up-gradation

Coal ash, being a fine particulate matter, is a pollutant under certain conditions when it is airborne and its concentration in a given volume of atmosphere is high. Control of dust levels (Suspended Particulate Matters – SPM) in flue gas is an important responsibility of thermal power stations. Electrostatic Precipitator (ESP) is used to reduce dust concentration in flue gases. Control of dust level is dependant on effective and efficient functioning of ESPs.

ESPs installed at BTPS were designed to achieve an SPM level of 378 mg per Nm³. No efforts were made by the Board for up gradation of existing ESPs or for installation of new ESPs. Consequently, desired SPM level (150 mg per Nm³) could not be achieved in the areas surrounding BTPS.

Installation of on-line monitoring equipment

As per the provisions of the Environment (Protection) Act, 1986, TPSs should provide on-line monitoring systems to record SPM levels. But there was no on-line monitoring equipment installed at BTPS to record SPM levels in violation of statutory provisions.

Use of high ash content coal

As per MoE&F notification (July 2003) coal based power stations located 1,000 KM away from the coal mine or located in urban, sensitive and critically polluted areas were required to use coal having less than 34 *per cent* ash on an annual weighted average basis. We observed that BTPS used coal obtained from colliery of Eastern Coalfields Limited (ECL), West Bengal, which is located more than 500 KM away. During review period, BTPS received 7.08 lakh MTs of coal, in which the weighted average of ash ranged from 41.27 to 46.24 *per cent*. However, the ash content could have been brought down by the Board in the larger environmental interest by washing the coal through washeries and beneficiation. However, no action was taken in this regard.

Ash disposal

Annual generation of fly ash from running units of BTPSs in the State was around 17825 MTs to 107349 MTs during review period. MoE&F issued a notification (September 1999) which provided that every thermal plant should supply fly ash to building material manufacturing units free of cost at least for 10 years. Our scrutiny of generation and disposal of fly ash for the years under review revealed that against the total fly ash of 287430 MTs generated in the BTPS, only 51852 MTs was disposed of. This suggested that no concerted effort was made to improve the utilisation of ash.

The Management stated (October 2010) that it has always allowed ash supply to needy person/Company. The reply is vague as it does not specifically mention quantity of ash disposed of year wise.

3.21 Noise Pollution

Noise Pollution (Regulation and Control) Rules, 2000 aim to regulate and control noise producing and generating sources with the objective of maintaining ambient air quality. To achieve the above, noise emission from equipment be controlled at source, adequate silencing equipment should be provided at various noise sources and a green belt should be developed around the plant area to diffuse noise dispersion. The TPSs are required to record sound levels in all the areas stipulated in the rules referred to above. The prescribed noise level in morning hours was 65 db and in night hours it was 55 db. However our scrutiny revealed that there was no device installed at BTPS to record noise level which was in violation of the statutory provisions.

3.22 Water pollution

The waste water of the power plant is the source of water pollution. As per the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the TPSs is required to obtain the consent of BPCB which inter-alia contains the conditions and stipulations for water pollution to be complied with by the TPSs. However, the BPCB has not prescribed any norms in this regard.

As per the norms prescribed by Central Pollution Control Board (CPCB), total suspended solids (TSS), in effluents from the TPSs should not exceed 100 mg per litre. We noticed (May 2010) that TSS in effluent discharges from BTPS ranged from 119 mg per litre (2009-10) to 123 mg per litre (2005-06). The main reasons for exceeding TSS standards were absence of sedimentation tanks and ineffective functioning of effluent treatment plants. As both the reasons are controllable, effective and time bound steps could have avoided the irreparable damage caused to the water bodies.

3.23 Monitoring by top management

Board/ Company play an important role in the State economy. For such a giant organisation to succeed in operating economically, efficiently and effectively, there should be documented management systems of operations, service standards and targets. Further, there has to be a Management Information System (MIS) to report on achievement of targets and norms. The achievements need to be reviewed to address deficiencies and also to set targets for subsequent years. The targets should generally be such that the achievement of which would make an organisation self-reliant. Our review of the system existing in this regard revealed that the Company compiles generation data on daily basis. However, other operational/financial parameters are collected in an ad hoc manner on need basis. In case of Board the generation station maintain the data which are used by the Board on need basis. As such there is no well laid down system for compilation, consolidation, review or monitoring of operational /financial parameters either in the Company or in the Board. Further, the following deficiencies were noticed in this regard.

- The Board/Company did not set the targets for important operational parameters.
- The Board/ Company did not devise a proper MIS.
- The Board of Directors (BoD) did not discuss the operational/ financial performance of the Board / Company.
- The BoD did not evaluate the socio economic parameters to analyse the success rate of the project or positive impact on the socio economic parameters.
- The Aggregate Revenue Requirement was filed belatedly by the Company with the BERC in 2009-10.

Conclusion

- **The Company and the Board could not keep pace with the growing demand of power in the State due to non-commencement of commercial production and non execution of R & M/LE work of the existing units respectively.**
- **The management of the projects under the Company was ineffective as there were instances of time and cost overrun in all the projects taken up during 2005-10.**

- **Operational performance of the thermal plant was also affected due to short receipt as well as inferior quality of coal. Low thermal efficiency and high heat rate caused excess consumption of coal.**
- **Plant load factor, plant availability and capacity utilization in the Company showed a declining trend since 2005-06 while in the case of Board the same parameters showed varied trend. In both, the plant load factor remained less than national average.**
- **The Company and the Board did not deploy man power in accordance with the prescribed CEA norms.**
- **The top management did not take corrective measures to enhance the operational performance of the plants.**
- **Environmental statutes were not adhered to in the BTPS.**

Recommendations

The Company and the Board must:-

- **evolve effective planning for capacity addition to keep pace with growing demand to overcome the shortage of power;**
- **evolve effective monitoring mechanism to establish new power generating stations/units;**
- **take effective steps to ensure the consumption of coal within the prescribed norms;**
- **ensure adequate plant load factor, plant availability and capacity utilisation by minimising outages and auxiliary consumption;**
- **rationalise their manpower allocation to ensure optimum utilisation;**
- **enhance the use of beneficiated coal in case of high ash content coal and ensure effective compliance relating to environmental laws; and**
- **evolve an MIS to exercise effective management control over generation activities.**