

Chapter II

Performance review relating to Government company

Gujarat State Electricity Corporation Limited

2 Performance Audit of Power Generating Activities

Executive summary

Power is an essential requirement for all facets of life and has been recognised as a basic human need.

To meet the energy generation requirement of 70,369 MUs in the State, a capacity addition of about 1,352 MW was required during 2005-10. Against this, the State had made the capacity addition of 3,329 MW. Despite this the State was unable to meet the peak demand to the extent of 8,277 MUs to 14,857 MUs during the period. In view of this, performance review on generating activities was undertaken.

Project management

During 2005-10, the Company had installed and commissioned three power projects with a total installed capacity of 562 MW. Of the three projects, time overrun of 37 months and cost overrun of ₹ 370.28 crore were observed in execution of Kutvhh Lignite Thermal Power Station Unit IV.

Operational performance

The operational performance of Gujarat State Electricity Corporation Limited (Company) for the period 2005-10 was assessed in audit based on various efficiency parameters as discussed below:

Input efficiency

In the absence of fuel supply agreement with the coal companies/ supplier of lignite, the Company could not procure allotted quantity of coal/ lignite and this was one of the factors for non achievement of generation targets.

During 2005-10, consumption of coal was in excess of norms by 37.49 lakh MT valued at ₹751.67 crore.

During 2005-10, the technical manpower actually deployed was above Central Electricity Authority (CEA) norms in thermal and oil/ gas based power stations and actual deployment of non technical manpower was above CEA norms in Oil/ Gas based power stations. Despite this, the Company had paid overtime allowance for ₹187.03 crore.

Output efficiency

During 2005-2010, against a target of 1,48,517 MUs fixed, the generation of power by the Company was 1,40,606 MUs, which led to short fall in achievement of target by 7,911 MUs.

As against the national average Plant Load Factor (PLF) of 76.74 per cent, the PLF of the Company remained between 68.01 to 76.2 per cent. Due to non maintenance of PLF at par with national average, there was a short fall in generation of 9,599 MUs resulting in loss of contribution amounting to ₹ 348.72 crore during 2005-10.

The planned and forced outages in excess of CEA norms led to generation loss of 13,810 MUs and 6,807 MUs respectively and consequential loss of contribution amounting to ₹740.72 crore during 2005-10. Further, auxiliary consumption of power was also in excess of norms of Gujarat Electricity Regulatory Commission which led to excess consumption of 254.62 MUs valuing ₹57 crore.

Renovation & Modernisation (R&M) and refurbishment activities (RA)

The delay in execution of R&M and RA at Ukai Unit I and II resulted in generation loss of 345.16 MUs. Further,

the Company's failure to stop accepting the material for the refurbishment activities of Gandhinagar Thermal Power Station (GTPS) I and II even after its decision to hold the implementation of work resulted in blocking of fund of ₹ 145.16 crore and consequential avoidable loss of interest of ₹ 30.60 crore during June 2008 to March 2010.

Financial Management

The Company allowed an irregular rebate of ₹ 174.55 crore to Gujarat Urja Vikas Nigam Limited even for the belated receipt of payments of energy bills during 2008-09.

The Company's delay in filing of accounting statements with aggregate revenue requirement with GERC for its approval under Multi Year Tariff for the control period from 1 April 2008 to 31

March 2011 led to loss of revenue of ₹172.65 crore.

Conclusion and recommendations

The management of contracts relating to execution of R&M and refurbishment activities were not carried out efficiently and economically.

The operational efficiency of power stations was lower as compared to norms relating to consumption of fuel, PLF, planned/ forced outages and auxiliary consumption.

The review contains seven recommendations which include undertaking R&M and refurbishment activities of GTPS on priority, maintaining coal consumption within norms and achieving target of generation.

Introduction

2.1 Power is an essential requirement for all facets of life and has been recognised 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 have a short term framework of five years and give a 15 years' perspective.

2.2 During 2005-06, electricity requirement in Gujarat was assessed as 57,137 Million Units (MUs) of which only 48,860 MUs were available leaving a shortfall of 8,277 MUs, which works out to 14.49 *per cent* of the requirement. The total installed power generation capacity (1 April 2005) in the State of Gujarat was 8,689 Mega Watt (MW) and effective available capacity was 6,951 MW[®] against the peak demand of 9,783 MW leaving a deficit of 2,832 MW. During 2009-10, the comparative figures of electricity requirement and its availability were 70,369 MUs and 59,757 MUs respectively leaving a short fall of 10,612 MUs which works out to 15.08 *per cent* of the requirement. The total installed power generation capacity

[®] Worked out on the basis of 80 *per cent* PLF as per CEA norm.

(31 March 2010) in Gujarat was 12,018 MW and effective available capacity was 9,614 MW[®] against the peak demand of 10,406 MW leaving a deficit of 792 MW (2009-10) which works out to 7.6 *per cent* of the peak demand. In addition, capacity of 1,655.91 MW was created by Ministry of Renewable Energy Sources (MRES) as at the end of March 2010. There was a growth in demand of 13,232 MUs during 2005-10. Of the installed capacity addition of 3,329 MW, the share of state sector was 713 MW after considering derating of capacity and balance 2,616 MW was attributable to private and central sector.

2.3 In Gujarat, the generation of power under state sector is carried out by the Gujarat State Electricity Corporation Limited (the Company), Gujarat Mineral Development Corporation Limited and Gujarat State Energy Generation Limited. However, the share of the Company in generation of power was 93 *per cent*. The Company was incorporated (August 1993) with the main objective to generate and supply power to transmission Company. Pursuant to the Gujarat Electricity Industry (Re-organisation and Regulation) Act, 2003, the erstwhile Gujarat Electricity Board (the Board) was unbundled in a phased manner by 31 March 2005. The generation, transmission and distribution activities of the erstwhile Board were transferred to six Companies (including the Company) working under the strategic control of Gujarat Urja Vikas Nigam Limited (the holding Company), which had taken over the residual activities of the erstwhile Board. The Company had taken over (August 2002 to March 2005) nine[∇] power stations (PS) of the Board under power sector reforms programme of the State. The Company had commissioned two PS *i.e.* Dhuvaran Combined Cycle Power Plant II (DCCPP II) and a renewable energy (wind) station at Byath during April 2005 to March 2010.

The management of the Company is vested with a Board of Directors comprising of Chairman, Managing Director (MD) and six Directors appointed by the State Government. The MD is mainly assisted by an Executive Director (Generation), General Manager (Finance and Accounts) in day-to-day working of the Company and Chief Engineers at field level. The Company has five[⊗] thermal generation stations, two[≠] gas based generating stations, two[∩] hydro generation stations, one[◊] oil based generating station and a renewable energy (wind) station with the installed capacity of 3,720 MW, 729 MW, 547 MW, 220 MW and 10 MW respectively. The turnover of the Company was ₹ 7,299.48 crore, which was equal to 12.49 and 1.92 *per cent* of the State PSUs turnover and State Gross Domestic Product, respectively during 2009-10. It employed 8,689 employees as on 31 March 2010.

2.4 A review on ‘Material Management and Inventory Control’ in Thermal Power Station (TPS) of erstwhile Gujarat Electricity Board, the ‘Implementation of Renovation and Modernisation Activities’ in power

[∇] Dhuvaran oil based Power Station; Kutchh Lignite Thermal Power Station; Gandhinagar, Sikka, Ukai, Wanakbori coal based Power Stations; Kadana and Ukai hydro based PS; and Utran Gas based Power Station.

[⊗] Wanakbori, Gandhinagar, Ukai, Sikka and Kutchh Lignite based Power Station.

[≠] Utran and Dhuvaran Gas based Power Stations.

[∩] Kadana and Ukai hydro Power Stations.

[◊] Dhuvaran oil based Power Station.

stations of the Company and the 'Performance of Dhuvaran oil and gas based thermal power station including commissioning of two new gas based Units' of the Company were included in the Audit Reports 2003-04, 2006-07 and 2007-08 (Commercial), Government of Gujarat, respectively. The reviews included in Audit Report 2003-04 and 2006-07 were discussed by Committee on Public Undertakings (COPU) in May 2008 and in July 2010 respectively. For the review included in the Audit Report 2003-04, the COPU recommended (19 February 2009) that the Company should have a proper system for assessing the requirement of machinery components in the initial stage of project so as to avoid generation loss in future. Similar cases of delayed procurement were not noticed during the present review of the Company. Further, discussion on other Audit Reports was pending (November 2010).

Scope and Methodology of Audit

2.5 The present review conducted during January to June 2010 covers the performance of the Company during the period from 2005-06 to 2009-10. The review mainly deals with Planning, Project Management, Financial Management, Operational Performance, Environmental Issues and Monitoring by Top Management.

Audit selected GSECL for conducting performance audit considering its total contribution of 93 *per cent* (5,226 MW) towards the total installed capacity of State PSUs. Five*Units of GSECL having total installed capacity of 3,094 MW, being 59.20 *per cent*, were selected for detailed audit. 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/Government for comments.

Audit Objectives

The objectives of the performance audit were to assess:

2.6.1 Planning and Project Management

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

* 374 MW Utran CCPP II, 75 MW Kutchh Lignite based TPS Unit IV, 305 MW Ukai Hydro based PS, 1,470 MW Wanakbori TPS and 870 MW Gandhinagar TPS.

- To ascertain whether the execution of projects were managed economically, effectively and efficiently;
- To ascertain whether hydro projects were planned and formulated after taking into consideration the optimum design to get the maximum power, dam design and safety aspects; and
- To ascertain whether the Company had taken up the projects under non conventional sources and tap generation from captive power sources.

2.6.2 Financial Management

- To assess whether all claims including energy bills were properly raised and recovered in an efficient manner; and
- To assess the soundness of financial health of the generating undertakings.

2.6.3 Operational Performance

- To assess whether the power plants were operated efficiently and preventive maintenance as prescribed was carried out to minimise 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 modernisation) programme were ascertained and carried out in an economic, effective and efficient manner; and
- To assess the impact of renovation and modernisation and refurbishment activity on the operational performance of the Unit.

2.6.4 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.

2.6.5 Monitoring and Evaluation

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

- To ascertain whether a documented and proper disaster management system was in place in all generating units.

Audit Criteria

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

- National Electricity Plan, norms/guidelines of 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 units in the regions/all India averages;
- prescribed norms for planned outages; and
- Acts relating to Environmental laws.

Financial Position and Working Results

2.8.1 The financial position of the Company 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					
Paid up Capital	573.30	573.30	573.30	912.97	912.97
Equity pending allotment	1,331.69	1,331.69	1,431.69	369.57	517.84
Reserve & Surplus (including Capital Grants)	275.17	381.92	479.34	1,536.61	1,910.68
Borrowings (Loan Funds)					
Secured	199.34	419.80	1,344.89	2,354.32	3,819.95
Unsecured	2,757.32	2,797.83	2,231.05	2,546.61	1,373.11
Current Liabilities & Provisions	1,348.75	1,884.47	2,240.54	2,656.74	3,276.33
Total	6,485.57	7,389.01	8,300.81	10,376.82	11,810.88
B. Assets					
Gross Block	6,653.13	6,824.71	7,436.12	7,895.46	10,345.68
Less: Depreciation	1,857.54	2,078.69	2,314.68	2,674.26	3,202.67
Net Fixed Assets	4,795.59	4,746.02	5,121.44	5,221.20	7,143.01
Capital works-in-progress	586.97	1,051.05	1,452.11	3,137.46	2,358.77
Investments	20.50	20.52	20.52	20.52	20.52
Current Assets, Loans and Advances	1,082.51	1,571.42	1,706.74	1,997.64	2,288.58
Total	6,485.57	7,389.01	8,300.81	10,376.82	11,810.88
Debt-equity ratio	1.29:1	1.53:1	1.70:1	3.49:1	3.51:1

(Source: Annual Reports of the Company)

The main reason for increase in the reserves and surplus during 2008-10 was due to receipt of share premium of ₹ 992.02 crore on issue of equity shares towards the consideration for transfer of generating undertakings of the erstwhile Board and receipt of ₹ 250 crore towards Capital grant under Financial Restructuring Plan by the Company. Further, the amount of capital

works-in-progress and secured loans were high during 2008-10 due to the execution of works related to setting up of 374 MW of Utran Combined Cycle Power Plant II (UCCPP II) and also in setting up the new units at the existing power stations Ukai and Sikka. The debt-equity ratio increased from 1.29:1 in 2005-06 to 3.51:1 in 2009-10, which shows the Company's heavy dependence on debt for financing its new projects.

2.8.2 The details of working results like cost of generation of electricity, revenue realisation, net surplus/loss and earnings and cost per unit of operation are given below:

(₹ in crore)

Sl. No.	Description	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Income					
	Generation Revenue	4,964.03	5,311.47	6,204.74	7,101.23	7,299.48
	Other income including interest	24.79	62.60	129.13	222.29	137.89
	Total Income	4,988.82	5,374.07	6,333.87	7,323.52	7437.37
2.	Generation					
	Total generation (In MUs)	27,130	27,533	29,241	28,388	28,314
	Less: Auxiliary consumption (In MUs)	2,437	2,490	2,609	2,523	2,469
	Total generation available for Transmission and Distribution (In MUs)	24,693	25,043	26,632	25,865	25,845
3.	Expenditure					
(a)	Fixed cost					
(i)	Employees cost	179.16	260.81	367.90	283.43	382.51
(ii)	Administrative and General expenses	24.26	29.59	74.22	215.82	63.91
(iii)	Depreciation	229.35	239.53	277.64	333.72	514.41
(iv)	Interest and finance charges	307.07	267.95	280.44	278.59	360.17
	Total fixed cost	739.84	797.88	1,000.20	1,111.56	1321.00
(b)	Variable cost					
(i)	Fuel consumption					
(a)	Coal	3,242.20	3,528.82	3,869.33	4,272.92	4,543.60
(b)	Oil	382.71	503.12	539.02	721.37	346.86
(c)	Gas	300.39	189.96	525.38	753.10	745.47
(d)	Other fuel related cost including shortages/surplus	129.95	57.53	100.18	84.98	8.39
(ii)	Cost of water (hydel/ thermal/ gas/ others)	39.47	53.43	64.09	96.90	97.24
(iii)	Lubricants and consumables	8.79	7.43	6.77	12.72	6.90
(iv)	Repairs and maintenance	84.89	145.79	135.48	188.55	200.77
	Total variable cost	4,188.40	4,486.08	5,240.25	6,130.54	5,949.23
(c)	Total cost 3(a) + (b)	4,928.24	5,283.96	6,240.45	7,242.10	7,270.23
4	Realisation (per unit)	2.01	2.12	2.33	2.75	2.81
5	Fixed cost (per unit)	0.30	0.32	0.37	0.43	0.51
6	Variable cost (per unit)	1.70	1.79	1.97	2.38	2.30
7	Total cost per unit (5+6)	2.00	2.11	2.34	2.81	2.81
8	Contribution (4-6) (per unit)	0.31	0.33	0.36	0.37	0.51
9	Profit (+)/Loss(-) (4-7)	0.01	0.01	-0.01	-0.06	0.00

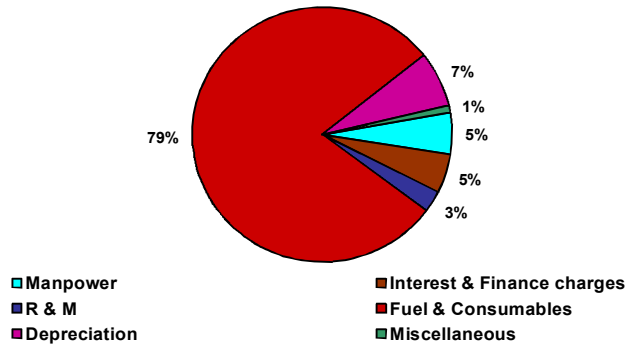
(Source: Annual Reports of the Company)

The variable and fixed cost per unit had increased by 35 and 70 per cent respectively with the corresponding increase in realisation per unit by 39.80 per cent during 2005-06 to 2009-10. The Administrative and general expenses during 2008-09 had increased due to payment on account of revision of salary and wages. The Company earned profit of one paise per unit of power generated during 2005-06 and 2006-07 and incurred a loss of one paise and six paise for the years 2007-08 and 2008-09 respectively and did not earn any profit during 2009-10 due to increased cost of generation.

Elements of Cost

2.8.3 Fuel & Consumables and Depreciation constitute the major elements of costs. The percentage break-up of costs for 2009-10 is given below in the pie-chart.

Components of various elements of cost

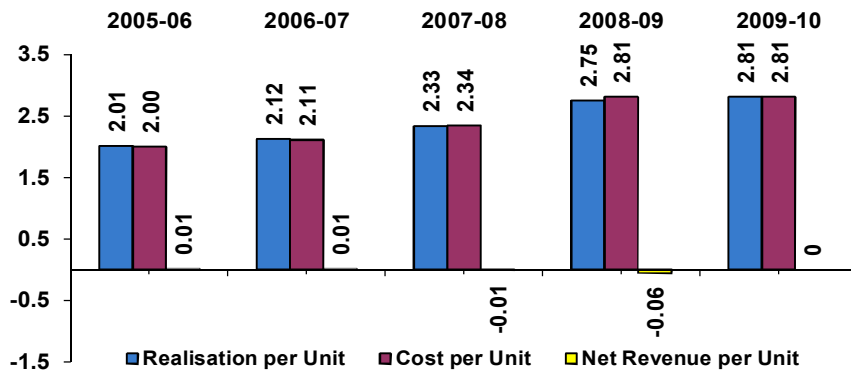


Elements of revenue

2.8.4 Sale of Power constitutes the major element of revenue. The percentage of other income constituted two per cent only.

Recovery of cost of operations

2.8.5 The Company's profit of one paise per unit in 2005-06 declined to zero paise per unit sold in 2009-10 after recovering its cost of operations as given in the graph below:



The Management stated that despite the stringent norms prescribed for variable cost under two part tariff for its old aged plant the Company achieved generation targets with corresponding increase in revenue.

Audit Findings

2.9 Audit explained the audit objectives to the Company during the 'entry conference' held on 9 February 2010. Subsequently, audit findings were reported to the Company and the State Government in July 2010 and discussed in an 'exit conference' held on 7 August 2010, which was attended by MD, ED and heads of the departments of the Company. The Management replied to audit findings in September 2010 and were endorsed (October 2010) by the State Government. The views expressed by them have been considered while finalising this review. The audit findings are discussed below.

Operational Performance

2.10 The operational performance of the Company for the five years ending 2009-10 is given in the *Annexure-7*. The operational performance of the Company was evaluated on various operational parameters as described below. It was also seen whether the Company 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 losses were controllable and there was scope for improvement in performance.

Planning

2.11.1 National Electricity Policy aims to provide availability of over 1,000 Units of per Capita electricity by 2012, for which it was estimated that need based capacity addition of more than 1,00,000 MW would be required during 2002-2012 in the country. The Government has laid emphasis on the full development of hydro potential being cheaper source of energy as compared to thermal. Besides, environmental concerns would have to be suitably addressed through appropriate advance actions. The power availability scenario in the State indicating own generation, peak demand and net deficit was as under:

2.11.2 During the period 2005-10, the actual generation was substantially less than the peak demand but exceeded the average demand as shown below:

Year	Generation (MW)	Peak Demand (MW)	Average Demand (MW)	Percentage of actual generation to Peak Demand	Percentage of actual generation to Average Demand
2005-06	7,610	9,783	7,141	77.8	106.6
2006-07	8,110	11,619	7,564	69.8	107.2
2007-08	8,885	12,119	8,351	73.3	106.4
2008-09	8,960	11,841	8,396	75.7	106.7
2009-10	9,515	10,406	8,664	91.4	109.8

(Source: Power scenario at a glance for April-2010 by CEA/ data furnished by the Company)

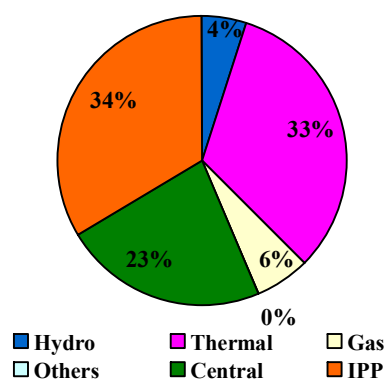
Percentage of actual generation to peak demand ranged between 69.8 and 91.4 during 2005-10

As may be seen from the above, the actual generation was 106.4 to 109.8 *per cent* of the average demand and 69.8 to 91.4 *per cent* of the peak demand during review period.

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

Capacity additions

2.11.3 The State had total installed capacity of 8,689 MW at the beginning of 2005-06 which increased to 12,018 MW at the end of 2009-10. The break-up of generating capacities, as on 31 March 2010, under thermal, hydro, Gas, Central, IPP and others is shown in the pie chart below.



To meet the energy generation requirement of 70,369 MUs in the State at the end of 2009-10, a capacity addition of about 1,352 MW was required during 2005-06 to 2009-10. However, the capacity addition programme as envisaged in NEP and shown as ‘Projects under Construction’ (PUC) and ‘Committed Projects[∞]’ (CP[⊗]) during period from 2005-06 to 2009-10 indicated that the total capacity addition planned was 9,763 MW which would have been more than the capacity addition to be made as per the assessment of demand for power. The details on capacity addition programme as per NEP are given below:

Status of the project	Thermal	Gas	Non-conventional Energy	Total
PUC	1,325	1,518	--	2,843
CP [⊗]	5,500	1,420	--	6,920
Total	6,825	2,938	--	9,763

2.11.4 The particulars of installed generation capacity, capacity additions, decrease/ retirement and capacity for the State as a whole as on 31 March 2010 are given in *Annexure-8*. The capacity additions envisaged, actual additions and peak demand *vis-à-vis* energy supplied during the period from 2005-06 to 2009-10 are given below:

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

[⊗] GPPC-Pipavav (700 MW), Company- Hazira (360 MW), GSECL- Dhuvaran St-III (360 MW), Adani-Mundra (2,000 MW), Torrent-Pipavav (900 MW), IPP-CBR-Prayag (200 MW), GPCL-Ghogha (500 MW), NLC GPCL JV- South Gujarat (900 MW) and ESSAR-Vadinar (1,000 MW).

Sl. No.	Description	2005-06	2006-07	2007-08	2008-09	2009-10	Total
1.	Capacity at the beginning of the year (MW)	8,689	8,977	9,561	9,497	9,874	--
2.	Additions Planned by NEP (MW)	413	737	913	667	2,584	5,314
3.	Additions planned by the State (MW)	96 [◊]	107 [▽]	112	0	1,420	1,735
4.a)	Actual Additions (MW)	315	584	250	377	2,144	3,670
b)	Retirement of plant	27	-	314	-	-	314
c)	Net addition (4a-4b)	288	584	-64	377	2,144	3,329
5.	Capacity at the end of the year (MW) (1 + 4c)	8,977	9,561	9,497	9,874	12,018	--
6.	Shortfall/ (Excess) in capacity addition (MW) (4c – 3)	(192)	(477)	176	(377)	(724)	--
7.	Peak demand (MUs)	57,137	62,503	68,747	67,482	70,369	--
8.	Energy supplied (MUs)						
a	Energy produced by State PSUs	29,292	28,842	31,472	30,519	31,077	--
b	Energy Purchased from others	19,568	20,447	22,418	25,252	28,680	--
c	Total Power Availability (Mus)	48,860	49,289	53,890	55,771	59,757	--
9.	Shortfall in demand (MUs) (7–8a+8b)	8,277	13,214	14,857	11,711	10,612	--

Against the planned capacity addition of 5,314 MW in accordance with NEP, the actual net capacity addition was 3,329 MW during the review period. We observed that State planned capacity addition of 1,735 MW during the review period but could actually make addition of only 713 MW to the power generating capacity during corresponding period.

However, 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 8,277 MUs to 14,857 MUs during the period from 2005-06 to 2009-10.

Optimum Utilisation of existing facilities

2.11.5 In order to cope up with the growing demand for power, not only additional capacity needs 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 (R&M) and Refurbishment activities (RA) (as per CEA norms) and also taken up during the period from 2005-06 to 2009-10 are indicated in the table given below:

Sl. No.	Name of the plant	Unit No.	Installed Capacity	Due date (as per CEA norms)	Date when actually taken up
1	Ukai TPS	I	120 MW	April 2000	September 2006
2	Ukai TPS	II	120 MW	July 2000	August 2008
3	Gandhinagar TPS	I	120 MW	April 2001	Not taken up
4	Gandhinagar TPS	II	120 MW	May 2001	Not taken up

The detailed audit observations relating to R&M and refurbishment works of the above mentioned TPS are discussed in the succeeding paragraphs 2.18.1 to 2.18.4.

[◊] This represents 16 per cent share of the State in Sardar Sarovar Hydro Power project.

[▽] This includes 32 MW which is 16 per cent share of the State in Sardar Sarovar Hydro Power project.

Project management

2.12.1 Preparation of an accurate and realistic Detailed Project Reports (DPR) after considering feasibility study, considering factors like creation of infrastructure facility, addressing bottlenecks likely to be encountered in various stages of project planning, are critical activities in planning stage of the project.

Project management includes timely acquisition of land, effective actions to resolve bottlenecks, obtain necessary clearances from Ministry of Forest and Environment and other authorities, rehabilitation of displaced families, proper scheduling of various activities using PERT/ CPM technique, adequate budget provisions, etc. Notwithstanding, time and cost over runs were noticed due to absence of coordinating mechanism throughout the implementation of the projects during review period as discussed in succeeding paragraphs.

2.12.2 The following table indicates the scheduled and actual dates of completion of power stations with total capacity of 562 MW, date of commissioning of power stations and time overrun.

Time overrun

Sl. No.	Name of the Unit	Details	As per DPR	Actual completion	Time overrun (in months)
1.	113 MW DCCPP II	Date of completion of unit	February 2005	March 2006	14
		Date of commercial operation/ commissioning of unit	January 2006	November 2007	22
2	75 MW KLTPS IV	Date of completion of unit	July 2006	October 2008	28
		Date of commercial operation/ commissioning of unit	November 2006	December 2009	37
3.	374 MW UCCPP II	Date of completion of unit	June 2009	June 2009	-
		Date of commercial operation/ commissioning of unit	August 2009	November 2009	3

It would be seen from the above that only one project at Sl. No. 3 was completed in time and commissioned with a delay of three months. Other projects were abnormally delayed. The reasons for the delay and its impact related to Dhuvaran CCPP II were commented *vide* paragraph 2.3 in the Audit Report 2007-08 (Commercial) - Government of Gujarat. As far as the reasons for the delays in respect of Kutchh Lignite Thermal Power Station Unit IV (KLTPS IV) are concerned, the same are discussed in the succeeding paragraphs:

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

Cost overrun

(₹ in crore)

Sl. No.	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	KLTPS IV	304.69	540.00	674.97	370.28	21.53
2	Utran CCPP II	1,336.47	1,334.22	1,318.61	-	-
3.	Dhuvaran CCPP II.	368.17	380.00	359.45	-	-

Under estimation of steel requirement and delay in taking up commissioning work of KLTPS IV led to time overrun of 37 months and cost overrun of ₹ 370.28 crore

The main reasons for the increase in the cost were delay in taking up the work and also under estimation of steel (by 89 *per cent*) requirement for the work relating to installation of the CFBC boiler and bay made in the original project estimate, as discussed in the subsequent paragraph 2.13.2. As the KLTPS IV project suffered a cost overrun of ₹ 370.28 crore, it led to increase in the cost per MW from ₹ 4.06 crore to ₹ 8.99 crore (March 2010). The project was belatedly commissioned mainly due to delay (12 months) in award of contracts for supply and commissioning of main plant and equipment (MPE) and 13 to 34 months delay in awarding contracts for balance of plant (BOP) as discussed below:

CEA had given (March 2003) techno economic clearance (TEC) for setting up of 75 MW KLTPS IV at an estimated cost of ₹ 304.69 crore. The project was to be taken up in January 2004 and was to be commissioned in November 2006. We observed that the project was taken up in May 2005 with an award of work to BHEL at a cost of ₹ 197.50 crore for supply and commissioning of MPE. Besides, various contracts for supply and commissioning of BOP were also awarded belatedly (July 2005 to March 2007) at a total cost of ₹ 170.19 crore without considering the targeted date of commissioning of the project by 28 November 2006. The project was finally commissioned on 20 December 2009 with a delay of 37 months. Consequentially, there was a potential generation loss of 1,242 MUs of power worth ₹ 317.97 crore[ⓓ] during the period 2006-10.

The Management stated that the belated commissioning of KLTPS IV was attributable to the delay of five to 12 months in supply of equipments/ components of MPE by BHEL and also due to the inclusion of CFBC[Ⓢ] technology based boiler. This technology being new to BHEL, it took considerable time in stabilising the operation of the new plant.

The fact remains that the delay on the part of the Company in award of contracts for both MPE and BOP on single tender basis led to overall delay in commissioning of KLTPS IV and the Company had decided for introducing the technology in 2000 itself.

Contract Management

2.13.1 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 are generally awarded on turnkey (Composite) basis to a single party involving civil construction, supplies of machines and ancillary works.

During the period under review, contracts valuing ₹ 2,254.22 crore were awarded of which contracts of value of ₹ 1,874.20 crore were examined by us. The agreements related to civil works, supply of equipments and other

[ⓓ] Generation at PLF 68.5 *per cent* = 1,388 MUs – auxiliary consumption (10.5 *per cent*) – 146 MUs = 1,242 MUs × average realisation per unit ranging from ₹ 2.12 to ₹ 2.81 prevailed during 2006-2010.

[Ⓢ] Circulating Fluidised Bed Combustion.

miscellaneous works pertaining to Utran CCPP II and KLTPS IV were examined in audit and the results of examination are discussed below:

Award of work

Improper estimation of steel

2.13.2 The Company placed order (02 June 2005) on General Mechanical Works, Vadodara (GMW) for supply, fabrication and erection of steel structures required for the KLTPS IV at a total cost of ₹ 12.78 crore with stipulation to complete the work by 1 February 2006.

We observed that against the Company's consultant's estimated (October 2004) steel requirement of 2,370 MT the total steel consumption was 4,486.34 MT, which was 89.3 *per cent* higher. Consequently, the quantum of erection work was increased and the work was completed in September 2008 at a cost of ₹ 25.17 crore. The site of the KLTPS IV i.e., Panandhro falls under Zone V as per seismic code; accordingly, the structure for the tripper floor of boiler should have the height of 50 metre instead of 27 metre as erroneously adopted while preparing the estimate for the work. Further, the Company was aware (August 2004) that the lignite handling plant which was being commissioned for KLTPS IV was also to feed lignite to KLTPS Unit III, for which the height of bay structure should be properly estimated and fixed. Thus, the above flaws led to incorrect estimation of quantity of steel due to lack of diligence in preparation and vetting of estimate for the work done by both the Consultant and by the Company respectively. Had the estimate for the work been prepared properly the Company could have availed the opportunity of getting competitive price for the work considering the economies of scale as huge quantity of steel was actually required for the work compared to the quantity originally estimated.

The Management stated that due to introduction of new technology, the consultant failed to assess the requirement of steel correctly for which it deducted ₹ 13.02 lakh being 50 *per cent* of the balance consultancy fee.

It is worth mentioning that the Consultant was aware of the applicable seismic data and other facts at the time of estimation.

Operational Performance

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

Input Efficiency

Procedure for procurement of coal

2.14.1 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 Company 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 Generating Company enters into Coal Supply Agreements with collieries. However, for the supply of coal, the Company had entered into Fuel Supply Agreement (FSA) with collieries only during 2008-09 as discussed in the succeeding paragraph 2.14.3.

2.14.2 The position of coal linkages fixed, coal received, generation targets prescribed and actual generation achieved during the period from 2005-06 to 2009-10 covering all coal based four¹ TPSs of the Company was as under:

Particulars	2005-06	2006-07	2007-08	2008-09	2009-10	Total
Coal Linkage fixed (Lakh MT)	142.35	143.63	161.77	149.47	148.61	745.83
Quantity of coal received at TPS (Lakh MT)	137.87	139.11	150.78	153.41	144.99	726.16
Generation targets (MUs)	24,193	23,007	23,708	22,524	22,279	1,15,711
Actual generation achieved (MUs)	22,396	22,205	23,165	23,324	23,040	1,14,130
Shortfall in generation targets (MUs)	1,797	802	543	-	-	3,142*

(Source: Data as furnished by the Company)

It would be seen from the above that the total linkage of coal during the five years fixed by the SLC was 745.83 lakh MT for the thermal power stations against which 726.16 lakh MT of coal was received, resulting in short receipt of 19.67 lakh MT (2.64 per cent) of coal which was one of the factors for shortfall in achievement of the prescribed generation targets. In the absence of any agreement during 2005-08 with the coal companies, the Management could not procure allotted quantity of coal during review period excepting 2008-09.

The Management stated that even after allocation of coal linkages by SLC, the coal companies, based on their production performance, supply coal to the power generation companies. Hence, the Company had a very little role in preventing the occurrence of such coal shortages.

Fuel supply arrangement

2.14.3 Coal is classified into different grades. The price of the coal depends on the grade of coal. The coal requirement was assessed up to 2008-09 by the Standing Linkage Committee appointed by Ministry of Energy, Government of India and thereafter through separate agreements by generating Company with Coal Companies.

The Ministry of Coal, GoI, issued (October 2007) the New Coal Distribution Policy which required power generation companies to enter into fuel supply agreement (FSA). Accordingly, the Company entered into FSA for supply of 164.40 lakh tonne per annum of coal with South Eastern Coalfields Limited, Bilaspur (SECL) and Western Coalfields Limited, Nagpur (WCL) in August

¹ Ukai, Gandhinagar, Wanakbori and Sikka TPS.

* Total of shortfall in generation (MUs) for three years only i.e. 2005-06 to 2007-08.

2008 and December 2008 respectively. The modified FSA was made effective from 1 April 2009.

Avoidable payment of loading supervision charges

2.14.4 A reference is invited to paragraph 3.7 of the Audit Report 2007-08 (Commercial)-Government of Gujarat, wherein it was highlighted that the Company overpaid loading supervision charges of ₹ 37.27 crore^v during the period October 2005 to March 2008.

Over payment of loading supervision charges of ₹ 34.79 crore incurred during 2008-10 due to inadequate corrective action

Further, analysis of this case in audit revealed that the Company continued to make the payments without revising the monthly average quantity (MAQ) even after the overpayment was pointed out in audit. During the period April 2008 to January 2010, all the four TPS[‡] received 4,21,676 wagons of coal with an average quantity of 62.04 to 65.37 MT per wagon and the Company had overpaid loading supervision charges of ₹ 34.79 crore during the period. This led to further increase in the input cost of coal to that extent during the period.

The Management stated that the Company invited fresh tenders for awarding LS contract on “₹ per MT” instead of “incremental loading” basis as followed in the present contract. However, due to receipt of higher prices in the tender, the Company continued the present LS contract by increasing MAQ by 0.4 MT per wagon and decreasing the service charges payable by ₹ 18 per MT for the quantity received extra with effect from 1 February 2010.

However, the Company should have invited tender on incremental loading basis with stipulation of 59.5 MT per wagon as MAQ and decided accordingly for competitiveness. Moreover, increase in MAQ and reduction in supervision charges was marginal and not sufficient to offset the extra expenditure involved.

Consumption of fuel

Excess consumption of coal

2.14.5 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-à-vis* maximum and minimum consumption of coal during the period of five years ending 2009-10 is depicted in the table below:

^v A. Remuneration payable as per terms = MAQ × No. of wagons × ₹ 330
B. Remuneration payable as per 58 MT/59.50 MT basis = (58 MT/ 59.50 MT – MAQ actually fixed) × no. of wagons × ₹330.
Over paid = A – B.
[‡] Wanakbori, Ukai, Gandhinagar and Sikka.

(In KGs)

Name of the Station	Norms per Unit fixed in the project report	Average min consumption during the year	Average max consumption during the year
Ukai TPS	0.66	0.66 (2006)	0.70 (2008 and 2009)
Gandhinagar TPS	0.60	0.58 (2006)	0.69 (2008)
Wanakbori TPS	0.67	0.58 (2006 and 2007)	0.69 (2009 and 2010)
Sikka TPS	0.63	0.63 (2007)	0.80 (2009 and 2010)
Kutchh Lignite TPS	1.10	1.08 (2007)	1.38 (2010)

(In KLTPS, the norms as fixed by GERC was adopted)

Receipt of inferior quality of coal and high station heat rate led to consumption of 37.49 lakh MT coal valued at ₹ 751.67 crore in excess of norm

From the above it may be seen that in Sikka and Ukai TPS, the consumption remained higher than the norms in 2008, 2009 and 2010. We observed that the excess consumption of coal was mainly due to high station heat rate (SHR) on account of improper maintenance of power plant in Sikka and Ukai TPS and also due to receipt of inferior quality of coal by all TPS. As a result, 37.49 lakh MT of coal was consumed in excess of the norms during the review period. The value of this excess consumption of coal worked out in audit amounted to ₹ 751.67 crore as per *Annexure-9*.

The Management accepted the audit contention about receipt of inferior quality of coal. It was also stated that excess consumption of coal in Ukai and Sikka TPS, was on account of partial operation of Unit I due to gradual stabilisation of the unit after completion of major R&M work and on account of low condenser vacuum due to silt in the intake channel of cooling water system respectively. However, excess consumption of coal could have been reduced had the Company taken effective action for early stabilisation of Unit I of Ukai TPS and also ensured proper maintenance of the plant at Sikka TPS.

Excess transit loss

2.14.6 As per GERC tariff order (January 2009), the transit loss for pit head station should not be more than 0.3 *per cent*. However, it was noticed that during the period 2008-09, Gujarat Mineral Development Corporation Limited (GMDC) being supplier of lignite, had dispatched 17.96 lakh MT of lignite against which 17.25 lakh MT was shown as consumption of lignite as per the records of Efficiency Department of the KLTPS. Thus, there was a difference of 0.71 lakh MT of which transit loss above norms was 0.66 lakh MT valued at ₹ 4.84 crore^φ. However, abnormal transit losses were not investigated by the Company and the meter for recording the actual receipt of lignite at the KLTPS remained defective during this period. Thus, instances of pilferage could not be ruled out.

Receipt of low quality lignite

2.14.7 As per norms of Gujarat Electricity Regulatory Commission (GERC), the gross calorific value (GCV) of lignite required for the efficient operation of plant of KLTPS was 2,946 Kcal./Kg. Even the erstwhile Board decided (October 2000) for procuring 'A' grade lignite (GCV-3,300 Kcal./ Kg.) from GMDC. We observed that the Company was not able to get supply of lignite

^φ Calculated at the purchase rate of ₹ 733 per MT.

Receipt of low quality lignite led to excess consumption of 5.42 lakh MT of lignite costing ₹ 39.62 crore

with requisite GCV throughout the period during 2005-06 to 2009-10. Out of 73.51 lakh MT, 55.98 lakh MT of lignite (75 per cent of the supply) was received with lesser GCV during review period. However, GMDC supplied lignite GCV ranging from 3,235 to 3,317 Kcal./ Kg. to its own Akrimota Thermal Power Station. Failure of the Company to insist for supply of 2,946 Kcal./ Kg. of lignite resulted in excess consumption of 5.42 lakh MT of lignite costing ₹ 39.62 crore.

The Management stated that it was regularly taking up the matter with GMDC regarding supply of inferior quality of lignite.

Loss of generation due to inadequate fuel stock

Shortage of gas and lignite led to loss of generation of 165.67 MUs

2.14.8 The Company faced problems of shortage of fuel from time to time. Test check of records relating to outages of plants revealed that the different units of Utran Gas, Dhuvaran Gas and Kutch Lignite TPS fell under forced shutdown during the years 2005-09 due to shortage of gas and lignite resulting in loss of generation aggregating to 165.67 MUs valued at ₹ 37.32 crore.

It was observed in audit that in case of Utran Gas and Dhuvaran Gas, shortage of gas occurred mainly due to lesser allocation of gas by GAIL as demand management measure, low flow of pressure of gas due to defects in gas pipelines of GAIL and non availability of gas due to flood. As a result, power plant was kept under forced shutdown leading to loss of generation of 130.69 MUs. The Company could have avoided this generation loss by resorting to spot purchase of gas as the shortage in supply of gas was beyond its control.

Manpower Management

2.15 Consequent upon the unbundling of erstwhile Gujarat Electricity Board (March 2005), the Company came into existence (April 2005). However, based on the State Government decision of December 2004, the staff strength available in the power stations on the date would be taken as their respective sanctioned strengths. CEA in its National Electricity Plan for 10th five year plan stipulated the norms for manpower per mega watt as 1.76 persons. The consolidated position of sanctioned strength of manpower as per CEA norm *vis-à-vis* actual strength in respect of thermal power stations is given below:

Sl. No.	Particulars.	2005-06	2006-07	2007-08	2008-09	2009-10
1	Sanctioned strength (Nos.)	8,884	8,916	8,903	8,936	8,969
2	Manpower as per the CEA recommendations (Nos.)	8,745	8,745	8,086	8,086	8,416
3	Actual manpower (Nos.)	8,232	8,229	8,274	8,050	8,284
4	Expenditure on salaries (₹ in lakh)	18,910.69	21,594.2	24,368.9	23,867.09	29,235.27

(Source: Data as provided by the Company)

However, the sanctioned strength in individual power stations except for Wanakbori, Ukai Hydro and Kadana, was more than the CEA norms during the period of review. Despite this, we observed that the generating stations were regularly employing temporary/contract staff for jobs such as housekeeping, cleaning of coal handling plant, cleaning of condenser etc.

During 2005-10 generating stations deployed on an average 524 Nos. and 1,852 Nos. skilled and unskilled temporary employees for such jobs by incurring an expenditure of ₹ 38.69 crore. Besides, overtime allowance had regularly been paid to the regular staff. We observed that overtime allowance paid by generating stations during the review period works out to ₹ 187.03 crore. No action was taken to rationalise its staff strength or explore ways to utilise them optimally. We observed that technical manpower deployed in thermal and oil/ gas based PSs were above norms and it was below norms in hydro PSs. As far as non technical manpower was concerned, it was above norms in oil/ gas based PSs but below norms in thermal and hydro PSs. The Company should reassess the manpower requirements at its PSs and deploy manpower keeping in view the norms stipulated by CEA.

The Management stated that though the technical manpower deployed was excess but due to lesser deployment of non technical manpower in thermal units, the overall position of manpower deployed in thermal was less than CEA norms. Regarding oil/gas based TPS, the manpower required to be maintained as per CEA norms was reduced during the years 2007-09 as there was a reduction in the installed capacity of Dhuvaran TPS by 314 MW due to retirement of Unit I to IV and also due to derating of capacity of Unit V and VI of DTPS. The Company, however, had further reduced the manpower in DTPS in the subsequent period.

The fact remains that the manpower deployed in thermal plants under both categories should not be combined and may be maintained separately for technical and non technical cadres to ensure optimum utilisation. Regarding oil/gas based TPS, while the capacity reduction of DTPS took place in April 2007, the Company could reduce the manpower from 891 in 2006-07 to 703 by end of March 2010, and was still higher than CEA norm for manpower of 342.

Output Efficiency

Shortfall in generation

2.16.1 The targets for generation of power for each year are fixed by the GERC and approved by the Central Electricity Authority. We observed that the Company was able to generate 1,40,606 MUs during 2005-10 against target of 1,48,517 MUs. This resulted in a shortfall of 7,911 MUs as shown in the following table:

(In MUs)

Year	Target	Actual	Shortfall
2005-06	30,193	27,130	3,063
2006-07	30,013	27,533	2,480
2007-08	30,208	29,241	967
2008-09	28,967	28,388	579
2009-10	29,136	28,314	822
Total	1,48,517	1,40,606	7,911

(Source: Data as provided by the Company in the Management Information System)

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 given in **Annexure-10**. An analysis of the annexure revealed the following:

- The actual generation and actual PLF achieved almost in all the years at all the PSs remained below the energy to be generated and PLF as per design during the five years up to 2009-2010.
- Considering 80 *per cent* PLF as norm, the total designed generation was of 1,70,669 MUs during period 2005-10, against which the actual generation was 1,40,606 MUs leading to shortfall of 30,063 MUs during the period which could have been technically produced.
- As the PLF had been designed considering the availability of inputs, the loss of generation (total 30,063 MUs) during the review period indicated that resources and capacity were not being utilised to the optimum level due to design deficiencies, frequent breakdown of units and delay in timely rectification of defects in the plant and equipments.

The Management stated that regarding short fall of 7,911 MUs against targeted generation, the backing down of operation of plant was the main reason for non achievement of the targets.

The fact remains that during 2005-10, the loss of generation on account of backing down was hardly five *per cent* of total units generated. Moreover, target itself was fixed below the possible generation of 1,70,669 MUs. Hence, the non achievement of targeted generation lacked justification.

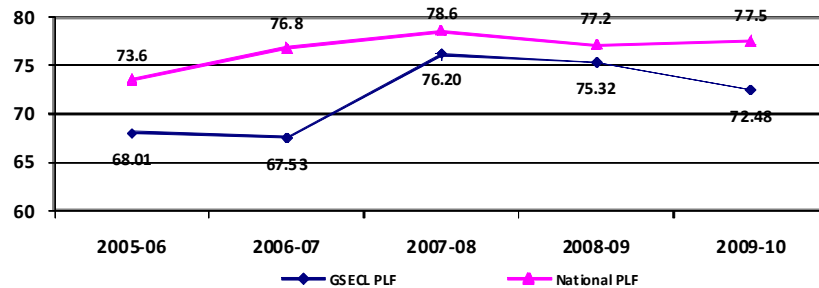
Plant Load Factor (PLF)

2.16.2 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 CERC, the PLF for thermal power generating stations should be 80 *per cent*,

PLF of Unit VI of Kota TPS of Rajasthan Rajya Vidyut Utpadan Nigam Limited at 101.10 *per cent* was the highest among all State Sector units

against which the national average was 76.74 *per cent*, against which the national average was 76.74

per cent. The PLF of the Company during 2005-10 is depicted in the graph below:



As seen from the above graph, the PLF of the Company remained below CERC norms and national average. We observed that PLF increased from 67.53 *per cent* in 2006-07 to 76.20 *per cent* in 2007-08 mainly due to

commissioning of 113 MW Dhuvaran gas based PS and simultaneous reduction in the installed capacity of Dhuvaran TPS by 314 MW due to retirement of Units I to IV besides derating of capacity of Units V and VI. Thereafter, PLF started decreasing again mainly due to prolonged period taken for execution of major R&M work and stabilisation of Unit I and II of Ukai TPS during 2008-10.

2.16.3 The details of average realisation *vis-à-vis* average cost per unit, PLF achieved, average realisation at national PLF, PLF at which average cost would be recovered and the difference of PLF in *per cent* 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)	201	212	233	275	281
2.	Average Cost (Paise per Unit)	200	211	234	281	281
3.	Actual PLF (<i>per cent</i>)	68.01	67.53	76.20	75.32	72.48
4.	National PLF	73.6	76.8	78.6	77.2	77.5
5.	Average Realisation at National PLF (Paise per Unit)	217	241	240	282	300
6.	PLF at which average cost stands recovered (<i>per cent</i>) (2/1 × 3)	67.67	67.21	76.52	76.94	72.48

(Source: Data as provided by the Company in the final accounts of respective years, Management Information System and from CEA)

If the PLF was maintained at par with the national average, the Company could have avoided estimated shortfall in generation of 9,599 MUs and consequential loss of contribution of ₹ 348.72 crore during the period.

The Management while accepting the facts stated that though the Company's PLF remained below the norms of CERC it was higher than the national average PLF of state sector power generation entities.

The details of maximum possible generation at installed capacity, actual generation and corresponding Plant Load Factor achieved in respect of each generating unit for the five years up to 2009-2010 are given in *Annexure-10*. The main reasons for the low PLF, as observed in audit were:

- Low plant availability
- Low capacity utilisation
- Major shut downs and delays in repairs and maintenance

These are discussed in the following paragraphs.

Plant availability

2.16.4 Plant availability means the ratio of actual hours operated to maximum possible hours available during certain period. As against the CERC norm of 80 *per cent* plant availability during 2004–09, the plant availability was 76.4 *per cent* during 2006-07. Likewise, against the norms of 85 *per cent* during 2010–2014, the plant availability of the Company was 81.6 *per cent* during 2009-10.

The overall plant availability in the State Sector was 82.67 *per cent* during 2008-09

The details of total hours available, total hours operated, planned outages[¥], forced outages and overall plant availability in respect of the power plants operated by the Company are shown below:

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Total hours available	2,89,081	2,89,079	2,58,361	2,62,800	2,68,776
2.	Operated hours	2,35,338	2,20,768	2,25,687	2,20,037	2,22,732
3.	Planned outages (in hours)	30,805	26,811	18,449	19,987	26,098
4.	Forced outages (in hours)	22,938	41,500	14,225	22,776	19,946
5.	Plant availability (<i>per cent</i>) [◊]	81.4	76.4	87.4	83.7	81.6
6	Backing down (in hours)	11,038	6,604	9,192	7,366	10,924
7	Forced outages (<i>per cent</i>)	7.9	14.4	5.5	8.7	7.4
8	Backing down (<i>per cent</i>)	3.8	2.3	3.6	2.8	4.1

(Source: Data as provided by the Company in the Management Information System.)

The low availability of power plant was due to longer duration of outages caused by inordinate delays in repair and maintenance and non-availability of required quantity of fuel and other critical inputs. Besides, the power stations were forced to back down its generation for 45,124 Hrs. (7,157.25 MUs) during 2005-10 due to various reasons. The main reasons for such backing down of plant was high operational costs (in case of DTPS oil based unit) and lack of demand for power due to monsoon or inability to cater to the demand due to failure of transmission system because of occurrence of natural calamities etc.

The Management stated that though the Company's PAF had remained below the norms of CERC in the year 2006-07 and 2009-10, PAF still remained higher than the national average PAF of state sector power generation entities which was 80.39 *per cent*.

Capacity utilisation

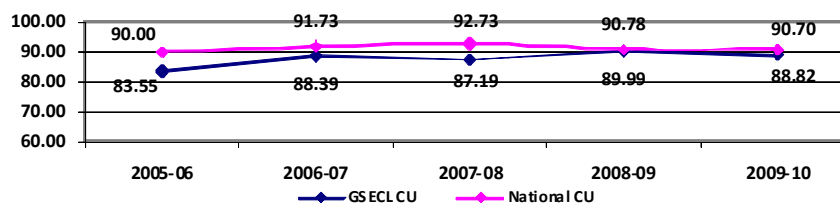
2.16.5 Capacity utilisation (CU) means the ratio of actual generation to possible generation during actual hours of operation. Based on national average PLF of 76.74 *per cent* and plant availability at 84.1 *per cent*, the standard capacity utilisation factor works out to be 91.2 *per cent* for power plants. As far as the average PLF of the Company is concerned, it was 71.9 *per cent* and average PAF was 83.1 *per cent* during the period 2005-06 to 2009-10. As such, the standard capacity utilisation factor works out to be 86.5 *per cent* for power plant of the Company. This indicated under utilisation of installed capacity by 4.7 *per cent* (91.2-86.5 *per cent*) in comparison to the national standard capacity utilisation factor.

We observed that capacity utilisation at the end of year 2009-10 had improved from the levels achieved in 2005-06, as given in the line graph.

Capacity utilisation of power plants of the Company was 86.5 per cent against the national average of 91.2 per cent

[¥] Outages refer to period for which the plant remained closed for attending planned/forced maintenance.

[◊] Plant availability is computed without reckoning backing down caused due to backing down of high operational cost.



Outages

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

Planned outages

2.16.7 The total number of hours lost due to planned outages decreased from 30,805 in 2005-06 to 18,449 in 2007-08 but again increased to 26,098 in 2009-10. We observed that in four power stations^f the percentage of planned outages hours to the total available hours was ranging between 14.24 and 56.48 *per cent* (i.e. between 743 hours in STPS in and 12,216 hours in KLTPS) during 2005-10 which was higher than the CEA norm of 10 *per cent*. Compliance of the CEA norms would have entailed availability of plant for additional 37,681^g operational hours with consequent generation of 13,810 MUs and contribution of ₹ 546.11 crore during the period from 2005-06 to 2009-10.

Forced outages

2.16.8 The total number of hours lost due to the forced outages increased from 22,938 hours in 2005-06 to and 41,500 hours in 2006-07 and thereafter reduced to 14,225, 22,776 and 19,946 during 2007-08, 2008-09 and 2009-10 respectively. We observed in four power stations^v referred to in earlier paragraph that the percentage of forced outages hours to the total available hours ranged between 10.17 and 47.80 *per cent* which was higher than the CEA norm of 10 *per cent*. Compliance of the CEA norms would have entailed availability of plant for additional 28,438 operational hours with consequent generation of 6,807 MUs and contribution of ₹ 194.61 crore^h during the review period.

Total outages in excess of CEA norms led to generation loss of 20,617 MUs and consequential loss of contribution of ₹ 740.72 crore

The Management stated that the overall percentage of planned and forced outages of 10 *per cent* each as a whole remained well within the norms during the period 2005-10. Regarding excessive forced outages over the norms, the Management attributed the unforeseen problems as main reasons for it.

^f STPS (2005-06), KLTPS (2005-07), UTPS (2006-10), DTPS-gas and oil based (2006-07 and 2009-10).

^g Calculated based on the cases of planned outages of each power station which exceeded the CEA norms.

^v STPS (2006-07), KLTPS (2006-10), UTPS (2008-10), DTPS-gas and oil based (2005-07 and 2008-09).

^h Calculated based on the cases of forced outages of each power station which exceeded the CEA norms.

The excess forced outages were mainly due to high vibration of turbine, boiler tube leakages, bad conditions of condenser tubes due to deteriorated water chemistry etc which could have been minimised by the Management by carrying out timely preventive maintenance of these power stations.

Auxiliary consumption of power

2.16.9 Energy consumed by power stations themselves for running their equipments and common services is called Auxiliary Consumption. GERC allowed (May 2006) auxiliary consumption of power ranging between 8.5 and 11.12 per cent, 11.5 to 12.5 per cent and 2.9 to 4.9 per cent of the power generated through thermal, lignite and gas based plants to be used as auxiliary consumption respectively.

We observed that the average actual auxiliary consumption of power stations of the Company varied between 8 per cent and 12.58 per cent in respect of thermal based stations, between 12.65 and 21.05 per cent in respect of lignite based station and between 2.32 and 6.01 per cent in case of gas based stations between 2005-06 and 2009-10, resulting in excess consumption of 254.62 MUs valuing ₹ 57 crore which could not be dispatched to the grid.

Wanakbori Thermal Power Station of GSECL was the best performer and achieved the lowest auxiliary power consumption at 7.05 per cent during 2008-09

The Management stated that the reasons for excess auxiliary consumption over the norms in case of lignite based TPS were due to poor quality of lignite and partial operation of KLPTS Unit III due to high vibration of turbine. However, in case of gas based DTSP I and UCCPP I, the auxiliary consumption as per design of the plant was 3.38 per cent which was higher than the norms fixed by GERC. Besides, partial operation of gas based DTSP I&II and UCCPP I&II due to backing down of the units was also one of the reasons for the excess auxiliary consumption over the norms.

The fact remained that actual auxiliary consumption of gas based DTSP I and UCCPP I remained higher than the consumption norms as per the plant design during 2005-10.

Lack of supervision in generation

2.16.10 The Company awarded (November 2006) a contract for testing and analysing the samples of condenser water, feed water, steam water, boiler drum at regular intervals to maintain the water chemistry as per BHEL recommendations for Reverse Osmosis Mixed Bed Plant (ROMB Plant)†at Dhuvanan CCPP. The contractor was required to report the abnormalities, if any, noticed while testing to the in charge of the plant.

† The Mixed bed plants are used for fine polishing of demineralised water and production of moderate amount of demineralised water from water works or a reverse osmosis plant for high tech water installations like power stations.

Failure to monitor the work of contractor led to generation loss of 45.04 MUs valued at ₹ 12.38 crore

We observed that during 10 to 29 January 2009 the officials of the Company did not supervise the water chemistry recorded by the contractor resulting in formation of extensive deposits of chemically decomposed material in boiler drum and steam turbine leading to shutdown of plant from 30 January 2009 to 22 March 2009. The Company repaired the plant at the cost of ₹ 2.33 crore and restarted the operation from 23 March 2009. During the period of shutdown the Company suffered generation loss of 45.04 MUs valued at ₹ 12.38 crore at the rate of ₹ 2.75 per unit.

The Management stated that the monthly bills of the contractor were withheld and legal actions were initiated for forfeiture of security deposit, *etc.* However, the fact remains the loss was avoidable by effective supervision of contractors working besides, the responsibility for the lapse of Company's officials was not fixed.

Repairs and Maintenance

2.17.1 To ensure long term sustainable levels of performance, it is important to adhere to periodic maintenance schedules. The efficiency and availability of equipment is dependent on the strict adherence to annual maintenance and equipment overhauling schedules. Non adherence to schedule carries 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.

Audit observed that annual maintenance/overhauling (AOH) of Units of majority of TPS was carried out with a delay up to 11 months from the date on which AOH was due to be taken up.

The Management cited that based on system demand/grid conditions, demand for power etc., the Company had to postpone the schedule of AOH. However, AOH is an annual exercise and is basically a preventive measure to avoid/minimise the possibility of forced outages; the Company should have ensured the timely taking up of AOH through proper planning.

Inadequate replacement of defective condenser tubes

2.17.2 A reference is invited to paragraph 2.4.21 of Audit Report (Commercial) for the year ended 31 March 2007-Government of Gujarat, in which it was mentioned that imprudent acceptance of supply of 13,978 condenser tubes costing ₹ 4.89 crore up to April 2007 resulted in blocking up of fund of ₹ 4.89 crore with consequential loss of interest of ₹ 19.56 lakh.

Further analysis by us revealed that the Company in order to overcome the vacuum problem in the plant, decided (October 2007) to improve the condenser tubes performance by replacing the defective tubes. The Company during July-August 2008 replaced 1,475 numbers of tubes which were highly choked up instead of replacing all the 13,262 defective tubes. Consequently, the Unit could function normally for brief spell of five months (September 2008 to January 2009) and there after the vacuum problem again increased

Inadequate replacement of defective condenser tubes led to generation loss of 152.15 MUs

during February to July 2009. As a result, the Company again undertook the replacement of remaining 11,787 numbers of tubes during August 2009 and September 2009 at the time of Capital overhaul. Subsequently, performance of the Unit had improved. Had the Unit carried out the replacement of condenser tubes at one go during July-August 2008, the performance would have improved enabling generation of additional 152.15 MUs (₹ 42.66 crore).

The Management stated that as AOH carried out during July-August 2008 had a smaller spell of 15 days, it could replace only bare minimum of required condenser tubes during that AOH and thereafter, the remaining tubes were replaced during capital overhauling (COH) when it was undertaken during August and September 2009.

Renovation and Modernisation

2.18.1 Renovation & Modernisation and Refurbishment activities involve (R&M and RA) 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.

Refurbishment activities are aimed at extending economic life of the units by 15 to 20 years which have served for more than 20 years or operating at PLF below 40 *per cent*. Necessary permission and clearance for R&M and refurbishment activities from State Electricity Regulatory Commission (SERC)/ CEA/ State Government are obtained. Residual Life Assessment (RLA) studies are also conducted for all Refurbishment activities and in major R&M works. For Refurbishment and R&M activities Power Finance Corporation (PFC) sanctions loan equal to 70 *per cent* of the estimated cost of the activity against guarantee furnished by the State Government and rest of the fund is met through internal sources or loan from State Government.

Renovation and Modernisation and Refurbishment activities

2.18.2 The Ministry of Power, Government of India (MOP) identified (11 September 2001) Ukai I&II and Gandhinagar I&II as the Units that had completed their useful life and were operating at poor efficiency levels for want of (R&M and RA) in the tenth Five Year Plan.

For taking up the R&M and RA of Unit I&II of Gandhinagar TPS, the Company had awarded the contract (October 2006), with a stipulation to complete the work by June 2009. However, the R&M and RA have not been carried out so far (March 2010) as discussed in the succeeding paragraphs. In Ukai TPS, R&M and RA were carried out in September 2006 to May 2008 for Unit I and in August 2008 to February 2010 for Unit II. Instances of delay in implementation of R&M and RA are discussed below:

Implementation of R&M/ Refurbishment activities

Avoidable delays in execution works at Ukai Unit I and II resulted in generation loss of 345.16 MUs

2.18.3 The Company awarded (January 2005) contracts to BHEL for supply, erection, commissioning and civil work at a total cost of ₹ 260 crore related to R&M and RA for Unit I and II UTPS. The zero date for start of the work was 29 March 2005 and the R&M activities of UTPS I and UTPS II were to be completed in 20 and 27 months respectively and the duration of shutdown allowed for carrying out erection, and commissioning of each Unit was seven months. We observed that the entire R&M and RA of Unit I and II were completed in May 2008 and February 2010 with a delay of 13 and 11 months respectively. This led to generation loss of 2,230.16 MUs[◊] out of which generation loss of 345.16 MUs, was due to avoidable delay of eight months as is discussed below:

- The Consultant who was to approve the design before start of the commencement work by BHEL from the zero date *i.e.*, 29 March 2005, was appointed (August 2005) by the Company with a delay of four months.
- As far as supply of material was concerned, against the stipulated completion by April 2006, BHEL supplied only 53 *per cent* of the material till 6 September 2006. The Company, however, shutdown the Unit I of UTPS on (6 September 2006) with an insufficient receipt of material that was improperly synchronised and mismatched for taking up the work of erection and commissioning of the plant. This led to further delay of four months.

The Management stated that in view of the grid requirement for supply of power, the R&M and RA of Unit I could not be taken up till September 2006. Since the outage of Unit I was not planned immediately after placement of order on BHEL (January 2005) for taking up the R&M and RA, the appointment of Consultant was not considered as urgent at that point of time. Since BHEL's delay in supply of material also contributed to the delay in carrying out the activities, BHEL had been penalised for such delay.

Since MOP had identified in September 2001 itself for the R&M and RA of Ukai Unit I & II the Company should have taken up the activities in March 2005 as per its original schedule. Moreover, the Company had backed down power for 13,666 hours during April 2005 to August 2006, there did not appear any grid constraints.

Post R&M evaluation

R&M and RA scheme envisaged norms for the consumption of auxiliary, heat rate, oil, coal, PLF and generation cost to be achieved post R&M in the TPSs. The norms related to input/output efficiencies as given in DPR for post R&M period of these thermal power stations are detailed below:

[◊] For Unit I during October 2006 to May 2008 and for Unit II September 2008 to February 2010.

Name of TPS	Norms as per DPR			Actual Post R&M		
	Auxiliary consumption (in per cent)	Heat Rate (in Kcl/ Kwh)	PLF (in per cent)	Auxiliary consumption (in per cent)	Heat Rate (in Kcl/ Kwh)	PLF (in per cent)
Ukai I	9.20 [⊗]	2,482	80	10.85	2,848	50.68

(Source: Data as provided by the Company and disclosed in the detailed project report)

In respect of Unit I, prior to R&M and RA, i.e., during 2005-06, the auxiliary consumption was 10.70 per cent, the heat rate was 2,899 Kcal/ Kwh and PLF was 54.53 per cent. Whereas, after carrying out R&M and RA, during 2009-10, the auxiliary consumption was 10.85 per cent, the heat rate was 2,848 Kcal/Kwh and PLF was 50.68 per cent. We observed that under performance was mainly due to high vibration of turbine and excessive boiler tube leakages which led to delay in stabilisation of operation of Unit I of Ukai TPS. Consequently, the Unit I suffered a loss of 1,004.03 MUs[‡] against the envisaged benefit of 1,790.06 MUs in DPR. As the R&M and RA of Unit II of Ukai TPS were completed only in February 2010, the performance of the Unit II with reference to norms could not be assessed in audit. Besides, the performance guarantee test for these Units after R&M and RA were not conducted so far (November 2010).

Idle investment on material

2.18.4 As discussed in paragraph 2.16.2, for taking up the R&M and RA of Unit I and II of GTPS, the Company initiated action by award of contract (October 2006) to BHEL at a total cost of ₹ 295 crore. This work was to be completed by June 2009. The Company, however, citing the reason of delay caused by BHEL in execution of R&M and RA of Unit I of Ukai TPS, decided (June 2008) to put on hold the R&M and RA of Unit I and II of GTPS. The Company has not taken any decision to restart the work till date (August 2010) as BHEL did not conduct the Performance Guarantee (PG) test of the Unit I and II of Ukai TPS to evaluate their performance. Even though the Company received the supply of material worth ₹ 173.03 crore against the total order for ₹ 250.05 crore, the supply of material for ₹ 145.16 crore could have been avoided as it was received after deciding to hold the work in June 2008. Consequently, the investment of ₹ 145.16 crore remained idle resulting in avoidable loss of interest^Σ of ₹ 30.60 crore and ₹ 0.72 crore commitment charges paid during the period from June 2008 to March 2010.

Imprudent acceptance of material worth ₹ 145.16 crore led to blocking up of fund and loss of interest of ₹ 30.60 crore

The Management stated that the material received was being used and, therefore, the expenditure incurred in this regard should not be considered wasteful.

However, the possibility for using the material is remote in view of the fact that GoG had given in principle approval for converting GTPS from coal to gas based power station.

[⊗] As per GERC.

[‡] Actual generation of Unit I during June 2008 to March 2010=786.93 MUs less the envisaged benefit of 1790.96 MUs (after reckoning increase in generation) during the above period.

^Σ Calculated at the rate of 11.5 per cent of PFC loan which was availed for the work.

Operation & Maintenance

2.18.5 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 excludes the expenditure on fuel.

CERC in its regulation in 2009 allowed O&M norm for 2009-10 as ₹ 18.20 lakh per MW in respect of thermal power units having 200-250 MW capacity. In respect of hydro power station, O&M cost per MW for 2009-10 was fixed at ₹ 38.45 lakh. The manpower management and repair & maintenance activities have been dealt with separately in paragraph nos. 2.15 and 2.17.1. Against the above mentioned norm, the total O&M cost per MW incurred in thermal power station by the Company was in the range of ₹ 6.39 lakh to ₹ 13.45 lakh during 2005-10. In case of hydro power station, O&M cost per MW was in the range ₹ 2.42 lakh to ₹ 7.07 lakh during that period. Thus, in both thermal and hydro power stations, O&M cost per MW actually incurred was lower than the norms which is indicative of the fact that adequate O&M activities had not been carried out in time.

Financial Management

2.19.1 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 power sector companies should, therefore, streamline their systems and procedures to ensure that:

- Funds are not invested in idle inventory;
- Outstanding advances are adjusted/recovered promptly;
- Funds are not borrowed in advance of actual need; and
- Swapping high cost debt with low cost debt is availed expeditiously.

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 payment of power purchase bills, debt servicing, employee and administrative costs, and system improvement works of capital and revenue nature.

2.19.2 Details of sources and utilisation of resources on actual basis for all the power sector companies for the years 2005-06 to 2009-10 are given below:

(₹ in crore)

Sl. No.	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
Cash Inflow						
1.	Net Profit/(loss)	52.60	86.48	68.34	82.01	149.26
2.	Add: Adjustments	533.81	508.29	576.16	604.61	892.65
3.	Operating Activities	1,018.92	621.73	433.11	712.96	609.35
4.	Investing Activities	2.60	2.64	6.07	20.90	1.01
5.	Financing Activities	3,800.10	206.32	582.50	1594.57	690.39
6.	Total	5,408.03	1,425.46	1,666.18	3,015.05	2,342.66
Cash Outflow						
7.	Operating Activities	782.56	403.18	376.67	609.79	310.06
8.	Investing Activities	4,312.51	714.91	1,040.24	2,137.17	1,676.60
9.	Financing Activities	308.29	267.95	289.45	272.58	356.53
10.	Total	5,403.36	1,386.04	1,706.36	3,019.54	2,343.19
Net increase/ (decrease) in cash and cash equivalent		4.67	39.44	(40.16)	(4.48)	(0.52)

(Source: Data as provided by the Company and disclosed in the final accounts of respective years.)

We observed that during 2007-08, cash crunch was due to ongoing capacity additions coupled with poor cash inflow from operating activities.

However, the situation could have been improved by gearing up the recoveries of its dues and also by expediting the disposal of unserviceable stores.

Claims and dues

Irregular allowance of rebate on payment of monthly electricity bills

2.20 As per the provisions of Power Purchase Agreement (PPA) entered by the Company with GUVNL, the Company allows rebate if GUVNL makes prompt payment on monthly electricity bills issued to them for sale of power. The rate of rebate is two and half *per cent* if the payment is received within seven days and is one *per cent* if the payment is received within one month from date of issue of monthly bill.

A rebate of ₹ 174.55 crore was allowed in violation of PPA terms

A test check of records related to issue of monthly electricity bills and payments received there against during the year 2008-09 revealed that as against sale of electricity of ₹ 7,101.23 crore, the Company received an amount of ₹ 6,572.59 crore against which the Company allowed rebate of ₹ 174.55 crore at the rate of two and half *per cent*. However, in none of the cases, the payments were received within seven days from the date of issue of bills; on the contrary, the payments were received over with a period ranging from one to eight months. Thus, the rebate of ₹ 174.55 crore allowed was not only against the provisions of PPA, but also remained unjustified especially in view of the fact that outstanding dues recoverable from GUVNL for sale of energy kept on increasing from ₹ 261.35 crore to ₹ 528.63 crore during 2006-07 to 2008-09 as mentioned in the previous paragraph.

The Management stated that GUVNL being the holding Company made several payments on behalf of the Company for which the Company was liable to pay to GUVNL. Therefore, the Company allowed the incentive. However, the Company did not address the issue involved in proper perspective.

Tariff fixation

2.21.1 The Generating Company 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 Gujarat Electricity Regulatory Commission (GERC). GERC accepts the application filed by the Generating Company with such modifications/conditions as may be deemed just and appropriate and after considering all suggestions and objections from public and other stakeholders, issues an order containing targets for controllable items and the generation tariffs for the year within 120 days of the receipt of the application.

The Commission sets performance targets for each year for the items or parameters that are deemed to be “controllable” and any financial loss on account of underperformance is not recoverable through tariffs.

GERC disallowed controllable expenditure of ₹ 133.25 crore due to underperformance of the Company

We observed that for the period 2008-09 GERC did not allow (December 2009) controllable expenditure amounting to ₹ 133.25 crore consisting of ₹ 39.81 crore on O&M expense, ₹ 85.33 crore on fuel cost and ₹ 8.11 crore on interest on working capital. The Company could not file its tariff petition for 2009-10 as it could not finalise its annual accounts for 2009-10.

The Management stated that variable cost was determined on the basis of technical parameters, however, as the majority power stations were old, the actual variable cost incurred was not matching the ceiling fixed by GERC in this regard.

However, technical parameters were fixed by GERC considering the life of the power plant, therefore, the excess expenditure was avoidable through efficient management of PS.

Belated submission of tariff petition

2.21.2 As per GERC Multi Year Tariff regulations issued (December 2007), the generating company was required to file separate accounting statements with aggregate revenue requirement (ARR) under Multi Year Tariff for the control period from 1 April 2008 to 31 March 2011, latest by 31 January 2008.

Delayed submission of tariff petition led to non recovery of fixed cost of ₹ 172.65 crore

We observed that the Company had failed to file separate accounting statements with ARR within the stipulated period of 31 January 2008, and belatedly filed it on 31 July 2008. As a result of the delay, the upward revision in fixed cost proposed for recovery, could not be made effective from 1 April 2008. GERC issued tariff order on 17 January 2009, which came into force from 1 February 2009. Consequently the Company could recover fixed cost aggregating to ₹ 917.57 crore for the period April 2008 to January 2009 by adopting the rate approved in the previous tariff order applicable for the year 2007-08. Had the Company filed accounting statements along with ARR in time, it could have got the tariff order applicable from 1 April 2008, and thereby could have recovered the enhanced fixed cost of ₹ 1,090.22 crore during the period from April 2008 to January 2009. Thus, an amount of ₹ 172.65 crore was not recovered.

Dispatch of power in excess of SLDC's instructions

2.21.3 Every Power Station (PS) is required to declare the plant availability factor (PAF) for the day to the State Load Dispatch Centre (SLDC) which in turn communicates to the PS, the requirement of power (at an interval of every 15 minutes). As per the provisions of PPA entered with GUVNL, the Company was not eligible to get variable cost (*i.e.*, fuel cost, cost of water, cost of lubricants and consumables and repairs and maintenance cost) incurred in the power generated over and above the quantum of power dispatched as per the instructions of SLDC.

We observed that during 2008-09, the UGBPS had generated power in excess of SLDC dispatch instructions resulting in excess generation of 8,227 MUs and incurred ₹ 1.63 crore which could not be recovered through tariff.

The Management stated that to ensure the safety of the turbine, the plant had maintained the operation at 76 *per cent* as per OEM specifications against the 65 *per cent* as stipulated by SLDC and consequentially it had to dispatch excess power to SLDC.

However, the Company could have taken up the matter with SLDC and explained the operational constraints immediately. In fact the Company as late in May 2009, in a routine way got this stipulation of SLDC amended for maintaining the generation at 76 *per cent* of the capacity. Thus, the laxity of the Company in this regard led to avoidable loss.

Environment Issues

2.22.1 In order to minimise the adverse impact on the environment, the GOI had enacted various Acts and statutes. At the State level, Gujarat Pollution Control Board (GPCB) 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.

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

Disposal of fly ash

2.22.2 Annual generation of fly ash from five TPSs^Σ in the State was around 49.20 lakh to 62.70 lakh MTs. 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. We observed that against the total fly ash of 285.70 lakh MTs generated, only 97.83 lakh MTs were disposed/ utilised. Thus, percentage of fly ash disposed to its total generation was around 34 *per cent* only.

^Σ WTPS, GTPS, Ukai TPS, KLTPS and Sikka TPS.

The Management while accepting the audit contention stated that the year wise percentage of fly ash disposed to its total generation increased from 22 to 41; further, the infrastructure facility for extraction, collection and evacuation of fly ash was being created at WTPS and STPS which would enhance the disposal of fly ash in due course.

Non compliance to MoE&F directions

2.22.3 MoE&F, while giving clearance (31 May 2005) to the project of the Company for setting up and commissioning of Unit IV of KLTPS, had stipulated that one single flue chimney of 190 M height with exit velocity of 18/m/sec should be provided exclusively for Unit IV for dispersing the flue gases with high sulphur oxide. However, the Company sought (29 November 2006) permission from MoE&F for the use of an existing chimney of 110 M height which was a redundant chimney of Units I and II instead of constructing the new chimney. But MoE&F (17 July 2009) reiterated the requirement for providing 190 M height chimney for the project. The Company, however, did not construct the new chimney of 190 M height (estimated to cost ₹ 4 crore) but continued to use the existing chimney of 110 M height after commissioning the Unit IV of KLTPS (December 2009) entailing environmental problems.

The Management stated that the use of this chimney of 110 M height would not pose any environmental problem and it was still continuing its efforts for convincing MoE&F for granting the approval to use this chimney.

Water pollution

2.22.4 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 are required to obtain the consent of GPCB which *inter alia* contains the conditions and stipulations for water pollution to be complied with by the TPSs.

Audit scrutiny revealed that as per the norms prescribed by GPCB, total suspended solids (TSS), in effluents from the TPSs should not exceed 100 mg/L for WTPS and 30 mg/L for GTPS. We noticed that TSS in effluent discharges from the following TPSs exceeded the standards for the years mentioned there against:

Sl. No.	Name of the TPS	2006	2007	2008	2009
1	Wanakbori TPS (norms-100 mg/L)	499.9	108.9	-	-
2	Gandhinagar TPS (norms-30 mg/L)	43.0	42.7	51.7	45.8

Thus, TPS had failed to maintain the prescribed level of TSS in effluent discharges which may cause non repairable damage to the water bodies.

The Management stated that WTPS constructed new ash dyke in 2008 and in case of GTPS, the Company had now constructed ETP in 2009. Thereafter, TSS level had remained within the permissible limit.

Carbon Credit for CDM projects

2.22.5 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). Article 3 of the Protocol targeted reduction of emission of GHG by five *per cent* in the developed countries. 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. Only those power plants that meet the UNFCCC norms and take up new technologies will be entitled to sell these credits, commonly called Carbon Credits. If the developed countries were unable to reduce their own carbon emissions, they could book the savings of GHG in developing countries in their account by paying some money to the concerned country. This whole system is named Clean Development Mechanism (CDM). The power plants that commenced operations on or after 1 January 2000 are eligible for registration.

We observed that out of the four power project commissioned after January 2000, the Company had registered (February 2008) only two projects viz., Dhuvaran CCCP 1 (107 MW) and II (112 MW) with UNFCCC as CDM project. The remaining two power projects viz., UCCPP II (374 MW) and KLTPS IV (75 MW) commissioned in November 2009 and December 2009 respectively were not registered. However, KLTPS IV did not qualify for CDM as the plant was not using requisite fuel.

For assessing the Carbon Credit entitlement in case of two CDM projects, the verification of 'Certified Emission Reduction' was carried out by TUV Nord India Private Limited (the designated operational entity) in 2008. Resultantly, the Company received (December 2008/April 2010) the Carbon Credits amounting to ₹ 6.69 crore.

The Management stated that UCCPP II was now being taken under CDM project and was under validation process.

Monitoring by top management

MIS data and monitoring of service parameters

2.23 The Generating Company plays 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.

The Chief Engineers of the power stations are reporting the performance of the respective power stations through a demi-official letter addressed to the Managing Director of the Company reporting about the targets and achievements of their power station during the month and stating the reasons for shortfall, if any. The information include fund requirement, staff position, status of R&M activities, indents pending approval, etc. The generation targets are monitored periodically by the top management for follow-up action. Operational targets were fixed and compared with actuals. Top management discussed the performance of PS during their regular meetings. We observed that MIS did not cover the shortfall in generation on account of operation of the plant at partial load consequent to short receipt of coal.

The Management stated that it had started incorporating details on shortfall in generation due to short receipt of coal from April 2010.

Acknowledgement

We acknowledge the cooperation and assistance extended by different levels of the Management at various stages of conducting the performance audit.

Conclusion

- **As on 31 March 2010, the total installed power generation capacity in Gujarat State was 12,018 MW and effective available capacity was 9,614 MW against the peak demand of 10,406 MW leaving a deficit of 792 MW.**
- **During review period, the Company installed and commissioned three power projects at a cost of ₹ 2,353.03 crore. Of the three projects, there was time overrun of 37 months and cost overrun of ₹ 370.28 crore in execution of KLTPS IV power project.**
- **The thermal plants consumed 37.49 lakh MT coal valued at ₹ 751.67 crore in excess of norms indicated in the DPRs of the power stations.**
- **The manpower deployed in thermal power stations was more than CEA norm during review period. Further, overtime allowance of ₹ 187.03 crore was paid during the above period.**
- **The Company never achieved the targeted generation of power and the shortfall was 7,911 MUs during 2005-10. The PLF remained lower as compared to CEA norm and national average. Further, the auxiliary consumption of power by lignite and gas based plants remained in excess of norms.**
- **Avoidable delays of 11-13 months and blocking up of funds were noticed in carrying out the Renovation & Modernisation and refurbishment activities at Ukai and Gandhinagar TPS respectively.**

- **An amount of ₹ 174.55 crore was allowed as rebate on early payment of energy bills in contravention of the PPA.**
- **The GERC did not allow controllable expenditure of ₹ 133.25 crore on O&M, fuel and working capital during 2008-09.**

Recommendations

The Company may consider:

- **meeting out peak demand by increasing its own generation and reduce the dependence on power purchase from Central Public Sector Undertakings/ Other states;**
- **undertaking R&M and RA programme in time so as to ensure efficient operation of Power Plants;**
- **emphasising on coal companies to supply allotted quantities of coal as per FSA;**
- **ensuring availability of adequate quantity of coal to avoid loss of generation and maintaining consumption of coal within CEA norm;**
- **improving PLF, Plant Availability and Capacity utilisation to augment power generation;**
- **containing auxiliary consumption within norms; and**
- **ensuring submission of ARR in time for tariff fixation to avoid non recovery of cost during intervening period.**