CHAPTER-II
PERFORMANCE AUDIT

Power Transmission Utilities

Executive Summary

Transmission of electricity and Grid operations in Himachal Pradesh are managed and controlled by Himachal Pradesh State Electricity Board Limited (HPSEBL) and Himachal Pradesh Power Transmission Corporation Limited (HPPTCL). HPSEBL and HPPTCL were incorporated on 3 December 2009 and 27 August 2008 respectively under the Companies Act, 1956. The HPPTCL had not yet started transmission of power.

Planning and Development

The HPSEBL had transmission network of 32 Extra High Tension (EHT) Sub-stations (SSs) with a transmission capacity of 2,362 MVA and 2,186.450 Circuit Kilometer (Ckm) as on 31 March 2007, which increased to 35 EHT SSs with a transformation capacity of 2,997 Mega Volts Ampere (MVA) and 2,296.567 Ckm as on 31 March 2012. HPPTCL has so far not created its own transmission network. However, 78 Ckm lines valuing ₹ 69.21 crore were transferred (June 2009) by Himachal Pradesh Power Corporation Limited (HPPCL- Power Generating Company) to HPPTCL. Subsequently, HPSEBL (October 2009) also transferred 200.860 Ckm EHT lines valuing ₹ 199.08 crore to HPPTCL. The maintenance of these lines was, however, being carried out by HPSEBL at the cost of HPPTCL.

Project management of transmission system

Notwithstanding the guidelines given by the Task Force Committee for timely completion of the projects, the HPSEBL failed to execute several SSs and Lines in time during 2007-12 resulting in cost overrun of ₹ 99.62 crore and non realisation of anticipated revenue of ₹ 1,031.27 crore. Both the companies failed to achieve the targets for construction of new SSs, capacity addition and laying of EHT lines by 57, 59 and 51 *per cent* respectively during the last five years ended 31 March 2012.

Performance of transmission system

The overall transmission capacity of HPSEBL was in excess of the requirement. The excess transmission capacity as on 31 March 2012 excluding 30 *per cent* towards redundancy worked out to 560.89 MVA valued at ₹ 28.04 crore which was a burden passed on to the consumer. Existence of

extra/idle capacity in the transmission network and prevalence of overloads, high voltages on certain places reflects deficient planning in creation of transmission network. Further, the percentage of transmission losses exceeded the Central Electricity Authority (CEA) and State Electricity Regulatory Commission (SERC) norms during all the five years ending March 2012. The value of total transmission loss of 114.12 MUs suffered by the Company over and above the norms fixed by the SERC during the five year period ending March 2012 was ₹ 46.81 crore.

Grid Management

Remote Terminal Units/Sub-station Management Systems (RTUs/SMSs) are essential for monitoring the efficiency of the transmission. There were nine 220 KV Sub-Stations (SS) and nine generators, out of which eight 220 KV SS (89 *per cent*) and four generators (44 *per cent*) only were provided with RTUs. Further, the State Load Despatch Centre (SLDC) did not have any data storing or back up facilities thus reducing it to merely an observation center.

The SLDC established in HPSEBL (August 2002) under Northern Region Electricity Board (NREB) scheme is responsible for scheduling generation *etc.* as *per* Indian Electricity Grid Code and manages the un-scheduled drawal under Unscheduled Interchange (UI) mechanism. It was noticed that the SLDC allowed drawal of 1,021.42 MUs valued at ₹ 432.49 crore under UI rates during 2007-08 to 2011-12.

Energy Accounting and Audit

High percentage of energy losses ranging between 4.03 and 6.88 *per cent* were noticed in six feeders due to inaccurate/defective meters during the period 2007-08 to 2011-12.

Financial Management

The loss of the HPSEBL increased by 435.53 *per cent* from ₹ 262.67 crore in 2007-08 to ₹ 1,406.68 crore in 2011-12 (provisional). HPPTCL had loss of ₹ 0.27 crore to ₹ 4.09 crore during 2008-09 to 2011-12 (provisional).

The Borrowings of HPSEBL increased from ₹ 2,300.27 crore in 2007-08 to ₹ 4,177.79 crore in 2011-12.

Debt Equity Ratio decreased from 6.89:1 (2007-08) to 4.30:1 (2011-12) due to increase of equity from ₹ 334 crore (2007-08) to ₹ 971.78 crore (2011-12). Percentage of Return on Capital employed decreased from 5.47 in 2007-08 to (-) 6.44 in 2011-12 due to increase in Current Liabilities from ₹ 2,423.12 crore (2007-08) to ₹ 2,733.98 crore (2011-12).

Working results

Per unit revenue realisation of HPSEBL increased from ₹ 3.78 to ₹ 4.63 during 2007-12 (22.49 *per cent*) as compared to *per* unit cost which increased from ₹ 3.82 to ₹ 4.96 (29.84 *per cent*) during the corresponding period. The employees cost and interest and finance charges constitute the major elements of cost in 2007-12 which represented 22.67 and 5.70 *per cent* of the total cost respectively. Sale of power constitutes the major elements of revenue which represented 96.82 *per cent* of the total revenue (2011-12).

Tariff Fixation

Though there was no delay in filing the ARR petitions by HPSEBL yet the tariff orders for the year 2008-09, 2010-11 and 2011-12 were approved after the effective date (April of each financial year) due to delayed compliance of SERC observations. The late approval of tariff for these years by SERC had affected the cash flow of the Company by ₹ 161.85 crore for three months during April to June in the years 2008-09, 2010-11 and 2011-12.

Conclusion and Recommendations

Various projects of the Companies were not completed within scheduled time resulting in time and cost over-run, shortfall in capacity addition, under achievement of targets for reduction in losses and blockade of funds. HPSEBL had incurred huge expenditure on purchase of power under UI due to ill planning. HPSEBL failed to recover maintenance charges and expenditure incurred for the up-gradation and capacity addition from consumers. The reasons for excessive Transmission losses were not investigated despite repeated instructions of SERC to spell out remedial steps for each feeder wherein losses were on higher side. Further, HPSEBL also could not comply with the orders of the regulator regarding recovery of SLDC fee/charges due to non-filing of separate Annual Revenue Requirement.

We have made six recommendations to improve transmission segment in the State. The HPSEBL needs to review physical and financial progress of incomplete schemes, plan day ahead requirement of power on a realistic basis, initiate adequate steps for recovery of cost share in respect of capacity addition, install meters of matching accuracy class at both ends, investigate reasons for excessive transmission losses and initiate action to file separate Annual Revenue Requirement to recover SLDC charges.

Introduction

2.1 With a view to supply reliable and quality power to all by 2012, the Government of India (GoI) prepared the National Electricity Policy (NEP) in February 2005, which stated that the Transmission System required adequate and timely investment besides efficient and coordinated action to develop a robust and integrated power system for the country. It also *inter-alia*

recognised the need for the development of a National and State Grid with the coordination of Central/State Transmission Utilities. Transmission of electricity and Grid operations in Himachal Pradesh are managed and controlled by Himachal Pradesh State Electricity Board Limited (HPSEBL) and Himachal Pradesh Power Transmission Corporation Limited (HPPTCL) which are mandated to provide an efficient, adequate and properly coordinated Grid management and transmission of energy. HPSEBL and HPPTCL were incorporated on 3 December 2009 and 27 August 2008 respectively under the Companies Act, 1956, and report to the Multi Purpose Projects & Power Department (MPP&P), Government of Himachal Pradesh. The execution of all new works, formulation, up-dation, execution of transmission master plan, coordination of transmission related issues with Central/State Public Sector Undertakings as well as facilitation of evacuation of power from upcoming generation plants was entrusted to HPPTCL. However, it has not yet commenced its work of transmission of power due to non-creation of its infrastructure.

2.2 The Management of HPSEBL is vested with the Board of Directors comprising six members appointed by the State Government. The day-to-day operations of the HPSEBL are carried out by the Managing Director who is the Chief Executive of the Company with the assistance of Director (Technical), Director (Projects), Director (Operation), Director (Finance & Administration) and Director (Personnel). The Management of HPPTCL is vested with the Board of Directors comprising seven members appointed by the State Government. The day-to day operations are carried out by the Managing Director who is the Chief Executive of the Company with the assistance of two whole time Directors (Technical) and four part time Directors.

During 2007-08, 7,189.20 Million Units (MUs) of energy was transmitted by HPSEBL[1], which increased to 9,694.92 MUs in 2011-12, *i.e.* an increase of 34.85 *per cent* during 2007-12. As on 31 March 2012, the Company had transmission network of 2,296.567 Circuit Kilometer (Ckm)[2] and 35 Sub-Stations (SSs) with installed capacity of 2,997 Mega Volts Ampere (MVA), capable of annually transmitting 23,628.35 MUs at 66 Kilo Volts (KV) and above. The turnover of the Company was ₹ 3,818.03 crore in 2011-12[3], which was equal to 6.05 *per cent* of State Gross Domestic Product. HPSEBL and HPPTCL employed 1,495 and 105 employees as on 31 March 2012 respectively on transmission activities.

1 The HPPTCL had not yet started function of transmission of power.

2 This includes 278.860 Ckm lines transferred to HPPTCL.

3 Provisional figure as the balance sheet of the Company for the year 2011-12 was under finalisation.

A Performance Review on Implementation of Transmission and Distribution Schemes (66KV and above) was included in the Report of the Comptroller and Auditor General of India (Civil and Commercial) Volume II, Government of Himachal Pradesh for the year ended 31 March 2006. The Report was discussed by Committee on Public undertakings (COPU) in July 2010. The COPU gave (September 2011) its recommendations in its 51st Report.

Scope and Methodology of Audit

2.3 The present Performance Audit conducted during January 2012 to June 2012 covers performance of the Companies during 2007-08 to 2011-12. Audit examination involved scrutiny of records of different wings at the Head Office, State Load Despatch Centre (SLDC), all circles (two[4]) headed by Superintending Engineers and six[5] out of 16 Divisions headed by Senior Executive Engineers/Additional Superintending Engineers of HPSEBL and Corporate Office of the HPPTCL as the Company is yet to open its field units.

The HPSEBL constructed three new SSs (222.3 MVA) and 10 lines (110.117 Ckm) as well as augmented existing transformation capacity by 635 MVA during the review period. Out of these, two new SSs (216 MVA), eight old SSs (303 MVA), nine lines (124.418 Ckm including old and new) and augmentation of existing transformation capacity by 132.2 MVA were examined.

The units were selected on the basis of simple random sampling method, without replacement. The methodology adopted for attaining 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

2.4 The objectives of the performance audit were to assess whether:

- Perspective Plan was prepared in accordance with the guidelines of the National Electricity Policy/Plan and State Electricity Regulatory Commission (SERC) and assessment of impact of failure on plan, if any;

- the transmission system was developed and commissioned in an economical, efficient and effective manner;

4 Electrical System Circles: Shimla and Hamirpur.
5 Electrical System Divisions: Nahan, Hamirpur, Bilaspur, Mandi, Nalagarh and Shimla.

- operation and maintenance of transmission system was carried out in an economical, efficient and effective manner;
- disaster Management System was set up to safeguard operations against unforeseen disruptions;
- effective failure analysis system was set up;
- effective and efficient financial management system with emphasis on timely raising and collection of bills and filing of Aggregate Revenue Requirement (ARR) for tariff revision in time was in place;
- efficient and effective system of procurement of material and inventory control mechanism were in place;
- efficient and effective energy conservation measures were undertaken in line with the National Electricity Plan (NEP) and establishment of Energy Audit System; and
- there is a monitoring system in place to review existing/ongoing projects, take corrective measures to overcome deficiencies identified, respond promptly and adequately to Audit/Internal audit observations.

Audit Criteria

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

- Provisions of National Electricity Policy/Plan and National Tariff Policy;
- Perspective Plan and project reports of the Company;
- Standard procedures for award of contracts with reference to principles of economy, efficiency, effectiveness, equity and ethics;
- ARR filed with SERC for tariff fixation, circulars, manuals and MIS reports;
- Manual of Transmission Planning Criteria (MTPC);
- Code of Technical Interface (CTI)/Grid Code consisting of planning, operation, connection codes;
- Directions from State Government /Ministry of Power (MoP);
- Norms/Guidelines issued by SERC/Central Electricity Authority (CEA);

- Report of the Committee constituted by the MoP recommending the "Best Practices in Transmission";
- Report of the Task Force constituted by the MoP to analyse critical elements in transmission project implementation; and
- Reports of Regional Power Committee (RPC)/SLDC).

Audit Methodology

2.6 Audit followed the following mix of methodologies:

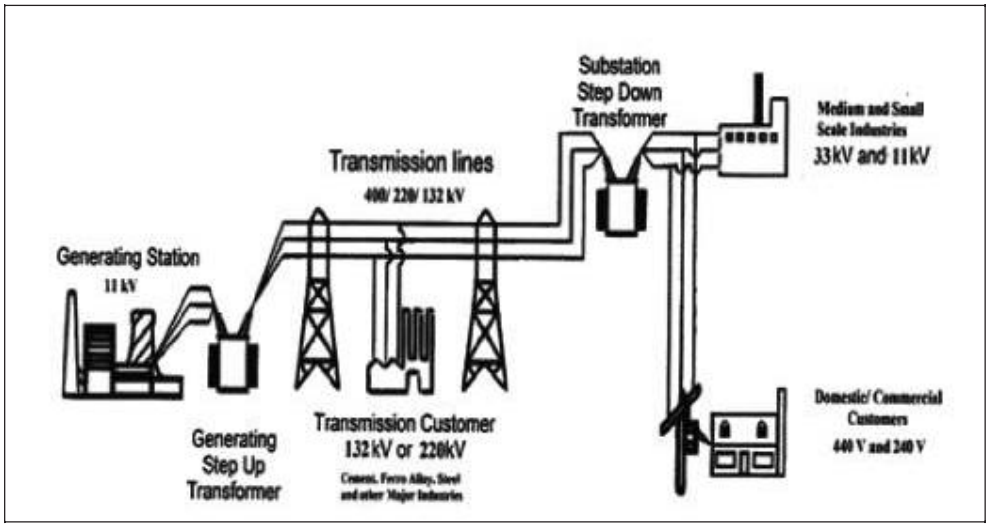
- Review of agenda notes and minutes of Company/Board/RPC/SLDC, annual reports, accounts and regional energy accounts (REA);
- Scrutiny of loan files, physical and financial progress reports;
- Analysis of data from annual budgets and physical as well as financial progress with completion reports;
- Scrutiny of records relating to project execution, procurement, receipt of funds and expenditure; and
- Interaction with the Management during entry and exit conferences.

Brief description of transmission process

2.7 Transmission of electricity is defined as bulk transfer of power over long distances at high voltages, generally at 132 KV and above. Electric power generated at relatively low voltages in power plants is stepped up to high voltage before it is transmitted, to reduce the loss in transmission and to increase efficiency of the Grid. Sub-stations (SSs) are facilities within high voltage electric system used for stepping-up/stepping down voltages from one level to another, connecting electric systems and switching equipment in and out of the system. The step up transmission SSs at the generating stations use transformers to increase the voltages for transmission over long distances.

Transmission lines carry high voltage electric power. The step down transmission SSs decreases voltage to sub transmission voltage levels for distribution to consumers. The distribution system includes lines, poles, transformers and other equipment needed to deliver electricity at specific voltages.

Electrical energy cannot be stored; hence generation must be matched to need. Therefore, every transmission system requires a sophisticated system of control called Grid management to ensure balancing of power generation closely with demand. A pictorial representation of the transmission process is given below:



Audit Findings

2.8 The audit objectives were explained to the HPSEBL and HPPTCL during an 'Entry Conference' held on 22 December and 23 December 2011 respectively. Subsequently, audit findings were reported to the Companies and the State Government on 7 September, 2012 and discussed in an 'Exit Conference' held on 12 November, 2012. The Exit Conference was attended by the Additional Chief Secretary, Multi Purpose Projects & Power Department (MPP & Power), Government of Himachal Pradesh. The views expressed by them during the exit conference have been considered while finalising this Performance Audit. The replies of the State Government/Management were awaited as of November 2012. The audit findings are discussed in subsequent paragraphs.

Planning and Development

National Electricity Policy/Plan

2.9 The Central Transmission Utility (CTU) and State Transmission Utilities (STUs) have the key responsibility of network planning and development based on the National Electricity Plan (NEP) in coordination with all the concerned agencies. At the end of 10th Plan (March 2007), the

transmission system in the country at 765/HVDC/400/230/220/KV stood at 1.98 lakh Ckm, which was planned to be increased to 2.93 lakh Ckm by the end of 11th Plan *i.e.* March 2012. The NEP assessed the total inter-regional transmission capacity at the end of 2006-07 as 14,100 MW and further planned to add 23,600 MW during the 11th plan bringing the total inter-regional capacity to 37,700 MW.

The transmission network of HPSEBL at the beginning of 2007-08 consisted of 32 Extra High Tension (EHT) SSs with a transmission capacity of 2,362 MVA and 2,186.450 Ckm of EHT transmission lines. The transmission network as on 31 March, 2012 consisted of 35 EHT SSs with a transformation capacity of 2,997 MVA and 2,296.567 Ckm of EHT lines against the target increase of 40 EHT SSs with a transmission capacity of 3,902.800 MVA and 2,410.874 Ckm of EHT lines as on that date. Thus, there was shortfall of 5 EHT SSs, 905.800 MVA in capacity addition and 114.307 Ckm in EHT lines. HPPTCL has so far not created its own transmission network. However, 220 KV Kashang-Bhaba lines (78 Ckm) valuing ₹ 69.21 crore were transferred (June 2009) by Himachal Pradesh Power Corporation Limited to HPPTCL. Subsequently, HPSEBL (October 2009) also transferred 200.860 Ckm EHT lines valuing ₹ 199.08 crore to HPPTCL. The maintenance of these lines was being carried out by HPSEBL at the cost of HPPTCL.

The STU is responsible for planning and development of the intra-state transmission system. Assessment of demand is an important pre-requisite for planning capacity addition. The State Electricity Regulatory Commission (SERC) authorised (July 2006) the Board (now HPSEBL) to strengthen transmission network for meeting out the growing power need, facilitate Open Access, explore multi-lateral funding arrangement along with extracting the maximum advantage from its unique status of being power surplus entity during summers in view of deficient power in northern part of the country by developing suitable trading strategies and system matching with transmission network as *per* Transmission Planning Report. The SERC again advised (May 2008) the Board to strengthen the intra-state and inter-state transmission system.

Audit noticed (January 2012) that the Board, in compliance of the directions *ibid.* stated (April 2007) that a scheme for ₹ 95.67 crore had been prepared and proposed to be funded by Rural Electrification Corporation for up-gradation of transmission infrastructure in industrial areas. The execution of scheme was examined during audit and deficiencies noticed are discussed in the succeeding paragraphs.

Transmission network and its growth

2.10 The transmission capacity (power in MVA) of both the Companies at EHT level during 2007-08 to 2011-12 is given in ***Table 2.1*** below:

Table-2.1

Sl. No	Description	2007-08	2008-09	2009-10	2010-11	2011-12	Total
A. Number of Sub-stations (Numbers)							
1	At the beginning of the year	32	33	33	34	35	
2	Additions planned for the year	2	-	-	-	5[6]	7
3	Added during the year	1[7]	-	1	1	-	3
4	Total sub stations at the end of the year **(1+3)**	33	33	34	35	35	
5	Shortfall in additions **(2-3)**	(-)1	-	(+)1	(+)1	(-) 5	4
B. Transformers capacity (MVA)							
1	Capacity at the beginning of the year	2,362.0	2,481.3	2,641.5	2,750.5	2,966.0	
2	Additions/ augmentation planned for the year	132.1	180.2	172.0	231.0	825.5	1,540.80
3	Capacity added during the year	119.3	160.2	109.0	215.5	31.0	635.00
4	Capacity at the end of the year **(1+3)**	2,481.3	2,641.5	2,750.5	2,966.0	2,997.0	
5	Shortfall in additions/ augmentation	12.8	20.0	63.0	15.5	794.5	905.80
C Transmission lines (CKM)							
1	At the beginning of the year	2,186.450	2,195.408	2,198.977	2,206.97	2,234.539	
2	Additions planned for the year	18.439	3.569	9.900	57.059	135.457	224.424
3	Added during the year	8.958	3.569	7.993	27.569	62.028	110.117
4	Total lines at the end of the year **(1+3)**	2,195.408	2,198.977	2,206.97	2,234.539	2,296.567	
5	Shortfall in additions **(2-3)**	9.481	-	1.907	29.490	73.429	114.307

6 This includes two Sub stations proposed in NEP to be executed by HPPTCL by the end of 11th Plan.

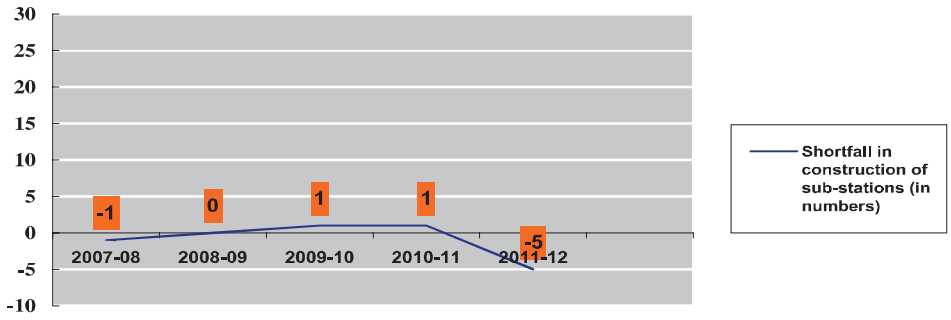
7 This includes spill over transformation and transmission capacity.

From the above table it could be seen that during the last five years, the companies had failed to achieve the targets for construction of new SSs, capacity addition and laying of EHT lines by 57, 59 and 51 *per cent,* respectively.

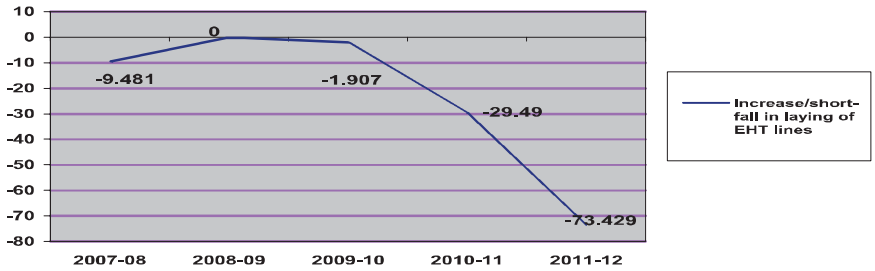
Delay in construction of sub-stations

2.10.1 As *per* NEP, HPPTCL was to construct 10.380 Ckm of 132 KV line and two Sub-stations having capacity of 294.5 MVA by the end of March 2012. Audit observed that the work for the construction of 10.380 Ckm 132 KV Prini - Palchan Line along with 31.5 MVA Sub-station at Palchan awarded (January 2010) was abandoned (November 2011) after incurring an expenditure of ₹ 1.91 crore as the site had to be shifted due to right of way problem. The work for the construction of another Sub-station at Wangtoo was yet to be awarded due to non receipt of forest clearance.

The companies could not achieve the targets for construction of SSs during 2007-08 to 2011-12 as shown in the line graph:



The companies also could not achieve the targets for laying of EHT lines during 2007-08, 2009-10, 2010-11 and 2011-12 as shown in the line graph:



Against the targeted construction of seven EHT SSs and laying of 224.424 Ckm lines, the HPSEBL constructed three EHT SSs and 110.117 Ckm lines during the five year period (achievement of 43 *per cent* and 49 *per cent* respectively). The transmission capacity added was 635 MVA for the five year period ending 2011-12.

The particulars of voltage-wise capacity additions planned, actual additions, shortfall in capacity, *etc*. during the performance audit period are given in **Appendix 2.1.**

From the table it could be seen that the Companies failed to add proposed transformation capacity of 905.8 MVA and 114.307 Ckm EHT lines during 2007-12. The main reasons for shortfall in achievement of targets were delay in arranging funds and award of works, slow pace of work by the contractor and non receipt of forest clearance.

Project management of transmission system

2.11 A transmission project involves various activities from concept to commissioning. Major activities in a transmission project are (i) Project formulation, appraisal and approval phase and (ii) Project Execution Phase. For reduction in project implementation period, the MoP, Government of India constituted a Task Force on transmission projects (February 2005) with a view to:

- analyse the critical elements in transmission project implementation,
- implementation from the best practices of CTU and STUs, and
- suggest a model transmission project schedule for 24 months' duration.

The task force recommended (July 2005) the following remedial actions to accelerate the completion of transmission systems:

- Undertake various preparatory activities such as surveys, design & testing, processing for forest & other statutory clearances, tendering activities *etc.* in advance/parallel to project appraisal and approval phase and go ahead with construction activities once Transmission Project sanction/approval is received;
- Break-down the transmission projects into clearly defined packages so that the packages can be procured & implemented requiring least coordination & interfacing and at the same time it attracts competition facilitating cost effective procurement; and
- Standardise designs of tower fabrication so that 6-12 months can be saved in project execution.

Short-comings of the HPSEBL with regard to the recommendations of the Task Force

2.11.1 The HPSEBL did not follow the recommendations of the Task Force regarding processing for forest & other statutory clearances *etc.* in advance/parallel to project appraisal and approval phase and went ahead with the award of construction activities in anticipation of approval. Consequently, the Company failed to execute several sub-stations and lines in time. The details of works executed during 2007-12 and time/cost overrun are given in ***Table 2.2*** below:

Table-2.2

Capacity in KV	Total No. constructed		No. test checked by Audit		Delay in construction (Numbers)		Time overrun (range in months)		Cost overrun (₹ in crore)	
	SSs	Lines	SSs	Lines	SSs	Lines	SSs	Lines	SSs	Lines
220	8	5	5	3	4	3	27 to 138	12 to 256	35.79	57.32
132/66	19	8	8	4	3	4	24 to 67	28 to 147	4.47	95.02
Total	**27**	**13**	**13**	**7**	**7**	**7**			**40.26**	**152.34**

The reasons for delay noticed during audit were mismatch in award and execution of work, delay in execution, delay in vacation of stay granted by the regulator *etc.* as discussed in the succeeding paragraphs:

Blockade of funds

2.11.2 As *per* Para 4.4 of the guidelines on Forest (Conservation) Act, 1980 issued by the, GoI, Ministry of Environment & Forest, no work should be commenced in cases where forest and non-forest land is involved, until the approval of the Central Government is received. In three cases, the HPSEBL awarded construction of 65.761 Ckm lines and one Sub Station (31.5 MVA) between May 2010 and June 2010 with stipulated completion period ranging between four and eight months at a cost of ₹ 53.08 crore without requisite forest clearance. Consequently, out of the awarded works for 65.761 Ckm lines and capacity addition of 31.5 MVA, actual achievement (April 2012) was only 50 *per cent*. The remaining works could not be completed for want of forest clearance. This resulted in time over-run ranging between 13 and 18 months besides blockade of funds of ₹ 30.18 crore.

Delay in completion of work

2.11.3 Further, it was also noticed that in eight works the erection of 163.579 Ckm lines and addition/augmentation of 1,078 MVA capacity could not be completed within the stipulated period **(Appendix 2.2)** mainly due to slow pace of work by the contractors resulting in time over-run ranging between 10 and 256 months with consequential cost over-run of ₹ 99.62 crore besides

non realisation of envisaged financial benefit of ₹ 1,031.27 crore. The cases regarding extension of time and imposition of penalty for delay were yet to be decided (June 2012).

Construction of Sub-stations without assessing load requirements

2.11.4 For construction of a Sub-station, the load growth and anticipated increase in future demand along with permissible limits of voltage regulations are required to be considered/mandatory, prior to taking up of the project, so that unnecessary expenditure can be avoided. The load forecasts for the proposed new schemes should also consider the anticipated physical and financial benefit to be derived. Audit observed that the HPSEBL had not assessed the capacity constraint while going for transformation capacity addition resulting in blockade of funds of ₹ 13.27 crore as discussed below:

2.11.5 The Board (now HPSEBL) approved (August 2005) a Short-term Plan for augmentation of existing transformation capacity of 132/33 KV, Sub-station, Kala Amb from 48 MVA to 114.5 MVA, which was completed (March 2011) at a cost of ₹ 6.15 crore. The increased capacity of the Sub-station was to be utilised by constructing a new line as the existing line could accommodate the load only up to 83.3 MVA. The work for construction of 132 KV Single Circuit (S/C) line from Devni to Kala Amb required to transmit the augmented load awarded (May 2010) had not been completed so far (June 2012). Therefore, the capacity addition of 31.2 MVA made after incurring an expenditure of ₹ 2.89 crore could not be utilised since March 2011.

Further, the above Short term Plan had a provision for augmentation of existing Power Transformation capacity of 66 KV Nalagarh Sub-station from 40 MVA to 80 MVA by installing four transformers (2 transformers each on 66/11 and 66/33 KV system). As the existing 66 KV S/C Baddi - Nalagarh line was fully loaded and had no capacity to cater to the proposed additional load of 40 MVA, the construction of 66 KV Double Circuit (D/C) Baddi - Nalagarh line on 132 KV towers was proposed.

2.11.6 Audit observed that two transformers (66/11 KV) were commissioned during December 2005 and December 2006 and other two (66/33 KV) during February 2006 and September 2007 after incurring an expenditure of ₹ 10.38 crore. The augmented capacity could not be utilised as the required transmission line was not completed simultaneously due to delay in award of transmission line work, which was completed in July 2009 against the scheduled date of completion in January 2007. Thus, due to delay in completion of transmission line the upgraded transformation capacity of 40 MVA could not be utilised for 31 months. This resulted in blockade of ₹ 10.38 crore and interest loss of ₹ 2.95 crore due to non-synchronisation of capacity augmentation and line work.

Performance of transmission system

2.12 The performance of the HPSEBL mainly depends on efficient maintenance of its EHT transmission network for supply of quality power with minimum interruptions. In the course of operation of sub-stations and lines, the supply-demand profile within the constituent sub-systems is identified and system improvement schemes are undertaken to reduce line losses and ensure reliability of power by improving voltage profile. These schemes are for augmentation of existing transformer capacity, installation of additional transformers, laying of additional lines and installation of capacitor banks. The performance of the Company with regard to O&M of the system is discussed below:

Annual charges for the operation and maintenance of transmission system/lines of transmission licensee/independent power producers/consumers are required to be recovered on norms (scheduled staff strength & material head) fixed by HPSEBL. Audit observed that an amount of ₹ 10.56 crore was not recovered by the HPSEBL from five parties[8] during the period covered under audit, for which no reasons were on record.

Transmission capacity

2.12.1 The Company in order to evacuate power from the Generating Stations and to meet the load growth in different areas of the State constructs lines and Sub-stations at different EHT voltages. A Transformer converts Alternate Current (AC) voltage and current to a different voltage and current at a very high efficiency. The voltage levels can be stepped up or down to obtain an increase or decrease of AC voltage with minimum loss in the process. The evacuation is normally done at 220 KV Sub-stations. The transmission capacity (220 KV) created *vis-à-vis* the transmitted capacity (peak demand met) at the end of each year by the HPSEBL during the five years ending March 2012 are given in ***Table 2.3*** below:

Table-2.3

Transmission capacity (in MVA)				
Year	**Installed capacity**	**After leaving 30 *per cent* towards margin**	**Peak demand including non-coincident demand**	**Excess/ shortage (3-4)**
(1)	(2)	(3)	(4)	(5)
2007-08	2,472.86	1,731	1,108.72	622.28
2008-09	2,492.86	1,745	1,114.37	630.63
2009-10	2,492.86	1,745	1,217.87	527.13
2010-11	2,492.86	1,745	1,283.61	461.39
2011-12	2,492.86	1,745	1,184.11	560.89

8 HPPTCL, M/s JP Associates, M/s Ambuja Cement Ltd., HEP Malana and PSEB.

From the above table it could be observed that the overall transmission capacity was in excess of the requirement for every year. The existing transmission capacity excluding 30 *per cent* towards redundancy worked out to an excess of 560.89 Mega Volts Amperes (MVA) to the end of March 2012 valued at ₹ 28.04 crore {₹ five crore *per* 100 MVA/Power Transformer (PTR)} which was a burden passed on to the consumer. Existence of extra/idle capacity in the transmission network and prevalence of overloads, high voltages on certain places reflects unscientific planning in creation of transmission network.

Transformation Capacity

2.12.2 Audit noticed that out of nine power transformers (damaged between June 1997 and August 2009) valued at ₹ 4.86 crore, eight were declared beyond economical repair due to non-existence of repair facilities (March 2012) and one transformer was lying for repair since October 2009 (Larji Power House). In addition, six working transformers worth ₹ 1.43 crore were dismantled (between November 1998 and January 2008) due to augmentation of SSs which were also lying un-utilised since then. No reasons for the same were on the record. The committee constituted (April 1996) to rationalise the manpower requirement of the HPSEBL had also recommended the establishment of workshops at Una and Sundernagar to repair the damaged power transformers but the same had not been established till date (March 2012). No reasons for the same were found on record.

Sub-Stations (SS)

Adequacy of Sub-stations

2.12.3 Manual on Transmission Planning Criteria (MTPC) stipulates the permissible maximum capacity for different Sub-stations *i.e.*, 320 MVA for 220 KV and 150 MVA for 132 KV SSs and for every Sub-station of 132 KV capacity and above should have at least two transformers. Further, the Transmission Planning and Security Standards (TPSS) issued (June 2004) by State Electricity Regulatory Commission (SERC) indicated that the size and number of transformers in the Sub-station shall be planned in such a way that in the event of outage of any single transformer the remaining transformer(s) could still supply 80 *per cent* of the load. Audit observed that in case of seven Sub-stations[9] constructed to provide power at 66/33/11 KV, there was only a single transformer which was not as *per* TPSS.

Voltage management

2.12.4 The licensees using intra-state transmission system should make all possible efforts to ensure that grid voltage always remains within limits. As *per* Indian Electricity Grid Code, STUs should maintain voltages ranges

9 220/132 Kangoo, 132/66 KV Solan, 132/33 KV Malana and Kunihar, 132/11 KV Paonta, Amb and Darlaghat.

between 198-245 KV and 119-145 KV in 220 KV and 132 KV lines respectively. Audit observed that out of eight 220 KV SSs, the voltage at three[10] SSs ranged between 192 and 247 KV while in three[11] 132 KV SSs out of 25 SSs, voltage recorded ranged between 114 and 145 KV. Thus, to provide quality power and reduce the transmission losses the Company should have ensured that the maximum and minimum voltages limits were maintained as *per* the norms.

Lines

EHT lines

2.12.5 As *per* Manual of Transmission Planning Criteria (MTPC), permissible line loading cannot be more than the Thermal Loading Limit (TLL). The TLL limits the temperature attained by the energised conductors and restricts sag and loss of tensile strength of the lines. Further, TLL limits the maximum power flow of the lines. As *per* MTPC, the TLL of 132 KV line with ACSR Panther (210 sq. mm) conductor was 366 amps. Scrutiny of line loadings on the 132 KV feeders revealed that out of 15 feeders in three Divisions[12] were loaded above 366 amps (ranged between 380 and 470 Amps). Loading of the lines beyond capacity resulted in voltage fluctuations, higher transmission losses and frequent interruptions/breakdowns.

Bus Bar Protection Panel (BBPP)

2.12.6 Bus bar is used as an application for interconnection of the incoming and outgoing transmission lines and transformers at an electrical Sub-station. BBPP limits the impact of the bus bar faults on the entire power network which prevents unnecessary tripping and is selective to trip only those breakers necessary to clear the bus bar fault. As *per* Grid norms and Best Practices in Transmission System, BBPP is to be kept in service for all 220 KV Sub-stations to maintain system stability during Grid disturbances and to provide faster clearance of faults on 220 KV buses.

Audit observed (March 2012) that out of eight 220 KV Sub-stations, BBPPs at six Sub-stations were installed (between 1998 and 2010) and out of these BBPP at one Sub-station (Jassure) had not been made functional for which no recorded reasons were found in audit. The BBPPs at remaining two Sub-stations (Kangoo and Kotla) were yet to be installed (March 2012) and the remaining three BBPPs had been working satisfactorily.

10 Uperala Nangal, Katha (Baddi) and Kangoo.
11 Bajaura, Bijni and Kangoo.
12 ESDs: Hamirpur, Mandi and Bilaspur.

Maintenance

Performance of Current transformers (CT)

2.13 Current transformers are one of the most important and cost-intensive components of electrical energy supply networks, thus it is of special interest to prolong their life duration while reducing their maintenance expenditure. In order to gather detailed information about the operation conditions of CTs, various kinds of oil analysis like the standard oil Dissolved Gas Analysis (DGA) tests are generally conducted. For CT insulation a combination of an insulating liquid and a solid insulation impregnated therewith are used. For an evaluation of the actual condition of this insulating system usually a DGA is used, as failures inside the CT lead to a degradation of the liquid insulation in such a way that the compound of the gases enables an identification of the failure cause. The status of failure of transformers during the years 2007-08 to 2011-12 is given ***Table 2.4*** below:

Table-2.4

(₹ in lakh)

Year	No of transformers at the beginning of the year	No. of transformers failed	No. of transformers failed within guarantee period	No. of transformers failed within normal working life	Expenditure on repair and maintenance
1	**2**	**3**	**4**	**5**	**6**
2007-08	1,515	1	-	1	0.19
2008-09	1,527	1	-	1	1.72
2009-10	1,590	1	-	1	-
2010-11	1,620	8	-	8	11.79
2011-12	1,617	5	-	5	-
Total		**16**	**0**	**16**	**13.70**

The above table indicates that no transformer failed within guarantee period. The year wise percentage of transformers failed with in normal life ranged between 0.07 and 0.49 *per cent*. The Company incurred total expenditure of ₹ 13.70 lakh on the repair of 16 transformers during 2007-12.

Transmission losses

2.13.1 While energy is carried from the generating station to the consumers through the Transmission & Distribution (T&D) network, some energy is lost which is termed as T&D loss. Transmission loss is the difference between energy received from the generating station/Grid and energy sent for further distribution. The details of transmission losses of 132 KV feeder Larji I & II, Bijni, Bajaura and Hamirpur I & II during the period from 2007-08 to 2011-12

are given in ***Table 2.5*** below:

Table-2.5

Particulars	Unit	Year				
		2007-08	2008-09	2009-10	2010-11	2011-12
Power received for transmission	MUs	764.77	1,182.32	1,464.46	1,566.49	1,174.08
Net power transmitted	MUs	718.49	1,114.40	1,386.72	1,483.73	1,106.40
Actual Transmission loss	MUs	46.28	67.92	77.74	82.76	67.68
	percentage	6.05	5.74	5.31	5.28	5.76
Transmission loss as *per* the CEA norm	percentage	4.00	4.00	4.00	4.00	4.00
Transmission loss as *per* SERC norms	percentage	3.71	3.71	3.71	3.71	3.71
Transmission loss in excess of SERC norm	MUs	17.90	24.05	23.41	24.64	24.12
	₹ *per* Unit	3.78	4.26	4.29	4.05	4.05
	₹ in crore	6.77	10.25	10.04	9.98	9.77

Source: Information supplied by the Company

It could be seen from the table that the percentage of transmission losses exceeded the CEA and SERC norms during all the five years ending March 2012 due to installation of meters of different accuracy classes at outgoing and incoming ends**.** The value of transmission losses suffered by the Company in excess of the norms fixed by the SERC for 2007-08 to 2011-12 was 114.12 MUs valued at ₹ 46.81 crore. The reasons for excessive losses were not investigated despite repeated instructions of SERC to spell out remedial steps for each feeder wherein losses were on higher side.

Non-achievement of anticipated saving in Transmission & Distribution losses

2.13.2 For reduction in losses, the Extra High Voltage committee in its 48th meeting (July 2008) *inter alia* decided to construct 220 KV Single Circuit (S/C) line from Rauri to Kunihar with diversion of 50 *per cent* load of existing (three) 132 KV feeders to 220 KV system. The line was to be completed within 14 months from August 2008 and with the construction of this line, the Company had anticipated to achieve 60 *per cent* reduction in T&D losses.

Audit observed that the 220 KV S/C line has not been constructed so far (March 2012), which resulted in non-achievement of anticipated saving in T&D losses by ₹ 18.07 crore for the period from October 2009 to March 2012.

Grid Management

Maintenance of Grid and performance of SLDC

2.14 Transmission and Grid Management are essential functions for smooth evacuation of power from generating stations to the consumers. Grid Management ensures moment-to-moment power balance in the interconnected power system to take care of reliability, security, economy and efficiency of the power system. Grid management in India is carried out in accordance with the standards/directions given in the Grid Code issued by CEA. National Grid consists of five regions *viz.*, Northern, Eastern, Western, North Eastern and Southern Grids, each of these having a Regional Load Despatch Centre (RLDC), an apex body to ensure integrated operation of the power system in the concerned region. The SLDC, a constituent of Northern Regional Load Despatch Centre (NRLDC), Delhi, ensures integrated operation of power system in the State. The State Government notified (August 2002) that the SLDC shall be operated by the HPSEBL. The SLDC is assisted by two Area Load Despatch Centers (ALDCs) for data acquisition and supervisory control of 132 KV and 33 KV equipments. The SLDC levies and collect such fees and charges from the generating companies and licensees engaged in intra-state transmission of electricity as specified by the SERC. The performance of the Company with regard to maintenance of Grid and SLDC is discussed in the subsequent paragraphs.

Infrastructure for load monitoring

2.14.1 Remote Terminal Units/Sub-station Management Systems (RTUs/SMSs) are essential for monitoring the efficiency of the transmission system and the loads during emergency in load despatch centers as *per* the Grid norms for all Sub-stations. Audit observed that there were nine 220 KV Sub-stations and nine generators, out of which eight 220 KV Sub-stations (89 *per cent*) and only four generators (44 *per cent*) were provided with RTUs for recording real time data for efficient Energy Management System. Further, the SLDC did not have any data storage or back up facilities in RTUs installed at different locations and no steps had been taken to develop the system.

Grid discipline by frequency management

2.14.2 As *per* Grid Code, the transmission utilities are required to maintain Grid discipline for efficient functioning of the Grid. All the constituent members of the Grid are expected to maintain a system frequency between 49 and 50.5 Hertz (Hz) (49.2 and 50.3 Hz with effect from March 2009) for various reasons such as shortages in generating capacities, high demand, Grid indiscipline in maintaining load generation balance, inadequate load monitoring and management and Grid frequency going below or above the permitted frequency levels. To enforce the Grid discipline, the SLDC issues three types of violation messages (A, B, C). Message A is issued when the frequency is less than 49.2 Hz and over-drawal is more than 50 MW or

10 *per cent* of schedule whichever is less. Violation B message is issued when frequency is less than 49.2 Hz and over-drawal is between 50 and 200 MWs for more than ten minutes or 200 MW for more than five minutes. Message C (serious nature) is issued 15 minutes after the issue of message B when frequency continues to be less than 49.2 Hz and over drawal is more than 100 MW or ten *per cent* of the schedule whichever is less.

Audit observed that HPSEBL received 2 C messages in 2009-10 which increased to 4 messages during 2011-12. Thus, increase in C messages due to drawal of power at less than 49.2 Hz for more than 15 minutes put a question mark on the Grid discipline although no penalty was imposed by Central Electricity Regulatory Commission (CERC) (till March 2012).

Backing Down Instructions (BDI)

2.14.3 When the frequency exceeds the ideal limits, *i.e.*, situation where generation is more and drawal is less (at a frequency above 50 Hz) SLDC takes action by issuing BDI to the Generators to reduce the generation for ensuring the integrated Grid operations and for achieving maximum economy and efficiency in the operation of the power system in the State. Failure of the generators to follow the SLDC instructions would constitute violation of the Grid code and entail penalties not exceeding ₹ five lakh. The Company had not maintained any record of BDI issued to it telephonically, in the absence of which compliance of BDI could not be checked in audit.

Planning for power procurement

2.14.4 The Company draws up a long term supply plan taking into account the contracted generation capacity, allocation from central sector and future committed projects and evolve net additional requirement of power in the State. It also draws up a day ahead plan for assessing its day to day power requirement. The details of total requirement of the State, total power supplied and shortage of power for the five years 2007-08 to 2011-12 are given in ***Table 2.6*** below:

Table-2.6

(Figures in MUs)

Sl.No.	Details	2007-08	2008-09	2009-10	2010-11	2011-12
1	Total power requirement	7,340.94	8,041.51	8,500.87	9,691.26	9,761.48
2	Total power supplied [13]	7,189.20	8,014.50	8,322.24	9,582.91	9,694.92
3	Power short supplied	151.74	27.01	178.63	108.35	66.56
4	Percentage of shortage	2.07	0.34	2.10	1.12	0.68

13 Including generation, short and long term purchases and drawal from Central Generating Stations.

It could be seen from the above that there was shortage of power supply during the period from 2007-08 to 2011-12 ranging between 0.34 *per cent* and 2.10 *per cent*.

The gap in demand supply position also leads to variation between actual generation or actual drawal and scheduled generation or scheduled drawal which is accounted through Unscheduled Interchange (UI) charges, worked out by SLDC for each 15 minutes time block. UI charges are levied for the supply and consumption of energy in variation from the pre-committed daily schedule. This charge varies inversely with the system frequency prevailing at the time of supply/consumption. Hence, it reflects the marginal value of energy at the time of supply. The levying of UI charges acts as a commercial deterrent to curb over drawals from CGS during low frequency conditions.

The SLDC established in HPSEBL (August 2002) under Northern Region Electricity Board scheme, is responsible for scheduling generation, a day ahead load requirement on day to day basis, regulate load on different feeders, drawal from regional grid as *per* Indian Electricity Grid Code and manage/restrict the un-scheduled/overdrawal during low frequency regime on higher rates under UI mechanism. Audit noticed that the SLDC allowed drawal of 1,021.42 MUs valued at ₹ 432.49 crore under UI rates during 2007-08 to 2011-12 as details given in ***Table 2.7*** below:

Table-2.7

Particulars	2007-08	2008-09	2009-10	2010-11	2011-12
Scheduled energy (MUs)	1,416.24	783.69	1,393.06	1,222.84	1,300.35
Actual Drawal (MUs)	1,587.65	867.94	1,673.50	1,480.67	1,527.84
Excess Drawal (MUs)	171.41	84.25	280.44	257.83	227.49
UI Charges (₹ in crore)	82.45	48.91	124.95	90.35	85.83
Average *per* unit UI Rate in ₹	4.81	5.81	4.46	3.50	3.77

The Company neither resorted to load scheduling/shedding of Industrial Large Supply Consumers to avoid Un-scheduled drawal of energy during low frequency regime nor investigated the reasons for un-realistic a day ahead scheduling despite receipt of type C messages during the year 2009-10 and 2011-12. The reasons for unscheduled drawal of power, during exit conference, were stated as low generation of power in HPSEBL power houses during winter season and floods. The reasons stated during the exit conference were not acceptable as it was due to improper planning and drawal of power in low frequency regimes.

Disaster Management

2.14.5 Disaster Management (DM) aims at mitigating the impact of a major break down on the system and restoring it in the shortest possible time. As *per* the best practices, DM should be set up by all power utilities for immediate

restoration of transmission system in the event of a major failure. It is carried out by deploying Emergency Restoration System, DG sets, vehicles, firefighting equipments, skilled and specialised manpower.

Disaster Management Centre, National Load Despatch Centre, New Delhi acts as a Central Control Room in case of disasters. As a part of DM programme, mock drill for starting up generating stations during black start[14] operation had been done by the Company only during January and February 2012.

Inadequate facilities for Disaster Management

2.14.6 The SLDC identified 13 major generating stations (having installed capacity of 5 MW and above) owned by the Company in the State. Out of these, black start facility was available only in Andhra Power House (16.96 MW) in Shimla district and commissioning of DG set at Bhabha Power House (120 MW commissioned during 1989) in Kinnaur district was in progress (March 2012).

Energy Accounting and Audit

2.15 Energy accounting and audit is necessary to assess and reduce the transmission losses. The transmission losses are calculated from the Meter Reading Instrument (MRI) readings obtained from Generation to Transmission (GT) and Transmission to Distribution (TD) Boundary metering points.

As on 31 March 2012, out of six GT points test checked under three divisions[15], in two cases meters of same accuracy class (0.2 in one case and 0.5 in one case) were provided at generating Sub-stations and Transmission sub-stations, whereas in other four cases meters of different accuracy classes (0.2 and 0.5 in two cases and 0.5 and 0.2 in two cases) were provided.

In addition, out of 12 TD points test checked, in six cases meters of same accuracy classes (0.2 in 4 cases and 0.5 in 2 cases) were installed, whereas in remaining six cases meters of different accuracy classes (ranging between 0.2 and 0.5) at sending and receiving ends had been installed. Further, analysis of data for the period 2007-08 to 2011-12 of five[16] divisions with ten feeders indicated existence of high percentage of losses in six feeders ranging between 4.03 and 6.88 *per cent.* Also, five feeders had inaccurate/defective meters and negative losses ranging between 0.76 and 7.07 *per cent* were noticed. It was also noticed that the negative losses were due to usage of different class of meters at input and output points and replacement of meters without compatibility to CTs and PTs resulted in un-realistic working of energy accounting and transmission losses.

14 The procedure necessary to recover from partial or a total black out.
15 Electrical System Divisions: Bilaspur, Mandi and Totu.
16 Electrical System Divisions: Hamirpur, Nahan, Totu, Bilaspur and Mandi.

Financial Management

2.16 One of the major objectives of the NEP, 2005 was ensuring financial turnaround and commercial viability of Power Sector. The financial position of both HPSEBL for the period from 2007-08 to 2011-12 and HPPTCL for the period from 2008-09 to 2011-12 is indicated in ***Table-2.8*** below:

Table-2.8

(₹ in crore)

	HPSEBL[17]					HPPTCL			
Particulars	**2007-08**	**2008-09**	**2009-10**	**2010-11[18]**	**2011-12[18]**	**2008-09**	**2009-10**	**2010-11**	**2011-12**
A. Liabilities									
Paid up Capital	334.00	372.23	971.78	971.78	971.78	11.00	56.70	116.70	166.70
Reserves & Surplus (including Capital Grants)	1,333.86	1,530.08	1,775.68	2,471.58	2,706.60	-	-	-	-
Borrowings (Loan Funds)	2,300.27	1,940.39	2,234.26	3,680.14	4,177.79	1.50	0.44	-	-
Security Deposit of consumers				228.50	243.57			-	-
Current Liabilities & Provisions (CL)	2,423.12	3,049.60	3,391.70	2,245.29	2,733.98	2.81	1.57	2.27	8.77
Total	**6,391.25**	**6,892.30**	**8,373.42**	**9,597.29**	**1,0833.72**	**15.31**	**58.71**	**118.97**	**175.47**
B. Assets									
Gross Block	3,564.76	4,271.34	4,644.54	4,713.68	5,293.85	0.28	0.63	1.01	6.49
Less: Depreciation	552.91	649.56	754.91	889.14	1,082.42	0.04	0.20	0.45	0.57
Net Fixed Assets	3,011.85	3,621.78	3,889.63	3,824.54	4,211.43	0.24	0.43	0.56	5.92
Capital Works-in-Progress (CWIP)	1,098.53	997.78	1,040.28	1,266.78	1,266.08	3.94	8.27	11.97	15.47
Deferred cost	104.81	135.72	129.22	128.20	125.34	-	-	-	-
Investments	815.66	1,121.04	1,907.56	2,126.71	2,233.03	-	-	-	-
Current Assets, oans and Advances (CA)	1,091.80	779.56	1,017.80	1,350.01	1,584.19	10.86	48.05	101.46	149.99
Miscellaneous expenditure	5.93	6.06	5.75	6.90	6.97	-	-	-	-
Accumulated losses	262.67	230.36	383.18	894.15	1406.68	0.27	1.96	4.98	4.09
Total	**6,391.25**	**6,892.30**	**8,373.42**	**9,597.29**	**1,0833.72**	**15.31**	**58.71**	**118.97**	**175.47**
Debt equity ratio	6.89:1	5.21:1	2.30:1	3.79:1	4.30:1	0.14:1	0.01:1	-	-
Interest (net of IDC[19] capitalised)	72.99	75.39	76.81	85.57	391.96	-	-	-	-
Total return	152.09	204.58	23.39	(-) 249.11	(-) 278.86	-	-	-	-
Capital Employed	2,779.06	2,349.52	2,556.01	4,196.04	4,327.72	12.23	55.18	111.72	162.61
Percentage return on Capital Employed	5.47	8.70	0.94	(-)5.94	(-)6.44	-	-	-	-

It may be seen from the above that the accumulated loss of the HPSEBL increased by 435.53 *per cent* from ₹ 262.67 crore in 2007-08 to ₹ 1,406.68 crore in 2011-12 (Provisional). The Company's borrowings stood at ₹ 4,177.79 crore as at March 2012. Further, debt equity ratio of HPSEBL decreased from 6.89:1 (2007-08) to 4.30:1 (2011-12) due to increase of equity

17 As the HPSEBL is carrying out all the three activities (Generation, Transmission and Distribution) and consolidated figures are given in the accounts, hence no separate figures for transmission activity could be ascertained.

18 Provisional figures (un-audited accounts).

19 Interest during construction.

from ₹ 334 crore (2007-08) to ₹ 971.78 crore (2011-12). Percentage of Return on Capital employed decreased from 5.47 in 2007-08 to (-) 6.44 in 2011-12 due to increase in Current Liabilities from ₹ 2,423.12 crore (2007-08) to ₹ 2,733.98 crore (2011-12).

The cases of losses/non-recovery/short recovery/irregular expenditure noticed in audit are discussed below:

2.16.1 Sub Regulation 8 of Expenditure Regulations (April 2005) stipulates that the applicant shall, before the commencement of work, deposit 100 *per cent* payment on notice of demand. Audit observed that the utility released/enhanced load (2008 to 2011) to 12 consumers without obtaining 100 *per cent* cost share based on Rural Electrification Corporation (REC) cost data plus departmental charges resulting in non-recovery of ₹ 17.12 crore (worked out on actual expenditure *per* KVA/MVA) as detailed in **Appendix 2.3**.

2.16.2 HPSEBL awarded (April 2011) the contract for construction of (supply of material and erection *etc*) 66/11 KV, 1x20 MVA Sub-station at Batolikalan (Nalagarh) under the deposit head on behalf of Himachal Urban Development Authority (HIMUDA) on receipt of partial deposit of ₹ 5.40 crore against the estimated cost of ₹ 10.57 crore. The remaining amount of ₹ 5.17 crore was still outstanding.

2.16.3 State Level Window Clearance and Managing Agency (SLSWC & MA) of the State Government approved (May 2008) the release of 15 MVA additional load to the consumer (M/s JPAL Cement Plant at Bagga) from 220 KV Sub-station, Kunihar at the cost of the consumer. The Extra High Voltage (EHV) committee of HPSEBL decided (August 2009) that the consumer would construct the 220 KV line from Kunihar to Rauri *etc.* on equal sharing basis between the consumer and HPSEBL in contravention of the decision of the State Government. As a result, HPSEBL shared the avoidable 50 *per cent* liability of ₹ 15.93 crore and extended undue benefit to the consumer.

2.16.4 The HPPTCL released an amount of ₹ 1.10 crore as interest bearing advance in May 2010 to the contractor for construction of 220 KV D/C Palchan - AD Hydro Switch yard transmission line. The advance was to be recovered at the rate of 20 *per cent* from each bill of the contractor. But the Company could recover only ₹ 33.17 lakh and balance amount of ₹ 76.83 lakh has not been recovered since June 2010 due to abandonment of the work and non submission of any bill by the Contractor. Thus, the total recoverable amount works out to ₹ 93.73 lakh including interest of ₹ 16.90 lakh (June 2010 to March 2012).

2.16.5 The work for construction of EHV lines and Sub-stations from the coming up hydel projects was entrusted by HPSEBL to HPPTCL. Against the sanctioned strength of 33 incumbents of certain categories, 57 officers/officials had been posted (April 2010) on secondment basis from HPSEBL for which no justification was found on record. Resultantly, the HPPTCL had incurred irregular expenditure of ₹ 2.11 crore on salaries of 24 incumbents deployed in excess of sanctioned posts up to March 2012.

2.16.6 The details of working results like revenue realisation, net surplus/loss and earnings/cost *per* unit are given in ***Table 2.9*** below:

Table-2.9

(₹ in crore)

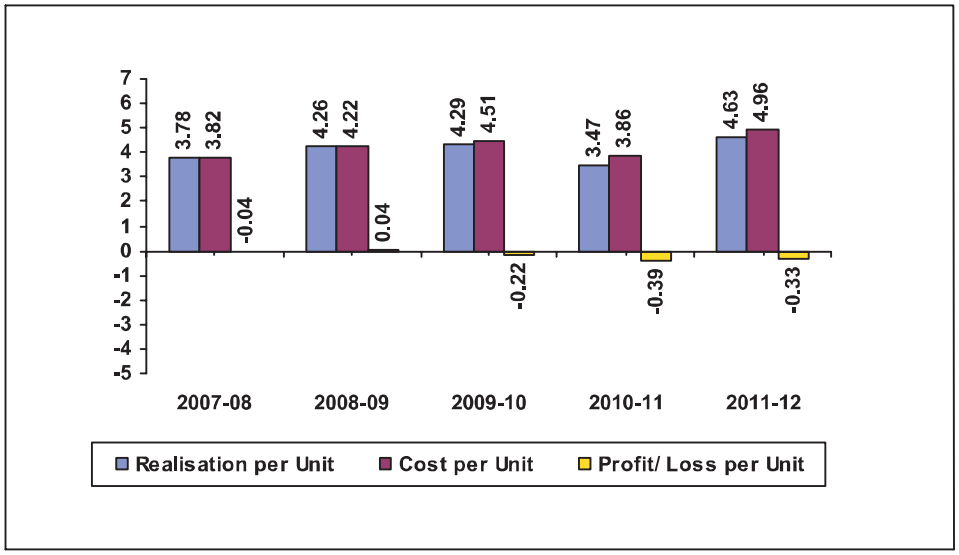
		HPSEBL					HPPTCL			
Sl.No	**Description**	**2007-08**	**2008-09**	**2009-10**	**2010-11[20]**	**2011-12[20]**	**2008-09**	**2009-10**	**2010-11**	**2011-12[20]**
1	**Income**									
	Revenue	2,139.50	2,813.37	2,838.35	2,914.60	3,818.03	-	-	-	-
	Other income including interest/subsidy	212.98	152.69	210.39	76.60	125.60	2.16	1.32	3.84	10.28
	Total Income	**2,352.48**	**2,966.06**	**3,048.74**	**2,991.20**	**3,943.63**	**2.16**	**1.32**	**3.84**	**10.28**
2	**Transmission**									
(a)	Installed capacity (MVA)	2,481.30	2,641.50	2,750.50	2,966.00	2,997.00				
(b)	Power received from generation units (MUs[21]	1,763.43	1,967.01	1,705.89	1,933.72	1,905.63				
(c)	Power purchased (MUs)	5,425.76	6,047.50	6,616.35	7,649.19	7,789.29				
	Total	**7,189.19**	**8,014.51**	**8,322.24**	**9,582.91**	**9,694.92**				
(d)	Loss in transmission & distribution (MUs)	972.14	1,055.79	1,223.89	968.94	1,179.32				
(e)	**Net power (Sold) transmitted (b)+(c)-(d) in MUs**	**6,217.05**	**6,958.72**	**7,098.35**	**8,613.97**	**8,515.60**				
3	**Expenditure**									
(a)	**Fixed cost**									
(i)	Employees cost	547.96	612.77	729.64	724.48	1027.65	0.24	2.28	4.56	6.18
(ii)	Administrative and General Expenses	31.38	49.34	48.31	39.84	44.46	0.10	0.62	1.83	2.40
(iii)	Depreciation	87.99	96.96	105.53	110.44	193.42	0.04	0.17	0.25	0.25
(iv)	Interest and Finance charges (net after capitalisation)	177.47	172.25	176.21	141.59	248.14	-	-	-	-
(v)	Other Expenses	(-) 21.95[22]	20.86	(-) 60.17[22]	1.36	0.15	-	-	-	-
	Total fixed cost	**822.85**	**952.18**	**999.52**	**1017.71**	**1513.82**	**0.38**	**3.07**	**6.64**	**8.83**
(b)	**Variable cost -** Repairs & Maintenance	1,555.01	1,981.57	2,202.04	2,309.85	2,711.58	-	-	-	-
(c)	**Total cost 3 (a) + 3 (b)**	2,377.86	2,933.75	3,201.56	3,327.56	4,225.40	0.38	3.07	6.64	8.83
4	Net profit/Loss (1-3)	(25.38)	32.31	(152.82)	(336.36)	(281.77)	1.78	(-) 1.75	(-) 2.80	1.45
5	Realisation (₹ *per* unit)	3.78	4.26	4.29	3.47	4.63				
6	Fixed cost (₹ *per* unit)	1.32	1.37	1.41	1.18	1.78				
7	Variable cost (₹ *per* unit)	2.50	2.85	3.10	2.68	3.18				
8	Total cost (₹ *per* unit) (6+7)	3.82	4.22	4.51	3.86	4.96				
9	Contribution (₹ *per* unit) (5-7)	1.28	1.41	1.19	0.79	1.45				
10	Profit (+)/Loss(-) (5-8) (₹ *per* unit)	(-) 0.04	0.04	(-) 0.22	(-) 0.39	(-) 0.33				
11	Surplus (+)/Deficit (-) Profit/loss *per* unit x Net power sold x 10	(-)24.87	27.83	(-)156.16	(-)335.94	(-)281.01				

20 Provisional figures (un-audited accounts).
21 Including generation of private generating units.
22 The figures are negative due to prior period adjustment.

It may be seen from the above that the realisation *per* unit though increased from ₹ 3.78 to ₹ 4.63 during 2007-12 (22.49 *per cent*), yet the same was, however, not sufficient to cover the cost *per* unit during the same period which increased from ₹ 3.82 to ₹ 4.96 (29.84 *per cent*) *per* unit during the same period. Further, the employees cost of ₹ 3,642.50 crore constituted the major element of cost in 2007-12, which represented 22.67 *per cent* of the total cost.

Recovery of cost of operations

2.16.7 During the last five years ending 31 March 2012, the loss *per* unit of HPSEBL was as given in the graph below:

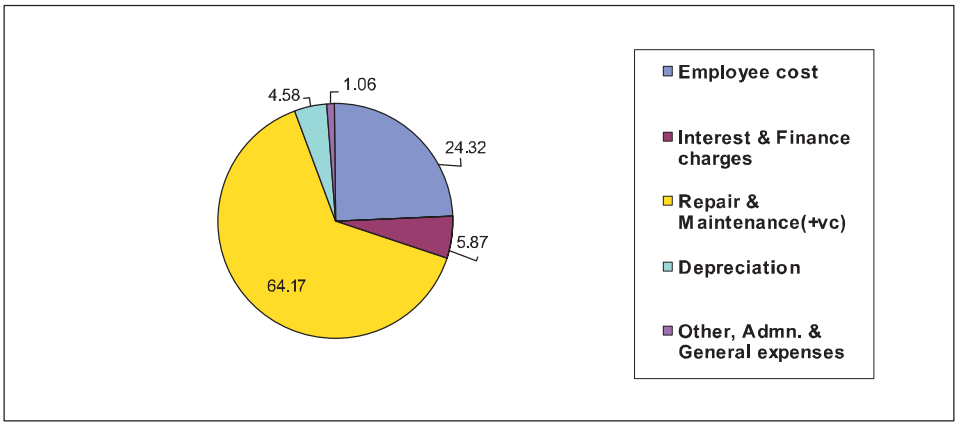


From the above graph it would be seen that there was deficit ranging between 0.04 paise and 0.39 paise *per* unit with reference to realisation and cost of power *per* unit during 2007-12, except surplus of 0.04 paise *per* unit during 2008-09, resulting in total deficit of ₹ 770.15 crore. This deficit could have been covered by reducing employee cost, interest and finance charges and ideal scheduling of drawal of power at higher rates during low frequency regime during the above period.

Elements of Cost

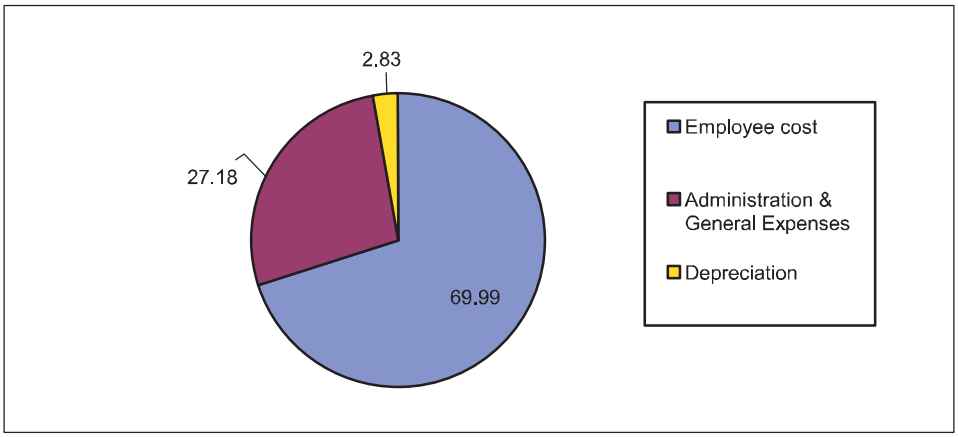
2.16.8 The percentage break-up of major elements of costs in respect of HPSEBL and HPPTCL during 2011-12 is given below:

HPSEBL



The pie chart depicts the percentage of elements of cost wherein repair and maintenance cost inclusive of purchase of power (64.17 *per cent*) and employee cost (24.32 *per cent*) were the major heads for application of funds.

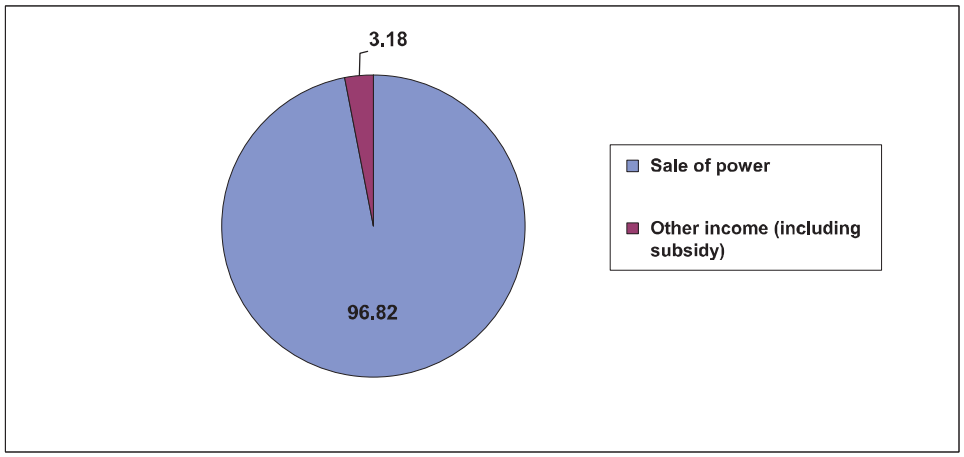
HPPTCL



The pie chart reflects that the employee cost (69.99 *per cent*) and Administration & General expenses (27.18 *per cent*) were the major elements of expenses.

Elements of revenue

2.16.9 Sale of power constitutes the major element of revenue. The HPPTCL (constituted on 27 August, 2008) is yet to start its commercial operations due to improper deployment of manpower and non creation of required infrastructure. Hence, the Company did not earned any income from transmission of power. The percentage break-up of revenue earned by HPSEBL for 2011-12 is given below in the pie chart**.**



The pie chart reflects the revenue position of HPSEBL wherein revenue from sale of power is the major source of income (96.82 *per cent*).

Collection of SLDC charges

2.16.10 The SLDC fee and Operating Charges were introduced (October 2007) by HPERC under Electricity Act, 2003. In accordance with these regulations, the fee was to be recovered annually from users based on the quantum of electricity transmitted in MWs computed on capital cost of SLDC and total contracted capacity of the user (capital cost/total contracted capacity) whereas the SLDC operation charges (Regulation 34) were to be collected/levied monthly or part thereof *per* MW. The HPSEBL had been operating SLDC in co-ordination with Power Grid Corporation of India Limited (PGCIL) since August 2002. Now, as *per* the notification issued (November 2010) by the State Government, the SLDC would be operated by Himachal Pradesh State Load Despatch Society registered (February 2011) under H.P. Societies Regulations Act, 2006. But the society had not started functioning due to staff and other constraints as of March 2012. Further, the SERC *vide* its Tariff Regulation (1,476 of October 2007) had also fixed the fee and SLDC charges with the direction to HPSEBL to prepare separate Annual Revenue Requirement (ARR) for SLDC activities, which had not been prepared so far (March 2012).

Tariff Fixation

2.16.11 The financial viability of the Company depends upon generation of surplus (including fair returns) from the operations to finance their operating needs and future capital expansion programmes by adopting prudent financial practices. Revenue collection is the main source of generation of funds for the Company. The issues relating to tariff are discussed in the subsequent paragraphs.

The tariff structure of the power transmission company is subject to revision approved by the respective SERC after the objections, if any, received against ARR petition filed by them within the stipulated dates. The Company was required to file the ARR petitions for each year 120 days before the commencement of the respective year. The SERC accepts the application filed by the Company with such modifications/conditions as may be deemed just and appropriate and after considering all suggestions and objections from public and other stakeholders. The details of due date of filing ARR petitions, actual date of filing, date of approval of tariff petition and the effective date of the revised tariff, are given in ***Table 2.10*** below:

Table-2.10

Year	Due date of filing	Actual date of filing	Delay in days	Date of approval	Effective date
2007-08	30.11.2006	30.11.2006	Nil-	16.04.2007	01.04.2007
2008-09	30.11.2007	30.11.2007	Nil-	30.05.2008	01.04.2008
2009-10	30.11.2008	30.11.2008	Nil	24.08.2009	01.09.2009
2010-11	30.11.2009	30.11.2009	Nil	10.06.2010	01.04.2010
2011-12	30.11.2010	30.11.2010	Nil	19.07.2011	01.04.2011

Though there was no delay in filing the ARR petition yet the tariff orders for the year 2008-09, 2010-11 and 2011-12 were approved after the effective date (April of each financial year) due to delayed submission of compliance report on SERC observations by HPSEBL. The late approval of tariff for these years by SERC affected the cash flow of the Company to the extent of ₹ 161.85 crore for three months (April to June).

Defective agreement for wheeling of energy

2.16.12 HPSEBL and Power Grid Corporation India Limited (PGCIL) entered into agreements (March 1999 and April 1999) with M/S Malana

Power Company Ltd. (MPCL) for purchasing/wheeling power from Nalagarh onwards through its system. HPSEBL fixed wheeling charges of ₹ 0.06 paise/unit (with in State periphery) for 12 years whereas PGCIL committed to regulate the same as *per* the rate fixed by CERC from time to time.

Audit noticed that HPSEB wheeled 14,062.77 MUs (April 2007 to October 2011) of energy of Malana HEP at the rate of ₹ 0.06 paise/unit whereas the wheeling rates fixed by SERC for wheeling energy within State during this period ranged between ₹ 0.16 paise and ₹ 0.43 paise/unit. Had HPSEBL committed to charge floating wheeling rates from MPCL on the analogy of PGCIL since the wheeling rates had been increased from time to time during the said period based on *per* unit cost of transmission of power, it could have generated extra revenue of ₹ 26.66 crore considering the differential wheeling rates from time to time.

Material Management

2.17 The key functions in material management are laying down inventory control policy, procurement of materials and disposal of obsolete inventory. The HPSEBL issued (July 2005) instructions that the material procured should be consumed within six months. In case the material remained un-utilised after six months, the value of the same should be placed in the Personal Ledger Account (PLA) of the procuring officer besides initiating disciplinary action against him.

Non-utilisation of material

2.17.1 Audit noticed that the material valued at ₹ 3.30 crore procured in seven units[23] of the utility was not utilised within six months and had been lying un-utilised for the period exceeding six months. Out of this, material valuing ₹ 2.03 crore had been lying un-utilised for more than five years. However, no action was initiated against the authorities responsible for procuring this material without requirement.

Further, line material valuing ₹ 1.88 crore procured between May 2010 and May 2011 for the construction of 220 KV Palchan-Prini Line being constructed by HPPTCL was lying un-utilised. The line could not be constructed by the Contractor due to objections raised by public. Consequently, the line route had to be shifted for which resurvey had been completed (April 2011) and the construction work of line was yet to be awarded (July 2012).

23 Electrical System Divisions: Totu, Bilaspur, Mandi, Hamirpur, Nahan, Nalagarh and Una.

Non-conducting of physical verification of stock

2.17.2 There are 11 Area Stores under the control of the HPSEBL. No physical verification (PV) of stores was conducted during 2009-10. During 2008-09 and 2010-11, PV of eight stores each and PV of five stores was conducted during 2011-12. The PV of two stores (Bhaba and Kotla) had not been conducted for the last three years. The material valued ₹ 2.10 crore was found lying un-utilised in five stores[24] for more than three years as *per* physical verification reports. Audit further observed that no action to declare the material surplus or to divert the same to other needy units was initiated so far.

Monitoring and Control

2.18 The performance of sub-stations and lines of 400/220/132 KV on various parameters like Maximum and Minimum voltage levels, breakdowns, voltage profiles should be recorded /maintained as *per* the Grid code standards.

- Audit noticed that the year-wise cumulative performance of Sub-stations and lines were neither being maintained nor consolidated for evaluation of their annual performance. However, the field divisions compile the monthly MIS reports indicating the performance of the units as well as equipments installed and forward them to Corporate Office of HPSEBL, where these reports are not being kept month-wise and year-wise for information/reference.

- The HPSEBL had not devised a centralised system to monitor the loading position of Sub-station/feeder.

- There existed no mechanism in HPSEBL to review the division-wise physical progress of various schemes from time to time so as to initiate timely action to gear-up the progress to avoid the time and cost over run.

- The HPSEBL had not developed programme for online access to its inventory to minimise the blockage therein.

- There was no shortfall in coverage of units by Internal Audit (Works Audit). However, the numbers of outstanding Inspection Reports/paras increased from 476/3960 in 2007-08 to 824/4864 in 2011-12.

24 Electrical System Divisions: Una, Hamirpur, Totu, Solan & Nalagarh.

Audit Committee

2.18.1 The HPSEBL constituted an Audit Committee (AC) in April 2010 as required under Section 292A of the Companies Act, 1956. As *per* the terms of reference, the AC should meet four times in a year. Thus, in a span of two years, the AC should have met for a minimum number of 7 times. However, the AC met only on two occasions. Further, the HPPTCL had also constituted the AC in June 2009. In a span of three years (10 quarter), the AC should have met for a minimum number of 10 times. However, the AC met only on three occasions. Further, as *per* Section 292A (5) of the Companies Act, 1956, the internal auditors should also attend all the meetings, but the same was not complied with by both the Companies in any of the meetings.

Conclusion

Various projects of the Companies were not completed within scheduled time resulting in time and cost over-run, shortfall in capacity addition, achievement of targets for reduction in losses and blockade of funds. HPSEBL had incurred huge expenditure on purchase of power under UI due to ill planning. HPSEBL failed to recover maintenance charges and expenditure incurred for the up-gradation and capacity addition from consumers. The reasons for excessive transmission losses were not investigated despite repeated instructions of SERC to spell out remedial steps for each feeder wherein losses were on higher side. Further, HPSEBL also could not comply with the orders of the regulator regarding recovery of SLDC fee/charges due to non-filing of separate ARR. The physical verification of stores of HPSEBL was not conducted regularly. Proper MIS did not exist to evaluate the execution of scheme and performance of projects. The meetings of the Audit Committee were not held regularly.

Recommendations

The Company needs to:

- review physical and financial progress of incomplete schemes periodically for remedial action to avoid time and cost overrun;
- plan a day ahead requirement of power on realistic basis so as to avoid payment of UI charges on over drawal of power;
- initiate adequate and effective steps for recovery of cost share in respect of capacity addition and operation & maintenance charges from consumers;
- install meters of matching accuracy classes at sending and receiving sub-stations to facilitate effective audit of energy losses,

- investigate the reasons for excessive transmission losses as *per* the instructions of the State Electricity Regulatory Commission for each feeder wherein losses were on higher side;

- initiate action to file separate Annual Revenue Requirement to recover State Load Despatch Centre fees and charges as fixed by the regulator.

The matter was reported to the Government/Company in September 2012; their reply was awaited (November 2012).