Chapter-4
Functioning of State Power Sector Undertakings

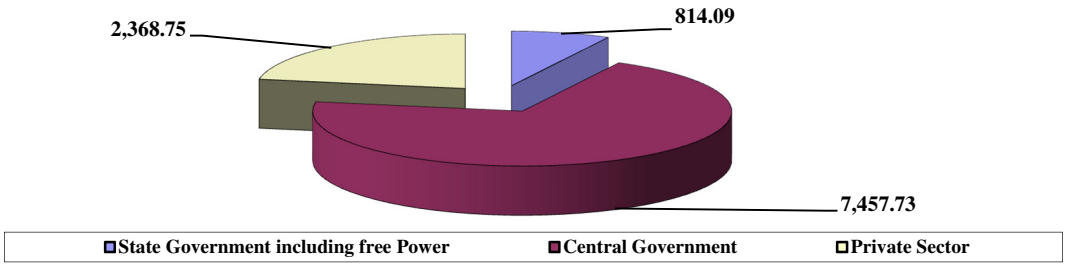
CHAPTER-4

FUNCTIONING OF STATE POWER SECTOR UNDERTAKINGS

Introduction

4.1 The Power Sector companies play an important role in the economy of the State**.** Power potential of 27,436 MW has been identified in the State, out of which 10,640.57 MW has been harnessed upto June 2020. There are four power sector undertakings (PSUs) in the State. Of these, two PSUs Himachal Pradesh Power Corporation Limited (HPPCL) and Himachal Pradesh State Electricity Board Limited (HPSEBL) are power generation Companies. Of these, HPPCL has three commissioned projects while rest of the projects are with HPSEBL as discussed in ***Paragraph 4.3***. HPSEBL is also the only State owned power distribution Company. There are four power sector undertakings (PSUs) in the State. Of these, one [8] PSU is a subsidiary of Himachal Pradesh State Electricity Board Limited (HPSEBL) for execution of 100 MW Uhl-III Hydro Electric Project (HEP) and had not commenced commercial activities until 2018-19 as the project was not commissioned. All other PSUs are active.

Chart 4.1: Share in the harnessed potential (In MWs)



During the year ended 31 March 2019 against the total electricity demand of 9,040.86 Million Units (MUs), HPSEBL was able to generate only 2,067.11 MUs and the balance of 6,973.75 MUs was received from other generating stations.

Apart from providing a critical infrastructure required for development of the State's economy, the sector also adds to the Gross Domestic Product (GDP) of the State. A ratio of Power Sector PSUs' turnover to Gross State Domestic Product (GSDP) shows the extent of activities of Power sector PSUs in the State economy. The table below provides the details of turnover of the power sector undertakings and GSDP of Himachal Pradesh for a period of five years ending March 2019.

Table 4.1: Details of turnover of power sector undertakings *vis-a-vis* GSDP of Himachal Pradesh

(₹ in crore)

Particulars	2014-15	2015-16	2016-17	2017-18	2018-19
Turnover	4,230.44	5,093.79	5,599.56	5,993.79	6325.56
GSDP of Himachal Pradesh (at actual current prices)	1,03,772	1,14,239	1,25,634	1,38,351	1,53,845
Percentage of Turnover to GSDP of Himachal Pradesh	4.08	4.46	4.46	4.33	4.11

Source: Compilation based on Turnover figures of PSUs and GSDP figures at current prices of Economic and Statistical Department of Government of Himachal Pradesh at actual current prices of the respective years for year to year comparison.

[8] Beas Valley Power Corporation.

The turnover of power sector undertakings has recorded continuous increase over previous years. The increase in turnover ranged between 5.54 *per cent* and 20.41 *per cent* during the period 2014-19, whereas increase in GSDP of Himachal Pradesh ranged between 9.97 *per cent* and 11.20 *per cent* during the same period. The compounded annual growth of GSDP was 10.34 *per cent* during last five years. The compounded annual growth is a useful method to measure growth rate over multiple time periods. Against the compounded annual growth of 10.34 *per cent* of the GSDP, the turnover of power sector undertakings recorded higher compounded annual growth of 10.58 *per cent* during last five years. This resulted in increase in share of turnover of these power sector undertakings to the GSDP from 4.08 *per cent* in 2014-15 to 4.11 *per cent* in 2018-19.

The State owned power Generation/Distribution Company (HPSEBL) was incurring continuous losses in its operations since inception. The power distribution utility was burdened by accumulated losses of ₹ 2,092.86 crore at the end of the financial year 31 March 2019. It also had debts of ₹ 8,367.04 crore as on 31 March 2019. The Ministry of Power (MoP), Government of India launched (20 November 2015) Ujjwal Discom Assurance Yojna (UDAY), a scheme for operational and financial turnaround of State owned Power Distribution Company. The provisions of UDAY and status of implementation of the scheme by HPSEBL are also discussed in this Chapter.

4.2 Power demand, availability and supply position in the State

The peak demand for power, its availability and share through State's own power distribution utility, the Himachal Pradesh State Electricity Board Limited (HPSEBL), during 2014-15 to 2018-19 is given in the table below:

Table 4.2: Details of Power Generation by HPSEBL

Year	Peak demand (in MW)	Availability of Power (in MW)	Total power Supply (in MUs)	Installed Capacity of HPSEBL (in MW)	Power Supplied by HPSEBL (in MUs)	HPSEBL's share in total supply (in *per cent*)
2014-15	1,422	1,422	8,728	487.45	1,982	23
2015-16	1,488	1,488	8,758	487.45	1,455	17
2016-17	1,499	1,499	8,779	487.45	1,491	17
2017-18	1,594	1,594	9,345	487.45	1,837	20
2018-19	1,700	1,700	9,618	487.45	1,956	20

Source: Load Generation Balance Reports of CEA and Annual Accounts of HPSEBL.

The State was able to meet its peak demand through tied up agreements (Power Purchase Agreements), purchase and drawl of power under unscheduled interchange (UI)[9] through power grid. Also, HPSEBL's share in total power supply in the State remained almost static due to no increase in its installed capacity to match the increase in demand. Overall Himachal Pradesh was a power surplus State, however, the State power distribution company (HPSEBL) was power deficit as of 31 March 2019.

4.3 Restructuring / Formation of Power Sector Undertakings

Unbundling of Electricity Boards was envisaged in the Electricity Act, 2003 to segregate the generation, transmission and distribution activities for making these as separate accounting centers.

[9] Actual drawal minus total scheduled drawal.

Pursuant to Electricity Act, 2003, the Government of Himachal Pradesh constituted three companies *viz.,*Himachal Pradesh Power Corporation Limited (HPPCL) during 2006-07 by infusing equity of ₹ 79.71 crore, Himachal Pradesh Power Transmission Corporation Limited (HPPTCL) by infusing equity of ₹ three crore in 2008-09 and Himachal Pradesh State Electricity Board Limited (HPSEBL) during December 2009.

The State Government formulated (June 2010) the Himachal Pradesh Power Sector Reforms Transfer Scheme 2010 (HPPSRT Scheme 2010) for unbundling of Himachal Pradesh State Electricity Board (HPSEB) and transfer of assets, properties, liabilities, obligations, proceedings and personnel of HPSEB to Himachal Pradesh State Electricity Board Limited (HPSEBL). The Company came into existence *w.e.f.* 10 June 2010 and all the assets and liabilities of HPSEB were transferred to the newly created Company according to the provisions of the Himachal Pradesh Power Sector Reforms Transfer (HPPSRT) Scheme 2010.

Another Power Sector company namely Beas Valley Power Corporation Limited (BVPCL) was incorporated during 2002-03, as a subsidiary of the HPSEB (now of HPSEBL) for execution of 100 MW Uhl-III HEP.

Thus, there were four Power Sector companies in the State as on 31 March 2019. Of these, Beas Valley Power Corporation Limited had not commenced commercial activities till 2018-19.

According to the reform scheme, 26 hydroelectric power projects having total generating installed capacity of 479.350 MW along with distribution activities were to be maintained by HPSEBL and only six new hydroelectric projects having generating capacity of 986 MW were transferred to HPPCL for construction. In addition, the HPSEBL had two projects of 110 MW capacity under execution out of which one project of 10 MW was commissioned during 2014. The State Government has also allotted four new hydroelectric projects having total installed capacity of 70.50 MW to HPSEBL for construction in April 2013.

According to the HPPSRT Scheme 2010, all assets and liabilities relating to transmission lines (not being essential part of distribution system or the dedicated lines from existing or future HEPs of HPSEBL) shall stand vested / transferred to HPPTCL. Accordingly, 14 existing transmission lines of 66 KV and above (278.860 Circuit Kilometers / one *per cent* of total) were transferred to HPPTCL during 2009-11.

Thus HPSEBL is still managing / operating all of its existing generating and transmission network except a negligible one *per cent* of transmission lines, along with distribution activities. Therefore, the very purpose of unbundling of the Board (i.e. to segregate the generation, transmission and distribution activities for making these as accounting centers) in true spirit as envisaged in Electricity Act, 2003 has not been achieved.

Disinvestment, restructuring and privatisation of Power Sector Undertakings

4.4 During the year 2018-19, no disinvestment, restructuring or privatisation in Power sector was done by the State government in these PSUs.

The activity-wise summary of investment in the Power Sector undertakings as on 31 March 2019 is given in table 4.3:

Table 4.3: Activity-wise investment in power sector undertakings

Activity	Number of Government Undertakings	Investment (₹ in crore)						
		Equity		Long term loans		Grants / Subsidy from GoHP	Total	
		GoHP	Others	GoHP	Others		GoHP	Others
Generation of Power (HPPCL)	1	609.64	1,405.92	2,388.97	142.45	-	2,998.61	1,548.37
Transmission of Power (HPPTCL)	1	326.45	-	1,079.19	66.61	-	1,405.64	66.61
Distribution of Power (HPSEBL)	1	720.57	-	2,925.66	2,000.36	771.68	4,417.91	2,000.36
Other[10](BVPCL)	1	-	300.00	-	933.40	-	-	1,233.40
Total	**4**	**1,656.66**	**1,705.92**	**6,393.82**	**3,142.82**	**771.68**	**8,822.16**	**4,848.74**

Source: Compiled based on information received from PSUs Grants / Subsidy from only GoHP were considered.

As on 31 March 2019, the total investment (equity, long term loans and grants/subsidy) in four power sector undertakings was ₹ 13,670.90 crore. The investment consisted of 24.60 *per cent* towards equity, 69.76 *per cent* in long-term loans and 5.64 *per cent* towards grants / subsidy.

The long term loans advanced by the State Government constituted 67.04 *per cent* (₹ 6,393.82 crore) of the total long term loans whereas 32.96 *per cent* (₹ 3,142.82 crore) of the total long term loans were availed from other financial institutions viz., Power Finance Corporation, Rural Electricity Corporation and nationalised Banks. However, during 2016-17, the State Government has taken over ₹ 2,890.50 crore (75 *per cent*) of the outstanding debts (₹ 3,854 crore).

Budgetary Support to Power Sector Undertakings

4.5 The Government of Himachal Pradesh (GoHP) provides financial support to power sector undertakings in various forms through annual budget. The summarised details of budgetary outgo towards equity, loans, grants/subsidies, loans written off and loans converted into equity during the year in respect of Power Sector undertakings for the last three years ending March 2019 are as follows:

Table-4.4: Details of budgetary support to power sector undertakings during last three years

(₹ in crore)

Particulars[11]	2016-17		2017-18		2018-19	
	Number of PSUs	Amount	Number of PSUs	Amount	Number of PSUs	Amount
Equity Capital (i)	2	69.51	3	182.11	3	250.00
Loans given (ii)	1	3,010.50	1	262.68	1	365.00
Grants/Subsidy[12] provided (iii)	-	-	1	6.00	2	24.00
Total Outgo (i+ii+iii)	**-**	**3,080.01**	**-**	**450.79**	**-**	**639.00**
Loan repayment written off	-	-	-	-	-	-
Loans converted into equity	-	-	-	-	-	-
Guarantees issued during the year	-	-	-	-	-	-
Guarantee Commitment/ Outstanding	1	3,760.25	1	3,715.50	-	-

Source: Compiled based on information received from PSUs.

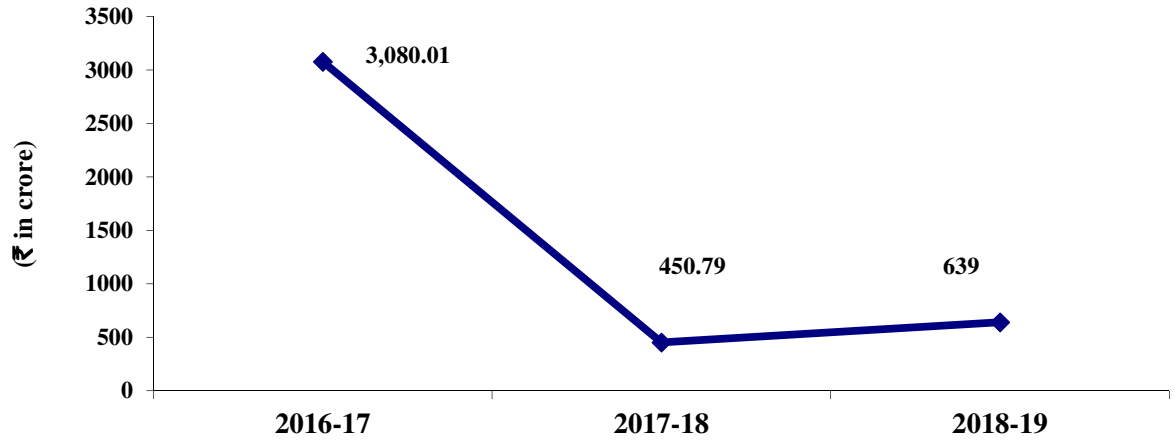
[10] Subsidiary of HPSEBL created for construction of Uhl-III HEP.

[11] Amount represents outgo from State Budget only.

[12] Grant represents Tariff roll back subsidy from State Government received by the HPSEBL on account of difference of rate between rates fixed by the regulator and rates fixed by the State Government for domestic consumers.

The details of budgetary support towards equity, loans and grants/ subsidies for the last three years ending March 2019 are given in a chart 4.2:

Chart 4.2: Budgetary support towards Equity, Loans and Grants/Subsidies



The budgetary assistance received by these PSUs during the year ranged between ₹ 450.79 crore and ₹ 3,080.01 crore during the period 2016-17 to 2018-19. In 2018-19 increase in budgetary support over the year 2017-18 was due to release of ₹ 274.00 crore to HPSEBL, HPPCL and HPPTCL in the shape of equity and grant / subsidies and ₹ 365.00 crore to HPPTCL as loans.

In order to enable PSUs to obtain financial assistance from Banks and financial institutions, the State Government provides guarantee and charges guarantee fee upto one *per cent*.

Reconciliation with the Finance Accounts of the Government of Himachal Pradesh

4.6 The figures in respect of equity, loans and guarantees outstanding as per records of State PSUs should agree with that of the figures appearing in the Finance Accounts of the Government of Himachal Pradesh. In case the figures do not agree, the concerned PSUs and the Finance Department should carry out reconciliation of the accounts. There were differences in equity and loans as on 31 March 2019 as given in table 4.5:

Table 4.5: Loans outstanding as per Finance Accounts vis-à-vis records of power sector undertakings

(₹ in crore)

Outstanding in respect of	Amount as per Finance Accounts	Amount as per records of State PSUs	Difference
Equity	1,615.35	1,656.66	41.31
Loans	6,597.07	6,394.12	202.95

Source: Compiled based on information received from PSUs and Finance Accounts (Statement no. 18 and 19).

The differences between the figures are persisting for the last many years. The issue of reconciliation of differences was also taken up by the Principal Accountant General (Audit) with the PSUs/ Departments from time to time.

It is recommended that the State Government and the PSUs should reconcile the differences in a time-bound manner.

Submission of accounts by Power Sector Undertakings

4.7 *Timeliness in preparation of accounts by Power Sector Undertakings*

There were four power sector undertakings under the audit purview of CAG as of 31 March 2019. Accounts for the year 2018-19 were not submitted by any of these working PSUs by 30 September 2019 as per the statutory requirement. Details of arrears in submission of accounts of power sector undertakings as on 30 September of each financial year, for the last five years ending 31 March 2019 are given in table 4.6:

Table 4.6: Position relating to submission of accounts of Power Sector Undertakings

Sl. No.	Particulars	2014-15	2015-16	2016-17	2017-18	2018-19
1.	Number of PSUs	4	4	4	4	4
2.	Number of accounts submitted during the year	3	4	4	3	4
3.	Number of PSUs which finalised accounts during the year	-	-	-	-	-
4.	Number of previous year accounts finalised during the year	3	4	4	3	4
5.	Number of PSUs with arrears in accounts	4	4	4	4	4
6.	Number of accounts in arrears	5	5	5	6	6
7.	Extent of arrears	Two years	Two years	Two years	Two years	Two years

Source: Compiled based on accounts of working PSUs received during the period October 2018 to September 2019

The four working State PSUs finalised four annual accounts for previous years (two accounts for 2016-17 and two accounts for 2017-18) during the period 1 October 2018 to 30 September 2019. The Administrative Departments have the responsibility to oversee the activities of these entities and to ensure that the accounts are finalised and adopted by these PSUs within the stipulated period.

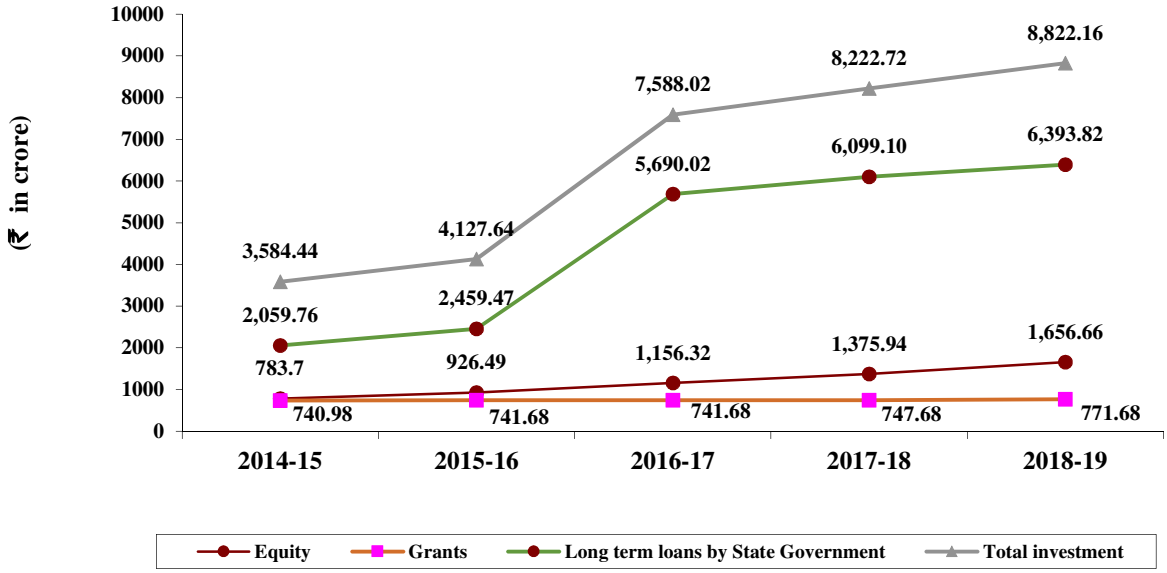
Performance of Power Sector Undertakings

4.8 The financial position and working results of four power sector companies are detailed in ***Appendix 4.1*** as per their latest finalised accounts as of 30 September 2019.

The Public Sector Undertakings are expected to yield reasonable return on investment made by the Government in them. The GoHP has an investment of ₹ 8,822.16 crore as on 31 March 2019 in the three Power Sector Undertakings only consisting of equity of ₹ 1,656.66 crore, long term loans of ₹ 6,393.82 crore and grants/subsidy of ₹ 771.68 crore. The increase in loans in the year 2016-17 was mainly due to loan of ₹ 2,890.50 crore of HPSEBL taken over by the GoHP under UDAY scheme.

The year wise status of investment of the GoHP in the form of equity, long term loans and grants/subsidy in the power sector PSUs, during the period 2014-15 to 2018-19 is given in chart 4.3:

Chart 4.3: Total investment of GoHP in power sector undertakings



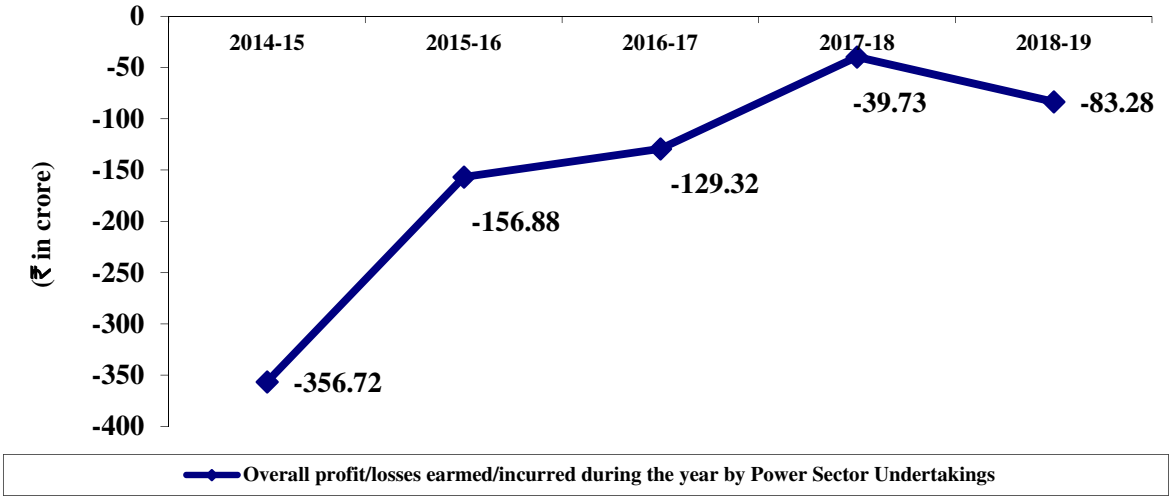
The total investment of the GoHP in the power sector had increased 2.46 times during the period from 2014-15 to 2018-19 as shown in the chart 4.3.

The profitability of a company is traditionally assessed through return on investment, return on capital employed and return of equity. Return on investment measures the profit or loss made in a year relating to the amount of money invested and is expressed as a percentage of net profit to total investment. Return on capital employed is a financial ratio that measures the Company's profitability and the efficiency with which its capital is used.

Return on Investment (ROI)

4.9 Return on investment is the percentage of profit or loss to the total investment. The overall position of Profit/losses [13] earned/incurred by all the power sector undertakings during 2014-15 to 2018-19 is depicted in chart 4.4:

Chart 4.4: Profit/Losses earned/incurred by Power Sector Undertakings



[13] Figures are as per the latest finalised accounts during the respective years.

- The loss incurred by these PSUs was ₹ 83.28 crore as per accounts their latest finalised accounts up to 2018-19 (***Appendix 4.1***) against loss of ₹ 356.72 crore incurred in 2014-15. The loss in 2018-19 increased to ₹ 83.28 crore against ₹ 39.73 crore in 2017-18 due to increase in losses of HPSEBL and HPPCL as compared to the previous year.
- The main reason for overall decrease in losses was grant of financial package in the form of grants-in-aid / subsidy by the State Government.

Position of Power Sector Undertakings which earned/incurred profit/loss during 2014-15 to 2018-19 is given in table 4.7:

Table 4.7: Power Sector Undertakings which earned/incurred profit/loss during 2014-15 to 2018-19 as per their latest finalised accounts

Financial year	Total PSUs in power sector	Number of PSUs which earned profits	Number of PSUs which incurred loss	Number of PSUs which had not prepared their Profit and Loss account during the year
2014-15	4	1	2	1
2015-16	4	1	2	1
2016-17	4	1	2	1
2017-18	4	-	3	1
2018-19	4	-	3	1

Source: Information as per latest finalised accounts.

Return on the basis of historical cost of investment

4.10 Out of four Power Sector undertakings of the State, the State Government infused funds in the form of equity, loans and grants / subsidies in three Power Sector undertakings only. The State Government did not infuse any direct funds in one company (BVPCL). The entire equity of the company which is subsidiary of HPSEBL was contributed by the concerned holding company.

The investment of the State Government in the three Power Sector Undertakings was ₹ 1,656.66 crore consisting of equity only. The grants / subsidies released to HPSEBL were on account of tariff roll back subsidy[14] and not for Operational and Administrative Expenses (O and AE).

The return on investment on historical cost basis for the period 2014-15 to 2018-19 is as given in table 4.8:

Table 4.8: Return on State Government Investment on historical cost basis

Financial year	Funds infused by the GoHP in form of Equity on historical cost basis *(₹in crore)*	Total Earnings/ Losses *(₹ in crore)*	Return on Investment (in *per cent)*
2014-15	784.21	-356.72	-45.49
2015-16	926.99	-156.88	-16.92
2016-17	1,156.80	-129.32	-11.18
2017-18	1,376.44	-39.73	-2.89
2018-19	1,656.66	-83.28	-5.03

Source: Statistical Information received from PSUs and latest finalised accounts.

The return on investment of the four power sector PSUs ranged between -45.49 *per cent* to -2.89 *per cent* during 2014-15 to 2018-19. The ROI has improved over the

14 Difference of rate between the rates fixed by the regulator and the State Government for domestic consumers.

years due to reduction in Aggregate Technical and Commercial (AT and C) losses and infusion of funds by the GoHP under UDAY scheme.

Present Value of Investment

4.11 In view of the significant investment by the Government in the three Power Sector companies, Rate of Real Return (RORR) is essential from the perspective of the State Government. Traditional calculation of ROI based only on historical cost of investment may not be a correct indicator of the adequacy of the return on the investment since such calculations ignore the Present Value (PV) of money. Therefore, in addition, RORR is calculated considering the Present Value (PV) of investment.

To bring the historical cost of investments to its present value at the end of each year up to 31 March 2019, the past investments / year-wise funds infused by the GoHP in the State PSUs have been compounded at the year-wise average rate of interest on Government borrowings which is considered as the minimum cost of funds to the Government, for the concerned year. Therefore, PV of the State Government investment in the shape of equity (no interest free loans or grants / subsidies for operational and administrative expenditure was received) since inception of these companies till 31 March 2019 was computed.

In calculating the PV of the State Government investment in Power Sector undertakings, the following assumptions were made:

- Where interest free loans were given to the PSUs and later converted into equity, the amount of loan converted into equity has been deducted from the amount of interest free loans and added to the equity of that year.
- The average rate of interest on Government borrowings for the concerned financial year[15] was adopted as compounded rate for arriving at the Present Value since these represent the cost incurred by the Government towards investment of funds for the year and therefore considered as the minimum expected rate of return on investments made by the Government.

For the period 2014-15 to 2018-19 when the four companies incurred losses, a more appropriate measure of performance is the erosion of net worth due to the losses. The erosion of net worth of the companies is commented upon in Paragraph 4.13.

Rate of real Return (RORR) on the basis of Present Value of Investment

4.12 The Company wise position of State Government investment in the three power sector companies in the form of equity and loans since inception of these companies till 31 March 2019 is indicated in ***Appendix 4.2***. The consolidated position of the PV of the State Government investment relating to the three power sector companies since inception of these companies, till 31 March 2019 is indicated in table 4.9:

[15] The average rate of interest on Government borrowings was adopted from the Reports of the Comptroller and Auditor General of India on State Finances (Government of Himachal Pradesh) for the concerned year wherein the calculation for the average rate for interest paid = Interest Payment/ [(Amount of previous year's Fiscal Liabilities + Current year's Fiscal Liabilities)/2]*100.

Table 4.9: Year-wise details of investment by the State Government and present value (PV) of Government funds from 2007-08 to 2018-19

(₹ in crore)

Year	Present value of total investment at the beginning of the year	Equity infused by the State Government during the year	Net Interest free loans given by the State Government during the year	Interest free loans converted into equity during the year	Grants/ subsidies given by State Government for operational and administrative expenditure	Disinvestment by the State Government during the year at face value	Total investment during the year (vii=ii+iii-iv+v-vi)	Total investment at the end of the year (viii=i+vii)	Average rate of interest on Government borrowings (in %)	Present value of total investment at the end of the year (x={viii*(1+ix)/100})	Minimum expected return to recover cost of funds for the year xi={viii*ix/100}	Total earnings for the year[16]
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)
2007-08	-	79.71	-	-	-	-	79.71	79.71	9.09	86.96	7.25	-
2008-09	86.96	252.32	-	-	-	-	252.32	339.28	9.19	370.46	31.18	-
2009-10	370.46	186.31	-	-	-	-	186.31	556.77	8.59	604.59	47.83	-
2010-11	604.59	532.29	-	-	-	-	532.29	1,136.88	7.78	1,225.33	88.45	-152.62
2011-12	1,225.33	91.80	-	-	-	537.15	445.35	779.98	7.80	840.82	60.84	-152.62
2012-13	840.82	185.04	-	-	-	-	185.04	1,025.86	8.08	1,108.75	82.89	-315.94
2013-14	1,108.75	292.42	-	-	-	-	292.42	1,401.17	7.71	1,509.20	108.03	-512.76
2014-15	1,509.20	251.46	-	-	-	550.00	-298.54	1,210.66	7.91	1,306.42	95.72	-356.72
2015-16	1,306.42	142.79	-	-	-	-	142.79	1,449.21	7.95	1,564.42	115.17	-156.88
2016-17	1,930.60	229.81	-	-	-	-	229.81	1,794.23	7.60	1,930.60	136.32	-129.32
2017-18	1,564.42	219.64	-	-	-	-	219.64	2,150.24	7.71	2,316.02	165.73	-39.73
2018-19	2,316.02	250.00	-	-	-	-	250.00	2,566.02	8.32	2,779.51	213.49	-83.28
		1,626.44[17]										

Source: Statistical information received from PSUs and latest finalised accounts.

Note: No grant/ subsidy was received from the State Government for operational and administrative expenditure.

The balance of investment of the State Government in these three companies at the end of the year increased to ₹ 1,626.44 crore in 2018-19 from ₹ 79.71 crore in 2007-08 as the State Government made further investments in shape of equity (₹ 1,546.73 crore). The PV of investments of the State Government up to 31 March 2019 worked out to ₹ 2,779.51 crore. The rate of real return for the year 2018-19 was (-) 3*per cent*.

It could be seen that total earnings of the companies remained negative during 2010-11 to 2018-19, which indicates that instead of generating returns on the invested funds, these companies did not even recover the cost of funds.

Erosion of Net worth

4.13 Net worth means the sum total of the paid-up capital and free reserves and surplus minus accumulated losses and deferred revenue expenditure. Essentially it is a measure of what an entity is worth to the owners. A negative net worth indicates that the entire investment by the owners has been wiped out by accumulated losses and deferred revenue expenditure. The accumulated losses of the four Power Sector Undertakings were ₹ 2,092.86 crore as against the capital investment of ₹ 2,910.63 crore resulting in net worth of ₹ 817.77 crore (***Appendix 4.1***). Of the four Power Sector Undertakings, the net worth was eroded completely in HPSEBL (₹ -1,390.57 crore).

[16] Total Earning for the year depicts total of net earnings (profit/loss) for the concerned year relating to those three Power Sector PSUs where funds were infused by State government.

[17] After adjusting disinvestment of ₹ 1,087.15 crore made during 2011-12 and 2014-15.

The following table indicates paid up capital, accumulated profit / loss and net worth of the three Power Sector Undertakings during the period 2014-15 to 2018-19 where the State Government has made direct investment:

Table 4.10: Net worth of four Power Sector Undertakings during 2014-15 to 2017-18

(₹ in crore)

Year	Paid up Capital at end of the year	Accumulated Profit (+)/ Loss (-) at end of the year	Deferred revenue Expenditure	Net worth
2014-15	1,810.01	-1,755.07	120.98	-66.04
2015-16	2,091.14	-1,920.33	116.20	287.01
2016-17	2,377.69	-2,049.65	115.53	212.51
2017-18	2,447.21	-2,064.03	-	383.18
2018-19	2,610.63	-2,092.86	-	517.77

Source: Information as per latest finalised accounts of PSUs.

The State Government continued to provide financial support to these three Power Sector companies by infusing equity during the period 2014-19 to improve their liquidity and for capital works. However, despite infusion of substantial capital, the accumulated losses of these power companies increased from ₹ 1,755.07 crore in 2014-15 to ₹ 2,092.86 crore in 2018-19.

Out of three PSUs, during 2014-15 to 2018-19, net worth of one[18] PSU was negative and two[19] PSUs showed positive net worth.

Dividend Payout

4.14 The State Government had decided (April 2011) that all profit making PSUs should pay a minimum return of five *per cent* on the paid up share capital contributed by the State Government, subject to a ceiling of 50 *per cent* of the profit after tax. However, as per their latest finalised accounts received during the year 2018-19, none of the PSUs had earned profit.

Return on Equity

4.15 Return on Equity (ROE) is a measure of financial performance to assess how effectively the Management is using the Company's assets to create profits and is calculated by dividing net income (i.e. net profit after taxes) by shareholders' fund. It is expressed as a percentage and can be calculated for any company if net income and shareholders' fund are both positive numbers.

Shareholders' fund of a Company is calculated by adding paid up capital and free reserves net of accumulated losses and deferred revenue expenditure and reveals how much would be left for a company's stakeholders if all assets were sold and all debts paid. A positive shareholders fund reveals that the company has enough assets to cover its liabilities, while a negative shareholder equity means that liabilities exceed assets.

[18] Himachal Pradesh State Electricity Board Limited.
[19] Himachal Pradesh Power Corporation Limited, Himachal Pradesh Power Transmission Corporation Limited.

Return on Equity has been computed in respect of four power sector undertakings. The details of shareholders fund and ROE relating to these four Power Sector undertakings, during the period from 2014-15 to 2018-19, are given in table 4.11:

Table 4.11: Return on Equity relating to four Power Sector Undertakings

Year	Net Income/ total Earnings for the year[20] (₹ in crore)	Shareholders' Fund (₹ in crore)	ROE (%)
2014-15	-356.72	-356.72	-
2015-16	-156.88	-156.88	-
2016-17	-129.32	512.51	-
2017-18	-39.73	683.18	-
2018-19	-83.28	817.77	-

Source: Information as per latest finalised accounts of PSUs.

As can be seen from the above table, the Net Income was negative during 2014-15 to 2018-19. Since the Net Income for all the years were negative, ROE in respect of these PSUs could not be worked out.

Return on Capital Employed

4.16 Return on Capital Employed (ROCE) is a ratio that measures a Company's profitability and the efficiency with which its capital is employed.

ROCE is calculated by dividing a Company's earnings before interest and taxes (EBIT) by the Capital Employed[21]. The details of ROCE of all the four power sector undertakings during the period from 2014-15 to 2018-19 are given in table 4.12:

Table 4.12: Return on Capital Employed

Year	EBIT	Capital Employed	ROCE
	(₹ in crore)		(In per cent)
2014-15	-356.72	6,045.75	-5.90
2015-16	-156.88	7,348.83	-2.13
2016-17	-128.29	6,341.71	-2.02
2017-18	-39.73	7,174.49	-0.55
2018-19	-84.58	9,184.81	-0.92

Source: Information as per latest finalised accounts of PSUs.

The ROCE of the Power Sector Undertakings ranged between -0.55 *per cent* and -5.90 *per cent* during the period 2014-15 to 2018-19.

Analysis of Long term loans of the Companies

4.17 The analysis of the long term loans of the Companies during 2014-15 to 2018-19 was carried out to assess the ability of the companies to service the debt owed by the Companies to Government, Banks and other financial institutions. This is assessed through the Interest Coverage Ratio (ICR) and Debt Turnover Ratio.

[20] As per the latest finalised annual accounts.

[21] Capital employed = Paid up share capital + free reserves and surplus + long term loans – accumulated losses - deferred revenue expenditure. Figures are as per the latest finalised accounts

Interest Coverage Ratio

4.18 Interest Coverage Ratio is used to determine the ability of a Company to pay interest on outstanding debt and is calculated by dividing a company's earnings before interest and taxes (EBIT) by interest expenses of the same period. The lower the ratio, the lesser the ability of the company to pay interest on debt. An interest coverage ratio of below one indicates that the Company was not generating sufficient revenues to meet its expenses on interest. The details of interest coverage ratio in those Power Sector Companies which had interest burden during the period from 2014-15 to 2018-19, are given in table 4.13:

Table 4.13: Interest coverage ratio

Year	Interest	Earnings before interest and tax (EBIT)	PSUs having liability of loans from Government and Banks and other financial institutions	Companies having interest coverage ratio more than 1	Companies having interest coverage ratio less than 1
	(₹ in crore)		(In numbers)		
2014-15	455.37	-356.72	4	-	4
2015-16	573.38	-156.88	4	-	4
2016-17	535.52	-128.29	4	-	4
2017-18	518.55	-39.73	4	-	4
2018-19	503.35	-84.58	4	-	4

Source: Information as per latest finalised accounts of PSUs.

It was observed that none of Power Sector Companies had Interest Coverage Ratio of more than one during 2014-15 to 2018-19.

Debt-Turnover Ratio

4.19 During the last five years, the turnover of power sector undertakings recorded compounded annual growth of 10.58 *per cent* and compounded annual growth of debt was 7.95 *per cent* due to which the Debt-Turnover Ratio improved from 1.46 in 2014-15 to 1.32 in 2018-19, as given in table 4.14:

Table 4.14: Debt Turnover ratio relating to the Power Sector undertakings

(₹ in crore)

Particulars	2014-15	2015-16	2016-17	2017-18	2018-19
Debt from Government and others (Banks and Financial Institutions)	6,160.88	4,957.69	5,829.20	6,491.31	8,367.04
Turnover	4,230.44	5,093.79	5,599.56	5,993.79	6,325.56
Debt-Turnover Ratio	1.46:1	0.97:1	1.04:1	1.08:1	1.32:1

Source: Compiled based on latest finalised accounts during the year.

Assistance under Ujwal DISCOM Assurance Yojana (UDAY)

4.20 The Ministry of Power (MoP), Government of India launched (20 November 2015) Ujwal DISCOM Assurance Yojana (UDAY Scheme) for operational and financial turnaround of State owned Power Distribution Companies (DISCOMs). As per the provisions of the Scheme, the participating States were required to undertake measures for achieving operational and financial turnaround of DISCOMs:

Measures for financial turnaround

(A) The State was required to take over 75 *per cent* of DISCOMs debt by 2016-17. The scheme for financial turnaround, *inter alia*, provided that:

- State will issue *Non Statutory Liquidity Ratio* (non-SLR) bonds and the proceeds realised from issue of such bonds shall be transferred to the DISCOMs which in turn shall discharge the corresponding amount of Banks / Financial Institutions (FIs) debt. The bonds so issued will have a maturity period of 10-15 years with a moratorium on repayment of principal upto five years.
- Debt of DISCOM will be taken over in the priority of debt already due, followed by debt with higher cost.
- The transfer of proceeds to the DISCOM by the State in 2016-17 will be as a loan which will be converted into 75 *per cent* grant and 25 *per cent* equity during 2020-21, subject to achievement of certain targets by the State DISCOM.

Measures for improving operational efficiency

(B) The participating States were required to undertake various targeted activities like compulsory feeder and distribution transformer (DT) metering, smart metering of all consumers consuming above 200 units per month, Demand Side Management (DSM) by providing LED for domestic and other category consumers, undertaking consumer awareness programs for optimum utilization of resources and replace at least 10 *per cent* of existing agriculture pumps with energy efficient pumps. The timeline prescribed for these targeted activities were also required to be followed, so as to ensure achievement of the targeted benefits *viz.* ability to track losses at feeder and DT level, identification of loss making areas, reduce technical losses and minimize outages, reduce power theft and enhance public participation for reducing theft, reduce peak load and energy consumption *etc.* The outcomes of operational improvements were to be measured through indicators *viz.* reduction of AT and C loss to12.75 *per cent* in 2018-19 as per loss reduction trajectory finalised by the MoP and States, reduction in gap between average cost of supply and average revenue realised to zero by 2018-19.

Implementation of UDAY Scheme

4.20.1 The status of implementation of the UDAY Scheme is detailed below:

A. Financial Turnaround

The Government of Himachal Pradesh (GoHP) conveyed (18 August 2016) its *'in principle'* consent to the MoP, GoI to take benefit of the UDAY Scheme. Thereafter, tripartite Memorandum of Understanding (MoU) was signed on 8 December 2016 between the MoP, the GoHP and State DISCOM (HPSEBL). As per provisions of UDAY Scheme and tripartite MoU, out of total outstanding debt (₹ 3,854 crore) pertaining to the State DISCOM as on 15 September 2015, the GoHP took over total debt of ₹ 2,890.50 crore during 2016-17 by taking over the loan as detailed in table 4.15:

Table 4.15: Implementation of UDAY Scheme

(₹ in crore)

Year	Equity Investment	Loan	Subsidy	Total
2015-16	--	--	--	--
2016-17	--	2,890.50	--	2,890.50
Total	**--**	**2,890.50**	**--**	**2,890.50**
2017-18	--	--	--	--
Position as on 31-03-2019	**--**	**2,890.50**	**--**	**2,890.50**

Source: Statistical information received from PSUs.

The amount of ₹ 2,890.50 crore which was provided by way of interest bearing loans under UDAY Scheme, is to be converted into 75 *per cent* grant and 25 *per cent* equity during 2020-21.

B. Achievement of operational parameters

The achievements *vis-a-vis* targets under UDAY Scheme regarding different operational parameters relating to the State DISCOM is given in table 4.16:

Table 4.16: Parameter wise achievements *vis-a-vis* targets of operational performance upto 30 September 2019

Parameter of UDAY Scheme	Target under UDAY Scheme	Progress under UDAY Scheme	Achievement (in %)
Feeder metering (in Nos.)	Meters already installed		
Metering at Distribution Transformers (in Nos.)	-	-	-
Urban	Meters already installed		
Rural	12,499	865	6.92
Rural Feeder Audit (in Nos.)	Energy Audit already being done		
Electricity to unconnected household (in lakh Nos.)	0.18	0.69	383
Distribution of LED UJALA (in lakh Nos.)	Already distributed		
AT and C Losses (in %)	12.75	11.59	100
ACS-ARR[22] Gap (₹ per unit)	-0.05	-0.01	100

Source: State Health Card under UDAY Scheme as per website of the MoP, GoI.

The performance of the State has been excellent in energy audit of rural feeders, electricity to unconnected households and in most important target of reduction in AT and C losses and reduction in ACS-ARR gap but it performed poorly in metering of DTs in rural areas.

The DISCOM paid interest of ₹ 474.54 crore, for the period February 2017 to March 2019, on the loans given by the GoHP under UDAY Scheme to discharge the loan liability due to other financial institutions and banks. The loans were extended by the GoHP at rates of interest ranging between 7.49 and 8.19 *per cent per annum.*

Comments on Accounts of Power Sector Undertakings

4.21 Four Power Sector Companies forwarded their audited accounts to the Principal Accountant General (Audit), Himachal Pradesh during the period from 1 October 2018 to 30 September 2019. All the accounts were subjected to supplementary audit. The Audit Reports of Statutory Auditors and supplementary audit conducted by the Comptroller and Auditor General of India indicated that the quality of accounts needs to be improved substantially. The details of aggregate money value of the comments of Statutory Auditors and the Comptroller and Auditor General of India, for the accounts are as follows:

Table 4.17: Impact of audit comments on Power Sector Companies

(₹ in crore)

Sl. No.	Particulars	2016-17		2017-18		2018-19	
		No. of accounts	Amount	No. of accounts	Amount	No. of accounts	Amount
1.	Decrease in profit	1	3.27	-	-	-	-
2.	Increase in profit	-	-	-	-	-	
3.	Increase in loss	2	21.16	2	24.98	3	19.64
4.	Decrease in loss	-	-	-	-	-	-
5.	Non-disclosure of material facts (Nos.)	-	-	-	-	3	4

Source: Compiled from comments of the Statutory Auditors/ Comptroller and Auditor General of India.

During the year 2018-19, the Statutory Auditors had issued qualified certificates on three accounts and disclaimer on one account. Compliance to the Accounting Standards by the PSUs remained poor as the Statutory Auditors pointed out four instances of non-compliance to the Accounting Standards in one accounts.

[22] Average Cost of Supply (ACS)- Average Revenue Realised (ARR).

Compliance Audit Paragraphs

4.22 For Chapter-4 of the Report of the Comptroller and Auditor General of India for the year ended 31 March 2019, four compliance audit paragraphs relating to Power Sector undertakings were issued to the Principal Secretary of Energy Department, GoHP between August 2019 and May 2020 with request to furnish replies within two weeks. The replies received have been suitably incorporated in this Report. The total financial impact of the audit paragraphs is ₹ 421.69 crore.

Follow up action on Audit Reports

4.23 The Report of the Comptroller and Auditor General of India is the product of audit oversight. It is, therefore, necessary that these elicit appropriate and timely response from the executive. The Finance Department, Government of Himachal Pradesh issued (February 1994) instructions to all Administrative Departments to submit replies / explanatory notes to paragraphs / performance audits included in the Reports of the CAG of India within a period of three months of their presentation to the Legislature, in the prescribed format, without waiting for any questionnaires from the Committee on Public Undertakings (COPU). The Department of Energy, GoHP has forwarded all the explanatory notes for the paragraphs contained in the Audit Reports.

Discussion of Audit Reports by the Committee on Public Undertakings

4.24 The status of discussion of Performance Audits and paragraphs that appeared in Audit Reports (PSUs) by the Committee on Public Undertakings as on 30 September 2019 is mentioned in table 4.18.

Table 4.18: Performance Audits/Paragraphs of Power Sector appeared in Audit Reports vis-a-vis discussed as on 30 September 2019

Period of Audit Report	Number of Performance Audits/Paragraphs			
	Appeared in Audit Report		Paragraphs discussed	
	Performance Audit	Paragraphs	Performance Audit	Paragraphs
2011-12	1	5	1	1
2012-13	2	5	1	3
2013-14	1	5	1	5
2014-15	1	9	-	1
2015-16	-	9	-	2
2016-17	1	9	-	2
2017-18	1	4	-	-

Source: Compiled based on the discussions of COPU on the Audit Reports.

The discussion on Audit Reports (PSUs) up to 2010-11 has been completed.

Compliance to Reports of the Committee on Public Undertakings

4.25 Action Taken Notes (ATNs) on four reports of the Committee on Public Undertakings presented to the State Legislature in March 2018 and February 2019 had not been received (31 March 2020) relating to the State PSUs (other than Power Sector) as indicated in table 4.19:

Table 4.19: Compliance to COPU Reports

Year of the COPU Report	Total number of Reports of COPU	Total number of recommendation in COPU Reports	Number of recommendations where ATNs not received
2014-15	7	42	39
2015-16	4	17	13
2016-17	3	50	50
2017-18	3	60	60
2018-19	4	32	32

Source: Compiled based on ATNs received on recommendations of COPU from the respective Departments of GoHP.

The ATN in respect of recommendations of the Committee on Public Undertakings shown above had not been received, till March 2020.

Compliance Audit Paragraphs

This section has four compliance audit paragraphs having a financial implication of ₹ 421.69 crore.

Himachal Pradesh State Electricity Board Limited

4.26 "Operation, Maintenance and Repair of Hydro Electric Projects"

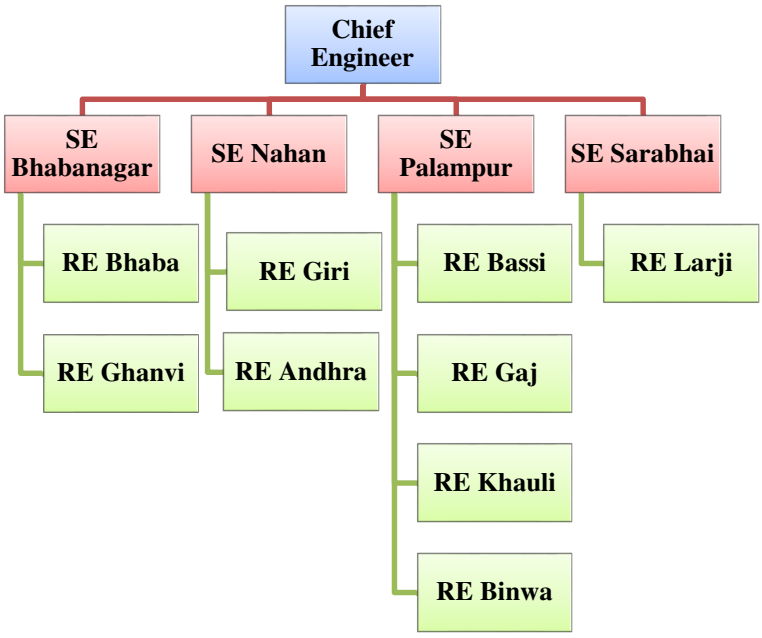
4.26.1 Introduction

The Himachal Pradesh State Electricity Board was constituted in 1971 in accordance with the Electricity (Supply) Act, 1948. It was reorganised as Himachal Pradesh State Electricity Board Limited (Company) in 2010.

As on 31 March 2019, the Company had 22 Hydro Electric Projects (HEPs) with total installed capacity of 487.45 MW (***Appendix 4.3***). Power Generation from these projects during 2016-19 is shown in the table alongside.

Table-4.20: Power Generation

Year	Power Generation (Million Units (MUs))
2016-17	1,598.01
2017-18	1,941.32
2018-19	2,060.16



SE : Superintending Enginner, RE : Resident Engineer

The HEPs are maintained by the Generation wing which is entrusted with their Planning, renovation / modernisation, and operation and maintenance. The wing is headed by the Chief Engineer (Generation) with a team at field level as shown in the organisational chart.

An audit was undertaken to assess the effectiveness of processes in the Company of operation, execution and monitoring of the maintenance and repair of the projects and to assess whether the Company was able to optimize generation with available resources. The audit covered the activities of the period from April 2016 to March 2019. Based on utilisation of water for generation, HEPs can be broadly categorised as Reservoir based projects and run of the river projects[23]

[23] (i) Run of the river project: A power station utilizing the run of the river flows for generation of power, (ii) Reservoir based projects: The water is stored through a hydroelectric dam and released for generation of electricity.

In the audit exercise, out of the 22 HEPs of the Company, seven[24] projects (Giri with reservoir and rest are run of the river projects) were selected, using Stratified Random Sampling Method, which constitute three mega, two small and two mini hydel projects. These seven projects constitute 69 *per cent* of total installed capacity and generated between 65 to 73 *per cent* of the total electricity produced by all the HEPs during 2016-17 to 2018-19. Besides the HEPs, the offices of the Chief Engineer (Generation), three[25] Generation Circles and offices of five[26] Resident Engineers (RE), looking after the selected HEPs were also covered in audit.

4.26.2 Importance of Operation and maintenance:

Good operation, maintenance and repair (O and M) practices are essential to ensure optimal performance and uninterrupted running of HEPs, failing which losses in production (direct and indirect) and higher needs for rehabilitation and equipment replacement is triggered.

The performance of the Hydroelectric power (HEP) plants has been assessed against the following benchmarks:

Indicator	Explanation	Benchmark
Generation achieved versus theoretical output (using actual hydrology)	Theoretical output is calculated keeping in view the available water and the height from which the water is received in the power house.	Should be maximum possible
Plant availability factor	The availability factor of a power plant is the amount of time that it is able to produce electricity over a certain period, divided by the amount of the time in the period.	95 *per cent*
Plant Load Factor	Plant Load Factor is a percentage of energy generated by the power plant corresponding to installed capacity/energy which it can produce in that period.	60 *per cent*
Auxiliary Consumption	The Auxiliary consumption in a HEP is the power required for operations of pumps for cooling compressors and maintenance of pressure in the power house.	0.2 *per cent*-0.7 *per cent*
Transformation losses	Transformer losses are produced by the electrical current flowing in the coils and the magnetic field alternating in the core because of the transformer winding resistance.	0.5 *per cent*
Optimal use of water	In hydel power projects, especially in case of run of the river projects, available water should be used for generation to the optimal level. As the water running in the stream, if not utilised for generation, will go waste.	Utilised to the maximum possible.
Amount of water spilled (cubic meters or *per cent* of average plant inflow)	As per Notifications issued by the State Government, during the lean season[27] 15 *per cent* of minimum inflow observed (of the main river water body whose water is being harnessed by the HEP) shall be maintained in the downstream.	15 *per cent*
Maintenance	Timely preventive Maintenance Schedules covering all vital areas and plants, the detailed Daily, Weekly, Monthly, Quarterly, Annually and Capital Maintenance Sheets should be maintained properly. Annual maintenance should be carried out during lean season.	As per Schedule

Source: Norms of Central Electricity Authority and Central Electricity Regulatory Commission

[24] Mega**:** Larji (126 MW), Bhaba (120 MW), Giri (60 MW), Small**:** Ghanvi-I (22.50 MW), Gumma (3MW), Mini**:** Rongtong (2 MW) and Rukti (1.5 MW).

[25] Bhabanagar, Nahan and Larji at Sarabhai.

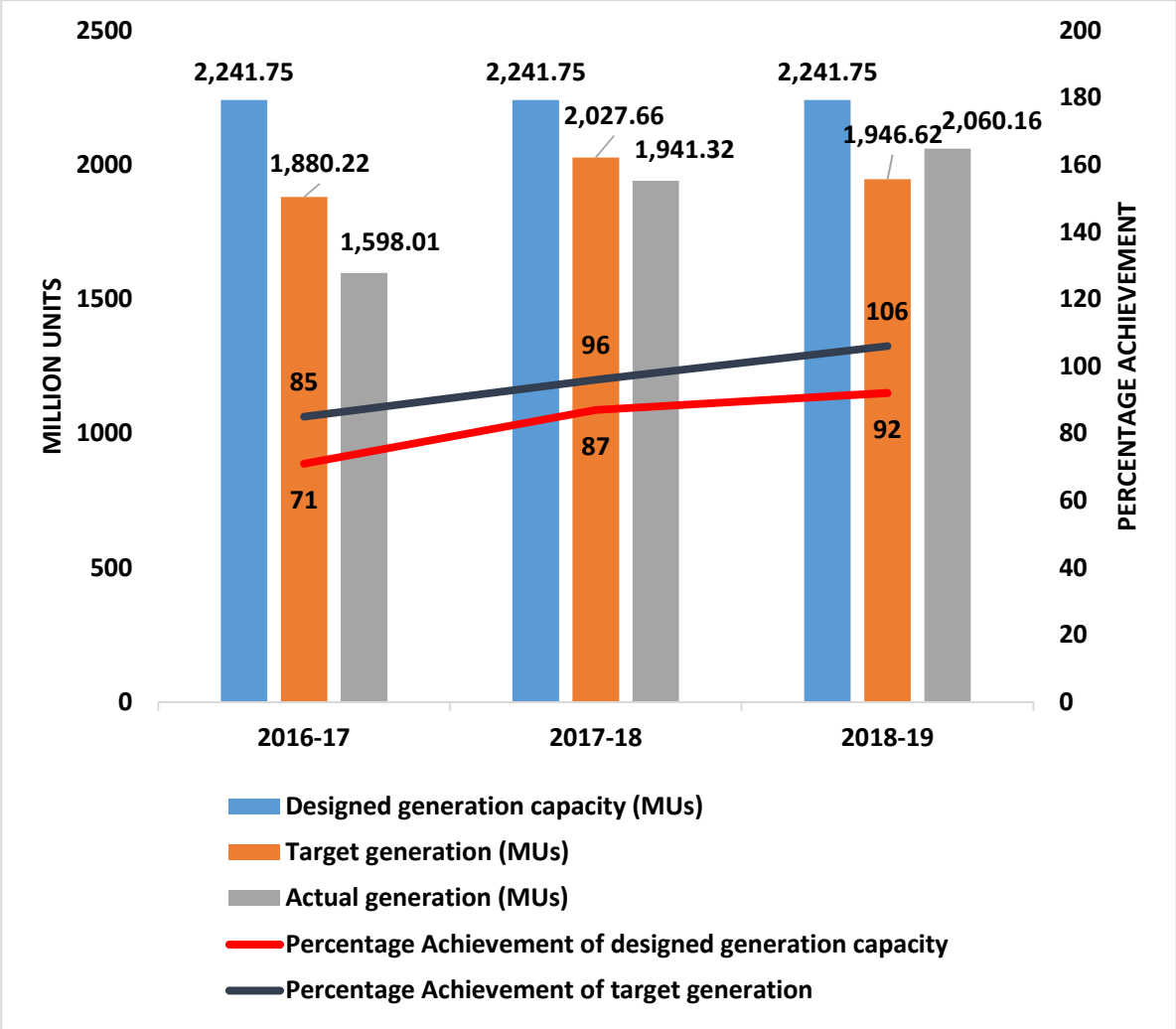
[26] Bhabanagar, Ghanvi, Giri, Andhra and Larji.

[27] The period in a year when the water availability is minimum (15 October to 15 March).

4.26.3 Performance of all HEPs at a glance

Designed capacity of all the projects of the Company was 2,241 MUs. The chart 4.5 shows year-wise actual generation against the designed capacity of 2,241 MUs and year wise targets during the period 2016-19.

Chart-4.5: Generation Data for 2016-17 to 2018-19



Source: Information supplied by the Company

There was no record available for the basis for fixation of targets for generation and the Company has not been able to achieve designed capacity in any of the years covered in audit.

The less generation in the test checked projects was mainly attributable to the following:

- Lower plant availability factor *(paragraph 4.26.5);*
- Frequent shutdown of Bhaba plant due to grid failures *{paragraph 4.26.5 (iv)};*
- Non-procurement of Trash Rack Cleaning Machine for Larji Power House (PH)*{paragraph 4.26.5 (v)};*and
- Release of excess water than the statutory provisions in Larji and Rukti HEPs *{paragraph 4.26.6 (ii)}.*

The difference between the designed capacity of HEPs and the actual generation was 1,125.76 MUs. Similarly difference between targets and the actual generation was 255.01 MUs as shown in the table 4.21:

Table 4.21: Generation Data for 2016-17 to 2018-19

Year	Designed capacity (MUs)	Targets (MUs)	Actual generation (MUs)	Difference in targets and actual (MUs)	Achievement of targets in percentage	Difference in designed and actual (MUs)
	I	ii	iii	iv = ii-iii	v	vi = i - iii
2016-17	2,241.75	1,880.22	1,598.01	282.21	84.99	643.74
2017-18	2,241.75	2,027.66	1,941.32	86.34	95.74	300.43
2018-19	2,241.75	1,946.62	2,060.16	(+) 113.54	105.83	181.59
Total	**6,725.25**	**5,854.50**	**5,599.49**	**255.01**		**1,125.76**

Source: Information supplied by the Company

4.26.4 Audit Findings

The details of expenditure incurred by the Company for operation, maintenance and repair of the HEPs during 2016-19 is given in table 4.22.

Table 4.22: Detail of O and M expenditure during the last three years

(₹ in crore)

Year	2016-17	2017-18	2018-19	Total
Operation and Maintenance (O and M) expenses	75.61	98.10	92.23	**265.94**

Even after spending ₹ 265.94 crore on O and M during the period 2016-19, avoidable lapses in the operation of the seven test checked HEPs by the Company, had resulted in generation loss of 715.64 MUs equivalent to ₹ 393.97[28] crores as discussed in subsequent sub paragraphs.

4.26.5 Plant availability factor[29] (PAF) and plant load factor[30](PLF)

The Review of Performance of Hydro Power Stations for 2017-18 published (November 2018) by Central Electricity Authority showed, All India Average PAF of hydroelectric power generating units during 2016-19 remained above 90 *percent*. The comparative plant availability factor of the seven test checked projects of HPSEBL is given in the table 4.23.

Table-4.23: PAF and PLF of test-checked Project

Name of Power House	PAF	PLF
126 MW Larji	92	54
120 MW SVP Bhaba	61	40
60 MW Giri	91	33
22.50 MW Ghanvi-I	89	42
3 MW Gumma	62	44
2 MW Rongtong	10	06
1.5 MW Rukti	57	15

The Plant Availability Factor of four (out of seven) projects, was very low (between 10 and 62 *per cent*) as compared to All India Average, This is significant for Bhaba project in view of its installed capacity of 120 MW. Moreover, Plant Availability Factor is of utmost importance in case of run of the river projects, as the water running in the river at the time of non-availability of Plant spills without generating power.

[28] Paragraph No. 4.26.5 (i) to (vii), 4.26.6 (i) to (iii), 4.26.7 (i) to (iii) and 4.26.8 (i) to (ii).

[29] The availability factor of a power plant is the amount of time that it is able to produce electricity over a certain period, divided by the amount of the time in the period.

[30] Percentage of energy sent out by the power plant corresponding to installed capacity in that period.

Similarly, the Plant Load Factor (PLF) of the seven test checked HEPs, was also below the 60 *per cent* benchmark fixed by the Central Electricity Authority. The low PLF (33 *per cent*) for the Giri project is also significant considering its installed capacity of 60 MW.

The Government stated (October 2020) that instructions have been conveyed for minimising the outages.

The low PAF and PLF was mainly due to frequent forced shutdowns at the selected HEPs due to the issues listed in table 4.24:

Table 4.24: Reasons for low PAF and PLF

Capacity/Name of the PH	Major Reasons	Para reference
126 MW (42 x3) Larji	Avoidable loss due to non-purchase of new TRCM, Annual maintenance and excess release of water.	4.26.5(v), 4.26.5(vi) and 4.26.6 (ii)
120 MW (40 x 3) SVP Bhaba	Delay in providing civil fronts for rehabilitation work, loss due to negligence of the operation and maintenance staff and grid failure.	4.26.5(i), 4.26.5(ii) 4.26.5(iv) and 4.26.6 (ii)
60 MW (30 x 2) Giri	Loss due to excessive silt and modified runner.	4.26.6(iii) and 4.26.7(iii)
22.50 MW (11.25x2) Ghanvi-I	Removal of silt, delay in award of repair work and sub optimal performance.	4.26.5(iii), 4.26.5(vii) and 4.26.6 (i)
3 MW (1.5x2) Gumma	Avoidable loss due to non-solving the problem of high speed and thrust bearing of the machines.	4.26.7(ii)
2 MW (0.5x4) Rongtong	Persisting problem even after renovation.	4.26.7(i)
1.5 MW (0.375x4) Rukti	Persisting problem even after renovation.	4.26.7 (i)

Source: Compiled from the information supplied by the Company

Shutdowns due to avoidable reasons and non initiation of timely action to undertake repair and annual maintenance activities so as to keep the production losses to the minimum, were observed in the following instances:

(i) Rehabilitation work of 120 MW Bhaba HEP

For rehabilitation of Bhaba HEP (after damage in fire in January 2015), a contract for Electro-mechanical work [31] was awarded (June 2015) to a contractor with scheduled completion period of 9 Months and 15 days. The Company was to provide a 5 Ton EOT (Electric Overhead Travelling) crane on 30 June 2015 and hand over the civil fronts to the contractor on 8 September 2015 to enable them to undertake their work.

The Company failed to provide the EOT crane and civil fronts to the contractor as per agreed schedule. The delay was due to non-coordination between civil and electrical wings of the Company. The contractor also delayed their part of work. There was overall delay of

[31] Consisting of supply and erection of 220 KV Gas Insulated Switch Gear, control and relay panels, 22 KV indoor switchgear, 415 V LT panels, 220 KV EHT cables, 22 KV HT cables, control and power cables and other associated equipment.

242 days in completion of the work, out of which 181 days' delay was on the part of the Company mainly due to delay in providing EOT crane (27 days) and handing over civil fronts (141 days) to the contractor. Sixty one days' delay was on the part of the contractor, as analysed by the Company. For the delay attributed to the contractor an amount of ₹ 92.47 lakh was recovered from the contractor as liquidated damages. Out of the total delay on the part of the Company, delay of 168 days was only due to delay in providing EOT crane and civil fronts.

The work was completed during November 2016. Due to the delay, the Company had to sustain avoidable generation loss of 398.91 MUs equivalent to ₹ 217.40 crore[32] (taking into consideration the plant load factor of the concerned months).

The Government stated (October 2020) that the civil works were delayed due to delay in award of works and delay in completion by the civil contractor.

(ii) Non-fixing of responsibility for damage of Unit-I of Bhaba HEP

In September 2016, Unit-I (40 MW) of Sanjay Vidyut Pariyojna (SVP), Bhaba, got damaged due to non-handling of the operational fault timely by the staff on duty. Investigation committee formed by the State Government to find out the cause, reported ignorance/ negligence of the maintenance staff to be the main reason.

In order to restore the Unit-I, an expenditure of ₹ 10.18 crore was incurred which was a direct loss to the Company. No responsibility was fixed despite the investigation report clearly pointing out negligence.

Thus, due to negligence of the operation and maintenance staff, SVP, Bhaba had to suffer financial loss of ₹ 10.18 crore on account of restoration cost and loss of generation of 175.68 MUs (considering only peak period generation from April 2017 to September 2017) valued at ₹ 97.50 crore[33] for which responsibility had not been fixed.

The Government stated (October 2020) that now the Company has recruited qualified helpers and posted them at Bhaba.

(iii) Award and execution of work for removal of silt at Ghanvi II HEP

With the passage of time silt accumulates in the reservoir, gradually reducing the capacity of the reservoir. To avoid generation loss, work for removal of silt from the reservoir of Ghanvi-II HEP should have been planned and executed during the lean season. Audit noticed that the award of work was delayed due to which the reservoir was filled with the silt completely even before awarding the work and power house remained under complete shutdown w.e.f. 3 August 2017 for 19 days, which resulted in generation loss of 4.56 MUs.

[32] 398.91 MUs x ₹ 5.45 per unit = ₹ 217.40 crore.
[33] 175.68 MU x ₹ 5.55 per unit = ₹ 97.50 crore.

The timelines of the work is given in table 4.25:

Table 4.25: Reasons for delay in award of work

Sl. No.	Event	Date of occurrence	Time taken (days)
1	Submission of estimate by RE	05-07-2016	-
2	Administrative approval and Expenditure sanction by CE	23-11-2016	141
3	Technical sanction by Circle office	08.12.2016	14
4	Tenders floated	10-03-2017	91
5	Submitted to CE	02.05.2017	33
6	Approved by CE	22.08.2017	111
7	Work completed	17.10.2017	-
		Total	**390**

- Though the fact of heavy accumulation of silt and consequent loss of generation was in the knowledge of the Company (July 2016), however, it took 390 days in completing the tendering process, which shows improper planning and inefficient approach.
- Had the tender been processed timely, generation loss for 19 days (before award of work), due to filling of reservoir with silt, could have been avoided.
- Further, due to delay in completion of tendering process, the work required to be done during lean seasons, was actually done during peak season, resultantly, Company had to suffer avoidable generation loss of 11.74 MUs.

Thus, due to delay in awarding the work, Company had to suffer generation loss of 16.30 MUs valued at ₹ 9.05 crore (16.30 MUs x ₹ 5.55 per unit).

In addition, the work was awarded without specifying the time for completion of each job separately. In the approved estimate (December 2016), provision for shutdown was kept for only 15 days, however, the work was completed by availing shutdown of 53 days. It is pertinent to mention here that as per sanctioned estimate 7,628.72 cubic-metre silt was to be removed in 15 days and actually 9,432.58 cubic-metre silt was removed for which only 19 day's shutdown was required. Thus, by non-specifying the time for each job separately in the award, the Company suffered generation loss of11.04 MUs valued at ₹ 6.13 crore (11.04 MUs x ₹ 5.55 per unit).

The Government stated (October 2020) that the delay in award was due to completion of all the codal formalities and attending to the various observations at different levels. The reply was not acceptable as the Company should have completed the codal formalities to ensure the execution of work during lean season and avoided generation loss.

(iv) Lack of capacity to Black Start at Bhabha and Rukti PH

Black Start capability is required to restart Hydro Electric Power station to operate in case of grid failure, without relying on external source for initial electric power. During grid failure, off-site power from the grid is not available, in such cases black start capacity is used for providing initial current to start the HEP and to bootstrap the grid into operation.

As per Indian Electricity Grid Code (IEGC), different sub-systems are required to be capable of Black Start. In this regard State Load Dispatch Society, Shimla had also intimated (28 March 2018) the Chief Engineer (CE) Generation, HPSEBL that machines of Larji and

Bhaba HEPs should be compliant to Black Start. The CE further directed the concerned Circles that whatever changes in the design or other parameters are required, may be carried out immediately for running these machines in isolation mode to make them capable of black start and for catering to the demand of local area even during grid failures. For compliance, the matter was to be taken up with the Original Equipment Manufacturer (OEM) i.e. BHEL regarding the required changes in the design or other parameters of the machines, for running these machines in isolation mode. However, any further action taken by the concerned authorities was not found on record till the date of audit (June 2019).

It was further observed that, Bhaba Power House (PH) remained under forced shut down for a total period of 205 Machine hours and Rukti PH remained under forced shut down for 23,955 Machine hours[34] on different occasions due to grid failure. During grid failure, Rukti PH was being run on lower load to cater to the local demand. But, Bhaba PH was not being run in isolation, although earlier there was a system existing for running the project in isolation mode, for which 10 MVA Station Transformer had been installed. The 10 MVA station transformer at Bhaba was installed to cater to the local demand in addition to the power requirement of 4 MVA for auxiliary[35], but due to non-maintenance of that system and damage of 10 MVA transformer during 1992, the project could not be run in isolation mode, due to absence of black start capabilities, for catering to the local demand. Since the frequency of grid failure remains very high due to which plant remained under forced shut down for above mentioned periods, matter should have been taken up with the concerned authorities for doing the needful and make the local distribution system functional in isolation mode. Frequent grid failures and lack of capability to black start the project, resulted into loss of generation of 17.19 MUs valued at ₹ 9.64 crore[36] to the Company.

The Government stated (October 2020) that to make the Bhaba project black start compliant, the governing and excitation system of Unit-II have been installed and commissioning process is in progress. The reply may be seen in the light of the fact that the project functioned without Black Start capability for over 27 years despite having a system in place. For making the Bhaba project black start compliant, process is not completed yet and may still be adding to the period of shutdown and consequent loss.

(v) Procurement of new Trash Rack Cleaning Machine at Larji HEP

Trash Rack Cleaning Machine (TRCM) is required at intake sites of Hydro Electric Projects for removal of trash being encountered at the intake site. Otherwise trash present in the water damages the generating machines. General Mechanical Works (GMW) make TRCM installed at Barrage site of 126 MW Larji HEP was being used for removal of trash from the intake site to regulate the water for generation. During June 2015 onwards, TRCM started giving trouble.

[34] Number of hours the machine runs to generate power.

[35] Auxiliary consumption means a quantum of energy consumed by the equipment of Power House used for operation including switchyard of the Power House.

[36] 4.542 MUs x ₹ 5.45 + 8.381 MUs x ₹ 5.55 + 4.262 MUs x ₹ 5.88 = ₹ 9.64 crore.

In order to procure a new TRCM, the Project Authorities submitted (17 February 2016) estimate to the Generation Circle, Sarabai for technical sanction and budget provision of ₹ 4.50 crore was also made in the annual working Programme for the year 2016-17.

It was further observed that regarding maintenance of existing TRCM, M/s GMW Private Limited (OEM) apprised (31 May 2016) the Project Authorities that it was not possible to operate the machine any more, as further operation in its present condition would lead to repeated breakdowns and it might cause accidents. However, the proposal for purchase was not accepted (July 2016) by the Chief Engineer (Planning and Monitoring) as the machine had not covered its useful life.

Further, scrutiny showed that the new machine was not purchased as of March 2019 and the Company even after incurring ₹ 34.59 lakh on repair and maintenance of the old machine, had to suffer generation loss of 15.68 MUs valued at ₹ 8.90 crore[37] during 2016-19 due to frequent breakdown of TRCM. Had the Company incurred ₹ 4.91 crore (including installation cost) on installation of TRCM, the above loss could have been avoided.

The Government stated (October 2020) that tenders for the procurement of new TRCM have now been floated and were under process. The reply may be seen in the light of the fact that due to delay in procurement of TRCM, the Company had to suffer generation loss of ₹ 8.90 crore and further the procurement process is still underway.

(vi) Non-adherence of Annual Maintenance Schedule at Larji HEP

To run PH smoothly, its annual maintenance should be carried out regularly and to avoid generation loss, it should only be planned during the lean season.

The Resident Engineers, Larji started the maintenance of Larji PH during late lean season without considering the time required for the same. Resultantly, the same was completed after end of lean season[38] (as per DPR) for 2016-17 and 2017-18. Audit observed that had the annual maintenance of the PH started timely at the time of beginning of the lean season and completed well before the end of lean period, Company could have avoided the generation loss for 13 days valued at ₹ 2.25 crore[39] (4.04 MUs).

In addition, annual maintenance of the Ghanvi-I PH for 2018-19 was also not planned and carried out during the lean season and was actually carried out during April 2018 to May 2018, resulting into generation loss of 7.37 MUs valued at ₹ 4.33 crore[40] (taking into consideration the plant load factor of concerned months). In other test checked projects, the annual maintenance was carried out during the lean season, for the period covered under audit.

Thus, due to not carrying out maintenance during the lean season, the Company had to sustain avoidable generation loss of 11.41 MUs valued at ₹ 6.58 crore.

The Government, while admitting, stated (October 2020) that there was delay in starting the maintenance of first Unit.

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37 5.33 MUs x ₹ 5.45 + 2.87 MUs x ₹ 5.55 + 7.48 MUs x ₹ 5.88 = ₹ 8.90 crore.

38 20 October to 20 March.

39 3.75 MU x ₹ 5.55 per unit + 0.29 MUs x ₹ 5.88 per unit = ₹ 2.25 crore.

40 7.37 MUs x ₹ 5.88 per unit = ₹ 4.33 crore.

(vii) Award of repair work at Ghanvi HEP

During scrutiny of records relating to shut down data in respect of Ghanvi-I HEP (2 X 11.25 MW) for 2016-19, it was observed that PH remained under planned shut down as per details given in table 4.26:

Table 4.26: Detail of planned shutdown of Ghanvi-I during peak season

Period	Planned shutdown duration		Total Machine Hours
	Unit-I (Machine Hours)	Unit-II (Machine Hours)	
April 2017	450.50	720.00	1,170.50
May 2017	630.30	472.20	1,102.50
June 2017	168.25	143.40	312.05
April 2018	0	720.00	720.00
May 2018	0	399.00	399.00
Total	**1,249.05**	**2,454.60**	**3,704.05**

From table 4.26, it can be seen that Unit-I and Unit-II remained under planned maintenance for 3,704.45 hrs during the peak season.

Main Inlet Valve (MIV) of both the units (Unit-I and Unit-II), turbine shaft, nozzles and governor of Unit-II were giving frequent trouble and required servicing/overhauling. Estimates were prepared during September 2016 for these works. Being original manufacturer of the machines, matter regarding replacement of turbine shaft and overhauling of nozzles and governor of Unit-II was taken up with BHEL, who submitted its offer on 14 September 2016. On enquiry, BHEL clarified (29 September 2016) that their scope would be limited to supervision / expert guidance and advisory work at site and completion period would depend on number of variable factors and inputs under the control of the Company. Thereafter, the Company took three months in awarding (28 December 2016) the work to BHEL, and the related repairing jobs were awarded by the Company to other contractors during March 2017**.** As per award, the tentative completion period of 40 days was envisaged. The work at site was started on 4 January 2017 and it took 155 days to get the work completed (7 June 2017).

Knowing that the BHEL was the original manufacturer of the machine and the work was to be done under the supervision of BHEL, the work should have been awarded more promptly. Had the Company not taken three months in awarding the work which was awarded in December 2016, the same could have been completed during first week of April 2017 (considering 155 days of actual completion) i.e. before onset of the peak season, and generation loss of 9.80 MUs (after considering the plant load factor of concerned months and lean period generation) valued at ₹ 5.44 crore[41] during 2017-18 could have been avoided.

The Government stated (October 2020) that the delay in award was due to search for the appropriate agency to execute the job. The reply is not acceptable as it was decided in September 2016 that, BHEL being the original manufacturer, should carry out the work. The Company should have expedited the award, so that the work could have been executed during the lean season and generation loss avoided.

[41] 9.80 MU x ₹ 5.55 per unit = ₹ 5.44 crore.

4.26.6 Sub optimal performance and use of available water

In HEPs, water is used for generation of power. In case HEP was being run through reservoir, the water is stored up to the capacity of the reservoir but, in case of run of the river HEPs, water once spilled without utilising the same for generation, would go waste. Keeping in view the nature of the Hydro Power, operation of the HEPs by utilising the water to the optimum is of utmost importance. Keeping reservoirs silt free is also important so that ample storage is available and generation is not affected.

Instances of non-utilisation of available water optimally have been discussed in the following paragraphs:

(i) Sub optimal performance of Ghanvi-I PH

Scrutiny of discharge data of the intake of Ghanvi-I PH showed that during the lean period (December to March), when the availability of water was less, the machines were not generating power in proportion to their designed rated capacity which was required to be generated with the quantum of available water. To generate power at its full capacity, the machines consumed more water than the rated discharge. Generation did not suffer in peak season due to availability of enough water but, in lean period during 2016-19, 38.84 MUs were required to be generated (calculated on the basis of available water and designed capacity) against which only 28.77 MUs generation was achieved. This resulted in generation loss of 10.07 MUs valued at ₹ 5.49 crore (10.07 MUs x ₹ 5.45). The Company had not analysed the reasons for less generation.

The Government had accepted (October 2020) the observation.

(ii) Excess release of water at Bhabha and Larji HEPs

As per Notifications[42] issued by the State Government, during the lean season 15 *per cent* of minimum inflow observed (of the main river water body whose water is being harnessed by the HEP) shall be maintained in the downstream.

Scrutiny of discharge data of 126 MW Larji and 120 MW SVP Bhaba, revealed that water was being released in excess of these provisions. Resultantly, the Company had to suffer generation loss of 14.60 MUs valued at ₹ 8.13 crore[43].

The Government stated (October 2020) that in Bhaba, no excessive water was discharged and in Larji the radial gate at Barrage has least reading of one cm corresponding to one cusecs (cubic meter per second) of water and exact required release is not possible. The reply of Bhaba unit was not based on the facts as the unit is not considering the release of 15 *per cent* water already released from the Bhaba Augmentation Project before taking the water from its tailrace. As regards to Larji, the Company should fix the problem of excess release of water.

(iii) Reduction in Storage capacity at Giri HEP

As per the Detailed Project Report, Giri project had live storage capacity of 16,34,000 cubic meters at Maximum level of 615.65 meter and usable live storage capacity for the operation of the plant was 9,07,800 cum. Due to deposition of silt, usable live storage capacity of the

[42] Notification No. PC-F(2)-1/2005 dated 16 July 2005 and 9 September 2005.

[43] Larji 2.84 MU x ₹ 5.45 (2016-17) + 2.85MU x ₹ 5.55 (2017-18) + 2.79 MU x ₹ 5.88 (2018-19) +Bhaba 3.40 MU x ₹ 5.45 (2016-17) + 2.72 MU x ₹ 5.55 (2017-18) = ₹ 8.13 crore.

reservoir had decreased to 2,26,920 cum. Since, the water discharge becomes low in the river during the lean season, therefore, live storage capacity of reservoir plays an important role for obtaining maximum generation during the lean season. The Company had not taken any action for removal of silt from the reservoir and increase its storage.

It was observed in audit that had there been no sedimentation in the reservoir area, then 50,23,158 cum additional water could have been used for generation. Had the company planned and removed sedimentation from the reservoir area, the company could have avoided generation loss of 1.79 MUs and potential revenue of ₹ 1.01 crore (1.79 MUs x ₹ 5.62 average rate).

4.26.7 Infructuous expenditure and lack of monitoring for repair contracts

(i) Infructuous expenditure on Repair and Maintenance (R and M) of Rongtong and Rukti HEPs

To end the problems related to power supply being faced by the people living in extremely difficult conditions in the border blocks (Spiti in Lahul and Spiti district and Pooh and Kalpa in Kinnaur district) of Himachal Pradesh, the 13th Finance Commission sanctioned grant of ₹ 25 crore under Border Area Development Programme (BADP), for the improvement of electricity infrastructure. The grant was available in four equal annual instalments amounting to ₹ 6.25 crore each from 2011-12 to 2014-15.

The work, for R and M of Electro mechanical equipments of Rongtong PH, was awarded (23 July 2012) to a firm at a cost of ₹ 4.32 crore. Similarly, the work of R and M of Electro Mechanical equipments of Rukti PH was also awarded (5 December 2012) to the same firm, at a cost of ₹ 4.29 crore including taxes and duties. As per the terms of the agreement, firm was to complete the work within 20 months from the effective date i.e. by August 2014, however, barring some issues, the work was completed during June 2018 (Rukti) and August 2018 (Rongtong) i.e. with a delay of 46 months and 53 months, respectively.

It was observed that the firm not only failed to complete the work in time but, the quality/standard of work was also not up to the mark, as major repair issues could not be successfully resolved. Thus, due to poor quality of work by the firm, even after incurring an expenditure of ₹ 8.20 crore (payment released to the firm), envisaged objective of scheme regarding improvement in efficiency of the P.Hs to deliver un-interrupted and quality power to the people of border blocks of Himachal Pradesh could not be achieved. Execution of poor quality of work by the firm was a result of poor monitoring on the part of the Company, which rendered expenditure incurred under above scheme, as infructuous.

The Government stated (October 2020) that now the proposal to rescind the work has been initiated and the pending work shall be carried out at the risk and cost of the contractor.

In addition, during the execution of work of Rongtong Project, a component (sluice valve) supplied by the firm broke during mechanical run (15 June 2015). This accident led to fatal accident causing loss of three lives and unwarranted delay in execution of work. During investigation, tests for assessing the quality of the material of the component was got conducted and it was found that the manufacturing material was not fit for the envisaged pressure of water and climatic conditions at site of work. This showed that the same was not properly tested during inspection by the inspecting officer deputed for inspection. The lapse

of the inspecting officer led to such an unfortunate incident. However, no action had been taken (June 2019) against the firm or officer for supply of sub-standard material.

The Government stated (October 2020) that the failure in valve was due to casting defects and stress developed in that area, which was not observed during inspection at manufacturers works. The reply was not tenable as the inspecting officer should have checked the quality of material used for manufacturing of valve.

(ii) Lack of improvement after repairs at Gumma HEP

Both the machines of the Gumma PH were often facing problems of high temperature of thrust bearing pads of main shaft of turbine, over speeding of machines, tripping and water leakage etc. since long back (2003).

The root cause of the problem was assessed as high speed (1,500 rpm) of the runners. To overcome this problem, work for repair / rehabilitation and installation of Hydraulic Braking System of Unit-I and Unit-II was awarded to the original equipment manufacturer at a cost of ₹ 1.11 crore each, on 16 April 2015 and 21 December 2015, respectively. As per award, the agency had to carry out the work of Repair/Rehabilitation, Erection, Testing and Commissioning of units along with defect liability for six months. However, even after repairs, the problem was not solved and machines remained under breakdowns/shutdowns for 28,338 hrs leading to generation loss of 19.08 MUs with consequent revenue loss of ₹ 10.68 crore[44]. This showed lack of monitoring on the part of the Company.

(iii) Decreased generation after repair

For its Giri project, the Company purchased (1992) three modified runners[45] and three sets of stationery labyrinth from BHEL (Bharat Heavy Electrical Limited) at a cost of ₹ 3.70 crore. With the old runner, the machine could operate at 33 MW and the project with both machines had generated energy at more than 60 MW. After installation of modified runner in Unit-II, generation in the power house came down to 58.5 MW (Unit-I with old profile runner could operate at 30 MW and Unit-II with modified runner could operate at 28.5 MW only) even at full discharge level. Since, the generation was showing downward trend, therefore, new runner was got re-modified (1997) and was installed in the Generator-II. Even after re-modification, there was no improvement in generation, which showed that modified/re-modified runners were not suitably designed and there were inherent design deficiencies in these new runners. In the light of these facts it was observed that decision of the Management to procure three new modified runners in one go without testing/ensuring their efficiency was not in the interest of the Company. Besides, the corrective measure has not been taken till date resulting into avoidable expenditure on procurement of modified runners which had also resulted in generation loss. By using modified runners, the Company had to sustain generation loss of 3.86 MUs valued at ₹ 2.22 crore[46].

[44] 7.86 MUs x ₹ 5.45 (2016-17) + 5.79 MUs x ₹ 5.55 (2017-18) + 5.43 MUs x ₹ 5.88 (2018-19) = ₹ 10.68 crore.
[45] Rotating part of the turbine machine which converts rotational energy for turbine for further generating the kinetic energy.
[46] O.886 MUs x ₹ 5.45 + 0.204 MUs x ₹ 5.55 + 2.766 MUs x ₹ 5.88 = ₹ 2.22 crore.

4.26.8 Other issues

Other issues relating to the projects have been discussed below:

(i) Loss due to transformation losses beyond norms

The Central Electricity Regulatory Commission, has prescribed norms for transformation losses[47] at 0.5 *per cent* of Energy generated. An analysis of data regarding Transformation Losses for the period 2016 to 2019 in respect of five of the seven selected HEPs (except Rongtong and Rukti due to non-provision of meters) revealed that transformation losses were in excess to prescribed norms (of 0.5 *per cent*) during 2016-19 by 8.81 MUs. Excess transformation losses deprived the Company of additional units of power which otherwise would have been available for sale, resulting in loss of potential revenue to the tune of ₹ five crore[48]. These losses are recurring and will continue until remedial action is taken by the Company. Moreover, in Ghanvi-I HEP, the transformation losses were ranging between 1.47 and 1.83 *per cent* against the limit of technical losses of 0.41 *per cent* guaranteed by the supplier resulting in excess loss of 3.05 MUs. This shows that the performance of transformers purchased by the Company was not as guaranteed by the suppliers and the Company had not taken any action against the suppliers.

The Government stated (October 2020) that the detailed analysis is being done to work out the actual transformation loss. The reply was not tenable as the losses had been worked out on the basis of meters installed at power house and the same were calibrated from time to time. Thus, the calculations for the losses that have occurred are already available.

(ii) Excess auxiliary consumption

Auxiliary consumption of a power project is vital for its operations. The Auxiliary consumption in a hydro-electric PH is the power required for operations of pumps for cooling compressors and maintenance of pressure in the power house. The Central Electricity Regulatory Commission has recommended the following norms of auxiliary consumption:

(a) Surface PH with rotating exciters- 0.2% of energy generated.

(b) Surface PH with static excitation- 0.5% of energy generated.

(c) Underground PH with rotating exciters- 0.4% of energy generated.

(d) Underground PH with static excitation - 0.7% of energy generated

An analysis of generation and auxiliary data pertaining to seven selected projects for the period 2016-19, revealed that auxiliary consumption in respect of Giri, Gumma, Rukti and Rongtong PHs was in excess of the above norms by 1.42 MUs, which resulted in loss of potential revenue amounting to ₹ 79.91 lakh as detailed in ***Appendix 4.4***.

(iii) Lack of technically qualified manpower

Qualified and trained manpower is the foremost requirement in efficient and effective operations of any HEP. Following table depicts the position of technically unqualified staff in

[47] Difference of input and output energy in the transformer.

[48] 2.15 MUs x ₹ 5.45 + 2.65 MUs x ₹ 5.55 + 4.01 MUs x ₹ 5.88 = ₹ 5.00 crore.

the seven selected power houses:

Table 4.27: Detail of posting of technically unqualified staff in Power Houses

Sr. No.	Name of Power House	Staff Posted	Technically unqualified	Percentage of technically unqualified
1	126 MW Larji	65	29	45
2	120 MW SVP Bhaba	58	24	41
3	60 MW Giri	44	9	20
4	22.50 MW Ghanvi-I	48	24	50
5	3 MW Gumma	28	19	68
6	2 MW Rongtong	27	25	93
7	1.5 MW Rukti	17	6	35
	Total	**287**	**136**	**47**

From the above table it can be seen that out of 287 operational and maintenance staff deployed in the seven HEPs, 136 (i.e. 47 *per cent*) were not technically qualified as they did not have any diploma in electrical / mechanical field. Since, the nature of jobs in PH is of technical nature, therefore deployment of unqualified staff impacts the operational efficiency of the plant. The document of CEA on Best Practices (2004), provides to arrange training to Operations and Maintenance staff to refresh their knowledge and to give advanced technical information, to improve work quality and quantity. However, it was observed that no such training program was arranged regularly for Operations and Maintenance staff during the period 2016-19. The Management should engage technically qualified staff and arrange training program/refresher course for them from time to time, to enable them perform their duties in an efficient manner. The impact of deploying unqualified staff had also been discussed in the Paragraph 4.26.5 (i).

It is pertinent to mention here that the Supervisory Control and Data Acquisition (SCADA) system was installed in Larji and Ghanvi-I HEP for efficient and safe operation of different equipment. However, SCADA in both the HEPs was not being operated due to non-availability of trained staff.

The Government stated (October 2020) that now the Company is recruiting qualified staff.

(iv) Non-provisioning of adequate number of spare runners

Runner[49] is one of the vital components / equipment of Hydro Electric Plant. Therefore, availability of a healthy runner is the foremost requirement for efficient generation of power in hydroelectric plant.

The Company had not fixed any norms regarding useful life of runners. However, as per International Electro Technical Commission publication 609 for cavitation pitting evaluation in hydro turbines, the useful life of Pelton runners was 8,000 hours.

Audit noticed that in Bhaba Project there were three Pelton type Runners in operation, out of which one runner (installed in 2008 in Unit-II) had completed 42,334 hours and other two runners covered 13,582 and 16,237 hours (June 2019). In addition, three spare runners had completed 25,210 to 41,414 hours. Out of these, one was beyond repair, and other two required repairs. Thus, the PH had no functional spare runner available with it, especially when out of three runners in operation, one had completed 42,334 hrs. In case of Rukti

[49] A water turbine runner is a rotary machine that converts kinetic energy and potential energy of water into mechanical work.

Power Plant, it was observed that plant had four units of 375 KW each and was operating with same runners which were installed at the time of commissioning of the plant (1980) and did not have any spare runner.

Similarly, scrutiny of record relating to runners in 2x11.25 MW Ghanvi HEP, showed that there were three runners, out of which, two in use had covered 18,918 and 29,648 hours and one spare runner (26,688 hrs), which was removed from the Machine (16 July 2018), required major repairs (March 2019).

Non-availability of functional spare runner has put the operation of PH at risk, which may consequently result into loss of generation in case fault develops in any operative runner. The Company had not evolved any mechanism to ensure timely availability of adequate spare runners.

The Government stated (October 2020) that the scheme for procurement of additional / spare runners for Ghanvi-I has been framed and was under consideration of the Management. The reply was silent about the other HEPs. The reply may be seen in light of the fact that the HEPs are still running without adequate spare runners and no concrete action has yet been taken.

Conclusions

Significant and avoidable loss of generation occurred due to inordinate delays in awarding of contracts for rehabilitation/repair, removal of silt and procurement of equipment. On several occasions, the Company could not ensure that annual maintenance was carried out during the lean season to minimize generation loss.

The company was especially deficient in ensuring that appropriate repair was carried out by the contractors as the repaired/modified parts did not function properly even after the repairs. No action was initiated for these problems, despite faulty equipment leading to three fatalities in one instance.

Specifically, one large project i.e. Bhaba Project has been poorly managed by negligent staff resulting in damage to its machinery and poor coordination, thereby delaying the rehabilitation work leading to a high generation and corresponding revenue loss. In the Rongtong and Rukti projects, frequent breakdowns and low generation due to aging equipments**,** deprived the beneficiaries of border areas of the intended benefits of quality and uninterrupted power. In the Giri HEP, lack of silt removal has significantly reduced the storage capacity of the reservoir and affected its generation capacity.

Recommendations

The Company may consider:

- Scheduling the annual maintenance during the lean season to avoid generation loss,
- Ensuring proper contract management for timely repairs and maintenance to avoid lengthy shutdowns,
- Posting of technically qualified staff at the projects, and
- Factoring in timely replacement of aging equipment and take corrective actions to avoid generation loss.

4.27 Unauthorised use of Power

Non-levy of charges of ₹3.80 crore on a consumer for unauthorised use of power.

(A) Section 126 (1) of the Indian Electricity Act (IEA), 2003, as amended from time to time provides that, if after inspection of records maintained by any person, the assessing officer comes to the conclusion that such person is indulging in unauthorized use of electricity, he shall, provisionally assess, to the best of his judgement, the electricity charges payable by such person or by any other person benefited by such use. Further, sub-section (6) of Section 126 of the Act, *ibid*, provides that the assessment under this section shall be made at a rate equal to twice the tariff rates applicable for the relevant category.

A large supply [50] industrial consumer [51] under Electrical Sub-division, Parwanoo was sanctioned (June 1993) load of 1,248.3 KW to carry out manufacturing activities. However, in the year 2004, the consumer rented out portion of the plot by entering into an agreement with M/s Reckitt Benckiser (India) Ltd., which was not related to the original consumer, to operate and manage its activities set up at Plot no. 1 sector-3 Parwanoo, for manufacturing their products. That the matter was known by the Company is evident from a provisional notice issued during 2011 and August 2016 to the consumer by the Company under Section 126 of the Indian Electricity Act, 2003, but no further action was initiated.

Audit noticed (March 2016) that the power connection (LS-81) was still in the name of the original consumer and a part of the sanctioned load was being used for manufacturing activities by the tenant, without the permission of the competent authority, which was unauthorised. As per IEA[52] the distribution / sale of power is allowed only to the authorised licensee and any other person / body is not allowed resale of power. Thus, a separate meter / connection was required to be taken by M/s Reckitt Benckiser.

It was confirmed from the website of M/s Reckitt Benckiser, that it has registered its unit at Parwanoo, which is situated in Plot No. 1 (A) Sector-3 Parwanoo, rented out by the consumer M/s Shivalik Agro Poly Products Ltd., w.e.f. 1 October 2004. Commercial operations in the above mentioned premises were started by M/s Reckitt Benckiser w.e.f. 7 December 2004, without obtaining any separate power connection.

This act of the consumer qualifies as resale of power for which the consumer was liable to pay enhanced energy charges under Section 126 of Indian Electricity Act, 2003 to the extent of ₹ 3.13 crore during the period from April 2008 to March 2016. As against the total sanctioned and connected load of 1,031.299 KW, a load of 448.499 KW was being used by M/s Reckitt Benckiser for their activities.

The Government stated (September 2020) that there was nothing on record to indicate the consumer had exceeded the sanctioned load and there was no financial loss. The reply is not tenable as it does not address the issue of resale of power to another consumer, which was a violation of the provisions of the Section 126 of the Indian Electricity Act, 2003, under which

[50] Industrial consumer having sanctioned load above 100 KW.
[51] M/s Shivalik Agro Poly Product Ltd.
[52] Section-14.

the consumer was liable to be subjected to additional levy of ₹ 3.13 crore. Had this not been a loss, the Company would not have issued second provisional assessment notice to the consumer in August 2016 i.e. after being pointed out by the audit.

(B) One industrial consumer under Electrical Sub Division (ESD), Baddi and two consumers under Operation Circle, Shimla had drawn load above the sanctioned connected load during August 2012 to March 2016. All three consumers had indulged in unauthorised use of power through extended load, as was evident from their recorded monthly consumptions, but no action was initiated to charge the consumers under Section 126 of the Indian Electricity Act, 2003, resulting in undue favour granted to the consumers by not-levying penalty of ₹ 0.67 crore, as detailed in the ***Appendix 4.5***.

The Government stated (September 2020) that the notice for recovery from two consumers relating to Shimla circle has been issued and amount has not been recovered. With regard to consumer of ESD Baddi, it was stated that although the load of only 56.648 KW was released, but the sanctioned load of the consumer was 399.250 KW, hence Section 126 cannot be applied. The reply is not tenable as the consumer had drown load in excess of the authorised (released) load for which Section 126 was to be applied.

The non-recovery against two consumers of Operation Circle, Shimla has been admitted. The reply is not acceptable regarding consumer of ESD Baddi, as merely sanction of load does not empower the consumer to draw the load till it is formally released after receipt and verification of Test Report from the consumer, as such, the consumer was authorised only to use released load of 56.648 KW and drawl of excess load was unauthorised for which penalty under Section 126 was required to be levied.

The Company may issue instructions to its field units to review similar cases and ensure compliance of the Act, to protect its financial interests.

4.28 Non-recovery of fixed demand charges

Due to non-adherence to the provisions of supply code, the Company lost its right to initiate action for levy of fixed charges resulting in revenue loss of ₹3.76 crore.

The Himachal Pradesh Electricity Supply Code, 2009[53] as approved by the Himachal Pradesh Electricity Regulatory Commission (HPERC) stipulates that in case of HT[54]/EHT[55] supply, where the licensee has completed the required work for supply of electricity to an applicant, but the applicant is not ready or delays to receive supply of electricity or does not avail the full sanctioned contract demand, the licensee shall, after a notice of sixty days, charge on *pro rata* basis, fixed demand charges on the sanctioned contract demand as per the relevant Tariff Order. Further, HPERC's Regulation 17 of the expenditure regulation, 2012 provided that in case the applicant opts for execution of works through own resources, all the requisite clearances under various laws shall be obtained by the applicant.

[53] Clause 3.9 of Chapter 3.
[54] High Tension (up to 66 Kilo Volt).
[55] Extra High Tension (132 Kilo Volt and above).

During August 2010, Himachal Pradesh State Electricity Board Limited (Company) sanctioned 6,000 KW load with contract demand (CD) of 2,500 KVA at 66 KV in favour of an industrial consumer[56], to be supplied from 220/66 KV sub-station Nalagarh. The Consumer opted (April 2011) for self-execution of 66 KV dedicated feeder and could not complete the same until January 2016. The Chief Engineer (Commercial), vide his letter dated 01 February 2016 while conveying the approval to release 600 KW load with CD of 600 KVA at 11 KV as an interim arrangement, directed the field unit to clarify the applicability of fixed demand charges under clause 3.9 of Supply Code to settle the issue before releasing the interim load. The field unit in its reply (April 2017) ruled out the applicability of clause 3.9 on the plea that readiness could not be ascertained until the completion of 66 KV line works. The load was released to the consumer on 2 June 2017, without levy of any fixed demand charges.

Audit noticed (December 2017) that consumer had opted for self-execution (August 2011) by depositing the mandatory charges (₹ 1.07 crore) calculated in the sanctioned estimate and the completion period for execution of work was two months. Accordingly, it was the responsibility of the consumer to obtain all the clearances and the delay of 65 months (November 2011 to March 2017) was on the part of consumer. However, during this period, no notice was served to the consumer in accordance with the provisions of the Supply Code.

From the above, it is evident that due to non-adherence to provisions of the Supply Code, the field unit had lost its right to initiate action for levy of fixed charges by not issuing the notice of sixty days, resulting in revenue loss of ₹ 3.76 crore to the Company as detailed in table 4.28.

Table 4.28: Revenue loss due to non levy of fixed demand charges as per Supply Code

Sl. No.	Period	Chargeable CD per month (KVA)	Rate per KVA per month (₹)	Amount (₹)
1	1/12 to 3/12	2,250	240	16,20,000
2	4/12 to 3/13	2,250	300	81,00,000
3	4/13 to 7/14	2,250	350	1,26,00,000
4	8/14 to 5/17	1,125	400	1,53,00,000
			Total	**3,76,20,000**

Thus, the Company extended undue favour to the consumer in direct contravention of the Supply Code 2009 by not charging fixed demand charges of ₹ 3.76 crore.

The Government in its reply stated (August 2020) that during July 2018 an amendment was made in paragraph 3.9 of the Supply Code, keeping in view the difficulties being faced by the consumers for extension of time period in availing the connection. The reply was not tenable as the instant case belongs to period prior to July 2018 and the amendment was applicable from the date of its publication in the Gazette hence, not applicable in this case.

The case is based on test check, the Company may check other such cases across its all field units.

[56] M/s Sunnox International.

Recommendation: The Company needs to review the operation of its field units and ensure compliance to the Act.

4.29 Undue favour to consumers

Failure of the Company to apply the tariff orders issued by the Himachal Pradesh Electricity Regulatory Commission, resulted in short recovery of ₹1.78 crore during the period April 2013 to August 2016.

The tariff order issued (April 2013) by the Himachal Pradesh Electricity Regulatory Commission (HPERC) specifies that the consumers for whom two part tariff [57] is applicable shall be entitled to revise the Contract Demand (CD) twice in a financial year without surrendering their *lien* of total sanctioned CD subject to the condition: (a) the CD shall not be reduced to less than 50 *per cent* of the total sanctioned contract demand. (b) the provision under (a) shall come into force from 1 July 2013 in cases where any consumer has got his CD reduced to less than 50 *per cent* of the total CD temporarily under the existing mechanism. In such cases, the financial year shall be construed from 1 July 2013 for the purpose of number of revisions in a financial year. In the intervening period (April to July 2013), the Himachal Pradesh State Electricity Board Limited (Company) and the consumers were required to take suitable action either to bring the CD minimum to 50 *per cent* of the total sanctioned CD or reduce the CD permanently by observing the required codal formalities. Further, in case the consumer gets his CD reduced permanently, the limit under clause (a) and (b) shall be considered to such reduced CD. Further, from August 2014 the lower limit was to be restricted to the lowest limit of applicable category.

Scrutiny of records of one [58] consumer of large industrial supply category showed (March 2018) that the consumer had reduced his CD (400 KVA), much below the 50 *per cent* limit of his original sanctioned CD (1,050 KVA), before the implementation of HPERC orders, *ibid,* with the prior approval of the Company. However, neither the Company insisted nor the consumer applied for increase in CD as required under the revised Tariff Order (April 2013) in order to bring it up to the minimum prescribed limit of 50 *per cent* of sanctioned CD. The Company continued to levy demand charges on the basis of reduced CD (instead of levying the demand charges as per provision of tariff order i.e. 90 *per cent* of CD or recorded demand whichever is higher) in violation of the HPERC orders. Thus, failure to levy and recover demand charges on 50 *per cent* of the original sanctioned CD w.e.f. July 2013 and lowest limit of 1,001 KVA w.e.f. August 2014, resulted in revenue loss of ₹ 1.03 crore (as detailed in ***Appendix 4.6***) to the Company during April 2013 to February 2018. Non-levy / non-recovery of demand charges were mainly due to non-review of consumer cases in the light of HPERC's orders of April 2013 and August 2014. Further, the Company continues to incur the loss as no corrective action has been taken, so far (April 2020).

[57] Two part tariff consists fixed charges based on contract demand and variable charges based on consumption of electricity.
[58] M/S KK Non Woven Kala Amb.

Similarly, another[59] consumer was categorised under HT-1 based on reduced contract demand instead of HT-2 on the basis of original sanctioned CD. Failure to levy and recover demand charges on applicable category, resulted in revenue loss of ₹ 74.70 lakh. Thus, failure of the sub-division to apply the tariff order had resulted in undue favour to consumers and revenue loss of ₹ 1.78 crore.

The Government stated (September 2020) that the reduction in CD by the consumers, prior to implementation of the said tariff order, had been considered as permanent reduction.

The reply is not acceptable as the consumers had reduced their CD prior to April 2013 temporarily, without surrendering their lien. The Company and the consumers were required to take suitable action where CD was less than 50 *per cent* of sanctioned contract demand during the interim period (April 2013 to June 2013). Moreover, the Chief Engineer (Commercial) has also clarified (August 2015) that for permanent reduction of CD, the consumer has to furnish an undertaking to that effect, which was not furnished by the consumers in these cases.

The observation is based on test check and all other similar cases may be checked by the Company.

Recommendation: The Management should ensure that after any change in the tariff order, affecting the billing, all consumer cases should be reviewed so as to avoid any revenue loss.

[59] M/s Nahan Ferro, Kala Amb.