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TECHNICAL PERFORMANCE OF POWER SECTOR IN PUNJAB - AN EVALUATION

RAMA RANI
M.A. (Eco.), M.Phil

Abstract

Development of Power Sector is the key to the economic development. The Punjab State Power Corporation Limited (PSPCL) is entrusted with the functions of generation, distribution, wheeling and retail supply of electricity in the state. The other successor entity, the Punjab State Transmission Corporation Limited (PSTCL) is assigned with the functions of transmission of electricity in the State, including functions of State Load Dispatch Centre (SLDC). The present paper is an attempt to examine the technical performance of PSEB/PSPCL during the last six years. i.e. from 2007-08 to 2012-13.

Introduction

Development of Power Sector is the key to the economic development. In nineties Government of India has promulgated Electricity Regulatory Commission Act, 1998 for setting up of Independent Regulatory bodies both at the Central level and at the State level viz. The Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commission (SERCs) at the Central and the State levels respectively. The main function of the CERC are to regulate the tariff of generating companies owned or controlled by the Central Government, to regulate the tariff of generating companies. The main functions of the SERC would be to determine the tariff for electricity wholesale bulk, grid or retail, to determine the tariff payable for use by the transmission facilities to regulate power purchase and procurement process of transmission utilities and distribution utilities, to promote competition, efficiency and economy in the activities of the electricity industries etc. Subsequently, as and when each State Government notifies, other regulatory functions would also be assigned to SERCs.

The Punjab State Electricity Board was constituted as an integrated power utility under the Electricity (Supply) Act 1948. It continued discharging the generation, transmission and distribution functions up to April 2010. The government of Punjab was required to

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unbundle the Punjab State Electricity Board (PSEB) under the provisions of the Electricity Act 2003. However, under the pressure from certain political interests and employees' unions, it deferred the restructuring process of PSEB for many years. Ultimately, the state government had to unbundle the PSEB into separate generation, transmission and distribution companies. The Govt. of Punjab vide its notification dated 16.4.2010 issued the Punjab Power Sector Reforms and Transfer Scheme, 2010 and has notified two successor entities of the erstwhile PSEB. The Punjab State Power Corporation Limited (PSPCL) is one of the successor entities and is entrusted with the functions of generation, distribution, wheeling and retail supply of electricity in the state. The other successor entity, the Punjab State Transmission Corporation Limited (PSTCL) is assigned with the functions of transmission of electricity in the State, including functions of State Load Dispatch Centre (SLDC). It may be noted that reform process was initiated with formation of the regulatory commission in 1999. However, the generation, transmission and distribution functions continued to be vested in the Punjab State Electricity Board, a single entity. The PSEB was reorganized quite recently on 16.04.2010 in to two separate companies, one for generation and distribution functions and the other for transmission and load dispatch centre which was a statutory requirement. Therefore, Punjab study is an exercise in examining the changes in performance of the under the direction of the regulatory commission (PSERC) during the last 6 years i.e. from 2007-08 to 2012-13. In this paper we analysed the performance of the utility taking into consideration some performance parameters such as plant load factor, energy losses, commercial losses etc.

Sr.No	KeyDevelopment	Date
1	The Punjab State Electricity Board(PSEB)was a statutory body formed	Feb01,1959
2	Re-organization of the erstwhile State of Punjab under the Punjab Re-organization Act 1966.	May01,1967
3	PSERC was constituted under the provisions of Electricity Regulatory Commissions Act, 1998.	March3,1999

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4	MoU on power sector reforms signed between Ministry of Power ,Govt of India and Govt of Punjab	March30,2001
5	The Commission passed its first (detail) tariff order on the proposal of PSEB	Sept6,2002
6	Submission of the Report of the Expert Group on Power Sector Reforms in Punjab (Gajendra Haldea Report)	March06,2003
7	These Regulations may be called the Punjab State Electricity Regulatory Commission Conduct of Business) Regulations,2005	March07,2005
8	Punjab State Electricity Regulatory Commission (Forum and Ombudsman)Regulations,2005.	August17,2005
9	Unbundling of Punjab State Electricity Board (PSEB)	April16,2010
10	PSPCL has filed its first ARR Petition for FY2011-12	Nov30,2010

In the view of above developments, the present paper is an attempt to examine

- The technical performance of PSEB/PSPCL in the light of regulatory observations made by PSERC during the last six years.
- To suggest measures for improvement in the performance

Technical Performance of PSEB/PSPCL

1. Demand and Supply Gap:

Generally, PSEB/PSPCL does not undertake any demand/supply forecasting exercise for making future energy projections in the state. However, as there is a shortage of power in the state, the demand projections were made on the basis of availability of power supply. It is assumed whatsoever power is available would be consumed by various categories of consumers. The demand supply scenario in the state is given in the Table 1 as follows:

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Table: 1

PSEB/PSPCL's Electricity Demand and Supply for Period April 2003-March 2013								
Year	Energy				Peak			
	Supply (MU)	Demand (MU)	Deficit (MU)	%age	Demand (MW)	Demand Met (MW)	Deficit	%age
2003-04	30520	31420	-900	-2.86	5922	5622	300	5.07
2004-05	30383	33393	-3010	-9.01	7122	5559	1563	21.95
2005-06	32591	35682	-3091	-8.66	7731	6158	1573	20.35
2006-07	34839	38641	-3802	-9.84	8971	6558	2413	26.90
2007-08	38795	42372	-3577	-8.44	8672	7340	1332	15.36
2008-09	37238	41635	-4397	-10.56	8690	7309	1381	15.89
2009-10	39408	45731	-6323	-13.83	9786	7407	2379	24.31
2010-11	42934	45889	-2955	-6.44	9399	7857	1542	16.41
2011-12	43792	45191	-1399	-3.19	10471	8701	1770	16.90
2012-13	46119	48724	-2605	-5.65	11520	8751	2769	24.04

Source: Monthly Report of Central Electricity Authority of India.

Table 1 indicates that Punjab is power deficit state where state is facing on an average 8 per cent deficit demand during the period of study i.e. 2003-04 to 2012-13. Further, the analysis showed that there was significant change in reduction of demand supply gap during the PSPCL period from 2010-11 to 2012-13. During this period the Demand Supply Gap was reduced to 6.44%, 3.19% and 5.65% for the years 2010-11, 2011-12 and 2012-13 respectively. The analysis also showed that the Punjab is also facing Peak Demand Deficit during the period of study i.e. 2003-04 to 2012-13. The peak demand deficit was highest at 24.31% during 2006-07 and lowest at 5.07% during the year 2003-04.

2. Generation Mix:

The major Sources of power in Punjab are Power from Thermal, Hydel Projects, Share from Common Pool Projects and Purchase from outside Parties/States. The thermal projects in Punjab are Guru Nanak Dev Thermal Plant (GNDTP) Bathinda, Guru Gobind Singh Super Thermal Plant (GGSSTP) Ropar, and Guru HargobindThermalPlant (GHTP) Lehra Mohabat. The major Hydro projects of PSEB/PSPCL are Anandpur Sahib Hydel Project (ASHP) Anandpur sahib, Shanan Hydel Project Joginder Nagar, Upper Bari Doab Canal Hydro

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Electric Project (*UBDC*) Pathankot, RanjitSagar Power Project (RSPP) Shapurkandi and Mukerian Hydel Project (MHP) Mukerian. The state Punjab has also power availability from common pool projects like Bhakra Beas Management Board (BBMB) etc. The deficit demand is met from the power purchase from outside parties like NTPC, NHPC etc. The share of different sources in power availability in Punjab is shown in table 2 as under:

Table: 2

PSEB/PSPCL's Power Availability for Period April 2003-March 2013												
Year	**Thermal**		**Hydel**		**Own Generation**		**BBMB Share**		**Power Purchase**		**Total Power Available**	
	Units (Mus)	**%age**	**Units (Mus)**	**%age**	**Units (Mus)**	**%age**	**Units (Mus)**	**%age**	**Units (Mus)**	**%age**	**Units (Mus)**	**%age**
2003-04	14235.5	**45.26**	4394.71	13.97	18630.3	59.23	4638.29	14.75	8183.5	26.02	31452.02	100
2004-05	14384.4	**45.18**	3242.99	10.19	17627.4	55.37	3425.17	10.76	10783.1	33.87	31835.70	100
2005-06	14834.4	**42.64**	5004.8	14.39	19839.2	57.03	4662.9	13.40	10285.2	29.57	34787.29	100
2006-07	15434.6	**41.28**	4404.53	11.78	19839.2	53.06	3978.26	10.64	13571.7	36.30	37389.16	100
2007-08	16456.7	**39.02**	4585.52	10.87	21042.2	49.90	4326.41	10.26	16803.0	39.84	42171.61	100
2008-09	18066.4	**43.64**	4175.33	10.09	22241.7	53.72	4472.64	10.80	14685.0	35.47	41399.32	100
2009-10	20295.7	**46.61**	3389.18	7.78	23684.9	54.39	3818.50	8.77	16041.5	36.84	43544.84	100
2010-11	18326.1	**41.44**	4567.55	10.33	22893.7	51.76	4570.88	10.33	16763.9	37.90	44228.43	100
2011-12	19068.2	**42.55**	4909.86	10.95	23978.1	53.50	4896.44	10.92	15944.2	35.57	44818.74	100
2012-13	18013.3	**39.93**	4254.35	9.43	22267.6	49.36	3836.74	8.51	19003.9	42.13	45108.24	100
EGR	**3.74**	-	**0.78**	-	**3.12**	-	**0.37**	-	**8.28**	-	**4.51**	-

Source: Electricity Statistics of Punjab.

Table 2 indicates that Thermal Plants are major source of Power in Punjab as it contributed on an average of 42.75per cent towards total power available in Punjab during the period of study. The percentage share of sale tax in total tax revenue showed adecreasing trend in all years of study except in 2008-09, 2009-10 and 2011-12. During the period of study the total power availability in Punjab had increased from 31452.02 MUs (2003-04) to 45108.24 (2012-13) at an EGR of 4.51 per cent. The power generation from Thermal stations had increased from 14235.5 MUs (2003-04) to 18013.3 MUs (2012-13) at an EGR of 3.74 per cent. The power generation from Hydel stations had increased at an EGR of 0.78 per cent. The power availability from purchase from outside parties had increased significantly from 8183.5 MUs (2003-04) to 19003.9 MUs (2012-13) at an EGR of 8.28 per cent.

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3. Auxiliary Consumption:

Auxiliary consumption means the quantum of energy consumed by the auxiliary equipment of the project inclusive of Transformation losses from Generation Voltage to Transmission Voltage. The plant wise and year wise Auxiliary consumption is shown in Table no.3 as follows:

Table No. 3

Plantwise Auxiliary Consumption at Thermal Plants of PSEB/PSPCL for Period April 2003-March 2013 (In %age)						
Year	**GNDTP**	**GGSTP**	**GHTP**	**Thermal Projects**	**Hydel Projects**	**Overall**
2003-04	9.54	8.33	8.91	8.68	0.21	6.68
2004-05	12.23	8.57	9.42	9.27	1.91	7.92
2005-06	12.36	8.51	8.97	9.19	1.47	7.03
2006-07	11.49	8.83	8.8	8.91	1.17	7.20
2007-08	11.46	8.5	8.87	9.1	1.25	7.39
2008-09	11.57	8.34	8.71	8.94	1.05	7.46
2009-10	11.36	8.14	7.88	8.47	1.19	7.43
2010-11	11.78	8.11	8.08	8.46	1.05	6.98
2011-12	11.18	8.45	7.87	8.49	0.96	6.95
2012-13	10.77	8.37	7.92	8.39	0.97	7.01

Source: Electricity Statistics of Punjab.

Table 3 reveals that total auxiliary consumption has shown increased from 6.68 in 2003-04 to 7.01 in 2012-13. The auxiliary consumption in case of GNDTP Bathinda was remained higher than the target of 11% fixed by PSERC except during the years 2003-04(9.54) and 2012-13(10.77). The auxiliary consumption in case of GGSSTP Ropar was remained lower or close to the target of 8.5% fixed by PSERC except during the period of study (2003-04 to 2012-13). The auxiliary consumption in case of GHTP Lehra was remained higher than the target of 8.5% fixed by PSERC except during the period of 2003-04 to 2008-09. But, it remained lower than the target of 8.5% during the period 2009-10 to 2012-13.Further, auxiliary consumption in case of Hydel projects remained less than 1 in 2003-04 (0.21), 2011-12 (0.96) and 2012-13 (0.97).

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4. Plant Load Factor:

A plant load factor is a measure of average capacity utilization. In the electricity industry, load factor is a measure of the output of a power plant compared to the maximum output it could produce. A power plant with low load factors will be less efficient. Therefore, a higher load factor usually means more output and a lower cost per unit, which means an electricity generator can sell more electricity at a higher spark spread.

Table No.**4**

Plant wise Plant Load Factor of Thermal Plants of PSEB/PSPCL for Period April 2003-March 2013 (In %age)				
Year	**GNDTP**	**GGSTP**	**GHTP**	**Hydel**
2003-04	66.01	75.02	91.63	43.73
2004-05	51.69	82.28	89.94	32.36
2005-06	57.8	84.52	85.51	49.94
2006-07	56.8	88.52	93.58	43.95
2007-08	77.83	88.54	95.10	45.63
2008-09	73.83	87.07	94.89	41.66
2009-10	70.66	91.11	96.44	33.82
2010-11	46.06	88.04	84.79	45.61
2011-12	48.72	86.41	94.31	48.86
2012-13	64.68	83.05	89.53	42.45

Source: Electricity Statistics of Punjab.

Table 4 indicates the plant wise Plant Load Factor (PLF). The PLF for GNTDP was 61.41 percent on an average. It was highest at 77.83 percent during 2007-08 and lowest at 46.06 during 2010-11. The PLF for GGSTP was 85.46 percent on an average. It was highest at 91.11 percent during 2009-10 and lowest at 75.02 during 2003-04. The PLF for GHTP was 91.57 percent on an average. It was highest at 96.44 percent during 2009-10 and lowest at 85.51 during 2005-06. Further' the PLF for Hydel Projects was 42.80 percent on an average. It was highest at 49.94 percent during 2005-06 and lowest at 32.36 during 2004-05.

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5. Aggregate Technical and Commercial Losses:

Due to lack of adequate investment on Transmission &Distribution works, the Transmission &Distribution losses have been consistently on higher side, and reached to the level of 32.86% in the year 2000-01.The reduction of these losses was essential to bring economic viability to the State Utilities. The commercial losses are mainly due to low metering efficiency, theft & pilferages. This may be eliminated by improving metering efficiency, proper energy accounting & auditing and improved billing & collection efficiency. With the initiative of the Government of India and Punjab Government, the Accelerated Power Development & Reform Programme (APDRP) was launched in 2001, for the reduction in AT&C losses. The main objective of the programme was to bring Aggregate Technical & Commercial (AT&C) losses below 15% in five years in urban and in high-density areas. The programme, along with other initiatives of the Government of India and of the States, has led to reduction in the overall AT&C losses. The year wise AT&C losses are shown in Table no.5 as follows:

Table: 5

AT&C Losses of PSEB/PSPCL During Period April 2003-March 2013			
Year	**Transmission & Distribution Losses**	**Collection Efficiency**	**AT&C Losses**
2003-04	25.35	99.21	25.55
2004-05	24.27	99.61	24.37
2005-06	25.07	98.01	25.58
2006-07	23.92	97.66	24.49
2007-08	22.53	100.44	22.43
2008-09	19.91	93.63	21.26
2009-10	20.12	98.44	20.44
2010-11	17.96	100.65	17.84
2011-12	17.42	100.55	17.32
2012-13	16.78	99.77	16.82

Source: Electricity Statistics of Punjab.

Table 5 indicates that Transmission and Distribution losses were on an average 21.33 percent during the period of study (2003-04 to 2012-13). The analysis shows that Transmission and Distribution losses consistently declined from 25.35 percent in 2003-04 to 16.78 percent during 2012-13. The collection efficiency was on average 98.80 percent over the period of study. It was highest at 100.65 percent during 2011-12 and lowest at 97.66 percent during

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2006-07. Further, The Aggregate Technical and Commercial losses (AT&C) were declined consistently during the period of study. It declined to 16.82 percent (2012-13) from 25.55 percent (2003-04). The study also found that there was significant reduction in AT&C losses immediately after unbundling of PSEB during 2010.

Table 10 indicates that overall productivity of manpower has shown a significant improvement over the period or study. The manpower per MU of energy sold has declined from 3.70 (2003-04) to 1.29 (2012-13). Similarly the manpower per MW of connected load has consistently declined from 4.94 (2003-04) to 1.65 (2012-13). Further, manpower per thousand connections had declined from 14.89 (2003-04) to 6.22 (2012-13). The manpower per rupees one lakh revenue was also declined from 0.14 (2002-03) to 0.04 (2012-13) employees. The manpower per MU of generation has also declined from 2.70 MU (2002-03) to 1.67 (2012-13).

Conclusion

Poor technical and financial performance was the main problems faced by PSEB/PSPCL in the pre-reforms period. The Plant load factor of the plants operated by PSEB was very low. At the same time, the auxiliary consumptions and energy losses were reported unreasonably high. Further, distorted tariff structure for various consumer categories compounded the problems. The tariff was kept too low to recover the cost of supplying power. Consequently, the revenue gap increased which further resulted into the financial crisis of the PSEB/PSPCL.. In this regard, the role of respective regulatory body is crucial. Apart from promoting economic efficiency, the interest of consumers needs to be protected. The analysis shows that the power sector in the state has shown some improvements on certain parameters such as plant load factor, loss level and recovery of dues. However, still the utility is suffering from the shortage of funds.

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