सत्यमेव जयते

Report of the Comptroller and Auditor General of India on Functioning of Haryana Power Generation Corporation Limited

भारतीय लेखापरीक्षा और लेखा विभाग
INDIAN AUDIT AND ACCOUNTS DEPARTMENT

लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

सत्यमेव जयते
हरियाणा सरकार
GOVT. OF HARYANA

Government of Haryana

Report No. 6 of the year 2022

(Performance Audit)

Report of the

Comptroller and Auditor General of India

on

Functioning of Haryana Power Generation

Corporation Limited

Government of Haryana
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PREFACE

The Performance Audit Report on 'Functioning of Haryana Power Generation Corporation Limited' has been prepared under the provisions of Section 19-A of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971 for submission to the Government and State Legislature. The Audit has been carried out in line with the Regulations on Audit and Accounts, 2007 (revised in August 2020) and Performance Audit Guidelines, 2014 of the Comptroller and Auditor General of India. The Audit covered the period from 2016-17 to 2020-21. This report examines Operation and Maintenance of Generating Plants, Fuel and Inventory Management, Financial Management, Compliance of Environmental norms and Generation of clean energy by the Haryana Power Generation Corporation Limited during the period from April 2016 to March 2021.

This Report for the year ended 31 March 2021 has been prepared for submission to the Governor of the State of Haryana under Article 151 of the Constitution of India.

Executive Summary

Executive Summary

Haryana Power Generation Corporation Limited (Company) a wholly owned Government Company incorporated (March 1997) to plan, commission and operate power generation plants to cater to the requirements of power in Haryana. As on 31 March 2021, the Company's total generation capacity was 2,582.4 Mega Watt (MW) comprising of three thermal power plants (2,510 MW), one hydro power plant (62.4 MW) at Western Yamuna Canal (WYC), Yamuna Nagar and one Solar Power Plant (10 MW) at Panipat. The power produced by the Company is exclusively sold to Haryana State owned Power Distribution Companies (DISCOMs). Energy charges for sale of power are decided every year by Haryana Electricity Regulatory Commission (HERC) on the basis of Annual Revenue Requirement of the Company. During the period of Performance Audit (PA), Unit-V (210 MW) of Panipat Thermal Power Station was phased out in March 2020 and a 10 MW solar power plant was commissioned during November 2016.

A summary of the main audit findings is given below:

Operation and maintenance of Generating Plants

The generation declined from 10,567.83 MUs in 2017-18 to 5,466.81 MUs in 2020-21. This was below the normative generation approved by the HERC and the shortfall ranged between 42.61 to 69.24 *per cent* during 2017-21. The main reason for low generation was higher variable cost of thermal power stations which resulted in backing down of plants.

(Paragraph 2.1, Page 9)

The Plant Load Factor in respect of all units of the Company decreased substantially due to forced outages on account of various technical problems, poor planning in execution of works pertaining to capital overhauling. Due to non-achievement of normative PLF, Company could not recover fixed cost of ₹ 390.94 crore during 2016-21 from the DISCOMs. The Company lost the opportunity to earn potential revenue of ₹ 15,576.80 crore on non-production of 49,559.73 MUs of power during 2016-21 due to non-achievement of normative PLF.

(Paragraph 2.2, Page 11)

As per merit order, plants of the Company were one of expensive plants amongst the 33 Power plants for which merit order is prepared by DISCOMs. Their ranks in merit order ranged between 1st and 13th during 2016-17 to 2020-21 due to high variable cost. The position of the thermal plants in merit order deteriorated due to which the Company lost opportunity of earning potential revenue of ₹ 13,449.61 crore by not generating 38,862.43 MUs of power.

(Paragraph 2.5, Page 15)

Unit-II of RGTPP got damaged (September 2020) due to irregular loading pattern. The Company had not carried out any cost benefit analysis either go for repair or purchase new equipment in view of high transportation cost against the small amount on repair cost and loss of fixed cost of ₹ 0.97 crore per day besides loss of generation of 12.24 MUs per day. The HIP rotor had been received during January 2022 but unit could not be commissioned due to non–receipt of associated spares resulting in non-recovery of fixed cost of ₹ 396.77 crore from the DISCOMs apart from loss of potential revenue for forced shutdown period.

(Paragraph 2.6.2, Page 21)

The Company suffered generation loss of 63.80 MUs of green energy valuing ₹ 30.73 crore in respect of Western Yamuna Canal Hydro Electric Project due to acceptance of non-inter-changeable blades and delay in completion of overhauling work of Machines. Due to lesser generation, DISCOMs had to purchase 63.80 MUs of power from other sources resulting in extra burden to the extent of ₹ 30.73 crore on consumers.

(Paragraph 2.6.6, Page 27)

With reference to Audit findings on Operation and maintenance of Generating Plants, Audit recommends that:

- The Company needs to control variable cost of its thermal plants for generation of power to get schedule for generation of power from the DISCOMs.
- The overhauling of the generating plants may be planned in accordance with recommendations of original equipment manufacturers and scheduled in a manner as to minimise forced outages.
- The Company must carry out cost benefit analysis to decide whether to go for repair of its capital equipments or purchase new equipment.

Fuel and Inventory Management

The coal consumption pattern of all the three power plants of Company was within the norms approved by HERC in respect of its units except for RGTPP (Unit-II) during 2019-20 and 2020-21.

(Paragraph 3.1, Page 29)

The quantity and quality claims include compensation for short supplies of Coal Companies, quality claims on un-sampled rakes and compensation pertaining to idle freight. Out of total claims lodged during 2016-21 for ₹ 421.74 crore on account of quantity claims, the Company could reconcile claims of ₹ 21.68 crore (5.14 *per cent* only) during 2016-17 to 2020-21. The quantity claims of ₹ 494.32 crore and quality claims of ₹ 270.50 crore raised by the Company with coal supply companies were pending as on 31 March 2021.

(Paragraph 3.3, Page 31)

The working capital involved in O&M spares was more than the prescribed norms of HERC in all the three plants of the Company and therefore the Company could not recover interest amounting to ₹ 105.31 crore on excess working capital involved in O&M spares through tariff.

(Paragraph 3.5.2, Page 39)

The mean time taken by the three plants (DCRTPP, RGTPP and PTPS) of the Company in placing purchase orders since the date of requirement ranged between 223 and 328 days for procurement of material. Further, the users received this material in these plants after mean days ranging between 412 and 682 days since their requirements.

(Paragraph 3.5.3, Page 40)

With reference to Audit findings on Fuel and Inventory Management, Audit recommends that:

The Company may

- pursue its quantity and quality claims with coal supply companies for their early settlement.
- ensure quality analysis of all coal rakes dispatched by coal companies.
- ensure that the inventory levels are maintained as per norms specified by HERC to avoid financial burden of interest on funds used.
- determine at an early date, a time frame for processing the purchase cases in its work and purchase regulations, as assured.

Financial Management

The Company recovered excess fixed cost amounting to ₹ 26.46 crore during 2018-19 and 2019-20 due to achievement of higher PLF against the HERC norms which was in contravention of the tariff orders of HERC.

(Paragraph 4.1.2, Page 45)

The actual average level of daily coal stock in all thermal plants remained less than the normative level determined by HERC during the period 2016-21. As a result, the Company had claimed and recovered excess interest of ₹ 107.23 crore on working capital during 2016-17 and 2017-18 from Haryana DISCOMs through tariff which had put extra burden on the State consumers.

(Paragraph 4.1.3 (a), Page 46)

The actual average working capital involved in sales receivables was lesser by ₹ 415.39 crore than normative working capital requirement due to low level of generation during the period 2016-18. Thus, the Company had claimed and recovered excess interest of ₹ 43.82 crore on working capital on account of receivables from DISCOMs.

(Paragraph 4.1.3 (b), Page 47)

The Company received funds amounting to ₹ 252.12 crore through sale of fly ash during 2016-17 to 2020-21 but utilised only ₹ 15.23 crore during this period. An amount of ₹ 476.20 crore remained unutilised in ash funds collected through sale of fly ash. The Company used this fund in the general business.

(Paragraph 4.1.4, Page 48)

With reference to Audit findings on Financial Management, Audit recommends that:

- The Company should recover its charges on account of fixed cost from the DISCOMs as per tariff orders of HERC to avoid any extra burden on State consumers.
- The Company should claim interest on working capital involved in coal stock and receivables from the DISCOMs on actual requirement basis, to avoid any undue financial burden on State consumers.
- The Company should utilise funds from sale of dry fly ash as per guidelines of MoEF&CC.

Compliance of Environmental norms and Generation of clean energy

Power plants of the Company met the emission norms regarding Suspended Particulate Matter (SPM) levels as determined by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in all the years from 2016-21. However, Emission norms of SO_2 and NO_x are not met by the power plants.

(Paragraph 5.1.1, Page 51)

The Company failed to utilise the fly ash fund for development of infrastructure or facilities, promotion and facilitation activities for use of fly ash which violate the MoEF&CC guidelines.

(Paragraph 5.1.3, Page 54)

The Company has not set any timeline for setting up of 133.20 MW solar power plants on its own land despite approval of the State Government in October 2016. The Company, however, could install only 10 MW solar power project at PTPS (December 2021) during the period 2016-21 and thus, the objective of green energy could not be achieved.

(Paragraph 5.2.1, Page 57)

While entering into PPA with DISCOMs for supply of power from solar project, the Company agreed to remove the terms and conditions regarding deemed generation, which has resulted in generation loss of 35.05 lakh units valuing ₹ 1.12 crore.

(Paragraph 5.2.2 A, Page 58)

With reference to Audit findings on Compliance of Environmental norms and Generation of clean energy, Audit recommends that:

The Company:

- to keep the emission levels within norms, may install pollution controlling equipments to ensure compliance with MoEF&CC guidelines;
- may ensure effective utilisation of dry fly ash fund and disposal of dry fly ash as per MoEF&CC guidelines;
- may install solar power plants on the available land in time bound manner to achieve the objective of green energy; and
- may follow HERC directions regarding Capacity Utilisation Factor (CUF) and deemed generation, etc. while finalising the PPAs for solar plants in future.

Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State

Against the maximum demand of 5,941.19 MW on 1 November 2019, HPPC had purchased 6,046.61 MW which included 1,628.69 MW from renewable sources (must run power), 4,027.02 MW from thermal power on merit order basis, 263.59 MW from short term thermal power and 127.31 MW from Energy Exchange.

(Paragraph 6.1.1, Page 62)

The HPPC could utilize maximum 5,119 MW and 5,595 MW capacity against the actual available of 7,204 MW capacity during 2019-20 and 2020-21 respectively. Thus, 2,085 MW capacity during 2019-20 and 1,609 MW capacity during 2020-21 remained unutilized. Due to which, the units of thermal power plants including Haryana State owned generating units were backed down (non-operational) for significant period of time during these years.

(Paragraph 6.4, Page 70)

HPPC/DISCOMs had added capacity on an adhoc assessment basis in the past which has resulted into underutilization of existing sources and undue burden of fixed cost on State Consumers.

(Paragraph 6.5, Page 71)

With reference to Audit findings on Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State, Audit recommends that:

- HPPC should use Operational Research/ Optimization Techniques to get the best mix for procurement of power.
- HPPC should take prompt action for consideration of proper variable cost of M/s JPL while preparing Merit Order Dispatch.

Chapter 1

Introduction

Chapter 1

Introduction

1.1 Introduction

Haryana Power Generation Corporation Limited (Company) a wholly owned Government Company incorporated (March 1997) to plan, commission and operate power generation plants to cater to the requirements of power in Haryana. As on 31 March 2021, the Company's total generation capacity was 2,582.4 Mega Watt (MW) comprising of three[1] thermal power plants (2,510 MW), one hydro power plant (62.4 MW) at Western Yamuna Canal (WYC), Yamuna Nagar and one Solar Power Plant (10 MW) at Panipat. The power produced by the Company is exclusively sold to Haryana State owned Power Distribution Companies[2] (DISCOMs). Energy charges for sale of power are decided every year by Haryana Electricity Regulatory Commission (HERC) on the basis of Annual Revenue Requirement of the Company. During the period of Performance Audit (PA), Unit-V (210 MW) of Panipat Thermal Power Station was phased out in March 2020 and a 10 MW solar power plant was commissioned during November 2016. The details of power plants and their units alongwith date of commissioning is given in Table below:

Name of plant and its capacity PTPS Panipat	Installed Capacity (in MW)	Date of commissioning
Unit-VI	210 MW	31 March 2001
Unit-VII	250 MW	28 September 2004
Unit-VII	250 MW	28 January 2005
DCRTPP, Yamuna Nagar		
Unit-I	300 MW	14 April 2008
Unit-II	300 MW	24 June 2008
RGTPP Khedar		
Unit-I	600 MW	24 August 2010
Unit-II	600 MW	1 March 2011

1.2 Organisational set up

The administrative control of the Company is with the Energy and Power Department of the State Government. Management of the Company is vested in Board of Directors comprising of a Chairman, a Managing Director (MD), three Whole Time Directors (WTDs) and six part time directors appointed by the State Government as on 31 March 2021. The organisation chart of the Company is given below:

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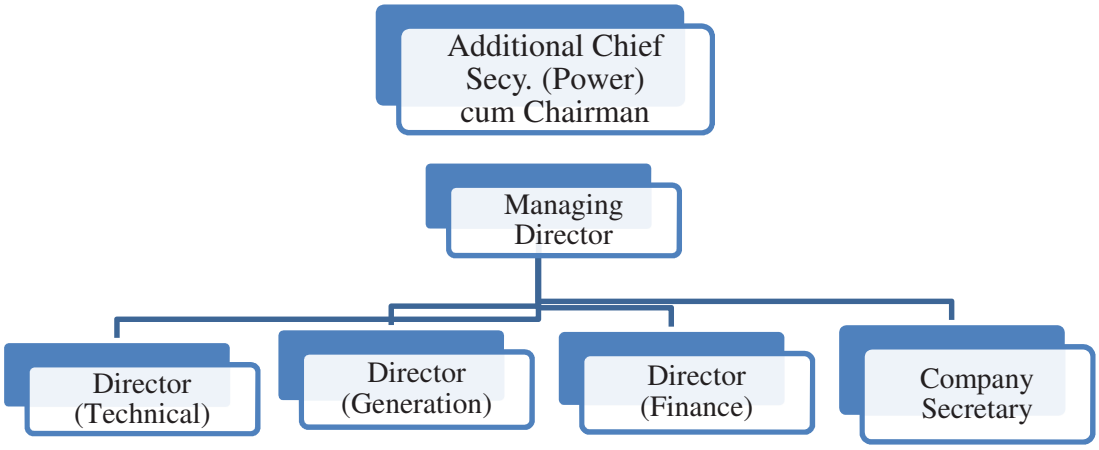
1 (i) Panipat Thermal Power Station (PTPS): 710 MW, (ii) Deen Bandhu Chhotu Ram Thermal Power Plant (DCRTPP), Yamuna Nagar: 600 MW and (iii) Rajiv Gandhi Thermal Power Plant (RGTPP), Hisar: 1200 MW.

2 Uttar Hayana Bijli Vitran Nigam Limited and Dakshin Hayana Bijli Vitran Nigam Limited.

Chart 1: Organisational Chart of the Company



1.3 Generation of power by the Company for Haryana

The table below indicates the share of the Company in the total power requirements of the State:

Table 1.1: Share of Power Generation by the Company in total power requirement of Haryana

Year	Total power supply in Haryana in Million Units (MUs)	Power supplied by HPGCL Plants (in MUs)	HPGCL's share in total power supply (in *per cent*)
2016-17	51,264	8,885	17.33
2017-18	54,735	10,084	18.42
2018-19	56,994	9,983	17.52
2019-20	55,160	6,766	12.27
2020-21	53,762	5,268	9.80

Source: Information supplied by the Company and Haryana Power Purchase Centre (HPPC)

The supplies from Company's power plants decreased from 10,084 Million Units to 5,268 Million Units in absolute terms and in percentage terms from 18.42 *per cent* to 9.80 *per cent* of total power supplied in Haryana between 2017-18 and 2020-21.

1.4 Financial Position and working results

The summarised Financial Position and working results of the Company for the last five years from 2016-17 to 2020-21 are as under:

Table 1.2: Financial position and working results of the Company for the last five years up to 2020-21

(₹ in crore)

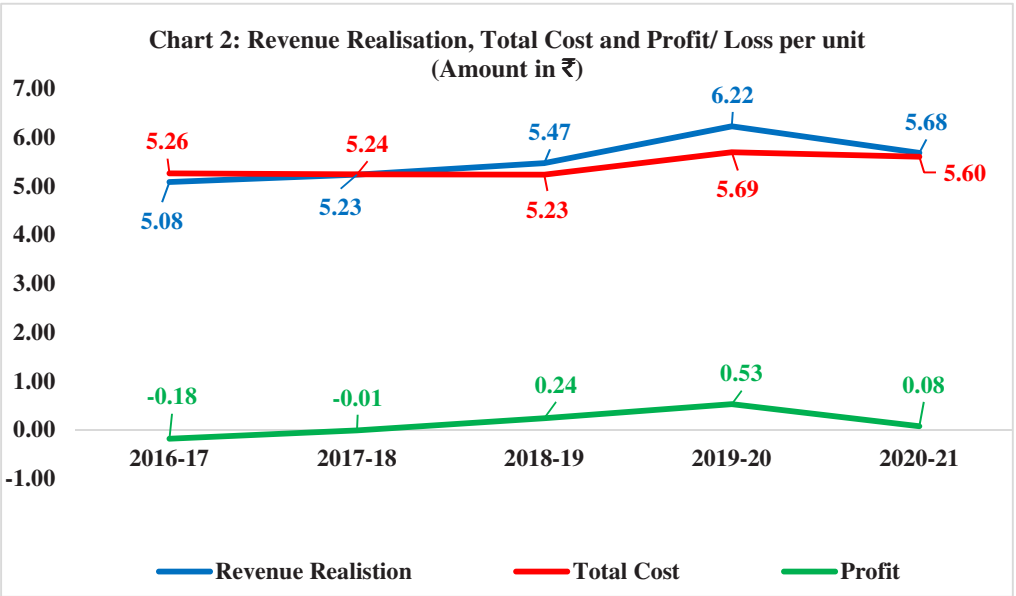
Particulars	2016-17	2017-18	2018-19	2019-20	2020-21
Equity Share Capital	2916.05	3004.86	3039.61	3069.34	3153.67
Net Property, Plant and equipment	5473.96	5077.66	4741.29	4363.14	4092.80
Capital work-in-progress	32.00	25.76	17.19	19.58	20.03
Generation Revenue	4,513.39	5,277.48	5,462.60	4,206.60	2,992.03

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21
Fixed cost					
Employee cost	747.19	746.14	993.38	641.36	637.86
Administrative & General cost	20.58	25.85	21.31	25.08	45.27
Depreciation	430.53	412.29	385.96	388.31	336.58
Interest and finance charges	408.47	306.72	252.89	183.41	174.86
Repair and maintenance	123.16	138.68	107.54	147.62	91.75
Total Fixed cost	**1729.93**	**1629.68**	**1761.08**	**1385.78**	**1286.32**
Variable cost					
Fuel cost					
(a) Coal	2,897.51	3,573.09	3,401.75	2,417.42	1,623.12
(b) Oil	16.10	31.15	33.13	22.62	15.27
(c) Other fuel related cost	29.81	52.00	29.18	22.18	27.76
Total variable cost	**2,943.42**	**3,656.24**	**3,464.06**	**2,462.22**	**1,666.15**
Total cost	**4,550.19**	**5,147.24**	**5,117.60**	**3,700.38**	**2,860.72**
Revenue Realisation (per unit)	5.08	5.23	5.47	6.22	5.68
Fixed cost (per unit)	1.95	1.62	1.76	2.05	2.44
Variable cost (per unit)	3.31	3.63	3.47	3.64	3.16
Total cost per unit	5.26	5.24	5.23	5.69	5.60
Profit/ Loss per unit	-0.18	-0.01	0.24	0.53	0.08

Source: Annual Accounts of the Company.

It would be seen from the above that the fixed cost per unit for the last five years has increased from ₹ 1.95 per unit to ₹ 2.44 per unit due to reduction in power generation from 8,885 MUs to 5,268 MUs during 2016-21. During 2016-17 and 2017-18, there was loss of ₹ 0.18 per unit and ₹ 0.01 per unit respectively on account of higher interest and finance charges. There was reduction in profit during 2020-21 due to higher finance cost and non-recovery of fixed cost due to damage of High Intermediate Pressure (HIP) rotor of Unit-II of Rajiv Gandhi Thermal Power Plant (RGTPP) Hisar (as discussed subsequently in Para 2.6.2 of Chapter-2). The graphical presentation of per unit revenue realisation, total cost of generation and profit/loss is as under:

Chart 2: Revenue Realisation, Total Cost and Profit/ Loss per unit (Amount in ₹)



1.5 Audit objectives

The performance audit was carried out to ascertain whether:

(i) Generating units were operated and maintained efficiently to optimize output;

(ii) Procurement, transportation and consumption of fuel and other inventory items were economic, efficient and effective;

(iii) Effective and efficient financial management at plant and Company level existed;

(iv) Environmental norms notified by Ministry of Environment Forests and Climate Change, Central Pollution Control Board (CPCB) and Haryana State Pollution Control Board (HSPCB) for power plants were complied; and

(v) Adequate steps were taken to develop generation capacity through clean energy sources.

1.6 Scope of Audit and Sampling

The Functioning of Company's two Plants (Deen Bandhu Chhotu Ram Thermal Power Plant, Yamuna Nagar and Rajiv Gandhi Thermal Power Plant Hisar) was last reviewed in the Report of the Comptroller and Auditor General of India (Public Sector Undertakings), Government of Haryana, for the year 2014-15. The recommendations of the Committee on Public Undertakings (COPU) thereon are contained in its 65th Report presented to State Legislature on 27 February 2019 and all three recommendations made by the COPU are still (December 2021) pending being the recoveries outstanding on account of Arbitration cases.

The present Performance Audit was conducted during May 2021 to November 2021 and assessed performance of the Company during the period 2016-17 to 2020-21. Audit examination involved scrutiny of records relating to 307 work orders/purchase orders valuing ₹ 874.11 crore selected through stratified sampling technique by using Interactive Data Extraction and Analysis (IDEA) i.e. an Information Technology tool. Detail of total population and sample selected is tabulated below.

Table 1.3: Statement showing total number of Purchase /work orders issued during 2016-21 and sample selected

(₹ in crore)

More than or equal to	Less than or equal to	Total		Selected Sample	
		Number	Value	Number	Value
₹0.20 crore and below		8,220	196.80	84	2.49
₹0.20 crore	₹0.50 crore	573	180.58	58	18.82
₹0.50 crore	₹1.00 crore	117	77.62	59	38.20
₹1.00 crore	₹5.00 crore	89	210.03	67	164.64
₹5.00 crore and above		39	649.96	39	649.96
Total		**9,038**	**1,314.99**	**307**	**874.11**

Source: Information supplied by the Company

For examination of the expenditure on consumption of coal, one quarter of each year 2016-17 to 2020-21 was selected through stratified random sampling by using IDEA in all the three thermal power plants of the Company. The value of total coal consumed during April 2016 to March 2021 was ₹ 13,952.49 crore of which consumption amounting to ₹ 3,333.67 crore (i.e., 23.89 *per cent*) was selected for detailed scrutiny.

1.7 Audit Methodology

The performance audit was carried out through examination of records of different wings at Head Office of the Company at Panchkula and its power plants i.e., Panipat Thermal Power Station (PTPS), Panipat, Deen Bandhu Chhotu Ram Thermal Power Plant (DCRTPP), Yamuna Nagar and Rajiv Gandhi Thermal Power Plant (RGTPP), Hisar. The audit objectives, scope, sample and timeline were discussed with the Management during entry conference held on 14 August 2020. Preliminary observations in the form of Audit memos were issued at unit level and consolidated draft report after incorporating management replies, wherever received, was issued to the Management and State Government through this Performance Audit report.

1.8 Audit criteria

The audit criteria adopted for this performance audit included:

(i) Electricity Act, 2003;

(ii) Guidelines/Norms issued by Central Electricity Authority (CEA)/Haryana State Electricity Regulatory Commission (HERC);

(iii) Norms/schedule for preventive and capital maintenance of boiler and turbine;

(iv) Agenda and minutes of Board of Directors and its sub-committees;

(v) Procurement policy & manuals and delegation of power in the Company;

(vi) Agreements with coal companies, Railways and other contractors;

(vii) Environmental norms notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Central Pollution Control Board (CPCB) and Haryana State Pollution Control Board (HSPCB); and

(viii) Coal distribution Policy as amended from time to time.

1.9 Structure of Report

Chapter 1 of the Report gives the information of the Company in respect of its total power generation and financial position and working results of the Company for the last five years up to 31 March 2021, Audit Objectives, Scope

of Audit, Audit Criteria, Audit Methodology, Sample Selection etc. The Audit findings have been broadly categorised into six Chapters aligning with the audit objectives.

Chapter 2 on Operation and maintenance of generating plants covers performance of the plants evaluated on various operational parameters viz. Generation, Plant Load Factor (PLF), Auxiliary Consumption and Station Heat Rate (SHR) besides backing down of plants due to higher variable cost, planning in execution of capital overhauling works and resultant prolonged shutdown of power plants. Besides it covers delay in overhauling work of machines at Western Yamuna Canal Hydel Project due to acceptance of non-interchangeable blades resulting into loss of green energy.

Chapter 3 on Fuel and Inventory Management covers the aspects of excess consumption of coal and secondary fuel, unsettled quantity and quality claims with coal supply companies, non-recovery of compensation for short supplies by coal companies and non-receipt of quality claims of rakes which were not subject to checks on samples, etc. Besides the points relating to inventory management and deficiencies in procurement process have been included.

Chapter 4 on Financial Management covers the aspects of under recovery of energy charges through fuel price adjustment, excess recovery of fixed cost and interest on working capital and Improper financial management due to use of fly ash fund in contravention to those prescribed by the Ministry of Environment Forest and Climate Change guidelines.

Chapter 5 on Compliance of Environmental norms and Generation of clean energy covers the aspects of violations of Emission limits, non-installation of equipment to control Sulfur Dioxides (SO_2), Non-utilisation of dry fly ash and dry fly ash fund, Failure to add Capacity in green/ solar energy and Failure in safeguarding financial interest of the Company while finalising the terms and conditions of Power Purchase Agreement of Solar Power Plant.

Chapter 6 on Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State covers the concept of Preparation of Merit Order Dispatch (MOD) on the basis of variable cost including Point of Connection (POC) losses and scheduling of power, Analysis of Demand and Purchase of Power, Comparative analysis of Scheduling of power by preparing MOD and on the basis of Landed cost (fixed cost, transmission cost and POC losses), Comparative analysis of Scheduling of power by preparing MOD and by considering transmission cost as a part of variable cost.

The overall conclusion of the Report based on the major audit findings on the five audit objectives is brought out in the Chapter 7. Audit recommendations on the key audit findings have also been included for each audit objective.

An exit conference for the performance audit to discuss the audit findings was held (May 2022) which was attended by Additional Chief Secretary to Government of Haryana, Department of Power; Managing Director of HPGCL and other senior functionaries. The replies/views of Government and HPGCL to the audit issues have been incorporated in the performance audit appropriately.

Chapter 2

Operation and maintenance of Generating Plants

Chapter 2

Operation and maintenance of Generating Plants

2.1 Generation of Power

The performance of the plants was evaluated on various operational parameters of Generation - Plant Load Factor (PLF), Auxiliary Consumption and Station Heat Rate. Performance parameters in respect of power plants of the Company were analysed during the audit. Detailed analysis of generation of power, parameter wise is discussed below.

Table 2.1: Unit wise power generated by the Company during 2016-21

Sr. No.	Plant	Unit No.	Installed Capacity in Mega Watt (MW)	Generation (in MUs)				
				2016-17	2017-18	2018-19	2019-20	2020-21
1	Normative Generation[1] for Thermal Units (in MUs)			18,413.52	18,413.52	18,413.52	18,413.52	17,769.66
	Actual Generation Thermal (A)							
2	Panipat Thermal Power Station (PTPS)	V	210	169.22	140.77	176.75	Decommissioned[2]	
		VI	210	219.54	373.69	324.00	0	51.93
		VII	250	1,126.89	1,277.64	1,308.75	884.46	619.48
		VIII	250	690.27	787.37	1,569.40	1,088.33	547.08
3	Deen Bandhu Chhotu Ram Thermal Power Plant (DCRTPP)	I	300	1,841.43	1,441.36	1,346.78	1,574.14	1,316.67
		II	300	1,582.78	2,006.76	1,974.87	1,166.89	1,294.75
4	Rajiv Gandhi Thermal Power Plant (RGTPP)	I	600	1,988.50	2,361.50	1,622.71	768.95	1,230.98
		II	600	1,816.83	2,319.51	2,229.48	1,547.17	405.92
5	**Total[3] Thermal (A)**		**2,510**	**9,266.24**	**10,567.83**	**10,375.99**	**7,029.94**	**5,466.81**
6	Shortfall in percentage to normative generation			**49.68**	**42.61**	**43.65**	**61.82**	**69.24**
7	Western Yamuna Canal Hydel Project		62.40	205.28	176.75	237.68	300.03	242.91
8	Solar PTPS Panipat		10	5.14	16.17	16.25	15.55	16.86
9	**Total Renewable (B)**		**72.40**	**210.42**	**192.92**	**253.93**	**315.58**	**259.77**
10	**Grand Total (A+B)**		**2,582.40**	**9,476.66**	**10,760.75**	**10,629.92**	**7,345.52**	**5,726.58**

Source: Information supplied by the Company.

The generation at power plants declined from 10,567.83 MUs in 2017-18 to 5,466.81 MUs in 2020-21. The generation was below the normative generation approved by the Haryana Electricity Regulatory Commission (HERC) and ranged between 42.61 to 69.24 *per cent* during 2017-21. The main reason for low generation was higher variable cost of thermal power stations which resulted in plants not getting schedule and resultant backing down[4] of plants.

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1 Normative generation is the quantum of power generation based on Plant Load Factor determined by HERC every year keeping in view the capacity of the Unit.

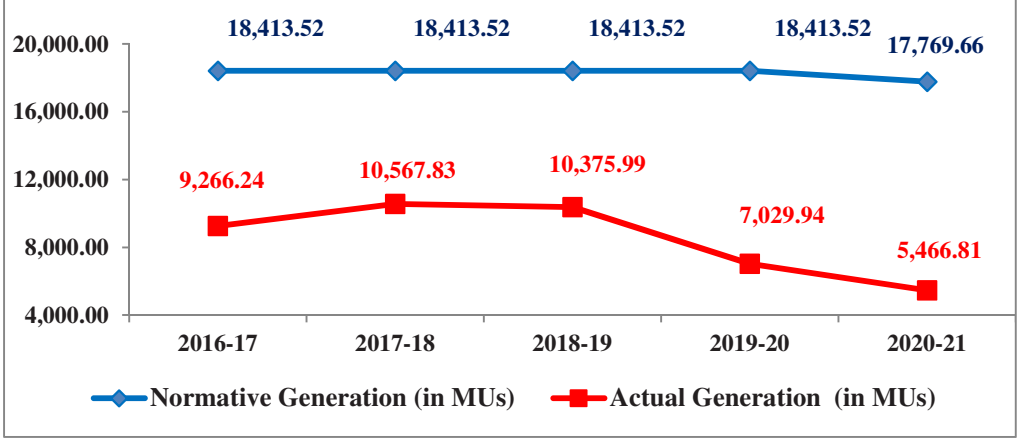
2 Unit V was decommissioned during March 2020. However, unit remained shut down during 2019-20 also.

3 Generation data of Unit V of PTPS is excluded from total generation given at row number 5 and 10.

4 A backing down refers to shut down of the unit due to availability of cheaper power elsewhere or less demand.

Comparison of actual generation *vis-à-vis* normative generation approved by HERC is depicted in the chart below:

Chart 2.1: Comparison of normative thermal generation approved by HERC *vis a vis* Actual generation



2.2 Plant Load Factor

Plant Load Factor (PLF) represents percentage of actual generation to generating capacity of the plant. PLF for subsequent period is assessed by the Company and assessment is approved by Haryana Electricity Regulatory Commission (HERC) considering all the factors affecting generation. The recovery of fixed cost from the DISCOMs depends upon achievement of PLF approved by HERC and in case of lower PLF, the fixed cost is recovered on *pro-rata* basis. The table below indicates the PLF determined by HERC *vis-à-vis* actual achievement by all the units of the Company during 2016-21:

Table 2.2: PLF approved by the HERC *vis-à-vis* actual PLF of the units

Year	PLF approved by HERC (in *per cent*)	Actual PLF (in *per cent*)						PLF approved by HERC for Unit V & VI of PTPS (in *per cent*)	Actual PLF of PTPS (in *per cent*)	
		DCRTPP		RGTPP		PTPS				
		Unit I	Unit II	Unit I	Unit II	Unit VII	Unit VIII		Unit V	Unit VI
2016-17	85	70.07	60.23	37.83	34.57	51.46	31.52	35	9.2	11.93
2017-18	85	54.85	76.36	44.93	44.13	58.34	35.95	35	7.65	20.31
2018-19	85	51.25	75.15	30.87	42.42	59.76	71.66	82.5[5]	9.61	17.61
2019-20	85	59.74	44.28	14.59	29.36	40.28	49.56	35	0	0
2020-21	85	50.10	49.27	23.42	7.72	28.29	24.98	35	0	2.82

Source: Information supplied by the Company and Tariff orders approved by the HERC for the year 2016-17 to 2020-21.

[5] It has been noted from HERC tariff order dated 31 October 2018. PLF of 82.5 *per cent* was determined on the basis of actual PLF (86 to 87.79 *per cent*) achieved by Unit V & VI of PTPS during April to May 2018. During this period, units of one of major power suppliers (M/s Adani Power Limited) remained shut down.

Due to non-availability of power plants owing to planned and forced outages resulting in non-achievement of normative PLF, Company could not recover fixed cost of ₹ 390.94 crore during 2016-21 from DISCOMs[6]. The plant wise details for forced outages, planned outages and Backing Down Instructions for the five years 2016-21 is given in ***Appendix 2.1***.

The main reasons for low PLF were forced outages[7] due to various technical problems, poor planning in execution of works pertaining to capital overhauling which resulted into prolonged shutdown of plants and Backing Down Instructions (BDIs) of Units due to their higher variable cost. Out of total outages of 1,94,580 hours (56.92 *per cent* of total available 3,41,832 hours), as much as 47.76 *per cent* outages were due to backing down of plants at the instructions of the DISCOMs.

Audit observed that had all the units been run on the PLF approved by HERC, additional 49,559.73 MUs of power valuing ₹ 15,576.80 crore could have been generated. Thus, Company lost the opportunity to earn potential revenue of ₹ 15,576.80 crore during 2016-21. Issues pertaining to non-recovery of fixed cost are discussed subsequently.

The Management replied (May 2022) that effective steps have been taken to minimise the forced outages and reduce backing down of plants by minimizing the cost of power. However, the fact remains that actual PLF of each HPGCL unit was on decreasing trend during 2016-2021.

2.3 Auxiliary Power Consumption

Auxiliary Power Consumption (APC) is power consumed by units themselves for running their equipments and common services. APC is expressed as a percentage of the gross energy generated by generating unit of the plant. HERC approves percentage of normative APC for each unit every year. The norms fixed by HERC ranged from six to ten *per cent* in respect of units of the Company during the period 2016-17 to 2020-21. Unit wise auxiliary power consumption is discussed below:

[6] Uttar Hayana Bijli Vitran Nigam Limited and Dakshin Hayana Bijli Vitran Nigam Limited.

[7] Forced outages is the period when the generating unit is not available for production of power due to unexpected breakdown of the unit.

Table 2.3: Auxiliary Power Consumption approved by the HERC *vis-à-vis* actual thereagainst

Auxiliary Power Consumption[8] (*per cent*)											
Name of Plant	**Year**	**2016-17**		**2017-18**		**2018-19**		**2019-20**		**2020-21**	
	Unit No.	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**
PTPS	V	10.00	15.95	10.00	16.12	10.00	14.81	**De-commissioned**			
	VI	10.00	12.52	10.00	10.61	10.00	10.54	10.00	NA[9]	9.00	18.52
	VII	8.50	9.20	9.00	8.97	9.00	8.65	8.50	9.29	8.50	9.93
	VIII	8.50	10.00	9.00	9.48	9.00	8.30	8.50	8.91	8.50	10.04
DCRTPP	I	8.50	8.67	8.50	8.62	8.50	8.69	8.50	8.41	8.50	8.37
	II	8.50	8.90	8.50	8.36	8.50	8.35	8.50	8.78	8.50	8.27
RGTPP	I	6.00	6.03	6.00	5.92	6.00	6.54	6.00	7.84	6.00	6.29
	II	6.00	6.12	6.00	5.89	6.00	5.89	6.00	6.18	6.00	8.49

Source: Information supplied by the Company and Tariff orders approved by the HERC for the year 2016-17 to 2020-21.

The APC in DCRTPP ranged between 8.37 to 8.69 *per cent* in respect of Unit-I and 8.27 to 8.90 *per cent* in respect of Unit-II against the norm of 8.50 *per cent* of both the Units. The APC in the units of RGTPP ranged between 5.92 to 7.84 *per cent* in respect of Unit-I and 5.89 to 8.49 *per cent* in respect of Unit-II against the norms of 6.00 *per cent* of both the Units. In addition, APC in the units of PTPS remained more than the norms fixed by HERC and it ranged between 8.3 *per cent* and 18.52 *per cent* during 2016-21, except during 2017-18 (for Unit VII – 8.97 *per cent*) and 2018-19 (for unit VII – 8.65 *per cent* and VIII- 8.30 *per cent*) It is seen from the table above that in eight units of three thermal power plants for five years, the APC was beyond HERC norms in 27 out of 38 combinations of units and years and within APC norms in remaining 11. APC beyond norms is a direct loss to the Company as it is not recoverable through tariff. Thus, due to higher APC (than norms), the Company suffered a loss of ₹ 49.45 crore on 140.33 MUs of power consumed in excess during 2016-21. The APC remained higher due to less running of plants which resulted in lesser generation and proportionately higher APC.

The Management replied (May 2022) that the APC remained higher due to frequent starts/stops, backing down and running of units on partial load. Further, efforts have been made to reduce the APC by replacing conventional lights, installation of Variable Frequency Drives (VFDs) and reduction in Induced Drought fans & compressors. Audit is of the view that APC should be kept within norms determined by HERC. However, while calculating the excess consumption of APC, Audit has adjusted the APC when the units were boxed up/shut down.

[8] Auxiliary Power Consumption data in the table is after adjustment of APC during shut down period.

[9] Auxiliary Power Consumption is calculated as percentage of total generation. During 2019-20 unit-VI of PTPS remained boxed up (shut down). Therefore, Auxiliary consumption cannot be calculated as percentage of total generation. However, total auxiliary power consumption in terms of Units was 5.10 MUs during 2019-20.

2.4 Station Heat Rate

Station Heat Rate (SHR) indicates the amount of fuel (heat) required to generate one unit of electricity. It is measured in kcal[10] per kWh[11]. Plant's efficiency is measured on the basis of its SHR. A Plant with higher SHR will consume more fuel in comparison to other plants with lower SHR. HERC has fixed normative SHR for each unit of the Company. The following table indicates HERC norms *vis-à-vis* actual SHR for each unit for the period 2016-17 to 2020-21:

Table 2.4: Station Heat Rate approved by the HERC *vis-à-vis* actual Station Heat Rate of the units

Station Heat Rate (Kcal/kWh)										
Year	**2016-17**		**2017-18**		**2018-19**		**2019-20**		**2020-21**	
Unit No.	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**	**HERC Norms**	**Actual**
PTPS										
V	2,550	2,499	2,550	**2,721**	2,550	**2,566**	0	0	0	0
VI	2,550	2,519	2,550	**2,653**	2,550	2,540	2,550	0	2,550	2,537
VII	2,500	2,478	2,500	**2,562**	2,500	2,473	2,500	2,476	2,500	2,476
VIII	2,500	2,465	2,500	**2,551**	2,500	2,468	2,500	2,471	2,500	2,480
DCRTPP										
I	2,344	2,315	2,344	2,321	2,344	2,327	2,344	2,328	2,344	2,341
II	2,344	2,317	2,344	2,317	2,344	2,319	2,344	2,333	2,344	2,342
RGTPP										
I	2,387	**2,589**	2,387	**2,523**	2,387	**2,461**	2,387	**2,476**	2,387	**2,431**
II	2,387	**2,573**	2,387	**2,505**	2,387	**2,419**	2,387	**2,442**	2,387	**2,461**

Source: Information supplied by the Company and Tariff orders approved by the HERC for the year 2016-17 to 2020-21

The SHR in RGTPP remained higher than HERC norms in all the five years while in DCRTPP it was within norms during the period 2016-21. The SHR at PTPS was higher than HERC norms in 2017-18 in respect of all the units and higher in 2018-19 in respects of unit V. Higher SHR eventually led to higher consumption of coal resulting in higher variable cost and the unit not getting schedule.

The Management replied (May 2022) that SHR remained higher than norms due to backing down of plants and low quality of coal. However, in MYT Regulation 2019, HERC has made provision for compensation on degradation of station heat rate due to low Plant utilization factor. The fact remains that SHR norms should have been adhered to. The Company did not adhere to the capital overhauling schedules as discussed in paragraphs 2.6.1 and 2.6.2 which was essential to maintain the operational parameters of the plant. Further, Management should take action to upgrade the technology of the plants and efforts should be made to improve the quality of coal and achieve the Station Heat Rate (SHR) norms as approved by Haryana Electricity Regulatory Commission.

[10] Kcal- Kilo calories is the amount of heat required to raise the temperature of one kg of water to one degree Celsius.

[11] KWh- Kilo watt per hour, it is a unit of energy measurement.

2.5 Backing down of plants due to higher variable cost

As per Regulation 59 of HERC Multi Year Tariff (MYT) Regulation, 2012 titled 'Cost of power Purchase', distribution licensees (DISCOMs) are bound to schedule power in accordance with the principles of merit order schedule and purchase power on the basis of ranking of all approved sources of supply in the order of their variable cost. Merit order[12] is decided every month on the basis of variable cost (generation cost) and Point of Connection (POC) charges (transmission losses) of electricity by the generation stations. Most expensive generator is kept at the top of merit order and gets the least opportunity to supply the power to DISCOMs. The details of BDI issued by DISCOMs on account of low demand during 2016-17 to 2020-21 were as under:

Table 2.5: Details of total operating hours and shut down period due to BDIs during 2016-21

Year	Total Operating hours		Shut down period due to BDI (in hours)			Shut down period due to BDI (in percentage)		
DCRTPP Yamuna Nagar								
	Unit-I	**Unit-II**	**Unit-I**	**Unit-II**		**Unit-I**	**Unit-II**	
2016-17	8,760	8,760	1,347	1,459		15.38	16.66	
2017-18	8,760	8,760	1,291	806		14.74	9.20	
2018-19	8,760	8,760	1,065	1,206		12.16	13.77	
2019-20	8,784	8,784	2,906	1,350		33.08	15.37	
2020-21	8,760	8,760	3,289	3,280		37.55	37.44	
Total	**43,824**	**43,824**	**9,898**	**8,101**		**22.59**	**18.49**	
RGTPP Hisar								
2016-17	8,760	8,760	4,123	3,245		47.07	37.04	
2017-18	8,760	8,760	3,290	2,531		37.56	28.89	
2018-19	8,760	8,760	3,961	3,550		45.22	40.53	
2019-20	8,784	8,784	3,681	5,197		41.91	59.16	
2020-21	8,760	4,104[13]	5,189	3,240		59.24	78.95	
Total	**43,824**	**39,168**	**20,244**	**17,763**		**46.19**	**45.35**	
PTPS, Panipat			**Unit-VI**	**Unit-VII**	**Unit-VIII**	**Unit-VI**	**Unit-VII**	**Unit-VIII**
2016-17	8,760	8,760	7,541	3,550	5,559	86.08	40.52	63.46
2017-18	8,760	8,760	5,368	2,759	3,714	61.28	31.50	42.40
2018-19	8,760	8,760	7,067	2,941	1,795	80.67	33.57	20.49
2019-20	8,784	8,784	8,784	4,303	3,847	100.00	48.99	43.80
2020-21	8,760	8,760	7,588	5,038	6,236	86.62	57.51	71.19
Total	**43,824**	**43,824**	**36,348**	**18,591**	**21,151**	**82.94**	**42.42**	**48.26**

Source: Information supplied by the Company for the year 2016-17 to 2020-21

Deen Bandhu Chhotu Ram Thermal Power Plant (DCRTPP)

The BDI increased from 1,347 hours to 3,289 hours and from 1,459 to 3,280 hours in case of Unit-I and Unit-II respectively during 2016-21. Scrutiny of Merit Order prepared by the Haryana Power Purchase Centre (HPPC) on behalf of Haryana DISCOMs, revealed that Variable Cost (VC) at DCRTPP increased from ₹ 3.100 to ₹ 3.484 per unit from April 2016 to March 2021. As per merit order, DCRTPP was one of expensive plants amongst the 33 Power plants for which merit order is prepared. Its Rank[14] in merit order ranged

[12] In this Performance Audit, the issue of preparation of merit order by Haryana Power Purchase Centre on behalf of both the DISCOMs has not been examined and no Audit opinion is formed on Merit order.

[13] Operating hours of Unit-II (RGTPP) has been reduced to 4,104 hours due to damage of HIP Rotor on 19 September 2020 resulted into shutdown of unit till date (January 2022).

[14] 1st rank means most expensive and 32nd rank means most economical.

between 1st and 12th during 2016-17 to 2020-21 ***(Appendix 2.2)***. We noticed that due to its high rank in merit order, DCRTPP did not get schedule and lost the opportunity to earn potential revenue of ₹ 1,557.26 crore by not generating 4,589.75 MUs of power ***(Appendix 2.3)***.

Rajiv Gandhi Thermal Power Plant (RGTPP)

The shut down period due to BDI increased from 4,123 hours to 5,189 hours and from 3,245 to 5,197 hours in case of Unit-I and Unit-II respectively during 2016-21. Unit-II was under forced shut down due to damage of High Intermediate Pressure (HIP) Rotor since 19 September 2020.

Scrutiny of Merit Order prepared by the Haryana Power Purchase Centre (HPPC) showed that Variable Cost of RGTPP increased from ₹ 3.190 to ₹ 3.622 per unit from April 2016 to March 2021. RGTPP was one of expensive plants among all 33 Power plants for which merit order was prepared. Its rank in merit order ranged between 1st and 13th during 2016-17 to 2020-21 ***(Appendix 2.2)***. Due to the high rank in merit order, RGTPP lost the opportunity to earn potential revenue of ₹ 6,666 crore by not generating 19,383.57 MUs of power ***(Appendix 2.3)***.

Panipat Thermal Power Station (PTPS)

During 2016-21, shut down period due to BDI ranged between 61.28 to 100 *per cent* of available hours for Unit VI, 31.50 to 57.51 *per cent* for Unit VII and 20.48 to 71.19 *per cent* for Unit VIII. The plant was given further BDI by Haryana Power Purchase Centre (HPPC) due to its higher Variable Cost (VC). In merit order, its position ranged between 1st and 7th for Unit VI, 2nd and 13th for Unit VIII and 2nd and 10th for Unit VIII ***(Appendix 2.2)***.

This resulted in lost opportunity to earn potential revenue of ₹ 5,226.35 crore by not generating 14,889.09 MUs of power ***(Appendix 2.3)***.

The net effect of this non-getting of schedule is loss of potential revenue of ₹ 13,449.61 crore ***(Appendix 2.3)***.

The Management contended (May 2022) the issue of backing down of plants due to higher variable cost. They stated that HPGCL plants were backed down on not being scheduled by DISCOMs due to erroneous Merit order Dispatch (MoD). The DISCOMs were not evaluating the power cost on cost to consumer or landed basis which impacted HPGCL scheduling. They added that HERC in its order dated 18 February 2021 had adjudicated that HPGCL don't have any liability of Point of Connection (PoC) Charges, whereas the charges of wheeling electricity to state has been considered as fixed cost and thus level playing field has not been provided for HPGCL units. The matter of erroneous MoD has been challenged at APTEL and outcome of the same was awaited (May 2022).

Inherent Locational disadvantages to HPGCL Plants

The variable cost for a generating plant (thermal) consists of fuel cost i.e., cost of coal and its transportation cost. The main reason for higher variable cost was transportation cost of coal. Coal is transported through Railways from collieries located at Jharkhand, West Bengal, Madhya Pradesh having distance of more than 1,200 kms. In case of plants located at pitheads (coal mining sites), transportation cost of fuel remains minimum. Due to this, units of the Company could not compete with pithead plants in terms of variable cost. Comparison of fuel cost with its transportation/freight cost is given in the table below:

Table 2.6: Average coal cost, average transportation cost and average distance from colliery thermal plant wise for the period 2018-19 to 2020-21.

Sr. No.	Name of the Plant	Average coal cost (₹ Per MT)	Average Transportation cost (₹ Per MT)	Total Coal cost (₹ Per MT)	Percentage of transportation cost to total coal cost	Average distance from colliery (in KMs)
1	RGTPP	2,577	2,831	5,408	52.35	1,418
2	PTPS	2,393	2,712	5,105	53.12	1,303
3	DCRTPP	2,684	2,520	5,204	48.42	1,265

Source: Information supplied by the Company for the year 2018-19 to 2020-21

The transportation cost of coal at RGTPP and PTPS was more than the cost of coal, at 52.35 *per cent* and 53.12 *per cent* respectively. Due to comparatively lower average transportation cost of coal at DCRTPP, the plant got more chances of scheduling of power, which resulted in better PLF.

Further analysis showed instances of incorrect booking of expenditures in coal accounting (Coal Price Store Ledger) due to which variable cost was depicted higher than cost to be booked as discussed below:

2.5.1 Increase in variable cost due to incorrect booking of Operation & Maintenance (O&M) expenses in variable coal cost

The generation tariff of the Company is determined by HERC every year as per Multi-Year Tariff (MYT) Regulations, 2012. The generation tariff consists of two parts - Annual fixed charges (Capacity charges) and Variable charges (Energy Charges). The fixed cost includes Return on equity, Interest and financing charges on loan capital, Interest on working capital, Depreciation and Operation & Maintenance expenses (O&M). The Energy Charges/ variable charges comprise mainly the primary fuel (coal) cost. The landed cost of fuel for the month includes price of coal corresponding to the grade of coal inclusive of royalty, taxes and duties as applicable, transportation cost by rail/road or any other means. The fuel cost also includes normative transit/ moisture losses and handling losses as percentage of the quantity of coal dispatched by the coal supply company during the month.

The power generated from DCRTPP, RGTPP and PTPS is sold to DISCOMs of Haryana. Haryana Power Purchase Centre (HPPC), on behalf of both the

DISCOMs, prepares a merit order of variable cost of available generators and accordingly releases the generation schedule to generators on the basis of variable cost of power. Therefore, it is essential for the Company to control its variable costs to get schedule for generation of power.

At RGTPP and PTPS, the landed cost of coal for 2016-21 also included cost of internal transportation of coal amounting to ₹ 72.69 crore and ₹ 9.12 crore respectively as detailed below:

Table: 2.7: Cost of internal transportation and its handling cost

(₹ in crore)

Period	Cost of internal transportation of coal	Cost of internal coal handling (Handling Charges)	Total
RGTPP			
2016-17	1.97	24.57	26.54
2017-18	1.95	13.37	15.33
2018-19	9.05	3.98	13.02
2019-20	16.73	0.00	16.73
2020-21	1.07	0.00	1.07
Total	**30.77**	**41.92**	**72.69**
PTPS			
2016-17	2.89	0.00	2.89
2017-18	2.18	0.00	2.18
2018-19	3.04	0.00	3.04
2019-20	1.01	0.00	1.01
Total	**9.12**	**0.00**	**9.12**

Source: Information supplied by the Company for the year 2016-17 to 2020-21

The expenditure on internal transportation of coal, which was a part of Operation and Maintenance (O&M) cost of coal handling plant and therefore it was to be charged to the fixed cost in O&M expenses, was treated as a variable cost. This resulted in a higher depiction of monthly Variable Cost ranging between ₹ 0.007 to ₹ 0.40 and ₹ 0.002 to ₹ 0.045 per unit at RGTPP and PTPS respectively during 2016-21. At the same time, DCRTPP, Yamuna Nagar correctly treated O&M expenses as part of fixed cost. Had O&M cost been excluded from the variable cost at RGTPP and PTPS, they would have been better placed in merit order in respective months and avoided/ reduced backing down.

The Management replied (May 2022) that as per MYT Regulations, 2012, Energy Charge Rate (ECR) is calculated on the basis of GCV of coal on 'fired basis'. It means that it included all expenditures incurred till Boiler front. Now, as per 2nd amendment in MYT Regulations, GCV on 'As Received basis' will be considered and all the expenditure on account of same will be booked under O&M. The point stays that expenditure incurred on internal transportation of coal which should have been part of O&M of plant as booked by DCRTPP to minimize the variable cost and backing down of plants was not done at RGTPP and PTPS.

2.5.2 Loading of transit gain into monthly coal cost resulted into higher variable cost

Regulation 32 (i) of Multi Year Tariff (MYT) Regulations, 2012 provides that 'for working out the landed cost of fuel for thermal power plants, the normative transit/moisture and handling losses as percentage of the quantity of coal dispatched by the coal supply company shall be less than or equal to 1.5 *per cent'*.

Clause 10.2.1 of Coal Accounting Manual under which Coal Price Stores Ledger (CPSL) is prepared, provides that the CPSL forms an important element of coal accounting, whereby all adjustments of coal quantities (received, consumed, lost in transit and handling, etc.) as well as adjustment related to all coal payments and receipts on account of claims raised are summarised. Clause 10.2.3 provides that CPSL preparation includes adjustments on account of transit and handling loss. Clause 10.5.2 provides that actual transit loss if less than the normative transit loss, should be adjusted in the CPSL.

Scrutiny of CPSL of all the plants of the Company revealed that wherever there was transit gain or the actual transit loss was less than the normative level, the thermal plants of the Company had booked the proportionate cost of it in the CPSL despite the fact that this cost was not paid by the Company. This has resulted in increase in variable cost for such months and thus adversely impacted the schedule for generation. These plants, however, at the end of the year (in March) adjusted the net impact of such transit gain/loss lesser than normative, which reduced the variable cost of March only every year. This led to increase in monthly weighted average variable cost by ₹ 0.040 in DCRTPP, ₹ 0.051 in PTPS and ₹ 0.021 in RGTPP during the months when transit gain was noticed or transit loss was less than normative level.

The Management replied (May 2022) that whole benefit of transit gain is transferred to the DISCOMs at the end of financial year. If Company follows the process of booking of actual gain/losses on monthly basis, then it will not be beneficial either for DISCOMs or for HPGCL. The reply is not tenable because the Company gets schedule as per merit order prepared on monthly basis. Therefore, any impact of transit gain should be accounted for on monthly basis to reduce the monthly variable cost and backing down of plants.

Impact of incorrect booking of transit gain and O&M expenditure on internal transportation of cost

Audit analyzed the impact of incorrect booking of transit gain and treatment of O&M expenditure on internal transportation of cost as Variable cost and scheduling of power to HPGCL Plants as per merit order. Due to increase in

Variable Cost as a result of above wrong bookings, HPGCL plants deprived themselves of scheduling of power during 20 months which translates into loss of revenue amounting to ₹ 1,505.90 crore for generation of 4,582.41 MUs to HPGCL. Further, this also resulted into increase in power purchase cost to Haryana DISCOMs by ₹ 99.62 crore for 4,582.41 MUs.

2.6 Repair and Maintenance of Power Plants

Efficiency of the plant and equipment and their availability for power generation is dependent on adherence to annual maintenance and equipment overhauling schedules. Failure to adhere to these schedules results in higher consumption of coal, fuel oil and higher forced outages and resultant increase in the cost of power generated. These issues also have an impact on variable cost and consequently on merit order as well as impact on operationality in view of provisions of backing down and impact of the same could not be quantified in Audit. Audit findings in respect of overhauling works at Company's plants are discussed in succeeding paragraphs:

(A) Rajiv Gandhi Thermal Power Plant (RGTPP)

RGTPP has installed capacity of 1200 MW having two Units of 600 MW each which were commissioned on 24 August 2010 and 1 March 2011 respectively. As per Operational Manual of Original Equipment Manufacturer (OEM) of the plant, Class-A service i.e., Capital overhauling was required to be conducted within an interval of four to six years depending upon the operating status of the concerned unit. Audit noticed:

2.6.1 Poor execution of capital overhauling works

OEM suggested (January 2017) for capital overhauling of Turbine and Generator of Unit-I to overcome the operational problems of higher heat rate, high vibration, leakage of hydrogen from Generator.

The Company also decided (March 2017) to revive two Electro Static Precipitators (ESPs) (nos. A1 and A9) of Unit-I which were out of order due to their damaged internals. The Company accorded (April 2017) administrative approval for revival of the two damaged ESPs and overhauling of remaining 62 ESPs on open tender basis to make the plant meet the new environmental norms and also decided to carry out suggested capital overhauling.

The Board of Directors (BoDs) of the Company approved (July 2017) the capital overhauling of Unit-I to be done during January to March 2018 for a period of 60 days at an estimated cost of ₹ 43.40 crore.

The Company issued NIT for revival of two ESPs and overhauling of remaining 62 ESPs fields in October 2017 but the work order was issued only by August 2018. Thus, due to delay in award of work of ESPs, the Company had to reschedule (September 2018) the planned capital overhauling to February 2019.

The Unit suffered from technical defects repeatedly during January 2018 to December 2019 but the Company persisted with operating the plant against technical advice leading to forced outages for 92 days resulting in loss of generation of 1,124.55 MUs equivalent to ₹ 379.28 crore.

In the meantime, Company decided to schedule the Cooling Tower repair also along with capital overhauling of Unit I and awarded (23 October 2019) work for repair of cooling tower. Due to this, Capital overhauling was rescheduled to October 2019 and thereafter from 15 February 2020 to 29 April 2020 (75 days).

Audit observed that the Unit-I was under forced shut down from 23 November 2019 due to technical faults. During this forced shut down period, the Company advanced the preponed Capital Overhauling schedule (15 February 2020 to 29 April 2020) for 75 days to 16 December 2019 to 28 February 2020. However, this capital overhauling could be completed by 4 May 2020, a delay of 65 days. The Unit-I was synchronized on 7 May 2020 (by taking 143 days).

Thus, the Capital overhauling was carried out after two years and took 68 extra days than the scheduled plan. The delay in finalisation of work order for revival and overhauling of ESPs and inclusion of the repair work of cooling tower which was finalized in October 2019 were the contributing factors for the delay in scheduling the Capital Overhaul. The delay and excess time taken in overhauling had led to identifiable generation loss of 832.32 MUs valuing ₹ 296.64 crore for 68 days of Unit-I due to extra days taken in Capital Overhauling, loss of generation of 1,124.55 MUs valuing ₹ 379.28 crore due to forced shutdowns during January 2018 to December 2019. Besides, due to excess time taken in capital overhauling, the Company could not recover fixed cost of ₹ 98.34 crore from the DISCOMs.

The Management replied (May 2022) that the work was delayed due to multiple problems in Turbine and inclusion of revival work of damaged ESP & cooling towers. Further, due to Covid-19, there was delay in supply of spares from China. The reply is not tenable as Original Equipment Manufacturer (OEM) suggested for capital overhauling during 2017 itself and Management took more than two years to commence the work. The capital overhauling works should have been planned and executed in a coordinated and timely manner which could have minimized the loss of fixed cost.

2.6.2 Delay in repair of High Intermediate Pressure Rotor of Unit-II of RGTPP

The Capital overhauling of the Unit-II was scheduled from 15 February 2021 to 30 April 2021. The Unit-II was backed down from 13 September 2020 to 18 September 2020. On obtaining schedule, it was lighted up (19 September 2020) when it developed technical fault. The OEM on inspection recommended (13 October 2020) shutting down the unit and overhauling of Turbine Generator set and repair of High Intermediate Pressure Rotor (HIP Rotor).

OEM submitted (December 2020) an offer for ₹ 27.80 crore which included ₹ 9.74 crore for overhauling of the Unit and ₹ 3.08 crore for repair while ₹ 14.08 crore was for transportation of Rotor to China based OEM. The Company placed (20 February 2021) a work order to OEM for ₹ 11.25 crore (excluding transportation).

OEM after dismantlement and inspection of the damaged turbine and HIP Rotor concluded that the equipment was not repairable and suggested (March 2021) for replacement. To bring the unit operational at the earliest, the Company decided (June 2021) to procure one old HIP Rotor also.

Audit observed that Unit-II of RGTPP which was commissioned in March 2011 had remained under forced shutdown during 2013-14 also when the HIP Rotor was sent to OEM in China for repair. At that time, Rotor was within Guarantee/ warranty period, so the repair cost was borne by the Contractor. This time the same HIP Rotor was damaged but was out of warranty. The Company had however, not carried out any cost benefit analysis either go for repair or purchase a new rotor in view of high transportation cost against a very small component of repair cost and loss of fixed cost of ₹ 0.97 crore per day as well as that of generation of 12.24 MUs per day.

Company placed (July 2021) a purchase order for procurement of two HIP Rotors at a value of US $ 48.50 lakh (one fully bladed new HIP Rotor at US $ 37.50 lakh and one fully blades old HIP Rotor at US $11 lakh) i.e., at ₹ 47.74 crore[15] inclusive of taxes and duties. OEM was required to ship new HIP Rotor within 13 Months from the date of issue of PO and the old HIP Rotor was to be shipped within six Months from the date of issue of PO and after receipt of 30 *per cent* advance payment of old Rotor. HIP Rotor has been received during January 2022 but unit could not be commissioned due to non-receipt of associated spares.

Thus, fixed cost of ₹ 396.77 crore[16] could not be recovered from DISCOMs apart from loss of potential revenue for forced shutdown period.

The Management replied (May 2022) that work was delayed due to covid-19 restrictions and the HIP Rotor has been received during January 2022 but unit could not be commissioned due to non-receipt of necessary associated spares from China due to lock down restrictions. The reply is not tenable as Management should have assessed the requirement of associated spares at the time of placing purchase order for HIP Rotor so that associated material would be received along with HIP Rotor.

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15 Based on $1 = ₹ 74.05 as on 29 April 2021 as per RBI rates.

16 ₹ 132.07 crore for period 20 September 2020 to March 2021 and ₹ 264.70 crore for the period April 2021 to December 2021.

(B) Deen Bandhu Chhotu Ram Thermal Power Plant (DCRTPP)

Unit I and Unit II of DCRTPP, Yamuna Nagar were commissioned in April 2008 and June 2008 respectively. The overhauling of these units was carried out by the OEM during 2012-13 and Units were re-commissioned on 5 February 2013 and 5 September 2013 respectively. The OEM had specified that Capital overhauling period for turbine ranged between four to six years. Accordingly, the Company planned for Capital overhauling of both Units during 2016-17 to 2017-18. The administrative approval of Capital Overhauling of both the Units were granted (December 2016) by Board of Directors (BoDs). The Company had also included work of revival and repair of Electrostatic Precipitators (ESP) during Capital Overhauling to comply with the environment norms.

The Company issued work order on OEM for capital overhauling of Turbine and Generator of both the Units with a contract cost of ₹ 9.19 crore in January 2018. Audit observed:

2.6.3 Capital overhauling of Unit I

Capital Overhauling works of Unit I, planned for 12 March 2016 to 10 May 2016, could not be finalised timely and the work order could be issued only on 9 January 2018. At the same time the work of revival and repair of ESP was decided to be executed. The Company awarded (October 2017) this work to a firm at a cost of ₹ 27.61 crore which took about four months for arranging the ESP spares from the time of issue of letter of intent (September 2017) further delaying the Overhauling schedule. The Capital Overhauling time of Unit-I was re-scheduled from 1 February 2018 to 1 April 2018.

Thus, the delay of 22 months in awarding the Capital Overhauling work of Unit I and ESP Revival and repair work pushed the Capital overhauling scheduled date from May 2016 to February 2018.

Further, insulation and cladding works at Turbine Generator I and II, Boiler Maintenance Division I and II, areas and their auxiliaries' area were awarded on 14 March 2018 (after 41 days from the start of Capital Overhauling of Unit-I) with a schedule completion period of 60 days. This contributed to overall delay in capital overhauling work which was eventually completed on 5 May 2018 by taking extra 34 days than planned.

Company noticed (May 2018) other technical abnormalities in Unit-I subsequent to overhauling which required shutting down of the Unit-I for 30 days. After shutdown undertaken (8 October 2018), the Unit-I was synchronised on 19 December 2018 after repairs. The Unit-I remained shut for further 72 days (i.e., 8 October 2018 to 19 December 2018) after Capital overhauling w.e.f. 1 February 2018 to 5 May 2018 (94 days).

Thus, Capital Overhauling of Unit-I carried out after delay of 22 months and taking 34 extra days than planned resulted in generation loss of 208.08 MUs equivalent to ₹ 70.96 crore for 34 days of Unit-I. The Company also could not recover fixed cost of ₹ 39.03 crore from the DISCOMs.

The Management replied (May 2022) that work was delayed due to late award of capital overhauling/ESP works because some works were awarded on propriety basis and some through NITs. Further, for awarding the contract lots of procedures/approvals were required. The reply is not tenable as Management was aware about the time required/necessary approvals for tendering/propriety basis and issue of Work orders.

2.6.4 Capital overhauling of Unit II

Capital Overhauling work of Unit II was planned during 12 May 2017 to 10 July 2017 (60 days). The schedule was revised multiple times and finally 1 November 2019 to 14 January 2020 (75 days). The capital overhauling work was eventually carried out between 1 November 2019 and 10 February 2020 (102 days) taking 42 days more than the planned period. The work of revival and repair of ESP was also included in Capital Overhauling work. The delay was attributed to:

- Capital overhauling work of Unit I was delayed up to February 2018 which delayed start of Capital Overhauling of Unit II.
- The Company had planned Capital Overhauling during peak summer/ paddy season of April-June and July-September during 2018 and 2019 respectively which was not allowed by Haryana Power Purchase Centre (HPPC). Accordingly, Capital Overhauling of Unit-II was delayed.
- Insulation and cladding work at Turbine Generator I and II, Boiler Maintenance Division I and II areas and their auxiliaries' area was also required to be carried out during Capital overhauling of these units. The work was awarded on 14 March 2018 with a schedule completion period of 60 days. The validity of the rates was for one year i.e. up to March 2019. The Company could not start work of Capital Overhauling of Unit II during the period in which rate of insulation and cladding work was valid. Accordingly, Company floated a new NIT and re-awarded (19 December 2019) (after a delay of 49 days from planned Capital Overhauling of Unit II).

Thus, Capital Overhauling of Unit II was carried out after delay of 29 months and took 42 extra days than original planned 60 days and 27 days extra from revised plan due to awarding of various works[17] of Capital Overhauling and related works at different time intervals and planning of overhauling during

[17] Award of Capital Overhauling work, re-awarding of Insulation & Cladding work to and non-availability of shut down from HPPC during paddy/summer season.

peak season due to ill planning by the Company. This resulted in generation loss of 165.24 MUs equivalent to ₹ 55.19 crore for 27 days of Unit-II of 300 MW due to extra days taken in Capital Overhauling. The Company could not recover fixed cost of ₹ 48.82 crore also from the DISCOMs.

The Management replied (May 2022) that work was delayed due to latein award of ESP revival work and delay in completion of capital overhauling of Unit-1. Reply is not tenable as reasons for delay could have been avoided had the Company awarded the works as per capital overhauling plan.

(C) Panipat Thermal Power Station

2.6.5 Avoidable expenditure due to deficient terms and conditions of the Operation and Maintenance contract

The Company awarded (July 2014) work for complete operation and maintenance of two Coal Handling Plants (CHP-II for Units V & VI and CHP-III for Units VII & VIII) along with other allied works at Panipat Thermal Power Station (PTPS) for the period of three years from August 2014 to July 2017 at the following rates:

Table 2.8: Details of period and cost of O&M contract

Sr. No.	Year	Period	Rate per annum (excluding taxes) (₹ in crore)
1	First Year	1 August 2014 to 31 July 2015	22.00
2	Second Year	1 August 2015 to 31 July 2016	23.10
3	Third Year	1 August 2016 to 31 July 2017	24.20
Total amount for three years (exclusive of taxes)			**69.30**

Source: Compiled from the records of company.

Haryana Electricity Regulatory Commission in its tariff order for the year 2016-17, reduced the normative PLF from 60 to 35 *per cent* and normative O&M expenses by considering the low level of PLF achieved by Unit V and VI. The Company, therefore, decided (June 2016) to foreclose the contract to keep the O&M cost within norms and also float fresh NIT with revised scope of work. Accordingly, the Company reduced the scope of work[18] as per HERC norms with an estimated value ₹ 14.08 crore p.a. (41.80 *per cent* less than the contract value of ₹ 24.20 crore p.a.). Thereafter, NIT was floated (October 2016) and offered rate of L-I firm of ₹ 13.14 crore p.a. was received. Audit scrutiny revealed that as there was no clause for foreclosing the contract in the existing work order and the Company did not issue fresh work order during January 2017 to July 2017.

The Company held negotiations with the firm for reduction in existing rates who offered (September 2016) a rebate of ₹ 4.20 crore per annum as per

[18] By taking 35 *per cent* PLF of Units V and VI and 85 *per cent* PLF of Units VII and VIII.

revised scope of work with the condition that the existing work order may be extended for further two years (4th and 5th year) at the revised offered rate i.e. ₹ 20 crore (₹ 24.20 crore minus rebate of ₹ 4.20 crore). The Company analysed offered rates were still on higher side and decided not to accept the revised offer.

Audit observed that while deciding the terms and conditions of a contract, Company had not inserted the enforceable clauses of reduction in scope of work and foreclosure. Accordingly, Company had to pay at higher rates (₹ 24.20 crore p.a.) to the firm despite receipt of reduced rates of ₹ 13.14 crore p.a. in January 2017.

Thus, due to deficient terms and conditions of the O&M Contract, the Company could not foreclose the contract and had to pay ₹ 13.48 crore to the firm during February to July 2017 against ₹ 7.39 crore as per lowest rates discovered. This has resulted in avoidable expenditure of ₹ 6.09 crore and the ultimate burden was passed to the consumers

The Management replied (May 2022) that there was no clause in the contract to close the contract intermittently. Further, the contract was made considering the power deficit scenario in the State. Audit is of the view that suitable clauses for short closure/reduction in scope of work should have been incorporated keeping in view the scenario of decreasing PLF and age of Units V and VI of PTPS.

(D) Western Yamuna Canal Hydro Electric Project

2.6.6 Delay in overhauling work of machines due to acceptance of non-interchangeable blades resulted into loss of green energy

The Company had commissioned four Power Houses namely A, B, C and D during 1986, 1987, 1989 and 2004 respectively at Western Yamuna Canal (WYC) Hydro Electric project at Bhudkalan, Yamuna Nagar with a total capacity of 62.4 MW. The Machines B1, C1 and C2 were running on partial load and to improve their efficiency, the Company placed (October 2015) a Purchase Order (PO) for purchase of four sets of runner blades on the OEM[19] at a cost of ₹ 8.48 crore for the capital overhauling of Machines. The supplied material was to be identical and interchangeable amongst the different machines. The Guarantee/warranty period was 12 months from the date when the product was put to use or 18 months from the date of dispatch whichever was earlier. The material supplied during July & September 2016 certified that all the components and equipments were identical in construction, interchangeable and suitable to the equipments already installed at WYC, Hydel Yamuna Nagar. The following was observed:

[19] M/s Voith Hydro Pvt limited.

Overhauling of Machine B-1

The Company issued work order (November 2017) for Capital overhauling of Machine B-1 to a contractor which was carried out from 8 December 2017 to 7 March 2018. The Company observed (March 2018) that despite Capital Overhauling, the Machine could achieve load of six MW only against the desired load of 7.5 MW. The low generation was taken up (March 2018) with contractor who attributed it to fault in new runner blades supplied by OEM. It was then observed that new blades procured from OEM were not identical/inter-changeable as certified and needed technical adjustment from the supplier/ OEM. As a result, despite its capital overhauling, the desired load could not be achieved and machine B-1 kept running on partial load of six MW.

Audit observed that despite knowing this fact, Company did not make any efforts to get the blades of Machine B-1 replaced from the OEM and let the machine B-1 to perform at lower load (April 2018 to June 2021) which resulted in generation loss of 27.336 MUs of green energy.

Overhauling of Machine C-1

Thereafter, during December 2017, the Company issued another work order for Repair Modernisation and Upgradation (RM&U) of turbine and generator of Machines C1 and C2 to a firm. The machine C1 was given to the firm on 13 March 2018 with scheduled date of completion as 12 September 2018. As the blades were not inter-changeable, the Company sent (May 2018) them to OEM for carrying out technical adjustment which were received back in December 2018. Due to this reason, C-1 Machine could be commissioned on 25 January 2019 with a delay of 134 days. It was observed that after overhauling the Machine successfully achieved the desired load level of 7.5 MW, but the delay in commissioning of machine resulted in generation loss of 15.44 MUs of green energy.

Overhauling of Machine C-2

Audit noticed that despite successful completion of RM&U work at Machine C-1 in January 2019, the Company took almost one year for providing site for overhauling work of C-2 machine. The work of overhauling of C-2 Machine was started by 17 January 2020 with scheduled date of completion as 16 July 2020. However, the work of overhauling was yet to be completed (July 2021). The main reasons for delay were extra repair work carried out by the firm on the non-inter-changeable blades supplied by OEM and spread of Covid-19 pandemic.

Table 2.9: Details of period of capital overhauling contract

Reasons for delay	Period	Period
Total period from the commencement of work	17 January 2020 to 17 July 2021	18 months
Delay on account of COVID	March to May- 2020 March to May- 2021	6 Months
Period allowed to firm		6 months
Delay till July 2021		**6 months**

Source: Compiled from the records of company.

Delayed completion of overhauling work of machine C-2 resulted in loss of generation 21.0275 MUs of green energy.

Therefore, there was total generation loss of 63.80 MUs of green energy valuing ₹ 30.73 crore in respect of all the three Machines due to acceptance of non-inter-changeable blades and delay in completion of overhauling work in Machine B-1, C-1 and C-2. Further, the Company had to bear higher inventory carrying cost due to delayed utilisation of runner blades. It was further observed that although fixed cost of hydel project was recovered by the Company by achieving the normative PLF, but due to lesser generation, DISCOMs had to purchase 63.80 MUs of power from other sources which resulted into extra burden to the extent of ₹ 30.73 crore[20] on the state consumers.

The Management replied (May 2022) that the matter was pursued with the OEM and correction work on blades in all three machines has now been completed and machines are running at full load. The reply is not tenable as Management took more than two years in taking corrective action after detection of fitment issues during March 2018 which resulted in generation loss of green energy.

2.7 Conclusion

The generation of the Company declined from 10,567.83 MUs in 2017-18 to 5,466.81 MUs in 2020-21, even far below the normative generation approved by the HERC and the shortfall ranged between 42.61 to 69.24 *per cent* during 2017-21. The main reason for low generation was higher variable cost of thermal power stations which resulted in backing down of plants.

The Plant Load Factor in respect of all units of the Company decreased substantially due to forced outages on account of various technical problems, poor planning in execution of works pertaining to capital overhauling. Due to non-achievement of normative PLF, Company could not recover fixed cost of ₹ 390.94 crore during 2016-21 from the DISCOMs. The Company lost the opportunity to earn potential revenue of ₹ 15,576.80 crore on non-production

[20] Calculated on the basis of DPR data 42.055 MUs per year @ 7.5 MW Load of machine B-1, C-1 and C-2 and average power purchase cost of respective years.

of 49,559.73 MUs of power during 2016-21 due to non-achievement of normative PLF.

As per merit order, plants of the Company were one of expensive plants amongst the 33 Power plants for which merit order is prepared by DISCOMs. Their ranks in merit order ranged between 1st and 13th during 2016-17 to 2020-21 Thus, the position of the thermal plants in merit order deteriorated due to which the Company lost opportunity of earning potential revenue of ₹ 13,449.61 crore by not generating 38,862.43 MUs of power. Further, due to higher transportation cost of coal the units of the Company could not compete with Pithead plants in terms of variable cost. The deficiency in coal accounting and O&M further accentuated the adverse impact on merit order. The consistent poor performance on O&M processes by the Company and deficient coal accounting carries the risk of it being by design in place of inefficiencies as competitors in the merit order include six private entities.

The HIP Rotor of Unit-II of RGTPP got damaged (September 2020) due to irregular loading pattern, frequent start and stop operations. The Company had however, not carried out any cost benefit analysis either go for repair or purchase a new rotor in view of high transportation cost against the small amount on repair cost and loss of fixed cost of ₹ 0.97 crore per day besides loss of generation of 12.24 MUs per day. The HIP Rotor has not been replaced as yet (December 2021) resulting in non-recovery of fixed cost of ₹ 396.77 crore from the DISCOMs.

The Company has suffered generation loss of 63.80 MUs of green energy valuing ₹ 30.73 crore in respect of Western Yamuna Canal Hydro Electric Project due to acceptance of non-inter-changeable blades and delay in completion of overhauling work of Machines. Due to lesser generation, DISCOMs had to purchase 63.80 MUs of power from other sources which resulted into extra burden to the extent of ₹ 30.73 crore on the State consumers.

2.8 Recommendations

- The Company needs to control variable cost of its thermal plants for generation of power to get schedule for generation of power from the DISCOMs.
- The overhauling of the generating plants may be planned in accordance with recommendations of original equipment manufacturers and scheduled in a manner as to minimise forced outages.
- The Company must carry out cost benefit analysis to decide whether to go for repair of its capital equipments or purchase new equipment.

Chapter 3

Fuel and Inventory Management

Chapter 3

Fuel and Inventory Management

Fuel cost is the major component of the total cost of the power generation. Optimization of the fuel cost through effective and efficient planning of procurement and consumption is therefore necessary to generate electricity at economical rates. Audit findings in fuel management are discussed as under.

3.1 Excess consumption of coal

The consumption of coal depends upon its Gross Calorific Value (GCV) and efficiency of thermal plant. Lesser GCV of coal and higher Station Heat Rate[1] (SHR) of plant would result into higher consumption of coal. HERC determines normative coal consumption every year through its tariff orders keeping in view the average GCV of coal received at plant and SHR of plant during previous year. Audit analysed the coal consumption pattern of all the three power plants of Company and found that it was within the norms approved by HERC at all units except at RGTPP (Unit-II) during 2019-20 and 2020-21 as detailed below:

Table 3.1: Details showing normative consumption of coal vis-à-vis actual consumption of coal

Year	GCV of Coal		Power generation (in MUs)	Normative coal consumption for actual generation (in MT)	Actual coal consumption (in MT)	Excess coal consumption (in MT)	Coal cost per MT	Excess coal cost (₹ in crore)
	Approved	Actual						
2019-20	3,641	3,461	1,547.17	10,74,189.22[2]	10,88,244.96	14,055.74	4,879	6.86
2020-21	3,539	3,378	405.92	2,90,616.81[3]	2,93,776.31	3,159.50	5,142	1.62
Total						**17,215.24**		**8.48**

Source: Information supplied by the Company and HERC Tariff orders

It was observed that coal consumption was higher than HERC norms due to low GCV of coal and reduced efficiency of plant. Actual GCV of coal received was 3,461 and 3,378 against the norms of 3,641 and 3,539 during 2019-20 and 2020-21 respectively. Also, SHR of plant remained higher during this period at 2,442 and 2,461 kcal/kwh against the norms of 2,387 kcal/kwh (refer table 2.5 of Chapter 2). Audit also observed that Unit-II remained under shutdown due to damage of rotor during 2013 and now since September 2020. This resulted in excess consumption of coal of 17,215.24 MT valuing ₹ 8.48 crore during 2019-21. The cost of excess coal consumed was a direct loss to the Company as it could not be recovered through tariff.

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1 Station Heat Rate (SHR) indicates the amount of fuel (heat) required to generate one unit of electricity.

2 Worked out in proportion to normative coal consumption of 29,15,711 MT for production of 4,199.54 MUs of power.

3 Worked out in proportion to normative coal consumption of 30,06,644 MT for production of 4,199.54 MUs of power.

The Management replied (May 2022) that they had to bear losses as per prevalent regulations. Now the regulations has been revised (March 2022) by HERC, therefore, further losses on account of excess coal consumption will be claimed and recovered through tariff. However, the fact remained that the company failed to adhere to the coal consumption norms during 2016-21 and suffered losses.

3.2 Excess consumption of Secondary fuel

Apart from coal, diesel and furnace oil are also used as secondary fuel to light up the boiler in thermal power plants. The consumption of fuel oil is directly proportional to number of starts/ stops of plant. HERC had fixed normative consumption rate (ml/kwh) for fuel oil for each year in respect of all the thermal power plant of the Company. The position of actual consumption of fuel oil vis-à-vis HERC norms in respect of Units having excess consumption was as under:

Table 3.2: Details showing normative consumption vis-à-vis actual consumption of oil

Name of the Plant	Unit	Year	Actual generation (In MUs)	Specific oil consumption (ml/kwh)			Total excess consumption (in KL)	Cost per KL as approved by HERC	Total cost (₹ in crore)
				Approved by HERC	Actual	Excess			
RGTPP	I	2020-21	1,230.98	0.5	0.649	0.149	183.41	51,156.00	0.93
	II		405.93	0.5	1.700	1.200	487.11	51,156.00	2.49
	Total (A)						**670.52**		**3.42**
PTPS	V	2016-17	169.215	1	2.22	1.22	206.44	39,255.58	0.81
		2017-18	140.77	1	4.04	3.04	427.94	38,880.01	1.66
		2018-19	176.752	1	2.94	1.94	342.90	31,285.00	1.07
	VI	2016-17	219.542	1	2.11	1.11	243.69	39,255.58	0.96
		2017-18	373.687	1	2.60	1.60	597.90	38,880.01	2.32
		2018-19	324.001	1	1.77	0.77	249.48	31,285.00	0.78
		2020-21	51.928	1	5.17	4.17	216.54	51,515.00	1.12
	VII	2020-21	619.476	0.5	0.96	0.46	284.96	51,515.00	1.47
	VIII	2016-17	690.272	1	1.02	0.02	13.81	39,255.58	0.05
		2017-18	787.366	1	1.26	0.26	204.72	38,880.01	0.80
		2020-21	547.078	0.5	0.92	0.42	229.77	51,515.00	1.18
	Total (B)						**3,018.15**		**12.22**
Grand Total (A+B)							**3,688.67**		**15.64**

Source: Information supplied by the Company and HERC Tariff orders

There was excess expenditure of ₹ 15.64 crore on account of excess consumption of secondary fuel during the period 2016-21. The main reasons for higher consumption were low PLF due to less scheduling on account of higher variable cost and more numbers of start/stop operations and tripping on account of forced outages. PTPS consumed excess secondary fuel worth ₹ 12.22 crore due to its older units[4].

The Management replied (May 2022) that reasons for excess fuel consumption were frequent start/stops due to excessive backing down and oil used during testing/balancing of Rotor. The reply is not tenable as frequent starts/stops are

[4] Year of installation of PTPS Unit VI-2001, Unit VII-2004, Unit VIII-2005, DCRTPP Unit 1 & II-2008, RGTPP Unit 1-2010, Unit II-2011.

on account of backing down instructions due to higher variable cost of generation. Management should take action to reduce its variable cost by optimizing fuel linkage and timely maintenance/overhauling of plants.

3.3 Unsettled quantity and quality claims

The Company entered into Fuel Supply Agreements (FSA) with the coal Companies i.e. Central Coalfields Limited (CCL), Mahanadi Coalfields Limited (MCL), Northern Coalfields Limited (NCL) and Eastern Coalfields Limited (ECL) for supply of coal. The FSA provided that the seller would raise source-wise bills for the coal supplied to the purchaser on declared graded basis within seven days of delivery of coal. Procedures regarding raising of bills, quality and quantity claims on account of grade slippage, under loading/overloading, short supplies, stones etc. have been prescribed in FSA. Quantity claims consisted of mainly under loading claims and claims on short delivery of coal. Quality claims involved claims on account of grade slippage and claims on account of un-sampled rakes from the colliery end.

It was observed that quantity claims of ₹ 494.32 crore and quality claims of ₹ 270.50 crore raised by the Company with coal supply companies were pending as at the end of March 2021. Following table indicates year wise detail of claim lodged, recovered and pending during 2016-21:

Table 3.3: Details showing status of quantity and quality claims in respect of coal

(₹ in crore)

Financial Year	Claims outstanding at the beginning of year	Claims lodged during the year	Claims reconciled during the year	Claims realised during the year	Claims outstanding at the end of the year
	A	B	C	E	F=A+B-C
A. Quantity Claims					
2016-17	94.24	29.57	14.66	14.66	109.15
2017-18	109.15	117.25	3.57	3.57	222.83
2018-19	222.83	31.46	2.75	2.75	251.54
2019-20	251.54	234.94	0.70	0.02	485.78
2020-21	485.78	8.52	0	0	494.30
Total		**421.74**	**21.68**		
B. Quality Claims					
2016-17	49.21	109.76	12.69	8.79	146.28
2017-18	146.28	232.64	60.31	51.94	318.61
2018-19	318.61	157.27	142.15	95.66	333.73
2019-20	333.73	97.45	149.97	47.82	281.21
2020-21	281.21	28.59	39.3	13.12	270.50
Total		**625.71**	**404.42**		

Source: Information supplied by the Company

The Company could reconcile quantity claims of only ₹ 21.68 crore (5.14 *per cent*) against the total claims of ₹ 421.74 crore lodged with the coal companies. The Company had not reconciled any claims during 2020-21.

The reconciliation of quality claims increased during 2016 to 2020 but was low during 2020-21.

The matter for recovery of claims of ₹ 477.86 crore for quantity claims and ₹ 158.21 crore for quality claims were pending with Committee of Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD) as on 28 February 2021. It was observed that claims had increased year upon year. Delay in settlement of claims resulted into blockade of funds leading to higher working capital loans by the Company. Besides, timely realisation of claims could have reduced variable cost of generation as the value of claims received is deducted from the total cost shown in coal price store ledger. It is recommended that the Company should make efforts to settle/ realise the coal claims at the earliest.

Some of the major claims are discussed below:

3.3.1 Non-recovery of compensation for short supplies of Coal.

The Company entered into a Fuel Supply Agreement (FSA) with six[5] coal companies. The FSA provided that if for a year, the Level of Delivery by the seller, or the Level of Lifting by the purchaser fell below Annual Contracted Quantity (ACQ) with respect to that year, the defaulting party would be liable to pay compensation to the other party for such shortfall in Level of Delivery or Level of Lifting, as the case may be (Failed Quantity). The applicable clause for compensation is as under:

Table 3.4: Rate of compensation for the failed quantity as per level of delivery/lifting of coal

Sr. No.	Level of Delivery/ Lifting of Coal in a year	Rate of Compensation for the failed quantity
1	Less than 100 *per cent* but up to 90 *per cent* of ACQ	Nil
2	Below 90 *per cent* but up to 85 *per cent* of ACQ	10 *per cent*
3	Below 85 *per cent* but up to 80 *per cent* of ACQ	20 *per cent*
4	Below 80 *per cent* of ACQ	40 *per cent*

Source: Information extracted from the Fuel Supply Agreements of the Coal Companies

Details of Annual Contracted Quantity, actual quantity received, short supply by the coal companies and compensation for short supply to be received by the Company were as under:

Table 3.5: Annual Contracted Quantity, actual quantity and amount of short supply compensation to be recovered from coal companies

Year	ACQ (in lakh Metric Tonne)	Actual Quantity received (in lakh Metric Tonne)	Short supply of Coal		Amount of Compensation for Short supply of coal (₹ in crore)
			in lakh Metric Tonne	In *per cent*	
DCRTPP at Yamuna Nagar					
Name of the coal company: Central Coalfields Limited					
2011-12	28	22.89	5.11	18.25	3.49
2014-15	28	19.84	8.16	29.15	18.03
2017-18	28	18.56	9.44	33.71	24.09
2018-19	28	17.62	10.38	37.07	34.27
2019-20	28	22.25	5.75	20.53	7.01
Total (A)					**86.89**

[5] M/s CCL, M/s MCL, M/s ECL, M/s NCL, M/s BCCL and M/s WCL.

Year	ACQ (in lakh Metric Tonne)	Actual Quantity received (in lakh Metric Tonne)	Short supply of Coal		Amount of Compensation for Short supply of coal (₹ in crore)
			in lakh Metric Tonne	In *per cent*	
RGTPP at Khedar					
Name of the coal company: Central Coalfields Limited					
2017-18	13.02	7.04	5.98	45.92	3.38
2018-19	13.02	5.03	7.99	61.36	9.34
2019-20	13.02	9.01	4.01	30.80	0.02
Name of the Coal company: Northern Coalfields Company Limited					
2017-18	15	8.44	6.56	43.73	2.68
2019-20	15	8.10	6.91	46.07	3.36
Name of the company: Mahanadi Coal Limited					
2018-19	25.6	8.45	17.15	66.99	1.62
Total (B)					**20.40**
Panipat Thermal Power Station at Panipat					
Name of the coal company: Central Coalfields Limited					
2017-18	26.65	5.50	21.15	79.36	98.60
2018-19	26.65	15.09	11.56	43.37	43.70
Name of the coal company: Western Coalfields Limited					
2017-18	3	0.84	2.16	71.97	9.70
2018-19	3	1.07	1.93	64.48	8.65
Total (C)					**160.65**
Grand Total (A+B+C)					**267.94**

Source: Fuel Supply Agreements with the Coal Companies and information supplied by the Company

Out of total claims of ₹ 267.94 crore during 2011-12 to 2019-20 as much as ₹ 241.92 crore (90 *per cent)* were recoverable from CCL as there was continuous short supply (average 38.53 *per cent)* of coal by CCL. The Company referred (May 2020) the matter of non-payment by coal companies to AMRCD, the response of which was awaited (March 2021). However, Company does not account for these recoverables in its annual financial statements.

Further scrutiny revealed that due to short supply of coal at RGTPP and PTPS, the units of these plants remained shut down for 38 days during August 2017 to March 2018 due to which these units could not achieve their normative PLF and failed to earn fixed cost of ₹ 36.45 crore (₹ 25.70 crore in RGTPP and ₹ 10.70 crore in PTPS).

The Management informed (May 2022) that in order to realize the pending claims, a committee comprising officers from all three power plants had been constituted (April 2019) which visited coal companies regularly for resolving the pending claims. In addition the matter regarding non-settlement of the claims was referred to Alternative Dispute Resolution Mechanism (ADRM) which was wound up during December 2018. Thereafter, a new forum i.e. Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD) was constituted by Government of India, Ministry of Coal in place of ADRM to resolve the pending claims and decision of the same is awaited (May 2022).

3.3.2 Non-receipt of quality claims on un-sampled rakes.

DCRTPP, Yamuna Nagar was receiving coal supplies from Central Coalfields Limited (CCL) with Annual Contracted Quantity of 28 lakh MT. The FSA provided for seller to raise source-wise bills for the coal supplied on declared grade basis within seven days of delivery. The samples of coal were to be taken jointly at loading point for assessment of the quality of the coal. The FSA also provided for CCL to give regular credit note on account of grade slippage to the extent of difference of the base price of declared grade and analysed grade of coal.

On the petition regarding various coal claims of the Company, the Alternative Dispute Resolution Mechanism[6] (ADRM) decided (May 2016) that for validating the grade slippage claims, third party coal sampling would be done by Central Institute of Mining and Fuel Research (CIMFR) at the loading end in the presence of the both the parties for avoiding disputes. Accordingly, a tripartite agreement between the Company, CCL and CIMFR was executed (September 2016) for sample collection, preparation, testing and analysis of coal at loading end. Clause 1 of the tripartite agreement, provided that CIMFR would be wholly responsible for collection, preparation and analysis of coal in respect of applicable FSA's. Clause 8 of the agreement further provided that CIMFR would hand over part of coal sample at loading ends to authorized representative of Company or any other agency deployed by Company. Clause 13 further provided that the collection and preparation of sample would be witnessed by the representatives of the Coal Company and the Thermal Plant. The Company appointed (June 2015) a coal handling agent for witnessing the sampling of coal on its behalf. The work of liaison with Coal Company, Railways and other agencies in connection with dispatch of coal was also within the scope of the coal handling agent.

It was observed that CIMFR could not take samples from 291 rakes dispatched during November 2016 to August 2018. CIMFR failed to collect all samples during initial period (November 2016 to June 2017) due to lack of coordination between Coal Handling Agent and CIMFR. Further, during June 2018 to August 2018, coal was dispatched from a new siding (KUJU) from which rakes were dispatched un-sampled due to lack of coordination between CIMFR and Coal Handling Agent.

Accordingly, quality analysis of coal at loading point was not carried out by the CIMFR. However, Company prepared grade slippage claims of such un-sampled coal rakes on the basis of coal sampling analysis done at unloading end as detailed below:

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[6] Earlier claims settlement mechanism set up by the Ministry of Coal, Government of India.

Table 3.6: Un-sampled rakes received from the coal company and claims thereof

Sr. No.	Period of receipt of rakes		Total number of un-sampled rakes received	Name of coal company	Month of raising claim	Amount of claims (₹ in crore)
	From	To				
1	November 2016	June 2017	135	M/s CCL	November 2017	19.04
2	June 2018	August 2018	149	M/s CCL	October 2018	27.99
3	November 2016	June 2017	7	M/s MCL	November 2017	1.03
	Total		**291**			**48.06**

Source: Records of the Company relating to coal claims

It was observed that despite appointment of sampling agency (CIMFR) and engagement of Coal Handling Agent for supervision of loading of coal at various sites of the coal companies, sampling of coal rakes dispatched to Company was erratic during November 2016 to August 2018. The Company had not incorporated any penalty clause in the agreement (with CIMFR) in case of a rake goes un-sampled.

Due to non-availability of loading end sampling analysis reports, the grade slippage claims were not processed as per the orders of AMRCD, and no credit note was received from the coal companies. Hence, the claims amounting to ₹ 48.06 crore continue to be pending (December 2021) with the coal companies.

The Management replied (May 2022) that initially CIMFR could not start sampling at all the collieries/sidings due to improper sampling conditions. However, DCRTPP is insisting CCL for settling of claims on declared grade basis and the matter is also being taken up before AMRCD.

3.3.3 Non-recovery of compensation pertaining to idle freight

Coal is transported to the Thermal Power Plants of the Company through Railways for which it charges freight on the basis of Permissible Carrying Capacity [7](PCC) of the wagon. As per FSA, any penal freight for overloading charged by the Railways for any consignment was payable by the Purchaser (Company) and any idle freight for under loading below the Stenciled Carrying Capacity[8] (SCC) as shown on the wagon or Carrying Capacity[9] (CC) based on the actual tare weight[10] as the case may be, plus two tones were to be borne by the seller i.e., Coal Company.

Audit observed that PCC was not mentioned in Fuel Supply Agreement between the Company and Coal Companies on which the Railway Charge freight. Further, the FSA was not clear about the capacity to be taken for

7 Permissible Carrying Capacity is the maximum carrying capacity of wagon decided by Railways on the basis of various factors such as route and type of commodity to be carried.

8 Stencilled Carrying Capacity is 'marked capacity' of the wagon.

9 The carrying capacity (CC) of a wagon is based upon the load that the axles of the wagon can carry

10 Tare weight is the weight of an empty container.

underloading claims as the Company was taking the CC for raising its claims but the coal companies were considering SCC for reimbursement of claims.

For example:

Let Permissible Carrying Capacity (PCC) be = 70 T, Carrying Capacity (CC) = 66 T, Stenciled Carrying Capacity (SCC)=64 T and Actual Weight = 60 T

In this case,

- Freight charged by Railways = 70 T
- Idle Freight under loading charges claimed by the Company from Coal Companies = (CC+2)- Actual Weight = (66+2) – 60 = 8 T
- Idle Freight / under loading charges reimbursed by Coal Companies = (SCC+2) - Actual Weight = (64+2) – 60 = 6 T

The company raised claims of ₹ 99.60 crore on account of idle freight during April 2016 to March 2021 as detailed below:

Table 3.7: Details showing claims in respect of idle freight

(₹ in crore)

Period	CCL	BCCL	NCL	MCL	ECL	WCL	Total
2016-17	17.76	1.74	4.68	1.81	0.00	0.70	26.69
2017-18	9.01	4.45	3.42	1.19	1.41	0.44	19.92
2018-19	10.41	6.62	5.20	5.98	1.62	0.43	30.26
2019-20	9.36	3.41	1.83	4.63	0.21	0.35	19.79
2020-21	2.49	0.06	0.23	0.09	0.07	0.00	2.94
Total	**49.03**	**16.28**	**15.36**	**13.70**	**3.31**	**1.92**	**99.60**

Source: Information received from the Company

As FSA was not clear about the capacity to be taken for underloading claims, the claims of ₹ 99.60 crore were not accepted by coal companies (December 2021).

Thus, while entering into Fuel Supply Agreement with the coal company, Company should have incorporated suitable unambiguous provisions to claim the idle freight charges.

The Management replied (May 2022) that the matter regarding non-settlement of the claims were also referred to Alternative Dispute Resolution Mechanism (ADRM) which was wound up during December 2018. Thereafter, a new forum i.e. AMRCD was constituted in place of ADRM to resolve the pending claims and decision of the same is awaited (May 2022).

3.4 Non-recovery of differential freight paid to Railways for diverted rakes

Railway Board, Ministry of Railways, Government of India issued (January 2014) revised rules and procedure regarding diversion of coal rakes while in transit. As per Para 29 of these rules, the concerned Office of Railway would take initiative of refund of differential freight after receipt of notice made by the party. Further, Section 106 (3) of the Indian Railways Act, 1989 provided

that a person would not be entitled to a refund of an overcharge in respect of goods carried by Railway unless a notice had been served by him or on his behalf to the Railways within six months from the date of such payment or the date of delivery of such goods at the destination station, whichever was later.

The Coal Companies supply coal at Company's power stations i.e. PTPS, Panipat, DCRTPP, Yamuna Nagar and RGTPP, Hisar through rail mode. A tripartite agreement was entered into in this regard with Indian Railways. The distance and freight from the coal mines to RGTPP, Hisar was maximum amongst these plants. The freight payable for any rake consigned to any plant was automatically debited by Railways from bank account of Company. If any rake was diverted to any other plant of Company, the differential freight became due for refund.

Audit scrutiny revealed that 184 rakes were diverted from RGTPP Hisar plant to other power plants (175 rakes to PTPS and nine rakes to DCRTPP) during December 2015 to March 2021. Accordingly, differential freight of ₹ 8.43 crore was due for refund from Railways, ₹ one crore was refunded by Railway and ₹ 7.43 crore remained to be recovered from Indian Railways as of September 2021. The request of the Company for refund of excess freight paid amounting to ₹ 0.78 crore in 33 cases was rejected by Railways on the ground that these cases were preferred after expiry of stipulated time i.e. six months as per provision under Section 106 (3) of Railway Act 1989 and were time barred.

Thus, lack of initiation of timely action for lodging claims for diverted rakes by RGTPP plant resulted in rejection of claims of ₹ 0.78 crore apart from risk of non-realization of others claims amounting to ₹ 6.65 crore[11] (September 2021).

The Management replied (May 2022) that HPGCL had requested Railway Board, Delhi to intervene into the matter.

3.5 Inventory Management and Procurement of spares

3.5.1 Inventory Management

HPGCL Purchase and Works Regulations, 2015, requires that the indents for purchase of items should be raised after the quantity in stock has reached at the "Re-Order Level" as determined for the respective items. Such indents/ requisitions, amongst other particulars, should also indicate Re-Order Quantity, Stock-in-hand (while considering the stock in hand it should be ensured that no item has been kept reserved for any specific use), pending Purchase Orders, Consumption statistics, safety stocks etc. One time purchase for projects or capital equipments/spares should be properly justified. Obsolescence factor should also be taken into account i.e., the equipment to be

[11] ₹ 7.43 crore minus ₹ 0.78 crore = ₹ 6.65 crore.

purchased should conform to the latest specifications and technology available in the market.

Scrutiny of records revealed the following points:

- All the three plants did not prepare item wise Inventory Control techniques i.e., Minimum Level, Maximum Level, Re-Order Level and danger Level of material. As a result, plants initiated the purchase process when the stock position of respective items was either nil or very low.
- DCRTPP purchased machinery spares parts valuing ₹ 0.79 crore procured during August 2019 and October 2020 vide two POs were yet to be issued (July 2021).
- Furnace Oil (FO) valuing ₹ 8.88 crore[12] purchased during November 2012 and June 2015 was not utilised (July 2021). Supreme Court of India imposed ban (November 2017) on use of FO due to high pollutant contents and adverse impact on environment. Hence, chances for use of this FO in future were very remote but the Company has not taken any action for its disposal.
- Mandatory and Recommendatory spares[13] valuing ₹ 186.74 crore[14] were still to be utilized (July 2021) even after capital overhauling of both the Units (Unit-I and II of DCRTPP) were carried out two times (2012-13 and 2018-20). The Unit-I and II were commissioned during 2008 and completed almost half of their life up to 2021 and Capital Overhauling of both the units has been carried out twice (December 2021). Also Unit-I and Unit II of RGTPP were commissioned during 2010 and have completed almost half of their life up to 2021. Hence, chances of use of this mandatory material are very remote.
- Spare parts valuing ₹ 47.37 crore of Unit I to Unit IV of PTPS-I, which had been surveyed off, dismantled and disposed off, were lying in the store for final disposal.
- Simultaneously, spare parts valuing ₹ 7.46 crore of Unit V of PTPS-II, which had been closed and were under disposal, were lying in the store for final disposal. Therefore, inventory which is not required in the plant has not been disposed off.

The Management informed (May 2022) that ERP system is being implemented and after its implementation various inventory control measures will be fixed. Furnace oil of DCRTPP has been auctioned and Furnace oil at

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12 DCRTPP: ₹ 2.18 crore and RGTPP: ₹ 6.70 crore.

13 These spares were handed over by the EPC contractor at time of commissioning 2008-13 of the plants and they were yet to be utilised by the plants.

14 DCRTPP: ₹ 36.70 crore (₹ 18.73 crore + ₹ 17.97 crore) and RGTPP: ₹ 150.04 crore (₹ 56.55 crore + ₹ 93.49 crore).

RGTPP is yet to be auctioned. Further, mandatory spares received as per commissioning package were intended to be utilized during lifetime of units and are presently being utilized as per the site requirement. The reply is not acceptable in view of the fact that Capital Overhauling of all the units of HPGCL having been completed and the units having expired half of their useful life, the material is yet to be utilised. Further, the Company should take early action to dispose off the furnace oil at RGTPP.

3.5.2 Excess inventories than HERC norms

Haryana Electricity Regulatory Commission (HERC) issued directive while approving Tariff Orders to optimize inventory of the Power Plants for spares and other maintenance equipments, etc. The HERC while approving the generation tariff during the period 2016-17 to 2020-21 had allowed inventories of 10/15 *per cent* of the operation and maintenance expenditure.

As per the purchase manual of the Company, the purchases of material should be restricted to the minimum requirement so as to avoid over stocking besides ensuring that the stock is readily available for consumption. The table below indicates the normative O & M spares, actual there against and consequential loss of interest during 2016-21 in respect of all the plants for excess O&M spares against norms of HERC:

Table 3.8: Working capital requirements on O&M spares and loss of interest

(₹ in crore)

Years	Working capital required for O&M Spares			Rate of interest allowed by (in *per cent*) HERC	Loss of interest
	Normative	Actual	Excess		
A. DCRTPP at Yamuna Nagar					
2016-17	16.25	59.05	42.80	10.55	4.52
2017-18	22.35	65.91	43.56	10.55	4.60
2018-19	23.24	63.11	39.87	9.95	3.97
2019-20	24.17	37.86	13.69	9.95	1.36
2020-21	21.48	36.49	15.03	8.65	1.30
				Total (A)	**15.75**
B. RGTPP at Khedar					
2016-17	18.01	87.76	69.75	10.55	7.36
2017-18	27.69	86.19	58.50	10.55	6.17
2018-19	28.80	85.01	56.21	9.95	5.59
2019-20	29.95	68.89	38.94	9.95	3.87
2020-21	25.99	67.01	41.02	8.65	3.55
				Total (B)	**26.54**
C. PTPS at Panipat					
2016-17	24.52	178.05	153.53	10.55	16.20
2017-18	26.52	155.93	129.41	10.55	13.65
2018-19	31.39	148.58	117.19	9.95	11.66
2019-20	29.83	147.41	117.58	9.95	11.70
2020-21	28.79	142.20	113.41	8.65	9.81
				Total (C)	**63.02**
				Total (A+B+C)	**105.31**

Source: Compiled from trial balances and Tariff Orders of HERC for the years 2016-17 to 2020-21

It is seen that the working capital involved in O&M spares was more than the prescribed norms of HERC in all the three plants of the Company. Accordingly, the Company could not recover interest amounting to ₹ 105.31 crore on excess working capital involved in O&M spares through tariff.

The Management accepted (May 2022) that inventory level was more than the norms prescribed by HERC and added that efforts are being made to keep the inventory within the prescribed norms of HERC.

3.5.3 Deficiency in procurement process

The Company has not set up any timeline for processing the cases for procurement of spare parts. Audit scrutiny of 117 Purchase orders valuing ₹ 183.63 crore selected through IDEA revealed the time taken in placement of purchase orders as under.

Table 3.9: Time taken in placement of selected purchase orders and their value

Time taken in finalisation of Purchase order since requirement/ indent	DCRTPP		RGTPP		PTPS	
	Number of Purchase Orders	Value (₹ in crore)	Number of Purchase Orders	Value (₹ in crore)	Number of Purchase Orders	Value (₹ in crore)
less than 180 days	12	11.56	20	55.32	9	37.82
180 to 360	15	15.33	16	13.77	11	36.42
More than 360 days	10	7.23	7	2.13	17	4.05
Total	**37**	**34.12**	**43**	**71.22**	**37**	**78.29**

Source: Information received from the Company and complied from the Purchase Orders files

Further scrutiny revealed that DCRTPP had taken 65 days to 519 days, RGTPP 31 days to 584 days and PTPS 39 days to 652 days (minimum to maximum) in placing purchase orders for procurement of material since date of requirement by the users. The average time in placing the purchase orders was 257 days in DCRTPP, 223 days in RGTPP and 328 days in PTPS. The median time in placing the purchase orders was 261 days in DCRTPP, 203 days in RGTPP and 336 days in PTPS ***(Appendix 3.1).***

Further, the users received this material in DCRTPP after 106 days to 987 days, RGTPP after 100 days to 919 days and PTPS after 302 days to 1600 days (minimum to maximum) since their submission of requirement. The mean time in receiving the material by the users was 474 days in DCRTPP, 412 days in RGTPP and 682 days in PTPS. The median time in receiving the material by the users was 446 days in DCRTPP, 350 days in RGTPP and 614 days in PTPS.

Further scrutiny revealed that DCRTPP while submitting requirement of material in ten cases valuing ₹ 2.04 crore, users had specifically mentioned that material was urgently required. Despite urgency, the plant took 167 to 898 days in supplying the material to the users. Audit scrutiny further revealed that out of ten cases of urgent purchase, in six cases valuing ₹ 1.70 crore, the approval of the competent authority was not obtained.

The Company has not prescribed any timeline for procurement of material in its Work and Purchase Regulations, 2015 which is a weakness of internal control system.

The Management replied (May 2022) that keeping in view of different modes of purchase (Proprietary, Limited Tender Enquiry and Press Tender Enquiry) which require different time spans to finalize the case and consumption of material as per site conditions, the difference of time period mentioned in audit para cannot be avoided. It was assured that efforts are being made to minimize time taken in purchases.

3.6 Conclusion

The coal consumption pattern of all the three power plants of Company was within the norms of coal approved by HERC in respect of its units except for RGTPP (Unit-II) during 2019-20 and 2020-21.

The quantity and quality claims include compensation for short supplies of Coal Companies, quality claims on un-sampled rakes and compensation pertaining to idle freight. Out of total claims lodged during 2016-21 for ₹ 421.74 crore on account of quantity claims, the Company could reconcile claims of ₹ 21.68 crore (5.14 *per cent* only) during 2016-17 to 2020-21. The quantity claims of ₹ 494.32 crore and quality claims of ₹ 270.50 crore raised by the Company with coal supply companies were pending as on 31 March 2021. Delay in settlement of claims resulted into blockade of funds.

Differential freight of ₹ 8.43 crore was due for refund from Railways on account of diverted rakes during December 2015 to March 2021, of which the Railways paid ₹ one crore and ₹ 7.43 crore remained to be recovered from Indian Railways as of September 2021. The claims of ₹ 0.78 crore in 33 cases were rejected by Railways on the ground that these cases were preferred after expiry of stipulated time and were time barred.

The working capital involved in O&M spares was more than the prescribed norms of HERC in all the three plants of the Company and therefore the Company could not recover interest amounting to ₹ 105.31 crore on excess working capital involved in O&M spares through tariff.

The mean time taken by the three plants (DCRTPP, RGTPP and PTPS) of the Company in placing purchase orders since the date of requirement ranged between 223 and 328 days for procurement of material. Further, the users received this material in these plants after mean days ranging between 412 and 682 days since their requirements. The Company has not prescribed any timeline for procurement of material in its Work and Purchase Regulations, 2015 which is a weakness of internal control system.

3.7 Recommendations

The Company may

- pursue its quantity and quality claims with coal supply companies for their early settlement.
- ensure quality analysis of all coal rakes dispatched by coal companies.
- pursue its claims with railways.
- ensure that the inventory levels are maintained as per norms specified by HERC to avoid financial burden of interest on funds used.
- determine at an early date, a time frame for processing the purchase cases in its work and purchase regulations, as assured.

Chapter 4

Financial Management

Chapter 4

Financial Management

Efficient fund management is the need of the hour in any organisation. This also serves as a tool for decision making, optimum utilisation of available resources at favourable terms at appropriate time. The main source of revenue of the Company is sale of power to the DISCOMs.

4.1 Determination of tariff

The Company sells power to Haryana DISCOMs on the basis of tariff determined by the Haryana Electricity Regulatory Commission (HERC). Tariff/ Energy charges for sale of power are decided every year by HERC on the basis of Annual Revenue Requirement of the Company. The tariff/energy charges i.e., fixed cost and variable costs are determined by the HERC on yearly basis. Audit findings in this regard are as under:

4.1.1 Under recovery of energy charges through Fuel Price Adjustments

HERC notified Multi Year Tariff Regulations, 2012 which prescribed the terms and conditions for determination of tariff for generation, transmission and retail supply of power in Haryana State. The procedure for recovery of energy/variable charges against sale of power by a Generating Company have been defined in Clause 31 to 33.

As per Clause 33 of MYT Regulations, Fuel Price Adjustment (FPA) is based on various factors viz. normative fuel (coal and oil) consumption, normative SHR, normative auxiliary consumption, base value of GCV for fuel (oil and coal) as per tariff order, weighted average price of coal as per invoices submitted for the month at the power station etc.

The Company presents monthly provisional bill to DISCOMs for sale of power on Ist day of each calendar month on the basis of net energy supplied during previous month. This bill is presented at the Energy Charge Rate (ECR) for the respective financial year as contained in the Tariff order of HERC. Final Bill is presented on 7/8th day of that month after incorporating adjustment on account of fuel prices during the previous month. The Company prepares a monthly Coal Price Store ledger (CPSL) for computation of Weighted Average Price (WAP) of coal consumed during each month, This WAP of coal is used to compute the FPA amount for the corresponding month. For example, WAP for the month of April is used to compute the FPA for the month of April.

During scrutiny of FPA bills and CPSL in respect of all three thermal plants, it was noticed that the WAP of coal consumed during the month as per CPSL were not used while raising the FPA Bills during April 2016 to September 2017.

For example, Company while raising FPA bills (i.e., for energy generated and sold during May month) used previous months WAP (of coal consumed during April month). Thus, using WAP different from corresponding months while raising FPA bills resulted in under recovery of energy charges of ₹ 5.45 crore (***Appendix 4.1***) during April 2016 to September 2017 from DISCOMs. Short recovery of energy charges leads to shortage of working capital which would ultimately increase the finance charges. Total financial implication on account of interest has been worked out to ₹ 3.23 crore (***Appendix 4.1***) on this amount of ₹ 5.45 crore.

The Management replied (May 2022) that the due date to raise the FPA bill was 8th of the month but during the period April 2016 to September 2017, the bills of the same month were not available. The receipt of bill in next month was entered into PSL and WAP was accordingly revised and ECR was charged in sale of power bill on that basis. The reply is not tenable as consumption of coal, price and actual generation were different for every month. Therefore, corresponding WAP should have been applied by the Company as per MYT Regulations.

4.1.2 Excess recovery of fixed cost

The annual fixed cost of Western Yamuna Canal (WYC) Bhudkalan is paid by DISCOMs subject to the achievement of normative Plant Load factor (PLF) approved by HERC. Tariff orders provides that while determining the fixed cost, in case of annual PLF of any unit, including deemed generation, is lower than the normative PLF given in the order of HERC, the recoverable annual fixed charges are determined on pro-rata basis and if the PLF is more than the normative PLF given in the order of HERC, Fixed charges are to be restricted to the fixed charges as determined by the HERC.

The following table indicates detail of fixed cost determined by HERC and recovered by the Company during 2016-17 to 2020-21:

Table 4.1: Normative PLF approved by HERC, actual PLF achieved and recovery of fixed cost

Year	Plant Load Factor (*per cent*)		Fixed cost (₹ in crore)		
	Approved by HERC	Actual	Approved by HERC	Actual recovered	Difference
2016-17	37	37.55	49.816	49.816	Nil
2017-18	37	32.33	43.374	37.983	-5.391
2018-19	37	43.48	54.876	64.711	9.835
2019-20	43.5	54.74	62.552	79.173	16.621
2020-21	46	44.63	37.620	36.502	-1.118

Source: Bills of sale of power and HERC Tariff orders

It is seen that during the year 2016-17, actual PLF was 37.55 *per cent* against the normative PLF of 37 *per cent* and Company thus recovered full annual fixed cost of ₹ 49.816 crore. However, during the year 2017-18 and 2020-21,

the Hydel project could not achieve the normative PLF. Resultantly full annual fixed cost could not be recovered by the Company during these periods.

Further, during the 2018-19 and 2019-20, the actual PLF were 43.48 and 54.74 *per cent* against the normative target of 37 and 43.5 *per cent* respectively. As per HERC tariff orders of respective years, Company was entitled for full recovery of annual fixed cost during these years. The Company, however, recovered fixed cost amounting to ₹ 64.711 crore and ₹ 79.173 crore against the approved fixed of ₹ 54.876 crore and ₹ 62.552 crore respectively. Thus, the Company recovered excess fixed cost amounting to ₹ 9.835 crore and ₹ 16.621 crore during 2018-19 and 2019-20 respectively. The reasons for excess recovery were analysed in Audit and it was found that the Company raised the monthly fixed cost bills on the basis of monthly generation multiplied by normative energy charge rate (by dividing the annual fixed cost with normative generation)**.** As a result, whenever, the actual generation was more than the normative generation, the Company recovered excess fixed cost in contravention of the tariff orders of HERC.

Audit further noticed that amount of fixed cost should have been recovered on the basis of cumulative PLF and recovery of fixed cost should have been restricted to the amount determined by HERC as per approved PLF. Thus, excess recovery of fixed cost amounting to ₹ 26.46 crore during the period 2018-20 were made by the Company in contravention of HERC Tariff Orders.

The Management replied (May 2022) that HPPC had deducted above amount from sale of power bills of the Company with interest arbitrarily and the Company had filed a petition before APTEL against above recovery. The final outcome of the case is awaited (May 2022).

4.1.3 Excess recovery of interest on working capital

Clause 30 of the MYT Regulations provided for recovery of fixed cost which includes interest on working capital, depreciation, finance charges, Operation and maintenance cost etc. Major components of working capital requirement include cost of coal and receivables equivalent to fixed and variables charges for sale of electricity. Clause 22.1 of Regulations, further provided for recovery of interest on working capital requirement for the following:

- Cost of coal equivalent to two months consumption corresponding to the normative availability for the period 2016-20 which was reduced to one month from 2020-21 onwards.
- Receivables equivalent to one month for energy charges (fixed and variable charges for one month) calculated corresponding to normative availability.

During audit of records regarding recovery of fixed cost, we noticed that actual working capital requirement remained less than the normative requirement determined by HERC. Major Audit findings, in this regard, are as under:

(a) Maintenance of coal stock below the normative level resulting in excess recovery of interest on working capital.

Scrutiny of records for 2016-21 relating to maintenance of coal stock at DCRTPP, RGTPP and PTPS revealed that the actual average level of daily coal stock remained less than the normative level determined by HERC. Details of average coal stock maintained during 2016-17 and 2017-18 was as under:

Table 4.2: Excess interest claimed against working capital requirement for maintaining normative Coal stock as per HERC Tariff order vis-à-vis actual average requirement

(₹ in crore)

Name of plant	Year	Requirement of working capital on normative coal stock as per HERC Tariff order	Actual Average working capital involved in coal stock	Difference	Amount of excess interest claimed[1]
DCRTPP Yamuna Nagar	2016-17	211.36	116.64	94.72	9.99
	2017-18	211.13	80.07	131.06	13.83
		Total			**23.82**
RGTPP Hisar	2016-17	469.78	217.44	252.34	26.62
	2017-18	451.03	106.90	344.13	36.31
		Total			**62.93**
PTPS Panipat	2016-17	274.80	204.44	70.36	7.42
	2017-18	246.34	122.53	123.81	13.06
		Total			**20.48**
		Grand Total			**107.23**

Source: Coal Price Store ledgers of the thermal plants and HERC Tariff orders

It was observed that actual working capital requirement for maintenance of coal stock remained less than the normative level approved by HERC. However, the Company did not mention this amount while filing true-up petition for respective years. As a result, the Company had claimed and recovered excess interest of ₹ 107.23 crore on working capital involved in maintenance of coal stock from Haryana DISCOMs through tariff. This had put extra burden on the State consumers.

Further scrutiny revealed during 2018-19 to 2019-20, the actual requirement of working capital also remained below normative level. However, HERC had taken cognizance of above while determining true up for the years 2018-19 and 2019-20 and allowed the interest on actual working capital requirement on the basis of audited accounts of respective years. True-up of 2020-21 was yet to be finalised.

[1] Worked out at interest rate of 10.55 *per cent* per annum allowed by HERC on working capital during 2016-17 and 2017-18.

(b) Excess recovery of interest on working capital on account of sales receivable due to lesser generation of power

Scrutiny of records revealed that the actual Plant Load Factor (PLF) of the DCRTPP, RGTPP and PTPS remained less than normative PLF on which working capital was worked out. Accordingly, the working capital requirement for the receivable for power generation was lesser than that had been envisaged while determining the tariff for the particular year. The details of each month's receivable as approved in the tariff orders and actual average monthly receivable on the basis of actual generation by plant for the years 2016-17 and 2017-18 was as under:

Table 4.3: Details showing excess interest claimed on working capital requirement against sales receivables

(₹ in crore)

Period	Receivable approved on sale of power by HERC (one month)	Actual amount claimed/raised to DISCOMs (Annual)	Average claimed monthly	Excess amount allowed on account of receivable	Rate of interest allowed on working capital (In *per cent*)	Excess interest allowed
A. DCRTPP						
2016-17	140.47	1,379.73	114.98	25.49	10.55	2.69
2017-18	143.31	1,516.85	126.40	16.91	10.55	1.78
Total (A)	**283.78**		**241.38**	**42.40**		**4.47**
B. RGTPP						
2016-17	302.17	1,974.47	164.54	137.63	10.55	14.52
2017-18	292.39	2,338.08	194.84	97.55	10.55	10.29
Total (B)	**594.56**		**359.38**	**235.18**		**24.81**
C. PTPS						
2016-17	180.66	1,154.08	96.17	84.49	10.55	8.91
2017-18	161.95	1,303.56	108.63	53.32	10.55	5.63
Total (C)	**342.61**		**204.8**	**137.81**		**14.54**
G.Total	**1,220.95**		**805.56**	**415.39**		**43.82**

Source: Bills of sale of power and HERC Tariff orders

It was observed that

- the actual requirement of working capital on account of total average monthly receivable was ₹ 805.56 crore against the normative requirement of ₹ 1,220.95 crore during the period 2016-18. Hence the actual average working capital was lesser by ₹ 415.39 crore than the normative working capital requirement due to low level of generation during the period 2016-18. Thus, the Company had claimed and recovered excess interest of ₹ 43.82 crore on working capital on account of receivables from DISCOMs.

- During 2018-19 to 2019-20, the actual requirement of working capital also remained below normative level. However, HERC had taken cognizance of above while truing up the tariff for the years 2018-19 and 2019-20 and allowed the interest on actual working capital requirement on the basis of audited accounts of respective years. True-up of tariff for 2020-21 was yet to be finalised.

The Management replied (May 2022) that during calculation of working capital, receivables are considered on normative basis and not on actual basis and true-up is applicable only when interest rate falls below or exceeds the level specified by the Commission. The reply is not tenable because as per clause 8.3.8, Interest & Finance charges are 'Controllable items' which are subject to true up as per clause 13.3 of MYT Regulations.

4.1.4 Improper financial management due to use of fly ash fund in contravention of guidelines of Ministry of Environment Forest and Climate Change

Ministry of Environment, Forest and Climate Change (MoEF&CC) vide its notification (2009) provided that the amount collected from sale of fly ash should be kept in separate account head and should be utilised for only development of infrastructure or facilities, promotion and facilitation activities for use of fly ash until 100 *per cent* fly ash utilisation level is achieved. Thereafter as long as 100 *per cent* fly ash utilisation levels are maintained, the thermal power station would be free to utilize the amount collected for other development programmes also. The Company has not been able to achieve utilisation levels of fly ash at 100 *per cent* (March 2021), as discussed at **paragraph 5.1.3**.

The table below indicates details of amount collected through sale of ash and its utilisation by the Company during 2016-17 to 2020-21:

Table 4.4: Statement showing details of funds collected and expenditure incurred in respect of Dry Fly Ash Fund

(₹ in crore)

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21	Grand Total
Opening Balance	239.31	295.97	346.36	397.33	440.74	-
Funds collected during the year	60.38	51.85	53.83	44.76	41.30	**252.12**
Total funds	299.69	347.82	400.19	442.09	482.04	-
Less: Expenditure during the year	3.72	1.46	2.86	1.35	5.84	**15.23**
Closing Balance	295.97	346.36	397.33	440.74	476.20	-

Source: Annual Accounts of the Company

It is seen that the Company received ₹ 252.12 crore through sale of fly ash during 2016-17 to 2020-21 and utilised ₹ 15.23 crore during this period. An amount of ₹ 476.20 crore remained unutilised in ash funds collected through sale of fly ash.

Thermal Power Stations (TPS) of the Company had booked revenue from sale of ash and kept the funds in their common account. The Company did not keep the proceeds received through sale of ash in separate account as required under MoEF&CC guidelines. The Company used this fund in the general business. It is assessed that the Company saved interest of ₹ 166.77[2] crore

[2] Calculated on unutilised opening balance of ash fund of respective years at the rate of interes on working capital allowed by HERC in the tariff orders respective years.

during the period 2016-17 to 2020-21 on working capital of respective years. However, during true up of tariff order for the year 2018-19 and 2019-20, the HERC had passed on the benefit/saving on account of interest on working capital to the beneficiary (i.e. Haryana DISCOMs). The Company earned interest amounting to ₹ 8.12 crore on these funds during September 2020 to March 2021.

Thus, due to improper financial Management, the Company neither used this fly ash fund for development of infrastructure or facilities, promotion and facilitation activities for use of fly ash nor kept the fund in separate account. Due to which this fund was used in general business in violation of the MoEF&CC notification of 2009.

The Management replied (May 2022) that Company saved an interest of ₹ 166.77 crore during FY 2016-17 to FY 2020-21 and the benefit was passed on to DISCOMs by HERC during true-up for the FY 2018-19 and 2019-20. Therefore, due to HPGCL's prudent financial management, consumers of the State were not burdened with extra financial implication and no violation was made by the Company regarding MoEF&CC guidelines as perceived. The Company may consider that if it achieves 100 *per cent* fly ash utilisation levels, it would be free to utilize the amount collected for other development programmes also. However, as on March 2021, 306.46 lakh metric tonne of pond ash was lying in dyke requiring disposal. Therefore, the Company failed to meet the MoEF&CC guidelines which would have enabled it to utilize fly ash funds as a part of its working capital.

4.2 Conclusion

The Company recovered excess fixed cost amounting to ₹ 26.46 crore during 2018-19 and 2019-20 due to achievement of higher PLF against the HERC norms which was in contravention of the tariff orders of HERC.

The actual average level of daily coal stock in all thermal plants remained less than the normative level determined by HERC during the period 2016-21. As a result, the Company had claimed and recovered excess interest of ₹ 107.23 crore on working capital during 2016-17 and 2017-18 from Haryana DISCOMs through tariff which had put extra burden on the State consumers.

The actual average working capital involved in sales receivables was lesser by ₹ 415.39 crore than normative working capital requirement due to low level of generation during the period 2016-18. Thus, the Company had claimed and recovered excess interest of ₹ 43.82 crore on working capital on account of receivables from DISCOMs.

The Company received funds amounting to ₹ 252.12 crore through sale of fly ash during 2016-17 to 2020-21 but utilised only ₹ 15.23 crore during this

period. An amount of ₹ 476.20 crore remained unutilised in ash funds collected through sale of fly ash. The Company used this fund in the general business in contravention of instructions of MoEF&CC.

4.3 Recommendations

- The Company should recover its charges on account of fixed cost from the DISCOMs as per tariff orders of HERC to avoid any extra burden on State consumers.
- The Company should claim interest on working capital involved in coal stock and receivables from the DISCOMs on actual requirement basis, to avoid any undue financial burden on State consumers.
- The Company should utilise funds from sale of dry fly ash as per guidelines of MoEF&CC.

Chapter 5

Compliance of Environmental norms and Generation of clean energy

Chapter 5

Compliance of Environmental norms and Generation of clean energy

5.1 Compliance of Environmental norms

Coal based Thermal Power Plants contribute to atmospheric pollution and greenhouse gases. Emissions from these plants like Carbon Dioxide (CO_2), Sulphur Dioxide (SO_2) and Nitrogen Oxides (NO_x) lead to Global Warming. Suspended Particulate Matter (SPM), the fine dust that is released from the stacks of Power Plants is a health hazard. In addition, thermal plants also generate considerable quantum of fly ash and bottom ash. These emissions are formed due to the combustion process when coal is burnt to produce heat. To control the emission of SPM/SO_2//NO_x in thermal power plants, Ministry of Environment, Forest and Climate Change, (MoEF&CC), Government of India (GoI) vide Notification No. SO 3305(E) dated 7 December 2015 had modified the Environment (Protection) Rules, 1986 with the following norms/levels of SPM/SO_2/NO_x to be implemented by Thermal Power Plants:

Period of installation of plants	Parameters to be measured and Standards of the parameter			
	SPM mg/Nm^3	SO_2 mg/Nm^3	NO_x mg/Nm^3	Mercury (Hg)mg/Nm^3
Thermal Power Plants installed before 31 December 2003	100	600 (plant with capacity less than 500 MW) 200 (Plant with capacity of 500 MW and above	600	0.03
Thermal Power Plants installed after 1 January 2004 and before 31 December 2016	50		300 till 18 October 2020	0.03
			450 (w.e.f. 19 October 2020)	
Thermal Power Plants installed after 1 January 2017	30	100	100	0.03

The extent of compliance of environmental norms by the Company as seen in Audit are discussed in succeeding paragraphs.

5.1.1 Violations of Emission limits

Audit observed that the power plants of the Company met the Suspended Particulate Matter (SPM) levels in all the years from 2016-21. However, Emission norms (SO_2 and NO_x) determined by the MoEF&CC were not seen to have been met by the power plants. The actual parameters there against in respect of all the three thermal plants of the Company are given in table below:

Table: 5.1: Emission levels of all three plants of the Company for the period 2019-21

Description	SO_2 (mg/ Nm^3)	NO_x (mg/Nm^3)	SO_2 (mg/ Nm^3)	NO_x (mg/Nm^3)
Norms fixed by CPCB	**600**	**300 and 450 (w.e.f. 19 October 2020)**	**600**	**300 and 450 (w.e.f. 19 October 2020)**
DCRTPP at Yamunanagar				
2019-20	**Unit-I**		**Unit-II**	
Minimum Level	1,050	475	980	484
Maximum Level	1,532	573	1,612	572
Mean level	1,408	518	1,473	520
2020-21				
Minimum Level	948	481	939	479
Maximum Level	1,078	530	1,010	571
Mean level	988	505	973	517
RGTPP at Khedar				
2019-20	**Unit-I**		**Unit-II**	
Minimum Level	900	380	1,101	421
Maximum Level	1,557	632	1,361	516
Mean level	1,175	475	1,227	480
2020-21				
Minimum Level	1,033	453	1,132	377
Maximum Level	1,735	521	1,433	444
Mean level	1,466	486	1,281	413
PTPS, Panipat				
2019-20	**Unit-VII**		**Unit-VIII**	
Minimum Level	701	401	793	408
Maximum Level	990	498	978	537
Mean level	802	460	889	463
2020-21				
Minimum Level	756	332	877	408
Maximum Level	959	619	986	520
Mean level	880	458	920	466

Source: Information supplied by the Company

As against the norm of 600 mg/Nm^3 of SO_2, the level at DCRTPP ranged between 939 and 1612 mg/Nm^3, at RGTPP it was between 900 and 1,735 mg/Nm^3 and at PTPS between 701 and 990 mg/Nm^3. Similarly, NO_x levels at DCRTPP ranged between 475 and 573 mg/Nm^3, RGTPP it ranged between 377 and 632 mg/Nm^3 and PTPS it ranged between 332 and 619 mg/Nm^3 against the norms of 300/450 mg/Nm^3. Audit assessed that the emission levels in respect of all the units were more than the norms prescribed by the MoEF&CC.

The Central Pollution Control Board had issued (May 2020) a show cause notice to close down Units of the Company and deposit of Environment compensations amounting to ₹ 18 lakh per month per non-compliant units. In this regard, the Company filed (August 2020) a petition in the Supreme Court, the results of which are awaited.

5.1.2 Non-installation of equipment to control Sulfur Dioxides (SO_2)

Flue Gas Desulphurization (FGD) plant removes Sulfur Dioxides (SO_2) from flue gas produced by boilers, furnaces and other sources. The work for preparation of estimates for the work, Detailed Project Report (DPR) and tender documents had been given to National Thermal Power Corporation

(NTPC). The Company had issued (April 2019 to November 2019) NIT for installation of FGD system for 2x300 MW DCRTPP, Yamuna Nagar, 2x600 MW RGTPP Hisar and for installation of Dry Sorbent Injection System package for 2x250 MW units of PTPS Panipat. Details of firms qualified for selection were as under:

(₹ in crore)

Name of firm	Name of Plant	Estimated cost	Quoted cost
M/s Shangai Electric Group Company Limited	DCRTPP, Yamuna Nagar	434.36	285.08
M/s Beijing SPC Environment Protection Tech Company Limited.	RGTPP, Hisar	582.83	539.89
M/s Beijing SPC Environment Protection Tech Company Limited	PTPS, Panipat	66.45	56.04
Total		**1,083.64**	**881.01**

The case for approval had been submitted in the meeting (10 February 2020) of State Level High Power Purchase Committee (HPPC). However, it was deferred by the committee with the remarks that a more detailed examination of the agenda and issue was required being a high value item. The State Government however, decided (August 2020) that we should allow only domestic Companies to participate in these tenders.

Therefore, the Company issued (September 2020) fresh tender enquiry and after scrutiny of tender documents, following firms for the respective plants were qualified and their quoted price were as under:

(₹ in crore)

Name of firm	Name of Plant	Estimated cost	Quoted cost
M/s SMS India Private Limited Gurugram	DCRTPP, Yamuna Nagar	493.88	552.51
M/s PES Engineers Private Limited Hyderabad	RGTPP, Hisar	634.84	665.52
M/s Melco India Private Limited Faridabad	PTPS, Panipat	69.77	74.34
Total		**1,198.49**	**1,292.37**

The case was again submitted to HPPC on 12 June 2021 and in the meeting, HPPC directed the Company that GoI notification dated 31 March 2021 (as detailed below) required to be thoroughly examined. Accordingly, the agenda was deferred.

It was observed that despite finalisation of bids twice, work of FGD could not be awarded. In the meantime, the MoEF&CC, GoI had also amended the timelines for compliance of environment emission norms vide notification dated 31 March 2021 which are as under:

Sl. No.	Category	Location/area	Timelines for compliance	
			Non-retiring units	Retiring units
1.	Category A	Within 10 km radius of National Capital Region or cities having million plus population	Up to 31st December 2022	Up to 31st December 2022
2	Category B	Within 10 km radius of Critically Polluted Areas or Non-attainment cities	Up to 31st December 2023	Up to 31st December 2025
3	Category C	Other than those included in category A and B	Up to 31st December 2024	Up to 31st December 2025

An environment compensation for not adhering to above timelines was also levied on the non-retiring thermal power plant, as stated below: -

Non-Compliant operation beyond the Timeline	Environmental Compensation (₹ per unit electricity generated)		
	Category A	Category B	Category C
0-180 days	0.10	0.07	0.05
181-365 days	0.15	0.10	0.075
366 days and beyond	0.20	0.15	0.10

Audit noticed that during the period 2019-21, the actual SO_2 and NO_x remained beyond permissible limits determined by the CPCB as shown in Table 5.1 above. In view of the above timelines, PTPS (Unit VII and VIII) categorised in category A, is required to install emission control equipment by December 2022. DCRTPP and RGTPP taken in category C, are required to install these equipments by December 2024. As the two tender enquiries have been dropped, the Company is required to take immediate action to install FGD Plants at its Power Stations to control the pollutant parameters and to avoid any environmental compensation in future.

The Management replied (May 2022) that earnest steps are being taken to meet the new environmental norms. However, the fact remains that Company failed to comply with the emission norms.

5.1.3 Non-utilisation of ash

Ministry of Environment, Forests and Climate Change (MoEF&CC) issued revised notification (November 2009) specifying that each thermal power generating station should achieve 100 *per cent* utilisation of total ash generated by the end of five years. Further, the unutilised fly ash in relation to the target during a year, if any, shall be utilised within next two years in addition to the targets stipulated for those years and the balance unutilised fly ash accumulated during first five years (the difference between the generation and the utilisation target) shall be utilised progressively over next five years in addition to 100 *per cent* utilisation of current generation of fly ash. Following table indicates details of ash disposal and ash utilised during 2016-21 in respect of all the three plants of the Company:

Table 5.2: Statement showing details of ash generated and utilised during 2016-21

(in Lakh Metric Tonne)

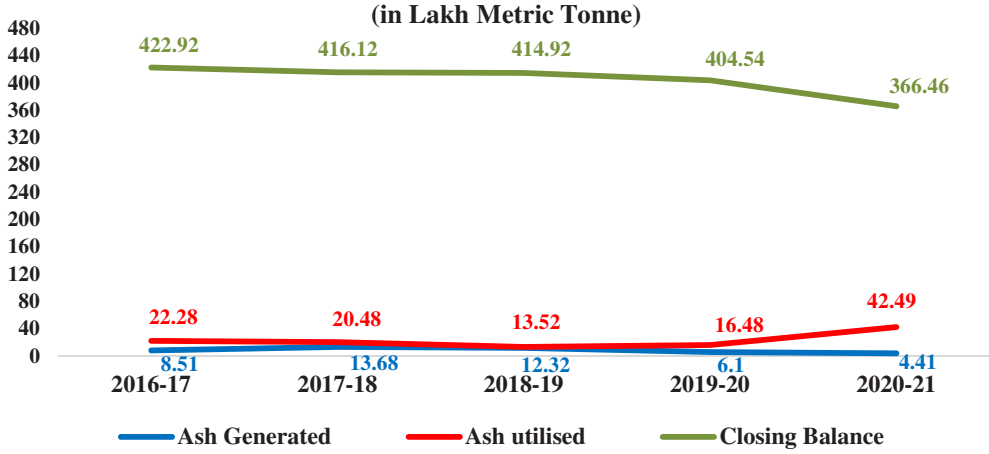
Year	Opening Balance in ash dyke	Total Ash Generated (Bottom Ash)	Ash Utilized (Bottom Ash)	Closing Balance
2016-17	436.69	8.51	22.28	422.92
2017-18	422.92	13.68	20.48	416.12
2018-19	416.12	12.32	13.52	414.92
2019-20	414.92	6.10	16.48	404.54
2020-21	404.54	4.41	42.49	366.46

Source: information supplied by the Company.

As on 1 April 2016, there was 436.69 lakh[1] MT of ash lying in the ash dyke of thermal plants of Company i.e. As per MoEF&CC notification (November 2009), the Company were required to utilized 100 *per cent* ash in addition to the ash generated during the year by the end of 2019-20. As of 31 March 2021, 366.46 lakh MT of ash lying in ash dyke of all the three thermal plants was not cleared despite MoEF&CC guidelines.

The graphical presentation of Ash generated, utlised and closing balance is as under:

Chart 5.1: Ash generated, Utilised and Closing balance (in Lakh Metric Tonne)



It would be seen from the above chart that though the ash utilisation has increased from the year 2018-19 onwards, the speed of utilisation of ash was very slow, thereby the closing stock had decreased at a very slow pace.

The Management replied (May 2022) that efforts are on to encourage lifting of ash and create awareness through advertisements in local newspapers and TV have been placed, correspondences made with various administrative offices of District administrator as well as NHAI for achieving the targets of ash utilisation notified (December 2021) by MoEF&CC.

5.2 Generation of clean energy

5.2.1 Failure to add Capacity in green/ solar energy

The Company signed (May 2015) a Memorandum of Understanding (MoU) with M/s Gujrat Energy Research and Management Institute (GERMI) to implement ground mounted on ash dykes and canal top Solar Photovoltaic Systems and Solar Parks. As per MoU, GERMI was to provide Technical and Feasibility support by preparing detailed project reports and project management consultancy etc. for setting of solar power plants. The scope of

[1] 43.98 lakh MT at RGTPP Khedar, 41.86 Lakh MT at DCRTPP Yamuna Nagar and 350.85 lakh MT at PTPS Panipat.

work included setting up Solar Power Plants by the Company on its own land available at Panipat (10 MW), Yamuna Nagar (10 MW), Faridabad (50 MW), Hisar (2 MW) including canal top and development of Solar Parks/ Ultra Mega Solar Power Projects on the land being identified in various districts of Haryana. The State Government has granted (October 2016) approval for setting up of 133.20 MW solar power plants as detailed below:

Table 5.3: Capacity addition in solar power approved by Government of Haryana

Ground mounted solar power plants:	
PTPS, Panipat	10 MW
WYC Hydel, Yamuna Nagar	13.2 MW
DCRTPP, Yamuna Nagar	15 MW
FTPS, Faridabad Old Ash Dyke New Ash Dyke	 20 MW 30 MW
Total	**88.20 MW**
Roof top Solar Plants:	
PTPS, Panipat	0.50 MW
DCRTPP, Yamuna Nagar	2 MW
RGTPP, Hisar	2.5 MW
Total	**5 MW**
Canal Top Solar Power Plants:	
WYC Hydel, Yamuna Nagar	**16 MW**
Floating type Solar Plants	
PTPS, Panipat	4 MW
DCRTPP, Yamuna Nagar	9 MW
RGTPP, Hisar	11 MW
Total	**24 MW**
Grand Total	**133.20 MW**

Source: Compiled from the records of the Company

The Company had, however, issued a work order (July 2015) for providing consultancy services relating to setting up of 10 MW solar power project at PTPS Panipat and 10 MW (Phase-I) on the top of old ash dyke area of Faridabad Thermal Power Station (FTPS)[2], Faridabad to M/s Gujrat Energy Research and Management Institute at a cost of ₹ 77.85 lakh. The solar power plant at PTPS was commissioned on 1 November 2016. It was observed that the work for setting up of 10 MW (phase-I) on the top of old ash dyke area of FTPS, Faridabad was yet to be awarded by the Company (December 2021).

The Company, however, issued (June 2019) a NIT for Design, Engineering, Procurement & Supply, Construction and Commissioning for setting up of Grid connected Ground Mounted Solar Photovoltaic Power Plant at three different locations i.e. 30 MW at new ash dyke area, FTPS Faridabad, 15 MW area near ash dyke DCRTPP, Yamuna Nagar and 12 MW at WYC Hydel on Build Operate and Transfer (BOT) basis for a period of 25 years including

[2] FTPS was decommissioned during 2011-12.

Operation and Maintenance thereof. It was observed that despite issue of ten corrigendum by relaxing the terms and conditions of NIT and extending the dates up to May 2021, no response was received from bidders and the Company had to cancel the bids.

Audit observed that the Company has not set any timeline for setting up of 133.20 MW solar power plants despite the approval of the State Government in October 2016. Non-receipt of response from the bidders under BOT model, the Company has not explored the potentiality for setting up of solar plants under any another model. Thus, the Company could install only 10 MW solar power project against the envisaged capacity of 133.20 MW during the period 2016-21 and the objective of green energy could not be achieved.

The Management replied (May 2022) that efforts are being made to achieve the targets of generation of green energy.

5.2.2 Failure in safeguarding financial interest of the Company while finalising the terms and conditions of Power Purchase Agreement

The Company set up a 10 MW Solar Power Plant at PTPS Colony at Panipat. The plant was commissioned in November 2016. For sale/purchase of power in a regulated manner, Company (Seller) and Haryana Power Purchase Centre (buyer on behalf of both the DISCOMs in Haryana) finalised a draft Power Purchase Agreement (PPA) which was sent (September 2016) to HERC for its approval. HERC approved the PPA on 24 November 2016 with certain conditions for inclusion in the PPA and directed to HPPC to sign the PPA and submit a copy of PPA within seven days from the signing date. After directions of HERC, HPGCL incorporated the 'deemed generation clause'[3], in the PPA and sent it to HPPC (DISCOMs) for its countersignatures so that it could be further sent to HERC for their approval. But HPPC did not sign the PPA and placed on hold the payments of monthly energy bills generated from solar plant in absence of signed/approved PPA.

A. While approving the PPA, HERC directed (November 2016) that a provision for deemed generation be inserted in the PPA which stipulates that if any backing down on account of non-availability of evacuation lines/system beyond 87.6 hours in a year is there, the same should be treated as deemed generation and should be paid for at the tariff determined by the HERC.

Audit scrutiny revealed the Company agreed to remove the ibid clause during the 40th meeting of Steering Power Purchase Committee (SCPP)[4] held on

[3] Deemed generation means the energy which a generating station was capable of generating but could not generate due to various reasons

[4] SCPP formed for Policy Planning/management of power procurement and monitoring the operations of Haryana Power Purchase Centre chaired by Secretary Power and Managing Directors of Haryana Vidyut Prasaran Nigam limited, Uttar Haryana Bijli Vitran Nigam Limited, Dakshin Haryana Bijli Vitran Nigam Limited, Haryana Power Generation Corporation Limited and Chief Engineer HPPC are the members.

22 February 2017 despite directions of HERC. During April 2017 to March 2021 there were 1,436 trippings of solar power plant due to outages of 33 kV Jattal transmission line (erected by UHBVNL for evacuation of solar power) which has resulted in generation loss of 35.05 lakh units valuing ₹ 1.12 crore[5] as detailed below:

Table: 5.4: Calculation of Revenue loss on account of deemed generation

Year	No. of outages	Outages Period (in hours)	Loss of Generation (In kWh)	Permissible outages as per HERC (in hours)	Outages after Permissible limit	Loss after adjustment of permissible outages	Rate per kWh	Loss (₹ in crore)
1	2	3	4	5	6 (3-5)	7 (4/3x6)	8	9 (7x8)
2017-18	306	241	8,34,909	87.6	153.4	5,31,432	4.88	0.26
2018-19	342	246	7,23,671	87.6	158.4	4,65,974	4.88	0.23
2019-20	457	365	13,83,157	87.6	277.4	10,51,199	4.88	0.51
2020-21	331	151	5,63,040	87.6	63.4	2,36,402	4.88	0.12
Total	**1436**	**1003**	**35,04,777**	**350.4**	**652.6**	**22,85,007**		**1.12**

Source: Information supplied by the Company.

B. On completion of 10 MW Solar Power Plant at PTPS Colony at Panipat in November 2016, the contractor who installed the project had given a conditional assurance of 22 *per cent* capacity utilisation factor (CUF) which was subject to certain radiation levels. Accordingly, the Company agreed to supply power to DISCOMs on the basis of 21 *per cent* CUF for the next 25 years at a rate of ₹ 4.88 per kWh. The tariff of ₹ 4.88 per kwh was determined to cover the cost of the plant on the basis of 21 *per cent* CUF for next 25 years. However, the Haryana Electricity Regulatory Commission (Terms and Conditions for determination of Tariff from Renewable Energy Sources, Renewable Purchase Obligation and Renewable Energy Certificate) Regulations, 2010 prescribed the CUF of solar plants in Haryana as 19 *per cent* but while sending proposal to the HERC, the Company projected the CUF at 21 *per cent* which was beyond the norms of HERC. As the CUF forms the basis for determination of tariff for solar power plants and any difference would entail the financial implication, it was incumbent upon the Company to ensure that the CUF of the projected plant is achieved or the CUF provided in the HERC Regulations is adopted. However, the Company had committed 21 *per cent* CUF as against the regulatory norms of 19 *per cent*, which resulted in fixation of lower tariff at ₹ 4.88 per kWh instead of ₹ 5.39 per kWh (in case of 19 *per cent* CUF).

We observed that the power generation by the plant during the period from April 2017 to March 2021, was less than that was projected and the actual CUF during this period remained at 18.5 *per cent* appx. Had the Company followed the CUF of 19 *per cent* as per HERC Regulations which was more realistic, the tariff rate of ₹ 5.39 per kWh could have been available to the Company for supply of power. Thus, fixation of lower tariff by ₹ 0.51 per

[5] Calculated @ ₹ 4.88 per kWh after adjustment of permissible outages of 87.6 hours as per HERC orders.

kWh has resulted in loss of ₹ 3.36 crore for the period from 2017-18 to 2020-21. The loss for PPA period of 25 years, worked out to ₹ 19.28 crore.

The Management replied (May 2022) that Company has filed a petition (August 2021) before APTEL for recovery of losses incurred due to non-availability of evacuation system. The final outcome of the case is pending.

5.3 Conclusion

Power plants of the Company met the emission norms regarding Suspended Particulate Matter (SPM) levels as determined by the Ministry of Environment, Forest and Climate Change, (MoEF&CC) in all the years from 2016-21. However, Emission norms of SO_2 and NO_x are not met by the power plants.

The Company has not set any timeline for setting up of 133.20 MW solar power plants on its own land despite approval of the State Government in October 2016. The Company, however, could install only 10 MW solar power project at PTPS (December 2021) during the period 2016-21 and thus, the targets of generation of green energy could not be achieved.

While entering into PPA with DISCOMs for supply of power from solar project, the Company agreed to remove the terms and conditions regarding deemed generation, which has resulted in generation loss of 35.05 lakh units valuing ₹ 1.12 crore.

Had the Company proposed the Capacity Utilisation Factor (CUF) of 19 *per cent* as per HERC (RE) Regulations which was more realistic, the tariff rate of ₹ 5.39 per kWh instead of ₹ 4.88 per kWh (at 21 *per cent* CUF) could have been available to the Company for sale of power from solar project. Thus, fixation of lower tariff by ₹ 0.51 per kWh has resulted in loss of ₹ 3.36 crore for the period from 2017-18 to 2020-21.

5.4 Recommendations

The Company:

- to keep the emission levels within norms, may install pollution controlling equipments to ensure compliance with MoEF&CC guidelines;
- may ensure effective utilisation of dry fly ash fund and disposal of dry fly ash as per MoEF&CC guidelines;
- may install solar power plants on the available land in time bound manner to achieve the objective of green energy; and
- may follow HERC directions regarding Capacity Utilisation Factor (CUF) and deemed generation etc. while finalising the PPAs for solar plants in future.

Chapter 6

Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State

Chapter 6

Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State

Haryana Power Purchase Centre (HPPC) was set up (2008) to procure and trade electricity for Haryana State Consumers on behalf of both distribution companies i.e. Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL) and Dakshin Haryana Bijli Vitran Nigam Limited (DHBVNL). It has signed power purchase agreements with various power generators including Central Generating Stations i.e. National Thermal Power Corporation Limited (NTPC), National Hydroelectric Power Corporation (NHPC), State Generator (HPGCL) and independent private producers i.e Adani Power Limited (ADANI), Coastal Gujarat Power Limited (CGPL), Lanco Amarkantak Power Limited (LANCO AMARKANTAK), Jhajjar Power Limited (JPL), Aravali Power Corporation Limited (APCPL), etc. HPPC had total tied up capacity of 11,624 MW as on 31 March 2021. The following procedure is being followed by HPPC for procurement and scheduling of power:

6.1 Preparation of merit order and scheduling of power

Electricity is purchased on day to day basis as per assessed demand of the entire state. To assess the daily demand, load forecasting is done on day ahead basis (one day before) after considering the various factors which may affect the demand like weather, temperature, crop season and industrial load etc. The schedule of the whole day (24 hours) is divided into 96 slots of 15 minutes each. Schedule once decided can be changed intraday if there is sudden change in demand due to change in weather or any other reason.

To meet the assessed demand, a bucket filling approach is followed while allocating schedule among power generators. Schedule is allocated as per ranking of power generator in the merit order which is determined on the basis of Variable cost of generation of each plant including transmission losses. While scheduling of power, cheaper plants get priority over other expensive plants. Plants are normally scheduled upto the level of average demand/ load of the day. For the peak hours during the day when demand remains more than average load (especially in the evening or during some particular slots), instead of lighting up a power plant for the whole day, short term power is purchased from Energy Exchange to meet the demand as well as to minimise the deviation settlement charges[1] (Unscheduled interchanges). In some cases,

[1] **Unscheduled interchanges/ Deviation settlement charges**-These charges are levied by Northern Region Power Committee in case of any over-drawal/under-drawal by DISCOMs in variation to the schedule given to generators. Means there should be balance between energy injected by Generators into the grid and energy consumed by State consumers to maintain the grid security and frequency. For this purpose, load forecasting is done on day ahead basis and adjustments during the day are carried out by purchasing/selling short term power through exchange.

last scheduled plant is directed to run at technical minimum capacity (55 *per cent* of total capacity) to match the demand of the particular slots.

6.1.1 Analysis of Merit Order and scheduling of Power

HPPC had tied up with 30 thermal power plants (TPP) having capacity of 8,766 MW. The available capacity from these plants is 7,204 MW on the basis of normative Plant Load Factor (80/85 PLF). HPPC prepares merit order of 30 thermal power plants on the basis of their variable cost including Point of Connection (PoC) losses during the year 2019-20.

Audit has examined the 96 slots of one day (1 November 2019), demand of power and power purchase quantum from various sources. The slot wise minimum, maximum, Average and median demand *vis-à-vis* power purchase are as under:

(in MW)

Particular	Time slot	Demand of Power	Total Purchase of Power	Purchase of Renewable Power/ Nuclear Power	Purchase of Thermal Power (Merit Order Purchase)	Purchase of Short Term Power purchase	Purchase of power from Open Exchange
Minimum	2:30 to 2:45	4,338.51	4,494.81	576.07	3,544.50	171.33	202.91
Maximum	18:30 to 18:45	5,941.19	6,046.61	1,628.69	4,027.02	263.59	127.31
Average		5,076.35	5,139.35	800.19	3,902.14	199.79	237.23
Median		4,950.66	5,097.04	665.84	3,884.37	193.90	201.98

(Source: Information supplied by the DISCOMs)

It is seen from the above table that against the maximum demand of 5,941.19 MW on 1 November 2019, HPPC had purchased 6,046.61 MW. Above power purchase included 1,628.69 MW from renewable sources (must run power), 4,027.02 MW from thermal power on merit order basis, 263.59 MW from short term thermal power and 127.31.MW from Energy Exchange.

Audit analysis showed that against the total tied up capacity of thermal power (as per normative PLF) of 7,204 MW, the HPPC could utilise maximum 4,378.68 MW from 22 Coal/Gas based thermal power plants (TPP) on merit order basis and remaining eight Coal/Gas based thermal power plants remained backed down/shut down.

6.1.2 Analysis of power purchase from Exchange and short term power

Further analysis for the period 2019-21 revealed that HPPC had purchased short term thermal power ranging between 208.41 MW to 391.21 MW. This power was purchased from two private thermal power plants (SKS Power and MB Power) at variable cost of ₹ 4.29 per unit. Similarly, power purchased from Energy Exchange ranged between 0.57 MW to 1405.40 MW at average cost of ₹ 3.18 per unit.

It was noticed that during the period of 2019-21, Unit-VI of HPGCL (210 MW) remained backed down (except July 2020). Audit observed that instead

of purchasing power at the rate of ₹ 4.88[2] per unit from private plants, Unit-6 of HPGCL having lower variable cost of ₹ 3.90 per unit could have also been considered for scheduling for power purchase.

6.2 Analysis of Demand and Purchase of Power

HPPC had total tied up capacity of 11,212 MW as on 1 April 2019 which increased to 11,648 MW as on 1 April 2021. The details of total tied up capacity and availability of power as per Plant Load factor were as under:

(Capacity in MW)

As on	Total installed capacity			Power available as per PLF		
	Thermal power	Renewable Power	Total power	Thermal power	Renewable Power	Total power
01 April 2019	8,766	2,446	11,212	7,204	1,363	8,567
01 April 2020	8,766	2,447	11,213	7,204	1,365	8,569
01 April 2021	8,766	2,882	11,648	7,204	1,455	8,659

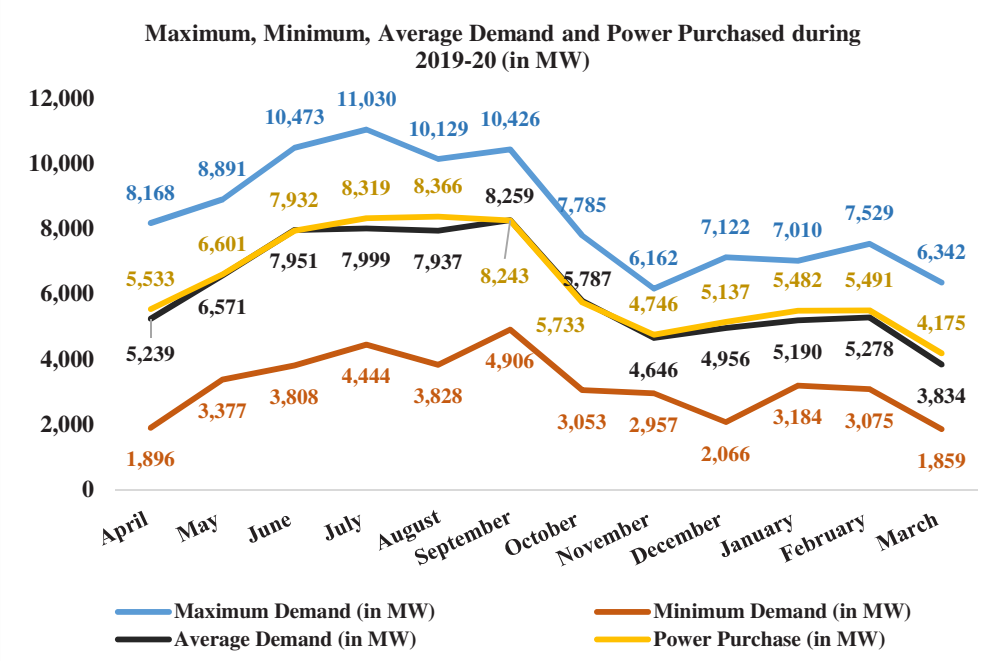
(Source: Information supplied by the HPPC)

From these tied up sources, the HPPC fulfills the demand of state consumers. The Maximum Minimum, Median demand and power purchased during the 2019-20 and 2020-21 were as under:

Year	Maximum Demand (in MW)	Minimum Demand (in MW)	Median Demand (in MW)	Average Demand (in MW)	Power Purchased (in MW)
2019-20	11,030	1,859	6,203	6,137	6,313
2020-21	10,897	1,274	6,106	6,037	6,175

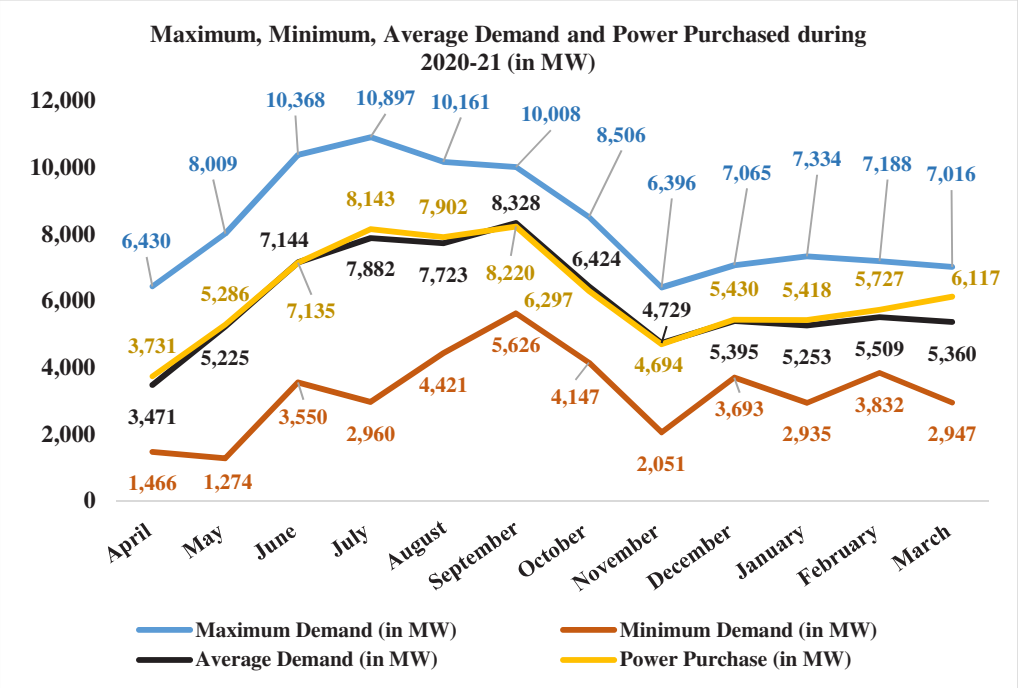
(Source: Information supplied by the HPPC)

Month wise demand and power purchased during 2019-20 from various sources are as under



[2] ₹ 4.88 per unit = Variable cost ₹ 4.29 per unit and Transmission cost & Losses (+) ₹ 0.59 per unit.

Month wise demand and power purchased during 2020-21 from various sources are as under



It is seen from the above graphs that during the year 2019-20 and 2020-21, total power purchased were almost equal to average demand of the state consumers. It was further noticed that during 2019-20 and 2020-21, the maximum demand of the power was 11,030 and 10,879 MW respectively and minimum demand during this period was 1,859 and 1,274 MW respectively. Thus, the difference of Maximum and Minimum demand was 9,171 MW and 9,623 MW during 2019-20 and 2020-21 respectively. To cater to meet the maximum demand of the state consumers, besides tied up sources, the HPPC had purchased short term power from banking arrangements and Energy Exchange etc. and in case of minimum demand, after matching the demand, backing down instructions are being issued to the remaining thermal power generators.

6.3 Comparative analysis of Scheduling of power

Audit analysed procuring/scheduling power on merit order as per current practice existing with preparation of merit order based on revised variable cost (incorporating variable cost, point of connection losses and transmission cost as part of variable cost in place of fixed cost) as well as preparing merit order based on landed cost. These findings are detailed subsequently at paragraph 6.3.2 and paragraph 6.3.1 respectively. It is seen that in both these scenarios there is an adverse impact on the distribution companies but positive impact on the state power generating utilities.

The analysis also shows that the existing basis of bifurcation of variable cost for preparation of merit order is disadvantageous to state generating units as while cost of transportation of coal for thermal plants of HPGCL located in Haryana (distant from Principal source of raw material viz. coal) is incorporated as a variable cost, the cost of transmission for plants located at a distance from Haryana is incorporated as a fixed cost. The scheduling of power including merit order preparation etc. is a product which has multiple variables and constraints and advanced techniques of historic data analysis and use of optimisation techniques for various permutations and combinations is required to be done by HPPC. The details of analysis are as under:

6.3.1 On the basis of Variable cost and Landed cost

Audit has conducted a comparative study for the year 2019-20 and 2020-21 to work out the difference between total power purchase cost when power is scheduled as per actual landed cost and when it is scheduled as per existing variable cost. For this purpose:

- A revised merit order was prepared on the basis of actual landed cost of electricity by all generators at Haryana periphery. Normative fixed cost, variable cost, Interstate transmission charges and transmission losses per unit were added to calculate the actual landed cost of the plant.
- Quantum of Actual power purchased during the year 2019-20 and 2020-21 was re-distributed among all thermal plants as per their ranking in revised merit order.
- It was assumed that all the power plants were available upto their full normative capacity during the whole year and full fixed cost was paid to all.

It was observed that most of the intra state generators (HPGCL Plants and other plants situated in Haryana) are likely be benefited by preparation of Merit order Dispatch on landed cost basis as their ranks were improved in MoD as their generation cost did not have transmission charges and losses which are being paid by DISCOMs in case of electricity purchase from Inter-State Generating stations. Overall cost of power purchase increased when scheduling was done as per landed cost, after factoring in the full fixed cost of all plants (whether power scheduled or not), and excess cash outflow of ₹ 103.96 crore and ₹ 442.24 crore during 2019-20 and 2020-21 respectively is assessed when power is scheduled as per merit order prepared on the basis of landed cost. These details are given in the table below:

Year	Units purchased (in MUs)	When power is scheduled on the basis of Variable cost only (existing system)		When power is scheduled on the basis of Landed cost		Excess cash outflow when power is scheduled on landed cost basis instead of variable costing (₹ in crore)
		Total cost of power purchase (₹ in crore)	Average rate (₹ per unit)	Total cost of power purchase (₹ in crore)	Average rate (₹ per unit)	
2019-20	38,013.91	16,807.17	4.421	16,911.13	4.449	103.96
2020-21	37,761.23	15,782.09	4.179	16,224.33	4.297	442.24

(Source: Compiled on the basis of information supplied by the HPPC)

It is evident from the above table that the existing system of power scheduling is economical in comparison to the scheduling of power on landed cost basis for the distribution Companies and in turn to the consumers. However it is likely to be advantageous to State Generating Stations.

Further analysis revealed that this gap decreases whenever capacity utilization increases i.e. during 2020-21, excess cash flow becomes ₹ 442.24 crore for 37,761.23 MUs (lesser Quantity) purchased in comparison to ₹ 103.96 crore for 38,013.91 MUs during 2019-20. From the above it can be concluded that the difference of cash flow as per scheduling on the basis of landed cost and variable cost decreases when capacity utilization increases. We have analysed the capacity utilization for the period 2019-21.

Audit also noticed that the following thermal plants will be benefited (improve their rank[3] in Merit Order Dispatch) while preparing merit order on the basis of landed cost as tabulated below:

Rank as per Variable cost	Rank as per landed cost	Impact on Rank	Name of the Thermal Plant	Average VC including POC Losses	Average landed cost per unit
Plants which will be advantageous while preparing MoD on the basis of landed cost comprising variable cost, transmission cost and fixed cost					
6	11	Improved	DCRTPP (YTPP)	3.626	4.686
7	12	Improved	JHAJJAR POWER Ltd.	3.594	4.662
2	13	Improved	PTPS- VII & VIII	3.658	4.628
9	15	Improved	Auriya (Gas GT+ST)	3.505	4.574
4	16	Improved	RGTPP -Khedar	3.639	4.549

(Source: Compiled on the basis of information supplied by the HPPC)

The list of plants losing out in comparison is tabulated below:

Rank as per Variable cost	Rank as per landed cost	Impact on Rank	Name of the Thermal Plant	Average VC including POC Losses	Average landed cost per unit
11	2	Down	Unchahar-3	3.477	5.258
14	3	Down	Unchahar-4	3.255	5.248
10	6	Down	Unchahar-1	3.477	4.992
17	7	Down	DVC RAGHUNATHPUR	2.879	4.973
16	9	Down	DVC MEJIA	2.948	4.831
18	10	Down	DVC KODERMA	2.596	4.710
23	18	Down	LANCO Amarkantak	2.037	3.921

(Source: Compiled on the basis of information supplied by the HPPC)

[3] Higher value of rank means better position in Merit Order Dispatch.

The mechanism of bifurcation of costs into variable cost and fixed cost as applied currently acts against the HPGCL as detailed in subsequent paragraph 6.3.2. Haryana Electricity Regulatory Commission while approving (18 February 2021) tariff order for the year 2021-22 of HPGCL had considered view that the DISCOMS, while evaluating any new proposal for purchase of power in future, shall give due weightage to the landed cost of power at its interface with the STU.

6.3.2 On the basis of Variable cost and Variable cost including transmission cost.

Audit has conducted a comparative study for the month of November 2019 to work out the difference between total power purchase cost when power is scheduled as per variable cost incorporating transmission cost as an additional component and when it is scheduled accordingly in merit order for this purpose:

- A revised merit order was prepared on the basis of variable cost including transmission cost of electricity by all Generators at Haryana periphery. Variable cost, Interstate transmission charges and transmission losses per unit were added to calculate the variable cost including transmission cost of the plant.
- Quantum of Actual power purchased for the month of November 2019 was re-distributed among all thermal plants as per their ranking in revised merit order.
- It was assumed that all the power plants were available upto their full normative capacity during the whole year and full fixed cost was paid to all.

It was observed that ranking of most of the Intra state Generators (Thermal power plants of HPGCL and other plants situated in Haryana) improved as their generation cost did not have transmission charges which are being paid by DISCOMs in case of electricity purchase from Inter-State Generating stations.

Audit also noticed that the following thermal plants will be benefited (by improving their rank[4] in Merit Order Dispatch) while preparing merit order by considering transmission cost as a part of variable cost, as tabulated below:

[4] Higher value of rank means better position in Merit Order Dispatch.

MoD as per Variable cost	MoD by considering transmission cost as part of VC	Impact	Name of the Generator/ Plant	Variable cost	Variable Cost including transmission charges
Plants which will be advantageous while preparing MoD by considering transmission cost as a part of variable cost					
1	6	Improved	PNP TH-VI	3.894	3.894
2	7	Improved	PNP TH- VII&VIII	3.799	3.799
3	9	Improved	DCRTPP unit-1 - 2	3.784	3.784
4	11	Improved	RGTPP	3.769	3.769
5	13	Improved	JHAJJAR POWER LTD.	3.691	3.691
6	14	Improved	Aravali Co. Pvt. Ltd.	3.678	3.678

(Source: Compiled on the basis of information supplied by the HPPC)

The list of plants losing out in comparison is tabulated below:

MoD as per Variable cost	MoD by considering transmission cost as part of VC	Impact	Name of the Generator/ Plant	Variable cost	Variable Cost including transmission charges
7	1	Down	Feroz Gandhi Unchahar-2	3.595	4.029
9	2	Down	Feroz Gandhi Unchahar-1	3.564	3.998
8	3	Down	Feroz Gandhi Unchahar-3	3.564	3.998
10	4	Down	PRAGATI POWER	3.559	3.993
11	5	Down	Auriya	3.504	3.938

(Source: Compiled on the basis of information supplied by the HPPC)

Comparative analysis of procurement/scheduling of power on the basis of Merit order Dispatch on the basis of Variable cost and variable cost including transmission cost are given in the table below:

Period	Units purchased (in MUs)	When power is scheduled on the basis of Variable cost only (existing system)		When power is scheduled on the basis of variable cost including transmission cost		Excess cash outflow when power is scheduled on variable cost including transmission cost basis instead of variable costing (₹ in crore)
		Total cost of power purchase (₹ in crore)	Average rate (₹ per unit)	Total cost of power purchase (₹ in crore)	Average rate (₹ per unit)	
November 2019	2,621.284	1,209.87	4.616	1,238.12	4.723	28.25

(Source: Compiled on the basis of information supplied by the HPPC)

It is evident from the above table that the existing system of power scheduling is economical for DISCOMs in comparison to the scheduling of power by considering transmission cost as a part of variable cost. However such a scheduling is likely to be advantageous to State Generating Stations.

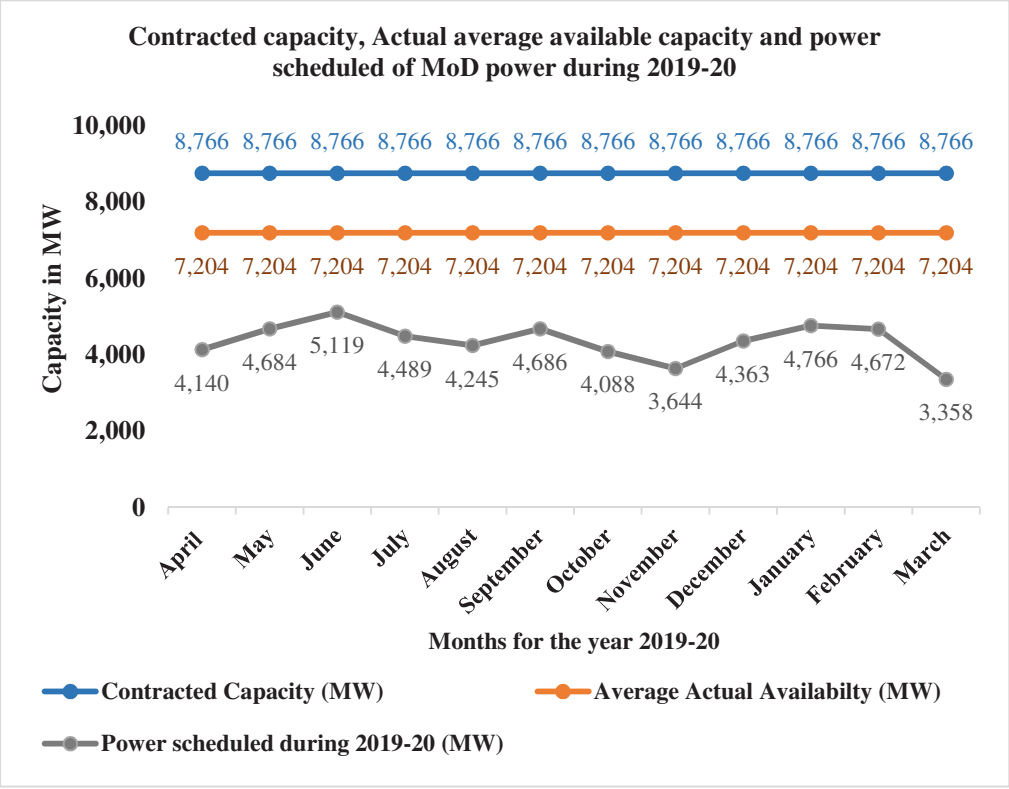
6.4 Excess tied up contracted capacity of thermal power

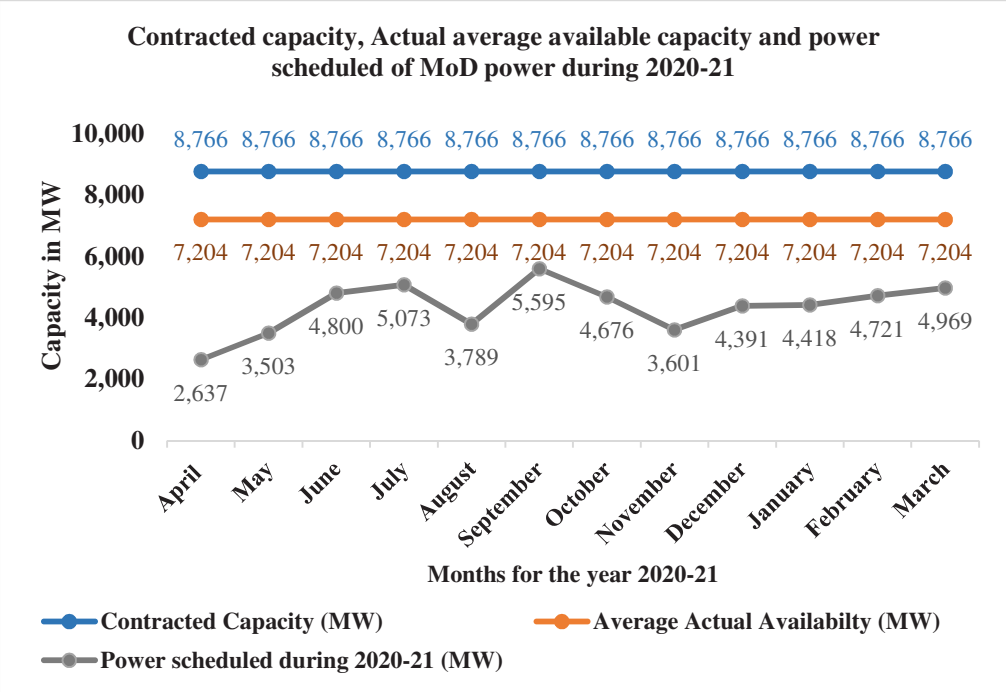
Haryana Power Purchase Centre (HPPC) on behalf of both the DISCOMS (UHBVNL and DHBVNL) procures and trades electricity to cater the electricity requirement of Haryana State. A proper cost benefit analysis should be carried out before adding new capacities as the procurer has to bear the liability of fixed cost for entire life (25 years appx.) of Power generating unit

irrespective of the scheduling of plant which results into creation of undue liability on the State Consumers.

HPPC had total contracted capacity of 11,624 MW as on 31 March 2021. Of which 8,766 MW is subject to merit order scheduling and remaining capacity of 2,858 MW are of must run generation category which includes Hydro, Solar, Wind, other Renewable power which might be expensive but dispensed with merit order scheduling being environmental friendly.

During the years 2019-20 and 2020-21, total contracted capacity of HPPC was 8,766 MW against which normative availability was 7,204 MW (as per normative plant load factor of 85/80 *per cent*). Audit has conducted an exercise to work out the actual capacity utilization against actual availability of power during the period 2019-21. The contracted capacity, actual average available capacity and actual capacity utilization of thermal power purchased on the basis of Merit Order Dispatch by the HPPC during the years 2019-20 and 2020-21 are as under:





It is seen from the above chart that during 2019-20 and 2020-21 the HPPC could utilize maximum 5,119 MW and 5,595 MW capacity against the actual available of 7,204 MW capacity during 2019-20 and 2020-21 respectively. Thus, 2,085 MW capacity during 2019-20 and 1,609 MW capacity during 2020-21 remained unutilized. Due to which, the units of thermal power plants including Haryana State owned generating units were backed down (non-operational) for significant period of time during these years. However, HPPC had to pay fixed cost to these power generators which put undue financial burden on state consumers. The proportionate fixed cost of unutilized capacity works out to be ₹ 3,030.64 crore (₹ 1,757.92 crore and ₹ 1,272.72 crore) for the period 2019-21. This has resulted into additional financial burden on state consumers due to increase in power purchase cost.

6.5 Capacity addition by Haryana DISCOMs

Audit has conducted analysis on the capacity addition by Haryana Power Purchase Centre over the years. During the period of 2006-2008, Maximum capacity had been added. During this period 18 Power Purchase Agreements (PPAs) of 5,600 MW capacity (almost 50 *per cent* of total capacity as on date) were signed. Above PPAs includes PPA with 6 major private plants i.e. Lanco Amarkantak Power Limited 285 MW (2006), Sasan Ultra Mega Power Project 445 (2007), Coastal Gujarat Power Limited 380 MW (2007), Adani Power Limited 1,424 MW (2008), Jhajjar Power Limited 1,188 MW (2008), GMR Kamalanga Energy Limited, 300 MW (2008). The power from above power plants started flowing from the year 2011. It was observed that although power purchase cost from these power plants (except Jhajjar Power Limited) was cheaper in comparison to existing power plants but over addition of

capacity has resulted into backing down of other existing plants except during peak season.

The table below shows the capacity added by HPPC during last 10 years.

Year	Power available at the beginning of the year (in MW)	Capacity added during the year[5] (in MW)	Power available at the end of year (in MW)	Source added, its capacity (PPA Signing year)
2011	3,890	2,434	6,324	Rajeev Gandhi Thermal Power Plant Hisar 1,200 MW (2003), Aravali 693 MW (2008), Lanco Amarkantak 285 MW (2006), Pragati Power 137 MW (2009), DVC Mejia 100 MW (2010)
2012	6,324	3,074	9,398	Adani 1,424 MW (2008), CGPL-380 MW (2007), JPL-1,188 MW (2008)
2013	9,398	577	9,975	SASAN 445 (2007), DVC Koderma 100 MW (2006)
2014	9,975	758	10,733	PTC GMR 300 MW (2008), Karchamwangtoo 376 MW (2006)
2015	10,733	158	10,891	Only Renewable power has been added since 2014
2016	10,891	110	11,001	
2017	11,001	61	11,062	
2018	11,062	25	11,087	
2019	11,087	100	11,187	
2020	11,187	124	11,311	
2021	11,311	699	12,011	

Since 2015 renewable power of 1,433 MW had also been added in compliance to Renewable Power Obligations (RPO) Regulations notified by the Commission. Under RPO Regulations, DISCOMs are bound to purchase certain quantum of power (as determined by the commission) from Renewable Sources. The power purchased from Renewable power plants further reduced the utilization of existing thermal power plants and contributed towards their backing down. Renewable Power plants have 'Must Run' status and they are not subject to merit order scheduling.

Audit has observed that HPPC/DISCOMs had added capacity on an adhoc assessment basis in the past which has resulted into underutilization of existing sources and undue burden of fixed cost on State Consumers. Existing capacity was utilized during peak time for the year 2019-20 and 2020-21 as the peak demand during the period remained at 11,030 MW on 3 July 2019 and 10,897 MW on 3 July 2020 respectively and in remaining period it remained underutilized. Therefore, every new PPA should have been signed after conducting detailed cost benefit analysis. Future demand and availability of power from existing sources should have been kept in mind before adding new capacity to get the maximum benefit with minimum cost and to avoid

[5] Capacity added means – the year during which generator started the power supply. Year of PPA is mentioned in bracket in the last column. Generally, the process of installation of plant is started after Signing of PPA and approval of Commission. It takes appox. 4-5 years in commissioning of coal based thermal power plant since PPA. The installation cost of coal based thermal power plant is appox. ₹ 4 to 5 crore per MW.

unnecessary financial burden of unutilized capacity. HPPC should use Operational Research/Optimisation Techniques to get the best mix for procurement of power. The addition of the capacities through PPA are assessed to be beyond the requirement of Haryana even after lapse of 10 to 15 years and recommended to be investigated.

Apart from above detailed analysis, audit has noticed specific cases related to Merit order and PPA which is given in subsequent paragraph:

6.6 Consideration of variable cost in case of Jhajjar Power Limited Bills while preparing Merit Order

DISCOMs had signed a Power Purchase Agreement (PPA) with Jhajjar Power Limited (JPL) on 7 August 2008. As per PPA, the fuel cost was to be worked out on the basis of 'average weighted Invoice Price' of the coal and no transit loss was allowed to the generator. It is worthwhile to mention that HPGCL and other generators are entitled for normative transit loss of 1.5 *per cent* or as determined by the Electricity Regulator. But in the instant case of Jhajjar Power Limited, it was not incorporated at the time of finalizing the PPA.

It was noticed that M/s JPL had raised/submitted its bills after loading the impact of transit loss of coal in violations of PPA which had resulted into increase in variable cost of generation. HPPC, however, while making payments deducted the amount of transit loss claimed by JPL. Aggrieved upon this deduction, M/s JPL lodged claims in respect of Transit loss amounting to ₹ 286.60 crore (₹ 170.60 crore transit loss claims and ₹ 116 crore as late payment surcharge) and the matter was under consideration in Appellate Tribunal for Electricity (APTEL).

Resultantly, there were two variable rates available for the purpose of merit order i.e variable cost as per bills submitted by M/s JPL and variable cost as per payments made by HPPC. Variable cost shown in the bills was higher than the rate at which actual payments were made by HPPC. Audit observed that HPPC considered the lower of the variable cost while preparing merit order (as per final payment made to generator) despite the fact that the generator was claiming this deducted amount and filed petition in Central Electricity Regulatory Commission (CERC)/ Appellate Tribunal for Electricity (APTEL). Thus, M/s JPL was getting the benefit of lower variable cost while scheduling power (merit order basis) as well as claiming benefit of higher variable costs. HPPC was allowing the generator to benefit in form of placing it in merit order on lower of the two costs. Audit has conducted an exercise regarding impact in position of M/s JPL in merit order, it placed on the basis of higher of the two costs i.e. as per bill by M/s JPL. It was noticed that in 8 out of 23 Months (for the years 2020-21 & 2021-22), the rank of generator got downgraded. The details of variable cost claimed by JPL and as per payments made by HPPC for the period 2020-21 and 2021-22 along with its position in merit order are as under:

Months	Variable cost considered in Merit Order as per payments made by HPPC	Position in merit order	Variable cost as per bills submitted by the JPL	Revised Position in merit order as per bills submitted by the JPL	Change in position
2020-21					
April	3.533	7	3.56	7	No change
May	**3.533**	**8**	**3.56**	**7**	**Rank downgraded**
June	**3.349**	**11**	**3.43**	**10**	**Rank downgraded**
July	3.478	3	3.56	3	No change
August	3.409	6	3.46	6	No change
September	**3.314**	**7**	**3.37**	**5**	**Rank downgraded**
October	3.417	6	3.48	6	No change
November	3.411	5	3.44	5	No change
December	3.259	7	3.26	7	No change
January	3.198	6	3.2	6	No change
February	3.17	6	3.17	6	No change
March	3.231	6	3.24	6	No change
2021-22					
April	**3.277**	**7**	**3.31**	**6**	**Rank downgraded**
May	**3.318**	**7**	**3.41**	**5**	**Rank downgraded**
June	**3.409**	**4**	**3.5**	**2**	**Rank downgraded**
July	**3.318**	**5**	**3.4**	**4**	**Rank downgraded**
August	**3.487**	**2**	**3.55**	**1**	**Rank downgraded**
September	3.534	5	3.59	5	No change
October	3.511	5	3.61	5	No change
November	3.606	7	3.71	7	No change
December	3.491	6	3.52	6	No change
January	3.561	4	3.68	4	No change
February	3.642	8	3.64	8	No change

Audit noticed that HPPC never raised any objection on the bills submitted by the M/s JPL and kept accepting the bills although those were not as per PPA. Audit is of the opinion that bills should have been got revised as per PPA before making final payment. Further, while preparing merit order the benefit of reduced cost was also passed on to the generator despite the fact that the Generator has lodged the claim for the differential cost (transit loss) through CERC/APTEL. Thus, HPPC was comparing variable cost in a manner for M/s JPL which was advantageous to M/s JPL over HPGCL.

The said matter was also deliberated in the meeting of Steering Committee for Power Planning (SCPP) on 28 October 2021, wherein it was deliberated that HPPC shall take up the matter with M/s JPL (China Light and Power- CLP) to raise the bills as per PPA and if CLP does not agree then CLP should be placed in the merit order as per the bills raised by them. In this regard, other than correspondence with the Generator, no action has been taken as of April 2022.

6.7 Conclusion

Against the total tied up capacity of thermal power (as per normative PLF) of 7,204 MW from 30 thermal power plants, the HPPC could utilised maximum 4,378.68 MW from 22 thermal power plants on merit order basis and remaining eight thermal power plants remained backed down/shut down. HPPC had purchased short term thermal power from two private thermal power plants (SKS

Power and MB Power) at variable cost of ₹ 4.29 per unit ranging between 208.41 MW to 391.21 MW. Audit observed that instead of purchasing power at the rate of ₹ 4.88 per unit from private plants, Unit-VI of HPGCL having lower variable cost of ₹ 3.90 per unit could have been considered to be scheduled for power purchase. Most of the Intra state Generators (HPGCL Plants and other plants situated in Haryana) are likely to be benefited in case of preparation of Merit order Dispatch on landed cost basis as their ranks improved in Merit Order Dispatch as their generation cost did not have transmission charges and losses which are being paid by DISCOMs in case of electricity purchased from Inter-State Generating stations. But overall cost of power purchase increased when scheduling was done as per landed cost. Besides revising the components of variable cost to include transmission charges and losses as a component of variable costs is assessed to be beneficial to generating units in Haryana because Haryana is in the northern part of the Country and thermal power plants of HPGCL located in Haryana have to pay significant cost on transportation of coal which is incorporated as component of variable cost and principal reason for low positioning of HPGCL plants in Merit order Dispatch. However, HPGCL plants have negligible transmission cost as its plants are closer to the consuming centres. As per MoD prepared by considering transmission cost as part of variable cost will increase the cost of power purchase to DISCOMs, however, it will be advantageous to Intra State power Generators including State generating Power Plants. HPPC could utilize maximum 5,119 MW and 5,595 MW capacity against the actual available of 7,204 MW capacity during 2019-20 and 2020-21 respectively. Thus, 2,085 MW capacity during 2019-20 and 1,609 MW capacity during 2020-21 remained unutilized. Due to which, the units of thermal power plants including Haryana State owned generating units were backed down (non-operational) for significant period of time during these years. The proportionate fixed cost of unutilized capacity works out to be ₹ 3,030.64 crore (₹ 1,757.92 crore and ₹ 1,272.72 crore) for the period 2019-21. This has resulted into additional financial burden on state consumers due to increase in power purchase cost. HPPC considered the lower of the variable cost in respect of M/s Jhajjar Power Limited while preparing merit order (as per final payment made to generator) despite the fact that the generator was claiming this deducted amount and filed petition in Central Electricity Regulatory Commission (CERC)/APTEL. HPPC was allowing the generator to benefit in form of placing it in merit order on basis of lower of the two variable costs.

6.8 Recommendations

- HPPC should use Operational Research/ Optimization Techniques to get the best mix for procurement of power.
- HPPC should take prompt action for consideration of proper variable cost of M/s JPL while preparing Merit Order Dispatch.

Chapter 7

Conclusion

Chapter 7

7.1 Conclusion

7.1.1 Operation and maintenance of generating plants

The generation of the Company declined from 10,567.83 MUs in 2017-18 to 5,466.81 MUs in 2020-21, far below the normative generation approved by the Haryana Electricity Regulatory Commission (HERC) and the shortfall ranged between 42.61 to 69.24 *per cent* during 2017-21. The main reason for low generation was higher variable cost of thermal power stations which resulted in backing down of plants.

The Plant Load Factor (PLF) in respect of all units of the Company decreased substantially due to forced outages on account of various technical problems, poor planning in execution of works pertaining to capital overhauling and backing down of plants due to higher variable cost. Due to non-achievement of normative PLF, Company could not recover fixed cost of ₹ 390.94 crore during 2016-21 from the Distribution companies (DISCOMs) of Haryana. The Company lost the opportunity to earn potential revenue of ₹ 15,576.80 crore on non-production of 49,559.73 MUs of power during 2016-21 due to non-achievement of normative PLF.

As per merit order, plants of the Company were one of expensive plants amongst the 33 Power plants for which merit order is prepared by DISCOMs. Their ranks in merit order ranged between 1st and 13th during 2016-17 to 2020-21. Thus, the position of the thermal plants in merit order deteriorated due to which the Company lost opportunity of earning potential revenue of ₹ 13,449.61 crore by not generating 38,862.43 MUs of power. Further, due to higher transportation cost of coal the units of the Company could not compete with Pithead plants in terms of variable cost.

The HIP Rotor of Unit-II of RGTPP got damaged (September 2020) due to irregular loading pattern, frequent start and stop operations. The Company had however, not carried out any cost benefit analysis either to go for repair or purchase a new rotor in view of high transportation cost against the small amount on repair cost and loss of fixed cost of ₹ 0.97 crore per day besides loss of generation of 12.24 MUs per day. The HIP rotor had been received during January 2022 but unit could not be commissioned due to non-receipt of associated spares resulting in non-recovery of fixed cost of ₹ 396.77 crore from the DISCOMs apart from loss of potential revenue for forced shutdown period.

The Company has suffered generation loss of 63.80 MUs of Green Energy valuing ₹ 30.73 crore in respect of Western Yamuna Canal Hydel Project due

to acceptance of non-interchangeable blades and delay in completion of overhauling work of Machines. Due to lesser generation, DISCOMs had to purchase 63.80 MUs of power from other sources which resulted into extra burden to the extent of ₹ 30.73 crore on the State consumers.

7.1.2 Fuel and Inventory Management

The coal consumption pattern of all the three power plants of Company was within the norms of coal approved by HERC in respect of its units except for RGTPP (Unit-II) during 2019-20 and 2020-21.

The quantity and quality claims include compensation for short supplies of Coal Companies, quality claims on un-sampled rakes and compensation pertaining to idle freight. Out of total claims lodged during 2016-21 for ₹ 421.74 crore on account of quantity claims, the Company could reconcile claims of ₹ 21.68 crore (5.14 *per cent* only) during last five years ending 2020-21. The quantity claims of ₹ 494.32 crore and quality claims of ₹ 270.50 crore raised by the Company with coal supply companies were pending as on 31 March 2021. Delay in settlement of claims resulted into blockade of funds.

Differential freight of ₹ 8.43 crore was due for refund from Railways on account of diverted rakes during December 2015 to March 2021, of which the Railways paid ₹ one crore and ₹ 7.43 crore remained to be recovered from Indian Railways as of September 2021. The claims of ₹ 0.78 crore in 33 cases were rejected by Railways on the ground that these cases were preferred after expiry of stipulated time and were time barred.

The working capital involved in Operation and Maintenance (O & M) spares was more than the prescribed norms of HERC in all the three plants of the Company and therefore, the Company could not recover interest amounting to ₹ 105.31 crore on excess working capital involved in O&M spares through tariff.

The mean time taken by the three plants (DCRTPP, RGTPP and PTPS) of the Company in placing purchase orders since the date of requirement ranged between 223 and 328 days for procurement of material. Further, the users received this material in these plants after days ranging between 412 and 682 days since their requirements. The Company has not prescribed any timeline for procurement of material in its Work and Purchase Regulations, 2015 which reflects weakness of internal control system.

7.1.3 Financial Management

The Company recovered excess fixed cost amounting to ₹ 26.46 crore during 2018-19 and 2019-20 due to achievement of higher PLF against the HERC norms which was in contravention of the tariff orders of HERC.

The actual average level of daily coal stock in all thermal plants remained less than the normative level determined by HERC during the period 2016-21. As a result, the Company had claimed and recovered excess interest of ₹ 107.23 crore on working capital during 2016-17 and 2017-18 from DISCOMs through tariff which had put extra burden on the State consumers.

The actual average working capital involved in sales receivables was lesser by ₹ 415.39 crore than normative working capital requirement due to low level of generation during the period 2016-18. Thus, the Company had claimed and recovered excess interest ₹ 43.82 crore on working capital on account of receivables from DISCOMs.

The Company received funds amounting to ₹ 252.12 crore through sale of fly ash during 2016-17 to 2020-21 but utilised only ₹ 15.23 crore during this period. An amount of ₹ 476.20 crore remained unutilised in ash funds collected through sale of fly ash. The Company used this fund in the general business in contravention of instructions of MoEF&CC.

7.1.4 Compliance of Environmental norms and Generation of clean energy

Power plants of the Company met the emission norms regarding Suspended Particulate Matter (SPM) levels as determined by the Ministry of Environment, Forest and Climate Change, (MoEF&CC) in all the years from 2016-21. However, Emission norms of SO_2 and NO_x are not met by the power plants.

The Company has not set any timeline for setting up of 133.20 MW Solar Power plants despite approval of the State Government in October 2016. The Company, however, could install only 10 MW solar power project at PTPS (December 2021) during the period 2016-21 and thus, the objective of green energy could not be achieved.

While entering into Power purchase Agreement (PPA) with DISCOMs for supply of power from solar project, the Company agreed to remove the terms and conditions regarding deemed generation, which has resulted in loss of revenue valuing ₹ 1.12 crore against deemed generation of 35.05 lakh units.

Had the Company proposed the Capacity Utilisation Factor (CUF) of 19 *per cent* as per HERC (RE) Regulations which was more realistic, the tariff rate of ₹ 5.39 per kWh instead of ₹ 4.88 per kWh (at 21 *per cent* CUF) could have been available to the Company for sale of power from solar project. Thus, fixation of lower tariff by ₹ 0.51 per kWh has resulted in loss of ₹ 3.36 crore for the period from 2017-18 to 2020-21.

7.1.5 Power Procurement on the basis of Merit Order Dispatch by Haryana Power Purchase Centre for Haryana State

Against the total tied up capacity of thermal power (as per normative PLF) of 7,204 MW from 30 thermal power plants, the HPPC could utilised maximum 4,378.68 MW from 22 thermal power plants on merit order basis and remaining eight thermal power plants remained backed down/shut down. HPPC had purchased short term thermal power from two private thermal power plants (SKS Power and MB Power) at variable cost of ₹ 4.29 per unit ranging between 208.41 MW to 391.21 MW. Audit observed that instead of purchasing power at the rate of ₹ 4.88 per unit from private plants, Unit-VI of HPGCL having lower variable cost of ₹ 3.90 per unit could have been considered to be scheduled for power purchase. Most of the Intra state Generators (HPGCL Plants and other plants situated in Haryana) are likely to be benefited in case of preparation of Merit Order Dispatch on landed cost basis as their ranks improved in Merit Order Dispatch as their generation cost did not have transmission charges and losses which are being paid by DISCOMs in case of electricity purchased from Inter-State Generating stations. But overall cost of power purchase increased when scheduling was done as per landed cost. Besides revising the components of variable cost to include transmission charges and losses as a component of variable costs is assessed to be beneficial to generating units in Haryana because Haryana is in the northern part of the Country and thermal power plants of HPGCL located in Haryana have to pay significant cost on transportation of coal which is incorporated as component of variable cost and principal reason for low positioning of HPGCL plants in Merit order Dispatch. However, HPGCL plants have negligible transmission cost as its plants are closer to the consuming centres. As per MoD prepared by considering transmission cost as part of variable cost will increase the cost of power purchase to DISCOMs, however, it will be advantageous to Intra State power Generators including State generating Power Plants. HPPC could utilize maximum 5,119 MW and 5,595 MW capacity against the actual available of 7,204 MW capacity during 2019-20 and 2020-21 respectively. Thus, 2,085 MW capacity during 2019-20 and 1,609 MW capacity during 2020-21 remained unutilized. Due to which, the units of thermal power plants including Haryana State owned generating units were backed down (non-operational) for significant period of time during these years. The proportionate fixed cost of unutilized capacity works out to be ₹ 3,030.64 crore (₹ 1,757.92 crore and ₹ 1,272.72 crore) for the period 2019-21. This has resulted into additional financial burden on state consumers due to increase in power purchase cost. HPPC considered the lower of the variable cost in respect of M/s Jhajjar Power Limited while preparing merit order (as per final payment made to

generator) despite the fact that the generator was claiming this deducted amount and filed petition in Central Electricity Regulatory Commission (CERC)/APTEL. HPPC was allowing the generator to benefit in form of placing it in merit order on basis of lower of the two variable costs.

Vishal Bansal

Chandigarh **(VISHAL BANSAL)**
Dated: 27 July 2022 **Principal Accountant General (Audit), Haryana**

Countersigned

New Delhi **(GIRISH CHANDRA MURMU)**
Dated: 02 August 2022 **Comptroller and Auditor General of India**

Appendices

Appendix 2.1

(Reference: Paragraph 2.2; Page 11)

Statement showing details of shutdown of plants due to Forced outages, Planned outages and Backing Down Instructions

Year	Total Operating hours	Forced outages		Planned outages		Shut down due to Backing down instructions		Total outages	
		Hours	*Per cent*	Hours	*Per cent*	Hours	*Per cent*	Hours	*Per cent*
DCRTPP, Yamuna Nagar									
Unit-I									
2016-17	8,760	428	4.89	0	0.00	1,347	15.38	1,775	20.26
2017-18	8,760	154	1.76	1,416	16.16	1,291	14.74	2,861	32.66
2018-19	8,760	1,825	20.83	858	9.79	1,065	12.16	3,748	42.79
2019-20	8,784	67	0.76	0	0.00	2,906	33.08	2,973	33.85
2020-21	8,760	3	0.03	0	0.00	3,289	37.55	3,292	37.58
Total (A)	**43,824**	**2,477**	**5.65**	**2,274**	**5.19**	**9,898**	**22.59**	**14,649**	**33.43**
Unit-II									
2016-17	8,760	687	7.84	618	7.05	1,459	16.66	2,764	31.55
2017-18	8,760	344	3.93	0	0.00	806	9.20	1,150	13.13
2018-19	8,760	203	2.32	0	0.00	1,206	13.77	1,409	16.08
2019-20	8,784	577	6.57	2,462	28.03	1,350	15.37	4,389	49.97
2020-21	8,760	144	1.64	0	0.00	3,280	37.44	3,424	39.09
Total (B)	**43,824**	**1,955**	**4.46**	**3,080**	**7.03**	**8,101**	**18.49**	**13,136**	**29.97**
Total (A+B)	**87,648**	**4,432**		**5,354**		**17,999**		**27,785**	
PTPS Panipat									
Unit-V									
2016-17	8,760	12	0.14	0	0.00	7,813	89.19	7,825	89.33
2017-18	8,760	1,225	13.98	0	0.00	6,781	77.41	8,006	91.39
2018-19	8,760	0	0.00	0	0.00	7,787	88.89	7,787	88.89
2019-20	8,784	0	0.00	0	0.00	8,784	100.00	8,784	100.00
Total (A)	**35,064**	**1,237**	**3.53**	**0**	**0.00**	**31,165**	**88.88**	**32,402**	**92.41**
Unit-VI									
2016-17	8,760	73	0.83	0	0.00	7,541	86.08	7,614	86.92
2017-18	8,760	608	6.94	885	10.10	5,368	61.28	6,861	78.32
2018-19	8,760	52	0.59	0	0.00	7,067	80.67	7,119	81.27
2019-20	8,784	0	0.00	0	0.00	8,784	100.00	8,784	100.00
2020-21	8,760	892	10.18	0	0.00	7,588	86.62	8,480	96.80
Total (B)	**43,824**	**1,625**	**3.71**	**885**	**2.02**	**36,348**	**82.94**	**38,858**	**88.67**

Year	Total Operating hours	Forced outages		Planned outages		Shut down due to Backing down instructions		Total outages	
		Hours	*Per cent*	Hours	*Per cent*	Hours	*Per cent*	Hours	*Per cent*
Unit-VII									
2016-17	8,760	262	2.99	0	0.00	3,550	40.53	3,812	43.52
2017-18	8,760	161	1.84	273	3.12	2,759	31.50	3,192	36.44
2018-19	8,760	107	1.22	0	0.00	2,941	33.57	3,048	34.79
2019-20	8,784	183	2.08	282	3.21	4,303	48.99	4,768	54.28
2020-21	8,760	83	0.95	792	9.04	5,038	57.51	5,914	67.51
Total (C)	**43,824**	**796**	**1.82**	**1,347**	**3.07**	**18,591**	**42.42**	**20,734**	**47.31**
Unit-VIII									
2016-17	8,760	155	1.77	0	0.00	5,559	63.46	5,713.62	65.22
2017-18	8,760	328	3.74	1,294	14.77	3,714	42.40	5,336.62	60.92
2018-19	8,760	118	1.35	0	0.00	1,795	20.49	1,912.36	21.83
2019-20	8,784	2	0.02	0	0.00	3,847	43.80	3,848.38	43.81
2020-21	8,760	37	0.42	0	0.00	6,236	71.19	6,273.19	71.61
Total (D)	**43,824**	**640**	**1.46**	**1,294**	**2.95**	**21,151**	**48.26**	**23,084.17**	**52.67**
Total (A+B+C+D)	**1,66,536**	**4,298**		**3,526**		**1,07,255**		**1,15,078**	
RGTPP, Khedar Hisar									
Unit - I									
2016-17	8,760	131	1.50	0	0.00	4,123	47.07	4,254	48.56
2017-18	8,760	428	4.89	0	0.00	3,290	37.56	3,718	42.44
2018-19	8,760	1,300	14.84	0	0.00	3,961	45.22	5,261	60.06
2019-20	8,784	742	8.45	2,568	29.23	3,681	41.91	6,991	79.59
2020-21	8,760	49	0.56	837	9.55	5,189	59.24	6,075	69.35
Total (A)	**43,824**	**2,650**	**6.05**	**3,405**	**7.77**	**20,244**	**46.19**	**26,299**	**60.01**
Unit – II									
2016-17	8,760	302	3.45	1,082	12.35	3,245	37.04	4,629	52.84
2017-18	8,760	1,079	12.32	0	0.00	2,531	28.89	3,610	41.21
2018-19	8,760	456	5.21	0	0.00	3,550	40.53	4,006	45.73
2019-20	8,784	96	1.09	0	0.00	5,197	59.16	5,293	60.26
2020-21	8,760	4,640	52.97	0	0.00	3,240	36.99	7,880	89.95
Total (B)	**43,824**	**6,573**	**15.00**	**1,082**	**2.47**	**17,763**	**40.53**	**25,418**	**58.00**
Total (A+B)	**87,648**	**9,223**		**4,487**		**38,007**		**51,717**	
Grand Total (HPGCL)	**3,41,832**	**17,953**	**5.25**	**13,367**	**3.91**	**1,63,261**	**47.76**	**1,94,580**	**56.92**

Appendix 2.2

(Reference: Paragraph 2.5; Page 15)

Statement showing Plant wise variable cost and their positions in merit order with respect to descending order of variable cost for the year 2016-21

Month	2016-17		2017-18		2018-19		2019-20		2020-21	
	Variable cost	Position in Merit order	Variable cost	Position in Merit order	Variable cost	Position in Merit order	Variable cost	Position in Merit order	Variable cost	Position in Merit order
DCRTPP										
April	3.100	11	3.011	11	3.244	8	3.484	8	3.483	10
May	3.200	4	3.094	10	3.325	8	3.464	11	3.519	11
June	3.030	9	3.254	4	3.207	10	3.524	10	3.474	6
July	3.050	9	3.303	7	3.255	9	3.584	8	3.304	10
August	3.050	9	3.654	5	3.394	10	3.634	9	3.524	1
September	3.080	9	3.485	6	3.444	5	3.624	9	3.355	5
October	3.120	8	3.375	8	3.555	6	3.784	3	3.494	3
November	3.100	9	3.415	7	3.395	10	3.784	4	3.364	6
December	3.050	8	3.403	6	3.425	9	3.784	4	3.264	6
January	3.090	10	3.375	5	3.505	7	3.554	10	3.274	5
February	3.034	12	3.355	9	3.535	8	3.734	2	3.404	5
March	3.023	11	3.374	8	3.505	9	3.554	9	3.484	5
Average	**3.075**		**3.342**		**3.399**		**3.626**		**3.412**	
Minimum	**3.023**		**3.011**		**3.207**		**3.464**		**3.264**	
Maximum	**3.200**		**3.654**		**3.555**		**3.784**		**3.524**	
RGTPP										
April	3.190	9	3.011	10	3.305	6	3.574	3	3.572	5
May	3.170	7	3.110	8	3.381	7	3.574	7	3.572	6
June	3.160	7	3.244	5	3.371	6	3.593	5	3.449	9
July	3.200	7	3.568	3	3.371	6	3.653	4	3.781	1
August	3.200	7	3.664	3	3.444	5	3.694	4	3.501	5
September	3.080	8	3.681	3	3.350	9	3.690	5	3.501	4
October	3.140	7	3.605	4	3.426	9	3.751	7	3.671	1
November	3.360	4	3.557	5	3.520	6	3.769	5	3.502	4
December	3.280	5	3.483	4	3.631	5	3.512	11	3.502	4
January	3.030	13	3.472	3	3.586	4	3.562	9	3.303	4
February	3.492	3	3.492	7	3.581	4	3.724	3	3.630	1
March	3.363	2	3.549	5	3.581	5	3.572	5	3.622	1

PTPS Panipat								
	Unit V		Unit VI		Unit VII		Unit VIII	
Month	**Variable cost**	**Position in merit order**	**Variable cost**	**Position in merit order**	**Variable cost**	**Position in merit order**	**Variable cost**	**Position in merit order**
April-2016	3.21	4	3.21	5	3.19	7	3.19	8
May-2016	3.210	2	3.210	3	3.190	5	3.190	6
June-2016	3.250	3	3.250	4	3.160	6	3.180	5
July-2016	3.360	3	3.360	4	3.200	6	3.200	5
August-2016	3.360	3	3.360	4	3.2	6	3.2	5
September-2016	3.710	1	3.180	6	3.150	7	3.200	5
October-2016	3.480	1	3.210	3	3.140	6	3.200	4
November-2016	3.790	1	3.360	3	3.340	6	3.340	5
December-2016	3.790	1	3.360	3	3.120	6	3.340	4
January-2017	3.790	1	3.360	3	3.100	9	3.120	8
February-2017	3.790	2	3.360	4	3.004	13	3.047	10
March-2017	3.794	1	3.363	3	3.089	10	3.220	7
April-2017	3.794	1	3.363	2	3.233	7	3.094	8
May-2017	3.794	1	3.363	2	3.110	7	3.094	9
June-2017	3.794	2	3.818	1	3.219	6	3.693	3
July-2017	3.794	2	3.818	1	3.553	5	3.553	4
August-2017	4.365	1	3.660	4	3.630	6	3.880	2
September-2017	4.260	1	3.650	4	3.630	5	3.990	2
October-2017	4.260	1	3.590	5	3.560	6	3.710	3
November-2017	3.890	1	3.770	2	3.540	6	3.710	3
December-2017	-	-	3.640	2	3.520	3	3.470	5
January-2018	-	-	3.550	1	3.550	2	3.460	4
February-2018	3.890	1	3.550	5	3.550	6	3.580	4
March-2018	3.890	1	3.550	4	3.510	7	3.580	3
April-2018	3.850	1	3.850	2	3.540	4	3.540	3
May-2018	3.850	3	3.850	4	3.580	6	3.580	5
June-2018	3.990	2	3.990	3	3.350	8	3.350	7
July-2018	3.880	2	3.880	3	3.350	8	3.350	7
August-2018	3.900	1	3.900	2	3.420	8	3.420	7
September-2018	3.920	2	3.920	3	3.420	7	3.420	6
October-2018	3.920	1	3.920	2	3.520	8	3.520	7
November-2018	3.672	4	3.672	5	3.502	8	3.502	7
December-2018	3.984	1	3.984	2	3.614	7	3.614	6
January-2019	3.857	1	3.857	2	3.564	6	3.564	5
February-2019	3.894	2	3.894	3	3.554	5	3.554	6
March-2019	3.894	1	3.894	2	3.514	7	3.514	8
April-2019	3.894	1	3.894	2	3.524	6	3.524	7
May-2019	3.894	1	3.894	2	3.594	5	3.594	6
June-2019	3.894	1	3.894	1	3.574	6	3.574	7
July-2019	3.894	2	3.894	2	3.634	5	3.634	6
August-2019	3.894	2	3.894	2	3.677	6	3.677	7
September-2019	3.894	2	3.894	2	3.657	7	3.657	8
October-2019	3.894	2	3.894	2	3.773	5	3.773	6
November-2019	3.894	1	3.894	1	3.799	2	3.799	3
December-2019	3.894	1	3.894	1	3.799	2	3.799	3
January-2020	3.894	1	3.894	1	3.610	5	3.610	6
February-2020	3.894	1	3.894	1	3.553	7	3.553	8
March-2020	3.894	1	3.894	1	3.704	2	3.704	3
April-2020	Unit Decommissioned in March 2020		3.894	1	3.490	1	3.490	1
May-2020			3.894	1	3.520	1	3.520	1
June-2020			3.894	1	3.490	1	3.490	1
July-2020			3.314	7	3.314	7	3.314	7
August-2020			3.514	2	3.514	2	3.514	2
September-2020			3.514	1	3.513	1	3.513	1
October-2020			3.514	2	3.480	2	3.480	2
November-2020			3.514	1	3.510	1	3.510	1
December-2020			3.514	1	3.510	1	3.510	1
January-2021			3.514	1	3.510	1	3.510	1
February-2021			3.514	2	3.500	2	3.500	2
March-2021			3.514	2	3.500	2	3.500	2
Minimum	**3.21**	**1**	**3.18**	**1**	**3.004**	**2**	**3.047**	**2**
Maximum	**4.365**	**4**	**3.99**	**7**	**3.874**	**13**	**3.99**	**10**

Year	Minimum Variable cost (Unit-I and II)	Maximum Variable cost (Unit-I and II)
DCRTPP		
2016-17	3.023	3.200
2017-18	3.011	3.654
2018-19	3.207	3.555
2019-20	3.464	3.784
2020-21	3.264	3.524
RGTPP		
2016-17	3.030	3.492
2017-18	3.011	3.681
2018-19	3.305	3.631
2019-20	3.512	3.769
2020-21	3.303	3.781

Appendix 2.3

(Reference: Paragraph 2.5; Page 15)

Working showing loss of power due to BDIs shut down

Year	Total Operating hours	Reserve shut down		PLF	Units lost (In MUs)	VC approved by HERC	Value of units lost (₹ in crore)
		Hours	in *per cent*				
RGTPP Khedar							
Unit-I							
2016-17	8,760	4,123	47.07	85	2,102.73	3.36	706.52
2017-18	8,760	3,290	37.56	85	1,677.90	3.22	540.28
2018-19	8,760	3,961	45.22	85	2,020.11	3.44	694.92
2019-20	8,784	3,681	41.91	85	1,877.31	3.39	636.41
2020-21	8,760	5,189	59.24	85	2,646.39	3.71	981.81
Total	**43,824**	**20,244**	**46.19**		**10,324.44**		**3,559.94**
Unit-II							
2016-17	8,760	3,245	37.04	85	1,654.95	3.36	556.06
2017-18	8,760	2,531	28.89	85	1,290.81	3.22	415.64
2018-19	8,760	3,550	40.53	85	1,810.50	3.44	622.81
2019-20	8,784	5,197	59.16	85	2,650.47	3.39	898.51
2020-21	8,760	3,240	36.99	85	1,652.40	3.71	613.04
Total	**43,824**	**17,763**	**40.53**		**9,059.13**		**3,106.06**
Total (RGTPP)	**87,648**	**38,007**	**43.36**		**19,383.57**		**6,666.00**
DCRTPP, Yamuna Nagar							
Unit-I							
2016-17	8,760	1,347	15.38	85	343.49	3.10	106.48
2017-18	8,760	1,291	14.74	85	329.21	3.10	102.05
2018-19	8,760	1,065	12.16	85	271.58	3.41	92.61
2019-20	8,784	2,906	33.08	85	741.03	3.34	247.50
2020-21	8,760	3,289	37.55	85	838.70	3.64	305.28
Total	**43,824**	**9,898**	**22.59**		**2,524.01**		**853.92**
Unit-II							
2016-17	8,760	1,459	16.66	85	372.05	3.10	115.33
2017-18	8,760	806	9.20	85	205.53	3.10	63.71
2018-19	8,760	1,206	13.77	85	307.53	3.41	104.87
2019-20	8,784	1,350	15.37	85	344.25	3.34	114.98
2020-21	8,760	3,280	37.44	85	836.40	3.64	304.45
Total	**43,824**	**8,101**	**18.49**		**2,065.76**		**703.34**
Total (DCRTPP)	**87,648**	**17,999**	**20.54**		**4,589.77**		**1,557.26**
PTPS Panipat							
Unit-V							
2016-17	8,760	7,813	89.19	35	574.26	3.71	213.05
2017-18	8,760	6,781	77.41	35	498.40	3.33	165.97
2018-19	8,760	7,787	88.89	82.50	1,349.10	3.40	458.69
2019-20	8,784	8,784	100.00	35	645.62	3.62	233.72
2020-21	0	0			0		0
Total	**35,064**	**31,165**	**88.88**		**3,067.38**		**1,071.43**

Year	Total Operating hours	Reserve shut down		PLF	Units lost (In MUs)	VC approved by HERC	Value of units lost (₹ in crore)
		Hours	in *per cent*				
Unit-VI							
2016-17	8,760	7,541	86.08	35	554.26	3.71	205.63
2017-18	8,760	5,368	61.28	35	394.55	3.33	131.38
2018-19	8,760	7,067	80.67	82.50	1,224.36	3.40	416.28
2019-20	8,784	8,784	100.00	35	645.62	3.62	233.72
2020-21	8,760	7,588	86.62	35	557.72	3.81	212.49
Total	**43,824**	**36,348**	**82.94**		**3,376.51**		**1,199.50**
Unit-VII							
2016-17	8,760	3,550	40.53	85	754.38	3.58	270.07
2017-18	8,760	2,759	31.50	85	586.29	3.22	188.78
2018-19	8,760	2,941	33.57	85	624.96	3.29	205.61
2019-20	8,784	4,303	48.99	85	914.39	3.49	319.12
2020-21	8,760	5,038	57.51	85	1,070.58	3.69	395.04
Total	**43,824**	**18,591**	**42.42**		**3,950.60**		**1,378.62**
Unit-VIII							
2016-17	8,760	5,559	63.46	85	1,181.29	3.58	422.90
2017-18	8,760	3,714	42.40	85	789.23	3.22	254.13
2018-19	8,760	1,795	20.49	85	381.44	3.29	125.49
2019-20	8,784	3,847	43.80	85	817.49	3.49	285.30
2020-21	8,760	6,236	71.19	85	1,325.15	3.69	488.98
Total	**43,824**	**21,151**	**48.26**		**4,494.60**		**1,576.80**
Total (PTPS)	**1,66,536**	**1,07,255**	**64.40**		**14,889.09**		**5,226.35**
Grand total HPGCL	**3,41,832**	**1,63,261**	**47.76**		**38,862.43**		**13,449.61**

Appendix 3.1

(Reference: Paragraph 3.5.3; Page 40)

Statement showing details of time taken in issuing Purchase orders since its requirement and time taken in issuing material since its requirement

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
DCRTPP Yamuna Nagar								
1	20191025	55,95,000	28 June 2018	30 May 2019	17 December 2019	17 December 2019	336	537
2	20191033	25,71,180	01 March 2019	07 August 2019	13 February 2021	Not issued	216	
3	20191050	55,95,000	20 November 2018	04 November 2019	29 April 2020	29 April 2020	349	526
4	20201019	37,383	16 March 2019	18 March 2020	29 May 2020	04 June 2020	368	446
5	20201053	53,64,857	24 December 2019	26 October 2020	02 June 2021	Not issued	307	
6	20201057	31,26,618	12 March 2019	11 February 2020	20 November 2020	25 November 2020	336	624
7	20211017	52,33,041	03 February 2020	24 February 2021	No supply has been made		387	
8	20161054	4,45,160	28 September 2015	28 April 2016	24 August 2016	29 August 2016	213	336
9	20161056	43,50,000	20 January 2016	03 May 2016	04 May 2016	10 May 2016	104	111
10	20161057	4,70,400	23 July 2015	06 May 2016	06 August 2016	28 March 2017	288	614
11	20161114	2,45,700	09 August 2016	20 December 2016	15 May 2017	30 May 2017	133	294
12	20171008	4,91,312	03 October 2016	13 January 2017	04 March 2017	08 March 2017	102	156
13	20171079	3,34,714	15 November 2016	16 November 2017	28 December 2017	05 March 2018	366	475
14	20171080	21,36,016	03 February 2017	22 November 2017	09 February 2018	09 February 2018	292	371
15	20181002	41,18,238	10 April 2017	04 January 2018	23 March 2018	24 March 2018	269	348
16	20181006	33,77,193	27 October 2017	09 January 2018	15 March 2018	22 March 2018	74	146
17	20181071	17,49,617	15 November 2017	29 May 2018	06 January 2019	23 October 2019	195	707
18	20181096	21,44,531	01 February 2018	16 July 2018	22 October 2018	28 November 2018	165	300
19	20181115	4,29,840	20 March 2017	21 August 2018	15 November 2019	02 December 2019	519	987
20	20181124	50,35,000	08 January 2018	26 September 2018	29 October 2019	18 November 2019	261	679
21	20191006	33,15,380	15 February 2018	12 March 2019	28 March 2019	10 April 2019	390	419
22	20162064	27,54,624	25 January 2016	04 May 2016	10 May 2016	10 May 2016	100	106
23	20162095	95,71,672	24 September 2015	09 September 2016	01 April 2017	28 December 2017	351	826

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
24	20162096	2,28,01,820	03 February 2016	09 September 2016			219	
25	20162114	9,97,052	23 September 2015	30 September 2016	23 November 2016	29 November 2016	373	433
26	20162126	26,42,920	17 August 2016	07 November 2016	11 January 2017	31 January 2017	82	167
27	20162135	31,58,040	23 July 2015	24 November 2016	31 January 2017	19 April 2017	490	636
28	20162138	71,72,002	27 August 2016	30 November 2016	05 December 2017	28 February 2018	95	550
29	20162141	97,840	23 September 2015	30 November 2016	23 March 2017	08 March 2018	434	897
30	20172003	66,28,185	30 September 2016	09 January 2017	04 April 2017	28 April 2017	101	210
31	20172057	60,25,300	27 June 2017	31 August 2017	24 January 2018		65	
32	20182020	29,24,640	15 November 2016	07 February 2018	22 March 2018	02 May 2019	449	898
33	20172005	36,755	10 August 2016	10 January 2017	24 March 2017		153	
34	20192029	5,57,94,528	20 February 2018	15 March 2019			388	
35	20202021	3,47,82,570	12 September 2019	01 May 2020			232	
36	20162115	7,97,36,199	30 May 2016	03 October 2016			126	
37	20172099	4,99,06,920	30 May 2017	02 December 2017			186	
	Total	**34,11,97,247**						
						Minimum	**65**	**106**
						Maximum	**519**	**987**
	Total (<180)	**11,56,04,721**				**Less than 180 days**	**12**	
	Total (180-360)	**15,32,70,068**				**180 to 360 days**	**15**	
	Total (>360)	**7,23,22,458**				**More than 360 days**	**10**	
						Mean	**257**	**474**
						Median	**261**	**446**
RGTPP at Khedar								
1	20161117	46,500	07 May 2016	22 December 2016	11 February 2017	18 November 2017	229	560
2	20171049	20,48,200	04 May 2016	06 June 2017	01 September 2017	29 September 2017	398	513
3	20171066	55,50,000	03 November 2016	14 October 2017	27 December 2017	02 April 2018	345	515
4	20171076	54,83,236	28 March 2017	01 November 2017	13 March 2018	30 June 2018	218	459
5	20181020	47,775	03 August 2017	22 February 2018	24 April 2018	02 June 2018	203	303
6	20181024	2,68,800	29 August 2017	27 March 2018	01 August 2018	03 August 2018	210	339

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
7	20181033	1,47,500	31 August 2017	05 June 2018	01 March 2019	02 March 2019	278	548
8	20181036	35,23,500	03 October 2017	11 June 2018	20 August 2018	27 August 2018	251	328
9	20181078	59,28,000	22 June 2018	30 November 2018	15 February 2019	26 February 2019	161	249
10	20181093	1,59,453	09 April 2018	14 December 2018	21 February 2019	28 February 2019	249	325
11	20191020	27,852	12 April 2018	15 February 2019	24 October 2019	10 January 2020	309	638
12	20191045	26,56,080	16 January 2019	29 May 2019	02 August 2019	02 September 2019	133	229
13	20191057	38,41,000	28 May 2018	06 June 2019	08 July 2019	06 December 2019	374	557
14	20162067	28,29,949	16 October 2014	19 May 2016	08 September 2016	20 February 2017	581	858
15	20162131	50,30,381	29 January 2016	16 September 2016	12 December 2016	13 January 2017	231	350
16	20172089	4,76,892	19 April 2017	09 October 2017	26 December 2017	20 January 2018	173	276
17	20172109	52,88,910	10 May 2017	15 November 2017	28 December 2017	04 January 2018	189	239
18	20172119	9,70,654	12 July 2017	01 December 2017	08 January 2018	03 October 2018	142	448
19	20172121	21,30,408	19 September 2017	04 December 2017	27 November 2018	15 February 2019	76	514
20	20172132	21,89,798	14 September 2017	08 December 2017	16 February 2018	27 February 2018	85	166
21	20182026	1,56,000	26 August 2016	26 February 2018	03 March 2019	03 March 2019	549	919
22	20182075	40,75,560	04 April 2018	16 November 2018	03 January 2019	29 January 2019	226	300
23	20182078	71,10,000	24 April 2017	29 November 2018	12 July 2019	17 August 2019	584	845
24	20182079	64,46,921	10 January 2018	06 December 2018	27 December 2018	27 December 2018	330	351
25	20182081	27,37,950	16 July 2018	13 December 2018	30 December 2018	08 January 2019	150	176
26	20192079	46,40,000	27 September 2018	19 December 2019	26 February 2020	26 February 2020	448	517
27	20202006	62,00,000	03 December 2019	18 February 2020	06 August 2020	13 August 2020	77	254
28	20212036	51,11,845	10 February 2021	31 March 2021	15 May 2021	10 July 2021	49	150
29	12/CHP/RGTPP/F-254	6,37,200	31 May 2018	02 November 2019	30 January 2020	11 February 2020	520	621
30	105/RGTPP/C&I-1/89	80,000	20 January 2020	28 February 2020	15 May 2020	15 May 2020	39	116
31	02/CHP/RGTPP/F-91	31,500	01 June 2020	06 July 2020	09 September 2020	09 September 2020	35	100
32	02/FM/RGTPP/Transport-163	0	05 January 2021	05 February 2021	On demand basis		31	
33	01/fuel/213/RGTPP/2020-21	67,20,000	20 April 2020	29 September 2020	On demand basis		162	

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
34	20201035	1,43,09,750	01 July 2019	14 May 2020	On demand basis		318	
35	20171059	1,62,14,844	17 September 2016	07 August 2017	On demand basis		324	
36	20161024	1,92,32,000	06 January 2016	19 April 2016	On demand basis		104	
37	20161036	4,14,52,358	03 December 2015	25 May 2016	On demand basis		174	
38	20171052	6,31,05,450	17 April 2017	13 June 2017	On demand basis		57	
39	20171061	2,47,89,588	23 May 2017	11 August 2017	On demand basis		80	
40	20171080	6,23,63,370	19 September 2017	02 November 2017	On demand basis		44	
41	20181041	14,42,38,255	05 February 2018	19 June 2018	On demand basis		134	
42	20191087	16,27,47,216	22 May 2019	16 September 2019	On demand basis		117	
43	20201076	7,11,21,290	08 May 2020	01 December 2020	On demand basis		207	
	Total	**71,21,65,985**						
						Minimum	**31**	**100**
						Maximum	**584**	**919**
	Total (<180)	**55,31,61,364**				**Less than 180 days**	**20**	
	Total (180-360)	**13,77,42,272**				**180 to 360 days**	**16**	
	Total(>360)	**2,12,62,349**				**More than 360 days**	**7**	
						Mean	**223**	**412**
						Median	**203**	**350**
PTPS at Panipat								
1	201610147	62,72,620	25 July 2016	10 November 2016	29 April 2017	14 October 2017	108	446
2	201610200	1,65,02,955	07 April 2016	18 January 2017	01 September 2017	20 October 2017	286	561
3	201610205	13,05,532	27 May 2016	03 March 2017	12 October 2017	13 October 2017	280	504
4	201610236	45,050	15 January 2016	16 March 2017	17 May 2017	16 October 2017	426	640
5	201520524	2,21,136	23 December 2014	19 April 2016	07 July 2016	14 December 2018	483	1,452
6	201620012	38,062	30 March 2015	26 April 2016	Not received		393	
7	201620246	48,84,400	19 August 2015	15 March 2017	11 April 2017	24 April 2017	574	614
8	201630082	7,87,80,750	30 March 2016	15 July 2016	Being Diesel received by the end user directly and issued time to time		107	

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
9	201630098	4,00,00,502	27 May 2016	01 August 2016	13 August 2016	Lubricant Received by GS Section end user directly	66	
10	201630233	3,94,36,360	30 August 2016	01 March 2017	22 March 2017	Issued in piecemeal	183	
11	201720009	71,754	14 January 2016	27 April 2017	22 April 2020	01 June 2020	469	1,600
12	201720047	2,67,30,000	27 March 2017	09 June 2017	Litigation case (M/s RN Metal)		74	
13	201720157	2,05,80,000	29 October 2017	07 December 2017	01 October 2018	10 October 2018	39	346
14	201730125	50,98,299	19 April 2017	12 October 2017	Being Diesel received by the end user directly and issued time to time		176	
15	201730126	5,35,87,200	19 April 2017	13 October 2017	Being Diesel received by the end user directly and issued time to time		177	
16	201730151	1,00,401	23 March 2017	14 November 2017	18 January 2018	19 January 2018	236	302
17	201730180	1,11,74,055	30 August 2016	10 January 2018	Being Diesel received by the end user directly and issued time to time		498	
18	201730214	11,08,27,175	08 November 2017	07 March 2018	Being Diesel received by the end user directly and issued time to time		119	
19	201730231	3,62,96,384	24 January 2018	24 May 2018	03 March 2018	Issued in piecemeal	120	
20	201730247	1,09,48,673	24 January 2018	15 November 2018	18 June 2019	15 March 2021	295	1,146
21	201730252	7,09,36,000	04 June 2018	08 February 2019	Being Diesel received by the end user directly and issued time to time		249	
22	201930024	2,69,11,200	04 June 2018	27 February 2019	Being Diesel received by the end user directly and issued time to time		268	
23	202010165	54,53,260	14 December 2018	18 September 2020	25 January 2021	Not issued (turbine spare)	644	
24	202020199	4,92,383	01 January 2019	14 October 2020	12 February 2021	12 April 2021	652	832
25	202030217	9,47,47,225	12 May 2020	20 November 2020	29 January 2021	Being LDO Issued in piecemeal	192	
26	202110007	84,500	20 January 2020	19 February 2021	12 March 2021	15 March 2021	396	420
27	202130011	66,50,319	04 October 2019	10 March 2021	Not received		523	
28	201920030	10,08,475	01 May 2018	13 June 2019	27 January 2020	20 March 2020	408	689
29	201930069	32,84,875	08 August 2018	10 July 2019	25 October 2019	28 July 2020	336	720

Sr. No.	Purchase Order No.	Value of Purchase order (in ₹)	Date of raising of Indent	Date of placement of Purchase Order	Date of receipt of material	Date of issue of material to end user	Time taken to issue purchase order (In days)	Time taken in receiving material by the end users (In days)
30	201970105	63,500	08 May 2018	28 August 2019	04 August 2020	05 August 2020	477	820
31	201970071	72,480	25 June 2018	11 June 2019	02 July 2019	10 July 2019	351	380
32	201930108	9,99,28,158	21 November 2018	12 August 2019	23 August 2019	Issued in piecemeal	264	
33	201930127	1,20,000	18 May 2018	23 September 2019	27 November 2019	28 November 2019	493	559
34	201910170	26,17,000	06 August 2018	02 December 2019	06 January 2020	09 January 2020	483	521
35	201930173	22,22,172	06 October 2018	18 December 2019	06 July 2020	08 July 2020	438	641
36	202070012	82,575	11 October 2018	01 January 2020	09 January 2020	10 January 2020	447	456
37	202020028	52,91,433	26 December 2018	13 February 2020	12 May 2020	03 November 2020	414	678
	Total	**78,28,66,863**						
						Minimum	**39**	**302**
						Maximum	**652**	**1,600**
						Less than 180 days	**9**	
	Total (<180)	**37,81,72,930**				**180 to 360 days**	**11**	
	Total (180-360)	**36,41,73,859**				**More than 360 days**	**17**	
	Total (>360)	**4,05,20,074**				**Mean**	**328**	**682**
						Median	**336**	**614**

Appendix 4.1

(Reference: Paragraph 4.1.1; Page 44)

Statement showing loss of interest due to under recovery of energy bills through Fuel Price Adjustment in respect of all three thermal power plants for the period April 2016 to September 2017

(₹ in crore)

Month	Amount recoverable (+)/ payable (-) as per PSL	Amount recovered (+) / paid (-) as per FPA Bill	Net recoverable (+)/ payable (-)	Date of raising FPA Bill	Number of days up to 31 March 2021	Interest recoverable as on 31 March 2021 at the rate of 9.09 [1]*per cent*
April 2016	(-) 14.18	(-) 12.64	(-) 1.54	10 May 2016	1,786	(-) 0.68
May 2016	(-) 19.43	(-) 17.39	(-) 2.04	08 June 2016	1,757	(-) 0.89
June 2016	(-) 10.26	(-) 14.80	4.54	08 July 2016	1,727	1.95
July 2016	(-) 11.96	(-) 12.05	0.09	08 August 2016	1,696	0.04
August 2016	(-) 7.52	(-) 5.51	(-) 2.01	08 September 2016	1,665	(-) 0.83
September 2016	(-) 11.4	(-) 14.33	2.94	13 October 2016	1,630	1.19
October 2016	6.60	(-) 6.25	12.86	10 November 2016	1,602	5.13
November 2016	(-) 2.32	(-) 5.82	3.51	09 December 2016	1,573	1.37
December 2016	(-) 8.25	(-) 10.72	2.47	06 January 2017	1,545	0.95
January 2017	(-) 1.17	0.45	(-) 1.62	08 February 2017	1,512	(-) 0.61
February 2017	(-) 10.55	(-) 10.53	(-) 0.02	08 March 2017	1,484	(-) 0.01
March 2017	(-) 8.6	(-) 7.87	(-) 0.73	10 April 2017	1,451	(-) 0.26
April 2017	1.79	(-) 3.09	4.88	08 May 2017	1,423	1.73
May 2017	8.00	11.80	(-) 3.80	08 June 2017	1,392	(-) 1.32
June 2017	16.28	15.53	0.75	07 July 2017	1,363	0.25
July 2017	54.09	55.11	(-) 1.02	08 August 2017	1,331	(-) 0.34
August 2017	34.81	44.98	(-) 10.17	08 September 2017	1,300	(-) 3.29
September 2017	19.58	23.21	(-) 3.63	09 October 2017	1,269	(-) 1.15
Total			**5.45**			**3.23**

[1] Calculated on weighted average rate of interest allowed by HERC during last five years