Chapter 5

Compliance of Environmental norms and Generation of clean energy

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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)

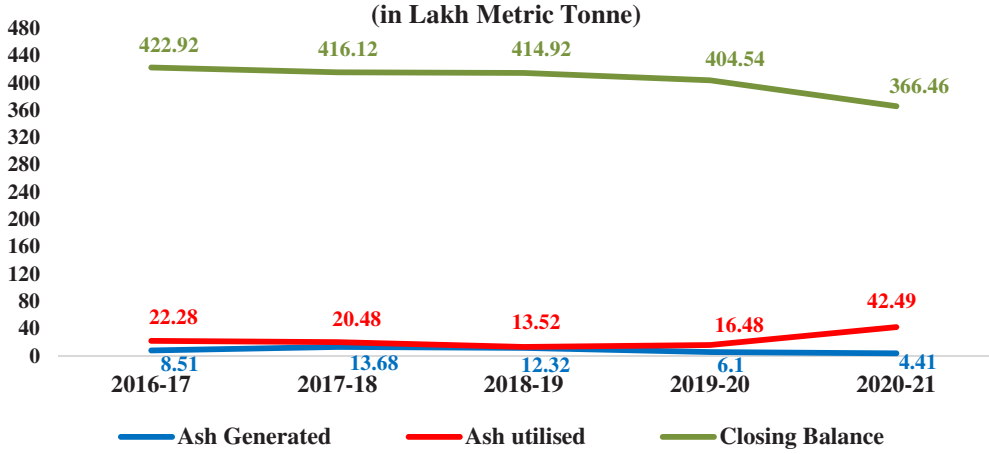
Year	Opening Balance in ash dyke	Total Ash Generated (Bottom Ash)	Ash Utilized (Bottom Ash)	Closing Balance
2016-17	436.69	8.51	22.28	422.92
2017-18	422.92	13.68	20.48	416.12
2018-19	416.12	12.32	13.52	414.92
2019-20	414.92	6.10	16.48	404.54
2020-21	404.54	4.41	42.49	366.46

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.