CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Petition No. 19/MP/2021

Coram:

Shri Jishnu Barua, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P. K. Singh, Member

Date of Order: 03.11.2023

In the matter of:

Petition under Section 79 of the Electricity Act, 2003 read with Regulation 29 of the Central Electricity Regulatory Commission (Terms and Condition of Tariff) Regulations, 2019 for approval of additional expenditure on account of installation of various Emission Control Systems at Vallur Thermal Power Station (3X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

And in the matter of:

NTPC Tamil Nadu Energy Company Limited (NTECL),
NTPC Bhawan, Core-7, Scope Complex
7, Institutional Area, Lodhi Road
New Delhi-110003. **……Petitioner**

Vs.

1. AP Eastern Power Distribution Company Limited (APEPDCL),
   Corporate Office, P&T Colony, Seethammadhara,
   Visakhapatnam-530013 (Andhra Pradesh).

2. AP Southern Power Distribution Company Limited (APSPDCL),
   Corporate Office, Back Side Srinivasa Kalyana Mandapam,
   Tiruchhanur Road, Kesavayana Gunta,
   Tirupathi-517503 (Andhra Pradesh).

3. Telangana State Northern Power Distribution Company Limited (TSNPDCL),
   H. No. 2-5-31/2, Vidyut Bhavan,
   Nakkalagutta, Hanamkonda,
   Warangal-506001 (Andhra Pradesh).

4. Telangana State Southern Power Distribution Company Limited (TSPDCL),
   Mint Compound, Corporate Office,

Hyderabad-500063 (Andhra Pradesh).

5. Tamil Nadu Generation & Distribution Corporation Limited (TANGEDCO), (formerly TNEB),
144, Anna Salai, Chennai-600002.

6. Bangalore Electricity Supply Company Limited (BESCOM),
Krishna Rajendra Circle,
Bangalore-560009.

7. Mangalore Electricity Supply Company Limited (MESCOM),
MESCOM bhavana, Corporate Office,
Bejai, Kavoor Cross Road,
Mangaluru-575004, Karnataka.

8. Chamundeshwari Electricity Supply Corp. Limited (CESC),
Corporate Office, No. 29,
Vijayanagar, 2nd stage, Hinkal,
Mysore-570017.

9. Gulbarga Electricity Supply Company Limited (GESCOM),
Main road, Gulbarga, Karnataka,
Gulbarga-585102.

10. Hubli Electricity Supply Company Limited (HESCOM),
Corporate office, P.B. Road,
Navanagar, Hubli-580025.

11. Kerala State Electricity Board Limited (KSEB),
Vaidyuthi Bhavanam, Pattom,
Thiruvananthapuram-695004.

12. Electricity Department,
Government of Puducherry,
137, Netaji Subhash Chandra Bose Salai,
Puducherry-605001. .....**Respondent(s)**

For Petitioner **:** Shri Venkatesh, Advocate, NTECL
Shri Anant Singh Uleeja, Advocate, NTECL
Shri Abhishek Nangia, Advocate, NTECL

For Respondents **:** Shri S. Vallinayagam, Advocate, TANGEDCO

ORDER

The Petitioner, NTPC Tamil Nadu Energy Company Limited (NTECL), has filed the instant petition under Section 79 of the Electricity Act, 2003 read with Regulation

29 of the Central Electricity Regulatory Commission (Terms and Condition of Tariff) Regulations, 2019 for approval of Additional Capital Expenditure (ACE) on account of installation of various Emission Control Systems at Vallur Thermal Power Station (3X500 MW) (hereinafter referred to as "VTPS") in compliance with the Ministry of Environment and Forests and Climate Change, Government of India (hereinafter referred to as "MoEFCC") notification dated 7.12.2015.

2. The Petitioner has made the following prayers in the instant petition:

(i) "Grant approval for undertaking implementation of various schemes mentioned above in order to meet Revised Emission Standards.

(ii) Grant liberty to approach Hon'ble Commission for approval of implementation of Revised Emission Schemes on account of mercury, specific water consumption, and Particulate Matter, if required.

(iii) Allow, Gross station heat Rate, additional water consumption, Cost of Reagents etc. as per Regulation-76 i.e. "Power to relax" of the Tariff Regulations 2019.

(iv) Allow deemed availability of the station/unit on account of shutdown for the implementation of ECS as per Regulation-76 i.e. "Power to relax" of the Tariff Regulations 2019.

(v) Pass such orders as deemed fit and necessary in the facts and circumstances of the present case."

Background

3. The background of the instant petition is as follows:

(a) The Petitioner is a Joint Venture company between NTPC Limited and TNEB (presently TANGEDCO). The Petitioner is generating power from its Vallur Thermal Power Station (3X500 MW) (VTPS) located in the State of Tamil Nadu and supplying power to the Respondents.

(b) MoEFCC, on 7.12.2015, notified the Environment (Protection) Amendment Rules, 2015 (hereinafter referred to as "MoEFCC Notification") which mandates that all thermal power plants installed (such as the Petitioner's project) and to be installed, are required to comply with the revised emission norms as specified in the MoEFCC Notification. The amended

norms specified by the MoEFCC Notification are as follows:

Sr. No	Industry	Parameter	Standard
1	2	3	4
"5A.	**Thermal Power Plant (Water consumption limit)**	**Water consumption**	I. All Plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption up to maximum of 3.5m^3/MW/hr within a period of two years from the date of publication of this notification. II. All existing CT-based plants reduce specific water consumption up to maximum of 3.5m^3/MW/hr within a period of two years from the date of publication of this notification. III. New Plants to be installed after 1.1.2017 shall have to meet specific water consumption upto maximum of 3.0 m^3/MW/hr and achieve zero waste water discharge.

"25.	**Thermal Power Plant**	**TPPs (Units) installed before 31.12.2003***	
		Particulate matter	100 mg/Nm3
		Sulphur Dioxide (So_2)	600 mg/Nm^3 (Units Smaller than 500 MW capacity units) 200 mg/Nm^3 (for units having capacity of 500 MW and above)
		Oxides of Nitrogen	600 mg/Nm3
		Mercury (Hg)	0.03 mg/Nm^3 (for units having capacity of 500 MW and above)
		TPPs (units) installed after 1.1.2004, upto 31.12.2016	
		Particular Matter	50 mg/Nm^3
		Sulphur Dioxide (SO_2)	600 mg/Nm^3 (Units smaller than 500 MW capacity units) 200 mg/Nm^3 (for units having capacity of 500 MW and above)
		Oxides of Nitrogen (NO_x)	300 mg/Nm^3
		Mercury (Hg)	0.03 mg/Nm^3
		TPPs (units) to be installed from 1.1.2017**	
		Particular Matter	30 mg/Nm^3
		Sulphur Dioxide (SO_2)	100 mg/Nm^3
		Oxides of Nitrogen (NO_x)	100 mg/Nm^3
		Mercury (Hg)	0.03 mg/Nm^3

**TPPs (units) shall meet the limits within two years date of publication of this notification.*
***Includes all the TPPs (units) which have been accorded environmental clearance and are under construction".*

(c) MoEFCC provided amended norms based on three categories i.e. i) TPP's Units installed before 31.12.2003, ii) TPP's Units installed between 1.1.2004 to 31.12.2016, and iii) TPPs which are executed after 1.1.2017. VTPS was commissioned on 26.2.2015. Accordingly, as per the MoEFCC Notification, the Petitioner falls under category (ii) of the revised emission standards. Therefore, in compliance with the revised emission standards under the MoEFCC Notification, the Petitioner is required to install various Emission Control Systems (hereinafter referred to as "ECS") in the station.

(d) In compliance with the MoEFCC Notification, requiring the capital expenditure, NTPC filed Petition No. 98/MP/2017 for in-principle approval of the capital cost required for the installation of ECS and other facilities in Singrauli STPS and Sipat STPSS-I. The Commission vide order dated 20.7.2018 in Petition No. 98/MP/2017 held that ACE for implementation of ECS as per the MoEFCC Notification is admissible under "change in law". The Commission further observed that it would require TPPs to identify suitable technology depending upon the location of the plant and existing level of emission and accordingly directed CEA to prepare guidelines regarding suitable technology, operational parameters, norms and other technical inputs. The relevant portions of the order dated 20.7.2018 are as follows:

"46. …..In all these situations, additional capital expenditure on change in law or compliance with any existing law" is allowed. Therefore, additional capital expenditure on implementation of the ECS in terms of the Notification dated 7.12.2015 shall be admissible after due prudence check, under Regulation 14 of the 2014 Tariff Regulations.

47. The compliance of the revised norms specified under the MOEFCC Notification by these generating stations would require identification of suitable technology depending upon location of plant and existing level of emission from such plant. Moreover, the scope of work would also differ from plant to plant, depending upon the type of technology to be adopted……..."

"48. Therefore, a mechanism needs to be devised for addressing the issues like identification of suitable technology for each plant for implementation of ECS, its impact on operational parameters and on tariff, and the recovery of additional capital and operational cost. The Commission in this regard directs the CEA to prepare guidelines specifying;

(a) Suitable technology with model specification for each plant, with

regard
to implementation of new norms;
(b) Operational parameters of the thermal power plants such as auxiliary consumption, O&M expenses, Station Heat Rate etc., consequent to the implementation of ECS.
(c) Norms of consumption of water, limestone, ammonia etc., required for operation of the plants after implementation of ECS.
(d) Any other detailed technical inputs."

(e) The Commission, on 7.3.2019, notified the 2019 Tariff Regulations and Regulation 29 provides in respect of ACE on account of revised emission standards.

(f) The Commission amended the 2019 Tariff Regulations vide Central Electricity Regulatory Commission (Terms and Conditions of Tariff) (First Amendment) Regulations, 2020 (hereinafter referred to as the "2020 Amendment Regulations"), wherein, separate tariff stream for ECS including determination of capital cost, financial parameters and operational parameters were specified.

(g) On the basis of directions of the Commission in the order dated 20.7.2018 in Petition No. 98/MP/2017, CEA vide its letter dated 21.2.2019 recommended various technologies for the implementation of the MoEFCC Notification.

(h) Further, CEA on 7.2.2020 issued an Advisory on FGD Technology selection for different unit sizes. As per the Advisory, TPPs are required to select the appropriate FGD technology based on parameters like SO_2 removal efficiency, unit size, balance plant life and the geographical location of TPPs.

4. The Petitioner has filed the instant petition under the 2019 Tariff Regulations for approval of the capital cost for implementation of ECS to comply with the revised emission standards. The Petitioner has made the following prayers:

(a) approve undertaking the implementation of ECS in order to meet revised ECNs;
(b) grant liberty to approach the Commission for approval of implementation

of ECS on account of mercury, water consumption and particulate matter in future, if required;

(c) allow additional operating norms (APC and GSHR);

(d) allow additional water consumption;

(e) allow the cost of reagents;

(f) allow additional O&M Expenses; and

(g) allow deemed availability on account of the shutdown.

5. This order is issued considering the submissions made by the Petitioner in the main petition and the subsequent affidavits dated 17.6.2021 and 31.5.2023, the written submission dated 10.5.2023, TANGEDCO's reply vide affidavit dated 28.4.2021, and the Petitioner's rejoinder vide affidavit dated 29.5.2021 in the matter.

Approval for undertaking implementation of ECS and incurring Additional Capital Expenditure (ACE)

6. The Petitioner has sought approval for ACE proposed/ incurred towards the implementation of ECS in order to meet revised ECNs. The Petitioner has proposed a WFGD system and Combustion Modification for control of SO_2 and NO_x emissions respectively from the VTPS Plant.

7. The Petitioner, based on the capital cost of ECS discovered through competitive bidding and on the basis of certain assumptions regarding operating parameters, had arrived at the indicative supplementary tariff and the same is provided in the petition. However, the Commission has introduced the operating parameters through the 2020 Amendment Regulations for additional APC, water consumption and O&M Expenses on account of installation of ECS.

8. The Petitioner has made the following submissions:

(a) The following capital cost and operating parameters for computing the indicative supplementary tariff were initially considered:

(₹ in crore)

		FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	1135.51	80	26.29	
2	Normative Specific Limestone/ Reagent Consumption (kg/kwh)	0.016 (Limestone)	0.0012 (Urea)	NIL	
3	Additional APC	1%			
4	Additional O&M		2% of capital cost (excluding IDC &FC)		
5	Shutdown Period	45 days	15 days	60 days	
6	Increase in GSHR		14.32 Kcal/kwh	19.09 Kcal/kwh	0.6% increase: due to SNCR 0.8% increase: due to CM

(b) The indicative supplementary tariff impact (without considering the impact on GSHR as indicated in the table above) due to the installation of schemes in order to meet Revised Emission Standards is FC: 20.17 paise/kwh, VC: 5.14 paise/ kwh (1st year) and FC: 18.52 paise/kwh, (levelised). Further, there would be increase in the Energy Charge Rate and per unit Fixed Charge (@85% Scheduled Generation) of the station by about 9 paisa/ kwh due to increased APC and Station Heat Rate.

(c) WFGD technology adopted by the Petitioner meets the criteria indicated in the CEA advisory dated 7.2.2020, and it would also meet SO_2 emission norms specified by MoEFCC Notification.

(d) As regards NO_x emissions, Low NO_x Burners (Primary Control) and Selective Non-catalytic Reduction (Secondary Control) systems were initially proposed to be installed in its three units to bring down the present NO_x level within the norm of 300 mg/Nm3.

(e) The deterioration of the Station Heat Rate due to the installation of primary and secondary De-NO_x systems would be claimed by the Petitioner based on the actual performance of these systems. SNCR demonstration pilot tests at NTPC stations are being conducted, and implementation of SNCR shall be taken up based on the reports of SNCR

pilot tests.

(f) The FGD System package was awarded through Domestic Competitive Bidding (DCB) to Tata Projects Limited (TPL).

(g) The awarded cost of WFGD at VTPS was approved at the total value of ₹875.50 crore excluding GST, for the Combustion Modification System ₹26.29 crore and the tentative estimate for capital cost of SNCR is approximately ₹80 crore (including IDC and GST). The awarded cost for implementation of WFGD at VTPS is approximately ₹1135.51 crore (including IDC and GST etc.)

9. On the basis of the submissions made by the Petitioner, the following three issues arise for our consideration as part of the prudence check (a) Selection of suitable ECS (b) approvals and the bidding process; and (c) capital cost of the identified ECS. We deal with them in the following paragraphs.

Selection of suitable ECS

ECS for control of SO_2 emission control

10. In respect of ECS for control of SO_2 emissions, the Petitioner has submitted that on the basis of the directions of the Commission in the order dated 20.7.2018 in Petition No. 98/MP/2017, CEA vide letter dated 20.2.2019 on *'Operation Norms for Thermal Generating Stations for the Tariff Period 2019-2024'* has recommended four technologies to comply with revised SO_2 emission norms reduction, which are as follows: a) Wet limestone based FGD; (b) Lime Spray Drier/ Semi-dry Semi FGD; (c) Dry Sorbent Injection based FGD; and (d) Sea water based FGD.

11. The Petitioner has submitted that the WFGD system is better than the other three FGD systems for the following reasons:

(a) In the case of Dry Sorbent Injection (DSI)/ Dry type FGD, SO_2 removal

efficiency is low (typically 30%-50%) which can be increased to 70%, but with high consumption of reagent. The reagent utilization is low when compared to the WFGD system leading to high operational expenses. DSI is particularly preferable for small unit sizes i.e. 60 MW-250 MW range since the reagent cost in this technology is relatively higher than WFGD and ammonia-based FGD, hence, units running on low PLF and with less balance operating life (07-09 years). Additionally, DSI-based technologies have low CAPEX (1/4th) and less APC (1/10th) as compared to WFGD and ammonia-based FGD technologies.

(b) In the case of ammonia-based FGD technology, there are few providers of such technology as compared to the WFGD system leading to less competition in the competitive bidding process. The storage and handling of aqueous ammonia is potentially risky/ hazardous when compared to the handling of limestone. The FGD technologies based on Ammonia as a reagent are preferable for unit sizes below 500 MW. Though Ammonia based FGD technologies have approximately 10% less CAPEX and APC when compared to WFGD systems and by-products of Ammonia based FGD technologies, i.e. Ammonium Sulphate is easily saleable, handling of Ammonia, which is volatile is a matter of concern. Further, the availability of ammonia is also a matter of concern.

(c) Sea Water FGD system is suitable only for coastal power stations as seawater is required for de-sulphurisation process. The instant generating station is located near the coast but operates in closed cycle cooling water system.

12. The Petitioner has proposed WFGD technology to comply with the revised SO_2 emission norms in the case of the VTPS generating station. The Petitioner has submitted that WFGD technologies based on limestone slurry as a reagent are most versatile and prominent for any unit size. However, for optimum selection of technology plant specific factors like unit size, balance unit life, space availability, salability of by-product etc. need to be considered. WFGD has a large footprint,

relatively higher CAPEX and Reagent purity issues when compared with Ammonia-based and dry type FGD technologies. WFGD is the most cost-effective technology for SO_2 removal at VTPS and is in line with the CEA recommendations. Therefore, the Petitioner has selected the WFGD technology in concurrence with the CEA Norms meeting the evaluation criteria of the CEA Advisory dated 7.2.2020 and letter dated 20.2.2019 and also meeting the SO_2 emission norms as stipulated by MoEFCC Notification dated 7.12.2015.

13. TANGEDCO has submitted that since the units of the Petitioner have been commissioned recently, the Petitioner may be directed to furnish the emission details about suspended particulate matter (SPM level), SO_2 and NO_x from all the three units for the past five years for analyzing any non-compliance and need for the commissioning of ECS systems.

14. In response, the Petitioner has submitted that earlier the SO_2 emission level of VTPS was 849 mg/NM3 which can go maximum up to 994 mg/NM3. The Revised Emission Norms is of 200 mg/NM3, therefore, the ECS system is required to be installed to meet the Revised Emission Norms at the VTPS to meet the norms all the time during the operation of the units.

ECS for NO_x emission control

15. As regards ECS for NOx, the Petitioner has submitted that CEA in its recommendations vide letter dated 20.2.2019 on Operation Norms for Thermal Generating Stations for the 2019-24 tariff period has provided the norms based on SCR/ SNCR technology. NO_x control technologies are of two categories as follows:

(a) Primary control technologies wherein the amount of NO_x produced in the combustion/ furnace zone is reduced by modifying fuel burners.

(b) Secondary control technologies reduce the NO_x present in the flue gas by injection of reagent (ammonia [NH3] or urea) in the flue gas path where it reacts with NO_x to reduce it to N2 and water.

16. The Petitioner has submitted that initially Low NO_x Burners (Primary Control) and Selective Non-Catalytic Reduction (Secondary Control) systems were proposed to be installed in its three units to bring down the NO_x level within the norm of 300 mg/Nm3.

17. De-NO_x using Low NO_x Burners: The Petitioner has submitted that in this system, normal present burners installed in the unit boilers are to be replaced by Low- NO_x Burners (LNB). An LNB limits NO_x formation by regulating the temperature profiles of the fuel combustion by controlling the aerodynamic distribution and mixing of the fuel and air, thereby yielding reduced oxygen in the primary flame zone, which limits the flame temperature, which in turn limits thermal NO_x formation. The Petitioner has submitted that due to the change in the temperature profile of the furnace and heat transfer pattern, LNB retrofits lead to higher economizer inlet temperatures and an increase in unburnt carbon. This increases the heat loss of the boiler. Accordingly, it is anticipated that the unit heat rate may increase to around 0.8% on account of De- NO_x LNB retrofit.

18. De-NO_x Selective Non-Catalytic Reduction: The Petitioner has submitted that the Selective non-catalytic reduction (SNCR) process involves injecting nitrogen-containing chemicals into the upper furnace or convective pass of a boiler within a specific temperature window without the use of a catalyst. There are different chemicals, that can be used that selectively react with NO_x in the presence of

oxygen to form molecular nitrogen and water, but the two most common chemicals are ammonia and urea. The SNCR to be installed in the station is proposed to be based on urea. This system requires low capital cost, having moderate NO_x removal involves non-toxic chemicals and it requires typically low energy injection. Further, due to the formation of water particles during NO_x reduction, it increases the wet loss of Boilers leading to deterioration of Unit Heat Rate by about 0.6%. The Petitioner has submitted that deterioration of the Station Heat Rate due to the installation of the above-mentioned De- NO_x systems would be claimed by the Petitioner based on the actual performance of these systems. SNCR demonstration pilot tests are being conducted at NTPC stations, and the implementation of SNCR will be taken up based on the reports of SNCR pilot tests.

19. The Petitioner has submitted that the awarded capital cost of the Combustion Modification system is ₹26.29 crore and the tentative estimate for the capital cost of SNCR is approximately ₹80 crore (including capital costs including IDC and GST). The Petitioner has submitted that the installation of the De-Nox-Combustion Modification system is expected to be completed during 2021-22. The shut-down time required for the units to install the system is approximately 45 to 60 days. Further, the SNCR scheme (yet to be awarded) is likely to be implemented during the time period of 15 months from the date of award. The shut-down period required will be around 15 days for each unit. However, decisions on the implementation of SNCR shall be taken based on the outcome of pilot tests.

20. The Petitioner vide affidavit dated 17.6.2021 and written submission dated 10.5.2023, has submitted that after the subsequent revision of NO_x norms from 300 mg/Nm3 to 450 mg/Nm3 by the MoEFCC vide notification dated 19.10.2020 in the

light of the Hon'ble Supreme Court order dated 8.7.2020 in I.A. No. 12493/2020, for the units commissioned before 31.12.2016, there is no requirement of SNCR installation. Accordingly, the Petitioner will be able to comply with NO_x norms with the installation of primary control only i.e. Combustion Modification. Therefore, the claim with respect to Combustion modification may be allowed. Further, with respect to the Combustion Modification System, the Board of Directors of the Petitioner's Company vide its 79th Board Meeting held on 24.5.2018, approved the proposal for "Package for Combustion modification for reduction of NO_x" for the instant station.

21. In response to the Commission's query, the Petitioner vide affidavit dated 31.5.2023 has submitted the monthly minimum and maximum SO_2 and NO_x emission levels, which are given in the following table, of its three units during the last four years and submitted that the SO_2 and NO_x level for a unit depends on many factors including the quality of coal, unit loading etc.

2020-21 (mg/Nm3)												
	Unit 1 NOx		Unit 1 SOx		Unit 2 NOx		Unit 2 SOx		UNIT 3 NOx		UNIT 3 SOx	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Apr-20	320	721	881	996	428	492	859	927				
May-20	447	605	856	982	441	513	877	975	442	503	819	977
Jun-20	442	604	855	992	373	516	900	961	431	524	854	978
Jul-20	368	722	860	996	366	557	936	954	440	582	860	976
Aug-20	442	703	872	996	426	554	854	990	515	695	889	956
Sep-20					466	538	919	954	528	669	859	955
Oct-20	433	744			447	640	863	966	532	717	862	972
Nov-20	442	745	929	996	435	588	870	977	534	831	876	980
Dec-20					438	585	890	946	534	804	899	996
Jan-21	190	300	830	996	448	601	889	978	553	827	880	992
Feb-21	226	404	753	996	434	612	846	981	582	794	823	992
Mar-21	194	437	791	996	445	615	886	957	613	798	880	987

2019-20 (mg/Nm3)												
	Unit 1 NOx		Unit 1 SOx		Unit 2 NOx		Unit 2 SOx		UNIT 3 NOx		UNIT 3 SOx	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Apr-19	118	245		603		226	401	568		279	493	721
May-19	123	245	377	539		214		537		273	480	706
Jun-19	123	244	418	633	174	260	437	652		284	501	735
Jul-19	118				179	928	450	1293	202	280	521	724
Aug-19	504	940	604		275	672	479	1174	331	369	666	769
Sep-19	494	956	589	1251						748		1216
Oct-19	542	952	587	860	248	332	433	579	510		830	
Nov-19	364	915	525	1272	256	346	448	605	532	734	866	1194
Dec-19	518	950	581	831	262	350	457	611	512	719	833	1171
Jan-20	475	961	553	816	257	341	449	595	515	712	839	1158
Feb-20	361	968	572	1074	258	573	450	1154	424	638	844	1038

Mar-20	339	749	791	1237	425	599	855	1204	415	577	826	1148

2018-19 (mg/Nm3)												
	Unit 1 NOx		**Unit 1 SOx**		**Unit 2 NOx**		**Unit 2 SOx**		**UNIT 3 NOx**		**UNIT 3 SOx**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Mln**	**Max**	**Min**	**Max**
Apr-18	251	321	533	729	194	251	483	628	224	336	636	956
May-18	247	314	512	687	193	244	483	611	220	311	625	884
Jun-18	218	310	474	728	211	298			211	298	599	847
Jul-18	228	313	497	714	175	214	437	533	203	274	571	777
Aug-18					176	231	438	580		292	558	822
Sep-18	225	318	479	644	187	258	470	647	207	303	558	781
Oct-18	218	316	453	661	183	241	460	604	210	283	541	728
Nov-18					184	234	463	587	224	358	577	923
Dec-18	239	317	467	642	173	228	449	569	220	283	554	746
Jan-19		319	452	616	173	219	429	550		286	517	736
Feb-19		249	456	610	171	380	428	952	200	274	514	705
Mar-19		255	480	991	170	223	440	560	204	280	525	718

2017-18 (mg/Nm3)												
	Unit 1 NOx		**Unit 1 SOx**		**Unit 2 NOx**		**Unit 2 SOx**		**UNIT 3 NOx**		**UNIT 3 SOx**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Apr-17	228	311	636	879		257	562	764	202	276		780
May-17	216	310	593	863	232	330	538	767		290	485	822
Jun-17	226	306	644	922	228	421	529	959	223	261	633	741
Jul-17	233	316	638	970	236	329	549	764				
Aug-17	222	314	677	953	254	319	589	741				
Sep-17	216	312	655	903	249	491		995				
Oct-17	219	333	695	996	249	375		950				
Nov-17	217	298	705	996	247	357	625	903				
Dec-17	228	297	583	995	202	339	507	857				
Jan-18	229	309	548	743		236		591				
Feb-18	233	310	557	769		234		585				
Mar-18	234	325	511	653		229	473	572				

22. We have considered the submissions of the Petitioner and TANGEDCO. TANGEDCO has submitted that the Petitioner may be directed to furnish the emission details about Suspended Particulate Matter (SPM level), SO_2 and NO_x from all three units for the past five years for analyzing any non-compliance and the need for commissioning of ECS systems. In response, the Petitioner has submitted that an ECS system is required to be installed to meet the Revised Emission Norms of 200 Mg/ Nm3. Further, the Petitioner has also submitted the monthly minimum and maximum SO_2 and NO_x emission levels of its three units during the last four years.

23. As regards the selection of the suitable technology, it is observed that the suitability and selection of the technology depend on various parameters like the age, size and location of the plant/ generating station, cost and availability of the

technology, cost and availability of the reagents, usage of the by-products, etc. CEA has recommended four types of technologies for control of SO_2 emissions and the Petitioner has selected WFGD technology for all the 3 units of the instant generating station. The Petitioner has mentioned the advantages of WFGD technology over other FGD technologies. Further, a large number of WFGD technology providers provide an opportunity to get competitive prices. The efficiency level of the WFGD system in reducing SO_2 emissions is better than the other three technologies suggested by CEA. The WFGD system proposed by the Petitioner is also in compliance with the CEA's recommendations.

24. With respect to NO_x emission, the MoEFCC vide Notification dated 19.10.2020, has revised the NO_x limit to 450mg/Nm3 against the limit of 300mg/Nm3 for units commissioned before 31.12.2016 in the light of the Hon'ble Supreme Court order dated 8.7.2020 in I.A. No. 12493/2020. Accordingly, he Petitioner would be able to comply with NO_x norms with the installation of primary control only i.e. Combustion Modification. Therefore, the instant station would not require additional capital of ₹80 crore with respect to SNCR installation.

25. The Petitioner has submitted that the selection of technology is in conformity with the recommendation dated 21.2.2019 and Advisory dated 7.2.2020 issued by CEA.

26. We are of the view that the Petitioner has done due diligence in identifying WFGD systems and Combustion Modification as the most suitable technology for reduction of SO_2 and NO_x emissions respectively in compliance with MoEFCC Notification. Accordingly, we approve installation of WFGD and Combustion Modification in all the 3 units of the Petitioner.

Approvals and the bidding process

27. The Petitioner selected the WFGD system to meet the revised ECNs with respect to SO_2 and Combustion Modification to meet the revised NOx norms. The Petitioner has submitted that the selection of technology was carried out on the basis of the best technology available in terms of plant specifications in line with the recommendation made by CEA vide its letter dated 20.2.2019. The Petitioner has submitted that accordingly, the Board of Directors of the Petitioner vide Circular Resolution No. 4 dated 26.3.2020 approved the proposal to award the contracts for the FGD package and through Circular Resolution No. 3 dated 26.3.2020, accorded the Investment Approval to undertake the implementation of the FGD system at the VTPS. The Petitioner has submitted that the awarded cost of FGD system package for VTPS was approved in the 90th meeting of the Board of Directors of the Petitioner company held on 2.6.2020 through video conferencing, at the total cost of ₹875.50 crore excluding GST. The award contract provides for an escalation factor. The Petitioner has submitted that to meet the revised standards within a stipulated strict timeframe, the Petitioner, proceeded with pre-award activities such as location survey, identification of suitable technology, identification of vendors, preparation of technical specifications, floating of bid/ tender etc. which consumed a substantial amount of time of at least three years. Accordingly, the Petitioner proceeded with tendering and awarding the WFGD systems as early as possible in a phased manner through a transparent competitive bidding process. The Invitation for Bids (IFB) for installation of the WFGD system at the instant station was issued by NTPC (on behalf of the Petitioner) on 27.8.2019. The WFGD System package was awarded through Domestic Competitive Bidding (DCB). Four bids were received from bidders namely TPL, BHEL, Thermax & GEPIL. The L1 among these 4 bidders

was Tata Projects Limited (TPL). The Petitioner has submitted that the estimated capital cost of FGD for VTPS was arrived after the transparent competitive bidding process. Accordingly, the capital cost is envisaged as ₹1135.51 crore based on the awarded price.

28. The Petitioner has submitted that the Board of Directors of the Petitioner in the 90th Meeting held on 2.6.2020, approved the investment approval for implementation of the FGD system in the VTPS and also approved the award of the FGD System Package to TATA Projects Limited. The contract for the installation of FGD was awarded on 6.4.2020. The process for installation of the FGD system is in progress. The installation of the WFGD system is delayed due to COVID-19 and at present, the civil works as well as Mechanical & Electrical erection work is in progress at VTPS.

29. The Petitioner has submitted that with the revision of NOx norms by MoEFCC to 450 mg/NM3, the Petitioner would be able to meet the revised NO_x norm of 450 mg/NM3 with the installation of CM and there is no requirement for SNCR for the present. The Board of Directors of the Petitioner's Company vide its 79th Board Meeting held on 24.5.2018, approved the proposal for "Package for Combustion modification for reduction of NO_x" for the instant station.

30. It is observed that the whole process from the identification of the suitable technology to the award of Notice of Award (NoA) to the selected L1 bidder was with the approval of its Board. The Petitioner has also certified that bidding and award have been carried out in a fair and transparent manner as per the Delegation of Power (DoP) of the Petitioner and it is in line with the Government of India guidelines. NoA was issued on 6.4.2020, and work is in progress. It has been

observed that the installation of the WFGD system was delayed due to COVID-19 and presently, TPL has started the works of installation of the WFGD system and the civil works as well as mechanical & electrical erection work are in progress at the instant station. The commissioning of the WFGD system is expected to be completed in the last quarter of the current financial year. The installation of the De-NO_x /Combustion Modification system is expected to be completed in the current financial year. As stated above, VTPS would not require SNCR. In view of the fact that the process from the stage of identification of the WFGD package to the issue of Notification of Award (NoA) was with the approval of the Petitioner's Board of Directors and as per the procedure laid down under its DoP, we consider that the bidding process has been carried out in a Transparent manner.

Capital cost of the identified ECS

31. The Petitioner has claimed ₹1135.51 crore as the total cost for installation of the WFGD system at VTPS, and the details of the same are as follows:

(₹ in crore)

Particulars	WFGD	Combustion Modification
Work Cost	875.50	21.11
GST	157.59	3.79
Contingency, IDC & FC	102.42	1.38
Total	**1135.51**	**26.29**

32. TANGEDCO has submitted that as per MoEFCC amendment notification dated 19.10.2020, the capital expenses proposed towards NO_x are not required, and the Commission may dismiss the claim towards SNCR and Combustion modification system totaling ₹106.29 crore. TANGEDCO has further submitted that the Petitioner has proposed the capital cost of ₹1135.51 crore incurred towards WFGD. CEA in

their Norms has stated that "*The increase in no. of units will reduce the CAPEX because of common facilities"*. TANGEDCO has submitted that the Petitioner has not spelt out the cost reduction in view of the installation of WFGD for Units-I, II and III, as there is a possibility of further reduction of expenditure.

33. In response, the Petitioner has submitted that the Combustion Modification is essential in order to comply with the revised norm of 450 mg/Nm3. Therefore, the instant station would not require capital addition with respect to SNCR. The claim of the Petitioner to comply with NO_x norms with installation of primary control i.e., Combustion Modification may be allowed and the other contentions raised by the TANGEDCO may be rejected.

34. The Petitioner has further submitted that the WFGD System package was awarded through DCB. Four bids were received from bidders namely TPL, BHEL, Thermax & GEPIL. The L1 among these 4 bidders was Tata Projects Limited ("TPL"). The awarded cost of the FGD system package for VTPS was approved at the total value of ₹875.50 crore excluding GST. The Petitioner has further submitted that the price has been discovered through a transparent competitive bidding process. Therefore, the prices discovered are reasonable. The said cost is economical and has been arrived at by carrying out DCB. Therefore, the contention of TANGEDCO is without merit.

35. The Petitioner vide affidavit dated 17.6.2021 has submitted that the hard cost without GST as proposed is ₹58.40 lakh/MW which is higher than CEA cost. The same is due to the reason that CEA has provided an indicative cost. The Petitioner has submitted that the instant station is located on the sea coast and seawater is used for various processes of power generation. This involved additional civil works

of piling and ground improvement which are costlier in comparison with other stations. The piling work is much longer in the shore plant as piles need to go deeper due to marshy land and thus increase the overall cost of the project. Further, additional water would be required for operating the WFGD, this necessitated the installation of additional water treatment systems such as RO etc. In view of the installation of an additional seawater treatment plant and additional civil works, the hard cost of WFGD is little on the higher side. However, CEA vide its letter dated 24.2.2021 has itself acknowledged that the earlier cost estimation is approximately three years old and the cost of FGD installation has increased possibly due to various reasons specified therein. In this regard, CEA has sought the latest tendering cost for different sizes and technology from Thermal Power Plants in India. The Petitioner has also submitted that the Commission has also acknowledged that, in recent times, bids for the installation of FGD systems have been floated by other generating stations as well and these may lead to changes in prices of FGD systems in the international and domestic market. The Petitioner has placed reliance on the Commission's *order dated 11.11.2019 in 152/MP/2019 – Maithon Power Ltd. vs. TPDDL & Ors, order dated 23.4.2020 in Petition No. 446/MP/2019 – Sasan Power Ltd. vs. MPPMCL & Ors and Order dated 6.5.2020 in Petition No. 209/MP/2019 – Sembcorp Energy India Ltd. vs. SPDCTL & Ors.,* wherein, the Commission has recognized that the cost provided by CEA was indicative in nature and the cost of FGD has increased due to various factors.

36. We have considered the submission of the Petitioner and TANGEDCO on the cost of installation of the WFGD system at VTPS. The Petitioner has claimed a hard cost of ₹58.40 lakh/MW (without GST) towards the installation of the WFGD system in VTPS of 3X500 MW against the CEA recommended hard cost of ₹45.00 lakh/MW.

TANGEDCO has contended that the capital expenses proposed towards NO_x is not required, and the claim towards SNCR and Combustion Modification system totalling to ₹106.29 crore may be dismissed. TANGEDCO has also contended that the hard cost of the WFGD system claimed by the Petitioner for VTPS of 3X500 MW is higher than the CEA norms and the Petitioner has not spelt out the cost reduction in view of the installation of FGD for Units-I, II and III, as there is a possibility of further reduction of expenditure. The Petitioner initially proposed the combination of Low NO_x Burners (Primary Control) and SNCR (Secondary Control) systems to meet the target of NO_x below 300 mg/NM3. However, with the revision of NO_x emission norms by the Hon'ble Supreme Court from 300 mg/Nm3 to 450 mg/Nm3, the CM is enough to meet the revised NO_x emission norms. Therefore, the capital cost towards the installation of CM is only claimed in the instant petition. The same has been approved by the Petitioner's 79th Board of Directors meeting held on 27.6.2018.

37. As the instant petition is for in-principle approval of the hard cost of ECS, which excludes IDC, IEDC, FERV, taxes and other costs, we are considering only the hard cost of the FGD system and other components of the cost of the FGD system is not considered in this order. The same will be considered after the implementation of the WFGD system and Combustion Modification system for SO_2 and NO_x reduction respectively in VTPS in a petition to be filed by the Petitioner under Regulation 29(4) of the 2019 Tariff Regulations.

38. The Commission has already recognized in the order dated 23.4.2020 in Petition No. 446/MP/2019 and the order dated 6.5.2020 in Petition No. 209/MP/2019 that the cost recommended by CEA is indicative in nature and that it is not possible to indicate the exact cost that can be discovered through a competitive bidding

process. The hard cost of ₹58.40 lakh/MW claimed by the Petitioner towards the installation of WFGD, which is more than the CEA recommended cost and the same has been discovered through the Domestic Competitive Bidding process and has been duly approved by the Board of Directors of the Petitioner. Moreover, the hard cost recommended by CEA is more than three years old and may have increased as has been acknowledged by CEA itself.

39. In view of the justifications provided by the Petitioner as regards the cost of installation of the WFGD system, we approve the hard cost of ₹58.40 lakh/MW claimed by the Petitioner towards installation of WFGD system to meet emission control norms for SO_2. Further, we also approve the claimed cost of ₹26.29 crore (without IDC) towards the Combustion Modification System to meet emission control norms for NO_x.

Liberty to approach the Commission

40. The Petitioner has submitted that the MoEFCC Notification mandates revised ECNs for water consumption, mercury and particulate matter, besides SO_2 and NO_x. As the Petitioner's Plant meets the norms in respect of water consumption, mercury and particulate matter as stipulated by the MoEFCC Notification, no claim has been made in respect of them in the instant petition. However, the Petitioner has sought liberty to approach the Commission if the Petitioner's Plant is unable to meet those norms and work(s) pertaining to the same is required to be undertaken in future.

41. We have considered the submissions of the Petitioner. It is observed that the MoEFCC Notification specifies revised ECNs for water consumption, particulate matter, Sulphur Dioxide (SO_2) and Oxides of Nitrogen (NO_x) and Mercury (Hg). The Petitioner has submitted that the works pertaining to the same will be taken up in

future. Any petition by the Petitioner in future for installation of ECS for control of water consumption, mercury emissions and particulate matter would be dealt with as per the applicable laws and regulations.

Additional Operating Norms (APC and GSHR)

42. The Petitioner has prayed for the grant of additional operating norms (APC & GSHR) over and above the normative APC and GSHR for the station due to the implementation of ECS under Regulation 76 (Power to Relax) of the 2019 Tariff Regulations. The Petitioner has claimed additional APC for ECS @1% as per the 2019 Tariff Regulations and has also submitted that there is an increase in GSHR of 14.32 kcal/kwh due to SNCR and 19.09 kcal/kwh due to CMS.

43. TANGEDCO has submitted that the Petitioner has stated that the supplementary tariff impact due to the installation of schemes in order to meet the Revised Emission Standard is FC: 20.17 paise/kwh, and VC: 5.14 paise/kwh (1st year) and FC: 18.52 paise/kwh (levelised). Further, there would be a further increase in ECR and per unit FC (@ 85% Scheduled Generation) of the station by about 9 paisa/kwh due to increased APC (Auxiliary Power Consumption) and Station Heat rate.

44. We have considered the submissions of the Petitioner and TANGEDCO with respect to APC. The claim for additional APC due to the installation of FGD shall be dealt with as per provisions of the 2019 Tariff Regulations at the time of determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after implementation of ECS.

45. TANGEDCO has submitted that the capital expenses proposed towards NO_x

is not required, therefore, the claim of an increase in GSHR on the installation of WFGD may be rejected.

46. We have considered the submissions of the Petitioner and TANGEDCO with respect to GSHR. The Petitioner has sought approval of additional GSHR over and above the normative GSHR due to the implementation of ECS under Regulation 76 i.e. “Power to relax” of the 2019 Tariff Regulations. TANGEDCO has submitted that the capital expenses proposed towards NO_x are not required and therefore, the claim of an increase in GSHR on the installation of WFGD may be rejected. Since the 2019 Tariff Regulations do not provide for allowing additional GSHR on account of installation of ECS for NO_x, the same is not allowed. The same may be raised by the Petitioner in its petition for determination of supplementary tariff under Regulation 29(4) of the 2019 Tariff Regulations after implementation of ECS.

Additional Water Consumption

47. The Petitioner has submitted that the quantum of water consumption would increase after the installation of the WFGD system. Accordingly, the Petitioner has claimed the cost of additional water consumption under Regulation 76, i.e. “Power to relax” of the 2019 Tariff Regulations.

48. We have considered the submissions of the Petitioner. The Petitioner’s claim for additional water consumption due to the installation of FGD shall be dealt with as per the norms specified by MoEFCC Notification as provided under Regulation 35(1)(6) of the 2019 Tariff Regulations, which provides as follows:

> *“**35 Operation and Maintenance Expenses:***
>
> *(1) Thermal Generating Station: Normative Operation and Maintenance expenses of thermal generating stations shall be as follows:*

xxx

(6) The Water Charges, Security Expenses and Capital Spares for thermal generating stations shall be allowed separately after prudence check:

Provided that water charges shall be allowed based on water consumption and considering the norms of specific water consumption notified by the Ministry of Environment, Forest and Climate Change" depending upon type of plant and type of cooling water system, subject to prudence check. The details regarding the same shall be furnished along with the petition;"

Cost of Reagents

49. The Petitioner has claimed the cost of chemical/reagents (limestone, ammonia etc.) on account of implementation of ECS in the instant station.

50. TANGEDCO has prayed to direct the Petitioner to furnish all details as per the directions of the CEA such as the Sulphur content of the coal, availability of reagent (if any), disposal and handling of By-product and space requirement etc. In response, the Petitioner has submitted that the Petitioner will submit all the relevant information as and if directed by the Commission.

51. We have considered the submissions of Petitioner and TANGEDCO. The Petitioner's claim for the cost of reagent due to the installation of FGD shall be dealt with as provided in Regulation 49(F) of the 2020 Amendment Regulations which provides for norms for consumption of reagent in the petition to be filed for the determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after installation of ECS.

Additional O&M Expenses

52. The Petitioner has submitted that with the installation of various ECS to meet the revised ECNs, there would be a requirement of additional manpower for the operation and maintenance of these systems, spares pertaining to these systems

etc. for operating these systems on a sustained basis. Accordingly, the Petitioner would incur additional O&M Expenses. The Petitioner has further submitted that as per Regulation 35(1)(7) of the 2019 Tariff Regulations, additional O&M Expenses on account of implementation of ECS shall be notified separately. However, till the norms are notified, the Commission may decide on the additional O&M Expenses on a case-to-case basis. The Petitioner has further submitted that as per the first amendment to the 2019 Tariff Regulations, Regulation 35(1)(7) of the Principle Regulations has been substituted as follows:

> *"(7) The operation and maintenance expenses on account of emission control system in coal or lignite based thermal generating station shall be 2% of the admitted capital expenditure (excluding IDC and IEDC) as on its date of operation, which shall be escalated annually @3.5% during the tariff period ending on 31st March 2024:*
>
> *Provided that income generated from sale of gypsum or other by-products shall be reduced from the operation and maintenance expenses."*

53. The Petitioner has computed the indicative supplementary tariff for the additional O&M Expenses @ 2% of the capital cost (excluding IDC and FC).

54. We have considered the submissions of the Petitioner. The Petitioner's prayer for the grant of additional O&M Expenses towards deployment of additional manpower on account of installation of ECS to meet the revised norms will be dealt with as per the regulations at the time of determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after implementation of ECS.

Deemed availability on account of shutdown

55. The Petitioner has submitted that the generating unit has to be taken under shutdown for about 45-60 days for implementation of ECS in compliance with MoEFCC Notification and stabilization of the same would take some more time. The Petitioner has submitted that during the period of the shutdown of the unit, there

would be a loss of availability of the station and would lead to under-recovery of Annual Fixed Charges on account of the implementation of ECS. Accordingly, the Petitioner has prayed to consider the shutdown period of the unit for implementation of the ECS as “deemed availability”.

56. TANGEDCO has submitted that the Commission in its order dated 11.11.2019 in Petition No. 152/MP/2019 has stated that the Commission has already taken a view that the generator in consultation with beneficiaries would plan to synchronize the interconnection of FGD with the annual overhaul so as to minimize the additional downtime required for FGD interconnection and has directed the Petitioner to schedule the shutdown period prudently to avoid the impact on availability. In the said order the Commission has further stated that if the shutdown period for FGD integration exceeds the period of annual overhauling, the Petitioner has liberty to claim the same at the time of tariff determination. TANGEDCO has further submitted that all the expenditures proposed to be incurred are being recovered from the beneficiaries. Therefore, treating the shutdown period as deemed available will result in unjust enrichment of the generator at the cost of beneficiaries. TANGEDCO has requested the Commission to issue suitable instructions regarding the implementation period for the installation of the ECS. Further, in case, the unit is taken for an annual overhaul along with interconnection of the ECS system and if the unit is not able to be brought back into service after the annual overhaul due to delay in interconnection of the ECS system, the commercial implications shall be to the account of the Petitioner.

57. In response, the Petitioner has submitted that the Petitioner has adopted all prudent methods and all steps have been taken to plan the integration of the FGD system with the main plant by synchronizing it with the annual overhaul. However, it

is not possible to assess the exact impact of charges payable during shutdown at this stage. The Petitioner has submitted that the Commission has supervision over the Petitioner and the prudency while installing FGD System would be analyzed by the Commission. However, in case, the installation of the FGD system is not completed in the annual overhaul then the Petitioner craves liberty to raise the claim of deemed generation at an appropriate stage. The Commission, vide order dated 27.4.2021 in Petition No. 335/MP/2020 and batch matters, has already taken a view that the period of shut down will be decided on a case-to-case basis. The Petitioner has also submitted that the same opinion has been reiterated in APTEL's judgment in Appeal No. 21 & 73 of 2019 in TSPL vs. PSPCL & Ors., Hon'ble Supreme Court's judgment in PTC India Vs. CERC & Ors. (2010)4 SCC 603 and the Commission's order dated 5.11.2018 in Petition No. 172/MP/2016. The Petitioner has further submitted that the Commission vide the 2020 Amendment Regulations, has allowed the generating company to recover O&M Expenses and Interest on Loan for the shutdown period due to the installation of ECS.

58. We have considered the submissions of the Petitioner and TANGEDCO. The Commission in the order dated 22.6.2020 in Petition No. 168/MP/2019 has already held that Petitioner and the beneficiaries shall plan and synchronize the inter-connection of the FGD system with the plant with the annual overhaul. The relevant portion of the order dated 22.6.2020 reads as follows:

> *"…The Commission is of the view that beneficiaries and the petitioner shall plan the interconnection of FGD system with main plant by synchronizing it with annual overhaul…"*

59. We are not inclined to go into this issue at this stage, and the same will be considered in the petition that has to be filed by the Petitioner under Regulation

29(4) of the 2019 Tariff Regulations after implementation of the ECS.

60. Summary of our main findings and decisions are as follows:

(a) The process from the stage of identification of the FGD package to NoA was with the approval of the Petitioner's Board of Directors and as per the procedure laid down under its DoP, We consider that the bidding process has been carried out in a transparent manner.

(b) The Petitioner has identified and proposed a WFGD system for reduction in the SO_2 emissions and a Combustion Modification system for reduction of NO_x, taking into consideration the effectiveness, availability, cost, size of the plant, operational expenses and availability of the reagents, we accordingly, approve the same.

(c) The costs claimed by the Petitioner towards the installation of the WFGD system and Combustion Modification system have been discovered through a competitive bidding process. The hard costs claimed by the Petitioner for the WFGD system are higher than the indicative cost recommended by CEA, but the Petitioner has provided justification and reasons for the same. Accordingly, "In-principle approval" is accorded to the claimed hard cost of ₹58.40 lakh/MW towards installation of the WFGD system to meet emission control norms for SO_2 and claimed cost of ₹26.29 crore (without IDC) towards Combustion Modification System to meet emission control norms for NO_x.

61. This order disposes of Petition No. 19/MP/2021 in terms of the above findings and discussions.

sd/-	**sd/-**	**sd/-**	**sd/-**
(P. K. Singh)	**(Arun Goyal)**	**(I. S. Jha)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**