

CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Petition No. 335/MP/2020,
Petition No. 519/MP/2020,
Petition No. 509/MP/2020,
Petition No. 516/MP/2020,
Petition No. 338/MP/2020,
Petition No. 521/MP/2020,
Petition No. 526/MP/2020,
Petition No. 512/MP/2020
and
Petition No. 339/MP/2020

Coram:

Shri P. K. Pujari, Chairperson
Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri Pravas Kumar Singh, Member

Date of Order : 28.04.2021

Petition No. 335/MP/2020

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 ACE on account of installation of various Emission Control Systems at Vindhyachal Super Thermal Power Station Stage-I (6x210 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 519/MP/2020

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 ACE on account of installation of various Emission Control Systems at Vindhyachal Super Thermal Power Station Stage-II (2X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 509/MP/2020

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 ACE on account of installation of various Emission Control Systems at Vindhyachal Super Thermal Power Station Stage-III (2X500 MW)



in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 516/MP/2020

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 ACE on account of installation of various Emission Control Systems at Vindhyaachal Super Thermal Power Station Stage-IV (2X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 338/MP/2020

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 ACE on account of installation of various Emission Control Systems at Korba Super Thermal Power Station Stage-I&II (3x200+3X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 521/MP/2020

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 ACE on account of installation of various Emission Control Systems at Korba Super Thermal Power Station Stage-III (1X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 526/MP/2020

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 ACE on account of installation of various Emission Control Systems at Mouda Super Thermal Power Station Stage-I (2X500 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.

Petition No. 512/MP/2020

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 ACE on account of installation of various Emission Control Systems at Mouda Super Thermal Power Station Stage-II (2X660 MW) in compliance with the Ministry of Environment and Forests and Climate Change, Government of India notification dated 7.12.2015.



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 ACE on account of installation of various Emission Control Systems at Sipat Super Thermal Power Station Stage-II (2X500 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 Ltd.,
NTPC Bhawan,
Core-7, Scope Complex,
7, Institutional Area, Lodhi Road,
New Delhi-110003.

.... **Petitioner**

Vs

1. Madhya Pradesh Power Management Company Ltd. (MPPMCL),
Shakti Bhawan,
Vidyut Nagar, Jabalpur-482008.
2. Maharashtra State Electricity Distribution Company Ltd. (MSEDCL),
Prakashgad, Bandra (East),
Mumbai-400051.
3. Chattisgarh State Power Distribution Company Ltd. (CSPDCL),
P.O. Sundar Nagar,
Danganiya,
Raipur-492013.
4. Gujarat Urja Vikas Nigam Ltd. (GUVNL),
Vidyut Bhawan, Race Course,
Vadodara-390007.
5. Electricity Department, Government of Goa,
Vidyut Bhawan,
Panaji, Goa.
6. Electricity Department,
Administration of Daman & Diu,
Daman-396210.
7. Electricity Department,
Administration of Dadra & Nagar Haveli,
Silvassa.

.....**Respondents**

For Petitioner:

Shri Venkatesh, Advocate, NTPC
Shri Anant Singh, Advocate, NTPC
Shri Ravi Sharma, Advocate, MPPMCL
Shri Abhinav Singh, Advocate, NTPC



Shri Parimal Piyush, NTPC
Shri V. V. Sivakumar, NTPC
Shri A. S. Pandey, NTPC
Shri V. K. Garg, NTPC
Shri Ishpaul Uppal, NTPC
Shri Anjum Jargar, NTPC

For Respondents : Shri Anurag Naik, MPPMCL
Shri Ravin Dubey, MPPMCL
Shri Arvind Banerjee, CSPDCL

ORDER

The Petitioner, NTPC Ltd., (hereinafter referred as 'NTPC'), has filed the above-mentioned 9 (nine) petitions 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 (hereinafter referred to as the “2019 Tariff Regulations”) for approval of Additional Capital Expenditure (ACE) on account of installation of various Emission Control Systems (ECS) in compliance with the Environment (Protection) Amendment Rules, 2015 dated 7.12.2015 (hereinafter referred to as "the MoEFCC Notification") notified by the Ministry of Environment, Forests and Climate Change, Government of India (MoEFCC). The MoEFCC Notification mandates all thermal power plants (TPPs) to comply with the revised emission norms as specified in the MoEFCC Notification.

2. The Petitioner has made the following prayers in these petitions:

- i) *Grant approval for under taking implementation of the scheme 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, Particulate Matter, if required.*
- iii) *Allow additional APC, additional water consumption, additional O&M Expenses, 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) *Allow the petitioner to file hard copies of the petition along with affidavit duly notarized, once normalcy is resumed.*
- vi) *Pass such orders as deemed fit and necessary in the facts and circumstances of the present case.”*



3. The prayers made by the Petitioner are identical in the nine petitions and the reliefs sought are also similar. Further, the beneficiaries in all the nine matters are the same. Moreover, the issues raised by the Respondents are identical. Accordingly, a common order is issued in these petitions. The details of the petitions covered in the instant order are as follows:

a. Petition No. 335/MP/2020-Vindhyachal Super Thermal Power Station Stage-I (VSTPSS-I)

The Petitioner has sought approval of ACE on account of installation of various ECS at VSTPSS-I (6x210 MW – COD: 1.2.1992) in compliance with the MoEFCC Notification. The petition was admitted on 21.7.2020 and order was reserved on 31.3.2021. Madhya Pradesh Power Management Company Limited (MPPMCL), Respondent No.1 and Maharashtra State Electricity Distribution Company Limited (MSEDCL), Respondent No.2 has filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents.

b. Petition No. 519/MP/2020 - Vindhyachal Super Thermal Power Station Stage-II (VSTPSS-II)

The Petitioner has sought approval of ACE on account of installation of various ECS at VSTPSS-II (2X500 MW – COD: 1.10.2000) in compliance with the MoEFCC Notification. The petition was admitted on 21.8.2020 and order was reserved on 31.3.2021. MPPMCL and MSEDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents MPPMCL and MSEDCL.

c. Petition No. 509/MP/2020- Vindhyachal Super Thermal Power Station Stage-III (VSTPSS-III)

The Petitioner has sought approval of ACE on account of installation of various ECS at VSTPSS-III (2X500 MW – COD: 15.7.2007) in compliance with the MoEFCC Notification. The petition was admitted on 21.7.2020 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and Chhattisgarh State Power Distribution Company



Ltd. (CSPDCL), Respondent No.3, have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.

d. Petition No. 516/MP/2020- Vindhyachal Super Thermal Power Station Stage-IV (VSTPSS-IV)

The Petitioner has sought approval of ACE on account of installation of various ECS at VSTPSS-IV (2X500 MW – COD: 27.3.2014) in compliance with the MoEFCC Notification. The petition was admitted on 21.8.2020 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.

e. Petition No. 338/MP/2020- Korba Super Thermal Power Station Stage-I&II (KSTPSS-I&II)

The Petitioner has sought approval of ACE on account of installation of various ECS at KSTPSS-I&II (3x200+3X500 MW – COD 1.6.1990) in compliance with the MoEFCC Notification. The petition was admitted on 21.7.2020 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.

f. Petition No. 521/MP/2020- Korba Super Thermal Power Station Stage-III (KSTPSS-III)

The Petitioner has sought approval of ACE on account of installation of various ECS at KSTPSS-III (1X500 MW – COD: 21.3.2011) in compliance with the MoEFCC Notification. The petition was admitted on 12.3.2021 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed the rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.



g. Petition No. 526/MP/2020 -Mauda Super Thermal Power Station Stage-I (MSTPSS-I)

The Petitioner has sought approval of ACE on account of installation of various ECS at MSTPSS-I (2X500 MW- COD: 30.3.2014) in compliance with the MoEFCC Notification. The petition was admitted on 12.3.2021 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.

h. Petition No. 512/MP/2020- Mauda Super Thermal Power Station Stage-II (MSTPSS-II)

The Petitioner has sought approval of ACE on account of installation of various ECS at MSTPSS-II (2X660 MW) in compliance with the MoEFCC Notification. Unit-I and Unit-II of MSTPSS-II were put into commercial operation on 28.3.2016 and 18.3.2017, respectively. The petition was admitted on 21.7.2020 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed by the Respondents, MPPMCL, MSEDCL and CSPDCL.

i. Petition No. 339/MP/2020- Sipat Super Thermal Power Station Stage-II (SSTPSS-II)

The Petitioner has sought approval of ACE on account of installation of various ECS at SSTPSS-II (2X500 MW – COD: 1.1.2009) in compliance with the MoEFCC Notification. The petition was admitted on 21.7.2020 and order was reserved on 31.3.2021. MPPMCL, MSEDCL and CSPDCL have filed reply to the petition and the Petitioner has filed rejoinder to the replies filed the Respondents, MPPMCL, MSEDCL and CSPDCL.



Background

4. Brief facts of the instant 9 petitions are as follows:

a) In exercise of the powers conferred by Sections 6 and 25 of the Environment (Protection) Act, 1986, MoEFCC vide its Notification No. S.O. 3305(E) dated 7.12.2015 has amended the Environment (Protection) Rules, 1986, introducing revised standards for emission of environmental pollutants to be followed by all existing and new thermal plants. As per the MoEFCC Notification, all TPPs were mandatorily required to comply with the revised norms within a period of two years from the date of the MoEFCC Notification dated 7.12.2015. The deadline for compliance of the revised norms has been subsequently modified to 2022 vide the notification dated 1.4.2021 of MoEFCC. The amended norms prescribed by the MoEFCC Notification are extracted hereunder:

“

Sr. No.	Industry	Parameter	Standards
1	2	3	4
5A.	Thermal Power Plant (Water consumption limit)	Water consumption	<p><i>I. All plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption up to maximum of 3.5 m³/MWh within a period of two years from the date of publication of this notification.</i></p> <p><i>II. All existing CT-based plants reduce specific water consumption up to maximum of 3.5 m³/MWh within a period of two years from the date of publication of this notification.</i></p> <p><i>III. New plants to be installed after 1st January, 2017 shall have to meet specific water consumption up to maximum of 2.5 m³/MWh and achieve zero waste water discharged</i></p>
25.	Thermal Power Plant	TPPs (units) installed before 31st December, 2003*	
		Particulate Matter	100mg/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)	600 mg/Nm ³
		Mercury (Hg)	0.03 mg/Nm ³ (for units having capacity of 500 MW and above)
		TPPs (units) installed after 1st January, 2003, up to 31st December, 2016*	
		Particulate Matter	50 mg/Nm ³



	<i>Sulphur Dioxide (SO₂)</i>	<i>600 mg/Nm³ (Units Smaller than 500 MW capacity units) 200 mg/Nm³ (for units having capacity of 500 MW and above)</i>
	<i>Oxides of Nitrogen (NO_x)</i>	<i>300 mg/Nm³</i>
	<i>Mercury (Hg)</i>	<i>0.03 mg/Nm³</i>
	<i>TPPs (units) to be installed from 1st January, 2017**</i>	
	<i>Particulate Matter</i>	<i>30 mg/Nm³</i>
	<i>Sulphur Dioxide (SO₂)</i>	<i>100 mg/Nm³</i>
	<i>Oxides of Nitrogen (NO_x)</i>	<i>100 mg/Nm³</i>
	<i>Mercury (Hg)</i>	<i>0.03 mg/Nm³</i>

**TPPs (units) shall meet the limits within two years from date of publication of this notification.*

***Includes all the TPPs (units) which have been accorded environmental clearance and are under construction”.*

b) As per the MoEFCC Notification, water consumption norms for TPPs with Once Through Cooling (OTC), existing CT-based TPPs and new TPPs commissioned after 1.1.2017 were specified. Further, norms for particulate matter, sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and Mercury (Hg) for TPPs commissioned before 31.12.2003; TPPs commissioned after 1.1.2003 upto 31.12.2016; and TPPs commissioned after 1.1.2017 were also specified. Subsequently, MoEFCC relaxed the norms of NO₂ for TPPs commissioned during the period 1.1.2004 and 31.12.2016 from “300 mg/Nm³” that was stipulated through the Notification of 7.12.2015 to “450 mg/Nm³” vide Notification G.S.R. 662(E) dated 19.10.2020.

c) For implementation of ECS notified by MoEFCC, the Central Electricity Authority (CEA) was entrusted with planning and coordination. CEA alongwith Regional Power Committees formulated a phasing plan up to 2024 which was subsequently reduced by 2022 as per revised action plan of Ministry of Power. Further, Hon'ble Supreme Court of India issued direction to complete the installation of ECS in highly polluted and densely populated area by December 2021 and other stations latest by December 2022.

d) The Ministry of Power, in exercise of the power under Section 107 of the Electricity Act, 2003, issued directions to the Commission vide letter dated 30.5.2018 to consider the additional cost implication due to the installation of ECS as a pass through in tariff.

e) As compliance of the MoEFCC Notification requires capital expenditure, the Petitioner filed Petition No.98/MP/2017 for in-principle approval of the capital cost required for installation of ECS and other facilities in Singrauli STPS and Sipat STPS Stage-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 location of plant and existing level of emission and accordingly directed CEA to prepare guidelines regarding suitable technology, operation parameters, norms and other technical inputs. The relevant portion of the order dated 20.7.2018 is extracted hereunder:

“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.”

f) On the basis of the directions of the Commission in 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’ recommended various technologies to comply with revised emission control norms as specified by the MoEFCC Notification.

g) However, prior to recommendation of CEA dated 20.2.2019, the Petitioner had identified technologies such as wet limestone based FGD system suitable for its various generating stations to achieve the revised environmental norms as specified by MOEFCC. These technologies are in line with the technologies identified by CEA vide letter dated 20.2.2019. Accordingly, the Petitioner has filed the instant petitions for approval of ACE for implementation of ECS as per Regulation 29 of the 2019 Tariff Regulations.

h) 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.

i) CEA on 7.2.2020 issued ‘Advice on FGD Technology selection for different unit size’. As per the Advisory, TPPs are required to select the appropriate FGD technology based on parameters like SO₂ removal efficiency, units’ size, balance plant life and the geographical location of TPPs.

j) MoEFCC has extended the time limit, vide Notification No. 243(E) dated 1.4.2021, for implementation of the ECS to comply with the revised emission control norms (hereinafter referred to as “ECNs”) through the Environment (Protection) Amendment Rules, 2021. The said Notification dated 1.4.2021 also provides for constitution of task force and environment compensation for operating the TPPs beyond the specified timelines. The relevant portion of the Notification dated 1.4.2021 is reproduced hereunder:

“ (i) A task force shall be constituted by Central Pollution Control Board (CPCB) comprising of representative from Ministry of Environment and Forest and Climate Change, Ministry of Power, Central Electricity Authority (CEA) and CPCB to categorise thermal power plants in three categories as specified in the Table-I on the basis of their location to comply with the emission norms within the time limit as specified in column (4) of the Table-I, namely: -*

Table-I

Sl. No.	Category	Location/area	Timelines for compliance	
			Non retiring units	Retiring units
(1)	(2)	(3)	(4)	(5)
1	Category A	Within 10 km radius of National Capital Region or cities having million plus population ¹ .	Up to 31 st December 2022	Up to 31 st December 2022
2	Category B	Within 10 km radius of Critically Polluted Areas ² or	Up to 31 st December	Up to 31 st December



		<i>Non-attainment cities²</i>	<i>2023</i>	<i>2025</i>
<i>3</i>	<i>Category C</i>	<i>Other than those included in category A and B</i>	<i>Up to 31st December 2024</i>	<i>Up to 31st December 2025</i>

¹ As per **2011** census of India.

² As defined by CPCB.

(ii) the thermal power plant declared to retire before the date as specified in column (5) of Table-I shall not be required to meet the specified norms in case such plants submit an undertaking to CPCB and CEA for exemption on ground of retirement of such plant:

Provided that such plants shall be levied environment compensation at the rate of rupees **0.20** per unit electricity generated in case their operation is continued beyond the date as specified in the Undertaking;

(iii) there shall be levied environment compensation on the non-retiring thermal power plant, after the date as specified in column (4) of Table-I, as per the rates specified in the Table-II, namely:-

Table-II

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

5. The Petitioner has filed the instant 9 petitions under the 2019 Tariff Regulations for approval of the capital cost for implementation of ECS as ACE. The Petitioner initially in the petition sought approval of additional APC (Auxiliary Power Consumption), Gross Station Heat Rate (GSHR), additional water consumption, additional O&M Expenses, cost of reagents and availability of the station/ unit on account of shutdown for the implementation of ECS under Regulation 76, i.e. “Power to Relax” of the 2019 Tariff Regulations as there are no specific provisions in this regard under the 2019 Tariff Regulations. During the pendency of the proceedings, the 2020 Amendment Regulations were notified by the Commission wherein specific provisions have been made which deal with some of the prayers made by the Petitioner. The Petitioner in its rejoinders to the reply filed by the Respondents and in response to the reply filed to the queries in the Record of Proceedings (RoPs) has submitted that its prayers may be dealt under the 2020 Amendment Regulations. As the 2020 Amendment Regulations have come into force, some of the prayers made



by the Petitioner have been dealt with as per the provisions of the 2020 Amendment Regulations in this order.

6. The Petitioner has submitted that due to COVID-19 pandemic and the subsequent lockdown across the country and restriction on movement of the persons, the Petitioner was unable to file affidavits in support of the petition, reply to RoPs and rejoinders as required under the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2010, and requested to allow it to file the affidavits after return of normalcy. It is observed that the Petitioner and the Respondents have filed the affidavits in support of the submissions made by them and accordingly the submissions made by the parties are considered in the petition.

Submissions of the Petitioner

7. The gist of the submissions made by the Petitioner in these petitions are as under:

(a) In compliance of revised ECNs specified in the MoEFCC Notification dated 7.12.2015, the Petitioner is required to install ECS in its generating stations.

(b) The Commission vide order dated 20.7.2018 in Petition No. 98/MP/2017 filed by the Petitioner seeking in-principle approval for servicing the expenditure related to installation of the ECS, had made the following observations:

“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. The Petitioner in its prayers (b) to (h) has also prayed for the following: (i) Incremental Auxiliary Consumption for computation of tariff post commissioning of ECS. (ii) Incremental O&M cost for installation of ECS and other associated facilities. (iii) Shutdown period required for installation and commissioning of ECS at the projects to be allowed as deemed availability for payment of capacity charges.



(iv) Expenditure on water cost required for operation of ECS and other associated facilities. (v) Allow procurement cost of limestone for operation of ECS at actuals. (vi) Expenditure on procurement cost of lime stones and other reagents like urea and ammonia etc. (vii) Permission to approach the Commission for remaining ECS.

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.”

(c) Regulation 29 of the 2019 Tariff Regulations provides for allowing ACE on account of installation of ECS to meet the revised ECNs. The instant petitions are filed for approval for servicing the expenditure to be incurred in its various generating stations to comply with revised ECNs.

(d) The Petitioner has considered operating parameters recommended by CEA in its letter dated 20.2.2019. Normative parameters as per the 2019 Tariff Regulations have been considered for working out indicative tariff based on the capital cost.

(e) The MoEFCC Notification mandates reduction in water consumption, particulate matter, SO₂, NO₂, and Mercury emission. To comply with the revised ECNs, the Petitioner has proposed to implement (a) Flue Gas De-sulphurisation (FGD) for SO₂ and (b) Combustion Modification and SNCR/ SCR for NO₂ control. The norms specified for water consumption, particulate matter and Mercury emission are already being met by the subject generating stations/ units and, therefore, there is no proposal to install any ECS for the same.

(f) CEA in its recommendations vide letter dated 20.2.2019 on TPPs for the 2019-24 tariff period has specified norms for four technologies in case of SO₂ reduction, namely wet limestone based Flue Gas De-sulphurisation (FGD), lime spray drier/ semi-dry FGD, dry sorbent injection based FGD and furnace injection in CFBC boilers. The wet limestone based FGD system is the most appropriate technology for FGD and it meets the norms specified in the MoEFCC Notification and it adheres to the CEA's recommendations.

(g) The wet limestone based FGD system is a wet scrubbing process and it uses limestone or lime as a reagent. It is the most frequently selected FGD system for SO₂ reduction from coal-fired utility boilers. It removes SO₂ by scrubbing the flue gas with limestone slurry. Flue gas is treated in an absorber by passing the flue gas stream through limestone or lime slurry spray where the gas flows upwards through the absorber counter current to the spray liquor flowing downward through the absorber. The shut-down period required for installation of the wet limestone based FGD system is approximately 30 to 45 days and it is envisaged that it would reduce SO₂ to less than 200 mg/Nm³ from current levels of 1000 mg/Nm³ and thereby comply with revised ECNs mandated by the MoEFCC Notification.

(h) For meeting revised ECNs w.r.t. NO_x, CEA has specified the norms based on DeNO_x combustion system as well as SCR/SNCR technology. There are two kinds of technologies for NO₂ control (a) primary control technologies wherein the amount of NO₂ produced in the combustion/ furnace zone is reduced by modifying fuel burners and (b) secondary control technologies that reduces NO₂ present in flue gas by injection of reagent (ammonia [NH₃] or urea) in flue gas path where it reacts with NO₂ to reduces it to N₂ and water.

(i) In De-NO_x Combustion Modification (CM) System, the normal burners installed in the unit boilers are to be replaced by Low-NO_x Burners (LNB). A 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 NO₂ formation. Due to change in temperature profile of the furnace and heat transfer pattern, LNB retrofits lead to higher economizer inlet temperatures and increase in un-burnt carbon. This increases heat loss of boiler. Accordingly, the unit heat rate is anticipated to increase by around 0.8% on account of De-Nox LNB retrofit.

(j) De-NO_x 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 NO₂ in the presence of oxygen to form molecular nitrogen and water. The two such most common chemicals are ammonia/ urea. SNCR system to be

installed in the generating stations of the Petitioner is proposed to be based on urea. This system requires low capital cost, having moderate NO₂ removal and it involves non-toxic chemical and it requires typically low energy injection. Further, due to formation of water particles during NO₂ reduction, it increases the wet loss of boilers leading to deterioration of Unit Heat Rate by about 0.5%. Shut-down period required for installation of Combustion Modification System and SNCR is approximately 45 to 60 days and 15 days respectively. SNCR demonstration pilot tests are being conducted at NTPC stations and implementation of SNCR shall be taken up based on the reports of SNCR pilot tests.

(k) De-NO_x Selective Catalytic Reduction (SCR) process involves injecting nitrogen-containing chemicals into the upper furnace or convective pass of a boiler within a specific temperature window with the use of a catalyst. The SCR process chemically reduces the NO₂ molecule into molecular nitrogen and water vapor. A nitrogen-based reagent such as ammonia or urea is injected into the furnace. SCR system proposed to be installed by the Petitioner is based on ammonia. The hot flue gas and reagent diffuse through the catalyst which is composed of active metals or ceramics with a highly porous structure. The reagent reacts selectively with NO_x in the presence of the catalyst and oxygen. The use of a catalyst results in two primary advantages, namely, higher NO₂ control efficiency and reactions within a broader temperature range. This system has high NO₂ removal, but requires high capital cost and involves toxic chemical. Due to formation of water particles during NO₂ reduction, it increases the wet loss of boilers leading to deterioration of Unit Heat Rate by about 0.1%.

(l) With the implementation of Combustion Modification System, NO₂ is anticipated to come below 400 mg/Nm³ and with the installation of SNCR, it is envisaged that the level of NO₂ shall come below 300 mg/Nm³.

(m) With the installation of revised ECS, there would be requirement of additional manpower for operation and maintenance of these systems, spares pertaining to these systems etc. on sustained basis. Accordingly, additional O&M Expenses would be required on account of implementation of ECS. In case of thermal generating stations, the norms of O&M Expenses in the 2019 Tariff Regulations have been fixed (in lakh/MW) based on actual O&M



Expenses of different stations in the last five years. As FGD and other ECS were not installed at various stations while finalizing the norms for 2019 Tariff Regulations, the expenditure on account of them was not considered while framing the norms. Further, the actual O&M Expenses data on account of FGD system and other ECS system is not available. Therefore, as has been provided in case of new hydro generating stations, a norm in relation to percentage (%) of capital cost may be considered. In case of large hydro generating stations, norms for O&M Expenses @ 3.5% of capital cost have been provided in the 2019 Tariff Regulations. Since proportion of plant and machinery is more in FGD/ other ECS, norms for additional O&M Expenses @4% of capital cost may be considered.

(n) Units may have to be taken under shutdown for about 45 days for implementation of ECS in compliance of the MoEFCC Notification and stabilization of the same may take some more time. During the period of shut down of unit, there would be loss of availability of the station and would lead to under-recovery of Annual Fixed Charges (AFC) on account of implementation of ECS. Accordingly, the shutdown period of station/ unit for implementation of ECS in compliance of the MoEFCC Notification may be treated as deemed availability as under Regulation 76 of the 2019 Tariff Regulations.

(o) The Commission may allow additional GSHR (gross station heat rate) over and above the normative GSHR for the station, due to implementation of ECS.

(p) The Petitioner will file separate supplementary tariff petitions in terms of Regulations 29(4) of the 2019 Tariff Regulations based on actual and projected expenditure, as the case may be, and normative operating parameters/ norms as specified in the 2019 Tariff Regulations and subsequent notification for reagent consumption, etc.

8. The representative of the Petitioner, during the hearing on 12.3.2021, submitted that the Petitioner has proposed Selective Non-Catalytic Reduction (SNCR) technology for reduction of NO₂ emissions. However, with relaxation of the ECNs for NO₂ from 300 mg/Nm³ to 450 mg/Nm³ for plants installed between 1.1.2004 and 31.12.2016 vide notification of MoEFCC dated 19.10.2020, there is no



requirement for installation of ECS for NO₂ control in case of TPPs covered in the instant 9 petitions. He further submitted that the revised indicative tariff has been shared with the beneficiaries. Accordingly, the Petitioner is only installing ECS for control of SO₂ emissions in the generating stations and Combustion Modification System for NO₂ emissions in some of the generating stations covered in the instant petitions.

9. Taking into consideration the submissions of the beneficiaries/ Respondents during the hearing on 12.3.2021, NTPC was directed to submit certain information which was considered relevant for the present proceedings. The beneficiaries/ Respondents were directed to file their reply and NTPC to file its rejoinder, if any. Accordingly, NTPC has filed the information in all the instant petitions vide affidavit dated 25.3.2021. In response, CSPDCL and MPPMCL have filed their replies to the information filed by NTPC and NTPC has also filed its rejoinder. The issues raised by CSPDCL and MPPMCL are similar to the issues raised by them in their reply to the petition and the clarifications given by NTPC earlier. The issues raised by the beneficiaries/ Respondents and clarifications given by NTPC are dealt in the respective paragraphs of this order.

Maintainability

10. MSEDCL, MPPMCL and CSPDCL have submitted that the Petitioner has not followed the procedure laid down under Regulation 29(2) of the 2019 Tariff Regulations and, hence, these petitions should be rejected as being not maintainable. MSEDCL has submitted that as per Regulation 29 of the 2019 Tariff Regulations, the Petitioner intending to implement ECS in compliance of the revised ECNs in terms of the MoEFCC Notification and the consequent capital expenditure is required to share the proposal with the beneficiaries and only then it can file a petition for undertaking such ACE. MSEDCL has submitted that the Petitioner has



submitted that ECS has to be mandatorily implemented within a stipulated timeframe and, therefore, the Petitioner proceeded for tendering and awarding the FGD systems in a phased manner through a transparent competitive bidding process and placed the Notification of Award (NoA) during the period starting from 1.7.2018 to 2.8.2020. MSEDCL has further submitted that the Petitioner has neither informed nor consulted the beneficiaries in this regard and the Petitioner has shared the details with the beneficiaries only on the directives of the Commission. MSEDCL requested not to consider the unilateral proposal of the Petitioner.

11. MPPMCL has submitted that the Petitioner has bypassed the steps and the procedures laid down in Regulation 29 of the 2019 Tariff Regulations. The Petitioner has directly filed petition for determination of “indicative tariff” based on “estimated costs” for implementation of ECS in violation and disregard of Regulation 29 of the 2019 Tariff Regulations and, hence, sought dismissal of the petition.

12. In response to the contentions of MSEDCL and MPPMCL, the Petitioner has submitted that as per the MoEFCC Notification, ECS was to be installed in TPPs in NCR (National Capital Region) by December 2019 and in other TPPs by December 2022. The deadlines have been extended by the Hon'ble Supreme Court to December 2021 in case of highly polluted and densely populated areas and to December 2022 in other stations and that the progress of work is being monitored by the Hon'ble Supreme Court. As the installation of ECS is mandatory to meet the revised ECNs and is required to be implemented within a stipulated timeframe, the Petitioner started the pre-award activities such as location survey, preparation of technical specifications, floating of bid/ tender etc., which involves lot of time. Taking into consideration that it would take about 3 years from pre-award activities to installation of ECS, the Petitioner proceeded for tendering and awarding FGD systems in a phased manner through a transparent competitive bidding process.



Accordingly, NIT was floated on 30.6.2017, which was prior to the notification of 2019 Tariff Regulations. All these activities took place during the 2014-19 tariff period and are, therefore, governed by provisions of the 2014 Tariff Regulations. By the time the 2019 Tariff Regulations were notified, the installation of ECS was at different phases of pre-award activities, like NIT regarding competitive bidding etc. Instant nine petitions have been served on the beneficiaries. Further, the proposals have been shared with the beneficiaries as per the directions of the Commission along with the re-computed indicative supplementary tariff in line with the provisions of the 2020 Amendment Regulations.

13. During the hearing on 31.3.2021, the learned counsel for the Petitioner, while responding to contentions of the Respondents as regards compliance with Regulation 29 of the 2019 Tariff Regulations reiterated the submissions made in the petition and narrated the circumstances which led to commencing the process of tendering and awarding FGD systems. The gist of the submissions made by the learned counsel for the Petitioner during the hearing is as follows:

a) As per the MoEFCC Notification, all TPPs were required to comply with the revised ECNs within a stipulated period. As per the Resolution of the Board of Directors of the Petitioner dated 22.3.2017 and the minutes of the 444th meeting, the proposal for interim environmental action plan for implementation of ECS was adopted. Accordingly, the process of tendering and awarding FGD systems was initiated during the 2014-19 tariff period. The 2014 Tariff Regulations does not have any specific regulation to deal with capital expenditure to be incurred for complying with the new environmental norms.

b) Petition No. 98/MP/2017 was filed for in-principle approval of the capital cost required for installation of ECS. In the order dated 20.7.2018 in Petition No. 98/MP/2017, the Commission held that the MoEFCC Notification constitutes Change in Law and that ACE incurred towards implementation of ECS for meeting the revised ECNs shall be admissible under Change in Law after prudence check by the Commission. The Commission further directed

CEA to prepare guidelines to meet the revised emission norms stipulated under the MoEFCC Notification. There was no direction to the CEA to recommend technology for each/ specific plant of the Petitioner. Prior to the 2019 Tariff Regulations or the order dated 20.7.2018 in Petition No.98/MP/2017, there was no express or implied direction to NTPC that for its various individual projects, it has to seek approval for the technology selected. In the order dated 20.7.2018 in Petition No. 98/MP/2017, the Commission only observed that on basis of the guidelines/ recommendation and operational parameters determined by CEA, the Commission will approve expenditure after prudence check as per Regulation 14(3) of the 2014 Tariff Regulations.

c) All the 47 beneficiaries of NTPC were made Respondents in the Petition No. 98/MP/2017. Tata Power Delhi Distribution Limited (TPDDL) had contended in that Petition that the Petitioner had to comply and incur expenditure as per prudent commercial discretion and practices and that the Commission may carry out prudence check once the expenditure has actually been incurred by NTPC. Now the Respondents cannot change their stand and contend that prior approval of the beneficiaries was required before incurring expenditure.

d) In addition to compliance with the MoEFCC Notification, the progress of the work was also being monitored by the Hon'ble Supreme Court. The non-compliance of revised emission control norms would have resulted in revocation of environment clearance, which in turn would have also affected the beneficiaries and consumers.

e) The Board of Directors of the Petitioner has approved the proposal to award the contracts for the FGD package. The investment approval for each package has also been accorded by the Board of Directors.

f) The tenders were floated as early as possible due to the strict timelines for complying with the revised ECNs. Even Regulation 29 of the 2019 Tariff Regulations does not prohibit any generator for tendering before the approval granted under Regulation 29(3).

g) The Hon'ble Supreme Court, on the basis of affidavits of CEA and Ministry of Power in the case of MC Mehta Vs. Union of India, prescribed the

timeline of December 2021 for complying with the revised emission control norms for generating stations of NTPC and for this reason, the tenders were floated/ awarded and all this was done before the 2019 Tariff Regulations came into effect. A fair and transparent bidding process has been followed to discover the most competitive price.

h) Irrespective of the useful life of the plant, the mandate of the MoEFCC Notification dated 7.12.2015 had to be implemented.

14. We have considered the contention of MSEDCL and MPPMCL and the clarifications given by the Petitioner. The basic contention the Respondents is that the Petitioner has not complied with the provisions of Regulation 29 of the 2019 Tariff Regulations and, therefore, the instant petitions are not maintainable and should be rejected. Regulation 29 of the 2019 Tariff Regulations provides as under:

“29. Additional Capitalization on account of Revised Emission Standards:

(1) A generating company requiring to incur additional capital expenditure in the existing generating station for compliance of the revised emissions standards shall share its proposal with the beneficiaries and file a petition for undertaking such additional capitalization.

(2) The proposal under clause (1) above shall contain details of proposed technology as specified by the Central Electricity Authority, scope of the work, phasing of expenditure, schedule of completion, estimated completion cost including foreign exchange component, if any, detailed computation of indicative impact on tariff to the beneficiaries, and any other information considered to be relevant by the generating company.

(3) Where the generating company makes an application for approval of additional capital expenditure on account of implementation of revised emission standards, the Commission may grant approval after due consideration of the reasonableness of the cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, and such other factors as may be considered relevant by the Commission.

(4) After completion of the implementation of revised emission standards, the generating company shall file a petition for determination of tariff. Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on reasonableness of the cost and impact on operational parameters shall form the basis of determination of tariff.”

15. As per Regulation 29(1) of the 2019 Tariff Regulations, a generating company intending to incur ACE towards installation of ECS shall share its proposal with the Respondents/ beneficiaries and file a petition for undertaking ACE. The proposal



should contain the details of the proposed technology as specified by CEA and other relevant information under Regulation 29(2) of the 2019 Tariff Regulations. On an application by the generating station, the Commission may approve ACE towards the implementation of ECS after prudence check as per Regulation 29(3) of the 2019 Tariff Regulations. As per Regulation 29(4) of the 2019 Tariff Regulations, the generating station after implementation of the revised ECS shall file a petition for determination of tariff.

16. The beneficiaries have contended that the Petitioner is required under Regulation 29(1) of the 2019 Tariff Regulations to share the proposal to incur ACE for implementation of the revised ECNs with the beneficiaries and thereafter file a petition for undertaking such ACE. However, it has been alleged that the Petitioner has not shared the proposal along with the details, as specified in Regulations 29(1) and 29(2) of the 2019 Tariff Regulations, and as such the petition should be rejected at the outset.

17. Per contra, the Petitioner has submitted that as the installation of the ECS is a long drawn process and is required to be implemented within a strict timeframe, which was monitored by the Hon'ble Supreme Court. The Petitioner had initiated the pre-award activities and floated NIT, which was during the 2014-19 tariff period.

18. It is observed that the Commission in order dated 20.7.2018 in Petition No. 98/MP/2017 has already held that ACE due to "change in law or compliance with any existing law" is allowable and, therefore, ACE due to installation of ECS in compliance with the MoEFCC Notification, which is a "change in law" event shall be admissible after due prudence check under Regulation 14 of the 2014 Tariff Regulations. Taking into consideration the observations of the Commission in order dated 20.7.2018, the stringent timelines specified in the MoEFCC Notification and

the fact that the compliance of the revised ECNs is being monitored by the Hon'ble Supreme Court, the Petitioner had initiated and taken substantial action for installation of ECS for meeting the revised ECNs in the right earnest during the 2014-19 tariff period. This can be seen from the following table:

Petition No.	Generating station/unit Capacity (MW)	BoD Meeting No. and date of approval of the proposal for FGD	Date of issue of IFB	BOD Meeting No. and date of approval of award of FGD	BOD Meeting No. and date of Investment Approval for FGD	Date of issue of NoA
509/MP/2020	VSTPS-III (2X500)	444 th 22.3.2017	31.7.2017	463 rd 8.9.2018	463 rd 8.9.2018	18.9.2018
516/MP/2020	VSTPS-IV (2X500)	444 th 22.3.2017	31.7.2017	463 rd 8.9.2018	463 rd 8.9.2018	18.9.2018
526/MP/2020	MSTPS-I (2X500)	444 th 22.3.2017	31.7.2017	259 th 8.9.2018	463 rd 8.9.2018	18.9.2018
512/MP/2020	MSTPS-II (2X660)	444 th 22.3.2017	30.6.2017	462 nd 28.7.2018	462 nd 28.7.2018	31.7.2018
335/MP/2020	VSTPS-I (6X210)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2019
519/MP/2020	VSTPS-II (2X500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2019
338/MP/2020	KSTPS-I&II (3X200 + 3X500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019.	22.8.2019
521/MP/2020	KSTPS-III (500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2020
339/MP/2020	SSTPS-II (2X500)	444 th 22.3.2017	24.4.2020	The bidding for FGD is under process.		

19. The requirement of sharing the proposal for installation of ECS for meeting the revised ECNs with the beneficiaries was introduced in the 2019 Tariff Regulations, which were notified in March 2019 and is effective since 1.4.2019 i.e. much after the Petitioner had initiated action for installation of ECS for meeting the revised ECNs in compliance with the MoEFCC Notification. Therefore, the Petitioner could not have shared the proposal for installation of the ECS with the beneficiaries in the year 2017 or 2018, as the provision of sharing such proposal was mandated only in the 2019 Tariff Regulations.

20. However, the Petitioner has shared the proposal for installation of the ECS with the beneficiaries on the directions of the Commission. Further, on the request of the beneficiaries during the hearing on 12.3.2021, the Petitioner was directed to



provide the relevant information to the beneficiaries. Moreover, a copy of the petition is automatically served on the beneficiaries immediately after the petition is uploaded in the e-filing portal of the Commission. Therefore, we are unable to agree with the beneficiaries that the instant petitions should be rejected and the Petitioner should be asked to file fresh petitions as per the procedure laid down in Regulation 29(1) of the 2019 Tariff Regulations. Accepting contentions of the Respondents would serve no material purpose and only delay the installation of the ECS and the Petitioner would not be able to comply with the timelines specified in the MoEFCC Notification and directions of the Hon'ble Supreme Court. Therefore, we reject the contentions of the beneficiaries on maintainability and are considering the instant nine petitions for "in-principle approval" under Regulation 11 of the 2019 Tariff Regulations.

Prayers of the Petitioner

21. We now take up the prayers of the Petitioner in the instant petitions. The Petitioner has prayed to (a) approve undertaking 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 APC; (d) allow additional GSHR; € allow additional water consumption; (f) allow additional O&M Expenses; (g) allow cost of reagents; and (h) allow deemed availability on account of shutdown. The prayers (other than approval of ACE for implementation of ECS) are common and similar in all the petitions and hence they are dealt together. As regards ACE for implementation of ECS, they being generating station/ unit specific, are dealt with individually and separately.



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

22. The Petitioner has sought approval for undertaking implementation of ECS in order to meet revised ECNs. The Petitioner has proposed wet limestone based FGD system for control of SO₂ in all the generating stations covered in the instant 9 petitions. It has proposed Combustion Modification System as the primary measure and SNCR as the secondary measure to control NO₂ emissions in case of some of the generating stations. Initially, the Petitioner had considered the capital cost of ECS discovered through competitive bidding and certain other operating parameters to arrive at the indicative supplementary tariff in the petition. The beneficiaries/ Respondents raised their concerns on various issues like identification of suitable ECS, effectiveness of the identified ECS, investment approval, bidding process and the capital cost of ECS identified in the instant nine petitions and similar other petitions filed by the Petitioner. Accordingly, the Commission for the purpose of prudence check and on the basis of the concerns raised by the beneficiaries/ Respondents directed the Petitioner to submit certain information at various stages of the present proceedings. The capital cost claimed towards ECS, the proposed technology for control of NO₂, the indicative supplementary tariff and other parameters considered by the Petitioner are different for the subject generating stations. The claims made by the Petitioner for the subject generating stations covered in the instant nine petitions are as under.

Petition No. 335/MP/2020 – VSTPSS-I

23. The Petitioner has submitted that wet limestone based FGD system is being implemented for control of SO₂ emission in VSTPSS-I (6x210MW). The Petitioner has submitted as under:

- a) The following capital cost and operating parameters for computing the indicative supplementary tariff has been considered:

Sl. No.	Particulars	FGD
1	Capital Cost	₹791.06 crore
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.01857 (Limestone)
3	Additional APC	1%
4	Additional O&M	4% of capital cost
5	Shutdown Period	45 days for each unit

b) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet the revised ECNs is:

Fixed Cost (FC): 31.44 paise/kWh; Variable Cost (VC): 3.10 paise/kWh (1st year) and Fixed Cost (FC): 29.22 paise/kWh (levelized).

A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 3 paise/ kWh due to increased APC and Station Heat Rate is anticipated.

c) VSTPSS-I was put into commercial operation on 1.2.1992 and it has completed the useful life of 25 years in 2016-17. Therefore, special allowances are availed under applicable provisions of the relevant Tariff Regulations after completion of the useful life of 25 years for carrying out need based R&M activities. It is proposed to run the unit/ station for a minimum of 5 years from the date of operation of ECS in the last unit.

d) VSTPSS-I comprises six units of 210 MW each (6x210 MW) and to comply with the MoEFCC Notification dated 7.12.2015, SO₂ emission has to be below 600 mg/Nm³ level. Therefore, the wet limestone based FGD technology is the most suitable technology for VSTPSS-I. Accordingly, the same has been selected for SO₂ removal for 1260 MW capacity of VSTPSS-I which is in line with the CEA Advisory dated 7.2.2020. The said Advisory was issued post the award of contract for installation of FGD. Nevertheless, the technology adopted is in compliance with the CEA's recommendations/ guidelines dated 7.2.2020.

e) The Board of Directors of the Petitioner in the 444th Meeting held on 22.3.2017 gave their approval for planning and tendering of ECS. Accordingly, the Invitation for Bids (IFB) for installation of FGD system was issued on 28.9.2018. Thermax, L&T, BHEL and Mitsubishi Hitachi Power Systems India (MHPSI) participated in the bid and L&T emerged as the successful bidder. The Board of Directors of the Petitioner on 1.7.2019 approved the proposal to award the contracts for the FGD package. In the 475th Meeting of Board of

Directors held on 10.8.2019, the Investment Approval for undertaking FGD system for VSTPPS-I was approved. On 22.8.2019, Notification of Award (NoA) was issued to L&T for installation of FGD. L&T has started the process for installation of FGD system and at present, the process of engineering and ordering of equipment by is in progress at VSTPSS-I. As the station meets the revised ECNs for NO₂, the De-NO_x system is not proposed for VSTPSS-I.

f) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total IDC claimed (₹ lakh)	Total IEDC claimed (₹ lakh)	Total FERV claimed (₹ lakh)	Total taxes & duties claimed (₹ lakh)	Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
VSTPSS-I (6X210)	45.00 (210 MW)	48.24	4946.69	2151.91	--	10941.93	276.89	79105.90

g) As the station has already completed its useful life in 2016-17, the depreciation has been spread over 5 years from the date of operation of ECS in order to avoid sudden increase in tariff.

Petition No. 519/MP/2020-VSTPSS-II

24. The Petitioner has submitted that wet limestone based FGD system is being implemented for control of SO₂ emission for VSTPSS-II (2x500 MW) and has submitted as under:

a) The following capital cost and operating parameters have been claimed for computing the indicative supplementary tariff:

Sl. No.	Particulars	FGD
1	Capital Cost	₹627.82 crore
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.00158 (Limestone)
3	Additional APC	1%
4	Additional O&M	4% of capital cost
5	Shutdown Period	45 Days

b) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 30.76 paise/kWh; Variable Cost (VC): 2.58 paise/kWh (1st year) and FC: 28.59 paise/kWh (levelized).



A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 3 paise/kWh due to increased APC and Station Heat Rate is anticipated.

c) VSTPSS-II (1000 MW) comprises of 2 units of 500 MW (2x500 MW) and its remaining useful life is about 5.4 years as on 1.4.2020. The wet limestone based FGD is the suitable technology taking into consideration the unit size and the CEA Advisory.

d) The Board of Directors of the Petitioner in the 444th Meeting held on 22.3.2017 gave their approval for planning and tendering of ECS. The Board of Directors in the 473rd Meeting dated 1.7.2019, approved the proposal to award the contracts for the FGD package. The Board of Directors accorded the Investment Approval for implementation of FGD system for VSTPSS-II on 10.8.2019. IFB for installation of FGD was issued on 28.9.2018. L&T emerged as the successful bidder and NoA was issued on 22.8.2019 to L&T for FGD installation. The process of engineering and ordering of equipment is in progress. As the station meets the revised ECNs for NO₂, the De-NOx system is not proposed for VSTPSS-I.

e) The bidding and award has been carried out in a fair and transparent manner as per DOP (Delegation of Power) of NTPC, which is in line with the Government of India guidelines.

f) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & capacity	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total IDC claimed (₹ lakh)	Total IEDC claimed (₹ lakh)	Total FERV claimed (₹ lakh)	Total taxes & duties claimed (₹ lakh)	Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
VSTPSS-II (2X500)	40.5 (500MW)	48.24	3925.94	1707.87	--***	8684.07	219.71	62782.41

*** Extra rupee liability on account of FERV, if any shall be claimed based on actuals

Petition No. 509/MP/2020-VSTPSS-III

25. The Petitioner has submitted that wet limestone based FGD system for control of SO₂ emission and Combustion Modification for NO₂ emission control for VSTPSS-III (2x500MW) is being implemented. The Petitioner has claimed the



following capital cost and operating parameters for computing the indicative supplementary tariff and submitted the following:

Sl. No.	Particulars	FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	`519.5 crore	`53.45 crore	`17.74 crore	SCNR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.013 (Limestone)	0.0015 (Urea)	Nil	
3	Additional APC	1%	0.6%	Nil	
4	Additional O&M	4% of capital cost			
5	Shutdown Period	45 days	15 days	45 to 60 days	
6	Increase in GSHR		11.95 Kcal/kwh	19.12 Kcal/kwh	0.8% increase: due to Combustion Modification. 0.4-0.6% increase: due to SNCR.

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 21.47 paise/kWh; Variable Cost (VC): 5.71 paise/kWh (1st year) and FC: 20.11 paise/kWh (levelized).

A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 5 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) VSTPSS-III was commissioned on 15.7.2007 and its remaining useful life is 13 years as on 1.4.2020. In order to avoid sudden increase in tariff, the Petitioner has spread the depreciation over remaining useful life (10 years) from the date of operation of ECS schemes.

c) As the remaining useful life is 13 years, VSTPSS-III is not eligible for availing special allowance.

d) Initially the combination of two technologies i.e. Combustion Modification System as the primary measure and SNCR as the secondary measure was proposed to be implemented to meet the norm of NO_x emission i.e. 300 mg/Nm³. However, with relaxation of the emission standards for NO₂ vide subsequent notification of MoEFCC dated 19.10.2020, there is no



requirement for installation of SNCR as secondary measure for NO₂ control. The primary De-Nox Combustion Modification System is proposed for NO₂ control and it is awarded to GE through Competitive Bidding Route. The projected capital cost for De-Nox Combustion Modification System is ₹17.74 crore. Combustion Modification technology does not involve reagent cost and impact on APC. Combustion Modification technology would impact the O&M Expenses and station heat rate. NO₂ reduction reactions are most effective within a specific temperature range. The Combustion Modification technology is one of the cheapest technologies to control NO₂ emission. However, the un-burnt carbon losses may increase leading to increase in heat rate.

e) As per the CEA Advisory dated 7.2.2020, there is only one technology i.e. wet limestone based FGD system for unit size of 500 MW and above. As VSTPSS-III comprises of 2 units of 500 MW (2x500 MW) and has remaining useful life of about 13 years, the optimum technology for De-Sox for VSTPS-III is wet limestone based FGD.

f) The Board of Directors of the Petitioner in the 444th Meeting held on 22.3.2017 gave their approval for planning and tendering of ECS. Accordingly, Invitation for Bids (IFB) for installation of FGD system for VSTPSS-III was issued by the Petitioner on 31.7.2017. The Board of directors of the Petitioner in the 463rd meeting held on 8.9.2018 approved the proposal to award the contracts for the FGD package and accorded the Investment Approval to undertake implementation of FGD system.

g) L&T emerged as the successful bidder. On 18.9.2018, NoA was issued to L&T for FGD installation. At present, the civil works are in progress in VSTPSS-III.

h) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total IDC claimed (₹ lakh)	Total IEDC claimed (₹ lakh)	Total FERV claimed (₹ lakh)	Total taxes & duties claimed (₹ lakh)	Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
VSTPSS-III (2X500)	40.5 (500MW)	40.276	2816.32	1425.77	***	7249.68	181.805	51949.58

*** Extra rupee liability on account of FERV, if any shall be claimed based on actuals



Petition No. 516/MP/2020 – VSTPSS-IV

26. The Petitioner has submitted that wet limestone based FGD system for control of SO₂ emission and Combustion Modification for NO₂ emission control for VSTPSS-IV is being implemented. The station was commissioned on 27.3.2014. The Petitioner has claimed the following capital cost and operating parameters for computing the indicative supplementary tariff in the petition:

Sl. No.	Particulars	FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	₹519.5 crore	₹53.45 crore	₹17.74 crore	SNCR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.013 (Limestone)	0.0015 (Urea)	Nil	
3	Additional APC	1%		Nil	
4	Additional O&M	4% of capital cost			
5	Shutdown Period	30-45 days	15 days	45 to 60 days	
6	Increase in GSHR		12.08 Kcal/kwh	19.32 Kcal/kwh	0.8% increase: due to Combustion Modification, 0.4-0.6% increase: due to SNCR

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 18.21 paise/kWh; Variable Cost (VC): 5.35 paise/kWh (1st year) and FC: 17.59 paise/kWh (levelized).

A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 6 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) Wet limestone based FGD technology is the best suited technology for VSTPSS-IV and it would meet the criteria of CEA Advisory dated 7.2.2020 and would also meet the SO₂ emission norms stipulated by the MoEFCC Notification dated 7.12.2015.

c) As per the MoEFCC Notification, the emission norms with respect to NO_x was 300 mg/Nm³. Accordingly, the Petitioner had sought approval of ACE on account of Combustion Modification System i.e. Low NO_x burners (primary



control) and SNCR (secondary control). The norm was revised vide Notification of MoEFCC dated 19.10.2020 to 450 mg/Nm³. Accordingly, the Petitioner is now proposing only implementation of Combustion Modification System as primary system of DeNO_x to bring the level of NO_x emission below 450 mg/Nm³ and the secondary DeNO_x system of SNCR proposed initially in the petition will not be implemented for the present.

d) The Combustion Modification System is proposed for NO₂ control and it is awarded to GE through competitive bidding route. The projected capital cost for Combustion Modification System is ₹17.74 crore. Combustion Modification technology does not involve reagent cost and impact on APC. However, Combustion Modification technology would impact the O&M Expenses and station heat rate. NO₂ reduction reactions are most effective within a specific temperature range. The Combustion Modification technology is one of the cheapest technologies to control NO₂ emission. However, the un-burnt carbon losses may increase leading to increase in station heat rate.

e) The Board of Directors of the Petitioner, in its 444th Meeting held on 22.3.2017, gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification dated 7.12.2015. The Board of Directors of the Petitioner in the 463rd Meeting dated 8.9.2018, approved the proposal to award the contracts for the FGD package. IFB for installation of FGD system was issued by the Petitioner on 31.7.2017. On 8.9.2018, Board of Directors accorded the Investment Approval to undertake implementation of FGD system. L&T emerged as the successful bidder. Accordingly, on 18.9.2018, NoA was issued to L&T for FGD installation. At present, the civil works are in progress at the instant generating station.

f) The remaining useful life of the plant as on 1.4.2020 is 18.5 years. Therefore, VSTPSS-IV is not eligible for availing Special Allowance as per provisions of the applicable Tariff Regulations.

g) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total IDC claimed (₹ lakh)	Total IEDC claimed (₹ lakh)	Total FERV claimed (₹ lakh)	Total taxes & duties claimed (₹ lakh)	Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
VSTPSS-IV (2X500)	40.5 (500MW)	40.276	2816.32	1425.77	-	7249.68	181.805	51949.58

Petition No. 338/MP/2020 - KSTPSS-I&II

27. The Petitioner has claimed wet limestone based FGD system for control of SO₂ emission for KSTPSS- I & II (2100 MW) consisting of 2x300 MW + 3x500 MW units. The Petitioner has claimed the following capital cost and operating parameters for computing the indicative supplementary tariff:

Sl. No.	Particulars	FGD
1	Capital Cost	₹1228.87 crore
2	Normative Specific Limestone/ Reagent Consumption (kg/kWh)	0.01699 (Limestone)
3	Additional APC	1%
4	Additional O&M	4% of capital cost
5	Shutdown Period	30-45 days

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 28.49 paise/kWh; Variable Cost (VC): 2.77 paise/kWh (1st year) and FC: 26.56 paise/kWh (levelized).

A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 2 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) KSTPSS- I & II were commissioned on 1.6.1990 and have already completed their useful life in 2016-17. In order to avoid sudden increase in tariff, it has been proposed to run the unit/ station for a minimum of 5 years from the date of operation of ECS in the last unit. Accordingly, the depreciation has been spread over 5 years from the date of operation of ECS.

c) Further, the generating station has availed Special Allowance after the useful life of the units/ stations for carrying out need based R&M activities in terms of provisions of applicable Tariff Regulations.

d) In line with the CEA Advisory and on the basis of best technology available in terms of plant specifications, the wet limestone based FGD technology has been selected for reduction of SO₂ emissions.

e) The Board of Directors of the Petitioner, in its 444th Meeting held on 22.3.2017, gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification dated 7.12.2015. Accordingly, in the 473rd meeting held on 1.7.2019, Board of Directors of the Petitioner approved the proposal to award the contracts for the FGD package. In the 475th Meeting held on 10.8.2019, the investment approval to undertake implementation of FGD system was accorded by the Board of Directors.

f) IFB for installation of FGD system was issued on 28.9.2018. BHEL emerged as the successful bidder and NoA was issued to BHEL for FGD installation and it has started the process for installation of FGD system. At present, the process of engineering and ordering of equipment is in progress in KSTPSS-I & II.

g) Opportunity cost arising on account of shut-down of the unit(s) and any associated costs for installation of ECS has not been considered at this stage. However, the same shall be claimed at the time of determination of tariff for these systems on actual basis. The base cost/ work cost of the FGD system for the 3x200 MW units of instant station is ₹271.26 crore i.e. equivalent to ₹0.4521 crore/MW, which is in line with the base cost proposed by CEA for 210 MW units i.e. ₹0.45 crore/MW. The base cost for 3x500 MW units of the instant station is ₹678.15 crore i.e. equivalent to ₹0.4521 crore/MW and is comparable to the tentative base cost of ₹0.405 crore/MW proposed by CEA.

h) As the station meets the revised ECNs for NO₂, the De-Nox system is not proposed for KSTPSS-I & II.

i) The break-up of the capital cost claimed by the Petitioner for FGD installation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	*Total IDC claimed (₹ lakh)	*Total IEDC claimed (₹ lakh)	#Total FERV claimed (₹ lakh)	*Total taxes & duties claimed (₹ lakh)	*Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
KSTPSS-I & II (3X200 + 3X500)	45 (for 200MW) & 40.5 (for 500MW)	45.21 (for 200 MW units) & 45.21 (500 MW units)	2018.8 (for 200 MW units) & 5047.01 (for 500 MW units)	960.26 (for 200 MW units) & 2400.65 (for 500 MW units)	–	4882.68 (for 200 MW units) & 12206.69 (for 500MW units)	122.88 (for 200 MW units) & 307.20 (for 500MW units)	122887.17

*tentative;

will be submitted based on actual determination of tariff

Petition No. 521/MP/2020 – KSTPSS-III

28. The Petitioner has claimed wet limestone based FGD system for control of SO₂ emission and Combustion Modification System for NO₂ emission control for KSTPSS-III (1X500 MW). The Petitioner has considered the following capital cost and operating parameters for computing the indicative supplementary tariff in the petition:

Sl. No.	Particulars	FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	₹292.59 crore	₹27.02 crore	₹8.76 crore	SCNR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.0158 (Limestone)	0.002 (Urea)	Nil	
3	Additional APC	1%	Nil	Nil	
4	Additional O&M	4% of capital cost			
5	Shutdown Period	45 days	15 days	45 to 60 days	
6	Increase in GSHR		14.42 Kcal/kwh	24.05 Kcal/kwh	1% increase: due to Combustion Modification; 0.6% increase: due to SNCR

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation ECS in order to meet revised ECNs is:

Fixed Cost (FC): 20.27 paise/kWh; Variable Cost (VC): 6.87 paise/kWh (1st year) and FC: 20.29 paise/kWh (levelized).



A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 6 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) In line with the CEA Advisory and on the basis of best technology available in terms of plant specifications, the wet limestone based FGD technology has been selected for reduction of SO₂ emissions.

c) The Board of Directors of the Petitioner, in its 444th Meeting held on 22.3.2017, gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification dated 7.12.2015. IFB for installation of FGD system was issued on 28.9.2018. BHEL emerged as the successful bidder and was awarded the contract for installation of FGD at KSTPSS-III. Accordingly, on 22.8.2020, NoA was issued to BHEL for FGD installation. In the 473rd meeting (held on 1.7.2019) of Board of Directors of the Petitioner, the proposal to award the contracts for the FGD package was approved. The Board of Directors in the 475th Meeting held on 10.9.2019 accorded the Investment Approval to undertake implementation of FGD system in KSTPSS-III.

d) As per the MoEFCC Notification dated 7.12.2015, the ECN with respect to NO₂ was 300 mg/Nm³. Accordingly, approval of additional expenditure on account of Combustion Modification System i.e. Low NO_x burners (primary control) and SNCR (secondary control) was sought initially in the petition. However, the above emission norm of 300 mg/Nm³ was revised by MoEFCC vide Notification dated 19.10.2020 to 450 mg/Nm³. Accordingly, now only Combustion Modification System is to be implemented as primary system of DeNO_x to bring the level of NO_x emission below 450 mg/Nm³ and the secondary DeNO_x system of SNCR proposed initially in the petition will not be implemented.

e) The primary DeNO_x system of Combustion Modification System was awarded to BHEL through Competitive Bidding Route. The projected capital cost for Combustion Modification (CM) is ₹8.76 crore; for SNCR, it is ₹27.02 crore and for FGD, it is ₹292.59 crore. However, since SNCR is no more proposed to be installed, the tariff of proposed ECS may further get reduced, assuming all other parameters remain same.

f) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	*Total IDC claimed (₹ lakh)	*Total IEDC claimed (₹ lakh)	#Total FERV claimed (₹ lakh)	*Total taxes & duties claimed (₹ lakh)	*Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
KSTPSS-III 500 MW	40.5	45.21	1682	800	***	4069	102	29259

*tentative; # will be submitted based on actual determination of tariff

*** Extra rupee liability on account of FERV, if any shall be claimed based on actuals

Petition No. 526/MP/2020-MSTPSS-I

29. The Petitioner has claimed wet limestone based FGD system for control of SO₂ emission and Combustion Modification System for NO₂ emission control for MSTPSS-I (2X500 MW) and has considered the following capital cost and operating parameters for computing the indicative supplementary tariff:

Sl. No.	Particulars	FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	₹545.83 crore	₹55.05 crore (without tax)	₹18.28 crore	SNCR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.016 (Limestone)	0.0015 (Urea)	Nil	
3	Additional APC	1%			
4	Additional O&M	4% of capital cost			
5	Shutdown Period	30-45 days	15 days	45 to 60 days	
6	Increase in GSHR		31.36 Kcal/kwh (12.06 Kcal/kwh due to SNCR + 19.3 Kcal/kwh due to CM)		0.8% increase: due to Combustion Modification; 0.4-0.6% increase: due to SNCR

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 19.09 paise/kWh; Variable Cost (VC): 5.79 paise/kWh (1st year) and FC: 18.45 paise/kWh (levelized).



A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 9 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) As MSTPSS-I was commissioned on 31.3.2014, its remaining useful life is approximately 19 years as on 1.4.2020.

c) In the 444th Meeting held on 22.3.2017, the Board of Directors of the Petitioner gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification dated 7.12.2015. In the 259th Meeting of the Sub-Committee of the Board of Directors of the Petitioner held on 8.9.2018, proposal to award the contracts for the FGD package was approved. The Board of Directors in its 463rd meeting held on 8.9.2018 accorded the Investment Approval to undertake implementation of FGD system. IFB for installation of FGD system was issued on 31.7.2017. BHEL emerged as the successful bidder. Accordingly, NoA was issued on 18.9.2018 to BHEL for FGD installation.

d) The wet limestone based FGD technology has been selected for reduction of SO₂ emissions. The selection of technology was on the basis of best technology available in terms of plant specifications. Adoption of same technology for all units has an added advantage in terms of operating cost in respect of spares, tie-up of reagent suppliers etc. Further, there are no safety issues as limestone is non-hazardous. This technology is most commonly used technology worldwide.

e) As per MoEFCC Notification dated 7.12.2015, the emission norms specified for NO₂ was 300 mg/Nm³. Accordingly, approval of ACE on account of Combustion Modification System i.e. Low NO_x burners (primary control) and SNCR (secondary control) was sought. Subsequently, *vide* Notification dated 19.10.2020, the same was revised by MoEFCC to 450 mg/Nm³. Therefore, now only the Combustion Modification System is proposed to be implemented as primary system of DeNO_x to bring the level of NO_x emission below 450 mg/Nm³ and the secondary DeNO_x system of SNCR is not to be implemented any more. The installation of Combustion Modification System has been awarded to BHEL and its projected capital cost is `18.28 crore.



f) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total *IDC claimed (₹ lakh)	Total *IEDC claimed (₹ lakh)	#Total FERV claimed (₹ lakh)	*Total taxes & duties claimed (₹ lakh)	*Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
MSTPSS-I 1000 MW	40.5	42.32	2959	1498	-	7617	191	54583

*tentative; # will be submitted based on actual determination of tariff

Petition No. 512/MP/2020-MSTPSS-II

30. The Petitioner has claimed wet limestone based FGD system for control of SO₂ emission and Combustion Modification for NO₂ emission control for MSTPSS-II (2x660 MW) in the petition and has considered the following capital cost and operating parameters for computing the indicative supplementary tariff in the petition:

Sl. No.	Particulars	FGD	SNCR (Unit-I)	SCR (Unit-II)	Remarks
1	Capital Cost	₹653.96 crore	₹36.33 crore	₹254.31 crore	SCR/SCNR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.014 (Limestone)	0.00125 (Urea and Ammonia)		
3	Additional APC	1%	0.4%		
4	Additional O&M	4% of capital cost			
5	Shutdown Period	45 days	15 days		
6	Increase in GSHR		7.84 Kcal/kwh		0.35% increase: due to SCR/SNCR

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 22.16 paise/kWh; Variable Cost (VC): 6.55 paise/kWh (1st year) and FC: 20.86 paise/kWh (levelized).

A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 8 paise/kWh due to increased APC and Station Heat Rate is anticipated.

- b) Total expenditure of about `944.60 crore is estimated towards installation of ECS in order to comply with the revised ECNs. COD of MSTPSS-II was 18.3.2017 and the remaining useful life of the instant station is 22 years as on 1.4.2020. Accordingly, in order to avoid sudden increase in tariff, the Petitioner has spread the depreciation over remaining useful life of 21 years from the date of operation of ECS schemes.
- c) MSTPSS-II has not completed 25 years of its useful life. Accordingly, no Special Allowance as per provisions of the applicable Tariff Regulations has been availed and no ACE was claimed towards R&M expenses.
- d) The remaining useful life as on 1.4.2020 is 22 years. After the installation of ECS in all units of the station, the remaining useful life of the plant would be 20 years. Accordingly, no life extension activity is being carried out by the Petitioner and no life extension beyond 25 years is envisaged at this stage.
- e) For reduction in NO₂ emissions, SNCR for Unit-I and SCR for Unit-II was proposed. However, with relaxation of the emission standards for NO₂ vide subsequent notification of MoEFCC dated 19.10.2020, SNCR for unit-I is not required. The matter of implementation of SCR for Unit-2 is sub-judice before SC and claim will be made accordingly.
- f) The projected capital cost for SNCR for unit-I is `36.33 crore and of SCR for unit-II, it is `254.31 crore. Projected capital cost for FGD of both units is `653.96 crore. However, SNCR and SCR are not proposed to be installed and, therefore, the presently proposed tariff of ECS may further get reduced, assuming all other parameters remain same.
- g) As per the CEA Advisory dated 7.2.2020, there is only one technology i.e. wet limestone based FGD system for the unit size of 500 MW and above. The said technology has many positives as compared to others for unit size 500 MW and above and hence is most suitable for MSTPSS-II.
- h) The Board of Directors gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification in its 444th meeting held on 22.3.2017. The Board of Directors approved the proposal to award contracts for the FGD package in the 462nd Meeting held on 28.7.2018. IFB for installation of

FGD system was issued on 30.6.2017 and MHPSI emerged as the successful bidder and NoA was issued on 31.7.2018 to MHPSI for FGD installation. At present, the civil and erection works are in progress.

i) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No. & Capacity (MW)	CEA's indicative hard cost (₹ lakh per MW)	Hard cost claimed (₹ lakh per MW)	Total IDC claimed (₹ lakh)	Total IEDC claimed (₹ lakh)	Total FERV claimed (₹ lakh)	Total taxes & duties claimed (₹ lakh)	Total other costs claimed (₹ lakh)	Total costs claimed (₹ lakh)
MSTPSS-II 1320 MW	37 (660MW)	38.07	4089.36	1778.95	***	9045.53	228.89	65395.68

*** Extra rupee liability on account of FERV, if any shall be claimed based on actuals

Petition No. 339/MP/2020-SSTPSS-II

31. The Petitioner has claimed wet limestone based FGD system for control of SO₂ emission and Combustion Modification for NO₂ emission control for SSTPSS-II (2x500 MW) and has considered the following capital cost and operating parameters for computing the indicative supplementary tariff in the petition:

Sl. No.	Particulars	FGD	SNCR	Combustion Modification System	Remarks
1	Capital Cost	₹525.50 crore	₹52.29 crore (without tax)	₹12.92 crore	SNCR implementation shall be decided based on pilot test report.
2	Normative Specific Limestone/ Reagent Consumption (Kg/kwh)	0.016 (Limestone)	0.0015 (Urea)	Nil	
3	Additional APC	1%	0.2%	Nil	
4	Additional O&M	4% of capital cost			
5	Shutdown Period	30-45 days	15 days	45 to 60 days	
6	Increase in GSHR		9.56 kCal/kWh	19.12 kCal/kWh	0.8% increase: due to Combustion Modification, 0.4% increase: due to SNCR

a) The indicative supplementary tariff (without considering the impact on GSHR) due to installation of ECS in order to meet revised ECNs is:

Fixed Cost (FC): 15.71 paise/kWh; Variable Cost (VC): 10.66 paise/kWh (1st year) and FC: 16.43 paise/kWh (levelized).



A further increase in Energy Charge Rate and per unit Fixed Charge (@85% scheduled generation) of the station by about 5 paise/kWh due to increased APC and Station Heat Rate is anticipated.

b) The Board of Directors in its 444th Meeting held on 22.3.2017 gave their approval for planning and tendering of ECS to comply with the MoEFCC Notification. The work relating to bidding is under progress and is yet to be awarded. IFB for installation of FGD system was issued by the Petitioner on 24.4.2020.

c) As per the CEA Advisory dated 7.2.2020, there is only one technology i.e. wet limestone based FGD system for the unit size of 500 MW and above. The said technology has many positives as compared to others for unit size of 500 MW and above and hence is most suitable for SSTPSS-II.

d) Total expenditure of about ₹590.71 crore is estimated towards installation of ECS in order to comply with the MoEFCC Notification. The remaining useful life of the generating station is 13.75 years as on 1.4.2020. Accordingly, in order to avoid sudden increase in tariff, the Petitioner has spread the depreciation over remaining useful life of 12 years from the date of operation of ECS schemes.

e) As the useful life of 25 years has not been completed, SSTPSS-II is not eligible for Special Allowance in terms of provisions of applicable Tariff Regulations.

f) Initially, approval of ACE on account of implementation of Combustion Modification System as primary control and SNCR as secondary control was sought. However, with the revision of the NO₂ emission norm from 300 mg/Nm³ to 450 mg/Nm³ vide Notification of MoEFCC dated 19.10.2020 for the units commissioned from 1.1.2004 to 31.12.2016, there is no requirement of DeNO_x system of SNCR. Accordingly, now only the Combustion Modification System as primary system of DeNox is being implemented with estimated cost of ₹12.92 crore to bring the level of NO_x emission below 450 mg/Nm³.

g) The process of bidding for FGD is under progress for the instant station and the same is yet to be concluded and work is yet to be awarded. The base cost/ work cost considered for the FGD system for 2x500 MW is ₹403.82 crore



i.e. equivalent to `0.403 crore/MW, which is in line with the base cost recommended by CEA for 500 MW units i.e. `0.405 crore/MW.

h) The break-up of the capital cost claimed by the Petitioner for FGD implementation, vide affidavit dated 25.3.2021, is as follows:

Unit No.	Capacity (MW)	CEA's indicative hard cost (` lakh per MW)	Hard cost claimed (` lakh per MW)	*Total IDC claimed (` lakh)	*Total IEDC claimed (` lakh)	#Total FERV claimed (` lakh)	*Total taxes & duties claimed (` lakh)	*Total other costs claimed (` lakh)	Total costs claimed (` lakh)
SSTPSS-II	1000	40.5	40.38	3286.06	1429.51	–	7268.68	183.91	52549.74

*tentative; # will be submitted based on actual determination of tariff

32. We have considered the submissions made by the Petitioner. In the instant nine petitions, the Petitioner has sought approval for installation of ECS and the consequent ACE towards installation of ECS to meet the revised ECNs notified by MoEFCC. The Commission is considering the instant nine petitions for “in-principle approval” under Regulation 11 of the 2019 Tariff Regulations.

33. The beneficiaries/ Respondents have raised issues regarding (a) approvals and the bidding process; (b) suitability and effectiveness of the ECS; and (c) capital cost of the identified ECS. We deal with these concerns of beneficiaries/ Respondents one-by-one.

Approvals and the bidding process

34. CSPDCL and MPPMCL have submitted that NTPC has not complied with the directive in order dated 20.7.2018 in Petition No.98/MP/2017 to consult CEA and, hence, NTPC may be directed to get all its ECS implementation projects evaluated by CEA or any other competent authority to ensure that the selection of technology and cost claimed is optimum and competitive. NTPC has not submitted any documentary evidence to show that it has obtained specific advise/ support from CEA. It is an afterthought that the technology selected is in consonance with CEA Advisory dated 7.2.2020. In response, NTPC has submitted that as per Regulation

29(2) of 2019 Tariff Regulations, the proposal under Regulation 29(1) of 2019 Tariff Regulations shall contain details of proposed technology as specified by the CEA. The FGD technology proposed by NTPC is one of the options specified by CEA in its Advisory dated 7.2.2020. The regulation does not make it mandatory for NTPC to necessarily consult CEA for the selection of technology nor a prerequisite under the MoEFCC Notification, which is the basis of installation of ECS in its TPPs. As per the CEA Advisory, the technologies mentioned therein need to be evaluated on a case-to-case basis. The CEA Advisory is not mandatory in nature. The Advisory has been issued post the award of contract for installation of FGD. Nevertheless, the technology adopted by NTPC is in compliance with the CEA's recommendations/guidelines dated 7.2.2020. For timely compliance of the MoEFCC Notification, NTPC took proactive steps to have ECS installed in TPPs covered in the instant petitions.

35. CSPDCL and MPPMCL have submitted that NTPC was directed to submit a certificate from the competent authority to the effect that the ECS technology selected is as per recommendations of CEA and is cost effective. Instead, NTPC has submitted a "*Copy of extracts of the Minutes of Meetings dated 01.07.2019*". NTPC may be directed to submit such certificate from CEA that it is as per Advisory dated 7.2.2020. Further, MPPMCL has submitted that CEA is the competent authority to issue certificate that the ECS selected by NTPC is based on the recommendations of CEA. In response, NTPC has submitted that there is no designated Competent Authority to issue such a certificate as per the regulations framed by the Commission or the MoEFCC Notification. The FGD technology selected has been approved by its Board and the MoM regarding the same have already been placed on record.

36. CSPDCL has submitted that NTPC has claimed that in-principle approval was granted by the Commission vide order dated 20.7.2018 in Petition No.98/MP/2017. However, no such approval was granted. MPPMCL has also made similar



submissions and stated that the statement made by NTPC is factually incorrect, misleading and misrepresentation of facts. MPPMCL has further stated that NTPC was directed to approach the Commission only after consulting CEA in specific projects regarding specific technology and finalizing the cost. In response, NTPC has submitted that the Respondents' contention that the Commission did not grant in-principle for installation of ECS in order dated 20.7.2018 in Petition No. 98/MP/2017 is not correct as the Commission in paragraph 46 of the order dated 20.7.2018 observed that *"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."*

37. CSPDCL has submitted that NTPC has not submitted the copy of the recommendations of the Bid Evaluation Committee as directed by the Commission. Instead, NTPC has submitted the Minutes of the Meeting dated 28.7.2018 which is the approval of the NTPC's proposal made on 22.3.2017 in 444th Meeting of Board of Directors. NTPC may be directed to produce the detailed bidding documents showing process of bidding for award of different packages of ECS, with names of the bidders who participated in the bid and name of the successful bidder and basis of their selection criteria. In response, NTPC has submitted that the details of the bidders, name of the successful bidder and basis of their selection criteria were duly submitted vide affidavit dated 25.3.2021 in due compliance of the RoP of hearing dated 12.3.2021.

38. MPPMCL has submitted that NTPC has submitted the Board resolution extracts from the Minutes dated 22.3.2017 of its 444th Meeting of Board which is an interim proposal, wherein it was stated that the interim Board resolution is subject to



approval. The final approval regarding the regarding cost bidding was given on 28.7.2018. Therefore, tendering/ bidding process must have been started when the final approval of its Board was received. However, NTPC had started the bidding process/ tendering process much prior to the approval received by its Board on 28.7.2018. Therefore, bidding process requires stricter legal scrutiny. MPPMCL has stated that IFB was issued on a date which is much prior to the directions of the Commission in order dated 20.7.2018 in Petition No.98/MP/2017 and the CEA Advisory dated 7.2.2020. NIT along with bid opening and closing dates reveal that NTPC had undertaken bidding process but it does not show how this bidding process was conducted. MPPMCL has further submitted that FGD technology was new to India and only few countries possess the requisite know-how. Therefore, international bidding process might have yielded better results. NTPC has failed to produce any document from competent authority to show that the bidding and award of the work has been carried out in a fair and transparent manner as per the applicable GOI/ NTPC guidelines. NTPC should produce documentary proof either from CEA or any other competent authority.

39. MPPMCL has submitted that the Notification of MoEFCC dated 1.4.2021 has revised the timeline for compliance of the revised norms and categorized thermal power plants in three groups. The Notification further provides that the plants retiring before date specified shall not be required to meet the prescribed norms in case they submit such undertaking. NTPC may be directed to submit an undertaking that the plants which have completed their useful life shall remain operative beyond 31.12.2025 or else their claim for ACE may be rejected. In response, NTPC has submitted that as per the Notification of MoEFCC dated 1.4.2021, the Central Pollution Control Board (CPCB) shall categorise TPPs on the basis of their location to comply with the revised ECNs within the extended timelines. The said exercise



has not been undertaken by CPCB till date. Therefore, the reference made by MPPMCL to the latest Notification of MoEFCC is not only premature but also an attempt to mislead the Commission.

40. We have considered the submissions made by CSPDCL and MPPMCL and the clarifications given by NTPC. The revised ECNs notified by MoEFCC on 7.12.2015 specify norms for water consumption, particulate matter, SO₂, NO₂ and Mercury. The Petitioner has submitted that its TPPs meet the revised ECNs with respect to particulate matters, water consumption and Mercury. Therefore, the Petitioner's Board of Directors (BOD) considered the revised ECNs pertaining to SO₂ and NO₂ in its 444th Meeting held on 22.3.2017 and approved the 'Proposal for interim Environmental Action Plan for meeting the New Emission Norms (notified by MOEF&CC on 7/12/2015)'. Thereafter, the Petitioner went through various stages of selection of technology on the basis of efficiency, capital and operating costs, location of plant, reliability, availability of suppliers, supply chain and disposal, etc. The Petitioner went through the pre-award activities like detailed engineering, NIT approval and publication of IFB, etc. The bids were called under International Competitive Bidding on two-stage bidding basis, i.e. techno-commercial bid and price bid. The bidders were evaluated and those found qualified in the first stage (techno-commercial bid) were asked to submit price bids through e-tendering portal. Based on the price bids, the L1 bidder was considered for award of contract. It is observed that the Petitioner's Board of Directors in its 444th Meeting held on 22.3.2017 approved planning and tendering of ECS to comply with the MoEFCC Notification. IFBs for installation of FGD in the subject generating stations in the instant nine petitions were issued over a period from 30.6.2017 to 24.4.2020. The Petitioner's Board of Directors in its 462nd, 463rd, 259th (Sub-Committee), 471st and 473rd Meetings held over a period from 28.7.2018 to 3.4.2020 accorded the



investment approval and approved the award of FGD System packages in 5 lots. Accordingly, the Petitioner issued NoA to the L1 bidders in stages from 31.7.2018 to 22.8.2020. The said details are tabulated as under:

Petition No.	Generating station/unit Capacity (MW)	BOD Meeting No. and date of approval of the proposal for FGD	Date of issue of IFB	BOD Meeting No. and date of approval of award of FGD	BOD Meeting No. and date of Investment Approval	Date of issue of NoA
335/MP/2020	VSTPS-I (6X210)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2019
519/MP/2020	VSTPS-II (2X500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2019
509/MP/2020	VSTPS-III (2X500)	444 th 22.3.2017	31.7.2017	463 rd 8.9.2018	463 rd 8.9.2018	18.9.2018
516/MP/2020	VSTPS-IV (2X500)	444 th 22.3.2017	31.7.2017	463 rd 8.9.2018	463 rd 8.9.2018	18.9.2018
338/MP/2020	KSTPS-I&II (3X200 + 3X500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019.	22.8.2019
521/MP/2020	KSTPS-III (500)	444 th 22.3.2017	28.9.2018	473 rd 1.7.2019	475 th 10.8.2019	22.8.2020
526/MP/2020	MSTPS-I (2X500)	444 th 22.3.2017	31.7.2017	259 th 8.9.2018	463 rd 8.9.2018	18.9.2018
512/MP/2020	MSTPS-II (2X660)	444 th 22.3.2017	30.6.2017	462 nd 28.7.2018	462 nd 28.7.2018	31.7.2018
339/MP/2020	SSTPS-II (2X500)	444 th 22.3.2017	24.4.2020	The bidding for FGD is under process.		

41. We have also perused the extracts of various meetings of the Petitioner's Board submitted by the Petitioner in support of its contention that the whole process from identification of the suitable technology to NoA to the selection of L1 bidders was with the approval of its Board. The Petitioner has also certified that bidding and award has been carried out in a fair and transparent manner as per Delegation of Power (DoP) of the Petitioner and it is in line with the Government of India guidelines. The Petitioner has also submitted that the wet limestone based FGD is the most appropriate technology to meet the ECNs (related to SO₂) specified in the MoEFCC Notification and it is in line with the CEA's recommendations dated 21.2.2019. As regards Combustion Modification System for controlling NO₂, the Petitioner has followed similar bid/ award process as in case of FGD system. It is observed that except in the case of SSTPSS-II, where the process of bidding for FGD is under process and NoA is yet to be issued, NoAs have been issued in case



of all the other generating stations and work is under progress. The Respondents have not adduced any evidence as regards deficiency in the bid/ award process. Having gone through the documents submitted by the Petitioner, we are of the view that the process from the stage of identification of 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 and the bidding was carried out in a fair and transparent manner.

Suitability and effectiveness of the ECS

42. CSPDCL and MPPMCL have submitted that NTPC has claimed that wet limestone based FGD system is most suitable for units of 500 MW and above and for units having higher balance useful life. However, the same technology has been selected for VSTPS I (6X210 MW) and Korba STPS-I & II (3X200 MW)+(3X500 MW), which have units of 200/210 MW and have completed their useful life. They have submitted that NTPC has claimed and certified that wet limestone based FGD is the most appropriate technology and that it is as per the CEA Advisory dated 7.2.2020. NTPC has neither submitted any cost-benefit study of the available technology as regards the remaining useful life of the plant nor has obtained project/unit specific recommendations from CEA as directed by the Commission.

43. In response, NTPC has submitted that selection of technology is in conformity with recommendations dated 21.2.2019 and Advisory dated 7.2.2020 issued by CEA. On the basis of the directions of the Commission in 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 SO₂ emission norms, which are as follows:

- (a) Wet limestone based FGD;
- (b) Lime Spray Drier/ Semi-dry Semi FGD;
- © Dry Sorbent Injection based FGD; and
- (d) Furnace Injection in CFBC Boilers.



44. The Petitioner has submitted that the wet limestone based FGD system is better than the other three FGD systems for the following reasons:

a) In case of Dry Sorbent Injection/ Dry type FGD, SO₂ removal efficiency is low (typically 30%- 50%) which can be increased to 70%, but with very high consumption of reagent. The reagent utilization is low when compared to wet limestone based FGD system leading to high operational expenses.

b) There are very few providers of Ammonia based FGD technology when compared to the wet limestone based FGD leading to less competition in competitive bidding process. The storage and handling of aqueous ammonia is potentially risky/ hazardous when compared to handling of limestone. Further, Ammonia Based FGD Technologies are preferable for units below 500 MW. Though Ammonia based FGD technologies have approximately 10% less CAPEX and APC when compared to wet limestone based FGD systems and by-product of Ammonia based FGD technologies, i.e. Ammonium Sulphate is easily saleable, handling of Ammonia, which is volatile is a matter of concern. Also, availability of ammonia is a matter of concern.

c) Sea Water FGD system is suitable only for coastal power stations as sea water is required for de-sulphurisation process. The subject generating stations covered in the instant nine petitions are not located near the coast and hence this technology was not considered.

d) Dry Sorbent Injection (DSI)/Dry type FGD technologies based on dry sorbent injection is preferable for unit size of 60 MW-250 MW since the reagent cost in this technology is relatively higher than wet limestone based FGD and Ammonia based FGD. It is more suitable for units running on low PLF and units with balance operating life of 7-9 years.

45. The Petitioner has proposed wet limestone based FGD systems to comply with the revised SO₂ emission norms in case of all the subject generating stations covered in the instant 9 petitions. The Petitioner has submitted that wet limestone based FGD technologies based on limestone slurry as reagent is most versatile and suitable for any unit size, thus has a large footprint. The Petitioner has submitted that

the wet limestone based FGD technology has been selected over other technologies due to the following reasons:

- (a) It has been used successfully around the world;
- (b) It is capable of very high SO₂ removal efficiency (around 98%);
- (c) The process operates with very low Ca/S molar ratio, typically in the range of 1 to 1.1, which brings down the operating cost, particularly when sorbent utilization is vital to plant economics;
- (d) The by-product of the process i.e. gypsum is easily marketable and helps to bring down the operating cost;
- (e) It is best suited for high PLF stations;
- (f) There are many of technology providers, leading to advantage on competitive bidding process.

46. The Petitioner has further submitted that CEA on 7.2.2020 issued 'Advice on FGD Technology selection for different unit size'. As per the Advisory, TPPs should select the appropriate FGD technology based on parameters like SO₂ removal efficiency, units' size, balance plant life and the geographical location of TPPs. The Petitioner has submitted that the said Advisory has been issued post the award of contract for installation of FGD by the Petitioner. The Petitioner has submitted that the technology proposed by the Petitioner is in compliance with the recommendations issued by the CEA vide letter dated 20.2.2019.

47. We have considered the submissions of CSPDCL, MPPMCL and NTPC. Compliance with revised ECNs as per the MoEFCC Notification are mandatory for all the TPPs including those of the Petitioner and they were to be complied with within a strict timeline, which has, however, been revised from time to time. Considering the fact that the implementation of the ECNs as mandated through the MoEFCC Notification is being monitored by the Hon'ble Supreme Court and the serious consequence of non-compliance of the directions issued by MoEFCC under Section 6 of the Environment Protection Act, 1986 read with Rule 3 of the Environment

Protection Rules, 1986, the Petitioner has initiated the process for implementation of ECS in 2017 and has issued IFBs in the years 2017, 2018 and thereafter and has also issued NoA in eight of subject generating stations since 2017. In some of the generating stations, IFB was issued before the issue of CEA's recommendations dated 21.2.2019. It is observed that though the Petitioner had issued NoA before the CEA's recommendations, , the wet limestone based FGD system proposed by the Petitioner is also in compliance of the CEA's recommendations. The details of the capital cost of the technology proposed by the Petitioner for the reduction in SO₂ and NO₂ emissions are given in the table below:

Petition No.	Generating station/unit Capacity (MW)	COD	Remaining useful life as on 1.4.2020	CEA indicative cost of FGD per MW (₹ in lakh)	Hard cost of FGD per MW claimed by the Petitioner (₹ in lakh)	Total capital cost of Combustion Modification System claimed by the Petitioner (₹ in crore)
335/MP/2020	VSTPS-I (6X210)	1.2.1992	Completed 25 years	45.00	48.24	Not claimed
519/MP/2020	VSTPS-II (2X500)	1.10.2000	5.4 years	40.50	-48.24	Not claimed
509/MP/2020	VSTPS-III (2X500)	15.7.2007	13 years	40.50	40.276	17.74
516/MP/2020	VSTPS-IV (2X500)	-7.3.2014	19 years	40.50	40.276	17.74
338/MP/2020	KSTPS-I&II (3X200 + 3X500)	1.6.1990	Completed 25 years	45.00(for 200 MW) 40.50 (for 500 MW)	45.21 for 200 MW as well as 500 MW units)	Not claimed
521/MP/2020	KSTPS-III (500)	21.3.2011	16 years	40.50	45.21	8.76
526/MP/2020	MSTPS-I (2X500 MW)	30.3.2014	19 years	40.50	42.32	18.28
512/MP/2020	MSTPS-II (2X660)	Unit-I 28.3.2016 Unit-II 18.3.2017	22 years	37.00	38.07	Not claimed*
339/MP/2020**	SSTPS-II (2X500)	1.1.2009	13.75 years	40.5	40.38	12.92

*For Unit-1 SCR and SNCR is not required. Implementation of SCR for Unit-2 is sub-judice before SC and claim will be made accordingly.

** work is yet to be awarded; the costs are base cost considered by the Petitioner.

48. In the case of VSTPS-I, which has 6 units of 210 MW, the Petitioner has submitted that they are clubbed together to take advantage of the economies of scale and common supply of reagent. The Petitioner has further submitted that using



other technology such as Dry Sorbent, etc., would have led to increase in operating cost of the station as the station maintains high PLF. In the case of Korba Stage-I, which has 3 units of 200 MW each, the Petitioner has submitted that the FGD system for Korba-I&II (3x200 MW+3x500 MW) as well as Korba-III (500 MW) were clubbed together for International Competitive Bidding to reap the benefit of economy of scale. The Petitioner has further submitted that the hard cost proposed for Korba-III is the cost pro-rated on MW basis, thereby normalizing the impact of lower size units of 200 MW.

49. The suitability and selection of the technology depends 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 SO₂ emissions and the Petitioner has selected the wet limestone based FGD system for all the generating stations under the instant petitions. The Petitioner has clearly outlined the advantages of wet limestone based FGD system over other FGD systems as far as its generating stations are concerned. Also, large number of wet limestone based FGD technology providers offer an opportunity for obtaining competitive prices. The Petitioner has also suggested that the efficiency level of wet limestone based FGD system in reducing the SO₂ emissions is around 98% which is better than the other three technologies suggested by CEA. The Petitioner has also submitted that wet limestone based FGD system is best suited for generating stations/ plants which are of 500 MW and in seven of the nine subject generating stations, the plants/ unit size is 500 MW and above.

50. Thus, the Commission observes that the Petitioner has identified and proposed wet limestone based FGD systems for reduction in the SO₂ emissions taking into consideration the effectiveness, availability and cost of the wet limestone



based FGD systems, size of the plants, operational expenses and availability of the reagents. Considering the justification submitted by the Petitioner, we are of the view that the Petitioner has done due diligence in identifying wet limestone based FGD systems as the most suitable technology for reduction of SO₂ emissions notified by MoEFCC for implementing in the subject generating stations covered in the instant nine petitions.

51. It is also observed that initially SCR/ SNCR (secondary measure) and Combustion Modification System (primary measure) were proposed by the Petitioner for reduction of NO₂ emissions. Later, the proposal for implementation of SCR/ SNCR was dropped with the revision of emission norms for NO₂ for TPPs (installed during the period 1.1.2004 to 31.12.2016) from “300 mg/Nm³” as per the MoEFCC Notification dated 7.12.2015 to “450 mg/Nm³” vide Notification dated 19.10.2020 of MoEFCC. The Petitioner has submitted that installation of only Combustion Modification System is sufficient to meet the revised ECN for NO₂ as per Notification of MoEFCC dated 19.10.2020 and that there is now no need to install secondary measure to control NO₂ through SCR/ SNCR. Consequently, the Petitioner has now proposed implementation of only Combustion Modification System to meet the revised NO₂ emission norms in six out of the nine generating stations/ plants covered in the instant nine petitions. Non-implementation of SCR/SNCR would reduce the cost for the beneficiaries. We, therefore, are of the view that the Petitioner has undertaken proper assessment while undertaking installation of Combustion Modification System for reduction in the NO₂ emissions.

Capital cost of the identified ECS

52. The Petitioner has claimed the following capital cost towards implementation of wet limestone based FGD system to control SO₂ emissions in the subject generating stations:



(In lakh)

Petition No. & Generating station/unit Capacity (MW)	CEA indicative hard cost	Hard cost claimed	Total IDC claimed	Total IEDC claimed	Total taxes and duties claimed	Total other costs claimed	Total costs claimed
335/MP/2020 VSTPS-I (6X210)	45.00	48.24	4946.69	2151.91	10941.93	276.89	79105.90
519/MP/2020 VSTPS-II (2X500)	40.50	48.24	3925.94	1707.87	8684.07	219.71	62782.41
509/MP/2020 VSTPS-III (2X500)	40.50	40.276	2816.32	1425.77	7249.68	181.80	51949.50
516/MP/2020 VSTPS-IV (2X500)	40.50	40.276	2816.32	1425.77	7249.68	181.80	51949.50
338/MP/2020 KSTPS-I&II (3X200 + 3X500)	45.00 (200 MW) And 40.5 (500 MW)	45.21 (200 MW) and 45.21 (500 MW)	2018.8 (200 MW) and 5047.01 (500 MW)	960.26 (200 MW) and 2400.65 (500 MW)	4882.68 (200 MW) and 12206.69 (500 MW)	122.88 (200 MW) and 307.20 (500 MW)	122887.17
521/MP/2020 KSTPS-III (500)	40.50	45.21	1682.00	800.00	4069.00	102.00	29259.00
526/MP/2020 MSTPS-I (2X500 MW)	40.50	42.32	2959.00	1498.00	7617.00	191.00	54583.00
512/MP/2020 MSTPS-II (2X660)	37.00	38.07	4089.36	1778.95	9045.53	228.89	65395.68
339/MP/2020* SSTPS-II (2X500)	40.50	40.38	3286.06	1429.51	7268.68	183.91	52549.74

* base cost considered by the Petitioner, tendering under process.

53. CSPDCL has submitted that NTPC has selected the technology for FGD without conducting any cost-benefit analysis, payback period etc. and that there is wide variation between capital cost discovered in the Lot-I and Lot-IV. MPPMCL has submitted that implementation of ECS was taken up by NTPC in phased manner in different lots and the capital cost of proposed ECS in case of Solapur STPS is ₹86 lakh per MW (total supplementary tariff 32.55 paise/kWh) and for Mauda STPS-II, it is ₹72 lakh per MW (total supplementary tariff 27.41 paise/kWh) which were taken up in Lot-I. The same for Sipat STPS is ₹52 lakh per MW (total supplementary tariff 21.65 paise/kWh) which was taken up in Lot-VI. The Lot-I is expensive when compared to Lot-VI, which is most recent and most economical. MPPMCL has



submitted that NTPC has compromised on the cost aspect in the guise of urgency and timeline and the beneficiaries have to bear the financial impact, whereas the deadline has been relaxed by MoEFCC. In response, NTPC has submitted that to reap the benefit of economy, bids were called in “lots” for units of similar nature and the price was discovered through Competitive Bidding Process through a transparent process and there is no imprudence on the part of NTPC. NTPC submitted that there was grave urgency for installation of ECS in view of the directions of Hon'ble Supreme Court and the MoEFCC Notification. Accordingly, its Board of Directors gave approval for planning and tendering of ECS, IFB to undertake the work for installation of ECS, award for contracts for the FGD Package and issued NoA for installation of FGD System in its TPPs. NTPC has submitted that non-adherence to the Environment Protection Rules, i.e. non-compliance of revised ECNs attract statutory punitive action under Section 15 read with Section 16 of the Environment Protection Act, 1986. NTPC has also submitted that the cost/MW quoted by MPPMCL for different stations does not pertain to only FGD, rather it also includes the cost of proposed DeNOx system for those stations e.g. in Solapur STPS, the base cost of FGD is `36 lakh/MW (not `86 lakh/MW), which is comparable with CEA prescribed capital cost. Similarly, in Mauda-II, the base cost of FGD is only `38 lakh/MW (not `72 lakh/MW), and these are the work costs discovered after competitive bidding.

54. The Petitioner has submitted that due to efflux of time, there has been deviation in the per MW hard cost claimed by the Petitioner for installation of wet limestone based FGD system from the CEA estimated per MW hard cost vide its dated 21.2.2019. The cost provided by CEA was only indicative in nature and does not represent the actual procurement cost. The Petitioner has submitted that the Commission in order dated 11.11.2019 in Petition No.152/MP/2019, order dated



23.4.2020 in Petition No. 446/MP/2019 and order dated 6.5.2020 in Petition No. 209/MP/2019 has already recognized that the cost provided by CEA was indicative in nature and that the cost of FGD has increased due to various factors. The Petitioner has submitted that CEA in its letter dated 20.2.2021 has also acknowledged that the earlier cost estimation is approximately three years old and that the cost of FGD installation has increased due to increase in demand for FGD equipment, shortage of indigenous manufacturing capacity, import restrictions, etc. and it requires to be revised. The Petitioner has further submitted that the actual capitalization may vary after the implementation of FGD.

55. The Petitioner has also proposed installation of Combustion Modification System for reduction of NO₂ emissions and accordingly claimed the capital cost as given in the table in paragraph 47 above. The Petitioner has further submitted that the cost for the Combustion Modification System has also been discovered through the International Competitive Bidding process.

56. We have considered the submissions of the Petitioner. The instant nine petitions are for approval of installation of wet limestone based FGD system and Combustion Modification System for control of SO₂ and NO₂ emissions respectively and the consequent ACE towards their installation. However, as the Commission is considering the instant nine petitions for “in-principle approval” under Regulation 11 of the 2019 Tariff Regulations, we would not deal with the Petitioner’s claim of total capital cost towards installation of ECS, which include IDC, IEDC, FERV, taxes and duties and other costs. These claims would be considered on case to case basis on petitions to be filed by the Petitioner for determination of tariff after implementation of ECS as provided under Regulation 29(4) of the 2019 Tariff Regulations. As regards contentions of the Respondents, MPPMCL and CSPDCL, that FGD cost per MW in case of Solapur STPS and Mauda STPS-II is very high, the Petitioner has submitted



that the cost is much lower than it is being stated by the Respondents. Solapur STPS is not a subject matter of the instant 9 petitions and shall be dealt with in the relevant petition when matter is raised there. As regards Mauda STPS-II, we note that the base cost of FGD per MW is lower than the CEA's indicative cost (table under paragraph 52).

57. It is observed that while the capital cost claimed by the Petitioner is less than the indicative cost of CEA in case of VSTPS-III and KSTPS-I & II, there is a variation of less than one lakh per MW between the Petitioner's claim and the CEA indicative cost of FGD in the case of VSTPS-I and SSTPS-II. In other cases, there is variation of about around five lakh per MW. We take note of the fact that the per MW hard cost suggested for FGD system by CEA is indicative in nature and that the cost claimed by the Petitioner is discovered through the International Competitive Bidding process. The Commission in order dated 23.4.2020 in Petition No. 446/MP/2019 and order dated 6.5.2020 in Petition No.209/MP/2019 has already observed 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. In the instant cases, the cost claimed by the Petitioner is discovered through International Competitive Bidding process and the same has been duly approved by the Board of Directors of the Petitioner. Moreover, the cost recommended by CEA is more than two years old and may have increased as has been acknowledged by CEA itself. Thus, the costs claimed by the Petitioner as given in paragraph 47 above towards installation of wet limestone based FGD system and the Combustion Modification System have been discovered through a competitive bidding process and the costs claimed by the Petitioner are in line with or marginally higher than the cost recommended by CEA.



58. It is also observed that the Petitioner has claimed depreciation of ECS installed in the instant nine petitions over different time periods. Any claim in this regard shall be considered at the time of determination of supplementary tariff for ECS in accordance with Regulation 29(4) of the 2019 Tariff Regulations and Regulations 9 and 10 of the 2020 Amendment Regulations.

Liberty to approach the Commission

59. The Petitioner has submitted that the MoEFCC Notification mandates revised ECNs for water consumption, mercury and particulate matter, besides SO₂ and NO₂. As the generating stations of the Petitioner meet 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. However, the Petitioner has sought liberty to approach the Commission as and when the generating stations are unable to meet those norms and work(s) pertaining to the same are required to be undertaken in future.

60. MPPMCL has submitted that the MoEFCC Notification requires compliance with various ECNs regarding water consumption, particulate matter, SO₂, NO₂ and Mercury (Hg) within a specified period in one go and not individually in a phased manner. However, the Petitioner has claimed implementation of ECS only for SO₂ and NO₂ and has sought liberty to approach the Commission for implementation of water consumption, particulate matter and Mercury (Hg) at a later date. Also, Regulation 29 of the 2019 Tariff Regulations does not provide for fragmented implementation of ECS. MPPMCL has further submitted that admitting the instant petitions would result in multiple petitions for each generating station leading to waste of valuable time of the Commission and unnecessary loading of avoidable filing fee of each petition on beneficiaries. Therefore, MPPMCL has requested to dismiss the instant petitions at the stage of admission and direct the Petitioner to file



a comprehensive revised petition covering proposed ACE for all parameters of the MoEFCC Notification.

61. In response, the Petitioner has submitted that the emissions with respect to water consumption, mercury, particulate matters etc. are currently within the emission standards notified by MoEFCC and hence, the Petitioner has not proposed any ACE with respect to them.

62. We have considered the submissions of the Petitioner and MPPMCL. MPPMCL has contended that the Petitioner is seeking to only partially comply with the directions of MoEFCC Notification and that neither the MoEFCC Notification nor the 2019 Tariff Regulations provide for such partial implementation of the MoEFCC Notification. MPPMCL has further contended that partial implementation of the MoEFCC Notification would result in filing of multiple petitions leading to unnecessary financial burden on the beneficiaries (in terms of reimbursement of filing fee) and also lead to wastage of valuable time of the Commission. We observe that the MoEFCC Notification specifies revised ECNs for water consumption, particulate matter, SO₂ and NO₂ and Mercury (Hg). The generating stations of the Petitioner already meet the norms specified by MoEFCC in case of water consumption, particulate matter and Mercury as on the date of filing of the petition. Accordingly, the Petitioner has proposed installation of ECS only in case of SO₂ emissions in all cases and NO₂ emissions in some cases. The MoEFCC Notification requires meeting revised ECNs and for that matter ECS has to be installed. In no case, does the MoEFCC Notification require a generating station to install new ECS irrespective of it meeting the revised ECNs or not. Accordingly, it is only appropriate to install ECS in respect of ECNs which are not being met by generating stations and not in case of other ECNs. Therefore, we do not find merit in the argument of MPPMCL that the Petitioner should install ECS for water consumption, particulate



matter and Mercury (Hg), even if they are not required. In our view, implementing ECS without analyzing the requirements of such implementation would result in wasteful expenditure which would be to the disadvantage of the beneficiaries. Therefore, we agree with the Petitioner's methodology of installation of ECS only in case of parameters which fall short of the norms specified in the MoEFCC Notification, as it is in the interest of the beneficiaries. Accordingly, MPPMCL's contention that the instant petitions should be dismissed as all the norms specified in the MoEFCC Notification are not implemented is rejected.

63. The Petitioner's prayer for approaching the Commission for installation of ECS for control of water consumption, mercury emissions and particulate matter if required in future would be dealt as per the applicable laws and regulations.

Additional Auxiliary Power Consumption (APC)

64. The Petitioner has prayed for grant of additional Auxiliary Power Consumption (APC) over and above the normative APC for the instant generating stations due to implementation of ECS under Regulation 76 (Power to Relax) of the 2019 Tariff Regulations.

65. MPPMCL in Petition No. 335/MP/2020, Petition No. 519/MP/2020, Petition No. 509/MP/2020 and Petition No. 516/MP/2020 has submitted that the Petitioner has not submitted the cost estimates recommended by CEA for additional APC claimed for ECS. As additional APC will have huge impact on the generation tariff, the same may not be allowed without any proper justification. MPPMCL has submitted that there is no justification in the Petitioner's claim that there would be further increase in Energy Charge Rate (ECR) and per unit Fixed Charge (@85% scheduled generation) of the generating stations by about 3 paise/kWh due to increased APC and Station Heat Rate. Further, there is no provision in the 2019

Tariff Regulations for allowing such claim and it does not call for invocation of Regulation 76 of the 2019 Tariff Regulations.

66. MSEDCL has submitted that the Petitioner's claim may be decided in accordance with the 2020 Amendment Regulations, wherein the norms for APC on account of ECS of thermal generating stations have been specified.

67. In response, the Petitioner has submitted that on account of FGD system (with/ without gas to gas heater), APC for the unit/ station would increase and, therefore, the Petitioner should be suitably compensated. The instant petitions have been filed taking into account the operating parameters as envisaged at the time of filing of the petitions and the indicative tariff has been derived accordingly. The Petitioner has further submitted that additional APC for ECS has been claimed @1% which has also been provided in the 2020 Amendment Regulations.

68. We have considered the submissions of the Petitioner, MPPMCL and MSEDCL. The Petitioner's claim for additional APC due to installation of FGD shall be dealt with as per provisions of the 2019 Tariff Regulations.

Gross Station Heat Rate (GSHR)

69. The Petitioner has prayed for additional GSHR over and above the normative GSHR due to implementation of ECS under Regulation 76 i.e. "Power to relax" of the 2019 Tariff Regulations.

70. MPPMCL has submitted that there is no provision in the 2019 Tariff Regulations to claim GSHR due to implementation of ECS and it does not call for invocation of Regulation 76 of the 2019 Tariff Regulations. MPPMCL has submitted that the Petitioner has not given any reference to cost estimates given by CEA for GSHR claimed for ECS and that it will have huge impact on the generation tariff.

Therefore, the same may not be allowed without any proper justification. MSEDCL has submitted that Regulation 29(3) of the 2019 Tariff Regulations provides that the Commission may grant approval for ACE after due consideration of the reasonableness of the cost estimates, financing plan, schedule of completion, IDC, use of efficient technology, cost-benefit analysis and such other factors as may be considered relevant. The Commission has already considered these parameters in the 2020 Amendment Regulations. Therefore, additional GSHR may be approved only after prudence check of all such parameters. CSPDCL has submitted that there is no provision in the Regulations for allowing increase in GSHR for determination of supplementary tariff and, therefore, it should not be allowed.

71. In response to the reply of MPPMCL, the Petitioner has submitted that the increase in GSHR is claimed due to installation of ECS to control NO₂ emissions and the same is being claimed under 'Power to Relax" as the norms for GSHR specified in the 2019 Tariff Regulations do not include the effect of ECS. Any implication on account of implementation of ECS in compliance of law (the MoEFCC Notification) must be compensated. As per Regulation 29(4) of the 2019 Tariff Regulations, the impact on operational parameters shall form basis of determination of tariff and accordingly, the impact due to this parameter has been considered to compute the tentative tariff as per Regulation 29(2) of the 2019 Tariff Regulations. The Petitioner has further submitted that the instant petitions have been filed only for approval to implement the ECS and for determination of supplementary tariff, the Petitioner shall approach the Commission with actual expenditure incurred for ECS post installation of the same, along with the normative parameters, as provided in the 2020 Amendment Regulations.

72. In response to MSEDCL and CSPDCL's reply, the Petitioner has submitted that although installation of SNCR as secondary DeNO_x is no more required in view



of the amended Notification of MoEFCC dated 19.10.2020 relaxing the limit of NO₂ norms from 300 mg/Nm³ to 450 mg/Nm³, the impact of GSHR shall be there on account of primary DeNO_x system i.e. the Combustion Modification System. Therefore, it has sought approval of the impact in GSHR due to Combustion Modification System and the same shall be claimed for determination of supplementary tariff post ECS installation.

73. We have considered the concerns raised by the Respondents and the clarifications given by the Petitioner. The Petitioner has submitted that though installation of SNCR as secondary DeNO_x is no more required in view of the amended MoEFCC Notification relaxing the limit of NO₂ norms from 300 mg/Nm³ to 450 mg/Nm³, the impact of GSHR shall be there on account of primary DeNO_x system i.e. the Combustion Modification System. Therefore, the Petitioner has sought approval of additional GSHR over and above the normative GSHR due to implementation of ECS under Regulation 76 i.e. "Power to relax" of the 2019 Tariff Regulations. The Respondents have submitted that the 2019 Tariff Regulations do not provide for GSHR over and above the norms due to installation of ECS and it does not call for invocation of the Power to Relax under Regulation 76 of the 2019 Tariff Regulations. In our view, as the 2019 Tariff Regulations do not provide for allowing additional GSHR on account of installation of ECS for NO_x, we are not inclined to consider the Petitioner's prayer at this stage in these petitions which are for in-principle approval for installation of ECS. The same may be considered on a case to case basis in Petitions to be filed for determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after implementation of ECS.



Additional Water Consumption

74. The Petitioner has submitted that the quantum of water consumption would increase after the installation of wet limestone based FGD 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.

75. MPPMCL has submitted that the Petitioner may be directed to submit the details of water consumption for last five years to assess the requirement of water to achieve the revised ECNs. MPPMCL has submitted that the claim of the Petitioner is made without any basis and that there is no provision in the 2019 Tariff Regulations for allowing such claim. Further, it does not call for invocation of Regulation 76 of the 2019 Tariff Regulations. MSEDCL has submitted that the Petitioner's claim may be decided in accordance with provisions of the 2020 Amendment Regulations, wherein the norms for additional water consumption on account of emission control system of thermal generating stations have been specified.

76. In response, the Petitioner has submitted that the Petitioner should be compensated for the additional cost on account of installation of ECS in compliance of law (the MoEFCC Notification). The 2020 Amendment Regulations has provided for separate operating norms on account of ECS and the cost of additional water consumption for ECS has been claimed as provided in the 2020 Amendment Regulations.

77. We have considered the submissions of the Petitioner, MPPMCL and MSEDCL. The Petitioner's claim for additional water consumption due to installation of FGD shall be dealt in accordance with Regulation 35(1)(6) of the 2019 Tariff Regulations, which provides as under:

"35 Operation and Maintenance Expenses:



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

(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; ”

Additional O&M Expenses

78. The Petitioner has submitted that with the installation of various ECS to meet the revised ECNs, there would be requirement of additional manpower for operation and maintenance of 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 2019 Tariff Regulations, additional O&M Expenses on account of implementation of revised ECS shall be notified separately. However, till the norms are notified, the Commission may decide the additional O&M Expenses on case to case basis. The Petitioner has prayed to allow additional O&M Expenses @4% of capital cost per annum and that the same has been considered by the Petitioner to compute indicative tariff.

79. MPPMCL has submitted that the Petitioner has claimed additional O&M Expenses for ECS @4% of capital cost, which is very high and arbitrary without any basis. MPPMCL has referred to Commission’s order dated 11.11.2019 in Petition No. 152/MP/2019 [Maithon Power Ltd. Vs. Tata Power Delhi Distribution Ltd. & Ors.], wherein the Commission did not consider O&M Expenses relating to FGD system and directed Maithon Power Ltd. To submit the O&M Expenses on actual basis at the time of filling the petition for determination of tariff after commissioning of the FGD system. The Petitioner has neither given any reference to cost estimate given by CEA nor any independent justification for such additional O&M Expenses claim. The Petitioner’s claim will have huge impact on the generation tariff and, therefore,



the same may not be allowed without proper justification. Further, there is no provision in the 2019 Tariff Regulations for allowing such claim and it does not call for invocation of Regulation 76 of the 2019 Tariff Regulations. MSEDCL has submitted that the Petitioner's claim may be decided in accordance with the 2020 Amendment Regulations, wherein norms for additional O&M Expenses on account of ECS of thermal generating stations have been specified. Regulation 35(1)(7) of the 2020 Amendment Regulations provides that O&M Expenses in case of coal or lignite thermal power stations shall be @2% of the capital cost as on its date of operation, which shall be escalated annually @3.5% during the tariff period ending on 31.3.2024. Accordingly, MSEDCL has submitted that the O&M expenses need to be considered on lower side considering the systems installed are new and the existing O&M facilities can be utilized for same and hence, the cost can further be brought down. CSPDCL has submitted that the claim of the Petitioner for additional O&M Expenses @4% of the Capital Cost of the ECS equipment is not maintainable. The Commission has already specified O&M Expenses @2% of the admitted capital expenditure (excluding IDC and IEDC) as on its date of operation. It has further submitted that the "Admitted Capital Expenditure" has to be Capital Expenditure towards ECS equipment only and not the capital expenditure of entire power plant. As such O&M Expenses @2% of the admitted capital expenditure towards ECS equipment should be considered.

80. In response, the Petitioner has submitted that the normative O&M Expenses for ECS have been specified in Regulation 35(1)(7) of the 2019 Tariff Regulations. Accordingly, the same shall be claimed by the Petitioner while filing the petition for determination of supplementary tariff for ECS of the instant station in accordance with Regulation 29(4) of the 2019 Tariff Regulations.



81. We have considered the submissions of the Petitioner, MPPMCL, MSEDCL and CSPDCL. The O&M norms for ECS for thermal generating stations have been specified in Regulation 35(1)(7) of the 2019 Tariff Regulations through the 2020 Amendment Regulations and the Petitioner's claim shall be dealt accordingly in Petitions to be filed for determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after implementation of ECS. The relevant extract of the Regulation 35(1)(7) is hereunder:

“(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 & IEDC) as on the date of its operation, which shall be escalated annually at the rate of 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 & maintenance expenses.”

Cost of Reagents

82. The Petitioner has submitted that the wet limestone based FGD system is based on using limestone or lime as a reagent, which involves a wet scrubbing process and the FGD technology is the most frequently selected for SO₂ reduction from coal-fired utility boilers. Accordingly, the Petitioner has also claimed cost of chemical reagents (limestone) on account of implementation of ECS in the instant stations.

83. MPPMCL has submitted that there is no provision in the 2019 Tariff Regulations for allowing such claim and that the claim is made without proper justification. MSEDCL has submitted that the Petitioner's claim may be decided in accordance with the 2020 Amendment Regulations, which specifies the norms for cost of reagent on account of ECS of thermal generating stations. CSPDCL has submitted that for limestone consumption, the Petitioner has considered limestone consumption of 0.013 kg/kWh, but no calculation has been provided by the Petitioner. CSPDCL has requested to conduct a prudence check of this value if the



same is in conformity to the formula specified by the Commission in the 2020 Amendment Regulations.

84. We have considered the submissions of Petitioner, MPPMCL, MSEDCL and CSDPCL. The Petitioner' claim for cost of reagent due to installation of FGD shall be dealt as provided in Regulation 49(f) of the 2019 Tariff Regulations which provides for norms for consumption of reagent in Petitions to be filed for determination of supplementary tariff under Regulation of 29(4) of the 2019 Tariff Regulations after implementation of ECS.

Deemed availability of the station/unit on account of shutdown

85. The Petitioner has submitted that each generating unit has to be taken under shutdown for about 45-60 days for implementation of ECS in compliance of the MoEFCC Notification and stabilization of the same would take some more time. The Petitioner has submitted that during the period of shutdown of unit, there would be loss of availability of the station and would lead to under-recovery of Annual Fixed Charges. Accordingly, the Petitioner has prayed to consider the shutdown period of the unit for implementation of the ECS as "deemed availability".

86. MPPMCL has submitted that there is no provision in the 2019 Tariff Regulations for allowing such claim and the claim does not call for invocation of Regulation 76 of the 2019 Tariff Regulations. The Petitioner has not given any justification for such shut down period and it will have huge impact on the generation tariff. MPPMCL has further submitted that during the shutdown period of 45-60 days, the beneficiaries and ultimate consumers will face tough times by either resorting to load shedding or arranging power from alternative sources. The Respondents and their consumers have to bear the opportunity cost and, therefore, the Petitioner should provide equivalent quantum of power to all the beneficiaries from its other



generating stations at the Petitioner's own cost during the period of proposed shutdown for implementation of ECS in order to claim deemed availability. MSEDCL has submitted that CGPL in its Petition No. 168/MP/2019 has estimated that installation of FGD package would lead to outage for about 22 days for each unit and the Commission vide order dated 22.6.2020 in Petition No.168/MP/2019 in this regard observed that the beneficiaries and the petitioner shall plan the inter-connection of FGD system with main plant by synchronizing it with annual overhaul. Therefore, MSEDCL has requested that the Petitioner may be directed to align the work of installation of ECS with the annual maintenance of its generating stations so that the additional burden on beneficiaries can be avoided. Further, as per Regulation 42A of the 2020 Amendment Regulations in case of generating station or unit thereof under shutdown due to Renovation and Modernisation, the generating company shall be allowed to recover O&M Expenses and interest on loan in respect of ECS. As the Commission has already considered recovery of O&M Expenses and interest on loan during the period of shutdown of unit due to installation of ECS, it may not consider deemed availability of the station/unit on account of shutdown due to implementation of ECS, to avoid additional burden on beneficiaries and end consumers. CSDPCL has submitted that there is no provision in the 2020 Amendment Regulations for allowing "shutdown" period as deemed availability. CSDPCL has further suggested that the Petitioner should approach Government of India and explore possibilities for utilizing NCEEF (National Clean Energy & Environment Fund) for installation of ECS equipment in their generating stations.

87. In response, the Petitioner has submitted that best efforts shall be made to align the shutdown period with overhauls. However, duration of installation of ECS may be more than that of annual overhauling period depending upon the layout and works involved. The shutdown period shall be opportunity loss to the Petitioner, which should be compensated. However, the same shall be claimed as per the 2020



Amendment Regulations. The funding of expenditure towards ECS has been envisaged to be met by the Petitioner from the debt and equity as provided in the 2019 Tariff Regulations. The opportunity loss has also been considered in the 2020 Amendment Regulations. The Petitioner has further submitted that as per Regulation 29(4) of the 2019 Tariff Regulations, the impact on operational parameters shall form the basis of determination of tariff and accordingly, the impact due to these parameters have been considered to compute the tentative tariff as per Regulation 29(2) of 2019 Tariff Regulations. As regards CSPDCL suggestion that the Petitioner should explore the possibility of funding the expenditure towards installation of ECS from NCEEF, the Petitioner has submitted that it is beyond the scope of these petitions.

88. We have considered the submissions of the Petitioner and the Respondents. The Commission in 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 FGD package with the plant with the annual overhaul. The relevant portion of the order Commission's 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..."

89. Further, as regards the Petitioner's request that the loss of availability of the generating station/ unit should be considered as "deemed availability", it is observed that taking into consideration the installation of ECS, the Commission has already revised the computation of the Plant Availability Factor for a Month (PAFM) specified in the 2019 Tariff Regulations through the 2020 Amendment Regulations. We are not inclined to go any further into this issue at this stage as we are of the view that the Petitioner's prayer for considering the shutdown period for implementation of ECS will be dealt on a case to case basis.



90. As regards MPPMCL's suggestion that the Petitioner should arrange power from alternate sources at its own cost during the period of shutdown to avoid power outage and CSPDCL's suggestion that the Petitioner should explore getting funds from NCEEF and PSDF for installation of ECS, we are of the view that these issues are beyond the scope of the instant petitions which are for accord of in-principle approval for implementation of ECS and, therefore, we are not inclined to dwell on them in this petition.

Conclusion

91. The Commission observes that

(a) The process from the stage of identification of 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 and the bidding has been carried out in a fair and transparent manner.

(b) The Petitioner has identified and proposed wet limestone based FGD systems for reduction in the SO₂ emissions taking into consideration the effectiveness, availability and cost of the wet limestone based FGD systems, size of the plants, operational expenses and availability of the reagents. Further, the Petitioner has undertaken proper assessment while selecting Combustion Modification System for reduction in the NO_x emissions.

(c) The costs claimed by the Petitioner towards installation of wet limestone based FGD system and the Combustion Modification System have been discovered through a competitive bidding process and the hard costs claimed by the Petitioner for FGD are in line with or marginally higher than the indicative cost recommended by CEA.

92. Therefore, the Commission accords "in-principle approval" of ACE under Regulation 11 of the 2019 Tariff Regulations towards installation of ECS (hard cost for FGD system and total cost claimed for Combustion Modification System) to meet the revised ECNs notified by MoEFCC for VSTPS-I (6X210 MW), VSTPS-II (2X500



MW), VSTPS-III (2X500 MW), VSTPS-IV (2X500 MW), KSTPS-I&II (3X200 MW + 3X500 MW), KSTPS-III (500 MW), MSTPS-I (2X500 MW), MSTPS-II (2X660 MW) and SSTPS-II (2X500 MW). In terms of above deliberations, petition-wise in-principle approval of capital cost granted is as under:

Petition No.	Generating station/unit Capacity (MW)	Hard cost of FGD (₹ in lakh/MW)	Capital cost of Combustion Modification System (₹ in crore)
335/MP/2020	VSTPS-I (6X210)	48.24	Not claimed
519/MP/2020	VSTPS-II (2X500)	48.24	Not claimed
509/MP/2020	VSTPS-III (2X500)	40.276	17.74
516/MP/2020	VSTPS-IV (2X500)	40.276	17.74
338/MP/2020	KSTPS-I&II (3X200 + 3X500)	45.21 (for 200 MW as well as 500 MW units)	Not claimed
521/MP/2020	KSTPS-III (500)	45.21	8.76
526/MP/2020	MSTPS-I (2X500)	42.32	18.28
512/MP/2020	MSTPS-II (2X660)	38.07	Not claimed
339/MP/2020	SSTPS-II (2X500)	40.38	12.92

93. The Commission has not dealt with the Petitioner's claim of total capital cost towards installation of FGD, which apart from hard cost includes IDC, IEDC, FERV, taxes and duties and other costs. These claims excluding hard cost would be considered on case to case basis on petitions to be filed by the Petitioner for determination of tariff after implementation of ECS as provided under Regulation 29(4) of the 2019 Tariff Regulations.

94. Accordingly, the Petitioner is directed to file separate petitions for determination of tariff after implementation of the revised ECS as provided in Regulation 29(4) of the 2019 Tariff Regulations.

95. The instant order disposes of Petition No. 335/MP/2020, Petition No. 519/MP/2020, Petition No. 509/MP/2020, Petition No. 516/MP/2020, Petition No. 338/MP/2020, Petition No. 521/MP/2020, Petition No. 526/MP/2020, Petition No. 512/MP/2020 and Petition No. 339/MP/2020.

sd/-
(Pravas Kumar Singh)
Member

sd/-
(Arun Goyal)
Member

sd/-
(I. S. Jha)
Member

sd/-
(P.K. Pujari)
Chairperson

