

CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Petition No. 607/MP/2020

Coram:

**Shri I. S. Jha, Member
Shri Arun Goyal, Member
Shri P.K. Singh, Member**

Date of Order: 25th April, 2023

In the matter of

Petition under Section 79(1) of the Electricity Act, 2003 read with Article 13 of the Power Purchase Agreement dated 22.04.2007 executed between the Petitioner with the Procurers across five States, namely Maharashtra, Gujarat, Rajasthan, Haryana and Punjab, Clause 4.7 of the Competitive Bidding Guidelines and this Hon'ble Commission's Order dated 17.09.2018 in Petition No. 77/MP/2016.

And

In the matter of

Coastal Gujarat Power Limited,
The Tata Power Company Limited,
34, Sant Tukaram Road, Carnac Bunder,
Mumbai - 400 021

...Petitioner

Versus

1. Gujarat Urja Vikas Nigam Ltd.,
Through its General Manager (Commerce),
Sardar Patel Vidyut Bhavan, Race Course,
Vadodara – 390 007, Gujarat
2. Maharashtra State Electricity Distribution Company Ltd.,
Through its Chief Engineer (Power Purchase),
4th Floor, Prakashgad, Plot No. G-9,
Bandra (East), Mumbai - 400 051, Maharashtra
3. Ajmer Vidyut Vitaran Nigam Ltd.,
Through its Chairman and Managing Director,
Hathi Bhata, Old Power House,
Ajmer, Rajasthan
4. Jaipur Vidyut Vitaran Nigam Ltd.,
Through its Chairman and Managing Director,
Vidyut Bhawan, Janpath,



Jaipur, Rajasthan

5. Jodhpur Vidyut Vitaran Nigam Ltd.,
Through its Chairman and Managing Director
New Power House, Industrial Area,
Jodhpur, Rajasthan
6. Punjab State Power Corporation Limited,
Through Chief Engineer
PP&R, Shed T-1, Thermal Design,
Patiala – 147 001
7. Uttar Haryana Bijli Vitran Nigam Limited,
Through Chief Engineer,
Vidyut Sadan, Plot No.C-16, Sector 6,
Panchkula – 134 112, Haryana
8. Dakshin Haryana Bijli Vitran Nigam Limited,
Vidyut Nagar, Vidyut Sadan,
Hissar, Haryana - 125005
9. Central Electricity Authority,
Sewa Bhawan, R. K. Puram,
New Delhi – 110 022

.....**Respondents**

For Petitioner:

Shri Sajan Poovayya, Senior Advocate, CGPL
Shri Anand Shrivastav, Advocate, CGPL
Shri Shivam Sinha, Advocate, CGPL
Shri Aluia Ahmed, Advocate, CGPL

For Respondents:

Shri Buddy Ranganathan, Advocate, MSEDCL
Shri Udit Gupta, Advocate, MSEDCL
Shri Vyom Chaturvedi, Advocate, MSEDCL
Shri Anup Jain, Advocate, MSEDCL
Shri Ashabair Thakur, Advocate, MSEDCL
Ms. Swapna Seshadri, Advocate, GUVL
Ms. Poorva Saigal, Advocate, Rajasthan Discoms & Haryana Discoms
Shri. Shubham Arya, Advocate, Rajasthan Discoms & Haryana Discoms
Shri Ravi Nair, Advocate, Rajasthan Discoms and Haryana Discoms
Ms. Shikha Sood, Advocate, Rajasthan Discoms & Haryana Discoms
Ms. Reeha Singh, Advocate Rajasthan Discoms & Haryana Discoms

ORDER

Coastal Gujarat Power Limited (“CGPL/Petitioner”) has filed the present petition for seeking approval of the expenditures (capital and operational) proposed to be incurred by the Petitioner in order to comply with the NOx norms prescribed by Ministry of Environment, Forest and Climatic Change (“MoEFCC”), vide its notification dated 07.12.2015 (“2015 Notification”) while issuing the Environment (Protection) Amendment Rules, 2015 (“Amendment Rules”) amending /introducing certain emission norms which are to be complied with, by all the thermal power plants operating within the country. Further, the Petition is being filed seeking clarity and adjudication on the incidental/associated issues related to financial/operational costs/parameters.

2. The Petitioner has made the following prayers:

- a. *“Admit the present petition;*
- b. *Grant approval to the Petitioner to incur the expenditures (including Capex and Opex) (depending upon the finalization of the emission parameter) as detailed under this Petition for meeting the revised emission norms in respect of NOx;*
- c. *Approve the estimated total capital cost of Rs. 119.89 crores for meeting the NOx norm of 450 mg/Nm³;*
- d. *Approve the estimated capital cost of Rs 694.23 Crores for meeting the Nox norm of 300 mg/Nm² or alternatively grant liberty to the Petitioner to approach this Hon’ble Commission to file separate Petition with firmed up cost in case 300 mg/Nm³ norm is retained by the MoEF&CC;*
- e. *Approve the recovery of the capital cost and the also the revised tariff as provided in the instant petition;*
- f. *In the alternative to Prayer (c) & (d) above, prescribe, devise and apply appropriate norms for computing the adjustment in tariff to offset the additional investment/ increase in costs due to 2015 Notification for restituting CGPL to the same economic position as if such Change in Law event had not occurred;*
- g. *Condone any inadvertent omissions/errors/rounding-off differences/ shortcomings and permit the Petitioner to add/alter this filing and make further submissions as may be required in future;”*

Background

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

- a) The Petitioner is a wholly owned subsidiary of The Tata Power Company Limited (“Tata Power”) and a Special Purpose Vehicle originally incorporated by Power Finance Corporation Limited (“PFC”) to implement the Project. The Petitioner

company was acquired by Tata Power on 22.04.2007.

b) Tata Power is the successful bidder of Mundra UMPP. Mundra UMPP consists of 5 (Five) units of 830 MW each ("Project/Mundra UMPP"). All the Units have achieved commercial operation, the last unit having date of commercial operation as 22.3.2013.

c) The tariff of the Project was adopted by the Commission under Section 63 of the Electricity Act, 2003 ("Electricity Act") vide order dated 19.09.2007 in petition No.18/2007.

d) The Respondent Nos. 1 to 8 are the Procurers of power from the Project who have entered into the PPA with the Petitioner being: -

e) Gujarat Urja Vikas Nigam Limited ("GUVNL/ Respondent No.1"), as per Clause 2.5 of the PPA, GUVNL is the Lead Procurer and is authorized to act for and on behalf of the other Procurers i.e. Respondent Nos. 2 to 8. The quantum of power allocated to GUVNL by CGPL is 47.5% of the Contracted Capacity of the Project;

f) Maharashtra State Electricity Distribution Company Limited ("MSEDCL/ Respondent No.2")-- the quantum of power allocated to MSEDCL by CGPL is 20% of the Contracted Capacity of the Project;

g) Ajmer Vidyut Vitaran Nigam Limited ("AVVNL/ Respondent No. 3"), the quantum of power allocated to AVVNL by CGPL is 3.6% of the Contracted Capacity of the Project;

h) Jaipur Vidyut Vitaran Nigam Limited ("JVVNL/ Respondent No. 4"), the quantum of power allocated to JVVNL by CGPL is 3.6% of the Contracted Capacity of the Project;

i) Jodhpur Vidyut Vitaran Nigam Limited ("JVVNL/ Respondent No. 5"), the quantum of power allocated to JVVNL by CGPL is 2.8% of the Contracted Capacity of the Project;

j) Punjab State Power Corporation Limited (“PSPCL/ Respondent No. 6”), created to handle generation, trading, distribution of power within the State (since 2010), is a Procurer under the PPA (being the successor of erstwhile Punjab State Electricity Board), the quantum of power allocated to PSPCL by CGPL is 12.5% of the Contracted Capacity of the Project;

k) Uttar Haryana Bijli Vitran Nigam Limited (“UHBVNL/ Respondent No.7”) is a procurer under the PPA.

l) Dakshin Haryana Bijli Vitran Nigam Limited (“DHBVNL/ Respondent No.8”) is also a procurer under the PPA, the total quantum of power allocated to UHBVNL and DHBVNL, by CGPL, is 10% of the Contracted Capacity of the Project.

m) In exercise of the powers conferred under sections 6 and 25 of the Environment (Protection) Act, 1986, (hereinafter referred to as “the 1986 Act”), MoEF&CC vide its Notification No. S.O. 3305(E) dated 7.12.2015 has amended the Environment (Protection) Rules, 1986 introducing revised standards for emission to be followed by all existing and new TPPs. As per the MoEFCC Notification, all TPPs were mandatorily required to comply with the revised standards within a period of two years from the date of the MoEFCC Notification. The said Amendment Rules had (a) Revised emission parameters of Particulate Matter (b) Introduced new parameters qua Sulphur Dioxide (“SO₂”), Oxides of Nitrogen (“NO_x”) and Mercury (c) All Thermal Power Plants with Once Through Cooling (“OTC”) shall install Cooling Towers and (d) Introduced a limit to the amount of water to be used by TPPs. The amended norms prescribed by the MoEFCC Notification are as follows:

| Sr. No | Industry | Parameter | Standard |
|---------------|--|--------------------------|--|
| 1 | 2 | 3 | 4 |
| 5A. | Thermal Power Plant (Water consumption limit) | Water consumption | I. All Plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption up to maximum of 3.5m³/MW/hr within a period of two years from the date of publication of this notification. |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--------------------|------------------------|------------------------------------|--|--------------------|------------------------|--------------|---|---|--|-------------------|-----------------------|------------------------------------|---|---------------------------------------|------------------------|--------------|-------------------------|---|--|-------------------|-----------------------|------------------------------------|------------------------|---------------------------------------|------------------------|--------------|-------------------------|
| | | <p>II. All existing CT-based plants reduce specific water consumption up to maximum of 3.5m³/MW/hr within a period of two years from the date of publication of this notification.</p> <p>III. New Plants to be installed after 1st January 2017 shall have to meet specific water consumption up to maximum of 3.0 m³/MW/hr and achieve zero waste water discharge.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| "25. | Thermal Power Plant | TPPs (Units) installed before 31st December, 2003* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <tr> <td>Particulate matter</td> <td>100 mg/Nm³</td> </tr> <tr> <td>Sulphur Dioxide (So₂)</td> <td>600 mg/Nm³ (Units Smaller than 500 MW capacity units) 200 mg/Nm³ (for units having capacity of 500 MW and above)</td> </tr> <tr> <td>Oxides of Nitrogen</td> <td>600 mg/Nm³</td> </tr> <tr> <td>Mercury (Hg)</td> <td>0.03 mg/Nm³ (for units having capacity of 500 MW and above)</td> </tr> <tr> <td colspan="2" style="text-align: center;">TPPs (units) installed after [1st January, 2004][#], upto 31st December, 2016</td> </tr> <tr> <td>Particular Matter</td> <td>50 mg/Nm³</td> </tr> <tr> <td>Sulphur Dioxide (SO₂)</td> <td>600 mg/Nm³ (Units smaller than 500 MW capacity units) 200 mg/Nm³ (for units having capacity of 500 MW and above)</td> </tr> <tr> <td>Oxides of Nitrogen (NO_x)</td> <td>300 mg/Nm³</td> </tr> <tr> <td>Mercury (Hg)</td> <td>0.03 mg/Nm³</td> </tr> <tr> <td colspan="2" style="text-align: center;">TPPs (units) to be installed from 1st January, 2017**</td> </tr> <tr> <td>Particular Matter</td> <td>30 mg/Nm³</td> </tr> <tr> <td>Sulphur Dioxide (SO₂)</td> <td>100 mg/Nm³</td> </tr> <tr> <td>Oxides of Nitrogen (NO_x)</td> <td>100 mg/Nm³</td> </tr> <tr> <td>Mercury (Hg)</td> <td>0.03 mg/Nm³</td> </tr> </table> | Particulate matter | 100 mg/Nm ³ | Sulphur Dioxide (So ₂) | 600 mg/Nm ³ (Units Smaller than 500 MW capacity units) 200 mg/Nm ³ (for units having capacity of 500 MW and above) | Oxides of Nitrogen | 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, 2004][#], upto 31st December, 2016 | | Particular Matter | 50 mg/Nm ³ | Sulphur Dioxide (SO ₂) | 600 mg/Nm ³ (Units smaller than 500 MW capacity units) 200 mg/Nm ³ (for units having capacity of 500 MW and above) | Oxides of Nitrogen (NO _x) | 300 mg/Nm ³ | Mercury (Hg) | 0.03 mg/Nm ³ | TPPs (units) to be installed from 1st January, 2017** | | Particular Matter | 30 mg/Nm ³ | Sulphur Dioxide (SO ₂) | 100 mg/Nm ³ | Oxides of Nitrogen (NO _x) | 100 mg/Nm ³ | Mercury (Hg) | 0.03 mg/Nm ³ |
| Particulate matter | 100 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphur Dioxide (So ₂) | 600 mg/Nm ³ (Units Smaller than 500 MW capacity units) 200 mg/Nm ³ (for units having capacity of 500 MW and above) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oxides of Nitrogen | 600 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury (Hg) | 0.03 mg/Nm ³ (for units having capacity of 500 MW and above) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Particular Matter | 50 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphur Dioxide (SO ₂) | 600 mg/Nm ³ (Units smaller than 500 MW capacity units) 200 mg/Nm ³ (for units having capacity of 500 MW and above) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oxides of Nitrogen (NO _x) | 300 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury (Hg) | 0.03 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Sulphur Dioxide (SO ₂) | 100 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Mercury (Hg) | 0.03 mg/Nm ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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".

amended vide Gazette Notification No.590 dated 7.3.2016 publication of this notification.

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

amended vide Gazette Notification No.590 dated 7.3.2016

- n) However, on 11.12.2017, Central Pollution Control Board ("CPCB") issued a letter extending the time limit for complying with the emission norms, viz.:

- i.) SO₂ for all the 5 Units by 31.03.2022. In this regard, different cut-off date was provided for each Unit viz., Unit 10 by 30.06.2020, Unit 20 by 31.03.2021, Unit 30 by 30.06.2021, Unit 40 by 31.03.2022 and Unit 50 by 31.03.2022; and
- ii.) NO_x by the end of the year 2022 for all the 5 Units of Mundra UMPP.
- o) The Petitioner approached the Commission for declaration of Amendment Rules vide Petition no. 77/MP/2016 as 'change in law' under Article 13 of the PPA read with Clause 4.7 of the 'Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees' under Section 63 of the Electricity Act ("Competitive Bidding Guidelines") and Section 79 of the Electricity Act issued by MoP on 19.01.2005.
- p) The Commission vide order dated 17.09.2018, disposed of Petition no. 77/MP/2016 ("Order dated 17.09.2018") holding that MoEFCC Notification amounts to 'change in law' in terms of Article 13 of the PPA. Further, liberty was also granted to the Petitioner to approach the Commission for 'determining increase in cost or/and revenue expenditure on account of implementation of revised norms prescribed in MoEFCC Notification, in accordance with the Guidelines to be issued by CEA and the mode of recovery of the same through monthly tariff'.
- q) In Compliance of directives of the Commission in Order dated 17.09.2018 in Petition no. 77/MP/2016, approval was sought from CEA for approval of appropriate FGD technology separately and bids were invited to finalize the Supply packages. This culminated into filing of a petition by the Petitioner vide its Petition No. 168/MP/2019 with the Commission for approval of capital cost of FGD separately.

- r) The Commission passed an order on 22nd June 2020 in 168/MP/2019. In the above petition seeking approval of FGD system for SO₂ control, the Petitioner had specifically sought liberty to approach the Commission by way of separate petition(s) for NO_x abatement system required to be installed in order to comply with the revised emission norms. The present Petition is seeking the approval of the other NO_x abatement system required to comply with NO_x norms.
- s) The Commission had, vide its Order dated 17.09.2018 in Petition No. 77/MP/2016, granted liberty to the Petitioner to approach the Commission for determining increase in cost or/and revenue expenditure and its impact on tariff to implement the revised norms. Accordingly, by the present Petition, CGPL is seeking the Commission's approval for of the cost/ liabilities to be incurred by the Petitioner.
- t) A consensus has been reached between EPCA, Ministry of Power (MoP), Central Pollution Control Board (CPCB), CEA, NTPC and MoEF&CC to revise the NO_x norms from 300 mg/Nm³ to 450 mg/Nm³ for TPP's installed between 1.1.2004 to 31.12.2016 and the same has also been informed to the Hon'ble Supreme Court, which has also directed the authorities to take an action on the consensus reached.
- u) The Petitioner, is submitting the proposed cost / technologies for meeting the parameter of 450 mg/Nm³ as well as tentative cost for meeting cost for meeting the parameter of 300 mg/Nm³. Further the impact on operational parameters such as Heat Rate, Auxiliary Consumption have been presented separately for the two norms. The tariff impact on account of the above too has been presented for the two separately.

Submissions of the Petitioner

4. The gist of the submissions made by the Petitioner are as follows:

- (a) At present the Project is operated as per the new limits specified by the

Amendment Rules in relation to Water Consumption, Particulate Matter and Mercury. However, the norms specified for SO₂ (200 mg/Nm³) and NO_x (300 mg/Nm³) has to be complied with and the same can be met by way of installation of Flue Gas De-Sulphurization (“FGD”) Plant to meet the SO₂ norms and installation of NO_x abatement system along with associated Electrical System Modification (ESM) and Civil Foundations.

- b) The Petitioner approached the Commission for declaration of Amendment Rules vide Petition no. 77/MP/2016 as ‘Change in Law’ under Article 13 of the PPA read with Clause 4.7 of the ‘Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees’ under Section 63 of the Electricity Act (“Competitive Bidding Guidelines”) and Section 79 of the Electricity Act issued by MoP on 19.01.2005.
- c) Pursuant to the directions by the Commission in Petition no. 77/MP/2016, on 27.09.2018, the Petitioner had submitted a feasibility report to CEA, detailing SO₂ abatement measures, specific to the Project. The said report provided for justification for selecting Sea Water based FGD and the tentative capital and operational expenditure to be incurred for retrofitting the FGD. Similarly, on the issue of NO_x abatement on 09.11.2018, the Petitioner submitted a Feasibility Report (“Original Feasibility Report”) detailing the NO_x abatement measures, specific to the Project with the CEA.
- d) Subsequently, on 15.05.2019, the Petitioner requested CEA to go through the feasibility report and grant its approval. However, there was no response of CEA on the same. Subsequently, the Petitioner submitted a Revised Feasibility Report on 30.04.2020 (“Revised Feasibility Report”). The said report discusses different types of technologies, their advantages, disadvantages and presents the most optimal choice of technology which could be used for the Project.



- e) CEA, thereafter on 23.06.2020 replied on the above Revised Feasibility Report. In the said letter, CEA left it to CGPL to decide and choose an appropriate technology based on the norm that would be eventually applicable i.e. whether it is 450 mg/m³ or 300 mg/m³.
- f) Calling in bids for the NO_x abatement system and initiation of the process for seeking approval of the Commission is necessary for achieving compliance with the NO_x emission norms by December 2022 and hence, the need to approach the Commission for seeking the capital cost and tariff approval simultaneously i.e. along with the approval of technology and cost from CEA.
- g) 2015 Notification has been held as a 'change in law' event by the Commission in its Order dated 17.09.2018. Accordingly, in terms of Article 13 of the PPA read with the Hon'ble Supreme Court's Judgment in the case of UHBVNL v. Adani Power Ltd. & Ors. [2019 SCC Online SC 265], the Petitioner ought to be restituted to the same economic condition as if the 'change in law' event i.e. 2015 Notification had not occurred.
- h) Nitrogen oxides are formed as a result of combustion of coal at elevated temperature and the existing boiler has been provided with then best available Low NO_x burner. For the Project, the design guarantee of NO_x is 748.25 mg/Nm³ and actual observed NO_x is > 450mg/Nm³ and hence the value exceeds allowable limit and there is no existing equipment available in the plant for further NO_x emission abatement. Hence, NO_x abatement measures are required to meet the revised emission norms, whether it is 450 mg/Nm³ or 300 mg/Nm³.
- i) Nitrogen oxides are formed as a result of combustion of coal at elevated temperature and the existing boiler has been provided with then best available Low NO_x burner. For the Project, the design guarantee of NO_x is 748.25 mg/Nm³ and actual observed NO_x is > 450mg/Nm³ and hence the value exceeds allowable limit and there is no

existing equipment available in the plant for further NO_x emission abatement. Hence, NO_x abatement measures are required to meet the revised emission norms, whether it is 450 mg/Nm³ or 300 mg/Nm³.

SELECTION OF TECHNOLOGY

5. For CGPL, the NO_x abatement system has been designed considering design NO_x emission of 748.25 mg/Nm³ (as per Boiler OEM design) and the limit of 450mg/Nm³ will be achieved by 'In combustion modification' alone and limit of 300 mg/Nm³ with combination of 'In combustion modification and SNCR'. The guaranteed outlet NO_x level after implementation of NO_x abatement system comprising of 'In Combustion Modification' shall be < 450 mg/Nm³ at 6% O₂ dry basis for entire operating range of Boiler i.e. 40% TMCR to 100% BMCR load. Similarly, the guaranteed outlet NO_x level after implementation of NO_x abatement system comprising of 'In Combustion Modification' and SNCR shall be <300 mg/Nm³ at 6% O₂ dry basis for entire operating range of Boiler i.e. 40% TMCR to 100% BMCR load.

6. The implementation of the above technology will require outage of 30 days from unit cooled down condition to boiler light up (clear calendar days to contractor to work for completion). At present, the implementation would be executed during the annual shutdown of the plant.

7. The above technologies option shall be implemented in 5x830 MW units in two stages. In the first stage, to meet limit of 450 mg/Nm³ 'In Combustion Control Technology' (Primary Control Measures) i.e. implementation of solutions based on the CFD analysis, Low NO_x Burner, SOFA, combustion optimization, etc. shall be implemented for NO_x reduction for achieving stable operation of unit in 40% - 100% load range. In the second stage, if the final requirement is to achieve 300mg/Nm³, SNCR System will be implemented.

NOx emission shall be < 300 mg/Nm³ at 6% O₂ on dry basis for 40% to 100% operating range after implementation of complete system.

Impact on Operational Parameters

8. Due to the quantum of increase in Unburnt Carbon (UBC), the Boiler Efficiency deteriorates by 0.4% in case of In Combustion Technology and there is no further deterioration due to SNCR System. Hence even in case of implementation of SNCR, the deterioration is the same as 0.4%. Similarly, as regards the Auxiliary Consumption, there is no or minimal additional Auxiliary Consumption in the case of In Combustion Technology while the same in case of SNCR system increases the Auxiliary Consumption by 0.05 %.

9. It is re-iterated, that calling in bids for the NOx abatement system and initiation of the process for seeking approval of the Commission is necessary for achieving compliance with the NOx emission norms by December 2022. Accordingly, the Petitioner has been very diligent in its approach and has continuously strived to take necessary steps/measures within the time frame prescribed by the MoEFCC. A detailed description of the bidding process adopted by the Petitioner has been submitted along with the main petition.

10. It is submitted that the implementation of NOx abatement system shall be planned considering unit outage rolling plan, if possible. Implementation of 'In combustion Modification' shall be within about 28 months from NTP for project. Implementation of 'In Combustion Modification plus SNCR System' shall be completed within about 30 months after NTP for the project.

Capital Cost Estimation

11. As discovered in the bidding process and with further estimations regarding the ancillary/associated costs, the total cost towards the proposed De-NOx implementation is estimated to be about (i) Rs. 119.89 Crore for only 'In Combustion Modification' including



Interest During Construction (“IDC”) and (ii) Rs 694.23 Crores for In Combustion Modification along with SNCR (5 x 830 MW) system, which is subject to true-up upon completion based on actually incurred cost. In light of the Hon’ble Supreme Court’s Order, there is clear indication that the generators would be required to meet 450 mm/Nm³ norm. The break-up of proposed capital expenditure for the De-NO_x system for 5 x 830 MW units of the Petitioner’s Project estimated, on the basis of bidding results and required estimates, is set out.

12. It is submitted that apart from an impact on capital cost there would also be other cost implications mainly pertaining to O&M Expenses, Auxiliary Power Consumption, increase in SHR etc. The O&M Expenses would increase on account of the running Operation Cost of the consumables for the De-NO_x system towards operation of the new facilities. Further, the Maintenance Spares and services of contracted/outsourced manpower would also be required to ensure the availability and reliability of the system. All these will lead to increase in O&M Costs (a part of the Capacity Charges).

Recovery of the Capital Cost

13. The Petitioner has two alternatives viz a) recover this capital cost through additional capacity charge or b) recover the capital cost upfront. It is submitted to the Hon’ble Commission that without going into the detailed computations, it is estimated compared to the capacity charge bill of Rs 2400 Crores per annum (i.e a capacity charge of Rs 0.90 per Kwh) to the procurers, this capital expenditure when translated into tariff would be very small value. The tariff impact is about 3.7 paise per KWh recovering the capital cost, in case of ‘In Combustion along with SNCR. In the case of only ‘In combustion’ technology it is negligible. Hence, the impact of the capital cost on the capacity charges is negligible as compared to the existing capacity charge of about 90 paise per Kwh. It is therefore suggested that instead of recovering the capital cost through tariff, the procurers may make

one-time reimbursement of the amount of the approved capital expenditure after considering the carrying cost from the date of completion to the date of payment. This is also in line with the principle of restituting the petitioner for the change in law event and more so at the time of incurrance of the expenditure.

Increase in Energy Charge

14. Due to additional auxiliary consumption and due to heat rate degradation the energy charge paid at present i.e. without the implementation of Nox systems needs to be grossed up for the additional Auxiliary Consumption by the following formula: -

$$\text{Revised Quoted Energy Charges} = \frac{(100\% - \text{Aux Cons1 } \%) }{(100\% - \text{Aux Cons2 } \%) } \times (1 + \text{Heat Rate degradation})$$

Auxiliary Consumption 1 is the Normative Auxiliary Consumption (in %) prior to NOx System installation while Aux Cons 2 is the Auxiliary Consumption (in %) after installation of NOx System. Similarly Heat Rate degradation denotes the degradation in Heat Rate after installation of the NOx System. For the two designs explained the following may be considered for inserting the above formula.

15. The Petitioner is re-iterating the impact on the O&M Cost in case of two options (i.e for achieving the norm of 300 mg/ Nm3 and 450 mg/Nm3). We request the Hon'ble Commission to kindly approve the same and permit suitable escalation (% per annum) linked to WPI and CPI for such expenditure over the term of the PPA. These charges would be payable by the procurers over and above the existing capacity charges. The Expenditure estimated in the first year of operation is as follows:

Increase in Capacity Charge

16. Since it is proposed to recover the capital cost upfront and also that the impact on

auxiliary consumption is only 0.05% (in the case of SNCR System), it is not proposed to increase the capacity charge on account of the capital expenditure. The same would be required to be increased to accommodate the increase in O&M expenditure as proposed earlier.

Financing Plan

17. Petitioner by way of the instant Petition is seeking necessary approval of this Hon'ble Commission of the cost to be incurred in carrying such modifications. Such approval of this Hon'ble Commission is critical for the Petitioner for securing financing from the financial institutions for the proposed schemes and achieve financial closure in order to make the execution possible by the stipulated timeline.

Hearing dated 01.06.2021

18. The learned counsel for the Petitioner submitted that the Petitioner has extended the bid timelines thrice and requested to admit the petition. . The Commission observed that the petition will be admitted only after considering the emission levels of NOx and hence directed to submit the emission levels of NOx during the past three years as submitted to the Pollution Control Board on affidavit in one week. The Commission also directed the Petitioner to submit the following information on affidavit by 10.6.2021 with an advance copy to the Respondent(s): i) Guaranteed value of maximum NOX emissions as agreed with OEM of Boiler; ii) Actual level of NOx measured at full load; and iii) Status of implementation of abatement system to meet revised norms for NOx in view MoEFCC gazette notification dated 16.10.2020 relaxing NOx emissions to 450 mg/Nm³ .

Petitioner Submission dated 21.06.2021

19. Vide issuance of the notification dated 19.10.2020, MoEFCC decided the NOx emission norm to be 450 mg/Nm³, and in light of the same, prayer (d) in the Main Petition has now become infructuous. The Petitioner prays to the Commission to grant relief with

respect to all other prayers seeking relief w.r.t. NOx emission norm of 450 mg/Nm³ as actual NOx emissions from the Petitioner's Units are much above the revised NOx norm of 450 mg/Nm³.

20. The Central Pollution Control Board ("CPCB"), vide its letter dated 05.02.2014 had directed the Petitioner to make on-line submission of emission data through Continuous Emission Monitoring System ("CEMS"). Hence, in compliance of such direction, the on-line emission data is being submitted by CGPL on instantaneous basis on 15-minute settlement block basis with the relevant information. Also, Gujarat Pollution Control Board ("GPCB") has been apprised of the IT infrastructure relating to instantaneous on-line submission.

21. The instantaneous data submitted to CPCB via the server comprises of voluminous automated data running into thousands of pages. Accordingly, for the sake of convenience of the Commission, the summary of the data as submitted to CPCB for the period FY 2018-19, FY 2019-20 and FY 2020-21 has been provided in the 2 (two) tables below. The said data has been analysed, excluding the erroneous data such as 'zero' value and readings beyond the instrumental limits:

Total no. of times NOx value exceeded 450 mg/Nm³ limit on 15 min average data

| FY19,20,21 | Total No. of times NOx value exceeded 450 mg/Nm ³ limit on 15min average data | | | | |
|------------|--|---------|---------|---------|---------|
| | Unit 10 | Unit 20 | Unit 30 | Unit 40 | Unit 50 |
| <450 | 37605 | 26196 | 31144 | 28226 | 26209 |
| >450 | 22344 | 61816 | 66618 | 58292 | 44601 |
| Total | 59949 | 88012 | 97762 | 86518 | 70810 |

Total %s (in percentage) NOx value exceeded 450 mg/Nm³ limit on 15 min average data

| FY19,20,21 | Total %s NOx value exceeded 450 limit on 15min average data | | | | |
|------------|---|---------|---------|---------|---------|
| | Unit 10 | Unit 20 | Unit 30 | Unit 40 | Unit 50 |
| <450 | 62.73% | 29.76% | 31.86% | 32.62% | 37.01% |
| >450 | 37.27% | 70.24% | 68.14% | 67.38% | 62.99% |

22. The design guarantee of NOx emission is 365 ppm equivalent to 748.25 mg/Nm³ at Design Coal specifications. The reference of the same has been made in the feasibility report which has been annexed with the Petition. The effect of loading on NOx emission has been recorded in Hon'ble Supreme Court's Order dated 05.08.2019 in Writ Petition Civil No. 13029/1985. The relevant portion of the said Order which quoted the terms of settlement between EPCA, MoP, CPCB, CEA, NTPC and MoEFCC has been set out hereunder:

"5. The Committee discussed : i) the report submitted by CPCB and CEA the joint monitoring was carried out in 7 units of 4 Thermal Power Plants ii) difficult to achieve by combustion modification along to achieve norms of 300 mg/Nm³ iii) assurance given to Power generating companies by BHEL would be able to achieve Nox emission level of 450 mg/Nm³ by combustion modification iv) operational issues with the Selected Non-Catalytic Reduction (SNCR) as it requires Urea/Ammonia for control of Nox and its suitability all type of boiler, temperature band v) globally available SCR system for Nox control are not proven for Indian Coal having high ash contained and retrofitting is not possible in operating /under construction plants vi) Nox emission level varies based on the operational conditions of the unit for example unit load composition of the coal, mill combination (i.e. top mill, bottom mill, middle mill operation), excess air etc."

23. Thus, some of the Units which had NOx within 300 mg/Nm³ at full load were not able to meet this norm at part load as their emission levels were higher at part load. As stated above, the NOx emission level is dependent on many factors and not only loading of Unit, therefore, even full load emission level may not give an accurate picture of the emissions at worst operating conditions. Pertinently, the emission levels even at part load have been much beyond the levels at full load on many occasions as is also evident from the data given above. Having said the above, the sample actual data on NOx emission when the Units were operating at or around full load have been set-out herein below:

NOx Emission Level of CGPL Units around Full Load for FY 2018-19 to FY 20-21

| Date & Time | Unit 10 generation | NOx (PPM) | NOx (mg/nm3) |
|--------------------|--------------------|-----------|--------------|
| 07-Aug-19 07:15:00 | 816 | 458 | 940 |
| 07-Aug-19 07:30:00 | 819 | 470 | 964 |
| Date & Time | Unit 20 Generation | NOx (PPM) | NOx (mg/nm3) |
| 04-Jul-20 05:15:00 | 811 | 460 | 942 |
| 04-Jul-20 05:30:00 | 810 | 475 | 974 |
| Date & Time | Unit 30 Generation | NOx (PPM) | NOx (mg/nm3) |
| 07-Sep-19 10:30:00 | 817 | 480 | 984 |
| 07-Sep-19 10:45:00 | 827 | 472 | 967 |
| Date & Time | Unit 40 Generation | NOx (PPM) | NOx (mg/nm3) |
| 10-Dec-20 14:45:00 | 807 | 444 | 909 |
| 10-Dec-20 15:00:00 | 802 | 419 | 860 |
| Date & Time | Unit 50 Generation | NOx (PPM) | NOx (mg/nm3) |
| 18-Mar-21 02:30:00 | 812 | 471 | 966 |
| 18-Mar-21 02:45:00 | 817 | 481 | 985 |

24. The equivalent design NOx emission guarantee by OEM at Design Coal is 748.25 mg/Nm³.

25. Regarding the status of project in view of MoEFCC notification dated 16.10.2020, it is submitted that the Petitioner has completed the bidding process, identified the L1 bidder but has not yet awarded the contract. L1 bidder has conveyed that they may at best accept the quoted price till 30.06.2021, after which they may seek some reasonable correction. In case, the bids are still not awarded till 30.06.2021, the bidder may either back out or may seek some escalation in price quoted last year. Further, if bid gets cancelled due to expiry

of price validity, fresh bidding process is required to be initiated which would take another 6 to 9 months. This may not only cause further delay in installing Combustion Modification System in order to meet the NOx norms but also there is no guarantee that the newly discovered prices would be lower than the one already discovered. On the contrary, due to increase in demand and limited vendors, the prices are likely to increase which shall have a consequential impact on the tariff affecting the consumers at large. It is, therefore, humbly requested that the Commission kindly allow this Petition and pass final Order before 30.06.2021.

Hearing dated 19.07.2021

26. The Commission observed that there is variation in design value of the NOx system, as given by the OEM, furnished by the Petitioner in Petition No.77/MP/2016 and in the instant petition and directed to submit the correct design value as guaranteed by the OEM on affidavit by 2.8.2021. In response, the learned counsel for the Petitioner submitted such variation may have occurred due to inadvertent error.

Petitioner in response to ROP of hearing dated 19.07.2021 furnished submission dated 02.08.2021 as under:

27. The design guarantee of NOx emission is 365 ppm equivalent to 748.25 mg/Nm³ at Design Coal specifications. The reference of the same has been made in the feasibility report which has been annexed with the Petition. Pertinently, both 'ppm' and 'mg/Nm³' are units to reflect NOx emissions. The Specification of wind box provided by the manufacturer of OEM boiler guarantees NOx emission at 365 ppm. However, since the Amendment Rules provides for compliance in 'mg/Nm³' therefore, the pleadings made under the present Petition provides NOx emissions in 'mg/Nm³'. 365 ppm can be converted to mg/Nm³ as per the following formula:

$$\text{"mg/Nm}^3 = \text{concentration (ppm)} \times 2.05\text{"}$$

As per the aforementioned formula, the guarantee for the OEM Boiler shall be 748.25 mg/Nm³ i.e. the quantum as mentioned in the present Petition. Also, the feasibility report annexed with the Petition specifies NO_x in 'mg/Nm³' and notes the values as 748.25 mg/Nm³.

28. The Petitioner during the hearing held on 19.07.2021 clarified that the variation in design value of NO_x system was an inadvertent error and there is no corroboration for the same. The Commission may kindly consider the submissions made in this Petition w.r.t NO_x emissions. Without prejudice, the inadvertent error in Petition no. 77/MP/2016 does not create any obstruction for the Commission to adjudicate this Petition.

Hearing dated 22.10.2021

29. The Commission admitted the petition and directed to issue notice to the Respondents. The Commission further directed the Respondents to file their reply on affidavit by 15.11.2021 and the Petitioner to file rejoinder, if any, by 26.11.2021. The Commission further directed the Petitioner to clarify the following on affidavit dated by 10.11.2021 with a copy to the Respondents.

- a. The variation in design value of the NO_x system, as given by the OEM, furnished by the Petitioner in Petition No.77/MP/2016 and in the instant petition is owing to the units of measurement of NO_x emissions. The MoEFCC notified norms for NO_x (450 mg/Nm³) are corresponding to 6% oxygen but the values of NO_x furnished vide submission dated 22.6.2021 and 31.7.2021 by Petitioner does not specify the corresponding value of oxygen.
- b. Whether the variation in the NO_x emission level in 2019 and 2021 is due to operational/ technical issues?

GUVNL Reply dated 12.11.2021

30. The Petitioner has claimed to implement the 'In Combustion Technology' comprising of Low NO_x burners. CCOFA, SOFA etc for reducing NO_x to less than 450 mg/NM³.

However, Environment Clearance dated 02.03.2007 required for low NOx burners (condition (xiii)) which was installed by the Petitioner along with Over Fire Air System.

31. During the proceedings before the Commission in Petition No. 77/MP/2016, the Petitioner had submitted maximum NOx values as 330 to 459 mg/NM³ at 4%. In the Rejoinder filed on 17.04.2018 also, the actual emissions stated to be in range of 330 to 459 mg/Nm³ at 4% of O₂ (approximately 283 to 393 mg/Nm³ at 6% of O₂). The Order dated 17.09.2018 also records the actual emissions of NOx are stated to be 476 mg/NM³ at 4% which is 425 mg/NM³ at 6%. This itself is contrary to the earlier pleadings and feasibility report submitted by the Petitioner. However even as per this, the emissions at 6% O₂ is well within the emission limits. The notification dated 28.06.2018 notes that all emissions to be considered at 6% Oxygen.

32. Further in the Report dated 23.06.2016 of Tata Consultancy Engineers Limited submitted by the Petitioner in the Petition No. 77/MP/2016, it was noted that the actual emission of NOx is 459 mg/NM³ at 4% O₂ which is 393 mg/NM³ at 6% O₂. As per the Feasibility Report by the Tata Consultancy Engineering Limited filed by the Petitioner in Petition No. 77/MP/2016, the reduction due to Low NOx burners was 30 to 40% and the Over Fire Air is 20 to 50%. Therefore, even considering the design guarantee of 748.25 mg/NM³, after the reduction due to the Low NOx burners and over fire air system, the same should be 448.95 (40%) and 374.12 (50%) i.e. less than the emission limits of 450 mg/NM³. The Petitioner has claimed in the Affidavit that the emissions are more than 450 mg/NM³ at significant number of time blocks which is denied. The above is clearly contrary to the earlier pleadings and feasibility report submitted by the Petitioner in Petition No. 77/MP/2016.

33. Petitioner has claimed that the actual NOx emission is more than 900 mg/NM³ which is clearly more than the guaranteed 600 mg/NM³ referred in Petition No. 77/MP/2016 or even 748.25 mg/NM³ in the present Petition. It is also higher than the 750 mg/NM³ the

Petitioner had claimed it was seeking to comply with in its Rejoinder in Petition No. 77/MP/2016. Further such actual emissions are after installation of Low NOx burners and COFA and it cannot be accepted. The Petitioner has merely claimed in Additional Affidavit dated 02.08.2021 that the design value in the earlier Petition was an inadvertent error which cannot be accepted.

34. The varying NOx due to load may be recognised by Hon'ble Supreme Court but this does not explain the alleged high variation by the Petitioner; The other alleged issues have not been recognised by the Hon'ble Supreme Court and it appears were not raised before the Court. The contentions of the Petitioner are denied. The action of the Petitioner using coal other than design coal is due to the choice of the Petitioner. The same is not to meet any requirement of the PPA. The fuel arrangement is the responsibility of the Petitioner. If the use of such coal is resulting in higher emissions, the same cannot be a reason to burden the Procurers or consumers at large. Other power plants, including those operating on imported coal have not raised any claim in regard to NOx emissions.

35. Even assuming but not admitting 459 mg/NM3, the use of combustion control technologies may be sufficient to bring the emissions within the limit of 450 mg/NM3. In fact in the earlier Feasibility report submitted in the Petition No. 77/MP/2016, there was no proposal for any other in combustion technology installation as Low NOx burners and Over fire air are already existing in the Petitioner's project. The combustion optimization can also lead to a reduction of NOx which has been admitted in the Report submitted by the Petitioner.

36. Central Pollution Control Board vide letter dated 11.12.2017 (Page 227 at 231) had given direction to the Petitioner in regard to NOx emission only for Low NOx burners with Over Fire Air "That plant shall take immediate measures like installation of low NOx burners, providing Over Fire Air (OFA) etc and achieve progressive reduction so as to comply NOx

emissions limit by the year 2022". There was no direction for installation of any other equipment. Since Petitioner already have the Low NOx burners with Closed Over Fire Air, this cannot be a change in law. Any measures related to existing equipment of Low NOx burner cannot be considered as change in law as per Government of India, Ministry of Power Letter dated 30.05.2018. The Commission in Order dated 17.09.2018 had directed for consideration of the technology with CEA while keeping the Respondent informed. However, the Petitioner has not consulted the Respondents.

37. The Commission in the case of Petitioner itself related to FGD for SO₂ emission in the Petition No. 168/MP/2019 vide Order dated 22.06.2020 after noting the entire circumstances at Paras 52 to 56 concluded that if there is any impact, it has to be considered based on 4000 MW power project and not 4150 MW.

38. There is no basis for the base cost claimed by the Petitioner. It is not clarified whether the costs are based on design guarantee of 748.25 mg/NM³ which is clearly erroneous. The Petitioner has claimed DCS Augmentation, mercury analyser which is not clear. The 'In Combustion modification' is already existing and therefore the above should also be existing. Petitioner has claimed Rs 37 crores in addition to base cost of Rs. 83 crores i.e.44.57% of the base cost. Further sought to include the Engineering and Project Management cost as part of base cost which is not correct. The costs claimed towards IDC Contingency, Engineering and Project Management costs cannot be accepted. There is no justification. Further GST or any taxes and duties can be considered only on actuals and subject to verification on the actual rate applicable and not on estimation.

39. The claim of the Petitioner is exaggerated:

- i. The Petitioner has claimed IDC at 10.5% whereas in the earlier Petition had claimed at 10.41%. The claim may be scrutinized.

ii. The Petitioner has claimed Engineering and Project Management Cost at 7% whereas in the Petition No. 168/MP/2019 for FGD it had claimed owners cost at 5% which included allegedly other costs. When the cost for installation of FGD is 5%, it cannot be that for in combustion technology (not even requiring SNCR/SCR), it is 7%.

iii. It is submitted that the claim of contingency at 5% of capital cost is baseless and that too not considering the base cost but inclusive of taxes duties, Engineering and Project Management Cost. Further it is substantially higher than the claim by ISGS in Tariff Petitions being filed under cost plus tariff which is generally around 1%. Further the contingency expenditure by their very nature may not arise in actual implementation. The claim of 5% is too high.

40. The claim for O&M expenses is also not correct. The 'In combustion modification' already exists and therefore the Petitioner is already operating and maintaining the same. The Petitioner cannot claim further increase in operation and maintenance expenses or maintenance spares or manpower. The Petitioner has also not specified why there would be an increase in the operation and maintenance or what the consumables are. Even as per the Petitioner there is no reagent costs, DM water costs etc. Though the Petitioner has considered the opportunity cost to be nil for present, it is submitted that in any case inclusion of opportunity costs in the claim is not correct. The opportunity cost is not a cost which can be claimed under change in law and is not part of capital cost. There is no such recognition in the PPA for opportunity costs. Further Article 18.17 of the PPA specifically provides that no indirect or consequential loss can be claimed.

41. The capacity charges are payable for declared availability (Schedule 7) and the Petitioner is not entitled to any such charges on deemed availability basis or as part of change in law compensation. The inability of the Petitioner to generate due to shutdown does not entitle the Petitioner to further claim compensation from the Procurers. There is no

default by the Procurers.

42. The Petitioner had claimed a shut down of 22 days for installation of FGD but for in combustion optimization, particularly when the low NOx burners and COFA is already existing, the Petitioner is seeking 30 days. The costs, if at all, are capital costs and therefore any recovery of capital costs would be linked to the actual availability. This is particularly when the Petitioner had shut down the plant for period of time and not supplied electricity. In the year 2021, the Petitioner has supplied only around 25% of contracted capacity during FY 2021-22 (upto September 2021). The alleged small value of impact on tariff is not relevant and the issue has to be considered on principle.

43. The impact of capital expenditure claimed by the Petitioner in the Petition for per unit tariff is not admitted. There cannot be any return on equity. In this regard the GUVNL has given reference of Order dated 13.08.2021 in Petition No. 6/SM/2021 though the said Order was considering Emission Control System such as FGD, SCNR, SCR etc and did not consider the aspect of pre-combustion technology and therefore there may be some differences such as operation and maintenance expenses which are different for the alleged costs being claimed by the Petitioner.

44. The Petitioner has failed to involve the Procurers in the bidding process. This is despite the directions in the Order dated 17.09.2018 passed by the Commission. Further the bid has been made considering the design guarantee of 748.25 mg/NM3 which is clearly erroneous. Regarding the Cost Benefit Analysis to Society by the Petitioner GUVNL has submitted that if the Petitioner is seeking to further reduce the NOx even beyond the emission limits, the same may be done by the Petitioner to assist the environment but the same is not a change in law within the meaning of the PPA.

45. The Rajasthan Discoms vide submission dated 12.11.2021 have re-iterated the submissions of GUVNL dated 12.11.2021.

Petitioner's Additional Information dated 26.11.2021

46. The Commission in its hearing dated 19.07.2021 sought clarification from the Petitioner regarding the design value of NOx system as given by OEM, pursuant to which the Petitioner filed an additional affidavit dated 02.08.2021. The Petitioner vide the additional affidavit submitted that the variation in the design value of the NOx system as furnished by the OEM in Petition 77/MP/2016 and the instant petition is an inadvertent error. It is submitted that the data related to NOx emission levels provided by the Petitioner in additional affidavit dated 22.6.2021 is with reference to the 6% O2 level as required by MOEFCC.

47. The major reason for variation in NOx emission levels for 2019 and 2021 is due to different coal blending ratio used during this period. The percentage of High Fixed carbon/Volatile Material (FC/VM) in the year 2019 was at an average level of approximately 13%, in comparison of only 2% in the year 2021.

Hearing dated 11.01.2022

48. The Commission directed the Respondents to file their reply, by 30.1.2022 with a copy to the Petitioner who may file its rejoinder, if any, by 12.2.2022. The Commission further observed that no further extension of time will be allowed and directed the parties to comply with the specified timeline.

HPPC Reply dated 17.01.2022

49. The HPPC vide submission dated 12.11.2021 have re-iterated the submissions of GUVNL dated 12.11.2021.

50. HPPC has also submitted that w.e.f April 2021, CGPL is running only one/two out of the five units of the Mundra UMPP and has completely stopped generation since 18.09.2021. With effect from 13.10.2021 onwards, CGPL is generating power from some of its units without declaring capacity (DC) to HPPC. CGPL is however continuing to supply

power to other long-term beneficiaries of the project, beyond the agreed terms and conditions under the PPA. In these circumstances, it would not be appropriate for the Petitioner to claim change in law relief under the PPA without fulfilling its obligations under the PPA.

MSEDCL Reply dated 20.01.2022

51. The relief sought by the Petitioner in the present Petition is merely a consequential relief based on the declaration of Environment (Protection) Amendment Rules, 2015 as a change in law in earlier Petition No. 77/MP/2016 by the Commission vide its order dated 17.09.2018. However, whether the subsequent amendment brought by Environment (Protection) Amendment Rules, 2020, independently would constitute a change in law, in the facts of the present case for the Petitioner is not supported by any dispensation.

52. The Additional Affidavit dated 02.08.2021 filed by the Petitioner in the present proceedings casually seeks to clarify this glaring variation as an “inadvertent error”. The Petitioner had not voluntarily approached the Commission from 17.09.2018 onwards for correction of purported error if any, in the said order. The Petitioner cannot be allowed to approbate and reprobate on the issue of design OEM value, which for all times cannot change and more particularly when the declaration of change in law itself is premised on the said design OEM value.

53. The present Petition distorts the entire factual matrix with regard to the submissions of the Petitioner qua the emission levels of NO_x as submitted to the Commission by the Petitioner when the norm was notified as 300 mg/Nm³ at 6% of O₂ and there is no cause to file the present Petition with the revised norms. with the order dated 05.08.2019 read with the corrigendum order dated 08.07.2020 passed by the Hon’ble Supreme Court, the emission levels of NO_x as recorded on behalf of the Petitioner by the Commission in its order dated 17.09.2018 are well within the revised limits of 450 mg/Nm³ at 6% of O₂.

54. MSEDCL has further re-iterated the submissions made by GUVNL in its reply dated 12.11.2021.

55. The Respondent PSPCL vide submission dated 24.01.2023 has re-iterated the submissions of GUVNL made vide reply dated 12.11.2021.

Rejoinder of Petitioner to GUVNL reply dated 05.02.2022

56. The Petitioner has already clarified vide the Additional Affidavit dated 02.08.2021 that the variation in the design guarantee value in Petition 77/MP/2016 with the one provided in 607/MP/2020 was an inadvertent error and that the same cannot be corroborated.

57. The Petitioner is not gaining any added benefit with the installation of 'In combustion modification' technology and the same is only being done for the protection of environment and in the public interest and in compliance with the NOx emission norms. Due to relaxation of the NOx emission from 300 to 450 mg/Nm³ SCNR was dropped and modified overfire dampers were retained. While currently, the Petitioner only has low NOx burners and Over Fire Air System, the installation of "In Combustion Modification" would also allow the Petitioner to access Separated Over Fire Air (SOFA) System and Combustion Optimization which are essential for bringing down the NOx emission below 450mg/Nm³.

58. The facts pertaining to the two petitions i.e., 77/MP/2016 and 607/MP/2020 are not same and that the variation in the data submitted in the two petitions does not restricts the Commission to adjudicate the present Petition. The report dated 23.03.2016 of TCE, which only provides for average emission and does not say that emission does not cross 450 mg/Nm³.

59. All the data provided by the Petitioner has been extracted considering the parameter of 6% O₂. NOx emission of more than 900 mg/Nm³ had occurred as an exception due to technical issues arising in the coal mix. GUVNL has merely denied the information submitted by the Petitioner regarding Design Guarantee Value without any justification. The usage of

any particular coal and decision is taken on the basis of market conditions and availability and does not relate to the present change in law event.

60. While design guarantee of 748.25 mg/Nm³ only guarantees the maximum value of emission, it is pertinent to consider such value of design guarantee since the same does not provide a minimum emission level and that the installation of a particular technology shall be done keeping in mind the design guarantee. Assuming but not conceding that the existing technology is sufficient to reduce the NO_x emission by 30-40 and 20 to 50 percent respectively under Low NO_x Burner and Over Fire Air, GUVNL has conveniently considered the upper limits ignoring the variation of percentage provided therein.

61. The order dated 17.09.2018 was passed under Section 62 of the Electricity Act, 2003. It is however pertinent to note that the present petition operates within the realm of Section 63 wherein the determination of tariff is done through competitive bidding. It is therefore submitted that the Petitioner is not liable to share/consult the procurers for choosing the required technology.

62. Even though the feasibility report has been made a company forming part of the same group of companies as that of the Petitioner, the two companies are different subsidiaries and that they work at arm's length distance. Further, there is no statutory embargo or restriction on the Petitioner.

63. The Petitioner vide the Additional Affidavit dated 21.06.2021 has put forth the emission numbers @ 6% O₂ basis for the past three years as submitted to the pollution control board along with the relevant testing reports, and there is no need to verify the feasibility report.

64. The installation of 'In combustion modification' technology is to be considered for the total capacity of the plant i.e., 4150 MW. It is submitted that in the paragraph under reply, GUVNL has relied on the judgment of the Commission in Petition No. 168/MP/2019 wherein

the Hon'ble Commission had only allowed the cost for which the PPA was entered between the parties and any deviation from the same would tantamount to alteration of the PPA.

65. The Petitioner herein has filed an appeal before the APTEL in DFR No. 362 of 2021 inter-alia challenging the order dated 22.06.2020 passed by the Commission in Petition No. 168/MP/2019. In furtherance to the same, it is submitted that the increased capacity from 4000 MW to 4150 MW does not lead to any increase in the coal consumption and resultant emission of additional fuel gases. It is further submitted that the NOx abatement system is based on concentration of Nitrogen in emission which is dependent of the quantum of coal and it needs to be appreciated that increase in installed capacity from 4,000 MW to 4,150 MW was not on account of change in boiler design, which determines the amount of coal consumption and resultant emissions. Accordingly, for CGPL the installed capacity of 800 MW or 830 MW per unit would have remained same and no additional cost would have to be incurred. In light of above, it is submitted that the instant issue is still sub-judice before the Hon'ble APTEL and therefore, the installation of 'In combustion modification' is to be considered for the installed capacity of 4150 MW.

66. The cost of installation of 'In combustion modification' provided by the Petitioner is market driven and have been arrived at through competitive bidding. It is submitted that the costs are based on the design guarantee of 748.25 mg/Nm³ as provided in the feasibility report which is completely justified. Additionally, the Petitioner in its Petition has provided a detail break-up of cost for installation of 'In combustion modification' which includes the with respect to DCS Augmentation and Mercury Analyser. Thus, it is submitted that the same are required to be installed by the Petitioner.

67. The additional cost of Rs. 37 crores to the base cost of Rs. 83 crores are inclusive of the GST and other taxes and duties which are to be borne by the Petitioner. The same is clear from the table provided at page 46, paragraph 56 of the main petition.

68. The inclusion of the IDC contingency, engineering and project management costs (“E&PM Costs”) are arrived at through competitive bidding. Further, in case there is any variation in the cost after the final approval of the Commission, the applicable GST and taxes shall be adjusted accordingly, however, it is important that the Petitioner gives the Commission a clear picture with regards to the total cost of the project which has been provided by the Petitioner.

69. The increase of 0.09% in the claim of IDC from the earlier petition filed by the Petitioner is a minimal increase which is accounted for considering the inflation growth. Further, the GUVNL has submitted that the E&PM costs submitted by the Petitioner have increased from 5% to 7%. It has already been submitted by the Petitioner above that the prices have been arrived through competitive bidding and that the Petitioner has added no extra cost from its end. It is further submitted that the contingency cost is a normal business practise and that the same is not inclusive of the GST or other taxes as averred by GUVNL.

70. The Petitioner has provided ‘0’ opportunity cost and that the averment of the GUVNL that the opportunity cost cannot be claimed is completely baseless since there is no opportunity cost which has been included to the cost of the project. The Petitioner that shutdown period provided by the Petitioner in the petition is the minimum period of shutdown needed to install the required technology. The installation of the ‘In combustion modification’ would be done according to the plan outage during the annual shutdown period. The order dated 13.08.2021 in Petition No. 6/SM/2021 nowhere provides for a specific period, and leaves it open to the generating stations to shut down for the minimum period, which is 30 days in the instant case.

71. Petitioner has furnished the rejoinder dated 05.02.2022 to the Respondents Rajasthan Discoms, HPPC and PSPCL and since the submissions made by the Respondents were similar to GUVNL submissions and hence Petitioner re-iterated the

submissions made in its Rejoinder to GUVNL dated 05.02.2022.

Rejoinder to MSEDCL dated 12.02.2022

72. Petitioner brought out that MSEDCL has made an averment that the Amendment Rules 2020 have not been considered for change in law. Petitioner submits that the instant issue has already been settled vide the Hon'ble Supreme Court order dated 08.07.2020. It is further submitted that the Amendment Rules 2020 notified on 19.10.2020 are in furtherance to the 2015 Notification of MoEFCC, which were subsequently been considered as change in law by the Hon'ble Supreme Court. It is therefore submitted that the averment made by the Petitioner with respect to non-consideration of the 2020 Amendment Rules is completely baseless and frivolous and needs to be denied in toto.

73. The Petitioner already vide the additional affidavit dated 02.08.2021 has intimated the Commission that the information provided in Petition 77/MP/2016 was an inadvertent error. The MSEDCL has made an averment on selective reliance on Petition No. 77/MP/2016. It is however submitted to the contrary that the Petitioner has nowhere relied on the aforementioned Petition. It is only to state that the issue with respect to the change-in-law has already been settled that the Petitioner has referred to the said petition, wherein the said issue was settled by the Commission. In the instant Rejoinder the Petitioner has also re-iterated some of the submissions in its Rejoinder to GUVNL dated 05.02.2022.

Hearing dated 20.10.2022

74. The Commission directed the Petitioner to furnish the following information on affidavit by 11.11.2022 with a copy to the Respondents:

- a) The emission levels of NO_x during the last five years as submitted to the Pollution Control Board.
- b) Summary of the data furnished by the Petitioner in Petition No.77/MP/2016 and in the

instant petition;

c) The envisaged scope of works under “In Combustion Control Technology” and head-wise envisaged capital cost for each of the solutions proposed under the same. i.e. Low NO_x burner, Closed Coupled Over Fire Air (CCOFA) system, Separated Over Fire Air (SOFA) system, Combustion optimization etc.; and

d) In view of the MoEF&CC notification dated 5.9.2022, the Petitioner shall furnish the details of the implementation schedule of the subject project for each unit along with a PERT chart i.e. bidding, award, starting date and completion date for each head solution etc,

e) The Commission also directed the parties to file to their written submissions/note by 18.11.2022 with a copy to the other parties.

Submission of Petitioner dated 01.12.2022 in response to RoP of hearing dated 20.10.2022

75. NO_x emission level varies based on the operational conditions of the unit. The Central Pollution Control Board (“CPCB”) vide its letter dated 05.02.2014 had directed the Petitioner to make on-line submission of emission data through Continuous Emission Monitoring System (“CEMS”). It is submitted that the data of emission levels for the last five years as submitted to the Central Pollution Control Board comprises of voluminous data running into thousands of pages. The Petitioner has also provided a summary of emission levels of three years as submitted to CPCB i.e., for the period FY 2018-19, FY 2019-20 and FY 2020-21 in the Additional Affidavit filed by the Petitioner on 21.06.2021. The said data has been analysed, excluding the erroneous data such as ‘zero’ value and readings beyond the instrumental limits.

76. The Petitioner in Petition No. 77/MP/2016 has submitted that the Petitioner has installed the low NO_x burners, which provides the design guarantee of 600 mg/ Nm³. It was also submitted by the Petitioner in the aforesaid petition that the actual emission of Nitrogen Oxide at Mundra UMPP is in the range of 330 to 459 mg/Nm³ at 4% of O₂ (approximately

283 to 393 mg/Nm³ at 6% of O₂) which is well within the design guarantee of NO_x burner.

77. Although the Petitioner had inadvertently submitted in Petition No. 77/MP/2016 that the design guarantee of NO_x burners is 600 mg/ Nm³, however, no prejudice has been caused as the correct design guarantee is 748.25 mg/Nm³ at Design Coal specifications, which is substantially higher than the prescribed norm of 450mg/Nm³.

78. Estimated Scope of Works under “In Combustion Control Technology” is already provided in the Petition. The envisaged capital cost for Low NO_x burner as discovered in the bidding process and with further estimations regarding the ancillary/associated costs is estimated to be about Rs. 119.89 Crore for only ‘In Combustion Modification’ including Interest During Construction (“IDC”) which is subject to true-up upon completion based on actually incurred cost. Apart from an impact on capital cost there would also be other cost implications mainly pertaining to O&M Expenses, Auxiliary Power Consumption, increase in SHR etc. The O&M Expenses would increase on account of the running Operation Cost of the consumables for the De-NO_x system towards operation of the new facilities. The estimated cost for ‘In-Combustion Modification’ along with a detailed break-down of the cost under each head is provided in Page 46 of the Petition Paperbook.

79. The implementation of NO_x abatement system shall be planned considering unit outage rolling plan, if possible. The implementation of ‘In combustion Modification’ shall be within about 28 months from NTP for project. The implementation of the above technology will require outage of 30 days from unit cooled down condition to boiler light up (clear calendar days to contractor to work for completion).

Respondents HPPC and RUVNL Replies dated 14.12.2022 in response to RoP dated 20.10.2022

80. Respondents HPPC and RUVNL in response to RoP dated 20.10.2022 furnished the replies dated 14.12.2022 and made the similar submissions. Salient points are furnished

below.

81. Till date the Petitioner has not furnished the original documents in respect of the design guarantee parameters as per Boiler OEM or the actual emission profile. Nor has the Petitioner furnished any affidavit from M/s Tata Consulting Engineers Limited stating that the Pre-Feasibility Report issued dated 23.03.2016 was based on erroneous figures.

82. The Petitioner vide its Additional Affidavit dated 01.12.2022 has furnished data for the period 2018-2022 i.e a tabular representation of the approximate deviations (i.e., every instance where the NO_x emissions exceeded 450 mg/NM₃). A perusal of the above data clearly evidences that there is a wide variation in the actual emissions for each stack/unit. However, no explanation has been provided by the Petitioner whether the same is attributable to the operational issues. The Petitioner has made vague submissions to the effect that the same are attributable to the GCV of the coal. This is particularly when the Petitioner has been sourcing the coal from the same source for all the above stated years. It is therefore not clear why there is such a wide variation, not only the different financial years but also inter-se the amongst the various units/stacks. Notwithstanding the fact that the emission profile does not allow the Petitioner to claim any change in law, the same also cannot be allowed inasmuch the provisioning for 'in-combustion modification' has already been incorporated and provided in the Environment Clearance dated 02.03.2007

83. Even assuming but not admitting that the emissions are at the norm of 450 mg/Nm₃, the use of pre-combustion control technologies like blending coal with bituminous content may be sufficient to bring the emissions within the limit of 450 mg/Nm₃. The Petitioner has proceeded on the basis of the alleged design guarantee of 748.25 mg/Nm₃ by the existing NO_x system. In this regard, it is submitted that the design guarantee is not the actual emissions but only provides a guarantee that the emission would not exceed the said number. There is no need to consider emissions of 748.25 mg/Nm₃ when the actual

emissions are much lower.

84. The Commission in its Order dated 17.09.2018 had directed for consideration of the technology with Central Electricity Authority ('CEA') while keeping the Respondents informed. However, no such information has been provided to the Respondents in respect of the proposed technological change on account of revised emission norm of NO_x, assuming but not admitting that the emission profile of the Petitioner requires such modifications, if any. As per the terms of the PPA dated 22.04.2007, the Petitioner was obligated to supply all the relevant information in order to claim any change in law benefit. In this regard, Article 13 of the PPA dated 22.04.2007 is extracted as under:

*“13.3.3 Any notice served pursuant to this Article 13.3.2 shall provide, among other things, precise details of:
(a) the Change in Law and;
(b) the effects on the Seller of the matters referred to in Article 13.2”*

85. The Petitioner has not provided for any recommendation of the CEA on the additional capital expenditure on account of proposed technological change. In absence of which, simpliciter reliance on the conflicting Report furnished by M/s TATA Consulting Engineers Private Limited [Pages 532 - 537] dated 23.03.2016 instead of M/s TATA Power Company Limited dated 30.04.2020 on the identical factual aspects lacks propriety. Hence, the recommendation of the CEA becomes absolutely critical for the determination of the type of technological proposal required to meet the revised emission norm in respect of NO_x if any.

86. The Petitioner has claimed that the technology to be implemented for 5X830 MW i.e., 4150 MW power project. However, as already recognized by the Commission, the PPA dated 22.04.2007 is between the Petitioners and the Respondents for 4000 MW. The bid of Tata Power was selected and the PPA was executed based on a 4000 MW Ultra Mega Power Project being 5 X 800 MW. The Commission while adopting the tariff under Section 62 vide Order dated 19.9.2007 in Petition No.18 of 2007 also recognised the capacity as

4000 MW. The Petitioner in its affidavit dated 14.10.2013 in petition 159/MP/2012 submitted that auxiliary consumption was assumed as 4.75% in its bid and installed capacity of 4000 MW. The PPA between the Petitioner and the Procurers do not reflect such expanded capacity. There is no additional supply to the Procurers due to such expansion from 4000 to 4150 MW. Therefore, the impact of the additional 150 MW cannot be passed onto the Procurers and their consumers.

87. The Petitioner has claimed that there would be no change in Auxiliary Consumption but there would be a drop in the boiler efficiency. In this regard, it is submitted that the Petitioner already has in-combustion technology and it is not clear why there should be any further reduction in boiler efficiency. There is no basis for the base cost claimed by the Petitioner. Further, in light of the apparent factual inconsistencies as illustrated in the above submissions, the computation of the cost cannot be accepted. It is also not unclear whether the costs are ought to be taken on design guarantee of 748.25 mg/Nm³ is at 6% or 4% oxygen. The Petitioner has wrongly claimed DCS Augmentation, mercury Analyser as a part of capital cost in provisioning of 'in-combustion modifications' [Page 46] without any basis and no reasonable explanation has been provided till date.

Analysis and Decision

88. We have considered the submissions of the Petitioner and perused documents available on record. It is observed that subsequent to MoEF&CC notification, the Petitioner approached the Commission for declaration of Amendment Rules vide Petition no. 77/MP/2016 as 'change in law' under Article 13 of the PPA read with Clause 4.7 of the 'Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees' under Section 63 of the Electricity Act ("Competitive Bidding Guidelines") and Section 79 of the Electricity Act.

89. The Commission vide order dated 17.09.2018 disposed of Petition no. 77/MP/2016 holding that MoEFCC Notification amounts to 'change in law' in terms of Article 13 of the PPA.

Further, liberty was also granted to the Petitioner to approach the Commission for 'determining increase in cost or/and revenue expenditure on account of implementation of revised norms prescribed in MoEFCC Notification, in accordance with the Guidelines to be issued by CEA and the mode of recovery of the same through monthly tariff.

90. In Compliance of directives of the Commission in Order dated 17.09.2018 in Petition no. 77/MP/2016 approval was sought from CEA for approval of appropriate FGD technology separately and bids were invited to finalize the Supply packages. This culminated into filing of a petition by the Petitioner vide its Petition No. 168/MP/2019 with the Commission for approval of capital cost of FGD separately. The Commission passed an order on 22nd June 2020 in 168/MP/2019. In the above petition seeking approval of FGD system for SO₂ control, the Petitioner had specifically sought liberty to approach the Commission by way of separate petition(s) for NO_x abatement system required to be installed in order to comply with the revised emission norms. The present Petition is seeking the approval of the other NO_x abatement system required to comply with NO_x norms.

91. The Petitioner, has submitting the proposed cost / technologies for meeting the parameter of 450 mg/Nm³ as well as tentative cost for meeting cost for meeting the parameter of 300 mg/Nm³. Further the impact on operational parameters such as Heat Rate, Auxiliary Consumption have been presented separately for the two norms. The tariff impact on account of the above too has been presented for the two separately.

92. MOEF&CC notification dated 07.12.2015 initially envisaged the NO_x norms of 300 mg/Nm³. Subsequently, a consensus has been reached between EPCA, Ministry of Power (MoP), Central Pollution Control Board (CPCB), CEA, NTPC and MoEF&CC to revise the NO_x norms from 300 mg/Nm³ to 450 mg/Nm³ for TPP's installed between 1.1.2004 to 31.12.2016 and the same has also been approved by the Hon'ble Supreme Court. Therefore, at present the Petitioner is required to comply the NO_x norms of 450 mg/Nm³. In view of the

above, technology, scope of work, capital cost and operational norms pertaining to the NO_x norms of 450 mg/Nm³ shall only be discussed here.

Selection of technology adopted and scope of work.

93. From the submissions of the Petitioner it is evident that on the issue of NO_x abatement on 09.11.2018, the Petitioner submitted a Feasibility Report (“Original Feasibility Report”) detailing the NO_x abatement measures, specific to the Project with the CEA. Subsequently, the Petitioner submitted a Revised Feasibility Report on 30.04.2020 (“Revised Feasibility Report”). The said report discusses different types of technologies, their advantages, disadvantages and presents the most optimal choice of technology which could be used for the Project.

94. CEA, on 23.06. 2020 replied on the above Revised Feasibility Report. In the said letter, CEA left it to CGPL to decide and choose an appropriate technology based on the norm that would be eventually applicable i.e. whether it is 450 mg/m³ or 300 mg/m³. For CGPL, the NO_x abatement system has been designed considering design NO_x emission of 748.25 mg/Nm³ (as per Boiler OEM design) and the limit of 450mg/Nm³ will be achieved by ‘In combustion modification’ alone. It is evident from affidavit dated 01.12.2022 furnished by Petitioner that the Guaranteed parameters of 748.25 mg/Nm³ are pertaining to 6% oxygen. The guaranteed outlet NO_x level after implementation of NO_x abatement system comprising of ‘In Combustion Modification’ shall be < 450 mg/Nm³ at 6% O₂ dry basis for entire operating range of Boiler i.e. 40% TMCR to 100% BMCR load.

95. The Commission vide RoP of hearing dated 01.06.2021 directed the Petitioner to clarify in regards to Guaranteed value of maximum NO_x emissions as agreed with OEM of Boiler and actual level of NO_x measured at full load. The Petitioner vide submission dated 21.6.2021 clarified that design guarantee of NO_x emission is 365 ppm equivalent to 748.25 mg/Nm³ at Design Coal specifications. The reference of the same has been made in the feasibility report

which has been annexed with the Petition. The effect of loading on NOx emission has been recorded in Hon'ble Supreme Court's Order dated 05.08.2019 in Writ Petition Civil No. 13029/1985. The relevant portion of the said Order which quoted the terms of settlement between EPCA, MoP, CPCB, CEA, NTPC and MoEFCC has been set out hereunder:

"5. The Committee discussed : i) the report submitted by CPCB and CEA the joint monitoring was carried out in 7 units of 4 Thermal Power Plants ii) difficult to achieve by combustion modification along to achieve norms of 300 mg/Nm3 iii) assurance given to Power generating companies by BHEL would be able to achieve Nox emission level of 450 mg/Nm3 by combustion modification iv) operational issues with the Selected Non-Catalytic Reduction (SNCR) as it requires Urea/Ammonia for control of Nox and its suitability all type of boiler, temperature band v) globally available SCR system for Nox control are not proven for Indian Coal having high ash contained and retrofitting is not possible in operating /under construction plants vi) Nox emission level varies based on the operational conditions of the unit for example unit load composition of the coal, mill combination (i.e. top mill, bottom mill, middle mill operation), excess air etc."

96. Further, the Petitioner furnished the sample actual data on NOx emission corresponding to 6% oxygen when the Units were operating at or around full load.

NOx Emission Level of CGPL Units around Full Load for FY 2018-19 to FY 20-21

| Date & Time | Unit 10 generation | NOx (PPM) | NOx (mg/nm3) |
|--------------------|--------------------|-----------|--------------|
| 07-Aug-19 07:15:00 | 816 | 458 | 940 |
| 07-Aug-19 07:30:00 | 819 | 470 | 964 |
| Date & Time | Unit 20 Generation | NOx (PPM) | NOx (mg/nm3) |
| 04-Jul-20 05:15:00 | 811 | 460 | 942 |
| 04-Jul-20 05:30:00 | 810 | 475 | 974 |
| Date & Time | Unit 30 Generation | NOx (PPM) | NOx (mg/nm3) |
| 07-Sep-19 10:30:00 | 817 | 480 | 984 |
| 07-Sep-19 10:45:00 | 827 | 472 | 967 |
| Date & Time | Unit 40 Generation | NOx (PPM) | NOx (mg/nm3) |
| 10-Dec-20 14:45:00 | 807 | 444 | 909 |

| | | | |
|--------------------|--------------------|-----------|--------------|
| 10-Dec-20 15:00:00 | 802 | 419 | 860 |
| Date & Time | Unit 50 Generation | NOx (PPM) | NOx (mg/nm3) |
| 18-Mar-21 02:30:00 | 812 | 471 | 966 |
| 18-Mar-21 02:45:00 | 817 | 481 | 985 |

97. The Commission vide RoP of hearing dated 19.7.2021 observed that there is variation in design value of the NOx system, as given by the OEM, furnished by the Petitioner in Petition No.77/MP/2016 and in the instant petition and directed to submit the correct design value as guaranteed by the OEM on affidavit by 2.8.2021. Also, some of the Respondents raised the similar issue of variation in design value of the NOx system, as given by the OEM, furnished by the Petitioner in Petition No.77/MP/2016 and in the instant petition through their replies.

98. In response, Petitioner submitted that the design guarantee of NOx emission is 365 ppm equivalent to 748.25 mg/Nm3 at Design Coal specifications. The reference of the same has been made in the feasibility report which has been annexed with the Petition. Pertinently, both 'ppm' and 'mg/Nm3' are units to reflect NOx emissions. The Specification of wind box provided by the manufacturer of OEM boiler guarantees NOx emission at 365 ppm. However, since the Amendment Rules provides for compliance in 'mg/Nm3' therefore, the pleadings made under the present Petition provides NOx emissions in 'mg/Nm3'. 365 ppm can be converted to mg/Nm3 as per the following formula:

$$\text{"mg/Nm3 = concentration (ppm) X 2.05"}$$

As per the aforementioned formula, the guarantee for the OEM Boiler shall be 748.25 mg/Nm3 i.e. the quantum as mentioned in the present Petition. Also, the feasibility report annexed with the Petition specifies NOx in 'mg/Nm3' and notes the values as 748.25 mg/Nm3.

99. From the above pleadings, it is observed that Petitioner called for the bids for both the options of 300‘mg/Nm³’ and 450 ‘mg/Nm³’ for NOx emission control system as there was no clarity whether the generator needs to comply with 300‘mg/Nm³’ or 450 ‘mg/Nm³’ NOx emission levels. Subsequently, MOEF&CC has revised the NOx emission levels from 300‘mg/Nm³’ to 450 ‘mg/Nm³’. The Petitioner also consulted the CEA for appropriate technology to be adopted and scope of work envisaged. In view of the above, technology and scope of work i.e, ‘In combustion Modification’ considered by the Petitioner to achieve the norms of NOx of 450 ‘mg/Nm³’ at 6% oxygen level is hereby approved.

Capital Cost Estimation

100. Details of Capital cost claimed by Petitioner is furnished below.

(Rs. in Crores)

| SI No | Description | In combustion Modification (5 X 830 MW) | Remarks |
|-------|---|--|--|
| 1.1 | NOx abatement System Base Cost | | |
| 1.1a | De-NOx main package cost (Crs) | 64.50 | As per offer received from bidder |
| 1.1b | Furnace CFD Analysis (Crs) | 0.17 | As per offer received from bidder |
| 1.1c | LOI Analyzer (Crs) | 10.84 | As per offer received from bidder |
| 1.2 | Fire Protection System (Crs) | 0 | Estimated |
| 1.3 | DCS Augmentation (Crs) | 2.5 | Estimated |
| 1.4 | Augmentation of RO DM Plant (Crs) | 0 | Estimated |
| 1.5 | Mercury Analyzer (Crs) | 5 | Estimated |
| 2 | Total NOx abatement System Base Cost | 83.00 | Item 1.1 (a,b&c) + Item 1.2 + Item 1.3 + Item 1.4 + Item 1.5 |
| 3 | Engineering & Project Management Cost (Crs) | 5.81 | 7% of Item 2 |
| 4 | Total Base Cost of the project | 88.81 | Item 2 + Item 3 |
| 5 | GST | 15.99 | 18% of Item 4 |
| 6 | IEDC (Start-up Cost and Pre-operative expense) | 0.00 | Estimated |
| 7 | Total NOx abatement System Cost including taxes and duties | 104.80 | Item 4 + Item 5 + Item 6 |
| 8 | Contingency | 5.24 | 5% of Item 7 |
| 9 | Project Cost including Taxes & Duties, IEDC and contingency | 110.04 | Item 7 + Item 8 |
| 10 | IDC and Financial charges | 9.9 | Estimated as worked on project schedule |

| | | | |
|-----------|---------------------------------|---------------|--|
| 11 | Opportunity Cost | 0 | Assuming that all required activities shall be completed during annual shutdown. |
| 12 | Total Project Cost (Crs) | 119.89 | Item 9 + Item 10 + Item 11 |

101. Petitioner has discovered the capital cost of De-NOx main package cost as Rs. 64.50 Cr, Furnace CFD (Computational Fluid Dynamics) Analysis as Rs 0.17 Cr. and LOI (Loss of Ignition) Analyzer as Rs. 10.84 Cr. through competitive bidding process and remaining items such as Fire Protection System, DCS Augmentation, Augmentation of RO & DM Plant and Mercury Analyzer are claimed on the basis of estimated cost. It is also observed that items such as Furnace CFD (Computational Fluid Dynamics) analysis and LOI (Loss of Ignition) analyzer etc. have been proposed by the petitioner, but the petitioner has not provided any justification regarding the need for such equipment for compliance to the MoEF notification in regards to De -NOx implementation.

102. The total hard cost towards the proposed De-NOx implementation is estimated to be about Rs. 64.50 Crore only 'In Combustion Modification'. The capital cost works out to Rs. 1.55 lakh/MW for hard cost. CEA has not specified any hard cost/ estimated cost for NOx control system till date. Further, scope of work and the related cost may vary plant to plant as per the design of furnace and design coal envisaged for the generating station.

103. In view of the above, at this stage only capital cost of De-NOx main package cost as Rs. 64.50 Cr is being approved and the Petitioner is granted liberty to approach the Commission with detailed justification for installation of Furnace CFD (Computational Fluid Dynamics) Analyzer and LOI (Loss of etc. at the time of true-up after execution of project.

104. Capital cost pertaining to Engineering & Project Management Cost, GST, IEDC (Start-up Cost and Pre-operative expense); Total NOx abatement System Cost including taxes, duties and Contingency; IEDC, contingency, IDC and Financial charges are the costs which are subject to variation during execution of the scheme and same shall be considered on

actual basis after prudence check.

105. In respect of other prayers of Petitioner with regard to O&M expenses, increase in energy charges, auxiliary consumption etc., the Commission vide order dated 13.08.2021 in Petition No. 06/SM/2021 has already specified the mechanism to determine compensation on account of installation of Emission Control System by the generating companies in compliance with the Revised Emission Standards issued by Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India, vide Environment (Protection) Amendment Rules, 2015 on 07.12.2015 in respect of the Thermal Generating stations whose tariff is determined through competitive bidding under Section 63 of the Electricity Act, 2003.

106. Petition No. 607/MP/2020 is disposed of in terms of the above discussions and findings.

sd/-
(P. K. Singh)
Member

sd/-
(Arun Goyal)
Member

sd/-
(I. S. Jha)
Member