

**CENTRAL ELECTRICITY REGULATORY COMMISSION**  
**NEW DELHI**

**Explanatory Memorandum for the “Draft Central Electricity Regulatory Commission (Terms and Conditions of Tariff)(First Amendment) Regulations, 2020”**

**1. Background**

1.1. The Central Electricity Regulatory Commission (“the Commission”), exercising power under Sub-clause (s) of clause (2) of the Section 178 of the Electricity Act, 2003 (“the Act’) read with Section 61 and Section 62 of the Act, has notified the Central Electricity Regulatory Commission(Terms and Conditions of Tariff) Regulations, 2019 (hereinafter referred to as the “Principal Regulations”) specifying the terms and conditions of tariff for determination of tariff of the Central generating companies or the generating companies having composite scheme of sale or purchase to more than one State and inter-State transmission system.

1.2. The Ministry of Environment, Forest & Climate Change (MoEFCC) has notified revised emission standards vide the Environment (Protection) Amendment Rules, 2015 dated 7<sup>th</sup> December, 2015 (“the 2015 Rules”) applicable to coal or lignite based thermal power plants (TPPs) in the country. In order to comply with revised emission standards, the generating companies would have to install appropriate equipment. For this, the generating companies need to incur additional capital expenditure, additional recurring expenses in the form of reagent, consumables, additional O&M expenses. Compliance to these standards would also have impact on the operating norms, specifically the auxiliary energy consumption of the generating station. The Principal Regulations has provisions for determination of supplementary tariff for emission control

system for servicing additional cost on account of meeting the revised emission standards issued by MoEFCC.

1.3. The Principal Regulations provides for in-principle approval, admissibility of additional capital expenditure and tariff structure<sup>1</sup> in respect of installing emission control system. The tariff structure provides for determination of supplementary tariff ( supplementary capacity charges and supplementary energy charges) for expenditure incurred for meeting revised emission standards.

1.4. On 20.2.2019, the Central Electricity Authority submitted its recommendations on additional operational norms for the generating stations undertaking installations to comply with revised emission standards. These recommendations could not be considered at the time of finalization of the Principal regulations.

1.5. The Principal Regulations have provisions related to tariff structure and additional capitalization in respect of emission control system. However, as regards financial and operational parameters and recovery mechanism, it was stipulated that provisions will be specified separately. Relevant provisions of the Principal Regulations and extract of the Statement of Reasons are as under:

Sub-Clause (7) of Clause (1) of Regulation 35-

*“(7) The additional operation and maintenance expenses on account of implementation of revised emission standards shall be notified separately:*

*Provided that till the norms are notified, the Commission shall decide the additional O&M expenses on case to case basis.”*

Clause (2) of Regulation 41-

*“41. Landed Cost of Reagent: ...*

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<sup>1</sup>*Ibid* Regulation 14, 15 and 29 of the 2019 Tariff Regulations

*(2) The normative consumption of specific reagent for the various technologies installed for meeting revised emission standards shall be notified separately."*

Para 2.2 and Para 12.4.2 of the Statement of Reason-

*"2.2 In the draft regulations, it was proposed to introduce the operational norms for the implementation of revised emission standards. The Central Electricity Authority had indicated that additional operational norms on account of the implementation of revised emission standards will be submitted later on which was received subsequent to hearing on 20.2.2019. The Commission has decided to notify relevant provisions separately for specifying additional operational norms on account of revised emission standards. Accordingly, the provisions pertaining to additional operational norms on account of revised emission standards has been removed at present."*

*"12.4.2 It has been decided that the provisions for O&M Expenses, operational norms, as well as normative consumption of specific reagent for various technologies installed for meeting revised emission standards shall be notified separately. Accordingly, clause (2) of the Regulation been amended and the table stating specific reagent consumption and proviso to clause (2) of the Regulation enabling for review of such norms, based on actual performance in 2021-22, has been deleted."*

1.6. On 25.6.2019, the Central Electricity Authority submitted detail working report alongwith back up calculations in support of operation norms in respect of reagent consumption & additional auxiliary consumption for emission control system. Central Electricity Authority has also submitted its recommendations on part load heat rate and degradation of auxiliary energy consumption.

1.7. In this backdrop, the Commission has proposed certain amendments in provisions of the Principal Regulations to enable the thermal generating stations to meet the requirements of the revised emission standards.

## **2. Emission Control Equipment**

2.1. The revised emission standards applicable to coal or lignite based thermal power plants specified the standards for emissions of particulate matter, sulphur dioxide, oxide of nitrogen and water consumption limit. The compliance of these standards requires adoption of specific technology and

installation of emission control equipment, a brief overview of which is as under:

- a) Retrofitting of additional fields in Electrostatic Precipitators (ESP) or replacement of ESP to control Suspended Particulate Matter (SPM);
- b) Installation of Flue Gas Desulphurization (in short, "FGD") with wet limestone or dry limestone technology to control emission of sulphur dioxide in combination with ESP;
- c) Emission of Oxides of Nitrogen (NO<sub>x</sub>) can be controlled by modification of the combustion process using low NO<sub>x</sub> burners or installation of de-nitrification systems such as Selective Non catalytic Reduction System (SNCR) or Selective Non-Catalytic System (SCR) or their combinations;
- d) Emission of mercury can be controlled through appropriate technology with installations of ESP, FGD and SCR or up-gradation of existing equipment;
- e) Meeting standards of specific water consumptions would require conversion of once through cooling (OTC) to achieve specific water consumption.

### **3. Proposed Amendments**

3.1 The proposed amendments are for introducing separate tariff stream for revised emission standards which requires determination of separate capital cost, fixation of date of operation of emission control systems, financial parameters and operational parameters. Formulae for computation of supplementary capacity charges, supplementary energy charges and its recovery mechanism have also been proposed. In order to incorporate these modifications, addition of new provisions apart from amendment in existing provisions to determine the supplementary tariff, has been proposed.

Proposed amendments and rationale thereof have been discussed in the subsequent paragraphs.

### **Regulation 1. Short title and commencement**

3.2 The amendments related to installation of emission control system are proposed to be made effective from 1<sup>st</sup> June, 2020. There were some deficiencies noticed in Regulation 21 that contains provisions related to Interest During Construction and Incidental Expenses during Construction. It is proposed to amend this provision with effect from 1<sup>st</sup> April, 2019.

### **Regulation 2. Definitions**

#### **a) Auxiliary Energy Consumption**

3.3 Since the supplementary capacity charges and supplementary Energy Charges for emission control system are to be determined separately, it requires separate provisions for auxiliary energy consumption. Accordingly, it is proposed to add a new Clause (5a) to Regulation 3 of the Principal Regulations.

#### **b) Date of Operation of emission control system**

3.4 The supplementary tariff for emission control system will commence from the date of operation of the emission control system till useful life of the generating station. Accordingly, definition for date of operation of emission control system is proposed by addition of new clause (15a) to Regulation 3 of Principal Regulations.

#### **c) Emission Control System**

3.5 The revised emission standards require installation of various emission control systems. Accordingly, it is proposed to insert a definition of emission control system vide new clause (20a) of Regulation 3 of the Principal Regulations.

#### **d) Plant Load Factor**

3.6 Plant load factor of a generating station depends on the auxiliary energy consumption. Since the installation of emission control system has impact on auxiliary energy consumption, the plant load factor of the generating station is to be computed by taking into account such auxiliary energy consumption. Accordingly, definition of plant load factor in Clause (48) of Regulation 3 of Principal Regulations is proposed to be amended.

#### **Regulation 8: Tariff Determination (Clause (1))**

3.7 The scope of clause (1) of Regulation 8 *inter-alia* scope of tariff determination is proposed to be expanded to include emission control system.

#### **Regulation 9: Application for determination of tariff**

3.8 The proposed amendment to Clause (4) of Regulation 9 of the Principal Regulations is to prescribe a procedure for filing application for determination of supplementary tariff of emission control system on the same lines as that of a generating station.

#### **Regulations 14, 15 and 16**

3.9 The scope of clause (2) of Regulation 14 of the Principal Regulations is proposed to be expanded to enable the Commission to determine supplementary capacity charges and supplementary energy charges in case of emission control systems.

3.10 Regulations 15 and 16 provide the framework of capacity charges and energy charges respectively of generating stations. New clause has been proposed to be added in Regulation 15 to provide for a framework for determination of supplementary capacity charges. Formula for determination of supplementary energy charges has been provided in Regulation 43 and same is referred to in Regulation 16.

### **Regulation 18 of the Principal Tariff Regulations**

3.11 The debt-equity ratio (70:30) of emission control system is proposed to be kept at par with that of the generating stations and accordingly, it is proposed to add new Clause (6) to Regulation 18.

### **Regulation 21: Interest During Construction (IDC) and Incidental Expenditure during Construction (IEDC)**

3.12 In order to remove ambiguity on treatment of Interest during construction, it is proposed to modify existing clause (5) and add a new clause (6) to the Regulation 21.

### **Regulation 23: Initial Spares**

3.13 The percentage of initial spares as followed for the generating station is proposed to be extended for the emission control system by inserting clarificatory clause (iii) to proviso to Regulation 23.

### **Regulation 29: Additional Capitalization on account of Revised Emission Standards:**

3.14 Regulation 29 provides for determination of the capital cost on completion of installation of the emission control system. The Commission is of the view that some expenditure may also be incurred after such installation and, therefore, it is proposed to include a provision of undischarged liability in additional capital expenditure. Accordingly, a new clause (5) is proposed to be added in Regulation 29.

### **Regulation 30: Return on Equity**

3.15 Servicing of additional capital expenditure is to compensate the generating station for the additional cost incurred to comply with revised emission standards. The Commission is of the view that it would be reasonable to allow equity infused by the generating company for installing emission control system at the cost of borrowing from financial institution.

The same principle is also applicable for additional capital expenditure required due to other Change in Law events. Accordingly, it is proposed to amend existing clause (2) and to add new clause (3) to Regulation 30.

#### **Regulation 32: Interest on Loan**

3.16 It is proposed to add new clause (5a) to Regulation 32 to extend the treatment of interest on loan for servicing loan on account of emission control system.

#### **Regulation 33: Depreciation**

3.17 Depreciation is proposed to be recovered during balance useful life of the project. However, in case useful life of a project is extended, it is proposed that depreciation may also be recovered during extended life, if any, of the project similar to additional capitalization during fag end of the project. Accordingly, new clause (9) to Regulation 33 has been proposed.

#### **Regulation 34: Interest on Working Capital**

3.18 The requirement of working capital for emission control system has been assessed in line with generating station. In place of fuel, emission control system will require reagent as consumable for ensuring its operation. Accordingly, it is proposed to include stock of 20 days of reagent consumption in working capital. Other components of working capital are kept in line with that of a generating station.

#### **Regulation 35: Operation and Maintenance Expenses**

3.19 Central Electricity Authority, vide letter dated 1.8.2016, has recognized that there will be increase in Operation and Maintenance expenses due to cost of limestone to be used for emission control system. Further, Operation & Maintenance expense may also increase due to additional manpower requirement and administrative and general expenses. At the same time, the Commission is of the view that due to utilization of common facilities, the increase in Operation and Maintenance Expense may not be significant.

However, quantification of normative Operation and maintenance expenses is difficult at this stage due to absence of adequate data.

3.20 The Commission has specified the O&M expenses as percentage of capital cost in case of hydro-generating stations. Similar principle was also followed Government of India vide its notification dated 30.3.1992. Accordingly, it is proposed that till adequate data is available, impact of O&M expenses may be worked out as % of the admitted capital expenditure. Accordingly, clause (7) to Regulation 35 added.

3.21 In case of generating station, the water expenses were allowed to recover on actual basis after taking into account of prudence check. Now, the revised emission standards specified the norms for consumption of water for generating station, it is proposed that admissibility of water expenses shall also takes into account these norms. Accordingly, existing clause (6) to Regulation 35 modified.

#### **Regulation 37: Energy Charge**

3.22 It is proposed to expand the scope of energy charge in Regulation 37 to include Supplementary Energy Charges. Accordingly, title of Chapter-10 and Regulations 37 have been proposed to be modified.

#### **Regulation 41: Landed Cost of Reagent**

3.23 In this draft amendment, norms of reagent consumption have been proposed and accordingly, reference is inserted in clause (2) to Regulation 41.

#### **Regulation 42: Computation and Payment of Capacity Charge for Thermal Generating Stations**

3.24 The installation of emission control system will require shutdown of the generating station for considerable duration similar to the case of Renovation & Modernisation of a generating station. Accordingly, treatment of tariff during shutdown as followed during Renovation & Modernisation is

proposed to be extended to the case of shutdown for installation of emission control system. Further, formula of Plant Availability Factor is proposed to substitute for inclusion of auxiliary energy consumption of emission control system. Accordingly, proviso to clause (2) of Regulation 42 is modified and clause (5) is substituted.

#### **Regulation 42A: Computation and Payment of Supplementary Capacity Charge for Coal or Lignite based Thermal Generating Stations**

3.25 The Commission has specified the regulatory framework for peak and off-peak tariff framework in Regulation 42 of the Principal Regulations. This framework provides the modalities for recovery of capacity charges and is effective from 1<sup>st</sup> April, 2020. It is proposed that the recovery of supplementary capacity charges shall also be computed and recovered in same manner. Accordingly, new Regulation 42A is added and title of Chapter-11 is aligned with it.

#### **Regulation 43: Computation and Payment of Energy Charge for Thermal Generating Stations**

3.26 The supplementary energy charge due to emission control system comprises the landed fuel cost of reagent. In addition to this, the energy charges of the generating station will also increase due to additional auxiliary energy consumption. Therefore, it is difficult to workout the supplementary energy charges without taking into account energy charges of the generating station. One of the options is to workout the supplementary energy charges based on incremental energy charges due to increase of auxiliary energy consumption. This incremental energy charge needs to be added with reagent consumption. By considering above, it is proposed to insert the formula for supplementary energy charges by adding new sub-clause (aa) to clause (2) of Regulation 43.

### **Regulation 49: Auxiliary Energy Consumption for emission control system**

3.27 The Central Electricity Authority, vide letter dated 20.2.2019, has recommended norms for additional auxiliary energy consumption for different technology and configuration of emission control system. CEA has also suggested that norms may be further reviewed after sufficient operational data is available in due course of time.

3.28 The Commission has considered the recommendations of CEA and proposed that auxiliary energy consumption of emission control system may be adopted as recommended by CEA which will be reviewed after availability of adequate data. Regulation 49 is proposed to be amended accordingly.

### **Regulation 49A: Norms for Consumption of Reagent**

3.29 The Commission had, in the draft Tariff Regulations, 2019, proposed norms based on the chemical reaction and molecular weight involved in different type of technology. On 20.2.2019, the Central Electricity Authority has submitted its recommendations on norms for consumption of reagent in respect of DeSO<sub>x</sub> and DeNO<sub>x</sub> systems for thermal generating stations (Appendix I). Further, on 25.6.2019, the supporting computation has also been furnished by CEA (Appendix II). It is observed that the Central Electricity Authority has followed similar approach as proposed by the Commission in the draft Tariff Regulations, 2019. However, the Commission has noted that while suggesting the norms of consumption of reagent, CEA has made certain assumptions such as typical purity of reagent, SO<sub>2</sub> or NO<sub>x</sub> removal efficiency, SO<sub>2</sub> conversion factor etc.

3.30 We have considered the recommendations of the Central Electricity Authority and assumptions made thereunder. As regards the assumptions with regard to limestone, it is noted that consumption of limestone is

variable and depends on commercial considerations and site conditions. Further, better purity of limestone can produce gypsum as by-product which is saleable and can generate revenues for the generating stations. In view of above, it is proposed that limestone purity, instead of assuming normative figure, may be factored in the formula. To take these into account, a new Regulation 49A is proposed to be inserted in the Principal Regulations.

### **Norms for Consumption of Reagent**

3.31 Form 15 of Part I of Annexure I is modify for bringing clarity while new Form 16A is proposed to be added to account for reagent consumption of emission control system.

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