



Comments on Draft Central Electricity Regulatory Commission (Terms and Conditions of Tariff) (First Amendment) Regulations, 2020

(Draft amendment No. L-1/236/2018/CERC dated 01/04/2020)

13th July 2020

Proposed in Draft

- 2.4 Clause (48) of Regulation 3 of the Principal Regulations shall be substituted as under:

“(48) ‘Plant Load Factor’ or ‘(PLF)’ in relation to athermal generating station or unit thereof for a given period means the total sent out energy corresponding to scheduled generation during the period, expressed as a percentage of sent out energy corresponding to installed capacity in that period and shall be computed in accordance with the following formula:

$$PLF = 10000 \times \sum_{i=1}^N \frac{SG_i}{[N \times IC_x (100 - AUX_n - AUX_{en})]} \%$$

Where,

AUX_n= Normative Auxiliary Energy Consumption as a percentage of gross energy generation; and

AUX_{en}= Normative Auxiliary Energy Consumption for emission control system as a percentage of gross energy generation, wherever applicable.”

Tata Power's Comments

- AUX_{en}** should be replaced with **AUX_e** in line with definition of Auxiliary energy consumption for ECS
 - There may be requirement of one ECS for meeting each revised parameter of emission norm (e.g. FGD for SO_x, De-NO_x for NO_x, ESP for Particulate matter and ZLD for water norm) and they may not only have different auxiliary consumptions but may also be installed at different times
 - Hence, it is proposed to define an additional term “AUX_{en}” which would be the normative auxiliary consumption of nth ECS required for meeting each norm.
 - Following formula may be inserted in the definition to bring further clarity.

$$AUX_e = \sum_{n=1}^n AUX_{en}$$

Where AUX_{en} is Normative Auxiliary Energy Consumption in the nth ECS as a percentage of gross energy generation;

Proposed in Draft

Tata Power's Comments

Computation and
Payment of Capacity
Charges

21. Amendment of Regulation 42 of the Principal Regulations

21.2. Clause (5) of Regulation 42 of the Principal Regulations along with the proviso of the said clause shall be substituted as under:-

.....

Where AUXen = Normative auxiliary energy consumption for pollution control system as a percentage of gross energy generation, wherever applicable.

4. Amendment of Regulation 9 of the Principal Regulations:

4.1. A new proviso, namely, Fourth Proviso shall be added to Clause (1) of Regulation 9 of the Principal Regulations as under:

“Provided also that the generating company shall file an application for determination of supplementary tariff for the emission control system installed in the coal or lignite based thermal generating station in accordance with these regulations not later than 60 days from the date of operation of such emission control system.”

- AUXen is for individual component of ECS such as AUXe1 for FGD, AUXe2 for NOx etc. where as per our understanding AUXe is the sum of all such AUXen.
- This clarity needs to be brought out in definition of AUXe provided at Sl. No 2.1 of draft amendment. Hence, in the above, the AUXen should be replaced by AUXe.
- Where $AUXe = \sum_{n=1}^{\infty} AUXen$, AUXen is Normative Auxiliary Energy Consumption for 'nth' component of the emission control system as a percentage of gross energy generation

Further clarity is required on following aspects as proposed amendment would not only **require multiple petitions to be filed for each station** but also **there would not be any tariff available on the date of operation for billing to beneficiaries:**

- Initial teething problems with each ECS during first 6-12 months of its operation and it **may not be possible for the station to adhere to declared availability during peak/off peak hours** for reasons beyond its control.
- It is suggested to determine **provisional tariff for each ECS based on provisional Capital Cost** as per in-principle approval by Hon'ble Commission subject to final true-up

12. Amendment of Regulation 30 of the Principal Regulation

12.1. In the first proviso under Clause (2) of Regulation 30 of the Principal Regulations, the words “excluding additional capitalization due to Change in Law,” shall be deleted and at the end of the said proviso, the words and expressions “or in the absence of actual loan portfolio of the generating station or the transmission system, the weighted average rate of interest of the generating company or the transmission licensee, as the case may be, as a whole, shall be considered;” shall be added.

- Dispensation in **deviation to principle of Regulatory Certainty**
- Detrimental to **investor sentiments**, jeopardize Capital Investment Plan for revised emission norms per-se and likely to increase the Tariff
- Compliance of emission norms would require **huge investment** and in order to tie-up for financial arrangements amid huge NPAs in the power sector, it is crucial to have in place **suitable norms which facilitate the funding.**
- Companies might prefer to **increase debt component** - it will increase the overall WACC increasing the Tariff and **defeating the sole intent of reduction in Tariff.** It will also have compounding impact on Capital Cost with increase in IDC
- **Discrimination among generators** who have finalised an agreement with lenders. It will be like going back on promise made under the principal regulations attracting the **doctrine of promissory estoppel.**
- Equitable treatment of cost of debt and cost of Equity which **is in deviation to financial principles** - Existing generating stations having 10-12 years remaining useful life, with gestation period of 28-30 months for implementation of capital intensive ECS, is required to be given higher RoE to have suitable IRR
- **Disparity between Existing and New Stations** - ROE at 15.5% for new stations whereas for similar investment, existing stations would be eligible for ROE at cost of debt which is unjust and bad in law
- Impact of **unforeseen challenges** associated with implementation and O&M of ECS

In light of above submissions, it is requested that Hon'ble Commission may kindly retain the existing norms of allowing a return on equity of 15.5% (Post tax) on equity infused for the additional capitalisation incurred on account of any 'Change in Law' event for any project.

Proposed in Draft

14. Amendment of Regulation 33 of the Principal Regulations

14.1. A new clause, namely, Clause (9) shall be added after Clause (8) of Regulation 33 of the Principal Regulations as under:

“(9) The depreciation of the emission control system shall be computed from its date of operation for the balance useful life or extended life of the generating station, as the case may be.”

Tata Power's Comments

Further clarity is required on following aspects to ensure that (i) 90% depreciation is recovered in balance useful life and (ii) depreciation rates during loan tenure are enough to cover loan repayments.

- That Proposed Amendment is to be read with regulations stipulated under clause 1 to 8 of the principal Regulation 33.
- Depreciation on additional capital cost on account of revised emission standards shall be calculated annually as higher of the following rates (i) based on SLM and at rates specified in Appendix-I to these regulations, and (ii) based on SLM over balance useful life of the station.
- Depreciation for generating station having **multiple units** with **different useful life** and the ECS achieving **COD on different dates**.
- **Ensure recovery of 90%** of the GFA within the balance useful life of the station and to ensure loan repayment within the first 12 years or balance life, whichever is lower

Proposed in Draft

Tata Power's Comments

Interest on Working
Capital

15. Amendment of Regulation 34 of the Principal Regulations

15.1. A new clause, namely, Clause (aa) shall be inserted after Clause (a) of Regulation 34 of the Principal Regulations as under:

“(aa) For emission control system of coal or lignite based thermal generating stations:

- (i) Cost of limestone or reagent towards stock for 20 days corresponding to the normative annual plant availability factor;
- (ii)

16. Amendment to Regulation 35 of the Principle Regulation

16.2. Sub-Clause (7) of Clause (1) of Regulation 35 of the Principal Regulations along with its proviso shall be substituted as under:

“(7) The operation and maintenance expenses on account of emission control system in coal or lignite based thermal generating station shall be 2% of the admitted capital expenditure (excluding IDC & IEDC) as on the date of its operation, which shall be escalated annually at the rate of 3.5% during the tariff period ending on 31st March 2024:

Provided that income generated from sale of gypsum or other by-products shall be reduced from the operation & maintenance expenses.”

- Reagent cost considered towards stock for 20 days which is lying in stockyard but not considered the cost towards reagents for 30 days at NAPAF for which advance payments or regular payments shall be made
- Replenishment is required to be done on daily basis; Working capital requirement equivalent to cost of reagent at NPAF is required for 30 days
- Doing away with such norms will impact the liquidity of the generators impacting sourcing of reagents thus impacting capacity declarations even after having primary fuel in stock.
- Include the provision for **true-up at actuals**. Once Hon'ble Commission will have adequate data backup during this control period, it may decide the generic norms thereafter
- It is humbly requested not to consider any revenue from gypsum and other by-products sale at this pre-mature stage and should be considered only while truing-up

Proposed in Draft

21. Amendment of Regulation 42 of the Principal Regulations

21.1. In the proviso under the formula under Clause (2) of Regulation 42 of the Principal Regulations, the words “or installation of emission control system, as the case may be” shall be inserted after the words “Renovation and Modernisation”.

Tata Power's Comments

Extant Regulations provides for recovery of O&M Expenses and IOL for the period of shutdown undertaken for R&M of the Generating Unit and through the proposed dispensation, Hon'ble CERC aims to extend such treatment for the shutdown period as may be required for installation of ECS only on the reasoning that it requires considerable shutdown alike R&M activity. The following aspects are relevant in this regard:

- **Incorrect Comparison** of outage period under R&M equivalent to outage required for installation of Emission Control Systems
- Depriving Generating Companies from full recovery of Fixed Charges will be **in deviation to the settled principle for compensation on account of CIL** event
- **Contrary to earlier reasoning** and objective behind extant Regulation
 - Rights cannot be taken away by new legislation or amendment: Legal maxim - *nova constitution futuris formam imponere debet non prateritis* which means “a new law ought to regulate what is to follow, not the past”
- Retain the existing proviso under Clause (2) of Regulation 42
- **A separate provision for recovery of full AFC for the number of days of shutdown period on pro-rata basis**

Proposed in Draft

22. New Regulation 42A to be added in the Principal Regulations

“42A. Computation and Payment of Supplementary Capacity Charge for Coal or Lignite based Thermal Generating Stations:

(1) The fixed cost of emission control system shall be computed on annual basis based on the norms specified under these regulations and recovered on monthly basis under supplementary capacity charge. The total supplementary capacity charge payable for a generating station shall be shared by its beneficiaries as per their respective percentage share or allocation in the capacity of the generating station. The supplementary capacity charge shall be recovered under two segments of the year, i.e. High Demand Season (period of three months) and Low Demand Season (period of remaining nine months), and within each season in two parts viz., Supplementary Capacity Charge for Peak Hours of the month and Supplementary Capacity Charge for Off-Peak Hours of the month as follows:

Tata Power's Comments

- Staggered implementation of ECS in the next two/three years → Shutdowns in phases so as to ensure the Grid stability → Impact on respective station's peak and off-peak periods resulting into **impact on cumulative availability**
- Commissioning and operation of ECS in India is at nascent stage → **unforeseen outages** during stability period at least for a year
- Implementation of peak and off-peak period availability may be mandated once the timelines of installations of ECSs are passed; May be implemented in the **next control period**.
- Determine **provisional tariff** for each ECS to be installed at the Station for its multiple units based on provisional Capital Cost subject to final true-up

Proposed in Draft

23. Amendment of Regulation 43

23.4. A new sub-clause, namely, sub-clause (aa) shall be inserted after sub-clause(a) of clause (2) of Regulation 43 of the Principal Regulations as under:

“(aa) Supplementary ECR for coal and lignite based thermal generating stations:

$$\text{Supplementary ECR} = (\Delta \text{ ECR}) + (\text{SRC} \times \text{LPR} / 1000)$$

Where,

(Δ ECR) =Difference between ECR with revised auxiliary consumption with emission control system equivalent to (AUXn + AUX en) and ECR with normative auxiliary consumption as specified in these regulations and revised;

Tata Power's Comments

Formulae for computation of supplementary ECR may be suitably revised as under:

- Supplementary ECR = $(\Delta \text{ ECR}) + (\text{SRC} \times \text{LPR} / 1000) / (1 - (\text{AUXn} + \text{AUXe}))$
- Where,
- AUXn = Normative Auxiliary Energy Consumption in percentage as applicable without emission control equipment;
- $\text{AUXe} = \sum_{n=1}^n \text{AUXen}$, AUXen is Normative Auxiliary Energy Consumption in the Nth emission control system as a percentage of gross energy generation;

Impact of 1.01% on Normative Station Heat Rate i.e. ($\text{SHR} / (1 - 1\%)$) due to **reduction in boiler efficiency by 1%** subject to true-up.

Proposed in Draft

Tata Power's Comments

25. Amendment of Regulation 49 of the principle regulation:

25.1. A new sub-clause, namely, sub-clause (bb) shall be inserted after sub-clause (b) of Clause (E) of Regulation 49 of the Principal Regulations as under:

“(bb) Auxiliary Energy Consumption (AUXe) on account of emission control system of thermal generating stations:

(1) For reduction of emission of sulphur dioxide:

a) Wet Limestone based FGD system (without Gas to Gas heater) – 1.0%

b)

c) Dry Sorbent Injection System (using Sodium bicarbonate)

- NIL

d)

e) Sea Water based FGD system (without Gas to Gas heater) – 0.7%

(2) For reduction of emission of oxide of nitrogen :

a) Selective Non-Catalytic Reduction system – NIL

b) Selective Catalytic Reduction system – 0.2%

Hon’ble CEA after examining project specific facts and design recommended certain operational parameters for some Generating Stations → It is suggested to revise the wordings of the proposed amendment “bb” as following:

“(bb) Auxiliary Energy Consumption (AUXe) on account of emission control system of thermal generating stations should be **as per project specific recommendations provided by CEA** and in case no norms have been given by CEA following norms will be considered subject to true-up at actuals:

a) Wet Limestone based FGD system (without Gas to Gas heater) – **1.2%**

a) CEA has approved 1.15% in case MPL and it may be higher based on actuals and for other projects based on plant specific requirements

b) Dry Sorbent Injection System (using Sodium bicarbonate) - **0.5%**

a) as per discussion with vendors

c) Sea Water based FGD system (without Gas to Gas heater) – **0.9%**

a) 1.2% (including Gas-Gas Heater) as set by Hon’ble MERC in its MYT Regulations 2019

d) Selective Non-Catalytic Reduction system – **0.05%**

a) based on the tentative electrical load list and considering nature of service of these loads

e) Selective Catalytic Reduction system – **0.3%**

a) As per the EPA document No. EPA/452/B-02-001 (Section- 4, NOx controls) as also referred by Hon’ble CEA

f) [Necessary provision for Impact on SHR needs to be inserted] – **1.01% x Normative Station Heat Rate.**

Proposed in Draft

25. Amendment of Regulation 49 of the principle regulation:

25.2. A new clause, namely Clause (F) shall be added after Clause (E) of Regulation 49 of the Principal Regulations as under:

“(F) Norms for consumption of reagent: (1) The normative consumption of specific reagent for various technologies for reduction of emission of sulphur dioxide shall be as below:

(a) For Wet Limestone based Flue Gas De-sulphurisation (FGD) system: The specific limestone consumption (g/kWh) shall be worked out by following formula:

$$[0.85 \times K \times \text{SHR} \times S] / [\text{CVPF} \times \text{LP}]$$

Where,

.....

Provided that value of K shall be equivalent to (35.2 x Design SO₂ Removal Efficiency/96%) for units to comply with SO₂ emission norm of 100/200 mg/Nm³ or (26.8xDesign SO₂ Removal Efficiency/73%) for units to comply with SO₂ emission norm of 600 mg/Nm³;

Provided further that the limestone purity shall not be less than 85%.

Tata Power's Comments

- A common empirical formula may be provided to compute the specific reagent consumption for various technologies → It is proposed that these parameters may be considered at actual/or as recommended by CEA rather than assigning them predefined values which seems inappropriate.
- $RC = 1000 \times \{ (\text{SHR}/\text{CVPF}) \times (S/100) \times (\text{SO}_2\text{Mol}/\text{SMol}) \times \text{SO}_2\text{Fac} \times \text{SO}_2\text{RemEff} \times \text{MR} \times (\text{Reagent Mol}/\text{SO}_2\text{Mol}) \times (\text{StoRat}/\text{RP}) \}$ in g/kWh
- Or $RC = K \times \{ (\text{SHR}/\text{CVPF}) \times S \times \text{SO}_2\text{RemEff} \times \text{MR} \times \text{Reagent Mol} \times (\text{StoRat} / \text{RP}) \}$ in g/kWh
- In a limestone with purity of say 85%, 5-10% may be non-reactive limestone and, hence, **effective purity** of reactive limestone shall be in the range of **76.50%-80.75%**
- CEA has acknowledged that stoichiometric ratio increases with increase in efficiency of Sox or NO_x removal system, it has considered only one value of stoichiometric ratio which is on lower side as per our assessment based on discussions on guarantees with bidders in this regard. Therefore, we have proposed **slightly higher stoichiometric ratios, which are practically achievable**

Comments on Draft CERC Tariff Regulations (First Amendment)



Norms of operation for thermal generating station

Proposed in Draft

Amendment to Regulation 49

(c) For Dry Sorbent Injection System (using sodium bicarbonate): The specific consumption of sodium bicarbonate shall be 12 gm per kWh at 100% purity.

(d) For CFBC Technology (furnace injection) based generating station: The specific limestone consumption for CFBC based generating station (furnace injection) at 85% purity limestone (kg/kWh) shall be computed with the following formula:

$$[62.9 \times S \times \text{SHR} / \text{CVPF}] \times [0.85 / \text{LP}]$$

Where

.....

(2) The normative consumption of specific reagent for various technologies for reduction of emission of oxide of nitrogen shall be as below:

(a) For Selective Non-Catalytic Reduction (SNCR) System: The specific urea Consumption of SNCR system shall be 1.2 gm per kWh at 100% purity of urea.

(b) For Selective Catalytic Reduction (SCR) System: The specific ammonia consumption of SCR system shall be 0.6 gm per kWh at 100% purity of ammonia.”

Tata Power's Comments

- Specific reagent consumption values given corresponds to approx. 60% SO2 removal efficiency, inlet SO2 loading of 1450 mg/Nm3 and meeting SO2 limit of 600 mg/Nm3. In case of higher removal efficiency say 70% SO2 removal efficiency & inlet SO2 loading of 1800 mg/Nm3, specific reagent consumption will be 21 g/KWH. Hence, it is suggested to **indicate SBC consumption with SO2 removal efficiency and inlet SO2 loading.**
- We have, therefore, proposed a **generic formulation for DSI, wet limestone and dry/semi dry FGD** as given in Annexure 3
- In case of CFBC Boilers, Ca / S molar ratio depends on SO2 removal efficiency required & with increase in removal efficiency, Ca/S molar ratio increases. Similarly, a common formula has been proposed
- Similarly, generic formula for De-NOx System is proposed
- $RC = \text{NOxcon} \times \text{NOxRemEff} \times \text{MR} \times \text{Reagent Mol/NOxMol} \times \text{StoRat}$
..... in g/kWh

Comments on Draft CERC Tariff Regulations (First Amendment)



Norms of operation for thermal generating station

Proposed in Draft

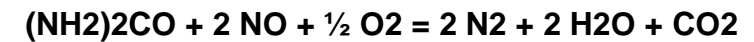
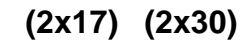
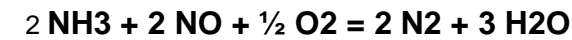
Additional Comments

1. Since NO₂ is unstable at very high temperatures almost 95% of boiler flue gas is NO. Therefore, reagent requirement needs to be worked out with NO molecular weight and not NO₂ molecular weight as has been suggested by CEA.
2. Preference should be given in merit order depatch i.e. merit order without Supplementary Energy Charge Rate till all plants comply
3. Since shutdown period due to ECS installation shall be compensated separately, Availability for the year of commissioning of ECS system should be computed after excluding this period of shutdown or in the alternative the Availability for this period may be considered as 100%..

Tata Power's Comments

CEA Report (Appendix II) extracts show that NO (30) reacts with reagent and not NO₂ (46):

- The chemical reaction taking place with use of ammonia and urea are indicated as below:



- In the reactions taking place, the NO_x is represented as NO since it is the predominant form of NO_x within the boiler. Theoretically, 1 mole of ammonia (or ½ mole of urea) is required to remove 1 mole of NO_x.
- Requirement of 100% urea = $(0.5 \times 60 / 46) \times 1.1 \times 1.551 = 1.113 \text{ g/kWh}$ Say 1.2 g/kWh
- Requirement of 100% ammonia = $(17 / 46) \times 1.08 \times 1.225 = 0.489 \text{ g/kWh}$ Say 0.5 g/kWh

**“Journey Continues..
We value your inputs, suggestions and
critique.”**

We take pride in Lighting up Lives!

Website: www.tatapower.com

Email ID: Pankaj.Prakash@tatapower.com