

Ref: LPGCL-RA/CERC/2020

Date: 14<sup>th</sup> May, 2020

To  
The Secretary,  
The Central Electricity Regulatory Commission,  
3rd & 4th Floor, Chanderlok Building,  
36, Janpath, New Delhi- 110001

Dear Sir,

**Sub: Comments on the Draft Central Electricity Regulatory Commission (Terms and Conditions of Tariff) (First Amendment) Regulations, 2020.**

Enclosed please find LPGCL's comment on the proposed amendment of "Central Electricity Regulatory Commission (Terms and Conditions of Tariff) (First Amendment) Regulations 2020". The same may kindly be taken into account while finalizing the regulation.

Further, LPGCL would like to make presentation before the Hon'ble Commission on the points included in the comments in the ensuing public hearing on the subject matter. An opportunity may kindly be given to us for the same.

Thanking you,

Yours faithfully,



(S.K.Sharma)

Executive Director (Regulatory Affairs)

(Authorised Signatory)

**Comments on the Draft CERC (Terms & Conditions of Generation Tariff),  
Regulations, 2019 (First Amendment)**

**Preliminary Observations:**

In order to address the various cost components consequent to the revised emission standards that had been notified vide MOEF & CC Notification dated 7.12.2015, the prevailing tariff regulations issued by the Hon'ble CERC in 2019, through various provisions, had recognised the various mitigation measures. The proposed amendments, accordingly, are for introducing separate tariff stream for the emission control systems to be installed for compliance of the revised emission standards which requires determination of separate capital cost, fixation of date of operation of emission control systems, financial parameters and operational parameters. **LPGCL/ Bajaj Group welcomes such step as it will ensure readiness of the tariff mechanism to determine supplementary capacity charges and supplementary Energy Charges for emission control system as and when such system is commissioned through amendment of CERC Tariff Regulations, 2019. This will go a long way in facilitating financial resources for the proposed capital addition and provide the necessary regulatory certainty especially in the backdrop of emerging consequences of Covid-19 Pandemic.**

**Our parawise comments/ views are as under:-**

**1. Amendment to Regulation 9 of the Principal Regulations – Application for determination of tariff**

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.”*

**In this regard, it is requested to consider the following and make necessary provisions in the Regulation.**

- (a) In order to allow the generators to recover the fixed and variable costs associated with installation of FGD, immediately after commissioning, filing of application for determination of supplementary tariff may be allowed before 180 days from Scheduled Commissioning Date as per the project schedule of the entrusted Contractor for the job. Hon'ble CERC may kindly dispose of such petition and fix a provisional tariff within the next 4 months. Such a provision will help generating company to recover cost incurred immediately on commissioning of the system.
- (b) In case there is difficulty in approving the final Tariff, Hon'ble Commission may allow a provisional supplementary tariff of 95 % of the reasonable costs after prudence check.

**2. Amendment of Regulation 21 of the Principal Regulations- Interest During Construction (IDC) and Incidental Expenditure during Construction (IEDC):**

9.2. A new clause, namely, Clause (6) shall be added after Clause (5) of Regulation 21 of the Principal Regulations as under:

*“(6) For the purpose of Clauses (4) and (5) of this Regulation, IDC on actual loan and normative loan infused shall be considered.”*

**In this regard, it is requested to consider the following and make necessary provisions in the Regulation:**

- (a) The Hon'ble Commission may include that IDC on normative loan and IEDC for pre-operative expenses would be provided from the zero date of investment which is consistent with the existing methodology of arriving at capital cost as on date of COD of the assets. Hon'ble Commission has also recognised the above in the order dated 23.04.2020 passed in case of allowing in principal capital cost of Sasan UMPP.

(b) Accordingly, we propose amendment as under:

***“(6) For the purpose of Clauses (1) to (5) of this Regulation, IDC on actual loan and normative loan infused and IEDC for pre-operative expenses shall be considered.”***

### **3. Initial Spares: Amendment of Regulation 23 of the Principal Regulations:**

10.1. A new Proviso, namely, Proviso (iii), has been proposed in the draft after Proviso (ii) to Regulation 23 of the Principal Regulations as under:

*“(iii) Where the emission control system is installed, the norms of initial spares specified in this regulation for coal or lignite based thermal generating station as the case may be, shall apply.”*

#### **Comments/Suggestions:**

Hon'ble Commission has considered/allowed initial spares as 4% of the Plant and Machinery cost Plant where Plant and Machinery cost has been considered as the original project cost excluding IDC, IEDC, Land Cost and Cost of Civil Works in Tariff Regulations, 2019. In the proposed amendment, Hon'ble Commission has proposed to extend the same for allowing initial spares to be used for emission control system (FGD). However, if we consider a conservative figure of FGD Hard cost as 0.5 Cr/MW, then for a 1980 MW Plant, cost of FGD hard cost will be 990 Cr. Accordingly, the initial spares that will be allowed as per proposed amendment will be only 39.6 Cr which is very less compare to the data available.

**Therefore, it is requested that based on the available data of cost initial spares to be required for FGD, the same may be revised upwards as 5% of FGD Hard Cost excluding IDC, IEDC, Land Cost and Cost of Civil Works.**

Further, the FGD technology and associated equipment are being introduced through MOEF Notification dated 07.12.2015 and it will be implemented across all

power plants simultaneously that may cause difficulty acquire associated initial spares well within timeframe provided by Tariff Regulation.

**To facilitate the smooth implementation of FGD technology across all power plants, it is requested to provide 5 year time cut-off time after successful commissioning of FGD to acquire mandatory spares allowed for FGD via this amendment.**

#### **4. ROE: 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," has been sought to 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.

12.2. A new clause, namely, Clause (3) has been proposed to be added after Clause (2) of Regulation 30 of the Principal Regulations, as under:

*"(3) The return on equity in respect of additional capitalization due to emission control system shall be computed at the weighted average rate of interest on actual loan portfolio of the generating station or in the absence of actual loan portfolio of the generating station, the weighted average rate of interest of the generating company as a whole shall be considered;"*

#### **Comments/Suggestions:**

As per Tariff Regulations, 2019, Hon'ble Commission has allowed normal Return on Equity on Additional Capitalization due to change in law vis-à-vis Additional capitalization allowed other than change in law attracting return computed at the weighted average rate of interest on actual loan portfolio. While providing the same, CERC in its Statement of Reason dated 22.03.2019 has provided justification as under:

"

10.1.2 The Commission has considered the stakeholders' comments/suggestions. The Commission is of the view that in cases where the additional capitalization has become necessary to comply with the 'Change in Law' event, normal rate of return of equity should be allowed instead of allowing rate of return on equity at weighted average rate of interest on actual loan portfolio. Therefore, first proviso to clause (2) of Regulation 30 has been revised suitably.

However, in the proposed draft amendment, the Hon'ble CERC has again proposed to modify the same clause so as to reduce the Return on Equity on the equity invested to the extent of 30 % by the promoter to fund the investment required to install the FGD as same as weighted average rate of interest on actual loan portfolio. It is against the commercial principle prescribed in the Electricity Act' 2003 and Tariff Policy 2016. Further, it is also against with the reasoning that CERC has provided only 10 months before to allow normal ROE on the equity invested corresponding to the additional capitalization due to change in law.

To put things in perspective, it is prudent to quote the Section 61 of electricity act, 2003 that provides as under:

***"Section 61. (Tariff regulations):***

***The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-***

*(c) the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;*

*(d) safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner;*

*(e) the principles rewarding efficiency in performance;*

*(f) multi year tariff principles;*

*(g) that the tariff progressively reflects the cost of supply of electricity and .....*

***(i) the National Electricity Policy and tariff policy:***

Further, Tariff Policy, 2016 provides as under:

***“Return on Investment***

*Balance needs to be maintained between the interests of consumers and the need for investments while laying down rate of return. **Return should attract investments at par with, if not in preference to, other sectors so that the electricity sector is able to create adequate capacity. The rate of return should be such that it allows generation of reasonable surplus for growth of the sector.***

*The Central Commission would notify, from time to time, **the rate of return on equity for generation and transmission projects keeping in view the assessment of overall risk and the prevalent cost of capital which shall be followed by the SERCs also.** The rate of return notified by CERC for transmission may be adopted by the SERCs for distribution with appropriate modification taking into view the risks involved. For uniform approach in this matter, it would be desirable to arrive at a consensus through the Forum of Regulators.”*

It is clear from the above that Equity invested in the project should attract competitive return as mandated under the Electricity Act, 2003 and Tariff Policy, 2016. It is noteworthy that the cost to meet the revised emission norms is quite substantial. Therefore, the equity contribution to be made by generators/ investors/ promoters will be substantial. Therefore, generators or investors would be discouraged from investing the equity in the emission systems' project because of the following factors:-

- i) Investment in FGD/Emission control system thus arose is akin to a new Greenfield project necessitated by the aforementioned change in law. It would be unfair that while new projects being approved as greenfield or capacity expansion project shall get the higher rate of return 15.5% (including the equity required to meet the expenses for environmental systems), the existing projects – undergoing retrofitting of FGD/SCR/SNCR shall be fetching lower returns at normative debt rate.

This would be highly anomalous approach specially in the backdrop of the facts pointed out below.

- ii) Thermal Power Plants inherently carry significantly higher risk as compared to transmission projects such as fuel risk, execution risk, operational risk and statutory compliance/environmental related risk. Existing returns to thermal power plants / projects is already inferior vis-à-vis transmission systems, if these risk factors are accounted for. Investment in emission systems would also encounter same level of risk. Therefore it would not be justified to consider a return lower than what is prevailing today and treat such equity investment akin to debt. This would also erode the existing return on equity. In the case of installation of FGD for existing operational plants, it actually poses a dual risk. Non-operational / break down of FGD for any time would result not only into shutdown of FGD operations but it would lead to shutdown of entire plant operations posing a grave risk to investments already made in existing operational plants.
- iii) Allowing return similar to debt would amount to denial of risk premium applicable to equity investments which would be contrary to the principles of commercial financing. Similar to any green field project wherein RoE is not provided during construction phase and is provided only after COD of project, similar risk reward matrix is there for FGD project also. During construction period of FGD, since no return on equity shall be provided, a higher rate of return on equity post COD is very much required to ensure financial viability of entire plant.
- iv) The current situation in the financial markets involving debt defaults coupled with payment defaults by the procurer DISCOMs has already resulted into leveraged balance sheets of the generating companies. Lower return on equity shall lead to efforts for acquiring more debt (and consequently higher debt). This is likely to push the cost of debt higher.
- v) In spite of lower return on equity, the overall cost of capital may not come down significantly as there would be tendency to borrow funds even at



higher rates, ie WACC may remain same ( and will not reduce) for generators other than those from PSU.

- vi) Due to outbreak of Covid-19 Pandemic, the Indian as well as global financial markets are facing serious crisis and consequent drying up of the avenues available to the investors to arrange equity. Further, cost of FGD and associated equipment being very high, it is very difficult to arrange the debt for 100% financing. As proposed in this amendment, ROE on the equity invested in FGD would be on the same rate as cost of debt. It will make difficult for promoter to put equity in FGD associated cost and 100% financing through debt may not be possible in the current Covid-19 Pandemic scenario. Therefore, it is highly essential to provide the ROE of 15.5% on the equity invested in the FGD associated cost to make it possible for bank to finance up to 70% of the cost.
- vii) Considering the significant amount of capital expenditure required for installation of FGD project, generators have no option other than to approach lenders for financing it. In the given case, if ROE is equal to cost of debt, developers may not be able to get it financed from its lenders owing to unfavorable Debt Service Coverage Ratio (DSCR) levels. This is especially applicable to project where Equity component is lower than normative levels of 30% which in any case results in lowering tariff. This has been explained by way of example below:

**Assumptions:**

<b>Component</b>	<b>Inputs</b>	<b>Remarks</b>
Cost of Project (Rs.)		<i>(assumed for example)</i>
	1,000	
Cost of Debt	10.00%	
Actual repayment terms <i>(as per bank case)</i>		<i>(fully amortised in years)</i>
	12	
Equity component	25.00%	
RoE	10.00%	<i>(equal to cost of debt)</i>
Depreciation rates	5.75%	<i>(for first 12 years)</i>

**Particulars**

**Year of Operation**

	1	2	3	4	5
<b>Revenue: Fixed Charges</b>					
Depreciation	57.50	57.50	57.50	57.50	57.50
O&M Expenses ( <i>see note 1</i> )	-	-	-	-	-
Interest on working capital ( <i>see note 1</i> )	-	-	-	-	-
Interest on Term Loan ( <i>refer table 1 below</i> )	72.13	66.38	60.63	54.88	49.13
Return on Equity	25.00	25.00	25.00	25.00	25.00
<b>Revenue (A)</b>	154.63	148.88	143.13	137.38	131.63
<b>Actual Debt Servicing (<i>refer table 2 below</i>) (B)</b>	<b>134.38</b>	<b>128.13</b>	<b>121.88</b>	<b>115.63</b>	<b>109.38</b>
DSCR (A/B)	1.15	1.16	1.17	1.19	1.20
<b>Average DSCR</b>	<b>1.17</b>				

*Note 1: O&M expenses and intt. on working capital assumed to be set off against expenses and thus assumed nil.*

**Table 1: Calculation of Interest on Term Loan (*normative for revenue purposes*)**

Opening Debt	750.00	692.50	635.00	577.50	520.00
Less: Repayment ( <i>equal to depreciation</i> )	57.50	57.50	57.50	57.50	57.50
Closing Debt	692.50	635.00	577.50	520.00	462.50
Average Debt	721.25	663.75	606.25	548.75	491.25
Interest	72.13	66.38	60.63	54.88	49.13

**Table 2: Calculation of Interest on Term Loan (*actual for expense purposes*)**

Opening Debt	750.00	687.50	625.00	562.50	500.00
Less: Repayment ( <i>as per bank terms</i> )	62.50	62.50	62.50	62.50	62.50
Closing Debt	687.50	625.00	562.50	500.00	437.50

Average Debt	718.75	656.25	593.75	531.25	468.75
Interest	71.88	65.63	59.38	53.13	46.88
<b>Total Debt Servicing</b>	<b>134.38</b>	<b>128.13</b>	<b>121.88</b>	<b>115.63</b>	<b>109.38</b>

From the above example, it would be amply clear that project has an average DSCR of 1.17 levels against bank stipulations of 1.25 rendering the project unviable for lenders to finance it.

Further, the present amendment to the Tariff Regulation proposes to treat the return on equity on additional expenditure due to change in law events at par with other additional expenditure incurred. In the statement of reasons the Hon'ble Commission has only stated that it felt such a treatment as reasonable, without offering any explanation for such reasonableness. It is requested to keep the provisions of the extant regulations intact, where return on equity on additional expenditure arising out of change in law events is treated at par with the equity of the original scope of work (i.e. RoE of 15.5% or 16.5%, as the case may be). The distinction of capital expenditure which is forced on the generator due to change in law must be retained.

In fact, Hon'ble Commission should recognize that the risks of equity investment in the emission control equipment are far higher for the existing generating plants as the original OEM of BTG package will not take any responsibility for deterioration of plant performance and the entire risk of system integration is completely on the original developer. The FGD Technology being totally new technology in the country, the chances for the failures and problems shall be more putting the entire risk of units of the station going out of service more frequently till the same gets stabilised. This is a grave risk. In order to align return with the commensurate risk, the Hon'ble Commission may consider an additional 1% return on equity investments for environmental systems.

As the risk of outage during commissioning of FGD and integration of FGD with plants is very high, it is requested that loss of DC during the integration of FGD with

existing plants may be provided separately. Further, sufficient time for testing of FGD and plant performance associated with FGD system may be provided.

Therefore, it will not be rational to modify the clause by way of proposing amendment to reduce the ROE on investment of FGD equivalent to the weighted average cost of debt

**It is humbly submitted that proposed draft modification to amend Regulation 30 is not only inconsistent with the principal adopted by CERC while framing CERC Tariff Regulations, 2019 but also is equally contrary to the principles of Electricity Act, 2003 and Tariff Policy 2006. Therefore, it is requested that the existing Regulation 30 to exempt Add cap due to change in law may be continued.**

#### **5. Interest on Working Capital: Amendment of Regulation 34 of the Principal Regulations**

15.1. A new clause, namely, Clause (aa) has been proposed to 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) Receivables equivalent to 45 days of supplementary capacity charge and supplementary energy charge for sale of electricity calculated on the normative annual plant availability factor;
- (iii) Operation and maintenance expenses in respect of emission control system for one month;
- (iv) Maintenance spares @ 20% of operation and maintenance expenses in respect of emission control system.”

#### **Comments/Suggestions:**

Hon'ble Commission while proposing working capital for emission control system has mentioned the following in the statement of Reasons:

*“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.”*

Further, Regulation 34 of CERC Tariff Regulations, 2019 on working capital provides as under:

Interest on Working Capital:

(1) The working capital shall cover:

(a) For Coal-based/lignite-fired thermal generating stations:

(i) Cost of coal or lignite and limestone towards stock, if applicable, for 10 days for pit-head generating stations and 20 days for non-pit-head generating stations for generation corresponding to the normative annual plant availability factor or the maximum coal/lignite stock storage capacity whichever is lower;

**(ii) Advance payment for 30 days towards cost of coal or lignite and limestone for generation corresponding to the normative annual plant availability factor;**

(iii) Cost of secondary fuel oil for two months for generation corresponding to the normative annual plant availability factor, and in case of use of more than one secondary fuel oil, cost of fuel oil stock for the main secondary fuel oil;

(iv) Maintenance spares @ 20% of operation and maintenance expenses including water charges and security expenses;

(v) Receivables equivalent to 45 days of capacity charge and energy charge for sale of electricity calculated on the normative annual plant availability factor; and

(vi) Operation and maintenance expenses, including water charges and security expenses, for one month.

If we compare the working capital provided for generating station vis-à-vis emission control system then we can clearly identify that point (ii) **Advance payment for 30 days towards cost of coal or lignite and limestone for generation corresponding to the normative annual plant availability factor** has escaped attention of the Hon'ble Commission in respect of emission control

system. As it is clear from statement of reasons, Hon'ble Commission has proposed the similar component of working capital for emission control system.

Therefore, it is requested that Hon'ble commission may add the point (ii) as **Advance payment for 30 days towards cost of limestone for generation corresponding to the normative annual plant availability factor while specifying working capital requirement for emission control systems.**

#### **6. O&M Expenses: Amendment of Regulation 35 of the Principal Regulations**

16.1. At the end of the first sentence of first proviso under sub-Clause (6) of Clause (1) of Regulation 35 of the Principal Regulations, the words "and considering the norms of specific water consumption notified by the Ministry of Environment, Forest and Climate Change" shall be added.

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 byproducts shall be reduced from the operation & maintenance expenses."*

#### **Comments/Suggestions:**

Hon'ble Commission has proposed operation and maintenance expenses on account of emission control system in coal or lignite based thermal generating station as 2% of the admitted capital expenditure (excluding IDC & IEDC) as on the date of its operation. In this regard, it is noteworthy to compare O&M cost as a percentage of admitted capital cost allowed in Tariff Regulations, 2019 for plant operation vis-a-vis O&M cost proposed for emission control system through this amendment.

The Hon'ble Commission vide suo mottu Order dated 4.6.2012 has set out Benchmark Capital Cost (Hard cost) for Thermal Power Stations with Coal as Fuel which provides as under:

*“In view of forgoing, we approve the benchmark norms as on December 2011 as per **Annexure II** to this order for capital cost for Thermal Power Station/Unit size(s) 500/600/660/800 MW which shall be taken into consideration while determining the capital cost in accordance with clause (2) of Regulation 7 of 2009 Tariff Regulations.....”*

The above mentioned Annexure – II for the Benchmark Capital Cost (Hard cost) for Thermal Power Stations with Coal can be summarized in respect of (3 X 660) 1980 MW as in the table under:

<b>BENCHMARK HARD COST</b>			
<b>Unit size (MW)</b>	660	660	660
<b>Number of units</b>	1	2	3
<b>Total hard cost per MW (Rs Crore)</b>	5.37	5.01	4.67
<b>Weighted average hard cost per MW (Rs Crore)</b>	5.02		
<b>Total Hard cost for (3 X 660) 1980 MW (Rs Crore)</b>	9933		

As it is clear from the above table that the weighted average cost (bench marked hard cost) per MW for (3 X 660) 1980 MW comes out to be 5.02 crore per MW. Accordingly the hard cost would be calculated at 9933 crore at those price levels which does not include MGR, Railway siding, unloading equipment at jetty, and Rolling stock, locomotive, Transmission line till tie point) etc Therefore, it may be prudent to add approximately 1 Cr/MW on account of MGR, Railway siding, escalation till that and other above mentioned miscellaneous items which has been

excluded while determining benchmark capital cost. The capital of Rs. 6 crs/ MW also compares reasonable well with respect to the contemporary prices.

Therefore, if we consider 6 Cr/MW of capital cost excluding IDC and IEDC for 1980 MW Plant, then hard capital cost will be  $1980 \times 6 = 11880$  Cr.

Further, Clause 1 of Regulation 35 of the Principal Regulations provides the O&M expenses for a thermal generating station which can be summarized as in the table under:

<b>O &amp; M expenses for (3 X 660) 1980 MW</b>	
O & M Expenses per MW (Rs lacs.)	20.26
Total (Rs Crore)	401

The explanatory memorandum for draft CERC (Terms and Conditions of Tariff) (First Amendment) Regulations, 2020 mentions that till adequate data is available, impact of O&M expenses may be worked out as % of the admitted capital expenditure. If we compare these O & M expenses as percentage of the CERC benchmark hard capital cost then the O & M expenses for (3 X 660) 1980 MW comes out to the tune of 3.37% of the admitted capital cost. However, O&M expenses for emission control system have been proposed as 2% of admitted capital cost which is substantially lower than the rest of the power plant and the same would be anomalous. FGD as against the existing plant equipment is most maintenance prone due to following:

Further, O&M expenses of emission control system may require additional cost involvement due to following:

- i) Faster degradation of equipment as the whole system operates in corrosive environment of sulphur. This may pose major challenges for the generators to ensure availability of emission control system.
- ii) Absorber tank holds very critical components like liners, oxytocin blower, agitator and recirculation system and these are all operating under very corrosive environment not experienced in existing plant equipment.



- (iii) Higher maintenance cost as a sizeable number of equipment installed for the emission control system are likely to be imported and imported spares are sensitive to forex fluctuations.
- (v) The lime handling system including gypsum disposal system, they are all subjected to very tough running conditions and subjected to wear and tear and failures.
- (vi) Additional system required to handle waste water having very high chloride level and zero liquid discharge
- (iv) Implementation of emission control system at existing plants setup may require additional infrastructural support to facilitate smooth operation (for example installation of a dedicated road and gate for trucks carrying gypsum - similar to separate dedicated gates with security personnel that have to be maintained in power plants for ash movement.)

As It is clear from the above that the O & M expenses pertaining to emission control system are higher than the normal O & M expenses as FGD system is highly maintenance prone area due to handling of Sulphur content and handling and use of other highly corrosive substances. In spite of higher O&M expenses for FGD System due to above reasons, the Hon'ble Commission has proposed lower O&M norms for FGD, which is against the principals of cost plus tariff.

**Therefore, it is requested that Hon'ble Commission may allow the O & M expenses for emission control system as 4% of the admitted capital expenditure (excluding IDC & IEDC) or alternatively, to provide parity with the plant O&M, Hon'ble Commission may provide O&M expenses control system as around 2 Lakh/MW (considering 4% of the admitted capex on account of FGD as O&M expenses)(Finance/Engg. may please see and provide comment if any)**

Further, Hon'ble Commission has proposed that **"income generated from sale of gypsum or other by-products** shall be reduced from the operation & maintenance expenses" which needs reconsideration the proposed O&M expenses on account of Emission control system are already quite insufficient.

Therefore, it is in the interest of justice that income generated from sale of gypsum or other by-products may be allowed to retain with generator.

Further, Simultaneous commissioning of similar limestone based emission control systems by majority Generators in 2022 may pose a challenge for marketability of Gypsum as a by-product. Presently the production and demand of industrial gypsum is limited. However once the FGD of the thermal power plants are commissioned it would change the supply chain of gypsum due to sudden high availability of gypsum.

In absence of marketability of the entire gypsum produced, disposal of by-product will be required through filling of abandoned mines or such other method as maybe approved by CPCB. Disposal of by-product will require additional transportation costs, which may be allowed to be recovered through operation and maintenance expenses.

Therefore, if Gypsum is not saleable then cost for disposal of the same may also be provided over and above normative O&M cost for emission control systems.

**In view of above, it is requested that Hon'ble Commission may allow 4% of O&M expense of admitted capital cost. Further, allow generator to retain the income generated from sale of gypsum or other by-products. In addition, in case Gypsum is not saleable then cost for disposal of the same may be provided.**

**7. Amendment of Regulation 42 of the Principal Regulations- Computation and Payment of Capacity Charge for Thermal Generating stations:**

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

*“(5) The Plant Availability Factor for a Month („PAFM”) shall be computed in accordance with the following formula:*

$$PAFM = 10000 \times DCi [Nxi / Cx 100 - AUXn - AUXen ] Ni = 1 \%$$

Where,

*AUX<sub>n</sub>* = Normative auxiliary energy consumption in percentage;

*AUX<sub>e</sub>* = Normative auxiliary energy consumption for pollution control system as a percentage of gross energy generation, wherever applicable;

*DC<sub>i</sub>* = Average declared capacity (in ex-bus MW), for the *i*th day of the period i.e. the month or the year as the case may be, as certified by the concerned load dispatch centre after the day is over;

*IC* = Installed Capacity or (MW) of the generating station;

*N* = Number of days during the period; “

In the above clause, we request Hon'ble commission to consider the following:

(a) Existing Generators retrofitting emission control system may lose Capacity Charges during the year when interconnection of emission control system is done with the flue gas system of the plant as a prolonged shutdown is required.

(b) Further, the availability of the unit may suffer during stabilization period post commissioning of FGD as the plant O&M engineers have no experience of operating the FGD plant. Hence, while calculating the plant Annual PAF for that particular year, availability loss due to shut down for interconnection of emission control system may be allowed to be excluded from calculation of actual availability for recovery of fixed costs.

**8. Aux. Power Consumption for wet limestone based FGD system : Amendments of Regulation 49 of the Principal Regulations**

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

“(bb) Auxiliary Energy Consumption (AUX<sub>e</sub>) on account of emission control system of thermal generating stations:

Name of Technology	AUX <sub>en</sub> (as % of gross generation)
<b>(1) For reduction of emission of sulphur dioxide:</b>	
a) Wet Limestone based FGD system (without Gas to Gas heater )	1.0%
b) Lime Spray Dryer or Semi dry FGD System	1.0%
c) Dry Sorbent Injection System (using Sodium bicarbonate)	NIL
d) For CFBC Power plant (furnace injection)	NIL
e) Sea Water based FGD system (without Gas to Gas heater )	0.7%
<b>(2) For reduction of emission of oxide of nitrogen :</b>	
a) Selective Non-Catalytic Reduction system	NIL
b) Selective Catalytic Reduction system	0.2%

*Provided that where the technology is installed with Gas to Gas heater, auxiliary energy consumption specified as above shall be increased by 0.3% of gross generation."*

*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:

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

Where,

S = Sulphur content in percentage

LP = Limestone Purity in percentage,

SHR= Gross station heat rate, in kCal per kWh;

CVPF = (a) Weighted Average Gross calorific value of coal as received, in kCal per kg for coal based stations less 85 Kcal/Kg on account of variation during storage at generating station;

(b) Weighted Average Gross calorific value of primary fuel as received, in kCal per kg, per litre or per standard cubic meter, as applicable for lignite, based stations;

Provided that value of K shall be equivalent to  $(35.2 \times \text{Design SO}_2 \text{ Removal Efficiency}/96\%)$  for units to comply with SO<sub>2</sub> emission norm of 100/200 mg/Nm<sup>3</sup> or  $(26.8 \times \text{Design SO}_2 \text{ Removal Efficiency}/73\%)$  for units to comply with SO<sub>2</sub> emission norm of 600 mg/Nm<sup>3</sup>;

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

(b) For Lime Spray Dryer or Semi-dry Flue Gas Desulphurisation (FGD) system: The specific lime consumption shall be worked out based on minimum purity of lime (PL) as at 90% or more by applying formula  $[0.90 \times 6 / PL(\%)]$  gm/kWh;

(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:

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

Where

S= Sulphur content in percentage,

LP = Limestone Purity in percentage,

SHR= Gross station heat rate, in kCal per kWh,

CVPF = (a) Weighted Average Gross calorific value of coal as received, in kCal per kg for coal based stations less 85 Kcal/Kg on account of variation during storage at generating station;

(b) Weighted Average Gross calorific value of primary fuel as received, in kCal per kg, per litre or per standard cubic meter, as applicable for lignite, based stations;

(e) For Sea Water based Flue Gas Desulphurisation (FGD) system: The reagent used is sea water, therefore there is no requirement for any normative formulae for consumption of reagent.

(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.”*

**Comments/Suggestions:**

**Hon’ble Commission has proposed Aux. Energy Consumption for wet limestone based FGD system as 1% which appears to have been considered at full loads. Considering average PLF of thermal power stations at national level close to 50% the proposed APC of 1% for the emission control systems inclusive of FGD is very low as per the data available.**

**Further, the proposed AEC for emission control systems is required to be adjusted for partial load operations in line with the rest of the systems of the power plant. The Regulation-6B of the IEGC 4<sup>th</sup> amendment Regulations, 2016 provides for adjustment of norms of operation (HR, AEC etc.) for the power plant systems other than emission control system. According the IEGC is required to be amended to incorporate adjustment of Aux Energy Consumption for emission control systems proposed in these draft regulations. Accordingly a suitable footnote also needs to be added at the end of clause (E) of the Regulation 49 of the Principal Regulations**

Further, it is clear that auxiliary energy consumption of the main plant will increase due to the following reasons:

- (i) Additional power consumption required on account of cooling water sourced from existing plant system for the new equipment.
- (ii) Additional power consumption required on account of pumping and treatment of makeup water to emission control system from the existing plant water system.

- (iii) Existing plants will require additional auxiliary consumption on account of various common services for emission control system.
- (iv) Due to acute scarcity of water at various locations, emission control system will entail installation of RO plant / ZLD Crystallizer system. Operation of such system will require additional auxiliary consumption.
- (v) Uncertainty over purity of lime stone and sulphur content of coal - while the auxiliary power increase will be dependent on the quality of limestone actually received as well as the coal quality and both are uncontrollable factors for generators. Additional energy consumption may be required to meet the statutory emission limit based on actual operating conditions and plant PLF.
- (vi) Economy of scale plays a key factor on account of consumption of common facility for emission control system.
- (vii) Auxiliary consumption of emission control system will depend on operating plant load factor of units, hence we request Hon'ble commission to allow a suitable compensation on account of degradation of auxiliary power consumption (APC) if PLF is reduced below normative PLF.

**Further, based on the data & experience of running FGD system, Hon'ble Commission may allow 1.5% operation norms for AEC may be kept as 1.5-1.6% because of the following reasons:**

1. Although the limestone purity of 85% has been mentioned in CERC draft amendment document, however, based on purity of limestone available in the selected sources for the plant, FGD system has been designed considering the limestone purity of 80%. Hence the limestone crushing, handling & slurry preparation system, limestone slurry feeding system, recirculation pumping system, gypsum dewatering system and other associated pumping system shall be designed considering the same (i.e. with limestone purity of 80% and corresponding generation of by-product). So, consequently the capacity of all the mentioned system/sub-systems shall be higher. As a result this will lead to considerable increase in FGD auxiliary power consumption.
2. Due to the layout constraints & system requirements considering wind buffeting effect and corrosive plume downwash aspects, the new wet stacks are required to be located at a sufficient distance away from the existing structures/ stack. Thus, the flue gas needs to be conveyed to a larger



distance, which will in turn increase the pressure drop in the duct leading to increased booster fan power consumption.

3. The FGD waste water generated requires to be treated in a new waste water treatment plant for better water recovery/reutilization. This waste water treatment plant will consist of clarifiers, filters and RO systems, which needs significant auxiliary power consumption to operate.
- 4) L (Lime)/G (flue gas) ratio is the important factor for absorption efficiency of FGD. Therefore auxiliary power is directly depending on L/G ratio which is higher in LPGCL due to coal quality. For example:
  - (i) Both 3X660MW LPGCL & 3X660MW TATA POWER BARA are supplied by BHEL means of same design.
  - (ii) TATA POWER BARA (3X660MW) fires 331 TPH coal of 4200 Kcal/kg GCV and generates 2652 TPH flue gas. However LPGCL (3X660MW) fires 436 TPH coal of 3250 Kcal/kg GCV and generate 2817 TPH flue gas hence LPGCL generate 8% more flue gas which has to be treated by lime stone therefore lime consumption will be more in case of LPGCL.
  - (iii) More Aux Power due to handling more Flue gas.
  - (iv) More Aux. Power due to one no mill extra. (Including Seal air fan, coal feeder etc.).
  - (v) Bigger ESP size due to low GCV coal hence more power is required.
- 5) CERC has considered 96% FGD efficiency which is very high and equal to design/guaranteed efficiency. All plants have to meet the SOX limit for entire plant life therefore design efficiency & aux power (Which OEM has to prove once and is minimum). Actual efficiency will always 4-5% lower due to frequent chocking of spray nozzles. Therefore CERC must consider 92% FGD efficiency.
- 6) At Part load, consumption of aux power in the FGD system will be almost equal to Full load.
- 7) Even during reserve shutdown for one (1) month, there will be some consumption of Aux. Power for recirculation of lime to avoid settling.

It is pertinent to mention that since limestone consumption and Aux. Energy Consumption is dependent on SO<sub>2</sub> Removal efficiency. Therefore, if the SO<sub>2</sub> removal efficiency is lower or will be lower due to degradation, it will lead to higher Aux. Energy Consumption and higher limestone consumption. In view of above, it is essential to factor in the same while specifying norms for Aux. Energy Consumption & Limestone consumption.

As suggested by CEA in its report attached as annexure-I, specific consumption of lime stone has been calculated based on the formula provided in the report. As from the report, it can be seen that based on the data shown in the report, specific limestone consumption is in the range of 15.3 g/kwh (for Telengana, NTPC 2x800 MW) to 12.5 g/kwh (for Lara NTPC, 2x660 MW) at 79% purity. In the regard, it is pertinent to mention that CEA has also recommended 11.36 g/kwh at 85% purity, if we convert the specific limestone consumption provide by CEA at 79% purity then it will be around 13.26 g/kwh. Therefore, it is suggested that in the formula provided to calculate specific limestone consumption, value of K should be such that it always gives specific lime stone consumption at 79% purity as 13.26 gm/kwh. It is also noteworthy that limestone consumption is dependent on the flue gas generated by plant which in turn is dependent on GCV of the coal. Whenever, there is higher GCV of coal then coal burnt for the same output would be less and accordingly flue gases would be less and less limestone consumption is required. However, for a plant like LPGCL (3X660 MW), where GCV of coal is comparatively lower, in that case limestone consumption will be much higher. Therefore, it is essential that the norms for specific limestone consumption should be made by considering plants having low GCV of coal.

Further, if plant is under shut down for short period like 10-15 days then Aux Power for agitators and recirculation system to be provided i.e the requirement for use to same lime slurry. During shut down, entire slurry has to transport to blow done area and all the slurry has to stir to avoid solidification. This is not only waste of entire slurry but also increasing Lime cost & Aux. Power. In case of solidification entire sump has to clean for future use.

**Further, it is requested to consider the following and make necessary provisions in the Regulation**

(a) In our humble opinion, we appreciate that the Hon'ble Commission has already allowed the landed price of such reagents applying applicable statutory charges and transportation cost. However, the Hon'ble Commission may consider to allow the consumption/quantity of limestone at actual. There is a dearth of actual limestone consumption data for wet limestone FGDs specifically for Indian conditions and we feel that normative values may have to be arrived at after 5 years of operation and during that period the actual consumption values need to be considered. Moreover, the specific limestone consumption may vary with other factors like the particular limestone FGD technology adopted, the reactivity of limestone and PLF of the unit.

(b) Purity of limestone will not be in control of the generators. Major portion of the domestic limestone is having purity less than 85%. Availability of the quality limestone is limited for plants in the eastern region. Generators may have to opt for low quality limestone – based on local availability. Hence ceiling of limestone purity at a minimum of 85% may not be practical to accommodate such huge requirement of limestone for emission control systems in India.

(c) A measure of Sulphur percentage in coal is required to find out the normative consumption of reagent as proposed by the Hon'ble Commission. It may be indicated whether the Sulphur percentage in coal will be treated as a predetermined quantity or actual monthly weighted average of Sulphur percentage needs to be determined.

In case monthly weighted average is required to be determined, testing charges for Sulphur percentage in coal may be allowed as a pass-through item.

**Further, in the draft,** Regent lime stone purity has been considered as minimum 90% which is very difficult to get. It is fact that limestone purity varies from one region to another region. It is essential to consider a range for lime stone purity.

**Therefore, it is submitted that Hon'ble Commission may provide different formula ranging from 75-90% purity of lime stone based on the data and purity of limestone available in the region and accordingly specify Aux. Energy Consumption and limestone consumption for different purity range.**

**9 Annexure -I PART 1 FORM- 16A**

**Details of Reagent for Computation of Supplementary Energy Charge Rate**

**In this regard, it is requested to consider the following and make necessary provisions in the Regulation**

- (a) Transit and handling loss of limestone may be allowed as transportation of limestone will entail transit losses similar to coal.
- (b) Handling cost, charges for third party sampling and applicable statutory charges for lime stone may be allowed.
- (c) Limestone sampling, Testing and Analysis charges may be allowed as a pass through item in limestone procurement.

**10 Additional Submission**

**(Consideration of all relevant costs/ expenses and incentives)**

**In this regard, it is requested to define a suitable mechanism for cost recovery of the following items:**

- (a) Lime stone / reagent consumption during an estimated 3 month trial operation of emission control systems prior to declaration of date of commissioning.
- (b) Actual additional auxiliary consumption of the unit during the trial operation period of emission control systems prior to declaration of date of commissioning.
- (c) The project execution phase from date of placement of order till commissioning of FGD may be considered as 30 months. Suitable incentive clauses of 70%:30% sharing of cost savings between generators and beneficiaries for achieving plant commissioning before the above period on account of savings from IDC

