

Staff Paper on Mechanism for Compensation for Competitively Bid Thermal Generating Stations for Change in Law on account of Compliance of the Revised Emission Standards of MoEF&CC:

Comments by Tata Power Company Limited

S.No.	Proposed Provisions	Suggestions	Justification
1.	<p>Clause 4.4 25 years is the minimum period that has been considered as life of a thermal generating station. Accordingly, the useful life of the ECS is considered as 25 years in line with the other major equipment of generating plant. However, many generating stations have already been in operation for a few years and the remaining useful life in case of such generating stations is less than 25 years. Therefore, while considering the useful life of ECS as 25 years, it has been assumed that the useful life of the generating station would be subsequently extended. The salvage value of ECS has been considered as 10% after completion of its useful life.</p> <p>Clause 4.5 In many cases, the term of the PPA may be ending earlier than the useful life of the generating station.</p> <p>Clause 4.6. There can be no obligations on the existing procurers to procure power beyond the contracted period and contracted capacity as per the PPA. Therefore, recovery of compensation from the existing procurers for the period beyond the contracted period of PPAs is not justified, Therefore, a procurer should be liable to pay compensation for Change in Law ... only for the duration of its</p>	<ul style="list-style-type: none"> • The proposed scheme actually increases the commercial risks for the thermal power stations as there may be a scenario wherein the arrangement for sale of power is not secured, commensurate with the life of FGD systems, thereby risking the recovery of capital expenditure related to ECS. Unless PPAs are extended to be in line with 25 years after ODe of ECS, the generation units will face non-recovery of ECS as there is no certainty or assurance of availability of procurers or getting a tariff that will cover the cost of ECS. Hence, to mitigate this risk, the Hon'ble Commission is requested to consider the following: • Deprecation against total ECS CAPEX to be allowed over remaining PPA period or 25 years from Date of Operation (Ode) of the generating station whichever is earlier. • The term of the existing long term open access for the thermal power plant extended to be in line with the useful life of the ECS. 	<p>Electricity Act, 2003 envisaged useful life of 25 years for thermal power stations and accordingly, maximum tenor of the power purchase agreements, whether in a Section 62 or Section 63 scenario, were kept as 25 years. The tenor of long term open access being granted by PGCIL was also 25 years.</p> <p>Under the proposed scheme of things, the existing status quo is being disturbed and it is envisaged that the useful life of the thermal power stations will be more than 25 years.</p> <p>In case of bidding also, all the terms & conditions of PPA including tenure of the PPA has been known to all bidders participating in the Bid (PPA is a part of RFP document). As tenure of PPA has been 25 years for section 63 projects, all bidders had factored the life of the plant as 25 years and considered various cost components to be recovered in 25 years while arriving at quoted tariff. It is also important to mention that in none of the Bid documents like RFP, RFQ, etc it had been specified that plant life should be considered more than 25 years for the bid purpose. As PPA life was mentioned as 25 years, all bidders considered the cost assuming plant life of 25 years and quoted tariffs accordingly. In other words, life of plant beyond PPA period (25years) was not envisaged in Bid/PPA. Therefore, it is not prudent to consider the life of the ECS beyond PPA period for any bid out projects. Hon'ble Commission would appreciate that there would be costs involved in extending the useful life of the plant beyond 25 years in terms of RLA + R&M and such costs would have to be recovered from</p>

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	<p>contract and commensurate to its contracted capacity.</p> <p>Clause 4.8. It is suggested that the compensation for installation and operation of the ECS should be available to the seller from the Date of operation (ODe) of the ECS</p> <p>Clause 4.9 Based on the above, life of 25 years has been considered for ECS. Accordingly, 90% (considering salvage value of 10%) of additional capital expenditure on account of installation of ECS is proposed to be recovered by the generating company in 25 years as depreciation {straight line method @3.6% (90%/25) per year} starting from ODe of ECS.</p>		<p>procurers in the event of extended tenures of PPA.</p> <p>In this regard it may be noted that there is no certainty that PPA will extended beyond PPA period. Taking into account the thrust given by policy makers on renewable energy in India, it is unlikely that PPA will be extended beyond current PPA period. Even assuming that PPA is extended, there is no certainty that PPA will be extended in such manner to complete total 25 years of ECS life from the ODe to recover the balance depreciation. Also generating company will have an option to recover the unrecovered compensation (beyond PPA period) by continuing the operation beyond PPA period provided there is PPA beyond current PPA period & tariff is commercially viable for generators.</p> <p>Further in case Depreciation is allowed over remaining PPA life(<25 years) with assumption that PPA will be extended further, it will provide the Discoms an upper hand to arm twist the generator to agree for the tariff as desired by Discoms which may not be commercially viable for generating companies.</p> <p>It was envisaged in PPA that any change in law during construction period, i.e. any change in law impacting CAPEX, to be recovered during PPA period ONLY as Procurers are liable to pay for the entire capital cost of the project during PPA period. Therefore, depreciation to be allowed within current PPA period.</p> <p>As mentioned in the para 3.6 to the Staff Paper , APTEL and the Hon'ble Supreme Court held that that the provision contained in Article 13.2 of the PPAs requiring to restore</p>

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			<p>the affected parties to the same economic position as if the event of Change in Law had not occurred “is in consonance with the principle of ‘restitution’ i.e. restoration of some specific thing to its rightful status” and that the affected party “is eligible for Carrying Cost arising out of approval of the Change in Law events from the effective date of Change in Law till the approval of the said event by appropriate authority” . If Depreciation @ CERC proposed rate is allowed, generators will not able to recover the capital cost of the project within current PPA period. Therefore, the purpose of restitution for the affected party (generating company) as held by APTEL & SC will be completely defeated.</p> <p>It is mentioned in para 3.2 that substantial part of such capital expenditure may have to be in the form of debt from banks and other financial institutions. Often, the banks and financial institutions, before committing to such funding, insist on approval of regulator as regards the proposed capital expenditure and a mechanism for recovery of such capital expenditure through tariff. If Depreciation (used for loan repayment) is allowed @ CERC proposed mechanism till expiry of current PPA period, then there may be not adequate cash from FGD tariff/revenue to meet loan repayment and thereby generating company will default in loan repayment. As mentioned the above para , even if there is approval of regulator as regards the proposed capital(ECS) expenditure, the banks and financial institutions may not participate in debt funding for ECS CAPEX if the recovery of such costs remains uncertain.</p> <p>In the event, current PPA is not extended, generator will</p>

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			not able to repay the Debt leading to potential default/ NPA.
2.	<p>Clause 4.10 The cost of capital employed also known as the cost of fund infused represents the weighted average cost of debt fund and equity fund deployed in the project. Considering the fact that any compensation mechanism needs to be based on the principle of restitution, there can be no expectation of profit in any component of tariff.</p> <p>Clause 4.11 Accordingly, additional capital expenditure on installation of emission control system is proposed to be serviced on Net Fixed Assets (NFA) basis (value of fixed assets reducing each year by the depreciation value) @ weighted average rate of interest of loans raised by the generator or at the rate of Marginal Cost of Lending Rate of State Bank of India (for one year tenor) plus 350 basis points, as on 1st April of the year in which emission control system is put into operation, whichever is lower.</p>	<p>The additional capitalization is expected to be funded through both debt and equity capital in the ratio of 70:30. Debt providing FIs/ banks and other institutions provide debt funds on the condition that the asset owner has put in equity capital as per the normative ratio mentioned above. It is the asset owner who bears the risks of the project and expects reasonable returns commensurate with that on risk capital. Hon'ble Commission has suggested that the entire capital on account of ECS be financed on NFA basis @ weighted average cost of debt OR SBI MCLR as on 1st April of the year on which the project is commissioned + 350 basis points. This equates the costs of both equity and debt capital and goes against the established fact that it is more expensive to service equity than to service debt (for reasons stated above).</p> <p>It is submitted that equity investors would expect a return which would be higher than the average cost of debt as suggested by Hon'ble Commission.</p>	<p>The Staff Paper proposes compensation for capital expenditure equivalent to the cost of debt thereby ignoring the cost of equity capital. Hence, the proposal for compensation in the Staff paper is not meeting investor expectation and falls way below cost of capital for investors and hence is not a viable investment to make. As investment in ECS is quite substantial, returns not in line with the current equity cost of capital of about 15-16% would not make it an attractive proposition.</p> <p>The Staff Paper assumes that a “substantial part of the capital expenditure may have to be in the form of debt from banks and other financial institutions”. Choice of funding should be left open to the generation companies and assuming debt as the major source of capital expenditure may not be appropriate as some of the companies may be already over-leveraged. Hence (a) banks and financial institutions may not finance the project despite approval from regulator on the compensation and (b) lenders will expect equity contribution at the normal ratio of 70:30.</p> <p>Compensation equivalent to cost of debt is not in consonance with the concept of cost of equity capital. Cost of equity capital represents a hurdle rate that a company must overcome before it can generate value and is the opportunity cost of making an investment. In short, about</p>

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		<p>In keeping with the principle of restitution and in order to facilitate the execution of the ECS project (mandated as per Law) which in turn would require availability of funds, the following is submitted for kind consideration of the Commission:</p> <ol style="list-style-type: none"> 1. RoE to be based on gross fixed asset not on net fixed asset. 2. Cost of additional capital be funded @ average rate of cost of debt to developer for 70% of capital employed and @ (average cost of debt to developer + 500 basis points) for 30% of capital employed. 	<p>15-16% is the cost of capital and investors will only invest in projects that will provide returns that exceed the cost of their capital. This concept is also highlighted in Capital Asset Pricing models and supported by valuation experts.</p> <p>Further as per staff paper, ROE is proposed on NFA which mean ROE in absolute terms will keep on decreasing on year on year basis based on depreciation(on ECS Capex) allowed in tariff. As per the Regulatory philosophy ROE is allowed on the equity investment made by the project developer. Increase/decrease on ROE in absolute terms is dependent upon addl capitalization/decapitalization approved by Commission. If ROE is allowed on Net Fixed Assets, it will be construed that value of investment made by Project Developer is eroded Y-0-Y basis. Therefore, ROE on NFA is against the spirit of basic regulatory principle.</p>
3.	<p>Clause 4.13 The Commission, in some of the orders, has allowed provisional first year O&M expenses @2% of capital expenditure for installation of FGD (excluding IDC and FERV) admitted by the Commission after prudence check. On similar lines, it is proposed that additional O&M expenses for first year may be allowed @2% of additional capital expenditure (ACEECS) for installation of ECS (excluding IDC and FERV), admitted by the Commission after prudence check. For subsequent years, the first year O&M expenses may be escalated @3.5% or any other escalation rate as may be specified</p>	<ol style="list-style-type: none"> 1. It is submitted that as per our estimate the O&M expenses including the manpower cost and routine maintenance spares work out to nearly 5% of the Capital cost excluding IDC and IEDC. However, as Hon'ble Commission may deem fit, may continue with the proposed norms but 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 	<p>O&M cost to be based on gross GFA i.e. Capital Cost approved by CERC after prudence check not on additional capex excl. FERV & IDC .</p> <p>O&M cost include manpower cost which normally increases by 6-7% annually under minimum Wages Act also. In addition, escalation in cost of spares & consumables for ECS depends upon inflation & forex rate (imported spares). Therefore, Yearly escalation @3.5% needs to be revisited.</p>

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	<p>by the Commission. The above O&M expenses may subsequently be reviewed based on actual O&M expenses of ECS installed at various generating stations.</p>	<p>thereafter.</p> <p>2. It is requested to consider the O&M cost to be on GFA not GFA less FERV & IDC. Particularly FERV is not under control of the generating company. Any impact of FERV is an integral part of hard cost/project cost</p> <p>3. In a multiunit power station, this needs more clarification as each FGD Unit will have different Date of Operation (ODe)</p>	
4.	<p>Clause 5.3 The recovery of monthly Supplementary Energy Charges (SECm) will be made by applying following formula: </p>	<p>Hon'ble Commission may provisionally consider the impact of 1.01% on Normative Station Heat Rate i.e. (SHR/(1-1%)) due to reduction boiler efficiency by 1% while finalizing the Regulations subject to true-up as per bid guarantee as it would severally impact the energy cost for reasons not attributable to Generating Stations.</p>	<p>Emission Control System will have impact on the Station Heat Rate of the generating unit(s). Hence, the normative SHRs of the generating unit(s) should also be adjusted appropriately. The 'in-combustion control system' which is one of the most suited method for abatement of NOx upto range of 450mg/Nm3 is sensitive to operational aspects and majorly impacts the boiler efficiency. Boiler efficiency will reduce due to increased unburnt carbon loss after implementation of 'In Combustion Control Technology'.</p> <p>The same has been highlighted by all the bidders for installation of In-Combustion control system for limiting NOx emissions. It is understood that the adverse impact on boiler efficiency would vary in the range of 0.8% to 1.8% depending on the site condition as per the discussions with vendors.</p> <p>Also, in case of SNCR system, because of water injection in</p>

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			the furnace, Boiler efficiency will decrease by 0.3% to 0.4% leading in increase in normative unit / station heat rate which will impact energy charges.
5.	<p>Annexure-I, Additional Auxiliary Power Consumption</p> <ol style="list-style-type: none"> 1) For reduction of sulphur dioxide <ol style="list-style-type: none"> a) For wet limestone FGD (without Gas to Gas Heater) - 1% b) Semi dry FGD system - 1% c) DSI (using sodium bicarbonate) - Nil d) For CFBC Power Plant - Nil e) Sea water based FGD (without GGH) - 0.7% 2) For reduction of emission of oxides of nitrogen <ol style="list-style-type: none"> a) SNCR - Nil b) SCR system - 0.2% 	<p>Regarding auxiliary consumption as given in annexure 1, the following may be considered:</p> <ol style="list-style-type: none"> a) For wet limestone based FGD, Auxiliary Power Consumption will be dependent on plant specific design. The limit of Auxiliary Power Consumption for wet limestone based FGD Shall be 1.2% in place of 1.0%. b) Auxiliary Power consumption for DSI should be 0.5% c) Auxiliary Power Consumption without Gas to Gas heaters for sea water based FGD shall be 0.9%. For Gas to Gas Heater, additional APC of 0.3% shall be considered. d) Auxiliary Power Consumption for SNCR System shall also be considered. It shall be 0.05% 	

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6.	<p>Annexure-I, 2 (1) Norms for consumption of reagent, (a) For wet limestone based FGD The specific limestone consumption (g/kWh) shall be worked out by following formula: $= [0.85 \times K \times \text{SHR (kCal/kWh)} \times S (\%)] / [\text{GCV (kCal/kg)} \times \text{LP} (\%)]$ Where, S = Sulphur content in percentage, LP = Limestone Purity in percentage; 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%.</p>	<p>e) The Hon'ble Commission is requested to remove the minimum % stipulation on limestone purity</p> <p>f) It is requested to consider SO₂ conversion factor 100% i.e. 100% Sulphur available in coal will be converted to SO₂.</p>	<p>It may kindly be noted that the assumptions considered for evaluation of normative consumption of Specific Reagent for various technologies for reduction of emission of Sulphur Dioxide would depend on several parameters such as (a) Normative Station Heat Rate (after duly factoring impact of ECS system) (b) GCV of Coal, (c) Sulphur content of Coal (f) Purity of Reagent (g) Design SO₂ Removal efficiency of the ECS and (h) Stoichiometric molar ratio of reagent consumption and therefore assigning normative values in some of the cases may not be correct. As such a common empirical formula may be provided to compute the specific reagent consumption for various technologies wherein 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.</p> <p>The details of common empirical formula with relevant details in enclosed in Tata Power Annexure 1 for kind consideration of the Hon'ble Commission. It may be noted that this is the same formula that CEA has used, including for computation of K, and incorporates all parameters considered by it.</p> <p>Further, in the formulation of CEA, the value of SO₂ conversion factor has been considered as 0.95 or 95% for which no basis has been given, whereas in most of calculations by bidders nowadays this factor is taken as 100%.</p> <p>Similarly, for computing limestone purity, it may be clarified</p>

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			<p>that the same relates to purity with reference to reactive component of limestone. Thus, 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%. This is again a commonly sought factor by bidders for the purposes of guaranteed purity. The paper showing non-reactive component of limestone being between 6-13% is attached herewith as Tata Power Annexure 2.</p> <p>It is also to be noted that while CEA has acknowledged that stoichiometric ratio increases with increase in efficiency of Sox or NOx 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 and are requested to be considered.</p> <p>Also, it may be noted that Limestone with lower purity can also be used specially in eastern region plants where low grade limestone from Jharkhand, Orissa and West Bengal can be sourced. Hence cap on limestone purity may be removed. Further, the variation in the price of the limestone does not vary linearly with the purity and therefore, in case when avenue of utilization of disposal is not available or the overall cost of lower purity limestone is less than high purity levels, flexibility should be given to the Generators to choose the appropriate purity of limestone after having cost benefit analysis of reagent cost plus disposal cost of the byproducts. Therefore, in cases, where</p>

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			utilities are not able to fully use gypsum produced, they may source low quality limestone for reducing reagent cost and, hence, energy cost.
7.	<p>Annexure-I, 2 (1) Norms for consumption of reagent. c) For Dry Sorbent Injection System The specific consumption of sodium bicarbonate shall be 12 gm per kWh at 100% purity.</p>	The Hon'ble Commission is suggested to indicate Sodium Bicarbonate consumption with SO2 removal efficiency and inlet SO2 loading.	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 Sodium Bicarbonate 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 Tata Power Annexure 1 , which accommodates these parameters as variables for different site conditions
8.	<p>Annexure-I, 2 (1) Norms for consumption of reagent, (d) For CFBC Technology Furnace Injection System. The specific limestone consumption for CFBC based generating station (furnace injection) at 85% purity limestone (kg/kWh) shall be computed with the following formula: $= [62.9 \times S (\%) \times [SHR (kCal/kWh) /GCV (kCal/kg)] \times [0.85/ LP]$ Where S= Sulphur content in percentage, LP = Limestone Purity in percentage.</p>	The Hon'ble Commission is requested to re-check the K value for CFBC Boiler, indicate range of efficiency for which K value is specified and factor design efficiency.	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. The SO2 removal efficiency required will depend on inlet SO2 level and outlet SO2 level to be achieved. The inlet SO2 level will depend on fuel being fired in CFBC Boilers. Hence it is suggested not to give general formula for specific reagent condition for CFBC Boilers. Even if, it need to be indicated, corresponding conditions like range of SO2 removal efficiency need to be indicated and design efficiency need to be factored similar to wet limestone based FGD. It is suggested to re-check the K value for CFBC Boiler, indicate range of efficiency for which K value is specified and factor design efficiency.

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			As stated above, a common formula has been proposed in Tata Power Annexure 1 to capture the above points.
9.	<p>Annexure 1</p> <p>2 (2) The normative consumption of specific reagent for various technologies for reduction of emission of oxide of nitrogen shall be as below:</p> <p>(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.</p> <p>(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.</p>	Hon'ble CERC may consider not to specify norms in view of the rationale provided.	<p>Additional new clause (F) Norms for consumption of reagent</p> <p>Sub clause (2) Normative Consumption for specific reagent for various technologies for emission of Nitrogen Oxides</p> <p>a) Selective Non catalytic reduction</p> <p>Comments:</p> <p>1. It is to be specified that reagent consumption indicated is for reducing NOx emission to <300 mg/Nm3 from the base level achieved after 'In Combustion Modification'</p> <p>2. Specific Urea consumption will depend on NOx value achieved during 'In Combustion Modification'. In case NOx value achieved during 'In Combustion Modification' is 450 mg/Nm3, specific urea consumption will be 1.55 gm / KWH. In case NOx value achieved during 'In Combustion Modification' is 400 mg/Nm3, Specific urea consumption shall be 1.30 gm/KWH.</p> <p>Accordingly, a generic formula based on CEA's methodology has been given in Tata Power Annexure 1, but with slightly higher stoichiometric ratios.</p>

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10	<p>Additional Point The Paper does not talk about Reduction in Long Term Access (LTA) Capacity for Beneficiaries due to Lower Declared capacity (DC) on account of the enhanced auxiliary power consumption due to ECS</p>	<p>The Hon'ble Commission is requested to device a mechanism for relinquishment of the transmission capacity equivalent to auxiliary power consumption of ECS without any liability.</p>	<p>Reduction in DC due to Additional Auxiliary Consumption due to FGD system as well as increase in AUX consumption, would mean that Long Term Open Access Capacity booked by the beneficiaries would not be fully utilized to the extent it was envisaged at the time of taking LTA with the CTU. The LTA Capacity would, therefore, need to be reduced to the extent of Additional Auxiliary Consumption for FGD. Hon'ble Commission is requested to allow the same immediately after installation of FGD system as per applicable Regulations for the same.</p>
11	<p>Additional point The staff paper is not clear about waste water treatment O&M expenses e.g. if due to Zero Liquid Discharge (ZLD) status, plants are not allowed to dispose FGD water and treatment scheme has to be put, e.g filter press followed by multistage evaporator and incinerator, then cost towards chemical dosing as well as steam, electricity will have to be also accounted for apart from the huge CAPEX.</p>	<p>In such condition following addition cost / APC shall be allowed: a) Additional APC in Waste Water Treatment Plant b) Cost towards additional steam consumption / compensation in SHR due to steam consumed in waste water treatment plant c) Additional cost of chemical</p>	
12	<p>Additional point The Staff Paper doesn't consider fresh water consumption in supplementary energy charges</p>	<p>Fresh water consumption shall also be considered in "supplementary energy charges". It shall be (i) Wet limestone based – 0.21 m3/MWH (ii) Sea water based FGD – Service water 0.02 m3/MWH</p>	

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