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ODISHA POWER GENERATION CORPORATION LTD.
(A Government Company of the State of Odisha)
CIN : U40104OR1984SGC001429

OPGC
Power for Progress

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Ref: No. OPGC/CERC/Tariff/2018-19/ 2028/AE July 31, 2018

To
The Secretary,
Central Electricity Regulatory Commission
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Sub: Comments/suggestions on Consultation Paper - Terms and Conditions of Tariff for the tariff period commencing from 1st April, 2019.

Ref: Public Notice No. L-1/236/2018/CERC Date: 13.07.2018

Dear Sir,

With reference to the Public Notice referred above, we are submitting herewith our comments/suggestions on Consultation Paper - Terms and Conditions of Tariff for the tariff period commencing from 1st April, 2019 issued by the Hon'ble Commission.

We request your kind self for suitably considering our views while framing the draft/final Terms and Conditions of Tariff Regulations for the period commencing from 1st April, 2019.

Thanking You.

Yours faithfully,

General Manager (C& RA)

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ODISHA POWER GENERATION CORPORATION'S SUBMISSION ON CERC CONSULTATION PAPER - TERMS & CONDITIONS FOR TARIFF REGULATION 2019-24

Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
Tariff Design	Clause 7.2.4 to 7.2.6 & 7.3.1 to 7.3.4	(1) The proposed 3-part tariff mechanism will lead to under recovery of fixed cost as well as variable cost for generating stations. Further it will also create huge regulatory uncertainty & chaos in the whole supply chain of power. Under recovery of cost & return on investment can lead to more non-performing assets in the industry. (2) The state generating stations with allocated coal mine through government dispensing mechanism, are not eligible for selling power through long term DBFOO tender. The cost plus PPA is only option for them for selling power in long term. Such generating stations should be kept outside of any such 3-part tariff mechanism. (3) Further it may be noted that as CERC's consultation paper Para 4.7, it has been established that the thermal power tariff increase across the country is mainly because of increase in fuel cost and not fixed cost. Rather the fixed cost has seen a drop. As per this clause, there is a proposal to reduce fixed cost recovery, which does not ensure reasonable returns as envisaged by the Electricity Act. Any measure for reduction of fixed cost directly impacts the financial viability of the power plant.
Components of Tariff	Clause 9.3	(1) The proposed pro-rata recovery of fixed charge after determination of the same on the basis of full plant capacity is already in use. However, it may be noted that for state owned generating companies with allotted coal blocks, and where the power plants are not fully contracted under Sec-62, the present SBD for DBFOO (Long term and Medium Term) does not allow participation in the bid. Hence, while restricting recovery of tariff to contracted capacity for such plants, sale under competitive bids will not be possible. Hence, DBFOO guidelines need to be amended to include state owned generating stations with allotted coal blocks.
Optimum utilization - Flexible Operation for Thermal Power Plant	Clause 10.1 to 10.5	(1) Present standard PPA/cost plus PPA takes care of selling unutilised / unscheduled capacity of Gencos and sharing profit with beneficiaries. a) The proposed provision will negatively impact the financial viability of the thermal plants. b) The provision is against the Gencos interest as it will dilute the PPA. This will also dilute the obligation of Discoms for fixed charge under the PPA.

ODISHA POWER GENERATION CORPORATION'S SUBMISSION ON CERC CONSULTATION PAPER - TERMS & CONDITIONS FOR TARIFF REGULATION 2019-24

Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
Capital Cost	Clause: 11.1 to 11.10	(1) **Benchmark cost should not be used because capital cost depends on location, technology, bidding process, etc. :** capital equipment procurement by IPPs are done on nomination /negotiation basis whereas for government companies it is required to go for tendering process. In the same light companies like NTPC have advantage of bulk procurement. These different processes lead to different price discovery and hence cannot be compares across different types of generating companies. (2) **CERC benchmark for capital cost was issued in 2012**, whereas the capital cost of projects have been continuously increasing. Unless such benchmark is reviewed every year, it will not capture the representative capital cost. (3) **Additional capital requirement** due to change in law or deferred work even after the cut-off date should be allowed. In addition to suggested provision to consider additional capitalisation up to cut-off date beyond COD, additional capitalisation beyond cut-off date should also be considered in line with present regulation. (4) **RoE should be linked to normative equity for approved project cost** and not to the benchmark cost.
Renovation & Modernisation	Clause 12.6	For transmission system the **R&M should be based on RLA and approval through regulatory process**. There should not be any normative special allowance for transmission assets
Financial Parameter – hybrid approach	Clause 13.1	**The present practice may be continued.** Any attempt to cap/prescribe the normative interest rate on loan will be detrimental for the generators & other project developers
Depreciation	Clause 14.1 to 14.7	**Rate of depreciation should match with the tenure of loan.**: The present regulatory practices for determining depreciation rate should be continued.
Gross Fixed Asset Approach	Clause 15.1	**This will reduce the RoE because in net block approach the equity base will be reduced which will adversely impact the investors.** The present regulatory practice should be continued.
Debt Equity Ratio	Clause 16.1 to 16.5	The developers should not be in disadvantage based on reduced equity base. Both act and tariff policy recommend ensuring reasonable return to developers. The present regulatory practice for determining debt equity ratio should be continued.
ROE	Clause 18.1 to 18.8	The present concept of allowing ROE which is linked to cost of borrowing & providing reasonable return should be followed. RoE is the return to the investor. It should be based on the opportunity cost. CAPM should be adhered to while determining ROE. However, the basis of determining cost of equity should have a progressive view in the light of rising inflation & risk free rate (G-sec) in India and should not be based on past data. Different RoE for different unit size may not

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Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
		be justifiable for old plants with lesser capacity or newer plants with high capacity. Post tax ROE shall be there as it will be more transparent to discoms also. RoE should not be reduced if project delay is beyond the proponent's control.
Cost of Debt	Clause 19.1 to 19.6	**The cost of debt should be at actual** (as it is in the present regulation). However, the incentive for reduction of cost of debt may be considered
Interest on Working Capital	Clause 20.1 to 20.4	Present regulatory provisions should be retained.
O&M Expenses	Clause 21.1 to 21.8	Special allowance or additional O&M cost should be allowed for Installation of pollution control system and mandatory use of treated sewage water
Fuel-GCV	Clause 22.1 to 22.9	Please refer OPGC's detailed note on GCV & coal cost recovery Whether CERC discussed the issue with MoC & Ministry of railways
Fuel- Blending of Imported Coal	Clause 23.1 to 23.6	CERC may prescribe norms based on unit size and make, which should be allowed during tariff determination process if the generator has availed the facility. Any quantity consumed over the normative allowance can be done with prior intimation and clearance from the beneficiaries.
Fuel-Landed Cost	Clause 24.1 to 24.5	(1) The proposal to allow full landed cost of coal under the tariff should be continued. (2) The source of coal & mode of transportation largely depend on the allocation of coal from the coal company, where the generator has no control. Secondly, to augment coal requirement for shortage of supply from linkage/allotted coal, there is no certainty of the source. Any attempt/proposal to standardise/fix the source of coal and mode of transportation will restrict the generator for lifting coal and as a result declaration of availability to beneficiaries will be impacted.
Fuel-Alternate Source	Clause 25.1 to 25.3	Commission should continue the existing provisions of 30% & 20% as provided in the regulation.
Operational Norms -SHR	Clause 26.1 to 26.3.15	**SHR**: The commission has rightly captured the need to take into account the make, unit size, vintage, heat rate degradation etc of the operating plant to specify normative values of SHR. However, since only past 5-year data are being referred, for arriving at standardised norms such norms of SHR may be considered taking into account wider cross section of plants of similar unit size and vintage and across state and private sector plants, and not restricted to NTPC plants alone. For example, unit size 210 MW are being considered operating units of both central & state sector. In addition, for old plants, where norms have been specified in the PPA, the same should be followed along with appropriate allowance for degradation.

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Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
		For new plants to be commissioned, the SHR norms should be considered corresponding to the date of placement of order and not COD as there could be further refinement on technology for plants which were ordered four to five years back and are being commissioned now.
Operational Norms - Secondary fuel consumption & auxiliary energy consumption	Clause 26.1 to 26.3.15	**Secondary Fuel Oil Consumption:** The impact on parameters like specific fuel oil, heat rate and auxiliary consumption as a result of operating at lower PLF are already provided in the IEGC 4th Amendment. The regulation should clearly provide pass through of higher parameters under tariff. Further, the commission may consider further increase of these allowances based on actual data. In addition, for old plants, where norms have been specified in the PPA, the same should be followed as older plants would have limited capability of improving SHR. **Auxiliary Energy Consumption**: The present provision in the regulation should be continued. In addition, for old plants, where norms have been specified in the PPA, the same should be followed, as older plants would have limited capability of improving AUX.
Operational Norms - Normative annual plant availability	Clause 26.1 to 26.3.15	**Normative Annual Plant Availability:** Capacity Charge is derived from AFC which is determined on annual basis. Any attempt to delink the recovery of capacity charge from PAFY (annual plant availability factor) will put generator in financial distress. In addition, for older plants, where norms have been specified in the PPA, the same should be followed.
Operational Norms -Transit & Handling Losses	Clause 26.3.16 to 26.3.19	**The norm for Transit & handling losses** provided in the regulation are on the basis of the data pertaining to NTPC's stations. However, the actual transit and handling loss of most of the state generating stations are much higher than the specified norms. **Suggested proposal in the discussion paper is not feasible unless and until FSA provisions are modified to that effect.**
Sharing of gains in case of controllable parameters	Clause 29.1 to 29.3	Generator takes maximum risk in terms of investment, equipment performance, fuel availability, operation and maintenance, etc and hence there should not be any sharing of gains as a result of achieving better operating norms than that provided in the regulation. On the contrary, if any plant is consistently unable to meet the regulatory norms due to inherent/technical limitations, the commission should prescribe provisions for relaxing operational norms on case to case basis.
Late Payment Surcharge & Rebate	Clause 30.1 to 30.2	**Late Payment Surcharge:** LPS is payable after 60days from the date of billing. Interest on working capital covers the month for which the bill is raised. For the balance period (60 days or more) generator has to rely on short term loan, which comes at a higher cost. Secondly, any penalties on default of debt servicing would be an additional burden. Thirdly, opportunity cost of investing RoE recoverable during this period and earning interest benefit, is lost. Taking all these into account and the fact that LPS is a penalty or disincentive to the

Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
		beneficiaries not to default on payments, the LPS rate should ideally be higher than bank rates and should continue to be in line with present regulations. **Rebate:** The Regulation should clearly state that rebate is payable only if the bill is paid in full, not after considering unpaid/ disputed dues.
Non-Tariff Income	Clause 31.1	(1) For disposal of old asset, which are fully depreciated, the generator has to bear the residual cost (5%) and hence sale/disposal of such old asset should not be adjusted. (2) Any financial benefit on account of interest income is generally used as contingency funds and adjustment against O&M would deprive the generator from having any fund for contingency. (3) Regarding ash disposal, most plants are unable to sell ash and on the contrary, have to provide transportation subsidy (Rs 150/T) as per govt. guidelines to agencies willing to offtake ash from the plant. Such cost should be allowed, in addition to O&M cost. (4) With the rising cost and non-availability of land, generators have to resort to using advanced technology like HCSD which requires higher cost of maintenance & operation. These should be factored when considering any adjustment of O&M expenses.
Standardisation of Billing Process	Clause 32.1 to 32.2	**Billing process & Format Standardisation:** Commission may consider as proposed the discussion paper. **Reimbursement of ED:** ED is imposed by the respective state government as duty/tax/cess which is a direct cost to the generator. Hence the same should be reimbursed at actual and not on normative auxiliary consumption
Tariff Mechanism for Pollution Control System	Clause 33.1 to 33.4	(1) **Benchmarking of technology & cost**: The solution would be plant specific and vary from plant to plant. Hence providing a benchmark will not be appropriate. The Commission should emphasise on carrying out the competitive bidding and the discovered price should be allowed in the tariff. (2) **Relaxation of equity and change in RoE for supplementary tariff**: The risk on the generator is higher with installation of environment retrofit in the light of proposed provision for reimbursing capacity charge with availability linked to auxiliary consumption. Further, there will be increase of O&M cost, higher Aux consumption, higher net heat rate, disposal cost of by-product of retrofit for the generator. Under these circumstances, funding with higher equity at cost of debt will reduce the effective RoE to the investor. The RoE should be based on the risk return perspective and not on the basis of interest rate of debt. (3) **Supplementary Tariff payable as per actual generation**: The supplementary tariff structure should be same as base two-part tariff structure i.e. with fixed and energy charge. The fixed charge payment should be linked to availability and energy charge should be linked to actual generation. (4) **Where ESP installation is required**, it may be noted that the efficiency of ESP goes down at lower PLF. Commission should suitably consider this fact in tariff determining process. (5) **For sewage water treatment**, the commission should allow both

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Subject	Clause	Remarks of Odisha Power Generation Corporation Ltd.
		the capital expenditure as well as increase in operating expenditure as pass through in determining tariff
Renewable Generation by existing Thermal Generating Stations	clause 34.1 to 34.4	The proposed mechanism needs to be further elaborated for better understanding. Fixing of higher target availability will be disadvantageous for the generator as the generation from the RE source cannot be specified and setting higher availability target in terms of MU will impact fixed charge recovery.
Commercial Operation or Service Start date	Clause 35.1 to 35.5	(1) **Delay in availability of transmission system** leading to delay in trial run and declaration of COD of power plant should be considered by the commission for pass through of additional cost of the project. Commission should also consider that under above situation generator may not be able to meet its supply obligation under PPA and subject to further financial liability by way of performance guarantee encashment. (2) **COD of transmission line** should not be considered if any of the upstream/downstream element is not ready since the very purpose of the power evacuation cannot be met. If COD is considered under above condition, no transmission charge should be levied on the generator since evacuation cannot be carried out. (3) **LTAA agreement** should be made effective from the date the generation plant starts despatching power. Accordingly, the regulations should be modified to state that any financial or payment liability should be linked to service start date and not COD.
Alternative Approach to Tariff Design - Plant CAPEX	Clause 37.1 to 37.6	(1) **Any equipment cost arrived based on competitive bidding** should be allowed by the commission with minimum diligence. (2) **Any benchmarking of capital cost for power plant** will be disadvantageous as these costs are dependent on several factors and should not be generalised. Hence the present practice of evaluating capital cost from case to case basis should be continued.
Alternative Approach to Tariff Design - Annual fixed cost	Clause 37.7 to 37.23	The present regulatory practices should be continued.
Alternative Approach to Tariff Design - Annual fixed cost	Clause 37.7 to 37.23	(1) The peak & off-peak months can be different from region to region. During months of summer season, running power plant at very high PLF (95%) may be difficult because of issues pertaining to (i)Lower output and lesser efficiency because of high ambient temperature (45-50 degree C), (ii) quality issue of coal from mine due to high demand of coal. However, during Nov to March, plant can be operated at higher PLF because of the improved coal quality & quantity availability due to dry season coupled with favourable ambient condition (2) Further the suggested proposal needs to be aligned with the availability factors for peak and off-peak period so that the plants can operate at that level. (3) Segmentation needs to be done for plants based on their vintage,

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		technology, coal source, etc and PAF may be determined on evaluation of available database. (4) Differential incentive should be considered for peak and off-peak period

Comments/Suggestions on Para 22 of CERC Consultation Paper on tariff regulations 2019-2024:

Fuel- Gross Calorific Value (GCV)

The standardization of technicalities, methodology and measurement of Fuel-GCV, which is a major constituent of generation tariff, is very much required in the prevailing market conditions to safe guard the interest of generators, distributors and ultimately end consumers. In addition to the grade slippage and lack of proper sampling methodologies at the Mine end, the lack of standardization of Fuel-GCV computation methods and normative losses in entire value chain from Mine end to firing end had resulted in number of disputes between the generators and distributors resulting in filing of cases with the regulators for resolution of the same. Hence there is a need to provide clarity on systems and standardization of Fuel-GCV computation method and specifying the Normative GCV losses from Billing to Firing.

A. Standardization of Gross Calorific Value (GCV) computation method

Facts of Fuel-GCV:

1. *"Invoice GCV/GCV As Billed"*, *"GCV As Received"* and *"GCV As Fired"* are the terms generally used in the industry and reported to various authorities/parties.
2. The term Gross Calorific Value (GCV) does not offer proper meaning, if the conditions under which the GCV is measured are not mentioned.
3. Bureau of Indian Standards (IS) clearly provides the measurement of GCV on Air Dried Basis and reporting the results on *Air Dried Basis*, *As Received Basis*, *Equilibrated Basis*, *Dry Basis* and *Dry Mineral Free basis* by applying the required moisture and other corrections.
4. In the industry, *"GCV As Received" and "GCV As Received Basis"* are often loosely and interchangeably used. *"GCV As Received"*, which is often used by the industry for measuring and reporting the GCV of Receipt coal does not specify the conditions under which the GCV has to be measured, leaving scope for confusion/dispute among the generators and distributors. Technically, if not specified, the GCV of Receipt coal can be measured in Air Dried Basis, Equilibrated Basis, As Received Basis or any basis as described in point (3). The term *"GCV As Received Basis"* specifically describes the conditions under which the GCV is measured and hence these two are not interchangeable.
5. Depending on the purpose, GCV is measured and reported in the industry under three different conditions.

   i. Air Dried Basis GCV (GCV-ADB): - The given coal sample is air dried and the GCV is measured thereafter as per the procedure given in the relevant IS.
   ii. GCV – As Received Basis (GCV-ARB) is reported taking into consideration the total moisture, i.e., moisture inherently present in coal and surface moisture present in the Coal.
   iii. Equilibrated Basis GCV (GCV-Eq.B)– The sample is brought to standardized moisture and humidity levels and GCV of the resultant sample is reported.

i. Air Dried Basis GCV (GCV-ADB)

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Purpose: GCV-ADB is the only GCV of coal which is actually measured in Bomb Calorimeter for a given sample. In other forms of determination i.e GCV-ARB, GCV-Equilibrated, the GCV-ADB analysis result is corrected to the field conditions by using the respective Moisture content of the determinations for the intended purposes. The GCV and the proximate analysis constituents are all corrected by using the same factor.

Methodology: Sample prepared as per IS: 436 Part1/sec1 and reduced to 212 micron is air dried in laboratory for about 24hrs. 1g of the sample is taken for determining the Gross Calorific Value and is burned in Automatic Bomb Calorie meter, which directly gives the GCV reading.

ii. As Received Basis GCV (GCV-ARB)

Purpose: GCV-ARB (often termed as Total Moisture Basis – GCV) is actually a derived one which is obtained by applying the correction in GCV-ADB to the extent of the Total moisture content in the coal. In essence, ADB analysis is corrected to the actual conditions in the field to obtain the As Received Basis GCV (GCV-ARB). This gives the exact GCV of the coal at the point of sampling; be it at the Mines end (Coal dispatched), Plant Receipt end (Coal Received) or Firing end (fed to the boiler).

As the coal is never processed for laboratory conditions before firing in the general conditions, GCV-ARB gives the true representation of the actual Heat Value of coal which is available for firing.

The data submitted to CERC on the heads of GCV-As Received and GCV-As Fired is actually the GCV measured on As Received Basis but sampled at different locations, i.e. at wagon/truck top at track hopper for GCV-As Received and before firing into the boiler for GCV-As Fired. In this context, the justification as to why the ideal point for drawing sample should be considered at a point after the bunkers and before pulversing in the ball mill, is provided at ANNEXURE - A.

Methodology: GCV-ARB = GCV-ADB*(100-Total Moisture)/(100-Inherent Moisture).

iii. Equilibrated Basis GCV (GCV-EqB)

Purpose: Equilibrated Basis GCV is obtained by measuring the Equilibrated Moisture of coal and applying it on GCV-ADB. The Equilibrated Moisture in coal is determined under laboratory conditions of 60% RH and 40^{0}C, which removes major part of Moisture present in the coal.

Grade declaration and sale of coal to the consumers by the coal companies viz.CIL/SCCL is based on the Equilibrated GCV. This method is used by the coal companies to have the standardized results for the same sample wherever it is tested, primarily for the purpose of gradation of coal. Mining and Sale of coal is carried out by the CIL/SCCL in different parts of the country, which have different atmospheric conditions like temperature and Relative humidity and hence the need for standardizing the measurement process for the purpose of establishing declared grade of coal.

The coals which can produce same heat value, when put in use, gives different values if they are tested in different parts and further the price of coal also differs. Hence, In the case of indigenous coals, CIL/SCCL declares the Grade of the mine based on Equilibrated GCV to have parity throughout the country.

Equilibrated Moisture is not measured for either the Imported coal or Open Market coal Procured or Received at the plant because it does not have any industry use.

The fuel supply agreements for Indian coals do not have any provision for accounting the effect of total moisture. Only equilibrated moisture (EM) gets factored in the pricing as under the FSA, CIL/SCCL are only obligated to maintain GCV as per the declared grade of coal for the purpose of billing and are not concerned with the GCV-ARB coal and its economics applicable to the generator. The surface moisture(SM) and hence the total moisture (TM) does not get factored into the agreement. Only compensation is provided if the SM exceeds beyond certain limits.

Methodology:

Equilibrated Basis GCV = GCV-ADB*(100-Equilibrated Moisture)/(100-Inherent Moisture)

6. The values of GCV in *Air Dried Basis, As Received Basis, Equilibrated Basis* differs substantially and mainly depends on the measurement of moisture content of coal and hence cannot be generalized. To elaborate more on this, a practical example of a sample tested in all the above methods is given below:

Parameter	Value
Total Moisture%	10.8
Inherent Moisture%	3.34
Equilibrated Moisture%	3.57
GCV-Air Dried Basis (as measured in Bomb calorimeter in Kcal/kg)	3767
GCV-Eq. Basis(Kcal/kg)	3758
GCV-As Received Basis (Kcal/kg)	3476

Clearly the difference between the GCV-Eq.B and GCV-ARB is 282 Kcal/kg, which actually is not the Grade slippage/Quality deterioration of coal Loaded but it is only the difference between two different methods of testing. Further the GCV- Eq.B is always nearer to the GCV-ADB and both these measurements are not of practical importance.

7. Any comparison of GCV value of coal loaded by coal company and received by the power plant should be made in the same methodology, i.e GCV-Eq. Basis at Loading End should not be compared with GCV-As Received Basis at Power Plant End. Further, the coal received in power plant is being put in use without subjecting it to the equilibrated conditions and hence GCV-

ARB should be an uniform basis of comparison and also should be used for determining any losses.

8. Comments on Option for Regulatory Framework as provided in consultation paper.

"22.8 (a) Take actual GCV and quantity at the generating station end and add normative transportation losses for GCV and quantity for each mode of transport and distance between the mine and plant for payment purpose by the generating companies. In other words, specify normative GCV loss between "As Billed" and "As Received" at the generating station end and identify losses to be booked to Coal supplier or Railways.

b) Similarly, specify normative GCV loss between "As Received" and "As Fired" in the generating stations.

c) Standardize GCV computation method on "As Received' and "Air-Dry basis" for procurement of coal both from domestic and international suppliers."

Comments on point 22.8(a): The coal which is dispatched from mines, i.e. handed over to generator, is transported in different modes viz. truck, rail, belt conveyor, MGR etc. and not necessarily directly transported to the generator. Quantification of the losses at each end and fixing up the responsibility on Coal Company or Railways may not be practically possible and also Coal Company or Railways may not accept to take the responsibility as the conditions leading to losses are beyond their control and not under their purview. In fact within the power plant itself often generator is not able to fix up the responsibility of handling losses on different coal handling agencies/sub-departments.

Suggested approach for Standardization of GCV computation method and normative GCV losses are suggested in the following section.

9. <u>Standardization of GCV Computation method</u>

Keeping in view of the above facts it is suggested to adopt the following methodology:

a) *"Invoice GCV/GCV As Billed"*: This is delivered GCV of coal, which is measured in Equilibrated Basis from the coal samples collected at Loading end as per the procedure and formula suggested in Clause 5(iii). In the Loading end analysis reports, the coal companies are presently providing TM%, Eq. Moisture%, Eq. Ash%, Eq.GCV% and Grade of coal.
Suggestion: The coal company should be advised to provide Inherent Moisture of coal in their analysis reports, which will facilitate in determining the GCV-ARB of coal at Loading End. The generator should treat the GCV-ARB so determined at the loading end as the Loaded GCV, excluding the losses on account of Grade slippage and sampling procedure adopted by Coal Company.

b) *"GCV As Received"*: This is GCV of receipt coal which shall be measured in As Received Basis (GCV-ARB) as per the procedure and formula suggested in Clause 5(ii).

Suggestion: CERC should clearly indicate that the GCV shall be measured from the coal samples collected at receipt end, i.e from wagon top *or* auto samplers installed on receiving end belt conveyors *or* from trucks as the case may be, before it is further crushed and stacked.

"GCV As Received" = (GCV ARB at Loading end) – (losses on account of Grade slippage and/or sampling procedure adopted by Coal Company) – (Transit losses)

c) *"GCV As Fired":* This is GCV of coal fed to the bunkers for firing and shall be measured in As Received Basis (GCV-ARB) as per the procedure and formula suggested in Clause 5(ii). The coal GCV measured at firing end includes the GCV of blended coal from all the sources and/or consignments.

Recommendation: CERC should clearly indicate that the GCV shall be measured from the coal samples collected at firing end, i.e. from auto samplers installed on feeder belt conveyors *or* manual samples collected from feeder belt conveyors as the case may be, on the final set of feeder coal belt which leads to the bunkers. Alternatively, sample can be collected from the feeders which carry crushed coal from the bunkers to the pulverisers / ball mill, as prescribed in ASME PTC 4.

"GCV As Fired" = (GCV ARB at Loading end) – (losses on account of Grade slippage and/or sampling procedure adopted by Coal Company) – (Transit losses) – (Handling and stacking losses at Power plant).

B. Normative GCV losses from Billing to Firing.

The actual GCV losses and difference in GCV from Billing to Firing occur because of any or all of the following factors:

1. <u>*Difference in GCV measurement methods*</u>: Conversion of GCV values at mines end from Equilibrated Basis to As Received Basis. i.e. difference between GCV-ARB and GCV-EqB.
2. <u>*Losses at Mines End*</u>: Grade slippage in Mines because of sampling procedure adopted by Coal Company and non homogeneity of coal samples collected. Indian coal are non homogenous and having more carbonaceous shale and shale content. Added to the non-homogenous nature of coal, the lack of infrastructure facilities for collecting the samples as per IS guidelines at mines, leads to wide variation in results obtained from same samples tested by different laboratories.
3. Transit Losses
   a. Addition of moisture,
   b. Addition of impurities
   c. Heating etc.
4. <u>*Inter lab tolerance*</u>: Losses on account of precision of the equipment used in two different laboratories and difference because of duplicate determination in two different laboratories i.e inter lab tolerance. Also, the corrections in GCV as per OEM of the bomb calorimeter are not applied by either coal companies or generators.
5. Losses at Generator end
   a. Handling and stacking losses at Power plant
      - Weathering
      - spontaneous combustion of coal
      - Addition of impurities with movement of trucks, wind etc.
      - Addition of Moisture during crushing, handling and Storage
   b. Blending of two different coals with varied GCV.
      Although GCV is generally found to be additive as it is a quantitative parameter, but if the GCV difference between two coals which are planned for blending is high then the resultant GCV is found to be less.

CERC in the concept paper have submitted that coal cost / variable charges account for almost 70% of the tariff and hence any regulation trying to fix these numbers based on normatives can be detrimental to the financial health of the generators. Prescribing normative losses would affect generators differently depending on source of coal, coal grade, mode of transportation, transit losses etc. and hence, should not be generalized. Rather, another

consideration maybe to provide a range of allowable/normative loss due to each factor. If at all, CERC desires to prescribe the normative losses at each point and basing on practical experience, indicative normative losses from Billing to Firing are suggested below:

SNo.	Description	Normative loss/approach	Remarks
1	Difference in GCV measurement methods	Convert GCV-Eq.Basis (Billed GCV) to GCV-ARB	
2	Losses at Mines End	100Kcal/kg	
3	Transit Losses	50Kcal/kg	
4	Inter lab tolerance	65Kcal/kg	As per IS 1350 Part 2 clause 5.5.3.2, the results of duplicate determinations in the same Laboratory should agree to within 30Kcal/kg and those between two different laboratories to within 65Kcal/kg .
5	Losses at Generator end	120 Kcal/kg	As per the CERC notice dated 14.11.2017, CEA is of the opinion that a margin of 105-1 20 kcal/kg for a non-pit head station may be considered as a loss of GCV of coal between "as received" and "as Fired". Also observed in repeated tests of received and fed coal.

Ex:

Billed GCV- Eq. Basis	**= 3758 Kcal/kg**
GCV-ARB at Mines End, i.e. dispatch end	= 3476Kcal/kg (as explained in Point no.6)
Losses at Mines End	= (-) 100Kcal/kg
Transit Losses	= (-) 50Kcal/kg
Inter lab tolerance	= (-) 65Kcal/kg
Losses at Generator End	= (-) 120Kcal/kg

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GCV-As Fired **=3141 Kcal/kg**

The above example is an indication of what is happening in the industry. Misrepresentation and misinterpretation of the above facts at various forums and lack of standardized methods are leading to the disputes and/or escaping from achieving the operational efficiency.

C. Normative Quantity losses from Billing to Firing.

Coal Quantity losses are majorly because of any or all of the following factors:

a. Difference in weighbridge measurements at Mines End- static, in-motion rail weighbridges and static road weigh bridges, tolerance limits of each system.
b. Transit Losses, i.e wind, Handling, re-handling during transit
c. Difference in weighbridge measurements at Receipt End
d. Crushing and conveying
e. Stacking and reclaiming
f. Environment conditions- rain, wind etc.
g. Spontaneous combustion
h. Handling and vehicle movement

Commission had specified the norms for Quantity loss for the pit head station as 0.2% and for the non- pithead stations as 0.8%.

However, as far as the quantity losses are concerned, the difference between a pit head station and a non- pithead station is only Transit losses as stated in 11(b), for which the commission has allowed 0.6%.

In reality the actual quantity losses arising out of the factors as stated above are much higher than the transit losses. Pit head stations have no means of recovering these losses.

Recommendation: keeping in view of the above facts, Normative transit and handling losses for the pit head station should be increased to 0.6%

D. Recommendation:

1. *Standardize the GCV computation method as indicated above and allow actual GCV losses.*
2. *If the normative values for GCV related losses and Quantity losses, from 'As Billed' to 'As fired' coal are specified, then the all the points leading to variation in GCV should be considered as provided in Para (B) above.*
3. *In case the generator is able to meet or perform better than the suggested norms, the generator should be provided with an incentive to meet the additional costs incurred towards reducing the normative losses.*

By as indicated above, and providing incentive and disincentive scheme on Billed Vs Fired coal GCV and Quantity, the operational efficiency of generator will improve and ultimately the end consumers will be benefitted.

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ANNEXURE - A

As regards sampling for testing 'as fired' value of GCV, the energy charge rate is dependent on station heat rate and heat content of the coal actually fired in the steam generation process defined by the process/system boundary inside which coal is subjected to the thermodynamic process. Therefore, for determination of the heat content of the coal actually fired in the steam generation process it's GCV has to be ascertained just before it enters the process boundary and where its property remains unaltered. Accordingly, as per the ASME PTC 4, the most appropriate point for drawing coal sample is from the feeder pipe after the bunker (which is outside the process boundary) and before it enters the pulveriser (ball mill which is inside the process boundary). Please refer to the attached Annexure A - 1 for steam generation process boundary demarcation as per PTC 4. The coal sample available at this point is already crushed to (-) 30 mm size in the Coal Handling Plant (CHP) and is a correct representation of the homogenous mix of the coal made available to the power station. Further, coal at this point is not subjected to any thermodynamic process which would alter the original property of coal, as is the case of coal coming out of the ball mill, where, hot air from the boiler is passed through the ball mill for carrying pulverised coal into the boiler. This hot air increases the temperature of the coal being crushed in the ball mill, in order to improve boiler efficiency as well as combustion stability and it also reduces the surface moisture of the coal.

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ANNEXURE – A(1)

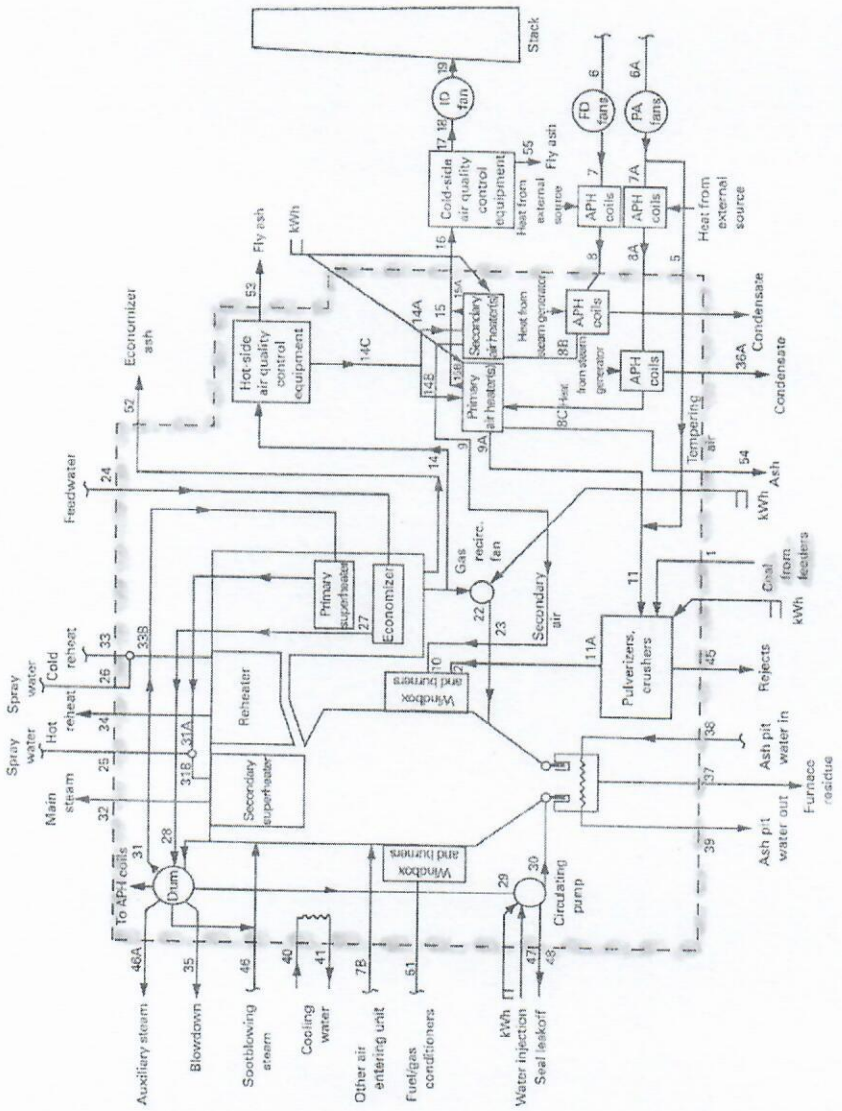

Fig. 1-4-3 Typical Pulverized-Coal-Fired Steam Generator, Alternative 2: Bisector Air Heater

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