

**TAMIL NADU ELECTRICITY REGULATORY COMMISSION**  
**(Constituted under section 82 (1) of the Electricity Act, 2003)**  
**(Central Act 36 of 2003)**

**PRESENT:-**

**Thiru S.Akshayakumar** .... **Chairman**

**and**

**Thiru.G.Rajagopal** .... **Member**

**R.A.No.3 of 2014**

The South Indian Sugar Mills Association, Tamil Nadu  
Rep. by its Secretary  
"Karumuthu Centre"  
2<sup>nd</sup> Floor, 634, Anna Salai  
Chennai – 600 035 and 9 others.

... Remand Applicants  
(Thiru Rahul Balaji,  
Advocate for the Remand Applicants)

Vs.

1. Tamil Nadu Generation and Distribution Corporation Ltd.  
144, Anna Salai  
Chennai – 600 002.
2. Tamil Nadu Transmission Corporation Ltd.  
144, Anna Salai  
Chennai – 600 002.

.... Respondents  
(Thiru P.Gunaraj,  
Standing Counsel for TANGEDCO)

**Dates of hearing : 22-12-2014, 19-01-2015, 05-10-2015 and  
29-12-2015**

**Date of order : 23-02-2016**

The R.A. No.3 of 2014 initiated by the Commission pursuant to orders of the Hon'ble APTEL dated 04-09-2013 in Appeal No.199 of 2012 and dated 30-06-2014 in R.P.No.13 of 2013 in the said Appeal No.199 of 2012 came up for final hearing on 29-12-2015. The Commission upon perusing the above petition and

the connected records and after hearing the submissions of the Remand Applicants and Respondents herein passes the following order:-

### **ORDER**

#### **1 Prayer in R.A. No.3 of 2014:-**

The Prayer of the Remand Applicant and Respondent in R.A.No.3 of 2014 is to take all the facts stated in their respective submissions on record and accordingly, reconsider and re-determine the following issues in line with the orders of the APTEL dated 04-09-2013 in Appeal No.199 of 2013 and the Review Order dated 30-06-2014 and pass such further or other orders as the Commission may deem fit in the circumstances of the case.

#### **Issues:-**

- (a) Re-determination of the capital cost afresh.
- (b) Consideration of all issues and submissions with regard to apportioning of cost between sugar plant and power plant.
- (c) Re-determination of fuel cost afresh in the light of observations in the judgment.
- (d) Re-determination of the incentive for generation beyond threshold Plant Load Factor afresh in the light of observations in the judgment.
- (e) Re-determination of O & M charges afresh in the light of observations in the judgment.
- (f) Re-computation of working capital by considering receivables for 2 months as per the CERC Regulations and rebate being allowed for payment within one month of presentation of bills as per CERC Regulations.
- (g) Redetermination of the Fixed cost component of tariff for plants set up on or after 01.08.2012 and Variable cost component of Tariff for plants set up on or

after 15.05.2006 for financial years 2012-13 and 2013-14 consequent to (a) to (f) above.

- (h) Consideration of allowing carrying cost by way of interest on the differential amount / arrears (i.e. the different between the tariff re-determined and the tariff originally determined) to be paid by the distribution licensee from the original due date of the monthly bills till the date of payment of the differential amounts.

## **2. Contentions in the Written Submissions of the Remand Applicant dated 12-01-2015:-**

2.1. The Applicant is an Association (SISMA) of private sugar mills in the State of Tamil Nadu. It is the 1<sup>st</sup> Appellant in the Appeal Proceedings before the Appellate Tribunal and the co-Appellants are members of the Association. These submissions are on behalf of the Applicant Association and its Members who have entered into Power Purchase Agreements with the TANGEDCO for the sale of the surplus electricity produced from their bagasse based cogeneration plants. '

2.2. The Commission is required to re-determine the capital cost in the light of observations and decisions of the Appellate Tribunal by considering -

- (a) the explanation in the Statement of Reasons for the 2012 CERC Regulations considering local/State circumstances including boiler configuration,
- (b) the suggestions of IREDA,
- (c) materials furnished by the sugar mills,
- (d) the evacuation cost required to be borne by the sugar mills.

2.3. The CERC, in the Statement of Reasons for the Regulation 2012, has clearly stated that higher capital cost is justified for higher temperature and pressure configuration, and has also referred to IREDA's evaluation of Rs 5.53 cr/MW for 2500 TCD 110 bar configuration. The CERC also observed that additional cost may be allowed for air cooled condensers.

2.4. In Tamil Nadu, as many as 10 plants set up between 2007 and 2012 were with a boiler configuration of 108-112 bar/540°C with air cooled condensers. That would establish the trend. Accordingly, the normative capital cost has to be considered for a boiler configuration of 110 bar/540°C and additional cost has to be allowed for the air cooled condensers. It was shown by way of an affidavit filed by Ponni Sugars (Erode) Ltd. before the Appellate Tribunal that they were called upon to bear the cost of evacuation, and as observed by the Hon'ble Appellate Tribunal this will have to be considered additionally. Thus, on the basis of the IREDA evaluation of 5.53 cr/MW and additional cost of air cooled condenser and evacuation cost, the capital cost may be considered as follows-

Sl. No.	Description	Capital Cost 2012-14 Rs crs/MW
1	Capital Cost relevant to .2500 TCD capacity mill 5.53 and 11'0 bar power plant Configuration	5.53
2	Add: 5% for Air Cooled Condensers	0.28
3	Add : Cost of Evacuation to liP	0.30
	Total	6.11

2.5. Of the members who were Co-Appellants before the Tribunal, only M/s.Ponni Sugars has established a co-generation plant during 2012-2014. This 19 MW co-generation plant is configured with a 110 bar boiler. The actual capital cost, excluding land, for this co-generation plant is Rs 107.18 crores as per the Chartered

Accountants, Certificate. That works out to Rs 5.64 cr/MW. Adjusting for the Building cost of Rs 10.97 crs and grossing the same up for the 15% deduction considered by the Commission, the adjusted capital cost is 5.96 MW  $[(107.18-10.97)/0.85/19]$  on actuals basis in the case of this power plant. It is pertinent to mention here that the cost of evacuation lines has been less than usual in this particular case because of the shorter transmission line; however for normative purposes a higher evacuation cost needs to be provided.

2.6. The process steam required for sugar manufacture is only saturated steam at a pressure of less than 3 ata, and this would only require a low pressure and low cost boiler. In order to gain the advantages of co-generation for power generation and better utilization of the available renewable energy resources, the configuration of the co-generation plant is scaled up substantially to include high pressure boiler, turbine, technological sophistication, power evacuation facilities and associated facilities with a far higher capital cost. The configuration of the plant is, therefore determined by the needs of power generation. The tariff determination for power generated by a co-generation plant can either be done on the basis of normative parameters considering condensation mode operation without extraction of steam, or on different normative parameters considering extraction mode operation with extraction of steam. The normative parameters of SHR (and consequently SFC) and Auxiliary consumption would be different for the two modes of operation.

2.7. Condensation mode (without extraction of steam):-

In this mode of operation, there is no extraction of steam, and the entire steam produced is used in power generation. Normative values of an SHR of 3700

kcal/kWh, SFC of 1.61 kg/kWh and Auxiliary Consumption of 9% can only be applicable if the operation is considered in the condensation mode. The fixed cost per unit determined on this basis takes all the fixed costs to the account of power generation. Once the tariff is determined on this basis, the licensee pays the per unit fixed cost only on the energy actually delivered and the sugar mill receives revenue only to that extent. To the extent that the power generation is reduced by reason of actual extraction of steam, there is no power generation or evacuation to that extent and therefore the licensee does not pay for the fixed cost for that much of the electricity. Therefore, the fixed cost realization / recovery of the sugar mill is less than the total fixed cost of operation. Such difference (shortfall) of fixed cost realization / recovery is then the sugar mill's cost, being the fixed cost borne by them for the process steam extracted. Thus, this is a self-adjusting methodology for sharing of fixed costs as between the power generation and the process steam. Therefore the question of making any deduction from fixed cost per unit for process steam extracted does not at all arise. If it is sought to be done. it will be a double deduction on the same account. The CERC, which also took the same normative values and determined the fixed cost per unit therefrom, has not made any deduction for process steam. The Commission is required to follow the principles and methodologies of the CERC except when special local conditions or circumstances require otherwise for good and special reason.

## 2.8. Extraction mode (with extraction of steam):-

In this mode of operation, there is extraction of steam, and the entire steam is considered to be used in power generation as well as in process. Normative values that will have to be considered for tariff determination in this mode of operation will

be an SHR of 4700 kcal/kWh, SFC of 2.09 kg/kWh and Auxiliary Consumption of 12%. The fixed cost per unit determined on this basis takes all the fixed costs to the account of both the energy generated as well as steam extracted.

#### 2.9. Approach-A (Electrical Energy Basis):-

The methodology and calculations are as follows:-

Briefly, this methodology shows that, as between electricity generated under operation without steam extraction and operation with steam extraction, the net power lost by the power plant by supplying process steam to the sugar mill is 14.7%. Since all the components of the plant and evacuation system other than the boiler are attributable only to the power generation, the above percentage of 14.7% is to be applied to the cost of boiler which is about 45% of the capital cost. Thus, the percentage of capital cost attributable to the extraction of steam is 6.62% (i.e. 14.7% of 45%) Now, the boiler is itself configured to high pressure and high temperature with super heater for, and on consideration of, power generation, and therefore a 5% loading to power generation out of the 62% of the fixed cost is necessary and justified. Consequently, the percentage of capital cost attributable to process steam is only 1.62%. Thus, proportionally only 1.62% of the fixed can be considered to be attributable to the process steam extracted.

#### 2.10. Approach-B (Heat Energy Basis):-

The methodology and calculations are as follows:-

Briefly, the useful heat energy for power generation under Condensation mode (without extraction of steam) is 26,999,734 kcal/hr (Case-1). The useful heat energy for power generation under Extraction mode (with extraction of steam for process) is 22,150,630 kcal/hr (Case-2). Whence, the loss of useful heat energy from power generation due to extraction of steam for process is 4,849,104 kcal/hr, which is 17.96% of the useful heat energy under Case-I.

Applying 17.96% to 45% of the capital cost, the percentage of capital cost attributable to extraction of process steam is 8.08%. Adjusting 5% by way of configuration loading to power generation as stated supra, the percentage of capital cost attributable to extraction of process steam is only 3.08%. It is also necessary to consider that the Act mandates the promotion of co-generation, and doubly so from renewable energy. Thereby, there is very good reason and justification not to consider any deduction for fixed cost in the case of co-generation from bagasse.

2.11. The fuel cost is required to be re-determined afresh considering the following observations in the judgment of the APTEL:-

- (a) that the State Commission is bound to be guided by the CERC principles and methodology having regard to local conditions in the State.
- (b) that the principles and methodology of the CERC are to be discerned and construed also from the explanations and observations in the Statement of Reasons of the CERC Regulations.
- (c) that the CERC observed in the Statement of Reasons that the prevalent price of bagasse be considered if the same is higher than the price on equivalent heat value basis

- (d) that the State Commission ought to determine the fuel price on the basis of equivalent heat value method with coal is available to the generating plants or on the basis of market value of bagasse.

#### 2.12. Equivalent Heat Value Method:-

The sugar mills do not get coal linkages and therefore the price at which thermal power plants obtain coal is irrelevant and cannot be considered. The only other sources are through e-auction (limited to when available irregularly) or otherwise only by import of coal. M/s.Ponni Sugars have purchased coal through import. The Average Fuel Cost on the equivalent heat value method for the period August 2012 to July 2013 is Rs 2,273/- per MT.

#### 2.13. Market Price of Bagasse:-

The Tamil Nadu Co-operative Sugar Federation Ltd has fixed the price for Bagasse at Rs.1,600/- per MT for 2012-13 season (nominal seasonal operation being from Oct-Apr) as per its communications dated 04.03.2013. The average market price of bagasse for the one year period from August 2012 to July 2013 is to be considered as 1,600/- per MT.

#### 2.14. Heat Value Method Vs. Market Price:-

The price of bagasse on the equivalent heat value method is Rs 2,273/- per MT, the market price of bagasse is lower at Rs Rs 1,600/- per MT. The equivalent heat value method is to be taken and the fuel cost is to be fixed at Rs.2,273/- per MT for the period from Aug 2012 to July 2013 with an escalation of 5% p.a. for the subsequent year.

## 2.15. Incentive for Generation beyond Threshold PLF:-

The incentive for generation beyond threshold PLF is to be determined in the light of the directions and observations of the APTEL considering -

- (a) The components for fixed costs would not remain unchanged for extended period of operation and there would be higher wear and tear, higher repairs and maintenance and employee cost. All these need to be considered as necessary cost for generation beyond threshold PLF.
- (b) The incentive should be such as to incentivize maximizing generation.
- (c) In any case, the incentive has to be better than that available to conventional power plants.

2.16. The CERC principles and methodology in the 2012 Regulation does not prescribe any different rate or tariff to be paid for generation above the normative PLF. The same rate applies for all generation. A sugar mill may generate below the normative PLF in situations where the crop has not been good, or the availability of cane is less, or the season is otherwise curtailed, or even due to failure or interrupted evacuation of power; and thereupon the sugar mill would not realize the fixed costs for that year. In other years, there may be surplus generation when the crop is good, or cane is available aplenty or the season is prolonged. These are uncontrollable factors. The principle and approach underlying the CERC provisions is that both the risk and rewards arising out of such situations are to the account of the sugar mill. That is a more equitable and fair approach. Therefore the same rate needs to be fixed irrespective whether the generation is up to or beyond the normative PLF. Alternatively, and in any case, the incentive ought to be fixed at not less than Re 1/- per unit for the generation above the normative PLF. It is also

necessary to confirm and make clear that the variable cost would also be paid in addition to the incentive.

#### 2.17. O & M Charges:-

The APTEL has directed the State Commission to re-determine the O&M cost considering the CERC Regulations. The APTEL has also observed that the O&M charges of the CERC is 3.8% of the total capital cost. Accordingly, the Commission may consider and determine the O&M cost at 3.8% of the entire capital cost as determined in these proceedings with annual escalation for subsequent year at 5.72%.

#### 2.18. Recomputation of Working Capital:-

The APTEL has directed, in the Review Order dated 30-06-2014, that the working capital be recomputed by considering receivables of two months and providing for a rebate for payment within one month of presentation of bills, as per the CERC Regulations. Accordingly, the Commission may re-compute the working capital and consequently allow the interest thereon. The Commission may further provide that there shall be a rebate of 1% for payment within one month of the presentation of bills.

#### 2.19. Consequent Redetermination of Tariff:-

Consequent to the re-determination / re-computation of the parameters and/or tariff components as aforesaid, the Commission may to re-determine the fixed cost component and variable cost component of tariff.

## 2.20. Consideration of carrying cost:-

The Tariff determined by the Commission is on the principle of cost plus regulated return. This requires that all costs be passed through in the tariff. In the circumstances that a part of the tariff bill amount required to be paid on the regular due date has not been realized at that time, and as the working capital cost does not provide for the interest on the differential amount of tariff payable upon re-determination pursuant to the Appellate Order, the sugar mills have incurred carrying cost on the differential amounts. Such differential amounts have to be funded through additional working capital which has a cost. The tariff is required by law to be determined on commercial principles and costs incurred cannot be left stranded. It is therefore necessary that the Commission may direct that the carrying cost, by way of interest, be paid on the differential amounts of tariff.

The rate of interest may fairly be the rate of interest on working capital as adopted in the order which is based upon the lending rates of the commercial banks for working capital. However, as the banks are required by the guidelines and directives of the Reserve Bank of India to charge interest with monthly rests (vide para 2.1.2 and 2.9 of RBI Master Circular No DBOD No.Dir.BC.5/13-03-00/2012-13, dated 02-07-2012), the interest has to be compounded with monthly rests. In fact, the sugar mills are actually being charged interest by their respective banks with monthly rests. The APTEL has observed in the Review Order dated 30-06-2014 that the issue requires to be considered by the Commission. Carrying cost by way of interest may be allowed on the differential amount of tariff between the tariff determined pursuant to remand by APTEL and the tariff determined originally in the order dated 31-07-2012 at a rate of 12% p.a. compounded monthly

from the original due date of payment for each of the monthly bills to the date of payment of the differential amounts.

2.21. In view of the Review Order of the Hon'ble Appellate Tribunal so declaring, the provisions of the tariff order dated 31-07-2012 in respect of matters enumerated in para 8.2 of the said order shall not apply to the sugar mills who sell their energy to the distribution licensee.

### **3. Contentions in the Written submissions of the TANGEDCO dated 29-05-2015:-**

3.1. The CERC in its Renewable Energy Sources Regulations, 2012 has fixed the normative capital cost at Rs.4.20 Crores /MW which is inclusive of evacuation cost. Taking in to consideration of the above, the Commission has considered capital cost of Rs.4.20 Crores per MW in Order No.7 of 2012 as one of the tariff component for fixation of power purchase tariff for procurement of power from the bagasse based co-generation plants. Hence the above capital cost is genuine.

3.2. The Commission has considered sale of manure as one of the revenue fetched by the generating company for fixation of power purchase tariff in P.P.A.P.No.6 of 2011 in respect of biogas plants proposed to be established by M/s. M/s.Pallava Water Works (P) Ltd,. Likewise the entire capital cost incurred on Co-gen plant is return back to the generator by the way of selling electricity, Sugar, Ethanol, such additional revenue fetched by the generators in addition to electricity may be taken into consideration for fixation of power purchase tariff. All equipments in co-generation plants other than turbine & generator are common in use both for

power generation and sugar mill process, the contention of the petition that boiler is only the common equipment both for power generation and sugar mill processing is not correct.

3.3. No monetary mechanism for pricing of bagasse has been put forth by the Remand Applicant. In the absence of the above, the Commission considered 50% of sugar cane price as bagasse price. The pricing of bagasse through equitable heat value method as suggested by the Remand Applicant is not appropriate. In view of the above the fuel cost of Bagasse of Rs.1,050 per metric ton which is 50% cost of sugar cane of Rs.2,100/-, has been considered by the Commission in Order No.7 of 2012. The sugar cane price for 2014-15 is Rs.2,650/- per metric ton.

3.4. The Bagasse based power tariff in Order No.7 of 2012 of the Commission has been fixed taking into consideration of the fact that entire cost invested on the power plant is recovered by selling power generated up to annual PLF of 55%. As per the above said order, the entire energy exported to grid up to annual PLF of 55% is entitled for bagasse based power tariff irrespective of type of fuel used. The above said order does not say that the type of fuel used up to 55% annual PLF. The generator having crushing season less than 55% annual PLF, can use fuel other than bagasse so as to extend the operation period of the plant up to annual PLF of 55%. The extension or short fall of crushing season from the threshold limit of 55% annual PLF as contended by the applicant, does not affect bagasse based power tariff. Keeping the plant idle with power generation beyond annual PLF of 55% does not cause loss to the generator. For the power generated beyond threshold limit of 55% annual PLF, is entitled for variable cost of bagasse based power tariff. To

encourage Renewable Source of power generation, 10% of fixed cost is rewarded. The power purchase tariff fixed in Order No.7 of 2012 of the Commission is genuine. The contention of the writ submissions of the applicant that Rs.1/- as incentive for extra power generated beyond the annual PLF of 55%, is abnormally high and not genuine.

3.5. Most of the Commissions allowed O&M charges @ 3% including insurance with an annual escalation of 5%. Therefore, the O & M charges of 3% with annual escalation of 5% from second year on 100% of capital cost, considered by the Commission in Order No.7 of 2012 is genuine.

3.6. Most of the State Electricity Regulatory Commissions have considered receivables as one of the component of working capital, for one month. Moreover the payment towards purchase of power exported during a month period become due only at the first week of the succeeding month. The payment beyond 30 days from date of submission of bills also attracts 1% of interest. In view of the above, receivable for a period of one month as considered by the Commission in Order No.7 of 2012, is genuine.

3.7. If the Commission decide to re-fix the tariff as directed by the Hon'ble APTEL, such a revised tariff may be given I prospective effect from the date of issuance of order on revision of tariff. Retrospective effect on revision of tariff as prayed by the Remand Applicant causes great hardship to the respondent TANGEDCO by paying huge arrears to more generators.

3.8. It is to be noted that 12 out of 16 issues as specified in clause 8.2 under the headings of "Related issues", of Commission Order No.7 of 2012 (i.e.) CDM benefits, Reactive power charges, Grid availability charges, Scheduling and System Operation charges, Application fee and Agreement fee, Billing and Payments, Payment security and Security deposit, Metering, Connectivity and evacuation of power, Energy Purchase Agreement, Scheduling of power generation and Tariff are relevant to the generators those who sell power to the Distribution Licensee under long term energy purchase agreement. Hence the contention of the Remand Applicant that the provisions of the tariff order in clause 8.2 shall not apply for generators those who sell power to Distribution Licensee, is not correct.

**4. Reply of SISMA to the Written Submission of TANGEDCO:-**

4.1. The TANGEDCO has completely overlooked the clear and express terms of the judgment of the APTEL and has merely restated its position on reasons that are patently contrary to the specific findings of the Tribunal, in this very matter. The Written Submissions of the TANGEDCO before the Commission in so far as they purport to reiterate issues already decided to the contrary by an Appellate authority militates against the doctrine of *res judicata* and hence deserve to be dismissed in *limine*. The TANGEDCO is seeking to reargue matters which have already been decided against it and have attained finality.

4.2. The APTEL has already decided the issue and held that

- (i) The State Commission cannot blindly follow the norms specified in the CERC Regulations without considering the assumptions behind the determination of the normative parameter.

(ii) If the Appellants (the Applicant herein) are called upon to bear the said additional evacuation cost, then the same has to be added to the capital cost for the purposes of determination of tariff.

(iii) The State Commission has to consider the materials furnished by the Appellants as well as the suggestions made by IREDA and the explanation given by the Central Commission in the statement of objects and reasons of the 2012 Regulations and fix the rate of capital cost on taking into consideration the local State circumstances.(vide para 39 of the judgment)

4.3. In view of the binding nature of the conclusions already reached and decision rendered by the Tribunal, the Commission is to fix the capital cost at RS.6.11 crore per MW.

4.4. Apportionment of cost between power generation and sugar plant:-

The TANGEDCO has made inappropriate comparison to draw illogical conclusion. There are specific and distinct capital costs incurred for the purpose of cogeneration, sugar and ethanol while a small part of it may be common to more than one segment. The TANGEDCO is patently wrong and factually incorrect in making a sweeping assertion, with no substantiation whatsoever, that all equipments in cogeneration plants other than turbine and generator is common in use both for power generation and sugar mill process. On the other hand, the Applicant has given detailed technical justification of its written submission dated 12-01-2015 on proper rationale to apportion the capital cost between cogen and sugar segments and the TANGEDCO has not controverted to these submissions in any convincing manner.

4.5. The CERC has consistently followed the principle and methodology not to allocate any part of the fixed cost of the co-gen project to sugar segment. In fact, no other State Regulatory Commission to the best of our knowledge has in any of the tariff orders issued till date sought to allocate any part of the capital cost between co-gen and sugar segments. It is hence submitted that the Commission should consider the mandate of the Electricity Act for promoting cogeneration, and doubly so from renewable energy sources such as bagasse, and follow similar course and hence not consider any deduction for capital cost in the case of cogeneration from bagasse.

4.6. Fuel Cost:-

The TANGEDCO has stated that the pricing of bagasse through equivalent heat value method as suggested by the Remand Applicant is not appropriate. This is legally untenable in view of the specific order of the Tribunal of its judgment holding that "It cannot be disputed that the State Commission ought to have determined the Fuel Price on the basis of equivalent heat value method with coal as available to the generating plants or on the basis of market price of Bagasse" It is just and proper for the Commission to fix fuel cost pursuant to the specific ruling of the Tribunal and based on the written submission of the Applicant made on 12-01-2015

4.7. Incentive for generation beyond threshold PLF:-

The written submission of the TANGEDCO is contrary to the specific observations of the Tribunal and hence legally untenable. The Commission may determine the tariff for power generation beyond the normative PLF based on the written submissions of the Applicant.

#### 4.8. Effective date of re-fixing:-

The written submission of the TANGEDCO for giving effect to the revised tariff prospectively is bad both in law and equity. The Applicant submits that tariff order determines tariff as applicable for different periods based on cost and other specific factors so as to ensure that the tariff so fixed is appropriate and adequate for recovering both fixed and variable cost and give a predetermined return on investment. When cost determination is based on factors that warrant a revision pursuant to the orders of an Appellate Authority, in law it is meant and intended to correct a mistake or error *ab initio*. Hence it should be given effect from the date of original tariff order.

4.9. The 2012 tariff order has determined cost plus basis of tariff for recovering capital cost and providing return on investment over 20 year tenure from the date of commissioning during the relevant tariff order applicability. A prospective revision would result in under recovery of fixed and variable cost within the tariff period and militate against the principles of tariff fixation based cost plus method.

4.10. The CERC (Terms & Conditions for Tariff Determination from Renewable Energy Sources) Regulations, 2012 has made specific provisions dealing with determination of tariff for renewable energy. Regulation 2 (aa) thereof defines the useful life of non-fossil fuel cogeneration project as 20 years. Having regard to this, the Commission in Para 8.2.1.6 of the 2012 tariff order specified the tariff period as 20 years. Further, the control period has also been determined as 2 years from 1st August 2012 in deference to Clause 6 of the Power Procurement from New & Renewable Sources of Energy Regulations, 2008. In order that the sanctity of tariff

period and control period under respective Central and State Regulations is protected, it is imperative that the tariff revision pursuant to the judgment of Hon'ble Tribunal be given effect to from 1<sup>st</sup> August 2012 or the date of commercial operation of the renewable energy generating stations during the tariff period.

4.11. The power of the State Commission to give retrospective effect to a Tariff revision has been upheld by APTEL while disposing of Appeal No.179 of 2012 vide their Order dated 31/5/13. In fact, while coming to the said conclusion, APTEL has relied on a catena of related decisions of the Apex Court in the matter. Furthermore and in any event, the present is not a case of a retrospective determination of a tariff but fixation of the tariff from the original date in compliance with the order of remand by the Hon'ble APTEL. The claim of the Respondent that the revision would have to be effected prospectively would be wholly contrary to the directions of the Hon'ble APTEL and the fundamental principles of tariff fixation and returns for a generator.

4.12. The Commission may give effect to the revised tariff from 1<sup>st</sup> August 2012, being the date of the tariff Order No.7 of 2012 coming into force, for achieving this fundamental objective and further grant compensation for the carrying cost as per submissions made by the Applicant on 25-11-2014.

**5. Submissions on behalf of Applicant, SISMA and others dated 29-12-2015 11-01-2016:-**

5.1. The normative PLF of 55% was first determined by Commission in the Order No 3 dated 15-05-2006 and the same was continued in the subsequent tariff orders. The decision of the Commission in the said Order No 3 was as follows:-

(3) Bagasse based cogeneration

In case of bagasse based Co-generation plants, the PLF depends mostly on availability of bagasse in the crushing season. Assuming that the projects can run for 130 days during the crushing season and another 100 days during non-crushing season (with the stored bagasse and other biomass fuels), the average PLF that can be achieved is around 55% when the project runs at a capacity of 90%. Hence a threshold level of PLF at 55% worked out on the basis of the availability of fuel is reasonable. If the PLF achieved in any financial year is more than 55%, then the rate for the excess energy produced over and above the 55% shall be equivalent to the rate fixed by the Commission for the fossil fuel based cogeneration.

5.2 From the above extract, the following is evident and conclusive-

- (a) That the PLF was determined only on the basis of the availability of fuel, and
- (b) That the plant was considered to be able to run for 130 days during crushing season and another 100 days during non-crushing season using stored bagasse, i.e. a total of 230 days in all during a year, and
- (c) That the plant would run at a capacity of 90% during the aforesaid period of 230 days (which could only be if the plant was considered to run in condensation mode alone), and
- (d) That thereby the PLF was fixed at 55% [or the year considering  $(230/365)*0.9=56.7\%$ , rounded down to 55%.
- (e) That no distinction whatsoever was made with regard to operation of the power plant during the 100 days non-crushing season (when there would be no extraction of steam as the sugar plant is not operating) and the 130 days crushing season (when the sugar plant is considered to be in operation and

the power plant is operated in extraction mode to provide process steam also).

Thereby, and consequently, the entire tariff determination was, and must be construed to be, necessarily considering the following -

- (f) That, for the purpose of tariff determination, the plant was considered to be run in the Condensation Mode (without extraction of steam).
- (g) All operational parameters for determination of fixed costs as well as variable costs were considered on this basis alone.
- (h) The denominator for arriving at the fixed cost per unit was accordingly of the export energy (generation less auxiliary) was taken only on the basis of the plant running on the condensation mode.

5.3. Additional and Alternate Submissions in case Extraction Mode Operation is to be considered:

It has been stated that all the fixed costs are apportioned as between the power plant and the sugar plant by any of the methodologies submitted in the letter dated 25-11-2014 and the written submissions earlier filed on behalf of the Remand Applicant, the following would also be considered -

- (a) The export generation (being the denominator for determination of fixed cost per unit) would have to be re-computed considering the lesser electricity generation feasible considering the extraction mode operation, and such aggregate fixed cost as is apportioned to power plant would have to be distributed over only so much of the export energy that can be available in such circumstances.

(b) The normative PLF itself would have to be revised downwards as the considerations on which the 55% PLF was determined would no longer be applicable. Such consequential effects would have to be examined in respect of all tariff determination parameters.

5.4. Moreover, considering that the operation of the plant is considered to be for 130 days only on Extraction mode (during crushing season) and 100 days on Condensation mode (during non-crushing season), the submissions made in the written submissions earlier filed with regard to the considerations required to be taken into account under Approach A and Approach B will have to be modified as follows :-

**Approach A**

A	Net Power lost by power plant operating in Extraction Mode	14.7%
B	Adjusted Loss considering 130/100 days Extraction/Condensing Mode Operation- (14.7 * 130/230) =	8.31%
C	% Capital Cost attributable to sugar plant Considering Boiler cost at 45% - (8.31 * 45%) =	3.74%
D	Deduction for configuration loading to Power Plant	5%
E	Consequent attribution of capital cost to process steam	Nil

5.5. The Approach A calculation is based on the actual power that is lost because of extraction of 3 ata steam from the Turbine to the Sugar Process. Because of difference in the specific steam consumption between the condensing mode of operation and the extraction mode of operation, the power loss across the Turbine will be 6000 Kw. The generation of steam in the boiler in both the cases remains the

same with the same fuel consumption. The condensate from the Sugar Process is returned back to the Cogeneration Power Plant with specific heat energy and this heat contributes to the equivalent power generation amounting to 1726 Kw as shown in the calculation.

5.6. Here make up water temperature is taken as 30 Deg C (around ambient temperature) because in the absence of hot condensate from the Sugar Process, the requirement of water for boiler has to be met from the R.P. plant which will have the temperature of 30 Deg. C only. So the net power loss because of extraction of 3 ata steam to Sugar Process will be 4274 Kw (6000 Kw–1726 Kw) only (if the condensate is returned back), which is equivalent to 14.71% of the total power generation as given in the Approach A methodology.

5.7. However, where make up water at 30 deg C is added (in the absence of hot condensate from the Sugar Process) the Cogeneration Power Plant will tend to utilize some extra heat energy which will proportionately affect the power generation to that extent in the Cogeneration Power Plant. The heat energy to be added is 4 million kcals and for heating the water to 100 Deg.C the deaerator steam consumption will increase by 7000 kg / hr. This 7000 kg / hr extracted of 3 ata would have generated an additional power of 580 kW.

5.8. In this latter scenario, the net power loss calculation as mentioned in the Approach “A”, will slightly change which will be 16.74% instead of 14.71%. Any reference to the Approach “B” calculation is inappropriate and incorrect while considering Approach “A”.

## Approach B

A	Net useful heat lost by power plant operating in Extraction Mode	17.96%
B	Adjusted Loss considering 130/100 days Extraction/Condensing Mode Operation- (17.96 * 130/230) =	10.15%
C	% Capital Cost attributable to sugar plant Considering Boiler cost at 45% - (10.15 * 45%) =	4.56%
D	Deduction for configuration loading to Power Plant	5%
E	Consequent attribution of capital cost to process steam	Nil

The consideration of the legislative mandate to promote co-generation, and doubly to promote generation from renewable energy, will nevertheless be necessary in any case.

### 5.9. Fuel Cost:-

(i) With respect to the Equivalent Heat Value statement to the letter dated 25-11-2014 and the written submissions earlier filed on our behalf and in further support thereof, the following are -

- a) Chartered Accountant's certified statement of the coal consumed, the cost thereof and the related calorific values as per records of M/s.Ponni Sugars Ltd.
- (b) Calculation Sheet showing how the equivalent heat value has been calculated.

Hence, the equivalent heat value method is to be taken and the fuel cost is to be fixed at Rs 2,273/- per MT for the period from Aug 2012 to July 2013. with an escalation of 5% p.a. for the subsequent year.

5.10. Clause 2 (1) (n) of the CERC 2012 Regulation defines “Interconnection Point” as the line isolator on the outgoing feeder on the HV side of the generator transformer; and clause 12 provides that the evacuation costs upto the interconnection point so defined are included in the CERC consideration of the capital cost. The cost of so much of the lines and equipment beyond the line isolator on the outgoing feeder on the HV side of the generator transformer as has been incurred at the cost of, or paid for, or payable by, the sugar mill has to added to the capital cost.

5.11. The Electricity Act mandates the promotion of co-generation and doubly so from renewable energy. Thereby, there is very good reason and justification not to consider any deduction for fixed cost in the case of co-generation from bagasse.

**6. Note submitted pursuant to the direction of the Commission dated 29-12-2015 on Boilers and Cogeneration Power Plant at Ponni Sugars (Erode) Limited:-**

6.1. It requires to be noted that the date given in the SISMA submissions with respect to the coal purchases by Ponni Sugars is only for the purpose of arriving at the actual price of coal purchase and working out the price of bagasse on the equivalent heat value method. As pointed out during the course of the hearing itself, the information furnished hereunder is not relevant at all for the purpose of determining the price of bagasse on the equivalent heat value method, but is being furnished as desired by the Commission.

**6.2. Coal fired Boilers for Sugar Plant Process Steam:-**

M/s. Ponni Sugars were having the following two boilers designed to use coal as fuel-

(a) 40 TPH, 21 kg / sq cm Boiler made by Walchandnagar Industries  
(hereafter referred to as “WIL” boiler)

(b) 26 TPH, 42 kg/sq cm Boiler made by Ignifluid Boilers India Ltd. (hereafter  
referred as “IBIL” Boiler)

The fuel used for the above boilers was coal obtained in exchange for bagasse supplied to a paper and paperboard manufacturer. The WIL boiler also used some small quantity of biomass fuels. The 1.5 MW / 440 V TG attached to the WIL Boiler and the 3 MW / 3.3. kV TG attached to the IBIL Boiler used to generate power exclusively for captive consumption by the sugar plant in addition to providing process steam by extraction.

6.3. In November 2012, the WIL Boiler was decommissioned and was scrapped subsequently in 2013. The 3 MW/3.3 kV TG attached to the IBIL Boiler was made non-operational in January 2013 and there was no power generation thereafter. The steam produced in the IBIL Boiler since January 2013 at a reduced pressure between 18 to 22 kg / sq cm was passed through two Pressure Reducing Stations to produce process steam for the sugar factory at 3 ata and 9 ata. The steam produced from this boiler is thus exclusively utilized as process steam for the sugar plant.

6.4. The fuel used for the IBIL boiler to exclusively produce process steam for the sugar plant comprises both coal purchased from various sources and also coal received in exchange for bagasse supplied to a paper and paper board manufacturer.

## 6.5. Baggasse based Cogeneration Plant

Upon expansion of the sugar plant capacity to more than 8 lakh MT cane per annum, M/s.Ponni Sugars has established a co-generation power plant with a 95 TPH 112 ata boiler and a 19 MW TG. This co-generation plant commenced commercial operation from 17-08-2012. The fuel used in the co-generation plant is bagasse supplemented as required with other biomass fuels and also supplemented with coal as required within the permissible limit. Steam is extracted from the co-generation plant at 3 ata to the extent required as make up process steam for the sugar plant in addition to the process steam available from the IBIL Boiler. The quantity of steam extracted is not uniform, and it varies according to the needs of make-up (additional) process steam requirement of the sugar plant.

## 6.6. Fuel Consumption Data:-

The data of fuel consumption during the period from August 2012 to July 2013 is furnished below:-

The coal consumption is for the aggregate for the WIL Boiler for the period it was in operation, the IBIL Boiler and the supplementary usage in the co-generation plant Boiler. The biomass consumption is for the aggregate for the WIL Boiler for the period, it was in operation and in the co-generation plant boiler.

Month	Fuel Consumption(MT)		
	Coal	Bagasse	Biomass
Aug 2012	3157	9708.05	5383.00
Sep 2012	3909	16700.31	2192.15
Oct 2012	4635	9957.60	1011.12
Nov 2012	2102	5208.41	310.26
Dec 2012	4675	18201.29	651.56
Jan-2013	3685	15191.25	10.30
Feb-2013	4098	14848.78	17.72
Mar-2013	2140	7942.34	243.81
April 2013	0	1435.58	0.00
May 2013	0	14206.84	0.00

June 2013	553	1435.58	0.00
July 2013	4940	14206.84	1625.75

## 7. Findings of the Commission:-

7.1. The Tamil Nadu Electricity Regulatory Commission passed the Tariff Order No.7 of 2012 dated 31-7-2012 fixing a Feed-in-Tariff (FIT) for the bagasse based co-generation plants commissioned on or after 1-8-2012.

7.2. M/s.SISMA and 9 other Sugar Mills who have set up bagasse based co-generation power plants in Tamil Nadu have filed an appeal in the Hon'ble APTEL on the following issues:

- i) Non-issue of consultative papers containing specific proposals.
- ii) Non encouragement of promotional measures for Non-Conventional Energy.
- iii) Capital cost
- iv) Fuel cost
- v) PLF
- vi) Incentives for generation beyond threshold PLF
- vii) O & M Charges
- viii) Working capital
- ix) Applications of matters in relation to the plants set up before the impugned order including before 15-5-2006.

The Appeal was heard by the Hon'ble APTEL in Appeal No.199 of 2012 and orders were issued on 4-9-2013 upholding the impugned order passed by this Commission. However, certain issues were remanded for re-hearing and re-determination of the matters as given below:-

- i) Capital cost
- ii) Fuel cost
- iii) Incentive
- iv) O & M charges

Subsequently, M/s.SISMA filed a Review Petition before the Hon'ble APTEL for review of the following issues:-

- 1) Capital cost
- 2) Working Capital
- 3) Application of matters in para 8.2 of the impugned order to plants set up before the impugned order.
- 4) Interim Tariff adjustment after final determination on remand and allowing of interest on arrears as carrying cost.

7.3. The Review Petition was heard by the Hon'ble APTEL in RP.No.13 of 2013 and orders were issued on 30-6-2014. The Hon'ble APTEL has allowed one issue namely Item No.(3) above, remanded one issue namely Item No.(2) working capital and rejected the other two issues vide Item Nos.(1) & (4) supra.

Accordingly, the remanded matters were taken up by the Commission in RA.No.3 of 2014 and the views of the Remand Applicant M/s.SISMA and the Respondents TANGEDCO were heard by the Commission.

7.4. Each of the remanded issues is dealt with one by one hereunder with orders of the Commission therefor.

#### **7.4.1. CAPITAL COST**

##### **Observations / Orders of Hon'ble APTEL:**

According to the Appellant, this determination is erroneous and unreasonable. It has been pointed out that in the earlier order passed by the State Commission in the order No.3 of 2009 dated 6.5.2009, the State Commission determined the Normative Capital Cost at Rs.4.67 Crores per MW but the State Commission failed to consider the effect of escalation and increase in the cost during the intervening period of more than 3 years despite the fact that IREDA had suggested to the State Commission to fix the Capital Cost at Rs.5.5 cr. per MW for boiler configuration of 110 bar/540°C.

The Appellant further pointed out that the inclusion of evacuation cost in the capital cost fixed at Rs.4.20 cr. per MW is contrary to the Central Commission's

Regulations, 2012 and that therefore, it is clear that the State Commission fixed the Capital Cost without proper application.

According to the Respondents, the State Commission examined the details which were available in different domain and also carefully studied the parameters considered by the Central Commission and adopted the capital cost of Rs.4.20 Cr. per MW. It is further pointed out by the learned Counsel for the State Commission that Capital Cost considered by the Central Commission in the previous tariff fixation in 2009 was higher at Rs.4.45 cr. per MW but in the year 2012 the Central Commission fixed the capital cost at Rs.4.20 cr. per MW on the basis of the market price and as such, the State Commission has followed the Central Commission's Regulations and fixed the capital cost at Rs.4.20 cr. per MW which is higher than the rates fixed by the other State Commissions.

According to the Appellants, during the last 5 years, the co-generating plants set up by the Appellants 2 to 10 , the Appellant have been having higher boiler pressure configuration which is as follows:

Sl. No.	Name of company/mill	Year of Co-gen	Boiler Pressure (kg)	Tem (deg. Cel)
1.	Sakthi (Modarkurichi)	2007	108	540
2.	Sakthi (Sivaganga)	2008	108	540
3.	Rajshree Sugars(Gingee)	2008	110	540
4.	Dharani Sugars (ThiagadurgamSankarapuram)	2009	110	535
5.	EID Parry (Pettavithalai)	2009	110	540
6.	Bannari Amman Sugars (Chengam, Tirunelveli)	2010	110	540
7.	Empee Sugars (Tirunelveli)	2010	110	540
8.	Dhanalakshmi Srinivasan (Perambalur)	2010	110	540
9.	Madras Sugars (Tirukoilur)	2011	110	540
10.	Ponni Sugars (Erode)Ltd.	2012	112	540

In view of the discussions made above, the rate of capital cost fixed by the State Commission is not correct. The State Commission has to consider the materials furnished by the Appellants as well as the suggestions made by IREDA, and the explanation given by the Central Commission in the statement of objects and reasons of the 2012 Regulations and fix the rate of capital cost on taking into consideration the local/State circumstances. The Appellants are also directed to furnish the information sought by the State Commission regarding steam used in the power generation and sugar production for deciding apportionment of cost between sugar plant and power generation.

Accordingly, this finding is set aside and the matter is remanded to the State Commission for fresh consideration on this issue.”

The Remand Applicant M/s.SISMA have contended that:

- i) the CERC, in the Statement of Reason for the Regulation 2012, has clearly stated that higher capital cost is justified for higher temperature and pressure configuration, and has also referred to IREDA's evaluation of Rs.5.53 Cr./MW for 2500 TCD 110 bar configuration.
- ii) the CERC also observed that additional cost may be allowed for air cooled condensers.
- iii) in Tamil Nadu, as many as 10 plants set up between 2007 and 2012 were with a boiler configuration of 108-112 bar/540°C and additional cost has to be allowed for the air cooled condensers.M/s.Ponni Sugars (Erode) Ltd., were called upon to bear the cost of evacuation this will have to be considered additionally.
- iv) that Clause 2(1)(n) of the CERC 2012 Regulation defines “Interconnection Point” as the line isolator on the outgoing feeder on the HV side of the generator transformer; and Clause 12 provides that the evacuation costs up to the interconnection point so defined are included in the CERC consideration of the capital cost.
- v) on the basis of the IREDA evaluation of Rs.5.53 Cr/MW and additional cost of air cooled condenser and evacuation cost, the capital cost may be considered at Rs.6.11 Cr./MW.
- (vi) M/s.PonniSugars established during 2012-14 with a capacity of 19 MW co-generation plant configured with a 110 bar boiler incurred an actual capital

cost of Rs.107.18 Cr. excluding land and the adjusted capital cost is 5.96 Cr/MW  $(107.18-10.97)/0.85/19$  on actual basis.

Per contra, M/s.TANGEDCO have contended that:

The CERC in its Renewable Energy Sources Regulations, 2012 has fixed the normative capital cost at Rs.4.20 Cr./MW which is inclusive of evacuation cost and that the above capital cost is genuine.

#### Orders of the Commission

The issue before the Commission is to

- (a) re-determine the Capital Cost.
- (b) apportion the capital cost relatable to power generation and sugar plants in the overall capital cost of the power plant.

In order to arrive at the capital cost of the co-gen plant let us have a brief look at the Statements of objects and reasons of the Renewable Energy Tariff Regulations 2012,(SOR) Regulation of CERC vide para 8.1.1 &2 page 89& 90 of SOR of CERC's Regulations dt.6.2.2012.

*8.1.1. "IL & FS RE Ltd has suggested that the capital cost of bagasse based co-generation projects should be Rs. 550 lakhs/ MW. IL&FS has further submitted that the Capital Costs of two projects (36 MW and 44 MW) commissioned by IREL under Urjankur Nidhi initiative on BOOT basis were Rs. 530 Lakh/ MW and Rs. 550 Lakh/ MW respectively for projects with 110 ata pressure and 540°C temperature."*

*Indian Sugar Mills Association submitted that the capital cost depends on boiler pressure / temperature, capacity of projects and utilization of high pressure boilers to increase generation of power which attracts huge capital investment. Further mills also have to construct transmission lines from sugar mill to the nearest 132 KV sub-station which also involves capital investment.*

#### **8.1.2. COMMISSION'S DECISION**

*With the advancement in the technology for generation and utilization of steam at high temperature and pressure, sugar industry can produce electricity and steam for their own requirements. It can also produce significant surplus electricity for sale to the grid using same quantity of bagasse. The sale of surplus power generated through optimum cogeneration would help a sugar mill to improve its viability, apart from adding to the power generation capacity of the country.*

*While proposing the normative capital cost of Rs.420 Lakh / MW for first year of the next Control Period in the draft Regulations, the Commission has considered*

*the capital cost norm developed by IREDA for financing the project during FY 2011-12 considering the typical size of the project for 2500 TCD with 66 bar / 480°C configuration*

Pressure Configuration (Kg/cm <sup>2</sup> )	Bagasse based cogeneration project Cost (Rs.Crore/MW)			
	2500 TCD	3500 TCD	5000TCD	>5000 TCD
44	3.70	3.58	3.53	3.46
66	4.13	4.06	4.00	3.93
86	4.77	4.70	4.66	4.60
102	5.42	5.12	4.83	4.77
110	5.53	5.22	4.93	4.87

*It can be seen that higher capital cost is justified if one opts for higher temperature and pressure configuration. Further the Commission has also considered the impact of Steam generation pressure on power generation in a 2500 TCD Sugar Mill as under:*

Steam Pressure / Temperature	Gross Electricity Generation (MW)	In-house Consumption (MW)	Surplus to Grid (MW)
21 BAR / 300 <sup>o</sup> c	2.0	2.5	-0.5
33 BAR / 380 <sup>o</sup> c	3.5	3.5	0
45 BAR / 440 <sup>o</sup> c	6.0	4.0	2.0
64 BAR / 480 <sup>o</sup> c	13.5	4.5	9.0
85 BAR / 510 <sup>o</sup> c	17.0	6.0	11.0
110 BAR /540 <sup>o</sup> c	21.0	8.0	13.0

*Based on analysis of the actual project cost, benchmark capital cost norm developed by IREDA for financing the project during FY 2011 – 12 and considering the typical size of the project for 2500 TCD with 66 bar / 480°C configuration, the Commission has decided to retain the normative capital cost of Rs 420 lakh / MW for first year of the next control period as proposed in draft Regulation. Capital cost of Rs.420 lakhs / MW for 1<sup>st</sup> year of next Control Period as proposed in draft Regulation.”*

As contended by the Remand Applicant M/s. SISMA, the capital cost of the co-gen project does increase if the plant is designed for higher pressure and temperature boiler configuration for achieving higher output. The norms adopted by

IREDA for funding the projects suggest that the capital cost may be Rs. 553 lakhs /MW for 110 kg /cm<sup>2</sup> boiler configuration. This capital cost is applicable for the plant with a capacity of 2500 TCD. It is also seen that IREDA have given normative capital cost for different plant capacities, namely, 3500 TCD, 5000 TCD and > 5000 TCD. The capital cost that is to be arrived at by this Commission is a generic one to be applied across all types of configurations. The Remand Applicant M/s.SISMA have provided details to the effect that all their plants which have been commissioned since 2009 are all 110 ata/540°C configuration or closer to it. All the projects which may be set up in the future would also have the above or even higher configuration. Therefore it will be prudent to consider the normative cost corresponding to this configuration. While discussing on the configuration, it will also be necessary to consider the production capacity of the plants. The capacities of the plants in the State set up during the period are seen to be not limited to 2500 TCD but they widely vary. The cost of the project is seen to be not constant across different capacities. They also vary as the capacity changes. Since the order is a generic one it shall not be representative of a specific capacity. In view of the same the Commission decides to re-determine the capital cost at Rs.510 lakh per MW.

Before concluding on the issue of capital cost we should not miss yet another important aspect, namely the effect of enhanced configuration. We have to see the SOR of regulation 2012 of CERC further in order to appreciate the effect of enhanced configuration of the boiler which is repeated here.

“Further the Commission has also considered the impact of Steam generation pressure on power generation in a 2500 TCD Sugar Mill as under:

<i>Steam Pressure / Temperature</i>	<i>Gross Electricity Generation (MW)</i>	<i>In-house Consumption (MW)</i>	<i>Surplus to Grid (MW)</i>
21 BAR / 300 <sup>o</sup> c	2.0	2.5	-0.5

33 BAR / 380 <sup>o</sup> c	3.5	3.5	0
45 BAR / 440 <sup>o</sup> c	6.0	4.0	2.0
64 BAR / 480 <sup>o</sup> c	13.5	4.5	9.0
85 BAR / 510 <sup>o</sup> c	17.0	6.0	11.0
110 BAR /540 <sup>o</sup> c	21.0	8.0	13.0

It is seen from the above that the power output of a 2500 TCD plant operating with a plant configuration of 64 bar/480<sup>o</sup>C is 13.5 MW and the same is increased to 21.0 MW, if the system is configured for 110 bar/540<sup>o</sup>C. There is a substantial improvement in terms of operational efficiency of over 50 %. Therefore there shall be a marked improvement in terms of station heat rate which is the only way to obtain higher power output with fuel input unchanged. While admitting the claim for the higher cost of capital for the higher rated machinery/equipment, one shall not ignore the associated benefits that are likely to be derived.

Even though the issue of station heat rate is not covered under the scope this remand, the Commission considers that when one is touching upon a cause it will be unnatural to leave the aspect of effect untouched and that it would not amount to out of bounds of the Commission in this remand. This aspect will be discussed further a little later.

**Apportioning of the capital cost :**

This is a sub issue related to the capital cost to be dealt by this Commission as directed by Hon'ble APTEL in its order.

The Hon'ble APTEL directed that *'the appellant are also directed to furnish the information sought by the State Commission regarding steam used in the power generation and sugar produced for deciding the apportionment of cost between sugar plant and power generation.'* Accordingly, the Remand Applicant M/s. SISMA filed affidavits citing reasons as to why they consider that separate apportioning is not required. They also included in their affidavit detailed schematics showing the

empirical steam flow and power output both during extraction mode and condenser mode of operations and heat balance calculations. From the said details it is seen that the maximum possible power output of 29 MW in the condensing mode gets reduced to 23 MW in extraction mode for the same fuel input. This resultant reduction of about 20% in power output is essentially due to the fact that part of steam generated is not utilized for power generation but diverted for the sugar production. Therefore the question of whether the cost of the plant that can be attributable to the sugar production process be apportioned to it and balance alone be considered for power generation arises.

Before getting into the issue of apportioning of steam between power generation and sugar production it will be useful to know as to how the cost of energy generated from the power plant is fixed.

It is well known that the cost of power or tariff in such cost plus regulated return method of determination has two components, namely, capacity charges and fuel charges. While the fuel charges or variable charges take care of the operating costs, the capacity charges or fixed charges address the fixed expenses including the cost of capital employed. In the present case the variable charges are determined considering the operation of the plant in the condensing mode irrespective of whether process steam is extracted from the system for sugar production or not. In other words, there is an appreciable loss of energy generation of about 20% when the plant is operating in the extraction mode due to extraction of the steam from the generation cycle to the sugar production cycle and this loss is not taken into account while the variable charge is fixed. Hence with regard to variable charges, the question of apportioning of cost does not arise.

Let us now consider the capacity charges. The capacity charges are payable for the entire name plate capacity even though during the extraction mode the plant is likely to operate at a considerably lower capacity since part of the steam is diverted from power generation to sugar production. To elaborate further the power plant runs at the designated capacity only during off season when there is no crushing operation. During crushing season due to the diversion or extraction of steam from the power generation cycle for use in the process of sugar production, the power generated is impaired to an extent of about 20%. The question before us is that should the Respondent be made to bear the cost of the capacity that is not actually utilized for power generation.

Now, we look into the contention of the Remand Applicant M/s.SISMA. It is contended by the Remand Applicant M/s.SISMA that the basis of determination of PLF at 55% and the inferences that may be drawn therefrom would reveal that this aspect of running the power plant below the capacity during the crushing period is already built. It is argued that number of days of operation of the power plant has been considered to be 130 days during crushing season plus 100 days during non-crushing season totalling to 230 days and that fuel availability has been the sole criterion for arriving this period. It is further contended that the plant has been assumed to be operated at condensing mode only even during the crushing season thus ignoring the power loss accrued on account of extraction of steam for the purpose of sugar production. Their contention is that, the capacity charges has also been fixed considering the plant operation to be entirely in condensing mode ignoring the steam extraction during crushing period.

Let us now see as to how the plant load factor has been arrived at. For this purpose, we recollect the portion of the order No. 3 dated 15.5.2006 of this Commission relating to determination of PLF.

**“(3) Bagasse based Cogeneration**

*In case of bagasse based Co-generation plants, the PLF depends mostly on availability of bagasse in the crushing season. Assuming that the projects can run for 130 days during the crushing season and another 100 days during non-crushing season (with the stored bagasse and other biomass fuels), the average PLF that can be achieved is around 55% when the project runs at a capacity of 90%. Hence a threshold level of PLF at 55% worked out on the basis of the availability of fuel is reasonable. If the PLF achieved in any financial year is more than 55%, then the rate for the excess energy produced over and above the 55% shall be equivalent to the rate fixed by the Commission for the fossil fuel based co-generation”.*

It is seen that the PLF is calculated on the premise that the plant would be operating at 90% of the full rated capacity for a period of 230 days. This period of 230 days is based on the availability of fuel viz., bagasse. This period of 230 days is inclusive of 130 days of crushing period also where the power generation will be limited to less than 80% of the rated capacity because of extraction of steam for process. In effect if the plant operates for 230 days (130 crushing days and 100 non-crushing days) as presumed, the plant would not be able to achieve 55% PLF as stipulated as the plant is likely to operate at less than 80% PLF for 130 days and not at 90% PLF as presumed. This means that the generator may not be able to recover the fixed charges in full corresponding to the entire capacity. The shortfall in the realization of fixed charges is to be counted against the capacity that has not been utilized for power generation. If only the plant is operated beyond normal 90% of the capacity or the number of days of operation is extended beyond normal 230 days on account of abundant availability of bagasse which are rare, the capacity charges would be fully covered. In a strict sense it is not permissible. However, in our view as the plant is being considered under section 86 (1) (e) of the Electricity Act, 2003, this concession can be extended to the Remand Applicant M/s.SISMA.

Hence the Commission proposes no deduction of capital cost for apportionment to the process.

In this regard, we consider that there is need for a clarification in the matter of PLF. The 55% PLF is to be calculated based on the energy generated as measured at the generator terminal. The auxiliary consumption of 8.5% has already been accounted for in the determination of tariff. The net billable export to grid would be the energy generated as measured at the generator terminal minus auxiliary consumption minus sugar plant consumption. Therefore, for the purpose of regulating fixed charges and incentive the PLF is to be calculated as the sum of units exported to grid, auxiliary consumption and in-house consumption, in other words, the generation as measured at the generation terminal and not on the basis of energy exported.

**Station Heat Rate** : As discussed earlier, Station Heat Rate is not an issue on remand. But it becomes an associated issue of the capital cost when the capital cost is fixed based on a technology or configuration different from the originally conceived one which changes the performance of the plant as such. Increased capital cost is being admitted to accommodate the latest technological advancements in terms of enhanced ratings of the BTG. We shall not lose sight of the consequent increased efficiency such enhanced system would bring in. This aspect was raised during the hearing and the Remand Applicant M/s. SISMA readily affirmed the same.

We have seen that by changing the configuration of the project from 64ata / 400°C to around 110 ata 540°C, the power output increases considerably for the same input. While passing on the increased cost of enhanced configuration of the plant to the Respondent TANGEDCO, it will be only natural that the associated benefit of increased output is also passed on.

This necessitates a relook at the Station Heat Rate originally envisaged. In other words the Station Heat Rate of 3600 kcal / kWhr corresponding to 60 ata scheme considered by CERC needs to be re-fixed to represent the enhanced configuration of 110 ata. In this regard we had an opportunity to go into the schematics along with the heat balance calculation filed by the Remand Applicant M/sSISMA. The table furnished in Annexure 5 of the affidavit dated 12.1.2015 is given below.

“Operation of the Cogeneration Plant in Power Generation mode with no Steam Supply to the Process

1	Boiler steam Generation	TPH	110
2	Bagasse Consumption as Fuel	kg/Hr	42300
3	Bagasse Gross Calorific Value	kCals/kg	2272
4	Fuel Heat Input to the Plant	kCals/hr	96105600
5	Boiler Efficiency on GCV	%	71.5
6	Losses in the Boiler	kCals/kg	27390096
7	Steam Flow to the Condenser	kg/Hr	82150
8	Enthalpy of steam going to the Condenser	kCals/kg	552.8
9	Condenser Condensate Enthalpy	kCals/kg	45
10	Losses in the Condenser	kCals/hr	41715770
11	Useful Heat Energy for Power Generation	kCals/hr	26999734

The above table of empirical heat balance corresponds to a plant designed with a capacity of 29MW in condensing mode of operation and operating with 110 ata boiler configuration. The total heat input to the plant at rated capacity is given as 96105600 kcal/hr. As the rated capacity of the plant is given as 29MW the electrical power output is 29000 kWhr/hr. Using the above we may calculate the station heat rate which is nothing but the ratio of the total heat input into the Boiler and the gross electrical output at the generator terminals. Thus it is seen that the Station Heat Rate considered by the Remand Applicant M/s. SISMA is 3314 kcal / kWhr in their empirical heat balance calculations.

CERC as mentioned has considered a station heat rate of 3600 kCal/kWhr for the 60 ata boiler configuration. Even though the actual increase in energy on account of updated configuration as seen from the EREDA literature is about 50%, the Commission considers that a modest reduction of 10% in the heat rate of 3600 kcal can be allowed.

Therefore in the light of the above discussion, the Commission feels that Station Heat Rate is inseparable from the re-fixation of capital cost as the same is considered on account of enhanced rating of the equipment and re-fixes the Station Heat Rate at 3240kcal/kWhr.

#### **7.4.2. FUEL COST**

##### Observations / Order of the Hon'ble APTEL

1. The prayer of the Appellant is that the fuel cost may be fixed at the rate of Rs.2085/- per MT having regard to the cost of coal or in the alternative to fix the fuel cost not below Rs.1408/- MT with an annual escalation of 5%.
2. The Respondents contended that being a by-product, it does not cost anything additional to the Sugar Mill and that it is freely available and it has no value in so far as it is input for generation of power and supply to the Distribution Licensee and therefore the fuel cost has been correctly fixed by the State Commission.
3. State Commission ought to have determined the Fuel price on the basis of equivalent heat value method with Coal as available to the generating plants or on the basis of market price of Bagasse.
4. It is well known that Bagasse has several uses and that it is saleable in the open market. Even the CERC explanatory memorandum for the 2012 Regulations explicitly states so. If the Bagasse is not used by the Sugar Mills in the power generation, it would be sold and it will fetch revenue at

the market price. That revenue which is foregone when the Bagasse is used for power generation is cost to the sugar mill and consequently it is the cost of the input for power generation.

5. In view of the above discussion, the fuel price fixed is not in accordance with the principles as referred to in the State Commission's Regulations as well as Central Commission's Regulations. In this Appeal, the Appellants have prayed for fixing the Fuel Cost at Rs.2085/MT on the basis of the Fuel equivalent cost of the coal or in the alternative, fix the Bagasse price on the equivalent heat value methodology taking an appropriate cost of imported coal and in any case the Fuel Cost should not be below Rs.1408/- per MT with an annual escalation of 5%.
6. We are not inclined to fix the Fuel Cost in this Appeal / Proceedings, though we hold the Fuel Cost fixed in this impugned order is not correct. Therefore, we remand the matter to the State Commission to fix the correct Fuel cost on the basis of the materials available on record after giving an opportunity to the parties to furnish further materials and in the light of the observations made above.

The Remand Applicant M/s.SISMA have contended that:

- i) the sugar mills do not get coal linkages and therefore the price at which thermal power plants obtain coal is irrelevant and cannot be considered.*
- ii) Ponni Sugars have purchased coal through import. The Average Fuel Cost on the equivalent heat value method for the period August 2012 to July 2013 is Rs.2,273/- per MT.*
- iii) the Tamil Nadu Co-operative Sugar Federation Ltd., has fixed the price for Bagasse at Rs.1,600/- per MT for 2012-13 season (nominal seasonal operation being from Oct-Apr) as per its communications dated 4-3-2013 Accordingly, the average market price of bagasse for*

*the one year period from August 2012 to July 2013 is to be considered as 1,600/- per MT.*

Per contra, the Respondent TANGEDCO contended that:

- i) in the absence of monitory mechanism for pricing of bagasse TNERC has considered 50% of sugar cane price as bagasse price.
- ii) the pricing of bagasse through equitant heat value method as suggested by the petitioner is not appropriate and hence cost of Bagasse of Rs.1,050/- per metric ton which is 50% cost of sugar cane of Rs.2,100/-, is to be maintained.

### **Orders of the Commission**

The contention of the Remand Applicant M/s. SISMA is to fix the fuel cost at 2273/MT which has been derived from the cost of coal procured by one of its members M/s. Ponni sugars. This is a generic order applicable to all the developers who are setting up co-generation plant using bagasse as fuel. Any parameter that specifically applies to a particular generator cannot be regarded as the parameter that will apply to all other generators as well. It could have the effect of distorting the process of determination of various elements of costs involved in fixing the generic tariff.

When we say equivalent coal cost it should mean the coal that is used in the conventional plants of the utility which is likely to be replaced by reducing its consumption on account of using the energy generated from renewable energy source based plant. This is basically the avoidance cost, avoidance of coal fuel elsewhere in the State. In this regard it will be useful to see the observation of the CERC in its SOR to the Regulation 2012 which is reproduced.

“(1) The price of bagasse shall be as specified in the table below and shall be linked to indexation formula as outlined under Regulation 54. Alternatively, for each

subsequent year of the Control Period, the normative escalation factor of 5% per annum shall be applicable at the option of the Project developer.

<b>State</b>	<b>Bagasse Price (Rs/MT)</b>
<i>Andhra Pradesh</i>	<i>1307</i>
<i>Haryana</i>	<i>1859</i>
<i>Maharashtra</i>	<i>1327</i>
<i>Madhya Pradesh</i>	<i>946</i>
<i>Punjab</i>	<i>1636</i>
<i>Tamilnadu</i>	<i>1408</i>
<i>Uttar Pradesh</i>	<i>1458</i>
<i>Other States</i>	<i>1420</i>

The Commission computed the above fuel price of bagasse for the respective States for base year 2012 – 13 on ‘equivalent heat value’ approach for landed cost of coal for thermal station for respective States.”

Thus the CERC also emphasizes that cost of coal for thermal power stations alone is to be considered in the equivalent heat value approach. In this case CERC had proposed a price of 1408 / MT. The Commission is inclined to adopt the same.

#### **7.4.3. INCENTIVES FOR GENERATION BEYOND THRESHOLD PLF**

##### Observations / Orders of Hon’ble APTEL

The Appellants in this Appeal have prayed for directions to the State Commission to allow incentives at Re.1 per kWh in addition to variable cost for generation above 55% after set off for previous years’ shortfall.

On this issue, the State Commission has given the following findings:

*“8.1.2.6. it is quite likely that in some cases, generation may go beyond 55% PLF. Once the annual fixed charges or the capital cost recovery is achieved at the normative PLF of 55% , any generation beyond the normative PLF of 55% does not warrant payment of fixed charges. An incentive would be adequate for such extra generation for the extra efforts and wear and tear of the plant and equipment. Commission therefore introduces the concept of incentive which is already in practice in other conventional power stations. 10% of the fixed charge applicable for*

*that year is allowed as incentive for extra generation beyond normative PLF. The variable cost as provided in this Order would be applicable if bagasse is used as fuel. If any other fuel is used, the total tariff shall be in accordance with Order No.4 of 2006 dated 15-5-2006, as amended from time to time. This tariff as per order No.4 of 2006 is the total tariff and the generator is not entitled for incentive and variable cost as in the case of generation with Bagasse as fuel”.*

Thus, the State Commission has allowed incentives of the fixed cost for generation above the 55% threshold PLF in addition to the variable cost.

The incentive fixed by the State Commission is as low as 19p during the 1<sup>st</sup> year of operation and reduces year after year to 14.7 p per unit for the 10<sup>th</sup> year.

We notice from the counter affidavit of the State Commission that the conventional plants of TANGEDCO are provided with incentive of 25 paise per Kwh besides the normative variable charges. It is well settled by the various decisions of this Tribunal that allowing a lower rate to renewable energy plants than that allowed to conventional power plants does not conform to the legislative mandate and the tariff policy. Thus, the State Commission on this issue has not followed a promotional approach as required.

All components of fixed cost would not remain unchanged for the extended period of operation. There would be higher wear and tear, higher repairs and maintenance and also higher employee cost. All these components must necessarily be considered as the necessary cost for power generation beyond the 55% normative PLF and compensated in the tariff fixation. On the other hand, the incentive for the bagasse based cogeneration plant appear to be declining with the passage of time and is less than that admissible to conventional plants.

The State Commission is directed to consider increasing the incentive adequately to incentives the bagasse based cogeneration plants to maximize generation by procuring adequate quality of bagasse fuel and improving the

availability of plants. In any case the incentive has to be better than that available to conventional power plants.

Accordingly, the issue of incentive is remanded to the State Commission to re-determine the same after hearing all the parties concerned.

The Remand Applicant M/s.SISMA have contended that:

- i) the components for fixed costs would not remain unchanged for extended period of operation and there would be higher wear and tear, higher repairs and maintenance and employee cost.
- ii) the incentive has to be better than that available to conventional power plants.
- iii) the CERC principles and methodology in the 2012 Regulation does not prescribe any different rate or tariff to be paid for generation above the normative PLF.
- iv) Alternatively, and in any case, the incentive ought to be fixed at not less than Re. 1/- per unit for the generation above the normative PLF.

Per contra, the Respondent M/s. TANGEDCO contended that:

- i) Bagasse based power tariff in TNERC order No.7 of 2012 has been fixed taking into consideration of the fact that entire cost invested on the power plant is recovered by selling power generated upto annual PLF of 55%.
- ii) for the power generated beyond the threshold limit of 55% annual PLF, is entitled for variable cost of bagasse based power tariff and in order to encourage Renewable Source of power generation, 10% of fixed cost is rewarded.

### **Orders of the Commission**

In the conventional power plants the normative PLF is fixed at 80% and incentive is allowed only beyond the threshold PLF of 80%, whereas the normative incentive is allowed from 55% onwards in respect of bagasse based co-generating plants and hence the wear and tear of the equipments is not directly comparable. Further at 55% PLF charges corresponding to full cost of the power plant inclusive of capacity that is used for sugar production is getting paid, which in itself is an

incentive. However in line with the direction of Hon'ble APTEL, an incentive is fixed at 25 paise per kwhr as payable by the Licensee for generation beyond 55% PLF using bagasse as fuel.

#### **7.4.4. O & M Charge**

##### Observations / Orders of Hon'ble APTEL

According to the Appellant, the State Commission has reduced the Operation and Maintenance charge to 3% in the impugned order as against 5.25% provided in the 2009 order. It is stated that the operation and maintenance charges should continue to be maintained at not less than 4.5% on 100% of the capital cost and there should be no discrimination in fixing the percentage of operation and maintenance charges between the co-generating plants commissioned before or after 31-7-2012. The Appellants have pleaded for retaining the operation and maintenance charges at the rate of 5.25% including insurance charges as provided in 2009 order irrespective of the date of commissioning of the co-generation either before or after 31-7-2012.

Refuting this contention, the learned counsel for the Respondents submitted that the State Commission has considered Operation and Maintenance cost of 3% on capital cost including the insurance charges as followed by other State Commission.

We find that the Central Commission's Regulations of 2012 provide for O&M expenses of Rs.16 lakhs per MW for FY 2012-13 to be escalated at 5.72% per annum during the subsequent years of control period. This translates into about 3.8% of the capital cost. We feel that the State Commission should have considered the Central Commission's Regulations while deciding the O&M charges.

We therefore, remand the matter to the State Commission to re-determine the O&M cost after considering the Central Commission's Regulations.

The Remand Applicant M/s.SISMA has contended that:

the Hon'ble Appellate Tribunal has directed the State Commission to re-determine the O&M cost considering the CERC Regulations; The Hon'ble Tribunal has also observed that the O&M charges of the CERC is 3.8% of the total capital cost and hence the O&M cost may be fixed at 3.8% of the entire capital cost.

Per contra, the Respondent M/s.TANGEDCO contended that:

Most of the Commissions in the country allowed O&M charges @ 3% including insurance with an annual escalation of 5% and therefore, the O&M charges of 3% with annual escalation of 5% from second year on 100% of capital cost, considered by the Hon'ble Commission in TNERC order No.7 of 2012 need not be modified.

#### Orders of the Commission

The O&M cost of Rs.16 lacs per MW was fixed by CERC in respect of bagasse based co-generation plants with 60ata boilers. But the Remand Applicant M/s. SISMA have stated that they have gone for improved boiler configuration with 110 ata boiler configuration for better efficiency etc and the capital cost has been revised now and therefore correspondingly the O&M cost must also be reduced from Rs.16 lakh/MW. As observed by CERC that in the case of co-generation projects there are several common expenses between the host sugar factory and cogeneration unit. It is also to be noted that the bagasse is readily available in the premises of the sugar factory only and hence does not require additional manpower in fuel transportation and hence associated handling charges are negligible.

However going by the Hon'ble APTEL's directive in Remand Order the Commission re-fixes the O&M cost at Rs.16 lakh/MW of the Capital Cost.

#### **7.4.5. WORKING CAPITAL**

##### Observations / Orders of Hon'ble APTEL:

The State Commission is directed to compute the Working Capital by considering receivables by 2 months as per the Central Commission Regulations and the rebate be allowed for payment within one month of the presentation of the bills as per the Central Commission's Regulations.

The Remand Applicant M/s.SISMA has contended that:

Accordingly, the Hon'ble Commission may re-compute the working capital as directed by APTEL by considering receivables of two months and providing for a rebate for payment within one month of presentation of bills, as per the CERC Regulations.

Per contra, the Respondent M/s.TANGEDCO contended that:

- i) most of the State Electricity Regulatory Commissions have considered Receivables as one of the components of working capital, for one month.
- ii) the payment towards purchase of power exported during a month period become due only at the first week of the succeeding month and the payment beyond 30 days from date of submission of bills also attracts 1% of interest and in view of this, receivable for a period of one month as considered by the Hon'ble Commission in Order No.7 of 2012 need no modification.

Orders of the Commission:

As directed by the Hon'ble APTEL the Receivables under the caption "working capital" is re-fixed at 2 months instead of one month.

**7.4.6. Interim Tariff adjustment after final determination on remand and allowing of interest on arrears as carrying cost.**

Observations / orders of Hon'ble APTEL

Interim tariff adjustment after final determination of demands and allowing of interest and arrears of carrying cost.

As correctly pointed out by the Learned Counsel for the Respondent this issue has been raised on the basis of the new plea made now for the first time in this Review Petition.

These are of the matters which are to be considered only by the State Commission after finalization of all the other issues. These issues cannot be decided by this Tribunal in this Review Petition. Therefore, the contention of the Review Petitioner on this issue is rejected.

The Remand Applicant M/s.SISMA has contended that:

- i) where the Tariff determined is on the principle of cost plus regulated return all costs be passed through in the tariff.
- ii) a part of the tariff bill amount required to be paid on the regular due date has not been realized at that time, and as the working capital cost does not provide for the interest on the differential amount of tariff payable upon-re-determination pursuant to the Appellate Order, the sugar mills have incurred carrying cost on the differential amounts; such differential amounts have to be funded through additional working capital which has a

cost and it is necessary that the carrying cost, by way of interest, be paid on the differential amounts of tariff.

Per contra, the Respondent M/s.TANGEDCO contended that:

If the Hon'ble Commission decides to re-fix the tariff as directed by the Hon'ble APTEL, such a revised tariff may be given prospective effect from the date of issuance of order on revision of tariff and retrospective effect on revision of tariff would cause great hardship to the respondent TANGEDCO as the number of generators are many and payment outgo will be huge.

#### Orders of the Commission

As pointed out by Hon'ble APTEL this is the new prayer brought out by the Remand Applicant M/s.SISMA. The Hon'ble APTEL has already rejected the contention of the Remand Applicant M/s.SISMA on this issue and hence this is an issue beyond the scope of the Review Petition and hence admission of carrying cost as prayed by the Remand Applicant M/s.SISMA is rejected.

#### Summary of the orders of the Commission.

1. Capital cost is re-fixed at Rs.5.10 Cr/MW.
2. Station Heat Rate is re-fixed at 3240 K.cal/kwh
3. Fuel cost is re-fixed at Rs.1408/MT
4. Incentive for Generation beyond threshold PLF of 55% using Bagasse is re-fixed at 25 Ps./kwh.
5. O&M charge is re-fixed as Rs.16 lakh/MW with 5.72% escalation per annum.
6. Receivables under Working Capital is re-fixed at 2 months.
7. Interim Tariff adjustment after final determination on remand and allowing of interest on arrears as carrying cost is rejected.

With these modifications the Tariff for Bagasse based co-generation plants covered under Order No.7 of 2012 dated 31-7-2012 is re-fixed at Rs.4.81 per kwh in the place of Rs.3.76 per kwh fixed in the impugned Order with effect from 31.07.2012. Detailed Tariff workings are annexed to this Order.

**8. Appeal:-**

An appeal against this order shall lie before the Appellate Tribunal for Electricity under section 111 of the Electricity Act, 2003 within a period of 45 days from the date of receipt of a copy of this order by the aggrieved person.

(Sd.....)  
**(G.Rajagopal)**  
**Member**

(Sd.....)  
**(S.Akshayakumar)**  
**Chairman**

/ True Copy /

Secretary  
Tamil Nadu Electricity  
Regulatory Commission

**PARAMETERS ADOPTED FOR DETERMINATION OF TARIFF IN**  
**R.A.NO. 3 OF 2014**

<b>Sl. No.</b>	<b>PARAMETERS</b>	<b>VALUES</b>
1.	Capital Cost	Rs.5.10 Crores/MW
2.	Plant Load Factor (PLF)	55%
3.	Debt Equity Ratio	70:30
4.	Term of Loan	10 years with one (1) year moratorium
5.	Interest on Loan	12.25%
6.	Return on Equity	19.85% pre-tax
7.	Life of Plant	20 years
8.	Depreciation on 85% of Capital Cost	4.5% per annum SLM on 85% of Capital Cost
9.	O & M Expenses	Rs. 16lakhs with an escalation of 5.72% from 2 <sup>nd</sup> year onwards
10.	Station Heat Rate(SHR)	3240 kCal/kWh
11.	Gross Calorific Value (GCV)	2300 kCal/kg
12.	Specific fuel consumption (kg/kWhr)	1.41
13.	Fuel Cost (Rs. PMT)	Rs.1408/MT
14.	Working Capital components	a) One month Fuel Stock b) One month O & M Expenses c) Two months Receivables
15.	Interest on Working Capital	12.50% p.a.
16.	Auxiliary Consumption	9.00%

ANNEXURE - II															
WORKING SHEET FOR TARIFF COMPUTATION FOR BAGASSE BASED CO-GENERATION PLANTS															
Year	O & M charges (Rs)	Interest on loan (Rs)	Depreciation (Rs)	Fuel cost (Rs)	O & M expenses	Fuel	Working capital (Rs.)		Return on Working Capital	Total Fixed Cost (Rs.)	Units generated Less Auxiliaries	Fixed Cost (Rs./unit)	Variable Cost (Rs./unit)	Total Cost per unit (Rs.)	
							Receivables	Total Working Capital	Interest on Working Capital						
1	1600000	4373250	1850750	9565079	133333	797090	3513605	4444029	55504	3037050	11516554	4384380	2.63	2.18	4.81
2	1601520	4373250	1850750	10041333	140961	836944	3611598	4589503	575688	3037050	11626258	4384380	2.65	2.29	4.94
3	1788273	3935925	1850750	10545500	149023	878792	3640166	4667981	583498	3037050	11295498	4384380	2.58		
4	1809564	3498600	1850750	11072755	157547	928731	3674004	4752425	594285	3037050	10971250	4384380	2.50		
5	1998765	3961273	1850750	11626413	166559	988868	3713382	4848809	609101	3037050	10655881	4384380	2.43		
6	2113034	2623950	1850750	12207784	176086	1017311	3758585	4951982	618998	3037050	10343778	4384380	2.36		
7	2233896	2186625	1850750	12818121	186158	1088177	3809912	5064241	634031	3037050	10041352	4384380	2.29		
8	2361673	1749300	1850750	13450027	196806	1121586	3867677	5186668	648259	3037050	9743033	4384380	2.22		
9	2496762	1311973	1850750	14131978	208064	1177665	3932210	5317938	664742	3037050	9461280	4384380	2.16		
10	2639577	874650	1850750	14838577	219965	1246548	4003858	5460371	682546	3037050	9184574	4384380	2.09		
11	2790561	437325	1850750	15580566	232547	1298375	4082988	5613911	701739	3037050	8917425	4384380	2.03		
12	2950181		1850750	16359531	245848	1362294	4169984	5779127	722391	3037050	8660372	4384380	1.98		
13	3118911		1850750	17177680	259911	1431459	4268687	6011657	753882	3037050	8426614	4384380	2.02		
14	3297334		1850750	18036313	274778	1503022	4370084	6295904	786987	3037050	8202121	4384380	2.07		
15	3485942		1850750	18938202	290495	1578184	4476622	6574301	821788	3037050	7995329	4384380	2.12		
16	3683338		1850750	19885112	307111	1657093	4602770	6869975	858372	3037050	7813700	4384380	2.17		
17	3896139		1850750	20879681	326678	1749947	4751023	7174649	896831	3037050	7658770	4384380	2.21		
18	4118998		1850750	21923310	347250	1826945	4927899	7499094	937262	3037050	7524060	4384380	2.29		
19	4354605		1850750	23019503	368384	1918292	5156946	7838123	979765	3037050	7402170	4384380	2.33		
20	4603688		1850750	24170478	385641	2014207	5397716	8395883	1024448	3037050	7291936	4384380	2.32		

Note: Fuel cost is escalated at the rate of 5% for arriving at the receivables in connection with determination of interest on working capita