
TAMIL NADU ELECTRICITY REGULATORY COMMISSION CHENNAI

Present :

Thiru M. Chandrasekar Chairman
Dr.T. Prabhakara Rao Member
Thiru K. Venkatasamy Member (Legal)

Order.No.12 of 2020, dated 10-12-2020

Recomputation of parameters of Biomass Order No.5 of 2016 dated 31-03-2016

In the matter of : Recomputation of parameters of Biomass Tariff Order No.5 of 2016 dated 31-03-2016 based on Hon'ble APTEL Order No.170 of 2016 dated 18-02-2020

This Commission had determined the tariff for power procurement by Distribution Licensee from Biomass based Power Generating Plants for the FY 2016-17 and 2017-18 vide Order No.5 of 2016 on 31-03-2016. Aggrieved by the said order of the Commission, the Biomass Power Producers Association filed an appeal before the Hon'ble Appellate Tribunal for Electricity (Appeal No.170 of 2016) on the following counts:-

- (a) Incorrect process followed by the State Commission in passing the tariff order;
- (b) Determination of capital cost at Rs.5.50 Crores/MW;
- (c) Gross Calorific Value being fixed at 3200 kCal / Kg;

-
- (d) Station Heat Rate determined at 3840 kCal / kWh
 - (e) Operation and Maintenance Expenses @ 4.5% of the Capital Cost;

The Hon'ble Appellate Tribunal for Electricity has made the following observations and orders on the aforesaid counts:

- (a) Incorrect process followed by the State Commission in passing the tariff order;

As regards the allegation that no public hearing was held prior to the issue of the impugned order, the Commission clarified that there is no statutory requirement for holding such a public hearing either under the Act or any of the regulations made thereunder. In this connection, it is submitted that section 64 (3) of the Act requires only consideration of all suggestions and objections from the public. The Regulation 4(1)(b) of Power Procurement from New and Renewable Sources of Energy Regulations, 2008 only mandates the invitation of public response for determination of tariff. Comments received from the Appellant have been considered while finalising the Tariff. Further, clause 4 of the said 2008 Regulations, as it was originally notified had a provision for holding of public hearing in Regulation 4(1)(c). This provision was amended through the amendment regulation No.TNERC/NCES/Regn./16/4 dated 27-04-2009 whereby the requirement of public hearing was dispensed with. Thus, the Commission has taken a

conscious decision by exercise of its legislative power, to dispense with the process of holding public hearings in tariff determination for power procurement from new and renewable sources of energy. This amendment is under challenge in W.P.No.312 of 2010 filed by Power Engineers' Society of Tamil Nadu before the High Court of Madras. As is well known, vires of Regulations can be challenged only under the power of Judicial Review by the High Courts. Fourthly, this Tribunal has settled the issue vide its judgement dated 13-05-2015 in Appeal No.77 of 2014 wherein it has been held as follows:-

“18. The reply to the main contention of the Appellant has made by the Respondent No.2 is that Section 64 of the Electricity Act, 2003 provides that the Appropriate Commission has to consider the suggestions and objections received from the public while considering the tariff petition filed by the utility. There is no requirement specified in the Act for granting an opportunity of hearing to the stakeholders. Hearing as mandated under Section 64 to be given to the applicant in case the Commission decides to reject the tariff application. Hence, the manner of application of the principle of natural justice is already provided in Section 64 of the Act namely, in form of written suggestions / objections. The Act provides for calling of suggestions and objections from the public and such opportunity of hearing is not required to be given to individual customer for tariff

determination. Providing for an opportunity of hearing is only required in case the tariff application is to be rejected and public hearing is contemplated for determination of tariff. Hence, the Court is not required to go beyond the express provision of the statute namely; Section 64 of the Electricity Act, 2003, dealing with the principle of natural justice”.

“As may be stated from the above, the issue is so larger res integra and there is no mandatory requirement under the Electricity Act to hold a public hearing.”

Order of the APTEL

(b) Determination of capital cost:

The Biomass Power Producers Association considered the decided capital cost of Rs.5.50 crores per MW as extremely low and on the other hand, the State Commissions and Discoms justified the same on the ground that it is 24% more than the previous order. In this regard, it is relevant to note that the Central Commission in its order dated 31-03-2015 determining the tariff for biomass plants for FY 2015-16 has determined the capital cost for biomass plants using Rice Straw and Juliflora (Plantation) based projects with water cooled condensers, a capital cost of Rs.6.104 crores per MW has been specified. For such plants using Air-cooled condensers, the Central Commission has allowed a capital cost of

Rs.6.518 crores per MW. It is further noticed that the Central Commission has based its determination of capital cost for various technology based biomass plants based on the actual data submitted by a Committee which studied the working of the actual biomass plants in the country and it further indexed the above capital cost for the year 2015-16. We are not inclined to accept the arguments of learned counsel for the Respondent that the State Commission has to follow its own regulations and data base for arriving at various parameters to be allowed to the biomass plants. In fact, the determination of tariff has to be undertaken by the State Commission as per its own regulations but the various parameters influencing the capital cost have to be based on certain realistic data and its due analysis. Pending such collection of data and prudent analysis, the State Commission could make reference to the data and analysis of the Central Commission, which is referred to by almost all State Regulatory Commissions. It is further relevant to note that in view of the considerable difference in efficiency of various technology based power plants, a distinction has to be made by the State Commission whether the plant is based on the Air-cooled condensers or Water-cooled condensers. There cannot be a uniform capital cost for all the biomass plants using different technologies.

In view of the above facts, we opine that in the facts and circumstances of the case, the capital cost of Rs.6.10 crores per MW as

determined by the Central Commission for Rice Straw and Juliflora (Plantation) based biomass plants with water cooled condensers, may also be considered for the power plant of the Appellant using same technology.

Order of the APTEL

(c) Gross Calorific Value:

The GCV determined by the State Commission is primarily based on the figures presumably adopted by it in its previous Orders. The State Commission has neither considered the figures adopted by the Central Commission as well as that decided by this Tribunal in its judgement dated 04-05-2016 in A.No.211 of 2015. In both these documents, the issue of GCV and associated problems like moisture content etc has been discussed at great length before recommending / deciding a figure of 3100 kCal per kg.

In view of these facts, we are of the opinion that the GCV of 3200 kCal per kg adopted by the State Commission is quite high and accordingly it appears justified to take into account the figures analysed and decided by the Central Commission as well as this Tribunal as 3100 kCal per kg.”

Order of the APTEL

(d) Station Heat Rate:

The State Commission has simply followed the SHR figure which was considered in its previous orders and also has made a cursory reference to the Orders of other State Commissions and also the CERC. In the facts and circumstances of the case and considering that SHR is dependent upon a number of uncontrollable factors like sand, moisture and ash contents, the State Commission ought to have adopted at least the figure decided by this Tribunal in its judgement dated 04-05-2016 in A.No.211 of 2015. Accordingly, we are of the considered opinion that the SHR of 4200 kCal/kWh could have been considered by the State Commission as decided by this Tribunal in its judgement dated 04-05-2016 and the judgement is squarely applicable to the case in hand.

Order of the APTEL

(e) Operation and Maintenance Expenses:

The State Commission has allowed an O&M Expense of 5% on 85% of the capital cost with annual escalation of 5% considered earlier. In view of the inflation in the prices considering O&M Expenses as percentage of the capital cost (85%) cannot sustain in long run and the biomass power plants become non-viable due to their frequent break downs due to inadequate O&M Expenses. In such a scenario, we are of the opinion that the State Commission ought to have considered the O&M Expenses of a fixed amount per MW basis instead of percentage. While escalation of 5.72% p.a. as

considered by the State Commission is fully justified, the base rate of O&M Expenses as 5% is considered inadequate. In other words, if we consider 5% of the capital cost of, say, Rs.6 crores, then the O&M Expenses as per the State Commission would work out to Rs.30 lacs per MW which is nowhere comparable with the figures decided by the Central Commission as Rs.40 lacs per MW for FY 2014-15 and Rs.44.71 lacs per MW for FY 2015-16.

In view of these facts, we opine that for FY 2015-16, the State Commission ought to have decided the O&M Expenses in the range of same as fixed by the Central Commission, if not allowing the exact figure. Accordingly, the State Commission is required to analyse the same afresh and decide the O&M Expenses considering the figures decided by the Central Commission.

The Commission preferred an appeal before the Supreme Court in Civil Appeal No.2918 of 2020 against the order of the APTEL on the following grounds:

- 1) APTEL directed to follow CERC orders and methodologies without considering that such a direction would amount to interfering with the jurisdiction of the Commission under section 86 of the Act, 2003.
- 2) APTEL while directing the Commission to follow CERC orders, principles and methodologies, has failed to consider that the Commission must be

guided by the principles and methodologies of CERC and not follow the same ignoring its own regulations. The expression guided by cannot be interpreted as to mean that the Commission is bound by CERC determination which is a general in nature applicable across the country as against the determination made by the Commission keeping in view the ground realities prevalent in the State.

3) APTEL directed the Commission to allow the Biomass Power Producers Association's Capital Cost in light of the determinations of CERC. APTEL failed to consider that the TNERC is guided by the CERC order but cannot be said to be bound by the same. Thus, the finding of the APTEL is wholly untenable.

4) APTEL directed the Commission to follow the order of the CERC in deciding the O&M Expenses. The said direction goes against the basic object of setting up of the State Regulatory Commission and Regulations framed by it under section 61, 86 read with section 181 of the Act, 2003.

5) APTEL failed to consider that the Commission is to be guided by the CERC orders and is not bound to adopt the same while determining the generic tariff. The direction of the APTEL is contrary to the provisions of the Act, 2003.

6) APTEL failed to consider the scope and ambit of Section 61 of the Act, 2003. APTEL directed the Commission to follow the CERC Regulations

without taking into consideration that Commission is not bound by the CERC but only guided by the principles and methodologies specified by CERC.

7) APTEL directed the Commission to follow the CERC Regulation, whereas Section 61 of the Act, 2003 as well as Regulation 4(2) of the Commission's RE Tariff Regulations, 2008 provide that the State Commission must be guided by the same.

8) APTEL order is against the settled principle of law that the Commission is the Appropriate Authority for determining tariff in the State of Tamil Nadu and the direction of the APTEL to follow the CERC Regulation interferes with the jurisdiction of the Commission conferred under Act, 2003.

9) APTEL judgement is contrary to the objective of setting up of the State Regulatory Commission and against the Regulation framed by it under Section 61 read with Section 181 of the Act, 2003.

After hearing the parties, the full bench of the Hon'ble Supreme Court has passed the following order:

"Heard learned counsel for the appellant. We see no reason to interfere with the impugned order. The appeal is, accordingly, dismissed".

Therefore, in view of the binding nature of the conclusions already reached and decision rendered by the Tribunal, the Commission re-fixed the capital cost at Rs.6.10 crore per MW for Rice Straw and Juliflora (Plantation)

based biomass power plants with water cooled condensers for the power plant of the Biomass Power Producers Association using same technology and other three parameters as directed by Tribunal are re-fixed and tariff workings are as follows:

1. Gross Calorific Value is re-fixed at 3100 kCal/kwh
2. Station Heat Rate is re-fixed at 4200 kCal/kwh
3. O&M charge is re-fixed as Rs.44.71 lakh/MW for FY 2015-16 with 5.72% escalation per annum.

Components of Biomass Tariff

Sl.No.	PARAMETERS	As per Biomass Order dated 31-03-2016	As per APTEL Order dated 18-02-2020
1	Capital Investment	Rs.5.50 Cr/MW	Rs.6.10 Cr/MW
2	Plant Load Factor	80%	80%
3	Debt Equity Ratio	70:30	70:30
4	Term of Loan	10 years with 1 year moratorium	10 years with 1 year moratorium
5	Interest on Loan	13% p.a.	13% p.a.
6	Return on Equity	20% (pre-tax)	20% (pre-tax)
7	Life of the Plant	20 years	20 years
8	Depreciation	4.5% p.a. on SLM on 85% of capital cost	4.5% p.a. on SLM on 85% of capital cost
9	O & M Charges for Machinery on 85% of capital investment	5% with escalation of 5.72% from 2 nd year onwards on 85% of capital cost.	Rs.44.71 Lakhs/Mw with escalation of 5.72% from 2 nd year onwards.

	O & M charges for land and civil works on 15% of capital investment	0.90% with escalation of 5.72% from 2 nd year onwards on 15% of capital cost.	
10	Station Heat Rate	3840 kCal/kWh	4200 kCal/kWh
12	Calorific Value of fuel	3200 kCal/kg	3100 kCal/kg
13	Specific fuel Consumption	1.20kg/kWh	1.35kg/kWh
14	Fuel Cost (FY 2016-17)	Rs.2892.03/MT with 5% escalation from 2 nd year onwards	Rs.2892.03/MT with 5% escalation from 2 nd year onwards
15	Working capital components	One month fuel stock, one month O&M and two month receivables	One month fuel stock, one month O&M and two month receivables
16	Interest on working capital	13.50% p.a.	13.50% p.a.
17	Auxiliary consumption	10%	10%

Tariff has been re-fixed based on the parameters directed by APTEL for the FY 2016-17:

Fixed Cost:

Sl.No.	Components	Cost (in Rs.)
1	Interest on Debt	55,51,000
2	Return on Equity	36,60,000
3	Depreciation	23,33,250

4	O&M Expenses	44,71,000
5	Interest on Working Capital	13,64,780
Total Fixed Cost		17380030

Fixed Cost per unit: = Rs. 2.75

(17380030/6307200)

Fixed Cost Workings:

1) Interest on Debt :

Capital Cost: Rs.61000000x70%=42700000x13%=Rs.55,51,000.

2) RoE :

Capital Cost: Rs.6,10,00,000x30%=1,83,00,000x20%=Rs.36,60,000

3) Depreciation : 6,10,00,000x85%=5,18,50,000x4.5%=Rs.23,33,250

4) O&M Expenses : Rs.44,71,000/MW for FY 2016-17

5) Interest on Working Capital : One month fuel stock, one month O&M and two month receivables

Fuel Cost / 12 = 27360917/12 = Rs.2280076

O&M 4471000/12 = Rs.372583

Receivables = (Fuel cost + Fixed cost) /12x2 =
(27360917+17380030)/12x2= Rs.7456825

Total = 2280076+372583+7456825 = 10109484x13.5%=Rs.13,64,780

Variable Cost Workings:

Variable Cost = Fuel Cost/
(Units generation – Auxiliary Consumption)

Where Fuel Cost = (1000 x 24 Hours x 365 days x PLF x
Specific Fuel Consumption)x(Rs.2892.03/1000) =Rs.2,73,60,917

$$\text{Units Generation} = 1000 \times 24 \text{ Hours} \times 365 \text{ days} \times \text{PLF} \times (100\% - \text{Auxiliary Consumption}\%) = 6307200$$

Variable Cost per unit:Rs.4.34

Tariff has been re-fixed based on the parameters directed by APTEL for the FY 2017-18:

Fixed Cost:

Sl.No.	Components	Cost (in Rs.)
1	Interest on Debt	55,51,000
2	Return on Equity	36,60,000
3	Depreciation	23,33,250
4	O&M Expenses	47,26,741
5	Interest on Working Capital	14,20,845
Total Fixed Cost		1,76,91,836

Fixed Cost per unit: = Rs.2.81

$$(1,76,91,836/63,07,200)$$

Fixed Cost Workings:

1) Interest on Debt :

$$\text{Capital Cost: Rs.6,10,00,000} \times 70\% = 4,27,00,000 \times 13\% = \text{Rs.55,51,000.}$$

2) RoE :

$$\text{Capital Cost: Rs.6,10,00,000} \times 30\% = 1,83,00,000 \times 20\% = \text{Rs.36,60,000}$$

$$3) \text{ Depreciation : } 6,10,00,000 \times 85\% = 5,18,50,000 \times 4.5\% = \text{Rs.23,33,250}$$

$$4) \text{ O\&M Expenses : Rs.44,71,000 + (44,71,000} \times 5.72\%) = \text{Rs.47,26,741}$$

5) Interest on Working Capital : One month fuel stock, one month O&M and two month receivables:

$$\text{Fuel Cost} / 12 = 2,87,28,963/12 = \text{Rs.}23,94,080$$

$$\text{O\&M} 47,26,741/12 = \text{Rs.} 3,93,895$$

$$\text{Receivables} = (\text{Fuel cost} + \text{Fixed cost}) / 12 \times 2 = \\ (28728963+17691836)/12 \times 2 = \text{Rs.}77,36,800$$

$$\text{Total} = \text{Rs.}2394080+393895+7736800 = \\ 1,05,24,775 \times 13.5\% = \text{Rs.}14,20,845$$

Variable Cost Workings:

$$\text{Variable Cost} = \text{Fuel Cost} / \\ (\text{Units generation} - \text{Auxiliary Consumption})$$

$$\text{Where Fuel Cost} = (1000 \times 24 \text{ Hours} \times 365 \text{ days} \times \text{PLF} \times \\ \text{Specific Fuel Consumption}) \times (\text{Rs.}2892.03/1000) \\ = 27360917 + (27360917 \times 5\%) = \text{Rs.}2,87,28,963$$

$$\text{Units Generation} = 1000 \times 24 \text{ Hours} \times 365 \text{ days} \times \text{PLF} \times \\ (100\% - \text{Auxiliary Consumption}\%) = 63,07,200 \text{ units}$$

Variable Cost per unit:Rs.4.55

Total cost for the FY 2017-18: Rs.7.36

Year	Tariff as per APTEL directed parameters		
	Fixed Cost (Rs./unit) (4)	Variable Cost (Rs./unit) (5)	Total Cost (Rs./unit) (6)
2016-17	2.75	4.34	7.09
2017-18	2.81	4.55	7.36

With these modifications the Tariff for Biomass based power generating plants covered under Order No.5 of 2016 dated 31-03-2016 is

re-fixed at Rs. 7.09 per kwh & Rs.7.36/kWh for the FY 2016-17 & 2017-18 in the place of Rs.6.07 per kwh & Rs.6.30 per kWh fixed in the impugned Order with effect from 31.03.2016 for Rice Straw and Juliflora (Plantation) based biomass power plants with water cooled condensers for the power plant of the Biomass Power Producers Association using same technology. Detailed Tariff workings for the rest of the period are annexed.

(Sd.....)
(K. Venkatasamy)
Member (Legal)

(Sd.....)
(Dr. T. Prabhakara Rao)
Member

(Sd.....)
(M. Chandrasekar)
Chairman

/ True Copy /

(Sd.....)
Secretary
Tamil Nadu Electricity
Regulatory Commission

COMPONENTS OF BIOMASS TARIFF

Sl. No.	PARAMETERS	VALUES
1	Capital Investment	Rs.6.10 Cr / MW
2	Plant Load Factor	80%
3	Debt Equity Ratio	70 : 30
4	Term of Loan	10 years with one year moratorium
5	Interest on loan	13.00%
6	Return on Equity	20% (Pre-tax)
7	Life of the plant	20 years
8	Depreciation	4.50% p.a on SLM on 85% of capital cost
9	O & M charges	Rs.44.71 Lakhs with an escalation of 5.72%.
12	Station Heat Rate	4200 kcal/ kwh
13	Calorific value of	3100 kcal / kg
14	Specific fuel consumption	1.35 kg / kwh
15	Fuel cost (FY 2016-17)	Rs.2892.03/ MT with 5% escalation from 2nd year onwards
16	Working capital componants	One Month Fuel stock, One month O & M and Two months Receivables
17	Interest on working capital	13.50% p.a
18	Auxiliary consumption	10.00%

BIOMASS TARIFF CALCULATION

Year	O & M charges	Interest on loan	Depn.	Fuel cost	Working Capital					ROE	Total FC	Units gen Less Aux consump	Fixed Cost	Variable Cost	Total
					O & M Expenses	Fuel	Receivables	Total WC	Int on WC						
1	4471000	5551000	2333250	27360917	372583	2280076	7456824.6	10109484	1364780	3660000	17380030	6307200	2.76	4.34	7.09
2	4726741	5551000	2333250	28728963	393895	2394080	7736799.9	10524775	1420845	3660000	17691836	6307200	2.81	4.55	7.36
3	4997111	4995900	2333250	30165411	416426	2513784	7936445.1	10866655	1466998	3660000	17453259	6307200	2.77		
4	5282946	4440800	2333250	31673682	440245	2639474	8151140.6	11230860	1516166	3660000	17233162	6307200	2.73		
5	5585130	3885700	2333250	33257366	465428	2771447	8381658	11618533	1568502	3660000	17032582	6307200	2.70		
6	5904599	3330600	2333250	34920234	492050	2910020	8628808.7	12030878	1624169	3660000	16852618	6307200	2.67		
7	6242343	2775500	2333250	36666246	520195	3055521	8893445.9	12469162	1683337	3660000	16694429	6307200	2.65		
8	6599405	2220400	2333250	38499558	549950	3208297	9176466.6	12934713	1746186	3660000	16559241	6307200	2.63		
9	6976890	1665300	2333250	40424536	581408	3368711	9478813.8	13428933	1812906	3660000	16448346	6307200	2.61		
10	7375969	1110200	2333250	42445763	614664	3537147	9801479.3	13953290	1883694	3660000	16363113	6307200	2.59		
11	7797874	555100	2333250	44568051	649823	3714004	10145506	14509333	1958760	3660000	16304984	6307200	2.59		
12	8243912		2333250	46796454	686993	3899704	10511990	15098687	2038323	3660000	16275485	6307200	2.58		
13	8715464		2333250	49136277	726289	4094690	10996730	15817709	2135391	3660000	16844105	6307200	2.67		
14	9213989		2333250	51593090	767832	4299424	11506293	16573550	2237429	3660000	17444668	6307200	2.77		
15	9741029		2333250	54172745	811752	4514395	12041953	17368101	2344694	3660000	18078973	6307200	2.87		
16	10298216		2333250	56881382	858185	4740115	12605050	18203350	2457452	3660000	18748918	6307200	2.97		
17	10887274		2333250	59725451	907273	4977121	13196994	19081387	2575987	3660000	19456511	6307200	3.08		
18	11510026		2333250	62711724	959169	5225977	13819266	20004412	2700596	3660000	20203871	6307200	3.20		
19	12168399		2333250	65847310	1014033	5487276	14473425	20974734	2831589	3660000	20993238	6307200	3.33		
20	12864432		2333250	69139676	1072036	5761640	15161109	21994784	2969296	3660000	21826978	6307200	3.46		