TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Comprehensive Tariff Order for Biomass based Power Plants

Order No.3 of 2018 dated 28-03-2018

BEFORE THE TAMIL NADU ELECTRICITY REGULATORY COMMISSION CHENNAI

<u>Present :</u>	**Thiru S. Akshaya Kumar**	**-**	**Chairman**
	Thiru G. Rajagopal	**-**	**Member**
	Dr. T. Prabhakara Rao	**-**	**Member**

Order No.3 of 2018, dated 28-03-2018

In the matter of : Power procurement by Distribution Licensee from Biomass based Co-generation plants and allied issues relating to captive use and third party sale.

In exercise of powers conferred by Section 181 read with Sections 61 (h) and 86(1) (e) of the Electricity Act 2003, (Central Act 36 of 2003), and after taking into account the stipulations in the National Electricity Policy and the Tariff Policy and in accordance with the Power Procurement from New and Renewable Energy Sources Regulations, 2008 of the Commission and after examining the comments received from the stakeholders, after considering the views of the State Advisory Committee meeting held on 21-03-2018 in accordance with section 88 of the Electricity Act 2003, after examining the comments received from the stakeholders as per Section 64 of Electricity Act 2003, the Tamil Nadu Electricity Regulatory Commission, hereby, passes this order to determine the tariff and other conditions for power procurement by Distribution Licensee from Biomass based Power Generating Plants and allied issues relating to captive use and third party sale.

This Order shall take effect on and from 01-04-2018.

(Sd…………….)	(Sd………)	(Sd…………..)
Dr. T. Prabhakara Rao	G. Rajagopal	S. Akshaya Kumar
Member	Member	Chairman

(By Order of the Commission)

(Sd…………..)
(S. Chinnarajalu)
Secretary

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ORDER ON POWER PROCUREMENT BY DISTRIBUTION LICENSEE FROM BIOMASS BASED POWER PLANTS AND ALLIED ISSUES RELATING TO CAPTIVE USE AND THIRD PARTY SALE

1.0 Overview

1.1. Commission in exercise of the powers vested under the Electricity Act, 2003 and in compliance with the mandate of the Act to promote renewable energy has so far issued seventeen Tariff Orders in respect of various sources of renewable energy. These orders on renewable energy sources covered Tariff determination for purchase of power by the Distribution licensee, issues related to open access, its promotional aspects and banking of energy depending on the source of renewable power.

1.2. The total capacity of renewable power in the State as in February 2018 is 10789.36 MW of which Biomass power constitutes 236.50 MW. The last generic Tariff Order of the Commission in the case of Biomass Power was issued on 31-03-2016 vide order No.5 of 2016. The control period of this order No.5 of 2016 on Biomass energy expires on 31-03-2018.

1.3. <u>Commission's Regulation on Power Procurement from New and Renewable Sources of Energy</u>

In accordance to Section 61 of the Electricity Act 2003 (Central Act 36 of 2003) which stipulates that the State Electricity Regulatory Commissions shall specify the terms and conditions for the determination of tariff, the Commission notified the "Power Procurement from New and Renewable Sources of Energy Regulations 2008" on 08-02-2008 which have been subsequently amended from time to time, as required. Clause 6 of the said Regulations state that while the tariff determined by the Commission would be in force for the time period mentioned in the Tariff Order, the control period would ordinarily be two years.

1.4. Commission's order on NCES based generation and allied Issues

1.5.1. The Commission has so far issued four tariff orders in respect of Biomass. While the first Order No. 3 of 2006 dated 15-05-2006 was a comprehensive order for Wind Energy Generators (WEGs), Biomass based generators and Bagasse based co-generators, the second Order No.2 of 2009 dated 27-04-2009 was issued exclusively for Biomass based power plants and valid upto 31-03-2011 and further extended till 30-06-2012 by way of Tariff Order No. 5 of 2011 dated 21-12-2011. The third Order on Biomass No. 8 of 2012 dated 31-07-2012 was issued with validity for the control period of 2 years till 31-07-2014, which was extended vide Order No.5 of 2014 dt. 28-07-2014 upto the date of issue of next Tariff Order. The fourth Order on Biomass No.5 of 2016 dated 31-03-2016 was issued with validity for the control period of 2 years till 31-03-2018.

2. Biomass based Power Scenario in Tamil Nadu

The installed capacity of Biomass based Power Plants in Tamil Nadu is 236.50 MW as on 31-01-2018.

The year-wise capacity addition in Tamil Nadu over the past 17 years is furnished below:

Year	***Capacity Addition in MW***
upto 2002	18.00
2002-03	1.60
2003-04	0.00
2004-05	1.50
2005-06	7.75
2006-07	17.50
2007-08	26.50
2008-09	36.70
2009-10	27.50
2010-11	6.95
2011-12	25.00
2012-13	8.40
2013-14	33.60
2014-15	19.00
2015-16	0.00
2016-17	0.00
2017-18	6.50
Total as on 31-01-2018	***236.50***

3. Legal Provisions

3.1 Related Provisions of the Electricity Act, 2003:

3.1.1. The Commission is guided by the following provisions of Section 61 of the Act which are relevant to this Order:

3.1.2. ***Section 61*** - *"The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-*

(a) the principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;

(b) the generation, transmission, distribution and supply of electricity are conducted on commercial principles;

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

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

(e) the principles rewarding efficiency in performance;

(f) multi year tariff principles;

(g) that the tariff progressively reflects the cost of supply of electricity and also reduces cross-subsidies in the manner specified by the Appropriate Commission;

(h) the promotion of co-generation and generation of electricity from renewable sources of energy;

(i) the National Electricity Policy and Tariff Policy:"

3.1.3. Section 86 stipulates the following among other functions of the State Commission.

3.1.4. Section 86 (1) (e), "promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee;"

3.2 Related Provisions of the National Electricity Policy:

3.2.1. The guidelines stipulated in the National Electricity Policy on NCES, which are relevant to this Order are reproduced below:

3.2.2. ***Clause 5.2.20:*** *"Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass would also need to be exploited fully to create additional power generation capacity. With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures."*

3.2.3. Clause 5.12.1: *"Non-conventional sources of energy being the most environment friendly, there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources."*

3.2.4. Clause 5.12.2: *"The Electricity Act 2003 provides that power and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for* *connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non- conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies."*

3.3 Related Provisions in the Tariff Policy

3.3.1. The Commission is guided by the following specific provisions of the Tariff Policy issued by the Ministry of Power, Government of India relating to promote generation of electricity from renewable sources.

3.3.2. Second Proviso to *Clause 5.2:* *"Provided also that the State Government can notify a policy to encourage investment in the State by allowing setting up of generating plants, including from renewable energy sources out of which a maximum of 35% of the installed capacity can be procured by the Distribution Licensees of that State for which the tariff may be determined under Section 62 of the Electricity Act, 2003."*

3.3.3. Clause 5.11(i): *"Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant base line should take into account the benefits obtained from the Clean Development*

Mechanism (CDM) into consideration, in a manner so as to provide adequate incentive to the project developers."

3.3.4. Clause 6.0: *"Accelerated growth of the generation capacity sector is essential to meet the estimated growth in demand. Adequacy of generation is also essential for efficient functioning of power markets. At the same time, it is to be ensured that new capacity addition should deliver electricity at most efficient rates to protect the interests of consumers…."*

3.3.5. Clause 6.4 (1): *"Pursuant to provisions of section 86(l)(e) of the Act, the Appropriate Commission shall fix a minimum percentage of the total consumption of electricity in the area of a distribution licensee for purchase of energy from renewable energy sources, taking into account availability of such resources and its impact on retail tariffs. Cost of purchase of renewable energy shall be taken into account while determining tariff by SERCs. Long term growth trajectory of Renewable Purchase Obligations (RPOs) will be prescribed by the Ministry of Power in consultation with MNRE.*

Provided that cogeneration from sources other than renewable sources shall not be excluded from the applicability of RPOs."

3.3.6. Clause 6.4(2): *"States shall endeavour to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Procurement of power by Distribution Licensee from renewable energy sources from projects above the notified capacity, shall be done through competitive bidding process, from the date to be notified by the Central Government.*

However, till such notification, any such procurement of power from *renewable energy sources projects, may be done under Section 62 of the Electricity Act, 2003….."*

4. Promotion of New and Renewable Source of Energy

4.1. In order to promote the New and Renewable source of energy, the Commission has prescribed minimum percentage of electrical energy which each obligated entity shall purchase from new and renewable sources generators. The obligated entity shall comply with this provision as stipulated in the Commission's Renewable Purchase Obligations Regulations, 2010, and as amended from time to time.

5. Applicability of the Order

5.1. The Order shall come into force from 01-04-2018. The tariff fixed in this order shall be applicable to all Biomass based Power Plants commissioned during the control period of this Order. The open access charges and other terms and conditions specified in this Order shall be applicable to all the Biomass based Power Plants, irrespective of their date of commissioning.

5.2. The agreement between the generators and the distribution licensee in relation to all plants commissioned on or after the date of issue of the tariff order shall be in conformity with the said order. The existing Energy Purchase Agreements (EPA) between the generators and the distribution licensee in relation to the tariff shall continue to be valid.

6. Tariff Determination Process

6.1. With regard to tariff determination, the relevant portions of regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008, are reproduced below:

(1) *"The Commission shall follow the process mentioned below for the determination of tariff for the power from new and renewable sources based generators, namely:-*

(a) "initiating the process of fixing the tariff either suo motu on expiry of control period and on expiry of the extended validity period of the earlier order or on an application filed by the distribution licensee or by the generator."

(b) "inviting public response on the suo motu proceedings or on the application filed by the distribution licensee or by the generator."

(c) - (omitted)

(d) "issuing general / specific tariff Order for purchase of power from new and renewable sources based generators."

7. Tariff / Pricing Methodology

(1) The relevant portion of Tariff / Pricing Methodology as specified in Regulation 4 of the Power Procurement from New and Renewable Sources of Energy Regulation, 2008, is reproduced below:

"(2) *While deciding the tariff for power purchase by distribution licensee from new and renewable sources based generators, the Commission shall, as far as possible, be guided by the principles and* *methodologies specified by:*

(a) Central Electricity Regulatory Commission
(b) National Electricity Policy
(c) Tariff Policy
(d) Rural Electrification Policy
(e) Forum of Regulators (FOR)
(f) Central and State Governments

(3) The Commission shall, by a general or specific Order, determine the tariff for the purchase of power from each kind of new and renewable sources based generators by the distribution licensee.

Provided where the tariff has been determined by following transparent process of bidding in accordance with the guidelines issued by the Central Government, as provided under section 63 of the Act, the Commission shall adopt such tariff.

(4) While determining the tariff, the Commission may, to the extent possible consider to permit an allowance / disincentive based on technology, fuel, market risk, environmental benefits and social impact etc., of each type of new and renewable source.

(5) While determining the tariff, the Commission shall adopt appropriate financial and operational parameters.

(6) While determining the tariff, the Commission may adopt appropriate tariff methodology".

7.1. Cost-Plus Tariff Determination

Cost-Plus Tariff Determination is a more practicable method but it discourages competition and efficiency. However, to encourage the setting up of new Biomass based power plants and till the competitive bidding is introduced, Cost-Plus Tariff method is followed. As it can be easily designed to provide adequate return to the investor as assured return will lead to larger investment in renewable power. Accordingly, the Commission adopts Cost-Plus Tariff approach in this Order.

7.2. Single Part vs. Two Part Tariff

Whenever the fuel cost varies from time to time and the fuel cost is considered as a pass through, the "Cost Plus Two Part Tariff" is adopted. In these cases, the variable component of the tariff would account for any price escalation. The Commission in its Order No.5 of 2016 dated 31-03-2016 adopted the "Cost Plus Two Part Tariff" as the stakeholders were of the view that the two part tariff was convenient to accommodate the fuel cost escalation appropriately. Accordingly, the same approach is adopted for this Order too.

8.0 Issues Relating to Tariff and allied matters:

8.1 Tariff Components

The Power Procurement from New and Renewable Sources Energy Regulation, 2008, of the Commission specifies that while determining the tariff, the Commission shall adopt appropriate financial and operational parameters for the tariff determined in a cost-plus scenario.

The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of Biomass based power plants.

The following important factors have been considered to arrive at the tariff and other related issues for Biomass based power plants.

1. Capital cost per MW
2. Plant Load Factor (PLF)
3. Debt – Equity ratio
4. Term of loan
5. Interest rate for the loan
6. Return on Equity
7. Life of plant and machinery
8. Depreciation
9. O & M Expenses
10. Station Heat rate
11. Gross calorific value of the fuel
12. Specific fuel consumption
13. Fuel cost
14. Components of working capital
15. Interest on working capital
16. Auxiliary consumption

The issue-wise suggestions of the stakeholders and the decision of the Commission are discussed below:

8.1.1. Capital cost per MW:

Orders of other Commissions on Capital Cost: (Rs. in Cr/MW)

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT	MNRE
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***	***Frequently Asked Questions (FAQ) No.(9)***
Rs.5.59 Crs. to Rs.6.52 Crs. / MW depending upon the type of condenser and / or type of fuel	Rs. 4 Cr. / MW	a) Water cooled : Rs. 5.28 Crs./ MW b) Air cooled : Rs.5.62 Cr. / MW	Rs.5.70 Crs./ MW	Rs. 4.88 Cr./ MW	Rs. 4.63336 Crs./ MW	a) Water cooled : Rs 4.68 Crs/MW b) Air cooled : Rs 4.98/MW	Rs.4.50 to 5.00 Crore/MW, depending upon boiler pressure and capacity

The Commission in Order No.5 of 2016 dated 31-03-2016 had considered Rs.5.50 Crores / MW as the capital cost.

CERC has adopted a Capital Cost of Rs.5.59 Crore/MW to Rs.6.52 Crore/MW as capital cost based on the type of condensers and / or type of fuel for 2018-19. CERC in its draft RE Tariff Order 2018-19 has marginally increased the Capital cost by about Rupees one lakh which is negligible.

Stakeholders' Comments:

TANGEDCO has agreed for a capital cost of Rs.5.50 Crores per MW as proposed in the Consultative Paper of the Commission.

Commission's View:

The Commission decides the capital cost of Rs.5.50Crs./MW for tariff calculation. The capital cost includes evacuation cost up to inter-connection point. The Commission also apportions the capital cost on machineries, land and civil works at 85% and 15% respectively as has been done in the earlier Tariff Order.

8.1.2. Plant Load Factor:

Orders of other Commissions on PLF:

CERC	*ANDHRA PRADESH*	*RAJASTHAN*	*KARNATAKA*	*MAHARASHTRA*	*MADHYA PRADESH*	*GUJARAT*	*MNRE*
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***	***Frequently Asked Questions (FAQ) No.(9)***
a) During stabilization (6 mths) : 60% b) During remaining period of the 1st year (after stabilization) : 70% c) Second year onwards : 80%	80%	a) During stabilization (6 mths) : 60% b) During remaining period of the 1st year (after stabilization) : 70% c) Second year onwards : 75%	75%	a) During stabilization : 60% b) During remaining period of the 1st year (after stabilization) : 70% c) Second year onwards : 80%	a) During stabilization (6 mths) : 60% b) During remaining period of the 1st year (after stabilization) : 70% c) Second year onwards : 80%	1st year : 70% 2nd year onwards : 80%	70% - 75%.

The plant load factor of a Biomass based power generation depends on number of factors like availability of fuel, vintage of the plant, etc. The Commission had assumed the PLF at 80% in Order No.5 of 2016 dated 31-03-2016.

Stakeholders' Comments:

TANGEDCO has agreed for PLF at 80%.

Commission's View:

PLF at 80% has been maintained in all the earlier tariff orders of the Commission and hence it retains the PLF at 80%.

8.1.3. Debt - Equity Ratio:

Orders of other Commissions on Debt-Equity Ratio :

CERC	*ANDHRA PRADESH*	*RAJASTHAN*	*KARNATAKA*	*MAHARASHTRA*	*MADHYA PRADESH*	*GUJARAT*
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
70:30	70:30	70:30	70:30	70:30	70:30	70:30

The Commission in Order No.5 of 2016 dated 31-03-2016 had specified the ratio as 70:30.

Stakeholders' Comments:

TANGEDCO agreed for the Debt equity ratio of 70:30.

Commission's View:

Debt equity ratio of 70:30 is an established financial norm and therefore, the Commission decides to maintain the norm at 70:30 for the next control period also.

8.1.4. Term of loan

In its Order No.5 of 2016 dated 31-03-2016, the Commission had fixed the tenure of the term loans at 10 years with a moratorium of one year on the consideration that financial institutions generally sanction loans for this time period. While the loan tenor is 13 years in CERC, it is assumed at 12 years in Maharashtra.

Stakeholders' Comments:

TANGEDCO agreed for the loan tenor of 10 years with one year moratorium period as proposed by the Commission in the consultative paper.

Commission's View:

Therefore, the Commission retains the same norm of ten years with a moratorium of one year for the next control period also.

8.1.5. Interest rate for the loan

Orders of other Commissions on Interest rate for Term Loan:

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***	***IREDA***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***	***01-11-2015***
9.97%	12.00%	12.30%	12.50%	11.00%	12.00%	12.86%	Grade I : 10.60% Grade II : 11.25% Grade III : 11.65% Grade IV : 11.90%

The Commission in its Order No.5 of 2016 dated 31-03-2016 adopted an interest rate on term loan of 13.00% p.a., as specified by CERC.

While the interest rate specified by CERC is at 9.97%, Rajasthan and Maharashtra have adopted the interest rate at 12.30% and 11.00% respectively.

The Commission has proposed in the consultative paper to fix the interest rate above 200 points from the average six months of State Bank of

India Marginal Cost of Funds based Lending Rate (MCLR) which works out to 9.95%.

Stakeholders' Comments:

TANGEDCO has suggested to adopt the interest rate for the loan of 8.95%.

Commission's View:

However, the Commission decides to fix the interest rate at 9.95% for the next control period as it is fully justified.

8.1.6. Return on Equity (RoE)

Orders of other Commissions on RoE

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
17.56%	16% (MAT / income tax pass through)	16%	16% (income tax on RoE pass through)	For first 10 years : 20.34% After 10 years : 24.47%	20% pre-tax	14%

ROE adopted by Rajasthan is 16% and Maharashtra is 20.34% (pre-tax) for the first 10 years and 24.47% (pre-tax) after 10 years.

The Commission in its Order No.5 of 2016 dated 31-03-2016 adopted a RoE of 20% (pre-tax) per annum without linking it to MAT and IT.

Central Electricity Regulatory Commission in its draft RE Tariff Order adopted a RoE of 17.56%. The Commission proposed in the consultative paper to adopt RoE at 17.56 (pre-tax) for the next control period.

Stakeholders' Comments:

TANGEDCO agreed for Return on Equity of 17.56% (pre-tax).

Commission's View:

Therefore, Commission decides to adopt RoE at 17.56% (pre-tax) for the next control period.

<u>8.1.7. Life of plant and machinery</u>

<u>Orders of other Commissions on life of plant & machinery</u>

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***	***MNRE***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***	***Frequently Asked Questions (FAQ) No.(12)***
20 years	20 years	20 years	20 years	20 years	20 years	20 years	20 years. It is possible to extend the lifetime by another 10 years by major rehabilitation.

For tariff determination process, the project life of a plant is considered as 20 years. The Commission had adopted 20 years as life of the Plant and Machinery in its Order No. 5 of 2016 dated 31-03-2016. All other ERCs have adopted 20 years as the life of the plant and machinery.

Stakeholders' Comments:

TANGEDCO agreed for the life of Plant and Machinery at 20 years.

Commission's View:

The Commission decides to retain the existing Plant life of 20 years for Biomass based power projects for tariff determination for the next control period also.

8.1.8. Depreciation

Orders of other Commissions on Depreciation:

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
First 13 years : 5.28%. 14th year onwards : 3.051%	First 8 years : 7.84% 9th year : 7.28% 10-20 years : 1.82%	First 12 years : 5.83% Balance 8 years : 2.505%/year	First 12 years : 5.83% Balance 8 years : 2.50%/year	First 12 years : 5.83% 13th year onwards : 2.505%	First 10 years : 7% 11-20th year: 2% p.a.	6% (upto 10 years) 3% (11 to 20 years)

CERC in its RE Tariff Order dated 01-03-2018 has fixed the depreciation rate as 5.28% for the first 13 years and 3.051% from the 14th year onwards. The depreciation rates of other ERCs are different to suit their needs.

The Commission in its Order No. 5 of 2016 dated 31-03-2016 adopted the rate of Depreciation as 4.5% p.a. SLM on Plant and Machinery by considering 85% of the capital cost while the accumulated depreciation would be limited to 90% of the plant and machinery.

Stakeholders' Comments:

TANGEDCO has agreed for the rate of Depreciation as 4.5% p.a. SLM on Plant and Machinery by considering 85% of the capital cost while the accumulated depreciation would be limited to 90% of the plant and machinery as proposed by the Commission in the consultative paper.

Commission's View:

The Commission in its earlier two orders has adopted the same percentage of depreciation. Therefore, the Commission decides to retain the depreciation rate of 4.5% SLM by considering 85% of the capital cost while the accumulated depreciation would be limited to 90% of the plant and machinery for the next control period also.

8.1.9. Operation and Maintenance Expenses

Orders of other Commissions on O & M Expenses:

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
Rs.0.4229 Crs. / MW with an escalation of 5.72% per year	5.50% of the capital cost with an escalation of 6.69%	a) Water cooled : Rs. 0.3993 crs./MW with an escalation of 5.85% per year b) Air cooled : Rs.0.4258 Crs /MW with an escalation of 5.85% per year	Rs. 0.30 Crs / MW with an escalation of 5.72% per year	Rs. 0.2630 Crs / MW for FY 2015-16 and Rs.0.2839 Crs./MW for FY 2017-18 with an escalation of 4.85% per year	4% of the capital cost for the first year with an escalation of 5.72% per year	First year : 5% of the project 2nd year onwards: 5.72% escalation

The Commission in its Order No. 5 of 2016 dated 31-03-2016, allowed Operation and Maintenance expenditure (including insurance) at 5% with annual escalation of 5.72% (from second year onwards) on plant and machinery by reckoning 85% of the capital cost as the cost of plant and machinery. With regard to land and civil works, which constitutes 15% of capital investment, 0.90% of 15% was allowed as Operation and Maintenance expenditure every year with an annual escalation of 5.72%.

Stakeholders' Comments:

TANGEDCO has agreed for the O & M expenses as 5% of the capital cost with escalation of 5% on plant and machinery by considering 85% of the capital cost as the cost of plant and machinery and land and civil works, which constitutes 15% of capital investment, 0.90% of 15% of capital cost would be continued as Operation and Maintenance expenditure every year with an annual escalation of 5%.

Commission's View:

Commission decides to follow the same procedure as adopted in its 2016 order for the next control period also.

8.1.10. Station Heat Rate

Orders of other Commissions on Station Heat Rate

(In Kcal / Kwhr)

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
4200	4200	a) Water cooled i) During stabilization : 4300 ii) After stabilization : 4200 b) Air cooled : i) During stabilization : 4540 ii) After stabilization : 4440	4000	4200	3800	a) Water cooled : 3800 b) Air cooled : : 3950

The Commission in its Order No. 5 of 2016 dated 31-03-2016 fixed the station heat rate at 3840 Kcal / Kwhr.

Stakeholders' Comments:

TANGEDCO has agreed for the station heat rate at 3840 kCal/kWhr as proposed by the Commission in the consultative paper.

Commission's View:

Therefore, the Commission decides to retain the Station Heat Rate at 3840 kCal/kWhr as followed in its order in 2016 for the next control period also.

8.1.11. Gross calorific value of the fuel

Orders of other Commissions on Gross calorific value of the fuel

(In Kcal/Kg)

CERC	*ANDHRA PRADESH*	*RAJASTHAN*	*KARNATAKA*	*MAHARASHTRA*	*MADHYA PRADESH*	*GUJARAT*
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
3100	3100	3400	3300	3611	3600	3400

Most of the ERCs including CERC have fixed the Gross Calorific Value in the range of 3100 – 3600 Kcal/Kwhr. The Commission in its Order No. 5 of 2016 dated 31-03-2016 adopted Gross Calorific value of 3200 Kcal / Kwhr and proposed the same in the consultative paper.

Stakeholders' Comments:

TANGEDCO agreed for the Gross Calorific Value of 3200 kCal/kg.

Commission's View:

Therefore, the Commission decides to retain the same Gross Calorific Value of 3200 kCal/kg as adopted in the earlier orders for the next control period also.

8.1.12. Specific fuel consumption

Orders of other Commissions on Specific fuel consumption:

(in Kg/Kwhr)

CERC	*ANDHRA PRADESH*	*RAJASTHAN*	*KARNATAKA*	*MAHARASHTRA*	*MADHYA PRADESH*	*GUJARAT*
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
1.35	1.35	Water Cooled: 1.23 Air Cooled: 1.30	1.21	1.16	1.05	a) Water cooled : 1.12 b) Air cooled : : 1.16

Commission's View:

Specific fuel consumption is the resultant of Station Heat Rate and Gross Calorific Value of Fuel, the specific fuel consumption works out to 1.20kg/kWhr.

8.1.13. Fuel Cost:

Orders of other Commissions on fuel cost :

(in Rs. /MT)

CERC	*ANDHRA PRADESH*	*RAJASTHAN*	*KARNATAKA*	*MAHARASHTRA*	*MADHYA PRADESH*	*GUJARAT*
Draft RE Order dt. 01-03-2018	***16-05-2014 & 13-03-2017***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
2967.35 with 5% escalation	FY 2017-18 2930.3 with 0.95% escalation	2875 with 5% escalation	2100 with 5.72% escalation	3896.21	FY 2013-14 2653 with 5% escalation	2726 with 5% escalation

The Commission in its Order No.5 of 2016 dated 31-03-2016 adopted Fuel cost as prescribed by CERC at Rs.2892.03/MT with 5% escalation p.a. during the control period. Currently, CERC in its draft RE Tariff Order dt. 01-03-2018 has considered fuel cost of Rs.2967.35/MT (for 2018-19) with 5% escalation in respect of Tamil Nadu.

Stakeholders' Comments:

TANGEDCO has agreed for the fuel cost of Rs.2967.35 /MT with 5% annual escalation as proposed in the consultative paper of the Commission.

Commission's View:

Considering the norms fixed by the CERC in its draft RE Tariff Order dated 01-03-2018, the Commission considers the fuel cost at Rs.2967.35 /MT for the next control period with 5% annual escalation.

8.1.14. Components of working capital

Orders of Other Commissions on Components of Working Capital

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
O&M charges : 1 month Maintenance spares :15% of O&M expenses Receivables for Debtors : 2 months Fuel stock : 4 months	Fuel cost : 1 month at threshold PLF O&M expenses : 1 month Receivables : 2 months at threshold PLF Maintenance spares :1% of project cost	O&M expenses : 1 month Maintenance spares :20% of O&M expenses Receivables for Debtors : 1.5 months Fuel Stock : 4 months	Receivables: 2 months Variable Costs : 2 months	O&M expenses : 1 month Maintenance spares :15% of O&M expenses Receivables for Debtors : 2 months Fuel stock : 4 months	O&M expenses : 1 month Maintenance spares :15% of O&M expenses Receivables: 2 months of energy charges based on normative PLF Fuel stock : 4 months	Fuel stock : 30 days Receivables : 1 month O&M expenses : 1 month Maintenance spares :1% on capital cost

As per the last Tariff Order No.5 of 2016 dated 31-03-2016, the working capital is based on the following norms:

- Fuel stock – One month
- O & M Expenses – One month
- Receivables - Two months

Stakeholders' Comments:

TANGEDCO has agreed for the following norms as proposed in the Consultative paper of the Commission.

→ Fuel Stock - One month

→ O & M Expenses - One month

→ Receivables - Two months

Commission's View:

The Commission decides to retain the same norms as adopted in its earlier Tariff Order in 2016 for the next control period also.

8.1.15. Interest on working capital

Orders of Other Commissions on Interest on Working Capital

(in % p.a.*)*

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
10.97%	12.00%	11.80%	13.25%	11.00%	13.00%	12.86%

The Commission in its Order No.5 of 2016 dated 31-03-2016 adopted Interest on working capital at 13.50%.

Considering the present market conditions, the Commission has proposed in the consultative paper the interest rate of 10.95%, which is 300 basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) prevalent during the last available six months, for the next control period.

Stakeholders' Comments:

TANGEDCO has suggested the interest on working capital at 9.45%.

Commission's View:

Commission decides to adopt the interest rate of 10.95% towards interest on working capital.

8.1.16. Auxiliary Consumption

Orders of other Commissions on Auxiliary Consumption:

CERC	***ANDHRA PRADESH***	***RAJASTHAN***	***KARNATAKA***	***MAHARASHTRA***	***MADHYA PRADESH***	***GUJARAT***
Draft RE Order dt. 01-03-2018	***16-05-2014 & 19-07-2014***	***28-11-2017***	***01-01-2015***	***28-04-2017***	***02-03-2012 & 03-05-2013***	***08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)***
a) Water cooled i) During 1st year of operation : 11% ii) From 2nd year onwards : 10% b) Air cooled : i) During 1st year of operation : 13% ii) From 2nd year onwards : 12%	10%	a) Water cooled : i) During stabilization : 10.50% ii) After stabilization : 10% b) Air cooled : i) During stabilization : 12.5% ii) After stabilization : 12%	10%	10%	10%	10%

The Commission in its last Tariff Order No. 5 of 2016 dated 31-03-2016 adopted Auxiliary Consumption at 10%. In other Commissions Orders, the auxiliary consumption adopted is in the range of 10% to 13%.

Stakeholders' Comments:

TANGEDCO has agreed for the auxiliary consumption at 10% as proposed in the consultative paper.

Commission's View:

Therefore, the Commission decides to retain the auxiliary consumption at 10% for the next control period also.

8.2 Related issues

The following are the issues related to power generation, transmission, wheeling and consumption from Biomass based power plants:

1. Open Access charges and line losses
2. Cross subsidy surcharge
3. CDM benefits
4. Reactive power charges
5. Grid availability charges
6. Energy Accounting and Billing Procedure
7. Energy Wheeling Agreement and fees
8. Security Deposit
9. Power factor disincentive
10. Metering
11. Connectivity and Evacuation of Power
12. Harmonics
13. Billing and Payments
14. Energy Purchase Agreement (EPA)
15. Tariff Review Period / Control Period

The above charges / terms are applicable to all biomass based power generating plants irrespective of their year of commissioning. These are discussed in detail in the following paragraphs.

8.2.1. Open Access charges and line losses

Transmission, Wheeling and Scheduling & System Operation charges are generally regulated by the Commission's Tariff regulations, Open access regulations and Commission's order on open access charges issued from time to time. However, as a promotional measure, under section 86(1) (e) of the Act, the Commission in the last three tariff orders adopted 50% in each of the transmission, wheeling and scheduling and system operation charges as applicable to the conventional power to the Biomass power.

In the case of scheduling and system operation charges, the work done by SLDC is the same as in the case of conventional power. SLDC has to monitor the grid operations effectively on real time basis. The scheduling and system operation charges have to be determined in a non-discriminatory manner with reference to the functions of SLDC and there cannot be any concession.

Commission does not want to take away all the concession at one go, and therefore decides that Transmission, Wheeling and Scheduling & System Operation charges are adopted at 60% of that applicable for conventional power plants notified by the Commission from time to time.

In respect of the plants availing Renewable Energy Certificates (REC), 100% of the respective charges as specified in the relevant orders shall apply.

Apart from these charges, the Biomass Power Generators shall have to bear the actual line losses in kind as specified in the respective orders of the Commission and as amended from time to time.

8.2.2 Cross subsidy surcharge

The Commission in its other tariff orders related to different renewable power and in the orders for Biomass power, has ordered to levy 50% of the cross subsidy surcharge for third party open access consumers. In the consultative paper, Commission proposed withdrawal of incentives in phases and proposed levy of 60% of cross subsidy surcharge as applicable for conventional power plants. The Distribution licensee has sought levy of 100 % of cross subsidy surcharge. However, in this order, Commission decides to levy of 60% of cross subsidy surcharge applicable to conventional power.

8.2.3 CDM benefits

In the earlier orders issued on renewable energy, the Commission adopted the following formula for sharing of CDM benefits as suggested by the Forum of Regulators (FOR):

"The CDM benefits should be shared on gross basis starting from 100% to developers in the first year and thereafter reducing by 10% every year till the sharing becomes equal (50:50) between the developer and the consumer in the sixth year. Thereafter, the sharing of CDM benefits will remain equal till such time the benefits accrue."

The Commission accepted the formula recommended by the Forum of Regulators in its earlier orders. The Commission decides to adopt the same formula. The generators shall furnish details of receipts of CDM to the distribution licensee and the distribution licensee shall account for the CDM receipts in the next ARR filing.

8.2.4. Reactive power charges

Commission proposes to adopt the reactive power charges as specified in its Order on Open Access charges issued from time to time.

8.2.5. Grid availability charges

Commission has proposed in the consultative paper that the charges for startup power of generators shall be as per Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force. Similarly if adequate generation does not materialize or if drawl by the captive / third party consumer exceeds generation, the energy charges and demand charges shall be regulated as specified in the Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force.

The Commission decides to adopt the above procedure as proposed in the consultative paper.

8.2.6. Energy Accounting and Billing Procedure

The energy accounting shall be regulated by the Commission's Regulations on open access, DSM and Order on open access. Till such time the DSM is implemented in the State, if a Biomass power generator utilizes power for captive use or if he sells it to a third party, the distribution licensee shall raise the bill at the end of the billing period for the net energy supplied. The licensee shall record the slot wise generation and consumption during the billing period. Slot wise adjustment shall be for the billing period. Peak hour generation can be adjusted to normal hour or off peak hour consumption of the billing period and normal hour generation can be adjusted to off peak hour consumption of the billing period. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.

When DSM is implemented, the licensee shall record the time block wise generation and consumption during the billing period. Time block wise adjustment shall be made for the billing period. Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.

The Commission decides that after the billing period, the balance energy may be sold at the rate of 75% of the respective Biomass tariff fixed by the Commission in the respective orders.

8.2.7. Energy Wheeling Agreement and fees

The format for Energy Wheeling Agreement, application and agreement fees, procedure and terms & conditions shall be governed by Commission's following regulations in force and as amended from time to time:

1. Tamil Nadu Electricity Regulatory Commission's Grid Connectivity and Intra State Open Access Regulations, 2014
2. Power Procurement from New and Renewable Sources of Energy Regulations, 2008.

8.2.8. Security Deposit

As regards the security deposit to be paid by captive /third party user, the Commission decides to retain the present arrangements i.e., charges corresponding to two times the maximum net energy supplied by the distribution licensee in any month in the preceding financial year shall be taken as the basis for the payment of security deposit.

8.2.9. Power factor disincentive

Power factor disincentive may be regulated for the power factor recorded in the meter at the user end as specified in the relevant regulations/orders in force.

8.2.10. Metering

The Commission proposes that metering and communication shall be in accordance with the following regulations in force and any specific orders of the Commission on metering whenever issued:

(1) Central Electricity Authority (Installation and Operation of Meters) Regulations 2006 and as amended from time to time.
(2) Tamil Nadu Electricity Distribution and Supply Codes
(3) Tamil Nadu Electricity Grid Code
(4) Tamil Nadu Electricity Regulatory Commission's Grid Connectivity and Intra State Open Access Regulations, 2014

8.2.11 . Connectivity and Evacuation of Power

The provisions contained in Central Electricity Authority(Technical Standards for Connectivity to the Grid) Regulations,2007 and Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations,2013, and its amendments shall be complied with. The connectivity and power evacuation system shall be provided as per the Act/ Codes/ Regulations/orders in force.

8.2.12. Harmonics

The Biomass Power Generators shall follow the CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 in respect of harmonics. It is the responsibility of the generator to provide adequate filtering mechanism to limit the harmonics within the stipulated norms. It shall be done before connecting the generator to the grid and the harmonics shall be measured by the respective distribution licensee during the commissioning. If the Biomass Power Generators inject the harmonics beyond the stipulated limit, they shall pay a compensation of 15% of applicable generation tariff rate to the distribution licensee in whose area the plant is located till such time it is reduced within the stipulated limit. The distribution licensee is responsible for measurement of harmonics with standard meters and issue notices for payment of compensation charges if the harmonics is beyond the stipulated limit. A minimum of 15 days notice period shall be given for payment of compensation charges.

8.2.13. Billing and Payments

When a Biomass power generator sells power to the distribution licensee, the generator shall raise the bill every month for the net energy sold after deducting the charges for power drawn from distribution licensee, reactive power charges etc. The distribution licensee shall make payment to the generator in 60 days of receipt of the bill. Any delayed payment beyond 60 days is liable for interest at the rate of 1% per month. TANGEDCO has suggested for levy of interest at 0.75% per month . However, Commission decides to adopt rate of interest of 1% per month for any delayed payment by the Distribution licensee beyond 60 days.

8.2.14 Energy Purchase Agreement (EPA)

The format for Energy Purchase Agreement (EPA) shall be evolved as specified in the Commission's "Power procurement from New and Renewable sources of energy Regulations 2008" and amended from time to time. The agreement shall be valid for 20 years or life of the plant specified in the respective tariff order. The distribution licensee shall execute the Energy Purchase Agreement or convey its decision in line with this order within a month of receipt of the proposal from the generator for selling the power. The agreement fees are governed by the Commission's Fees and Fines regulation.

8.2.15 Tariff Review Period / Control Period

Regulation 6 of the Power Procurement from New and Renewable Sources of Energy Regulations, 2008 of the Commission specifies that the tariff as determined by the Commission shall remain in force for such period as specified by the Commission in such tariff orders and the control period may ordinarily be two years.

Commission decides to retain the control period of 2 years from the date of coming into force of this order, and the tariff period shall be 20 years.

9. Tariff

Commission's View:

9.1. With the adoption of above financial and operational parameters the tariff rate for the new plants works out as follows:

9.1.1. Fixed costs

(Amount in Rs./unit)

Year	*FC*		*Year*	*FCC*
1	1.93		11	1.73
2	1.96		12	1.72
3	1.93		13	1.77
4	1.89		14	1.83
5	1.87		15	1.88
6	1.84		16	1.94
7	1.81		17	2.01
8	1.79		18	2.07
9	1.77		19	2.14
10	1.75		20	2.22

9.1.2. Variable Costs

9.2.2.1. The variable cost for the financial year 2018-19 will be Rs.3.96 per unit and for the financial year 2019-20 will be Rs.4.15 per unit.

9.2.2.2. The fixed capacity charges will be applicable with reference to the date of commissioning of the plant and the variable cost will be applicable with reference to the financial year. The Fixed capacity charges specified above will be continued to be applicable to the entire agreement period of 20 years.

9.2.2.3. The fixed charges specified in this Order will be applicable to the plants commissioned after the expiry of Order No. 5 of 2016, dated 31-03-2016 and the variable cost specified in this Order will apply to all plants commissioned on or after 15-05-2006.

9.1.3. Total Cost

As the control period of the Order is two years, the total cost inclusive of fixed and variable charges for the 1st year (2018-19) is Rs.5.89/unit and for the 2nd year is Rs.6.11/unit (2019-20).

9.2. Use of Fossil Fuel

The use of fossil fuels shall be limited to the extent of 15% of total fuel consumption on annual basis.

10. Quantum of power purchase by the Distribution Licensee

The distribution licensee can purchase Biomass energy at the rate determined by the Commission from the Biomass Power Generators to meet the Renewable Power Purchase Obligations (RPO) requirement on "first come first served basis". It is open to the Distribution licensee to procure the same through competitive bidding route following the guidelines of Government of India if it can realize a more competitive rate than the one determined by Commission's Order. For any procurement in excess of RPO, specific approval shall be obtained from the Commission.

11. Acknowledgement

The Commission acknowledges with gratitude the contribution of the officers and staff of the Commission, the active participation and advice of the Members of the State Advisory Committee and the pains taken by the stakeholders in offering their suggestions. The Commission also recognizes the input of the Tamil Nadu Generation and Distribution Corporation Ltd., Tamil Nadu Transmission Corporation Ltd., and the Ministry of New and Renewable Energy Sources, Government of India.

(Sd................)	**(Sd...........)**	**(Sd..............)**
Dr.T.Prabhakara Rao	**G. Rajagopal**	**S. Akshaya Kumar**
Member	**Member**	**Chairman**

(By Order of the Commission)

(Sd…………..)
(S. Chinnarajalu)
Secretary

Annexure - 1

LIST OF STAKEHOLDERS COMMENTS ON CONSULTATIVE PAPER:-

1) Tamil Nadu Generation and Distribution Corporation Ltd., (TANGEDCO).

<u>Annexure - 2</u>

<u>LIST OF MEMBERS PARTICIPATED IN THE STATE ADVISORY COMMITTEE MEETING HELD ON 21-03-2018</u>

Members Present :

1. Thiru. S.Akshaya Kumar, Chairman, TNERC
2. Thiru. G.Rajagopal, Member, TNERC
3. Thiru. Dr.T.Prabhakara Rao, I.A.S., (R), Member, TNERC
4. Thiru. Vikram Kapur, I.A.S., CMD/TNEB Ltd., & TANGEDCO Ltd., and Chairman, TANTRANSCO, and Principal Secretary to Government, Energy Department (FAC) Secretariat, Chennai.
5. Dr.Jagmohan Singh Raju, I.A.S., Chairman and Managing Director, Tamil Nadu Energy Development Agency, 5th Floor, E.V.K.Sampath Maaligai, College Road, Chennai – 600 006.
6. Thiru. S.Ramasubbu, Chief Electrical Engineer, Southern Railways, Head Quarters, Chennai – 600 003.
7. Thiru G.S.Rajamani, Villa No.367, Adarsh Palm Retreat, Outer Ring Road (Near Intel), Bellandur P.O., Bengaluru – 560 103.
8. Thiru. K.Kathirmathiyon, Secretary, Coimbatore Consumer Cause, 25, Periyar Nagar, 4th Street, Coimbatore – 641 041.
9. Thiru. M.R.Krishnan, Deputy Director, Consumer Association of India, 32, Kohinoor Complex, Vettuvankeni, Chennai – 115.
10. Thiru. Gurunathan, Confederation of Indian Industry on behalf of Thiru. M.Ponnuswamy, Chairman, Confederation of Indian Industry

(Tamil Nadu), 98/1, Velachery Main Road, Guindy, Chennai – 32.

11. Thiru. K.Alagu, Vice-President, Tamil Nadu Chamber of Commerce and Industry, No.178-B, Kamarajar Salai, Madurai- 625 009.
12. Dr.K.Selvaraj, New No.12, Thiru Nagar, Singanallur, Coimbatore–5.
13. Thiru. T.Vijayarangan, Secretary, Anna Labour Union, Old No.167, New No. 394, Kabali Vanabhojana Thottam, Raja Annamalaipuram, Chennai – 600 028.
14. Thirumathi. Valchala, Professor on behalf of Dr.G.Uma, Professor and Head of Department, Electrical and Electronics Engineering, Anna University, Sardar Patel Road, Chennai – 600 025.

Annexure - 3

Components of Biomass Tariff

Sl.No.	PARAMETERS	VALUES
1	Capital Investment	Rs.5.50 Cr/MW
2	Plant Load Factor	80%
3	Debt Equity Ratio	70:30
4	Term of Loan	10 years with 1 year moratorium
5	Interest on Loan	9.95% p.a
6	Return on Equity	17.56% (Pre-Tax)
7	Life of the Plant	20 years
8	Depreciation on 85% of Capital Investment	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 2nd year on 85% of capital cost
10	O & M Charges for land and civil works on 15% of capital investment	0.90% with escalation of 5.72% from 2nd year on 15% of capital cost
11	Station Heat Rate	3840 kCal/kWh
12	Calorific Value of fuel	3200 kCal/kg
13	Specific fuel Consumption	1.20kg/kWh
14	Fuel Cost (FY 2018-19)	Rs.2967.35 per MT with 5% escalation

		from 2nd year onwards
15	Working capital components	One month fuel stock, one month O&M and two month receivables
16	Interest on working capital	10.95% p.a.
17	Auxiliary consumption	10%