



# TAMIL NADU ELECTRICITY REGULATORY COMMISSION

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## Comprehensive Tariff Order for Biomass based Power Plants

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Order No.11 of 2020 dated 05-11-2020



**BEFORE THE TAMIL NADU ELECTRICITY REGULATORY COMMISSION  
CHENNAI**

**Present :**

<b>Thiru M. Chandrasekar</b>	<b>.... Chairman</b>
<b>Dr.T. Prabhakara Rao</b>	<b>.... Member</b>
<b>Thiru K. Venkatasamy</b>	<b>.... Member (Legal)</b>

**Order No.11 of 2020, dated 05-11-2020**

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**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.**

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In exercise of powers conferred by Section 181 read with section 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 Provisions of Power Procurement from New and Renewable Energy Sources Regulations, 2008 and after examining the comments received from the stakeholders, after considering the views of the State Advisory Committee meeting held on 20-03-2020, the Tamil Nadu Electricity Regulatory Commission, hereby, issue 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 05-11-2020.

-sd-  
K. Venkatasamy  
Member (Legal)

-sd-  
Dr. T. Prabhakara Rao  
Member

-sd-  
M. Chandrasekar  
Chairman

(By Order of the Commission)

-sd-  
(S. Chinnarajalu)  
Secretary

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**TAMIL NADU ELECTRICITY REGULATORY COMMISSION**  
**Comprehensive Tariff Order for Biomass Based Power Plants**

**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 Biomass is an industry term for getting energy by burning Organic material that comes from plants and animals. Plants or plant-based materials that are not used for food or feed, and are specifically called lignocellulosic biomass. Biomass is a renewable and sustainable source of energy, it can either be used directly via combustion to produce heat, or indirectly after converting it into various forms of biofuel.

1.2 The 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 several Tariff Orders from time to time 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.

1.3 The conducive policies of the Central and State Government for promotion of renewable power has helped the sector to achieve a remarkable progress.

1.4 The total capacity of renewable power in the State is 14144.35 MW of

which Biomass power constitutes 265.59 MW. The last generic Tariff Order of the Commission in the case of Biomass Power was issued on 28-03-2018 vide order No.3 of 2018 which expired on 31-03-2020. However the validity of the said order was extended till the issuance of the present order.

### 1.5 Commission's Regulation on Power Procurement from New and Renewable Sources of Energy

Sub-section (h) of section 61 of the Electricity Act 2003 (Central Act 36 of 2003) 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.

### 1.6 Commission's order on NCES based biomass generation and allied Issues

1.6.1. The Commission has so far issued five 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. The fifth Order on Biomass No.3 of 2018 dated 28-03-2018 was issued with validity for the control period of 2 years till 31-03-2020. Due to Covid-19 pandemic, the Commission extended the validity of the Order No. 3 of 2018 dated 28.3.2018 till the date of issuance of this order.

## **2. Biomass based Power Scenario:**

### **In India:**

The biomass power generation capacity in India has rapidly grown over the last few years as the Indian government focused on increasing power generation through renewable energy sources. As of December 1, 2019, the grid-connected biomass power generation capacity in India stood at 9.95 GW (which includes Biomass, Bagasse and Waste to Energy), up from 4.95 GW as of March 31, 2016. Going by the current growth rate in biomass power generation, India is likely to surpass the target of 10 GW by the end of the next fiscal year, way ahead of the target year of 2022. The potential of power generation from biomass has been assessed as around 25 GW.

### **In Tamil Nadu:**

The installed capacity of Biomass based Power Plants in Tamil Nadu is 265.59 MW till August 2020.

The year-wise capacity addition in Tamil Nadu over the past 20

years is furnished below:

<b>Year</b>	<b>Capacity Addition in MW</b>
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	7.67
2018-19	27.92
2019-20	0
2020-21	0
<b>Till August 2020</b>	<b>265.59</b>

### **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 Tariff Order No.3 of 2018 dated 28-03-2018 for Biomass based Power Plants was valid till 31-03-2020. Due to Covid-19 pandemic, the Commission extended the validity of the Order No. 3 of 2018 dated 28.3.2018 till the date of issuance of this order. This order shall come into force from 05-11-2020 and valid upto 31.3.2022.

5.2 The tariff proposed to be fixed shall be applicable to all Biomass based Power Plants commissioned during the control

period of the Order. The tariff is applicable for purchase of Biomass based Power by Distribution Licensee from Biomass based Power Plants conforming to this Order.

5.3 The Variable cost, open access charges, Cross subsidy surcharge, parallel operation charges, Reactive power charges, Grid availability 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.

5.4 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**

7.1 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”.*

## **7.2 Cost-Plus Tariff Determination**

Cost-plus tariff determination is a more practicable method but it discourages competition and efficiency. However, considering the Projects in pipe line in setting up of new plants to arrive the ceiling price, the Cost-plus Tariff is arrived based on the latest data available. The Distribution Licensee shall procure Biomass based power through competitive bidding method.

## **7.3 Single Part vs. Two Part Tariff**

7.3.1. 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.3 of 2018 dated 28-03-2018 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 proposed 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 Commission has analysed various tariff factors of Punjab ERC, Karnataka ERC, Maharashtra ERC, Gujarat ERC and Haryana ERC in which PSERC has invited suggestions and objections from stakeholders till 04-09-2020. Hence, PSERC's last tariff order was taken into consideration.

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 the 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)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
Rs.6.11Cr/MW	Rs.6.11Cr/MW	<u>Air-Cooled</u> Rs.5.86Cr/MW <u>Water-Cooled</u> Rs.5.76Cr/MW	Rs.5.22Cr/MW	<u>Air-Cooled</u> Rs.5.07Cr/MW <u>Water-Cooled</u> Rs.4.77Cr/MW	<u>Air-Cooled</u> Rs.6.00Cr/MW <u>Water-Cooled</u> Rs.6.10Cr/MW

The Commission in its Order No.3 of 2018 dated 28-03-2018 had considered Rs.5.50 Crores / MW as the capital cost.

In the consultative paper, the Commission proposed the capital cost at Rs.6.11 Crs./MW as fixed by CERC.

### Stakeholders' Comments:

TANGEDCO has agreed for a capital cost of Rs.6.11 Crores per MW as proposed in the Consultative Paper of the Commission.

### Commission's View:

The Commission decides the capital cost of Rs.6.11Crs./MW for tariff calculation. The capital cost includes the 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:

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
80%	a) During stabilization (6 mths) : 60% b) During remaining period of the 1 <sup>st</sup> year (after stabilization) : 70% c) Second year onwards : 80%	75%	a) Stabilization for 6 months : 60% b) During remaining period of the 1 <sup>st</sup> year ( after stabilization) : 70% c) Second year onwards : 80%	a)During 1 <sup>st</sup> year : 70% b) Second year onwards : 80%	<u>Air-Cooled</u> First 6 months:65% 1 <sup>st</sup> year : 65% 2 <sup>nd</sup> year : 80% <u>Water Cooled</u> First 6 months:60% 1 <sup>st</sup> year : 65% 2 <sup>nd</sup> year : 80%

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.3 of 2018 dated 28-03-2018.

PLF at 80% has been maintained in all the earlier tariff orders of the Commission. In the consultative paper, the Commission retained the PLF at 80%.

**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 the Commission retains the PLF at 80%.

**8.1.3. Debt - Equity Ratio:**

**Orders of other Commissions on Debt-Equity Ratio :**

<i>CERC</i>	<i>PSERC</i>	<i>KARNATAKA</i>	<i>MAHARASHTRA</i>	<i>GUJARAT</i>	<i>HERC</i>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
70:30	70:30	70:30	70:30	70:30	Air-Cooled & Water Cooled 70:30

The Commission in Order No.3 of 2018 dated 28-03-2018 had specified the ratio as 70:30.

Debt equity ratio of 70:30 is an established financial norm and therefore, in the consultative paper, the Commission maintained the norm at 70:30.

**Stakeholder's Comments:**

TANGEDCO has agreed for the Debt Equity ratio of 70:30.

**Commission's View:**

Debt Equity ratio of 70:30 is an established financial norm. Therefore, the Commission decides to maintain the norm at 70:30 in this order also.

**8.1.4. Term of loan**

In its Order No.3 of 2018 dated 28-03-2018, the Commission had fixed the tenure of the term loan at 10 years with a moratorium of one year on the consideration that financial institutions generally sanction loan for this time period. While the loan tenor is 15 years in CERC, it is assumed at 12 years in Maharashtra.

In the consultative paper, the Commission maintained the same norm of ten years with a moratorium of one year for the next control period.

**Stakeholder's Comments:**

TANGEDCO has recommended to consider term of loan as 12 years plus 1 year moratorium.

**Commission's View:**

The Commission retains the same norm of ten years with a moratorium of one year in this order.

**8.1.5. Interest rate for the loan****Orders of other Commissions on Interest rate for Term Loan:**

<i>CERC</i>	<i>PSERC</i>	<i>KARNATAKA</i>	<i>MAHARASHTRA</i>	<i>GUJARAT</i>	<i>HERC</i>
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<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
9.67%	10.41%	10.50%	11.31%	11.40%	<u>Air-Cooled &amp; Water Cooled</u> 10.13%

The Commission in its Order No.3 of 2018 dated 28-03-2018 adopted an interest rate on term loan of 9.95% p.a., as specified by CERC. While the interest rate specified by CERC is at 9.67% and Maharashtra have adopted the interest rate at 11.31%.

In the consultative paper, the Commission adopted the interest rate of 10.31%, which is 200 basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) prevalent at the time issuing consultative paper for the next control period.

#### **Stakeholder's Comments:**

TANGEDCO has suggested to adopt the interest rate for the loan of 9.31%.

#### **Commission's View:**

During the last six months, the interest rate has been drastically reduced. Hence, the Commission decides to fix the interest rate of 9.28% which is 200 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.

#### **8.1.6. Return on Equity**

#### **Orders of other Commissions on RoE**



<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
First 20 years:16.96%	17.60%	14% (income tax on RoE pass through)	For first 10 years : 20.39%	14%	<u>Air-Cooled &amp; Water Cooled</u> 14%
After 20 years: 21.52%			After 10 years : 22.57%		

CERC fixed a RoE for the first 20 years at 16.96% p.a. (pre-tax) and after 20 years at 21.52%. ROE adopted by Maharashtra is 20.39% (pre-tax) for the first 10 years and 22.57% (pre-tax) after 10 years and Gujarat is 14% (post-tax).

The Commission in its Order No.3 of 2018 dated 28-03-2018 adopted a RoE of 17.56% (pre-tax) per annum without linking it to MAT and IT.

In the consultative paper, the Commission proposed a RoE of 17.60% p.a. (pre-tax) as per CERC norms for the next control period.

### **Stakeholder's Comments:**

TANGEDCO has recommended RoE of 16.50%p.a. (pre-tax).

### **Commission's View:**

The Commission decides to adopt RoE for the first 20 years at 16.96% p.a. (pre-tax) and after 20 years at 21.52% as fixed by CERC in this order.

### **8.1.7. Life of plant and machinery**

#### **Orders of other Commissions on life of plant & machinery**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>

<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
25 years	20 years	20 years	20 years	20 years	<u>Air-Cooled &amp; Water Cooled</u> 20 years

For tariff determination process, the Commission had adopted 20 years as life of the Plant and Machinery in its Order No.3 of 2018 dated 28-03-2018.

CERC fixed 25 years as life of plant and machinery. All other ERCs have adopted 20 years as the life of the plant and machinery.

In the consultative paper, the Commission retained the life of plant and machinery at 20 years for the next control period also.

#### **Stakeholder's Comments:**

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

#### **Commission's View:**

The Commission decides to adopt the CERC norms of 25 years for Biomass Based Power Projects for tariff determination.

#### **8.1.8. Depreciation**

#### **Orders of other Commissions on Depreciation:**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>

First 15 years : 4.67%.	First 13 years : 5.28%.	First 13 years : 5.38% and balance spread equally over the life of the plant.	First 12 years : 5.83%	First 10 years : 7%	<u>Air-Cooled &amp; Water Cooled</u> First 13 years : 5.38% and balance spread equally over the life of the plant.
16 <sup>th</sup> years onwards : 2%	14 <sup>th</sup> year onwards : 3.051%		13 <sup>th</sup> year onwards : 2.505%	11-20 <sup>th</sup> year: 2% p.a.	

CERC in its Order has fixed the depreciation rate as 4.67% for the first 15 years and 2% from the 16<sup>th</sup> year onwards. The depreciation rates of other ERCs are different to suit their needs.

The Commission in its Order No. 3 of 2018 dated 28-03-2018 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.

In the consultative paper, the Commission proposed to continue the existing depreciation rate for the next control period.

### **Stakeholder's 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.

### **Commission's View:**

The Commission decides to adopt the depreciation rate of 3.6% SLM by considering 85% of the capital cost while the accumulated depreciation would be limited to 90% of the Plant and Machinery.

### **8.1.9. Operation and Maintenance Expenses**

#### **Orders of other Commissions on O & M Expenses:**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
Rs.46.42 lakh / MW with an escalation of 3.84%.	Rs.0.45 Crs. / MW with an escalation of 5.72% per year	<u>Water Cooled</u> 5% with an escalation of 5.72%. <u>Air Cooled</u> 4% with an escalation of 5.72%.	Rs. 0.30 Crs / MW for FY 2019-20 with an escalation of 2.63% per year	5% of the capital cost for the first year with an escalation of 5.72% per year	<u>Air-Cooled &amp; Water Cooled</u> Rs.0.45 Crs. / MW with an escalation of 5.72% per year

The Commission in its Order No. 3 of 2018 dated 28-03-2018, allowed Operation and Maintenance expenditure (including insurance) at 5% with annual escalation of 5.72% (from second year) 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%.

In the consultative paper, the Commission proposed the procedure as adopted in its 2018 order.

#### **Stakeholder's 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, while 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:

APTEL in its Judgment dated 18-02-2020 in Appeal No.170 of 2016 against Biomass Tariff Order dt.31-03-2016 has remanded the Commission to decide various parameters associated with the biomass power plants such as Capital Cost, GCV, SHR, O&M Expenses etc. are in resonance with the methodology of the Central Commission. TNERC has gone for appeal against the aforesaid APTEL Order in the Supreme Court and the Supreme Court has upheld the Order of APTEL.

Hence, the Commission decides to follow the CERC norm for O&M Expenses at Rs.46.42 lakh / MW with an escalation of 3.84% for the next control period.

### **8.1.10. Station Heat Rate**

#### **Orders of other Commissions on Station Heat Rate**

(In Kcal / Kwhr)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
4125	For project using AFBC Boiler 4125 For project using grate travelling Boiler 4200	--	4200	Water cooled 3800  Air cooled 3950	Air-Cooled  4063 Water Cooled  4125

The Commission in its Order No. 3 of 2018 dated 28-03-2018 fixed the station heat rate at 3840 Kcal / Kwhr.

In the consultative paper, the Commission proposed to retain the SHR at 3840 Kcal/Kwhr as followed in its order in 2018.

### **Stakeholder's Comments:**

The Biomass Power Producers Association, Tamil Nadu, has stated that no Biomass plant in the country operates at a Station Heat Rate of 3840 kcal/kwh. It would be prudent to collect the actual operational data across plants in other States. The value will not be less than 4500 kcal/kwh. A Station Heat Rate of 3840 kcal/kwh is not at all attainable by any of the Biomass Power Plants, with the kind of biomass available in the State with the considered capital cost of Rs.611 L/MW. It would call for another Rs.200 L/MW for installing fuel processing and briquetting unit. Hence, requested to consider SHR of 4500 kcal/kwh as the criteria for tariff consideration. This will enable the plant operators to realistically work towards bringing down the SHR.

TANGEDCO has agreed for the station heat rate at 3840 kcal/kwhr as proposed by the Commission.

### **Commission's View:**

APTEL in its Judgment dated 18-02-2020 in Appeal No.170 of 2016 against Biomass Tariff Order dt.31-03-2016 has remanded the Commission to decide various parameters associated with the biomass power plants such as Capital Cost, GCV, SHR, O&M Expenses etc. are in resonance with the methodology of the Central Commission. TNERC has gone for appeal against the aforesaid APTEL Order in the Supreme Court and the Supreme Court has upheld the Order of APTEL.

Hence, the Commission decides to follow the CERC norm for Station Heat Rate at 4125 Kcal/Kwhr for the next control period.

### **8.1.11. Gross calorific value of the fuel**

**Orders of other Commissions on Gross calorific value of the fuel**

(In Kcal/Kg)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
3100	3100	--	3611	4423	Air-Cooled & Water Cooled 3100

Most of the ERCs including CERC have fixed the Gross Calorific Value in the range of 3100 – 4423 Kcal/Kwhr. The Commission in its Order No. 3 of 2018 dated 28-03-2018 adopted Gross Calorific value of 3200 Kcal / Kwhr.

In the consultative paper, the Commission proposed to retain the same GCV of 3200 Kcal/Kg also as adopted in its 2018 order.

**Stakeholder’s Comments:**

The TANGEDCO has agreed for the Gross Calorific Value of 3200 kcal/kg.

**Commission’s View:**

APTEL in its Judgment dated 18-02-2020 in Appeal No.170 of 2016 against Biomass Tariff Order dt.31-03-2016 has remanded the Commission to decide various parameters associated with the biomass power plants such as Capital Cost, GCV, SHR, O&M Expenses etc. are in resonance with the methodology of the Central Commission. TNERC has gone for appeal against the aforesaid APTEL Order in the Supreme Court and the Supreme Court has upheld the Order of APTEL.

Hence, the Commission decides to follow the CERC norm for Gross

Calorific Value of 3100 kcal/kg for the next control period.

### **8.1.12. Specific fuel consumption**

#### **Orders of other Commissions on Specific fuel consumption:**

(in Kg/Kwhr)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
1.33	1.33	<u>Water Cooled:</u> 1.21 <u>Air Cooled:</u> 1.18	1.16	<u>Water cooled</u> 0.86 <u>Air cooled</u> 0.89	<u>Air-Cooled</u> 1.31 <u>Water Cooled</u> <u>1.33</u>

As Specific fuel consumption is a function of SHR and GCV, the specific fuel consumption works out to 1.20 Kg/Kwhr.

#### **Stakeholder's Comments:**

TANGEDCO has agreed for the Specific Fuel Consumption of 1.20 kg/kwh.

#### **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 1.33 Kg/Kwhr.

### **8.1.13. Fuel Cost:**

#### **Orders of other Commissions on fuel cost :**

(in Rs. /MT)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>



3272 with 5% escalation	3771.17 with 5% escalation	2500	4295.57	3764 with 5% escalation	<u>Air-Cooled</u> 3605.175 with 5% escalation <u>Water Cooled</u> 3605.61 with 5% escalation
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The Commission in its Order No.3 of 2018 dated 28-03-2018 adopted Fuel cost as prescribed by CERC at Rs.2967.35/MT with 5% escalation p.a. during the control period as per CERC norms. Currently, CERC in its RE Regulations dt. 19-03-2019 has considered fuel cost of Rs.3115.72/MT (for 2019-20) with 5% escalation in respect of Tamil Nadu. Therefore, the fuel cost for 2020-21 works out to Rs.3271.51/MT.

In the consultative paper, the Commission proposed the fuel cost at Rs.3271.51/MT (for 2020-21) as adopted by CERC with 5% escalation p.a.

### **Stakeholder's Comments:**

The Biomass Power Producers Association, Tamil Nadu, has stated that there is no fuel available in the State with calorific value of 3200 kcal/kg at the rate of Rs.3115.72/MT as considered by the Commission for the FY 2019-20.

TANGEDCO has agreed for the fuel cost of Rs.3271.51/MT with 5% annual escalation as proposed by the Commission.

### **Commission's View:**

Considering the norms fixed by the CERC in its order dated 21-07-2020, the Commission considers the fuel cost of Rs.3272/MT for the control period 2020-21 with 5% escalation.

### **8.1.14. Components of working capital**

#### **Orders of Other Commissions on Components of Working Capital**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
O&M charges : 1 month  Maintenance spares :15% of O&M expenses  Receivables for Debtors : 1.5 days	O&M charges : 1 month  Maintenance spares :15% of O&M expenses  Receivables for Debtors : 2 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	Fuel stock : 30 Days  O&M expenses : 1 month  Receivables: 1 month charges for sale of electricity  Maintenance spares :1% of capital cost with 5% escalation	Fuel stock : 6 months  Receivables : 2 month  O&M expenses : 1 month  Maintenance spares :15% of O&M

As per the last Tariff Order No.3 of 2018 dated 28-03-2018, the working capital is based on the following norms:

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

In the consultative paper, the Commission proposed to retain the aforesaid norms.

#### **Stakeholder's Comments:**

TANGEDCO has agreed the norms as proposed by the Commission.

#### **Commission's View:**

The Commission decides to retain the same norms as adopted in its earlier order in this order too.

### **8.1.15. Interest on working capital**

#### **Orders of Other Commissions on Interest on Working Capital**

(in % p.a.)

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
11.17%	11.41%	11.50%	11.81%	11.40%	<u>Air-Cooled &amp; Water Cooled</u> 9.13%

The Commission in its Order No.3 of 2018 dated 28-03-2018 adopted Interest on working capital at 10.95%.

In the consultative paper, the Commission adopted the interest rate of 11.31%, which is 300 basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) during the last available six months, prevalent at the time of issuing the consultative paper.

#### **Stakeholder's Comments:**

TANGEDCO has suggested the interest on working capital at 9.81% p.a.

#### **Commission's View:**

During the last six months, the interest rate has been drastically reduced. Hence, the Commission decides to fix the interest rate of 10.28% 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, in this order.

### **8.1.16. Auxiliary Consumption**

#### **Orders of other Commissions on Auxiliary Consumption:**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
10%	a) Water cooled i) During 1 <sup>st</sup> year of operation : 11% ii) From 2 <sup>nd</sup> year onwards : 10%  b) Air cooled : i) During 1 <sup>st</sup> year of operation : 13% ii) From 2 <sup>nd</sup> year onwards : 12%	10%	10%	10%	<u>Air-Cooled</u> 12%  <u>Water Cooled</u> <u>10%</u>

The Commission in its last Tariff Order No. 3 of 2018 dated 28-03-2018 adopted Auxiliary Consumption at 10%. In other Commissions Orders, the auxiliary consumption adopted is in the range of 10% to 12%.

In the consultative paper, the Commission proposed to retain the auxiliary consumption at 10% for the next control period.

#### **Stakeholder's Comments:**

TANGEDCO has suggested for the Auxiliary consumption at 10% as proposed by the Commission.

#### **Commission's View:**

The Commission now decides to retain the Auxiliary consumption at 10% in this order.

## **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 tariff order adopted 60% 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.

In the consultative paper, Commission proposed the transmission, wheeling and scheduling and system operation charges 100% of that applicable for conventional power.

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.

### **Stakeholder's Comments:**

The Biomass Power Producers Association, Tamil Nadu, has requested to consider 50% Transmission, Wheeling and Scheduling and System Operation Charges or even less.

M/s. Raghu Rama Renewable Energy Ltd., has stated that levy of Transmission, Wheeling and Scheduling & System Operation charges at

100% applicable for conventional power plants will increase the burden for the Biomass Based Power Plants.

Thiru A.D. Thirumoorthy, Member, Code Review Committee has suggested that to promote renewable energy, the transmission charges, wheeling charges may be kept at the present level of 60% of conventional charges.

TANGEDCO has agreed the views of the Commission.

**Commission's View:**

Considering the unprecedented situation that arose due to the outbreak of the Covid-19 pandemic where several restrictions were in place on the movement of public and opening of offices etc., and the gradual slowdown in economic activity, Commission decides to retain the levy of transmission, wheeling and scheduling and system operation charges at 60% of that applicable for conventional power 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.

**8.2.2 Cross subsidy surcharge**

The Commission in its last tariff order for Biomass power, has ordered to levy 60% of the cross-subsidy surcharge for third party open access consumers. In this consultative paper, Commission proposed to withdraw incentives in phases and proposed levy of 100% of cross subsidy surcharge as applicable for conventional power plants.

**Stakeholder's Comments:**

The Biomass Power Producers Association, Tamil Nadu, has requested to consider 50% Cross Subsidy or even less.

M/s. Raghu Rama Renewable Energy Ltd., has stated that levy of 100% of cross subsidy surcharge applicable for conventional power plants will increase the burden for the Biomass Based Power Plants.

Thiru A.D. Thirumoorthy, Member, Code Review Committee has suggested that as mandated by Electricity Act, Cross Subsidy charges are to be eliminated or minimized. A road map for elimination has to be prescribed by the Commission. Until such time existing rate of 60% of the Cross Subsidy charges may be prescribed for the Biomass Power.

TANGEDCO has agreed the views of the Commission.

**Commission's View:**

As most of the stakeholders have requested to retain the existing level of cross subsidy, the Commission decides to retain the levy of cross subsidy surcharge at 60% of that applicable to conventional power as ordered in the Order No.3 of 2018 dated 28-03-2018.

**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 continue 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.

**Stakeholder’s Comments:**

TANGEDCO has agreed the views of the Commission.

**Commission’s View:**

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 i.e. 50:50 between the developers and the consumers in the sixth year. Thereafter, the sharing of CDM benefits will remain equal till such time the benefits accrue.

**8.2.4. Reactive power charges**

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

**Stakeholder’s Comments:**

TANGEDCO has agreed the views of the Commission.

**Commission's View:**

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

**8.2.5. Grid availability charges**

In the consultative paper, the Commission proposed that the charges for startup power of generators shall be as per Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 and Deviation Settlement Mechanism and other orders of the Commission 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 and Deviation Settlement Mechanism and other relevant orders in force.

The Commission decides to continue the above procedure.

**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. 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 the 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.

#### **Stakeholders' Comments:**

M/s. Raghu Rama Renewable Energy Ltd., has stated that the generation will be hovering around the contracted load and it will be very difficult to maintain the time block wise generation and consumption during the billing period.

TANGEDCO has suggested that Excess consumption in each block will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.

#### **Commission's View:**

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 was proposed for payment of compensation charges. Stakeholders have requested for a time period of 90 days for payment of compensation charges.

The Commission decides that a minimum of 30 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.

### **Stakeholder's Comments:**

The Biomass Power Producers Association, Tamil Nadu, has requested a reasonable tariff along with assured payment terms can help to revive the industry and this will be a major boost to farmers across the State.

M/s. Raghu Rama Renewable Energy Ltd., has suggested that the

distribution licensee may make payment to the generator within 30 days of receipt of the bill as is being done for power purchase tender etc.

TANGEDCO has recommended the interest on delayed payment shall not exceed 0.81% per month.

### **Commission's View:**

The Commission decides to retain the interest rate at 1% per month for delayed payment 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.

The Commission decides that the control period of this order shall be from date of this order to 31-03-2022.

### **8.2.16 Stakeholder's General Comments:**

The Biomass Power Producers Association, Tamil Nadu, has suggested that Must Run Status should be extended to all Biomass Power Plants to ensure viability as the turning down of the Biomass boilers is cumbersome.

M/s. Raghu Rama Renewable Energy Ltd., has suggested that since the Biomass Based Power Plants are clean energy on par with Thermal Plants without flue gas desulphurization, the Distribution Licensee may be requested to procure the entire generation of power from Biomass Based Power Plants at the tariff fixed by the Commission. The Biomass Based Power Plants may be given must run status as being done for solar power plants.

## **9. Tariff**

### **9.1 Orders of other Commissions on Tariff**

<b>CERC</b>	<b>PSERC</b>	<b>KARNATAKA</b>	<b>MAHARASHTRA</b>	<b>GUJARAT</b>	<b>HERC</b>
<b>21-07-2020</b>	<b>13-09-2019</b>	<b>14-05-2018</b>	<b>30-04-2019</b>	<b>15-03-2018</b>	<b>01-04-2019</b>
Variable cost for FY 2020-21 : Rs 4.84/unit  Fixed cost for FY 2020-21: Rs.2.70/unit  Applicable tariff : Rs 7.54/unit	Variable cost for FY 2019-20 : Rs 5.74/unit  Fixed cost for FY 2019-20: Rs.3.01/unit  Applicable tariff : Rs 8.75/unit	a) <u>Air cooled</u>  Variable cost : Rs 3.47/unit  Fixed Cost : Rs 2.07/unit  Applicable tariff : Rs 5.54/unit	Levellised tariff (Variable) : Rs 5.55/unit  Levellised tariff (Fixed): Rs.2.28/unit  Levellised tariff : Rs 7.83/unit	<u>Air cooled:</u> Levellised tariff (variable) : Rs. 4.17/unit  Levellised tariff (fixed) : Rs. 1.91/unit  Levellised tariff : Rs.6.08/unit	<u>Air cooled:</u> Levellised tariff (variable) : Rs. 7.51/unit  Levellised tariff (Fixed) : Rs. 2.79/unit  Levellised tariff : Rs.10.31/unit



		b) <u>Water cooled</u> Variable cost : Rs.3.55/unit  Fixed Cost : Rs 2.19/unit  Applicable tariff : Rs.5.74/unit		<u>Water cooled:</u> Levellised tariff (variable) : Rs. 4.01/unit  Levellised tariff (fixed) : Rs. 1.80/unit  Levellised tariff : Rs.5.81/unit	<u>Water cooled:</u> Levellised tariff (variable) : Rs. 7.46/unit  Levellised tariff (fixed) : Rs. 2.89/unit  Levellised tariff : Rs.10.34/unit
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9.2. With the adoption of above financial and operational parameters the tariff rate for the new plants are worked out as follows (Detailed workings in the annexure III):

### 9.2.1. Fixed costs:

(Amount in Rs./unit)

<b>Year</b>	<b>FC</b>		<b>Year</b>	<b>FC</b>
1	2.33		14	2.27
2	2.36		15	2.33
3	2.33		16	2.40
4	2.31		17	2.46
5	2.28		18	2.53
6	2.26		19	2.60
7	2.24		20	2.67
8	2.22		21	2.88
9	2.20		22	2.96
10	2.19		23	3.04
11	2.17		24	3.12
12	2.16		25	3.21
13	2.22			

### 9.2.2. Variable Costs

#### Stakeholder's Comments:

M/s. Raghu Rama Renewable Energy Ltd., has suggested that the fixed charges will be applicable to the plants commissioned on or after the date of issuance of this Order and the variable cost specified in this

Order will apply to all plants commissioned on or after 15-05-2006. The fixed charges for the old plants and variable cost for the plants commissioned before 15-05-2006 may also be clearly specified in this Order.

9.2.2.1. The variable cost for the financial year 2020-21, i.e. from issue of this order to 31.3.2021 will be Rs.4.84 per unit and for the financial year 2021-22 will be Rs.5.08 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 25 years.

9.2.2.3. The fixed charges specified in this Order will be applicable to the plants commissioned on or after the date of this Order and the variable cost specified in this Order will apply to all plants commissioned on or after 15-05-2006.

### **9.2.3. Total Cost**

As the control period of the Order is two years, the total cost inclusive of fixed and variable charges for the 1<sup>st</sup> year (FY 2020-21) ie, from date of this order to 31.3.2021 is Rs.7.16/unit and for the 2nd year is Rs.7.44/unit (FY 2021-22).

### **9.3. Use of Fossil Fuel**

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

#### **9.4. 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”. The Commission ordered that the licensee shall procure Bagasse based power through competitive biddings/reverse auctions under Section 63 of the Electricity Act, 2003, following the bidding guidelines of the Government of India. The preferential tariff fixed in this Order is the ceiling price for future biddings by the licensee and may also help the projects that have not been able to commission in the previous control periods. For any procurement in excess of RPO, specific approval shall be obtained from the Commission.

#### **9.5. Acknowledgment**

The Commission would like to place on record and acknowledge with thanks, the contributions of the officers and staff of the Commission and the valuable guidance provided by the experts and members of the State Advisory Committee. The Commission also recognizes the input of TANGEDCO in finalizing this Tariff Order.

**(By Order of the Commission)**

**-sd-**

**Secretary**

**Tamil Nadu Electricity Regulatory Commission**

**ANNEXURE - I**

**List of Stakeholders who offered comments on Consultative Paper**

- 1) TANGEDCO
- 2) Biomass Power Producers Association
- 3) M/s. Raghu Rama Renewable Energy Ltd.,
- 4) Thiru A.D. Thirumoorthy, Member, Code Review Committee.

**ANNEXURE - II****List of members participated in the 35th State Advisory Committee (SAC) Meeting held on 20<sup>th</sup> March 2020 AT HOTEL SAVERA, CHENNAI****Members Present :**

1. Thiru. M. Chandrasekar, Chairman, TNERC
2. Dr. T. PrabhakaraRao, I.A.S. (R), Member, TNERC
3. Thiru. K. Venkatasamy, Member/Legal, TNERC
4. Thiru. Vikram Kapur, I.A.S., CMD, TANGEDCO Ltd., and Chairman, TANTRANSCO.
5. Thiru. M.R. Krishnan, Deputy Director, Consumer Association of India.
6. Thiru.S. Sankaranarayanan, General Manager/TEDA.
7. Tmt.V. Geetha, Additional Secretary to Government (FAC), Energy Department
8. Thiru.A. JesuThayanand, Under Secretary to Government, Co-operation, Food & Consumer Protection Department.
9. Thiru. T. Vijayarangan, Secretary, Anna Labour Union.

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**Annexure -III**  
**Components of Biomass Tariff**

<b>Sl.No.</b>	<b>PARAMETERS</b>	<b>VALUES</b>
1	Capital Investment	Rs.6.11 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	9.28% p.a.
6	Return on Equity	First 20 years at 16.96% p.a. (pre-tax) and after 20 years at 21.52%.
7	Life of the Plant	25 years
8	Depreciation	3.6% p.a. on SLM on 85% of capital cost
9	O & M Charges	Rs.46.42 Lakhs/Mw with escalation of 3.84% from 2 <sup>nd</sup> year onwards.
10	Station Heat Rate	4125 kCal/kWh
12	Calorific Value of fuel	3100 kCal/kg
13	Specific fuel Consumption	1.33kg/kWh
14	Fuel Cost (FY 2020-21)	3272/MT with 5% escalation from 2 <sup>nd</sup> year onwards
15	Working capital components	One month fuel stock, one month O&M and two month receivables
16	Interest on working capital	10.28% p.a.
17	Auxiliary consumption	10%

**ANNEXURE - IV**  
**STAKEHOLDERS COMMENTS**

**1) Comments of TANGEDCO in respect of Biomass based power plants**

Sl. No.	Tariff Components	TNERC's Parameters suggested for Tariff Order 2020	TANGEDCO Views/Suggestions
1	Capital Cost per MW	Rs.6.11 Crores/MW	Rs.6.11 Crores/MW considered by TNERC is accepted
2	Plant Load Factor	80%	80% PLF adopted by TNERC is accepted
3	Debt Equity Ratio	70:30	70:30 considered by TNERC is accepted
4	Term of loan	10 years with one year moratorium	TANGEDCO recommends to consider term loan as 12 years plus 1 year moratorium.
5	Interest on loan	10.31% p.a	TANGEDCO recommends 9.31% p.a
6	Return on equity	17.60%p.a (Pre-Tax)	TANGEDCO recommends 16.5% p.a (Pre-Tax)
7	Life of plant	20 years	20 years is accepted
8	Depreciation	4.5% p.a SLM on plant and machinery by considering 85% of the Capital cost	4.5% p.a SLM on plant and machinery by considering 85% of the Capital cost adopted by TNERC is accepted
9	Operation & Maintenance Charges for Machinery	5% with escalation of 5.72% from 2 <sup>nd</sup> year on 85% of capital cost	5% with escalation of 5.72% from 2 <sup>nd</sup> year on 85% of capital cost adopted by TNERC is accepted
10	Operation & Maintenance charge for land and civil works	0.90% with escalation of 5.72% from 2 <sup>nd</sup> year on 15% of capital cost	0.90% with escalation of 5.72% from 2 <sup>nd</sup> year on 15% of capital cost adopted by TNERC is accepted
11	Station Heat Rate	3840 kcal/kwhr.	3840 kcal/kwhr – Accepted
12	Calorific Value of the fuel	3200 kcal/kg	3200 kcal/kg – Accepted
13	Specific Fuel Consumption	1.20kg/kwh	1.20kg/kwh – Accepted
14	Fuel Cost	Rs.3271.51/MT with 5% annual escalation from 2nd year onwards	Rs.3271.51/MT with 5% annual escalation from 2nd year onwards adopted by TNERC is

			accepted
15	Working Capital components	One month Fuel stock, one month O&M and two months receivables.	One month Fuel stock, one month O&M and two months receivables adopted by TNERC is accepted
16	Interest on Working capital	11.31% p.a.	TANGEDCO recommends 9.81% p.a
17	Auxiliary Consumption	10%	10%
18	Tariff (Rs.)	2.17(FC)+4.36(VC) =6.54 2.21(FC)+4.58(VC) =6.79	TANGEDCO recommends tariff of 2.05(FC)+4.36(VC) =6.41 2.08(FC)+4.58(VC) =6.66

## **2. Comments of TANGEDCO for related issues in respect of tariff determination of Biomass based power plants**

Sl.No.	Issues	TNERC's Parameters suggested for Tariff Order 2020	TANGEDCO View/Suggestion
1	Open Access Charges and Line losses	Commission does not want to take away all the concession at one go, and therefore decides that Transmission, wheeling and Scheduling and System Operation Charges are adopted at 100% of that applicable for conventional power plants notified by the Commission from time to time.	The views of the Commission is accepted
2	Cross Subsidy Surcharge	The Commission in its last Tariff order for Biomass power has ordered to levy 60% of Cross subsidy surcharge for third party open access consumers. In this consultative paper, Commission proposes to withdraw incentives in phases and proposes levy of 100% of cross subsidy	The views of the Commission is accepted



		charge as applicable for conventional power plants.	
3	CDM Benefit	<p>CDM benefits which shall be shared as follows:</p> <p>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.</p>	The views of the Commission is accepted
4	Reactive Power Charges	The reactive power charges as specified in its order on open access charges issued from time to time.	The views of the Commission is accepted
5	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%/month.	It is recommended that the interest on delayed payment shall not exceed 0.81%/month.
6	Energy	If a Biomass Power generator utilizes power for captive use or if he sells it to a	When DSM is implemented,

Accounting and Billing Procedure		<p>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.</p> <p>The licensee shall record the time block wise generation and consumption during billing period. Time block wise adjustment shall be made for the billing period.</p> <p>Excess consumption will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply.</p>	<p>the licensee shall record the time block wise generation and consumption during the billing period.</p> <p>TANGEDCO suggests that "Excess consumption in each block will be charged at the tariff applicable to the consumer subject to the terms and conditions of supply".</p>
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**3) Biomass Power Producers Association, Tamil Nadu would like to present the following Comments/Suggestions for the kind perusal of the Commission.**

1. At the outset we wish to bring to your kind notice that out of the 265 MW installed biomass power capacity, None of them are operational since tariff are unviable.

2. There is not a single fuel available in the State with calorific value of 3200 kcal/kg at the rate of 3115.72/MT (for 2019-20) as considered by the Commission.
3. No biomass plant in the country operates at a Station Heat Rate of 3840 kcal/kwh. It would be prudent to collect the actual operational data across plants in other States. The value will not be less than 4500 kcal/kwh.

A station heat rate of 3840 kcal/kwh is not at all attainable by any of the biomass power plants, with the kind of biomass available in the State with the considered capital cost of Rs.611 L per MW. It would call for another Rs.200 L per MW for installing fuel processing and briquetting unit.

Hence, it is requested to consider the station heat rate of 4500 kcal/kwh as the criteria for Tariff Considerations. This will enable the plant operators to realistically work towards bringing down the Station Heat Rate.

4. Further in order to encourage Biomass or any other renewable, we request the Commission to consider reverting to
  - a. 50% Cross Subsidy or even less;
  - b. 50% Transmission, wheeling and Scheduling and System operation charges or even less.

This would help revive at least some of the units in the State.

5. Must Run Status also should be extended to all biomass power plants to ensure viability as the turning down of the biomass boilers in cumbersome.

A reasonable tariff along with assured payment terms can help revive the industry and this will be a major boost to farmers across the State.

We sincerely request the Hon'ble Commission to consider our above suggestions and determine a viable tariff.

#### **4) RAGHU RAMA RENEWABLE ENERGY LIMITED**

In response to the consultative paper on power procurement by distribution licensee from Biomass based power plants, the following Comments/Suggestions are furnished for kind consideration before issue of final orders of the Hon'ble Commission.

##### Clause No.2: Biomass based Power Scenario in Tamil Nadu:

The installed capacity of Biomass based power plants in Tamil Nadu is of the order of 265 MW. The capacity addition of Biomass based power plants in Tamil Nadu is very meager from the year 2015 onwards and there was no addition of capacity during the year 2019-20. The National Electricity Policy and Tariff Policy is for promotion of generation of electricity from Renewable sources of energy. From the year 2008 onwards, Biomass power sector was facing many difficulties from all directions which were not conducive for survival of the Biomass based power plants. The Biomass based power plants need additional maintenance and running expenditure due to its very nature as compared to fossil fuel based power plants. The cost of labour and Biomass has gone up considerably. The availability of fuel also got affected due to flood/drought and unhealthy competition. The achievement of the designed efficiency of the Boiler was a great challenge due to varying usage of fuel with different chemical composition and moisture content. It was unviable to run the plant without any loss in the

tariff either to the Distribution Licensee or Third Party consumers and many of the power plants have been shut down. Now only one or two power plants are running with restricted load.

In this juncture, the Hon'ble Commission proposes to withdraw the concession at one go and decided to levy of Transmission, wheeling and scheduling and system operation charges and cross subsidy surcharges at 100% of that applicable for conventional power plants notified by the Commission from time to time which will increase the burden of the Biomass based power plants.

Clause No.8.2.6: Energy Accounting and Billing Procedure:

In the Biomass based power plant, the generation will be hovering around the contracted load and it will be very difficult to maintain the time block wise generation and consumption during the billing period.

Clause No.9.2.2.3:

In clause 9.2.2.3 of Tariff order, the fixed charges specified in this order will be applicable to the plants commissioned on or after the date of issuance of this order and the variable cost specified in this order will apply to all plants commissioned on or after 15-05-2006. The fixed charges for the old plants and variable cost for the plants commissioned before 15-05-2006 may also be clearly specified in the order.

Clause No.8.2.13: Billing and Payments:

The distribution licensee may make payment to the generator within 30 days of receipt of the bill as is being done for power purchase tender etc.

Clause No.9.4: Quantum of power purchase by the Distribution Licensee:

Since the Biomass based power plants are clean energy on par with Thermal plants without flue gas desulphurization, the Distribution Licensee may be requested to procure the entire generation of power from Biomass based power plants at the tariff fixed by the Hon'ble Commission in this Order and also the Biomass based power plants may be given must run status as being done for solar power plants.

These points may kindly be considered favourably before issue of the final paper on power procurement from Biomass based power plants.

### **5) Thiru A.D. Thirumoorthy**

This is comments for consultative paper on power procurement by distribution licensee from Biomass based power plants and allied issues relating to captive use and third party sale.

#### **8.2.1. Open Access charges and line losses:**

To promote renewable energy as mandated by the Electricity Act transmission charges, wheeling charges may be kept at the present level of 60% of conventional charges.

#### **8.2.2. Cross Subsidy surcharge:**

As mandated by Electricity Act cross subsidy charges are to be eliminated or minimized. A road map for elimination has to be prescribed by the Commission. Until such time existing rate of 60% of the cross subsidy may be prescribed for the biomass power.

**8.2.12. Harmonics:**

Harmonics shall be regulated as per the latest CEA regulations. Measurement methodology has to be prescribed by the Commission in consultation with the stakeholders as per CEA guidelines.

**8.2.13. Energy Purchase Agreement (EAP):**

Energy Purchase Agreement (EPA) and Energy Wheeling Agreement shall be valid for the life of the Plant. Responsibility of safe operation of the plant lies with the Generators as per the existing norms.

**8.2.14. Renewable Purchase Obligation:**

In case of non-REC plants, captive wheeling of power or third party mode of transactions, the end consumers shall be eligible to offset RPO obligation using this transaction.

**COMPONENTS OF BIOMASS TARIFF**

<b>SI. No.</b>	<b>PARAMETERS</b>	<b>VALUES</b>
1	Capital Investment	Rs.6.11 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	9.28%
6	Return on Equity	First 20 years @ 16.96% (Pre-tax) & after 20 years @ 21.52%
7	Life of the plant	25 years
8	Depreciation	3.6% p.a on SLM on 85% of capital cost
9	O & M charges	Rs.46.42 Lakhs with an escalation of 3.84%.
12	Station Heat Rate	4125 kcal/ kwh
13	Calorific value of fuel	3100 kcal / kg
14	Specific fuel consumption	1.33 kg / kwh
15	Fuel cost (FY 2020-21)	Rs.3271.51 / 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	10.28% p.a
18	Auxiliary consumption	10.00%



**BIOMASS TARIFF CALCULATION**

Year	O & M charges	Total 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	4642000		3969056	1869660	30497134	386833	2541428	7526901	10455163	1074791	3108768	14664275	6307200	2.33	4.84	7.16
2	4820253		3969056	1869660	32021991	401688	2668499	7818175	10888362	1119324	3108768	14887060	6307200	2.36	5.08	7.44
3	5005351		3572150	1869660	33623090	417113	2801924	8056355	11275392	1159110	3108768	14715039	6307200	2.33		
4	5197556		3175245	1869660	35304245	433130	2942020	8309442	11684592	1201176	3108768	14552405	6307200	2.31		
5	5397142		2778339	1869660	37069457	449762	3089121	8578167	12117050	1245633	3108768	14399542	6307200	2.28		
6	5604392		2381434	1869660	38922930	467033	3243577	8863297	12573907	1292598	3108768	14256852	6307200	2.26		
7	5819601		1984528	1869660	40869076	484967	3405756	9165638	13056361	1342194	3108768	14124751	6307200	2.24		
8	6043074		1587622	1869660	42912530	503589	3576044	9486034	13565668	1394551	3108768	14003675	6307200	2.22		
9	6275128		1190717	1869660	45058157	522927	3754846	9825372	14103146	1449803	3108768	13894076	6307200	2.20		
10	6516093		793811.2	1869660	47311065	543008	3942589	10184582	14670178	1508094	3108768	13796426	6307200	2.19		
11	6766311		396905.6	1869660	49676618	563859	4139718	10564639	15268216	1569573	3108768	13711217	6307200	2.17		
12	7026137			1869660	52160449	585511	4346704	10966568	15898784	1634395	3108768	13638960	6307200	2.16		
13	7295941			1869660	54768471	607995	4564039	11458747	16630782	1709644	3108768	13984013	6307200	2.22		
14	7576105			1869660	57506895	631342	4792241	11975000	17398584	1788574	3108768	14343107	6307200	2.27		
15	7867027			1869660	60382239	655586	5031853	12516510	18203949	1871366	3108768	14716821	6307200	2.33		
16	8169121			1869660	63401351	680760	5283446	13084518	19048724	1958209	3108768	15105758	6307200	2.40		
17	8482815			1869660	66571419	706901	5547618	13680327	19934847	2049302	3108768	15510545	6307200	2.46		
18	8808555			1869660	69899990	734046	5824999	14305305	20864350	2144855	3108768	15931839	6307200	2.53		
19	9146804			1869660	73394989	762234	6116249	14960885	21839367	2245087	3108768	16370319	6307200	2.60		
20	9498041			1869660	77064739	791503	6422062	15648573	22862138	2350228	3108768	16826697	6307200	2.67		
21	9862766			1869660	80917976	821897	6743165	16511685	24076746	2475090	3944616	18152131	6307200	2.88		

22	10241496			1869660	84963875	853458	7080323	17268405	25202186	2590785	3944616	18646557	6307200	2.96		
23	10634770			1869660	89212068	886231	7434339	18062211	26382780	2712150	3944616	19161195	6307200	3.04		
24	11043145			1869660	93672672	920262	7806056	18894926	27621244	2839464	3944616	19696885	6307200	3.12		
25	11467201			1869660	98356305	955600	8196359	19768467	28920426	2973020	3944616	20254497	6307200	3.21		