



TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Comprehensive Tariff Order for Biomass based Power Plants

Order No.5 of 2016 dated 31-03-2016



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

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

Order No.5 of 2016, dated 31-03-2016

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 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 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 17-03-2016 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 01-04-2016.

-sd-
Dr. T. Prabhakara Rao
Member

-sd-
G. Rajagopal
Member

-sd-
S. Akshaya Kumar
Chairman

(By Order of the Commission)

-sd-
(S. Chinnarajalu)
Secretary

CONTENTS		
PARA	DESCRIPTION	PAGE NO.
1	Introduction	6
1.1	Commission's Regulation on Power Procurement from New and Renewable Sources of Energy	7
1.2	Commission's order on New and Renewable Energy Sources (NRES) based generation and allied Issues	7
1.3	Commission's initiative on tariff revision for Biomass based generation	8
2.	Biomass based Power Scenario in Tamil Nadu	8
3.	Legal Provisions	8
3.1	Related Provisions of the Electricity Act, 2003	8
3.2	Related Provisions of the National Electricity Policy	10
3.3	Related Provisions in the National Tariff Policy	11
4.	Promotion of New and Renewable Sources of Energy	13
5.	Applicability of this Order	13
6.	Tariff Determination Process	14
7.	Tariff / Pricing Methodology	14
7.1	Cost-Plus Tariff Determination	16
7.2	Single Part vs. Two Part Tariff	16
8.0	Issues Relating to Tariff and allied matters	16
8.1	Tariff Components	16
8.1.1	Capital cost per MW	18
8.1.2	Plant Load Factor	20
8.1.3	Debt - Equity Ratio	21
8.1.4	Term of loan	21
8.1.5	Interest rate for the loan	22
8.1.6	Return on Equity	23
8.1.7	Life of plant and machinery	24

8.1.8	Depreciation	25
8.1.9	Operation and Maintenance Expenses	27
8.1.10	Station Heat Rate	29
8.1.11	Gross calorific value of the fuel	30
8.1.12	Specific fuel consumption	31
8.1.13	Fuel Cost	31
8.1.14	Components of working capital	32
8.1.15	Interest on working capital	34
8.1.16	Auxiliary Consumption	35
8.2	Related issues	36
8.2.1.1	Transmission & wheeling charges and line losses	36
8.2.1.2	Scheduling and System Operation Charges	37
8.2.2	Cross Subsidy Surcharge	37
8.2.3	CDM Benefits	38
8.2.4	Reactive power charges	39
8.2.5	Grid availability charges	39
8.2.6	Adjustment of generated energy	40
8.2.7	Application fees and agreement fees	40
8.2.8	Billing and payments	41
8.2.9	Payment Security and Security Deposit	43
8.2.10	Power factor	43
8.2.11	Metering	44
8.2.12	Connectivity and Evacuation of power	45
8.2.13	Energy purchase and wheeling agreement	45
8.2.14	Scheduling of power generation	46
8.2.15	Tariff Review Period / Control Period	46
9.	Tariff	47
9.1.1	Fixed costs	47

9.1.2	Variable Costs	48
9.1.3	Total Cost	48
9.1.4	Use of Fossil Fuel	48
9.1.5	Monitoring Mechanism for the use of fossil fuel	48
10.	Acknowledgement	50
ANNEXURES		
I	List of Stakeholders who offered comments on Consultative Paper	51
II	List of members participated in the State Advisory Committee meeting	52
III	Components of Biomass Tariff	53
IV	Biomass Tariff Calculation	54

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 Introduction

The generating capacity connected to the Tamil Nadu's grid including the allocation from Central Generating stations is 13883.5 MW as on 29-2-2016 comprising of 4,660 MW from TANGEDCO's four thermal stations, 516 MW from four gas turbine stations, 2288 MW from hydro stations, 852.5 MW from private generating stations, 68 MW as contribution to Tamil Nadu grid by sale of electricity from captive generating and biomass plants, 5464 MW as Tamil Nadu's share from central generating stations and 35 MW as external assistance.

The Generating capacity from privately owned wind farms is 7512 MW as on 29-02-2016. The installed capacity of cogeneration plants is 659.4 MW and biomass power projects is 230 MW. The solar generation capacity is 581.26 MW.

The present demand in the State is around 13700 MW. The expected peak may vary from 14200 MW to 14800 MW. The peak power requirement is increasing at the rate of around 8% annually in the State. Therefore any capacity addition will help the State to a great extent.

Among the various sources of Non-Conventional Energy Sources (NCES) in Tamil Nadu, energy is generated from Biomass which generally includes crops, plants, agriculture produce, forest products, saw dust and

agro industrial wastes. Therefore, the Commission after analyzing various factors effecting the power sourced from biomass proposes to issue the fourth tariff order on Biomass.

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

In accordance with 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 states that while the tariff determined by the Commission would be in force for the time period mentioned in the Tariff Order, the control period may ordinarily be two years.

1.2 Commission's order on New and Renewable Energy Sources (NRES) based generation and allied Issues

1.2.1. The Commission has so far issued three 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. The third order on Biomass was issued on 31-07-2012 vide Order No. 8 of 2012.

1.3 Commission's initiative on tariff revision for Biomass based generation

The Commission issued a Consultative Paper on 25-09-2014 for fixing the tariff for the next control period in the Commission's website to seek the views / suggestions from the stakeholders. The list of stakeholders who have submitted their written submission to the Consultative Paper is placed in Annexure-1. The State Advisory Committee (SAC) meeting was held on 17-03-2016 to elicit their views. The list of members who participated in the SAC meeting is in Annexure-2. Taking into account the views of the stakeholder and the views of the SAC, the Commission issues this Comprehensive Tariff Order on Biomass based Power generation.

2. Biomass based Power Scenario in Tamil Nadu

The installed capacity of Biomass based Power Plants in Tamil Nadu is 230 MW as on 31-03-2015.

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 co-generation 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 biomass 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 of issued by the Ministry of Power, Government of India, relating to Promote of 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(1)(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 Sources of Energy

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 this Order

5.1 This Order shall come into force from 01-04-2016. The tariff fixed in this order shall be applicable to all biomass power plants commissioned during the control period of this Order. As the control period is for a period of 2 years, the tariff order would also be applicable for all biomass plants commissioned within the period of 2 years from the date of issue of the tariff order. The open access charges and other terms and conditions specified in this Order shall be applicable to all the Biomass energy generators, 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

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 not the best method as it discourages competition and efficiency. However, to encourage the Biomass based power generation plants and till competitive bidding is introduced, Cost-Plus method is followed. As it can be easily designed to provide adequate return to the investor, the Commission adopts Cost-Plus Tariff approach in this Order.

7.2 Single Part vs. Two Part Tariff

7.4.1. 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. 8 of 2012 dated 31-07-2012 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 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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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.5.58 Crs. to Rs.6.51 Crs. / MW depending upon the type of condenser and / or type of fuel	Rs. 4 Cr. / MW	a) <u>Water cooled</u> : Rs. 5.40 Crs./ MW b) <u>Air cooled</u> : Rs.5.75 Cr. / MW	Rs.5.70 Crs./ MW	Rs. 4.9432 Cr./ MW	Rs. 4.63336 Crs./ MW	a) <u>Water cooled</u> : Rs 4.68 Crs/MW b) <u>Air cooled</u> : Rs 4.98/MW	Rs.4.50 to 5.00 Crore/MW, depending upon boiler pressure and capacity

The Commission in Order No.8 of 2012 dated 31-07-2012 had considered Rs.4.45 Crores / MW as the capital investment based on the capital cost specified by CERC.

Rajasthan and Gujarat have arrived at capital cost based on the type of condensers. MNRE in its website has indicated that the capital cost can be in the range of Rs.4.50 Cr. to Rs. 5.00 Cr./MW depending upon boiler pressure and capacity. CERC in its Order dated 31-03-2015 has indicated that the capital cost can be in the range of Rs.5.58 Crs. to Rs.6.51 Crs. / MW depending upon the type of condenser and / or type of fuel.

Stakeholders' Comments :

The Biomass Power Producers Association, Tamil Nadu has suggested that in 2009 tariff determination considered a capital cost of Rs.4.87 Crs./MW based on average cost of the funded projects by IREDA, which was scaled down to Rs.4.45 Crs. in 2012 order. As almost all fixed cost

parameters are linked to project cost, this assumption led to a 10% reduction in fixed cost (Rs.1.658/unit in 2012 vis-à-vis Rs.1.833/unit in 2009). This effectively means that the prices have gone down after a period of 36 months by 10% when the real inflation during the period was as high as 85% per annum.

TANGEDCO have agreed for a capital cost of Rs.4.80 Crores per MW as proposed in the Consultative Paper of the Commission.

Commission's View :

Considering the general increase in capital cost and all the above inputs on capital cost, the Commission decides the capital cost at Rs.5.50 Crs./MW. 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.

8.1.2. Plant Load Factor:

Orders of other Commissions on PLF:

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT	MNRE
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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 1 st year (after stabilization) : 70% c) Second year onwards : 80%	80%	a) During stabilization (6 mths) : 60% b) During remaining period of the 1 st year (after stabilization) : 70% c) Second year onwards : 75%	75%	a) During stabilization : 60% b) During remaining period of the 1 st year (after stabilization) : 70% c) Second year onwards : 80%	a) During stabilization (6 mths) : 60% b) During remaining period of the 1 st year (after stabilization) : 70% c) Second year onwards : 80%	1 st year : 70% 2 nd 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. 8 of 2012 dated 31-07-2012.

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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 the previous Tariff Orders on Biomass dated 15-05-2006 and 31-07-2012 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 retains the norm at 70:30 for the next control period also.

8.1.4. Term of loan

In its Order No. 8 of 2012 dated 31-07-2012, 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 12 years in CERC and Maharashtra, it is assumed at 10 years in Gujarat.

Stakeholders' Comments :

TANGEDCO agreed for the Loan Tenor of 10 years with one year moratorium period.

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)	01-11-2015
13.00%	12.00%	13.00%	12.50%	13.00%	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 8 of 2012 dated 31-07-2012 adopted an interest rate on term loan of 12.25% p.a., which was based on the views of the stakeholders and the market conditions prevalent at that time.

While the interest rates specified by all the Commissions as stated above are in the range of 12% - 13%, IREDA have specified the financing norm of 10.60% – 11.90%. CERC has considered interest rate at 13%.

Stakeholders' Comments :

TANGEDCO agreed for interest on Term Loan at 12.70% as proposed in the Consultative Paper of the Commission.

Commission's View :

Under the circumstances, the Commission adopts the interest rate of 13.00% as specified by CERC for the next control period.

8.1.6. Return on Equity

Orders of other Commissions on RoE

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
For first 10 years : 20% After the first 10 years : 24%	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%

While CERC proposes a RoE of 20% p.a. for the first 10 years with an increase to 24% from the 11th year onwards, ROE adopted by majority of the Commissions are in the range of 14% (post tax) to 24% (pre-tax).

Stakeholders' Comments :

TANGEDCO agreed for RoE of 20% (pre-tax).

Commission's View :

The Tariff Regulations of the Commission stipulates 14% (post tax) RoE for conventional fuel based generating stations. With the objective of promoting renewable energy, Commission in its Comprehensive tariff order on Biomass based power plants issued during 2009 considered 19.85% (pre-tax) RoE, wherein the RoE was adopted linking it to Minimum Alternate Tax(MAT) and Income Tax(IT). Since these factors are changing frequently, the Commission in its Orders issued in 2012 relating to determination of tariff for NCES power (including the Biomass Order No 8 of 2012 dated 31-07-2012), adopted a RoE of 19.85% (pre-tax) without linking to MAT and IT. Hon'ble APTEL in its order dt.24-05-2013 in Appeal Nos.197, 198, 200, 201 & 208 of 2012 and 6 of 2013 upheld this rate.

Therefore, the Commission adopts a RoE of 20% (pre-tax) per annum without linking it to MAT and IT.

8.1.7. Life of plant and machinery

Orders of other Commissions on life of plant & machinery

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT	MNRE
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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. 8 of 2012 dated 31-07-2012.

Stakeholders' Comments :

TANGEDCO agreed for the life of plant and machinery at 20 years.

Commission's View :

All the other ERCs and MNRE have proposed 20 years as the life of the plant and machinery. Therefore, the Commission retains the life of plant and machinery at 20 years for the next control period.

8.1.8. Depreciation

Orders of other Commissions on Depreciation:

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
First 12 years : 5.83%. 13 th year onwards : 2.505%	First 8 years : 7.84% 9 th year : 7.28% 10-20 years : 1.82%	First 12 years : 5.83% Balance 8 years : 2.50%/year	First 12 years : 5.83% Balance 8 years : 2.50%/year	First 12 years : 5.83% 13 th year onwards : 2.50%	First 10 years : 7% 11-20 th year: 2% p.a.	6% (upto 10 years) 3% (11 to 20 years)

CERC in its Order has fixed the depreciation rate to 5.83% for the first 12 years with a reduction to 2.505% from the 13th year onwards. The depreciation rates of other ERCs are in the range of 6% to 7% for the first 10 years with a reduction to 2% - 3% from the 11th year onwards.

Stakeholders' Comments :

TANGEDCO 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.

The Biomass Power Producers Association, Tamil Nadu has objected to adopting 85% of project cost for the purpose of depreciation and requested to adopt differential depreciation as done by CERC and adopted by most SERCs.

Commission's View :

The Commission in its Order No. 2 of 2009 dated 27-04-2009 and 8 of 2012 dated 31-07-2012 had 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.

Therefore, the Commission decides to retain the depreciation rate of 4.50% 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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
Rs.0.4471 Crs. / MW with an escalation of 5.72% per year	5.50% of the capital cost with an escalation of 6.69%	a) <u>Water cooled</u> : Rs. 0.36 Crs/MW with an escalation of 5.85% per year b) <u>Air cooled</u> : Rs.0.38 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 with an escalation of 5.72% per year	4% of the capital cost for the first year with an escalation of 5.72% per year	<u>First year</u> : 5% of the project <u>2nd year onwards</u> : 5.72% escalation

The Commission in its Order No.8 of 2012 dated 31-07-2012, allowed Operation and Maintenance expenditure including insurance at 4.5% with annual escalation of 5% (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%.

Stakeholders' Comments :

TANGEDCO has agreed for the O & M expenses as 4.5% of the capital cost with escalation of 5.72% 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 5.72%.

The Biomass Power Producers Association, Tamil Nadu has suggested that in 2009 order, the Commission has approved a rate of 4.5% on plant & machinery (85% of project cost) and 0.9% on land and civil works (15% of project cost). In effect, the Commission approved a rate of 3.96% of the project cost with an escalation of 5% YoY. The Commission also approved an additional 0.75% towards insurance on plant & machinery alone (i.e. 0.63% of project cost). It may be noted that fixed cost as determined by the Commission shall be applicable for all power plants started on or after the effective date of the order until the project period.

In 2012 order, while adopting the same approach as in 2009 order, the Commission omitted insurance on the premise that it is part of O&M, i.e. included within the 3.96% of project cost allotted towards O&M. In effect, excluding insurance cost of 0.63%, only 3.33% has been provided for towards Operation and Maintenance.

Commission's View :

The Commission decides to follow the procedure as adopted in its 2012 order and retains the O & M expenses as 4.5% of the capital cost with escalation of 5.72% on plant and machinery by considering 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% of capital cost would be continued as Operation and Maintenance expenditure every year with an annual escalation of 5.72%.

8.1.10. Station Heat Rate

Orders of other Commissions on Station Heat Rate

(In Kcal / Kwahr)

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (<i>corrigendum to order dated 08-08-2013</i>)
a) For project using travelling grate boilers: 4200 b) For project using AFBC boilers: 4125	4200	a) <u>Water cooled</u> i) During stabilization : 4300 ii) After stabilization : 4200 b) <u>Air cooled</u> : i) During stabilization : 4540 ii) After stabilization : 4440	4000	i) During stabilization : 3800 ii) After stabilization : 4200	3800	a) <u>Water cooled</u> : 3800 b) <u>Air cooled</u> : 3950

The Commission in its Order No.8 of 2012 dated 31-07-2012 had fixed the station heat rate at 3840 Kcal / Kwahr.

Stakeholders' Comments :

TANGEDCO agreed for the station heat rate at 3840 Kcal / Kwahr.

Commission's View :

Most of the ERCs including CERC have fixed the station heat rate in the range of 3800 – 4200 Kcal/Kwahr in respect of water cooled condensers and 3950-4440 Kcal/Kwahr in respect of air cooled condensers. Therefore, the Commission now decides to retain the SHR at 3840 Kcal/Kwahr as followed in its order in 2012.

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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.8 of 2012 dated 31-07-2012 adopted Gross Calorific value of 3200 Kcal / Kwhr. This parameter is quite close to the parameter set by CERC and APERC.

Stakeholders' Comments :

TANGEDCO agreed for the GCV of 3200 Kcal/Kg.

Commission's View :

Therefore, the Commission decides to retain the same GCV of 3200 Kcal/Kg for the next control period also as adopted in its 2012 order.

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
1.35	1.35	<u>Water Cooled:</u> 1.23 <u>Air Cooled:</u> 1.30	1.21	1.05	1.05	a) <u>Water cooled</u> : 1.12 b) <u>Air cooled</u> : 1.16

Commission's View :

As Specific fuel consumption is a function of SHR and GCV, the specific fuel consumption works out to 1.20 Kg/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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
2892.03 with 5% escalation	FY 2014-15 2843 with 6% escalation (indicative-computed)	2550 with 5% escalation	2100 with 5.72% escalation	3987	FY 2013-14 2653 with 5% escalation	2726 with 5% escalation

The Commission in its Order No.8 of 2012 dated 31-07-2012 adopted Fuel cost as prescribed by CERC at Rs.2277/MT with 5% escalation p.a.

during the control period. Currently, CERC in its Order dt. 31-03-2015 has considered fuel cost of Rs.2892.03/MT with 5% escalation.

Stakeholders' Comments :

TANGEDCO has agreed for the fuel cost of Rs.2706.03/MT as proposed in the Consultative Paper of the Commission.

Commission's View :

Therefore, considering that the fuel cost in the market has been on an increase, the Commission also considers the fuel cost at Rs.2892.03/MT for the next control period with 5% escalation p.a.

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	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 current Order No.8 of 2012 dated 31-07-2012, the working capital is based on the following norms:

- Fuel stock - One month
- O & M Expenses - One month
- Receivables - One month

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 - One month

Commission's View :

The Commission would like to adopt the following norms for the next control period:

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

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
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
13.50%	12.00%	12.50%	13.25%	13.50%	13.00%	12.86%

The Commission in its Order No.8 of 2012 dated 31-07-2012 had adopted Interest on working capital at 12.50%.

Stakeholders' Comments :

TANGEDCO agreed for Interest on working capital at 13.20% as proposed in the Consultative Paper of the Commission.

Commission's View :

The interest rates adopted by other Commissions are in the range of 12% - 13.3%. Under the circumstances, the Commission adopts the interest rate specified by CERC in its Order dated 31-03-2015 at 13.50% for the next control period.

8.1.16. Auxiliary Consumption

Orders of other Commissions on Auxiliary Consumption:

CERC	ANDHRA PRADESH	RAJASTHAN	KARNATAKA	MAHARASHTRA	MADHYA PRADESH	GUJARAT
31-03-2015	16-05-2014 & 19-07-2014	08-07-2015	01-01-2015	25-01-2016	02-03-2012 & 03-05-2013	08-08-2013 & 30-09-2013 (corrigendum to order dated 08-08-2013)
a) Water cooled i) During 1 st year of operation : 11% ii) From 2 nd year onwards : 10% b) Air cooled : i) During 1 st year of operation : 13% ii) From 2 nd year onwards : 12%	10%	a) <u>Water cooled</u> : i) During stabilization : 10.50% ii) After stabilization : 10% b) <u>Air cooled</u> : i) During stabilization : 12.5% ii) After stabilization : 12%	10%	10%	10%	10%

The Commission in its present Order No.8 of 2012 dated 31-07-2012 has adopted Auxiliary Consumption at 10%. In other Commissions Orders, the auxiliary consumption adopted is in the range of 10% to 12%.

Stakeholders' Comments :

TANGEDCO has agreed for the auxiliary consumption at 10%.

Commission's View :

Therefore, the Commission would like 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. Transmission and wheeling charges & Scheduling and system operation charges
2. Cross subsidy surcharge
3. CDM benefits
4. Reactive power charges
5. Grid availability charges
6. Adjustment of energy generated
7. Application fees and Agreement fees
8. Billing and payments
9. Payment security and Security deposit
10. Power factor
11. Metering
12. Connectivity and Evacuation of power
13. Energy Purchase and Wheeling Agreement
14. Scheduling of Power
15. Tariff Review Period / Control Period

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

8.2.1.1 Transmission & wheeling charges and line losses

The Commission in its Order No.8 of 2012 dated 31-07-2012 has adopted as a promotional measure under section 86 (1) (e) of the Electricity Act 2003, 50% of the transmission charges and 50% of the

wheeling charges of conventional power to the Non-conventional energy sources power.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

It is proposed to continue the existing norms for this control period also.

8.2.1.2 Scheduling and System Operation Charges

With regard to scheduling and system operation charges, TANGEDCO suggested 100% of the Scheduling and System Operation charges applicable for conventional power charges (may be recovered from Biomass Power Producers).

The Commission now decides to adopt 50% of the Scheduling and System Operation Charges as applicable to conventional power charges for Biomass Power Producers during this control period also.

Apart from these charges, actual line losses in kind as specified in the respective Order of the Commission and as amended from time to time are also payable for the captive use and third party sale.

For generators who are availing Renewable Energy Certificate (REC), normal transmission charges, wheeling charges and line losses will apply.

8.2.2 Cross Subsidy Surcharge

The Commission in its Order No.8 of 2012 dated 31-07-2012 as a

promotional measure for renewable energy, adopted 50% of the applicable Cross Subsidy Surcharge for Biomass based Power Generating Projects.

Stakeholders' Comments :

TANGEDCO concurs with the proposal of the Commission for levy of 50% Cross Subsidy Surcharge.

Commission's View :

It is decided to continue the existing Cross Subsidy Surcharge rate of 50% during this control period also.

8.2.3 CDM Benefits

The Commission in its Order No.8 of 2012 dated 31-07-2012 has adopted the formula recommended by Forum of Regulator (FOR), which recommended that 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.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

It is decided to continue the existing norms for CDM benefits and sharing of CDM benefits.

8.2.4 Reactive power charges

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to adopt the reactive power charges for biomass power plants as specified in its Order on Open Access charges issued from time to time.

8.2.5 Grid availability charges

Stakeholders' Comments :

TANGEDCO agreed for the Grid availability charges as proposed in the Consultative Paper of the Commission.

The Biomass Power Producers Association, Tamil Nadu, has objected to the withdrawal of deemed demand concept in 2012, introduced by Order Nos.2 & 4 of 15-05-2006.

Commission's View :

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.

8.2.6. Adjustment of generated energy

The Commission in its previous Order dated 31-07-2012 had ruled that the adjustment of generated energy would be as per Commission's Open Access Regulations and related orders in force.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission proposes to continue with the existing procedure.

8.2.7 Application fees and agreement fees

The Commission in its previous Order dated 31-07-2012 had ruled that the application fees and agreement fees for the Energy Purchase and Energy Wheeling Agreements would be as specified in the Commission's Intra State Open Access Regulations 2005 and Fees and Fines Regulations 2004 in force. It also ruled that the fees for EPA would be collected by the licensee and passed on to the Commission. Whenever the Commission revises the above fees, the revised fees would be payable by the Biomass based Power Generators.

Whenever there is change in the usage of energy from Biomass based Power Generators or a change in the drawl point etc, there will be extra work to the licensee. Therefore, an additional fees equivalent to the application fees and agreement fees shall be leviable by the licensee on the generator as per the above Open Access Regulations.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to continue with the existing charges applicable to this control period also.

8.2.8 Billing and payments

The Commission in its Order No.8 of 2012 dated 31-07-2012 adopted the following stand :

When a renewable energy generator sells power to the distribution licensee, the generator will raise a bill every month for the net energy sold after deducting the charges for startup power and reactive power. If the distribution licensee makes the payment within a period of one month of presentation of bills by a generating company, a rebate of 1% shall be allowed. Any delayed payment beyond 60 days is liable for interest at the rate of 1% per month.

If a Biomass based generator utilizes the 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 month for the net energy supplied. The licensee should record the generation and consumption on the same day as far as possible. While preparing the bill, peak hour generation shall be adjusted against peak hour consumption. Off peak generation shall be adjusted against off peak consumption. Normal generation shall be adjusted against normal consumption. Peak, off-peak and normal hours shall be as defined in the Terms and Conditions for Determination of Tariff Regulation, 2005

as amended from time to time. Presently as per Clause 11 (2) of the Terms and Conditions for determination of Tariff Regulations, 2005 defines Peak hour as "the time between 0600 hrs and 0900 hrs and between 1800 hrs and 2100 hours." Clause 11 (3) of the Terms and Conditions for determination of Tariff Regulations, 2005 defines Off-peak hour as "the duration between 2200 hours and 0500 hrs. Balance hours are normal hours.

The Commission also prescribed in the above order No.8 of 2012 dt. 31-07-2012 that the peak hour generation and normal hour generation can be adjusted against lower slot consumption. Excess consumption will be charged at the tariff applicable to the consumer as per the Regulations / Orders of the Commission in force. Appropriate Transmission and wheeling charges, scheduling and system operation charges and cross subsidy surcharge, wherever applicable, shall be recovered from the consumer. The net amount recoverable from the consumer shall be raised in the bill as per their normal billing schedule.

Stakeholders' Comments :

TANGEDCO has suggested that in the case of sale to them, the norms of levy of penalty for the delayed payment beyond 30 days to the Distribution Licensee, as proposed in the Consultative Paper may be withdrawn by the Commission. The surplus energy, if any, available after wheeling the energy on captive consumption/third party sale may be treated as lapsed. TANGEDCO concurs with the views of the Commission on all other terms proposed in the consultative paper under the heading of "Billing and Payment".

Commission's View :

The Commission proposes to continue with the existing procedure to this control period also.

8.2.9 Payment Security and Security Deposit

The Commission in the previous Order ruled that the interest @ 1% per month would be payable by the licensee for the delayed payment.

In the same Order, the Commission had decided that the security deposit of the consumer would be two times the maximum net energy supplied by the distribution licensee in any month in the preceding financial year.

Stakeholders' Comments :

TANGEDCO has suggested that the levy of interest to the Distribution Licensee @ 1% per month for the delayed payment as proposed in the Consultative paper may be withdrawn. TANGEDCO concurs with the views of the Commission on security deposit of the consumer.

Commission's View :

The Commission decides to continue with the existing procedure to this control period also.

8.2.10 Power factor

In the Order dated 31-07-2012, the Commission ruled that as per the Retail Tariff Order in force, Power Factor disincentive is applicable to a consumer as a percentage of current consumption charges. The average power factor recorded by the meter shall be the reference for calculation

of disincentive. On the same analogy, captive / third party consumers of Biomass Plants shall be liable for disincentive based on the average power factor recorded by the meter.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to adopt the above procedure for this control period also.

8.2.11 Metering

The Commission in its last Tariff Order No.8 of 2012 dated 31-07-2012 ruled that metering and communication arrangements shall be in accordance with the following:

- (1) Central Electricity Authority (Installation and Operation of Meters) Regulations 2006
- (2) Tamil Nadu Electricity Distribution Code, 2004
- (3) Tamil Nadu Grid Code, 2004
- (4) Tamil Nadu Electricity Intra State Open Access Regulation in force.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to adopt the above procedure for this control period also.

8.2.12 Connectivity and Evacuation of power

The Commission in its Tariff Order dated 31-07-2012 for Biomass had ruled that the connectivity and power evacuation system shall be provided as per the Act, Codes, Regulations and Orders in force.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to adopt the above procedure for this control period also.

8.2.13 Energy purchase and wheeling agreement

The Commission in its Order No.8 of 2012 dated 31-07-2012 had stated that the format of the Energy Purchase Agreement (EPA) shall be evolved as specified in the Commission's New and Renewable Sources of Energy Regulation in force. The agreement shall be valid for a minimum period of 20 years. The distribution licensee shall execute the Energy Purchase Agreement within a month of receipt of application from the generator. The parties to the agreement shall be given the option of exiting in case of violation after serving a three months notice to the other party.

The Order had also stated that the format of the Energy Wheeling Agreement (EWA) shall be evolved as specified in the Commission's New and Renewable Sources of Energy Regulation in force. The period of agreement and other terms and conditions shall be as per the terms of Open Access Regulations issued by the Commission.

Stakeholders' Comments :

TANGEDCO agreed to the views of the Commission.

Commission's View :

The Commission decides to continue with the same procedure for this Order also.

8.2.14 Scheduling of power generation

The Commission in its previous Order of 31-07-2012 had decided that the generator shall follow the scheduling procedure as specified in Indian Electricity Grid Code, Tamil Nadu Electricity Grid Code, other Regulations, Codes and Orders of the Commission.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to continue with the same procedure for this Order also.

8.2.15 Tariff Review Period / Control Period

In the previous Order of 31-07-2012, based on the views of the majority of the stakeholders, the Commission had agreed for the continuance of 2 years as the control period and tariff period as 20 years.

Clause 6 of the Power Procurement from New and Renewable Sources of Energy Regulations, 2008 of the Commission also 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.

Stakeholders' Comments :

TANGEDCO concurs with the views of the Commission.

Commission's View :

The Commission decides to continue with the same procedure for this Order also.

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	2.22		11	1.86
2	2.25		12	1.83
3	2.20		13	1.89
4	2.15		14	1.94
5	2.10		15	2.00
6	2.06		16	2.06
7	2.01		17	2.13
8	1.97		18	2.20
9	1.93		19	2.27
10	1.90		20	2.35

9.1.2. Variable Costs

9.1.2.1. The variable cost for the financial year 2016-17 will be Rs.3.86 per unit and for the financial year 2017-18 will be Rs.4.05 per unit.

9.1.2.2. 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.

9.1.2.3. 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.

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 is Rs.6.07/unit and for the 2nd year is Rs.6.30/unit.

9.1.4. Use of Fossil Fuel

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

9.1.5. Monitoring Mechanism for the use of fossil fuel

(1) The Project developer shall furnish to the State Nodal Agency, a monthly fuel usage statement and monthly fuel procurement statement duly certified by Chartered Accountant to the beneficiary (with a copy to

appropriate agency appointed by the Commission for the purpose of monitoring the fossil and non-fossil fuel consumption) for each month, along with the monthly energy bill. The statement shall cover details such as –

- (a) Quantity of fuel (in tonne) for each fuel type (biomass and fossil fuels) consumed and procured during the month for power generation purposes,
- (b) Cumulative quantity (in tonne) of each fuel type consumed and procured till the end of that month during the year,
- (c) Actual (gross and net) energy generation (denominated in units) during the month,
- (d) Cumulative actual (gross and net) energy generation (denominated in units) until the end of that month during the year,
- (e) Opening fuel stock quantity (in tonne),
- (f) Receipt of fuel quantity (in tonne) at the power plant site and
- (g) Closing fuel stock quantity (in tonne) for each fuel type (biomass and fossil fuels) available at the power plant site.

(2) Non-compliance with the condition of fossil fuel usage by the project developer, during any financial year, shall result in withdrawal of applicability of tariff for such biomass based power project.

10. Acknowledgement

10.1 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 recognises 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-
Dr. T. Prabhakara Rao
Member

-sd-
G. Rajagopal
Member

-sd-
S. Akshaya Kumar
Chairman

(By Order of the Commission)

-sd-
(S. Chinnarajalu)
Secretary

Annexure-1

**LIST OF STAKEHOLDERS WHO OFFERED COMMENTS ON
CONSULTATIVE PAPER**

1. Tamil Nadu Generation and Distribution Corporation Ltd.
(TANGEDCO)
2. Biomass Power Producers Association

Annexure-2**LIST OF MEMBERS WHO PARTICIPATED IN THE STATE
ADVISORY COMMITTEE MEETING HELD ON 17-03-2016****Members Present :**

1. Thiru. S. Akshaya Kumar, Chairman, TNERC
2. Thiru. G. Rajagopal, Member, TNERC
3. Thiru. Dr. T. Prabhakara Rao, Member, TNERC
4. Thiru. Dr. M. Saikumar, CMD, TNEB Ltd. & TANGEDCO Ltd. And
Chairman, TANTRANSCO Ltd.
5. Thiru. R.K. Kulshreshta, Chief Electrical Engineer, Southern Railways
6. Dr. A.S. Kandasamy, Member, SAC
7. Thiru T. Vijayarangan, Member, SAC
8. Thiru. K. Alagu, Member, SAC
9. Thiru. Ramesh Kymal, Member, SAC
10. Thiru. C. Muthusami, Member, SAC
11. Thiru. G.S. Rajamani, Member, SAC
12. Thiru. K. Kathirmathiyon, Member, SAC

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 one year moratorium
5	Interest on loan	13.00% p.a.
6	Return on Equity	20% (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/Kwhr
12	Calorific value of fuel	3200 Kcal/Kg
13	Specific fuel consumption	1.20 Kg/Kwh
14	Fuel cost	Rs.2892.03/MT with 5% escalation from 2nd year onwards
15	Working capital components	One Month Fuel stock, One month O & M and Two months Receivables
16	Interest on working capital	13.50% p.a.
17	Auxiliary consumption	10.00%

Annexure-4**BIOMASS TARIFF CALCULATION**

Year	O & M charges for machinery	O & M charges for land & civil works	Total O & M charges for machinery, land & civil works	Interest on loan	Depn.	Fuel cost	Working Capital					ROE	Total FC	Units gen Less Aux consumption	Fixed Cost	Variable Cost	Total
							O & M Exps.	Fuel	Receivables	Total WC	Int. on WC						
1	2337500	74250	2411750	5005000	2103750	24320815	200979	2026735	6383982	8611696	1162579	3300000	13983079	6307200	2.22	3.86	6.07
2	2471205	78497	2549702	5005000	2103750	25536856	212475	2128071	6617439	8957986	1209328	3300000	14167780	6307200	2.25	4.05	6.30
3	2612558	82987	2695545	4504500	2103750	26813699	224629	2234475	6777404	9236507	1246929	3300000	13850724	6307200	2.20		
4	2761996	87734	2849730	4004000	2103750	28154384	237478	2346199	6949814	9533490	1287021	3300000	13544501	6307200	2.15		
5	2919982	92752	3012735	3503500	2103750	29562103	251061	2463509	7135303	9849873	1329733	3300000	13249718	6307200	2.10		
6	3087005	98058	3185063	3003000	2103750	31040208	265422	2586684	7334536	10186642	1375197	3300000	12967010	6307200	2.06		
7	3263582	103667	3367249	2502500	2103750	32592219	280604	2716018	7548212	10544834	1423553	3300000	12697051	6307200	2.01		
8	3450259	109596	3559855	2002000	2103750	34221830	296655	2851819	7777064	10925538	1474948	3300000	12440553	6307200	1.97		
9	3647614	115865	3763479	1501500	2103750	35932921	313623	2994410	8021864	11329898	1529536	3300000	12198265	6307200	1.93		
10	3856257	122493	3978750	1001000	2103750	37729567	331563	3144131	8283425	11759118	1587481	3300000	11970981	6307200	1.90		
11	4076835	129499	4206335	500500	2103750	39616046	350528	3301337	8562597	12214462	1648952	3300000	11759537	6307200	1.86		
12	4310030	136907	4446937		2103750	41596848	370578	3466404	8860278	12697260	1714130	3300000	11564817	6307200	1.83		
13	4556564	144738	4701302		2103750	43676690	391775	3639724	9262744	13294244	1794723	3300000	11899775	6307200	1.89		
14	4817199	153017	4970216		2103750	45860525	414185	3821710	9685650	13921545	1879409	3300000	12253375	6307200	1.94		
15	5092743	161769	5254513		2103750	48153551	437876	4012796	10130035	14580707	1968395	3300000	12626658	6307200	2.00		
16	5384048	171023	5555071		2103750	50561229	462923	4213436	10596992	15273350	2061902	3300000	13020723	6307200	2.06		
17	5692016	180805	5872821		2103750	53089290	489402	4424108	11087670	16001179	2160159	3300000	13436730	6307200	2.13		
18	6017599	191147	6208746		2103750	55743755	517396	4645313	11603276	16765985	2263408	3300000	13875904	6307200	2.20		
19	6361806	202081	6563887		2103750	58530942	546991	4877579	12145080	17569649	2371903	3300000	14339539	6307200	2.27		
20	6725701	213640	6939341		2103750	61457489	578278	5121457	12714415	18414151	2485910	3300000	14829001	6307200	2.35		