

CONSULTATIVE PAPER ON FIXATION OF NORMS FOR DETERMINATION OF TARIFF FOR PROCUREMENT OF POWER FROM MUNICIPAL SOLID WASTE (MSW) BASED POWER GENERATING PLANTS

1. Legislative Provisions:

1.1. Section 86(1)(e) of the Electricity Act 2003(Central Act 36 of 2003) mandates the State Electricity Regulatory Commissions to 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. The Regulatory Commissions are also required to specify, for the purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution Licensee. Under Section 62, the Act empowers the Commissions to determine the tariff for the supply of electricity by a generating company to a distribution Licensee.

2. Commission's Regulation on Power Procurement from New and Renewable Energy Sources of Energy:

2.1 The Commission notified the "Power Procurement from New and Renewable Sources of Energy Regulations 2008" on 08-02-2008 in accordance with the powers vested under 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.

2.2 Amongst other important provisions listed in the Regulations, it is also specified that the tariff determined by the Commission shall be applicable for a period of twenty years and the control period may ordinarily be two years.

3. Commission's Order on New and Renewable Energy Sources based generation and allied issues.

3.1 The Commission issued Order No. 3 dated 15-05-2006 on "Power purchase and allied issues in respect of Non-Conventional Energy Sources based Generating Plants and Non-Conventional Energy Sources based Co-generation Plants". The said Order stipulated tariff rates for power procurement by the Distribution Licensee

from Wind Energy Generators (WEGs), Biomass based generators and Bagasse based generators. In respect of Renewable Energy, Commission has already issued orders for various control periods. In respect of Municipal Solid Waste based power Plants generic tariff order has not been issued and now Commission desires to issue generic order for such type of projects. The Consultative paper now floated is the first of its kind on the power generation by using Municipal Solid Waste.

4. Legal Provisions:

4.1 Related Provisions of the Electricity Act, 2003:

4.1.1. The Commission is guided by the following provisions of Section 61 of the Electricity Act 2003 which are relevant to this Order:

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) Multiyear 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.”*

Section 86 stipulates the following among other functions of the State

Commission.

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;”

4.2. Related Provisions of the National Electricity Policy:

4.2.1 The guidelines stipulated in the National Electricity Policy on NCES, which are relevant, are reproduced below:

“(1)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.

(2)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) Clause 5.12.2: The Electricity Act 2003 provides that co-generation 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 shares 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. “

4.3 Related Provisions in the Tariff Policy

4.3.1 The Commission is also guided by the following specific provisions of the Tariff Policy of Government of India (Ministry of Power) relating to Renewable Energy Sources:

“ (1) Clause 5(7) (i): Tariff fixation for all electricity projects (generation, transmission and distribution) that result in lower Green House Gas (GHG) emissions than the relevant baseline 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.

(2) 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. This policy stipulates the following for meeting these objectives.

(3) 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.

(4) Clause 6.4(2): States shall endeavor 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. While determining the tariff from such sources, the Appropriate Commission shall take into account the solar radiation and wind intensity which may differ from area to area to ensure that the benefits are passed on to the consumers.

5. Promotion of New and Renewable sources of Energy:

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

6. Applicability of the proposed Order:

6.1 The tariff fixed in this Consultative paper shall be applicable to all Municipal Solid Waste (MSW) based power generating plants in the State of Tamil Nadu commissioned on or after the date of issue of the order for sale of electricity to the distribution licensee. The open access charges and other terms and conditions specified in this Order shall be applicable to all the municipal solid waste projects irrespective of their date of commissioning.

6.2 The Ministry of Power, Government of India vide Gazette Notification dated 28-01-2016 issued the revised Tariff Policy and provided compulsory procurement of 100% power produced from all the Waste-to-Energy plants in the State by the Distribution Licensees for disposal of waste besides generation of electricity.

6.3 In exercise of powers vested under Section 86(1)(a), (b) and (c) read with (e) and Section 62(1) of the Electricity Act, 2003 and all other powers enabling it in this behalf, through this approach paper, the Tamil Nadu Electricity Regulatory Commission proposes to determine tariff and related dispensation for the purchase of power by the Distribution Licensees from municipal solid waste based power generating plants in the State.

7. Tariff Review Period/Control Period

The tariff determined in this particular control period shall apply to all projects which are commissioned within that period and the tariff determined for a project shall remain in effect for the whole project life of 20 years from the date of grid connectivity i.e. the date of commissioning.

8. Tariff Determination Process

8.1 The Commission has issued the Regulations on Power Procurement from New and Renewable Sources of Energy Regulation, 2008. Important provisions of the Regulation which emphasis on promotion of NCES is reproduced below for reference:

“ (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 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. “*

9. Tariff / Pricing Methodology

9.1 Tariff /Pricing Methodology specified in Regulation 4 of the Commission's New and Renewable Sources of Energy Regulation, 2008 also details the basic guidelines on the Tariff / Pricing Methodology. Important provisions in the Regulations are 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 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. In case of small hydro projects with a capacity of more than 5MW but not exceeding 25 MW capacities, Commission decide the tariff on case to case basis.

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.* “

10. Cost-Plus Tariff Determination

10.1 Regulation 4(6) of “Power Procurement from New and Renewable Sources of Energy Regulations, 2008” empowers the Commission to adopt “appropriate tariff methodology” to determine the tariff for generation of energy from municipal solid waste. Cost- plus tariff determination is a more practical method. It can be easily designed to provide adequate returns to the investor and a surety of returns will lead to larger investment in municipal solid waste plants. On 07-10-2015, the CERC had issued CERC (Terms and Conditions for tariff determination from Renewable Energy Sources) (Fourth Amendment) Regulations, 2015 specifying the norms and terms and conditions for various non-conventional sources of energy including power from municipal solid waste in its Amendment dated 07-10-2015.

11. Single Part Tariff

11.1 Two part tariff is generally adopted when the variable component is significant. As the municipal solid waste plant does not require any purchase of Fuel, the Fuel Cost, Gross Calorific Value and Specific Fuel Consumption are considered as not applicable. Hence, the Commission proposes to adopt single part levelled tariff for fixed cost as adopted by CERC.

12. Tariff Components:

12.1 The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of power generation from municipal solid waste power plants. The tariff determined in a cost plus scenario, would depend significantly on the following operating and financial parameters:

1. Capital Cost
2. Life of Plant and Machinery
3. Plant Load Factor
4. Debt-Equity ratio
5. Term of loan and Interest

6. Return on Equity
7. Components of Working Capital
8. Interest on Working Capital
9. Operation and Maintenance Expenses
10. Depreciation
11. Auxiliary Consumption
12. Fuel Cost

12.2. Capital Cost:

12.2.1 The Capital cost is one of the most important parameters for municipal solid waste power projects for tariff determination. The CERC in its Statement of Reasons dated 07th October 2015 has discussed in detail for fixing the Capital Cost for the municipal solid waste power projects.

5.3.6."Considering the comparable nature of technology of biomass and waste to energy plants, the normative capital cost for the Rankine Cycle Combustion based Power Plants utilizing MSW as input shall be in accordance with Biomass Power plant with additional cost consideration for the requirement of a larger boiler and more sophisticated equipments to control flue gas emissions.

In view of the above, the CERC has fixed a Capital Cost of Rs.15.00 Crores/MW. As the capital cost for preprocessing comes to around 35%-40% of entire capital cost, 40% of the capital cost has been considered as a capital cost of preprocessing facility for MSW.

The capital cost adopted/ proposed by other Regulatory Commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Capital Cost
CERC	Regulation dated 07-10-2015	a) Rs.15.00 Crores/ MW based on Rankine Cycle technology application for municipal solid waste.
Telengana	Order dated 13-06-2016	MSW - Rs.14.00 Crores

	in O.P.No.18 of 2016 (RDF/MSW)	
MPERC	Approach paper dated March 2016 (only for MSW Projects)	Rs.15.00 Crores/MW (inclusive of Power Evacuation Cost)
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	Rs.17.78 Crores/MW
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	Rs.17.86 Crores/MW
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016 (for projects having CoD upto 31-3-2020)	MSW FY2016-17 – Rs.15.00 Cr./MW
UPERC	Captive and Renewable Energy Generating Plants Regulations, 2014, dated 20-1-2015	Only tariff is notified in this Regulations
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	600 TPD Project Technology Biomethanation – Rs.18 Cr./MW and Incineration – Rs.16.7 Cr./MW

Comparing the capital cost adopted by CERC and other Commissions, it is proposed to adopt a capital cost of Rs.15.00 Crores/MW including all costs.

12.3. Life of Plant and Machinery

12.3.1 The life of Plant and Machinery adopted /proposed by other commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Useful Life of Plant for MSW projects
CERC	Regulation dated 07-10-2015	20 years
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	20 years
MPERC	Approach paper dated March	20 years

	2016 (only for MSW Projects)	
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	25 years
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	25 years
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016 (for projects having CoD upto 31-3-2020)	20 years
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	20 years

12.3.2 Commission proposes to adopt 20 years as useful life of Plant and Machinery for MSW based power projects.

12.4. PLANT LOAD FACTOR (PLF):

12.4.1. The life of Plant Load Factor adopted /proposed by other commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	PLANT LOAD FACTOR
CERC	Regulation dated 07-10-2015	1) During stabilization - 65% and during the remaining period of first year (after stabilization) – 65% 2) From 2 nd year onwards – 75%
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	1 st Year - 65.0% 2 nd Year onwards – 75.0%
MPERC	Approach paper dated March 2016 (only for MSW Projects)	1 st year – 65% and 75% from 2 nd year onwards
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	a) During 1 st year of stabilization 60% and b) from 2 nd year onwards 85.6%
BERC	Order dated 24-9-2015	a) During 1 st year of stabilization 60%

	in Case No.22/2015.(MSW Project)	and b) from 2 nd year onwards 85.6%
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	a) During first year 65% and b) From 2 nd year onwards 75%
UPERC	Captive and Renewable Energy Generating Plants Regulations, 2014, dated 20-1-2015	70%
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	70%

12.4..2.1 In respect of PLF Commission proposes to adopt a normative PLF level of 75% for MSW based projects. For any generation beyond the normative PLF, an incentive would be adequate for the additional efforts and to meet the wear and tear of the plant and equipment and therefore Commission proposes an incentive of 25 paise per unit which is already in practice in respect of Conventional Power Stations and for Bagasse based co-generation plants.

12.5 .Debt-Equity ratio

12.5.1. Commission has adopted a Debt-Equity ratio of 70:30 in all the other Renewable Sources based Tariff Orders viz. Solar, Wind, Biomass based power plants and Bagasse based Co-generation Plants. Hence, in respect of municipal solid waste plants also, Commission desires to adopt a Debt-Equity ratio of 70:30.

12.6. Term of loan and Interest:

12.6.1. Commission in all other Renewable Sources based Tariff Orders has adopted the term of loan as 10 (ten) years with a moratorium period of one year for the municipal solid waste projects.

12.6.2. The Interest on Debt adopted/ proposed by other Commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Interest on Debt
CERC	Regulation dated 6-02-2012	Rate equivalent to the average SBI Base Rate prevalent during the first six months of the previous year plus 300 basis points. As per draft generic tariff for various renewable energy technologies for 2016-17 has notified a rate of interest at 12.76%
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	12.00%
MPERC	Approach paper dated March 2016 (MSW Projects)	12.00%
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	12.96%
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	13.00%
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	Avg. SBI Base Rate during first 6 months of previous year +3%
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	12.00%

12.6.3. CERC in its generic tariff order for various renewable energy technologies for FY2016-17 has adopted a rate of interest at 12.76% for FY2016-17. The rate has been derived based on the weighted average of Base rate prevalent during the first six months of FYT2015-16 (i.e.9.76%) plus 300 basis points which is equivalent to

interest rate of 12.76%. But the current scenario is that the rate of interest has further declining trend.

12.6.4. Hence, in the draft proposal, Commission proposes to adopt the rate of interest on debt as 12.76% p.a.

12.7. Return on Equity:

12.7.1. The Return on Equity adopted/proposed by other commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Return on Equity
CERC	Regulation dated 07-10-2015	a)20% p.a. for the first 10 years. b)24% p.a. from 11 th year onwards.
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	16%
MPERC	Approach paper dated March 2016 (MSW Projects)	20% pre-tax
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	14%
BERC	Order dated 24-9-2015 in Case No.22/2015.(MSW Project)	a)For 1 st 10 years @ 20% b)From 11 th year onwards 24%.
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	Upto 10 th year – 20% and from 11 th year onwards 24%
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	16%

12.7.2. 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 New and Renewable Energy Tariff Orders issued during 2009 considered 19.85% (pre-tax) RoE, wherein the RoE was adopted linking it to Minimum Alternate Tax 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 Bagasse based Co-gen plants Order No.7 of 2012, dated 31-07-2012), adopted a RoE of 19.85% (pre-tax) without

linking to MAT and Income Tax. Hon'ble APTEL in its order dated 24-05-2013 in Appeal No. 197, 198, 200, 201 and 208 of 2012 and 6 of 2013 upheld the same.

12.7.3. Commission has adopted a RoE of 20% (pre-tax) per annum for Wind, Solar, Biomass based power plants and Bagasse based Cogeneration Plants without linking it to MAT and Income Tax. Hence, Commission proposes to adopt the same to the municipal solid waste power plants.

12.8. Components of Working Capital:

12.8.1. The components of Working Capital adopted by other Commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Interest on Working Capital
CERC	Regulation dated 07-10-2015	a) Fuel costs for four months equivalent to normative PLF; b) O & M Expenses for one month; c) Receivables equivalent to 2(Two) months of fixed and variable charges for sale of electricity calculated on the target PLF; d) Maintenance spare @ 15% of operation and maintenance expenses.
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	a) O & M Expenses for one month. b) Maintenance (% of O & M) – 15% c) Two months Receivables.
MPERC	Approach paper dated March 2016 (MSW Projects)	a) Operation & Maintenance expenses for one month. b) Receivables equivalent to 2 (two) months of energy charges on sale of electricity calculated on the normative CUF. c) Maintenance spares @ 15% of operation & maintenance expenses.
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	a) O & M expenses @ 1% b) One month receivables and c) Maintenance Spares @ 1%

BERC	Order dated 24-9-2015 in Case No.22/2015. (MSW Project)	a)O & M expenses @ 1% b)Two month receivables and c) Maintenance Spares @ 1%
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	a) Fuel Cost for four (4) months equivalent to normative PLF; b) O & M expenses for one (1) month; c) Receivables equivalent to Two months of fixed and variable charges for sale of electricity calculated on the target PLF; d) Maintenance spares @ 15% of O & M expenses.

12.8.2. In respect of municipal solid waste there is no expenditure in respect of fuel cost. Hence, Commission proposes to consider O & M expenses at one month and Receivables at two months as components of working capital.

12.9. Rate of Interest on Working Capital:

12.9.1. The rate of Interest on Working Capital adopted by other Commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Rate of Interest on Working Capital
CERC	Regulation dated 7.10.2015	Rate equivalent to the average SBI Base Rate prevalent during the first six months of the previous year plus 350 basis points.(13.5%)
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	12.50%
MPERC	Approach paper dated March 2016 (only for MSW Projects)	12.50%
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	12.96%
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	13.50%
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid	Interest rate equivalent to the average SBI Base Rate prevalent during the first six

	Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	months of the previous year plus 350 basis points.
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	12.00%

12.9.2. CERC in its generic tariff order for various renewable energy technologies for FY2016-17 has adopted a rate of interest at 13.26% for FY2016-17. This has been derived based on the weighted average of Base rate prevalent during the first six months of FYT2015-16 (i.e.9.76%) plus 350 basis points which is equivalent to interest rate of 13.26%. But the current scenario is that the rate of interest is in the declining trend.

12.9.3. Hence, in the draft proposal, Commission proposes to adopt the rate of interest as 13.26% for calculating Interest on Working Capital.

12.10. Operation & Maintenance Expenses:

12.10.1. The O & M Expenses adopted/proposed by other commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	O & M Expenses
CERC	Regulation dated 07-10-2015	Normative O & M expenses for FY2015-16 shall be @ 6% of normative capital cost and thereafter an escalation of 5.72% p.a.
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	Rs.84 lakhs per MW (6% of Capital Cost) with an escalation of 5.72% from 2 nd year onwards.
MPERC	Approach paper dated March 2016 (MSW Projects)	5% of the capital cost in the first year and thereafter a simple escalation of 5.72% per annum
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	Rs.1.34Crores/MW with an annual escalation of 5.72%
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW)	Rs.1.29 Crores/MW with an annual escalation of 5.72%

	Project)	
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	Rs.95.00 Lakhs/MW with an annual escalation of 5.72% per annum
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	Biomethanation – 5% Incineration – 6%

12.10.2. Commission proposes an O & M expense of 5% of the capital cost with an annual escalation of 5.72% 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% of capital cost would be allowed as Operation and maintenance expenditure every year with an annual escalation of 5.72%.

12.11. Depreciation:

12.11.1 The rates of Depreciation adopted/proposed by other commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Depreciation
CERC	Regulation dated 6-02-2012	Depreciation at 5.83% for 12 years and at 2.51% from 13 th year onwards.
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	a) For 1 st 12 years – 5.83% and b) 2.50% for the following 8 years.
MPERC	Approach paper dated March 2016 (MSW Projects)	7% p.a. for the first 10 years and remaining 20% is spread over the remaining useful Life of Plant from 11 th year onwards.
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	a)For 1 st 10 years @ 7% p.a. and b)From 11 th year onwards @ 1.33% p.a.

BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	a)For 1 st 10 years @ 6% p.a. and b)For next 15 years 2% p.a.
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	a) Year 1 to 12 – 5.83% and b) from 13th year onwards remaining depreciation spread over useful life.

12.11.2. Commission proposes to adopt depreciation at 4.5% p.a. Straight Line Method on Plant and machinery by reckoning 85% of capital cost as the cost of plant and machinery. The accumulated depreciation shall however be limited to 90% of the cost of plant and machinery.

12.12 Auxiliary Consumption

12.12.1 The Auxiliary Consumption adopted by other commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Auxiliary Consumption
CERC	Regulation dated 07-10-2015	15%
Telengana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	12%
MPERC	Approach paper dated March 2016 (MSW Projects)	11.50%
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	16%
BERC	Order dated 24-9-2015 in Case No.22/ 2015.(MSW Project)	16%
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	15%
Karnataka	Concept paper dated 20-11-2015 TERI Report prepared for KERC. (MSW projects)	a)Biomethanation – 25% and b) Incineration – 16%

12.12.2. As CERC has considered an Auxiliary Consumption of 15%, commission proposes to adopt an Auxiliary Consumption of 15%.

12.13. Fuel Cost:

12.13.1 The fuel cost adopted by other commissions are as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Fuel Cost (in Rs.)
CERC	Regulation dated 07-10-2015	Nil
TELENGANA	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	Nil
GERC	Order dated 4-8-2015 in Petition No.1443 of 2014 (MSW Project)	Nil
BERC	Order dated 24-9-2015 in Case No.22/2015.(MSW Project)	Nil
JERC	Draft regulations – Determination of Tariff for procurement of Power from Wind, Biogas, Municipal Solid Waste and Refuse Derived Fuel based Power Projects) Regulations, 2016	Nil

12.13.2. In respect of MSW based projects no fuel cost is allowed by the Commission.

13. Related issues

13.1. The following are the related issues for energy generation from Municipal Solid Waste 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. Energy Wheeling Agreement and Fees

8. Billing and payments
9. Security deposit
10. Power factor disincentive
11. Metering
12. Connectivity and Evacuation of energy
13. Energy Purchase Agreement
14. Scheduling of power generation
15. Tariff review period / Control period
16. Parallel operation charges

The above charges are applicable to Municipal Solid Waste based plants irrespective of their year of installation. These are discussed in detail in the following paragraphs.

13.2 Transmission and Wheeling Charges& Scheduling and System Operation Charges:

13.2.1. 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 Electricity Act, 2003 the Commission proposes to adopt 50% (in each) of the transmission charges, wheeling charges and Scheduling and System Operation charges as applicable to the conventional power to the MSW plants. 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 deductible in kind for the captive use and third party sale. In respect of plants availing Renewable Energy Certificates (REC), 100% of the respective charges as specified in the relevant orders shall apply.

13.3 Cross Subsidy Surcharge:

13.3.1. Commission in its other tariff orders related to different renewable power has adopted 50% of the applicable Cross Subsidy Surcharge and wish to propose the same for the generation plant based on the Municipal Solid Waste plants.

13.4 CDM Benefits:

13.4.1. It is proposed that as recommended 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.

13.5 Reactive Power Charges:

13.5.1. Commission proposes to adopt the Reactive Power Charges as specified in its Order on Open Access charges issued from time to time.

13.6. Grid availability charges:**(a) Charges for the start-up power supplied by the distribution licensee.**

The question of start-up power of generators shall be as per Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force.

(b) Standby charges:

If adequate generation does not materialize or if drawal 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.

13.7. Adjustment of energy generated:

The adjustment of energy shall be as per the Commission's Open Access Regulations in force.

13.8 Energy Wheeling Agreement and Fees:

13.8.1. The format of Energy Wheeling Agreement, application and agreement fees, procedure and terms and 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.

13.9 Billing and payments:

13.9.1. It is proposed that 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. The bill amount is due only after one month. 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.

13.9.2. 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 hour generation shall be adjusted against off-peak hour consumption. Normal hour generation shall be adjusted against normal hour 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 open access consumers. The net amount recoverable from the consumer shall be raised in the bill as per their normal billing schedule.

13.9.3. Peak, Off-peak and normal hours shall be as defined in Terms & Conditions for Determination of Tariff Regulations, 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 06.00 hrs and 09.00 hrs and between 18.00 hrs and 21.00 hours*”. Clause 11(3) of the Terms and Conditions for determination of Tariff Regulations, 2005 defines off-peak hour as “*the duration between 22.00 hours and 05.00 hours*”. Balance hours are normal hours.

13.10 Security Deposit:

13.10.1. As regards the security deposit to be paid by captive/third party user, the Commission proposes that charges corresponding to two times of 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.

13.11. Power factor disincentive:

13.11.1. 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.

13.12 Metering:

13.12.1. The Commission proposes that metering and communication shall be in accordance with the following Regulations/ Codes, in force and any specific orders of the Commission on metering and ABT whenever issued:

(a) Central Electricity Authority (Installation and Operation of Meters) Regulations 2006

(b) Tamil Nadu Electricity Distribution Code.

(c) Tamil Nadu Grid Code.

(d) Tamil Nadu Electricity Regulatory Commission's Grid Connectivity and Intra State Open Access Regulations, 2014.

13.13 Connectivity and Evacuation of energy:

13.13.1. 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.

13.14 Energy Purchase Agreement:

13.14.1. The format of the Energy Purchase Agreement (EPA) shall be evolved as specified in the Commission's Regulations in force. The agreement shall be valid for a minimum period of twenty years. The distribution licensee shall execute the Energy Purchase Agreement or convey its decision in line with this order within a month of receipt of application from the generator. The parties to the agreement may be given the option of exiting in case of violation with three months' notice to the other party.

13.15 Scheduling of power generation:

13.15.1. The generator shall follow the scheduling procedure as specified in Indian Electricity Grid Code and Tamil Nadu Electricity Grid Code and other Regulations, Codes and Orders of the Commission.

13.16 Tariff review period / Control period:

13.16.1. 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”

13.16.2. The Commission proposes that the control period of this Order shall be for two years from the date of issue of the Order and the tariff period is twenty years.

13.17. Parallel operation charges

13.17.1. MSW power generators who consume power captively in the same location but wish to avail Renewable Energy Certificate (REC) may opt for paralleling of their generators with the grid without actually wheeling their power. Such generators shall have to pay 50% of applicable parallel operation charges to the respective distribution licensee as specified in the relevant regulations.

14. Tariff:

With the adoption of above financial and operational parameters the tariff rate for the new plants works out as follows in respect of MSW based Projects.

Technology	Levellised Fixed Cost	Variable Cost	AD benefit	Applicable Tariff Rate
	(Rs./kWh)	(Rs./kWh)	(Rs./kWh)	(Rs./kWh)
MSW	5.79	0.00	0.45	5.34

PARAMETERS PROPOSED FOR DETERMINATION OF TARIFF FOR MUNICIPAL SOLID WASTE (based on Rankine cycle technology) – CONSULTATIVE PAPER

Sl. No.	PARAMETERS	VALUES
1.	Capital Cost	Rs.15.00 Crores/MW
2.	Life of plant and machinery	20 years
3.	Plant Load Factor (PLF)	75%
4.	Debt-Equity ratio	70:30
5.	Term of loan and interest	10 years with a moratorium period of one year. Interest at 12.76%
6.	Return on Equity	20% (pre-tax)
7.	Components of working capital	a) O & M expenses at one month and b) Two months Receivables
8.	Rate of interest for interest on working capital	13.26%
9(a)	O and M Expenses for plant and machinery on 85% of the capital cost	5% with an escalation of 5.72% from 2 nd year onwards.
9(b)	O & M Expenses for land and civil works on 15% of capital cost	0.90% with an escalation of 5.72% from 2 nd year onwards.
10.	Depreciation	4.5% SLM on 85% of the capital cost
11.	Auxiliary Consumption	15%

Sd/-
(T.Prabhakara Rao)

Sd/-
(G.Rajagopal)

Sd/-
(S.Akshaya Kumar)

(By Order of the Commission)

Sd/-
(S.Chinnarajalu)
Secretary,
Tamil Nadu Electricity
Regulatory Commission.

