



TAMIL NADU ELECTRICITY REGULATORY COMMISSION

Comprehensive Tariff Order for
Municipal Solid Waste (MSW) based
Power Plants

Order No.4 of 2019 dated 28-03-2019



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TAMIL NADU ELECTRICITY REGULATORY COMMISSION

“Comprehensive Tariff Order for Municipal Solid Waste (MSW) based Power Plants”

Order on power procurement by distribution licensee from Municipal Solid Waste (MSW) based power plants and allied issues relating to captive use and third party sale

1.0 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.

2.0 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.

3.0 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, the Commission issued its first generic tariff vide Order No. 3 of 2017, dated 28-03-2017, which is applicable from 01-04-2017, which is valid upto 31-03-2019.

4.0 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 dated 28-01-2016 of Government of India (Ministry of Power) relating to Renewable Energy Sources:

4.3.2 **Clause 4(e):** *Promote generation of electricity from Renewable Sources.*

4.3.3 **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.*

4.3.4 **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.”*

4.3.5 **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....”*

4.3.6 Clause 6.4 Renewable sources of energy generation including Co-generation from renewable energy sources:

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."

4.3.7 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....."

5.0 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.

6.0 Applicability of this Order:

6.1 This Order shall come into force from 01-04-2019. The tariff fixed in this Order shall be applicable to all Municipal Solid Waste (MSW) based power generating plants in the State of Tamil Nadu commissioned during the Control Period of this Order for sale of electricity to the distribution licensee.

6.2 This will apply to all MSW based power projects irrespective of the technology therein.

6.3 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.

6.4 The Ministry of Power, Government of India vide Gazette Notification dated 28-01-2016 issued the revised Tariff Policy wherein it was provided in Clause 6.4 (1) (ii) that the Distribution Licensees shall compulsorily procure 100% power produced from all the Waste-to-Energy plants in the State, in the ratio of their procurement of power from all sources including their own, at the tariff determined by the Appropriate Commission under Section 62 of the Act.

6.5 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, the Tamil Nadu Electricity Regulatory Commission determines the tariff and related dispensation for the purchase of power by the Distribution Licensees from municipal solid waste based power generating plants in the State.

7.0 Tariff Review Period/Control Period

7.1 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

7.2 Commission's View:

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"

7.3 The Commission decides that the control period of this Order shall be two years from 01-04-2019 and the Tariff period is twenty years.

8.0 Tariff Determination Process

8.1 The Commission has issued the Regulations on Power Procurement from New and Renewable Sources of Energy Regulation, 2008. An important provision of the Regulation which emphasizes 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. "*

9.0 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 decides 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.

10.2 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.

10.3 On 17-04-2017, the CERC had issued CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017 specifying the norms and terms and conditions for various non-conventional sources of energy.

11. Single Part Tariff

11.1 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC. M/s Avant-Garde Engineers & Consultants (P) Ltd. (Avant) suggested that auxiliary fuel (LDO or Biomass) to the extent of 5% of heat value to be considered to meet the requirement of SWM Rules 2016 with respect to the furnace temperature for 2.0 sec, under wide variation in fuel quality, during rainy

season, start up etc. In addition, they also suggested that the cost of chemical injection such as ammonia in the furnace, lime injection in the reactor and activation carbon are to be taken into account, which are variable depending upon the fuel quality.

11.2 Commission's View:

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. Other incidentals are built in the fixed cost. Hence, the Commission adopted single part levelled tariff for fixed cost.

12. Tariff Components:

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
13. Discount Factor

12.1. Capital Cost:

12.1.1 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 18-04-2017 has discussed in detail for fixing the Capital Cost for the municipal solid waste power projects.

"44.1. The Commission has analyzed the comments & observations submitted by the stakeholder. Since the Commission has decided to provide only project specific tariff for MSW/RDF, it does not find any material reason for providing capital cost for MSW/RDF based projects".

In view of the above, the CERC has not fixed the Capital Cost.

12.1.2 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 pre-processing facility for MSW.

12.1.3 The Commission in Order No.3 of 2017 dated 28-03-2017 had considered Rs.16.00 Crores / MW as the capital cost.

12.1.4 In the Consultative Paper Commission proposed to adopt a capital cost of Rs.17.00 Crores.

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

Electricity Regulatory Commission	Date of Order/ Regulation	Capital Cost
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	MSW - Rs.14.00 Crores/MW RDF – Rs.9.00 Crores/MW
MPERC	Order dated 29-06- 2016	Rs.15.00 Crores/MW (inclusive of Power Evacuation Cost)
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-	<u>Mass Incineration</u> Rs.16.00 Crores/MW

	2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>RDF based Incineration</u> Rs.9.00 Crores/MW
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	Rs.17.86 Crores/MW
JSERC	Order dated 21-06-2017	Rs.16.20 Crores/MW
MERC	Order dated 05-02-2018	Rs.17.97 Crores/MW
Karnataka	Order dated 19-09-2016	Rs.17.00 Crores/MW
Kerala	Order dated 06-03-2018	Rs.16.52 Crores/MW

12.1.5 Stakeholders' Comments:

TANGEDCO agreed for the capital cost of Rs.17.00 Cr/MW proposed in the Consultative Paper. Avant suggested a capital cost of Rs.19.00 Crores/MW including pre-processing.

12.1.6 Commission's View:

In the present order, after considering the Stakeholders' comments and the capital cost adopted by other Commissions, the Commission decides to adopt a capital cost of Rs.17.00 Crores / MW for the plants to be commissioned during this control period.

12.1.7 This capital cost is inclusive of equipments/machineries required for handling, pre-processing and segregation of Municipal Solid Waste, Processing of the segregated waste for conversion of fuel, Rankine cycle based power generation plant and disposal of residual waste and other incidentals.

12.2. Life of Plant and Machinery

12.2.1 The Commission had adopted 20 years as life of the Plant and Machinery in its Order No.3 of 2017 dated 28-03-2017.

12.2.2 In the Consultative Paper Commission proposed to adopt 20 years as useful life of Plant and Machinery.

12.2.3 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
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	20 years
MPERC	Order dated 29-06- 2016	20 years
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	20 years
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	25 years
JSERC	Order dated 21-06-2017	20 years
MERC	Order dated 05-02-2018	20 years
Karnataka	Order dated 19-09-2016	20 years
Kerala	Order dated 06-03-2018	20 years

12.2.4 **Stakeholders' Comments:**

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

12.2.5 **Commission's View:**

As most of the Commissions' have adopted 20 years as life of the Project based on MSW, Commission accepts that the useful life of Plant and Machinery for MSW based power projects as 20 years.

12.3. PLANT LOAD FACTOR (PLF):

12.3.1 The Commission had adopted a normative PLF level of 75% for MSW based projects in its Order No.3 of 2017 dated 28-03-2017.

12.3.2 In the Consultative Paper Commission proposed to adopt a normative PLF level of 75% for MSW based projects and 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 Biomass based power projects and for Bagasse based co-generation plants.

12.3.3 The Plant Load Factor adopted /proposed by other commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Plant Load Factor
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	<u>RDF</u> I Year : 65% II Year onwards : 80% <u>MSW</u> I Year : 65% II Year onwards : 75%
MPERC	Order dated 29-06-2016	1 st Year - 65% 2 nd Year onwards - 75%
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>Mass Incineration</u> 1 st year - 65% and 2 nd year onwards - 75% <u>RDF based Incineration</u> 1 st year - 65% and 2 nd year onwards - 80%
BERC	Order dated 24-9-2015 in Case No.22/2015 (MSW Project)	a)During 1 st year after stabilization 60% and b) 2 nd year onwards 85.62%
JSERC	Order dated 21-06-2017	1 st Year - 65% 2 nd Year onwards - 75%
MERC	Order dated 05-02-2018	1 st Year - 65% 2 nd Year onwards - 80%
Karnataka	Order dated 19-09-2016	1 st Year - 65% 2 nd Year onwards - 75%
Kerala	Order dated 06-03-2018	1 st Year - 65% 2 nd Year onwards - 75%

12.3.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC. Avant suggested to consider power generation also alongwith PLF for WTE plants, since the PLF doesn't reflect the actual generation.

12.3.5 Commission's View:

In respect of PLF Commission decides 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 allows an incentive of 25 paise per unit to MSW based power plants as being adopted in practice in respect of Biomass plants and for Bagasse based co-generation plants.

12.4. Debt-Equity ratio

12.4.1 The Commission had adopted a Debt-Equity ratio of 70:30 in its Order No.3 of 2017 dated 28-03-2017.

12.4.2 In the Consultative Paper Commission proposed a Debt-Equity ratio of 70:30.

12.4.3 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

12.4.4 Commission's View:

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. All the stakeholders have agreed for this Debt Equity ratio. Hence, in respect of municipal solid waste plants also, Commission decides to adopt a Debt-Equity ratio of 70:30.

12.5. Term of loan and Interest:

12.5.1 The Commission had adopted a term of loan as 10 (ten) years with a moratorium period of one year for the municipal solid waste projects and the rate of interest at 11.00% in its Order No.3 of 2017 dated 28-03-2017.

12.5.2 In the Consultative Paper Commission proposed a term of loan as 10 (ten) years with a moratorium period of one year for the municipal solid waste projects. Further, with respect to rate of interest on debt, proposed a rate of interest at 10.55% p.a.

12.5.3 The rate of Interest on Debt adopted/ proposed by other Commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Interest on Debt
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	12.00%
MPERC	Order dated 29-06- 2016	12.00%
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	11.80%
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	13.00%
JSERC	Order dated 21-06-2017	12.30%
MERC	Order dated 05-02-2018	10.99%
Karnataka	Order dated 19-09-2016	12.00%
Kerala	Order dated 06-03-2018	9.90%

12.5.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC in respect of the term of loan and as regards the rate of interest, it has suggested that the term loan which is a component of Capital Cost may be adopted as MCLR plus 150 Basis points which works out to 8.55% + 150 basis points = 10.05%.

12.5.5 Commission's View:

CERC in its CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017 dated 17-04-2017, has proposed normative interest rate of two hundred (200) basis points above

the average State Bank of India MCLR (One year Tenor) prevalent during the last available six months.

12.5.6 The prevalent lending rate being the marginal cost of funds based lending rate at which the bank prices all its loans, the Commission proposes the latest MCLR rate of 1 year of 8.55% notified by the State Bank of India in March 2019 plus 200 points which is 10.55% p.a.

12.5.7 After considering all the above, Commission decides to adopt a term of 10 years with 1 year moratorium as adopted by the Commission in its previous orders on Wind, Bagasse, Biomass power and Solar and adopt the rate of interest on debt as 10.55% p.a.

12.6. Return on Equity:

12.6.1 The Commission had adopted the Return on Equity as 20% (pre-tax) in its Order No.3 of 2017 dated 28-03-2017.

12.6.2 In the Consultative Paper, Commission proposed a Return on Equity of 17.60% (pre-tax) to the municipal solid waste power plants.

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

Electricity Regulatory Commission	Date of Order/ Regulation	Return on Equity
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	16% (Post Tax)
MPERC	Order dated 29-06-2016	20% (Pre Tax)
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	14%
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	First 10 years : 20% 11 th year onwards : 24%
JSERC	Order dated 21-06-2017	First 10 years : 20% 11 th year onwards :

		24%
MERC	Order dated 05-02-2018	First 10 years : 20.34% (grossed up for I.Tax) 10 th year onwards : 24.47% (grossed up for I.Tax)
Karnataka	Order dated 19-09-2016	16%
Kerala	Order dated 06-03-2018	14% (Pre Tax)

12.6.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

12.6.5 Commission's View:

The Tariff Regulations of the Commission stipulates 14% (post tax) Return on Equity for conventional fuel based generating stations.

12.6.6 Commission has adopted a RoE of 17.60% (pre-tax) per annum for Solar based power plants. Hence, Commission decides to adopt the same to the municipal solid waste power plants also.

12.7. Components of Working Capital:

12.7.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the working capital is based on the following norms:

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

12.7.2 In the Consultative Paper, Commission proposed to continue the above norms.

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

Electricity Regulatory Commission	Date of Order/ Regulation	Interest on Working Capital
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	a) O & M Expenses for one month. b) Maintenance Spares @ 15% of O & M c) Two months Receivables for sale of electricity calculated on target PLF d) Fuel cost for 4 months equivalent to normative PLF (only for RDF)
MPERC	Order dated 29-06-2016	a) O & M expenses for one month. b) Receivables equivalent to 2 months of energy charges based on normative CUF. c) Maintenance spares @ 15% of O & M expenses.
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>RDF</u> a) Fuel Stock for 30 days b) O & M expenses for one month c) Receivables of one month charges for sale of electricity d) Maintenance Spares @ 1% of the capital cost escalated at 5% p.a. <u>Mass Incineration projects</u> a) O & M expenses for one month b) Receivables of one month charges for sale of electricity c) Maintenance Spares @ 1% of the capital cost escalated at 5% p.a.
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	a) O & M expenses @ 1 month b) Two month receivables and c) Maintenance Spares @ 15% of O&M
JSERC	Order dated 21-06-2017	a) O & M expenses for one month; b) Receivables Two months c) Maintenance spares @ 15% of O & M expenses.
MERC	Order dated 05-02-2018	a) O & M expenses for one month; b) Receivables Two months c) Maintenance spares @ 15% of O & M expenses.
Karnataka	Order dated 19-09-2016	Receivables Two months
Kerala	Order dated 06-03-2018	a) O & M expenses for one month; b) Receivables Two months c) Maintenance spares @ 15% of O & M expenses.

12.7.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC. Avant suggested to consider minimum 2 months towards the O&M expense for the working capital.

12.7.5 Commission's View:

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

12.8. Rate of Interest on Working Capital:

12.8.1 The Commission had adopted the Rate of Interest on Working Capital as 11.50% in its Order No.3 of 2017 dated 28-03-2017.

12.8.2 In the Consultative Paper the Commission proposed 11.55% as the rate of interest for calculating Interest on Working Capital.

12.8.3 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
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	12.50%
MPERC	Order dated 29-06- 2016	12.50%
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	11.80%
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	13.50%
JSERC	Order dated 21-06-2017	12.80%
MERC	Order dated 05-02-2018	11.49%
Karnataka	Order dated 19-09-2016	12.50%
Kerala	Order dated 06-03-2018	10.90%

12.8.4 Stakeholders' Comments:

TANGEDCO suggested that the rate of interest for the Working Capital which is a component of Capital cost may be adopted as MCLR plus 200 basis points which works out to 8.55% + 200 basis points = 10.55%. Accordingly, the preferential tariff rate now proposed in the consultative paper may get altered.

12.8.5 Commission's View:

The prevalent lending rate being the marginal cost of funds based lending rate at which the bank prices all its loans, Commission decides to adopt the latest MCLR rate of 1 year of 8.55% notified by the State Bank of India in March 2019 plus 300 points which is 11.55% p.a. Hence, Commission decides to adopt 11.55% p.a. for calculating the Interest on Working Capital.

12.9. Operation and Maintenance Expenses:

12.9.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission allowed Operation & Maintenance Expenses of 5.50% 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%.

12.9.2 In the Consultative Paper the Commission proposed to continue the above norms.

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

Electricity Regulatory Commission	Date of Order/ Regulation	O & M Expenses
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	6% of CAPEX with an escalation of 5.72%.
MPERC	Order dated 29-06-2016	5% of the capital cost with an escalation of 5.72%.
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>Mass Incineration</u> 6% of the capital cost with an escalation of 5.72%. <u>RDF based Incineration</u> 5% of the capital cost with an escalation of 5.72%.
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	7.19% of the capital cost with an escalation of 5.72%.
JSERC	Order dated 21-06-2017	Rs.90 lakhs/MW with an annual escalation of 5.72%
MERC	Order dated 05-02-2018	8.87% of the capital cost with an escalation of 5.27%.
Karnataka	Order dated 19-09-2016	6% of the capital cost with an escalation of 5.72%.
Kerala	Order dated 06-03-2018	6% of the capital cost with an escalation of 5.72%.

12.9.4 Stakeholders' Comments:

TANGEDCO has suggested that the Operation & Maintenance Cost for plant and machinery escalation rate of 5% may be adopted and in respect of land and civil works TANGEDCO suggested to adopt the views of Hon'ble TNERC. Avant has suggested to consider civil cost as 25% of the capital cost and Operation & Maintenance expense at 7.5% of the capital cost.

12.9.5 Commission's View:

The Commission has noted that due to more abrasive nature of Municipal Solid Waste, wear and tear of the boiler in such projects shall be more. Also, due to more protective equipments, the O & M cost shall increase to

some extent. Therefore, Commission decides to allow O & M expense of 5.5% 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%.

12.10. Depreciation:

12.10.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission allowed 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.

12.10.2 In the Consultative Paper Commission proposed to continue the same.

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

Electricity Regulatory Commission	Date of Order/ Regulation	Depreciation
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	Depreciation at 5.83% for 12 years and at 2.50% for the following 8 years.
MPERC	Order dated 29-06-2016	7% p.a. for the first 10 years and balance 20% in the next 10 years.
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	a) 7% (upto 10 years) b) 2% (11 to 20 years)

BERC	Order dated 24-9-2015 in Case No.22/2015 (MSW Project)	a)For 1 st 10 years @ 7% p.a. and b)From 11 th year onwards @ 1.33% p.a.
JSERC	Order dated 21-06-2017	a)For 1 st 12 years @ 5.83% b)From 13 th year onwards @ 2.50%
MERC	Order dated 05-02-2018	a) Year 1 to 12 – 5.83% and b) 2.50% for balance useful life.
Karnataka	Order dated 19-09-2016	Depreciation at 5.83% for 12 years and at 2.50% for the following 8 years.
Kerala	Order dated 06-03-2018	a)For 1 st 12 years @ 5.28% b)From 13 th year onwards @ 3.05%

12.10.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

12.10.5 Commission's View:

Commission decides 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.

12.11. Auxiliary Consumption

12.11.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission allowed Auxiliary Consumption of 15%.

12.11.2 In the Consultative Paper Commission proposed for continuation of the same.

12.11.3 The Auxiliary Consumption adopted by other Commissions is as follows:

Electricity Regulatory Commission	Date of Order/ Regulation	Auxiliary Consumption
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	<u>RDF</u> 11% <u>MSW</u> 12%
MPERC	Order dated 29-06- 2016	15%
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>Mass Incineration</u> 16% <u>RDF based Incineration</u> 12%
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	16%
JSERC	Order dated 21-06-2017	15%
MERC	Order dated 05-02-2018	17.17%
Karnataka	Order dated 19-09-2016	12% for the integrated plant and power plant
Kerala	Order dated 06-03-2018	15%

12.11.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC. Avant suggested 22% taking into account the processing equipments, running equipment during maintenance, leacahte pumping, part load operation (on power side) due to low calorific value, pollution control equipments, odour control equipments, two boiler operation, etc.

12.11.5 Commission's View:

The Commission decides to adopt an Auxiliary Consumption of 15%.

12.12. Fuel Cost:

12.12.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission has not allowed any fuel cost since it is available at free of cost to the generator.

12.12.2 In the Consultative Paper Commission proposed for continuation of the same.

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

Electricity Regulatory Commission	Date of Order/ Regulation	Fuel Cost (in Rs.)
Telangana	Order dated 13-06-2016 in O.P.No.18 of 2016 (RDF/MSW)	<u>RDF</u> : Rs.1800/tonne <u>MSW</u> :Nil
MPERC	Order dated 29-06- 2016	Nil
GERC	Order No.4 of 2016 (MSW Project) dated 10-11-2016 and extended by way of Suo Motu Petition No.1654/2017 dated 23-10-2017	<u>RDF</u> : Rs.1600/MT <u>MSW</u> :Nil
BERC	Order dated 24-9-2015 in Case No.22/ 2015 (MSW Project)	Nil
JSERC	Order dated 21-06-2017	Nil
MERC	Order dated 05-02-2018	Nil
Karnataka	Order dated 19-09-2016	
Kerala	Order dated 06-03-2018	

12.12.4 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

12.12.5 Commission's View:

The Commission decides not to allow any fuel cost for MSW based projects because the cost of fuel preparation is included in the overall Capital Cost of the Project that will address both Capacity Charges and Operation and Maintenance Cost of Fuel preparation and other incidentals are included in the fixed cost. Hence, the related norms like Station Heat Rate, Fuel cost escalation, Gross Calorific Value, etc. are not applicable herein.

12.13 Discount Factor:

12.13.1. The Commission adopts a discount factor of 0.095300 equal to the post tax weighted average cost of the capital on the basis of normative debt: equity ratio (70:30) for the purpose of levellised tariff computation.

12.14 Tariff Determinants

The financial and operational parameters in respect of Municipal Solid Waste to energy projects adopted in the Order are tabulated below:

Sl. No.	Tariff Components	VALUES
1.	Capital Cost	Rs.17.00 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 10.55%
6.	Return on Equity	17.60% (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	11.55%
9(a)	O and M Expenses for plant and machinery on 85% of the capital cost	5.5% 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%
12.	Discount rate	0.095300
13.	Levellised Tariff without AD	Rs.6.28/unit
14.	Levellised Tariff with AD	Rs.5.90/unit

13. Tariff

13.1 Stakeholders' Comments:

Avant suggested that considering the support fuel, power generation & PLF, auxiliary power consumption, plant configuration, maintenance cost, worldwide practices, etc. the tariff requires review.

13.2 Commission's View:

MSW power tariff is computed with reference to the determinants listed above. The tariff works out to Rs.6.28/unit for projects without Accelerated Depreciation (AD) benefit. The AD benefit component of the tariff is Rs.0.38/unit. The tariff for the generators availing AD benefit will be the tariff arrived at after deduction of AD benefit from the tariff as determined above. The respective working sheets are enclosed in Annexure III.

14 . Related issues:

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 power plants irrespective of their year of installation. These are discussed in detail in the following paragraphs.

14.1. Transmission and Wheeling Charges and Scheduling and System Operation Charges:

14.1.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission adopted 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.

14.1.2 In the Consultative Paper Commission proposed to adopt 60% in each of the transmission charges, wheeling charges and Scheduling and System Operation charges as applicable to the conventional power to the MSW plants.

14.1.3 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.1.4 Commission's View:

Transmission, Wheeling and Scheduling & System Operation charges are generally regulated by the Commission's Tariff regulations, Tariff Orders, Open Access Regulations and Commission's order on open access charges issued from time to time.

14.1.5 However, as a promotional measure, under section 86 (1)(e) of the Electricity Act, 2003 the Commission decides to adopt 60% in each of the transmission charges, wheeling charges and Scheduling and System Operation charges as applicable to the conventional power to the MSW plants.

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

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

14.1.8 Apart from these charges, the MSW Power Generators shall have to bear the actual line losses in kind as specified in the respective Order of the Commission and as amended from time to time for the captive use and third party sale.

14.2. Cross Subsidy Surcharge (CSS):

14.2.1 As per the last Tariff Order No.3 of 2017 dated 28-03-2017, the Commission adopted 50% of the Cross Subsidy Surcharge applicable to conventional power to the MSW plants.

14.2.2 In the Consultative Paper Commission proposed to adopt 50% of the Cross Subsidy Surcharge applicable to conventional power to the MSW plants.

14.2.3 **Stakeholders' Comments:**

TANGEDCO suggested that the cross subsidy charge should be recovered at full rate. If at all any concession to be provided to MSW generator, it may be at par with solar power generator.

14.2.4 **Commission's View:**

The Commission decides to adopt 60% of the charges applicable to conventional power.

14.3. CDM Benefits:

14.3.1 **Stakeholders' Comments:**

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.3.2 **Commission's View:**

In respect of MSW based power projects, Commission decides to continue the sharing of CDM benefits as recommended by 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.

14.4. Reactive Power Charges:

14.4.1 **Stakeholders' Comments:**

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.4.2 **Commission's View:**

Commission decides to adopt the reactive power charges for the MSW based Power Plants as specified in its Order on Open Access charges issued from time to time.

14.5. Grid Availability Charges:

14.5.1. In respect of Grid Availability Charges, Commission decides that the following charges shall be regulated as follows:

a. Startup Charges –

a.1 Stakeholders' Comments:

TANGEDCO has suggested that if the drawl of the energy is more than the generation in a billing month, the energy so drawn may be billed at HT Industrial Tariff-I until the implementation of DSM regulations.

a.2 Commission's View:

The Startup charges shall be as per the Commission's Grid Connectivity and Intra-State Open Access Regulations, 2014 in force and as amended from time to time.

b. Standby Charges –

b.1 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

b.2 Commission's View:

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 and as amended from time to time.

14.6. Adjustment of energy generated:

14.6.1 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.6.2 **Commission's View:** Commission decides that the Adjustment of energy shall be as per the Commission's Open Access Regulations in force and as amended from time to time.

14.7. Energy Wheeling Agreement and Fees:

14.7.1 Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.7.2 Commission's View:

The Commission decides to adopt that 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. TNERC's Grid Connectivity and Intra State Open Access Regulations, 2014.
2. Power Procurement from New and Renewable Sources of Energy Regulations, 2008.

14.8. Billing and Payment:

14.8.1 Stakeholders' Comments:

TANGEDCO suggested that for any payment delayed beyond the 60 days period, the interest rate @ 0.90% p.m. may be adopted which is corresponding to the rate adopted for interest on working capital. A prompt payment rebate of 1% may be considered if payment is made within 30 days from the date of receipt of invoice in complete shape.

14.8.2 Commission's View:

The Commission decides to adopt the following in respect of Billing and payment:

i) When a MSW power generator sells power to the distribution licensee, the generator shall raise the bill every month for the net energy sold after deducting the charges for power drawn from distribution licensee, reactive power charges etc. The distribution licensee shall make payment to the generator within 60 days of receipt of the bill. Any delayed payment beyond 60 days is liable for interest at the rate of 1% per month.

14.9. Security Deposit:

14.9.1. As regards the security deposit to be paid by captive/third party user, the Commission decides 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.

14.10. Power factor disincentive:

14.10.1. 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.

14.11. Metering:

14.11.1. The Commission decides that metering and communication shall be in accordance with the following Regulations/ Codes, in force and any specific orders of the Commission on metering 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.

14.12. Connectivity and Evacuation of Energy:

14.12.1. 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.

14.13. Energy Purchase Agreement:

14.13.1 Stakeholders' Comments:

TANGEDCO suggested that the parties to the Energy Purchase Agreement may be given the option of exiting in case of violation with three months' notice to the other party. The above clause pertaining to exit option may be deleted as there is no such provision available in any other tariff orders.

14.13.2 Commission's View:

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.

14.14. Scheduling of Power:

14.14.1. Stakeholders' Comments:

Avant suggested that scheduling of MSW based WTE plant is possible, but difficult to achieve due to uncertainties and seasonal changes and hence cannot be treated on par with conventional power plants in all aspects.

14.14.2 Commission's View:

Commission decides that 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.

14.15. Parallel Operation Charges

14.15.1. Stakeholders' Comments:

TANGEDCO suggested to adopt the views of Hon'ble TNERC.

14.15.2 Commission's View:

The Commission decides that MSW power generators who opt for parallel operation with the grid shall pay 60% of applicable parallel operation charges to the respective distribution licensee as specified in the relevant regulations/orders of the Commission.

15. Other Comments of Stakeholders':

15.1 The minimum capacity of the Municipal Solid Waste (MSW) based power Generating Plants for which the tariff order is applicable may also be incorporated in the tariff order to be issued.

Commission's View:

Considering the projects available in other States viz. Kerala, Maharashtra, Bihar etc., the Commission considers that the project capacity shall be of 1 MW and above.

16. Acknowledgement:

16.1. The Commission would like to place on record and acknowledge with thanks, the contributions by the officers and staff of the Commission and the valuable guidance provided by the experts and members of the State Advisory Committee. The Commission also appreciates the pain taken by the stakeholders in offering their suggestions. The Commission

also recognizes the input of the TANGEDCO which have been helpful to the Commission in finalizing this Tariff Order.

-sd-
(Dr. T. Prabhakara Rao)
Member

-sd-
(S. Akshaya Kumar)
Chairman

(By Order of the Commission)

-sd-
(S. Chinnarajalu)
Secretary

ANNEXURE-I**List of SAC members who participated in the 33rd SAC Meeting held on 05-03-2019**

Sl. No.	Name of the Member
1	Thiru S. Akshayakumar, Chairman, TNERC
2	Dr. T. Prabhakara Rao, I.A.S., (R) Member, TNERC
3	Thiru. Md.Nasimuddin, I.A.S., Principal Secretary to Government, Energy Department, GoTN
4	Thiru. Vikaram Kapur, I.A.S., Chairman & Managing Director, TNEB & TANGEDCO, Chairman & Managing Director (Addl Charge) Tamil Nadu Energy Development Agency
5	Representative of Thiru. M. Ponnusamy, Chairman, Confederation of Indian Industry (Tamil Nadu)
6	Thiru. K.V.V. Sathyanarayana Chief Electrical Engineer, Southern Railways.
7	Thiru. G.S. Rajamani, Bengaluru.
8	Thiru. K. Alagu, Tamil Nadu Chamber of Commerce and Industry, Madurai.
9	Thiru. K. Kathirmathiyon, Secretary, Coimbatore Consumer Cause, Coimbatore.
10	Dr. A.S. Kandasamy, Athapur (Post), Rasipuram Taluk, Namakkal.
11	Dr. K. Selvarajan, Singanallur, Coimbatore.
12	Thiru. T. Vijayarangan, Secretary, Anna Labour Union, Chennai.
13	Thiru. M.R. Krishnan, Deputy Director, Consumer Association of India, Chennai.

ANNEXURE-II

List of Stakeholders who submitted their written comments

Sl. No.	Name of the Stakeholder
1	TANGEDCO
2	Avant-Garde Engineers and Consultants (P) Ltd.

ANNEXURE-III**Working sheet for tariff computation for Municipal Solid Waste (MSW) based Power Plants**

Sl. No.	Tariff Components	VALUES
1.	Capital Cost	Rs.17.00 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 10.55%
6.	Return on Equity	17.60% (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	11.55%
9(a)	O and M Expenses for plant and machinery on 85% of the capital cost	5.5% 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%
12.	Discount rate	0.095300
13.	Levellised Tariff without AD	Rs.6.28/unit
14.	Levellised Tariff with AD	Rs.5.90/unit

Tariff Details																				
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Gross Generation	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000	6570000
Auxiliary	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Net Generation	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500
Components of W.Cap.																				
2 months Receivables	6166829	6247078	6118569	5994912	5876386	5763284	5655916	5554610	5459713	5371591	5291096	5217736	5365733	5522194	5687606	5862479	6047355	6242805	6449436	6667886
1 months O & M	681417	720394	761600	805164	851219	899909	951384	1005803	1063335	1124157	1188684	1256677	1328559	1404552	1484893	1569829	1659623	1754553	1854914	1961015
Interest on Debt	12554500	12554500	11299050	10043600	8788150	7532700	6277250	5021800	3766350	2510900	1255450									
ROE	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000
Depreciation	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500	6502500
O & M Expenses	8177000	8644724	9139203	9661965	10214629	10798906	11416604	12069633.4	12760016.43	13489889	14264209	15080122	15942705	16854627	17818712	18837942	19915473	21054638	22258963	23532176
Interest on Working Cap.	790972	804743	794660	785409	777038	769599	763143	757728	753412	750259	748415	747795	773191	800039	828424	858432	890156	923695	959152	996638
Total fixed cost	37000972	37482467	36711412	35969474	35258318	34579705	33935497	33327661	32758278	32229548	31746574	31306416	32194395	33133167	34125636	35174874	36284129	37456833	38696615	40007314
Tariff	6.63	6.71	6.57	6.44	6.31	6.19	6.08	5.97	5.87	5.77	5.68	5.61	5.76	5.93	6.11	6.30	6.50	6.71	6.93	7.16
Discount factor	1.00	0.91	0.83	0.76	0.69	0.63	0.58	0.53	0.48	0.44	0.40	0.37	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.18
Present Value	6.63	6.13	5.48	4.90	4.39	3.93	3.52	3.16	2.83	2.54	2.29	2.06	1.93	1.82	1.71	1.61	1.51	1.43	1.35	1.27
Levellized Tariff (Rs.)	6.28																			

Determination of Accelerated Depreciation benefit

Depreciation amount 90%
 Book depreciation rate 5.28%
 Tax depreciation rate 40%
 Income Tax (Normal rate) 27.82%

Capital Cost **170000000**

YEARS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Book depreciation rate	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%		
Bk Depn in lakhs	4488000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	8976000	4896000	
Accelerated Depreciation																				
Opening	100%	70%	35%	21.0%	12.60%	7.56%	4.54%	2.73%	1.64%	0.99%	0.60%	0.36%	0.22%	0.13%	0.08%	0.05%	0.03%	0.02%	0.01%	0.01%
Allowed	30.0%	35.00%	14.00%	8.40%	5.04%	3.02%	1.81%	1.09%	0.65%	0.39%	0.24%	0.14%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%
Closing	70%	35%	21%	12.60%	7.56%	4.54%	2.73%	1.64%	0.99%	0.60%	0.36%	0.22%	0.13%	0.08%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%
AD	51000000	59500000	23800000	14280000	8568000	5134000	3077000	1853000	1105000	663000	408000	244800	146880	88128	52877	31726	19036	11421	6853	4112
Net Depn benefit	46512000	50524000	14824000	5304000	-408000	-3842000	-5899000	-7123000	-7871000	-8313000	-8568000	-8731200	-8829120	-8887872	-8923123	-8944274	8956964	-4884579	6852.833	4111.7
Tax benefit	12939638	14055777	4124037	1475573	-113506	-1068844	-1641102	-1981618.6	2189712.2	-2312677	-2383618	-2429020	-2456261	-2472606	-2488297	-2488297	2491827	-1358890	1906.458	1143.875
Energy generation	2792250	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500	5584500
Discount factor	1.00	0.91	0.83	0.76	0.69	0.63	0.58	0.53	0.48	0.44	0.40	0.37	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.18
Av DCF	1	0.96	0.87	0.80	0.73	0.66	0.61	0.55	0.51	0.46	0.42	0.38	0.35	0.32	0.29	0.27	0.24	0.22	0.20	0.19
DCF En. Gen.	2792250	5341552	4876793	4452473	4065071	3711377	3388457	3093634	2824462	2578711	2354342	2149496	1962472	1791721	1635827	1493496	1363550	1244910	1136593	1037700
Tax benefit with DCF	12939638	13444293	3601410	1176461	-82623	-710338	-995756.6	-1097753	-1107487	-1067907	-1004898	-934939	-863165	-793306	-727155	-665460	-608422	-302927	388.0145	212.5524
AD benefit	0.38																			
Levellised tariff with AD benefit (in Rs.)	5.90																			