

## RAJASTHAN ELECTRICITY REGULATORY COMMISSION JAIPUR

In the matter of application under Section 62 and Section 86 of the Electricity Act, 2003 requesting Commission to determine the project specific tariff under the provisions of said Regulations with respect to the upcoming Municipal Solid Waste to Energy plants at Langariawas, Jaipur and Keru dumpsite, Jodhpur of the Petitioners.

### Coram :

Shri Vishvanath Hiremath, Chairman  
Shri Rajendra Prasad Barwar, Member  
Shri Suresh Chandra Dinkar, Member

- Petitioner(s):
- (1) M/s Jindal Urban Waste Management (Jaipur) Ltd, Jindal ITF Centre, 28, Shivaji Marg, New Delhi-110015
  - (2) M/s Jindal Urban Waste Management (Jodhpur) Ltd, Jindal ITF Centre, 28, Shivaji Marg, New Delhi-110015
- Respondent(s):
- (1) The Managing Director, Jaipur Vidyut Vitran Nigam Limited, Vidyut Bhawan, Janpath, Jaipur, Rajasthan.
  - (2) The Managing Director, Jodhpur Vidyut Vitran Nigam Limited, New Power House, Industrial Area, Jodhpur, Rajasthan.
  - (3) The Principal Secretary, Local Self-Government, Government of Rajasthan G-3, Rajmahal Residential Area, C-Scheme, Near Civil Line Phatak, Jaipur, Rajasthan.
  - (4) The Commissioner, Nagar Nigam Jaipur. Pandit Dindayal Uppadhyay Bhawan, Lalkothi, Tonk Road, Jaipur, Rajasthan.
  - (5) The Commissioner, Jodhpur Nagar Nigam, Polytechnic College Campus, Residency Road, Jodhpur, Rajasthan.

**Date of hearing(s):** 9.11.2017, 30.11.2017, 21.12.2017, 16.01.2018, 15.02.2018, 22.02.2018, 08.03.2018 and 22.03.2018.

**Present** : (1) Sh.Pawan Upadhyay, Advocate for Petitioners.  
(2) Sh. Bipin Gupta, Advocate for Discoms.

(3) Sh. Hemang Gangjeya, Advocate for Nagar Nigam.

**Date of Order:**

**18.05.2018**

**ORDER**

1. M/s Jindal Urban Waste Management (Jaipur) Ltd ['JUWM (Jaipur)'] is setting up a 12 MW Municipal Waste to Energy (WtE) plant using Refused Derived Fuel (RDF) as a fuel at Langariawas, Jaipur. The Nagar Nigam, Jaipur ('NNJ') has executed a concession agreement with JUWM (Jaipur) on 19.04.2017 to establish 700 Tons per Day (TPD) MSW processing plant and to generate electricity. Similarly, M/s Jindal Urban Waste Management (Jodhpur) Ltd., ['JUWM (Jodhpur)'] is setting up a 6 MW Municipal WtE plant using RDF as a fuel at Keru dumpsite, Jodhpur. The Jodhpur Nagar Nigam ('JNN') has executed a concession agreement with JITF Urban Infrastructure Ltd, on 25.01.2017 to establish 400 TPD MSW processing plant and to generate electricity.
2. Both M/s JUWM (Jaipur) and M/s JUWM (Jodhpur) intend to sell electricity generated from their proposed power plants to Jaipur Vidyut Vitran Nigam Ltd ('JVVNL') and Jodhpur Vidyut Vitran Nigam Ltd., ('JdVVNL') respectively. They have filed petitions on 14.06.2017 and 30.06.2017 respectively for determination of project specific tariff under Section 62 and Section 86 of the Electricity Act, 2003 in respect of their respective upcoming MSW RDF based power plants.
3. Both the petitions have been filed for determination of project specific tariff for sale of electricity generated from their respective RDF based Municipal Solid Waste based power plants to be set up at Jaipur and Jodhpur to the concerned Distribution Licensees of the State, therefore, have been dealt with in this common order.
4. Along with both the petitions, the details of cost and other particulars related to their respective projects considered in their respective tariff proposals. Commission on dated 19.07.2017 and 27.07.2017 communicated several data gaps/deficiencies noticed in their petitions to the respective petitioners.

Among other things, the petitioners were also directed to intimate the tariff requested in their petitions along with tariff calculations. The replies were received on 8.08.2017.

5. The petitioners were directed to publish public notices in the newspapers as required under Section 64(2) of the Electricity Act, 2003.

6. The petitioners published the public notices in the newspapers as follows:

(A) JUWM (Jaipur):

**Table-1: List of newspapers and date of publication**

Newspaper	Date of publication
Naya India (Hindi)	17.09.2017
Nafa Nuksan (Hindi)	17.09.2017
Indian Express (English)	19.09.2017

The tariff application was also placed on the Petitioner's website as well as on the Commission's website. The last date of receiving comments/suggestions was 8.10.2017.

(B) JUWM (Jodhpur):

**Table-2: List of newspapers and date of publication**

Newspaper	Date of publication
Nafa Nuksan (Hindi)	17.09.2017
Dainik Navjyoti (Hindi)	17.09.2017
Indian Express (English)	19.09.2017

The tariff application was also placed on the Petitioner's website as well as on the Commission's website. The last date of receiving comments/suggestions was 8.10.2017.

### **Background:**

7. Before proceeding further it would be appropriate to go through the background leading to the filing of the present petitions.

8. Municipal Corporations, namely - Nagar Nigam, Jaipur ('NNJ') and Jodhpur Nagar Nigam ('JNN') had invited single stage two envelope bids in accordance with RTPP Act, 2012 & Rules 2013 on dated 01.02.2016 and 5.07.2016 respectively for setting up of MSW processing plants adopting WtE

technology with sanitary landfill at Langariawas, Jaipur and Keru dumpsite, Jodhpur respectively under the guidelines of Swachh Bharat Mission (Urban) ('SBM') on Design, Build, Finance, Operate and Transfer ('DBFOT') basis.

9. The bidding process was carried out by procurement committees of the respective Municipal Corporations on tipping fee/ royalty model with given CERC Tariff of ₹ 7.90 per unit for RDF based Waste to Energy (WtE) plants and ₹ 7.04 per unit for mass incineration based WtE plants with Viability Gap Funding ('VGF') of ₹ 25 Crs and ₹ 10 Crs for projects to be set up at Jaipur and Jodhpur respectively. As per the conditions of RFP the successful bidders shall propose WtE system for processing and disposal of MSW in line with the MSW (Management & Handling) Rules, 2000 and subsequent amendments thereof.
10. The promoter company JITF Urban Infrastructure Limited ('JITF') of both the petitioners participated in the bidding processes and was selected as lowest bidder. JITF quoted a rate agreeing to pay royalty of ₹ 66 per ton and ₹ 126 per ton to Nagar Nigam Jaipur and Jodhpur Nagar Nigam respectively. The bids were accepted by Directorate of Local Bodies, Rajasthan on 23.08.2016 and 19.12.2016 respectively. Subsequently, Letters of Acceptances (LOAs) were issued to it on 04.11.2016 and 11.01.2017 by Nagar Nigam, Jaipur and Jodhpur Nagar Nigam respectively.
11. Subsequent to the receipt of LOA to set up the plants at Jaipur and Jodhpur, the promoter company JITF formed Special Purpose Vehicles (SPVs) namely- M/s JITF Urban Waste Management (Jaipur) Ltd ['JUWM (Jaipur)'] and M/s JITF Urban Waste Management (Jodhpur) Ltd ['JUWM (Jodhpur)'] respectively incorporated on 10.10.2016 and 13.02.2017 under the Companies Act, 2013 with integrated solid waste management as one of their main objectives. Now they have filed the instant petitions before the Commission for determination of project specific tariff under Section 62 and Section 86 of the Electricity Act, 2003.
12. The petitioners in their petitions have made the following submissions for consideration:

- (1) Municipal Corporations in various cities usually collect the garbage, transport it to the dump yards and dispose it off as non-sanitary land fill or open ground dumping. In addition, the non-sanitary land filling practice currently being followed has been causing uncontrolled methane evolution in the dump yards besides hazardous gases like CO, CO<sub>2</sub>, SO<sub>2</sub>, NO etc. Therefore, it is imperative to install Projects to recover heat energy by burning such wastes in boilers to reduce the overall quantities of waste to be disposed of in a controlled manner. There are several benefits-commercial, environmental, social and economic benefits that will accrue to the society at large including the urban local bodies by establishing the waste to energy plants using MSW.
- (2) Indian municipalities have overall responsibility of Municipal Solid Waste Management in their cities. However, most of them are currently unable to fulfill their duty to ensure environmentally sound and sustainable ways of dealing with MSW. Because of deficient waste treatment facilities, collected waste is disposed of in uncontrolled dumpsites or burned openly, thus resulting in severe environmental impacts including pollution of ground water resources and air.
- (3) As per National Environmental Engineering Research Institute (NEERI) 38 million tonnes of municipal solid waste is generated in India annually. Per capita waste generation in major Indian cities ranges from 0.2 kg to 0.6 kg and increasing at the rate of 1.3% per annum. With urban population increasing at the rate of 3 – 3.5% per annum, yearly increase in waste generation is around 5% annually. Calorific value of Indian solid waste is between 600 and 800 kcal/kg and the density of waste is between 330 and 560 kg/m<sup>3</sup>. Out of the total municipal waste collected, on an average 94% is dumped on land and 5% is composted. Thereby consuming precious urban land and sourcing hazardous gases and other infections.
- (4) This increased quantity of solid waste to be disposed shall exponentially increase the land requirement. As per the estimates by TERI, the estimated land requirement considering an average collection efficiency of 72.5%, average landfill depth of 4 meters and average density of 0.9 tonnes /m<sup>3</sup> works out to 1400 km<sup>2</sup>.

- (5) Studies have further revealed high Suspended Particulate Matter (SPM) values at landfill site. Acro-biological studies demonstrate the presence of actinomycetes/fungi and other microbes in air sample from the vicinity of landfill sites.
- (6) The two leading innovative mechanisms of waste disposal being adopted in India include composting (aerobic composting and vermi-composting) and Waste-to-Energy (WtE) (incineration, pelletisation, biomethanation). WtE projects for disposal of MSW are a relatively new concept in India. Although these have been tried and tested in developed countries with positive results, these are yet to get off the ground in India largely because of the fact that financial viability and sustainability is still being tested.
- (7) The Petitioners are setting up 12 MW and 6 MW RDF based power generation plants at Jaipur and Jodhpur respectively. The projects shall procure RDF from existing processing facilities of promoter on arm's length basis or from open marketing through transparent procurement process. The power projects shall utilize the RDF with GCV in the range of 2200-2300 kcal/kg (with RDF yield to more than 35%). The power shall be sold to obligated entities (Distribution Licensees or captive consumers) under Renewable Power Obligation (RPO) framework at tariff approved by the Commission.
- (8) The country is in urgent need to provide boost to MSW based power generation projects as they not only generate green power but also encourage the efficient collection and disposal of MSW which is a major source of pollution and a potential public health hazard if not properly disposed of.
- (9) Justification for using RDF as fuel for power generation:-  
Waste disposal through RDF is a process, where MSW is converted into fuel pellets which can either be used in industries to generate steam or produce power. In addition, RDF plant reduces pressure on landfills. Combustion of the RDF is technically sound and is capable of generating power. RDF may also be fired along with the conventional fuels like coal without any ill effects for generating steam. Furthermore, use of RDF to generate power is much more

efficient method to dispose MSW than using as a fuel in industries. Conversion of waste into RDF not only reduces the land requirement for waste disposal but also utilizes the waste in the most efficient manner to reduce any public health danger otherwise possible due to open dumping of waste. Similarly, incineration requires controlled burning of solid waste, which results in reduction in volumes. However, from the economic lookout, the solid waste is not utilized to full extent under this method of waste disposal as the entire energy content of MSW gets wasted. This method also has adverse environmental impact as waste is directly burnt.

- (10) As per the Central Pollution Control Board Report, 2008, total waste generation in big cities that represent a mere 10% of total urban population is 40,000 TPD, weighted average per capita waste generation: 0.453 kg/c/day assuming that 30% of waste generated can be converted into RDF and assuming specific fuel consumption of 2.5 kg/unit of RDF and 70% PLF, the fuel is sufficient to generate approximately 300 MW per year.
- (11) MSW based power projects provide many social benefits. They not only provide environmentally clean electricity but also encourage efficient and economically favorable utilization of municipal waste. Following are the benefits of MSW based power generation.
  - (a) Reduction in Public Health Hazard
  - (b) Efficient Collection of MSW
  - (c) Unlocking of Real Estate Locked in Dumping Sites
  - (d) Environment friendly power
- (12) Economically, the project by converting the waste into valuable products, i.e., electricity helps in reducing the demand on the limited natural resources. Being a project that contributes significantly to environment and other social development in many ways deriving the economic value of waste, can be considered to contribute significantly to sustainable development. Thus, the project should be treated as a special initiative than a mere power plant.
- (13) For Execution of Nationwide "Swatch-Bharat Abhiyan", the one of the most important aim is to provide solid waste processing/management

covering around 1.04 crores household in all 4,041 statutory towns and being a project that contributes to significantly this nationwide program helps in achieving the objects of the same.

- (14) In the given circumstances it is imperative that the present project be considered a special project in terms of its objectives and purpose and let a special tariff be determined for it. While considering the cost full value be given to expenditure and no deduction be applied on it. The prices offered under competitive bidding process are not lucrative and they do not offer any promotion to the projects of the present type which sub-serves a larger public interest.
- (15) The petitioners have submitted the following parameter to be considered for determination of tariff:

**Table-3: Parameters submitted by the Petitioners**

Head	Particulars	Submitted by JUWM (Jaipur) (Petition No.1195/17)	Submitted by JUWM (Jodhpur) (Petition No.1221/17)
Operational parameters	Capacity	12 MW	6 MW
	Plant load factor-1 <sup>st</sup> year	60%	60%
	Plant load factor-2 <sup>nd</sup> year and onwards	80%	80%
	Auxiliary consumption	15%	15%
	Useful life	20 years	20 years
Project cost	Capital cost	₹ 17.90 Cr/MW	₹ 20.83 Cr/MW
Sources of Fund-Debt	Debt: Equity Ratio	70:30	70:30
	Loan repayment tenure	10 years	10 years
	Interest rate	14%	14%
	Return on Equity (RoE)	20% -10 years 24% -11 <sup>th</sup> year onwards	20% -10 years 24%-11 <sup>th</sup> year onwards
	Discount rate	11.42%	11.42%
Depreciation	Depreciation rate for first 10 years	7%	7%
	Depreciation rate from 11 <sup>th</sup> year onwards	2%	2%
Operation & Maintenance Expenses	O&M Expenses	5% of capital cost	5%of capital cost
	Escalation factor for O&M Expenses	5% per annum	5% per annum



Head	Particulars	Submitted by JUWM (Jaipur) (Petition No.1195/17)	Submitted by JUWM (Jodhpur) (Petition No.1221/17)
Royalty		₹ 66/MT	₹ 126/MT
Working capital	O&M Expenses	One month	One month
	Receivables	Two months	Two months
	Fuel stock	4 months	4 months
	Maintenance spares	15% of O&M expenses	15% of O&M expenses
	Interest on working capital	14.50%	14.50%
Fuel related	Price of RDF	₹ 2100/MT	₹ 2100/MT
	GCV of RDF	2250 kcal/kg	2250 kcal/kg
	Annul rise in RDF price	5%	5%
	Transit Loss	2%	2%
	Station Heat Rate	4300 kcal/kWh	4300 kcal/kWh
Levelling Tariff	Fixed	₹ 7.22/kWh	₹ 8.64/kWh
	Variable	₹ 6.99/kWh	₹ 6.99/kWh
	Total	₹ 14.21/kWh	₹15.63/kWh

- (16) CERC has notified CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) (Fourth Amendment) Regulations, 2015 (hereinafter referred to as the 'CERC MSW Regulations') on 07.10.2015. For the parameters such as O&M cost, O&M cost escalation, Depreciation, Interest on Debt, working capital requirement, Interest rate on working capital, Return on Equity etc., the petitioners have relied on the norms from the said Regulations.
- (17) The cost factors referred above may be tentative and there is likelihood of its upward increase during the period of setting up of the project and the petitioners reserve their right to reproach the Commission in case of increase the cost for redetermination of tariff.
- (18) The petitioners have participated in the bid on the basis of and considering the applicability of the CERC Regulations 2015, therefore, the benefits available therein be considered and made available to them.
- (19) Other Respondents have been arrayed since in Lol and in the concession agreement it has been assured to the bidders that the base rate of ₹ 7.90 shall be paid to the successful bidder, in the circumstances

it is prayed that while determining the tariff the terms and conditions of this special project be taken into consideration .

(20) In the facts and circumstances of the case and as per objects of the Electricity Act, 2003 for promotion of the Renewable Energy Projects such as that of the petitioners and the environment and social benefits of the Municipal Solid Waste to Energy Projects, it is prayed to the Commission:

- i. to determine the multiyear (for 30 years) tariff for the project in line with duration of concession agreement,
- ii. treat the project as a special project for the purpose of determination of tariff and grant special and promotional tariff, and
- iii. allow the petitioner to further approach this Hon'ble Commission for re-determination of tariff in case of enhancement of cost; and
- iv. and pass such other and further order as this Hon'ble Commission deem fit and proper in the premises of the case.

**Submissions of the Municipal Corporations:**

13. The Commissioners of NNJ and JNN vide letters dated 25.10.2017 and 29.09.2017 respectively clarified that in the event Government of Rajasthan is unable to procure the electricity in accordance with Clause 5.12(c), the concessionaire shall have the right to sell the electricity generated at the project facilities in the open market. It is further clarified by them that except Viability Gap Funding (VGF), at present they are not able to bear any kind of extra financial burden in near future. However, they do not have any problem if GoR is ready to bear any financial expenditure as expected by concessionaire.

**Rejoinder to the reply filed by the Municipal Corporations:**

14. The Petitioners have made the following submissions in response to the submissions of the Municipal Corporations for consideration:

- (1) Petitioners are committed to establish the WtE plants in terms of concession agreements and with the schedule/timeline mentioned therein. They have submitted the bid only after going through the tender document and considering the terms & conditions stated therein. The royalty rates of ₹ 66/MT and ₹ 126/MT against the collection of MSW to be set up at Jaipur and Jodhpur respectively have been quoted by them keeping in view the assured Tariff of ₹ 7.90/unit of the electricity generated by the above plants.
  - (2) If the tariff is reduced from the rate of ₹ 7.90/unit, they will be subjected to great financial unwarranted hardship at both the ends, at one hand, the tariff will be reduced and on the other hand the payment of royalty of ₹ 66/MT and ₹ 126/MT has to be made. It may hamper/disrupt the processing of the establishment of the WtE plants by the petitioners, which may cause unwarranted delay in achieving the target as per the milestone mentioned in the concession agreement.
  - (3) The establishment of WtE plants is not based on the commercial motive rather it is a contribution in the growth and development of the society and the returns from the project are incidental.
  - (4) Both Municipal Corporations- NNJ and JNN are under obligation to make good to the petitioners in case the tariff is not determined by this Commission already assured to them of ₹ 7.90/unit, in that circumstances, the quantum of the deferential amount is to be made good to the petitioners by the Municipal Corporations by way of compensation.
  - (5) The Commission may please consider the above mentioned facts and circumstances to fix the tariff of ₹ 7.90/unit to facilitate/encourage the petitioners to establish the WtE plants in terms of the concession agreement and tender documents.
15. The matter was heard on 9.11.2017 and 30.11.2017. Discoms sought time to file their reply. Subsequently, the matter listed on 21.12.2017 and 16.01.2018.

### **Submissions made by the Discoms- JVVNL and JdVVNL:**

16. The JVVNL and JdVVNL ('Discoms')- the respondents to the petitions, have made the following submissions for consideration:

- (1) The levellised tariffs of ₹ 14.21/unit and ₹ 15.63/unit calculated and prayed in the Petitions for the plants to be set up at Jaipur and Jodhpur respectively under provisions of Section 62 of the Electricity Act, 2003 are without any basis. The status of the petitioners' plants- whether the entire generation would be from RDF plant or from MSW plant, is not clear as the capital costs of the both types of plants are different. In the calculation sheets, the petitioners have claimed capital cost of a MSW plant, whereas, they have also claimed variable cost of RDF as fuel. As per the CERC order, when the capital cost of MSW plant is taken, fuel would be freely available and there is no variable cost.
- (2) The average power purchase cost/pooled cost of power purchase of the Discoms determined by the Commission is only ₹ 3.43/unit. Procurement of such costly power shall put unnecessary burden on the consumers. Therefore, the claims of the petitioners need to be thoroughly scrutinized.
- (3) The tariffs demanded by the petitioners in the petitions are not reasonable and the Commission is requested to vet their claim, if required, by engaging an expert in this field who can scrutinize their claim authentically.
- (4) As per the RFP clause 5.11 & 5.12, the GoR has undertaken to buy the electricity at ₹ 7.90/unit and ₹ 7.04/unit in case of plant using RDF and MSW as a fuel respectively. In this regard, the Energy Department had asked for Discoms for their in principle approval for the PPA to be entered into between them and prospective bidder in respect of power generated from MSW. The in-principle approval conveyed to Energy Department vide letter dated 4.04.2016 as under:

*"In reference to subject cited above, Rajasthan Discoms hereby convey in-principal approval for power purchase agreement to be entered into between Discoms and prospective bidder in respect of power generated from Municipal Solid Waste with the following conditions:-*

*(i) Energy injected by such plants will be first set off against the consumptions of local bodies such as public street lightning etc.*

*(ii) After setting off consumption of local bodies such as public street lightning etc., remaining energy injected will be paid by the Discoms at tariff determined by the state regulators."*

- (5) The tariffs mentioned in RFP are not applicable to Rajasthan as the order prescribing these tariffs is that of CERC not of RERC. Moreover, the tariffs are for the power plants commissioned in the year 2015-16 and even on this account are not applicable to the plants proposed to be set up by the petitioners.
- (6) In the light of above facts, Commission may independently decide the tariff invoking Section 86(1)(b) of the Electricity Act, 2003 in the public interest.

**Petitioners' rejoinder to reply filed by the Discoms:**

17. The petitioners have submitted their reply as under:

- (1) It is submitted that the entire basis of the calculations of the levelled tariffs has already been provided in the petitions. The following components of fixed cost have been considered for determining the tariff for the proposed WtE power projects:
- (i) Capital cost
  - (ii) Operation and Maintenance Expenses
  - (iii) Interest on long term loan
  - (iv) Depreciation
  - (v) Interest on working capital
  - (vi) Return on Equity

The cost parameters considered in the tariff proposed in the petitions are summarized in the main petitions. The capital costs of the RDF based Waste to Energy Plants have been taken in line with the Project Information Memorandum (PIM) provided along with Tender RFP. Further, it is submitted that the cost of the Project is also supported by the Detailed Project Report (DPR) submitted by the Petitioners along

with the present petitions. To further support the cost estimate, budgetary offer for WtE Plant has been obtained from the reputed power plant supplier-M/s Cheema Boiler Ltd and the same has been submitted along with the petition. Hence, the objection/suggestion raised by the Respondents has no merit and force. It is further submitted that the variable cost of MSW processing is based upon the fuel used for the generation of Energy is whether derived directly from the MSW or after processing from RDF. It is hereby clarified that the Petitioner is establishing the RDF plant and thus, the cost of the RDF processing Plant is also taken in the tariff.

- (2) It is submitted that the Government's prime aim and object is to disassociate from the traditional power plant and at the same time to encourage and enhance the establishment of WtE plant in order to keep the society clean and pollution free and protect & preserve the environment for the benefit of public at large. Hence, under the circumstances, the comparison of the tariff arising out of/derived from WtE plant may not be done with Average Power Purchase Cost/Pooled Cost of Power Purchase of Discoms. Commission while determining the tariff derived from WtE plant look into the material placed on record by the petitioners, provisions of the Electricity Rules (sic. Act), 2003, provisions of the National Electricity Policy and principles and provisions laid down by CERC for determination of tariff for plants based on MSW.
- (3) It is submitted that the cost obtained from the reputed power plant supplier is already submitted and further, the said cost/claim of the power plant has already been obtained by the concerned Department from a competent agency for these particular projects. Therefore, the issue of engaging the expert does not arise and survive in the circumstances as mentioned above.
- (4) It is submitted that CERC is the apex body in respect of determination of power tariff, which is guiding in its nature for all the SERCs and generally a State Electricity Regulatory Commission adopts the same principles and analogy in determination of power tariff. CERC has already determined the tariff in respect of RDF based WtE plant as ₹ 7.90/unit. The said calculations are based on base guidelines provided by the

CERC. The Rajasthan Electricity Regulatory Commission (RERC) has not framed any rules for generation of electricity through MSW. The Rajasthan Regulations are related to bio-mass, bio-gas and biomass gasifier energy, which do not include the present issue. More so, all the State Commissions have adopted and are bound by the CERC Regulations, therefore, the present petitions which have been filed as per Rajasthan Regulations are maintainable and binding.

- (5) Visualizing and realizing their importance, Government (Central as well as State) is encouraging establishing of the WtE vis-a-vis managing the MSW, which has become menace of the day. The prime objects for establishing the WtE Plants are:-
- (a) To manage the Municipal Solid Waste;
  - (b) To make the city clean & green and
  - (c) To protect the environment as well as health of the public at large.

With this view, the Central Government has framed various schemes to encourage the public and promote the establishment of WtE Plants as mentioned above.

- (6) It is requested that Commission may accept the prayer made in the petitions for determination of tariff under Sections 62 and 86 of the Electricity Act, 2003. In addition, it is also prayed to grant exemptions from merit order dispatch principles for the projects and also direct the respondent/distribution company to consider the benefit of zero contract demand charges and to net off energy which may be drawn during shutdown or start up after the COD of the projects against the energy injected into the grid.

18. During hearing on 15.02.2018, the petitioner submitted that they are not pressing for the tariffs requested by them in their petitions. However, it is requested that as the projects have been awarded to them through a transparent process with assured tariff of ₹ 7.90/kWh determined by CERC for sale of electricity generated from the RDF based MSW plants under RFP, the same tariff may be allowed to them. The Discoms, however, on the other hand submitted that they have conveyed their in principle approval to the Energy

Department for power purchase agreement to be entered into between them and the prospective bidder in respect of power generated from municipal solid waste with the conditions that energy injected by petitioners' plants will be first set off against the consumptions of local bodies such as public street lighting etc., and after setting off consumption the remaining surplus energy injected will be paid by them at tariff determined by the Commission.

19. On the question of agreement of the petitioners to the conditions put by the respondent Discoms in their in principle approval of PPA and agreement of the respondent Discoms on the prayer of petitioners allowing CERC tariff, both parties sought time. The counsel for Nagar Nigam Jaipur was also directed to make their stand clear regarding purchase of electricity generated from the plants being set up by the petitioners in view of the stand of making payment for surplus energy under the net metering arrangement taken by the Discoms.
20. The matter was listed again on 22.02.2018, 08.03.2018 and finally heard on 22.03.2018.
21. During hearing the counsel on behalf of NNJ clarified that the purchase of electricity from the plants would put financial burden on them. As per the para 6.4(1) of the National Tariff Policy, the Discoms are obligated to procure 100% electricity produced from all the WtE plants in the State. It is further submitted by them that as per clause 5.12 of RfP in the event GoR is unable to procure such electricity, the concessionaires, i.e., the petitioners have the right to sell electricity generated at the project facilities in the open market.
22. The counsel appearing on behalf of the Discoms submitted that Discoms still stand by the condition put by them in the in-principle approval of the PPA according to which they are ready to buy surplus electricity after setting off the electricity consumption of local bodies such as public street lighting etc.
23. The counsel on behalf of the petitioners submitted that the Nagar Nigams agree for their claim, however, the Discoms have put a condition in their in-principle approval. It is submitted that Discoms are obliged to procure 100%



power produced from the Petitioners' units of WtE plants in terms of National Tariff Policy 2016 issued under Section 3 of the Electricity Act, 2003, The counsel for petitioners further referred the judgments passed by SERCs of the States like Delhi, Punjab and Telangana where respective Commissions have directed the Discoms to procure 100 % power produced from such WtE projects. The respective SERCs have determined the tariff under Section 62 of the Electricity Act, 2003 which presupposes the agreement of Discoms to purchase this power. The projects have also additional environmental benefits, which will sub serve the larger public interest. The State Discoms should purchase this power which is also mandated by the provisions of National Tariff Policy 2016.

24. Finally after hearing the rival contentions, the Commission reserved the order.

**Commission's views/decisions:**

25. It is the case of the petitioners that they have participated in the bidding called by NNJ and JNN as per the bid documents. Under RfP, they have been assured of sale of electricity generated by their RDF based MSW projects at the tariff of ₹ 7.90/kWh as determined by CERC. They have quoted royalty rates keeping in view the above assured tariff with their reciprocal obligation of making payment of royalty at the rates quoted by them. If the petitioners do not get the tariff rate assured to them in RfP, they will be subjected to great financial warranted hardship in two fold manner, above one hand the tariff will be reduced and on the other hand they would pay royalty at the rates ₹ 66/ MT and ₹ 126/ MT for Jaipur and Jodhpur plants respectively. If the tariff is reduced from the above rate, the royalty rates shall also be liable to be reduced. The petitioners have also vehemently pleaded that their plants are not with commercial motive and would serve the larger public interest.
26. The Discoms on the other hand have submitted that in their in-principle approval given to GOR, they have already clarified their stand that energy injected by plants of the petitioners be first set off against the consumption of the local bodies such as public street lighting etc., and after setting off consumption of above local bodies, remaining energy injected would be paid by them at tariff determined by the Commission.

27. The NNJ and JNN have submitted that they have initiated the bidding based on the conditions stipulated under RfP. They are not in position to bear the burden of purchase of electricity generated from petitioners' generation facilities.
28. Before proceeding further, that it would be appropriate to consider the relevant provisions of the Electricity Act, 2003, National Tariff Policy, 2016 and Solid Waste Management Rules, 2016.
29. The preamble to the Electricity Act, 2003 emphasizes upon promotion of efficient and environmentally benign policies and encourage generation and consumption of green energy to sub-serve the mandate of Article 48 read with Article 51 A (g) of the Constitution of India. The Article 48 A of Constitution of India under the Directive Principles of State Policy provides for protection and improvement of environment and safeguarding of forest and wildlife and further it envisages that the State shall make an endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country. The Article 51 A (g) under the fundamental duties states that it is a fundamental duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living features. These projects would not only supply environmentally clean electricity but would also encourage efficient and economically favorable utilization of municipal waste. These projects have several social and economic benefits associated with them and therefore, would serve the larger public interest and will also serve as pilot projects for the State.
30. The Section 61 of the Electricity Act, 2003 reads as under :
- “Section 61. (Tariff regulations):*  
*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:

Provided that the terms and conditions for determination of tariff under the Electricity (Supply) Act, 1948, the Electricity Regulatory Commission Act, 1998 and the enactments specified in the Schedule as they stood immediately before the appointed date, shall continue to apply for a period of one year or until the terms and conditions for tariff are specified under this section, whichever is earlier."

31. Section 62 of the Electricity Act,2003 reads as under:

" Section 62. (Determination of tariff): ---

- (1) The Appropriate Commission shall determine the tariff in accordance with the provisions of this Act for –
  - (a) supply of electricity by a generating company to a distribution licensee:

Provided that the Appropriate Commission may, in case of shortage of supply of electricity, fix the minimum and maximum ceiling of tariff for sale or purchase of electricity in pursuance of an agreement, entered into between a generating company and a licensee or between licensees, for a period not exceeding one year to ensure reasonable prices of electricity;

- (b) transmission of electricity ;
- (c) wheeling of electricity;
- (d) retail sale of electricity:

Provided that in case of distribution of electricity in the same area by two or more distribution licensees, the Appropriate Commission may, for promoting competition among distribution licensees, fix only maximum ceiling of tariff for retail sale of electricity.

- (2) The Appropriate Commission may require a licensee or a generating company to furnish separate details, as may be specified in respect of generation, transmission and distribution for determination of tariff.
- (3) The Appropriate Commission shall not, while determining the tariff under this Act, show undue preference to any consumer of electricity but may differentiate according to the consumer's load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required or

the geographical position of any area, the nature of supply and the purpose for which the supply is required.

- (4) No tariff or part of any tariff may ordinarily be amended, more frequently than once in any financial year, except in respect of any changes expressly permitted under the terms of any fuel surcharge formula as may be specified.
- (5) The Commission may require a licensee or a generating company to comply with such procedures as may be specified for calculating the expected revenues from the tariff and charges which he or it is permitted to recover.
- (6) If any licensee or a generating company recovers a price or charge exceeding the tariff determined under this section, the excess amount shall be recoverable by the person who has paid such price or charge along with interest equivalent to the bank rate without prejudice to any other liability incurred by the licensee."

32. The para 6.4 (1)(ii) of the Tariff Policy notified by Ministry of power on 28.01.2016 reads as under:

**“ 6.4 Renewable sources of energy generation including Co-generation from renewable energy sources:**

- (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.*

- (i) *Within the percentage so made applicable, to start with, the SERCs shall also reserve a minimum percentage for purchase of solar energy from the date of notification of this policy which shall be such that it reaches 8% of total consumption of energy, excluding Hydro Power, by March 2022 or as notified by the Central Government from time to time.*
- (ii) *Distribution Licensee(s) 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.*
- (iii) *.....”*

33. The Clause 9 of the Solid Waste Management Rules,2016 notified on 8.04.2016 by Ministry of Environment, Forest and Climate Change reads as under:

“9. **Duties of Ministry of Power:**-The Ministry of Power through appropriate mechanism shall-

- (a) decide tariff or charges for the power generated from the waste to energy plants based on solid waste.
- (b) compulsory purchase power generated from such waste to energy plants by distribution company.”

34. From the perusal of the Section 62 of the Electricity Act,2003 reproduced above, it emerges that Appropriate Commission shall determine the tariff in accordance with the provisions of this Act for supply of electricity by a generating company to a Distribution licensee. The para 6.4(1)(ii) of the National Tariff Policy provides for purchase of 100% of electricity generated from such power plants by the Discoms. It is also not disputed that till now no PPA has been signed between the petitioner and Discoms. The petitioners have been vehemently arguing that they have submitted the bids with the understanding the Discoms shall purchase 100 % of the electricity generated from their MSW power plants. However, Discoms repeatedly submitted that they are ready to purchase electricity generated from plants in terms of their consent /approval given to the State Government.
35. In the Commission's considered view the stand of Discoms is not in accordance with National Tariff Policy which mandates that 100% energy of WtE plants has to be purchased by Discoms as part of their RPO. Discoms' argument that the tariff provided to petitioners through the bid is very high and hence at that rate electricity cannot be purchased by them is without appreciating the fact that these plants are essential in the interest of environment and public of Rajasthan. It cannot be ignored that these plants will help the Nagar Nigams in reducing urban waste and serve the residents of these cities. The benefit of these plants has to be seen de hors the cost of power. At any rate in overall power purchase cost of Discoms, the cost of the power generated by these plants will not impact Discoms greatly. Overall public interest is paramount and has to be considered over economic interest.
36. The Govt. of India in the interest of country and general public in particular has launched Swachh Bharat Mission (SBM) to maintain the cleanliness in the cities, towns and villages and assisting the public by finding several measures in this

regard. The State of Rajasthan has also taken giant steps in this regard in taking forward the SBM of Govt. of India. Purchasing power from these WtE plants will significantly help the SBM in maintaining the cities clean while disposing of usefully the waste in generating electricity and supplying back the same to the general public.

37. While upholding the Regulations of the Commission vide which the Commission has imposed RPO on captive and open access consumers, the Hon'ble Supreme Court of India in case reported 2015 12 SCC 611 observed as under:

*"49. The purchase of nominal quantum of energy from renewable resources cannot adversely affect the cost effectiveness of the Captive Power Plant. Moreover, the object being reduction of pollution by promoting renewable source of energy, larger public interest must prevail over the interest of the industry herein which will in any case pass on the extra burden, if any, will be as part of the cost of its products and therefore, the same does not burden the appellants...."*

*"50. Article 51A(g) of the Constitution of India cast a fundamental duty on the citizen to protect and improve the natural environment. Considering the global warming, mandate of Articles 21 and 51A(g) of the Constitution, provisions for the Act of 2003, the National Electricity Policy of 2005 and the Tariff Policy of 2006 is in the larger public interest, Regulations have been framed by RERC imposing obligation upon captive power plants and open access consumers to purchase electricity from renewable sources. The RE obligation imposed upon captive power plants and open consumers through impugned Regulation cannot in any manner be said to be restrictive or violative of the fundamental rights conferred on the appellants under Articles 14 and 19(1)(g) of the Constitution of India. Upon consideration of the rival submissions by the well-reasoned order, the High Court has rightly upheld the validity of the impugned Regulation and we do not find any reason to interfere with the impugned judgment. All the appeals are dismissed as the same are devoid of merit..."*

The above observation of Hon'ble Supreme Court equally applicable for purchase of power from WtE plants which may generate miniscule electricity.

38. Commission further observes that Rajasthan Discoms are one step ahead from others in meeting their RPO. However, it is observed that they are falling short of compliance in purchase of electricity from Biomass power plants. The

electricity purchased from WtE plants may be accounted against this purpose and still will be within their purchase obligation.

39. Commission under Section 86(1)(e) has a duty to encourage such plants which are environmentally benign.
40. In the light of the above, Commission rejects the submission of Discoms. Commission is of the view that Discoms are under obligation to purchase 100% electricity generated by the WtE power plants of the petitioners under National Tariff Policy.
41. During hearing petitioners submitted that their projects have been awarded through a transparent process of bidding at an assured tariff of ₹ 7.90/kWh. It is observed that the Nagar Nigams have carried out bidding under Swachh Bharat Mission. However, these biddings are not under Section 63 of the Electricity Act, 2003 under which the procurers, i.e., Discoms were required to carry out the bidding. As such there is no contractual obligation on the Discoms to purchase power at the rate at which the bidding was done by Nagar Nigams. Further, from the perusal of para 6.4 (1) (ii) of National Tariff Policy, 2016 it is also clear that procurement of power from WtE plants by the Discoms shall be made at the tariff determined by the Commission under Section 62 of the Act.
42. Considering above conclusion and the petitions of JUWM (Jaipur)-Petition No. 1195/17 and JUWM (Jodhpur) - Petition No.1221/17, the Commission hereby proceeds for deciding the tariff in respect of electricity generated from the proposed MSW power plants using RDF as fuel.
43. The Commission observes that these two projects are pilot projects and have insignificant effect on overall power purchase cost of the Discoms. If the projects are successfully completed and run they would become model projects and with experience the Discoms and Municipal corporations have in these plants may help them to replicate such plants all over Rajasthan. Based on inputs received regarding operating parameters of these plants, Discoms

may negotiate better commercial conditions with other Nagar Nigams which may result in lower tariff in the days to come.

44. Section 61(a) of the Electricity Act,2003 provides that the Appropriate Commission while specifying the terms and conditions for determination of tariff shall be guided, inter-alia, by the principles and methodologies specified by the Central Commission for determination of tariff applicable to generating companies and transmission licensees. Section 61 (h) of the Act further provides that while specifying the terms and conditions of determination of tariff, the Commission shall be guided by the objective of promotion of co-generation and generation of electricity from renewable energy sources.
45. From the material produced before the Commission in relation to bidding it is observed that the entire bidding process is based on rate determined by CERC for RDF based MSW plants for FY 2015-16. It is observed that CERC while determining the tariff has not considered any receipt of grant/VGF in the hands of project developer. Further, CERC observed that to preprocess the waste to utilize it in MSW projects like RDF, a cost is involved and considered Rs 1800 Per MT with an escalation at the rate of 5% per annum for fuel of RDF based MSW projects. On perusal of material it is also observed that the projects to be set up at Jaipur and Jodhpur would receive capital grant of ₹ 25 Cr and ₹ 10 Cr respectively as VGF. Commission is of the view that the effect of receipt of the above funding should also be given in the tariff determined by this Commission so as to pass on the benefit to the retail consumers.
46. In view of the above, Commission decides to determine the tariff for the projects based on tariff determined by CERC considering the VGF to be received by them. Accordingly, Commission determines the tariff for petitioners' plants as under:

**Table-4: Tariff for 12 MW RDF based MSW project to be set up at Jaipur:**

Technology	Levelling fixed cost (₹/kWh)	Variable cost (₹/kWh)	Applicable Tariff Rate (₹/kWh)
RDF based MSW	3.75	3.56	7.31



**Table-5: Tariff for 6 MW RDF based MSW project to be set up at Jodhpur:**

Technology	Levellised fixed cost	Variable cost	Applicable Tariff Rate
	(₹/kWh)	(₹/kWh)	(₹/kWh)
RDF based MSW	3.87	3.56	7.43

[The detailed calculations are annexed as Annexure-I&II.]

47. The above tariffs are without considering accelerated depreciation (AD) benefit. The tariffs shall be applicable from the date of commercial operation (COD) of the projects and shall remain applicable for entire useful life of 20 years for MSW/RDF based MSW projects. However, the variable component of the above tariffs will change every year based on escalation factor of 5%.
48. During the proceedings a lack of coordination appeared in the stands taken by the parties involved. Commission feels that at the inception stage of such projects to be taken up in future, the parties involved may be well informed of their risk and responsibilities, so that the projects may be implemented successfully in a dispute free manner.

**Other issues:**

49. The petitioners in their submissions dated 1.02.2018, among other things, have also prayed before the Commission to grant exemption to their proposed power plants from merit order dispatch principles and also direct the respondents/Discoms to consider the benefit of zero contract demand charges and to net off of energy which may be drawn during shutdown or start up after COD of the project against the energy injected into the grid.
50. It is observed that though the above requests are not part of prayer made by them in their main petition. Both being contingent to the operation of the plants, Commission, therefore, has considered their requests. As the facility of exemption from merit order dispatch principle and netting off the energy drawn during shut down and start up against energy injected into the grid is available to other RE plants, therefore, the WtE plants shall also be treated at par with them in this respect.

51. **Commission's order:**

- (1) The tariff for the petitioners' plants shall be ₹ 7.31/ kWh for 12 MW project to be set up at Jaipur and ₹ 7.43/kWh for 6 MW project to be set up at Jodhpur for sale of electricity to JVVNL and JdVVNL respectively. The tariffs are without considering AD benefit for which the petitioners shall submit the declarations as being submitted by other RE projects of the State supplying power to the Discoms. . There will be 5% escalation in variable charges as stated in **Para 47** above.
- (2) The tariff shall be applicable for a period of twenty years from their respective CODs. The tariff beyond twenty years and upto the concession period shall be determined by the Commission based on the prevailing market conditions and regulations/guidelines in force.
- (3) This order only deal with tariff payable by Discoms for the electricity supplied from time to time, the petitioners shall be bound with the other terms and conditions of RFP/LOA/ Concession agreement.
- (4) The reactive energy charges applicable to above projects shall be at par with other renewable energy generation sources. Hence, the reactive energy tariff approved by the Commission for the RE technologies like wind and solar shall be applicable to these projects.
- (5) The proceeds of carbon credit under CDM benefits if availed shall be in the ratio of 25:75 between the distribution licensee and generating company respectively. The share of 25% obtained by the distribution licensee shall be passed on to the consumers.

52. The petitions are disposed of in terms of above.

(Suresh Chandra Dinkar)  
Member

(Rajendra Prasad Barwar)  
Member

(Vishvanath Hiremath)  
Chairman

TARIFF DETERMINATION FOR 12 MW RDF BASED MSW PROJECT

Annexure-I

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Base Case		
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1		
			Auxiliary Consumption during stabilisation	%	15.00%		
			Auxiliary Consumption after stabilisation	%	15%		
			PLF (Stabilization for 6 months)	%	65%		
			PLF (during first year after Stabilization)	%	65%		
			PLF (Second year onwards)	%	80%		
			Useful life of Power Plant	Years	20		
			2	Project Cost	Capital Cost/MW	Capital cost considering VGF @ Rs 2500 Lakh	Rs Lakh/MW
3	Sources of Fund	Debt: Equity	Debt	%	70%		
			Equity	%	30%		
			Total Debt Amount	Rs Lakh	484.17		
			Total Equity Amount	Rs Lakh	207.50		
			Debt Component	Loan Amount	Rs Lakh	484.17	
		Interest Rate	%	13.00%			
		Loan repayment period		12.00			
		Equity Component	Equity amount	Rs Lakh	207.50		
		Return on Equity 10 years	% p.a	20.00%			
		Return on Equity after 10 years	% p.a	24.00%			
		Average RoE	% p.a	22.00%			
Discount Rate (Equiv. to WACC)	%	10.81%					
4	Financial Assumptions	Fiscal Assumptions	Income Tax (for yr-11 to yr-20)	%	33.99%		
			MAT Rate (for yr-1))	%	33.99%		
			MAT Rate (for yr-2 to yr-10)	%	33.99%		
			80 IA benefits	Yes/No	Yes		
			Accelerated depreciation benefit(Rs/kWh)	Yes/No	0.24		
			Depreciation	Depreciation Rate-1	%	5.83%	
		Depreciation Rate 2	%	2.51%			
Years for Rate-1		12					
5	Working Capital	For Fixed Charges	O&M Expenses	Months	1		
			Maintenance Spares	(% of O&M exepenses)	%	15%	
		For Variable Charges	Receivables for Debtors	Months	2		
			Biomass Stock	Months	4		
			Interest On Working Capital	%	13.50%		
		6	Fuel Related Assumptions	Heat Rate	After Stabilisation period	kCal/kWh	4200
					During Stabilization Period	kCal/kWh	4200
Biomass	RDF Price			Rs/MT	1800		
	GCV			kCal/kg	2500		
	RDF Price Escalation Factor				5%		
7	Operation & Maintenance	power plant	Rs Lakh/MW	Rs Lakh/MW	54.00		
		Esca. in O & M Expense	%	%	5.72%		
		Total No. of Hours	hrs	hrs	8760		

TARIFF DETERMINATION FOR 12 MW RDF BASED MSW PROJECT

Annexure-I (contd)

Tariff for MSW(RDF) plant

Cost of Generation

Particulars of Generation	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation	MU		5.69	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01
Auxiliary Consumption	MU		0.85	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Net Generation	MU		4.84	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96

Variable Cost	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Biomass Cost	Rs Lakhs		172.19	222.52	233.64	245.33	257.59	270.47	284.00	298.20	313.11	328.76	345.20	362.46	380.58	399.61	419.59	440.57	462.60	485.73	510.02	535.52
Per unit Variable Cost	Rs/kWh		3.56	3.74	3.92	4.12	4.32	4.54	4.77	5.01	5.26	5.52	5.80	6.08	6.39	6.71	7.04	7.40	7.77	8.15	8.56	8.99

Fixed Cost	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
O&M Expenses	Rs Lakhs		54.00	57.09	60.35	63.81	67.46	71.31	75.39	79.71	84.27	89.09	94.18	99.57	105.26	111.29	117.65	124.38	131.49	139.02	146.97	155.37
Depreciation	Rs Lakhs		40.32	40.32	40.32	40.32	40.32	40.32	40.32	40.32	40.32	40.32	40.32	40.32	17.33	17.33	17.33	17.33	17.33	17.33	17.33	17.33
Interest on term loan	Rs Lakhs		60.32	55.07	49.83	44.58	39.34	34.09	28.85	23.60	18.36	13.11	7.87	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakhs		18.15	21.67	22.50	23.38	24.30	25.28	26.32	27.42	28.58	29.81	31.30	32.66	33.64	35.29	37.02	38.84	40.75	42.77	44.88	47.11
Return on Equity	Rs Lakhs		41.50	41.50	41.50	41.50	41.50	41.50	41.50	41.50	41.50	41.50	49.80	49.80	49.80	49.80	49.80	49.80	49.80	49.80	49.80	49.80
Total Fixed Cost	Rs Lakhs		214.29	215.66	214.51	213.59	212.92	212.52	212.39	212.56	213.03	213.83	223.47	224.98	206.03	213.70	221.80	230.35	239.37	248.91	258.98	269.61
Per unit Fixed Cost	Rs/kWh		4.43	3.62	3.60	3.59	3.57	3.57	3.57	3.57	3.58	3.59	3.75	3.78	3.46	3.59	3.72	3.87	4.02	4.18	4.35	4.53
Per unit Fixed Cost considering accelerated	Rs/kWh		4.19	3.39	3.37	3.35	3.34	3.33	3.33	3.33	3.34	3.35	3.52	3.54	3.22	3.35	3.49	3.63	3.78	3.94	4.11	4.29

Levelised per unit fixed charges (Rs/kWh) **3.75**  
(Without Availing AD Benefit)

Applicable Tariff

Variable Cost	3.56	Rs/kWh
Levelised Fixed Cost	3.75	Rs/kWh
Total Applicable Tariff	7.31	Rs/kWh

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Base Case
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Auxiliary Consumption during stabilisation	%	15.00%
			Auxillary Consumption after stabilisation	%	15%
			PLF (Stablization for 6 months)	%	65%
			PLF (during first year after Stablization)	%	65%
			PLF (Second year onwards)	%	80%
			Useful life of Power Plant	Years	20
			2	Project Cost	Capital Cost/MW
3	Sources of Fund	Debt: Equity	Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lakh	513.33
			Total Equity Amount	Rs Lakh	220.00
			Debt Component	Loan Amount	Rs Lakh
		Interest Rate	%	13.00%	
		Loan repayment period		12.00	
		Equity Component	Equity amount	Rs Lakh	220.00
		Return on Equity 10 years	% p.a	20.00%	
		Return on Equity after 10 years	% p.a	24.00%	
		Average RoE	% p.a	22.00%	
Discount Rate (Equiv. to WACC)	%	10.81%			
4	Financial Assumptions	Fiscal Assumptions	Income Tax (for yr-11 to yr-20)	%	33.99%
			MAT Rate (for yr-1))	%	33.99%
			MAT Rate (for yr-2 to yr-10)	%	33.99%
			80 IA benefits	Yes/No	Yes
			Accelerated depreciation benefit(Rs/kWh)	Yes/No	0.25
			Depreciation	Depreciation Rate-1	%
		Depreciation Rate 2	%	2.51%	
		Years for Rate-1		12	
5	Working Capital	For Fixed Charges	O&M Expenses	Months	1
			Maintenance Spares	(% of O&M exepenses)	%
		For Variable Charges	Receivables for Debtors	Months	2
			Biomass Stock	Months	4
		Interest On Working Capital	%	13.50%	
		6	Fuel Related Assumptions	Heat Rate	After Stabilisation period
During Stablization Period	kCal/kWh				4200
Biomass	RDF Price			Rs/MT	1800
	GCV			kCal/kg	2500
	RDF Price Escalation Factor				5%
7	Operation & Maintenance	power plant	Rs Lakh/MW	Rs Lakh/MW	54.00
		Esca. in O & M Expense	%	%	5.72%
		Total No. of Hours	hrs	hrs	8760

TARIFF DETERMINATION FOR 6 MW RDF BASED MSW PROJECT

Annexure-II (contd..)

Tariff for MSW(RDF) plant

Cost of Generation

Particulars of Generation	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation	MU		5.69	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01
Auxiliary Consumption	MU		0.85	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Net Generation	MU		4.84	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96

Variable Cost	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Biomass Cost	Rs Lakhs		172.19	222.52	233.64	245.33	257.59	270.47	284.00	298.20	313.11	328.76	345.20	362.46	380.58	399.61	419.59	440.57	462.60	485.73	510.02	535.52
Per unit Variable Cost	Rs/kWh		3.56	3.74	3.92	4.12	4.32	4.54	4.77	5.01	5.26	5.52	5.80	6.08	6.39	6.71	7.04	7.40	7.77	8.15	8.56	8.99

Fixed Cost	Unit	Years-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
O&M Expenses	Rs Lakhs		54.00	57.09	60.35	63.81	67.46	71.31	75.39	79.71	84.27	89.09	94.18	99.57	105.26	111.29	117.65	124.38	131.49	139.02	146.97	155.37
Depreciation	Rs Lakhs		42.75	42.75	42.75	42.75	42.75	42.75	42.75	42.75	42.75	42.75	42.75	42.75	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37
Interest on term loan	Rs Lakhs		63.95	58.39	52.83	47.27	41.71	36.15	30.59	25.03	19.46	13.90	8.34	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakhs		18.34	21.86	22.68	23.55	24.47	25.45	26.48	27.57	28.72	29.94	31.43	32.79	33.73	35.38	37.11	38.93	40.85	42.86	44.98	47.20
Return on Equity	Rs Lakhs		44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	52.80	52.80	52.80	52.80	52.80	52.80	52.80	52.80	52.80	52.80
<b>Total Fixed Cost</b>	<b>Rs Lakhs</b>		<b>223.05</b>	<b>224.09</b>	<b>222.62</b>	<b>221.38</b>	<b>220.39</b>	<b>219.66</b>	<b>219.21</b>	<b>219.05</b>	<b>219.20</b>	<b>219.68</b>	<b>229.51</b>	<b>230.70</b>	<b>210.17</b>	<b>217.84</b>	<b>225.93</b>	<b>234.48</b>	<b>243.51</b>	<b>253.05</b>	<b>263.11</b>	<b>273.75</b>
Per unit Fixed Cost	Rs/kWh		4.61	3.76	3.74	3.72	3.70	3.69	3.68	3.68	3.68	3.69	3.85	3.87	3.53	3.66	3.79	3.94	4.09	4.25	4.42	4.60
Per unit Fixed Cost considering accelerated	Rs/kWh		4.36	3.51	3.49	3.47	3.45	3.44	3.43	3.43	3.43	3.44	3.61	3.63	3.28	3.41	3.55	3.69	3.84	4.00	4.17	4.35

Levelised per unit fixed charges (Rs/kWh) **3.87**  
(Without Availing AD Benefit)

Applicable Tariff

Variable Cost	3.56	Rs/kWh
Levelised Fixed Cost	3.87	Rs/kWh
<b>Total Applicable Tariff</b>	<b>7.43</b>	<b>Rs/kWh</b>