

**SMP – 52 /2021**



## **Madhya Pradesh Electricity Regulatory Commission**

**5th Floor, "Metro Plaza", Bittan Market, Bhopal - 462016**

**PRESENT:**

**S.P.S Parihar, Chairman**

**Mukul Dhariwal, Member**

**Shashi Bhushan Pathak, Member**

### **IN THE MATTER OF:**

**DETERMINATION OF TARIFF FOR PROCUREMENT OF POWER BY  
DISTRIBUTION LICENSEES GENERATED FROM BIOGAS BASED  
POWER PROJECTS IN THE STATE OF MADHYA PRADESH**

**December 2021**

## ORDER

(Passed on this day of 07.12.2021)

### 1 Preamble

In exercise of the powers conferred under Sections 61(a), (h) and (i), 62 (1) (a), and 86 (1) (a), (b), and (e) of the Electricity Act, 2003, and all other powers enabling it in this behalf, the Madhya Pradesh Electricity Regulatory Commission (MPERC or 'the Commission') determines the tariff for procurement of power by Distribution Licensees from Biogas based power projects to be commissioned during the control period of this order.

The Commission had issued generic tariff order on 05<sup>th</sup> February 2015 (in SMP 27/2014) for procurement of power from Biogas based power projects in Madhya Pradesh. The control period of the aforesaid tariff order was up to 31<sup>st</sup> March 2018 which was subsequently extended vide Commission's order dated 07<sup>th</sup> March 2019 till issuance of further order in this subject matter.

The Commission had considered various provisions of the following legislative /Policy documents, while determining tariff in this matter:

#### 1.1 Legislative and Policy Provisions

##### Electricity Act, 2003

The following provisions of the Electricity Act 2003 provide the enabling legal framework for promotion of Renewable Sources of energy by the State Electricity Regulatory Commissions (SERCs):

**Section 61 (h)** of the Act provides that, while specifying the terms and conditions of determination of tariff, the Commission shall be guided by the objective of promotion of cogeneration and generation of electricity from renewable sources of energy.

**Section 62 (1) (a)** of the Act provides for determination of tariff for supply of electricity by a generating company to a distribution licensee.

**Section 86 (1) (b)** of the Act regulates the procurement process of electricity by the distribution licensees as under: "regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licensees or from other sources through agreements for purchase of power for distribution and supply within the State;"

**Section 86 (1) (e)** of the Act mandates promotion of co-generation and generation of electricity from renewable sources of energy: “Promote co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee.”

**Tariff Policy (TP), 2016**

In compliance with Section (3) of the Electricity Act 2003, the Central Government has notified the revised tariff policy on 28<sup>th</sup> January 2016. The tariff policy elaborates the role of regulatory commissions, the mechanism for promoting renewable energy, the timeframe for implementation, etc. Clause 6.4 of the tariff policy addresses various aspects associated with promoting and harnessing renewable sources of energy generation including the Waste to Energy power projects. The provisions stated under Clause 6.4 of Tariff Policy are given below.

*“(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.*

- (i).....*
- (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 .....*

**1.2 MPERC RE Tariff Regulations, 2017**

MPERC (Terms and Conditions of determination of tariff for sale of energy from RE sources) Regulations, 2017 has been notified on 07<sup>th</sup> July 2017 which will remain in force for 5 years, unless reviewed earlier or extended. The general tariff related provisions provided in Regulations, applicable for all RE technologies are summarized below:

- Applicability – apply in all cases where the tariff is to be determined by the Commission under Section 62 read with Section 86 of the Act.

- Tariff determined for the projects commissioned during the control period, shall continue to be applicable for the entire duration of the 'useful life' as specified in these Regulations.
- Tariff structure would be fixed and /or variable cost, as applicable.
- Generic tariff will be determined on levelled basis on useful life, and discount factor is the post-tax weighted average cost of capital.
- The Commission shall indicate in the order whether the subsidy is considered or not.
- The preferential tariff as determined by the Commission for RE technologies/sources other than Solar shall also be subject to bidding after the date of issue of notification by the Central Government in terms of Tariff Policy, 2016.

Apart from above general tariff related provisions, MPERC RE Regulations, 2017 have following technology specific provisions for determination of generic tariff for procurement of electricity from Biogas based power projects.

- **Clause 2 (f)** – Biogas means a gas produced when organic matter like crop residues, sewage and manure breaks down (ferments) in an oxygen-free environment.
- **Clause 4 (g)** – Biogas based Power Project –using new plant and machinery and having grid connected system that uses 100% Biogas fired engine, coupled with Biogas technology for co-digesting agriculture residues, manure and other bio waste as may be approved by MNRE.
- Technology specific parameters for Biogas power projects:
  - **Capital cost:** The normative capital cost for the Biogas power projects shall be Rs 950 Lakh/MW during the control period.
  - **Plant Load Factor:** During 1<sup>st</sup> year of operation – 70%  
From 2<sup>nd</sup> year onward – 80%
  - **Auxiliary Consumption:** The auxiliary consumption factor shall be 10% of the gross generation for tariff determination.
  - **O&M expenses:** Normative O&M expenses during the first year of operation shall be 4% of the capital cost and shall be escalated at the rate of 5.72% during the balance useful life of the plant.
  - **Other costs:** Fuel cost in such projects shall be Rs 175/MT with an annual escalation at the rate of 5.72% p.a. from 2<sup>nd</sup> year.
  - **Specific fuel consumption:** Normative specific fuel consumption shall be 10.7 kg/kWh.
  - **Working capital components:** Fuel cost for four months, O&M expenses for one month, receivable equal to two months of fixed and variable charges for the sale of electricity calculated on target PLF and maintenance spare @ 15% of O&M expenses.
  - **Income from Manure:** Income from manure shall be considered at Rs 1.5 per Kg during the control period.

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## 2 Procedural History

The Commission issued an Approach Paper elaborating the principles, methodology and various financial and operating parameters for determination of tariff for procurement of power from Biogas based power projects by the distribution licensees in the state. The Commission invited, comments/suggestions/objections in this matter from the Stakeholders/ Interested persons on the Approach Paper through Public Notice published in Raj Express – Bhopal (Hindi), The Times of India- Indore (English) and Nav Bharat– Jabalpur (Hindi) on 07.10.2021, in addition to uploading the same on the Commission's website.

Public Hearing in this matter was held on 09.11.2021 to hear the comments/suggestions/ Objections of Stakeholders on the Approach Paper. The Commission has not received any written comments / suggestions/ objections from stakeholders on the Approach paper. No one appeared on behalf of stakeholders in the public hearing.

## 3 Tariff framework for procurement of power from Biogas based power projects

### 3.1 Tariff Structure and Design

#### Proposed in Approach Paper

Clause 6.4 (1) (ii) of Tariff Policy mentioned that 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.”

MPERC RE Tariff Regulations, 2017 provides that generic tariff shall normally be determined on levellised basis. Levellisation shall be carried out for the 'useful life' of the renewable energy project. Further, MPERC RE Tariff Regulations, 2017 provides for single part tariff with two components for determination of generic tariff for Biogas based power projects.

Considering above regulatory provisions, the Commission in the Approach Paper proposed to determine single part levellised tariff on Cost- plus basis consisting of fixed cost and variable cost components. Fixed cost component is to be determined on following basis: -

- a. Capital cost;
- b. Debt: Equity Ratio
- c. Return on equity;

- d. Interest on loan capital;
- e. Depreciation;
- f. Interest on working capital;
- g. O&M expenses

Variable component to be determined on following basis: -

- a. Feedstock Composition
- b. Cost of feedstock
- c. Specific fuel consumption
- d. Auxiliary Consumption
- e. Plant Load Factor
- f. Income from manure

### **Comments/Suggestions**

The Commission has not received any comments / suggestions from the stakeholder in this regard.

### **Commission's View**

The Commission decides to determine single part levelled tariff on Cost-plus basis consisting of fixed cost and variable cost components over the useful life of the plant. The Biogas based project owner / generator shall be allowed to recover the fixed cost and variable cost on the basis of actual energy generation as per the levelled fixed and variable tariff specified by the Commission.

The electricity generation over and above the normative Plant Load Factor specified in this order shall be dealt according to the 'Treatment for Over-generation' provided under Regulation 11 of CERC's RE Tariff Regulations, 2020, which provides as under:

*"In case a renewable energy project, in a given year, generates energy in excess of the capacity utilization factor or plant load factor, as the case may be, specified under these Regulations, the renewable energy project may sell such excess energy to any entity, provided that the first right of refusal for such excess energy shall vest with the concerned beneficiary. In case the concerned beneficiary purchases the excess energy, the tariff for such excess energy shall be 75 percent of the tariff applicable for that year".*

### **3.2 Useful Life of Plant**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper proposed 25 years as useful life for the Biogas based power projects for tariff determination purpose.

#### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

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

CERC in its RE Tariff Regulations, 2020 along with few SERCs has considered the project life for Biogas based power projects as 25 years.

In view of aforesaid, the Commission decides to consider 25 years as useful life for the Biogas based power projects for tariff determination in this order.

### **3.3 Control Period**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper has proposed that the control period of the tariff order for Biogas based power project shall commence from the date of issuance of the new tariff order and shall be valid up to 31 March 2024 (i.e., end of FY 2023-24).

#### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

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

The Commission decides that the Control period of this tariff order shall commence from the date of issue of order till 31st March 2024 (i.e., end of FY 2023-24) unless reviewed earlier or extended.

### **3.4 Tariff Period**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper has proposed tariff period as 25 years which is equivalent to useful life of the Biogas based power projects for tariff determination purpose.

### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

### **Commission's View**

The Commission decides to consider Tariff period equal to useful life of plant i.e., 25 years in this order.

## **3.5 Eligibility Criteria**

### **Proposed in Approach Paper**

In the Approach Paper, it was proposed that the Biogas based power projects that uses 100% biogas-fired engine coupled with Biogas technology using cow dung, agriculture residue, vegetable waste, and other bio-waste as may be approved by MNRE and to be commissioned during new control period from the date of issue of this order to 31/03/2024, shall be eligible to sell power to distribution licensees at the tariff determined by the Commission under this tariff order for useful life of the project.

### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

### **Commission's View**

The Commission decides to retain the eligibility criteria as proposed in the Approach Paper in this order.

## **3.6 Benchmark Capital Cost for Tariff Determination**

### **Proposed in Approach Paper**

The Commission in the Approach Paper proposed to fix benchmark capital cost of **Rs 11.62 Cr/MW** for Biogas based power projects for tariff determination in the control period of this tariff order.

The benchmark capital cost considered by the Commission in the previous tariff order dated 05<sup>th</sup> February 2015 (SMP 17/2014) was Rs 9.25 Cr/MW.

In order to arrive at benchmark capital cost for the Biogas based power projects to be commissioned in new control period, the Commission has gone through the Biogas based power project's capital cost considered by CERC and other SERCs in their recent RE Regulations/ tariff orders.



The Commission has also looked into the change in WPI of steel and E&M during the year 2018 to 2020, the extended control period of previous tariff order and corresponding growth rate based on the data published by the Office of Economic Advisor, Ministry of Commerce, and Industry, GOI.

### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

### **Commission's View**

The CERC RE Tariff Regulations, 2020 consider the normative capital cost benchmark of Rs 11.86 Cr/MW for Biogas based power projects. The normative capital cost proposed in the Approach Paper was based on analysis of growth rate of the normative capital cost in previous control period as well as study of approach followed by other SERC in respective tariff orders / Regulations.

In view of aforesaid, the Commission decides to fix the benchmark capital cost of Rs **11.62** Cr/MW for Biogas based power projects for tariff determination for the control period in this order. The capital cost is inclusive of the cost towards (i) Biogas unit (including pre-processing equipment), (ii) land cost (iii) civil works, (iv) Biogas fired engine & alternator (v) cost towards evacuation arrangement.

## **3.7 Debt Equity Ratio**

### **Proposed in Approach Paper**

The Commission has considered the debt-equity ratio of 70:30 in the Approach Paper. The MPERC RE Tariff Regulations, 2017 provides normative debt-equity ratio is 70:30. The CERC and SERCs are also considered debt-equity ratio as 70:30 for tariff determination purpose. The Tariff policy, 2016 also mentions the same ratio for the tariff determination purpose.

### **Comments/Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The Commission decides to consider the debt-equity ratio of 70:30 for tariff determination purpose, which is in line with the MPERC RE Tariff Regulations, 2017 as well as CERC RE Tariff Regulations, 2020 and provisions in Tariff Policy 2016.

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### **3.8 Return on Equity**

#### **Proposed in Approach Paper**

MPERC RE Tariff regulations, 2017 provides for the Return on Equity as 20% on Pretax basis. The Commission while proposing RoE in the Approach Paper reviewed the current market practices and norms followed by CERC and other SERCs. The CERC RE Tariff Regulations, 2020 provides the normative Return on Equity as 14%. The normative Return on Equity is to be grossed up by the applicable notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the applicable notified Corporate Tax rate for the remaining Tariff Period. Further, in States like Haryana, and Rajasthan the rate of RoE in the case of RE projects is allowed at 14%.

Accordingly, the Commission has proposed a normative Return on Equity as 14%. The normative Return on Equity to be grossed up by the applicable notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the applicable notified Corporate Tax rate for the remaining Tariff Period.

#### **Comments/Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

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

CERC RE Tariff Regulations, 2020 specifies 14% RoE to be grossed up as per applicable tax rate for the Renewable Energy projects including Biogas based power projects. Other SERCs in recent past have also considered 14% RoE for RE tariff determination purpose. The Commission observed that post tax 14 % RoE grossing up by the applicable notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the applicable notified Corporate Tax rate for the remaining Tariff Period is reasonable to strike a balance between the generator and procurer. In view of the above, the Commission decides to consider a normative Return on Equity as 14%. The normative Return on Equity shall be grossed up by the applicable notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the applicable notified Corporate Tax rate for the remaining Tariff Period in this order.

### **3.9 Loan Repayment Period**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper proposed to consider the loan repayment equal to 15 years for tariff determination in this control period.

The MPERC RE Tariff Regulations, 2017 provides for the loan repayment period of 10 years. However, it has been noted that the CERC in its RE Tariff Regulations, 2020 has

recommended the loan repayment period as 15 years. Presently, the RE project proponents are getting loan for 15 years' repayment period. In view of aforesaid, the loan repayment equal to 15 years is proposed for tariff determination in this control period.

### **Comments/ Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

In view of above, the Commission decides to consider the loan repayment period equal to 15 years for tariff determination purpose in this order which is consistent with CERC RE Tariff Regulations, 2020 and present market conditions.

## **3.10 Interest on Term Loan**

### **Proposed in Approach Paper**

MPERC RE Tariff Regulations, 2017 provides that the Commission would decide the interest on term loan in the tariff order. CERC RE Tariff Regulations, 2020 has provided the norms of normative interest rate as two hundred (200) basis points above the average State Bank of India Marginal Cost of Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months. Accordingly, in the approach paper interest on term loan for tariff determination was normative interest rate of two hundred (200) basis points above the average State Bank of India Marginal Cost of Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months i.e., SBI MCLR rate of 7.0% (average of last six months) plus 200 basis points i.e. 9.0% (7.0% + 2.0%).

### **Comments/Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The normative Interest rate on term loan has been proposed by Commission based on the norms of normative interest rate of two hundred (200) above the average State Bank of India Marginal Cost of Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months as recommended in CERC RE Tariff Regulations, 2020. Same norms are being followed by most of the SERCs for fixing the normative interest on term loan. Actual interest rate offered by IREDA and PFC for lending to RE project have also been examined and found to be in same range.

In view of above, the Commission preferred to follow CERC norms based on SBI MCLR rate (one-year tenor) prevalent during the last available six months as elaborated below:

Table No 1: SBI MCLR (one-year tenure) for last six months

Effective rate	Interest rate
10 January 2021	7.0%
10 December 2020	7.0%
10 November 2020	7.0%
10 October 2020	7.0%
10 September 2020	7.0%
10 August 2020	7.0%

The Commission decides to consider a normative interest on loan equal to 9% considering SBI MCLR rate of 7.0% (average of last six months) plus 200 basis points for tariff determination purpose for the control period of this order.

### 3.11 Rate of Depreciation

#### Proposed in Approach Paper

MPERC RE Tariff Regulations, 2017 provides that the capital cost of the asset admitted by the Commission would be the base value for the purpose of determination of depreciation. Further, the salvage value of the asset is considered as 10%, and depreciation is allowed up to a maximum of 90% of the capital cost of the asset. The Commission in the Approach Paper proposed depreciation rate of 4.67% per annum for the first 15 years and the remaining depreciation is spread over the remaining useful life of the plant. This is in line with the method followed by CERC and other SERCs wherein the depreciation is linked with the loan repayment period.

#### Comments/ Suggestions

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

#### Commission's View

In view of above, the Commission decides to retain the depreciation rate of 4.67% per annum for the first 15 years and then the remaining depreciation (20%) to be spread over the remaining useful life of 10 years as proposed in the Approach paper, for a maximum of 90 % of the Capital Cost of the assets.

### 3.12 Working Capital

#### Proposed in Approach Paper

The MPERC RE Tariff Regulations, 2017 provides the following components of working capital for Biogas based power projects:

- i) O&M expenses for 1 month

- ii) Receivables equivalent to 2 months of energy charges
- iii) Maintenance spares @ 15% of O&M expenses.
- iv) Fuel cost for four months equivalent to normative PLF.

CERC and other SERCs like UERC, RERC and HERC have also followed similar approach while deciding working capital requirements for Biogas based power projects. In view of the above, it is proposed to consider working capital components as per MPERC RE Tariff Regulations, 2017.

### **Comments/ Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The Commission decides to consider the following components of working capital for tariff determination purpose:

- i) O&M expenses for 1 month
- ii) Receivables equivalent to 2 months of energy charges
- iii) Maintenance spares @ 15% of O&M expenses.
- iv) Fuel cost for four months equivalent to normative PLF.

## **3.13 Interest on Working Capital**

### **Proposed in the Approach Paper**

CERC RE Tariff Regulations, 2020 has provided the norms for interest on working capital as three hundred and fifty (350) basis points above the average State Bank of India Marginal Cost of Lending Rate (MCLR) (one-year tenor) prevalent during the last available six months. Accordingly, in the Approach Paper interest on working capital for tariff determination was proposed as SBI MCLR rate of 7.0% (average of last six months) plus 350 basis points i.e., 10.5% (7.0% + 3.5%).

### **Comments / Suggestions**

The Commission has not received any comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The Commission decides to consider the interest on working capital for tariff determination as 10.5% i.e., 350 basis points above SBI MCLR rate of 7.0% (average of last six months), similar to CERC RE tariff Regulations, 2020 in this order.

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### **3.14 Operations and Maintenance Cost**

#### **Proposed in Approach Paper**

The MPERC RE Tariff Regulations, 2017 defines Operations and Maintenance (O&M) expenses as the expenditure incurred on operation and maintenance of the project, or part thereof, and includes the expenditure on manpower, repairs, spares, consumables, insurances, and overheads.

The Commission in the approach paper has proposed to fix O&M cost for Biogas based Power projects as 4% of the capital cost during first year of operation with an annual escalation factor of 3.84% over the useful life of the plant.

The CERC in its RE Tariff Regulations, 2020 provides for annual escalation factor of 3.84% for O&M cost escalation over useful life of plant. This has been derived by CERC based on changes in WPI and CPI during the last five years (FY 2014-15 to FY 2018-19).

#### **Comments/ Suggestions**

The Commission has not received any suggestions/comments from the stakeholders in this regard.

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

The Commission in its earlier order dated 05<sup>th</sup> February 2015 had considered O&M expenses at the rate of 4% of the Capital Cost with annual escalation of 5.72 %. It has been observed that in CERC RE Regulations, 2020, the annual escalation rate is revised to 3.84% with respect to change in WPI and CPI during last 5 years. In view of this, the Commission decides to fix normative O&M cost as 4% of the capital cost during first year of operation with an annual escalation at the rate of 3.84% over the useful life of the plant for the projects commissioned during the control period of this order.

### **3.15 Plant Load Factor**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper has proposed to consider plant load factor as 90% for tariff determination purpose.

#### **Comments/ Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders.

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

For Biogas based power plants, MPERC RE Tariff Regulations, 2017 provides a normative Plant Load Factor equal to 70% during 1st year of operation and 80% from 2nd year

onward for tariff determination purpose. CERC RE Tariff Regulations, 2020 provides for a normative Plant Load Factor of 90% for Biogas power plants. Other SERC's has also followed the CERC approach while specifying PLF for the Biogas based power projects. In view of above, the Commission decides to consider the normative Plant Load Factor of 90 % for the Biogas based power project for tariff determination purpose in this order.

### **3.16 Auxiliary Consumption**

#### **Proposed in Approach Paper**

The Commission in the Approach Paper has proposed normative auxiliary consumption at 10 % of gross generation for tariff determination purpose, according to MPERC RE Tariff Regulations, 2017.

The Commission in its earlier tariff order dated 05<sup>th</sup> February 2015 (SMP 27 /2014) had considered the same normative value for the auxiliary consumption.

#### **Comments/ Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders.

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

The Commission decides to fix the normative value of auxiliary consumption as 10% of the gross generation for tariff determination purpose for the control period of this order, which is also in line with the MPERC RE Tariff Regulations, 2017.

### **3.17 Cost of Fuel**

#### **Proposed in Approach Paper**

The Commission in the Approach paper has proposed that the feedstock suitable for Biogas based power plants shall consist of agricultural residue (with high cellulosic content) like Maize stalk, Paddy straw, Cane crush or it can be cow dung/ poultry manure, food industry waste, and segregated organic urban waste. The Commission in the discussion paper opined that the composition of feedstock/substrates which goes into the digester of Biogas based power plant depends on the availability of feedstock in a particular State therefore, its composition and cost may not be the same for all States.

In view of above, the Commission preferred to decide the normative fuel cost for determination of variable cost component of Biogas tariff after examining the comments/suggestions received from the stakeholders in this regard.

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**Comments/Suggestions**

The Commission has not received any Comments/ suggestions from the stakeholders in this regard.

**Commission's View**

MPERC RE Regulations, 2017 provides feedstock cost as Rs 175/MT with escalation of 5.72 % per annum considering 100% cow dung/manure as feedstock for biogas plant.

The Commission has examined the feedstock availability in the state of Madhya Pradesh and observed that substrate consisting of organic fraction of MSW, Cow dung /manure, and agricultural crop residue can be used as feedstock in Biogas based power plants. The experience in Madhya Pradesh so far shows that the organic fraction of MSW is being primarily used for the purpose of producing Bio CNG and not for power generation, example of the aforesaid experience is Indore. Experience elsewhere in the country shows that for power generation inorganic/ dry fraction of MSW is being used, example being Delhi and few other cities. Further, it was observed that cow dung/manure is being used in Jabalpur city of Madhya Pradesh for producing Biogas, to be utilized for power generation. However, it has been observed that in spite of the notification of Biogas related Regulations in 2017 by MPERC, use of agricultural residue for biogas-based power projects has yet to be initiated in Madhya Pradesh.

Notwithstanding the above-mentioned scenario, it is felt necessary to promote use of agriculture crop residue such as soyabean or paddy in Madhya Pradesh for the purpose of generating power from the Biogas or for use as direct fuel to generate electrical power. This is also intended to minimize occurrence of crop burning resulting in adverse environment consequences. Moreover, cow dung/manure being available in substantial quantity especially in rural areas, make sense to promote a mix of agricultural crop residue and cow dung/manure as feedstock in appropriate proportion to produce Biogas and then to generate electrical power. A mix of these two feedstocks would ensure better efficiency because the potential of generating Biogas using agricultural crop residue such as paddy is almost five times that of using cow dung. Use of organic fraction of MSW in the feedstock mix for generating electric power using Biogas is currently not being recommended, as it is observed that production of Bio CNG fuel seems to be preferred option for the same. It is also noteworthy that, the potential of Biogas using organic fraction of MSW is almost two and half times lower than that using agricultural crop residue. Therefore, in view of abundance of cow dung, environment related advantages of using agriculture crop residue and higher potential to generate Biogas coupled with current experience of limited use of organic fraction of MSW for producing Bio CNG in Madhya Pradesh, the Commission feels it appropriate that the feedstock mix for Biogas production to generate power in the state may be limited to agricultural residue and cow dung/manure for Tariff determination purpose.



Considering the high potential of agricultural crop residue to produce Biogas, optimal ratio for Madhya Pradesh appears to be 40% Cow dung/manure, and 60% agricultural crop residue for the purpose of tariff determination. This is also in line with CERC consideration for tariff determination.

Based on above, the cost of for a representative feedstock consisting of 40% Cow dung/manure, and 60% agricultural crop residue for FY 2021-22 is worked out as given below:

Table No. 2: Cost of for a Representative Feedstock

S.No.	Feedstock composition for typical Biogas based power Plant	60% Agricultural Crop Residue + 40% Cow dung /manure
1	Cost / per MT of dry agriculture crop residue having GCV of 3600 Kcal/kg for FY 2021-22 considering 5% escalation over base cost determined in MPERC RE Tariff Regulations, 2017	Rs 3038 / MT
2	Cost/MT of agricultural crop residue with 55 % dry solid fraction to be used in Biogas based power plant	55% of (Rs 3038) = Rs 1671 /MT
3	Cost/MT of cow dung/manure with 18 % dry solid fraction to be used in Biogas based power plants for FY 2021-22. (Considering 5.72% escalation over base cost determined in MPERC RE Tariff Regulations, 2017)	Rs 214 /MT
4	Considering 40% Cow dung/manure, and 60% agricultural crop residue, weighted average representative feedstock cost for determination of variable component of Tariff	$(0.6 * 1671) + (0.4 * 214) = \text{Rs } 1088 / \text{MT}$

Hence, the Commission has considered Rs 1088/MT as representative feedstock cost for biogas plant for base year of the control period with escalation of 5 % p.a. over the useful life of the plant for tariff determination purpose.

### 3.18 Specific Fuel Consumption

#### Proposed in Approach Paper

The Commission in the approach paper has proposed that Specific Fuel consumption is a function of Biogas Yield from Biogas plant; whereas Biogas yield depends on the type of feedstock/substrates that goes into the digester of Biogas based power plant.

Therefore, it is preferred to fix the value of normative Specific Fuel Consumption after examining the comments received from stakeholder with regard to the normative representative feedstock composition for Biogas based power plant in the state.

### Comments/Suggestions

The Commission has not received any Comments/ suggestions from the stakeholders.

### Commission's View

The Commission in its earlier tariff order dated 05<sup>th</sup> February 2015 (in SMP 27/2014) had considered the specific fuel consumption as 10.7 kg/kWh considering 100 % cow dung as feedstock for biogas-based power plants. CERC and other SERCs has considered specific fuel consumption as 3 kg/kWh considering 40% Cow dung/manure, and 60% agricultural crop residue as feedstock.

As recommended by the MNRE, the normative Station Heat Rate of 2150 kCal/kWh has been considered for typical biogas based power plant. Biogas produced from substrate mix of cow dung / manure and agricultural crop residues would typically have 55% methane. The net calorific value of methane is 8750 Kcal/Nm<sup>3</sup>. Hence for biogas with 55% methane the calorific value would be around 4812 Kcal/Nm<sup>3</sup>.

The Biogas yield of different feedstock varies depending upon the characteristics of individual substrate. MNRE has suggested typical yields for representative substrates as given in table below:

Table 3: MNRE suggested typical yields for representative substrates

<b>Substrates</b>	<b>Percentage of Dry solids</b>	<b>Biogas yield cum/MT as per CERC/MNRE</b>
<b>Agriculture crop residues</b>	55 %	255
<b>Cow Dung/manure</b>	18 %	45

The Specific fuel consumption for representative feedstock of 40% Cow dung/manure, and 60% agricultural crop residue is worked out as shown in table below:

Table 4: Specific fuel consumption for representative feedstock

Feedstock	Feedstock ratio considered	Biogas yield cum/MT as per CERC/MNRE	Biogas yield in cum/MT by weight
1	2	3	4= 2*3
Agriculture crop residue for 55% dry solid	60%	255	153
Cow dung/manure for 18% dry solid	40%	45	18
<b>Average biogas yield in cum/MT</b>			<b>171</b>
GCV of biogas		4812	kcal/cum
SHR of biogas plant		2150	Kcal/kwh
<b>Specific fuel consumption (SHR/ GCV in kcal/cum * Average biogas yield)</b>		<b>2.61</b>	<b>Kg/kWh</b>

Hence, The Commission decides to consider the specific fuel consumption equal to 2.61 kg/kWh for tariff determination purpose for control period of this order.

### 3.19 Income from Manure

#### Proposed in Approach Paper

The Commission in the Approach paper has proposed to consider income from manure after examining the suggestions from stakeholders in this regard.

#### Comments/Suggestions

The Commission has not received any Comments/ suggestions from the stakeholders.

#### Commission's View

CERC/ SERCs like RERC, UERC and HERC have considered the income from manure while determining the tariff for sale of electricity generated from biogas-based power plant. MNRE / CERC had recommended to consider by-product recovery at rate of 10 % of the feedstock cost. In view of the aforesaid, the Commission decides to consider income from the manure as 10% of the Feedstock cost. This cost is set off against the Fuel Cost during the determination of Tariff.

### 3.20 Discount Factor

#### Commission's View

The MPERC RE Tariff Regulations, 2017 define the discount factor as post-tax weighted average cost of capital (WACC). The CERC RE tariff Regulations, 2020 also provides for same definition of discount factor. In line with above provisions, the Commission has computed the discount factor as given below:

WACC = Cost of Debt + Cost of Equity

Cost of Debt =  $0.70 \times (\text{Market Rate of Interest}) \times (1 - \text{Corporate tax})$

Cost of Equity =  $0.30 \times \text{Return on Equity (i.e., normative 14\%)}$

Interest Rate considered for the loan component (i.e., 70% of the capital cost) is 9%. For the equity component (i.e., 30% of the capital cost), the rate of Return on Equity (ROE) is considered at a post-tax rate of 14%, as a normative factor. Further, the Corporate Tax rate has been considered as 34.94% (30% for domestic companies, plus applicable surcharge (12%) and Health and Education Cess (4%)). The computation is given below:

Discount Factor (WACC) =  $[(0.70 \times 9\%) \times (1 - 34.94\%)] + (0.30 \times 14\%) = 8.30\%$

In view of above, the Commission decides to consider the discount factor as 8.30% for levelized tariff calculation in this order.

## 4 Treatment for Subsidy or Incentive received from Central / State Government

#### Proposed in Approach Paper

The MPERC RE Tariff Regulations, 2017 provides that the Commission shall indicate in the tariff order whether any subsidy or incentive offered by the Central or State Government is taken into consideration or not.

It has been noted that the Central Financial Assistance (CFA) of Rs 300 lakh / MW is available from the Ministry of New and Renewable Energy (MNRE), Government of India to the eligible Biogas based power projects (as per MNRE File No. 2/222/2016-17-WTE, dated 28.02.2020). This is significant amount which is almost 25-30% of the capital cost. Hence, for clarity, it has proposed determine to tariff with and without factor in the subsidy component.

The MP Power Management Company shall confirm the receipt of MNRE subsidy from the State Nodal Agency before signing Power Purchase Agreement with Biogas power projects developers.

To factor in the benefit of Accelerated depreciation available from central government, the Commission proposed to specify separate tariff by taking into account the accelerated depreciation (AD) benefit as well as without considering the AD benefit.

Following principles was proposed to determine the per-unit AD benefit:

As per the current provisions under Income Tax Act, RE project owners can avail accelerated depreciation at the rate of 40% in the first year on a **written-down value (WDV)** basis. In addition to this 40% depreciation, an additional depreciation of 20% in the initial year is extended to new assets acquired by power generation companies vide amendment in the section 32, sub-section (1) clause (ia) of the Income Tax Act, 1961. With this, the projects can avail 60% depreciation in the first year of commissioning. From the second year onwards, depreciation at the rate of 40% on written-down-value (WDV) is available. The Commission has considered the above depreciation rate while calculating per unit AD benefit in this order.

Following principles have been considered for ascertaining the Income Tax benefit on account of accelerated or additional depreciation for the purpose of tariff determination:

- a. The assessment of benefit shall be based on normative Capital Cost, book depreciation rate of 5.28% per annum, accelerated/ additional depreciation rate (i.e., 60% in the first year and 40% from Second year onwards) as per the relevant provisions of the Income Tax Act and the Corporate Income Tax rate.
- b. The Capitalisation of RE Projects for the full financial year;
- c. The Per-unit benefit shall be derived on levellised basis at a discounting factor equivalent to the post-tax weighted average cost of capital.

### **Comments/Suggestions**

The Commission has not received any comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The Commission decides to determine tariff with and without considering the subsidy /incentive available to Biogas based project proponent from the MNRE, GoI vide its administrative approval MNRE File No. 2/222/2016-17-WTE, dated 28.02.2020. The MPPMCL shall confirm the receipt of such subsidy / incentive to Biogas based project proponent from the State Nodal Agency and accordingly execute the Power Purchase Agreement as per applicable Tariff specified in this order.

To factor-in the benefit of Accelerated depreciation available from central government, the Commission decides to specify separate tariff by taking into account the accelerated depreciation (AD) benefit as well as without considering the AD benefit.

Following principles shall be adopted to determine the per-unit AD benefit:

As per the current provisions under Income Tax Act, RE project owners can avail accelerated depreciation at the rate of 40% in the first year on a written-down value (WDV) basis. In addition to this 40% depreciation, an additional depreciation of 20% in the initial year is extended to new assets acquired by power generation companies vide amendment in the section 32, sub-section (1) clause (ia) of the Income Tax Act, 1961. With this, the projects can avail 60% depreciation in the first year of commissioning. From the second year onwards, depreciation at the rate of 40% on WDV is available.

Following principles shall be adopted for ascertaining the Income Tax benefit on account of accelerated or additional depreciation for the purpose of tariff determination:

- a. The assessment of benefit shall be based on normative Capital Cost, book depreciation rate of 5.28% per annum, accelerated/ additional depreciation rate (i.e., 60% in the first year and 40% from Second year onwards) as per the relevant provisions of the Income Tax Act and the Corporate Income Tax rate.
- b. The Capitalisation of RE Projects for the full financial year;
- c. The Per-unit benefit shall be derived on levellised basis at a discounting factor equivalent to the post-tax weighted average cost of capital.

It is further clarified that in case the generating company is not claiming accelerated depreciation benefit, the Power Purchase Agreement entered into with the generating company shall include an undertaking by the generating company with certificate from the Chartered Accountant indicating that accelerated benefit would not be availed for the project.

Provided also that if accelerated or higher depreciation benefit has been claimed despite submission of the undertaking then the MPPMCL / distribution licensee shall be entitled recover amount wrongly claimed along with penal charges at the rate of 1.50% per month calculated on daily basis.

## **5 Computation of Tariff for Biogas based Power Projects**

The operating and financial parameters considered by the Commission for tariff determination for the control period in this order are as given below:

## Parameters for tariff determination of Biogas based Power projects

Parameters	Biogas based power Projects
<b>Project Cost and O&amp;M</b>	
Total Project Cost (Rs. Lakh/MW) Without Subsidy	1162
Project Life in Years	25
MNRE Subsidy (Rs. Lakh/MW)	300
Total Project Cost (Rs. Lakh/MW) With Subsidy	862
Normative O&M Cost for First Year (Rs. Lakh/MW)	4% of Project Cost (Rs 46.48 Lakhs/MW)
Escalation in O&M (per annum from 2nd year)	3.84%
<b>Performance Parameters</b>	
PLF	90 %
Auxiliary Consumption	10 %
Specific Fuel consumption	2.61 kg/kWh
Feedstock Cost (Fuel cost)	Rs 1088/MT
Income from manure	10% of the feedstock cost
<b>Financial Parameters</b>	
Debt-Equity Ratio	70:30
Term of Loan in Years	15
Interest on Term Loan	9 %
Interest on Working Capital	10.5 %
Depreciation	4.67% (up to 15 years), 2% (16 to 25 years)
Base rate of Return on Equity	14 %
Minimum Alternate Tax (MAT)	17.47%
Corporate Tax rate	34.94%
Discount Factor	8.30%
<b>Biogas based Power Projects Tariff without capital subsidy</b>	
Levelized Fixed charges (without AD)	Rs 3.26 / kWh
AD Benefit	Rs 0.21 / kWh
Levelized Variable charges	Rs 4.45/ kWh
Total Levelized Tariff (without AD)	Rs 7.71 / kWh
Total Levelized Tariff (with AD)	Rs 7.50 / kWh
<b>Biogas based Power Projects Tariff with capital subsidy</b>	
Levelized Fixed charges (without AD)	Rs 2.73 / kWh
AD Benefit	Rs 0.16 / kWh
Levelized Variable charges	Rs 4.45 / kWh
Total Levelized Tariff (without AD)	Rs 7.18 / kWh
Total Levelized Tariff (with AD)	Rs 7.02 / kWh

**Detailed tariff computation sheets for Biogas based power projects without subsidy and with subsidy are enclosed as Annexure - I & Annexure - II respectively, with this order.**

## **6 Other Issues**

### **Proposed in Approach Paper**

In the Approach Paper, the Commission has proposed arrangement for power purchase agreement between the Biogas based power project owner and MPPMCL, reactive energy charges applicable to Biogas based power project as per provisions under relevant regulations / code notified by MPERC/CEA / CERC depending on the case. The Commission in the Approach paper also proposed the mechanism of sharing of CDM benefits as per the provisions under the MPERC RE Regulations, 2017.

### **Comments/ Suggestions**

The Commission has not received any comments/ suggestions from the stakeholders in this regard.

### **Commission's View**

The Commission decides to deal with the power purchase arrangement, Reactive energy charges and sharing of CDM benefit sharing issues as provided below:

#### **6.1 Power Purchase Agreement**

The energy generated from the Biogas based power projects will be procured centrally by the M.P. Power Management Co. Ltd. (MPPMCL) at the applicable tariff determined by the Commission in this order. The Power Purchase Agreement shall be signed between the developer and the MPPMCL. The agreement will be for the sale of electricity for a period of 25 years from the date of commissioning of the plant. The energy so procured will be allocated by MPPMCL to the three distribution licensees on the basis of actual energy input in the previous financial year. MPPMCL will have a back-to-back power supply agreement with the Distribution Licensees. The developer may execute the agreement with MPPMCL before commissioning of the plant. The developer shall file Commissioning Certificate with all relevant documents to the Procurer separately.

The Biogas based power developers are required to get all the required statutory clearances/approvals/consents from the government before entering into agreement with M.P. Power Management Company Limited.

#### **6.2 Reactive Power Supply**

The Biogas based power project are deemed to be generating stations of a generating company and all functions, obligations, and duties assigned to such stations under the Electricity Act, 2003 would apply to these power stations. These stations would be



required to abide by all applicable codes notified by MPERC / CERC /CEA as the case may be.

The Commission determines the charges for KVARh consumption from the grid time to time. A rate prevalent in the state would be applicable to Biogas based power projects. Presently applicable rate is 27 paise per unit. Reactive energy charges as applicable would be paid by the developer to the Distribution Licensees in whose territorial area the Biogas based power project is located.

### **6.3 Sharing of Clean Development Mechanism (CDM) Benefits**

Regulations 18 of MPERC RE Tariff Regulations, 2017 provides mechanism for sharing of CDM benefit by the generator with the power procurer.

#### **18. Sharing of CDM Benefits:**

- (1) The proceeds of carbon credit from approved CDM project shall be shared between generating company and concerned beneficiaries in the following manner, namely-*
- (a) 100% of the gross proceeds on account of CDM benefit to be retained by the project developer in the first year after the date of commercial operation of the generating station;*
  - (b) In the second year, the share of the beneficiaries shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, where after the proceeds shall be shared in equal proportion, by the power generating company and the beneficiaries."*

The Commission decides to retain the above provisions for sharing of CDM benefits for this control period. However, Biogas based power projects availing CDM benefit shall share the CDM proceeds annually as per above, by 31<sup>st</sup> March of every year with an affidavit stating the annual energy generation (date of commissioning as starting point of the first year), carbon credits generated, and receipts in this regard.

## **7 Any Other Provisions**

### **Proposed in Approach Paper**

The Commission in the Approach Paper proposed that all other provisions which are not mentioned in the approach paper explicitly for Biogas based power projects like scheduling, Wheeling charges for Third-Party sale/captive consumption, Metering & Billing, payment mechanism, Default Provisions for Third-Party Sale or sale to utility, etc. shall be guided by the relevant provisions of Madhya Pradesh Electricity Regulatory Commission (Co-generation and Generation from Renewable sources of Energy), Regulations as applicable.

### **Comments/Suggestions**

No Comments/ suggestions were received from the stakeholders.

### **Commission's View**

All other provisions which are not mentioned in this tariff order explicitly Biogas based power projects like scheduling, Wheeling charges for Third-Party sale/captive consumption, Metering & Billing, payment mechanism, Default Provisions for Third-Party Sale or sale to utilities, etc. shall be governed by the provisions under the relevant Regulations of the Commission.

## **8 Applicability of the Order**

The tariff determined in this order shall be applicable to all Biogas based power project using 100 % Biogas fired engine commissioned on or after the date of issue of this order for sale of electricity to the distribution licensees in the state. The control period of this tariff order shall commence from the date of issue of this order till 31<sup>st</sup> March 2024 (i.e., end of FY 2023-24) unless reviewed earlier or extended.

The tariff determined by the Commission under this order shall be the ceiling tariff, the distribution licensee may procure electricity from the interested Biogas based Power project proponent/ generator at a tariff lower than the tariff determined by the Commission. The Biogas based Power projects commissioned during the control period of the previous Tariff order dated 05<sup>th</sup> February 2015 (in SMP 27/2014) shall be governed by the terms and conditions given in the said tariff order.

**(Shashi Bhushan Pathak)**

**Member**

**(Mukul Dhariwal)**

**Member**

**(S.P.S Parihar)**

**Chairman**

**Place: Bhopal**

**Date: 07/12/2021**

:::::

**Annexure - I**

**Tariff Computation for Biogas based Power Projects (without subsidy)**

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
<b>MW</b>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<b>Net Energy sold (lakh kWh)</b>	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00
<b>O&amp;M</b>	46.48	48.26	50.12	52.04	54.04	56.12	58.27	60.51	62.83	65.25	67.75	70.35	73.05	75.86	78.77	81.80	84.94	88.20	91.59	95.10	98.76	102.55	106.49	110.57	114.82
<b>Depreciation</b>	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	54.23	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24	23.24
<b>Interest on term loan</b>	70.77	65.89	61.01	56.12	51.24	46.36	41.48	36.60	31.72	26.84	21.96	17.08	12.20	7.32	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Interest on working capital</b>	16.04	16.57	17.13	17.72	18.34	18.99	19.69	20.42	21.19	22.00	22.86	23.76	24.71	25.71	26.76	27.36	28.62	29.93	31.31	32.76	34.56	36.15	37.82	39.57	41.41
<b>Return on equity</b>	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	59.14	75.02	75.02	75.02	75.02
<b>Fixed cost (Rs Lakh)</b>	246.65	244.08	241.61	239.25	236.99	234.84	232.81	230.89	229.11	227.45	225.93	224.55	223.33	222.25	221.34	191.54	195.93	200.51	205.27	210.24	231.57	236.96	242.56	248.40	254.48
<b>Variable Cost (Rs Lakhs)</b>	201.63	211.71	222.30	233.41	245.08	257.34	270.20	283.71	297.90	312.79	328.43	344.86	362.10	380.20	399.21	419.18	440.13	462.14	485.25	509.51	534.99	561.73	589.82	619.31	650.28
<b>Fixed Charges (Rs/kWh)</b>	3.47	3.44	3.40	3.37	3.34	3.31	3.28	3.25	3.23	3.20	3.18	3.16	3.15	3.13	3.12	2.70	2.76	2.82	2.89	2.96	3.26	3.34	3.42	3.50	3.58
<b>Variable Charges (Rs/ kWh)</b>	<b>2.84</b>	2.98	3.13	3.29	3.45	3.62	3.81	4.00	4.20	4.41	4.63	4.86	5.10	5.35	5.62	5.90	6.20	6.51	6.83	7.18	7.53	7.91	8.31	8.72	9.16
<b>Discounting Factor</b>	8.30%																								
<b>Levellised Tariff</b>																									
Levelized Fixed charges (without AD)										Rs 3.26 / kWh															
AD Benefit										Rs 0.21 / kWh															
Levelized Variable Charges										Rs 4.45/ kWh															
Total Levelized Tariff (without AD)										Rs 7.71 / kWh															
Total Levelized Tariff (with AD)										Rs 7.50 / kWh															

**Annexure - II**

**Tariff Computation for Biogas based Power Projects (with subsidy)**

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
<b>MW</b>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<b>Net Energy sold (lakh kWh)</b>	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00
<b>O&amp;M</b>	46.48	48.26	50.12	52.04	54.04	56.12	58.27	60.51	62.83	65.25	67.75	70.35	73.05	75.86	78.77	81.80	84.94	88.20	91.59	95.10	98.76	102.55	106.49	110.57	114.82
<b>Depreciation</b>	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	40.23	17.24	17.24	17.24	17.24	17.24	17.24	17.24	17.24	17.24	17.24
<b>Interest on term loan</b>	52.50	48.88	45.26	41.63	38.01	34.39	30.77	27.15	23.53	19.91	16.29	12.67	9.05	5.43	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Interest on working capital</b>	15.19	15.74	16.32	16.94	17.58	18.26	18.98	19.73	20.52	21.36	22.23	23.16	24.13	25.15	26.23	26.98	28.24	29.55	30.93	32.38	34.11	35.70	37.37	39.12	40.95
<b>Return on equity</b>	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	43.87	55.65	55.65	55.65	55.65
<b>Fixed cost (Rs Lakh)</b>	198.27	196.98	195.79	194.71	193.73	192.87	192.12	191.49	190.98	190.61	190.37	190.28	190.33	190.54	190.91	169.89	174.28	178.86	183.63	188.59	205.75	211.14	216.74	222.58	228.67
<b>Variable Cost (Rs Lakhs)</b>	201.63	211.71	222.30	233.41	245.08	257.34	270.20	283.71	297.90	312.79	328.43	344.86	362.10	380.20	399.21	419.18	440.13	462.14	485.25	509.51	534.99	561.73	589.82	619.31	650.28
<b>Fixed Charges (Rs/kWh)</b>	2.79	2.77	2.76	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.68	2.68	2.68	2.68	2.69	2.39	2.45	2.52	2.59	2.66	2.90	2.97	3.05	3.13	3.22
<b>Variable Charges (Rs/ kwh)</b>	<b>2.84</b>	2.98	3.13	3.29	3.45	3.62	3.81	4.00	4.20	4.41	4.63	4.86	5.10	5.35	5.62	5.90	6.20	6.51	6.83	7.18	7.53	7.91	8.31	8.72	9.16
<b>Discounting Factor</b>	8.30%																								
<b>Levellised Tariff</b>																									
Levelized Fixed charges (without AD)										Rs 2.73 / kWh															
AD Benefit										Rs 0.16 / kWh															
Levelized Variable Charges										Rs 4.45 / kWh															
Total Levelized Tariff (without AD)										Rs 7.18 / kWh															
Total Levelized Tariff (with AD)										Rs 7.02 / kWh															