

**Before the**  
**MAHARASHTRA ELECTRICITY REGULATORY COMMISSION**  
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**CASE No. 204 of 2018**

**In the matter of**

**Determination of Generic Tariffs for Renewable Energy for FY 2018-19**

**Coram**

**Shri. Anand B. Kulkarni, Chairperson**  
**Shri. I.M. Bohari, Member**  
**Shri. Mukesh Khullar, Member**

**DRAFT ORDER**

**Dated: 09 July, 2018**

1. The Commission notified the MERC (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2015, ('RE Tariff Regulations') on 10 November, 2015. The Regulations specify the terms and conditions and the procedure for determination of Generic Tariff in respect of the following types Renewable Energy (RE) Generation Projects:
  - (a) Wind Power Projects;
  - (b) Biomass-based Power Projects;
  - (c) Non-Fossil Fuel-based Co-Generation Projects;
  - (d) Mini/Micro and other Small Hydro Power Projects;
  - (e) Solar Photo Voltaic (PV) and Solar Thermal Power Projects;
  - (f) Solar Roof-top PV Systems Power Projects.

2. Regulation 9.1 of the RE Tariff Regulations requires the Commission to determine the Generic Tariffs for RE technologies for which the norms have been specified in the Regulations:

*"9.1 The Commission shall notify the generic tariff at the beginning of each year of the Review Period considering the norms specified by the Central Commission from time to time with regard to the respective RE technologies:*

*Provided that, for the first year (FY 2015-16) of the Review Period, the generic tariff may be determined by the Commission within three months from the date of notification of these Regulations."*

3. The Commission, vide its Order dated 135 of 2015 dated 25<sup>th</sup> January 2016, had determined the Generic Tariff for RE Technologies for FY 2015-16. Further, the Commission, vide its Order dated 29 April, 2016 in Case No 45 of 2016, had determined the Generic Tariff for RE Technologies for FY 2016-17. The Commission also determined the Generic RE Tariff for FY 2017-18 vide its Order dated 28 April, 2017 in Case No 33 of 2017.
4. In discharge of its mandate under Regulation 9.1 and through this draft Order, the Commission proposed to determine the Generic Tariff for RE Technologies for FY 2018-19 to be applicable for the RE Projects which would be commissioned during that year. Commission invited public comments, objections and suggestions on the draft order.

## **1. BACKGROUND**

The Ministry of New & Renewable Energy (MNRE), Government of India has set ambitious target of achieving 175 GW target for installed Renewable Energy capacity by 2022. Over the years, various policy initiatives have been taken to promote renewable energy capacity in India. Renewable Energy (RE) generic tariffs are one of such measures to incentivise the industry. These incentives and various policy initiatives have reduced gap between tariffs of conventional power projects and renewable energy projects. Guidelines have been issued for carrying out competitive bidding for various renewable energy projects and tariffs discovered by competitive bidding are considerably lower than RE generic tariffs.

It has been observed that since the rates discovered by competitive bidding process are considerably lower than the generic tariffs, many of the distribution companies have carried out the bidding process than to purchase renewable energy at generic tariff.

### **1.1. PROPOSED AMENDMENT IN TARIFF POLICY 2016**

The Ministry of Power (MoP) has proposed amendment in Tariff Policy, 2016 on 30 May 2018. As per para 6.4 of the proposed amendment, the states are encouraged to procure power from renewable energy sources above the notified capacity through competitive bidding to keep the tariff low. The portion of proposed amendment of tariff policy is quoted below:

*“States shall endeavor to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Procurement of power by Distribution Licensee from renewable energy sources from projects above the notified capacity shall be done through competitive bidding process, from the date to be notified by the Central Government.*

*However, till such notification, any such procurement of power from renewable energy sources projects may be done under Section 62 of the Electricity Act, 2003.”*

The Central Government has notified competitive bidding guidelines for solar & wind power projects on August 2017 & December 2017 respectively. As per bidding guidelines,

intra-state wind projects below 25 MW and solar projects below 5 MW are excluded from applicability of tariff based competitive bidding for procurement of power from grid connected solar and wind power projects.

The Ministry of New & Renewable Energy (MNRE), Government of India has further clarified that the State Electricity Commissions (SERCs) have statutory powers to determine tariff for procuring power from RE projects not covered under competitive bidding guidelines.

However, this Commission has received requests for deviation in bidding guidelines to allow participation of RE developers below notified capacity also in competitive bidding. Recently, the Commission has allowed such deviations to Maharashtra State Electricity Distribution Company Ltd (MSEDCL) in Case No. 131 of 2018.

## **2. COMMON PARAMETERS FOR DETERMINATION OF GENERIC TARIFF**

This Section sets out the norms for determination of the Generic levelised Tariff which are applicable to all types of RE technologies as specified in the RE Tariff Regulations.

### **2.1. TARIFF PHILOSOPHY**

The Commission emphasizes that purpose of setting Financial Principles and Technology-specific parameters for each eligible RE technology is two-fold. It is not only to give assured returns to the RE developers in order to make the project viable, but also to cap cost of renewable energy purchase payable by distribution licensees. This cost is eventually borne by the consumers.

However, it is observed that RE tariffs discovered recently by various distribution licensees within the State of Maharashtra are considerably lower than the earlier RE Generic Tariffs determined by this Commission calculated in accordance with Financial Principles and Technology-specific parameters in RE Tariff Regulations, 2015. Many of these bids are by projects commissioned or to be commissioned in FY 2018-19. In view of above, adoption of generic tariff is exposed to risk of being misused for profiteering of RE generators at expense of end consumers.

As per Section 86 (a) of Electricity Act 2003 reads as follows:

*“(1) The State Commission shall discharge the following functions, namely: -  
(a) Determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the State:”*

In view of above, this Commission has adopted two approaches for determination of Generic Tariff for eligible RE technologies:

#### **2.1.1. Approach-1: No Precedent of Competitive Bidding**

If no tariff is adopted by this Commission for eligible RE technology by way of competitive bidding carried out by any distribution licensee within the State of Maharashtra; then

Generic Tariff is calculated as per Financial Principles and Technology-specific parameters in RE Tariff Regulations, 2015.

### **2.1.2. Approach-2: Precedent of Competitive Bidding**

If tariff adopted by this Commission which is discovered through competitive bidding process carried out by any distribution licensee within the State of Maharashtra is lower than the tariff calculated by the way of Financial Principles and Technology-specific parameters as defined in RE Tariff Regulations, 2015, then such tariff discovered through competitive bidding is considered to be the Generic Tariff.

If any such tariff by way of competitive bidding is adopted and is higher than tariff calculated by Financial Principles and Technology-specific parameters in RE Tariff Regulations, 2015; then latter is defined to be Generic Tariff.

## **2.2. REVIEW PERIOD**

Regulation 6.1 of the RE Tariff Regulations specifies that the Review Period for determination of the Tariff for RE Projects shall be five financial years, starting from the date of publication of the Regulations (i.e. 10 November, 2015). Thus, FY 2015-16 was the first year of the Review Period and FY 2018-19 is the fourth year of this Review Period.

## **2.3. GENERAL & FINANCIAL PRINCIPLES (MERC RE TARIFF REGULATIONS 2015) FOR APPROACH-1**

### **2.3.1. TARIFF STRUCTURE**

Regulation 10 specifies that the Tariff for RE Projects shall be a single-part Tariff consisting of the following fixed cost components:

- (a) Return on Equity;
- (b) Interest on loan capital;
- (c) Depreciation;
- (d) Interest on working capital;
- (e) Operation and maintenance expenses.

For RE technologies with a fuel cost component, like Biomass-based Projects and Non-Fossil Fuel-based Co-Generation Projects, a single-part Tariff with two components, viz., fixed cost and fuel cost, has been determined in this Order. The relevant cost components and basis for determination of the Generic Tariff for each RE technology have been elaborated in the technology-specific Sections of this Order.

### **2.3.2. TARIFF DESIGN**

As per Regulation 11, the Tariff Design for RE Generating Stations is as under:

*“11.1 The tariff shall be determined on a levelised basis for the Tariff Period:*

*Provided that, for RE Projects having a single-part tariff with two components, the tariff shall be determined on a levelised basis considering the year of commissioning of the Project for the fixed cost component, while the fuel cost component shall be specified on the basis of the year of operation.*

*11.2 For the purpose of computation of levelised tariff, a discount factor equivalent to the normative post-tax weighted average cost of capital shall be considered.*

*11.3 Levelisation shall be carried out for the 'useful life' of the RE Project, while tariff shall be determined for the period equivalent to the Tariff Period."*

### **2.3.3.INTEREST ON LOAN**

Regulation 15.1 specifies loan tenure of 12 years for determination of the Generic Tariff for RE Projects. Regulation 15.2 provides for consideration of the rate of interest on loan as follows:

*"For the purpose of computation of tariff, the Base Rate of the State Bank of India prevailing during the previous year plus 300 basis points shall be considered as the normative interest rate.*

*Notwithstanding any moratorium period availed, the repayment of loan shall be considered from the first year of commercial operation of the Project and shall be equal to the annual depreciation allowed."*

However, the Commission observes that, the reference rate for sanction of new loan has been shifted to MCLR instead of SBI Base Rate. Accordingly, the Commission while determining generic RE Tariff for FY 2017-18 vide its Order dated 28April,2017 in Case 33 of 2017 considered as below:

*However, as per the RBI guidelines dated 3 March, 2016 (updated on 29 March, 2016),*

*"All rupee loans sanctioned and credit limits renewed w.e.f. April 1, 2016 shall be priced with reference to the Marginal Cost of Funds based Lending Rate (MCLR) which will be the internal benchmark for such purposes."*

*SBI will continue to declare its Base Rate for existing loans, but new loans will be sanctioned on the basis of MCLR.*

Considering this difficulty of unavailability of new loan with reference of SBI Base Rate, the Commission invoked the provision of Regulation 82 of MERC RE Tariff Regulations, 2015 as below:

Regulation 82 of the RE Tariff Regulations empower the Commission as follows:

*"82. Power to remove difficulties*

*If any difficulty arises in giving effect to the provisions of these Regulations, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty."*

*The Commission has invoked the provisions of Regulation 82 in view of the change in the circumstances and dispensation concerning interest rates and the consequent issues in persisting with consideration based on the SBI Base Rate.*

Hence, the Commission has determined the Interest Rate as 11% for determination of Generic RE Tariff for FY 2017-18. Further the Commission also amended the provisions of MERC (MYT) Regulations, 2016 vide amendment dated 29 November, 2017, wherein the Commission has amended the definition of Base Rate as below:

*2. Amendment to Regulation 2.1 (10)*

*Regulation 2.1 (10) of the principal Regulations shall be substituted by the following:*

*“**Base Rate**” shall mean the one-year Marginal Cost of Funds-based Lending Rate (‘MCLR’) as declared by the State Bank of India from time to time;”*

Considering the above discussed difficulties in implementing provisions of RE Tariff Regulations related to Interest Rate, the Commission has invoked the provisions of Regulation 82 of MERC RE Tariff Regulations, 2015, *Power to remove difficulties* in view of the change in the circumstances and dispensation concerning interest rates and the consequent issues in pursuing rate to be linked to MCLR instead of SBI Base Rate.

Accordingly, the Commission has determined the Interest on loan considering 1-year average (from March 2017 to February 2018) of 1 year MCLR of SBI as shown in the Table below:

<b>Date of Revision of 1 Year MCLR by SBI</b>	<b>MCLR by SBI</b>
01-Mar-17	8.00%
01-Apr-17	8.00%
01-May-17	8.00%
01-Jun-17	8.00%
01-Jul-17	8.00%
01-Aug-17	8.00%
01-Sep-17	8.00%
01-Nov-17	7.95%
01-Dec-17	7.95%
01-Jan-18	7.95%
01-Feb-18	7.95%
Average 1 year MCLR	7.98%
<b>1 Year MCLR + 300 Basis points</b>	<b>7.98% + 3.00% =10.98%</b>

Hence, the Commission has considered the Interest on term Loan as 7.98% + 3% = 10.98% for the purpose of determination of Tariff.

#### **2.3.4.INTEREST ON WORKING CAPITAL**

Regulation 18.3 provides for computation of the rate of IoWC as follows:

*"Interest on Working Capital shall be the average of the Base Rate of State Bank of India prevalent during the previous year, plus 350 basis points."*

As discussed earlier in Para 1.4, the SBI Base Rate-linked interest rate for working capital is no longer available for new RE Projects. The Commission has worked our Average of 1 year MCLR as 7.98%. Hence the Commission considers the Interest on Working Capital as 7.98% + 3.50% = 11.48%. In view of the above, as in the case of interest on long term loan, the Commission invokes its powers under Regulation 82 to remove difficulties and to apply, for the purposes of this Order, interest rate on working capital loan of 11.48% is considered for FY 2018-19.

### **2.3.5. REVISION IN INCOME TAX RATE**

In Union Budget 2018-19, it was proposed to extend benefit of reduced income tax rate of 25% to companies who have reported turnover upto Rs. 250 crore in FY 2016-17. This benefit is expected to benefit almost 99% of companies filing their tax returns. Moreover, the existing three per cent education cess is proposed to be replaced by a four per cent "Health and Education Cess". As a result of these proposed changes, income tax rates are changed as follows:

<b>Particulars</b>		<b>Income tax</b>	<b>MAT</b>
Corporate Tax		25%	18.50%
Surcharge	2%	3.00%	2.22%
Corporate Tax + surcharge		28.00%	20.72%
Health & Education Cess	4%	1.12%	0.83%
Total Tax Rate		29.12%	21.55%

### **2.3.6. LEVELISED TARIFF**

The Levelised Tariff is computed by undertaking levelisation over the Useful Life of each RE technology considering a discount factor equivalent to the normative post-tax weighted average cost of capital, to represent the time value of money.

#### **Discount Factor**

The discount factor considered for this purpose is 10.25%, which is equal to the normative post-tax weighted average cost of capital on the basis of the normative debt-equity ratio of 70:30 specified in the Regulations, and the weighted average rates for the debt and equity components.

The Interest Rate considered for the loan component (i.e., 70%) of Capital Cost is 10.98%. For the equity component (i.e., 30%), the rate of RoE is computed at the base rate of 16%, grossed up as per the applicable tax rate. The rate of RoE is to be computed by grossing up the base rate with the tax rate equivalent to MAT for the first 10 years from the Commercial Operation Date (COD), and the normal tax rate for the remaining years of Project life. Based on these rates and the debt-equity ratio, the weighted average RoE ranges from 21.55% to 29.12% depending on the Useful Life of different RE technologies. The discount

factor for each technology derived by this method is detailed in the respective technology-specific Sections of this Order.

The Discount Factor is computed as  $10.25\% = ((10.98\% \times 0.70 \times (1-29.12\%)) + (16.00\% \times 0.30))$ .

### **2.3.7. ESCALATION RATE FOR O&M EXPENSE AND FOR CAPITAL COST COMPUTATION**

In May 2017, the base year of All-India WPI has been revised from 2004-05 to 2011-12 by the Office of Economic Advisor (OEA), Department of Industrial Policy and Promotion, Ministry of Commerce and Industry to align it with the base year of other macroeconomic indicators to capture structural changes in the economy. Therefore, 2011-12 WPI series is used for undertaking the capital cost indexation for the RE technologies, i.e., biomass, non-fossil fuel based cogeneration, small hydro power (SHP).

For determination of escalation rate for O&M expenses in RE generic tariff orders for FY 2016-17 and FY 2017-18, WPI series with base year 2004-05 was used. In calculation of annual escalation rate for O&M expenses, the five year monthly average WPI escalation rate is required as per amendment in MERC (MYT) Regulations, 2016. However, WPI data of 2011-12 series is available only from January 2014. Therefore, 2004-05 WPI series, which has data available for more than five years but only till March 2017, is referred for calculation of O&M escalation rate.

### **2.3.8. GRANT, SUBSIDY OR INCENTIVE FROM CENTRAL/ STATE GOVERNMENTS**

Regulation 24 of the RE Tariff Regulations specifies that:

*“The Commission shall take into consideration any grant, subsidy or incentive offered by the Central or State Government or their agencies, including accelerated/additional depreciation benefit, if availed, while determining the tariff under these Regulations:*

*Provided that the State Nodal Agency shall inform the Distribution Licensee regarding any such grant, subsidy or incentives received by a Project Entity on a quarterly basis;*

*Provided further that any such grant, subsidy or incentives availed by a Project Entity shall be deducted by the Distribution Licensee in subsequent bills raised by the particular Project Entity towards sale of electricity in suitable instalments or within such period as may be stipulated by the Commission;*

*Provided also that the following principles shall be considered for ascertaining the Income Tax benefit on account of accelerated or additional depreciation, if availed, for the purpose of tariff determination:*

*a. The assessment of benefit shall be based on normative Capital Cost, accelerated/additional depreciation rate as per the relevant provisions of the Income Tax Act and the Corporate Income Tax rate;*



*b. Capitalisation of RE Projects for the full financial year;*

*c. Per-unit benefit shall be derived on levelised basis at a discounting factor equivalent to the post-tax weighted average cost of capital;*

*Provided also that, in case the Central or State Government or their agencies provide any generation-based incentive which is specifically over and above the tariff, such incentive shall not be taken into account while determining the tariff.”*

Accordingly, for Projects availing the benefit of accelerated depreciation, the applicable Corporate Income Tax rate of 29.12% (25% Income Tax rate + 12% surcharge + 4% Health & Education Cess) has been considered. As per the Circular dated 7 November, 2016 of the Income Tax Department, the accelerated depreciation rates have been revised to 40% for FY 2017-18.

For determining the net depreciation benefits, depreciation @ 5.28% as per the Straight Line Method (book depreciation as per the Companies Act, 2013) has been compared with depreciation as per the Income Tax Act, i.e., 40% under the Written Down Value method. Moreover, additional 20% depreciation in the initial year is proposed to be extended to new assets acquired by Generation Companies vide the amendment to Section 32 (1) (ii a) of the Income Tax Act.

Depreciation for the first year has been computed at the rate of 40% and the accelerated depreciation at 20%, assuming the Project to be capitalized for the full financial year as per the second proviso to Regulation 24 of the RE Tariff Regulations. The tax benefit has been worked out as per the Corporate Income Tax rate on the net depreciation benefit. The ‘per unit levelised accelerated depreciation benefit’ has been computed considering the weighted average cost of capital as the discounting factor of 9.83 %, as detailed in para 1.6 of this Order. The detailed computation of benefit of accelerated depreciation in respect of each RE technology is set out in the technology-specific Sections.

As per the second proviso to Regulation 24, in case the Central or State Government or their agencies provide any generation-based incentive which is specifically intended to be over and above the Tariff, such incentive shall not be taken into account while determining the Tariff. Thus, while determining the Tariffs for RE Projects in this Order, no such incentives have been considered.

### **2.3.9. SHARING OF CDM BENEFITS**

As per Regulation 22, all risks, costs and efforts associated with the availing of carbon credits shall be borne by the Project Entity. The entire proceeds of carbon credit from an approved Clean Development Mechanism (CDM) Project, if any, shall be retained by it.

### **2.3.10. APPLICABILITY OF TARIFF ORDER**

The Commission vide its Order dated 24 April, 2018 in Case No. 113 of 2018 extended the applicability of existing Generic Tariff Order dated 28 April 2017 in Case No. 33 of 2017 for RE technologies along with its related terms and conditions, till 31 July 2018 or the

issue of new RE Generic Tariff Order, whichever is earlier. Therefore, this Tariff Order shall be applicable to RE Projects commissioned in FY 2018-19, i.e. from 1 August, 2018 to 31 March, 2019.

The Variable Charge component determined for Biomass-based Power Projects and Non-Fossil Fuel-based Co-Generation Projects commissioned in FY 2018-19 shall also be applicable to such existing Projects commissioned prior to FY 2018-19.

The Fixed Charge component of the Tariff of such Projects shall continue to be governed by the other relevant Orders of the Commission.

The applicable Tariff Rate, Tariff Structure and other terms and conditions for other RE Projects commissioned on or before 31 March, 2018 will be in accordance with the provisions of the relevant Generic RE Tariff Orders.

The following Sections of this Order outline the technology-wise norms and corresponding Generic Tariffs for RE Projects to be commissioned in FY 2018-19 based on various RE technologies.

### 3. WIND ENERGY PROJECTS

#### 3.1. USEFUL LIFE

Regulation 2.1 (mm) of the RE Tariff Regulations defines ‘Useful Life’ in relation to a Unit of a Generating Station (including evacuation system) to mean the period from the COD till such time as specified under the Regulations. The Useful Life of Wind Energy Projects under Regulation 2.1 (mm) is 25 years from COD.

#### 3.2. TARIFF PERIOD

Regulation 7 specifies the Tariff Period for various RE Projects. The Tariff Period for Wind Energy Projects is 13 years, considered from the COD of the Project, and the Tariff determined under the Regulations is applicable only for the duration of the Tariff Period.

#### 3.3. CAPACITY UTILISATION FACTOR

Under Regulation 28 of the RE Tariff Regulations, the CUF norms for Wind Energy Projects are as under:

<i>Wind Zone</i>	<i>Annual Mean Wind Power Density (W/m<sup>2</sup>)</i>	<i>CUF</i>
<i>Zone 1</i>	<i>&lt;=250</i>	<i>22%</i>
<i>Zone 2</i>	<i>&gt;250 - &lt;=300</i>	<i>25%</i>
<i>Zone 3</i>	<i>&gt;300 - &lt;=400</i>	<i>30%</i>
<i>Zone 4</i>	<i>26.1.5 &gt;400</i>	<i>32%</i>

*Provided that these CUF norms may be revised by the Commission through general or specific Order considering data that may become available subsequently.”*

In accordance with Regulation 28.2, the annual mean wind power density is to be measured at 80 metre hub height.

### 3.4. CAPITAL COST

Due to technological advancements, capital cost of wind energy projects has plummeted over last few years. In CERC RE Tariff Regulations 2017 dated 17 April, 2017, wind energy tariffs shall be determined project specific on case to case basis as per Regulation 7 (a). Karnataka, Rajasthan and Tamilnadu are some of the major states which have issued generic tariff orders after CERC RE Tariff Regulations 2017 were notified. Following are the observations of Karnataka Electricity Regulatory Commission (KERC) and Rajasthan Electricity Regulatory Commission (RERC):

#### Karnataka Electricity Regulatory Commission (KERC)

Vide Order dated 4<sup>th</sup> September 2017 for revision of generic tariff for wind power projects, KERC has made following observations in paragraph 2:

*“Periodic upward revision of tariff especially for wind power can no longer be taken as the norm for promoting the sector:*

- a) *The new Tariff Policy dated 28.01.2016 issued by the Central Government envisages procurement of renewable energy (except from waste to energy plants) in future, only through competitive bidding, as per its notified bidding framework.*
- b) *The CERC, which was hitherto determining the Generic Tariff annually for the wind projects, has not determined the same for the FY18, following its amended Regulations, wherein it has decided to determine project specific tariff for wind projects, in line with the Tariff Policy, 2016.*
- c) *The GERC, in its Order dated 30.08.2016, has revised the wind power tariff (net of AAD of 53 paise/unit) to Rs.4.19/unit from the earlier tariff of Rs. 4.23/unit [2012 Order] and the APERC has also reduced the wind power tariff from the existing Rs.4.70/unit [2012 Order] to Rs.4.25/unit, in its Order dated 26.03.2016. Further, in the bids called by the SECI for procurement of 1000 MW wind power, the lowest tariff quoted is Rs. 3.46/unit.”*

In view of above, KERC had initially proposed capital cost of Rs. 4.80 crore/MW in its discussion paper. However, in final Order by KERC, approved capital cost for wind energy projects is Rs. 6.20 crore/MW. Approved capital cost by KERC is primarily based on data from projects allocated by Karnataka Renewable Energy Development Ltd (KREDL) during FY 2015-16 and FY 2016-17. Considering project cost of wind energy projects allotted 2 to 3 years ago for generic tariff of FY 2018-19 would not incorporate impact on capital cost during FY 2017-18. Therefore, MERC has not considered capital cost approved by KERC.

#### Rajasthan Electricity Regulatory Commission (RERC)

Vide Order dated 10<sup>th</sup> July 2017 for determination of generic tariff for sale of electricity from wind power plants getting commissioned during FY 2017-18, RERC has made following observations in paragraph 10:

“

- a) *Indexation mechanism being based on WPI indices may not capture the impact of technological advancements such as high tower with increased rotor diameter, next generation towers, change in design etc., that have taken place since FY 2014-15;*
- b) *There exists a potential of reduction in the capital cost by consolidation of the supply chain and manufacturing process;*
- c) *In the recent past higher rating units of wind turbine are being deployed. In future, mostly higher capacity wind turbines viz. 1.5/2 MW or more are expected to be installed in the State.*

“

Considering aforementioned factors, RERC has taken capital cost of wind energy projects for FY 2017-18 is adopted to be Rs. 525 lakh/MW for projects commissioning during FY 2017-18 without indexation.

#### Tamilnadu Electricity Regulatory Commission (TNERC)

Vide Order dated 13<sup>th</sup> April 2018 for determination of generic tariff for wind power plants commissioned during FY 2018-19 to FY 2019-20, TNERC has made following observations in paragraph 6.2:

“

##### *6.2.1*

*The cost of wind turbines have considerably reduced over the years from 2010. One of the reasons widely reported for lower tariffs of Rs.3.46 per unit and Rs.2.64 per unit in the auctions conducted by SECI is the significant reduction in the price of wind turbines with advanced technologies and discounts offered by the wind turbine manufacturers. The cost of wind turbine with tall wind towers and advanced technology have reportedly come down by 20% in terms of cost per MW. Stakeholders have requested to adopt capital costs ranging from Rs.5 crores to Rs.7.5 crores and have requested to factor in land costs, evacuation, operation and maintenance costs, forecasting of wind power etc.*

##### *6.2.2*

*Commission adopted a capital cost of Rs.6.2 crores per MW in the wind tariff order of 2016. With the cost of the wind turbine that makes for 70% or more for a wind power project added with other costs for installation, and considering the reduced prices of machinery, a capital cost of Rs.5.25 crores per MW is adopted. It is upto the developer to identify land, factor in various parameters that influence the performance of the plant. Based on the recommendation of MNRE, Commission in its tariff orders No.1 of 2009, order No.6 of 2012 and order No.3 of 2016, considered 85% of the capital cost as attributable to machinery cost,10% for civil works and 5% for land cost. Commission decides to adopt the same percentage in this order also.*

In view of above orders by RERC and TNERC, MERC has taken capital cost for FY 2018-19 equal to Rs. 525 lakh/MW without applying any further reduction in capital cost.

### 3.5. DEBT-EQUITY RATIO

Regulation 14.1 of the RE Tariff Regulations provides for a debt-equity ratio of 70:30 for determination of Generic Tariff. Considering this normative ratio and the above Capital Cost, the debt and equity components for Wind Energy Projects work out to Rs. 367.50 lakh per MW and Rs. 157.50 lakh per MW, respectively.

### 3.6. RETURN ON EQUITY

Regulation 17.2 and 17.3 specifies the normative RoE as under:

*“The Return on Equity shall be computed at the base rate of 16%, to be grossed up as per the applicable tax rate.*

*The rate of Return on Equity shall be computed by grossing up the base rate with the tax rate equivalent to Minimum Alternate Tax (MAT) during the year for the first 10 years from COD and the weighted average of normal tax rate during the year for the remaining years of Project life.”*

Accordingly, the RoE for the applicable period of this Order is worked out as follows:

(Rs. crore)	
Particulars	Amount
Opening Equity (Rs lakh / MW)	157.50
Return on Equity for first 10 years @ 16% grossing up with MAT rate of 21.55% (Rs lakh per MW)	20.39%
Return on Equity after first 10 years @ 16% grossing up with Income Tax rate of 29.12% (Rs lakh per MW)	22.57%

Grossing up of the RoE is done as per the Formula:  $RoE (\%) / [1 - Tax Rate (\%)]$

### 3.7. INTEREST ON LOAN

As explained in para. 1.4 of this Order, the interest rate of 10.98% has been considered for Wind Energy Projects for a loan amount of Rs. 367.50 lakh per MW.

### 3.8. DEPRECIATION

Regulation 16 specifies that depreciation is to be allowed up to 90% of the Capital Cost of the asset. The depreciation rate for the first 12 years of the Tariff Period shall be 5.83% per annum, and the remaining depreciation shall be spread over the remaining Useful Life of the Project from the 13<sup>th</sup> year onwards.

Accordingly, for Wind Energy Projects, the depreciation rate is 5.83% for the first 12 years, and works out to 1.54% thereafter for the remaining Useful Life of 13 years.

### 3.9. INTEREST ON WORKING CAPITAL

Regulation 18.1 of the RE Tariff Regulations provides for computation of the Working Capital requirements of Wind Energy Projects as follows:

*"(a) Operation & Maintenance expenses for one month;*

*(b) Receivables equivalent to Two months of tariff for sale of electricity calculated on the normative CUF;*

*(c) Maintenance spares @ 15% of O & M expenses."*

As explained earlier at para. 1.4 and 1.5, IoWC is considered as 11.48 % for computation of the Tariff of Wind Energy Projects for the period for FY 2018-19.

### 3.10. OPERATION AND MAINTENANCE EXPENSES

Regulations 29 of the RE Tariff Regulations stipulates that as follows:

“

29.1)

*Normative O&M expenses for the base year of the Review Period shall be 1.47% of the Capital Cost for the purpose of tariff determination.*

29.2)

*Normative O&M expenses allowed under these Regulations shall be escalated at the rate specified in the Regulations of the Commission governing Multi Year Tariff, to compute the levelised tariff.*

“

As per Regulation 29.1, O&M expense is Rs. 8.83 lakh/MW for base year i.e. FY 2015-16. Applying escalation rates arrived as per MERC MYT Regulations, 2015 applicable at time of each of the subsequent financial year in control period; O&M expense per MW for each of the financial year in control period is as follows:

Financial Year	O&M escalation rate (%)	O&M expense (Rs. Lakh/MW)
FY 2015-16		8.83
FY 2016-17	2.96%	9.09
FY 2017-18	4.85%	9.53

O&M expense for FY 2018-19 as per above methodology is Rs. 9.94 lakh/MW. This O&M expense as percentage of revised capital cost in section 2.4 of this order (Rs. 525 lakh/MW) is 1.89%. This is on higher side vis-à-vis normative O&M expense of 1.47% of capital cost mentioned in Regulation 29.1 of MERC RE Tariff Regulations 2016. Percentage deviation from percentage mentioned in Regulation 29.1 mentioned above is 29% [calculated as  $(1.89\% - 1.47\%) / 1.47\%$ ].

Such anomaly is as a result of revision of capital cost to reflect current correction due to technological advancements, but application of O&M escalation rate on base year O&M expenses derived from capital cost of FY 2015-16. Therefore, O&M expense mentioned above does not reflect recent developments in wind energy projects.

Further, TNERC has made following observations in paragraph 6.4 of Order dated 13<sup>th</sup> April 2018 for determination of generic tariff for wind power plants commissioned during FY 2018-19 to FY 2019-20:

“

#### 6.4.1

*Commission in its previous orders of 2009,2012 and 2016 adopted per annum O&M expenses of 1.1% on 85% of the capital investment and 0.22% on 15% of the capital investment and escalation factor of 5% from second year onwards. The 85% of the capital cost refers to the plant and machinery cost and 15% refers to the land and civil works.*

#### 6.4.2

*Some of the stakeholders have requested for adoption of 2% to 3% of capital cost as O&M cost. Some of them have requested flat rates of Rs.9 to 12 Lakhs per MW. The issue of operation and maintenance cost has been dealt in the order of Hon'ble APTEL in Appeal No.197,198 etc of 2012 wherein the Commission's methodology has been upheld. Further, the Central Electricity Regulatory Commission's Regulations on Terms and Conditions of determination of Tariff from Renewable Energy Sources, 2017 specify determination of O&M expenses in a Project specific case based on prevailing market information. Commission decides to adopt an O&M expense of 1.1% on 85% of Capital investment (plant and machinery cost) and 0.22% on 15% of the Capital investment (land and civil works) with an escalation of 5% from second year onwards as adopted in its earlier orders.*

“

In view of revised capital cost of wind energy projects as per section 2.4 and of Regulation 29.1 of MERC RE Tariff Regulations 2016, O&M expense for FY 2018-19 is calculated as 1.47% of revised capital cost i.e.7.72 lakh/MW.

#### Rate of escalation for O&M expenses

Regulations 19 of the RE Tariff Regulations stipulates that the Base Year O&M is to be escalated at the rate specified in the MYT Regulations over the Tariff Period for determination of the levellised Tariff. The Commission amended the provisions Regulations 45.1(c), of the MERC (Multi-Year Tariff) Regulations, 2015 ('MYT Regulations') vide amendment dated 29 November, 2017. The amended provisions as applicable for generation projects specify the norms for escalation of O&M expense in subsequent years beyond the base year as follows:

*“ (c) The Operation and Maintenance expenses for each subsequent year shall be determined by escalating these Base Year expenses of FY 2015-16 by an inflation factor with 50% weightage to the average yearly inflation derived based on the monthly Wholesale Price Index of the past five financial years as per the Office of Economic Advisor of Government of India and 50% weightage to the average yearly inflation derived based on the monthly Consumer Price Index for Industrial Workers (all-India) of the past five financial years as per the Labour Bureau, Government of India, as reduced by an efficiency factor of 1% or as may be stipulated by the*

*Commission from time to time, to arrive at the permissible Operation and Maintenance expenses for each year of the Control Period.”*

Accordingly, the Commission has analyzed the last 5 year average WPI and CPI indices from FY 2012-13 to FY 2016-17 considering 50% and 50% weightage to WPI and CPI, which works out to 5.27% per annum.

Particulars	Value
Average WPI rates for 2012-13 to 2016-17	3.31%
Weightage of WPI	50%
Effective Wt. avg. Value of WPI	1.65%
Average CPI rates for 2012-13 to 2016-17	7.22%
Weightage of CPI	50%
Effective Wt. Avg. Value of CPI	3.61%
Wt. Avg. value of inflation rate considering WPI (50%)+CPI(50%) for 2012-13 to 2016-17 less 1% efficiency factor	4.26%

Accordingly, the Commission has considered annual escalation factor for projecting O&M expenses works out to 4.26% per annum.

### 3.11. TARIFF AS PER APPROACH-1 FOR WIND ENERGY PROJECTS

As mentioned in Section 2.1.1 above, the Wind Zone-wise ‘Approach-1 Tariffs’ for Wind Energy Projects commissioned from 1 August, 2018 to 31 March, 2019 have been determined as follows. The discount factor for levelisation of Tariff for Wind Energy Projects is 10.25%.

#### Tariff for Wind Energy Projects for FY 2018-19 by Approach-1

Wind Energy Zone	Tariff Period	Levelised Tariff from 1 August, 2018 to 31 March, 2019	Benefits of Tax and Additional Depreciation (if availed)	Net Levelised Tariff, adjusting for Tax and Additional Depreciation Benefit (if availed)
		Rs/kWh	Rs/kWh	Rs/kWh
<b>Zone-1</b>	13	4.64	0.37	4.27
<b>Zone-2</b>	13	4.08	0.33	3.75
<b>Zone-3</b>	13	3.40	0.27	3.13
<b>Zone-4</b>	13	3.19	0.25	2.93

Notes:

- Detailed computations of Tariffs for Wind Zones 1, 2, 3 and 4 are provided in Annexures 1A, 1B, 1C and 1D of this Order, respectively.

### 3.12. TARIFF AS PER APPROACH-2 FOR WIND ENERGY PROJECTS

As mentioned in Section 2.1.2 above, the Tariff discovered through competitive bidding in the State of Maharashtra for wind energy projects for FY 2018-19 is Rs. 2.87 per unit as adopted by the Commission in its Order in Case No. 129 of 2018 dated 14 June, 2018.



### 3.13. GENERIC TARIFF FOR WIND ENERGY PROJECTS FOR FY 2018-19

As per Section 3.11 and 3.12 above, Tariff as per Approach-2 is lower than Tariff as per Approach-1 for all wind zones. Following table gives comparison of the two approaches:

Comparison of Wind Energy Tariff by Approach-1 and by Approach-2

Particulars	Approach-1	Approach-2
Wind zone-1	4.64	2.87
Wind zone-2	4.08	
Wind zone-3	3.40	
Wind zone-4	3.19	

Therefore, Rs. 2.87 per unit is proposed to be a Generic Tariff applicable for all new Wind projects in all wind zones by this Commission.

#### Notes:

- The above Tariff shall be valid for Projects commissioned from 1 August, 2018 to 31 March, 2019.
- The above Tariff shall be valid for a Tariff Period of 13 years from the COD.

## 4. SMALL (INCLUDING MINI/MICRO) HYDRO POWER PROJECTS

### 4.1. USEFUL LIFE

The Useful Life specified for SHPs, including Mini/Micro Hydro Projects, under Regulation 2.1 (mm) of the RE Tariff Regulations is 35 years from COD.

### 4.2. TARIFF PERIOD

Regulation 7.2 specifies a Tariff Period of 13 years for SHPs of a capacity higher than 5 MW and upto and including 25MW.

Regulation 7.3 specifies a Tariff Period of 35 years for Mini/Micro Hydro Projects and for other SHPs upto and including 5 MW. The Tariff Period matches the Useful Life in case of these Projects, reflecting a longer preferential treatment for them.

### 4.3. CAPITAL COST OF SMALL HYDRO PROJECTS

For the purpose of the RE Tariff Regulations, SHPs are those Projects located at sites approved by the State Government/ State Nodal Agency using new plant and machinery and with installed power plant capacity lower than or equal to 25 MW. For Capital Cost, SHPs have been classified into two categories based on their installed capacities, viz., a) SHPs above 1 MW and upto and including 5 MW, and b) SHPs above 5 MW and lower than or equal to 25 MW.

Under Regulation 30.1, the Commission has considered the normative Capital Cost for SHPs for the first year of the Review Period (Base Year) as below:

Project Size	Capital Cost (Rs. lakh/MW)
> 1 MW and upto and including 5 MW	605.28
> 5 MW and upto and including 25 MW	550.70

This Capital Cost has been escalated by applying the indexation mechanism of the CERC RE Tariff Regulations, as stipulated in Regulation 31 of the Commission's Regulations. The computation steps are shown in table below. For FY 2018-19, that base Capital Cost has been revised applying the indexation specified in the CERC RE Tariff Regulations, as stipulated in Regulation 27 of this Commission's Regulations. The computation is shown below.

#### Indexation Formula

$$CC(n) = P \& M(n) * [1 + F1 + F2 + F3]$$

$$dn = (a * (SI_n - 1 / SI_0) - 1) + b * (EI_n - 1 / EI_0) - 1) / (a + b)$$

$$P \& M(n) = P \& M(0) * (1 + dn)$$

Where: a=Weightage for Steel Index and b= Weightage for Electrical Machinery Index

#### **Capital Cost Indexation for FY 2018-19**

Technology	Variables				
	a	b	F1	F2	F3
Small Hydro	0.60	0.40	0.16	0.10	0.14
Biomass	0.70	0.30	0.10	0.09	0.14
Co-Generation	0.70	0.30	0.10	0.09	0.14

#### **Wholesale Price Index (WPI)**

	WPI of Electrical Machinery		WPI of Iron and Steel	
	2017	2014	2017	2014
January	108.30	106.90	89.20	102.40
February	108.00	106.20	90.80	103.60
March	108.00	107.20	93.20	103.60
April	108.40	108.00	96.30	106.30
May	108.50	108.60	95.20	107.70
June	109.00	108.00	92.00	107.00
July	109.60	109.10	92.40	105.40
August	109.90	110.90	92.30	102.80
September	110.70	110.70	93.50	102.30
October	110.20	111.30	93.80	102.00
November	109.70	110.40	95.40	99.10
December	110.00	109.60	95.50	98.40
<b>Average</b>	<b>109.19</b>	<b>108.91</b>	<b>93.30</b>	<b>103.38</b>

Variable	Year	Value
SI <sub>0</sub>	2014	103.38
SI <sub>n-1</sub>	2017	93.30
EI <sub>0</sub>	2014	108.91
EI <sub>n-1</sub>	2017	109.19
<b>Dn</b>		<b>-5.75%</b>

The normative Capital Cost for FY 2018-19 computed as per the mechanism specified in the CERC RE Tariff Regulations is shown in the Table below.

Parameter	Particulars	SHP of > 1 MW and upto and including 5 MW	SHP of > 5 MW and upto and including 25 MW
1+F1+F2+F3		1.40	1.40
CC <sub>0</sub> (Rs. lakh/MW)	Capital Cost for the Base Year	605.28	550.70
P&M <sub>0</sub> (Rs. lakh/MW)	Plant and Machinery Cost for the Base Year Capital Cost	432.34	393.36
P&M <sub>n</sub> (Rs. lakh/MW)	Plant & Machinery Cost for the nth Year (FY 2018-19)	407.49	370.75
<b>CC<sub>n</sub>(Rs. lakh/MW)</b>	<b>Capital Cost for the nth Year (FY 2018-19)</b>	<b>570.49</b>	<b>519.05</b>

#### 4.4. DEBT-EQUITY RATIO

In accordance with Regulation 14.1, the debt and equity components for SHPs with capacities above 1 MW and up to and including 5 MW work out to Rs. 399.34 lakh per MW and Rs. 171.15 lakh per MW (i.e., 70% and 30% of the Capital Cost), respectively. For Projects of capacities above 5 MW and lower than or equal to 25 MW, the debt and equity components work out to Rs. 363.33 lakh per MW and Rs. 155.71 lakh per MW, respectively.

#### 4.5. RETURN ON EQUITY

In accordance with Regulation 17.2, the RoE works out as shown in the Table below:

Particulars	> 1 MW and up to and including 5 MW	> 5 MW and up to and including 25 MW
Opening Equity (in Rs lakh per MW)	171.15	155.71
Return on Equity for the first 10 years @16% grossing up with MAT rate of 21.55% (Rs lakh per MW)	34.81	31.76
Return on Equity after first 10 years @16% grossing up with Income Tax	41.88	35.15

Particulars	> 1 MW and up to and including 5 MW	> 5 MW and up to and including 25 MW
rate of 29.12% (Rs lakh per MW)		

Grossing up of the RoE is done as per the Formula:  $RoE (\%) / [1 - Tax Rate (\%)]$

#### 4.6. INTEREST ON LOAN

The interest rate of 10.98% has been taken for SHPs with capacities above 1 MW and up to and including 5 MW, with a gross opening loan amount of Rs. 399.34 lakh per MW; and for SHPs above 5 MW and lower than or equal to 25 MW, with a gross opening loan amount of Rs. 363.33 lakh per MW in the applicable period of this Order.

#### 4.7. DEPRECIATION

In accordance with Regulation 16.2, the depreciation for SHPs will be charged at 5.83% for the first 12 years and at 0.87% thereafter for the remaining Useful Life of 23 years.

#### 4.8. INTEREST ON WORKING CAPITAL

Regulation 18.1 of the RE Tariff Regulations provides for computation of the working capital requirements of SHPs as follows:

*"(a) O & M expenses for one month;*

*(b) Receivables equivalent to two months of tariff for sale of electricity calculated on the normative CUF;*

*(c) Maintenance spares @ 15% of O & M expenses."*

The IoWC is taken as 11.48 % for computation of the Tariff for SHPs for FY 2018-19.

#### 4.9. OPERATION AND MAINTENANCE EXPENSES

Regulation 34.1 provides for the normative O&M Expenses for SHPs for FY 2015-16 (Base Year), in accordance with which the following normative O&M expenses have been considered for the Base Year:

Project Size	O&M Expense Norm	O&M Expenses (Rs. lakh/MW)
> 1 MW and upto and including 5 MW	3.60% of the Capital Cost	21.79
> 5 MW and upto and including 25 MW	2.80% of the Capital Cost.	15.42

These O&M Expenses are escalated by 2.96% for FY 2016-17 and further escalated at of 4.85% for FY 2017-18. From FY 2018-19 onwards, O&M expense is escalated at 4.26% per annum as explained in section 2.10. Accordingly, the Commission has applied the O&M expense norm for SHPs for FY 2018-19 as shown in the Table below:

Project Size	O&M Expenses (Rs. lakh/MW) for FY 2018-19
> 1 MW and upto and including 5 MW	24.53
> 5 MW and upto and including 25 MW	17.36

#### 4.10. CAPACITY UTILISATION FACTOR

In accordance with Regulation 32, a CUF of 30% has been applied for determination of Tariff for SHPs.

#### 4.11. AUXILIARY POWER CONSUMPTION

In accordance with Regulation 33, a Normative Auxiliary Consumption of 1.0% has been considered for determination of Tariff.

#### 4.12. TARIFF MARK-UP FOR MINI/MICRO HYDRO PROJECTS

The RE Tariff Regulations provide for a higher Tariff for Mini/Micro Hydro Projects than for other SHPs, as below:

*“35.1 The tariff for Mini Hydro Power Projects of capacity of 1 MW and less but more than 500 kW, shall be higher by Rs 0.50 per kWh than that applicable to Small Hydro Power Projects with installed capacity of 5 MW or less, but more than 1 MW.*

*35.2 The tariff for Micro Hydro Power Projects of a capacity of 500 kW and below shall be higher by Rs. 1.00 per kWh than that tariff applicable to Small Hydro Power Projects with installed capacity of 5 MW or less but more than 1 MW.”*

Accordingly, the Commission has determined a higher Tariff for Mini/Micro Hydro Projects which is higher by 50 paise and Re. 1 per kWh, respectively, than for other SHPs.

#### 4.13. TARIFF AS PER APPROACH-1 FOR SMALL HYDRO PROJECTS

Considering the above parameters and the discount factor of 10.25% for levelisation of Tariff for SHPs, the ‘Approach-1 Tariffs’ during the applicable period of this Order for SHPs commissioned from 1 August, 2018 to 31 March, 2019 have been determined as under:

##### Tariff for Mini/Micro Hydro Projects and other SHPs by Approach-1

Type of SHP	Tariff Period (Years)	Levelised Tariff from 1 August, 2018 to 31 March, 2019	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff (upon adjusting for accelerated depreciation benefit, if availed)
		(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
Mini and Micro Hydro Projects				

Type of SHP	Tariff Period (Years)	Levelised Tariff from 1 August, 2018 to 31 March, 2019	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff (upon adjusting for accelerated depreciation benefit, if availed)
		(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
500 kW and below	35	5.63	0.28	5.35
Above 500 kW and up to and including 1 MW	35	5.13	0.28	4.85
<b>Other SHPs</b>				
Above 1 MW and up to and including 5 MW	35	4.63	0.28	4.35
Above 5 MW and upto and including 25 MW	13	3.91	0.26	3.66

Notes:

- Following is the comparison of generic tariffs determined by CERC and this Commission for FY 2017-18 and FY 2018-19 respectively. Tariff determined by CERC for FY 2018-19 is as per Order dated 28 March, 2018.

Year	CERC		MERC		Difference	
	FY2017-18	FY 2018-19	FY2017-18	FY 2018-19*	FY2017-18	FY 2018-19
SHP <5	6.00	6.05	4.86	4.63	1.14	1.42
SHP 5-25	5.04	5.07	4.11	3.91	0.93	1.16

\* Proposed in this Order

- Detailed computations of Tariffs for SHPs of 1 MW to 5 MW, and for SHPs of 5 MW to 25 MW are provided in Annexures 2A and 2B of this Order, respectively.

#### 4.14. TARIFF AS PER APPROACH-2 FOR SMALL HYDRO POWER PROJECTS

In FY 2018-19, no tariff is adopted for hydro power projects (including mini/micro) through competitive bidding. Therefore as mentioned in Section 2.1.2 above, if any such tariff by way of competitive bidding is discovered and is approved by the Commission in FY 2018-19 for small hydro (including mini/micro), such tariff will be considered to be the Approach-2 Tariff for small hydro (including mini/micro) for FY 2018-19 from the date of approval by this Commission.

#### 4.15. GENERIC TARIFF FOR SMALL HYDRO POWER PROJECTS FOR FY 2018-19

As per Section 4.13 and 4.14 above, due to non-availability of Approach-2 tariff for small hydro projects; tariff by Approach-1 is adopted to be the Generic Tariff.

#### Generic Tariff for Mini/Micro Hydro Projects and other SHPs

Type of SHP	Tariff Period (Years)	Generic Tariff from 1 August, 2018 to 31 March, 2019	Benefit of Accelerated Depreciation (if availed)	Net Generic Tariff (upon adjusting for accelerated depreciation benefit, if availed)
		(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
<b>Mini and Micro Hydro Projects</b>				
500 kW and below	35	5.63	0.28	5.35
Above 500 kW and up to and including 1 MW	35	5.13	0.28	4.85
<b>Other SHPs</b>				
Above 1 MW and up to and including 5 MW	35	4.63	0.28	4.35
Above 5 MW and upto and including 25 MW	13	3.91	0.26	3.66

- The above Tariffs shall apply to Projects commissioned from 1 August, 2018 to 31 March, 2019
- The above Tariffs shall be valid for a Tariff Period of 35 years from COD for SHPs of capacity up to and including 5 MW, and for 13 years for SHPs with installed capacity greater than 5 MW and up to and including 25 MW.

## 5. BIOMASS-BASED POWER PROJECTS

### 5.1. KEY PROVISIONS OF RE TARIFF REGULATIONS

Chapter 5 of the RE Tariff Regulations specifies the technology-specific norms for determination of Tariff for Biomass-based Power Projects based on Rankine Cycle technology applications using water-cooled condensers, as below:

*"37.1 The Capital Cost and performance norms as specified in this Chapter shall be applicable only to new Biomass-based Power Projects commissioned after notification of these Regulations.*

*37.2 The fuel-related aspects specified in Regulations 44 to 50 shall be applicable to both existing and new Biomass-based Power Projects;*

*Provided that the norms in respect of SHR and Auxiliary Consumption factor for existing Biomass-based Power Projects shall be as stipulated in the respective RE Tariff Orders referred to in Regulation 3.2."*

Regulation 49 specifies the Biomass fuel price as Rs. 3987 /MT during the first year of the Review Period, i.e., FY 2015-16, escalated for each subsequent year as per the indexation mechanism specified in Regulation 50. Regulation 50.1 reads as follows:

“50.1 In the case of both existing and new Biomass-based Power Projects, the following indexing mechanism for adjustment of fuel prices for each year of operation will be applicable for determination of the variable charge component of tariff:

The Variable Charge for the  $n$ th year shall be computed as under:

$$VC_n = VC_{1,x} (P_n / P_1)$$

where,

$VC_1$  represents the Variable Charge based on Biomass Price  $P_1$  for FY 2015-16 as specified under Regulation 49, and shall be determined as under:

### **VC1**

$P_{(n)}$  = Price per tonne of biomass for the  $n^{\text{th}}$  year to be considered for tariff determination

$P_{(n-1)}$  = Price per tonne of biomass for the  $(n-1)^{\text{th}}$  year to be considered for tariff determination.  $P_1$  shall be the Biomass price for FY 2015-16 as specified under Regulation 49.”

The Biomass fuel price shall be revised by the Commission taking into consideration the Biomass fuel price determined by the Central Commission or a normative escalation factor of 5% per annum, as it may consider appropriate.”

Accordingly, in case of Biomass-based Power Projects commissioned on or before 31 March, 2019, the Variable Charge component of the Tariff for FY 2018-19 shall be determined as outlined in para 4.14 of this Order. The Fixed Charge component shall continue to be governed by the relevant RE Tariff Orders of the Commission.

## **5.2. CAPITAL COST OF BIOMASS-BASED POWER PROJECTS**

Regulation 38 specifies the normative Capital Cost for Biomass-based Power Projects based on Rankine Cycle technology as Rs. 494.32 lakh per MW for FY 2015-16 (Base Year). This Base Year Cost has been revised as per the indexation mechanism of the CERC RE Tariff Regulations, as stipulated in Regulation 39 of the Commission’s Regulations. The computation steps are as shown in para. 3.3 of this Order. The normative Capital Cost for FY 2018-19 computed accordingly is shown in the Table below.

<b>Parameter</b>	<b>Description</b>	<b>Cost</b>
1+F1+F2+F3		1.33
CC <sub>0</sub>	Capital Cost for the Base Year (Rs. lakh/MW)	494.32
P&M <sub>0</sub>	Plant & Machinery Cost for the Base Year Capital Cost (Rs. lakh/MW)	371.67
P&M <sub>n</sub>	Plant & Machinery Cost for the nth Year (FY 2018-19) (Rs. lakh/MW)	346.58
<b>CC<sub>n</sub></b>	<b>Capital Cost for the nth Year (FY2018-19) (Rs. lakh/MW)</b>	<b>460.96</b>



### 5.3. DEBT-EQUITY RATIO

In accordance with Regulation 14.1, the debt and equity components for Biomass-based Power Projects to be commissioned in FY 2018-19 work out to Rs. 322.67 lakh per MW and Rs. 138.29 lakh per MW respectively.

### 5.4. RETURN ON EQUITY

In accordance with Regulation 17.2, the RoE is as shown in the Table below:

Particulars	Amount (Rs. lakh/MW)
Opening Equity	138.29
Return on Equity for the first 10 years @16% grossing up with MAT rate of 21.55%	28.20
Return on Equity after first 10 years @16% grossing up with Income Tax rate of 29.12%	31.22

Grossing up of the RoE is done as per the Formula:  $RoE (\%) / [1 - Tax Rate (\%)]$

### 5.5. INTEREST ON LOAN

The interest rate of 10.98% has been considered for Biomass-based Power Projects commissioned in FY 2018-19, with a gross opening loan amount of Rs. 322.67 lakh per MW.

### 5.6. DEPRECIATION

In accordance with Regulation 16.2, depreciation will be charged at 5.83% for the first 12 years, and at 2.50% thereafter for the remaining Useful Life of 8 years.

### 5.7. INTEREST ON WORKING CAPITAL

Regulation 18.2 provides for computation of the working capital requirements of Biomass-based Power Projects as under:

*"(a) Fuel costs for four months equivalent to normative Plant Load Factor(PLF);*

*(b) O & M expenses for one month;*

*(c) Receivables equivalent to two months of fixed and variable charges for sale of electricity calculated on the target PLF;*

*(d) Maintenance spares @ 15% of O & M expenses"*

IoWC is taken as 11.48 % for computation of the Tariff of Biomass Power Projects for FY 2018-19.

## **5.8. PLANT LOAD FACTOR**

In accordance with Regulation 40.1 of the RE Tariff Regulations, the Plant Load Factor (PLF) for determining the Fixed Charge component of the Tariff for Biomass-based Power Projects will be as follows:

- a) During stabilisation: 60%
- b) During the remaining period of the first year (after stabilisation): 70%
- c) From 2<sup>nd</sup> Year onwards: 80%.

## **5.9. AUXILIARY POWER CONSUMPTION**

In accordance with Regulation 41, a Normative Auxiliary Consumption of 10.0% has been considered.

## **5.10. STATION HEAT RATE**

In accordance with Regulation 42, the Normative SHR of 4200 kcal/kWh has been considered for determination of Tariff.

## **5.11. OPERATION AND MAINTENANCE EXPENSES**

Regulation 43.1 specifies the normative O&M Expenses for Biomass-based Power Projects for FY 2015-16 (Base Year) as 5.32% of the Capital Cost. This works out to Rs. 26.30 lakh per MW, which is to be escalated at 2.96% for the second year FY 2016-17, and further escalated by 4.85% for FY 2017-18 as per the RE tariff orders for FY 2016-17 and FY 2017-18 respectively. From FY 2018-19 onwards, O&M expense is escalated at 4.26% per annum as explained in section 2.10. Accordingly, the Commission has taken the O&M expense norm for Biomass Projects for FY 2018-19 as Rs. 29.60 lakh per MW.

## **5.12. CALORIFIC VALUE**

In accordance with Regulation 48, the average Calorific Value of the Biomass Fuel (s) of 3,611 kcal/kg has been considered for determination of Tariff.

## **5.13. FUEL COST**

Regulation 49 specifies the Biomass fuel price in the first year of the Review Period, i.e., FY 2015-16, as Rs. 3987/MT, to be linked to the indexation mechanism specified under Regulation 50. As per Regulation 50.1, the Biomass fuel price is to be revised taking into consideration the Biomass fuel price determined by the CERC or a normative escalation factor of 5% per annum, as it may consider appropriate.

The CERC had notified its RE Tariff Regulations, 2017 for 3 years starting from FY 2017-18. The CERC Regulations specify the Biomass fuel price for Maharashtra for FY 2017-18 as Rs. 3344.85/MT. The Commission, in RE tariff order for FY 2017-18, had calculated the biomass fuel price considering the principle of equivalent heat value. Accordingly, the

approved biomass fuel price for Maharashtra for FY 2017-18 was Rs. 3,896.21 /MT as per the last RE generic Tariff Order.

Regulation 50.1 provides for revision of Biomass fuel price as below:

*“the Biomass fuel price shall be revised by the Commission taking into consideration the Biomass fuel price determined by the Central Commission or a normative escalation factor of 5% per annum, as it may consider appropriate.”*

Accordingly, the Commission has escalated fuel price of FY 2017-18 by 5% per annum to arrive at fuel price of Rs. 4,091.02/MT for FY 2018-19.

Considering this, Fuel Cost, the Commission has computed the Variable Charge as Rs. 5.29/kWh in accordance with Regulation 50.1, considering GCV of 3611 kcal/kg, SHR as 4200 kCal/kWh and Auxiliary Consumption as 10%.

#### **5.14. VARIABLE CHARGE FOR BIOMASS-BASED POWER PROJECTS COMMISSIONED PRIOR TO 1 APRIL, 2018**

As per Regulation 37.2, the fuel-related aspects specified in Regulations 44 to 50 shall be applicable to both existing and new Biomass-based Power Projects, except for the SHR and Auxiliary Consumption norms which shall be as stipulated in the respective RE Tariff Orders referred to in Regulation 3.2. Accordingly, the norms in respect of Fuel Price and GCV shall be applicable to existing Projects as per Regulations 48, 49 and 50. Further, as detailed in para. 1.18 of the Generic RE Tariff Order in Case No. 135 of 2015, the SHR for existing Projects has been considered the same as for new Projects, i.e. 4200 kcal/kWh. The Auxiliary Consumption Factor for existing Projects commissioned prior to 1 April, 2018 shall be as stipulated in the respective Tariff Orders (i.e., 10%). Based on these parameters, the variable cost of the Projects commissioned before 1 April, 2018 works out to Rs 5.29/kWh.

The Fixed Charge component of the FY 2018-19 Tariff for Biomass-based Power Projects commissioned prior to 1 August, 2018 shall be the levelised Fixed Charge approved under the respective RE Tariff Orders.

#### **5.15. TARIFF AS PER APPROACH-1 FOR BIOMASS-BASED POWER PROJECTS FOR FY 2018-19**

Considering the above parameters and the discount factor of 10.25% (as computed at para 2.3.6 of this Order) for levelisation of Tariff, the ‘Approach-1 Tariffs’ for Biomass-based Power Projects for FY 2018-19 have been determined as in the Table below:

##### **Tariff for Biomass based Projects by Approach-1**

Year of Commissioning of Project	Fixed Charge (Rs/kWh)	Variable Charge (Rs/kWh)	Tariff from 1 April, 2018 to 31 March, 2019 (Rs/kWh)	Benefit of Accelerated Depreciation (if availed) (Rs/kWh)	Net Levelised Tariff (upon adjusting for accelerated depreciation benefit, if availed) (Rs/kWh)
<b>FY 2018-19</b>	2.15	5.29	7.44	0.13	7.31
<b>FY 2017-18</b>	2.20 <sup>^</sup>	5.29	7.49	0.16 <sup>^</sup>	7.33
<b>FY 2016-17</b>	2.25 <sup>***</sup>	5.29	7.54	0.17	7.37
<b>FY 2015-16 (10 November, 2015 to 31 March, 2016)</b>	2.35 <sup>@</sup>	5.29	7.64	0.16	7.48
<b>FY 2015-16 (1 April to 9 November, 2015)</b>	2.27 <sup>*</sup>	5.29	7.56	0.22 <sup>*</sup>	7.34
<b>FY 2014-15</b>	2.27 <sup>*</sup>	5.29	7.56	0.22 <sup>*</sup>	7.34
<b>FY 2013-14</b>	2.17 <sup>#</sup>	5.29	7.46	0.21 <sup>#</sup>	7.25
<b>Prior to FY 2013-14</b>	1.70 <sup>**</sup>	5.29	6.99	NA	6.99

<sup>^</sup> As per Order Dt 28 April, 2017 in Case No. 33 of 2017 (from 1<sup>st</sup> April, 2017 to 31<sup>st</sup> March, 2018)

<sup>\*\*\*</sup> As per Order Dt 29 April, 2016 in Case No. 45 of 2016 (from 1<sup>st</sup> April, 2016 to 31<sup>st</sup> March, 2017)

<sup>@</sup> As per Order dt 25 January, 2016 in Case No 135 of 2015 (from 10 November, 2015 to 31 March, 2016)

<sup>\*</sup> As per Order dt 7 July, 2014 in Case No. 100 of 2014 (extended till 31 Dec 2015)

<sup>#</sup> As per Order dt 22 March, 2013 in Case No. 6 of 2013

<sup>\*\*</sup> Considering first year of operation as per Order dt 8 August, 2005 in Case Nos. 37 of 2003 and 83 of 2008.

The detailed computations of Tariff for FY 2018-19 for Biomass-based Power Projects are provided in Annexure 3 of this Order.

The Tariff Rate comprises (i) Fixed Charge component, and (ii) Variable Charge component, and shall be applicable for sale of power by Rankine Cycle-based Projects to Distribution Licensees in Maharashtra in FY 2018-19.

Following is the comparison of generic tariffs determined by CERC and this Commission for FY 2017-18 and FY 2018-19 respectively. Tariff determined by CERC for FY 2018-19 is as per Order dated 28<sup>th</sup> March 2018.

	CERC		MERC		Difference	
Year	FY2017-18	FY 2018-19	FY2017-18	FY 2018-19	FY2017-18	FY 2018-19
Biomass	8.11	8.12	7.24	7.44*	0.87	0.68

\* Proposed in this Order

In Case No. 95 of 2017, Maharashtra Biomass Energy Developers Association (MBEDA) had stated that due to viability issues arising from the generic tariffs determined by the Commission and other factors, new Projects are not coming up in Maharashtra and existing Projects are in difficulty or have closed down. The Commission had directed MEDA to analyse the reasons for this situation and apprise the Commission of any tariff-related implications during the proceedings of order for the determination of the RE Generic Tariffs for FY 2018-19. Accordingly, MEDA should submit its analysis to the Commission.

#### 5.16. TARIFF AS PER APPROACH-2 FOR BIOMASS BASED POWER PROJECTS

In FY 2018-19, no tariff is adopted for biomass based power projects through competitive bidding. Therefore as mentioned in Section 2.1.2 above, if any such tariff by way of competitive bidding is discovered and is approved by the Commission in FY 2018-19 for biomass based power projects, such tariff will be considered to be the Approach-2 Tariff for biomass based power projects for FY 2018-19 from the date of approval by this Commission.

#### 5.17. GENERIC TARIFF FOR BIOMASS-BASED POWER PROJECTS FOR FY 2018-19

As per Section 5.15 and 5.16 above, due to non-availability of Approach-2 tariff for biomass based power projects; tariff by Approach-1 is adopted to be the Generic Tariff.

#### Levelised Tariff for Biomass based Projects

Year of Commissioning of Project	Fixed Charge (Rs/kWh)	Variable Charge (Rs/kWh)	Tariff from 1 August, 2018 to 31 March, 2019 (Rs/kWh)	Benefit of Accelerated Depreciation (if availed) (Rs/kWh)	Net Levelised Tariff (upon adjusting for accelerated depreciation benefit, if availed) (Rs/kWh)
FY 2018-19	2.15	5.29	7.44	0.13	7.31
FY 2017-18	2.20^	5.29	7.49	0.16^	7.33
FY 2016-17	2.25***	5.29	7.54	0.17	7.37
FY 2015-16 (10 November, 2015 to 31 March, 2016)	2.35@	5.29	7.64	0.16	7.48

<b>FY 2015-16 (1 April to 9 November, 2015)</b>	2.27*	5.29	7.56	0.22*	7.34
<b>FY 2014-15</b>	2.27*	5.29	7.56	0.22*	7.34
<b>FY 2013-14</b>	2.17#	5.29	7.46	0.21#	7.25
<b>Prior to FY 2013-14</b>	1.70**	5.29	6.99	NA	6.99

- The above Tariffs shall apply to Projects commissioned from 1 August, 2018 to 31 March, 2019

## 6. NON-FOSSIL FUEL-BASED CO-GENERATION PROJECTS

### 6.1. KEY PROVISIONS OF RE TARIFF REGULATIONS

Chapter 6 of the RE Tariff Regulations provides the technology-specific norms for determination of Tariff for Non-Fossil Fuel-based Co-Generation Projects. Regulations 52.1 and 52.2 read as follows:

*"52.1 The Capital Cost and performance norms specified in this Chapter shall be applicable only to Non-Fossil Fuel-based Co-Generation Projects commissioned after notification of these Regulations.*

*52.2 The fuel-related aspects specified under Regulations 59 to 66 shall be applicable to both existing and new Non-Fossil Fuel-based Co-Generation Projects:*

*Provided that the norms in respect of specific fuel consumption and Auxiliary Consumption factor for existing Non-Fossil Fuel-based Co-Generation Projects shall be as stipulated in the respective RE Tariff Orders referred to in Regulation 3.2."*

The Regulations also specify that the fuel price for each year of operation, for both existing and new Projects, shall be adjusted according to the following indexation mechanism:

*"61.1 In the case of both existing and new Non-Fossil Fuel-based Co-Generation Projects, the following indexing mechanism for adjustment of fuel prices for each year of operation will be applicable for determination of the variable charge component of tariff:*

*The Variable Charge for the nth year shall be computed as under:*

$$VC_n = VC_1 \times (P_n / P_1)$$

*where,*

*VC<sub>1</sub> represents the Variable Charge based on Bagasse Price P<sub>1</sub> for FY 2015-16 as specified under Regulation 60, and shall be determined as under:*

$$VC_1 = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Auxiliary Consumption Factor})} \times \frac{P_1}{1000}$$

$P_{(n)}$  = Price per tonne of Bagasse for the  $n^{th}$  year to be considered for tariff determination

$P_{(n-1)}$  = Price per tonne of Bagasse for the  $(n-1)^{th}$  year to be considered for tariff determination.  $P_1$  shall be the Bagasse price for FY 2015-16 as specified under Regulation 60.

*The Bagasse fuel price shall be revised by the Commission taking into consideration the Bagasse fuel price determined by the Central Commission for each year or a normative escalation factor of 5% per annum, as it may consider appropriate.*”

Accordingly, in case of Non-Fossil Fuel-based Co-Generation Power Projects commissioned on or before 31 March, 2018, the Variable Charge component of the Tariff for FY 2018-19 shall be determined as per para. 5.14 of this Order. The Fixed Charge component shall continue to be governed by the relevant Orders issued by the Commission.

## 6.2. CAPITAL COST OF NON-FOSSIL FUEL-BASED CO-GENERATION PROJECTS

The normative Capital Cost of Non-Fossil Fuel-based Co-Generation Projects for the first year of the Review Period (FY 2015-16) has been specified in Regulation 53 as Rs. 489.02 lakh per MW. This Base Year Capital Cost has been escalated considering the CERC RE Tariff Regulations indexation mechanism, as stipulated in Regulation 54 of the Commission’s Regulations. The computation steps are as shown in para. 3.3 of this Order. The normative Capital Cost for FY 2018-19 computed accordingly is as shown in the Table below.

Parameter	Description	Cost
1+F1+F2+F3		1.33
CC <sub>0</sub>	Capital Cost for the Base Year (Rs. lakh/MW)	489.02
P&M <sub>0</sub>	Plant & Machinery Cost for the Base Year Capital Cost (Rs. lakh/MW)	367.68
D <sub>n</sub>	Capital Cost Escalation Factor	-6.75%
P&M <sub>n</sub>	Plant & Machinery Cost for the nth Year (FY 2018-19) (Rs. lakh/MW)	342.87
CC <sub>n</sub>	<b>Capital Cost for the nth Year (FY2018-19) (Rs. lakh/MW)</b>	456.01

## 6.3. DEBT-EQUITY RATIO

In accordance with Regulation 14.1, the debt and equity components work out to Rs. 319.21 lakh per MW and Rs. 136.80 lakh per MW, respectively.

## 6.4. RETURN ON EQUITY

In accordance with Regulation 17, the RoE works out as shown in the Table below:

<b>Particulars</b>	<b>Amount (Rs. lakh/MW)</b>
Opening Equity	136.80
Return on Equity for the first 10 years @16% grossing up with MAT rate of 21.34%	27.90
Return on Equity after first 10 years @16% grossing up with Income Tax rate of 34.61%	30.88

Grossing up of the RoE is done as per the Formula:  $\text{RoE (\%)} / [1 - \text{Tax Rate(\%)}]$ .

#### **6.5. INTEREST ON LOAN**

As explained in para. 1.4 of this Order, an interest rate of 10.98% has been taken, with a gross opening loan amount of Rs. 319.21 lakh per MW in FY 2018-19.

#### **6.6. DEPRECIATION**

In accordance with Regulation 16, the depreciation will be charged at 5.83% for the first 12 years, and at 2.50% thereafter for the remaining Useful Life of 8 years.

#### **6.7. INTEREST ON WORKING CAPITAL**

Regulation 18 provides for computation of the working capital requirements as follows:

- a) “ Fuel costs for four months equivalent to normative Plant Load Factor (‘PLF’);
- b) O&M expenses for one month;
- c) Receivables equivalent to two months of fixed and variable charges for sale of electricity calculated on the target PLF;
- d) Maintenance spares @ 15% of O&M expenses.”

Further, as explained in para. 1.5, the IoWC is considered as 11.48 % for computation of the Tariff for FY 2018-19.

#### **6.8. OPERATION AND MAINTENANCE EXPENSES**

Regulation 58.1 specifies the normative O&M Expenses for Non-Fossil Fuel-based Co-Generation Projects for FY 2015-16 (Base Year) as 3.54% of the Capital Cost, which works out to Rs. 17.31 lakh per MW. This is to be escalated at 2.96% for the second year of control period i.e. FY 2016-17, and at 4.85% for the third year of control period i.e. FY 2017-18 as per the RE tariff orders for FY 2016-17 and FY 2017-18 respectively. From FY 2018-19 onwards, O&M expense is escalated at 4.26% per annum as explained in section 2.10. Accordingly, the Commission has taken the O&M expense norm for Non-Fossil Fuel-based Co-Generation Projects for FY 2018-19 as Rs. 19.49 lakh per MW.

#### **6.9. PLANT LOAD FACTOR**

In accordance with Regulation 55.2, PLF of 60% has been considered.



## **6.10. AUXILIARY POWER CONSUMPTION**

In accordance with Regulation 56, the Auxiliary Consumption of 8.5% has been applied.

## **6.11. STATION HEAT RATE**

In accordance with Regulation 57, the Normative SHR is 3600 kcal/kWh.

## **6.12. CALORIFIC VALUE**

Under Regulation 59, the average Calorific Value of Bagasse fuel is considered as 2250 kcal/kg for determination of Tariff.

## **6.13. FUEL COST**

Regulation 60.1 specifies the Bagasse fuel price during the first year, i.e., FY 2015-16, as Rs. 2326.84/MT, which is linked to the indexation mechanism specified under Regulation 61.

As per the indexation mechanism specified in Regulation 61.1, the Bagasse fuel price shall be revised taking into consideration the fuel price determined by the CERC or a normative escalation factor of 5% per annum, as may be considered appropriate. The CERC had notified its RE Tariff Regulations, 2017 for 3 years starting from FY 2017-18. The CERC Regulations specify the Bagasse price for Maharashtra for FY 2017-18 as Rs. 2273.75/MT. The Commission, in RE tariff order for FY 2017-18, approved the Bagasse fuel price of Rs. 2,273.75/MT for Maharashtra considering the equivalent calorific value method, as per the last RE generic Tariff Order.

Regulation 61.1 provides for revision of Biomass fuel price as below:

*“The Biomass fuel price shall be revised by the Commission taking into consideration the Biomass fuel price determined by the Central Commission or a normative escalation factor of 5% per annum, as it may consider appropriate.”*

Accordingly, the Commission has escalated fuel price of FY 2017-18 by 5% per annum to arrive at fuel price of Rs. 2,387.44/MT for Maharashtra for FY 2018-19.

Considering this Fuel Cost, the Commission has computed the Variable Charge as Rs. 4.17/kWh for Projects to be commissioned in FY 2018-19, in accordance with Regulation 61.1, considering GCV as 2250 kcal/kg, SHR as 3600 Kcal/kWh and Auxiliary Consumption as 8.5%.

## **6.14. VARIABLE CHARGE FOR BAGASSE-BASED CO-GENERATION POWER PROJECTS COMMISSIONED PRIOR TO 1 APRIL, 2018**

As per Regulation 55.2, the fuel-related aspects specified in Regulations 59 to 66 shall be applicable to both existing and new Non-Fossil Fuel-based Co-Generation Projects, except for the SHR and Auxiliary Consumption norms which shall be as stipulated in the respective RE Tariff Orders referred to in Regulation 3.2. Accordingly, the norms in respect of Fuel

Price and GCV shall be applicable to existing Projects as per Regulations 59, 60 and 61. The Auxiliary Consumption Factor for existing Projects commissioned prior to 1 April, 2018 shall be as stipulated in the respective Tariff Orders (i.e., 8.5%). Based on these parameters, the variable cost of the Projects commissioned prior to 1 April, 2018 works out to Rs. 4.17/kWh.

The Fixed Charge component of the Tariff for Projects commissioned prior to 1 April, 2019 shall be the levelised Fixed Charge approved under the respective RE Tariff Orders.

#### 6.15. TARIFF AS PER APPROACH-I FOR NON-FOSSIL FUEL-BASED CO-GENERATION PROJECTS FOR FY 2018-19

Considering the above parameters and the discount factor as 10.25% for levelisation of Tariff of Non-Fossil Fuel-based Co-Generation Projects commissioned from 1 August, 2018 to 31 March, 2019, the 'Approach-1 Tariffs' for such Projects for FY 2018-19 have been determined as under:

**Tariff of Non-Fossil Fuel-based co-generation Projects by Approach-1**

Year of Commissioning	Fixed Charge (Rs/kWh)	Variable Charge (Rs/kWh)	Tariff (Rs/kWh)	Benefit of Accelerated Depreciation (if availed) (Rs/kWh)	Net Levelised Tariff (upon adjusting for accelerated depreciation benefit, if availed) (Rs/kWh)
<b>FY 2018-19</b>	2.28	4.17	6.45	0.13	6.32
<b>FY 2017-18</b>	2.35 <sup>^</sup>	4.17	6.52	0.16	6.36
<b>FY 2016-17</b>	2.43 <sup>***</sup>	4.17	6.60	0.21	6.39
<b>FY 2015-16 (10 Nov, 2015 to 31 March, 2016)</b>	2.52 <sup>@</sup>	4.17	6.69	0.21	6.48
<b>FY 2015-16 (1 April to 9 November, 2015)</b>	2.46 <sup>*</sup>	4.17	6.63	0.28	6.35
<b>FY 2014-15</b>	2.46 <sup>*</sup>	4.17	6.63	0.28	6.35
<b>FY 2013-14</b>	2.38 <sup>#</sup>	4.17	6.55	0.27	6.28
<b>Prior to FY 2013-14</b>	2.26 <sup>**</sup>	4.17	6.43		6.43

<sup>^</sup> As per Order Dt 28 April, 2017 in Case No. 33 of 2017 (from 1<sup>st</sup> April, 2017 to 31<sup>st</sup> March, 2018)

<sup>\*\*\*</sup> As per Order dt 29 April, 2016 in Case No. 45 of 2016 (from 1<sup>st</sup> April 2016 to 31<sup>st</sup> March, 2017)

<sup>@</sup> As per Order dt 25 January, 2016 in Case No 135 of 2015 (from 10 November, 2015 to 31 March, 2016)

<sup>\*</sup> As per Order dt 7 July, 2014 in Case No. 100 of 2014 (extended till 31 Dec 2015)

<sup>#</sup> As per Order dt 22 March, 2013 in Case No. 6 of 2013

<sup>\*\*</sup> As per Order dt 11 January, 2010 in Case No. 123 of 2008.

The computations of Tariff for FY 2018-19 are provided in Annexure 4 of this Order. The Fixed Charge component of the Tariff for Projects commissioned prior to 1 April, 2019 shall be the levelised Fixed Charge approved under the respective RE Tariff Orders. The Tariff Rate comprises (i) Fixed Charge component, and (ii) Variable Charge component,

and shall be applicable for sale of power by such Projects to Distribution Licensees in Maharashtra in FY 2018-19.

#### **6.16. TARIFF AS PER APPROACH-2 FOR NON-FOSSIL FUEL-BASED CO-GENERATION PROJECTS**

As mentioned in Section 2.1.2 above, the Tariff discovered through competitive bidding in the State of Maharashtra proposed (Fixed Charge + Variable Charge) for non-fossil fuel based cogeneration projects for FY 2018-19 is Rs. 4.99/unit as approved by the Commission in its Order in Case No. 165 of 2018 dated 30<sup>th</sup> June 2018.

#### **6.17. GENERIC TARIFF FOR NON-FOSSIL FUEL-BASED CO-GENERATION PROJECTS**

As per Section 6.16 and 6.17, Tariff as per Approach-2 is lower than Tariff as per Approach-1. Following table gives comparison of the two approaches:

Comparison of Co-generation Tariff by Approach-1 and by Approach-2

<b>Particulars</b>	<b>Approach-1</b>	<b>Approach-2</b>
Co-generation	6.45	4.99

Therefore, Rs. 4.99 per unit is adopted as Generic Tariff for non-fossil fuel based cogeneration projects by this Commission.

#### Notes:

- The above Tariff shall be valid for Projects commissioned from 1 August, 2018 to 31 March, 2019.

#### **6.18. TARIFF FOR NON-FOSSIL FUEL-BASED CO-GENERATION PLANTS USING BIOMASS**

Regulation 60.2 specifies that the fuel price for Non-Fossil Fuel-based Co-Generation Projects using biomass other than Bagasse will be the biomass prices specified under Regulation 49. Accordingly, the fuel cost for such Projects is considered as Rs. 4,091.02/MT as set out in para. 5.13 of this Order. The corresponding Calorific Value of biomass fuel (3611 kcal/kg) has been taken as set out in para 5.12. Considering the Auxiliary Consumption and SHR applicable to Non-Fossil Fuel-based Co-Generation Projects set out at para 5.10 and 5.11, respectively, the Commission has computed the Variable Charge as Rs. 4.46/kWh for Non-Fossil Fuel-based Co-Generation Projects using biomass for FY 2018-19 (for the period for which such Projects are using biomass) as follows:

$$\text{Variable Charge} = \frac{\text{Station Heat Rate (SHR)}}{\text{Gross Calorific Value (GCV)}} \times \frac{1}{(1 - \text{Auxillary Consumption Factor})} \times \frac{\text{Price per tonne of Fuel}}{1000}$$

$$4.46 = \frac{3600}{3611} \times \frac{1}{(1 - 8.5\%)} \times \frac{4091.02}{1000}$$

The Project Entity shall, along with its monthly energy bill, furnish a monthly fuel procurement and fuel usage statement certified by a Chartered Accountant to the Distribution Licensee with whom an EPA has been entered into and to the State Nodal Agency (presently, MEDA) for monitoring the fossil and Non-Fossil fuel consumption as per Regulation 46. The State Nodal Agency shall verify the use of biomass other than Bagasse for applicability of the biomass fuel Tariff for Non-Fossil Fuel-based Co-Generation Projects using biomass. Before making payment of the monthly energy bills, the Distribution Licensees shall satisfy themselves about the monthly fuel procurement and fuel usage as per the statement certified by a Chartered Accountant and verified by the State Nodal Agency. The Distribution Licensees shall also submit an annual consolidated report to the Commission, giving details of monthly fuel bills and fuel use statement for such Projects having EPAs with them.

#### **6.19. TARIFF FOR NON-QUALIFYING NON-FOSSIL FUEL-BASED CO-GENERATION PLANTS**

The Tariff of Non-Qualifying Non-Fossil Fuel-based Co-Generation Projects will be equivalent to the Average Power Purchase Cost (APPC) of the respective Distribution Licensees for FY 2018-19, in accordance with Regulation 67.

### **7. SOLAR PHOTO VOLTAIC PROJECTS**

#### **7.1. USEFUL LIFE**

Regulation 2.1 (mm) defines ‘Useful Life’ in relation to a Unit of a Generating Station (including evacuation system) to mean the duration from the COD till such time as specified under the Regulations for such generation facility. The Useful Life specified for Solar Photo Voltaic (PV) Projects is 25 years.

#### **7.2. CONTROL PERIOD**

The Control Period for Solar PV Projects shall be in accordance with the relevant stipulations at para 2.1 of this Order.

#### **7.3. TARIFF PERIOD**

Regulation 7 specifies the Tariff Period for Solar PV Projects as 13 years. In terms of Regulation 7.5, the Tariff Period specified shall be reckoned from the COD of the RE Projects, and the Tariff determined under the Regulations shall be applicable only for the duration of the Tariff Period.

#### **7.4. OPERATION AND MAINTENANCE EXPENSES**

MERC RE Regulations 2015 have not given any relation between O&M expenses and capital cost similar to that of wind energy projects. However, vide the fifth amendment in CERC Regulations for tariff determination from RE sources 2016 dated 30<sup>th</sup> March 2016, O&M expenses for solar PV projects were modified by CERC as follows;

“

*Provided that Normative O&M expenses for the last year of the Control Period (i.e. FY 2016-17) shall be Rs. 7 lakhs per MW.*

“

This Commission has observed that actual O&M expenses per MW are much lower than Rs. 7 lakhs per MW. In tariff petition dated 11<sup>th</sup> December 2017 of IREDA to Kerala State Electricity Regulatory Commission (KSERC) for determination of tariff for 50 MW solar PV plant, annual O&M charges are taken as Rs. 7 lakh/MW as per above amendment by CERC. However, Letter of Intent (LoI) dated 29<sup>th</sup> December 2015 for this project to ‘EPC and O&M contractor’ mentions annual O&M cost of Rs. 2,57,62,500/- for 50 MW i.e. at Rs. 5,15,250/- per MW without any escalation. This shows that annual O&M expenses of Rs. 7 lakhs per MW for FY 2016-17 is more than adequate for O&M expense.

In view of absence of any benchmark for O&M expense as percentage of capital cost, this Commission is adopting normative O&M expense for FY 2016-17 as given in the fifth amendment of CERC (mentioned above). This is further escalated by 4.85% for FY 2017-18 (as per Generic RE Order for FY 2017-18) and by 4.26% for FY 2018-19 (as per section 2.10 mentioned above). Therefore, annual O&M expense per MW for FY 2018-19 is Rs. 7.65 lakh per MW.

However, this Commission may adopt any reliable benchmark for O&M expense as percentage of capital cost as and when it is available.

## **7.5. CAPITAL COST OF SOLAR PV PROJECTS**

Regulation 69 specifies the normative Capital Cost of Solar PV Projects as Rs. 605.85 lakh/MW for the Base Year FY 2015-16. In RE Tariff Order for FY 2016-17 dated 29 April, 2016 in Case No.45 of 2016, the Commission had taken the Capital Cost of Solar PV Projects as Rs. 530.02 lakh/MW, in line with the CERC’s RE tariff Order dated 23 March, 2016.

However, for FY 2018-19, CERC has not determined a benchmark Capital Cost for Solar PV Projects and its RE Tariff Regulations, 2017 do not envisage such generic determination. The Commission notes that the capital cost of Solar PV modules has decreased significantly during last twelve months. Hence, for deriving the normative Capital Cost for Solar PV Projects for FY 2018-19, the Commission evaluated the following three options:

### **a) Option 1: Capital Cost determined by other SERCs for FY 2018-19**

The Commission considered the Capital Cost specified by other SERCs, primarily Gujarat (GERC), Madhya Pradesh (MPERC), Rajasthan (RERC), Tamilnadu (TNERC) and Karnataka (KEREC) for FY 2017-18. Except for RERC, all others have considered a Capital Cost in the range of Rs. 440 lakh/MW to Rs. 615 lakh/MW, i.e. higher than the Capital Cost considered by this Commission for FY 2017-18.

In its recent Order dated 9 October, 2017, the RERC has taken a Capital Cost of Rs. 358.36 lakh/MW. Following is the summary of capital costs considered by various states for FY 2017-18:

State	Capital Cost for FY 2017-18 (lakh/MW)
Gujarat	615.00
Madhya Pradesh	530.00
Tamilnadu	470.00
Karnataka	440.00
Rajasthan	358.36
<b>Average Capital Cost</b>	<b>482.67</b>
Capital cost for Maharashtra	424.74

Karnataka Electricity Regulatory Commission (KERC) has issued discussion paper on 7<sup>th</sup> February 2018 for determination of tariff and other norms, including capital cost, for solar photovoltaic projects. Proposed capital cost of ground mounted MW scale solar photovoltaic projects for FY 2018-19 is Rs. 350 lakh/MW. However, no final order is issued in this regard as on date of this order.

As per CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017; project specific tariff shall be determined for solar photovoltaic projects. Therefore no benchmark capital cost is available.

**b) Option 2: Derived Capital Cost considering Viability Gap Funding and tariff discovered under reverse bidding process of SECI under JNNSM and NTPC**

In this option, capital cost is derived from tariff discovered through competitive bidding process. It may not be justifiable to apply all the parameters such as rate of interest on long term loans, rate of interest on working capital, return on equity as considered in RE tariff regulations 2015 while computing capital cost from tariff discovered in competitive bidding, because L1 bidders in reverse bidding process have access to competitive cost of funds and return expectations. Accordingly, the Commission has taken more aggressive parameters to estimate capital cost used for competitive bidding from the L1 tariffs. The Commission has considered competitive bids from the Government of India (GoI) Undertaking only, like SECI & NTPC.

Competitive bidding conducted by the state utilities like TANGEDCO and GUVNL is not considered as there is significant difference in tariffs received by both the state utilities even though both had conducted e-reverse auction at same time. This is mainly due to difference in various factors like solar insolation, Discom ratings, payment security, etc.

**i. Competitive bidding conducted for the GoI enterprises**

The Government of India owned enterprises like NTPC and SECI had invited bids during FY 2017-18. These tenders were not for the projects in the State of Maharashtra, but for solar parks in other states. The tariffs discovered through competitive bidding are summarized in table below:

No.	Tender	Capacity (MW)	Month	L1 tariff (Rs./unit)
1	SECI Bhadla (ILFS Solar Park)	500	May 2017	2.44
2	SECI Bhadla (Adani park)	250	May 2017	2.62

No.	Tender	Capacity (MW)	Month	L1 tariff (Rs./unit)
3	NTPC Kadappa solar park	250	April 2017	3.15

No viability gap funding was sought by any of the L1 bidders. The Commission notes, however, that there are several provisions in the bid documents and structuring of the Solar Parks that has enabled significant reduction in the price. Some of the important factors include (a) very large project size enabling economies of scale, (b) solar park model which reduces development risk; (c) evacuation arrangement with ISTS connectivity (d) long term off-take assurance with pre-identified credit-worthy customers (e) conducive payment security mechanism supported by suitable fund which minimises risk and facilitates long term capital (f) payment guarantee support, etc.

Solar park developers have to pay land lease payments and O&M costs to solar park developers for facilities including roads, drainage system, and evacuation infrastructure. Some developmental costs are also paid upfront.

However, the present Generic Tariff determination has accommodated cost of transmission line unlike solar park projects which are provided with transmission line by the state utilities by virtue of being government sponsored projects. Therefore, it would be appropriate to include cost of transmission lines in capital cost considered for solar park projects. Capital cost per MW of transmission lines depends upon distance of the project site from the nearest substation with spare bays for power evacuation and generation capacity. These two factors are project specific and vary on case to case basis. Cost towards contingency and other miscellaneous expenses are also higher for typical solar PV developers vis-à-vis project developers in solar park due to various project risks which are not encountered by solar park projects. Therefore, Rs. 15 lakh per MW are added towards cost for transmission line and contingency expenses in 'capital cost per MW' derived from L1 bids for solar park.

Accordingly, following capital costs were discovered by competitive bidding for SECI & NTPC:

No.	Tender	L1 tariff (Rs./unit)*	(Rs. lakh/MW)		
			Solar park	Cost of transmission line	Total
1	SECI Bhadla (ILFS Solar Park)	2.44	211	15	226
2	SECI Bhadla (Adani park)	2.62	233	15	248
3	NTPC Kadappa solar park	3.15	297	15	312

It may be noted that NTPC is selling power from Kadappa solar park to Andhra Pradesh State Power Distribution Company Limited (APSPDCL) at rate lower than Rs. 3.15 per

unit. However, this Commission has not reduced the L1 rate further to PSA rate, because PSA rate is for solar power bundled with thermal power from other plants of NTPC.

**c) Option 3: Component-wise cost-plus approach based on market cost for Solar PV modules and Balance of Systems (BoS) of Projects**

The Capital Cost of Solar PV Projects broadly comprises the PV module and the non-module components, or the BoS of the Project. The Commission analysed the module and non-module cost separately at market trends and considered the component-wise Capital Cost as below:

Item	Component-wise Capital Cost (Rs. lakh/MW)	Remarks
PV Module*	184.28 <sup>^</sup>	Based on Market Analysis
Power Conditioning Unit	25.00	
Land	25.00	Similar to CERC's Order for FY 2016-17
Civil & general Works	35.00	
Ground Mounting Structures	35.00	
Cables and transformers	44.00	
Preliminary/Pre-operating expenses	27.63	
<b>Total in Rs. lakh/MW</b>	<b>375.91</b>	

\* Minimum poly silicon PV module rate on 28<sup>th</sup> February 2018 is USD 0.27/W (source: wap.pvinsights.com); 1 USD=INR 65.00

<sup>^</sup> Minimum 1.05 MW solar PV modules at DC side assumed for 1 MW AC output

The Capital Cost set out in **Option-1** above may not be representative of the prevalent Solar PV market scenario trend as most of the SERC Orders, except RERC Order, were issued a year ago. As regards **Option-3** for estimating the component-wise Capital Cost, the CERC RE Tariff Regulations, 2017 do not envisage any generic benchmark Capital Cost for Solar PV Projects, and the Capital Cost would be determined on a Project-specific basis. Thus, no benchmark for component-wise Capital Cost for FY 2018-19 is available at this stage, and the component-wise cost benchmark for FY 2016-17, is available from the CERC's earlier RE Tariff Order.

Estimating the component-wise Capital Cost for FY 2018-19 under Option-3 considering the percentage share of different cost components as approved for FY 2016-17 would not be appropriate considering the rapid decline in the PV Module costs. The PV module costs based on current and expected market price trends may be considered for Capital Cost estimation for FY 2018-19, but projection of other non-Module costs (e.g. land, power evacuation, erection and installation costs) would be challenge without assessment of ground realities. Estimation of non-module costs linked to approved costs for FY 2016-17, as envisaged under Option-3, would not appropriately represent the projected cost estimates for FY 2018-19.

The Commission notes that, out of 20 GW + Solar PV installed capacity in India (as on 31<sup>st</sup> January, 2018), majority of capacity has been set up through the bidding process under Central schemes (SECI/NTPC) or State-level programmes, and only a relatively small



component of Solar capacity addition has taken place under the cost-plus regulated regime. Hence, it may be appropriate to consider cost benchmarks emerging through the bidding process as it reflects prevalent market conditions, emerging trends in technology and costs and corresponding expectations of risks and returns. The process referred to in **Option-2** was undertaken by various central and state enterprises like SECI through open competitive bidding. Moreover, the Projects under this bidding process are expected to be commissioned in FY 2018-19.

Hence, the Commission is of the view that it would be appropriate to consider the Capital Cost derived from Option-2 above. Therefore, average capital cost for solar PV power project for determination of the Generic Tariff for FY 2018-19 is as calculated in table below:

No.	Tender	L1 tariff (Rs./unit)	Capital Cost (Rs. lakh/MW)
1	SECI Bhadla (ILFS Solar Park)	2.44	226.0
2	SECI Bhadla (Adani park)	2.62	248.0
3	NTPC Kadappa solar park	3.15	312.0
<b>Average capital cost (Rs. lakh/MW)</b>			<b>262.00</b>

#### 7.6. DEBT-EQUITY RATIO

In accordance with Regulation 14.1, the normative debt and equity components for Solar PV Projects shall be Rs. 183.05 lakh per MW and Rs. 78.45 lakh per MW, respectively.

#### 7.7. RETURN ON EQUITY

In accordance with Regulation 17.1, the RoE works out as shown in the Table below:

Particulars	Amount (Rs. lakh/MW)
Opening Equity	78.45
Return on Equity for the first 10 years @16% grossing up with MAT rate of 21.55%	16.00
Return on Equity after first 10 years @16% grossing up with Income Tax rate of 29.12%	17.71

Grossing up of the RoE is done as per the Formula:  $RoE (\%) / [1 - Tax Rate (\%)]$ .

#### 7.8. INTEREST ON LOAN

An interest rate of 10.98% has been taken for a loan amount of Rs. 183.05 lakh per MW in FY 2018-19.

#### 7.9. DEPRECIATION

In accordance with Regulation 16, depreciation will be charged at 5.83% for the first 12 years, and at 1.54% thereafter for the remaining Useful Life of 13 years.

## 7.10. INTEREST ON WORKING CAPITAL

Regulation 18.1 provides for computation of the working capital requirements for Solar PV Projects as under:

- a) "O&M expenses for one month;
- b) Receivables equivalent to two months of tariff for sale of electricity calculated on the normative CUF;
- c) Maintenance spares @ 15% of O&M expenses."

The IoWC is considered as 11.48 % for computation of the Tariff.

## 7.11. CAPACITY UTILISATION FACTOR

In accordance with Regulation 70, a CUF of 19% has been taken.

## 7.12. TARIFF AS PER APPROACH-1 FOR SOLAR PV POWER PROJECTS

Considering the parameters discussed above, the Generic Tariff for Solar PV Projects commissioned from 1 August, 2018 to 31 March, 2019 has been determined as shown below:

<b>Tariff for Solar PV Power Projects commissioned in FY 2018-19</b>				
<b>Particulars</b>	<b>Tariff Period</b>	<b>Levelised Tariff</b>	<b>Benefit of Accelerated Depreciation (if availed)</b>	<b>Net Levelised Tariff (upon adjusting for Accelerated Depreciation benefit, if availed)</b>
		<b>(Rs/kWh)</b>	<b>(Rs/kWh)</b>	<b>(Rs/kWh)</b>
Solar PV Projects	13	3.01	0.21	2.80

The Tariff computations for FY 2018-19 are provided in Annexure 5A of this Order.

## 7.13. TARIFF AS PER APPROACH-2 FOR SOLAR PHOTOVOLTAIC PROJECTS

As mentioned in Section 2.1.2 above, the Tariff discovered through competitive bidding in the State of Maharashtra for solar photovoltaic projects commissioned in FY 2018-19 is Rs. 2.72/unit as approved by the Commission in its Order in Case No. 164 of 2018 dated 29th June 2018.

## 7.14. GENERIC TARIFF FOR SOLAR PHOTOVOLTAIC PROJECTS FOR FY 2018-19

As per Section 7.12 and 7.13 above, Tariff as per Approach-2 is lower than Tariff as per Approach-1. Following table gives comparison of the two approaches:

Comparison of Co-generation Tariff by Approach-1 and by Approach-2

Particulars	Approach-1	Approach-2
Solar Photovoltaic	3.01	2.72

Therefore, Rs. 2.72 per unit is adopted as Generic Tariff for solar photovoltaic projects by this Commission.

Notes:

- The above Tariff shall be valid for Projects commissioned from 1 August, 2018 to 31 March, 2019.

**7.15. GENERIC TARIFF FOR SOLAR ROOF-TOP PV PROJECTS**

The Solar Roof-top PV Projects covered in this Order under the RE Tariff Regulations, 2015 are distinct and separate from and do not include those covered under the MERC (Net Metering for Roof-top Solar PV Systems) Regulations, 2015.

Regulation 72 of the RE Tariff Regulations specifies that the Tariff for Solar Roof-top PV Projects shall be Rs 0.50 per kWh higher than that of other Solar PV Projects. Accordingly, the Tariff for such Projects during FY 2018-19 shall be as follows:

**Comparison of Tariff for Solar Roof-top PV Projects by Approach-1& Approach-2**

Particulars	Tariff Period	Approach-1			Approach-2
		Levelised Total Tariff	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff (upon adjusting for Accelerated Depreciation benefit, if availed)	
Solar Roof-top PV and other small Solar Power Projects	13	3.51	0.21	3.30	3.22

Therefore, Rs. 3.21 per unit is adopted as Generic Tariff for Solar Roof-top PV projects by this Commission.

Note:

- The above Tariff shall be valid for Projects commissioned from 1 August, 2018 to 31 March, 2019.

## **8. SOLAR THERMAL POWER PROJECTS**

### **8.1. USEFUL LIFE**

Regulation 2.1 (mm) defines the 'Useful Life' of a Unit of a Generating Station (including evacuation system) to mean the duration from the COD till such time as specified under the Regulations for such generation facility. The Useful Life specified for Solar Thermal Power Projects is 25 years.

### **8.2. CONTROL PERIOD**

The Control Period for Solar Thermal Power Projects shall be in accordance with the relevant stipulations in para 2.1 of this Order.

### **8.3. TARIFF PERIOD**

Regulation 7 specifies the Tariff Period for Solar PV Projects as 25 years. In terms of Regulation 7.5, the Tariff Period is reckoned from the COD of the RE Project, and the Tariff determined under the Regulations is applicable only for the duration of the Tariff Period.

### **8.4. CAPITAL COST OF SOLAR THERMAL POWER PROJECTS**

Regulation 74 specifies the normative Capital Cost of a Solar Thermal Power Project for FY 2015-16 (Base Year) as Rs. 1200 lakh/MW. The CERC in its RE Tariff Regulations, 2017 has considered Solar Thermal Power Projects for Project-specific tariff determination.

This Commission's RE Tariff Regulations do not specify the indexation mechanism for Solar Thermal Power Projects. No recent benchmark Capital Cost is available for consideration, and no specific suggestions have been received from Solar Thermal Power Project Developers in these proceedings. The Commission has taken the normative benchmark Capital Cost of Rs. 1,200 Lakhs/MW as specified in the RE Tariff Regulations for the base year for the Projects to be commissioned in FY 2018-19 also. However, Developers may also approach the Commission for Project-specific Tariff determination as provided in the RE Tariff Regulations.

### **8.5. DEBT-EQUITY RATIO**

In accordance with Regulation 14.1, the normative debt and equity components for Solar Thermal Projects shall be Rs. 840 lakh per MW and Rs. 360 lakh per MW, respectively.

### **8.6. RETURN ON EQUITY**

In accordance with Regulation 17.1, the RoE for such Projects works out as shown in the Table below:

<b>Particulars</b>	<b>Amount (Rs. lakh/MW)</b>
Opening Equity	360.00
Return on Equity for the first 10 years @16% grossing up with MAT rate of 21.55%	73.42
Return on Equity after first 10 years @16% grossing up with Income Tax rate of 29.12%	81.26

Grossing up of the RoE is done as per the Formula:  $\text{RoE (\%)} / [1 - \text{Tax Rate (\%)}]$ .

### **8.7. INTEREST ON LOAN**

The interest rate of 10.98% has been considered for Solar Thermal Power Projects for a loan amount of Rs. 840.00 lakh per MW for FY 2018-19.

### **8.8. DEPRECIATION**

In accordance with Regulation 16, Depreciation will be charged at 5.83% for the first 12 years, and at 1.54% thereafter for the remaining Useful Life of 13 years.

### **8.9. INTEREST ON WORKING CAPITAL**

Regulation 18.1 provides for computation of the working capital requirements for Solar Thermal Power Projects as follows:

- “a) O&M expenses for one month;*
- b) Receivables equivalent to two months of tariff for sale of electricity calculated on the normative CUF;*
- c) Maintenance spares @ 15% of O&M expenses.”*

The IoWC is considered as 11.48% for computation of Tariff for FY 2018-19.

### **8.10. OPERATION AND MAINTENANCE EXPENSES**

Regulation 76.1 specifies the normative O&M Expenses for Solar Thermal Power Projects for FY 2015-16 (Base Year) as Rs. 15 lakh per MW. These are to be escalated at 2.96% for the second year FY 2016-17 and further escalated at 4.85% for FY 2017-18. From FY 2018-19 onwards, O&M expense is escalated at 4.26% per annum as explained in section 2.10. Accordingly, the Commission has considered the O&M expenses for Solar Thermal Power Projects for FY 2018-19 as Rs. 16.88 lakh per MW.

### **8.11. CAPACITY UTILISATION FACTOR**

In accordance with Regulation 75, CUF of 23% has been considered for determination of the Tariff for such Projects.

## 8.12. LEVELISED TARIFF FOR SOLAR THERMAL POWER PROJECTS COMMISSIONED IN FY 2018-19

Considering the parameters discussed in the preceding paragraphs, the Generic Tariff for Solar Thermal Power Projects commissioned in FY 2018-19 has been determined as under:

Particulars	Tariff Period (Years)	Levelised Tariff	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff (adjusting for Accelerated Depreciation benefit, if availed)
		(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
Solar Thermal Power Projects	25	11.20	0.90	10.30

The Tariff computations for FY 2018-19 are provided in Annexure 5B of this Order.

## 8.13. TARIFF AS PER APPROACH-2 FOR SOLAR THERMAL PROJECTS

In FY 2018-19, no tariff is adopted for solar thermal power projects through competitive bidding. Therefore as mentioned in Section 2.1.2 above, if any such tariff by way of competitive bidding is discovered and is approved by the Commission in FY 2018-19 for solar thermal power projects, such tariff will be considered to be the Approach-2 Tariff for solar thermal power projects for FY 2018-19 from the date of approval by this Commission.

## 8.14. GENERIC TARIFF FOR SOLAR THERMAL PROJECTS FOR FY 2018-19

As per Section 8.12 and 8.13 above, due to non-availability of Approach-2 tariff for solar thermal projects; tariff by Approach-2 is adopted to be the Generic Tariff.

### Generic Tariff for Solar Thermal Projects

Particulars	Tariff Period (Years)	Levelised Tariff	Benefit of Accelerated Depreciation (if availed)	Net Levelised Tariff (adjusting for Accelerated Depreciation benefit, if availed)
		(Rs/kWh)	(Rs/kWh)	(Rs/kWh)
Solar Thermal Power Projects	25	11.20	0.90	10.30

#### Note:

- The above Tariff shall be valid for Projects commissioned from 1 August, 2018 to 31 March, 2019.

9. The detailed computations of the Generic Tariff for various RE technologies are set out in the following Annexures to this Order:

<b>S.No.</b>	<b>Renewable Energy Projects</b>	<b>Annexure</b>
<b>1</b>	<b>Wind Power Projects</b>	
	Wind Zone-I	Annexure 1A
	Wind Zone-II	Annexure 1B
	Wind Zone III	Annexure 1C
	Wind Zone IV	Annexure 1D
<b>2</b>	<b>Small Hydro Power Projects</b>	
	SHP above 1MW and upto and including 5 MW	Annexure 2A
	SHP above 5 MW and upto and including 25 MW	Annexure 2B
<b>3</b>	<b>Biomass Power Projects</b>	Annexure 3
<b>4</b>	<b>Non-Fossil Fuel-based Co-Generation Projects</b>	Annexure 4
<b>5</b>	<b>Solar Projects</b>	
	Solar PV Projects	Annexure 5A
	Solar Thermal Power Projects	Annexure 5B

Sd/-  
**(Mukesh Khullar)**  
Member

Sd/-  
**(I. M. Bohari)**  
Member

Sd/-  
**(Anand B. Kulkarni)**  
Chairperson

## Form 1.1 Assumptions Parameters

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	1	
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	22.0%	
			Deration Factor	%	0	
			Useful Life	Years	25	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	525	
3	Sources of Fund	<u>Debt: Equity</u>	Tariff Period	Years	13	
			Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	367.50	
			Total Equity Amout	Rs Lacs	157.50	
			<u>Debt Component</u>	Loan Amount	Rs Lacs	367.50
				Moratorium Period	years	0
				Repayment Period(incld Moratorium)	years	12
				Interest Rate	%	10.98%
			<u>Equity Component</u>	Equity amount	Rs Lacs	157.50
				Return on Equity for first 10 years	% p.a	20.39%
				RoE Period	Year	10
				Return on Equity 11th year onwards	% p.a	22.57%
Weighted average of ROE		21.70%				
Discount Rate		10.25%				
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.120%	
			MAT Rate (for first 10 years)	%	21.549%	
			<u>Depreciation</u>	Depreciation Rate for first 12 years	%	5.83%
				Depreciation Rate 13th year onwards	%	1.54%
				Years for 5.83% rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1	
			Maintenance Spare	(% of O&M exepenses)	15.00%	
			Receivables for Debtors	Months	2	
			<u>For Variable Charges</u>			
			Interest On Working Capital	%	11.48%	
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	8.83	
			%ge escalation (FY16-17)	%	2.96%	
			%ge escalation (FY17-18)	%	4.85%	
			power plant (FY18-19)	Rs Lakh	7.72	
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%	



**Form 1.2 Form Template for (Wind Power Projects) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Gross/Net Generation	MU		1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93

Fixed Cost	Unit	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	
O&M Expenses	Rs Lakh		7.72	8.05	8.39	8.75	9.12	9.51	9.91	10.34	10.78	11.24	11.72	12.22	12.74	13.28	13.85	14.44	15.05	15.70	16.37	17.06	17.79	18.55	19.34	20.16	21.02	
Depreciation	Rs Lakh		30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09
Interest on term loan	Rs Lakh		38.69	35.32	31.96	28.59	25.23	21.87	18.50	15.14	11.77	8.41	5.05	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		1.92	1.93	1.94	1.94	1.95	1.97	1.98	1.99	2.00	2.01	2.02	2.04	2.05	2.07	2.08	2.10	2.11	2.13	2.15	2.17	2.19	2.21	2.23	2.25	2.27	
Return on Equity	Rs Lakh		32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>111.05</b>	<b>108.02</b>	<b>105.01</b>	<b>102.02</b>	<b>99.04</b>	<b>96.07</b>	<b>93.12</b>	<b>90.19</b>	<b>87.28</b>	<b>84.39</b>	<b>84.95</b>	<b>82.10</b>	<b>58.44</b>	<b>58.99</b>	<b>59.58</b>	<b>60.18</b>	<b>60.81</b>	<b>61.47</b>	<b>62.16</b>	<b>62.88</b>	<b>63.62</b>	<b>64.40</b>	<b>65.22</b>	<b>66.06</b>	<b>66.94</b>	
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>5.76</b>	<b>5.61</b>	<b>5.45</b>	<b>5.29</b>	<b>5.14</b>	<b>4.98</b>	<b>4.83</b>	<b>4.68</b>	<b>4.53</b>	<b>4.38</b>	<b>4.41</b>	<b>4.26</b>	<b>3.03</b>	<b>3.06</b>	<b>3.09</b>	<b>3.12</b>	<b>3.16</b>	<b>3.19</b>	<b>3.23</b>	<b>3.26</b>	<b>3.30</b>	<b>3.34</b>	<b>3.38</b>	<b>3.43</b>	<b>3.47</b>	

**Levelling tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levelling	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
O&M expn	Rs/kWh	<b>0.57</b>	0.40	0.42	0.44	0.45	0.47	0.49	0.51	0.54	0.56	0.58	0.61	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.85	0.89	0.92	0.96	1.00	1.05	1.09
Depreciation	Rs/kWh	<b>1.30</b>	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Int. on term loan	Rs/kWh	<b>0.94</b>	2.01	1.83	1.66	1.48	1.31	1.13	0.96	0.79	0.61	0.44	0.26	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.10</b>	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12
RoE	Rs/kWh	<b>1.72</b>	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
<b>Total COG</b>	<b>Rs/kWh</b>	<b>4.64</b>	<b>5.76</b>	<b>5.61</b>	<b>5.45</b>	<b>5.29</b>	<b>5.14</b>	<b>4.98</b>	<b>4.83</b>	<b>4.68</b>	<b>4.53</b>	<b>4.38</b>	<b>4.41</b>	<b>4.26</b>	<b>3.03</b>	<b>3.06</b>	<b>3.09</b>	<b>3.12</b>	<b>3.16</b>	<b>3.19</b>	<b>3.23</b>	<b>3.26</b>	<b>3.30</b>	<b>3.34</b>	<b>3.38</b>	<b>3.43</b>	<b>3.47</b>

Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost	4.64		89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36
<b>Levelling Tariff</b>	<b>4.64</b>	<b>Rs/Unit</b>																									

### Determination of Additional Depreciation for Wind Power Projects

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	525.00

Years	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	1.26	0.00	0.00	0.00	0.00	0.00	0.00

### Accelerated Depreciation

Opening	%	100.0%	40.0%	24.0%	14.4%	8.6%	5.2%	3.1%	1.9%	1.1%	0.7%	0.4%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	315.00	84.00	50.40	30.24	18.14	10.89	6.53	3.92	2.35	1.41	0.85	0.51	0.30	0.18	0.11	0.07	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	287.28	56.28	22.68	2.52	-9.58	-16.83	-21.19	-23.80	-25.37	-26.31	-26.87	-27.21	-27.42	-27.54	-27.61	-27.65	-27.68	-1.24	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	83.66	16.39	6.60	0.73	-2.79	-4.90	-6.17	-6.93	-7.39	-7.66	-7.83	-7.92	-7.98	-8.02	-8.04	-8.05	-8.06	-0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93
Per unit benefit	Rs/Unit	4.34	0.85	0.34	0.04	-0.14	-0.25	-0.32	-0.36	-0.38	-0.40	-0.41	-0.41	-0.41	-0.42	-0.42	-0.42	-0.42	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
<b>Levellised benefit</b>	<b>0.37</b>	<b>Rs/Unit</b>																								

**Annexure – 1B  
(Wind Zone-2)**

**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	2	
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	25.0%	
			Deration Factor	%	0	
			Useful Life	Years	25	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	525	
3	Sources of Fund	<u>Debt: Equity</u>	Tariff Period	Years	13	
			Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	367.50	
			Total Equity Amount	Rs Lacs	157.50	
			<u>Debt Component</u>	Loan Amount	Rs Lacs	367.50
				Moratorium Period	years	0
				Repayment Period(incld Moratorium)	years	12
				Interest Rate	%	10.98%
			<u>Equity Component</u>	Equity amount	Rs Lacs	157.50
				Return on Equity for first 10 years	% p.a	20.39%
				RoE Period	Year	10
				Return on Equity 11th year onwards	% p.a	22.57%
Weighted average of ROE		21.70%				
Discount Rate		10.25%				
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.120%	
			MAT Rate (for first 10 years)	%	21.549%	
			<u>Depreciation</u>	Depreciation Rate for first 12 years	%	5.83%
				Depreciation Rate 13th year onwards	%	1.54%
				Years for 5.83% rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1	
			Maintenance Spare	(% of O&M exepenses)	15.00%	
			Receivables for Debtors	Months	2	
			<u>For Variable Charges</u>			
			Interest On Working Capital	%	11.48%	
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	8.83	
			%ge escalation (FY16-17)	%	2.96%	
			%ge escalation (FY17-18)	%	4.85%	
			power plant (FY18-19)	Rs Lakh	7.72	
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%	

**Form 1.2 Form Template for (Wind Power Projects ) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Gross/Net Generation	MU		2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19

Fixed Cost	Unit	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
O&M Expenses	Rs Lakh		7.72	8.05	8.39	8.75	9.12	9.51	9.91	10.34	10.78	11.24	11.72	12.22	12.74	13.28	13.85	14.44	15.05	15.70	16.37	17.06	17.79	18.55	19.34	20.16	21.02
Depreciation	Rs Lakh		30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09
Interest on term loan	Rs Lakh		38.69	35.32	31.96	28.59	25.23	21.87	18.50	15.14	11.77	8.41	5.05	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		1.92	1.93	1.94	1.94	1.95	1.97	1.98	1.99	2.00	2.01	2.02	2.04	2.05	2.07	2.08	2.10	2.11	2.13	2.15	2.17	2.19	2.21	2.23	2.25	2.27
Return on Equity	Rs Lakh		32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>111.05</b>	<b>108.02</b>	<b>105.01</b>	<b>102.02</b>	<b>99.04</b>	<b>96.07</b>	<b>93.12</b>	<b>90.19</b>	<b>87.28</b>	<b>84.39</b>	<b>84.95</b>	<b>82.10</b>	<b>58.44</b>	<b>58.99</b>	<b>59.58</b>	<b>60.18</b>	<b>60.81</b>	<b>61.47</b>	<b>62.16</b>	<b>62.88</b>	<b>63.62</b>	<b>64.40</b>	<b>65.22</b>	<b>66.06</b>	<b>66.94</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>5.07</b>	<b>4.93</b>	<b>4.80</b>	<b>4.66</b>	<b>4.52</b>	<b>4.39</b>	<b>4.25</b>	<b>4.12</b>	<b>3.99</b>	<b>3.85</b>	<b>3.88</b>	<b>3.75</b>	<b>2.67</b>	<b>2.69</b>	<b>2.72</b>	<b>2.75</b>	<b>2.78</b>	<b>2.81</b>	<b>2.84</b>	<b>2.87</b>	<b>2.91</b>	<b>2.94</b>	<b>2.98</b>	<b>3.02</b>	<b>3.06</b>

**Levallised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levallised	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
O&M expn	Rs/kWh	<b>0.50</b>	0.35	0.37	0.38	0.40	0.42	0.43	0.45	0.47	0.49	0.51	0.54	0.56	0.58	0.61	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.85	0.88	0.92	0.96
Depreciation	Rs/kWh	<b>1.15</b>	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Int. on term loan	Rs/kWh	<b>0.83</b>	1.77	1.61	1.46	1.31	1.15	1.00	0.84	0.69	0.54	0.38	0.23	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.09</b>	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
RoE	Rs/kWh	<b>1.52</b>	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62
<b>Total COG</b>	<b>Rs/kWh</b>	<b>4.08</b>	<b>5.07</b>	<b>4.93</b>	<b>4.80</b>	<b>4.66</b>	<b>4.52</b>	<b>4.39</b>	<b>4.25</b>	<b>4.12</b>	<b>3.99</b>	<b>3.85</b>	<b>3.88</b>	<b>3.75</b>	<b>2.67</b>	<b>2.69</b>	<b>2.72</b>	<b>2.75</b>	<b>2.78</b>	<b>2.81</b>	<b>2.84</b>	<b>2.87</b>	<b>2.91</b>	<b>2.94</b>	<b>2.98</b>	<b>3.02</b>	<b>3.06</b>

Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost	4.08		89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36
<b>Levallised Tariff</b>	<b>4.08</b>	<b>Rs/Unit</b>																									

### Determination of Additional Depreciation for Wind Power Projects

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	525.00

Years	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00

#### Accelerated Depreciation

Opening	%	100.0%	40.0%	24.0%	14.4%	8.6%	5.2%	3.1%	1.9%	1.1%	0.7%	0.4%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	315.00	84.00	50.40	30.24	18.14	10.89	6.53	3.92	2.35	1.41	0.85	0.51	0.30	0.18	0.11	0.07	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	287.28	56.28	22.68	2.52	-9.58	-16.83	-21.19	-23.80	-25.37	-26.31	-26.87	-27.21	-27.42	-27.54	-27.61	-27.65	-27.68	-1.24	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	83.66	16.39	6.60	0.73	-2.79	-4.90	-6.17	-6.93	-7.39	-7.66	-7.83	-7.92	-7.98	-8.02	-8.04	-8.05	-8.06	-0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19
Per unit benefit	Rs/Unit	3.82	0.75	0.30	0.03	-0.13	-0.22	-0.28	-0.32	-0.34	-0.35	-0.36	-0.36	-0.36	-0.37	-0.37	-0.37	-0.37	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
<b>Levellised benefit</b>	<b>0.33</b>	<b>Rs/Unit</b>																								

**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	3	
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	30.0%	
			Deration Factor	%	0	
			Useful Life	Years	25	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	525	
3	Sources of Fund	<u>Debt: Equity</u>	Tariff Period	Years	13	
			Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	367.50	
			Total Equity Amount	Rs Lacs	157.50	
			<u>Debt Component</u>	Loan Amount	Rs Lacs	367.50
				Moratorium Period	years	0
				Repayment Period(incl. Moratorium)	years	12
				Interest Rate	%	10.98%
			<u>Equity Component</u>	Equity amount	Rs Lacs	157.50
				Return on Equity for first 10 years	% p.a	20.39%
				RoE Period	Year	10
				Return on Equity 11th year onwards	% p.a	22.57%
				Weighted average of ROE		21.70%
Discount Rate		10.25%				
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.12%	
			MAT Rate (for first 10 years)	%	21.55%	
			<u>Depreciation</u>	Depreciation Rate for first 12 years	%	5.83%
				Depreciation Rate 13th year onwards	%	1.54%
				Years for 5.83% rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1	
			Maintenance Spare	(% of O&M expenses)	15.00%	
			Receivables for Debtors	Months	2	
			<u>For Variable Charges</u>	Interest On Working Capital	%	11.48%
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	8.83	
			%ge escalation (FY16-17)	%	2.96%	
			%ge escalation (FY17-18)	%	4.85%	
			power plant (FY18-19)	Rs Lakh	7.72	
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%	

**Form 1.2 Form Template for (Wind Power Projects ) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Gross/Net Generation	MU		2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63

Fixed Cost	Unit	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
O&M Expenses	Rs Lakh		7.72	8.05	8.39	8.75	9.12	9.51	9.91	10.34	10.78	11.24	11.72	12.22	12.74	13.28	13.85	14.44	15.05	15.70	16.37	17.06	17.79	18.55	19.34	20.16	21.02
Depreciation	Rs Lakh		30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09
Interest on term loan	Rs Lakh		38.69	35.32	31.96	28.59	25.23	21.87	18.50	15.14	11.77	8.41	5.05	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		1.92	1.93	1.94	1.94	1.95	1.97	1.98	1.99	2.00	2.01	2.02	2.04	2.05	2.07	2.08	2.10	2.11	2.13	2.15	2.17	2.19	2.21	2.23	2.25	2.27
Return on Equity	Rs Lakh		32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>111.05</b>	<b>108.02</b>	<b>105.01</b>	<b>102.02</b>	<b>99.04</b>	<b>96.07</b>	<b>93.12</b>	<b>90.19</b>	<b>87.28</b>	<b>84.39</b>	<b>84.95</b>	<b>82.10</b>	<b>58.44</b>	<b>58.99</b>	<b>59.58</b>	<b>60.18</b>	<b>60.81</b>	<b>61.47</b>	<b>62.16</b>	<b>62.88</b>	<b>63.62</b>	<b>64.40</b>	<b>65.22</b>	<b>66.06</b>	<b>66.94</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>4.23</b>	<b>4.11</b>	<b>4.00</b>	<b>3.88</b>	<b>3.77</b>	<b>3.66</b>	<b>3.54</b>	<b>3.43</b>	<b>3.32</b>	<b>3.21</b>	<b>3.23</b>	<b>3.12</b>	<b>2.22</b>	<b>2.24</b>	<b>2.27</b>	<b>2.29</b>	<b>2.31</b>	<b>2.34</b>	<b>2.37</b>	<b>2.39</b>	<b>2.42</b>	<b>2.45</b>	<b>2.48</b>	<b>2.51</b>	<b>2.55</b>

**Levillised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levillised	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
O&M expn	Rs/kWh	<b>0.41</b>	0.29	0.31	0.32	0.33	0.35	0.36	0.38	0.39	0.41	0.43	0.45	0.46	0.48	0.51	0.53	0.55	0.57	0.60	0.62	0.65	0.68	0.71	0.74	0.77	0.80
Depreciation	Rs/kWh	<b>0.96</b>	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Int. on term loan	Rs/kWh	<b>0.69</b>	1.47	1.34	1.22	1.09	0.96	0.83	0.70	0.58	0.45	0.32	0.19	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.08</b>	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09
RoE	Rs/kWh	<b>1.26</b>	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
<b>Total COG</b>	<b>Rs/kWh</b>	<b>3.40</b>	<b>4.23</b>	<b>4.11</b>	<b>4.00</b>	<b>3.88</b>	<b>3.77</b>	<b>3.66</b>	<b>3.54</b>	<b>3.43</b>	<b>3.32</b>	<b>3.21</b>	<b>3.23</b>	<b>3.12</b>	<b>2.22</b>	<b>2.24</b>	<b>2.27</b>	<b>2.29</b>	<b>2.31</b>	<b>2.34</b>	<b>2.37</b>	<b>2.39</b>	<b>2.42</b>	<b>2.45</b>	<b>2.48</b>	<b>2.51</b>	<b>2.55</b>

Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost	3.40		89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36
<b>Levillised Tariff</b>	<b>3.40</b>	<b>Rs/Unit</b>																									

### Determination of Additional Depreciation for Wind Power Projects

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	525.00

Years ----->	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00

#### Accelerated Depreciation

Opening	%	100.0%	40.0%	24.0%	14.4%	8.6%	5.2%	3.1%	1.9%	1.1%	0.7%	0.4%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	315.00	84.00	50.40	30.24	18.14	10.89	6.53	3.92	2.35	1.41	0.85	0.51	0.30	0.18	0.11	0.07	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	287.28	56.28	22.68	2.52	-9.58	-16.83	-21.19	-23.80	-25.37	-26.31	-26.87	-27.21	-27.42	-27.54	-27.61	-27.65	-27.68	-1.24	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	83.66	16.39	6.60	0.73	-2.79	-4.90	-6.17	-6.93	-7.39	-7.66	-7.83	-7.92	-7.98	-8.02	-8.04	-8.05	-8.06	-0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.63
Per unit benefit	Rs/Unit	3.18	0.62	0.25	0.03	-0.11	-0.19	-0.23	-0.26	-0.28	-0.29	-0.30	-0.30	-0.30	-0.31	-0.31	-0.31	-0.31	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
<b>Levelling benefit</b>	<b>0.27</b>	<b>Rs/Unit</b>																								



**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	4
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Capacity Utilization Factor	%	32.0%
			Deration Factor	%	0
			Useful Life	Years	25
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	525
3	Sources of Fund		Tariff Period	Years	13
			<u>Debt: Equity</u>		
			Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lacs	367.50
			Total Equity Amout	Rs Lacs	157.50
			<u>Debt Component</u>		
			Loan Amount	Rs Lacs	367.50
			Moratorium Period	years	0
			Repayment Period(incld Moratorium)	years	12
			Interest Rate	%	10.98%
			<u>Equity Component</u>		
			Equity amount	Rs Lacs	157.50
			Return on Equity for first 10 years	% p.a	20.39%
RoE Period	Year	10			
Return on Equity 11th year onwards	% p.a	22.57%			
Weighted average of ROE		21.70%			
Discount Rate		10.25%			
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.12%
			MAT Rate (for first 10 years)	%	21.55%
			<u>Depreciation</u>		
			Depreciation Rate for first 12 years	%	5.83%
			Depreciation Rate 13th year onwards	%	1.54%
Years for 5.83% rate		12			
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15.00%
			Receivables for Debtors	Months	2
			<u>For Variable Charges</u>		
			Interest On Working Capital	%	11.48%
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	8.83
			%ge escalation (FY16-17)	%	2.96%
			%ge escalation (FY17-18)	%	4.85%
			power plant (FY18-19)	Rs Lakh	7.72
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%

**Form 1.2 Form Template for (Wind Power Projects) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Gross/Net Generation	MU		2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80

Fixed Cost	Unit	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	
O&M Expenses	Rs Lakh		7.72	8.05	8.39	8.75	9.12	9.51	9.91	10.34	10.78	11.24	11.72	12.22	12.74	13.28	13.85	14.44	15.05	15.70	16.37	17.06	17.79	18.55	19.34	20.16	21.02	
Depreciation	Rs Lakh		30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	30.61	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09
Interest on term loan	Rs Lakh		38.69	35.32	31.96	28.59	25.23	21.87	18.50	15.14	11.77	8.41	5.05	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		1.92	1.93	1.94	1.94	1.95	1.97	1.98	1.99	2.00	2.01	2.02	2.04	2.05	2.07	2.08	2.10	2.11	2.13	2.15	2.17	2.19	2.21	2.23	2.25	2.27	
Return on Equity	Rs Lakh		32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	32.12	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>111.05</b>	<b>108.02</b>	<b>105.01</b>	<b>102.02</b>	<b>99.04</b>	<b>96.07</b>	<b>93.12</b>	<b>90.19</b>	<b>87.28</b>	<b>84.39</b>	<b>84.95</b>	<b>82.10</b>	<b>58.44</b>	<b>58.99</b>	<b>59.58</b>	<b>60.18</b>	<b>60.81</b>	<b>61.47</b>	<b>62.16</b>	<b>62.88</b>	<b>63.62</b>	<b>64.40</b>	<b>65.22</b>	<b>66.06</b>	<b>66.94</b>	
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>3.96</b>	<b>3.85</b>	<b>3.75</b>	<b>3.64</b>	<b>3.53</b>	<b>3.43</b>	<b>3.32</b>	<b>3.22</b>	<b>3.11</b>	<b>3.01</b>	<b>3.03</b>	<b>2.93</b>	<b>2.08</b>	<b>2.10</b>	<b>2.13</b>	<b>2.15</b>	<b>2.17</b>	<b>2.19</b>	<b>2.22</b>	<b>2.24</b>	<b>2.27</b>	<b>2.30</b>	<b>2.33</b>	<b>2.36</b>	<b>2.39</b>	

**Levelling tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levelling	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
O&M expn	Rs/kWh	<b>0.39</b>	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38	0.40	0.42	0.44	0.45	0.47	0.49	0.52	0.54	0.56	0.58	0.61	0.63	0.66	0.69	0.72	0.75
Depreciation	Rs/kWh	<b>0.90</b>	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Int. on term loan	Rs/kWh	<b>0.65</b>	1.38	1.26	1.14	1.02	0.90	0.78	0.66	0.54	0.42	0.30	0.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.07</b>	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
RoE	Rs/kWh	<b>1.18</b>	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
<b>Total COG</b>	<b>Rs/kWh</b>	<b>3.19</b>	<b>3.96</b>	<b>3.85</b>	<b>3.75</b>	<b>3.64</b>	<b>3.53</b>	<b>3.43</b>	<b>3.32</b>	<b>3.22</b>	<b>3.11</b>	<b>3.01</b>	<b>3.03</b>	<b>2.93</b>	<b>2.08</b>	<b>2.10</b>	<b>2.13</b>	<b>2.15</b>	<b>2.17</b>	<b>2.19</b>	<b>2.22</b>	<b>2.24</b>	<b>2.27</b>	<b>2.30</b>	<b>2.33</b>	<b>2.36</b>	<b>2.39</b>

Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost	3.19		89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36	89.36
<b>Levelling Tariff</b>	<b>3.19</b>	<b>Rs/Unit</b>																									

### Determination of Additional Depreciation for Wind Power Projects

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	525.00

Years ----->	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	27.72	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00

#### Accelerated Depreciation

Opening	%	100.0%	40.0%	24.0%	14.4%	8.6%	5.2%	3.1%	1.9%	1.1%	0.7%	0.4%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Depn.	Rs Lakh	315.00	84.00	50.40	30.24	18.14	10.89	6.53	3.92	2.35	1.41	0.85	0.51	0.30	0.18	0.11	0.07	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	287.28	56.28	22.68	2.52	-9.58	-16.83	-21.19	-23.80	-25.37	-26.31	-26.87	-27.21	-27.42	-27.54	-27.61	-27.65	-27.68	-1.24	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	83.66	16.39	6.60	0.73	-2.79	-4.90	-6.17	-6.93	-7.39	-7.66	-7.83	-7.92	-7.98	-8.02	-8.04	-8.05	-8.06	-0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Per unit benefit	Rs/Unit	2.98	0.58	0.24	0.03	-0.10	-0.17	-0.22	-0.25	-0.26	-0.27	-0.28	-0.28	-0.28	-0.29	-0.29	-0.29	-0.29	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
<b>Levillised benefit</b>	<b>0.25</b>	<b>Rs/Unit</b>																								

## Form 1.1 Assumptions Parameters

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	<=5 MW
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1
			Capacity Utilization Factor	%	30%
			Auxilliary Consumption		1%
			Useful Life	Years	35
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	570.49
3	Sources of Fund		Tariff Period	Years	35
			<u>Debt: Equity</u>		
			Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lacs	399.34
			Total Equity Amout	Rs Lacs	171.15
			<u>Debt Component</u>		
			Loan Amount	Rs Lacs	399.34
			Repayment Period(incld Moratorium)	years	12
			Interest Rate	%	10.98%
			<u>Equity Component</u>		
			Equity amount	Rs Lacs	171.15
			Return on Equity for first 10 years	% p.a	20.39%
			RoE Period	Year	10
Return on Equity 11th year onwards	% p.a	22.57%			
Weighted average of ROE		21.95%			
Discount Rate		10.25%			
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.120%
			MAT Rate (for first 10 years)	%	21.549%
			<u>Depreciation</u>		
			Depreciation Rate for first 12 years	%	5.83%
			Depreciation Rate 13th year onwards	%	0.87%
			Years for 5.83% rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15%
			Receivables for Debtors	Months	2
			<u>For Variable Charges</u>		0
			Interest On Working Capital	%	11.48%
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	21.79
			power plant (FY16-17)		22.44
			power plant (FY17-18)		23.52
			power plant (FY18-19)	Rs Lakh	24.53
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%

**Form 1.2 Form Template for (Small Hydro Projects) : Determination of Tariff Component**

Units Generation	Unit	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	26	27	28	29	30	31	32	33	34	35
Installed Capacity	MW		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	1	1	1	1	1	1	1	1	1	1
Net Generation	MU		2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60

Fixed Cost	Unit	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	26	27	28	29	30	31	32	33	34	35
O&M Expenses	Rs Lakh		24.53	25.57	26.66	27.80	28.99	30.22	31.51	32.85	34.25	35.72	37.24	38.83	40.48	42.21	44.01	45.88	47.84	49.88	52.01	54.23	56.54	58.95	61.46	64.08	66.82	69.67	72.64	75.73	78.96	82.33	85.84	89.50	93.32	97.30	101.45
Depreciation	Rs Lakh		33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	33.26	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97
Interest on term loan	Rs Lakh		42.04	38.38	34.73	31.07	27.42	23.76	20.11	16.45	12.79	9.14	5.48	1.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		2.97	2.99	3.02	3.05	3.08	3.12	3.15	3.19	3.23	3.26	3.31	3.35	3.39	3.44	3.49	3.54	3.59	3.64	3.70	3.76	3.82	3.89	3.95	4.03	4.10	4.17	4.25	4.34	4.42	4.51	4.61	4.71	4.81	4.92	5.03
Return on Equity	Rs Lakh		34.91	34.91	34.91	34.91	34.91	34.91	34.91	34.91	34.91	34.91	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63	38.63
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>137.69</b>	<b>135.11</b>	<b>132.58</b>	<b>130.09</b>	<b>127.65</b>	<b>125.26</b>	<b>122.93</b>	<b>120.66</b>	<b>118.44</b>	<b>116.28</b>	<b>114.12</b>	<b>112.00</b>	<b>110.00</b>	<b>108.21</b>	<b>106.54</b>	<b>105.00</b>	<b>103.59</b>	<b>102.31</b>	<b>101.15</b>	<b>100.12</b>	<b>99.21</b>	<b>98.42</b>	<b>97.74</b>	<b>97.17</b>	<b>96.71</b>	<b>96.35</b>	<b>96.08</b>	<b>95.89</b>	<b>95.77</b>	<b>95.71</b>	<b>95.71</b>	<b>95.76</b>	<b>95.85</b>	<b>95.98</b>	<b>96.14</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>5.29</b>	<b>5.19</b>	<b>5.10</b>	<b>5.00</b>	<b>4.91</b>	<b>4.81</b>	<b>4.73</b>	<b>4.64</b>	<b>4.55</b>	<b>4.47</b>	<b>4.39</b>	<b>4.32</b>	<b>4.26</b>	<b>4.20</b>	<b>4.15</b>	<b>4.10</b>	<b>4.05</b>	<b>4.00</b>	<b>3.95</b>	<b>3.90</b>	<b>3.85</b>	<b>3.80</b>	<b>3.75</b>	<b>3.70</b>	<b>3.65</b>	<b>3.60</b>	<b>3.55</b>	<b>3.50</b>	<b>3.45</b>	<b>3.40</b>	<b>3.35</b>	<b>3.30</b>	<b>3.25</b>	<b>3.20</b>	<b>3.15</b>

**Levillised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levelised	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	26	27	28	29	30	31	32	33	34	35	
O&M expn	Rs/kWh	<b>1.43</b>	0.94	0.98	1.02	1.07	1.11	1.16	1.21	1.26	1.32	1.37	1.43	1.49	1.56	1.62	1.69	1.76	1.84	1.92	2.00	2.08	2.17	2.27	2.36	2.46	2.57	2.68	2.79	2.91	3.04	3.16	3.30	3.44	3.59	3.74	3.90	
Depreciation	Rs/kWh	<b>0.97</b>	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Int. on term loan	Rs/kWh	<b>0.72</b>	1.62	1.48	1.33	1.19	1.05	0.91	0.77	0.63	0.49	0.35	0.21	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.13</b>	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19
RoE	Rs/kWh	<b>1.39</b>	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
<b>Total COG</b>	<b>Rs/kWh</b>	<b>4.63</b>	<b>5.29</b>	<b>5.19</b>	<b>5.10</b>	<b>5.00</b>	<b>4.91</b>	<b>4.81</b>	<b>4.73</b>	<b>4.64</b>	<b>4.55</b>	<b>4.47</b>	<b>4.39</b>	<b>4.32</b>	<b>4.26</b>	<b>4.20</b>	<b>4.15</b>	<b>4.10</b>	<b>4.05</b>	<b>4.00</b>	<b>3.95</b>	<b>3.90</b>	<b>3.85</b>	<b>3.80</b>	<b>3.75</b>	<b>3.70</b>	<b>3.65</b>	<b>3.60</b>	<b>3.55</b>	<b>3.50</b>	<b>3.45</b>	<b>3.40</b>	<b>3.35</b>	<b>3.30</b>	<b>3.25</b>	<b>3.20</b>	<b>3.15</b>	

Levillised Tariff	Unit	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	26	27	28	29	30	31	32	33	34	35	
Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.04	
Fixed Cost			120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57	120.57
<b>Levillised Tariff</b>	<b>4.63</b>	<b>Rs/Unit</b>																																				

**Determination of Additional Depreciation for Small Hydro Power Projects**

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	570.49

Years	Unit	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	26	27	28	29	30	31	32	33	34	35
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	30.12	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Accelerated Depreciation**

Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Depn.	Rs Lakh	342.29	91.28	54.77	32.86	19.72	11.83	7.10	4.26	2.56	1.53	0.92	0.55	0.33	0.20	0.12	0.07	0.04	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	312.17	61.16	24.65	2.74	-10.41	-18.29	-23.02	-25.86	-27.57	-28.59	-29.20	-29.57	-29.79	-29.92	-30.00	-30.05	-30.08	-1.34	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Tax Benefit	Rs Lakh	90.90	17.81	7.18	0.80	-3.03	-5.33	-6.70	-7.53	-8.03	-8.33	-8.50	-8.61	-8.68	-8.71	-8.74	-8.75	-8.76	-0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Per unit benefit	Rs/Unit	3.49	0.68	0.28	0.03	-0.12	-0.20	-0.26	-0.29	-0.31	-0.32	-0.33	-0.33	-0.33	-0.33	-0.34	-0.34	-0.34	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.04	
Applicable Discounting Factor		1.00	0.95	0.86	0.78	0.71	0.64	0.58	0.53	0.48	0.44	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	

Levelised benefit	0.28	Rs/Unit
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## Annexure – 2B

(SHP above 5 MW and upto and including 25 MW)

## Form 1.1 Assumptions Parameters

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	up to 25 M	
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	30%	
			Auxilliary Consumption		1%	
			Useful Life	Years	35	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	519.05	
3	Sources of Fund		Tariff Period	Years	13	
			<u>Debt: Equity</u>			
			Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	363.33	
			Total Equity Amout	Rs Lacs	155.71	
			<u>Debt Component</u>			
			Loan Amount	Rs Lacs	363.33	
			Repayment Period(incl Moratorium)	years	12	
			Interest Rate	%	10.98%	
			<u>Equity Component</u>			
			Equity amount	Rs Lacs	155.71	
			Return on Equity for first 10 years	% p.a	20.39%	
			RoE Period	Year	10	
Return on Equity 11th year onwards	% p.a	22.57%				
Weighted average of ROE		21.95%				
Discount Rate		10.25%				
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.120%	
			MAT Rate (for first 10 years)	%	21.549%	
			<u>Depreciation</u>			
			Depreciation Rate for first 12 years	%	5.83%	
			Depreciation Rate 13th year onwards	%	0.87%	
			Years for 5.83% rate		12	
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1	
			Maintenance Spare	(% of O&M exepenses)	15%	
			Receivables for Debtors	Months	2	
			<u>For Variable Charges</u>		0	
			Interest On Working Capital	%	11.48%	
6	Operation & Maintenance		power plant (FY15-16)	Rs Lakh	15.42	
			power plant (FY16-17)		15.88	
			power plant (FY17-18)		16.65	
			power plant (FY18-19)	Rs Lakh	17.36	
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%	

**Form 1.2 Form Template for (Small Hydro Projects) : Determination of Tariff Component**

Units Generation	Unit	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	26	27	28	29	30	31	32	33	34	35	
Installed Capacity	MW		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	1	1	1	1	1	1	1	1	1	1	1
Net Generation	MU		2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60

Fixed Cost	Unit	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	26	27	28	29	30	31	32	33	34	35	
O&M Expenses	Rs Lakh		17.36	18.10	18.87	19.67	20.51	21.39	22.30	23.25	24.24	25.27	26.35	27.48	28.65	29.87	31.14	32.47	33.85	35.30	36.80	38.37	40.01	41.72	43.49	45.35	47.28	49.30	51.40	53.59	55.88	58.26	60.75	63.34	66.04	68.85	71.79	
Depreciation	Rs Lakh		30.26	30.26	30.26	30.26	30.26	30.26	30.26	30.26	30.26	30.26	30.26	30.26	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52
Interest on term loan	Rs Lakh		38.25	34.92	31.60	28.27	24.94	21.62	18.29	14.97	11.64	8.31	4.99	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		2.41	2.43	2.45	2.48	2.50	2.52	2.55	2.57	2.60	2.63	2.65	2.69	2.72	2.75	2.78	2.82	2.86	2.89	2.94	2.98	3.02	3.07	3.11	3.16	3.22	3.27	3.33	3.38	3.45	3.51	3.58	3.65	3.72	3.79	3.87	
Return on Equity	Rs Lakh		31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	35.15	
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>120.04</b>	<b>117.47</b>	<b>114.94</b>	<b>112.44</b>	<b>109.97</b>	<b>107.54</b>	<b>105.15</b>	<b>102.80</b>	<b>100.50</b>	<b>98.23</b>	<b>99.41</b>	<b>97.23</b>	<b>71.04</b>	<b>72.29</b>	<b>73.60</b>	<b>74.96</b>	<b>76.38</b>	<b>77.87</b>	<b>79.41</b>	<b>81.02</b>	<b>82.70</b>	<b>84.45</b>	<b>86.28</b>	<b>88.19</b>	<b>90.17</b>	<b>92.24</b>	<b>94.40</b>	<b>96.65</b>	<b>99.00</b>	<b>101.44</b>	<b>103.99</b>	<b>106.65</b>	<b>109.43</b>	<b>112.32</b>	<b>115.33</b>	
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>4.61</b>	<b>4.52</b>	<b>4.42</b>	<b>4.32</b>	<b>4.23</b>	<b>4.13</b>	<b>4.04</b>	<b>3.95</b>	<b>3.86</b>	<b>3.78</b>	<b>3.82</b>	<b>3.74</b>	<b>2.73</b>	<b>2.78</b>	<b>2.83</b>	<b>2.88</b>	<b>2.94</b>	<b>2.99</b>	<b>3.05</b>	<b>3.11</b>	<b>3.18</b>	<b>3.25</b>	<b>3.32</b>	<b>3.39</b>	<b>3.47</b>	<b>3.55</b>	<b>3.63</b>	<b>3.71</b>	<b>3.81</b>	<b>3.90</b>	<b>4.00</b>	<b>4.10</b>	<b>4.21</b>	<b>4.32</b>	<b>4.43</b>	

**Levillised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levillised	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	26	27	28	29	30	31	32	33	34	35		
O&M expn	Rs/kWh	<b>1.01</b>	0.67	0.70	0.73	0.76	0.79	0.82	0.86	0.89	0.93	0.97	1.01	1.06	1.10	1.15	1.20	1.25	1.30	1.36	1.41	1.47	1.54	1.60	1.67	1.74	1.82	1.89	1.98	2.06	2.15	2.24	2.33	2.43	2.54	2.65	2.76		
Depreciation	Rs/kWh	<b>0.88</b>	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Int. on term loan	Rs/kWh	<b>0.65</b>	1.47	1.34	1.21	1.09	0.96	0.83	0.70	0.58	0.45	0.32	0.19	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Int. on working capital	Rs/kWh	<b>0.10</b>	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
RoE	Rs/kWh	<b>1.27</b>	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	
<b>Total COG</b>	<b>Rs/kWh</b>	<b>3.91</b>	<b>4.61</b>	<b>4.52</b>	<b>4.42</b>	<b>4.32</b>	<b>4.23</b>	<b>4.13</b>	<b>4.04</b>	<b>3.95</b>	<b>3.86</b>	<b>3.78</b>	<b>3.82</b>	<b>3.74</b>	<b>2.73</b>	<b>2.78</b>	<b>2.83</b>	<b>2.88</b>	<b>2.94</b>	<b>2.99</b>	<b>3.05</b>	<b>3.11</b>	<b>3.18</b>	<b>3.25</b>	<b>3.32</b>	<b>3.39</b>	<b>3.47</b>	<b>3.55</b>	<b>3.63</b>	<b>3.71</b>	<b>3.81</b>	<b>3.90</b>	<b>4.00</b>	<b>4.10</b>	<b>4.21</b>	<b>4.32</b>	<b>4.43</b>		

Levillised Tariff	Unit	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	26	27	28	29	30	31	32	33	34	35	
Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.04	
Fixed Cost			101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81	101.81
<b>Levillised Tariff</b>	<b>3.91</b>	<b>Rs/Unit</b>																																				



**Determination of Additional Depreciation for Small Hydro Power Projects**

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	519.05

Years	Unit	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	26	27	28	29	30	31	32	33	34	35
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	27.41	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Accelerated Depreciation**

Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	311.43	83.05	49.83	29.90	17.94	10.76	6.46	3.87	2.32	1.39	0.84	0.50	0.30	0.18	0.11	0.07	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	284.02	55.64	22.42	2.49	-9.47	-16.64	-20.95	-23.53	-25.08	-26.01	-26.57	-26.90	-27.10	-27.22	-27.30	-27.34	-27.37	-1.22	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	82.71	16.20	6.53	0.73	-2.76	-4.85	-6.10	-6.85	-7.30	-7.57	-7.74	-7.83	-7.89	-7.93	-7.95	-7.96	-7.97	-0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	
Per unit benefit	Rs/Unit	3.18	0.62	0.25	0.03	-0.11	-0.19	-0.23	-0.26	-0.28	-0.29	-0.30	-0.30	-0.30	-0.30	-0.31	-0.31	-0.31	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	
Applicable Discounting Factor		1.00	0.95	0.86	0.78	0.71	0.64	0.58	0.53	0.48	0.44	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	

<b>Levellised benefit</b>	<b>0.26</b>	<b>Rs/Unit</b>
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**Annexure – 3  
(Biomass Power Project)**

**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	MERC
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Auxillary Consumption during stabilisation	%	10%
			Auxillary Consumption after stabilisation	%	10%
			PLF(Stablization for 6 months)	%	60%
			PLF(during first year after Stabilization)	%	70%
			PLF(second year onwards)	%	80%
			Useful Life	Years	20.00
			Tariff Period	Years	13
			2	Project Cost	Capital Cost/MW
3	Financial Assumptions	Debt: Equity			Debt
			Equity	%	30%
			Total Debt Amount	Rs Lacs	322.67
			Total Equity Amount	Rs Lacs	138.29
		Debt Component	Loan Amount	Rs Lacs	322.67
			Moratorium Period	years	0
			Repayment Period(incld Moratorium)	years	12
			Interest Rate	%	10.98%
		Equity Component	Equity amount	Rs Lacs	138.29
			Return on Equity for first 10 years	% p.a	20.39%
			RoE Period	Year	10
			Return on Equity after 10 years		22.57%
			Weighted average of ROE		21.48%
			Discount Rate (equiv. to WACC)		10.25%
4	Financial Assumptions	Fiscal Assumptions	Income Tax	%	29.12%
			MAT Rate (for first 10 years)	%	21.55%
		Depreciation	Depreciation Rate(power plant)	%	5.83%
			Depreciation Rate 13th year onwards	%	2.505%
			Years for 5.83% depreciation rate		12
5	Working Capital	For Fixed Charges	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15%
		For Variable Charges	Receivables for Debtors	Months	2
			Biomass Stock	Months	4
		Interest On Working Capital	%	11.48%	
		6	Fuel Related Assumptions	Heat Rate	During/After Stabilisation period
During Stabilization Period	Kcal/kwh				4200
Biomass	Base Price(FY15-16)			Rs/T	3987
	GCV - Biomass			Kcal/kg	3611
	Biomass Price Escalation Factor				5%
	Price (FY 18-19)			Rs/T	4091.02
7	Operation & Maintenance	power plant (FY15-16)	Rs Lakh	26.30	
		power plant (FY16-17)	Rs Lakh	27.08	
		power plant (FY17-18)	Rs Lakh	28.39	
		power plant (FY 2018-19)	Rs Lakh	29.60	
		Total O & M Expenses Escalation	%	4.26%	
8	Generation and Sale Of Energy	Working Hours/Day	Hrs	24	
		No. of Days	Days	365	
		Total No. of Hours	Hrs	8760	

## 2.2 Form Template for (Biomass Power Projects) : Determination of Tariff Component

Units Generation	Unit	Year-->	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		0.57	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Net Generation	MU		5.12	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31

Variable Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Biomass Cost	Rs Lakh		270.94	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46	333.46
<b>Per unit Var Cost</b>	<b>Rs/kWh</b>		<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>	<b>5.29</b>

Fixed Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
O&M Expenses	Rs Lakh		29.60	30.86	32.18	33.55	34.98	36.47	38.03	39.65	41.34	43.10	44.94	46.86	48.86	50.94	53.11	55.38	57.74	60.20	62.77	65.44
Depreciation	Rs Lakh		26.87	26.87	26.87	26.87	26.87	26.87	26.87	26.87	26.87	26.87	26.87	26.87	11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55
Interest on term loan	Rs Lakh		33.97	31.01	28.06	25.11	22.15	19.20	16.25	13.29	10.34	7.38	4.43	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		18.46	22.57	22.61	22.65	22.69	22.73	22.77	22.81	22.86	22.90	22.95	23.00	23.06	23.11	23.17	23.23	23.30	23.36	23.43	23.50
Return on Equity	Rs Lakh		28.20	28.20	28.20	28.20	28.20	28.20	28.20	28.20	28.20	28.20	31.22	31.22	31.22	31.22	31.22	31.22	31.22	31.22	31.22	31.22
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>137.11</b>	<b>139.53</b>	<b>137.93</b>	<b>136.38</b>	<b>134.90</b>	<b>133.47</b>	<b>132.12</b>	<b>130.83</b>	<b>129.61</b>	<b>128.47</b>	<b>130.41</b>	<b>129.43</b>	<b>114.68</b>	<b>116.82</b>	<b>119.05</b>	<b>121.37</b>	<b>123.80</b>	<b>126.32</b>	<b>128.96</b>	<b>131.71</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>2.68</b>	<b>2.21</b>	<b>2.19</b>	<b>2.16</b>	<b>2.14</b>	<b>2.12</b>	<b>2.09</b>	<b>2.07</b>	<b>2.05</b>	<b>2.04</b>	<b>2.07</b>	<b>2.05</b>	<b>1.82</b>	<b>1.85</b>	<b>1.89</b>	<b>1.92</b>	<b>1.96</b>	<b>2.00</b>	<b>2.04</b>	<b>2.09</b>

### Levillised tariff corresponding to Useful life

Per Unit Cost of Generation	Unit	Levillised	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Variable COG	Rs/kWh	<b>5.29</b>	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29
O&M expn	Rs/kWh	<b>0.64</b>	0.58	0.49	0.51	0.53	0.55	0.58	0.60	0.63	0.66	0.68	0.71	0.74	0.77	0.81	0.84	0.88	0.92	0.95	1.00	1.04
Depreciation	Rs/kWh	<b>0.39</b>	0.52	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Int. on term loan	Rs/kWh	<b>0.28</b>	0.66	0.49	0.44	0.40	0.35	0.30	0.26	0.21	0.16	0.12	0.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.36</b>	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
RoE	Rs/kWh	<b>0.47</b>	0.55	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
<b>Total COG</b>	<b>Rs/kWh</b>	<b>7.43</b>	<b>7.96</b>	<b>7.50</b>	<b>7.47</b>	<b>7.45</b>	<b>7.43</b>	<b>7.40</b>	<b>7.38</b>	<b>7.36</b>	<b>7.34</b>	<b>7.32</b>	<b>7.35</b>	<b>7.34</b>	<b>7.11</b>	<b>7.14</b>	<b>7.17</b>	<b>7.21</b>	<b>7.25</b>	<b>7.29</b>	<b>7.33</b>	<b>7.38</b>

Levillised Tariff	Unit	Year -->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor			1	0.907	0.823	0.746	0.677	0.614	0.557	0.505	0.458	0.416	0.377	0.342	0.310	0.281	0.255	0.231	0.210	0.190	0.173	0.157
Variable Cost			271.1	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7	333.7
Fixed Cost			110.2	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6	135.6

Levillised Tariff (Variable)	5.29
Levillised Tariff (Fixed)	2.15
<b>Levillised Tariff (Rs/Unit)</b>	<b>7.44</b>

### Determination of Accelerated Depreciation for Biomass Power Project

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	461.0

Years ----->	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%
Book Depreciation	Rs Lakh	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	24.34	1.11	0.00	0.00

Accelerated Depreciation		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	60%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%
Closing	%	40%	24%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	276.57	73.75	44.25	26.55	15.93	9.56	5.74	3.44	2.06	1.24	0.74	0.45	0.27	0.16	0.10	0.06	0.03	0.02	0.01	0.01

Net Depreciation Benefit	Rs Lakh	252.24	49.41	19.91	2.21	-8.41	-14.78	-18.60	-20.90	-22.27	-23.10	-23.60	-23.89	-24.07	-24.18	-24.24	-24.28	-24.30	-1.09	0.01	0.01	
Tax Benefit	Rs Lakh	73.45	14.39	5.80	0.64	-2.45	-4.30	-5.42	-6.09	-6.49	-6.73	-6.87	-6.96	-7.01	-7.04	-7.06	-7.07	-7.08	-0.32	0.00	0.00	
Net Energy generation	MU	5.12	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	
Per unit benefit	Rs/Unit	1.43	0.23	0.09	0.01	-0.04	-0.07	-0.09	-0.10	-0.10	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.01	0.00	0.00
Discounting Factor		1.00	0.95	0.86	0.78	0.71	0.64	0.58	0.53	0.48	0.44	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.16	

<b>Levellised Benefit</b>	<b>0.13</b>	<b>Rs/ Unit</b>
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## Form 1.1 Assumptions Parameters

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	MERC
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Auxillary Consumption during stabilisation	%	8.5%
			Auxillary Consumption after stabilisation	%	8.5%
			PLF(Stablization for 6 months)	%	60%
			PLF(during first year after Stablization)	%	60%
			PLF(second year onwards)	%	60%
			Useful Life	Years	20.00
			Tariff Period	Years	13
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	456.01
		3	Financial Assumptions	<u>Debt: Equity</u>	Debt
Equity	%				30%
Total Debt Amount	Rs Lacs				319.21
Total Equity Amount	Rs Lacs				136.80
<u>Debt Component</u>	Loan Amount			Rs Lacs	319.21
	Repayment Period(incld Moratorium)			years	12
	Interest Rate			%	10.98%
<u>Equity Component</u>	Equity amount			Rs Lacs	136.80
	Return on Equity for first 10 years			% p.a	20.39%
	RoE Period			Year	10.00
	Return on Equity after 10 years				22.57%
	Weighted average of ROE				20.90%
	Discount Rate (equiv. to WACC)				10.25%
4	Financial Assumptions			<u>Fiscal Assumptions</u>	Income Tax
		MAT Rate (for first 10 years)	%		21.55%
		<u>Depreciation</u>	Depreciation Rate(power plant)	%	5.83%
			Depreciation Rate 13th year onwards	%	2.51%
			Years for 5.83%% depreciation rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15%
		Receivables for Debtors	Months	2	
		<u>For Variable Charges</u>	Biomass Stock	Months	4
			Interest On Working Capital	%	11.48%
		6	Fuel Related Assumptions	<u>Heat Rate</u>	After Stabilisation period
<u>Biomass</u>	CERC Price - Bagasse (FY17-18)				Rs/T
	GCV - Bagasse			Kcal/kg	2,250.00
	Biomass Price Escalation Factor				5%
Bagasse (FY 18-19)	Rs/T			2387.44	
7	Operation & Maintenance	power plant (FY15-16)	Rs Lakh	17.31	
		power plant (FY16-17)	Rs Lakh	17.82	
		power plant (FY17-18)		18.69	
		power plant (FY 18-19)		19.49	
		Total O & M Expenses Escalation	%	4.26%	

## 2.2 Form Template for (Cogen and Bagasse based Power Projects) : Determination of Tariff Component

Units Generation	Unit	Year-->	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		5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
Auxiliary Consumption	MU		0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Net Generation	MU		4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81

Variable Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Biomass Cost	Rs Lakh		200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77	200.77
<b>Per unit Var Cost</b>	<b>Rs/kWh</b>		<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>	<b>4.17</b>

Fixed Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
O&M Expenses	Rs Lakh		19.49	20.32	21.18	22.09	23.03	24.01	25.03	26.10	27.21	28.37	29.58	30.85	32.16	33.53	34.96	36.45	38.01	39.63	41.32	43.08
Depreciation	Rs Lakh		26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42
Interest on term loan	Rs Lakh		33.60	30.68	27.76	24.84	21.92	18.99	16.07	13.15	10.23	7.31	4.38	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		14.15	14.17	14.19	14.22	14.24	14.27	14.29	14.32	14.35	14.38	14.42	14.45	14.49	14.52	14.56	14.60	14.64	14.69	14.73	14.78
Return on Equity	Rs Lakh		27.90	27.90	27.90	27.90	27.90	27.90	27.90	27.90	27.90	27.90	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88	30.88
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>121.72</b>	<b>119.65</b>	<b>117.62</b>	<b>115.63</b>	<b>113.67</b>	<b>111.76</b>	<b>109.89</b>	<b>108.06</b>	<b>106.28</b>	<b>104.55</b>	<b>105.85</b>	<b>104.22</b>	<b>88.95</b>	<b>90.36</b>	<b>91.83</b>	<b>93.36</b>	<b>94.95</b>	<b>96.62</b>	<b>98.35</b>	<b>100.16</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>2.53</b>	<b>2.49</b>	<b>2.45</b>	<b>2.40</b>	<b>2.36</b>	<b>2.32</b>	<b>2.28</b>	<b>2.25</b>	<b>2.21</b>	<b>2.17</b>	<b>2.20</b>	<b>2.17</b>	<b>1.85</b>	<b>1.88</b>	<b>1.91</b>	<b>1.94</b>	<b>1.97</b>	<b>2.01</b>	<b>2.05</b>	<b>2.08</b>

### Levelling tariff corresponding to Useful life

Per Unit Cost of Generatio	Unit	Levelised	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Variable COG	Rs/kWh	<b>4.17</b>	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17	4.17
O&M expn	Rs/kWh	<b>0.54</b>	0.41	0.42	0.44	0.46	0.48	0.50	0.52	0.54	0.57	0.59	0.62	0.64	0.67	0.70	0.73	0.76	0.79	0.82	0.86	0.90
Depreciation	Rs/kWh	<b>0.49</b>	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Int. on term loan	Rs/kWh	<b>0.35</b>	0.70	0.64	0.58	0.52	0.46	0.39	0.33	0.27	0.21	0.15	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.30</b>	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31
RoE	Rs/kWh	<b>0.60</b>	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
<b>Total COG</b>	<b>Rs/kWh</b>	<b>6.45</b>	<b>6.71</b>	<b>6.66</b>	<b>6.62</b>	<b>6.58</b>	<b>6.54</b>	<b>6.50</b>	<b>6.46</b>	<b>6.42</b>	<b>6.38</b>	<b>6.35</b>	<b>6.38</b>	<b>6.34</b>	<b>6.02</b>	<b>6.05</b>	<b>6.08</b>	<b>6.12</b>	<b>6.15</b>	<b>6.18</b>	<b>6.22</b>	<b>6.26</b>

Levelling Tariff	Unit	Year -->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor			1	0.907	0.823	0.746	0.677	0.614	0.557	0.505	0.458	0.416	0.377	0.342	0.310	0.281	0.255	0.231	0.210	0.190	0.173	0.157
Variable Cost			200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5	200.5
Fixed Cost			109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7	109.7

Levelling Tariff (Variable)	4.17
Levelling Tariff (Fixed)	2.28
<b>Levelling Tariff (Rs/Unit)</b>	<b>6.45</b>

### Determination of Accelerated Depreciation for Cogen and Bagasse based Power Project

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.12%
Capital Cost	456.0

Years ----->	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%
Book Depreciation	Rs Lakh	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	24.08	1.09	0.00	0.00

#### Accelerated Depreciation

Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	60%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%
Closing	%	40%	24%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	273.61	72.96	43.78	26.27	15.76	9.46	5.67	3.40	2.04	1.23	0.74	0.44	0.26	0.16	0.10	0.06	0.03	0.02	0.01	0.01

Net Depreciation Benefit	Rs Lakh	249.53	48.88	19.70	2.19	-8.32	-14.62	-18.40	-20.67	-22.04	-22.85	-23.34	-23.64	-23.81	-23.92	-23.98	-24.02	-24.04	-1.07	0.01	0.01
Tax Benefit	Rs Lakh	72.66	14.24	5.74	0.64	-2.42	-4.26	-5.36	-6.02	-6.42	-6.65	-6.80	-6.88	-6.93	-6.97	-6.98	-6.99	-7.00	-0.31	0.00	0.00
Net Energy generation	MU	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
Per unit benefit	Rs/Unit	1.51	0.30	0.12	0.01	-0.05	-0.09	-0.11	-0.13	-0.13	-0.14	-0.14	-0.14	-0.14	-0.14	-0.15	-0.15	-0.15	-0.01	0.00	0.00
Discounting Factor		1.00	0.95	0.86	0.78	0.71	0.64	0.58	0.53	0.48	0.44	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.16

<b>Levellised Benefit</b>	<b>0.13</b>	<b>Rs/ Unit</b>
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**Annexure – 5A  
(Solar PV Projects)**

**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	PV
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1
			Capacity Utilization Factor	%	19%
			Auxilliary Consumption		0%
			Useful Life	Years	25
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	261.50
3	Sources of Fund		Tariff Period	Years	13
			<u>Debt: Equity</u>		
			Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lacs	183.05
			Total Equity Amout	Rs Lacs	78.45
			<u>Debt Component</u>		
			Loan Amount	Rs Lacs	183.05
			Moratorium Period	years	0
			Repayment Period(incld Moratorium)	years	12
			Interest Rate	%	10.98%
			<u>Equity Component</u>		
			Equity amount	Rs Lacs	78.45
			Return on Equity for first 10 years	% p.a	20.39%
			RoE Period	Year	10
Return on Equity 11th year onwards	% p.a	22.57%			
Weighted average of ROE		21.70%			
Discount Rate		10.25%			
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.12%
			MAT Rate (for first 10 years)	%	21.55%
			<u>Depreciation</u>		
			Depreciation Rate for first 12 years	%	5.83%
			Depreciation Rate 13th year onwards	%	1.54%
Years for 5.83% rate		12			
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15%
			Receivables for Debtors	Months	2
			<u>For Variable Charges</u>		
			Interest On Working Capital	%	11.48%
6	Operation & Maintenance		Operation & Maintenance (2015-16)		
			Operation & Maintenance (2016-17)		
			Operation & Maintenance (2017-18)	Rs Lakh	
			Operation & Maintenance (2018-19)	Rs Lakh	7.65
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%



**Form 1.2 Form Template for (Solar PV Projects of Capacity - ) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Net Generation	MU		1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66

Fixed Cost	Unit	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
O&M Expenses	Rs Lakh		7.65	7.98	8.32	8.67	9.04	9.43	9.83	10.25	10.69	11.14	11.62	12.11	12.63	13.17	13.73	14.32	14.93	15.56	16.23	16.92	17.64	18.39	19.18	20.00	20.85
Depreciation	Rs Lakh		15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03
Interest on term loan	Rs Lakh		19.27	17.59	15.92	14.24	12.57	10.89	9.22	7.54	5.86	4.19	2.51	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		1.16	1.17	1.18	1.19	1.20	1.21	1.22	1.23	1.25	1.26	1.27	1.28	1.30	1.31	1.33	1.34	1.36	1.38	1.39	1.41	1.43	1.45	1.47	1.50	1.52
Return on Equity	Rs Lakh		16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>59.33</b>	<b>57.99</b>	<b>56.67</b>	<b>55.35</b>	<b>54.06</b>	<b>52.78</b>	<b>51.52</b>	<b>50.27</b>	<b>49.04</b>	<b>47.84</b>	<b>46.36</b>	<b>44.79</b>	<b>43.67</b>	<b>42.22</b>	<b>40.80</b>	<b>39.40</b>	<b>38.03</b>	<b>36.68</b>	<b>35.36</b>	<b>34.07</b>	<b>32.81</b>	<b>31.59</b>	<b>30.39</b>	<b>29.23</b>	<b>28.11</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>3.56</b>	<b>3.48</b>	<b>3.40</b>	<b>3.33</b>	<b>3.25</b>	<b>3.17</b>	<b>3.10</b>	<b>3.02</b>	<b>2.95</b>	<b>2.87</b>	<b>2.91</b>	<b>2.84</b>	<b>2.74</b>	<b>2.68</b>	<b>2.61</b>	<b>2.55</b>	<b>2.48</b>	<b>2.42</b>	<b>2.36</b>	<b>2.30</b>	<b>2.24</b>	<b>2.18</b>	<b>2.12</b>	<b>2.06</b>	<b>2.00</b>

**Levillised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levelised	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
O&M expn	Rs/kWh	<b>0.65</b>	0.46	0.48	0.50	0.52	0.54	0.57	0.59	0.62	0.64	0.67	0.70	0.73	0.76	0.79	0.82	0.86	0.90	0.94	0.97	1.02	1.06	1.11	1.15	1.20	1.25
Depreciation	Rs/kWh	<b>0.75</b>	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Int. on term loan	Rs/kWh	<b>0.54</b>	1.16	1.06	0.96	0.86	0.76	0.65	0.55	0.45	0.35	0.25	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.08</b>	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09
RoE	Rs/kWh	<b>0.99</b>	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
<b>Total COG</b>	<b>Rs/kWh</b>	<b>3.01</b>	<b>3.56</b>	<b>3.48</b>	<b>3.40</b>	<b>3.33</b>	<b>3.25</b>	<b>3.17</b>	<b>3.10</b>	<b>3.02</b>	<b>2.95</b>	<b>2.87</b>	<b>2.91</b>	<b>2.84</b>	<b>2.74</b>	<b>2.68</b>	<b>2.61</b>	<b>2.55</b>	<b>2.48</b>	<b>2.42</b>	<b>2.36</b>	<b>2.30</b>	<b>2.24</b>	<b>2.18</b>	<b>2.12</b>	<b>2.06</b>	<b>2.00</b>

Levillised Tariff	Unit	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
Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost			50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14	50.14
<b>Levillised Tariff</b>	<b>3.01</b>	<b>Rs/Unit</b>																									

### Determination of Additional Depreciation for Solar PV Power Projects

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.120%
Capital Cost	261.50

Years	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	13.81	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00

#### Accelerated Depreciation

Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Deprn.	Rs Lakh	156.90	41.84	25.10	15.06	9.04	5.42	3.25	1.95	1.17	0.70	0.42	0.25	0.15	0.09	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00

Net Depreciation Benefit	Rs Lakh	143.09	28.03	11.30	1.26	-4.77	-8.38	-10.55	-11.86	-12.64	-13.10	-13.39	-13.55	-13.66	-13.72	-13.75	-13.77	-13.79	-0.62	0.01	0.00	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	41.67	8.16	3.29	0.37	-1.39	-2.44	-3.07	-3.45	-3.68	-3.82	-3.90	-3.95	-3.98	-3.99	-4.00	-4.01	-4.01	-0.18	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Per unit benefit	Rs/Unit	2.50	0.49	0.20	0.02	-0.08	-0.15	-0.18	-0.21	-0.22	-0.23	-0.23	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11

<b>Levellised benefit</b>	<b>0.21</b>	<b>Rs/Unit</b>
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**Annexure – 5B  
(Solar Thermal Projects)**

**Form 1.1 Assumptions Parameters**

S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	olar thermal	
1	Power Generation	<u>Capacity</u>	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	23%	
			Auxilliary Consumption		10%	
			Useful Life	Years	25	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	1,200.00	
3	Sources of Fund	<u>Debt: Equity</u>	Tariff Period	Years	25	
			Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	840.00	
			Total Equity Amout	Rs Lacs	360.00	
			<u>Debt Component</u>	Loan Amount	Rs Lacs	840.00
				Moratorium Period	years	0
				Repayment Period(incld Moratorium)	years	12
				Interest Rate	%	10.98%
			<u>Equity Component</u>	Equity amount	Rs Lacs	360.00
				Return on Equity for first 10 years	% p.a	20.39%
				RoE Period	Year	10
				Return on Equity 11th year onwards	% p.a	22.57%
				Weighted average of ROE		21.70%
Discount Rate		10.25%				
4	Financial Assumptions	<u>Fiscal Assumptions</u>	Income Tax	%	29.120%	
			MAT Rate (for first 10 years)	%	21.549%	
			<u>Depreciation</u>	Depreciation Rate for first 12 years	%	5.83%
				Depreciation Rate 13th year onwards	%	1.54%
				Years for 5.83% rate		12
5	Working Capital	<u>For Fixed Charges</u>	O&M Charges	Months	1	
			Maintenance Spare	(% of O&M exepenses)	15%	
			Receivables for Debtors	Months	2	
			<u>For Variable Charges</u>			
			Interest On Working Capital	%	11.48%	
6	Operation & Maintenance	Operation & Maintenance (2015-16)	%ge escalation (FY16-17)	%	2.96%	
			%ge escalation (FY17-18)	%	4.85%	
			Operation & Maintenance (2018-19)	Rs Lakh	16.88	
			<u>Total O &amp; M Expenses Escalation</u>	%	4.26%	

**Form 1.2 Form Template for (Solar Thermal Projects of Capacity - ) : Determination of Tariff Component**

Units Generation	Unit	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
Installed Capacity	MW		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
Net Generation	MU		1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Fixed Cost	Unit	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
O&M Expenses	Rs Lakh		16.88	17.60	18.35	19.14	19.95	20.80	21.69	22.62	23.58	24.59	25.63	26.73	27.87	29.06	30.29	31.59	32.93	34.34	35.80	37.33	38.92	40.58	42.31	44.11	46.00
Depreciation	Rs Lakh		69.96	69.96	69.96	69.96	69.96	69.96	69.96	69.96	69.96	69.96	69.96	69.96	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
Interest on term loan	Rs Lakh		88.43	80.74	73.05	65.36	57.67	49.98	42.29	34.60	26.91	19.22	11.53	3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		4.34	4.36	4.38	4.40	4.42	4.45	4.47	4.49	4.52	4.55	4.58	4.60	4.64	4.67	4.70	4.73	4.77	4.81	4.85	4.89	4.93	4.98	5.02	5.07	5.12
Return on Equity	Rs Lakh		73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	73.42	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26	81.26
<b>Total Fixed Cost</b>	<b>Rs Lakh</b>		<b>253.03</b>	<b>246.08</b>	<b>239.16</b>	<b>232.28</b>	<b>225.43</b>	<b>218.61</b>	<b>211.83</b>	<b>205.09</b>	<b>198.39</b>	<b>191.74</b>	<b>192.97</b>	<b>186.40</b>	<b>132.26</b>	<b>133.48</b>	<b>134.76</b>	<b>136.08</b>	<b>137.47</b>	<b>138.91</b>	<b>140.41</b>	<b>141.98</b>	<b>143.61</b>	<b>145.32</b>	<b>147.10</b>	<b>148.95</b>	<b>150.88</b>
<b>Per unit Fixed Cost</b>	<b>Rs/kWh</b>		<b>13.95</b>	<b>13.57</b>	<b>13.19</b>	<b>12.81</b>	<b>12.43</b>	<b>12.06</b>	<b>11.68</b>	<b>11.31</b>	<b>10.94</b>	<b>10.57</b>	<b>10.64</b>	<b>10.28</b>	<b>7.29</b>	<b>7.36</b>	<b>7.43</b>	<b>7.50</b>	<b>7.58</b>	<b>7.66</b>	<b>7.74</b>	<b>7.83</b>	<b>7.92</b>	<b>8.01</b>	<b>8.11</b>	<b>8.21</b>	<b>8.32</b>

**Levillised tariff corresponding to Useful life**

Per Unit Cost of Generation	Unit	Levelised	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
O&M expn	Rs/kWh	<b>1.31</b>	0.93	0.97	1.01	1.06	1.10	1.15	1.20	1.25	1.30	1.36	1.41	1.47	1.54	1.60	1.67	1.74	1.82	1.89	1.97	2.06	2.15	2.24	2.33	2.43	2.54
Depreciation	Rs/kWh	<b>3.17</b>	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Int. on term loan	Rs/kWh	<b>2.29</b>	4.88	4.45	4.03	3.60	3.18	2.76	2.33	1.91	1.48	1.06	0.64	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Int. on working capital	Rs/kWh	<b>0.25</b>	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28
RoE	Rs/kWh	<b>4.19</b>	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48
<b>Total COG</b>	<b>Rs/kWh</b>	<b>11.20</b>	<b>13.95</b>	<b>13.57</b>	<b>13.19</b>	<b>12.81</b>	<b>12.43</b>	<b>12.06</b>	<b>11.68</b>	<b>11.31</b>	<b>10.94</b>	<b>10.57</b>	<b>10.64</b>	<b>10.28</b>	<b>7.29</b>	<b>7.36</b>	<b>7.43</b>	<b>7.50</b>	<b>7.58</b>	<b>7.66</b>	<b>7.74</b>	<b>7.83</b>	<b>7.92</b>	<b>8.01</b>	<b>8.11</b>	<b>8.21</b>	<b>8.32</b>

Discount Factor			1	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10
Fixed Cost			203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14	203.14
<b>Levillised Tariff</b>	<b>11.20</b>	Rs/Unit																									

**Determination of Additional Depreciation for Solar Thermal Projects**

Depreciation amount	90%
Book Depreciation rate	5.28%
Tax Depreciation rate	40%
Additional Depreciation	20%
Income Tax (MAT)	21.549%
Income Tax (Normal Rates)	29.120%
Capital Cost	1200.00

Years ----->	Unit	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
Book Depreciation	%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	2.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Accelerated Depreciation**

Opening	%	100%	40%	24%	14%	9%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.75%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	40.0%	24.0%	14.4%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Accelerated Depn.	Rs Lakh	720.00	192.00	115.20	69.12	41.47	24.88	14.93	8.96	5.37	3.22	1.93	1.16	0.70	0.42	0.25	0.15	0.09	0.05	0.03	0.02	0.01	0.01	0.00	0.00

Net Depreciation Benefit	Rs Lakh	656.64	128.64	51.84	5.76	-21.89	-38.48	-48.43	-54.40	-57.99	-60.14	-61.43	-62.20	-62.66	-62.94	-63.11	-63.21	-63.27	-2.83	0.03	0.02	0.01	0.01	0.00	0.00	0.00
Tax Benefit	Rs Lakh	191.21	37.46	15.10	1.68	-6.37	-11.20	-14.10	-15.84	-16.89	-17.51	-17.89	-18.11	-18.25	-18.33	-18.38	-18.41	-18.42	-0.82	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	
Per unit benefit	Rs/Unit	10.54	2.07	0.83	0.09	-0.35	-0.62	-0.78	-0.87	-0.93	-0.97	-0.99	-1.00	-1.01	-1.01	-1.01	-1.02	-1.02	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.91	0.82	0.75	0.68	0.61	0.56	0.51	0.46	0.42	0.38	0.34	0.31	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.10

<b>Levellised benefit</b>	<b>0.90</b>	<b>Rs/Unit</b>
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