**Before the**

# MAHARASHTRA ELECTRICITY REGULATORY COMMISSION

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**Case No. 100 of 2014**

**In the matter of**

**Determination of Generic Tariff for Renewable Energy Sources for FY 2014-15 under Regulation 8 of the Maharashtra Electricity Regulatory Commission (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2010**

**Smt. Chandra Iyengar, Chairperson**

**Shri Vijay L. Sonavane, Member**

## ORDER (SUO-MOTU)

**Dated: 7th July, 2014**

In exercise of the powers vested under Section 61 read with Section 181 of the Electricity Act, 2003 ("EA 2003"), the Maharashtra Electricity Regulatory Commission("MERC" or "the Commission") has notified the MERC (Terms and Conditions for determination of RE Tariff) Regulations, 2010, herein after referred as "MERC RE Tariff Regulations 2010" or "RE Tariff Regulations") on 7 June, 2010. The MERC RE Tariff Regulations, 2010 provide for Terms and Conditions and the Procedure for determination of generic tariff on *Suo-Motu* basis in respect of the following Renewable Energy (RE) generating stations:

(a) Wind Power Projects;
(b) Small Hydro Projects, Mini and Micro Hydro Projects;
(c) Biomass Power Projects;
(d) Qualifying and Non-Qualifying Non-fossil fuel-based co-generation Plants;
(e) Solar Photo Voltaic (PV) Projects,
(f) Solar Rooftop PV and other small Solar Power Projects.

2. Regulation 8.1 of the MERC RE Tariff Regulations, 2010 requires the Commission to determine the Generic Tariff for the RE technologies for which norms have been specified in the said Regulations on Suo-Motu basis, as reproduced below:

> *"8.1 The Commission shall notify the generic preferential tariff on Suo-Motu basis pursuant to issuance of revised norms by Central Electricity Regulatory Commission at the beginning of each year of the Control Period for renewable energy technologies for which norms have been specified under the Regulations.*
>
> *Provided that for the first year of Control Period, (i.e. FY 2010-11), the generic tariff on Suo-Motu basis may be determined within a period not exceeding three months from the date of notification of these Regulations."*

3. Accordingly, the Commission vide its Order dated 14 July, 2010, issued the Order for the 'Determination of Generic Tariff for RE Technologies for the first year of the Control Period, i.e., FY 2010-11' on Suo-Motu basis.

4. Further, in accordance with the above Regulations, the Commission, issued Suo-Motu Order dated 29 April, 2011 for the second year i.e. FY 2011-12, Suo-Motu Order dated 30 March, 2012 for the third year i.e., FY 2012-13' and Suo-Motu Order dated 22 March, 2013 for the fourth year of the control period i.e. FY 2013-14. The same is applicable for Renewable Energy Projects to be commissioned in Maharashtra during the fourth year of the control period, i.e., from 1 April, 2013 to 31 March, 2014.

5. Furthermore, in due discharge of the mandate under Regulations 8.1 of the MERC RE Tariff Regulations, 2010, the Commission, vide its public notice dated 9 May, 2014, issued a draft Order for the "Determination of Generic Tariff for RE Technologies for the fifth year of the Control Period, i.e., FY 2014-15" on Suo-Motu basis, and invited comments/objections/suggestions from interested stakeholders. The Commission has received written suggestions and objections from various stakeholders.

6. A public hearing was held on Tuesday, 13 June, 2014, at Centrum Hall, 1st floor, Centre No.1, World Trade Centre, Cuffe Parade, Mumbai 400005. The list of stakeholders who submitted their comments/suggestions in writing or made oral submissions during the public hearing is placed at **Appendix-1** and the list of participants who attended the public hearing is placed at **Appendix-2**.

7. After considering the suggestions and objections received on the Draft Order published by the Commission, in due discharge of the mandate under Regulation 8.1 of MERC RE Tariff Regulations, 2010, the Commission hereby determines the generic tariff of the RE projects for the fifth year of the Control Period (i.e., FY 2014-15) through this Order based on the financial principles and technology specific parameters as explained in the subsequent sections of the Order.

# 1. Comments/Objections received and the Commission's Ruling

## 1.1 Interest on Loan and Interest on Working Capital

*Stakeholders Comments/Suggestions:*

Indian Wind Turbine Manufacturers Association (IWTMA) and Indian Wind Energy Association (InWEA) requested the Commission not to consider any change in the methodology for computation of Interest Rate for long term loan and interest on working capital and same may be considered only after the amendment of MERC RE Tariff Regulations, 2010.

Cogeneration Association of India and Shree Chhatrapati Shahu Sahakari Sakhar Karkhana Ltd. proposed to consider interest rate for bagasse based co-generation projects at 13.50%.

Essel Infra projects Ltd., requested for consideration of Interest rate of 13.78% comprising 400 basis points over SBI average base rate and interest on working capital at 13.78%. Sri Maruti Solar Power Private Ltd. requested the Commission to consider the Interest on Loan to be 14.5%.

M/s. Mytrah Energy (India) Ltd., requested to consider a spread of 350 basis points and not 300 basis points for arriving at the interest on term loan percentage and 400 basis points for interest on working capital.

Association of Power Producers (APP) submitted to consider upfront fee of 1.50% of debt amount while computing interest on loan.

Welspun Renewables Energy Private Ltd. suggested that loan tenure of 14 years may be considered in view of prevailing tight liquidity conditions and impact on cash flows and proposed the Debt Equity ratio of 75:25 instead of 70:30.

***Commission's Ruling:***

The Commission notes the suggestions regarding the interest of loan and working capital. The premise for consideration of interest rate on long term loan and Interest rate on working capital by Commission has been elaborated along with necessary justification under Para 2.4 and 2.5 of this Order.

### 1.2 Return on Equity

*Stakeholders Comments/Suggestions*

M/s. H-Energy requested to consider RoE at 16% (Post Tax) whereas Essel Infra projects Limited suggested for consideration of 20% post tax RoE to attract the investment in RE projects.

Shri Datta Sakhar Karkhana, Sri. Maruti Wind Park Ltd and Association of Power Producers requested to consider 20% RoE for 10 yrs and 24% thereafter in line with Central Electricity Regulatory Commission (CERC) norms.

***Commission's Ruling:***

Regulation 16 of the MERC RE Tariff Regulations, 2010 specifies the normative Return on Equity for RE projects at 19% pre-tax per annum for the first ten years and after 10 years normative Return on Equity for RE projects is 24% pre-tax per annum. As the said Regulations have been notified after due public consultation process, the Commission is of the view that the scope of present proceedings is limited to determination of Generic Tariff for the fifth year of the first Control Period under Regulation 8 of the MERC RE Tariff Regulations, 2010.

### 1.3 Review of Accelerated Depreciation (AD) Benefits in Solar sector:

*Stakeholders Comments/Suggestions*

Welspun Renewables Energy Private Limited submitted to the Commission that the Accelerated Benefit in the Solar sector is creating distortion and disparities between IPPs and big corporate houses and disturbing the equilibrium against IPPs particularly when the selection of solar project developer is through competitive bidding. So it is requested the Commission to decide whether AD should continue to be given to attract investors in the sector considering the fact that the sector is already around 4 years old.

***Commission's Ruling:***

The continuation or dis-continuation of Accelerated Depreciation Benefits is not within the scope of the Commission. As per Regulation 22 of MERC RE Tariff Regulations, 2010, the Commission shall take into consideration such benefits/subsidies, if provided, by the Central Government, for the purpose of determination of tariff.

### 1.4 Subsidy or incentive by Central/ State Government and sharing of CDM benefits:

*Stakeholders Comments/Suggestions:*

MSEDCL requested to consider various facilities availed by investors such as capital subsidy /grants /incentives provided to non-conventional sources and Electricity Duty exemption while determining the tariffs. MSEDCL further submitted that the Commission may adopt the policy of CDM benefits as recommended by the Forum of Regulators.

***Commission's Ruling:***

The Commission is of the view that in absence of specific information as regards nature of subsidy, its purpose, eligibility, applicability etc., the Commission is not inclined to pass generic ruling in the matter in the present proceedings. The issue of sharing of such subsidies can be taken up based on application filed by the concerned party.

As regards sharing of CDM benefits, Regulation 21.1 of MERC RE Tariff Regulations, 2010 specifies that all risks, costs and efforts associated with the availing of carbon credits shall be borne by the generating company and entire proceeds of carbon credit from approved CDM project, if any, shall be retained by the generating company.

### 1.5 Reactive Energy Charges

*Stakeholders Comments/Suggestions:*

MSEDCL submitted that the Commission may levy reactive power charges from renewable sources consistent with the Transmission tariff Order. MSEDCL further submitted that reactive energy pricing should be uniform for all types of renewable sources**.**

***Commission's Ruling:***

As regards the issue of reactive charges, the Commission in its earlier Orders (Ref. Case No. 10 of 2012 & Case No. 6 of 2013) had already observed that a detailed technical study and reactive energy compensation is necessary. Accordingly, vide the said Orders, MSEDCL was directed to undertake a technical study and propose its recommendation in consultation with Grid Co-ordination Committee within a period of 4 months from issuance of the later Order. The Commission observes that MSEDCL vide its letter dated

8 January, 2014 submitted that the technical committee has been formed under C.E. (Commercial). MSEDCL further submitted that the matter is complex in nature and hence is taking time. Thus, MSEDCL is yet to submit the report of the Committee to the Commission.

## RE technology-wise comments and Commission's ruling:

## Solar Power Plants:

### 1.6 Capital Cost of Solar PV Power Plants

*Stakeholders Comments/Suggestions:*

Shri Ulhas Chaudhari requested to consider land cost while determining the capital cost of solar projects.

Association of power producers (APP) requested to consider the capital cost of Solar PV Projects as Rs. 1132.21 Lakh/MW whereas Sri Maruti Solar Power Pvt. Ltd. proposed to revise the capital cost to 900 Lakh/MW.

Green Energy Association and Enrich Energy requested to consider capital cost as Rs.751 to Rs. 755 Lakh/MW.

Welspun Renewables Energy Private Limited submitted to consider the lowest tariff of the projects which is feeding power to the grid and arrive at an optimum price. Welspun and Enrich Ltd. further suggested to consider the preliminary/pre-operating expenses and financing costs at the percentage of capital cost.

Essel Infra projects requested for pass through provision for antidumping duty, if levied in future.

Arbutus Consultants Pvt. Ltd. submitted that at the current level of market prices, as the module price has gone up, the experience shows that the capital cost without transmission line for a healthy project would be about Rs. 7.5 Crores per MW. It is further submitted that with the kind of volatility seen on foreign exchange it is essential to have "forward cover" for import of materials. This enhances the transaction cost for imported items (almost 70% items are imported) by about 4 to 5%.

***Commission's Ruling:***

The Commission has considered the capital cost of solar PV power plants in line with the capital cost determined for such plants by CERC for FY 2014-15 and in accordance with the provisions of MERC RE Tariff Regulations, 2010.

As regards the issue of pass through of antidumping duty, the Commission is of the view that it is premature to decide on the issue as imposition of the same is yet to be decided.

**1.7 Operation & Maintenance Expenses of Solar PV Plants**

*Stakeholders Comments/Suggestions:*

Sri Maruti Solar Power Private Limited requested to consider O&M cost as Rs.20 Lakh /MW for Solar PV Project and annual escalation rate should be reflective of actual price due to higher WPI and increase manpower cost.

***Commission's Ruling:***

The Commission observes that the O&M cost for Solar PV for FY 2013-14 have been determined in accordance with norms stipulated under Regulation 67 of the MERC RE Tariff Regulations, 2010. The review of the same cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

**1.8 Capacity Utilization Factor (CUF) of Solar PV**

*Stakeholders Comments/Suggestions:*

Essel Infra projects Limited, Welspun Renewables Energy Private Limited and Sri Maruti Solar Power Private Limited suggested for consideration of zone wise CUF varying from 15% to 20% as Solar irradiation varies from 12-17% in the State.

***Commission's Ruling:***

The Commission observes that the issue of review of CUF norms cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.9 Policy Review for Solar Power Plants

*Stakeholders Comments/Suggestions:*

MSEDCL requested the Commission to review the solar tariff policy and to link solar projects to the year of commissioning irrespective of date of execution of EPA.

Janmorcha submitted that there is need to bring scale / volume in solar energy projects which is possible only with the net metering concept and requested to consider possibility of implementation of net metering.

***Commission's Ruling:***

The Commission observes that policy review aspects cannot be addressed through the present proceedings, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.10 Degradation of Solar PV Module:

*Stakeholders Comments/Suggestions:*

Sri Maruti Solar requested to consider degradation of Solar Module at the rate of 1% every year after 2$^{nd}$ year whereas Welspun proposed to consider degradation after 4$^{th}$ year at a rate of 0.5% p.a. and requested to factor the annual degradation for Solar PV by way of reducing the PLF every year.

Arbutus Consultants Pvt Ltd submitted that the annual degradation of PV module power at the rate of 0.5% per annum may be considered.

***Commission's Ruling:***

The Commission observes that the objector has not submitted the data to substantiate its claim for degradation. Further, the Commission observes that the issue of review of performance norms for capacity utilisation factor and considering degradation factor for Solar PV projects cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.11 Auxiliary consumption of solar PV power plants

*Stakeholders Comments/Suggestions:*

Sri Maruti Solar and Essel Infra projects requested to consider 2% as auxiliary consumption for Solar PV Project.

***Commission's Ruling:***

The Commission observes that the petitioner has not submitted the data to substantiate its claim for auxiliary consumption.The Commission observes that the issue of review of performance norms for auxiliary consumption cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.12 Power Purchase Agreement:

*Stakeholders Comments/Suggestions:*

Green Energy Association requested the Commission to direct State utilities to sign PPA with Private Investors to promote Solar Energy in the State of Maharashtra.

***Commission's Ruling:***

In order to promote purchase of solar power by DISCOMs in the State, the Commission in accordance with its mandate under Section 86 (1) (e) of the Electricity Act, 2003 has already issued MERC (Renewable Purchase Obligation, its Compliance and Implementation of REC framework) Regulations, 2010 wherein year-wise solar specific RPO targets has been specified for the DISCOMs to comply with.

**Small Hydro Power Plants:**

### 1.13 Capital cost of Small Hydro Power Plants

*Stakeholders Comments/Suggestions:*

Mahati HPVPL requested to revisit the capital cost of small hydro projects in Maharashtra, across the entire range from 1 MW to 24 MW and also proposed that the

capital cost of SHP needs to be in synchronism with hydrological facts and ground realities in the state of Maharashtra.

***Commission's Ruling:***

Regulation 29 of the MERC RE Tariff Regulations, 2010 specifies that the indexed capital cost in case of small hydro projects for each year of the Control Period shall be notified pursuant to notification of such indexed capital cost for small hydro projects by CERC. Accordingly, the Commission has specified a capital cost pursuant to notification of such indexed capital cost vide CERC Order dated 9 November, 2010. Such capital cost, with an appropriate variation for updated data of indexed information has been considered for the current Order as elaborated in Section 4.3 of this Order.

### 1.14 Real time monitoring for RE projects less than 25 MW:

Mahati Hydro Power Vidarbha Pvt. Ltd. requested Commission to direct SLDC to do away with the requirement of real time monitoring for RE projects less than 25 MW.

***Commission's Ruling:***

The Commission observes that the conditions outlined under IEGC/State Grid Code will have to be adhered to by all concerned, in this matter.

### 1.15 Tariff Period of SHP below 5 MW

Mahati Hydro Power Vidarbha Pvt. Ltd. requested Commission that, the tariff period for hydro power projects 1MW to 5MW be 13 years in uniformly with projects greater than 5 MW.

***Commission's Ruling:***

It is a settled issue under Regulation 6.1 and Regulation 6.2 of the MERC RE Tariff Regulations, 2010 which specifies that in case of Small hydro projects above 5 MW and up to and including 25 MW, tariff period shall be 13 years and in case of Small hydro

projects up to and including 5 MW and Mini/Micro hydro projects, tariff period shall be 35 years.

### 1.16 Reimbursement of evacuation expenses of small hydro power plants.

Mahati Hydro Power Vidarbha Pvt. Ltd. submitted that as per MERC RE Tariff Regulations, 2010 evacuation from interconnection point and infrastructure immediately after interconnection point is the responsibility of Distribution Licensee. However, in 100% of cases, evacuation infrastructure is created by the developer at his own expense and effectively it takes 7 years from the date of commissioning to obtain reimbursement of cost. Further the cost is reimbursed subject to a ceiling of Rs.110 Lakh by MEDA & MSEDCL/MSETCL.

***Commission's Ruling:***

The Inter-connection point for Mini/Micro/Small Hydro power projects has been defined under Regulation 2.1(p) of MERC RE Tariff Regulations, 2010. Further, the Grid Connectivity framework and responsibility of power evacuation has been clearly stipulated under Regulation 17.1 of MERC (Renewable Purchase Obligation, its Compliance and Implementation of REC Framework ) Regulations, 2010, which outlines the responsibility for evacuation arrangement with concerned licensee, i.e., distribution licensee or transmission licensee depending upon whether RE project is required to be connected to distribution system or transmission system, respectively. Besides, the Commission observes that the capital cost norm specified in accordance with the provisions of the MERC RE Tariff Regulations, 2010 already include the cost of evacuation infrastructure up to inter-connection point as defined under the said Regulations.

**Wind Power Plants:**

### 1.17 Capital cost of Wind Power Plants:

*Stakeholders Comments/Suggestions:*

Inox Renewables submitted that, due to increase in hub height will increase the capital cost of the projects. Also it is submitted that, connectivity standards applicable to wind

generators as per CEA notification may give rise in the additional cost to the projects. Hence, by considering the above facts it requested Commission, that the capital cost may be revised to Rs. 603 Lakh/MW for FY 2014-15.

Indian Wind Turbine Manufacturers Association and Indian Wind Energy Association submitted that, increasing in the hub height may increase in towers as well as rotor diameters of the turbines which automatically increases the capital cost of the projects. Further requested to consider capital cost for wind power projects as Rs. 619.52 Lakh/MW

InWEA requested the Commission not to discontinue the indexation formula as per MERC RE Tariff Regulations, 2010 and may continue the indexation mechanism. Further, InWEA submitted that additional cost towards increase in hub height to 80 m, cost of scheduling and communication requirement, need for compliance for new regulations would result in additional cost burden and hence requested Commission to consider normative capital cost of Rs 619 Lakh/MW.

M/s. H-Energy requested to consider capital cost of Rs. 7 Crores/MW for CUF at 20-30% levels for project to be commercially feasible.

IWPPA submitted that MERC RE Tariff Regulations, 2010 linked the capital cost to indexation mechanism, which was in line with indexation mechanism provided under CERC RE Tariff Regulations. CERC has considered the capital cost of Rs. 603.93 Lakh/MW for FY 2014-15 which is linked to indexation mechanism.

Tata Power Renewable Energy Ltd. requested for consideration of capital cost of Rs. 554.04 Lakh/MW for wind power projects.

Essel Infra Projects Limited suggested that the capital cost of wind power projects should be revised to Rs. 725 Lakh/MW by considering higher hub height, high land cost, land development charges and long transmission lines and ROW issues.

M/s. Bothe Windfarm Development Pvt. Ltd. requested to increase the capital cost from the proposed level to the actual industrial figure or at least equivalent to CERC norms as adopted in its Order dated 15 March, 2014.

M/s. Mytrah Energy (India) Limited requested to consider the various parameters in the capital cost such as statutory fees paid towards various Governmental/and its undertaking Agencies, insurance cost, increase in land cost as well as Civil and Electrical cost.

CLP requested the Commission to revise the capital cost upwards in consonance with the MERC RE Tariff Regulations, 2010 and with due consideration to turbine prices in the market.

APP suggested that capital cost of Wind Power Plants to be revised to Rs. 7.25 Cores/ MW

IL&FS submitted that the Commission while following Section 61 of the Electricity Act 2003 should also consider the current market scenario and may consider approving a capital cost of Rs. 603 Lakh/MW as determined by the CERC for FY 2014-15.

Maruti Wind Park (India) Ltd. requested the Commission to revise the normative Capital Cost to 650 Lakh/MW.

Welspun Renewables Energy Private Limited submitted that the present market value for Wind Turbines, on a turnkey basis in Maharashtra is no lesser than Rs.700 Lakh/MW but the Commission has considered 575 Lakh/MW as Capital cost for Wind Power Plants.

***Commission's Ruling:***

The premise for computation of capital cost norm for wind power projects for FY 2014-15 have been elaborated under para 3.4 of this Order.

### 1.18 Operation and Maintenance Expenses for Wind Power Projects:

*Stakeholders Comments/Suggestions:*

Inox Renewables and IL&FS requested to consider O&M cost as Rs. 10.50 Lakh/MW. M/s. H-Energy requested to link escalation in O&M to consumer price index (CPI). Essel Infra projects Limited and APP requested to consider O&M expenses as Rs. 14 to 14.5 Lakh /MW. In addition, insurance cost should also be considered at 1% of the project cost for first five years.

M/s. Bothe Wind farm Development Pvt. Ltd. submitted that the current O&M cost taken from the various developers is varying between Rs. 10 to 12 Lakh/MW with 5-6% annual escalation. Considering the advance metering and forecasting requirements, O&M cost will increase drastically, hence it is requested to increase the O&M cost from current level.

Maruti Wind Park (India) Ltd suggested that the O&M cost should be considered at 20 Lakh/MW.

Welspun Renewables Energy Private Limited proposed the O&M Cost in the 1st year to be Rs.10.5 Lakh/MW i.e.1.5% of the Capital Cost.

***Commission's Ruling:***

The normative O&M expenses for wind energy projects have been determined in accordance with Regulations 27.1 and 27.2 of the MERC RE Tariff Regulations, 2010 which have been notified after undertaking the required regulatory process.

### 1.19 Capacity Utilisation Factor and Wind Zone

*Stakeholders Comments/Suggestions:*

Inox Renewables requested to allow wind zoning based on wind density at 50 m hub height till the time adequate numbers of masts with height more than 50 m are set up and wind data from such masts for a minimum period of 2-3 years is available.

IWTMA and InWEA requested Commission to not to increase the hub height at this stage as it may lead to decrease in applicable tariff for the specific wind zones. Also, C-WET initiated work for validation of the wind resource assessment at 80 m which is yet to be completed. Hence considering the above facts, IWEA requested Commission that, till such time C-WET issues validated data regarding WPD at 80 m hub height, the Commission should continue with CUF norms at 50 m hub height as per RE Tariff Regulations, 2010 or if the Commission wishes to continue with hub height of 80 m then the CUF should not be changed.

IWTMA and InWEA submitted that the Commission vide its draft RE tariff Order for FY 2014-15 had *inter-alia* proposed to change the Capacity Utilisation Factor (CUF) for wind power projects in the State and change the Hub Height of the Wind Turbine Generators from 50 m to 80 m by invoking the "Power to Remove Difficulties" provision, namely Regulation 77.1 of MERC RE Tariff Regulations, 2010. In this context, the objectors stated that in light of relevant Hon'ble Supreme Court Judgment (in the case of Madeva Upendra Sinai and Ors v. Union of India & Ors (1975)3SCC765), it is settled that existence of difficulty is a sine qua non and the difficulty is to be of the person who has to effect or regulate, i.e. this Commission. However, there is no difficulty being faced by this Commission to execute or exercise the said power to determine tariff which can be determined as per the Regulations and therefore there is no requirement for change in the Capacity Utilisation Factor (CUF) or to deviate from the norms of capital cost for wind power projects.

It was further submitted that in the last year of the control period of the MERC RE Tariff Regulations, 2010 the Commission should not have deviated from the said Regulations. IWTMA and InWEA submitted that in light of relevant APTEL Order (Appeal No. 200 of 2011, Judgment dated 04.10.2012) the Regulations framed by the State Commissions are binding on them and that once Regulations are framed by the State Commissions, the Regulations framed by the Central Commission are not relevant. In view of the above, IWTMA and InWEA submitted that there is no reason for revising the hub height norms of the wind turbine generators, CUF and the norms of capital cost for wind power projects vide the draft RE tariff Order for FY 2014-15.

Wind Independent Power Producers Association (WIPPA) submitted that with a increase in installed capacity, the availability of higher wind potential sites have been reduced and thus there is no rational to increase the CUF from a minimum level of 20% to 22%. A study is required to be conducted in this regard prior to any such amendment.

Tata Power Renewable Energy Ltd. requested not to change the parameters such as hub height and CUF for last year of control period and the same may be revised in the next control period only.

M/s. Bothe Windfarm Development Pvt. Ltd. requested either to maintain the original terms of the RE Tariff Regulations i.e. < = 250 W/m2 with the CUF @ 20% at 50 meter hub height or address the lower CUF of referred Zone -1 as considered by CERC in its RE Tariff Regulations, 2012 at 80 meter hub height.

M/s. Mytrah Enegy (India) Limited requested for inclusion of sites below 200 Watt/m2 as eligible sites as Wind Zone-1 which is also in line with MNRE directives /CERC Regulations.

CLP requested the Commission in its submission to continue with the wind zoning mechanism provided under the existing MERC RE Tariff Regulations, 2010 for 50m hub-height and to specify separate tariff for projects using the wind turbines less than 80m hub-height.

APP suggested to maintain the earlier CUF as Wind Zone 1: 20%, Wind Zone 2: 23%, Wind Zone 3: 27%, Wind Zone 4: 30%

IL&FS submitted that the Commission may specify an additional zone for WPD less than 200 $W/m^2$ in line with the CERC.

Maruti Wind Park (India) Ltd suggested that till C-WET issues validated data regarding WPD and wind speed at 80 m hub heights. The Commission may continue the Wind Power Density measurement at 50 meter hub height for determining CUF.

Welspun Renewables Energy Private Limited requested the Commission to maintain the MERC RE Tariff Regulations, 2010 for the FY 2014-15 along with "Procedure for classification of Projects into "Wind Zones" as defined by MEDA, as the Suo-motu Order of RE Tariff is already getting in the FY 2014-15 itself.

GE India Industrial Private Limited supports the revised Wind Power Density (WPD) characterization, CUF norms aligned with the WPD and the hub height criteria for measurement of WPD taken by the Commission.

***Commission's Ruling:***

The Commission notes the objections raised by the stakeholders. The rational for considering CUF norm and Wind Zones for wind power projects during FY 2014-15 have been elaborated under para 3.3 of this Order.

### 1.20 Auxiliary Consumption and De-rating of wind machine

*Stakeholders Comments/Suggestions:*

Maruti Wind Park (India) Ltd suggested that the de-rating of wind machine shall be considered at the rate of 1% every year after 5 years and 1% may be considered as auxiliary consumption.

***Commission's Ruling:***

The Commission observes that the review of the performance norms for auxiliary consumption and treatment for import of power from the grid by RE projects cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.21 Banking Mechanism

*Stakeholders Comments/Suggestions:*

Tata Power Renewable Energy Ltd. sought clarification on applicability of CSS in case of third party sale on which REC is claimed by the wind generators.

Maruti Wind Park (India) Ltd suggested that Banking Mechanism may be provided in this Regulation. Banking period may be considered from June to May. Banking charges may be considered as 2%. Tariff for unutilized banked energy at the end of the banked period may be fixed as 85% of Normal tariff for that category.

***Commission's Ruling:***

The Commission observes that the issues related to banking which pertain to captive/third party wheeling transactions cannot be addressed as a part of the current regulatory process, which has been initiated for determination of generic RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

## 1.22 Tariff for Wind Power Projects

*Stakeholders Comments/Suggestions:*

M/s. H-Energy proposed to consider tariff of Rs, 5.80 /kWh for Zone- 1, Rs. 5.05 /kWh for Zone- 2, Rs. 4.15 /kWh for Zone- 3 and Rs, 3.88 /kWh for Zone- 4.

GE India Industrial Private Limited submitted that the tariff levels to support low and medium wind speed turbines would be Rs.4.65 – 7.20 per kWh for WPD range of 400-200 W/sq.m.

***Commission's Ruling:***

The preferential tariff for wind energy projects getting commissioned during FY 2014-15 has been determined in line with provisions stipulated under MERC RE Tariff Regulations, 2010 along with suitable modifications which has been further elaborated under in Para 3.11 of this Order.

## 1.23 Tariff Period & Levellization

APP requested the Commission to consider the PPA period for 25 years to eliminate the uncertainties.

APP submitted that the tariff period should either be equal to the life period i.e., of 25 years or levellization should be done for the tariff period i.e. 13 years.

Maruti Wind Park (India) Ltd requested the Commission to consider the Tariff period of minimum 20 years from Commercial Operation Date (COD) for Wind energy Plant.

Welspun Renewables Energy Private Limited requested to keep the tariff period valid for 25 years.

***Commission's Ruling:***

Regulation 6 of the MERC RE Tariff Regulations, 2010 specifies the Tariff period for various RE projects. Accordingly, the Tariff Period for wind energy projects is 13 years, considered from the date of commercial operation of the wind project. The Commission also observes that while tariff period is specified as 13 years, the levellization is carried out over useful life which is 25 years and not just over 13 years, thereby ensuring the cost recovery is spread over entire useful life which also results in back-ending of the returns.

Further, the Commission notes that the review of tariff period or revision in useful life are not the subject matters of the current regulatory process, which has been initiated for determination of Tariff based on provisions outlined under the notified RE Tariff Regulations.

## Non-Fossil fuel based Co-generation projects:

### 1.24 Capital cost of Non-Fossil fuel based Co-generation projects:

*Stakeholders Comments/Suggestions:*

Cogen Association of India and Shree Chhatrapati Shahu SSK Ltd., requested to consider capital cost of Rs. 5.25 Crore/MW and Rs. 6.50 Crore/MW with modernization for bagasse based co-generation projects.

Shri Datta Sakhar Karkhana requested to consider capital cost of Rs. 6.50 Crores/MW.

Orient Green power Company Limited has requested the Commission to consider Rs.630 Lakh/MW as the Capital Cost for Non-Fossil fuel based Co-generation projects.

Maha Co-Gen Green Power Producers Association requested the Commission to consider Rs.568 Lakh/MW as the Capital Cost for non-fossil fuel based plants.

***Commission's Ruling:***

The Commission observes that the capital cost for the non-fossil fuel based co-generation projects for FY 2014-15 has been determined in line with the provisions of the MERC RE Tariff Regulations, 2010 which has been further elaborated under Para 6.2 of this Order.

### 1.25 Operation and Maintenance Expense:

*Stakeholders Comments/Suggestions:*

Cogen Association of India and Shree Chhatrapati Shahu SSK Ltd. requested to consider O&M expenses for bagasse based co-generation projects in line with CERC guided O&M expenses of Rs. 17.89 Lakh/MW

Orient Green power Company Limited requested to consider Rs.40 Lakh/MW as Normative O&M expenses.

***Commission's Ruling:***

The Commission is of the view that revision in norm for the O&M costs is not the subject matter of these proceedings which have been initiated to determine generic RE Tariff in accordance with the provisions stipulated under MERC RE Tariff Regulations, 2010.

### 1.26 Auxiliary Consumption and Station Heat Rate:

*Stakeholders Comments/Suggestions:*

Cogen Association of India, Shree Chhatrapati Shahu SSK Ltd. and Shri Datta Sakhar Karkhana requested to consider Station Heat Rate at 4000 kCal/kWh whereas Maha Co-Gen GPPA submitted that Station Heat Rate for Travelling Grate Boilers to be considered as 4200 kCal/kWh.

Cogen Association of India, Shree Chhatrapati Shahu SSK Ltd., Orient Green power Company Limited and Maha Co-Gen Green Power Producers Association requested to change Auxiliary consumption from 8.5% to 10%.

***Commission's Ruling:***

The Commission observes that the current regulatory process has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010.

### 1.27 Variable Cost of Non-Fossil fuel based Co-generation projects:

*Stakeholders Comments/Suggestions:*

Cogen Association of India, Shree Chhatrapati Shahu SSK Ltd. and Shri Datta Sakhar Karkhana requested to consider fuel cost for bagasse based co-generation projects in line with CERC guided cost of Rs. 2174.34/MT.

Maha Co-Gen GPPA submitted that the variable charge component should be revised to Rs.5.19 from Rs.3.60 per unit.

Maha Co-Gen GPPA requested that the price of Bagasse/ other fuel may be considered at least Rs.2500/MT for the tariff determination for FY 2014-15.

***Commission's Ruling:***

The Commission observes that the fuel price for the co-generation projects has been determined in accordance with the provisions stipulated under MERC RE Tariff Regulations, 2010 and further elaborated under the Para 6.13 of this Order. The revision in variable cost computation for new co-generation projects cannot be addressed as a part of the current regulatory process, which has been initiated for determination of RE Tariff for FY 2014-15 in pursuance of MERC RE Tariff Regulations, 2010. The variable cost for existing projects is addressed in Para 6.15 of this Order.

**1.28 Use of fossil fuel**

Shri Datta Sakhar Karkhana requested to revise the uses of fossil fuel to 25% from the existing 15%.

***Commission's Ruling:***

The Commission observes that the use of fossil fuel by the co-generation projects has been specified under Regulation 42 of the MERC RE Tariff Regulations, 2010.

**1.29 Levellised Tariff of Non-Fossil fuel based Co-generation projects:**

*Stakeholders Comments/Suggestions:*

Cogen Association of India requested for determination of tariff for non-fossil fuel based co-generation projects whose 13 years EPA tenure has been expired or in process of renewal of EPA.

Shri Datta Sakhar Karkhana requested for tariff of Rs. 5.98/kWh having fixed cost of Rs. 2.38/kWh and variable charges of Rs. 3.60/kWh for non-fossil fuel based co-generation projects commissioned in FY 2013-14.

***Commission's Ruling:***

The Commission observes that the Tariff for non-fossil fuel based co-generation projects for has been determined in accordance with the norms stipulated under MERC RE Tariff Regulations, 2010 and further elaborated under chapter 6 of this Order.

**1.30 Guidelines for old Bagasse based Cogeneration Plant**

*Stakeholders Comments/Suggestions:*

MSEDCL requested the Commission to issue guidelines such as term of EPA & the tariff to be made applicable in respect of old Bagasse based Cogeneration Plant commissioned prior to MERC RE Tariff Regulation, 2010 and whose EPAs are expired or due for expiry this year.

***Commission's Ruling:***

The Commission notes that it had stipulated the tenure of EPA for old Bagasse based Cogeneration Plant commissioned (prior to MERC RE Tariff Regulation 2010), vide its Order dated 16 August, 2002 under para 4.6 of the said Order. The Commission is of the view that the parties could mutually discuss and agree for terms and conditions after expiry of the existing EPA.

## Biomass Power Projects:

### 1.31 Capital cost of Biomass based Power Projects:

*Stakeholders Comments/Suggestions:*

MBEDA and MVPNL requested to consider capital cost Rs.6- 6.5Crores /MW as per CERC.

GMT Mining & Power Pvt. Ltd. and AA ENERGY Ltd. requested to consider capital cost of Rs. 540 Lakh/MW as per CERC.

M/s. Blue Gums Agro & Biotech Pvt. Ltd. requested that the capital cost of biomass power projects should be kept within provision of cost required for building supply chain management in every biomass power projects.

Tata Power Company Ltd. requested to consider the parameters for biomass power plants in line with CERC RE Tariff Order for FY 2014-15.

Orient Green power Company requested for Capital Cost of Biomass Power projects as Rs.540 Lakh/MW for project [other than rice straw and juliflora (plantation) based project] with water cooled condenser, Rs.580 Lakh/MW [other than rice straw and juliflora (plantation) based project] with air cooled condenser, Rs.590 Lakh/MW for rice

straw and juliflora (plantation) based project with water cooled condenser and Rs.630 Lakh/MW for rice straw and juliflora (plantation) based project with air cooled condenser.

***Commission's Ruling:***

The Commission observes that the capital cost norm for biomass power projects for FY 2014-15 has been determined in accordance with the provisions stipulated under the MERC RE Tariff Regulations, 2010 and further elaborated under Para 5.2 of this Order.

### 1.32 Working capital of Biomass based power projects:

GAPS Power and Infrastructure Ltd vide letter dated 08 February, 2013 requested to the Commission to revise the interest in the working capital taking into account fuel stock of 6 months and also maintenance spares to the extent of 15.00% of O & M Expenses.

***Commission's Ruling:***

Consideration of the revision in parameters for computing normative working capital requirement as suggested by the objector would entail amendment of MERC RE Tariff Regulations, which is not subject matter of this regulatory process.

### 1.33 O&M Expenses of Biomass Power Projects

MBEDA requested to consider the O&M cost as Rs. 60 Lakh/MW whereas GMT MPPL, MVPNL, AA ENERGY LTD and Tata Power Company Ltd requested to consider O&M cost Rs. 42.29 Lakh/MW in line with CERC. Orient Green power Company Limited requested to consider Rs.40 Lakh/MW as Normative O&M expenses.

***Commission's Ruling:***

Regulation 18 of the MERC RE Tariff Regulations, 2010 specifies the provision related to Operational and Maintenance cost which comprises of repair and maintenance (R&M), establishment including employee expenses, and administrative and general expenses including insurance. The issue raised by the stakeholder is not a subject matter of this regulatory process, scope of which is limited to determination of Generic Tariff for FY 2014-15 under MERC RE Tariff Regulations, 2010.

### 1.34 Station Heat Rate, Calorific Value and Auxiliary power consumption of Biomass power Projects:

*Stakeholders Comments/Suggestions:*

MBEDA requested to consider the Station heat rate as 4125 kCal/kWh to 4200 kCal/kWh. GMT Mining and Power Pvt. Ltd. and Orient Green power Company Limited requested to consider SHR as 4125 kCal/kWh (AFBC Boiler) and 4200 kCal/kWh (travelling grate boiler) as per CERC.

MBEDA, MVPNL, Orient Green power Company Limited, A A ENERGY Ltd., and GMT Mining and Power Pvt. Ltd., requested to consider the GCV of 3100 kCal/kg as per the CREC and in line with Judgement dated 29.5.2014 of the Hon'ble APTEL.

MBEDA submitted that, it is very difficult to operate a biomass power plant at the annual PLF 80% even after the stabilization period. Hence the PLF may be fixed at 70% even after stabilization.

M/s. Blue Gums Agro & Biotech Pvt. Ltd. mentioned that auxiliary energy consumption should be considered as 10% for developers using rise husk or similar biomass which is pre-process whereas developers using material like cotton stalks, Tur stalks, Paddy Straws etc additional allowance of 2% should be considered.

Tata Power Company Ltd. requested to consider the parameters for biomass power plants in line with CERC RE Tariff Order dated 15 May, 2014.

MVPNL and A A ENERGY Ltd., requested to consider fuel cost in line with CERC as Rs. 3200/ MT.

Orient Green power Company Limited has requested the Commission for changes in the Auxiliary power consumption of Biomass Power projects. For project using water cooled condenser, they requested for 11% during first year of operation and 10% from second year onwards. While for project using air cooled condenser, they requested for 13% during first year of operation and 12% from second year onwards.

MBEDA requested to re-compute variable charges by considering not just fuel cost but also related parameters such as GCV and SHR. MBEDA further submitted that the GCV

and SHR cannot depend on year of Commissioning but are based on characteristics of fuel.

***Commission's Ruling:***

The Commission is of the view that station heat rate, calorific value and auxiliary power consumption are performance parameters for which norms have been stipulated under the MERC RE Tariff Regulations, 2010. Any modification in the same will amount to a review of the RE Tariff Regulations, which is not the subject matter of this Regulatory process.

**Variable Charges and Fixed Charges**

*Stakeholders Comments/Suggestions:*

Tata Power Company Ltd. requested to consider the parameters for biomass power plants in line with CERC RE Tariff Order for FY 2014-15.

Greta Energy Ltd. proposed to consider Fixed Charge (Levellised) of Rs. 2.86/ kWh and Variable Charge of Rs. 4.76/ kWh after incorporating CERC's critical norms in the MERC's draft Tariff Order.

AA ENERGY Ltd. and MVPNL submitted that the revised Fixed Charge (Levellised) as Rs. 2.83/ kWh to Rs. 2.84/ kWh & Variable Charge as Rs. 4.73/ kWh to Rs. 4.74/ kWh shall be considered.

MBEDA requested to consider the fuel cost as Rs. 3600/MT.

***Commission's Ruling:***

The Commission observes that the biomass fuel price and applicable variable cost for new biomass power projects during FY 2014-15 has been determined in accordance with the provisions stipulated under MERC RE Tariff Regulations, 2010 and further elaborated under Para 5.13 and Para 5.14 of this Order.

### 1.35 Tariff for Biomass Gassifier Technology

*Stakeholders Comments/Suggestions:*

GE India Industrial Private Limited submitted that the Gassifier Gas Engine route for power generation may be promoted in addition to the direct combustion based on Rankine cycle technology.

M/s. Sun Sphoorthy Maarth Pvt. Ltd. suggested that as CERC in its RE Tariff Regulations has included Biomass Gasification power plants with specific heading, the Commission should also include Biomass Gasification power plants in RE Tariff Order. Further, SSMPL submitted that, instead of having case to case tariff determination for other technologies, new technologies should be allowed to proceed with the present prevailing biomass tariff instead of having case.

M/s. VanaVidyut Pvt. Ltd. submitted that the Commission has not determined the tariff for Biomass gasification route. The Biomass Gasifier power plants up to 2 MW capacity should be allowed to get the PPA with status same as of biomass power plants based on Rankine cycle.

Tata Power Company Ltd. requested to promote biomass gasification technology.

***Commission's Ruling:***

For determination of tariff for biomass power projects based on technology other than Rankine Cycle, the Commission has enabled project specific tariff determination as per Regulation 7.1(f) of MERC RE Tariff Regulations, 2010. The Commission has enabled a 1 MW pilot power project based on biomass gasification route (Otto Cycle) to be set up at a tariff as applicable for biomass power projects based on Rankine Cycle based technology vide its Order dated 30 December, 2010 (Case No. 39 of 2010). Further the Commission also notes that CERC has specified the norms of such technologies in its RE Tariff Regulations. However, for the Commission to specify generic tariff norms for such technology would require amendment in the MERC RE Tariff Regulations, 2010 which is beyond the scope of the present Order.

### 1.36 Tariff of Biomass Power Plant

*Stakeholders Comments/Suggestions:*

MBEDA requested to consider the variable Tariff for existing Biomass plants as Rs. 4.88/kWh as per CERC norms.

M/s. Vayunandana has submitted that, the actual fixed cost and variable cost of Biomass projects is Rs. 7.08/kWh. So requested to revise the tariff to Rs. 7.50/kWh. Further M/s Vayunandana requested to direct MSEDCL to make payment within 45 days from the billing date.

GMT Mining and Power Pvt. Ltd. submitted that, Tariff for Biomass based power plants works out to Rs. 7.56/kWh for FY 2014-15 with Fixed charge of Rs. 2.83/kWh and Variable charge of Rs, 4.73/kWh based on CERC's critical norms.

M/s. IBPA requested to adhere with the guidelines issued by CERC while determining the tariff for biomass power projects.

Greta Energy Ltd proposed that RE Tariff for Biomass based power plants works out to Rs. 7.62/ kWh for FY 2014-15.

MSEDCL submitted that CERC has amended the norms for determination of generic levellised tariff for the biomass based generating plant. Hence, MSEDCL requested to consider the same and rationalize the biomass tariff.

AA ENERGY Ltd. submitted that the revised Tariff to be considered is Rs. 7.56/kWh

MVPNL suggested that the Revised Tariff of @ Rs. 7.58/kWh shall be considered for Biomass projects.

GE India Industrial Private Limited submitted that the tariff for Biomass shall range from Rs.5.38/kWh – Rs.6.72/kWh.

***Commission's Ruling:***

The Commission has determined the tariff for new biomass power projects during FY 2014-15 in accordance with the provisions stipulated under MERC RE Tariff Regulations, 2010 and further elaborated under chapter 5 of this Order.

# 2. Common Parameters applicable for determination of Generic Tariff

This Section of the Order details the applicable norms for determination of Generic Levelised Tariff, which are common to all type of renewable technologies as specified in the RE Tariff Regulations.

## 2.1. CONTROL PERIOD

Regulation 5.1 of the RE Tariff Regulations specifies that the Control Period for determination of tariff for RE projects shall be five years, starting from the date of notification of the RE Tariff Regulations. The first year of the Control Period was FY 2010-11, the second year of the Control Period was FY 2011-12, the third year of the Control Period was FY 2012-13, the fourth year of the Control Period was FY 2013-14 and the fifth year of the control period is FY 2014-15. The first Proviso to Regulation 5.1 of RE Tariff Regulations stipulates that the tariff determined for the RE projects commissioned during the Control Period shall continue to be applicable for the entire duration of the Tariff Period (as specified in Regulation 6 of the RE Tariff Regulations).

Further, in accordance with Regulation 5.2 of RE Tariff Regulations, the generic tariff determined for Solar PV projects and Rooftop Solar PV and other small solar projects based on the Capital Cost and other norms applicable for FY 2013-14 vide Commission's Order (Case No. 6 of 2013) dated 22 March, 2013 shall also apply for such projects during FY 2014-15, provided that (i) the Power Purchase Agreements (PPA) in respect of the Solar PV projects as mentioned in this Paragraph are signed on or before 31 March, 2014; and (ii) the entire capacity covered by the Power Purchase Agreement is commissioned on or before 31 March, 2015 in respect of Solar PV projects.

Further, for those Solar PV power projects and Rooftop Solar PV and other small solar projects whose PPAs are signed after 31 March, 2014, the tariff for such projects for their commissioning during FY 2014-15 would be based on the benchmark capital cost norm for Solar PV power projects for FY 2014-15 as specified under para 7.4 of this Order.

## 2.2. TARIFF STRUCTURE

Regulation 9.1 of the RE Tariff Regulations 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 having fuel cost component, like biomass power projects and non-fossil fuel based cogeneration projects, single-part tariff with two components, i.e., fixed cost component and fuel cost component, has been determined under this Order.

The relevant cost components and basis for determination of Generic Tariff in respect of each RE technology have been elaborated under technology specific Sections in detail.

## 2.3. TARIFF DESIGN

In accordance with Regulation 10 of the RE Tariff Regulations, the Tariff Design for RE generating stations is as under**:**

*"10.1 The generic tariff shall be determined on levellised basis for the Tariff Period.*

*...*

*10.2 For the purpose of levellised tariff computation, the discount factor equivalent to normative weighted average cost of capital shall be considered.*

*10.3 Levellisation shall be carried out for the 'useful life' of the Renewable Energy project while tariff shall be specified for the period equivalent to 'Tariff Period'."*

## 2.4. INTEREST ON LOAN

Regulation 14.1 of the RE Tariff Regulations specifies that the loan tenure of 10 years is to be considered for the purpose of determination of generic tariff for RE projects. Regulation 14.2 provides for consideration of the rate of interest on loan as under:

"*The loans arrived at in the manner indicated above shall be considered as gross normative loan for calculation for interest on loan. The normative loan outstanding as*

*on April 1st of every year shall be worked out by deducting the cumulative repayment up to March 31st of previous year from the gross normative loan.*

*For the purpose of computation of tariff, the normative interest rate shall be considered as average of State Bank Advance Rate (SBAR) prevalent during the previous year plus 150 basis points.*

*Notwithstanding any moratorium period availed by the generating company, 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, it may be noted that as per the guidelines issued by the Reserve Bank of India (RBI) dated 01 July, 2010 related to interest rates on loan advances, all banks have been directed to switch over to the system of Base Rate with effect from July 01, 2010 by replacing the existing Benchmarking Prime Lending Rate (BPLR) [also known as Advance Rate, which is referred to in the RE Tariff Regulations] (Ref. Master Circular by RBI, http://www.rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=5816#a9). This policy shift is a result of the recommendation made by the Working Group on Benchmark Prime Lending Rate constituted by RBI in its Report submitted in October 2009. As per the Report, BPLR system is incompatible with the market situation and has fallen short of expectation to enhance transparency in lending rate due to which BPLR system needs to be replaced with Base Rate system.

As per this new guideline, all categories of loans have to be priced only with reference to the Base Rate with effect from 1 July, 2010. The Base Rate is the minimum rate for all loans below which, banks are not permitted to lend any funds. All banks have been directed to determine their actual lending rates on loans and advances with reference to the Base Rate plus borrower-specific charges, which will include product-specific operating costs, credit risk premium and tenor premium. Accordingly, all banks in India including the State Bank of India (SBI), have replaced Benchmark Prime Lending Rate with the new regime of Base Rate with effect from 1 July, 2010. Further, in order to give banks some time to stabilize the system of Base Rate calculation, banks were permitted to change the benchmark and methodology any time during the initial six month period, i.e., latest by end-December 2010. Accordingly, the system of Base Rate based lending has been under operation for almost three years. The Base Rate as notified by State Bank of India for the period 1 April, 2013 to 31 March, 2014 is summarised below. The table also provides the State Bank of India Prime Lending Rate (SBI PLR) notified for the FY 2013-14 for comparison purpose.

| Period | Base Rate (%) | SBI PLR (%) |
|---|---|---|
| 1 April-2013 to 18 September-2013 | 9.70% | 14.45% |
| 19 September-2013 to 6 November-2013 | 9.80% | 14.55% |
| 7 November-2013 to 31 March-2014 | 10.00% | 14.75% |
| **Weighted Average Base Rate for FY 2014 – 15** | **9.83%** | **14.58%** |

Furthermore, the RE Tariff Regulations, 2012 published by CERC for the second Control Period, has also linked the normative interest rate with Base Rate of State Bank of India. The CERC RE Regulations, 2012 specified normative interest rate equal to three hundred (300) basis points above the State Bank of India Base Rate prevalent during the first six months of the previous year.

Besides, it is observed from the above table that if the reference rate linked to BPLR is used for the purpose of benchmark normative interest cost, the rate of interest works out to 16.18% (14.58% +150 basis point), while if the interest rate is considered as per the reference rate methodology as proposed in the draft Order (i.e., Base Rate +300 basis points), which is also in line with the notified CERC RE Tariff Regulations, 2012, the benchmark normative interest rate works out to 12.83% (9.83% + 300 basis points). Similarly, the Interest Rate on Working Capital linked to SBI PLR works out to 15.58% (14.58% + 100 basis points) whereas the same works out to 12.33% (9.83% + 250 basis points) linked to SBI Base Rate. The Commission is of the view that the reference rates to be used for the purpose of benchmark interest rate norm should be representative of the prevalent market conditions. In addition, the normative interest rates should be viewed in context of the prevailing interest rates offered by banks and financial institutions for funding renewable energy projects by agencies such as Indian Renewable Energy Development Agency Ltd (IREDA) and Power Finance Corporation Ltd (PFC). The following table summarises the current interest rates offered by IREDA and PFC for RE Technologies and Generation facilities:

***Table: Interest Rates offered by IREDA w.e.f. 12 June, 2014***

| S. No. | BORROWER / SECTOR | Grade I | Grade II | Grade III | Grade IV |
|---|---|---|---|---|---|
| 1 | Schedule A, 'AAA' Rated PSUs | 11.50% | 11.50% | 11.50% | 11.50% |
| 2 | State Sector Borrowers | 11.50% | 11.50% | 11.75% | 11.90% |
| 3 | Wind Energy | 11.90% | 12.00% | 12.25% | 12.50% |
| 4 | Solar PV, Co-generation & Hydro | 12.00% | 12.15% | 12.40% | 12.65% |
| 5 | Energy EE/ EC, Solar Thermal & Biomass Power | 12.50% | 12.75% | | |

*(Source: www.ireda.gov.in)*

***Table: Interest Rates offered by PFC w.e.f. 7 November, 2013***

| S. No. | Renewable Energy Projects (within purview of MNRE) | Interest Rate (%) |
|---|---|---|
| 1 | State Sector Borrowers(Category 'A+' ) [AND]<br>Identified CPSUs [AND]<br>AAA rated Companies | 11.75% |
| 2 | State Sector Borrowers (Category 'A' )[AND]<br>Central Sector Borrowers(Other than Identified CPSUs & AAA rated) | 12.00% |
| 3 | Private Sector Borrowers : Gen. Projects with IR-1 | 12.25% |
| 4 | Private Sector Borrowers :<br>(a) Gen. Projects with IR-2<br>(b) Entity Grade : E I & E II | 12.75% |
| 5 | Private Sector Borrowers :<br>(a) Gen. Projects with IR-3<br>(b) Entity Grade : E III & E IV<br>(c) Discom : Grade A | 13.00% |
| 6 | Private Sector Borrowers :<br>(a) Gen. Projects with IR-4 | 13.25% |
| | Private Sector Borrowers :<br>(a) Gen. Projects with IR-5<br>(b) Discoms : Grade B.<br>(c) Entity Grade : E V<br>(d) Non-graded. | 13.50% |

*(Source: www.pfcindia.com)*

From the above table, it is observed that the interest rate offered by IREDA for different RE technologies and borrowers ranges from 11.90 % to 12.75 % while that for PFC varies from 11.75 % to 13.50%.Thus, it can be observed that allowing normative interest rate based on BPLR would lead to allowing normative interest rates as high as 16.18% which is not representative of the ground reality and the prevailing market condition.

While the Commission recognises that modification of the benchmark reference interest rate would require amendment of RE Tariff Regulations, at the same time, the Commission cannot ignore the principles and methodology specified by the Central Commission. Hence, in view of the significant policy shift of BPLR to Base Rate for Banks as per RBI Guidelines, the Commission has decided to revise the computation of normative interest rate from Prime Lending Rate (Advance Rate) to Base Rate in pursuance of the powers of the Commission under "Deviation from norms" as specified in Regulation 74.1 of the RE Tariff Regulations.

Further, in order to factor in the concerns for lending to RE projects, the Commission has decided to consider a spread of 300 basis points above the average Base Rate of State Bank of India to arrive at normative interest rate for loan financing of the RE projects.

Thus, Interest on normative long-term loan shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 300 basis points.

Accordingly, the weighted average of State Bank of India Base Rate for 1 April, 2013 to 31 March 2014 as shown in the above table, plus 300 basis points, works out to an interest rate of 12.83% p.a. (9.83% + 300 basis points), which has been considered as the normative interest rate on long-term loans for computation of levellised tariff for RE technologies in this Order.

## 2.5. INTEREST ON WORKING CAPITAL

Regulation 17.3 of the RE Tariff Regulations provides for computation of the rate of interest on working capital as under:

> *"Interest on Working Capital shall be at interest rate equivalent to average State Bank Advance Rate (SBAR) during the previous year plus 100 basis points."*

In view of the rationale elaborated in para 2.4 above, the Commission has decided to revise the computation of normative interest rate on working capital also, by moving from Prime Lending Rate system to Base Rate system in pursuance of the powers of the Commission under "Deviation from Norms" as specified in Regulation 74.1 of the RE

Tariff Regulations. Further, in order to factor in the concerns for lending for RE projects, the Commission has decided to consider a spread of 350 basis points above the average Base Rate of State Bank of India to arrive at the normative interest rate on working capital. Thus, Interest on Working Capital loan shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points.

Accordingly, the weighted average State Bank of India Base Rate for FY 2013-14 as available from 1 April, 2013 to 31 March 2014 as shown in the above table, plus 350 basis points, works out to an interest rate of 13.33% (9.83% + 350 basis points), which has been considered as normative interest rate on Working Capital for computation of levellised tariff for RE technologies in this Order.

## 2.6. LEVELISED TARIFF

Levellised Tariff is calculated by carrying out levellisation over useful life of each technology considering the discount factor equivalent to weighted average cost of capital, to represent the time value of money.

*Discount Factor*

The discount factor considered for this purpose is equal to the weighted average cost of capital on the basis of normative debt: equity ratio (70:30) specified in the Regulations, and weighted average rates for debt and equity component.

Interest Rate considered for the loan component (i.e., 70%) of Capital Cost is 12.83% (as explained in para 2.4 above). For the equity component (i.e., 30%), rate of Return on Equity (ROE) for the first ten (10) years is 19%, and for the 11$^{th}$ year onwards till useful life of the RE project, the rate is 24%. Based on these rates, the weighted average ROE has been calculated, which is around 22.3% (ranging from 22% to 22.57% depending on the useful life of RE technologies). The discount factor for each technology derived by this method is detailed in the respective technology specific Sections of this Order.

## 2.7. SUBSIDY OR INCENTIVE PROVIDED BY THE CENTRAL/STATE GOVERNMENT

Regulation 22 of the RE Tariff Regulations specifies:

*"The Commission shall take into consideration any incentive or subsidy offered by the Central or State Government, including accelerated depreciation benefit if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations.*

*Provided that the following principles shall be considered for ascertaining income tax benefit on account of accelerated depreciation, if availed, for the purpose of tariff determination:*

*a) Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.*
*b) Capitalisation of RE projects during second half of the fiscal year.*
*c) Per unit benefit shall be derived on levellised basis at discount factor equivalent to weighted average cost of capital."*

Accordingly, for the projects availing the benefit of accelerated depreciation as per applicable Income Tax rate of 33.99% (30% IT rate + 10% surcharge + 3% Education cess) has been considered. For the purpose of determining the net depreciation benefits, depreciation @ 5.28% as per Straight Line Method (Book depreciation as per Companies Act, 1956) has been compared with depreciation as per Income Tax Act, i.e., 80% under Written Down Value method except in case of wind power projects, wherein, as per Income Tax (Fourth Amendment Rules), 2012, depreciation is now restricted to 15% for wind mills installed after 31 March, 2012 vide Notification No. 15/2012 [F.No.149/21/2010-SO(TPL)] S.O.694(E), dated 30 March, 2012. Moreover, additional 20% depreciation in the initial year is proposed to be extended to new assets acquired by Power Generation Companies vide amendment in Section 32, sub-section (1) clause (ii a) of the Income Tax Act.

Depreciation for the first year has been calculated at the rate of 50% of 80% or 15% as the case may be, and 50% of the additional depreciation of 20%, assuming the project to be capitalized during the second half of the financial year as per second proviso of Regulation 22.1. The tax benefit has been worked out as per normal tax rate on the net depreciation benefit. The 'per unit levellised accelerated depreciation benefit' has been computed considering the weighted average cost of capital as discounting factor. The

detailed computation of benefit of accelerated depreciation in respect of each RE technology has been covered under the technology specific Sections.

Further, as per the second proviso under Regulation 22.1 of the RE Tariff Regulations, in case any Central Government or State Government notification specifically provides for any Generation Based Incentive (GBI) over and above tariff, the same shall not be factored in while determining tariff. Thus, while determining the tariffs for RE projects in this Order, no such incentives have been considered.

## 2.8. SHARING OF CDM BENFITS

As per Regulation 21.1 of the RE Tariff Regulations, all risks, costs and efforts associated with the availing of carbon credits shall be borne by the Generating Company. Further, the entire proceeds of carbon credit from approved CDM project, if any, shall be retained by the Generating Company.

## 2.9. APPLICABILITY OF TARIFF ORDER

This Tariff Order shall be applicable for New RE Projects to be commissioned during FY 2014-15 (i.e. from 1 April, 2014 to 31 March, 2015).

In case of Biomass power projects and Non fossil fuel based power projects commissioned on or prior to 31 March, 2014, the variable charge component of the tariff for FY 2014-15 shall be determined as outlined under the relevant provisions of this Order, whereas, fixed charge component of the tariff of such projects shall continue to be governed by the relevant Orders issued by the Commission.
The applicable Tariff Rate, Tariff Structure and other terms and conditions for RE Projects commissioned on or before 31 March, 2014will be in accordance with the relevant provisions outlined under the Generic RE Tariff Order for FY 2013-14(Case No. 6 of 2013 dated 22 March , 2013) issued by the Commission.

The following Sections of the Order outline the technology-wise norms and corresponding Generic Tariff for New RE Projects to be commissioned during FY 2014-15 based on various renewable energy technologies.

# 3. WIND ENERGYPROJECTS

## 3.1. USEFUL LIFE

Regulation 2.1 (ff) of the RE Tariff Regulations defines 'useful life' in relation to a Unit of a generating station (including evacuation system) to mean the duration from the date of commercial operation (COD) till such time as specified under the RE Tariff Regulations, for such generation facility. Accordingly, the useful life for wind energy projects as specified under Regulation 2.1 (ff) is 25 years from COD.

## 3.2. TARIFF PERIOD

Regulation 6 of the RE Tariff Regulations specifies the Tariff Period for various RE projects. Accordingly the Tariff Period for wind energy projects is 13 years, considered from the date of commercial operation of the RE project, and the tariff determined under the Regulations shall be applicable only for the duration of the Tariff Period.

## 3.3. CAPACITY UTILISATION FACTOR

Wind energy projects located at the wind sites having minimum annual Wind Power Density (WPD) of 200 Watt/$m^2$ measured at hub height of 50 metres and using new wind turbine generators are eligible for the preferential tariff as determined under the RE Tariff Regulations. However, the Commission, in its Order dated 11 January, 2012 (Case No. 153 of 2011) in the matter of Petition filed by M/s Gamesa, has considered the submissions made by MNRE that the provision for consideration of WPD of 200 W/$m^2$ at 50 m hub height does not hold relevance any longer. With change in wind turbine technology and better efficiency, even the lower wind regimes have become exploitable. Considering the same, the MNRE, vide its Circular dated 1 August 2011, issued a new guideline wherein it has been decided that hereafter, no restriction will exist for Wind Power Density criteria as far as the development of wind power project is concerned. Subsequently, CERC in RE Tariff Regulations, 2012 specified the revised eligibility criteria for the wind energy projects in line with the latest guidelines issued by MNRE.

In accordance with Regulation 26 of the MERC RE Tariff Regulations, 2010, the norms for Capacity Utilization Factor (CUF) specified for wind energy projects are as under:

| **Wind Energy Projects** | **CUF** |
|---|---|
| Annual Mean Wind Power Density ($W/m^2$) | |
| Wind zone-1 (200-250) | 20% |
| Wind zone-2 (250-300) | 23% |
| Wind zone-3 (300-400) | 27% |
| Wind zone-4 (above 400) | 30% |

In accordance with Regulation 26.2 of the RE Tariff Regulations, the annual mean wind power density is to be measured at 50 metre hub-height and as per Regulation 26.3, for the purpose of classification of wind energy project into particular wind zone class, the State-wise wind power density map prepared by Centre for Wind Energy Technology (C-WET) annexed as schedule to the RE Tariff Regulations, is to be considered, provided that the said Schedule may be amended based on inputs provided by C-WET/MNRE.

Further, as directed by the Commission in its generic RE Tariff Order for FY 2010-11 (Case No. 20 of 2010 dated 14 July, 2010), the State Nodal Agency, MEDA has provided the procedure for classification of wind power projects into wind zone class vide its letter ref: MEDA Letter no. IDD 2011/CR-28/WRA-028/2011-12/2897 dated 16 July, 2011 and published it on its website. The same has been approved by the Commission vide its letter no. MERC/MEDA-COR/2011-12/01571 dated 12 September, 2011.

Subsequently, considering the MNRE circular dated 1 August, 2011, which suggests that there should not be any restriction for minimum WPD of 200 $W/m^2$ for development of wind power projects and in pursuance of the powers of the Commission under "Deviation from Norms" as specified in Regulation 74.1 of RE Tariff Regulations, 2010, the Commission modified the wind zone-1as "<=250 $W/m^2$" vide its generic RE tariff Order dated 22 March, 2013 issued for FY 2013-14 in Case No. 6 of 2013.

However, the Commission observes that the general market trend is towards steadily growing hub heights, with most major wind turbine manufacturers now routinely offering turbines with hub heights around 80 meters. Greater hub height of wind turbines allows greater utilisation of wind energy due to the greater wind potential available at higher heights and a larger rotor diameter. CERC in its RE Tariff Regulations, 2012 stipulated the capital cost and CUF corresponding to 80m hub height. Considering the above and the MNRE, Circular dated 1 August, 2011, which suggests that there should not be restriction for minimum WPD of 200 $W/m^2$ for development of wind power projects and in

pursuance of the powers of the Commission under "Deviation from Norms" as specified in Regulation 74.1 of RE Tariff Regulations, 2010, Commission vide this Order considers to revise the zone-wise classification and CUF for wind energy projects.

The Commission observes that CERC while issuing the RE Tariff Regulations, 2012has revised zone-wise classification and respective CUF based on 80m hub height highlighting that there is no merit in contentions that WPD zones should be defined at 50m when most of the wind turbines being installed in India are having hub heights of about 80m. Further, the Commission notes that CERC while formulating its RE Tariff Regulations, 2012 has observed that some of the stakeholders including manufacturers of wind turbine are also in agreement with considering 80 m hub height against 50m hub height turbines.

The Commission is of the view that while promoting the wind power generation through preferential tariff and other Regulatory measures, the benefit of advancement in the technology and improvement in the performance thereof should also be passed onto the utilities/consumers. In this context, the Commission notes the submission made by MSEDCL that there is need to review the wind zone classification based on the actual generation by wind power project at the end of the financial year.

In view of above, the Commission recognises that there is a need to revisit the wind zone classification and the benchmark CUF norms thereof, to take into consideration advancement in the wind turbine technology and proliferation of wind turbines installation with higher hub height/rotor diameter yielding significant increase in generation.

This is clearly evident from the fact that during last one year alone, (i.e. FY 2013-14), around 1078.50 MW of wind power capacity has been installed within Maharashtra. This capacity represents > 50% of total wind power capacity (2084 MW) addition in the Country during last year (i.e. FY 2013-14) and also represents highest wind power capacity addition in any year over past decade in the state. Annual Wind power capacity addition in Maharashtra over past decade is summarised below:

| **Sr. No.** | **Type of RE Power** | **2004-05** | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **Cumulative upto 31.03.2014** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Wind Power Projects | 456* | 545 | 485 | 268 | 178 | 139 | 239 | 407.06 | 288.6 | **1078.5** | **4084.16** |

*Source: MEDA and * Note: Figure for 2004-05 represents cumulative figure.*

The Commission recognises that CUF to be specified against the revised zone-wise classification and higher hub height need to be established through study of actual CUF data for the recent years in the State.

Accordingly, the Commission directs MEDA to submit a report of project-wise CUF of wind projects in the State for the latest two years (FY 2012-13 & FY 2013-14) which would be taken into consideration to arrive at the CUF norms to be specified against the revised zone-wise classification at higher hub height. Result of such analysis shall be considered by the Commission for arriving at appropriate CUF norms in the future years. Meanwhile, for the purpose of the FY 2014-15, the Commission in pursuance of its powers under "Deviation from Norms" as specified in Regulation 74.1 of RE Tariff Regulations, 2010, adopts the wind zone-wise CUFs norms as specified by CERC for the comparable wind zones specified under the CERC RE Regulations, 2012 and the Commission's RE Tariff Regulations, 2010.

The revised the zone-wise classification and CUF for wind energy projects applicable for determination of FY 2014-15 is as given below:

| **Wind Zone** | Annual Mean Wind Power Density ($W/m^2$) as per MERC RE Tariff Regulations, 2010 | **Revised Annual Mean Wind Power Density ($W/m^2$) as per MERC Order in Case No. 6 of 2013** | CUF As per MERC RE Tariff Regulations, 2010 | **Revised CUF** |
|---|---|---|---|---|
| Zone 1 | 200-250 | **<=250** | 20% | **22%** |
| Zone 2 | 250-300 | **>250 - <=300** | 23% | **25%** |
| Zone 3 | 300-400 | **>300 - <=400** | 27% | **30%** |
| Zone 4 | >400 | **>400** | 30% | **32%** |

### 3.4. CAPITAL COST

In order to determine the yearly normative Capital Cost for such eligible Wind Energy Projects over the Control Period, the RE Tariff Regulations specify an indexed capital cost to be notified on a yearly basis pursuant to issuance of such indexed Capital Cost by CERC for wind energy projects in accordance with indexation mechanism stipulated under CERC RE Tariff Regulations, 2012. The indexed capital cost for wind power projects to be commissioned during FY 2014-15 based on the stipulated indexation formulation works out to Rs 551 Lakh/MW.

It is to be noted that the indexed capital cost derived as per norms specified in the RE Tariff Regulations correspond to wind energy generators with a hub height of 50m. With an increased hub height of 80m, the capital cost of wind energy projects is expected to increase. A comparative study of capital cost approved for wind energy generators as approved by the CERC and various State Electricity Regulatory Commissions (SERC) is shown below:

| Sr. No. | CERC/State | Regulation / Order | Capital Cost Lakh/MW |
|---|---|---|---|
| 1. | CERC | Suo-Motu Order dated 15 May, 2014 (SM/354/2013) | 603.93 |
| 2. | Gujarat | Order No 2 of 2012 dated 8 August, 2012 | 606 |
| 3. | Karnataka | OP No 19/2012 dated 10 October, 2013 | 560 |
| 4. | Tamil Nadu | Order No 6 of 2012 dated 31 July, 2012 | 575 |
| 5. | Andhra Pradesh | O P No 13 of 2012 dated 15 November, 2012 | 575 |
| 6. | Rajasthan | RE Tariff Regulations dated 24 February, 2014 | 565 |

The Commission observes that the capital cost allowed by CERC and various SERCs mentioned above for wind power projects ranges from Rs. 560 Lakh/MW to Rs. 606 Lakh/MW. Accordingly, in pursuance of the powers of the Commission under "Deviation from Norms" as specified in Regulation 74.1 of RE Tariff Regulations, 2010, Commission vide this Order proposes to specify the capital cost applicable for wind energy projects as Rs 585 Lakh/MW.

### 3.5. DEBT-EQUITY RATIO

Regulation 13.1 of the RE Tariff Regulations provides that the debt-equity ratio of 70:30 is to be considered for determination of generic tariff. In accordance with the normative debt equity ratio and the above stipulated Capital Cost, the debt and equity component for wind energy projects works out to Rs. 409.50 Lakh/MW and Rs. 175.50 Lakh/MW, respectively, for FY 2014-15.

### 3.6. RETURN ON EQUITY

Regulation 16.2 stipulates the normative Return on Equity (RoE) as under:

(a) Pre-tax 19% per annum for the first 10 years, and

(b) Pre-tax 24% per annum from the 11$^{th}$ year onwards.

Accordingly, Return on Equity for FY 2014-15works out as under:

| | |
|---|---|
| Opening Equity (Rs lakh / MW) | 175.50 |
| Return on Equity for the first 10 years @19% (Rs lakh per MW) | 33.35 |
| Return on Equity after first 10 years @24% (Rs lakh per MW) | 42.12 |

### 3.7. INTEREST ON LOAN

As explained above in para 2.4 of this Order, the interest rate of 12.83% (9.83% SBI Base Rate + 300 basis points) has been considered for Wind Energy Projects for loan amount of Rs. 409.50 Lakh per MW in FY 2014-15.

### 3.8. DEPRECIATION

Regulation 15 of the RE Tariff Regulations specifies that depreciation is to be allowed up to a maximum of 90% of the Capital Cost of the asset and the depreciation rate for the first 10 years of the Tariff Period shall be 7% per annum and the remaining depreciation shall be spread over the remaining useful life of the project from 11$^{th}$ year onwards.

Accordingly, for Wind Energy Projects, depreciation rate is 7% for the first 10 years, and works out to 1.33% thereafter, for the remaining useful period of 15 years.

### 3.9. INTEREST ON WORKING CAPITAL

Regulation 17.1 of the RE Tariff Regulations provides for computation of the working capital requirements of the wind projects as under:

*"(a) Operation & Maintenance expenses for one month;*
*(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;*
*(c) Maintenance Spares @ 15% of operation and maintenance expenses."*

Further, as explained above in para 2.5 of this Order, Interest on Working Capital shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points. para 2.4 of this Order shows that average Base Rate of State Bank of India for FY 2013-14 is 9.83%. Accordingly, the rate of Interest on

Working Capital for wind energy projects in FY 2014-15 works out to 13.33% (9.83% + 350 basis points).

## 3.10. OPERATION AND MAINTENANCE (O&M) EXPENSES

Regulation 27 of the RE Tariff Regulations specifies the normative O&M expenses for wind energy projects for FY 2010-11 as Rs 6.87 Lakh per MW, which is to be escalated at the rate of 5.72% per annum over the Tariff Period for determination of the levelised tariff. Accordingly, the Commission has considered O&M expense norm for wind energy projects as Rs 8.58 Lakh per MW for FY 2014-15.

## 3.11. LEVELLISED TARIFF FOR NEW WIND ENERGY PROJECTS IN FY 2014-15

Accordingly, the generic tariffs for Wind Energy Projects for FY 2014-15 have been determined as under. The discount factor for carrying out levelisation of Tariff for wind energy projects works out to 15.58%.

**Tariff for New RE Projects for FY 2014-15 Wind**

| Wind Energy | Tariff Period | Levelised Tariff for FY 2014-15 | Benefits of Tax and Additional Depreciation | Net Levelised Tariff upon adjusting for Tax and Additional Depreciation Benefit) |
|---|---|---|---|---|
| | | | (if availed) | (if availed) |
| | | Rs/kWh | Rs/kWh | Rs/kWh |
| **Wind Zone-1** | 13 | 5.70 | 0.36 | 5.33 |
| **Wind Zone-2** | 13 | 5.01 | 0.32 | 4.69 |
| **Wind Zone-3** | 13 | 4.18 | 0.27 | 3.91 |
| **Wind Zone-4** | 13 | 3.92 | 0.25 | 3.67 |

**Notes**:

- The above Tariff shall be applicable for Projects Commissioned in FY 2014-15.
- The above Tariff shall be valid for a Tariff Period of 13 years from the Commercial Operation Date (COD).

# 4. SMALL HYDRO POWER PROJECTS AND MINI/MICRO HYDRO PROJECTS

## 4.1. USEFUL LIFE

The useful life specified for Small Hydro Projects (SHPs) and Mini/Micro Projects under Regulation 2.1 (ff) of the RE Tariff Regulations is 35 years from COD.

## 4.2. TARIFF PERIOD

Regulation 6.1 of the RE Tariff Regulations specifies a Tariff Period of 13 years for Small Hydro Projects of capacities above 5 MW and lower than or equal to 25 MW.

Regulation 6.2 of the RE Tariff Regulations specifies a Tariff Period of 35 years for Mini/Micro Hydro projects and Small hydro projects up to and including 5 MW. The Tariff Period matches the useful life in case of these Projects, reflecting a longer preferential treatment for such Projects.

## 4.3. CAPITAL COST OF SMALL HYDRO PROJECTS

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

The RE Tariff Regulations provide for indexed capital cost to be notified on a yearly basis pursuant to issuance of such indexed Capital Cost by CERC for small hydro projects in accordance with indexation mechanism stipulated under CERC RE Tariff Regulations, 2012.

While arriving at the index for capital cost norm for FY 2014-15 for the SHP projects in Maharashtra, the Commission has considered the indices related information for the period of 12 months during calendar year 2013 starting from January 2013 to December 2013. Besides, in accordance with the RE Tariff Regulations, the calendar year 2013 has

been considered as the base year. Accordingly, the indexed capital cost for small hydro power projects to be commissioned during FY 2014-15works out to Rs589.41 Lakh/MW for small hydro projects with installed capacity (> 1 MW and up to and including 5 MW) and Rs 536.26 Lakh/MW for small hydro projects with installed capacity (> 5 MW to 25 MW) as summarised under the following table:

**Capital Cost Indexation for Small Hydro Power Projects (FY2014-15)**

| **Indexation Formulation** |
|---|
| **CC(n)=P&M(n)*[1+F1+F2+F3]** |
| **dn = (a*(SIn-1/SI0)-1)+b*(EIn-1/EI0)-1))/(a+b)** |
| **P&M(n)=P&M(0)*(1+dn)** |

| Variable | Description | Value |
|---|---|---|
| A | Weightage for Steel Index | 0.6 |
| B | Weightage for Electrical Machinery Index | 0.4 |
| $F_1$ | Factor for Land and Civil Work | 0.16 |
| $F_2$ | Factor for Erection and Commissioning | 0.10 |
| $F_3$ | Factor for IDC and Financing | 0.14 |

| Month/Year | Electrical & Machinery | | Iron & Steel | |
|---|---|---|---|---|
| | 2013 | 2009 | 2013 | 2009 |
| January | 133.90 | 124.60 | 152.40 | 118.00 |
| February | 133.80 | 124.50 | 153.70 | 118.00 |
| March | 134.10 | 123.90 | 153.80 | 117.20 |
| April | 134.50 | 123.60 | 155.10 | 124.00 |
| May | 135.50 | 123.80 | 154.50 | 124.30 |
| June | 135.60 | 123.70 | 153.30 | 122.20 |
| July | 135.60 | 123.70 | 153.40 | 123.10 |
| August | 135.70 | 123.70 | 154.00 | 125.30 |
| September | 136.30 | 120.30 | 154.30 | 131.40 |
| October | 137.10 | 120.70 | 153.00 | 130.80 |
| November | 137.50 | 120.50 | 153.90 | 131.70 |
| December | 137.80 | 120.40 | 154.10 | 131.60 |
| **Average** | **135.62** | **122.78** | **153.79** | **124.80** |

| Parameter | Description | <5 MW | 5-25 MW |
|---|---|---|---|
| $CC_{(0)}$(RsL/MW) | Capital Cost for the Base Year | 499.00 | 454.00 |
| $P\&M_{(0)}$ (RsL/MW) | Plant & Machinery Cost for the Base Year | 356.43 | 324.29 |
| dn | Capital Cost Escalation Factor | 18.12% | 18.12% |
| **$P\&M_{(n)}$ (RsL/MW)** | **Plant & Machinery Cost for the nth Year (FY 2014-15)** | **421.01** | **383.04** |
| **$CC_{(n)}$ (RsL/MW)** | **Capital Cost for the nth Year (FY2014-15)** | **589.41** | **536.26** |

## 4.4. DEBT-EQUITY RATIO

In accordance with Regulation 13.1 of the RE Tariff Regulations, the debt and equity component for FY 2014-15for SHP having capacities above 1MW and up to and including 5MW works out to Rs. 412.59 Lakh/MW and Rs. 176.82 Lakh/MW, respectively, and for projects having capacities above 5 MW and lower than or equal to 25 MW, the debt and equity component works out to Rs. 375.38Lakh per MW and Rs. 160.88 Lakh/MW, respectively.

## 4.5. RETURN ON EQUITY

In accordance with Regulation 16.2 of the RE Tariff Regulations, the RoE works out as shown in the Table below:

| Particulars | > 1 MW and up to and including 5 MW | > 5 MW to 25 MW |
|---|---|---|
| Opening Equity (in Rs lakh per MW) | 176.82 | 160.86 |
| Return on Equity for the first 10 years @19% (Rs lakh per MW) | 33.60 | 30.57 |
| Return on Equity after first 10 years @24% (Rs lakh per MW) | 42.44 | 38.61 |

## 4.6. INTEREST ON LOAN

As explained in para 2.4 of this Order, the interest rate of 12.83% (9.83% +300 basis points) has been considered for small hydro projects having capacities above 1MW and up to and including 5MW with a gross opening loan amount of Rs. 412.59Lakh per MW and

for projects having capacities above 5 MW and lower than or equal to 25 MW with a gross opening loan amount of Rs. 375.38Lakh per MW in FY 2014-15.

## 4.7. DEPRECIATION

In accordance with Regulation 15.2 of the RE Tariff Regulations, the depreciation will be charged at 7% for the first 10 years, and at 0.80% thereafter for the remaining useful period of 25 years for SHPs.

## 4.8. INTEREST ON WORKING CAPITAL

Regulation 17.1 of the RE Tariff Regulations provides for computation of the working capital requirements of the SHPs as under:

*"(a) Operation & Maintenance expenses for one month;*
*(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;*
*(c) Maintenance spares @ 15% of operation and maintenance expenses"*

Further, as explained above in para 2.5 of this Order, Interest on Working Capital shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points, i.e., 13.33% (9.83% + 350 basis points).

## 4.9. OPERATION AND MAINTENANCE (O&M) EXPENSES

Regulation 32.1 of the RE Tariff Regulations provides, the normative O&M expenses for small hydro projects for FY 2010-11, to be escalated at the rate of 5.72% per annum over the Tariff Period for determination of the levelised tariff. Accordingly, the following table presents the normative O&M expenses considered by the Commission for small hydro power for FY 2014-15:

| Project Size | O&M expenses (Rs Lakh/MW) |
|---|---|
| > 1 MW and up to and including 5 MW | 22.45 |
| 5 MW to 25 MW | 15.86 |

## 4.10. CAPACITY UTILISATION FACTOR (CUF)

In accordance with Regulation 30.1 of the RE Tariff Regulations, a CUF of 30% has been considered for determination of Tariff for SHPs.

## 4.11. AUXILIARY POWER CONSUMPTION

In accordance with Regulation 31 of the RE Tariff Regulations, the Normative Auxiliary Consumption of 1.0% has been considered for determination of tariff of SHPs.

## 4.12. INCENTIVE FOR MINI/MICRO HYDRO PROJECTS

The RE Tariff Regulations provide for a higher tariff for Mini/Micro hydro projects over the other SHP projects, as reproduced below:

> *"33.1 Tariff for Mini/Micro Hydro Projects shall be higher by Rs 0.50/kWh* ***or such other higher amount as may be stipulated by Commission from time to time*** *over and above the tariff applicable for Small Hydro Projects with installed capacity more than 1 MW but up to and including 5 MW." (****Emphasis Added****)*

In pursuance of Regulation 33.1 of the RE Tariff Regulations and in order to encourage deployment of Mini/Micro Hydro power projects, while determining the generic tariff for the second year of the Control Period in the Tariff Order dated 29 April, 2011 in Case No 39 of 2011,the Commission has further categorised small hydel projects below 1 MW into two sub categories, viz., a) above 500 kW and up to and including 1 MW at single location, and b) 500 kW & below at single location. Further, in view of the lack of economies of scale associated with such small hydel projects, the Commission has provided preferential tariff incentive for Mini/Micro hydel projects below 500 kW. Accordingly, in line with the principle outlined under earlier Order, the Commission hereby determines the tariff for such sub-categories of Mini/Micro Hydro Projects for FY 2014-15as under:

a) Tariff for Mini/Micro Hydro Projects above 500 kW and up to and including 1 MW at single location shall be higher by Rs 0.50 per kWh over and above the tariff applicable for Small Hydro Projects with installed capacity more than 1 MW but up to and including 5 MW.
b) Tariff for Mini/Micro Hydro Projects of capacity 500 kW and below at single location shall be higher by Rs 1.00 per kWh over and above the tariff applicable

for Small Hydro Projects with installed capacity more than 1 MW but upto and including 5 MW.

## 4.13. LEVELLISED TARIFF FOR NEW SMALL HYDRO PROJECTS IN FY 2014-15

In light of the above parameters and the discount factor worked out as 15.75% for levelisation of tariff for SHPs, the generic tariffs for Small Hydro Projects for FY 2014-15have been determined as under:

**Tariff for New RE Projects-Small Hydro Projects, Mini and Micro Hydro Projects**

| Small Hydro Power | Tariff Period | Levelised Tariff (FY2014-15) | 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** | | | | |
| 500kW and below | 35 | 6.06 | 0.63 | 5.44 |
| Above 500 kW and up to and including 1 MW | 35 | 5.56 | 0.63 | 4.94 |
| **Other SHP** | | | | |
| Above 1 MW and up to and including 5 MW | 35 | 5.06 | 0.63 | 4.44 |
| Above 5 MW to 25 MW | 13 | 4.33 | 0.57 | 3.76 |

**Notes:**

- The above Tariff shall be applicable for Projects commissioned in FY 2014-15.
- The above Tariff shall be valid for a tariff period of 35 years from their Commercial Operation Date (COD) for Projects less than and including 5 MW, and for 13 years for Projects with installed capacity greater than 5 MW and up to and including 25 MW

# 5. BIOMASS POWER PROJECTS

## 5.1. KEY PROVISIONS OF RE TARIFF REGULATIONS

The Chapter 5 of the RE Tariff Regulations provides technology specific norms for determination of tariff for Biomass Power Projects and the same shall be applicable to new Biomass Projects only from the fourth year of the Control Period, i.e., from FY 2013-14. The relevant Regulations specifying the applicability of such norms is reproduced as under:

*"35.1 The capital cost and performance norms as specified under Regulation 36 to Regulation 40 shall be applicable only for new biomass power projects with effect from April 1, 2013.*

*35.2 The fuel related aspects specified under Regulation 41 to Regulation 47 shall be applicable for existing and new biomass power projects with effect from April 1, 2013:*

*Provided that norms in respect of Station Heat Rate, Gross Calorific Value and Auxiliary Consumption factor for existing biomass power projects shall be as stipulated under the respective RE tariff Order as referred under Regulation 3.2."*

In addition, the Regulations also specify that the fuel price for each year of operation, of both existing and new Biomass Projects shall be adjusted based on an indexation mechanism with effect from April 1, 2013. The relevant extract of the Regulations is reproduced as under:

*"47.1 In case of (existing and new) biomass power projects, the following indexing mechanism for adjustment of fuel prices for each year of operation, from April 1, 2013, will be applicable for determination of applicable variable charge component of tariff:*

*The indexed Biomass Fuel Price (Pn) in case of Biomass Power projects for each year (n) of the Control Period shall be notified pursuant to notification of such indexed Biomass Fuel Price norm as applicable for Biomass Power projects within Maharashtra by Central Electricity Regulatory Commission in accordance with indexation mechanism stipulated under CERC RE Tariff Regulations.*

*Where,*

*P (n) = Price per ton of biomass for the nth year to be considered for tariff determination"*

Accordingly, in case of Biomass power projects commissioned on or prior to 31 March, 2014, the variable charge component of the tariff during FY 2014-15 shall be as outlined under Para 5.16 (for biomass power projects commissioned during FY 2013-14) and Para 5.17 (for biomass power projects commissioned prior to FY 2013-14) of this Order, whereas, fixed charge component of the tariff of such projects shall continue to be governed by the relevant Orders (i.e. Case 6 of 2013 for biomass power projects commissioned during FY 2013-14) and (Case 37 of 2003 and Case 83 of 2008 for biomass power projects commissioned prior to FY 2013-14) as issued by the Commission.

## 5.2. CAPITAL COST OF BIOMASS BASED POWER PROJECTS FOR FY 2014-15

The Commission under Regulation 36.1 has specified the normative capital cost for the biomass power projects based on Rankine cycle technology as Rs 402.54 Lakh/MW for FY 2010-11, which shall be linked to the indexation mechanism as specified under Regulation 36.1 of the RE Tariff Regulations. In accordance with the above referred Regulation, the normative capital cost of biomass power projects based on Rankine cycle technology shall be Rs. 480.43 Lakh/MW for FY 2014-15.

**Capital Cost Indexation for Biomass Power Projects (FY2014-15)**

**Indexation Formulation**

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

**dn = (a*(SIn-1/SI0)-1)+b*(EIn-1/EI0)-1))/(a+b)**

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

| Variable | Description | Value |
|---|---|---|
| A | Weightage for Steel Index | 0.7 |
| B | Weightage for Electrical Machinery Index | 0.3 |
| $F_1$ | Factor for Land and Civil Work | 0.10 |
| $F_2$ | Factor for Erection and Commissioning | 0.09 |
| $F_3$ | Factor for IDC and Financing | 0.14 |

| Month/Year | Electrical & Machinery | | Iron & Steel | |
|---|---|---|---|---|
| | 2013 | 2009 | 2013 | 2009 |
| January | 133.90 | 124.60 | 152.40 | 118.00 |
| February | 133.80 | 124.50 | 153.70 | 118.00 |
| March | 134.10 | 123.90 | 153.80 | 117.20 |
| April | 134.50 | 123.60 | 155.10 | 124.00 |
| May | 135.50 | 123.80 | 154.50 | 124.30 |
| June | 135.60 | 123.70 | 153.30 | 122.20 |
| July | 135.60 | 123.70 | 153.40 | 123.10 |
| August | 135.70 | 123.70 | 154.00 | 125.30 |
| September | 136.30 | 120.30 | 154.30 | 131.40 |
| October | 137.10 | 120.70 | 153.00 | 130.80 |
| November | 137.50 | 120.50 | 153.90 | 131.70 |
| December | 137.80 | 120.40 | 154.10 | 131.60 |
| **Average** | **135.42** | **122.78** | **153.79** | **124.80** |

| Parameter | Description | Cost |
|---|---|---|
| $CC_{(0)}$(RsL/MW) | Capital Cost for the Base Year | 402.54 |
| $P\&M_{(0)}$ (RsL/MW) | Plant & Machinery Cost for the Base Year | 302.66 |
| dn | Capital Cost Escalation Factor | 19.35% |
| **$P\&M_{(n)}$ (RsL/MW)** | **Plant & Machinery Cost for the nth Year (FY 2014-15)** | **361.22** |
| **$CC_{(n)}$ (RsL/MW)** | **Capital Cost for the nth Year (FY2014-15)** | **480.43** |

## 5.3. DEBT-EQUITY RATIO

In accordance with Regulation 13.1 of the RE Tariff Regulations, the debt and equity component for Biomass Power Projects to be commissioned in FY 2014-15 works out to Rs. 336.30 Lakh/MW and Rs. 144.13 Lakh/MW respectively.

## 5.4. RETURN ON EQUITY

In accordance with Regulation 16.2 of the RE Tariff Regulations, the RoE works out as shown in the Table below:

| Particulars | Biomass Project |
|---|---|
| Opening Equity (in Rs Lakh/ MW) | 144.13 |

| Particulars | Biomass Project |
|---|---|
| Return on Equity for the first 10 years @19% (Rs Lakh/MW) | 27.38 |
| Return on Equity after first 10 years @24% (Rs Lakh/MW) | 34.59 |

## 5.5. INTEREST ON LOAN

As explained in para 2.4 of this Order, the interest rate of 12.83% (9.83% +300 basis points) has been considered for Biomass projects commissioned in FY 2014-15 with a gross opening loan amount of Rs. 336.30 Lakh/ MW in FY 2014-15.

## 5.6. DEPRECIATION

In accordance with Regulation 15.2 of the RE Tariff Regulations, the depreciation will be charged at 7% for the first 10 years, and at 2% thereafter for the remaining useful period of 10 years for Biomass Projects.

## 5.7. INTEREST ON WORKING CAPITAL

Regulation 17.2 of the RE Tariff Regulations provides for computation of the working capital requirements of the Biomass Projects as under:

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

*(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;*

*(c) Maintenance spares @ 15% of operation and maintenance expenses"*

Further, as explained above in para 2.5 of this Order, Interest on Working Capital shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points, i.e., 13.33% (9.83% + 350 basis points).

## 5.8. PLANT LOAD FACTOR (PLF)

In accordance with Regulation 37.1of the RE Tariff Regulations, Threshold PLF

a) During Stabilisation: 60%
b) During the remaining period of the first year (after stabilisation): 70%

c) From 2nd Year onward: 80% has been considered for determination of Tariff for Biomass Projects.

## 5.9. AUXILIARY POWER CONSUMPTION

In accordance with Regulation 38.1 of the RE Tariff Regulations, the Normative Auxiliary Consumption of 10.0% has been considered for determination of tariff of Biomass Projects.

## 5.10. STATION HEAT RATE

In accordance with Regulation 39.1 of the RE Tariff Regulations, the Normative Station Heat Rate of 3800 kcal per kWh has been considered for determination of tariff of Biomass Projects.

## 5.11. OPERATION AND MAINTENANCE EXPENSES

Regulation 40.1 of the RE Tariff Regulations specifies the normative Operation & Maintenance (O&M) expenses for Biomass Projects for FY 2010-11 as Rs. 21.41 Lakh/ MW, which is to be escalated at the rate of 5.72% per annum over the Tariff Period as per Regulation 40.2 of the RE Tariff Regulations, for determination of the levellised tariff. Accordingly, the O&M expenses for Biomass Projects for FY 2014-15 have been considered as Rs. 26.75 Lakh/MW.

## 5.12. CALORIFIC VALUE

In accordance with Regulation 45.1 of the RE Tariff Regulations, the average Calorific Value of the Biomass Fuel (s) of 3611 kcal per kg has been considered for determination of tariff of Biomass Projects.

## 5.13. FUEL COST

Regulation 46 of the RE Tariff Regulations, specifies the Biomass fuel price during first three years of the Control Period (i.e. FY 2010-11, FY 2011-12 & FY 2012-13) as Rs. 2605 per MT, which shall be further linked to indexation mechanism as specified under Regulation 47.

In its Order dated 22 March, 2013 in Case No. 6 of 2013, the Commission determined the Biomass Price as Rs. 3160 per MT for FY 2013-14 based on biomass fuel price as

stipulated by CERC for FY 2013-14using equivalent heat value approach. Similarly, it is observed that CERC under its RE Tariff Order for FY 2014-15 has stipulated Biomass fuel price of Rs. 3202.80 per MT for Maharashtra and a Gross Calorific Value (GCV) of 3100 kcal per kg which translates to fuel price in equivalent heat value (in Rs/ Million kCal) terms as Rs. 1033 per Million kCal (i.e., Fuel Price (Rs. 3203 per MT) / Calorific Value (3100 kcal per kg) x 1000). Accordingly, applying the equivalent heat value approach on a GCV of 3611 kcal per kg as specified for Biomass under the MERC RE tariff Regulations, 2010, the fuel cost of Biomass for FY 2014-15works out to Rs. 3730.74/MT, which has been considered for determination of variable charge component of tariff of Biomass Power Projects for FY 2014-15.

'Compliance Monitoring' under the Regulation 44 of the RE Tariff Regulations stipulate that the biomass project developers are required to submit to MEDA necessary information with regards to fuel usage and such necessary financial statements or documents as stipulated from time to time. It has been observed by the Commission that the above information has not been furnished by project developers. The Commission once again direct the biomass project developers to submit necessary information as specified under Regulation 44 of the RE Tariff Regulations, within the timelines specified therein.

## 5.14. LEVELISED TARIFF FOR BIOMASS POWER PROJECTS COMMISSIONEDDURINGFY 2014-15

In light of the above parameters and the discount factor worked out as 15.43% for levellisation of tariff for Biomass Projects, the generic tariffs for Biomass Power Projects for FY 2014-15 have been determined as under:

## 5.15. TARIFF FOR BIOMASS POWER PROJECTS COMMISSIONED DURING FY 2014-15

| Levellised Fixed Charge (Rs/kWh) | Variable Charge for FY 2014-15 (Rs/kWh) | Tariff for FY 2014-15 (Rs/kWh) | Benefit of Accelerated Depreciation (if availed) (Rs/kWh) | Net Tariff (upon adjusting for accelerated depreciation benefit) (if availed) (Rs/kWh) |
|---|---|---|---|---|
| 2.27 | 4.36 | 6.63 | 0.22 | 6.41 |

The Tariff Rate comprises two parts, viz., (i) fixed charge component, and (ii) variable charge component and shall be applicable for sale of power by Rankine Cycle based biomass power project to distribution licensees within Maharashtra during FY 2014-15.

## 5.16. TARIFF FOR BIOMASS POWER PROJECTS COMMISSIONED DURING FY 2013-14

The variable charge as determined above for Biomass projects to be commissioned during FY 2014-15 shall also be applicable, for those Biomass projects which were commissioned during FY 2013-14.

Fixed charge component of the Tariff for biomass power projects commissioned during FY 2013-14 shall be the levellised fixed charge approved under the RE tariff Order issued for FY 2013-14 in Case No. 6 of 2013.

| Levellised Fixed Charge linked to year of Commissioning (Rs/kWh) | Variable Charge in FY 2014-15 for Projects with CoD in FY 2013-14 (Rs/kWh) | Tariff for FY 2014-15 (Rs/kWh) | Benefit of Accelerated Depreciation (if availed) (Rs/kWh) | Net Tariff (upon adjusting for accelerated depreciation benefit) (if availed) (Rs/kWh) |
|---|---|---|---|---|
| 2.17* | 4.36 | 6.53 | 0.21 | 6.32 |

** Considering levellised fixed charge as approved in Case 6 of 2013.)*

## 5.17. VARIABLE CHARGE FOR BIOMASS POWER PROJECTS COMMISSIONED PRIOR TO FY 2013-14:

In accordance with Regulation 35.1 and 35.2 of MERC RE Tariff Regulations, the performance norms as specified under the Regulations shall be applicable only for new biomass power projects with effect from 1 April, 2013. Thus, the norms in respect of Station Heat Rate, Gross Calorific Value and Auxiliary Consumption Factor for existing biomass power projects (i.e. commissioned prior to FY 2013-14) shall be as stipulated under respective Tariff Orders issued from time to time.

In view of the above, Station Heat Rate and Gross Calorific Value for biomass power projects commissioned prior to FY 2013-14 shall be governed as per the terms and conditions outlined under relevant biomass Tariff Orders (i.e. Case No. 37 of 2003 and Case no. 83 of 2008). Accordingly, the Commission has considered the Gross Calorific

Value as 3200 kCal/kg and Station Heat Rate as 3650 kCal/kWh for existing biomass power projects. Based on the said parameters along with the revised fuel price applicable for FY 2014-15 of Rs 3730.74 per MT, the variable cost of the biomass power projects commissioned prior to FY 2013-14 works out to Rs 4.73 per kWh.

### 5.18. TARIFF FOR BIOMASS POWER PROJECTS COMMISSIONED PRIOR TO FY 2013-14

Fixed charge component of the Tariff for biomass power projects commissioned prior to FY 2013-14 shall be governed as per the terms and conditions outlined under relevant biomass Tariff Orders (i.e. Case No. 37 of 2003 and Case No. 83 of 2008).

| Fixed Charge linked to year of operation (Rs/kWh) | Variable Charge for FY 2014-15 (Rs/kWh) | Tariff for FY 2014-15 (Rs/kWh) |
|---|---|---|
| 1.70* | 4.73 | 6.43 |

** Considering first year of operation as per Order dt 8 August, 2005 in Case No 37 of 2003 and Case no. 83 of 2008)*

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

### 6.1. KEY PROVISIONS OF RE TARIFF REGULATIONS

The Chapter 6 of the RE Tariff Regulations provides technology specific norms for determination of tariff for non-fossil fuel based co-generation projects and the same are applicable to existing and new non-fossil fuel based co-generation projects only from the fourth year of the Control Period, i.e., from FY 2013-14. The relevant Regulations specifying the applicability of such norms is reproduced as under.

*"49.1 The capital cost and performance norms as specified under Regulation 50 to Regulation 54 and Regulation 62 shall be applicable only for new non-fossil fuel based co-generation projects with effect from April 1, 2013.*

*49.2 The fuel related aspects specified under Regulation 55 to Regulation 61 shall be applicable for existing and new biomass power projects with effect from April 1, 2013:*

*Provided that norms in respect of specific fuel consumption, Gross Calorific Value and Auxiliary Consumption factor for existing non-fossil fuel based co-*

*generation projects shall be as stipulated under the respective RE tariff Order as referred under Regulation 3.2."*

In addition, the Regulations also specify that the fuel price for each year of operation, of both existing and new non-fossil fuel based co-generation projects shall be adjusted based on an indexation mechanism with effect from 1 April, 2013. The relevant extract of the Regulations is as reproduced as under:

*"56.1 In case of (existing and new) non-fossil fuel based co-generation projects, the following indexing mechanism for adjustment of fuel prices for each year of operation, from April 1, 2013, will be applicable for determination of applicable variable charge component of tariff:*

*The indexed Bagasse Fuel Price (Pn) in case of Non-fossil fuel based Co-generation projects for each year (n) of the Control Period shall be notified pursuant to notification of such indexed Bagasse Fuel Price norm as applicable for Non-fossil fuel based Co-generation projects within Maharashtra by Central Electricity Regulatory Commission in accordance with indexation mechanism stipulated under CERC RE Tariff Regulations.*

*Where,*

*P (n) = Price per ton of Bagasse for the nth year to be considered for tariff determination"*

Accordingly, in case of Non fossil fuel based power projects commissioned on or prior to 31 March, 2014, the variable charge component of the tariff for FY 2014-15 shall be determined as outlined under para 6.14 of this Order, whereas, fixed charge component of the tariff of such projects shall continue to be governed by the relevant Orders issued by the Commission.

## 6.2. CAPTITAL COST OF NON-FOSSIL FUEL BASED CO-GENERATION PROJECTS COMMISSIONED DURING FY 2014-15

The Commission under Regulation 50.1 has specified the normative capital cost for the Non-fossil fuel based Co-generation project as Rs 398.07 Lakh/MW for FY 2010-11, which shall be linked to the indexation mechanism specified under Regulation 50.1 of the RE Tariff Regulations. In accordance to the above referred Regulation, the normative capital cost of Non-fossil fuel based Co-generation projects shall be Rs 475.28 Lakh/MW for FY 2014-15.

**Capital Cost Indexation for Cogen and Bagasse based Power Projects (FY2014-15)**

**Indexation Formulation**

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

**dn = (a*(SIn-1/SI0)-1)+b*(EIn-1/EI0)-1))/(a+b)**

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

| Variable | Description | Value |
|---|---|---|
| A | Weightage for Steel Index | 0.7 |
| B | Weightage for Electrical Machinery Index | 0.3 |
| $F_1$ | Factor for Land and Civil Work | 0.10 |
| $F_2$ | Factor for Erection and Commissioning | 0.09 |
| $F_3$ | Factor for IDC and Financing | 0.14 |

| Month/Year | Electrical & Machinery | | Iron & Steel | |
|---|---|---|---|---|
| | 2013 | 2009 | 2013 | 2009 |
| January | 133.90 | 124.60 | 152.40 | 118.00 |
| February | 133.80 | 124.50 | 153.70 | 118.00 |
| March | 134.10 | 123.90 | 153.80 | 117.20 |
| April | 134.50 | 123.60 | 155.10 | 124.00 |
| May | 135.50 | 123.80 | 154.50 | 124.30 |
| June | 135.60 | 123.70 | 153.30 | 122.20 |
| July | 135.60 | 123.70 | 153.40 | 123.10 |
| August | 135.70 | 123.70 | 154.00 | 125.30 |
| September | 136.30 | 120.30 | 154.30 | 131.40 |
| October | 137.10 | 120.70 | 153.00 | 130.80 |
| November | 137.50 | 120.50 | 153.90 | 131.70 |
| December | 137.80 | 120.40 | 154.10 | 131.60 |
| **Average** | **135.62** | **122.78** | **153.79** | **124.80** |

| Parameter | Description | Cost |
|---|---|---|
| $CC_{(0)}$(RsL/MW) | Capital Cost for the Base Year | 398.07 |
| $P\&M_{(0)}$ (RsL/MW) | Plant & Machinery Cost for the Base Year | 299.30 |
| Dn | Capital Cost Escalation Factor | 19.42% |
| **$P\&M_{(n)}$ (RsL/MW)** | **Plant & Machinery Cost for the nth Year (FY 2014-15)** | **357.36** |
| **$CC_{(n)}$ (RsL/MW)** | **Capital Cost for the nth Year (FY2014-15)** | **475.28** |

## 6.3. DEBT-EQUITY RATIO

In accordance with Regulation 13.1 of the RE Tariff Regulations, the debt and equity component for FY 2014-15 for Non-fossil fuel based Co-generation project works out to Rs. 332.70 Lakh/MW and Rs. 142.59 Lakh/MW respectively.

## 6.4. RETURN ON EQUITY

In accordance with Regulation 16 of the RE Tariff Regulations, the RoE works out as shown in the Table below:

| **Particulars** | **Non-fossil fuel based Co-generation project** |
|---|---|
| Opening Equity (in Rs Lakh MW) | 142.59 |
| Return on Equity for the first 10 years @19% (Rs Lakh/MW) | 27.09 |
| Return on Equity after first 10 years @24% (Rs Lakh/MW) | 34.22 |

## 6.5. INTEREST ON LOAN

As explained in para 2.4 of this Order, the interest rate of 12.83% (9.83% +300 basis points) has been considered for Non-fossil fuel based Co-generation project with a gross opening loan amount of Rs. 332.70 Lakh/MW in FY 2014-15.

## 6.6. DEPRECIATION

In accordance with Regulation 15 of the RE Tariff Regulations, the depreciation will be charged at 7% for the first 10 years, and at 2% thereafter for the remaining useful period of 10 years for Non-fossil fuel based Co-generation projects.

## 6.7. INTEREST ON WORKING CAPITAL

Regulation 17 of the RE Tariff Regulations provides for computation of the working capital requirements of the Biomass Projects as under:

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

*(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;*

*(c) Maintenance spares @ 15% of operation and maintenance expenses"*

Further, as explained above in para 2.5 of this Order, Interest on Working Capital shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points, i.e., 13.33% (9.83% + 350 basis points).

## 6.8. OPERATION AND MAINTENANCE (O&M) EXPENSES

Regulation 62.1 of the RE Tariff Regulations specifies the normative Operation & Maintenance (O&M) expenses for Non-fossil fuel based Co-generation projects for FY 2010-11 as Rs. 14.11 Lakh/MW, which is to be escalated at the rate of 5.72% per annum over the Tariff Period as per Regulation 62.2 of the RE Tariff Regulations, for determination of the levellised tariff. Accordingly, the O & M expenses for Non-fossil fuel based Co-generation project for FY 2014-15 has been considered as Rs. 17.63 Lakh/MW.

## 6.9. PLANT LOAD FACTOR (PLF)

In accordance with Regulation 51.2 of the RE Tariff Regulations, Plant load Factor of 60% has been considered for determination of Tariff for Non-fossil fuel based Co-generation project.

## 6.10. AUXILIARY POWER CONSUMPTION

In accordance with Regulation 52.1 of the RE Tariff Regulations, the Auxiliary Consumption of 8.5% has been considered for determination of tariff of Biomass Projects.

## 6.11. STATION HEAT RATE

In accordance with Regulation 53.1 of the RE Tariff Regulations, the Normative Station Heat Rate of 3600 kcal per kWh has been considered for determination of tariff of Non-fossil fuel based Co-generation project.

## 6.12. CALORIFIC VALUE

In accordance with Regulation 54.1 of the RE Tariff Regulations, the average Calorific Value of the bagasse Fuel of 2250 kcal per kg has been considered for determination of tariff of Non-fossil fuel based Co-generation project.

## 6.13. FUEL COST

Regulation 55.1 of the RE Tariff Regulations, specifies the Bagasse fuel price during first three years of the Control Period (i.e. FY 2010-11, FY 2011-12 & FY 2012-13) as Rs. 1832 per MT, which shall be further linked to indexation mechanism as specified under Regulation 56. Further, in its Order dated 22 March, 2013 in Case No. 6 of 2013, the Commission determined the Bagasse Price as Rs. 1963 per MT for FY 2013-14 based on Bagasse price as specified by CERC for FY 2013-14. For FY 2014-15, the CERC, vide its Suo-Motu Order has stipulated the Bagasse cost for Maharashtra for FY 2014-15 as Rs. 2177 per MT. The same has been considered for determination of tariff of Non-fossil fuel based Co-generation project under this Order.

'Compliance Monitoring' under the Regulation 61 of the RE Tariff Regulations stipulate that the Non-fossil fuel based Co-generation project developers are required to submit to MEDA necessary information with regards to fuel usage and such necessary financial Statements or documents as stipulated from time to time. It has been observed by the Commission that the above information has not been furnished by project developers. The Commission once again direct the developers to submit necessary information as specified under Regulation 61 of the RE Tariff Regulations, within the timelines specified therein.

Regulation 56 of the MERC RE Tariff Regulations, 2010 states as follows:

"…

> *The indexed Bagasse Fuel Price (Pn) in case of Non-fossil fuel based Co-generation projects for each year (n) of the Control Period shall be notified pursuant to notification of such indexed* ***Bagasse Fuel Price norm as applicable for Non-fossil fuel based Co-generation projects within Maharashtra by Central Electricity Regulatory Commission in accordance with indexation mechanism stipulated under CERC RE Tariff Regulations.***

…"

Accordingly, the fuel cost for Non-fossil fuel based Co-generation projects to be commissioned in FY 2014-15 in Maharashtra shall be Rs.2177 per MT.

## 6.14. LEVELLISED TARIFF FOR NON-FOSSIL FUEL BASED CO-GENERATION PROJECTS IN FY 2014-15

In light of the above parameters and the discount factor worked out as 15.43% for levellisation of tariff for Non-fossil fuel based Co-generation projects commissioned in FY 2014-15, the generic tariffs for Non-fossil fuel based Co-generation projects for FY 2014-15 have been determined as under:

**TARIFF FOR NON-FOSSIL FUEL BASED CO-GENERATION PROJECTS**

**Tariff for Non-Fossil based Bagasse Cogen Power Projects**

| Date of Commissioning of the Cogeneration Project | Fixed Charge (Rs/kWh) | Variable Charge for FY 2014-15 (Rs/kWh) | Tariff for FY 2014-15 (Rs/kWh) | Benefit of Accelerated Depreciation (if availed) (Rs/kWh) | Net Levellised Tariff (upon adjusting for accelerated depreciation benefit) (if availed) (Rs/kWh) |
|---|---|---|---|---|---|
| **During FY 2014-15** | 2.46 | 3.81 | 6.27 | 0.28 | 5.99 |
| **During FY 2013-14** | 2.38* | 3.81 | 6.19 | 0.27 | 5.92 |
| **Prior to FY 2013-14** | 2.26** | 3.81 | 6.07 | | |

**As per Order dt 22 March, 2013 in Case No. 6 of 2013*

*** As per Order dt 11 January, 2010 in Case No. 123 of 2008*

The Tariff Rate comprises of two parts, viz., (i) fixed charge component, and (ii) variable charge component and shall be applicable for sale of power by non-fossil fuel based co-generation project to Distribution Licensees within Maharashtra during FY 2014-15.

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

The Commission has determined the Tariff for non-qualifying non-fossil fuel based co-generation (NQNFFC) projects as Rs 1.94 per kWh with escalation of 2% per annum on compounded basis under its Order (Case 26 of 2004) dated 25 May, 2005. In its Order dated 22 March, 2013 in Case No 6 of 2013, the Tariff Rate for existing non-qualifying non-fossil fuel based co-generation projects for FY 2013-14 has been determined as Rs 2.28 per kWh. Accordingly, the Tariff Rate for existing non-qualifying non-fossil fuel based co-generation projects for FY 2014-15 works out to Rs 2.33 per kWh.

# 7. SOLAR PHOTOVOLTAIC (PV) PROJECTS

## 7.1. USEFUL LIFE

Regulation 2.1 (ff) of the RE Tariff Regulations defines 'useful life' in relation to a Unit of a generating station (including evacuation system) to mean the duration from the date of commercial operation (COD) till such time as specified under the RE Tariff Regulations for such generation facility. Accordingly, as per Regulation 2.1 (ff), the useful life specified for Solar PV Projects is 25 years.

## 7.2. CONTROL PERIOD

The Control Period for Solar PV Projects shall be in accordance with the relevant stipulations made under para 1.1 of this Order.

## 7.3. TARIFF PERIOD

Regulation 6 of the RE Tariff Regulations, specifies the Tariff Period for Solar PV projects as 25 years. In terms of Regulation 6.4 and 6.5 of the RE Tariff Regulations, the Tariff Period specified shall be reckoned from the date of commercial operation of the RE projects and the tariff determined under the Regulations shall be applicable only for the duration of the Tariff Period.

## 7.4. CAPITAL COST OF SOLAR PV PROJECTS

The CERC has notified RE Tariff Regulation 2012 for the second Control Period (i.e., FY 2012-13 to FY 2016-17). The CERC, vide its Suo-Motu Order dated 15 May, 2014 has specified the normative capital cost for the Solar PV power projects to be commissioned in FY 2014-15 as Rs.691 Lakh/MW

The above capital cost norm shall also apply for Solar PV projects in Maharashtra for FY 2014-15, provided PPAs are signed after 31 March, 2014 and solar PV project is commissioned during FY 2014-15.

## 7.5. DEBT-EQUITY RATIO

In accordance with Regulation 13.1 of the RE Tariff Regulations, the normative debt and equity component for Solar PV Projects shall be Rs. 483.70 Lakh/MW and Rs. 207.30 Lakh/MW, respectively.

## 7.6. RETURN ON EQUITY

In accordance with Regulation 16.1 of the RE Tariff Regulations, the RoE for Solar PV Projects works out as shown in the Table below:

| Particulars | Solar PV |
|---|---|
| Opening Equity (in Rs Lakh per MW) | 207.30 |
| Return on Equity for the first 10 years @ 19% (in Rs Lakh per MW) | 39.39 |
| Return on Equity after first 10 years @24% (in Rs Lakh per MW) | 49.75 |

## 7.7. INTEREST ON LOAN

As explained in para 2.4 of this Order, the interest rate of 12.83% (9.83% + 300 basis points) have been considered for Solar PV Projects for loan amount of Rs. 483.70 Lakh/MW in FY 2014-15.

## 7.8. DEPRECIATION

In accordance with Regulation 15 of the RE Tariff Regulations, the depreciation will be charged at 7% for the first 10 years and at 1.33% thereafter for the remaining useful period of 15 years for Solar PV projects.

## 7.9. INTEREST ON WORKING CAPITAL

Regulation 17.1 of the RE Tariff Regulations provides for computation of the working capital requirements for Solar PV Projects as under:

*"(a) Operation & Maintenance expenses for one month;*
*(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;*
*(c) Maintenance Spares @ 15% of operation and maintenance expenses"*

Further, as explained above in para 2.5 of this Order, Interest on Working Capital shall be computed at an interest rate equivalent to average Base Rate of State Bank of India during the previous year plus 350 basis points, i.e., 13.33% (9.83% + 350 basis points).

## 7.10. OPERATION AND MAINTENANCE (O&M) EXPENSES

Regulation 67.1 of the RE Tariff Regulations specifies the normative O&M expenses for Solar PV projects for FY 2010-11 as Rs. 9.51 Lakh/MW, to be escalated at the rate of 5.72% per annum over the Tariff Period, for determination of the levellised tariff. Accordingly, the O&M expense norm for Solar PV projects for FY 2014-15 has been considered as Rs. 11.87 Lakh/MW.

## 7.11. CAPACITY UTILISATION FACTOR

In accordance with Regulation 66.1 of the RE Tariff Regulations, CUF of 19% has been considered for determination of Tariff for Solar PV power projects.

## 7.12. LEVELISED TARIFF FOR SOLAR PV POWER PROJECTS IN FY 2014-15

In light of the parameters discussed in the preceding paragraphs and with respect to the discount factor of 15.54% derived based on the methodology stipulated in para 1.6 of this Order, the generic tariffs for Solar PV Projects for FY 2014-15have been determined as under:

| **Tariff for New RE Projects-Solar Power Projects**<br>[Refer Regulation 3.1 of RE Tariff Regulations] | | | | |
|---|---|---|---|---|
| Particulars | Tariff Period | Levellised Tariff (FY 2014-15) | Benefit of Accelerated Depreciation (if availed) | Net Levellised Tariff (upon adjusting for Accelerated Depreciation benefit) (if availed) |
| | | (Rs/kWh) | (Rs/kWh) | (Rs/kWh) |
| Solar PV | 25 | 7.95 | 1.16 | 6.79 |

The above Tariff shall be applicable for Solar PV Projects wherein PPA are signed after 31 March, 2014 and projects are commissioned during FY 2014-15, and shall be valid for a tariff period of 25 years from the Commercial Operation Date (COD).

The Tariff for Solar PV Projects to be commissioned during FY 2014-15, wherein PPA are signed on or before 31 March, 2014, shall be as stipulated in the Commission's Generic RE Tariff Order (Case No. 6 of 2013) for RE technologies for the fourth year of the Control Period, issued on 22 March, 2013.

## 7.13. LEVELLISED TARIFF FOR SOLAR ROOFTOP PV AND OTHER SMALL SOLAR PROJECTS IN FY 2014-15

Regulation 68.1 of the RE Tariff Regulations specifies that the tariff for Solar Rooftop PV projects and other small solar projects will be Rs 0.50 per kWh higher than the Tariff specified for Solar PV projects in the Regulations. Accordingly, the Tariff for such Projects in FY 2014-15shall be as follows:

### Tariff for New Solar Rooftop PV and other small Solar Power Projects

| Particular | Tariff Period | Levellised Total Tariff (FY 2014-15) | Benefit of Accelerated Depreciation (if availed) | Net Levellised Tariff (upon adjusting for Accelerated Depreciation benefit) (if availed) |
|---|---|---|---|---|
| | | (Rs/kWh) | (Rs/kWh) | (Rs/kWh) |
| Solar Power Projects | | | | |
| Solar rooftop PV and other small solar power Projects | 25 | 8.45 | 1.16 | 7.29 |

The above Tariff shall be applicable for Solar Rooftop PV and other small solar Projects wherein PPA are signed after 31 March, 2014 and projects are commissioned during FY 2014-15, and the same shall be valid for a tariff period of 25 years from the Commercial Operation Date (COD).

The Tariff for Solar Rooftop PV and other small solar Projects to be commissioned during FY 2014-15 wherein PPA are signed on or before 31 March, 2014, shall be as specified in

the Commission's Generic RE Tariff Order (Case No. 6 of 2013) for RE technologies for the fourth year of the Control Period, issued on 22 March, 2013.

**8. The detailed computations of the generic tariff for various RE technologies have been annexed with this Order, as per the details given hereunder:**

| S No | Renewable Energy Projects | Annexure |
|---|---|---|
| **1** | **Wind Power Projects** | |
| | Wind Zone-I | Annexure 1A |
| | Wind Zone-II | Annexure 1B |
| | Wind Zone III | Annexure 1C |
| | Wind Zone IV | Annexure 1D |
| **2** | **Small Hydro Power Projects** | |
| | SHP Projects Less than 5 MW | Annexure 2A |
| | SHP Projects between 5 MW and 25 MW | Annexure 2B |
| **3** | **Biomass Power Project** | Annexure 3 |
| **4** | **Non-Fossil Fuel Based Co-Generation Project** | Annexure 4 |
| **5** | **Solar Projects** | |
| | Solar PV Projects | Annexure 5 |

**Sd/-**
(Vijay L. Sonavane)
Member

**Sd/-**
( Chandra Iyengar)
Chairperson

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## Appendix-1

## List of stakeholders submitted the comments/suggestion

| Sr. No. | Name of Person / Organization |
|---|---|
| 1 | Maharashtra Energy Development Agency,( MEDA) |
| 2 | Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) |
| 3 | The Tata Power Company Ltd, |
| 4 | GE India Industrial Pvt. Ltd. |
| 5 | Welspun Renewable Energy private Ltd , New Delhi |
| 6 | Laxmi Organic Industries Ltd. |
| 7 | Green Energy Association |
| 8 | Enrich Solar Energy Ltd. |
| 9 | Maha Co-gen Green Power Producers Association. |
| 10 | Orient Green Power Company Limited |
| 11 | Welspun Renewable Energy private Ltd , Mumbai |
| 12 | Sri. Maruti Solar Pvt. Ltd. , Chennai |
| 13 | Indian Biomass Power Association |
| 14 | Ulhas Pandharinath Chaudhari |
| 15 | Mytrah Energy Ltd. |
| 16 | Vana Vidyut Pvt. Ltd. |
| 17 | Blue Gums Agro & Biotech Pvt. Ltd |
| 18 | Sun Sphoorti Mart Pvt. Ltd |
| 19 | Dalmia Bharat Sugar and Industries Ltd. |
| 20 | Essel Infra Projects Ltd. |
| 21 | Tata Power Renewable Energy Ltd. |

| | |
|---|---|
| 22 | Co-generation Association of India |
| 23 | Mahati Hydro Power Vidarbha Pvt. Ltd. |
| 24 | Maharashtra Vidyut Nigam Pvt. Ltd. |
| 25 | Sri Maruti Wind Park India Pvt. Ltd. , Pune |
| 26 | Utkarsh Bahu Udeshiya Sanstha |
| 27 | Indian Wind Energy Association |
| 28 | Inox Renewables |
| 29 | Maharashtra Irrigation Federation Kolhapur |
| 30 | Janmorcha |
| 31 | Bothe Wind Farm Development Private Ltd. |
| 32 | Maharashtra Biomass Energy Developers Association |
| 33 | IL & FS Energy Development Company Ltd. |
| 34 | Greta Energy Ltd. |
| 35 | Wind Independent Power Producers Association |
| 36 | Association of Power Producers |
| 37 | Shree Chhatrapati Shahu Sahakari Sakhar Karkhana Ltd. |
| 38 | CLP India Wind Farms |
| 39 | A A Energy Ltd. |
| 40 | GMT Mining and Power Ltd. |
| 41 | H-Energy Pvt. Ltd. |
| 42 | Sahyadri Sahakari Sakhar Karkhana Ltd. |
| 43 | Indian Wind Turbine Manufactures Association |

## Appendix- 2

## List of persons attended the public hearing in the matter on 13.06.2014

| Sr. No | Name of Person |
|---|---|
| 1 | Thane Belapur Industries Association |
| 2 | Shri S. L. Patil, MEDA |
| 3 | D. H. Kulkarni, MSEDCL |
| 4 | Rajiv Sawant, Tata Power Company Ltd. |
| 5 | Govind Bhagavarikar, Welspun Renewable Energy Private Ltd. |
| 6 | Maha Co-gen Green Power Producers Association. |
| 7 | Welspun Renewable Energy private Ltd , Mumbai |
| 8 | Dalmia Bharat Sugar and Industries Ltd |
| 9 | Shri S. C. Natu, Co-generation Association of India |
| 10 | Shri Vishal Gupta, Indian Wind Energy Association |
| 11 | Shri Pradeep Dheer, Inox Renewables |
| 12 | Janmorcha |
| 13 | Shri Rakesh Rathod, Bothe Wind Farm Development Private Ltd. |
| 14 | Maharashtra Biomass Energy Developers Association |
| 15 | Shri Sanjay Joshi, IL & FS Energy Development Company Ltd. |
| 16 | Dilip Doshi, Greta Energy Ltd. |
| 17 | Ms. Priya, Wind Independent Power Producers Association |
| 18 | Shri Sachin Agrawal, Association of Power Producers |
| 19 | Shri V. B. Nagave, Shree Chhatrapati Shahu Sahakari Sakhar Karkhana Ltd. |
| 20 | Shri Swapnil Agrawal, A A Energy Ltd. |
| 21 | Shri Uday Kamat, GMT Mining and Power Ltd. |
| 22 | Shri Neeraj Lodha, H-Energy Pvt. Ltd. |
| 23 | Shri R. G. Tambe, Sahyadri Sahakari Sakhar Karkhana Ltd. |
| 24 | Shri Vishal Gupta, Indian Wind Turbine Manufactures Association |
| 25 | Shri Manoj Pise, MEDA |
| 26 | Shri S. R. Chandan |
| 27 | Shri F Jagdish, Maharashtra Biomass Energy Development Assosiation |
| 28 | Shri S. G. Bapat, Urja Prabodhan Kendra |
| 29 | Shri S. K. Taur, Majalgaon SSKL |
| 30 | Shri B. S. Borkar, Urja Prabodhan Kendra |
| 31 | Shri A. B. Chougale, Jawahar SSK. |
| 32 | Shri S. A. Karve, MSPGCL |
| 33 | Shri Brajesh Kumar, MSPGCL |
| 34 | Shri T. N. Singh, Dalmia Sugar |
| 35 | Shri Pradeep Mittal, Dalmia Sugar |
| 36 | Shri Ishwar Manauare, MSPGCL |

| Sr. No | Name of Person |
|---|---|
| 37 | Shri Vikrant R. Musale, Reconnect Energy Pvt. Ltd |
| 38 | Shri Abhijit Dharmdhare, IPPAI |
| 39 | Shri Kishore Kumbhare, Vayunandan Power Ltd. |
| 40 | Shri Tushar K Roy, MSPGCL |
| 41 | Ms. Renu Chandra, MSPGCL |
| 42 | Ms. Meghana Rao Modali, M P EnSystem |
| 43 | Shri Sudhanshu Mishra, M P EnSystem |
| 44 | Shri R. T. Age, MSPGCL |
| 45 | Shri Saurabh Mehta, APP |
| 46 | Shri Vikalp Vati, InWEA |
| 47 | Shri Kiran Patil, Mytra Energy Industries Ltd |
| 48 | Shri Amol Zirhile, Anant Electricals |
| 49 | Shr Rahul Joshi, Anant Electricals |
| 50 | Shri Nagesh Rokade, Garuda Vaayu Shakti |
| 51 | Shri Anith Sapaliga, R E Connect Energy |
| 52 | Shri P. H. Jambhulkar, MSEDCL |
| 53 | Shri Y. K. Parsad, MSEDCL |
| 54 | Shri Ajit Pandit, IDAM Infrastructure |
| 55 | Shri Krishnajit M. U., IDAM Infrastructure |
| 56 | Shri A Gurunathan, Gamesa |
| 57 | Shri D. V. Giri, IWTMA |
| 58 | Shri Rahul Mirge, Mytrah Energy |
| 59 | Shri M. M. Davare, BEST |
| 60 | Shri Vinayak Rokade, BEST |
| 61 | Shri K. P. Khadke, BEST |
| 62 | Shri Shashwat Kumar, TISS |
| 63 | Shri Gaurav Kumar Jha, TISS |
| 64 | Shri Prapti Patel, WEL |
| 65 | Shri Tund Verghese, TISS |
| 66 | Shri Mahesh Viprada, Suzlon |
| 67 | Shri Ghansham J Thakkar, R-Infra |
| 68 | Shri Prabir Chakrawarti, Global Metal & Energy Pvt Limited |
| 69 | Shri Vishwajeet Yadav, Global Metal & Energy Pvt. Limited |
| 70 | Shri Karthik Pillai, TPC |
| 71 | Shri Mahadeo Rokade, Garuda Renewable |
| 72 | Shri Gaurav Srivastava, TPC |
| 73 | Shri Sandeep Pipaliya, TPC |
| 74 | Shri S. V. Bedekar, MSPGCL |
| 75 | Shri R. S. Sangle, MSEDCL |
| 76 | Shri Amol Dahat, IEX |
| 77 | Shri Rohit Agarwal, TISS |
| 78 | Shri Ahmed Adeel Khan, TISS |

| Sr. No | Name of Person |
|---|---|
| 79 | Shri Rahul Verma, TISS |
| 80 | Shri Monami Chakraborty, TISS |
| 81 | Shri Rachana Lankapatti, TISS |
| 82 | Shri Gutika Gupta, TISS |
| 83 | Shri Paramita Das, TISS |
| 84 | Ms. Kanika Balani, TISS |
| 85 | Ms. Mahak Rai, TISS |
| 86 | Ms. Azhagu Meena ST, TISS |
| 87 | Ms. Manabika Mandal, TISS |
| 88 | Riddhi Banerjee, TISS |
| 89 | Ms. Akanksha Gokhha, TISS |
| 90 | Ms. Kiningkambe Raime, TISS |
| 91 | Shri Shivansh Rachit, TISS |
| 92 | Shri Sayantan Bairagi, TISS |
| 93 | Shri Siddharth Singh, TISS |
| 94 | Shri Abhishek Mali, TISS |
| 95 | Shri Vishal Trehan, TISS |
| 96 | Shri Shyamal K Roy, TISS |
| 97 | Crystal Sameelar, TISS |
| 98 | Shri Sachin Warghade, TISS |
| 99 | Shri Deva Prasad, TISS |
| 100 | Shri Rakesh Akela, TISS |
| 101 | Emlon Tirkey, TISS |
| 102 | Shoban Badgujar, TISS |

# Annexure – 1A
# (Wind Zone-1)

**Form 1.1 Assumptions Parameters** — **Wind Zone**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | 1 |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Capacity Utilization Factor | % | 22.0% |
| | | | Useful Life | Years | 25 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 585.00 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 13 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 409.50 |
| | | | Total Equity Amout | Rs Lacs | 175.50 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 409.50 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 175.50 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.00% |
| | | | Discount Rate | | 15.58% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 1.33% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15.00% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 8.58 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Wind Power Projects under Zone - 1 : 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 | | 8.58 | 9.07 | 9.59 | 10.14 | 10.72 | 11.33 | 11.98 | 12.66 | 13.39 | 14.15 | 14.96 | 15.82 | 16.73 | 17.68 | 18.69 | 19.76 | 20.89 | 22.09 | 23.35 | 24.69 | 26.10 | 27.59 | 29.17 | 30.84 | 32.60 |
| Depreciation | Rs Lakh | | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 |
| Interest on term loan | Rs Lakh | | 49.92 | 44.67 | 39.41 | 34.16 | 28.90 | 23.65 | 18.39 | 13.14 | 7.88 | 2.63 | 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 | | 2.71 | 2.72 | 2.74 | 2.75 | 2.77 | 2.79 | 2.81 | 2.83 | 2.86 | 2.88 | 2.90 | 2.93 | 2.96 | 2.99 | 3.02 | 3.05 | 3.09 | 3.13 | 3.17 | 3.21 | 3.25 | 3.30 | 3.35 | 3.40 | 3.45 |
| Return on Equity | Rs Lakh | | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 |
| **Total Fixed Cost** | **Rs Lakh** | | **135.50** | **130.75** | **126.03** | **121.34** | **116.69** | **112.06** | **107.48** | **102.93** | **98.42** | **93.96** | **67.79** | **68.67** | **69.60** | **70.59** | **71.63** | **72.74** | **73.90** | **75.13** | **76.44** | **77.81** | **79.27** | **80.81** | **82.44** | **84.16** | **85.98** |
| **Per unit Fixed Cost** | **Rs/kWh** | **5.70** | 7.03 | 6.78 | 6.54 | 6.30 | 6.05 | 5.81 | 5.58 | 5.34 | 5.11 | 4.88 | 3.52 | 3.56 | 3.61 | 3.66 | 3.72 | 3.77 | 3.83 | 3.90 | 3.97 | 4.04 | 4.11 | 4.19 | 4.28 | 4.37 | 4.46 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **0.65** | 0.45 | 0.47 | 0.50 | 0.53 | 0.56 | 0.59 | 0.62 | 0.66 | 0.69 | 0.73 | 0.78 | 0.82 | 0.87 | 0.92 | 0.97 | 1.03 | 1.08 | 1.15 | 1.21 | 1.28 | 1.35 | 1.43 | 1.51 | 1.60 | 1.69 |
| Depreciation | Rs/kWh | **1.76** | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 2.12 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| Int. on term loan | Rs/kWh | **1.32** | 2.59 | 2.32 | 2.05 | 1.77 | 1.50 | 1.23 | 0.95 | 0.68 | 0.41 | 0.14 | 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 | **0.15** | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 |
| RoE | Rs/kWh | **1.83** | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 1.73 | 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 |
| **Total COG** | **Rs/kWh** | **5.70** | **7.03** | **6.78** | **6.54** | **6.30** | **6.05** | **5.81** | **5.58** | **5.34** | **5.11** | **4.88** | **3.52** | **3.56** | **3.61** | **3.66** | **3.72** | **3.77** | **3.83** | **3.90** | **3.97** | **4.04** | **4.11** | **4.19** | **4.28** | **4.37** | **4.46** |

**COG excl. RoE**

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Discount Factor | | | 1 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Fixed Cost | 5.70 | | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 |
| **Levellised Tariff** | **5.70** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | |

**Determination of Additional Depreciation for Wind Power Projects**

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 15% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 585.00 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 15.44 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 16.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100.0% | 82.5% | 70.1% | 59.6% | 50.7% | 43.1% | 36.6% | 31.1% | 26.4% | 22.5% | 19.1% | 16.2% | 13.8% | 11.7% | 10.0% | 8.5% | 7.2% | 6.1% | 5.2% | 4.4% | 3.8% | 3.2% | 2.7% | 2.3% | 2.0% |
| Allowed during the year | % | 17.50% | 12.38% | 10.52% | 8.94% | 7.60% | 6.46% | 5.49% | 4.67% | 3.97% | 3.37% | 2.87% | 2.44% | 2.07% | 1.76% | 1.50% | 1.27% | 1.08% | 0.92% | 0.78% | 0.66% | 0.56% | 0.48% | 0.41% | 0.35% | 0.29% |
| Closing | % | 82.5% | 70.1% | 59.6% | 50.67% | 43.07% | 36.61% | 31.11% | 26.45% | 22.48% | 19.11% | 16.24% | 13.81% | 11.73% | 9.97% | 8.48% | 7.21% | 6.13% | 5.21% | 4.43% | 3.76% | 3.20% | 2.72% | 2.31% | 1.96% | 1.67% |
| Accelrated Depm. | Rs Lakh | 102.38 | 72.39 | 61.53 | 52.30 | 44.46 | 37.79 | 32.12 | 27.30 | 23.21 | 19.73 | 16.77 | 14.25 | 12.11 | 10.30 | 8.75 | 7.44 | 6.32 | 5.38 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Net Depreciation Benefit | Rs Lakh | 86.93 | 41.51 | 30.65 | 21.42 | 13.57 | 6.90 | 1.23 | -3.58 | -7.68 | -11.16 | -14.12 | -16.64 | -18.77 | -20.59 | -22.14 | -23.45 | -24.56 | -11.47 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Tax Benefit | Rs Lakh | 29.55 | 14.11 | 10.42 | 7.28 | 4.61 | 2.35 | 0.42 | -1.22 | -2.61 | -3.79 | -4.80 | -5.65 | -6.38 | -7.00 | -7.52 | -7.97 | -8.35 | -3.90 | 1.55 | 1.32 | 1.12 | 0.95 | 0.81 | 0.69 | 0.59 |
| Energy generation | MU | 0.96 | 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 | 3.07 | 0.73 | 0.54 | 0.38 | 0.24 | 0.12 | 0.02 | -0.06 | -0.14 | -0.20 | -0.25 | -0.29 | -0.33 | -0.36 | -0.39 | -0.41 | -0.43 | -0.20 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Discounting Factor | | 1.00 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.70 | 0.60 | 0.52 | 0.45 | 0.39 | 0.34 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.36** | **Rs/Unit** |

# Annexure – 1B
# (Wind Zone-2)

**Form 1.1 Assumptions Parameters** — **Wind Zone**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | 2 |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Capacity Utilization Factor | % | 25.0% |
| | | | Useful Life | Years | 25 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 585.00 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 13 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 409.50 |
| | | | Total Equity Amout | Rs Lacs | 175.50 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 409.50 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 175.50 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.00% |
| | | | Discount Rate | | 15.58% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 1.33% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15.00% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 8.58 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Wind Power Projects under Zone - 2 : 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 | | 8.58 | 9.07 | 9.59 | 10.14 | 10.72 | 11.33 | 11.98 | 12.66 | 13.39 | 14.15 | 14.96 | 15.82 | 16.73 | 17.68 | 18.69 | 19.76 | 20.89 | 22.09 | 23.35 | 24.69 | 26.10 | 27.59 | 29.17 | 30.84 | 32.60 |
| Depreciation | Rs Lakh | | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 |
| Interest on term loan | Rs Lakh | | 49.92 | 44.67 | 39.41 | 34.16 | 28.90 | 23.65 | 18.39 | 13.14 | 7.88 | 2.63 | 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 | | 2.71 | 2.72 | 2.74 | 2.75 | 2.77 | 2.79 | 2.81 | 2.83 | 2.86 | 2.88 | 2.90 | 2.93 | 2.96 | 2.99 | 3.02 | 3.05 | 3.09 | 3.13 | 3.17 | 3.21 | 3.25 | 3.30 | 3.35 | 3.40 | 3.45 |
| Return on Equity | Rs Lakh | | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 |
| **Total Fixed Cost** | **Rs Lakh** | | **135.50** | **130.75** | **126.03** | **121.34** | **116.69** | **112.06** | **107.48** | **102.93** | **98.42** | **93.96** | **67.79** | **68.67** | **69.60** | **70.59** | **71.63** | **72.74** | **73.90** | **75.13** | **76.44** | **77.81** | **79.27** | **80.81** | **82.44** | **84.16** | **85.98** |
| **Per unit Fixed Cost** | **Rs/kWh** | **5.01** | 6.19 | 5.97 | 5.75 | 5.54 | 5.33 | 5.12 | 4.91 | 4.70 | 4.49 | 4.29 | 3.10 | 3.14 | 3.18 | 3.22 | 3.27 | 3.32 | 3.37 | 3.43 | 3.49 | 3.55 | 3.62 | 3.69 | 3.76 | 3.84 | 3.93 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **0.57** | 0.39 | 0.41 | 0.44 | 0.46 | 0.49 | 0.52 | 0.55 | 0.58 | 0.61 | 0.65 | 0.68 | 0.72 | 0.76 | 0.81 | 0.85 | 0.90 | 0.95 | 1.01 | 1.07 | 1.13 | 1.19 | 1.26 | 1.33 | 1.41 | 1.49 |
| Depreciation | Rs/kWh | **1.55** | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 1.87 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| Int. on term loan | Rs/kWh | **1.16** | 2.28 | 2.04 | 1.80 | 1.56 | 1.32 | 1.08 | 0.84 | 0.60 | 0.36 | 0.12 | 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 | **0.13** | 0.12 | 0.12 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 | 0.16 |
| RoE | Rs/kWh | **1.61** | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 | 1.92 |
| **Total COG** | **Rs/kWh** | **5.01** | **6.19** | **5.97** | **5.75** | **5.54** | **5.33** | **5.12** | **4.91** | **4.70** | **4.49** | **4.29** | **3.10** | **3.14** | **3.18** | **3.22** | **3.27** | **3.32** | **3.37** | **3.43** | **3.49** | **3.55** | **3.62** | **3.69** | **3.76** | **3.84** | **3.93** |

**COG excl. RoE**

| Discount Factor | | | 1 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixed Cost | 5.01 | | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 |
| **Levellised Tariff** | **5.01** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | |

**Determination of Additional Depreciation for Wind Power Projects**

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 15% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 585.00 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 15.44 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 16.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100.0% | 82.5% | 70.1% | 59.6% | 50.7% | 43.1% | 36.6% | 31.1% | 26.4% | 22.5% | 19.1% | 16.2% | 13.8% | 11.7% | 10.0% | 8.5% | 7.2% | 6.1% | 5.2% | 4.4% | 3.8% | 3.2% | 2.7% | 2.3% | 2.0% |
| Allowed during the year | % | 17.50% | 12.38% | 10.52% | 8.94% | 7.60% | 6.46% | 5.49% | 4.67% | 3.97% | 3.37% | 2.87% | 2.44% | 2.07% | 1.76% | 1.50% | 1.27% | 1.08% | 0.92% | 0.78% | 0.66% | 0.56% | 0.48% | 0.41% | 0.35% | 0.29% |
| Closing | % | 82.5% | 70.1% | 59.6% | 50.67% | 43.07% | 36.61% | 31.11% | 26.45% | 22.48% | 19.11% | 16.24% | 13.81% | 11.73% | 9.97% | 8.48% | 7.21% | 6.13% | 5.21% | 4.43% | 3.76% | 3.20% | 2.72% | 2.31% | 1.96% | 1.67% |
| Accelrated Deprn. | Rs Lakh | 102.38 | 72.39 | 61.53 | 52.30 | 44.46 | 37.79 | 32.12 | 27.30 | 23.21 | 19.73 | 16.77 | 14.25 | 12.11 | 10.30 | 8.75 | 7.44 | 6.32 | 5.38 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Net Depreciation Benefit | Rs Lakh | 86.93 | 41.51 | 30.65 | 21.42 | 13.57 | 6.90 | 1.23 | -3.58 | -7.68 | -11.16 | -14.12 | -16.64 | -18.77 | -20.59 | -22.14 | -23.45 | -24.56 | -11.47 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Tax Benefit | Rs Lakh | 29.55 | 14.11 | 10.42 | 7.28 | 4.61 | 2.35 | 0.42 | -1.22 | -2.61 | -3.79 | -4.80 | -5.65 | -6.38 | -7.00 | -7.52 | -7.97 | -8.35 | -3.90 | 1.55 | 1.32 | 1.12 | 0.95 | 0.81 | 0.69 | 0.59 |
| Energy generation | MU | 1.10 | 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 | 2.70 | 0.64 | 0.48 | 0.33 | 0.21 | 0.11 | 0.02 | -0.06 | -0.12 | -0.17 | -0.22 | -0.26 | -0.29 | -0.32 | -0.34 | -0.36 | -0.38 | -0.18 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 |
| Discounting Factor | | 1.00 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.70 | 0.60 | 0.52 | 0.45 | 0.39 | 0.34 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.32** | **Rs/Unit** |

# Annexure – 1C
# (Wind Zone-3)

**Form 1.1 Assumptions Parameters** — **Wind Zone**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | 3 |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Capacity Utilization Factor | % | 30.0% |
| | | | Useful Life | Years | 25 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 585.00 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 13 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 409.50 |
| | | | Total Equity Amout | Rs Lacs | 175.50 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 409.50 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 175.50 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.00% |
| | | | Discount Rate | | 15.58% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 1.33% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15.00% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 8.58 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Wind Power Projects under Zone - 3 : 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 | | 8.58 | 9.07 | 9.59 | 10.14 | 10.72 | 11.33 | 11.98 | 12.66 | 13.39 | 14.15 | 14.96 | 15.82 | 16.73 | 17.68 | 18.69 | 19.76 | 20.89 | 22.09 | 23.35 | 24.69 | 26.10 | 27.59 | 29.17 | 30.84 | 32.60 |
| Depreciation | Rs Lakh | | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 |
| Interest on term loan | Rs Lakh | | 49.92 | 44.67 | 39.41 | 34.16 | 28.90 | 23.65 | 18.39 | 13.14 | 7.88 | 2.63 | 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 | | 2.71 | 2.72 | 2.74 | 2.75 | 2.77 | 2.79 | 2.81 | 2.83 | 2.86 | 2.88 | 2.90 | 2.93 | 2.96 | 2.99 | 3.02 | 3.05 | 3.09 | 3.13 | 3.17 | 3.21 | 3.25 | 3.30 | 3.35 | 3.40 | 3.45 |
| Return on Equity | Rs Lakh | | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 |
| **Total Fixed Cost** | **Rs Lakh** | | **135.50** | **130.75** | **126.03** | **121.34** | **116.69** | **112.06** | **107.48** | **102.93** | **98.42** | **93.96** | **67.79** | **68.67** | **69.60** | **70.59** | **71.63** | **72.74** | **73.90** | **75.13** | **76.44** | **77.81** | **79.27** | **80.81** | **82.44** | **84.16** | **85.98** |
| **Per unit Fixed Cost** | **Rs/kWh** | **4.18** | 5.16 | 4.98 | 4.80 | 4.62 | 4.44 | 4.26 | 4.09 | 3.92 | 3.75 | 3.58 | 2.58 | 2.61 | 2.65 | 2.69 | 2.73 | 2.77 | 2.81 | 2.86 | 2.91 | 2.96 | 3.02 | 3.07 | 3.14 | 3.20 | 3.27 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **0.47** | 0.33 | 0.35 | 0.36 | 0.39 | 0.41 | 0.43 | 0.46 | 0.48 | 0.51 | 0.54 | 0.57 | 0.60 | 0.64 | 0.67 | 0.71 | 0.75 | 0.80 | 0.84 | 0.89 | 0.94 | 0.99 | 1.05 | 1.11 | 1.17 | 1.24 |
| Depreciation | Rs/kWh | **1.29** | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 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 |
| Int. on term loan | Rs/kWh | **0.97** | 1.90 | 1.70 | 1.50 | 1.30 | 1.10 | 0.90 | 0.70 | 0.50 | 0.30 | 0.10 | 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 | **0.11** | 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 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 |
| RoE | Rs/kWh | **1.34** | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 |
| **Total COG** | **Rs/kWh** | **4.18** | **5.16** | **4.98** | **4.80** | **4.62** | **4.44** | **4.26** | **4.09** | **3.92** | **3.75** | **3.58** | **2.58** | **2.61** | **2.65** | **2.69** | **2.73** | **2.77** | **2.81** | **2.86** | **2.91** | **2.96** | **3.02** | **3.07** | **3.14** | **3.20** | **3.27** |

**COG excl. RoE**

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Discount Factor | | | 1 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Fixed Cost | 4.18 | | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 |
| **Levellised Tariff** | **4.18** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | |

**Determination of Additional Depreciation for Wind Power Projects**

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 15% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 585.00 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 15.44 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 16.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100.0% | 82.5% | 70.1% | 59.6% | 50.7% | 43.1% | 36.6% | 31.1% | 26.4% | 22.5% | 19.1% | 16.2% | 13.8% | 11.7% | 10.0% | 8.5% | 7.2% | 6.1% | 5.2% | 4.4% | 3.8% | 3.2% | 2.7% | 2.3% | 2.0% |
| Allowed during the year | % | 17.50% | 12.38% | 10.52% | 8.94% | 7.60% | 6.46% | 5.49% | 4.67% | 3.97% | 3.37% | 2.87% | 2.44% | 2.07% | 1.76% | 1.50% | 1.27% | 1.08% | 0.92% | 0.78% | 0.66% | 0.56% | 0.48% | 0.41% | 0.35% | 0.29% |
| Closing | % | 82.5% | 70.1% | 59.6% | 50.67% | 43.07% | 36.61% | 31.11% | 26.45% | 22.48% | 19.11% | 16.24% | 13.81% | 11.73% | 9.97% | 8.48% | 7.21% | 6.13% | 5.21% | 4.43% | 3.76% | 3.20% | 2.72% | 2.31% | 1.96% | 1.67% |
| Accelrated Deprn. | Rs Lakh | 102.38 | 72.39 | 61.53 | 52.30 | 44.46 | 37.79 | 32.12 | 27.30 | 23.21 | 19.73 | 16.77 | 14.25 | 12.11 | 10.30 | 8.75 | 7.44 | 6.32 | 5.38 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Net Depreciation Benefit | Rs Lakh | 86.93 | 41.51 | 30.65 | 21.42 | 13.57 | 6.90 | 1.23 | -3.58 | -7.68 | -11.16 | -14.12 | -16.64 | -18.77 | -20.59 | -22.14 | -23.45 | -24.56 | -11.47 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Tax Benefit | Rs Lakh | 29.55 | 14.11 | 10.42 | 7.28 | 4.61 | 2.35 | 0.42 | -1.22 | -2.61 | -3.79 | -4.80 | -5.65 | -6.38 | -7.00 | -7.52 | -7.97 | -8.35 | -3.90 | 1.55 | 1.32 | 1.12 | 0.95 | 0.81 | 0.69 | 0.59 |
| Energy generation | MU | 1.31 | 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 | 2.25 | 0.54 | 0.40 | 0.28 | 0.18 | 0.09 | 0.02 | -0.05 | -0.10 | -0.14 | -0.18 | -0.22 | -0.24 | -0.27 | -0.29 | -0.30 | -0.32 | -0.15 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |
| Discounting Factor | | 1.00 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.70 | 0.60 | 0.52 | 0.45 | 0.39 | 0.34 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.27** | **Rs/Unit** |

# Annexure – 1D
# (Wind Zone-4)

**Form 1.1 Assumptions Parameters** — **Wind Zone**

| 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% |
| | | | Useful Life | Years | 25 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 585.00 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 13 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 409.50 |
| | | | Total Equity Amout | Rs Lacs | 175.50 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 409.50 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 175.50 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.00% |
| | | | Discount Rate | | 15.58% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 1.33% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15.00% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 8.58 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Wind Power Projects under Zone - 4 : 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 | | 8.58 | 9.07 | 9.59 | 10.14 | 10.72 | 11.33 | 11.98 | 12.66 | 13.39 | 14.15 | 14.96 | 15.82 | 16.73 | 17.68 | 18.69 | 19.76 | 20.89 | 22.09 | 23.35 | 24.69 | 26.10 | 27.59 | 29.17 | 30.84 | 32.60 |
| Depreciation | Rs Lakh | | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 40.95 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 |
| Interest on term loan | Rs Lakh | | 49.92 | 44.67 | 39.41 | 34.16 | 28.90 | 23.65 | 18.39 | 13.14 | 7.88 | 2.63 | 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 | | 2.71 | 2.72 | 2.74 | 2.75 | 2.77 | 2.79 | 2.81 | 2.83 | 2.86 | 2.88 | 2.90 | 2.93 | 2.96 | 2.99 | 3.02 | 3.05 | 3.09 | 3.13 | 3.17 | 3.21 | 3.25 | 3.30 | 3.35 | 3.40 | 3.45 |
| Return on Equity | Rs Lakh | | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 33.35 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 | 42.12 |
| **Total Fixed Cost** | **Rs Lakh** | | **135.50** | **130.75** | **126.03** | **121.34** | **116.69** | **112.06** | **107.48** | **102.93** | **98.42** | **93.96** | **67.79** | **68.67** | **69.60** | **70.59** | **71.63** | **72.74** | **73.90** | **75.13** | **76.44** | **77.81** | **79.27** | **80.81** | **82.44** | **84.16** | **85.98** |
| **Per unit Fixed Cost** | **Rs/kWh** | **3.92** | 4.83 | 4.66 | 4.50 | 4.33 | 4.16 | 4.00 | 3.83 | 3.67 | 3.51 | 3.35 | 2.42 | 2.45 | 2.48 | 2.52 | 2.56 | 2.59 | 2.64 | 2.68 | 2.73 | 2.78 | 2.83 | 2.88 | 2.94 | 3.00 | 3.07 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **0.44** | 0.31 | 0.32 | 0.34 | 0.36 | 0.38 | 0.40 | 0.43 | 0.45 | 0.48 | 0.50 | 0.53 | 0.56 | 0.60 | 0.63 | 0.67 | 0.71 | 0.75 | 0.79 | 0.83 | 0.88 | 0.93 | 0.98 | 1.04 | 1.10 | 1.16 |
| Depreciation | Rs/kWh | **1.21** | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 1.46 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 |
| Int. on term loan | Rs/kWh | **0.91** | 1.78 | 1.59 | 1.41 | 1.22 | 1.03 | 0.84 | 0.66 | 0.47 | 0.28 | 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 | 0.00 | 0.00 |
| Int. on working capital | Rs/kWh | **0.10** | 0.10 | 0.10 | 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 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| RoE | Rs/kWh | **1.26** | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| **Total COG** | **Rs/kWh** | **3.92** | **4.83** | **4.66** | **4.50** | **4.33** | **4.16** | **4.00** | **3.83** | **3.67** | **3.51** | **3.35** | **2.42** | **2.45** | **2.48** | **2.52** | **2.56** | **2.59** | **2.64** | **2.68** | **2.73** | **2.78** | **2.83** | **2.88** | **2.94** | **3.00** | **3.07** |

**COG excl. RoE**

| Discount Factor | | | 1 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixed Cost | 3.92 | | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 | 109.76 |
| **Levellised Tariff** | **3.92** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | |

**Determination of Additional Depreciation for Wind Power Projects**

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 15% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 585.00 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 15.44 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 30.89 | 16.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100.0% | 82.5% | 70.1% | 59.6% | 50.7% | 43.1% | 36.6% | 31.1% | 26.4% | 22.5% | 19.1% | 16.2% | 13.8% | 11.7% | 10.0% | 8.5% | 7.2% | 6.1% | 5.2% | 4.4% | 3.8% | 3.2% | 2.7% | 2.3% | 2.0% |
| Allowed during the year | % | 17.50% | 12.38% | 10.52% | 8.94% | 7.60% | 6.46% | 5.49% | 4.67% | 3.97% | 3.37% | 2.87% | 2.44% | 2.07% | 1.76% | 1.50% | 1.27% | 1.08% | 0.92% | 0.78% | 0.66% | 0.56% | 0.48% | 0.41% | 0.35% | 0.29% |
| Closing | % | 82.5% | 70.1% | 59.6% | 50.67% | 43.07% | 36.61% | 31.11% | 26.45% | 22.48% | 19.11% | 16.24% | 13.81% | 11.73% | 9.97% | 8.48% | 7.21% | 6.13% | 5.21% | 4.43% | 3.76% | 3.20% | 2.72% | 2.31% | 1.96% | 1.67% |
| Accelrated Depm. | Rs Lakh | 102.38 | 72.39 | 61.53 | 52.30 | 44.46 | 37.79 | 32.12 | 27.30 | 23.21 | 19.73 | 16.77 | 14.25 | 12.11 | 10.30 | 8.75 | 7.44 | 6.32 | 5.38 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Net Depreciation Benefit | Rs Lakh | 86.93 | 41.51 | 30.65 | 21.42 | 13.57 | 6.90 | 1.23 | -3.58 | -7.68 | -11.16 | -14.12 | -16.64 | -18.77 | -20.59 | -22.14 | -23.45 | -24.56 | -11.47 | 4.57 | 3.88 | 3.30 | 2.81 | 2.39 | 2.03 | 1.72 |
| Tax Benefit | Rs Lakh | 29.55 | 14.11 | 10.42 | 7.28 | 4.61 | 2.35 | 0.42 | -1.22 | -2.61 | -3.79 | -4.80 | -5.65 | -6.38 | -7.00 | -7.52 | -7.97 | -8.35 | -3.90 | 1.55 | 1.32 | 1.12 | 0.95 | 0.81 | 0.69 | 0.59 |
| Energy generation | MU | 1.40 | 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 | 2.11 | 0.50 | 0.37 | 0.26 | 0.16 | 0.08 | 0.01 | -0.04 | -0.09 | -0.14 | -0.17 | -0.20 | -0.23 | -0.25 | -0.27 | -0.28 | -0.30 | -0.14 | 0.06 | 0.05 | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 |
| Discounting Factor | | 1.00 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.70 | 0.60 | 0.52 | 0.45 | 0.39 | 0.34 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.25** | **Rs/Unit** |

# Annexure – 2A
# (SHP above 1 MW and up to and including 5 MW)

**Form 1.1 Assumptions Parameters**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | Capacity <=5 MW |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | 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 | 589.41 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 35 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 412.59 |
| | | | Total Equity Amout | Rs Lacs | 176.82 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 412.59 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 176.82 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.57% |
| | | | Discount Rate | | 15.75% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 0.80% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 22.45 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Small Hydro 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 | 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 | | 22.45 | 23.73 | 25.09 | 26.53 | 28.04 | 29.65 | 31.34 | 33.14 | 35.03 | 37.04 | 39.16 | 41.39 | 43.76 | 46.27 | 48.91 | 51.71 | 54.67 | 57.79 | 61.10 | 64.60 | 68.29 | 72.20 | 76.33 | 80.69 | 85.31 | 90.19 | 95.35 | 100.80 | 106.57 | 112.66 | 119.11 | 125.92 | 133.12 | 140.74 | 148.79 |
| Depreciation | Rs Lakh | | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 41.26 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 | 4.72 |
| Interest on term loan | Rs Lakh | | 50.30 | 45.00 | 39.71 | 34.41 | 29.12 | 23.83 | 18.53 | 13.24 | 7.94 | 2.65 | 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 | 0.00 |
| Interest on working Capital | Rs Lakh | | 3.63 | 3.67 | 3.71 | 3.75 | 3.80 | 3.85 | 3.90 | 3.96 | 4.02 | 4.08 | 4.15 | 4.22 | 4.29 | 4.37 | 4.45 | 4.54 | 4.63 | 4.73 | 4.83 | 4.94 | 5.05 | 5.17 | 5.30 | 5.44 | 5.58 | 5.73 | 5.89 | 6.06 | 6.24 | 6.43 | 6.63 | 6.85 | 7.07 | 7.31 | 7.56 |
| Return on Equity | Rs Lakh | | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 33.60 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 | 42.44 |
| **Total Fixed Cost** | **Rs Lakh** | | **151.23** | **147.26** | **143.37** | **139.55** | **135.82** | **132.18** | **128.63** | **125.19** | **121.85** | **118.62** | **90.45** | **92.76** | **95.21** | **97.79** | **100.51** | **103.40** | **106.45** | **109.67** | **113.08** | **116.69** | **120.50** | **124.52** | **128.78** | **133.28** | **138.04** | **143.07** | **148.39** | **154.02** | **159.96** | **166.25** | **172.89** | **179.92** | **187.34** | **195.19** | **203.49** |
| **Per unit Fixed Cost** | **Rs/kWh** | **5.06** | 5.81 | 5.66 | 5.51 | 5.36 | 5.22 | 5.08 | 4.94 | 4.81 | 4.68 | 4.56 | 3.48 | 3.57 | 3.66 | 3.76 | 3.86 | 3.97 | 4.09 | 4.22 | 4.35 | 4.48 | 4.63 | 4.79 | 4.95 | 5.12 | 5.31 | 5.50 | 5.70 | 5.92 | 6.15 | 6.39 | 6.65 | 6.92 | 7.20 | 7.50 | 7.82 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **1.31** | 0.86 | 0.91 | 0.96 | 1.02 | 1.08 | 1.14 | 1.20 | 1.27 | 1.35 | 1.42 | 1.50 | 1.59 | 1.68 | 1.78 | 1.88 | 1.99 | 2.10 | 2.22 | 2.35 | 2.48 | 2.62 | 2.77 | 2.93 | 3.10 | 3.28 | 3.47 | 3.66 | 3.87 | 4.10 | 4.33 | 4.58 | 4.84 | 5.12 | 5.41 | 5.72 |
| Depreciation | Rs/kWh | **1.27** | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 1.59 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |
| Int. on term loan | Rs/kWh | **0.97** | 1.93 | 1.73 | 1.53 | 1.32 | 1.12 | 0.92 | 0.71 | 0.51 | 0.31 | 0.10 | 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 | 0.00 |
| Int. on working capital | Rs/kWh | **0.15** | 0.14 | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 | 0.16 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.20 | 0.20 | 0.21 | 0.21 | 0.22 | 0.23 | 0.23 | 0.24 | 0.25 | 0.25 | 0.26 | 0.27 | 0.28 | 0.29 |
| RoE | Rs/kWh | **1.37** | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.29 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 | 1.63 |
| **Total COG** | **Rs/kWh** | **5.06** | **5.81** | **5.66** | **5.51** | **5.36** | **5.22** | **5.08** | **4.94** | **4.81** | **4.68** | **4.56** | **3.48** | **3.57** | **3.66** | **3.76** | **3.86** | **3.97** | **4.09** | **4.22** | **4.35** | **4.48** | **4.63** | **4.79** | **4.95** | **5.12** | **5.31** | **5.50** | **5.70** | **5.92** | **6.15** | **6.39** | **6.65** | **6.92** | **7.20** | **7.50** | **7.82** |

**COG excl. RoE**

| Discount Factor | | | 1 | 0.86 | 0.75 | 0.64 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.17 | 0.15 | 0.13 | 0.11 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixed Cost | 5.06 | | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 | 131.77 |
| **Levellised Tariff** | **5.06** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 80% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 599.41 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 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 | 15.56 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 31.12 | 16.98 | 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% | 50% | 10% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 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 | % | 50.00% | 40.00% | 8.00% | 1.60% | 0.32% | 0.06% | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Closing | % | 50.0% | 10.0% | 2.0% | 0.40% | 0.08% | 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% | 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 | 294.71 | 235.77 | 47.15 | 9.43 | 1.89 | 0.38 | 0.08 | 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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Net Depreciation Benefit | Rs. Lakh | 279.15 | 204.64 | 16.03 | -21.69 | -29.23 | -30.74 | -31.05 | -31.11 | -31.12 | -31.12 | -31.12 | -31.12 | -31.12 | -31.12 | -31.12 | -31.12 | -31.12 | -16.98 | 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 |
| Tax Benefit | Rs. Lakh | 94.88 | 69.56 | 5.45 | -7.37 | -9.94 | -10.45 | -10.55 | -10.57 | -10.58 | -10.58 | -10.58 | -10.58 | -10.58 | -10.58 | -10.58 | -10.58 | -10.58 | -5.77 | 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 | 1.30 | 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 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.69 | 0.60 | 0.52 | 0.45 | 0.39 | 0.33 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

| Levellised benefit | 0.63 | Rs/Unit |
|---|---|---|

# Annexure – 2B
# (above 5 MW to 25 MW)

**Form 1.1 Assumptions Parameters**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | Capacity >5 up to 25 MW |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | 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 | 536.26 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 13 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 375.38 |
| | | | Total Equity Amout | Rs Lacs | 160.88 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 375.38 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 160.88 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.57% |
| | | | Discount Rate | | 15.75% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 0.80% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 15.86 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Small Hydro 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 | 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 | | 15.86 | 16.77 | 17.73 | 18.74 | 19.81 | 20.95 | 22.14 | 23.41 | 24.75 | 26.16 | 27.66 | 29.24 | 30.92 | 32.68 | 34.55 | 36.53 | 38.62 | 40.83 | 43.17 | 45.63 | 48.24 | 51.00 | 53.92 | 57.01 | 60.27 | 63.71 | 67.36 | 71.21 | 75.28 | 79.59 | 84.14 | 88.96 | 94.04 | 99.42 | 105.11 |
| Depreciation | Rs Lakh | | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 37.54 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 | 4.29 |
| Interest on term loan | Rs Lakh | | 45.76 | 40.95 | 36.13 | 31.31 | 26.49 | 21.68 | 16.86 | 12.04 | 7.23 | 2.41 | 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 | 0.00 |
| Interest on working Capital | Rs Lakh | | 3.00 | 3.02 | 3.05 | 3.09 | 3.12 | 3.15 | 3.19 | 3.23 | 3.27 | 3.32 | 3.36 | 3.41 | 3.46 | 3.52 | 3.58 | 3.64 | 3.70 | 3.77 | 3.84 | 3.92 | 4.00 | 4.09 | 4.18 | 4.28 | 4.38 | 4.48 | 4.60 | 4.72 | 4.84 | 4.98 | 5.12 | 5.27 | 5.43 | 5.60 | 5.77 |
| Return on Equity | Rs Lakh | | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 30.57 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 | 38.61 |
| **Total Fixed Cost** | **Rs Lakh** | | **132.72** | **128.84** | **125.01** | **121.24** | **117.53** | **113.88** | **110.30** | **106.79** | **103.35** | **99.99** | **73.92** | **75.56** | **77.28** | **79.10** | **81.03** | **83.07** | **85.22** | **87.50** | **89.91** | **92.46** | **95.15** | **97.99** | **101.00** | **104.18** | **107.54** | **111.10** | **114.86** | **118.83** | **123.03** | **127.47** | **132.16** | **137.13** | **142.37** | **147.92** | **153.78** |
| Per unit Fixed Cost | Rs/kWh | **4.33** | 5.10 | 4.95 | 4.81 | 4.66 | 4.52 | 4.38 | 4.24 | 4.10 | 3.97 | 3.84 | 2.84 | 2.90 | 2.97 | 3.04 | 3.11 | 3.19 | 3.28 | 3.36 | 3.46 | 3.55 | 3.66 | 3.77 | 3.88 | 4.00 | 4.13 | 4.27 | 4.41 | 4.57 | 4.73 | 4.90 | 5.08 | 5.27 | 5.47 | 5.69 | 5.91 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **0.92** | 0.61 | 0.64 | 0.68 | 0.72 | 0.76 | 0.81 | 0.85 | 0.90 | 0.95 | 1.01 | 1.06 | 1.12 | 1.19 | 1.26 | 1.33 | 1.40 | 1.48 | 1.57 | 1.66 | 1.75 | 1.85 | 1.96 | 2.07 | 2.19 | 2.32 | 2.45 | 2.59 | 2.74 | 2.89 | 3.06 | 3.23 | 3.42 | 3.61 | 3.82 | 4.04 |
| Depreciation | Rs/kWh | **1.15** | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 1.44 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 |
| Int. on term loan | Rs/kWh | **0.88** | 1.76 | 1.57 | 1.39 | 1.20 | 1.02 | 0.83 | 0.65 | 0.46 | 0.28 | 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 | 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 | **0.12** | 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 | 0.16 | 0.16 | 0.16 | 0.17 | 0.17 | 0.18 | 0.18 | 0.19 | 0.19 | 0.20 | 0.20 | 0.21 | 0.22 | 0.22 |
| RoE | Rs/kWh | **1.25** | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 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 |
| **Total COG** | **Rs/kWh** | **4.33** | **5.10** | **4.95** | **4.81** | **4.66** | **4.52** | **4.38** | **4.24** | **4.10** | **3.97** | **3.84** | **2.84** | **2.90** | **2.97** | **3.04** | **3.11** | **3.19** | **3.28** | **3.36** | **3.46** | **3.55** | **3.66** | **3.77** | **3.88** | **4.00** | **4.13** | **4.27** | **4.41** | **4.57** | **4.73** | **4.90** | **5.08** | **5.27** | **5.47** | **5.69** | **5.91** |

**COG excl. RoE**

| Discount Factor | | | 1 | 0.86 | 0.75 | 0.64 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.17 | 0.15 | 0.13 | 0.11 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixed Cost | 4.33 | | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 | 112.60 |
| **Levellised Tariff** | **4.33** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 80% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 536.26 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 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 | 14.16 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 28.31 | 15.44 | 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% | 50% | 10% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 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 | % | 50.00% | 40.00% | 8.00% | 1.60% | 0.32% | 0.06% | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Closing | % | 50.0% | 10.0% | 2.0% | 0.40% | 0.08% | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Accelrated Depm. | Rs Lakh | 268.13 | 214.50 | 42.90 | 8.58 | 1.72 | 0.34 | 0.07 | 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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Net Depreciation Benefit | Rs Lakh | 253.97 | 186.19 | 14.59 | -19.73 | -26.60 | -27.97 | -28.25 | -28.30 | -28.31 | -28.31 | -28.31 | -28.31 | -28.31 | -28.31 | -28.31 | -28.31 | -28.31 | -15.44 | 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 |
| Tax Benefit | Rs Lakh | 86.33 | 63.29 | 4.96 | -6.71 | -9.04 | -9.51 | -9.60 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -9.62 | -5.25 | 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 |
| Energy generation | MU | 1.30 | 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 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.69 | 0.60 | 0.52 | 0.45 | 0.39 | 0.33 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.57** | **Rs/Unit** |

# Annexure – 3
# (Biomass Power Project)

**2.1 Form Template for Biomass Power Projects- Other**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | Assumptions |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Auxillary Consumption during stablisatio | % | 10% |
| | | | Auxillary Consumption after stabilisation | % | 10% |
| | | | PLF(Stablization for 6 months) | % | 60% |
| | | | PLF(during first year after Stablization) | % | 70% |
| | | | PLF(second year onwards) | % | 80% |
| | | | Useful Life | Years | 20 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 480.43 |
| 3 | **Financial Assumptions** | | | | |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 336.30 |
| | | | Total Equity Amout | Rs Lacs | 144.13 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 336.30 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 144.13 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10.00 |
| | | | Return on Equity after 10 years | | 24.00% |
| | | | Discount Rate (equiv. to WACC) | | 15.43% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.99% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate(power plant) | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 2.00% |
| | | | Years for 7% depreciation rate | | 10.00 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15% |
| | | Receivables for Debtors | | Months | 2 |
| | | For Variable Charges | | | |
| | | Biomass Stock | | Months | 4 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Fuel Related Assumptions** | | | | |
| | | Heat Rate | After Stabilisation period | Kcal/kwh | 3800 |
| | | Biomass | | | |
| | | | Base Price(FY14-15) | Rs/T | 3731 |
| | | | GCV - Biomass | Kcal/kg | 3611 |
| 7 | **Operation & Maintenance** | | | | |
| | | power plant (FY 2014-15) | | Rs Lakh | 26.75 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**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 |

| Vaiable 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 | | 223.55 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 | 275.13 |
| **Per unit Var Cost** | **Rs/kWh** | | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 |

| 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 | | 26.75 | 28.27 | 29.89 | 31.60 | 33.41 | 35.32 | 37.34 | 39.48 | 41.74 | 44.12 | 46.65 | 49.31 | 52.14 | 55.12 | 58.27 | 61.60 | 65.13 | 68.85 | 72.79 | 76.95 |
| Depreciation | Rs Lakh | | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 33.63 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 | 9.61 |
| Interest on term loan | Rs Lakh | | 41.00 | 36.68 | 32.37 | 28.05 | 23.74 | 19.42 | 15.10 | 10.79 | 6.47 | 2.16 | 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 | | 18.32 | 22.40 | 22.45 | 22.50 | 22.56 | 22.62 | 22.68 | 22.75 | 22.82 | 22.89 | 22.97 | 23.05 | 23.14 | 23.23 | 23.33 | 23.44 | 23.55 | 23.66 | 23.78 | 23.91 |
| Return on Equity | Rs Lakh | | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 27.38 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 | 34.59 |
| **Total Fixed Cost** | **Rs Lakh** | | **147.07** | **148.37** | **145.72** | **143.17** | **140.72** | **138.37** | **136.14** | **134.03** | **132.04** | **130.19** | **113.82** | **116.57** | **119.48** | **122.55** | **125.80** | **129.24** | **132.87** | **136.71** | **140.77** | **145.07** |
| **Per unit Fixed Cost** | **Rs/kWh** | | 2.87 | 2.35 | 2.31 | 2.27 | 2.23 | 2.19 | 2.16 | 2.12 | 2.09 | 2.06 | 1.80 | 1.85 | 1.89 | 1.94 | 1.99 | 2.05 | 2.11 | 2.17 | 2.23 | 2.30 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | Unit | Levellised | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable COG | Rs/kWh | **4.36** | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 | 4.36 |
| O&M expn | Rs/kWh | **0.60** | 0.52 | 0.45 | 0.47 | 0.50 | 0.53 | 0.56 | 0.59 | 0.63 | 0.66 | 0.70 | 0.74 | 0.78 | 0.83 | 0.87 | 0.92 | 0.98 | 1.03 | 1.09 | 1.15 | 1.22 |
| Depreciation | Rs/kWh | **0.48** | 0.66 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Int. on term loan | Rs/kWh | **0.36** | 0.80 | 0.58 | 0.51 | 0.44 | 0.38 | 0.31 | 0.24 | 0.17 | 0.10 | 0.03 | 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 | **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 | 0.38 | 0.38 | 0.38 |
| RoE | Rs/kWh | **0.47** | 0.53 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 |
| **Total COG** | **Rs/kWh** | **6.64** | **7.23** | **6.71** | **6.67** | **6.63** | **6.59** | **6.56** | **6.52** | **6.49** | **6.46** | **6.43** | **6.17** | **6.21** | **6.26** | **6.31** | **6.36** | **6.41** | **6.47** | **6.53** | **6.59** | **6.66** |

| Levellised 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 | 0.866 | 0.750 | 0.650 | 0.563 | 0.488 | 0.423 | 0.366 | 0.317 | 0.275 | 0.238 | 0.206 | 0.179 | 0.155 | 0.134 | 0.116 | 0.101 | 0.087 | 0.076 | 0.065 |
| Variable Cost | | | 223.4 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 | 275.0 |
| Fixed Cost | | | 116.3 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 | 143.2 |

| | |
|---|---|
| Levellised Tariff (Variable) | 4.36 |
| Levellised Tariff (Fixed) | 2.27 |
| **Levellised Tariff (Rs/Unit )** | **6.63** |

**Determination of Accelerated Depreciation for Biomass Power Project**

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 80% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.99% |
| Capital Cost | 480.4 |

| Years ----------> | Unit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Book Depreciation | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 12.68 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 25.37 | 13.84 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100% | 50% | 10% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Allowed during the year | % | 50% | 40.00% | 8.00% | 1.60% | 0.32% | 0.06% | 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% |
| Closing | % | 50% | 10% | 2.00% | 0.40% | 0.08% | 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% |
| Accelrated Deprn. | Rs Lakh | 240.21 | 192.17 | 38.43 | 7.69 | 1.54 | 0.31 | 0.06 | 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 |
| Net Depreciation Benefit | Rs Lakh | 227.53 | 166.80 | 13.07 | -17.68 | -23.83 | -25.06 | -25.30 | -25.35 | -25.36 | -25.37 | -25.37 | -25.37 | -25.37 | -25.37 | -25.37 | -25.37 | -25.37 | -13.84 | 0.00 | 0.00 |
| Tax Benefit | Rs Lakh | 77.34 | 56.70 | 4.44 | -6.01 | -8.10 | -8.52 | -8.60 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -8.62 | -4.70 | 0.00 | 0.00 |
| Net Energy generation | MU | 2.56 | 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 | 3.02 | 0.90 | 0.07 | -0.10 | -0.13 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.14 | -0.07 | 0.00 | 0.00 |
| Discounting Factor | | 1.00 | 0.93 | 0.81 | 0.70 | 0.61 | 0.52 | 0.45 | 0.39 | 0.34 | 0.30 | 0.26 | 0.22 | 0.19 | 0.17 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 |

| | | |
|---|---|---|
| Tax Benefit Levellised | 12.85 | |
| Electricity Generation (Levellised) | 5.81 | |
| **Levellised benefit** | **0.22** | **(Rs/kWh)** |

# Annexure – 4
## (Cogen Power Projects)

**2.1 Form Template for Cogen Power Projects**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | Assumptions |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Auxillary Consumption during stablisati | % | 8.5% |
| | | | Auxillary Consumption after stabilisatio | % | 8.5% |
| | | | PLF(Stablization for 6 months) | % | 60% |
| | | | PLF(during first year after Stablization) | % | 60% |
| | | | PLF(second year onwards) | % | 60% |
| | | | Useful Life | Years | 20 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/MW | 475.28 |
| 3 | **Financial Assumptions** | | | | |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 332.70 |
| | | | Total Equity Amout | Rs Lacs | 142.59 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 332.70 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 142.59 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10.00 |
| | | | Return on Equity after 10 years | | 24.00% |
| | | | Discount Rate (equiv. to WACC) | | 15.43% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.99% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate(power plant) | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 2.00% |
| | | | Years for 7% depreciation rate | | 10.00 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15% |
| | | Receivables for Debtors | | Months | 2 |
| | | For Variable Charges | | | |
| | | Biomass Stock | | Months | 4 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Fuel Related Assumptions** | | | | |
| | | Heat Rate | After Stabilisation period | Kcal/kwh | 3600 |
| | | Biomass | | | |
| | | | Base Price - Bagasse (FY14-15) | Rs/T | 2177.19 |
| | | | GCV - Bagasse | Kcal/kg | 2250 |
| 7 | **Operation & Maintenance** | | | | |
| | | power plant (FY 2014-15) | | | 17.63 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**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 |

| Vaiable 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 | | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 | 183.09 |

| 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 | | 17.63 | 18.63 | 19.70 | 20.83 | 22.02 | 23.28 | 24.61 | 26.02 | 27.51 | 29.08 | 30.74 | 32.50 | 34.36 | 36.32 | 38.40 | 40.60 | 42.92 | 45.38 | 47.97 | 50.72 |
| Depreciation | Rs Lakh | | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 33.27 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 |
| Interest on term loan | Rs Lakh | | 40.56 | 36.29 | 32.02 | 27.75 | 23.48 | 19.21 | 14.94 | 10.67 | 6.40 | 2.13 | 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 | | 15.39 | 15.42 | 15.45 | 15.49 | 15.52 | 15.56 | 15.60 | 15.65 | 15.69 | 15.74 | 15.79 | 15.85 | 15.91 | 15.97 | 16.03 | 16.10 | 16.17 | 16.25 | 16.33 | 16.42 |
| Return on Equity | Rs Lakh | | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 27.09 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 | 34.22 |
| **Total Fixed Cost** | **Rs Lakh** | | **133.93** | **130.70** | **127.53** | **124.42** | **121.38** | **118.41** | **115.52** | **112.70** | **109.96** | **107.32** | **90.26** | **92.07** | **93.99** | **96.02** | **98.16** | **100.43** | **102.82** | **105.35** | **108.03** | **110.86** |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | Unit | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable COG | Rs/kWh | **3.81** | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 | 3.81 |
| O&M expn | Rs/kWh | **0.51** | 0.37 | 0.39 | 0.41 | 0.43 | 0.46 | 0.48 | 0.51 | 0.54 | 0.57 | 0.60 | 0.64 | 0.68 | 0.71 | 0.76 | 0.80 | 0.84 | 0.89 | 0.94 | 1.00 | 1.05 |
| Depreciation | Rs/kWh | **0.60** | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Int. on term loan | Rs/kWh | **0.44** | 0.84 | 0.75 | 0.67 | 0.58 | 0.49 | 0.40 | 0.31 | 0.22 | 0.13 | 0.04 | 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 | **0.32** | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.34 | 0.34 | 0.34 | 0.34 |
| RoE | Rs/kWh | **0.59** | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 |
| **Total COG** | **Rs/kWh** | **6.27** | **6.59** | **6.52** | **6.46** | **6.39** | **6.33** | **6.27** | **6.21** | **6.15** | **6.09** | **6.04** | **5.68** | **5.72** | **5.76** | **5.80** | **5.85** | **5.90** | **5.95** | **6.00** | **6.05** | **6.11** |

| Levellised 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 | 0.866 | 0.750 | 0.650 | 0.563 | 0.488 | 0.423 | 0.366 | 0.317 | 0.275 | 0.238 | 0.206 | 0.179 | 0.155 | 0.134 | 0.116 | 0.101 | 0.087 | 0.076 | 0.065 |

| | |
|---|---|
| Levellised Tariff (Variable) | 3.81 |
| Levellised Tariff (Fixed) | 2.46 |
| **Levellised Tariff (Rs/Unit )** | **6.27** |

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

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 80% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.99% |
| Capital Cost | 475.3 |

| Years ----------> | Unit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Book Depreciation | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 12.55 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 25.09 | 13.69 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100% | 50% | 10% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Allowed during the year | % | 50% | 40.00% | 8.00% | 1.60% | 0.32% | 0.06% | 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% |
| Closing | % | 50% | 10% | 2.00% | 0.40% | 0.08% | 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% |
| Accelrated Deprn. | Rs Lakh | 237.64 | 190.11 | 38.02 | 7.60 | 1.52 | 0.30 | 0.06 | 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 |
| Net Depreciation Benefit | Rs Lakh | 225.09 | 165.02 | 12.93 | -17.49 | -23.57 | -24.79 | -25.03 | -25.08 | -25.09 | -25.09 | -25.09 | -25.09 | -25.09 | -25.09 | -25.09 | -25.09 | -25.09 | -13.69 | 0.00 | 0.00 |
| Tax Benefit | Rs Lakh | 76.51 | 56.09 | 4.39 | -5.94 | -8.01 | -8.43 | -8.51 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -8.53 | -4.65 | 0.00 | 0.00 |
| Net Energy generation | MU | 2.40 | 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 |
| Discounting Factor | | 1.00 | 0.93 | 0.81 | 0.70 | 0.61 | 0.52 | 0.45 | 0.39 | 0.34 | 0.30 | 0.26 | 0.22 | 0.19 | 0.17 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 |

| | | |
|---|---|---|
| **Levellised benefit** | **0.28** | **(Rs/kWh)** |

**Annexure – 5**
**(Solar PV)**

**Form 1.1 Assumptions Parameters**

| S. No. | Assumption Head | Sub-Head | Sub-Head (2) | Unit | Assumptions |
|---|---|---|---|---|---|
| 1 | **Power Generation** | | | | |
| | | Capacity | | | |
| | | | Installed Power Generation Capacity | MW | 1 |
| | | | Capacity Utilization Factor | % | 19% |
| | | | Useful Life | Years | 25 |
| 2 | **Project Cost** | | | | |
| | | Capital Cost/MW | Power Plant Cost | Rs Lacs/M | 691.00 |
| 3 | **Sources of Fund** | | | | |
| | | | Tariff Period | Years | 25 |
| | | Debt: Equity | | | |
| | | | Debt | % | 70% |
| | | | Equity | % | 30% |
| | | | Total Debt Amount | Rs Lacs | 483.70 |
| | | | Total Equity Amout | Rs Lacs | 207.30 |
| | | Debt Component | | | |
| | | | Loan Amount | Rs Lacs | 483.70 |
| | | | Repayment Period(incld Moratorium) | years | 10 |
| | | | Interest Rate | % | 12.83% |
| | | Equity Component | | | |
| | | | Equity amount | Rs Lacs | 207.30 |
| | | | Return on Equity for first 10 years | % p.a | 19.00% |
| | | | RoE Period | Year | 10 |
| | | | Return on Equity 11th year onwards | % p.a | 24.00% |
| | | | Weighted average of ROE | | 22.00% |
| | | | Discount Rate | | 15.58% |
| 4 | **Financial Assumptions** | | | | |
| | | Fiscal Assumptions | | | |
| | | | Income Tax | % | 33.990% |
| | | | MAT Rate (for first 10 years) | % | 20.960% |
| | | Depreciation | | | |
| | | | Depreciation Rate for first 10 years | % | 7.00% |
| | | | Depreciation Rate 11th year onwards | % | 1.33% |
| | | | Years for 7% rate | | 10 |
| 5 | **Working Capital** | | | | |
| | | For Fixed Charges | | | |
| | | O&M Charges | | Months | 1 |
| | | Maintenance Spare | (% of O&M exepenses) | | 15.00% |
| | | Receivables for Debtors | | Months | 2 |
| | | Interest On Working Capital | | % | 13.33% |
| 6 | **Operation & Maintenance** | | | | |
| | | power plant (FY14-15) | | Rs Lakh | 11.87 |
| | | Total O & M Expenses Escalation | | % | 5.72% |

**Form 1.2 Form Template for (Solar PV 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 | | 1.66 | 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 | | 11.87 | 12.55 | 13.27 | 14.03 | 14.83 | 15.68 | 16.57 | 17.52 | 18.52 | 19.58 | 20.70 | 21.89 | 23.14 | 24.46 | 25.86 | 27.34 | 28.90 | 30.56 | 32.31 | 34.15 | 36.11 | 38.17 | 40.36 | 42.66 | 45.10 |
| Depreciation | Rs Lakh | | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 48.37 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 | 9.21 |
| Interest on term loan | Rs Lakh | | 58.97 | 52.76 | 46.55 | 40.35 | 34.14 | 27.93 | 21.72 | 15.52 | 9.31 | 3.10 | 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 | | 3.31 | 3.33 | 3.35 | 3.38 | 3.40 | 3.43 | 3.46 | 3.48 | 3.52 | 3.55 | 3.58 | 3.62 | 3.66 | 3.70 | 3.74 | 3.79 | 3.84 | 3.89 | 3.94 | 4.00 | 4.06 | 4.13 | 4.20 | 4.27 | 4.34 |
| Return on Equity | Rs Lakh | | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 39.39 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 | 49.75 |
| **Total Fixed Cost** | **Rs Lakh** | | **161.90** | **156.40** | **150.93** | **145.51** | **140.13** | **134.79** | **129.51** | **124.28** | **119.11** | **113.99** | **83.25** | **84.47** | **85.76** | **87.13** | **88.57** | **90.10** | **91.71** | **93.41** | **95.22** | **97.12** | **99.14** | **101.27** | **103.52** | **105.90** | **108.41** |
| Per unit Fixed Cost | Rs/kWh | 7.95 | 9.73 | 9.40 | 9.07 | 8.74 | 8.42 | 8.10 | 7.78 | 7.47 | 7.16 | 6.85 | 5.00 | 5.08 | 5.15 | 5.23 | 5.32 | 5.41 | 5.51 | 5.61 | 5.72 | 5.84 | 5.96 | 6.08 | 6.22 | 6.36 | 6.51 |

**Levallised tariff corresponding to Useful life**

| Per Unit Cost of Generation | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O&M expn | Rs/kWh | **1.03** | 0.71 | 0.75 | 0.80 | 0.84 | 0.89 | 0.94 | 1.00 | 1.05 | 1.11 | 1.18 | 1.24 | 1.31 | 1.39 | 1.47 | 1.55 | 1.64 | 1.74 | 1.84 | 1.94 | 2.05 | 2.17 | 2.29 | 2.42 | 2.56 | 2.71 |
| Depreciation | Rs/kWh | **2.40** | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 2.91 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 |
| Int. on term loan | Rs/kWh | **1.80** | 3.54 | 3.17 | 2.80 | 2.42 | 2.05 | 1.68 | 1.31 | 0.93 | 0.56 | 0.19 | 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 | **0.21** | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 |
| RoE | Rs/kWh | **2.50** | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 | 2.99 |
| **Total COG** | **Rs/kWh** | **7.95** | **9.73** | **9.40** | **9.07** | **8.74** | **8.42** | **8.10** | **7.78** | **7.47** | **7.16** | **6.85** | **5.00** | **5.08** | **5.15** | **5.23** | **5.32** | **5.41** | **5.51** | **5.61** | **5.72** | **5.84** | **5.96** | **6.08** | **6.22** | **6.36** | **6.51** |

| Discount Factor | | | 1 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fixed Cost | 7.95 | | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 | 132.30 |
| **Levellised Tariff** | **7.95** | Rs/Unit | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| | |
|---|---|
| Depreciation amount | 90% |
| Book Depreciation rate | 5.28% |
| Tax Depreciation rate | 80% |
| Additional Depreciation | 20% |
| Income Tax (MAT) | 20.960% |
| Income Tax (Normal Rates) | 33.990% |
| Capital Cost | 691.00 |

| 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 | % | 2.64% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 5.28% | 2.88% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Book Depreciation | Rs Lakh | 18.24 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 36.48 | 19.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Accelerated Depreciation** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Opening | % | 100% | 50% | 10% | 2% | 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 | % | 50.00% | 40.00% | 8.00% | 1.60% | 0.32% | 0.06% | 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 | % | 50.0% | 10.0% | 2.0% | 0.40% | 0.08% | 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% | 0.00% |
| Accelrated Deprn. | Rs Lakh | 345.50 | 276.40 | 55.28 | 11.06 | 2.21 | 0.44 | 0.09 | 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 |
| Net Depreciation Benefit | Rs Lakh | 327.26 | 239.92 | 18.80 | -25.43 | -34.27 | -36.04 | -36.40 | -36.47 | -36.48 | -36.48 | -36.48 | -36.48 | -36.48 | -36.48 | -36.48 | -36.48 | -36.48 | -19.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tax Benefit | Rs Lakh | 111.23 | 81.55 | 6.39 | -8.64 | -11.65 | -12.25 | -12.37 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -12.40 | -6.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Energy generation | MU | 0.83 | 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 | 13.37 | 4.90 | 0.38 | -0.52 | -0.70 | -0.74 | -0.74 | -0.74 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.75 | -0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Discounting Factor | | 1.00 | 0.87 | 0.75 | 0.65 | 0.56 | 0.48 | 0.42 | 0.36 | 0.31 | 0.27 | 0.23 | 0.20 | 0.18 | 0.15 | 0.13 | 0.11 | 0.10 | 0.09 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |
| Applicable Discounting Factor | | 1.00 | 0.93 | 0.80 | 0.70 | 0.60 | 0.52 | 0.45 | 0.39 | 0.34 | 0.29 | 0.25 | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.11 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Levellised benefit** | **1.16** | **Rs/Unit** |