

3 General Principles

3.1 Control Period

- 3.1.1 The Commission observes that CERC in its CERC RE Tariff Regulation, 2020 and most of the ERCs have adopted a Control period of three (3) years, except for States like Maharashtra, Madhya Pradesh, Chhattisgarh, which have opted for Control Period of five (5) years.
- 3.1.2 It is noted that, during the Control Period from FY 2014-20, the maturity level of most of the existing Renewable Energy technologies has grown significantly. In addition, majority of the capacity addition through Solar PV technology and Wind Technologies are taking place through the competitive bidding route. Considering the discovery of lower tariff regimes through competitive bidding and with due regard to frequent changes in market dynamics in all upcoming technologies, the Commission proposes for short duration of Control Period of three (3) years from FY 2020-21 (w.e.f. 1.4.2020) to FY 2022-23.

3.2 Tariff Period

- 3.2.1 In the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015 specified that Tariff Period for Wind, Solar Energy, Biomass, Biogas and Biomass Gasifier power projects shall be same as useful life.
- 3.2.2 Accordingly, the Commission proposes to continue with the existing provisions of Tariff Period equal to useful life of the project. Since, the tariff period is equal to useful life of the project, it will enable the Project Developers to ensure returns from projects and will help in reasonable tariff discovery as the benefits of the same can be passed to end consumers.
- 3.2.3 As regards to the useful life of biomass power project with Rankine Cycle technology, the Commission has observed that the biomass technology is matured over a period of time and boiler technology used is the same as that of thermal stations. Hence, the useful life of Biomass power projects with Rankine Cycle technology, Biomass Gasifier projects, Biogas Projects and Municipal Solid Waste (MSW)/Refuse Derived Fuel (RDF) projects should be revised similar to that of thermal power projects.
- 3.2.4 Further, the Commission has observed that the technology for Small Hydro Projects (SHP) and large hydro power projects is almost similar. Therefore, the provision of useful life of conventional hydro projects as defined in CERC (Terms and Conditions for Tariff) Regulations, 2019 is for 40 years. Further, the Commission observes that CERC in its CERC RE Tariff Regulation, 2020 have adopted the same approach for specifying the useful life of RE projects.

3.2.5 In view of the above, the Commission proposes tariff period of Renewable Energy power projects as follows: -

In case of Small Hydro projects, the tariff period shall be forty (40) years. For Wind, Solar PV and Solar Thermal projects, the Tariff Period shall be twenty-five (25) years. In case of Biomass based projects with Rankine cycle technology, Biomass Gasifier, Non-fossil-fuel co-generation projects, Biogas based projects, Municipal Solid Waste and Refuse Derived Fuel based projects the tariff period shall be twenty (25) years.

3.2.6 In case of Renewable Hybrid Energy projects, the Commission proposes that the Useful life of the project shall be the minimum of the useful life of different Renewable Energy technologies combined for Renewable Hybrid Energy Project and the same shall be considered as Tariff Period. However, in case any of the RE technologies combined for RE hybrid project is left with further useful life, the levelled tariff for remaining useful life of such RE technology shall be determined separately, by factoring in the tariff components for the remaining useful life. For Renewable energy with storage project, the Commission proposes that the Useful life shall be same as useful life of project assuming that there is no storage.

3.2.7 In view of the above, the Commission proposes the following for useful life in Draft Regulations:

'2.1(nn) Useful Life' in relation to a Unit of a generating station shall mean the following duration from the date of commercial operation (COD) of such generation facility, namely:

(a)	Wind energy power project	25 years
(b)	Biomass power project with Rankine cycle technology	25 years
(c)	Non-fossil fuel cogeneration project	25 years
(d)	Small Hydro Plant	40 years
(e)	Municipal Solid Waste (MSW)/ and Refuse Derived Fuel (RDF) based Power project	25 years
(f)	Solar PV/ Floating Solar PV / and Solar thermal power project	25 years
(g)	Biomass Gasifier based power project	25 years
(h)	Biogas based power project	25 years
(i)	Renewable hybrid energy project	Minimum of the Useful Life of different Renewable Energy technologies combined for Renewable Hybrid Energy Project for Composite Tariff as specified in Regulation 82
(j)	Renewable energy with storage project	Same as Useful Life of project assuming that there is no storage

3.3 Competitive Bidding for procurement of power generated by grid connected RE Projects

- 3.3.1 The National Tariff Policy, 2016 specify that States shall endeavour to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Further, it is also stated that, the Commission shall adopt the tariff for a RE Power Project where such tariff has been determined through a transparent process of competitive bidding in accordance with the Guidelines issued by the Central Government under Section 63 of the Act.
- 3.3.2 Further, the Commission noted that there has been significant capacity addition from RE projects that have tied up their generation capacity with Distribution Licensees at tariff discovered through competitive bidding, and the tariffs have also reduced significantly. Hence, the Commission wishes to encourage such RE power procurement through competitive bidding by the Distribution Licensees, and has specified that certain RE technologies shall be procured through competitive bidding.
- 3.3.3 Further, the Commission also proposes procurement of power from Repowering of Wind Power Projects through competitive bidding in accordance to guidelines and policy issued by Government of India and Government of Rajasthan.
- 3.3.4 Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020 for procurement of power generated by grid connected RE projects are as under:

“7. Competitive Bidding for procurement of power generated by grid-connected RE Projects

7.1 The tariff shall invariably be determined through a transparent process of competitive bidding in accordance with the Guidelines issued by the Central Government under Section 63 of the Act, inter-alia for the following types of RE Projects:

- a) Wind power projects;*
- b) Solar PV power projects;*
- c) Solar Thermal power projects;*
- d) Renewable hybrid energy projects;*
- e) Renewable with Storage projects;*
- f) Repowering of Wind Power Projects*

7.2 The Commission shall adopt the tariff for a RE Power Project where such tariff has been determined through a transparent process of competitive bidding in accordance with the Guidelines issued by the Central Government under Section 63 of the Act.

Provided that, in case the Competitive Bidding Guidelines for any particular technology are not issued by the Central Government, the Competitive Bidding Guidelines issued for the other technologies issued by the Central Government with suitable deviations approved by the Commission may be followed by Distribution Licensee for procurement of power through competitive bidding.

Provided further for Renewable Energy projects below threshold limit of eligibility specified in Competitive Bidding Guidelines issued by the Central Government, the Competitive Bidding Guidelines issued for that particular technology with suitable deviations approved by the Commission may be followed by Distribution Licensee for procurement of power through competitive bidding.

Provided also that the Competitive Bidding for procurement of power from Re-powering of Wind Power Projects shall be carried out in accordance with the policy issued by State Government from time to time with suitable deviations approved by the Commission. "

3.4 Generic Tariff and Project Specific Tariff

3.4.1 The Commission observed that most of the ERCs are not determining Generic Tariff for most of the technologies. However, CERC, Himachal Pradesh and Maharashtra have adopted the approach for specifying the generic tariff for only few technologies.

3.4.2 In view of the above, the Commission proposes to continue with the determination of Generic Tariff for Biomass Power Projects with Rankine Cycle technology, Biogas based power projects and Biomass Gasifier based power projects.

3.4.3 Regarding the determination of project specific tariff, the Commission proposes to continue with RE Technologies specified in RERC RE Tariff Regulations for Wind and Solar Energy and Biomass, Biogas and Biomass Gasifier with slight modification. Further, the Commission has included the provisions of new RE Technologies for determination of tariff on project specific basis.

3.4.4 Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation,2020:

"8. Generic Tariff

8.1 The generic tariff shall be determined by the Commission on annual basis in accordance with these Regulations for the following types of renewable energy projects:

- a) Biomass power project with Rankine cycle technology;*
- b) Biogas based power project; and*
- c) Biomass gasifier based power project.*

Provided that the generic tariff determined for the year, in which a RE project is commissioned, shall be applicable for such RE Projects of same type and shall remain valid for the tariff period."

“9. Project Specific Tariff

9.1 The Commission may determine project specific tariff, on case to case basis, for the following types of new projects:

- a) Wind power projects (both on-shore and off-shore);
- b) Solar PV power projects and solar thermal power projects;
- c) Biomass Gasifier based projects; if a project developer opts for project specific tariff;
- d) Biogas based projects; if a project developer opts for project specific tariff;
- e) Small Hydro projects;
- f) Non-fossil fuel-based co-generation project;
- g) Floating Solar PV Projects;
- h) Municipal Solid Waste and Refuse Derived Fuel based projects with Rankine cycle technology;
- i) Renewable hybrid energy projects;
- j) Renewable Energy with Storage projects;
- k) Any other new renewable energy technologies approved by MNRE.

9.2 Financial norms and operational norms, except Capital cost, specified in these Regulations, shall be the ceiling norms while determining such project-specific tariff.”

3.5 Procurement of Power from Renewable Energy Projects during Extended Period

3.5.1 Post the enactment of Act, the promotional measures are being taken up for RE projects. It is observed that most of the projects commissioned in initial years are going to expire their tariff period. However, in earlier period, tariff period may not be equivalent to useful life of the project. In such case, the project can still supply electricity for balance useful life and may offer to supply power to Distribution Licensees at reasonable price. Hence, the Commission intends provide enabling framework for procurement of power from such projects after completion of tariff period.

3.5.2 In Draft RERC RE Tariff Regulation, 2020, the Commission has proposed provision for Renewable Energy Projects, which are completing their Useful life. The Commission has proposed this provision in order to continue procurement of power from these projects after they have completing their Useful life. It is proposed that Distribution licensee may procure tariff from such project on mutual terms considering the energy requirement, RPO target and reasonableness of tariff.

3.5.3 Accordingly, the Commission has added following provision in Draft RERC RE Tariff Regulation, 2020 as under:

“10. Procurement of Power from Renewable Energy Projects during Extended Period

10.1 The Distribution Licensees at their own discretion may procure power from Renewable Energy Projects during extended period considering the following aspects:

- a) Overall Energy Requirement and Energy Availability from various sources
- b) To meet the RPO targets for the year
- c) Reasonableness of tariff for procurement of power from such projects (equivalent to or lower than the latest tariff discovered through competitive bidding)

10.2 For procurement of power from such projects, the Distribution Licensees may enter into an agreement with Renewable Energy Project Developer during extended period at mutually agreed terms, to be approved by the Commission and it will not be mandatory for Distribution Licensees to procure power from such Renewable Energy Projects during extended period.”

3.6 Petition and proceedings for determination of tariff

3.6.1 Regulation 7 of RERC RE Tariff Regulations for Wind and Solar Energy, 2014, and Biomass, Biogas and Biomass Gasifier, 2015 specifies proceedings of determination of Tariff. In the proposed draft, the Commission proposes to continue determination of generic tariff on the basis of suo-motu Petition at the beginning of each year of the Control Period for the following types of renewable energy projects:

- a. Biomass power project with Rankine cycle technology,
- b. Biogas based power project
- c. and Biomass gasifier based power project.

3.6.2 The list of documents to be submitted with Petition for determination of project specific tariff are also specified in the Draft Regulation. Further, the Commission is of the view that the application for project specific tariff determination should be filed based on consent from the Beneficiary that they will procure the power at the project specific tariff determined by the Commission. Hence, the Commission has proposed to include this condition of consent from the Beneficiary along with the Petition for project specific tariff determination.

3.6.3 As discussed earlier, most of the Wind and Solar capacity addition is taking place through competitive bidding and hence, in case the project specific tariff is to be determined for these RE technologies for which the competitive bidding is taking place, it becomes important to assess the reasonableness and competitiveness of tariff proposed with the tariffs discovered through competitive bidding. Hence, the Commission has proposed to include specific provisions in this regard in the Petition to be filed for project specific tariff determination. Further, the Commission observed that CERC in CERC RE Tariff Regulation, 2020 has also taken the same approach.

3.6.4 Therefore, the Commission proposes following principles regarding petition and proceedings for determination of Tariff in Draft RERC RE Tariff Regulation, 2020:

“11. Petition and proceedings for determination of tariff

11.1 In case of Renewable Energy projects for which generic tariff has to be determined as per these Regulations, the Commission shall determine such generic tariff on suo-motu basis at the beginning of each year of the Control Period.

Provided that for first year of Control Period i.e., from 1.4.2020 to 31.3.2021, the Generic Tariff Order shall be issued after notification of these Regulations.

11.2 A petition for determination of project specific tariff shall be accompanied by such fee as specified in applicable Regulations and shall be accompanied by:

- a) Information in forms 1.1, 1.2, 2.1, 2.2 and 2.3 as the case may be, and as appended in these regulations;
- b) Detailed project report outlining technical and operational details, site specific aspects, premise for capital cost and financing plan, details of installation, manufacturer's/supplier's guaranteed and other technical particulars, recommended O&M practices and public safety requirements, etc. etc.
- c) A statement of all applicable terms and conditions and expected expenditure for the period for which tariff is to be determined.
- d) A statement containing full details of calculation of any subsidy and incentive received, due or assumed to be due from the Central Government and/or State Government. This statement shall also include the proposed tariff calculated without consideration of the subsidy and incentive.
- e) Consent from Distribution Licensee or beneficiary for procurement of power from Renewable Energy Project at tariff approved by the Commission, in the form of Initialled Power Purchase Agreement; Provided that the consent from Distribution Licensee shall also include the following:
 - i) Status of compliance of RPO Obligation by Distribution Licensee
 - ii) Impact of Project Specific Tariff on Distribution Licensee's overall power purchase cost
- f) Following documents in case of petition for determination of project specific tariff by renewable energy projects, where tariff from such renewable energy sources is generally determined through competitive bidding process in accordance with provisions of Section 63 of the Act:
 - (i) Rationale for opting project specific tariff instead of competitive bidding
 - (ii) Competitiveness of the proposed tariff vis-à-vis tariff discovered through Competitive Bidding/tariff prevalent in the market.
- g) Any other information that the Commission requires the petitioner to submit.

11.3 The proceedings for determination of tariff shall be in accordance with the RERC (Transaction of Business) Regulations, 2005 as amended from time to time.”

3.7 Tariff Structure

- 3.7.1 The Commission observed that CERC and most of ERCs have specified a single part tariff for RE technologies. Further, for RE technologies with fuel cost components, single part tariff with two components, fixed and fuel cost components has been specified..
- 3.7.2 In view of the above, the Commission proposes to continue with the same tariff structure for the next control period as under:

"12. Tariff Structure

12.1 The tariff for renewable energy technologies shall be 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; and*
- e) Operation and Maintenance expenses;*

Provided that for renewable energy projects having fuel cost component, like biomass based power projects based on rankine cycle technology, biomass gasifier based power projects, biogas based power projects, non-fossil fuel based co- generation projects and refuse derived fuel based power projects, single part tariff with two components, fixed cost component and fuel cost component, shall be determined."

3.8 Tariff Design

- 3.8.1 Tariff Design is one of the most important aspects in ensuring the cash flow stream to generating companies and at the same time protecting the interest of the utility (and consumers) by avoiding undue cost burden during the initial stages of the project. The tariff should be designed in such a way that the generating company is able to meet all its cash outflow obligations, while at the same time ensuring that the generating company continues to supply power to the utility in subsequent years after its initial cash outflow obligations are met.
- 3.8.2 The Commission observed that CERC and most of ERCs have adopted levelled tariff determination approach. As under this approach the aspect of time value of money is recognized over the tariff period of the project. Therefore, the Commission, proposes to continue the existing levelled tariff design in the Draft RERC RE Regulations, 2020 for the fixed cost component.
- 3.8.3 Further, the Commission has also considered Levelled tariff with appropriate discount rate representing weighted average cost of capital on the basis of normative debt-equity ratio as specified in the Regulations. The discount rate

used for Renewable Energy tariff determination was the post-tax Weighted Average Cost of Capital (WACC). The WACC was computed as under:

$$\text{Post Tax WACC} = \text{Cost of Debt} + \text{Cost of Equity}$$

Where,

$$\text{Cost of Debt} = \text{Normative Debt} \times (\text{Normative Rate of Interest}) \times (1 - \text{Corporate Tax Rate})$$

$$\text{Cost of Equity} = \text{Normative Equity} \times (\text{Post Tax Return on Equity})$$

3.8.4 Further, the Commission also observed that while taking the investment decisions, the developer considers post tax WACC as the discount rate to discount the post-tax incremental cash flows to arrive at Net Present Value (NPV) of the project. In view of the above, the Commission proposes to continue the discount rate equivalent to post tax WACC in the Draft RERC RE Regulations, 2020.

3.8.5 Accordingly, the provision regarding Tariff Design proposed in the Draft Regulations is as follows:

“13. Tariff Design

13.1 The generic tariff shall be determined, on levelled basis, considering the year of commissioning of the power project, for the tariff period of the project:

Provided that for renewable energy projects having single part tariff with two components, fixed cost component shall be determined on levelized basis considering the year of commissioning of the project, while fuel cost component shall be determined on year of operation basis in the Tariff Order to be issued by the Commission.

13.2 For the purpose of levelled tariff computation, the discount factor equivalent to post tax weighted average cost of capital shall be considered.

13.3 The above principles shall also apply for project specific tariff determination.”

3.9 Despatch principles for electricity generated from Renewable Energy Sources

3.9.1 The Commission has issued RERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2017, which mandates the scheduling requirement for Wind and Solar power projects. The same provisions has been incorporated in RERC (Terms and Conditions for Determination of Tariff for Renewable Energy Sources-Wind and Solar Energy) (Second Amendment) Regulations, 2019 issued on March 5, 2019. The Commission proposes to continue the same approach in the present Draft Regulations.

3.9.2 The Commission notes that the Waste to Energy plants are essential in the interest of environment and public health. The off-take of power from these

projects will significantly help the Swachh Bharat Mission in maintaining the cities clean while disposing of usefully the waste in generating electricity and supplying back to the general public. Also, there are practical limitations regarding the collection and transportation of waste for these plants. Also, a limited capacity of these projects is likely to come up in the State. In view of the above, the Commission decides to treat Municipal Solid Waste projects as Must Run and MSW projects shall not be subjected to merit order despatch principles. However, the scheduling from these projects would be done as per relevant provisions of Grid code, if applicable.

- 3.9.3 The Commission has also analysed the approach under taken by the various ERCs. The Commission decides that Biomass, Biogas and Biomass Gasifier based power plants with installed capacity of 2 MW and above, commissioned after notification of these Regulations, shall not be treated as 'Must Run' power plants and shall be subjected to 'Merit Order Despatch' principles. Further, despatch principles shall be governed as per relevant provisions of the Grid Code.
- 3.9.4 Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020.

"14. Despatch principles for electricity generated from Renewable Energy Sources:

14.1 *Wind, Solar, Wind Solar Hybrid plants and Municipal Solid Waste based plants shall be treated as 'MUST – RUN' power plants and shall not be subjected to 'merit order despatch' principles.*

14.2 *The despatch principles for electricity generated from wind and solar energy plants shall be as per the provisions of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010, as amended from time to time, except where specific provisions have been made under the Rajasthan Electricity Regulatory Commission (Rajasthan Electricity Grid Code) Regulation, 2008 and RERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2017 and amendments thereto.*

14.3 *The despatch principles for electricity generated from other renewable energy plants shall be as per the provisions of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010, as amended from time to time, except where specific provisions have been made under the Rajasthan Electricity Regulatory Commission (Rajasthan Electricity Grid Code) Regulation, 2008 and amendments thereto.*

14.4 *Biomass, Biogas and Biomass Gasifier based power plants with installed capacity of 2 MW and above, commissioned after notification of these Regulations, shall not be treated as 'Must Run' power plants and shall be subjected to 'Merit Order Despatch' principles.*

14.5 *All Biomass, Biogas and Biomass Gasifier based power plants commissioned before notification of these Regulations, shall be treated as 'Must Run' power plants and shall not be subjected to 'Merit Order Despatch' principles.*

4 Financial Principles

In this Section, the financial principles such as Capital Cost, Debt-Equity ratio, Loan and Finance Charges, Depreciation, Return on Equity, Interest on Working Capital, Operation and Maintenances, Rebate and Late Payment Surcharge and Subsidy/ Incentive by Central/ State Government have been discussed.

4.1 Capital Cost

4.1.1 The approach considered to arrive at Capital Cost in case of each technology has been elaborated under the respective technology specific Section.

4.2 Debt-Equity Ratio

4.2.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, Debt Equity ratio is specified as follows:

“Debt-equity ratio

(1) *For the purpose of determination of generic tariff, debt-equity ratio shall be 70:30.*

(2) *For project specific tariff, the following provisions shall apply-
If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan:*

Provided that where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff:

Provided further that the equity invested in foreign currency, if any, shall be designated in Indian rupees on the date of each investment.”

4.2.2 For analysing the trend in the Debt-Equity ratio of various Renewable Energy projects, comparison of debt-equity ratio considered by various ERCs has been done and the Commission observed that CERC and most of the ERCs have adopted the normative Debt Equity ratio of 70:30.

4.2.3 In view of the above, the Commission proposes to retain the debt-equity ratio of 70:30 in the Draft RERC RE Tariff Regulation, 2020.

4.2.4 Further, the Commission notes that, in case of project specific Tariff, the actual equity is to be considered with maximum limit of 30%. Also, the project may have opted for Capital Subsidy. Hence, it is proposed that Debt Equity ratio shall be considered after reduction of capital subsidy from capital cost of the project.

4.2.5 In view above, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020:

“16. Debt Equity Ratio

16.1 For determination of generic tariff and project specific tariff, the debt equity ratio shall be 70:30:

Provided that, for project specific tariff, where the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan:

Provided further that for project specific tariff, where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff:

Provided further that the equity invested in foreign currency, if any, shall be designated in Indian rupees on the date of each investment:

Provided also that debt equity ratio shall be considered after deducting the amount of grant or capital subsidy received for the project for arriving at the amount of debt and equity.

Explanation- The premium, if any, raised by the Generating Company, while issuing share capital and investment of internal resources created out of its free reserves, for the funding of the project, shall be reckoned as paid up capital for the purpose of computing return on equity, provided such premium amount and internal resources are actually utilised for meeting the capital expenditure of the Renewable Energy project. ”

4.3 Loan and Finance Charges

4.3.1 Loan Tenure

4.3.1.1 The loan tenure is the key component of tariff determination. As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy and Biomass, Biogas and Biomass Gasifier, loan tenure is specified as follows:

“Loan Tenure: - For the purpose of determination of generic tariff, loan tenure of 13 years shall be considered. “

4.3.1.2 For analysing the present market conditions, the prevailing loan terms stipulated by REC, PFC and IREDA are summarised as shown in the following Table

Table 1-Comparison of Prevailing Terms of REC, PFC and IREDA

Sr. No.	Particulars	PFC	REC	IREDA
1	Tenor of loan	The max repayment period up to 15 Years for all RE projects except Hydro which is upto 20 years	The repayment period (in addition to moratorium period) for hydro projects shall be 15 years while the rest of the projects will have a repayment of 12 years	The repayment periods shall be maximum of 10 to 15 years (maximum 20 years in case of Hydro projects)

4.3.1.3 The Commission observed that CERC has adopted loan tenure of 15 years in its CERC RE Tariff Regulations, 2020. Hence, in line with the current market trends, the Commission proposes to increase the loan tenure to 15 years from the present 13 years for all the RE Projects.

4.3.1.4 Accordingly, the provisions related to Loan Tenure proposed in the Draft RERC RE Tariff Regulation, 2020 are as follows:

“17.1 Loan Tenure

17.1.1 For the purpose of determination of generic tariff and project specific tariff, loan tenure of 15 years shall be considered”

4.3.2 Interest Rate

4.3.2.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, Interest Rate is specified as follows:

“Interest Rate: -

(a) *The loan arrived in the manner indicated in regulation 12 shall be considered as gross normative loan for calculation of 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 the previous year from the gross normative loan.*

(b) *For the purpose of computation of tariff, normative interest rate of two hundred (200) basis points above the average State Bank of India Marginal Cost of Funds Lending Rates (MCLR) (one year tenure) prevalent during the last available six months shall be considered.*

(c) *Notwithstanding any moratorium period availed by the generating company or project, 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.*

4.3.2.2 For analysing the present market conditions, the prevailing terms stipulated by REC, PFC and IREDA are summarised as shown in the following Table:

Table 2-Comparison of prevailing Terms of REC, PFC and IREDA

Particulars	PFC	REC	IREDA
Rate of Interest	RE projects except Biomass – 10.10% - 11.50% Biomass & Waste to Energy (WTE) – 11.00%-12.50% (with reset after every 3, 5 & 10 years)	RE projects except Biomass – 10.10% - 11.50% Biomass & Waste to Energy (WTE) – 11.00%-12.50% (with reset after every 3 years)	RE projects except Biomass & Waste to Energy– 9.80% - 11.45% Biomass & Waste to Energy (WTE) – 10.25%-11.45% (with reset after every 1 years)

4.3.2.3 The Commission observed that, present rate of interest of PFC, REC and IREDA is in the range of 10.25% - 12.50% for Biomass and WTE projects and 9.80% to 11.45% for other technologies. Further, CERC in its CERC RE Tariff Regulation,

2020 has proposed the same norms.

- 4.3.2.4 Considering the above, the Commission proposes to continue with the existing interest rate provisions as per RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015 in Draft RERC RE Tariff Regulations, 2020. Accordingly, the provisions related to interest rate proposed in the Draft RERC RE Tariff Regulation, 2020 are as follows:

“17.2 Interest Rate

- a) *The loans arrived at in the manner indicated in Regulation 16 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.*
- b) *For the purpose of computation of tariff, normative interest rate of two hundred (200) basis points above Base Rate prevalent during the last available six months shall be considered.*
- c) *Notwithstanding any moratorium period availed by the generating company or project developer, 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.”*

4.4 Depreciation

- 4.4.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, depreciation is specified as follows:

“Depreciation: -

- (1) *The value base for the purpose of depreciation shall be the capital cost determined by the Commission (for generic tariff) or the capital cost admitted by the Commission (for project specific tariff), as the case may be. The salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to a maximum of 90% of the capital cost of the asset.*
- (2) *Depreciation rate of 5.28% per annum for the first 13 years and remaining depreciation shall be spread over the remaining useful life of the project considering the salvage value of the project as 10% of project cost shall be considered.*
- (3) *Depreciation shall be chargeable from the first year of commercial operation:*

Provided that in case of commercial operation of the asset for part of the year, depreciation shall be charged on pro-rata basis.”

- 4.4.2 The depreciation is utilised to primarily meet the debt repayment and hence the depreciation for first 70% of the Project may be spread over the loan tenure and balance depreciation at the end of loan tenure can be spread over the remaining life of the Project.
- 4.4.3 Following the 'Differential Depreciation Approach over the loan tenure and beyond loan tenure over useful life computed on 'Straight Line Method', the Commission now proposes depreciation rate of 4.67% per annum for first 15 years and remaining depreciation to be spread during remaining useful life of the RE projects considering the salvage value of the project as 10% of project cost.
- 4.4.4 Further, the Commission observed that CERC is also following same approach in CERC RE Tariff Regulation, 2020. Accordingly, the provisions related to Depreciation proposed in Draft RERC RE Tariff Regulations, 2020 are as follows:

"18. Depreciation

- 18.1 *The value base for the purpose of depreciation shall be the Capital Cost determined by the Commission (for generic tariff) or the capital cost admitted by the Commission (for project specific tariff), as the case may be.*
- 18.2 *The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset.*
- 18.3 *Depreciation rate of 4.67% per annum for first 15 years and remaining depreciation shall be spread over the remaining useful life of the project considering the salvage value of the project as 10% of the project cost shall be considered.*
- 18.4 *Depreciation shall be chargeable from the first year of commercial operation:
Provided that, in case of determination of project specific tariff, if commercial operation of the asset is for part of the year, depreciation shall be computed on pro rata basis."*

4.5 Return of Equity

- 4.5.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, return on equity is specified as follows:

"Return on Equity

- (1) *The value base for the equity shall be 30% of the Capital Cost as specified under regulation 12.*
- (2) *The normative Return on Equity shall be 14 % to be grossed up by prevailing Minimum Alternate Tax (MAT) as on 1st April of previous year for the entire useful life of the project."*

4.5.2 For analysing the recent trend in the Return on Equity (RoE) of various Renewable Energy projects, comparison of Return on Equity (RoE) considered by various SERCs has been done and the Commission observed that most of SERCs have specified the rate of Return on Equity in the range of 14% to 16%.

Table 3-Comparison of Rate of Return on Equity for ERCs

ERC Name	Rate of Return
CERC,2020	14% grossed up with the tax rate equivalent to latest notified MAT rate for first 20 years and grossed up with latest notified Corporate tax rate for remaining tariff period.
MERC	14% grossed up with the tax rate equivalent to MAT rate as on 1 st April of previous financial year
JERC	14% for mainland areas and 16% for Island area. Grossed up by MAT as on 1 st April of available year
UERC	16% post tax for RE power Projects, 20% (Pre-tax) for first 10 years considering Avg MAT rate and 22% (Pre-tax) from 11 th year onwards considering Avg Corporate Tax.
GERC	14% post tax (grossed up with base rate); Tax Rate- MAT at 21.34% for first 10 years from COD, Corporate tax rate at 34.61% from 11 th year onwards.
MPERC	20% p.a. pre-tax RoE for first 10 years, 24% pre-tax RoE from 11 th year onwards.
KERC	14% grossed up with the tax rate equivalent to MAT rate
TNERC	17.60% pre-tax RoE
TSERC	16% pre-tax to be grossed up with actual tax rate
CSERC	20% per annum for the first 10 years; 24% per annum 11 th year onwards.
HPERC	The normative return on Equity shall be 17% per annum on pre-tax basis and shall not be subject to any adjustment on account of any taxes

4.5.3 There are various methods of determining the cost of equity such as the Arbitrage Pricing Model, Dividend Growth Model, and Capital Asset Pricing Model (CAPM). The appropriate model may be used to benchmark the cost of equity. Among all the above models, CAPM is generally the most preferred model for determination of cost of equity in the Country. CAPM has also been accepted by various Regulators internationally as well. Further, CAPM model has also been adopted in specifying the Return on Equity for Conventional Generating Stations and Transmission Business in RE Tariff Regulations, 2019.

4.5.4 Further, CAPM also captures issues related to expected risk premium for the market over the risk free rate. In order to arrive at the risk free rate, historical trends of various benchmarks rates such as Bank Rate, SBI PLR, Deposit Rates and Government Securities rate can be considered. In order to assess the market risk premium, the returns provided by the market over the historical period can be considered. Based on the above analysis the market risk premium has been derived.

4.5.5 The Commission has reviewed the 10 year G-Sec rates for the past six months and considered the average of the same as the Risk free Rate. The Commission has considered the average return of BSE Sensex over 20 years and considered the average of the same as Market Return Rate. The Commission has considered the measure of volatility of security in comparison to market as a whole.

4.5.6 The cost of equity through CAPM model has been worked out as follows:

Required/Expected Return = Risk Free Rate R_f + (Market Return R_m – Risk Free Rate R_f) x Beta,

Where R_f = average 10-year yield of zero-coupon G-Sec, i.e., 6.71%;

R_m = average return of BSE Sensex over 20 years, i.e., 14%;

Beta = measure of volatility of security in comparison to market as a whole, i.e., around 1.01

With this approach the Cost of equity works out to be around 14%.

4.5.7 Considering the present market scenario, wherein competitively bid tariffs in solar and wind projects over the last couple of years have shown declining trends, the Commission has inferred that the market expectation of ROE has come down. Further, as compared to conventional Generation projects, the gestation period of RE project is significantly lower. Hence, RE projects are exposed to lower risk during the construction phase compared to conventional generation projects.

4.5.8 Therefore, the Commission proposes that prevailing rate of RoE of 14% to be continued with grossing up with MAT Rate for the entire life of the project. Going forward, Minimum Alternate Tax/Corporate Tax are expected to be lowered and the Commission has observed that the effective tax rate is lower than the Corporate Tax rate. Hence, for the certainty of regulatory principles, the Commission proposes that the normative RoE shall be grossed up by the latest available notified Minimum Alternate Tax (MAT) rate for the entire Tariff Period.

4.5.9 Accordingly, the Commission proposes the following proviso in Draft RERC RE Tariff Regulations, 2020:

“19. Return on Equity

19.1 The value base for the equity shall as determined under Regulation 16.

19.2 The normative Return on Equity shall be 14%. The normative Return on Equity shall be grossed up by the latest available notified Minimum Alternate Tax (MAT) rate for the entire Tariff Period.”

4.6 Interest on Working Capital

4.6.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, the Interest on Working Capital is specified as follows:

“Interest on Working Capital: -

- (1) The Working Capital requirement with respect to Wind and Solar energy plants shall be computed in accordance with the following:
 - (a) Operation and Maintenance (O&M) Expenses for one month;
 - (b) Receivables equal to one and a half months of charges for sale of electricity calculated at the normative CUF;
 - (c) Maintenance Spares at 15% of O&M Expenses.
- (2) The Working Capital requirement with respect to Biomass, Biogas and Biomass Gasifier based power plants shall be computed in accordance with the following:
 - (a) Fuel cost for four months at normative PLF
 - (b) Operation and Maintenance (O&M) Expenses for one month;
 - (c) Receivables equivalent to one and a half (1.5) months of fixed and variable charges for sale of electricity calculated at the normative PLF;
 - (d) Maintenance Spares at 20% of O&M Expenses.
- (3) Interest on Working Capital shall be at interest rate equivalent to the normative interest rate of three hundred (300) basis points above the average State Bank of India MCLR (One Year Tenor) prevalent during the last available six months for the determination of tariff.”

4.6.2 The prevailing interest rates in market were analysed and it is observed that the prevailing interest rates stipulated by REC and PFC (for private sector) for short term loans are as under:

- PFC – 11.50% (3-6 months) and 11.75% (6-12 months)
- REC - 11.25% (3-6 months) and 11.50% (6-12 months)

4.6.3 The Commission observed that RERC Tariff Regulations, 2019 for conventional projects has stipulated that the interest rate for interest on working capital shall be equal to one year marginal cost of lending rate (MCLR) of the State Bank of India plus 300 basis points. The same approach has been followed in CERC RE Tariff Regulation, 2020 for determination of Interest on working capital and made equal to rate of interest specified for conventional generators.

4.6.4 Hence, the Commission proposes to follow the same approach in Draft RERC RE Tariff Regulations, 2020.

4.6.5 Accordingly, the Commission proposes the following proviso in Draft RE Tariff Regulations, 2020:

“20 Interest on Working Capital

20.1 The Working Capital requirement in respect of wind power projects, small hydro projects, solar PV power projects, floating solar PV projects, solar

thermal power projects, and renewable energy with storage projects shall be computed in accordance with the following:

- a) Operation & Maintenance expenses for one month;
- b) Receivables equivalent to one and half (1.5) months of tariff for sale of electricity calculated on the normative Capacity Utilisation Factor (CUF);
- c) Maintenance spare @ 15% of operation and maintenance expenses.

20.2 The Working Capital requirement in respect of biomass power projects with Rankine cycle technology, biogas power projects, biomass gasifier based power projects, non-fossil fuel based co-generation projects, municipal solid waste based power projects and refuse derived fuel based power projects shall be computed in accordance with the following clause:

- a) Fuel costs for four months equivalent to normative Plant Load Factor (PLF);
- b) Operation & Maintenance expenses for one month;
- c) Receivables equivalent to one and half (1.5) months of tariff for sale of electricity calculated at the normative PLF;
- d) Maintenance spare @ 20% of operation and maintenance expenses.

20.3 In case of renewable hybrid energy projects, the Working Capital requirement shall be sum of the Working Capital requirement determined as per norms applicable for renewable energy sources, in proportion to their rated capacity in the project.

Interest on Working Capital shall be at interest rate equivalent to the normative interest rate of three hundred (300) basis points above Base Rate prevalent during the last available six months for the determination of tariff."

4.7 Operation and Maintenance Expenses

4.7.1 The existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015 specifies the escalation rate of 5.85% per annum for determination of Operation and Maintenance Expenses for the Control Period.

4.7.2 The Commission observed that there is wide variation in the range of the O&M expenses for RE projects. Considering the wide variation in the O&M expenses, the Commission proposes to normalise the O&M expenses by applying average escalation rate determined for FY 2014-15 to FY 2018-19 which works out to be WPI of 1.31% and CPI of 4.92%. Thus, the escalation rate has been calculated based on the five (5) years average of CPI and WPI indices and by considering the weightage of CPI and WPI in the ratio of 70:30. Hence, the escalation factor for O&M expenses works out to be 3.84%. The similar methodology of specifying escalation rate for O&M expenses has been adopted by CERC in its RE Tariff Regulations, 2020.

4.7.3 Accordingly, the Commission proposes the following in Draft RERC RE Tariff Regulations, 2020:

“21. Operation and Maintenance Expenses

- 21.1 Operation and maintenance expenses shall be determined for the Tariff Period based on the normative O&M expenses specified by the Commission subsequently in these Regulations for the first Year of Control Period.
- 21.2 Normative O&M expenses allowed during first year of the Control Period (i.e. FY 2020-21) under these Regulations shall be escalated at the rate of 3.84% per annum over the Tariff Period.”

4.8 Rebate and Late Payment Surcharge

- 4.8.1 The rebate and late payment surcharge as per existing provisions in RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015 are as follows:

”Rebate: -

- (1) For payment of bills of the generating company through letter of credit or by cash/cheque within three working days of presentation of bills, a rebate of 2% shall be allowed.
- (2) If payments of bills of the generating company are made through letter of credit or by cash/cheque beyond three working days of presentation of bills but within thirty days of presentation of bills, a rebate of 1% shall be allowed.

“Provided that the rebate w.e.f. 1.4.2019 for payment of bills shall be as per provisions of rebate specified In RERC (Terms and Conditions for Determination of Tariff) Regulations, 2019 as amended from time to time.”

Late Payment Surcharge: -

In case the payment of any bill is delayed beyond a period of 45 days from the date of presentation of bill, a late payment surcharge of 1.25% per month calculated on a daily basis shall be levied by the generating company.”

- 4.8.2 The Commission observes that there should be provisions for ensuring ease of payment mechanisms and hence proposes to include payment through National Electronic Fund Transfer (NEFT) or Real Time Gross Settlement (RTGS) payment.
- 4.8.3 The Commission is of the view that the principles of rebate and late payment surcharge for RE Projects and conventional projects should be more or less similar. Hence, the Commission has aligned the provisions of rebate and late payment surcharge in Draft RE Tariff Regulations, 2020 with Tariff Regulations, 2019 as follows:

“22. Rebate

- 22.1 For payment of bills of the generating company effected through letter of credit or by cash/cheque or through electronic transfer within 5 working days of presentation of bills, a rebate of 1.5 % shall be allowed.

Explanation: In case of computation of '5 days', the number of days shall be counted consecutively without considering any holiday. However, in case the last day or 5th day is official holiday, the 5th day for the purpose of Rebate shall be construed as the immediate succeeding working day (as per the official State Government's calendar, where the Office of the Authorised Signatory or Representative of the Beneficiary, for the purpose of receipt or acknowledgement of Bill is situated).

22.2 If payments of bills of the generating company are made beyond 5 working days through Letter of Credit or by cash/cheque or through electronic transfer but within a period of 30 days of presentation of bills, a rebate of 1% shall be allowed.

23. Late payment surcharge

In case the payment of bills of renewable energy tariff is delayed beyond a period of 45 days from the date of presentation of bills, a late payment surcharge equivalent to Base Rate as on 1st April of the respective year plus 400 basis points per annum on daily basis shall be levied by the Generating Company."

4.9 Subsidy or incentive by the Central /State Government

4.9.1 As per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Biomass, Biogas and Biomass Gasifier, 2015, Subsidy or incentive by the Central /State Government is specified as follows:

"Subsidy or incentive by the Central / State Government

The Commission shall take into consideration any incentive or subsidy or benefit available from Central or State Government, including accelerated or higher 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 or higher depreciation, if availed, for the purpose of tariff determination:

- (a) Assessment of benefit shall be based on normative Capital Cost and accelerated or higher depreciation rate as per relevant provisions under Income Tax Act and Corporate Income Tax Rate;
- (b) Capitalization of Wind, Solar PV, Solar Thermal, Biomass, Biogas and Biomass Gasifier based power plants during second half of fiscal year;
- (c) Per unit benefit shall be derived on levelised basis at discount factor determined as per regulation 9 of these Regulations:

Provided further that in case the generating company is not claiming

accelerated or higher depreciation benefit, the Power Purchase Agreement entered into with the generating company shall include an undertaking by the generating company that accelerated or higher depreciation benefit would not be availed for the project:

Provided further that if accelerated or higher depreciation benefit has been claimed despite submission of the undertaking, the distribution licensee shall be entitled to recover amount wrongly claimed along with penal charges @ 1.50 % per month calculated on daily basis

Provided further that the Generation Based Incentive/Tariff Subsidy, if allowed by the Central/State Government would be governed by the terms and conditions of such scheme."

4.9.2 The Commission proposes that it shall take into account subsidy or incentive offered by Central or State Government at time of determination of tariff under these regulations. In case of Project specific tariff, subsidy or incentive are being accounted. However, in case of generic tariff, there may be cases where project may receive subsidy or incentive after determination of tariff and which is not accounted for during determination of tariff. Hence, for such subsidy or incentive, which is not considered in tariff determination, it is proposed that the same shall be adjusted in subsequent bills after receipt of such grant, subsidy or incentive in suitable instalments or within such period as may be stipulated by the Commission. It is also proposed that any generation-based incentive, which is specifically over and above the tariff, shall neither be taken into account while determining the tariff nor be adjusted in subsequent bills.

4.9.3 Accordingly, the Commission proposes following provision to be added under subsidy or incentive by the Central and State Governments in addition to the existing provision.

".....

24.2 Any grant, subsidy or incentives availed by renewable energy project, which is not considered at time of determination of tariff, shall be deducted by the beneficiary in subsequent bills after receipt of such grant, subsidy or incentive in suitable instalments or within such period as may be stipulated by the Commission.

24.3 In case the Central or State Government or their agencies provide any generation based incentive, which is specifically over and above the tariff, such incentive shall neither be taken into account while determining the tariff nor be deducted by the beneficiary in subsequent bills raised by the particular Renewable energy project."

5 TECHNOLOGY SPECIFIC PARAMETERS

5.1 Technology specific parameter for Wind Power Projects

5.1.1 Overview

5.1.1.1 Under this section, parameters such as Capital Cost, Capacity Utilization Factor, Operation and Maintenance Expenses and Tariff Determination for Wind Power Projects have been discussed.

5.1.2 Capital Cost

5.1.2.1 The Capital Cost for Wind power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014, are as follows: -

“22. Capital Cost

- (1) *The normative Capital Cost for wind energy plants shall be inclusive of all capital works including plant and machinery, civil works, erection and commissioning, financing and interest during construction, etc., and evacuation infrastructure upto the inter-connection point.*
- (2) *The normative Capital Cost for wind energy plants for FY 2014-15 shall be Rs. 565 Lakh/MW inclusive of Rs. 25 Lakh/MW towards cost of transmission system including pooling station upto the interconnection point, and this Rs. 25 Lakh/MW also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee*
- (3) *Capital Cost Indexation Mechanism as outlined under regulation 23 shall be applicable for determining tariffs for the plants commissioned for each subsequent year during the Control Period:*

Provided that the Commission may review the Capital Cost at the end of third year of the Control Period, i.e., for FY 2017-18, if considered appropriate by the Commission, as outlined in regulation 5.”

5.1.2.2 It is envisaged that, tariff for Wind power projects shall be invariably determined through the process of competitive bidding. Hence, the Commission has not specified Capital Cost for Wind energy projects. However, it is proposed in the Draft RERC RE Tariff Regulations, 2020 that, Capital Cost for such project shall be determined only on project specific basis considering the prevailing market trends.

5.1.3 Capacity Utilisation Factor

5.1.3.1 The Capacity Utilisation Factor for Wind power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“24. Capacity Utilization Factor

The Capacity Utilisation Factor (CUF) for wind power plants shall be as follows:

Sr.No	Districts	CUF
1	Jaisalmer, Jodhpur & Barmer	21%
2	Other Districts	20%

The de-ration in Capacity Utilization Factor shall be 1.25% of CUF from 6th, 10th, 14th and 18th year.”

5.1.3.2 The Commission notes that CERC in its CERC RE Tariff Regulations, 2020 has specified CUF separately for five wind zones. The Commission in the existing Regulations has specified CUF separately for two wind zones viz. Jaisalmer, Jodhpur & Barmer districts as 21% and Other Districts as 20%. The due preference has been already given by the Commission while considering the higher CUF for area having higher potential of wind energy. Hence, the Commission decides to continue with the existing norms of CUF for Draft RERC RE Tariff Regulations, 2020.

5.1.3.3 Further, the Commission noted that the existing regulations has specified de-ration in CUF of 1.25% after every four year from 6th year onwards. The technology has been matured in past decade. Allowing such deration would not be appropriate considering technological development in Wind energy. Also, the Commission notes that such proviso is not specified by CERC in its CERC RE Tariff Regulations, 2020 as well as most of other SERCs. Hence, the Commission decides to remove the proviso for de-ration in CUF for Wind Power Projects.

5.1.4 Operation and Maintenance Expenses

5.1.4.1 The Operation and Maintenance Expenses for Wind power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“25. Operation and Maintenance Expenses

(1) The normative O&M expenses for the first year of the Control Period, i.e., FY 2014-15 shall be Rs. 7.87 Lakh per MW.

(2) Normative O&M expenses allowed under these Regulations shall be escalated at the rate of 5.85% per annum over the Tariff Period to compute the levelised tariff.”

5.1.4.2 It is envisaged that, tariff for Wind power projects shall be invariably determined though the process of competitive bidding. Hence, the Commission has not specified O&M expenses for Wind energy projects.

However, it is proposed in the Draft RERC RE Tariff Regulations, 2020 that O&M expenses for such project shall be determined only on project specific basis considering the prevailing market trends.

5.1.5 **Tariff Determination in case of Re-powering of Wind Power Project**

5.1.5.1 In the Draft Regulations, the Commission has also proposed the determination of tariff for re-powering of Wind power project. Although, tariff for repowering of Wind power projects shall be invariably determined through the process of competitive bidding, the following pre-conditions are proposed by the Commission in Draft Regulations:

- (a) Any existing wind project that have completed at least 10 years in operation shall be considered for Re-powering.
- (b) In case of power being procured by Distribution Licensee through existing PPA, the energy generated corresponding to average of last three year's generation prior to re-powering would continue to be procured on the terms of PPA in-force and remaining additional generation may be purchased by Distribution Licensee at a tariff discovered through competitive bidding in the State at the time of commissioning of the re-powering project.

5.2 **Technology Specific parameters for Solar PV Power Plants**

5.2.1 **Overview**

5.2.1.1 Under this section, parameters such as Capital Cost norm, Capacity Utilization Factor, Auxiliary Consumption and Operation and Maintenance Expenses for Solar PV Power Projects have been discussed.

5.2.2 **Capital Cost**

5.2.2.1 The Capital Cost for Solar PV power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014, are as follows:

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"26. Capital Cost

- (1) *The normative Capital Cost for solar PV plants shall be inclusive of all capital works including plant and machinery, civil works, erection and commissioning, financing and interest during construction, etc., and evacuation infrastructure upto the interconnection point.*
- (2) *The normative Capital Cost for Solar PV power plants shall be determined by the Commission separately for each year by a separate Order."*

5.2.2.2 It is envisaged that, tariff for Solar PV projects shall be invariably determined through the process of competitive bidding. Hence, it is proposed in the Draft

RERC RE Tariff Regulations, 2020 that the Commission shall determine only project specific capital cost considering the prevailing market trends.

5.2.3 Capacity Utilisation Factor

5.2.3.1 The Capacity Utilisation Factor for Solar PV Power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“27. Capacity Utilization Factor

The Capacity Utilization Factor for Solar PV plants shall be 20% with deration factor of 0.5% of CUF every year after second year.”

5.2.3.2 The Commission decides to continue with the existing norm of CUF of 20% for Solar PV projects. Further, it is noted the Solar PV technology has been matured in past decade. Allowing such deration in CUF at this stage would not be appropriate considering technological development in Solar PV projects. Also, the Commission notes that such proviso is not specified by CERC in its CERC RE Tariff Regulations, 2020 as well as most of other SERCs. Hence, the Commission decides to remove the proviso for de-ration in CUF for Solar PV Projects.

5.2.4 Operation and Maintenance Expenses

5.2.4.1 The Operation and Maintenance Expenses for Solar PV Power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“28. Operation and Maintenance Expenses

(1) The normative O&M expenses for the first year of the Control Period, i.e., FY 2014- 15, shall be Rs. 12.76 Lakh/MW.

(2) Normative O&M expenses allowed under these Regulations shall be escalated at the rate of 5.85% per annum over the Tariff Period to compute the levelised tariff.”

5.2.4.2 Since, tariff for Solar PV projects shall be invariably determined through the process of competitive bidding, it is proposed that the Commission shall determine only project specific O&M Expenses considering the prevailing market trends.

5.2.5 Auxiliary Consumption

5.2.5.1 The Commission notes that existing Regulations do not provide norm for auxiliary consumption for Solar PV projects.

5.2.5.2 The Commission notes that CERC in its CERC RE Tariff Regulations, 2020 has increased auxiliary consumption norm from 0.25% to 0.75%. Earlier, for hydro

power plants, in addition to the auxiliary consumption, transformation losses of 0.50% were also allowed separately. The same 0.50% of transformation losses was considered by CERC, in addition to auxiliary consumption of 0.25%.

- 5.2.5.3 It is observed that for grid connected projects, auxiliary consumption also includes the losses of transformer apart from other auxiliary consumption such as consumption towards solar trackers, lighting, module cleaning, etc. There is consumption in large Solar PV project to meet the site-specific requirement.
- 5.2.5.4 Hence, in line with the approach adopted by CERC in its CERC RE Tariff Regulations, 2020, the Commission has proposed to include the provision of maximum auxiliary consumption of 0.75% for Solar PV Projects in the Draft RERC RE Tariff Regulations, 2020.

5.3 Technology Specific parameters for Solar Thermal Power Plants

5.3.1 Overview

- 5.3.1.1 Under this section, parameters such as Capital Cost norm, Capacity Utilization Factor, Auxiliary Consumption and Operation and Maintenance Expenses for Solar Thermal Power Projects have been discussed.

5.3.2 Capital Cost

- 5.3.2.1 The Capital Cost for Solar Thermal power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014, are as follows:

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"29. Capital Cost

(1) The normative Capital Cost for Solar Thermal power plants shall be inclusive of all capital works including plant and machinery, civil works, erection and commissioning, financing and interest during construction etc., and evacuation infrastructure upto the inter-connection point.

(2) The normative Capital Cost for Solar Thermal power plants shall be determined by the Commission separately for each year by a separate Order."

- 5.3.2.2 Since, the tariff for Solar Thermal project is to be determined on project specific basis, the Commission shall determine only project specific capital cost considering the prevailing market trends.

5.3.3 Capacity Utilisation Factor

- 5.3.3.1 The Capacity Utilisation Factor for Solar Thermal power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“30. Capacity Utilization Factor

The Capacity Utilization Factor for Solar Thermal power plants shall be 23% with deration factor of 0.25% of CUF every year after four years.”

5.3.3.2 The Commission decides to continue with the existing CUF norm of 23% for Solar Thermal projects, which is also in line with CERC RE Tariff Regulations, 2020.

5.3.3.3 As discussed earlier, the Solar PV technology has been matured in past decade. Allowing deration in CUF at this stage would not be appropriate considering technological development in Solar PV projects. Also, the Commission notes that such proviso is not specified by CERC in its CERC RE Tariff Regulations, 2020 as well as most of other SERCs. Hence, the Commission decides to remove the proviso for de-ration in CUF for Solar PV Projects.

5.3.4 Operation and Maintenance Expenses

5.3.4.1 The Operation and Maintenance Expenses for Solar Thermal power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows: -

“31. Operation and Maintenance Expenses

(1) The normative O&M expenses for the first year of the Control Period, i.e., FY 2014-15 shall be Rs. 17.24 Lakh/MW.

(2) Normative O&M expenses allowed under these Regulations shall be escalated at the rate of 5.85% per annum over the Tariff Period to compute the levelised tariff.”

5.3.4.2 Since, the tariff for Solar Thermal project is to be determined on project specific basis, the Commission shall determine only project specific O&M Expenses considering the prevailing market trends.

5.3.5 Auxiliary Consumption

5.3.6 The Auxiliary Consumption for Solar Thermal power projects as per the existing provisions in the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 are as follows:

“32. Auxiliary Consumption

The auxiliary consumption factor shall be 6.5%”.

5.3.6.1 The Commission decides to continue with the existing Auxiliary Consumption norm of 6.5% for Solar Thermal projects.

5.4 Technology specific parameter for Biomass Power Plants based on Rankine Cycle

5.4.1 Overview

5.4.1.1 In order to continue promotion of Biomass Power Plants based on Rankine Cycle the Commission has proposed to specify parameters such as capital cost norm, plant load factor, auxiliary consumption, station heat rate, calorific value, fuel price, O&M Expenses and Use of fossil fuel or solar power for biomass power plants based rankine cycle, which have been discussed.

5.4.2 Capital Cost

5.4.2.1 The Capital Cost for Biomass power projects based on Rankine cycle technology, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

“22. Capital Cost

- (1) *The normative Capital Cost for Biomass power plants shall be inclusive of all capital works including plant and machinery, civil works, erection and commissioning, financing and interest during construction etc., and evacuation infrastructure up to the interconnection point.*
- (2) *The normative Capital Cost for Biomass power plants for FY 2015-16 shall be Rs. 540 Lakh/MW with water cooled condenser and Rs. 575 Lakh/MW for Biomass power plants with air cooled condenser. The capital cost is inclusive of Rs. 15 Lakh/MW towards cost of transmission system upto the interconnection point and this Rs. 15 Lakh/MW also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee and Distribution Licensee as the case may be.*
- (3) *Capital Cost Indexation Mechanism as outlined at Annexure-II shall be applicable for determining tariffs for the plants commissioned for each subsequent year during the Control Period.*

Provided that the capital cost as specified for FY 2017-18 of the control period will remain valid for the entire remaining duration of control period unless reviewed earlier by the Commission.”

5.4.2.2 Further, the Capital Cost considering the latest generic tariff order for biomass power plant based with rankine cycle dated January 15, 2020 and March 8, 2019 are as follows;

*“Water Cooled – Rs. 527.78 Lakh/MW incl. of other charges
Air Cooled – Rs. 561.98 Lakh/MW incl. of other charges”*

5.4.2.3 The Commission observed that CERC and most of the ERCs have specified Capital Cost for Biomass projects in RE Tariff Regulations. MERC and JERC have specified project Specific Tariff determination for the Capital Cost. The Capital Cost norms specified by various ERCs for biomass power projects are follows:

Table 4-Comparison of Capital Cost for biomass power projects by various ERCs

CERC 2020	MERC '19	JERC '19	UERC '18	KERC '18	MPERC '17
Rs. 5.59 to Rs. 6.52 Cr/MW	Project Specific	Project Specific	Rs. 5.59 to 6.52 Cr/MW	Rs. 5.76 to Rs 5.86 Cr/MW	Rs. 4.50 Cr/MW

5.4.2.4 Based on the analysis of the capital cost considered by various ERCs, the Commission observed that capital cost specified by ERCs is in marginal variation with the Capital Cost approved by RERC in its RE Tariff Regulations. Hence, it is proposed to continue with the same benchmark capital cost as specified in to latest generic tariff order for biomass power plant based with rankine cycle dated January 15, 2020. Further, no escalation in Capital cost is considered. The capital cost as specified for FY 2020-21 of the control period will remain valid for the entire remaining duration of control period unless reviewed earlier by the Commission.

5.4.2.5 Accordingly, the Commission proposes the benchmark capital cost of Rs 527.78 lakh/MW with water cooled condenser and Rs. 561.98 lakh/MW for Biomass power plants with air cooled condenser for FY 2020-21.

5.4.2.6 It is further clarified that, this capital cost is inclusive of Rs. 15 Lakh/MW towards cost of transmission system upto the interconnection point and this Rs. 15 Lakh/MW also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee and Distribution Licensee as the case may be.

5.4.3 **Plant Load Factor**

5.4.3.1 The Plant Load Factor for Biomass power projects based on Rankine cycle technology, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"23. Plant Load Factor

(1) The Plant Load Factor (PLF) for determining the fixed charges component of tariff shall be as follows:

- | | |
|--|------------|
| <i>(a) During stabilisation</i> | <i>60%</i> |
| <i>(b) During first year after stabilisation</i> | <i>70%</i> |
| <i>(c) From Year-2 Onwards</i> | <i>75%</i> |

(2) The stabilisation period shall not be more than six months from the date of the commissioning of the plant."

5.4.3.2 The Commission has reviewed PLF norms specified by various ERCs for Biomass power projects based on Rankine cycle technology, which are as follows.