Table 5-Comparison of PLF for biomass power projects by various ERCs

ERC	Plant Load factor (%)
CERC, 2020	80%
MERC	During Stabilization (6 months) 60%,
	During remaining period of first year after stabilization: 70%
	From second year onwards: 80%
JERC	First Year: 70%
	Second Year: 80%
UERC	During Stabilization (6 months) 60%,
	During remaining period of first year after stabilization: 70%
	From second year onwards: 80%
GERC	First Year: 70%
	Balance Life: 80%
MPERC	Same as CERC
KERC	75%
TNERC	80%
CSERC	80%

5.4.3.3 Based on the review of orders of various ERCs and CERC, the Commission observed that ERCs of Tamil Nadu, Karnataka, Chhattisgarh and CERC are following approach of uniform PLF for all the years without any relaxation for stabilisation period.

5.4.3.4 In view of the above, the Commission proposes to specify a uniform PLF of 80% PLF for all years without any relaxation during the stabilisation period in the Draft RERC RE Tariff Regulations, 2020.

5.4.4 Auxiliary Consumption

5.4.4.1 The Auxiliary Consumption 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: -

"***24. Auxiliary Consumption***

(1) *The auxiliary power consumption factor for water cooled condensers shall be considered as 10.5% (during stabilisation) and 10% (after stabilisation) for the determination of tariff.*

(2) *The auxiliary power consumption factor for air cooled condensers shall be considered as 12.5% (during stabilisation) and 12% (after stabilisation) for the determination of tariff."*

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

Table 6-Comparison of Auxiliary Consumption for biomass power projects by various ERCs

ERC	Aux. Cons. (%)
CERC, 2020	For Projects using water cooled condenser- 10%

ERC	Aux. Cons. (%)
	For Projects using air cooled condenser- 12%
MERC	10%
JERC	For water cooled condenser:
	1st Year: 11% & From 2nd Year: 10.0%
	For air cooled condenser:
	1st Year: 13% & From 2nd Year: 12%
UERC	For water cooled condenser:
	1st Year: 11% & From 2nd Year: 10.0%
	For air cooled condenser:
	1st Year: 13% & From 2nd Year: 12%
GERC	10%
MPERC	10%
KERC	10%
TNERC	10%
CSERC	15%

5.4.4.3 The Commission observed that most of ERCs are following the approach followed by CERCs.

5.4.4.4 In view of the above, the commission proposes normative auxiliary consumption for Biomass power projects as for project using water- cooled condenser 10% and for project using air-cooled condenser 12% in line with CERC RE Tariff Regulations, 2020.

5.4.5 **Station Heat Rate**

5.4.5.1 The Station Heat Rate for Biomass power projects based on Rankine cycle technology, as per the existing Tariff Regulations, are 4200 kcal/kwh for water cooled condenser and 4440 kcal/kwh for air cooled condenser. Also, existing regulations specified separate Station heat rate during stabilization period and after stabilization period.

5.4.5.2 Further, the comparison of Station Heat Rate specified by CERC and various SERCs for Biomass project is shown in the following Table:

Table 7-Comparison of SHR for biomass power projects by various ERCs

ERC	Station Heat Rate
CERC, 2020	For Project using travelling grate boilers- 4200 kCal/kWh
	For Project using AFBC boilers- 4125 kCal/kWh
MERC	4200 kCal/kWh
JERC	4200 kCal/kWh for Travelling grate Boilers
	4125 kCal/kWh for AFBC boilers
UERC	4200 kCal/kWh for Travelling grate Boilers
	4125 kCal/kWh for AFBC boilers

ERC	Station Heat Rate
GERC	3800 kCal/kWh for Water Cooled Condenser
	3950 kCal/kWh for Air Cooled Condenser
MPERC	4200 kCal/kWh
TNERC	3840 kCal/kWh
CSERC	4000 kCal/kWh

5.4.5.3 The Commission observed that CERC and most of ERCs are following the approach followed by CERCs. Further, it is noted that CERC in its RE Tariff Regulations, 2020 has removed relaxation in Station Heat Rate during stabilization period in line with the approach adopted for thermal generating stations. The same approach is adopted in the present Draft Regulations.

5.4.5.4 In view of the above, the Commission proposes normative SHR for Biomass power projects as for project using travelling grate boilers: 4200 kCal/kWh and for project using AFBC boilers: 4125 kCal/kWh

5.4.6 Calorific Value

5.4.6.1 The Calorific Value 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: -

"***26. Calorific Value***

The calorific value of the biomass fuel used for the purpose of determination of tariff shall be 3400 kCal/kg."

5.4.6.2 The Commission observed that Calorific Value of Biomass considered by most of ERCs and CERC is in the range of 3100-3611 kCal/kg. The Calorific value norms specified by various SERCs for biomass power projects, are as follows:-

Table 8-Comparison of Calorific value for biomass power projects by various ERCs

ERC	CERC, 2020	MERC	JERC	UERC	GERC	MPERC	TNERC
Calorific Value	3100 kCal/kg	3611 kCal/kg	Project Specific	3100 kCal/kg	4423 kCal/kg	3100 kCal/kg	3200 kCal/kg

5.4.6.3 Accordingly, the Commission proposes to continue with existing calorific value of 3400 kCal/kg in the Draft RERC RE Tariff Regulations, 2020.

5.4.7 Operation and Maintenance Expenses.

5.4.7.1 The Operation and Maintenance expenses 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: -

"***27. Operation and Maintenance Expenses***

(1) *The normative O&M expenses for the first year of the Control Period, i.e., FY 2015-16 shall be Rs. 35.64 Lakh per MW for water cooled*

condenser and Rs. 38 Lakh/MW for air cooled condenser

(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 levellised tariff.*

5.4.7.2 Further, O&M expenses considering the latest generic tariff order for biomass power plant based with rankine cycle dated 15.01.2020 and 08.03.2019, O&M expenses are as follows;

"Water Cooled – Rs. 42.27 Lakh/MW
Air Cooled – Rs. 45.07 Lakh/MW"

5.4.7.3 The Commission has determined escalation rate 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 years average CPI and WPI indices by considering the weightage of 70% CPI and 30% WPI. Hence, the Commission proposes O&M expenses escalation rate of 3.84% per annum for the Tariff Period for the purpose of determination of levellised tariff.

5.4.7.4 Therefore, the normative expenses approved for FY 2019-20 have been escalated with 3.84% to arrive at normative O&M expenses for FY 2020-21 which works out to Rs. 46.46 Lakh per MW for water cooled condenser and Rs. 49.53 Lakh/MW for air cooled condenser for Biomass power projects in the Draft RERC RE Tariff Regulations, 2020.

5.4.7.5 It is also proposed that normative O&M expenses allowed shall be escalated at the rate of 3.84% per annum over the Tariff Period to compute the levellised tariff.

5.4.8 **Fuel Price**

5.4.8.1 The Fuel Price 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: -

"28. Fuel Price

Biomass fuel price shall be Rs. 2550/MT for FY 2015-16. This price shall be subject to revision prospectively during the course of the year through a separate order based on recommendation of the State Level Committee constituted by the Commission consisting of representatives of Nodal Agency, State Government, Distribution Licensee and any other organisation as decided by the Commission. The Committee shall recommend biomass fuel price once in every two years based on the fuel study conducted by RREC. The State Level Committee shall also recommend the annual escalation in the Biomass fuel price for the year immediately following the year for which the fuel price has been recommended by it based on the fuel study conducted by RREC. Thereafter, the fuel cost including annual escalation would again be revisited by the Committee taking into account the prevailing market conditions, and

the cycle would continue till the end of the control period. Alternatively, the Fuel Price Indexation Mechanism as outlined at ***Annexure-III*** *shall be applicable for adjustment of fuel prices for subsequent years of the control period till FY 2017-18 in case developer wishes to opt for indexing mechanism.*

Provided that the fuel cost arrived at as above shall be applicable to the Biomass power plants commissioned during the current control period and also during the earlier control period FY 2009-15."

5.4.8.2 Further, in the latest generic tariff order for biomass power plant based with rankine cycle dated 15.01.2020 and 08.03.2019, fuel price is considered as Rs. 2958.25/MT based on recommendations of State level committee.

5.4.8.3 The Commission, in its order dated 08.03.2019 in matter of suo-motu determination of generic tariff for Biomass, Biogas and Biomass Gasifier based power plants for FY 2018-19 gave following judgment. The relevant paragraphs are reproduced below: -

> *"In terms of Regulation 28 of the RERC RE – Biomass, Biogas and Biomass Gasifier Tariff Regulations, 2015, the State Level Committee constituted by the Commission shall recommend the Biomass fuel price once in every two years based on the fuel study conducted by RREC. Besides this, the Committee shall also recommend the annual escalation in the Biomass fuel price for the year immediately following the year for which the fuel price has been recommended by it based on the fuel study conducted by RREC. Thereafter, the fuel cost including annual escalation would be revisited by the Committee taking into account the prevailing market conditions, and the cycle would continue till the end of the control period.*
>
> *The State Level Committee has recommended Biomass fuel price as 2875/MT (=Rs 2775/MT base price + Rs 100/MT towards stacking & covering and feeding cost) for FY 2017-18 and annual escalation of 3% (max.) in the base price of ` 2775/MT for FY 2018-19. Based on the above recommendations of the Committee, Commission specified the Biomass fuel price of 2875/MT (= 2775/MT base price + 100/MT towards stacking & covering and feeding cost) for FY 2017-18. Considering annual escalation of 3% on base price of ` 2775/MT, as recommended by the State Level Committee, the biomass fuel price works out to be 2958.25/MT (= 3% rise in 2775/MT base price + 100/MT) for FY 2018-19. Accordingly, the Biomass fuel price has been considered as 2958.25/MT for FY 2018-19 in this order."*

5.4.8.4 Further, the Commission, in its order dated 15.01.2020 in matter of suo-motu determination of generic tariff for Biomass, Biogas and Biomass Gasifier based power plants for FY 2019-20 gave following judgment. The relevant paragraphs are reproduced below: -

> *"The Committee so constituted based on the fuel study conducted by Rajasthan Renewable Energy Corporation Ltd (RREC) recommends fuel price for a year and annual escalation in it for the year immediately following the year for which fuel price has been recommended by it. In this respect, Commission has also issued standing order on 26.2.2019 for constitution of the State Level Committee for recommendation of biomass fuel price for FY 2019-20 and for future years until the same is*

reviewed by the Commission.

In accordance with Regulation 28 of the RERC RE – Biomass, Biogas and Biomass Gasifier Tariff Regulations, 2015, the State Level Committee constituted by the Commission shall recommend the Biomass fuel price once in every two years based on the fuel study conducted by RRECL. Besides this, the Committee shall also recommend the annual escalation in the Biomass fuel price for the year immediately following the year for which the fuel price has been recommended by it based on the fuel study conducted by RRECL. Thereafter, the fuel cost including annual escalation would be revisited by the Committee taking into account the prevailing market conditions, and the cycle would continue till the end of the control period.

The State Level Committee in its meeting dated 08.05.2019 has decided not to increase the Biomass price any further for FY 2019-20 vis-a-vis Biomass fuel price considered by the Commission for FY 2018-19 and recommended a Biomass fuel price of ₹ 2858 per Ton for FY 2019-20. The Committee further recommended the average stacking & covering and feeding cost Biomass fuel as ₹100/MT for FY 2019-20.Commission considers the Biomass fuel price recommended by the State Level Committee as reasonable and the Biomass fuel has been considered as Rs 2958/MT (=₹ 2858/MT base price+ ₹ 100/MT towards stacking & covering and feeding cost) for FY 2019-20 in this order at the same level as considered for FY 2018-19."

5.4.8.5 Accordingly, the Commission proposes Biomass Price for FY 2020-21 as Rs.2958.25/MT in the Draft RERC RE Tariff Regulations, 2020.

5.4.8.6 This price shall be subject to revision prospectively during the course of the year through a separate order based on recommendation of the State Level Committee constituted by the Commission consisting of representatives of Nodal Agency, State Government, Distribution Licensee and any other organisation as decided by the Commission. The Committee shall recommend biomass fuel price once in every two years based on the fuel study conducted by RRECL. The State Level Committee shall also recommend the annual escalation in the Biomass fuel price for the year immediately following the year for which the fuel price has been recommended by it based on the fuel study conducted by RRECL. Thereafter, the fuel cost including annual escalation would again be revisited by the Committee taking into account the prevailing market conditions, and the cycle would continue till the end of the control period.

5.4.9 **Use of fossil fuel or Solar Power**

5.4.9.1 The Use of fossil fuel 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: -

"29. Use of fossil fuel

The use of fossil fuels shall be limited to the extent of 15% in terms of calorific value on annual basis, till 31.03.2020.

Provided that the Biomass power generator in addition to fossil fuel may also use the solar power within the above limit of 15%."

5.4.9.2 The Commission proposes to continue with promotional measure of upto 15% solar power for the existing biomass power projects.

5.4.9.3 As regards to usage of fossil fuel in biomass power projects, the Commission would like to emphasize that prime objective of the Regulations is to promote usage of Biomass for energy generation. Therefore, by continuously allowing usage of fossil fuel, the very objective of using alternate fuel will be defeated. Moreover, CERC has also disallowed usage of fossil fuel for biomass projects to be commissioned from FY 2017-18 onwards. Hence, considering the necessity to promote the usage of Biomass as fuel in power projects, the Commission proposes to not allow the usage of fossil fuel for new Biomass power projects to be commissioned after notification of these Regulations. However, to provide regulatory certainty to existing biomass projects, the existing provision of use of fossil fuel to the extent of *15%* in terms of calorific value on annual basis or solar power within the limit of 15% shall be allowed.

5.4.9.4 In view of the above, the Commission proposes following modification in Draft RERC RE Regulation, 2020 as under:

"***44. Use of fossil fuel or Solar Power***

44.1 For new biomass power projects based on Rankine cycle technology installed after notification of these Regulations, use of fossil fuels or solar power shall not be allowed.

44.2 For existing biomass power projects based on Rankine cycle technology installed prior to notification of these Regulations, use of fossil fuels to the extent of 15% in terms of gross calorific value on annual basis or solar power within the limit of 15% on annual basis, shall be allowed for the Useful Life of the project from the date of commercial operation:

Provided further that in case of usage of solar power, the project developer shall furnish to the RRECL and to the distribution licensee, the details of solar power generation and consumption for each month, along with the monthly energy bill."

5.5 Technology specific parameter for Biogas Power Plant

5.5.1 Overview

5.5.1.1 In order to continue promotion of Biogas Power Plant the Commission has proposed to specify parameters such as capital cost norm, plant load factor,

auxiliary consumption, specific fuel consumption, fuel cost and O&M Expenses for biogas power plant, which have been discussed.

5.5.2 Capital Cost

5.5.2.1 The Capital Cost for Biogas power plant, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"32. Capital Cost
The normative Capital Cost for Biogas 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.

The normative Capital Cost for Biogas power plants for FY 2015-16 shall be Rs. 1183.62 Lakh/MW. This capital is inclusive of evacuation of generated energy upto interconnection point and this capital cost also includes Rs.2 Lakh/MW for grid connectivity charges payable to Transmission Licensee or Distribution Licensee as the case may be. After taking into account of capital subsidy, net project cost shall be Rs. 883.62 Lakh/MW for FY 2015-16.
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"

5.5.2.2 Further, the Capital Cost considered in the latest generic tariff order for Biogas power plant dated 08.03.2019 for FY 2018-19 is as follows:

"Before Subsidy – Rs. 1156.77 Lakhs/MW
After Subsidy – Rs. 856.77 Lakhs/MW"

5.5.2.3 The Commission has reviewed Capital Cost norms specified by various ERCs for Biogas power projects, which are as follows:-

Table 9-Comparison of Capital Cost for biogas power projects by various ERCs

ERC	CERC, 2020	MPERC	JERC
Capital Cost	Rs. 11.86 Cr/MW	Rs. 9.50 Cr/MW	Project Specific

5.5.2.4 The Commission observed that CERC and most of the ERCs have specified Capital Cost for Biogas power projects in RE Tariff Regulations. JERC have specified Project Specific Tariff determination for the Capital Cost.

5.5.2.5 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 the latest generic tariff order for biogas power plant dated 8.3.2019. Further, no escalation is provided in capital cost and it is proposed that the capital cost as specified for FY 2020-21 of the control period will remain valid for the entire remaining control period unless reviewed by the Commission.

5.5.2.6 Accordingly, the Commission proposes the benchmark capital cost of Rs 1156.77 lakh/MW. In addition, taking into account the capital subsidy of 300 lakh/MW, the net project cost works out to be 856.77 lakh/MW for Biogas power plants for FY 2020-21.

5.5.2.7 It is also clarified that, this capital cost is inclusive of evacuation of generated energy upto interconnection point and this capital cost also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee or Distribution Licensee as the case may be.

5.5.3 Plant Load Factor

5.5.3.1 The Plant Load Factor for Biogas power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***33. Plant Load Factor***
The Plant Load Factor (PLF) for determining the fixed charges shall be 85%."

5.5.3.2 The Commission has reviewed PLF norms specified by various ERCs for Biogas power projects, which are as follows:-

Table 10-Comparison of PLF for biogas power projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Plant Load factor (%)	90%	First year: 70%, From second year onwards: 80%	90%	90%

5.5.3.3 Based on the review of orders of various ERCs and CERC, the Commission observed that most of ERCs are following same approach as CERC. Accordingly, the Commission proposes to specify a PLF of 90% PLF in the Draft RERC RE Tariff Regulations, 2020.

5.5.4 Auxiliary Consumption

5.5.4.1 The Auxiliary Consumption for Biogas power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***34. Auxiliary Consumption***
The auxiliary power consumption factor shall be 12%."

5.5.4.2 The Commission has reviewed Auxiliary Consumption norms specified by

various ERCs for Biogas power projects, which are as follows:-

Table 11-Comparison of Auxiliary Consumption for biogas power projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Auxiliary Consumption (%)	12%	10%	12%	12%

5.5.4.3 The Commission observed that CERC and most of ERCs are following the same approach followed by CERCs. In view of the above, the commission proposes to continue with the existing provision as per RERC RE Tariff Regulations.

5.5.5 **Specific Fuel Consumption**

5.5.5.1 The Specific Fuel Consumption for Biogas power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***35. Specific Fuel Consumption***
The specific fuel consumption shall be 3 kg of substrate mix per kWh."

5.5.5.2 The Commission has reviewed the norms adopted by various ERCs, which are as follows:-

Table 12-Comparison of SFC for biogas power projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Specific Fuel Consumption	3 Kg/kWh	10.7 Kg/kWh	Project Specific	3 Kg/kWh

5.5.5.3 Based on the review of norms adopted by various ERCs, the Commission proposes to continue with the existing provision as per RERC RE Tariff Regulations.

5.5.6 **Operation and Maintenance Expenses.**

5.5.6.1 The Operation and Maintenance expenses for Biogas power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***36. Operation and Maintenance Expenses***
The normative O&M expenses for the first year of the control period, i.e., FY 2015-16 shall be Rs. 47.27 Lakh/MW.

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 levellised tariff."

5.5.6.2 Further, in latest generic tariff order for Biogas power projects dated 08.03.2019, operation and maintenance expenses considered is Rs. 56.06 lakh/MW.

5.5.6.3 The Commission has determined escalation rate 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 years average CPI and WPI indices by considering the weightage of 70% CPI and 30% WPI. Hence, the Commission proposes O&M expenses escalation rate of 3.84% per annum for the Tariff Period for the purpose of determination of levellised tariff.

5.5.6.4 Therefore, the normative expenses approved for FY 2019-20 have been escalated with 3.84% to arrive at normative O&M expenses for FY 2020-21 which works out to Rs 61.62 Lakh/MW for Biogas power projects in the Draft RERC RE Tariff Regulations, 2020.

5.5.6.5 It is also proposed that normative O&M expenses allowed shall be escalated at the rate of 3.84% per annum over the Tariff Period to compute the levellised tariff.

5.5.7 **Fuel cost (Feed Stock price)**

5.5.7.1 The Fuel Price for Biogas power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015, First Amendment 2019 are as follows: -

***"37. Fuel* cost (Feed Stock price)**

Feed stock price for the first year of the control period (i.e. FY 2015-16) shall be Rs 1269/MT (net of any cost recovery from digester effluent). The feed stock price for subsequent years shall be linked to the Fuel Price Indexation Mechanism outlined at ***Annexure-III*** *of these Regulations.*

Provided for the years beyond 2017-18 of the control periods, the biogas price for FY 2017-18 will change in the same proportion of change in Biomass fuel price determined based on the recommendations of the State Level Committee constituted under Regulation 28 of these Regulations unless specifically reviewed by the Commission."

5.5.7.2 Further, in the latest generic tariff order for Biogas power plant dated 08.03.2019, fuel cost considered is Rs. 1273.06 /MT.

5.5.7.3 The Commission, in its order dated 08.03.2019 in matter of suo-motu determination of generic tariff for Biomass, Biogas and Biomass Gasifier based power plants for FY 2018-19 gave following judgment. The relevant paragraphs are reproduced below:-

> *"In terms of Amended Regulation 37 of the RERC RE – Biomass, Biogas and Biomass Gasifier based power plant Regulations, 2015, for the year beyond FY 2017-18 of the control period, the biogas price for FY 2017-18 will change in the same proportion of change in Biomass fuel price determined based in the recommendation of the State Level committee constituted under Regulation 28 unless specifically reviewed by the Commission, Therefore, the feed stock price for Biogas power*

plants applicable during FY 2018-19 works out as 1273.06/MT (=1237.24/MT x [2958.25(FY 2018-19)/ 2875 (FY 2017-18)]) (net of any cost recovery from digester effluent), where 1237.24/MT is the biogas price determined for FY 2017-18."

5.5.7.4 Accordingly, the Commission proposes feed stock price for FY 2020-21 as Rs.1273.06/MT in the Draft RERC RE Tariff Regulations, 2020.

5.6 Technology specific parameter for Biomass Gasifier based Power Plants

5.6.1 Overview

5.6.1.1 In order to continue promotion of Biomass Gasifier power plant, the Commission has proposed to specify parameters such as capital cost norm, plant load factor, auxiliary consumption, specific fuel consumption, fuel cost and O&M Expenses for Biomass Gasifier power projects, which have been discussed.

5.6.2 Capital Cost

5.6.2.1 The Capital Cost for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"39. Capital Cost
The normative Capital Cost for Biomass Gasifier based 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 inter-connection point.

The normative Capital Cost for Biomass Gasifier based power plants for FY 2015-16 shall be Rs. 607.24 Lakh/MW. The capital cost is inclusive of evacuation of generated energy upto interconnection point and this capital cost also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee or Distribution Licensee as the case may be. After taking into account of capital subsidy, net project cost shall be Rs. 457.24 Lakh/MW for FY 2015-16.

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 shall be the same for subsequent years of the control period unless reviewed earlier by the Commission."

5.6.2.2 Further, the capital cost considered in the latest generic tariff order for Biomass Gasifier power plant dated 08.03.2019 is as follows:

"Before Subsidy – Rs. 593.49 Lakhs/MW
After Subsidy – Rs. 443.49 Lakhs/MW"

5.6.2.3 The Commission has reviewed Capital Cost norms specified by various ERCs for Biomass Gasifier power projects, which are as follows:-

Table 13-Comparison of Capital Cost for Biomass Gasifier power projects by various ERCs

ERC	CERC, 2020	JERC	UERC
Capital Cost	Rs. 5.93 Cr/MW	Project Specific	5.92 to 6.25 Cr/MW

5.6.2.4 Based on review of norms adopted by CERC and 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 Gasifier power plant dated 8.3.2019. Further, no escalation is provided in capital cost and it is proposed that the capital cost as specified for FY 2020-21 of the control period will remain valid for the entire remaining control period unless reviewed by the Commission.

5.6.2.5 Accordingly, the Commission proposes the benchmark capital cost of Rs 593.49 lakh/MW. In addition, taking into account the capital subsidy, the net project cost works out to be 443.49 lakh/MW for Biomass Gasifier power plants for FY 2020-21.

5.6.2.6 It is also clarified that the capital cost is inclusive of evacuation of generated energy upto interconnection point and this capital cost also includes Rs. 2 Lakh/MW for grid connectivity charges payable to Transmission Licensee or Distribution Licensee as the case may be.

5.6.3 Plant Load Factor

5.6.3.1 The Plant Load Factor for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

*"**40. Plant Load Factor***
The Plant Load Factor (PLF) for determining the fixed charges shall be 85%."

5.6.3.2 The Commission has reviewed PLF norms specified by various ERCs for Biomass Gasifier power projects, which are as follows:-

Table 14-Comparison of PLF for Biomass Gasifier power projects by various ERCs

ERC	CERC, 2020	JERC	UERC	BERC
PLF (%)	85%	85%	85%	85%

5.6.3.3 Based on the review of orders of various ERCs and CERC, the Commission observed that most of ERCs are following same approach as CERC. Accordingly, the Commission proposes to specify a PLF of 85% PLF in the Draft RERC RE Tariff Regulations, 2020.

5.6.4 Auxiliary Consumption

5.6.4.1 The Auxiliary Consumption for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***41. Auxiliary Consumption***
The auxiliary power consumption factor shall be 10%."

5.6.4.2 The Commission has reviewed Auxiliary Consumption norms specified by various ERCs for Biomass Gasifier power projects, which are as follows:-

Table 15-Comparison of Auxiliary Consumption for Biomass Gasifier power projects by various ERCs

ERC	CERC, 2020	JERC	UERC	BERC
Auxiliary Consumption (%)	10%	10%	10%	10%

5.6.4.3 The Commission observed that CERC and most of ERCs are following the same approach followed by CERCs. In view of the above, the commission proposes to continue with the existing provision as per RERC RE Tariff Regulations.

5.6.5 Specific Fuel Consumption

5.6.5.1 The Specific Fuel Consumption for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***42. Specific Fuel Consumption***
The normative specific fuel consumption shall be 1.25 kg per kWh"

5.6.5.2 The Commission has reviewed the norms adopted by various ERCs, which are as follows:

Table 16-Comparison of SFC for Biomass Gasifier power projects by various ERCs

ERC	CERC, 2020	JERC	UERC	BERC
Specific Fuel Consumption (Kg/kWh)	1.25	Project Specific	1.50 kg/kWh for Pine leaves-based Biomass Gasifier Projects 1.25 kg/kWh for Other Biomass Gasifier Projects	Project Specific

5.6.5.3 Based on the review of norms adopted by various ERCs, the Commission proposes to continue with the existing provision as per RERC RE Tariff

Regulations for Biomass, Biogas and Biomass Gasifier, 2015.

5.6.6 **Operation and Maintenance Expenses**

5.6.6.1 The Operation and Maintenance expenses for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015 are as follows: -

"***43. Operation and Maintenance Expenses***
The normative O&M expenses for the first year of the control period i.e. FY 2015-16 shall be Rs. 47.27 Lakh/MW.

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 levellised tariff."

5.6.6.2 Further, in the latest generic tariff order for Biomass Gasifier power projects dated 08.03.2019, operation and maintenance expenses considered is Rs. 56.06 lakh/MW.

5.6.6.3 The Commission has determined escalation rate 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 years average CPI and WPI indices by considering the weightage of 70% CPI and 30% WPI. Hence, the Commission proposes O&M expenses escalation rate of 3.84% per annum for the Tariff Period for the purpose of determination of levellised tariff.

5.6.6.4 Therefore, the normative expenses approved for FY 2019-20 have been escalated with 3.84% to arrive at normative O&M expenses for FY 2020-21 which works out to Rs 61.62 Lakh/MW for Biomass Gasifier power projects in the Draft RERC RE Tariff Regulations, 2020. It is also proposed that normative O&M expenses allowed shall be escalated at the rate of 3.84% per annum over the Tariff Period to compute the levellised tariff.

5.6.7 **Fuel cost (Feed Stock price)**

5.6.7.1 The Fuel Price for Biomass Gasifier power projects, as per the existing provisions in the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier, 2015, First Amendment 2019 are as follows: -

***"44. Fuel* cost (Feed Stock price)**

Feed stock price for the first year of the control period (i.e. FY 2015-16) shall be as per Regulation 28 of these Regulations."

5.6.7.2 Further, in the latest generic tariff order for Biomass Gasifier power plant dated 15.01.2020 and 08.03.2019, Biomass fuel price for Biomass gasifier power plant considered is Rs. 2,958.25 /MT.

5.6.7.3 The Commission, in its order dated 08.03.2019 in matter of suo-motu determination of generic tariff for Biomass, Biogas and Biomass Gasifier based power plants for FY 2018-19 gave following judgment. The relevant paragraphs are reproduced below:-

"Further, in terms of Regulation 44 of the said Regulations, the Biomass price for Biomass gasifier power plant is considered as 2958.25/MT as elaborated earlier for FY 2018-19."

5.6.7.4 Accordingly, the Commission proposes feed stock price for Biomass gasifier power plant for FY 2020-21 as Rs.2,958.25/MT in the Draft RERC RE Tariff Regulations, 2020.

5.7 Technology specific parameter for Small Hydro Projects

5.7.1 Overview

5.7.1.1 In the State of Rajasthan SHP has achieved only 41.84% of its estimated potential of 57 MW and presently the Installed capacity of SHP stand at 24 MW. Therefore, to promote and achieve SHP full potential the Commission has proposed to specify parameter such as Capital Cost norm, Capacity Utilization Factor, Auxiliary Consumption and O&M Expenses for small hydro power projects, which have been discussed.

5.7.2 Capital Cost.

5.7.2.1 The Commission analysed the norms specified for Capital Cost by various ERCs as shown in the following table:-

Table 17-Comparison of Capital Cost of Small Hydro Plants

CERC '20	MERC '19	JERC '19	UERC '18	KERC '18	MPERC '17	GERC (T.O.)
Rs. 7.8 to 11 Cr/MW	Project Specific	Rs. 6 to 7 Cr/MW	Rs. 9 to Rs. 10 Cr/MW	Rs. 6.33 Cr/MW	Rs. 6.35 to Rs. 6.50 Cr/MW	Rs. 7.48 to Rs. 8.20 Cr/MW

5.7.2.2 The Commission observed that most of the ERCs have notified the Small hydro capital cost through Tariff Regulations/Order. These orders are based on the SHP potential available in the State and the type and design of the SHP projects going to be set up in the control period in the State of Rajasthan SHP installed capacity is lower. Therefore, based on the prevailing market information, the Commission proposes to determine only Project Specific Capital Cost for Small Hydro Projects for the next Control Period 2020-2023.

5.7.3 Capacity Utilisation Factor

5.7.3.1 The Commission has compared the CUF allowed by other ERCs as shown in

the following table: -

Table 18-Comparison of Capacity Utilisation Factor of Small Hydro Plants

ERC	CERC, 2020	MERC	UERC	GERC	MPERC	KERC	CSERC	HPERC
CUF (%)	Others-30%	30%	Generic Tariff – 40% Project Specific – 45%	42%	30%	30%	30%	55%

5.7.3.2 The Commission observed that the CUF ranges from 30-55%. Accordingly, the Commission proposes CUF of 30%, in line with CERC RE Tariff Regulation, 2020.

5.7.4 **Auxiliary Consumption**

5.7.4.1 The Commission has reviewed the Tariff Orders of various ERCs issued during the Control period 2017-2020 and observed that most of ERCs are following the approach followed by CERCs as shown in following table:-

Table 19-Comparison of Auxiliary Consumption of Small Hydro Plants

ERC	CERC, 2020	MERC	UERC	GERC	MPERC	KERC	CSERC	HPERC
Aux. Cons.	1%	1%	**1%**	1%	1%	1%	**1%**	1%

5.7.4.2 In view of the above, the commission proposes normative auxiliary consumption for small hydro projects as 1% in line with CERC RE Tariff Regulation, 2020.

5.7.5 **Operation and Maintenance expenses**

5.7.5.1 The Commission proposes to determine only Project Specific O&M Expenses for Small Hydro Projects for the next Control Period 2020-2023.

5.8 Technology specific parameter for non- fossil fuel based co-generation Projects

5.8.1 **Overview**

5.8.1.1 In order to promote non-fossil fuel based co-generation the Commission has proposed to specify parameters such as capital cost norm, plant load factor, auxiliary consumption, station heat rate, gross calorific value, fuel cost and O&M Expenses for non- fossil fuel based co-generation Projects, which have been discussed.

5.8.2 **Capital Cost**

5.8.2.1 The Commission analysed the norms specified for Capital Cost by various

ERCs, issued in their respective tariff orders for Non-fossil fuel based co-generation projects. The capital cost approved by them are as under:

Table 20-Comparison of Capital Cost for Non-fossil fuel based Co-generation projects by various ERCs

ERC	CERC, 2020	MERC	UERC	GERC	MPERC	KERC	TNERC	CSERC
Capital Cost (Rs. Crore)	Rs. 4.92 Cr/MW	Project Specific	Rs. 4.93 Cr/MW	Rs. 4.66 Cr/MW	Rs. 4.36 Cr/MW	Rs. 4.70 Cr/MW	Rs. 4.93 Cr/MW	Rs. 4.93 Cr/MW

5.8.2.2 Based on the review of capital cost specified by various ERCs, the Commission observed that most of ERCs capital ranges from Rs.4.36-4.93 Cr/MW

5.8.2.3 Accordingly, the Commission proposes the benchmark capital cost of Rs 492 lakh/MW in line with CERC RE Tariff Regulation, 2020. This capital cost will remain valid for the entire duration of the Control Period unless reviewed earlier by the Commission.

5.8.3 **Plant Load Factor**

5.8.3.1 The Commission has reviewed PLF norms specified by various ERCs for Non-fossil fuel based Cogeneration power projects, which are as follows:-

Table 21- Comparison of PLF for Non-fossil fuel based Co-generation projects by various ERCs

ERC	CERC,2020	MERC	UERC	GERC	MPERC	KERC	TNERC	CSERC
Plant Load factor (%)	UP & AP: 45%, Other States: 53%, Tamil Nadu & Maharashtra: 60%	60%	45%	60%	53%	60%	55%	80%

5.8.3.2 The Commission observed that the PLF ranges from 45-80%. Accordingly, the Commission proposes PLF of 53%, in line with CERC RE Tariff Regulation, 2020.

5.8.4 **Auxiliary Consumption**

5.8.4.1 The Commission has reviewed Auxiliary Consumption norms specified by various ERCs for Non-fossil fuel based Cogeneration power projects, which are as follows:-

Table 22-Comparison of Auxiliary Consumption for Non-fossil fuel-based Co-generation projects by various ERCs

ERC	CERC,2020	MERC	UERC	GERC	MPERC	KERC	TNERC	CSERC
Aux. Cons.	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%

5.8.4.2 The Commission observed that most of ERCs are following the approach followed by CERCs. In view of the above, the commission proposes normative auxiliary consumption for Non-fossil fuel based Cogeneration power projects as 8.50%.

5.8.5 **Station Heat Rate**

5.8.5.1 The Commission has reviewed the SHR norms specified by various ERCs for Non-fossil fuel based Cogeneration power projects, which are as follows:-

Table 23-Comparison of SHR for Non-fossil fuel based Co-generation projects by various ERCs

ERC	CERC,2020	MERC	UERC	GERC	MPERC	KERC	TNERC	CSERC
SHR	3600 kCal/kWh	3600 kcal/kWh	3600 kcal/kWh	3600 kcal/kWh	3600 kcal/kWh	3600 kcal/kWh	3240 kcal/kWh	4000 kcal/kWh

5.8.5.2 The Commission observed that most of ERCs are following the approach followed by CERCs. In view of the above, the commission proposes normative SHR for Non-fossil fuel based Cogeneration power projects as 3600 kCal/kWh.

5.8.6 **Calorific Value**

5.8.6.1 The Commission has reviewed the Calorific Value norms specified by various ERCs for Non-fossil fuel based Cogeneration power projects, which are as follows:

Table 24-*Comparison of Calorific value for Non-fossil fuel based Co-generation projects by various ERCs*

ERC	CERC, 2020	MERC	UERC	GERC	MPERC	KERC	TNERC	CSERC
Calorific Value	2250 kcal/kg	2250 kcal/kg	2250 kcal/kg	2250 kcal/kg	2250 kcal/kg	2250 kcal/kg	2300 kcal/kg	2500 kcal/kg

5.8.6.2 The Commission observed that Calorific Value of Bagasse considered by most of ERCs is same as that specified in CERC RE Tariff Regulation, 2020 i.e., 2250 kCal/kg except TNERC as they have specified the higher GCV. Based on review of GCV adopted by different ERCs, the Commission proposes normative Calorific value for Non-fossil fuel based Cogeneration power projects as 2250 kCal/kWh.

5.8.7 **Fuel Cost**

5.8.7.1 The Commission has reviewed the norms adopted by various ERCs which are as follows:

Table 25-*Comparison of Fuel Cost for Non-fossil fuel based Co-generation projects by various ERCs*

ERC	CERC, 2020	MERC	UERC	GERC	MPERC (2018 Order)	KERC	TNERC	CSERC
Bagasse Price (Rs /MT)	Other States-2274	For first year of the Project bagasse price shall be determined based on the prevailing price of bagasse as assessed through an independent study by the Commission,	1954	2075	1583	1161.28	1834.4	2166
Escalation Rate of Bagasse Price (%)	5% per annum	Separate Indexation Mechanism for escalation	5% per annum	5% per annum	5% per annum	5.72% per annum	5% per annum	5% per annum

5.8.7.2 Based on the review of norms adopted by various ERCs, the commission proposes the same approach of Bagasse Price as specified in CERC RE Tariff Regulation, 2020. Accordingly, the Commission proposes Bagasse Price for FY 2020-21 as Rs. 2274 per MT with escalation rate of 5% per annum for subsequent years of the Control Period.

5.8.8 **Operation and Maintenance Expenses.**

5.8.8.1 The existing Regulations does not provide any norm for non-fossil fuel based co-generation projects. Hence, the Commission proposes normative O&M expenses for FY 2020-21 as Rs 24.52 Lakh/MW for Non-fossil fuel based Cogeneration power projects, in line with CERC RE Tariff Regulation, 2020.

5.8.8.2 As discussed in earlier Section, the Commission proposes O&M expenses escalation rate of 3.84% per annum for the Tariff Period for the purpose of determination of levellised tariff.

5.9 Technology specific parameter for municipal solid waste based power projects and refuse derived fuel based power projects

5.9.1 **Overview**

5.9.1.1 In order to promote MSW/RDF based power project the Commission has

proposed to specify parameters such as capital cost norm, plant load factor, auxiliary consumption, station heat rate, gross calorific value, fuel cost and O&M Expenses for MSW based power projects and RDF based power projects, which have been discussed.

5.9.2 **Capital Cost**

5.9.2.1 The Commission has reviewed Capital Cost norms specified by various ERCs, for MSW/RDF based power project, which are as follows:-

Table 26-Comparison of Capital Cost for MSW/RDF projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Capital Cost	Project Specific	Rs. 15.00 Cr/MW	Project Specific	Rs. 9.00 to 15.00 Cr/MW

5.9.2.2 The Commission observed that most of ERCs have followed the approach of CERC for approving the Capital Cost for MSW/RDF based power project. Therefore, in line with CERC RE Tariff Regulation, 2020 the Commission proposes to determine only Project Specific Capital Cost for MSW/RDF based power project for the next Control Period.

5.9.3 **Plant Load Factor**

5.9.3.1 The Commission has reviewed PLF norms specified by various ERCs MSW/RDF based power project, which are as follows:-

Table 27-Comparison of PLF for MSW/RDF projects by various ERCs

ERC	Plant Load factor (%)
CERC, 2020	During Stabilization (6 months) 65%,
	During remaining period of first year after stabilization: 65%,
	From second year onwards: 80%(RDF),
	75%(MSW)
MPERC	During Stabilization (6 months) 65%,
	During remaining period of first year after stabilization: 65%
	From second year onwards: 75%
JERC	MSW - First Year: 70%, Second Year: 70%;
	RDF - First Year: 65%, Second Year: 80%
UERC	During Stabilization (6 months) 65%,
	During remaining period of first year after stabilization: 65%
	From second year onwards: 80%(RDF),
	75%(MSW)

5.9.3.2 The Commission has reviewed the norms of PLF for municipal solid waste (MSW) and refuse derived fuel (RDF) considered by various ERCs and observed that most of ERCs are following the approach followed by CERCs.

5.9.3.3 In view of the above the commission proposes PLF for MSW/RDF based power projects, in line with CERC RE Tariff Regulation, 2020. The following provisions regarding PLF for MSW/RDF based power projects in Draft RERC RE Tariff Regulation,2020 is proposed, which are as follows:-

"73. Plant Load Factor

1. *Plant Load Factor for determining tariff for municipal solid waste based power projects and refuse derived fuel based power projects shall be:*

Sl. No.	PLF	MSW	RDF
a)	During Stabilisation	65%	65%
b)	During the remaining period of the first year (after stabilization)	65%	65%
c)	From 2nd year onwards	75%	80%

2. *The stabilization period shall not be more than 6 months from the date of commercial operation of the project."*

5.9.4 **Auxiliary Consumption**

5.9.4.1 The Commission has reviewed the norms of Auxiliary Consumption for municipal solid waste (MSW) and refuse derived fuel (RDF) considered by various ERCs and observed that most of the SERCs are following the approach followed by CERCs. The comparison of auxiliary consumption for ERCs is summarised as below :-

Table 28-Comparison of Auxiliary Consumption for MSW/RDF projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Auxiliary Consumption (%)	15%	15%	15%	15%

5.9.4.2 In view of the above, the commission proposes normative auxiliary consumption for municipal solid waste (MSW) and refuse derived fuel (RDF) power projects as 15%.

5.9.5 **Station Heat Rate**

5.9.5.1 The Commission has reviewed the norms of Station Heat Rate for municipal solid waste (MSW) and refuse derived fuel (RDF) considered by various ERCs are as follows:-

Table 29-Comparison of SHR for MSW/RDF projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
SHR	4200 kcal/kWh	Project Specific	Project Specific	4200 kcal/kWh

5.9.5.2 In view of the above, the commission proposes normative SHR for municipal

solid waste (MSW) and refuse derived fuel (RDF) power projects as 4200 kCal/kWh.

5.9.6 Calorific Value

5.9.6.1 The Commission has reviewed the Calorific Value norms specified by various ERCs for municipal solid waste (MSW) and refuse derived fuel (RDF) power projects considered by various ERCs are as follows:-

Table 30-Comparison of Calorific Value for MSW/RDF projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Calorific Value	RDF- 2500 kcal/kg MSW - Project specific	Project Specific	Project Specific	RDF- 2500 kcal/kg

5.9.6.2 In view of the above the commission proposes GCV for MSW/RDF based power projects, in line with CERC RE Tariff Regulation, 2020. The following provisions regarding GCV for MSW/RDF based power projects in Draft RERC RE Tariff Regulation,2020 is proposed, which are as follows:-

"77. Gross Calorific Value

77.1 The gross calorific Value of the RDF fuel used for the purpose of determination of tariff shall be at 2500 kcal/kg.

77.2 The gross calorific value of MSW shall be determined by the Commission on a case to case basis while determining the project specific tariff."

5.9.7 Fuel Cost

5.9.7.1 The Commission has reviewed the norms adopted by various ERCs which are as follows:-

Table 31- Comparison of Fuel Cost for MSW/RDF projects by various ERCs

ERC	CERC, 2020	MPERC	JERC	UERC
Feedstock Price (Rs/MT)	For RDF-2084 For MSW-Nil	Nil	Project Specific	For RDF-1800 For MSW-Nil
Fuel Escalation (%) p.a.	5% p.a.	-	-	5% p.a

5.9.7.2 Based on the review of norms adopted by various ERCs, the commission proposes the same approach of escalating the refuse derived fuel (RDF) Price by 5% per annum as specified in CERC RE Tariff Regulation, 2020. Accordingly, the Commission proposes refuse derived fuel (RDF) Price for FY 2020-21 as Rs. 2084 per MT. In case of MSW, fuel cost shall be considered as nil and the Commission proposes to consider the transportation cost while determining

the project specific tariff. In addition, the tipping fee/ Royalty received by the project shall be adjusted in the fuel price while working out the tariff for MSW.

5.9.7.3 Further, the grant/ capital subsidy received shall be adjusted in accordance with the provision mentioned in subsidy or incentive by the Central/State Government in Draft RERC RE Tariff Regulation, 2020, while determination of fuel cost and levellised tariff.

5.9.8 **Operation and Maintenance Expenses.**

5.9.8.1 Considering the prevailing market information, the Commission proposes to determine only Project Specific O&M Expenses for municipal solid waste (MSW) and refuse derived fuel (RDF) power projects for the next Control, which is in line with CERC RE Tariff Regulation, 2020.

5.10 Technology specific parameter for Renewable Hybrid Energy projects

5.10.1 **Overview**

5.10.1.1 Draft RERC RE Regulations, 2020 seek to provide the project developers option to use two RE technologies as Hybrid Project in order to optimise the use of resources. It also provides optimal and efficient utilization of transmission infrastructure and better grid stability by reducing the variability in daily and seasonal renewable power generation. Renewable Hybrid Energy Projects can also be seen as alternative for short term power purchase requirement.

5.10.1.2 Regarding Wind Solar Hybrid, MNRE notified National Wind Solar-Hybrid Policy in May 2018 and Rajasthan notified Wind and Hybrid Energy policy in December 2019. The policy defines various aspects of Hybrid projects. Considering the increasing capacity of RE Hybrid Projects, the regulatory framework is required to be defined for such projects. The issues related to Hybrid projects are discussed as under:

5.10.2 **Definition and Eligibility Criteria**

5.10.2.1 Regarding the RE Hybrid projects, the existing RERC RE Tariff Regulations provides for determination of Project Specific Tariff for hybrid projects including renewable–renewable or renewable–conventional sources, for which renewable technology is approved by MNRE. However, it is proposed that tariff for Conventional projects shall be determined as per Rajasthan Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2019 and tariff for RE Projects shall be determined under these Regulations. In case, RE project and Conventional project are installed

and integrated at same point of interconnection, then energy accounting for both projects shall be made separately with appropriate metering arrangement and tariff for both projects shall be determined separately as per respective applicable regulations.

5.10.2.2 In view of the above, the Commission, in the Draft RERC RE Tariff Regulation, 2020 proposes to consider Hybrid Projects as combination of renewable-renewable sources integrated at the same point of interconnection.

5.10.2.3 Further, sizing of the plant depends on the resource availability. The combination of different RE technologies with appropriate sizing will lead to optimal utilisation of existing network.

5.10.2.4 It is noted that MNRE and Rajasthan Wind and Hybrid Energy Policy stipulates that a Wind-Solar plant will be recognized as hybrid plant if the rated power capacity of one resource is at least 25% of the rated power capacity of other resource.

5.10.2.5 In view of the above, the Commission proposes that for RE projects to be recognised as Hybrid Projects, only if the rated power capacity of rated capacity of one renewable energy technology is at least 25% of the rated capacity of other renewable energy technology(ies) and operate at the same point of interconnection.

5.10.2.6 Further, it is proposed that if the interconnection point of the both projects are different then both projects are to be treated separately. However, if the interconnection point is the same, then the principles applicable for Renewable Hybrid Energy Projects shall be applicable in such case.

5.10.3 **Capacity Utilisation Factor**

5.10.3.1 The RE technologies used for Hybrid projects have different CUFs. The CUF for individual RE technology has been discussed in earlier Section. This CUF shall be considered as ceiling norm. The effective CUF of the RE Hybrid Plant shall be considered based on minimum CUF and rated power capacity of each technology. It is also noted that CUF of the Hybrid Plant shall be measured at interconnection point. In case of Wind Solar Hybrid Project, the minimum CUF has been stipulated as 30%. However, the higher CUF can be achieved in combination with other RE technologies.

5.10.3.2 Comparative analysis of recent Hybrid Project Tenders has been done to analyse the trend of the Capacity Utilisation Factor.

Table 32-Comparison of CUF for Renewable Hybrid Energy Projects

Date of Issuance	Details of the Project	CUF
22-06-2018	2500 MW ISTS-Connected Wind-Solar Hybrid Power Projects (Tranche-I)	40%
30-06-2018	ISTS-connected 2500 MW Wind-Solar Hybrid Power Projects	40%
22-06-2018	ISTS-connected 1200 MW Wind-Solar Hybrid Power Projects in India	40%
08-03-2019	1200 MW ISTS-connected Wind-Solar Hybrid Power Projects in India (Tranche-II)	30%
14-01-2020	1200 MW ISTS-connected Wind-Solar Hybrid Power Projects in India (Tranche-III)	30%

From the above table, it has been observed that CUF for RE Hybrid projects is more than minimum CUF of 30%. However, higher CUF has been proposed for this project considering the large scale and capacity and the same being connected to inter-state transmission network.

5.10.3.3 In the view of the above, it is proposed that minimum CUF for Renewable Hybrid Energy project shall be 30% in line with the CERC RE Tariff Regulations, 2020. The CUF of the project shall be measured at interconnection point. For computation of CUF, the rated capacity of project shall be considered in proportion to their rated capacity of each Renewable Technology and applicable CUF for such RE Technology. The CUF for each technology may also be measured. However, any underachievement in CUF of particular technology in Hybrid Plant shall be ignored, if the Renewable Hybrid Energy project has achieved the minimum CUF.

5.10.4 **Capital Cost and Operation and Maintenance Expenses**

5.10.4.1 As the technology development is at such nascent stage, the capital cost and operation and maintenance expenses cannot be benchmarked. Therefore, it is proposed to determine the capital cost and operation and maintenance of Renewable Hybrid Energy Projects on project specific basis considering the prevailing market trends.

5.10.5 **Tariff**

5.10.5.1 As regards to tariff determination of Renewable Hybrid Energy Projects, the Commission proposes a composite levellised tariff for the projects as a whole by factoring in the tariff components upto the minimum of the useful life of the RE technologies combined for such RE Hybrid Project. Further, in case any of the RE technologies combined for RE hybrid project is left with further useful life, the levellised tariff for remaining useful life of such RE technology shall be determined separately by factoring in the tariff components for the remaining

useful life.

5.10.5.2 In view of the above, the Commission after considering all the aspects proposes the following provisions for Renewable Hybrid Energy projects in the Draft RERC RE Tariff Regulations, 2020, which in line with CERC RE Tariff Regulation, 2020.

> "***79. Capital Cost***
> *79.1 The capital cost shall be determined on project specific basis considering the prevailing market trends.*
>
> ***80.Capacity Utilisation Factor (CUF)***
> *80.1 The Commission shall determine only project specific capacity utilisation factor in respect of renewable hybrid energy projects taking into consideration the proportion of rated capacity of each renewable energy source, as the case may be, and applicable capacity utilisation factor for such renewable energy source, as the case may be:*
>
> *Provided that the minimum capacity utilization factor for renewable hybrid energy project shall be 30% when measured at the inter-connection point, where the energy is injected into the grid.*
>
> ***81.Operation and Maintenance expenses***
> *81.1 The Commission shall determine only project specific O&M expenses considering the prevailing market trends.*
>
> ***82.Tariff***
> *82.1 The tariff for a renewable hybrid energy project shall be a composite levellised tariff for the project as a whole by factoring in the tariff components upto the minimum of the useful life of the RE technologies combined for such RE hybrid Project:*
>
> *Provided that, in case any of the RE technologies combined for RE hybrid project is left with further useful life, the levellised tariff for remaining useful life of such RE technology shall be determined separately, by factoring in the tariff components for the remaining useful life."*

5.11 Technology specific parameter for Renewable Energy with Storage projects

5.11.1 Proposed Framework

5.11.1.1 The generation from RE technologies has been increasing. Large scale Renewable Energy integration with grid has significant challenges, which are both technical and economic in nature. The intermittent generation from Renewable sources due to seasonal weather fluctuations introduces uncertainty in the generation trend.

5.11.1.2 On January 4, 2017, CERC issued a Staff Paper on Introduction of Electricity Storage System (ESS) in India. This paper covers the probable uses of storage technologies, operational framework, tariff and other related aspects. Energy

Storage System (ESS) is envisaged for optimal utilization of the available generation, shifting of generation at the time when it is required, and utilization of the RE generator for longer period. At present, there are various uncertainties on practical use, applications and the governing market rules for ESS technologies. A well-established policy and regulatory framework at this infancy stage may channelize the investment in this segment of the power sector. The developed countries have already set up several pilot projects. However, in India, at present, there are few projects running based on non-traditional storage technologies.

5.11.1.3 ESS can provide a range of services to the electric grid and can be positioned based on their cost and performance. The only electricity storage technology that has been traditionally adopted is pump storage hydropower. Storage facilities can be designed with non-traditional technologies such as large number of Electrochemical Battery Cells, Flywheels and Compressed Air Energy Storage. The generic technical parameters about various ESS technologies are as follows:

***Table 33*-Technical Parameters of various ESS Technologies**

Type of Storage	Net Energy Yield	Discharge Capacity	Range of Capacity
Pumped Storage	75-80%	6-10 hours	250-1000 MW
Electrochemical Battery	60-75%	4-5 hours	100-200 MW
Flywheel	80-90%	¼ hours	10-20 MW
Compressed Air	73-80%	8-20 hours	0-180

5.11.1.4 Considering the increasing need of storage facility in the near future, the tariff framework is required to be defined for such projects. Accordingly, in the present Draft RERC RE Tariff Regulations, 2020, the Commission intends to propose the tariff framework to promote use of ESS along with Renewable Energy project. Accordingly, various aspects of RE projects combined with storage technologies viz. Battery Storage and Pumped Storage have been discussed in the Draft RERC RE Tariff Regulations,2020.

5.11.2 Definition and Eligible Storage Technologies

5.11.2.1 In storage facility, the RE Generator can exercise the option for selecting any storage facility for balancing the generation from project. Such balancing of generation can be for Round the Clock basis or for selected time periods. It is intended that ESS and RE projected shall be connected at the same inter-connection point and energy generated from RE project shall be used as input to Storage. Further, it is noted that Rajasthan Wind and Hybrid Energy Policy, 2019 issued by Government of Rajasthan envisages the use of Storage along with Hybrid Project. Hence, the combination of Renewable Hybrid

Energy project and Storage has also been considered as Renewable Energy with Storage Project.

5.11.2.2 In view of the above, the Commission, in the Draft RERC RE Tariff Regulations, 2020, proposes to consider RE with Storage projects as combination of renewable including hybrid projects that combines with ESS to use partly or fully renewable energy generated from such project to store and connected at the same point of interconnection.

5.11.3 Capital Cost and Operation and Maintenance Expenses

5.11.3.1 The capital cost of RE with Storage project includes the capital cost of RE project, capital cost of Storage and other common infrastructure. The capital of RE project has been discussed in earlier Section. At such nascent stage, the capital cost of storage cannot be benchmarked. Also, the configuration of storage may depend on RE technologies and applications. Hence, it is proposed to determine the cost of RE with storage project on project specific basis. The capital cost of RE with Storage project shall be determined considering the prevailing market trends.

5.11.3.2 Similarly, it is also proposed to determine only project specific O&M Expenses considering the prevailing market trends.

5.11.4 Rated Capacity of Energy Storage System (ESS)

5.11.4.1 Rajasthan Wind and Hybrid Energy Policy, 2019 stipulates that the minimum rated energy capacity of an Energy Storage System (ESS) shall be equal to 'X/2' MWh, where 'X' is the installed capacity of the Project in MW. In the view of the above, it is proposed that minimum rated capacity of Energy Storage System (ESS) for Renewable Energy with Storage project shall be X/2' MWh of the installed capacity of the project.

5.11.5 Storage Efficiency and Tariff framework

5.11.5.1 As discussed earlier, pump storage hydropower is only electricity storage technology which has been traditionally adopted. As regards Pumped Storage, energy produced by solar power or base load stations during off peak hours is stored through Pumped storage hydroelectric power stations. Further, the energy generated from the water stored in the dams or reservoirs can be used to meet energy needs during peak demand seasons. Lithium-ion batteries are by far the most popular battery storage option today and control more than 90 percent of the global grid battery storage market. Compared to other battery options, lithium-ion batteries have high energy density and are lightweight.

5.11.5.2 Energy Storage can be conceived as purchase from RE which is used for

storage purposes and the sale of such stored energy with fixed and variable charges of the storage system is to be recovered through supply of energy. Thus, cost of stored energy supplied to Grid is nothing but the summation of cost of energy to be stored at project specific Tariff and cost of storage facility. The efficiency of storage facility is important.

5.11.5.3 The cost of stored energy is dependent on cost of power supplied for storage, efficiency of storage and cost of storage facility. For storage of RE energy in captive / shared hydro station by conservation of water in dam and retrieval of energy later, the operational cost will not change, and energy retrieval will be same as energy conserved less transmission losses. Also, the cost of stored energy depends on amount of energy stored into storage facility. This means that the sizing of storage facility also affects the output from RE plus Storage Projects. Hence, the Commission intends to provide norms for Storage efficiency. However, the sizing of storage shall be decided to optimise the energy output and balancing the generation from project. Efficiency of storage component of RE with Storage project shall be measured as ratio of output energy received from storage and input energy supplied to the storage component of such project, on annual basis.

5.11.5.4 In view of the above, it is proposed to specify norms for Storage efficiency as 75% for Pumped Storage and 80% for Battery Storage. Also, the project specific tariff is proposed to be determined for RE with Storage Project.

5.11.5.5 Further, considering the tariff determination for renewable energy with storage project, the Commission proposes a composite tariff or differential tariff based on time of day, which will also include the energy supplied from the storage facility. Further, the determination of tariff for supply of power may also be on the basis of round the clock or for time periods as per the agreement/arrangement between the Project Developer and Beneficiary.

5.11.5.6 The Commission, after considering all the aspects, proposes the following provisions for Renewable Hybrid Energy with Storage projects in the Draft RERC RE Tariff Regulations, 2020, which in line with CERC RE Tariff Regulation, 2020.

> "***83. Capital Cost***
> *83.1 The Commission shall determine only project specific capital cost for renewable energy with storage project considering the prevailing market trends.*
>
> ***84. Rated Capacity of Energy Storage System (ESS)***
> *84.1 The minimum rated energy capacity of an Energy Storage System (ESS) shall be equal to 'X/2' MWh, where 'X' is the installed capacity of the Project in MW.*
>
> *For example: In case, the installed capacity of a Project is 20 MW, then minimum energy rating of ESS installed shall be 10 MWh.*

85. Storage Efficiency

85.1 The Commission shall approve the storage efficiency only for project specific tariff:

Provided that the minimum efficiency for storage based on technology of solid-state batteries shall be 80%:

Provided further that the minimum efficiency for storage based on technology of pumped storage shall be 75%:

85.2 Efficiency of storage component of renewable energy with storage project shall be measured as ratio of output energy received from storage and input energy supplied to the storage component of such project, on annual basis.

86.Operation and Maintenance expenses

86.1 The Commission shall determine only project specific O&M expenses considering the prevailing market trends.

87. Tariff determination for Energy Storage

87.1 The tariff for renewable energy with storage project shall be a composite tariff or differential tariff based on time of day, determined for energy supplied from the Project including the energy supplied from the storage facility:

Provided that such tariff may be determined for supply of power on round the clock basis or for time periods as agreed by Project Developer and Beneficiary."

6 Others

6.1 Tariff for existing Plants set up as per Government of Rajasthan and Government of India Policies

6.1.1 As per Government of Rajasthan Policies for Wind Power Projects:

6.1.1.1 In the RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and RERC RE Tariff Regulations for Wind and Solar Energy (Second Amendment), 2019, tariff for plants set up under the GoR Policy of 1999 and 2000 has been specified as Rs. 5.7171 per kWh and Rs. 5.7135 per kWh, respectively. Further, for Wind energy projects set up under Government of Rajasthan Policies 2003 and 2004, tariffs have been specified as Rs. 3.92 /kWh (policy dated 30.4.03), Rs. 3.36/kWh (policy dated 25.10.04) and Rs. 3.79/kWh (Policy dated 25.10.04 & 24.02.2016).

6.1.1.2 The Commission observed that the tariff based on allowable escalation of plants set up under the GoR Policy of 1999 and 2000 has already reached levels of Rs. 5.7171 per kWh and Rs. 5.7135 per kWh, respectively, which are on the higher side to the tariff determined by the Commission in recent years. Further, it may be mentioned that in wind tariff, there is no fuel component and the entire tariff is on account of fixed cost. Fixed component of the tariff goes down in the initial years, as interest burden on loan decreases and it is only a small O&M component of fixed cost, which is subject to annual escalation. Considering the said position and also the fact that the tariff of plants set up under the said GoR Policies have reached to a level, which is comparable with the tariff determined for the plants commissioned in the recent past, the Commission considers it reasonable to cap the tariff for the plants set up under the GoR's Policies of 1999 and 2000 at the existing levels, i.e., Rs. 5.7171/kWh and Rs. 5.7135/kWh, respectively for the Control Period from FY 2020-21 to FY 2022-23.

6.1.1.3 Further, considering the projects commissioned as per Government of Rajasthan Policies 2003 and 2004, the tariff was specified for 20 years. Further, as per the GoR Policy of 2003, the tariffs for the wind power plants are frozen at Rs. 3.36 per kWh from FY 2013-14 onwards, and as per the GoR Policy of 2004, the tariffs for the wind power plants are frozen at Rs. 3.79 per kWh from FY 2014-15 onwards. Accordingly, the same tariffs have been considered in the proposed Control Period, i.e., FY 2020-21 to FY 2022-23.

6.1.2 As per Government of Rajasthan Policies for Biomass Power Projects:

6.1.2.1 In the RERC RE Tariff Regulations for Biomass, Biogas and Biomass Gasifier Energy , 2015 and subsequent amendments thereof, tariff for projects set up under GOR Policy of 1999 has been specified as 7.6614/kWh for FY 2019-20,

after considering the escalation of 5% for each year.

6.1.2.2 The Commission in its Seventh Amendment in RERC Tariff Regulations observed that Biomass Tariff comprises of energy charges as fuel used as distinct from wind and solar tariff where there is no fuel component. The Govt. policy allows an annual escalation of 5% in tariff. Considering the increase in fuel price, the Commission has considered the same escalation of 5% in the tariff as per Government Policy, and accordingly, specified a tariff of Rs. 8.0445/kWh for FY 2020-21.

6.1.2.3 In light of the above, Commission is of the view that it would be appropriate to continue with the same approach and specify the tariff for the Biomass power plants set up under GoR Policy 1999 for the next control period considering an annual escalation of 5% for the next control period as follows:

Table 34-Tariff for Biomass Power Plants set up under GOR Policy 1999

Sr. No.	Renewable Energy Generation during the year	Tariff in Rs. Per kWh for plants under GoR policy of 11.3.99
1	2020-21	8.0445
2	2021-22	8.4467
3	2022-23	8.8690

6.1.3 **Solar Power Projects (For projects commissioned under Generation based incentive scheme of Govt of India)**

6.1.3.1 The existing RERC Tariff Regulations 2014 also provide for tariff for Solar Power Projects commissioned under Generation Based Incentive Scheme of Govt. of India as under:

"

(i) The total tariff, inclusive of generation incentive on solar power payable by GoI to the solar power producer, shall be as under and all conditions of GoI policy shall be applicable for them.

Sl.	Particulars	SPV Technology	CSP Technology
1.	Solar power plants eligible for full GBI as per GOI Scheme	Rs.15.78 /kWh	Rs.13.78 /kWh
2.	Solar power plants eligible for reduced GBI as per GOI Scheme	Rs.15.18 /kWh	Rs.13.18 /kWh

(ii) The above tariff for solar power project is for ten years only. The tariff after 10 years shall be determined separately by a separate order"

6.1.3.2 It is noted that RE project has opted for GBI scheme considering its risks and benefits. As per the applicable scheme, the PPA period is 20 years and tariff after 10th year onwards shall be determined by the Commission as per prevailing norms.

6.1.3.3 It is noted that, at present, tariff for solar PV projects is determined through competitive bidding route, which has substantially reduced in recent years. Hence, the procurement of power from these projects under GBI scheme should not put additional burden on consumers. Hence, the Commission proposes to continue with the latest tariff paid by distribution licensee in 10th year for these projects for remaining life of PPA. Further, the option is also provided for such project to sell such electricity to other entity, in case they are not willing to supply electricity to Distribution Licensees at the same tariff. However, Generator may approach Government of India for extension of GBI scheme considering the risk taken during initial years of Solar PV technology. In case the Generator gets any benefit or incentive from the Government, the same shall not be considered for reducing the tariff further.

6.1.3.4 Accordingly, the following proviso has been proposed in Draft RERC RE Tariff Regulation, 2020 as under:

"***88.4 Solar Power Projects (For projects commissioned under Generation based incentive scheme of Govt of India)***

(i) The total tariff payable by Discoms to the solar power producer for projects commissioned under Generation Based Incentive of Govt of India shall be as under:

A. Tariff for first 10 years from COD

Sr. No.	***Particulars***	***SPV Technology***	***CSP Technology***
1.	*Solar power plants eligible for full GBI as per GoI scheme*	*Rs.15.78 /kWh*	*Rs.13.78 /kWh*
2.	*Solar power plants eligible for reduced GBI as per GoI scheme*	*Rs.15.18 /kWh*	*Rs.13.18 /kWh*

B. Tariff after10 years from COD

The tariff after 10 years from COD shall be equivalent to the tariff paid by Distribution Licensee for procurement of power during 10th year of operation from COD of the project excluding GBI Incentive i.e., Rs 4.81/kWh (Rs 4.03/kWh + Additional Rs 0.78/kWh) for the remaining tenure of PPA. In case the Solar Project Developer does not want to supply power to Distribution Licensees at this tariff, Solar Project Developer is free to sell power to any other entity."

6.2 Grid Connectivity

6.2.1 The Commission proposes to retain Grid Connectivity provision for Renewable Energy projects as specified in RERC RE Tariff Regulation for Wind, Solar Energy (Second Amendment), Biomass, Biogas and Biomass Gasifier (First Amendment), 2019:

"***89. Grid Connectivity***

89.1 Grid connectivity charges of Rs. 2 Lakh per MW shall be payable by the Renewable Energy Projects to Transmission Licensee or Distribution Licensee, as the case may be.

89.2 The power injection into the State grid shall be limited to the capacity indicated below.

Sr. No.	***Total Power fed through a feeder (in MW)***				
		11 kV	***33 kV***	***132 kV***	***220 kV***
1	*ACSR Panther conductor*	*3 MW*	*12 MW*	*50 MW*	*-*
2	*ACSR Dog conductor*	*2 MW*	*6 MW*	*-*	*-*
3	*ACSR Racoon conductor*	*1 MW*	*2 MW*	*-*	*-*
4	*ACSR Zebra*	*-*	*-*	*-*	*Above 50 MW & up to 150 MW*
5	*As per SIL for short line*	*-*	*-*	*90 MW*	*180 MW*

Provided that for short line length, the envisaged capacity of the line may be considered about 1.2 to 2.0 times the Surge Impedance Loading (SIL) of the line."

6.3 Metering

6.3.1 The Metering 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:

"***Metering***

(1) *In respect of sale of energy to the Distribution Licensee, the metering for the purpose of energy accounting shall be as under:*
   (a) For Solar PV and solar thermal plants, the metering shall be at the line isolator on the outgoing feeder on HV side of the generator transformer.
   (b) For wind power plants supplying power through pooling arrangement, the metering shall be at the grid substation of the licensee:

   Provided that for the said metering at the grid substation of licensee, the following losses shall be considered:
   (1) *Losses of 1% for metering upto 33 kV.*
   (2) *Losses of 2.5 % for metering at 132 kV and above.*

(2) *In respect of sale of energy to the Distribution Licensee, from Biomass,*

Biogas and Biomass Gasifier based power plants, the metering for the purpose of accounting shall be at the line isolator on the outgoing feeder on HV side of the generator transformer. Biomass power plants, covered under GoR Policy, 1999, shall also be allowed to shift their meters to the line isolator of the outgoing feeder on HV side of the generator, if it opts so, subject to the technical feasibility and acceptance by the Distribution Licensee. However, the cost of shifting shall be borne by the concerned generator.

(3) *In case of open access for Wind, Solar Energy, Biomass, Biogas and Biomass Gasifier based power plants and in case of sale of electricity under REC mechanism, the metering would be at EHV substation of transmission licensee or HV station of distribution licensee as the case may be, and the provision of losses, as specified above, shall not be applicable."*

6.3.2 The existing metering provisions has also been made applicable to Non-fossil fuel based cogeneration plants, Municipal solid waste based plants and any other technologies approved by MNRE which does not use pooling arrangement for the supply of power.

6.3.3 Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020 as under:

"***90. Metering***

90.1 In respect of sale of energy to the Distribution Licensee, the metering for the purpose of energy accounting shall be as under:

(a) For Solar PV and solar thermal plants, the metering shall be at the line isolator on the outgoing feeder on HV side of the generator transformer.

(b) For wind power plants supplying power through pooling arrangement, the metering shall be at the grid substation of the licensee.

Provided that for the said metering at the grid substation of licensee, the following losses shall be considered:

(a) Losses of 1% for metering up to 33 kV.

(b) Losses of 2.5 % for metering at 132 kV and above.

90.2 In respect of sale of energy to the Distribution Licensee, from Biomass, Biogas, Biomass Gasifier based power plants, Non-fossil fuel based cogeneration plants, Municipal solid waste based plants and any other technologies approved by MNRE which does not use pooling arrangement for the supply of power, the metering for the purpose of accounting shall be at the line isolator on the outgoing feeder on HV side of the generator transformer.

90.3 Biomass power plants, covered under GoR Policy, 1999, shall also be allowed to shift their meters to the line isolator of the outgoing feeder on HV side of the generator, if it opts so, subject to the technical feasibility and acceptance by the Distribution Licensee. However, the cost of shifting shall be borne by the concerned generator.

90.4 In case of open access for renewable energy and in case of sale of electricity under REC mechanism, the metering would be at EHV substation of transmission licensee or HV station of distribution licensee as the case may be, and the provision of losses, as specified above, shall not be applicable."

6.4 Other Charges

6.4.1 kVArh charges

6.4.1.1 The kVArh charges 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:

"kVArh charges

Net kVArh drawal by generating plants from the Grid shall be billed at 12.50 paise / kVArh w.e.f 01.04.2014 for Wind and Solar Energy and 01.04.2015 for Biomass, Biogas and Biomass Gasifier escalated annually at 0.50 paise / kVArh, unless otherwise revised by the Commission by Order."

6.4.1.2 The Commission has escalated the kVArh charges 0.50 paise annually as per the Grid Code and hence, proposed following provision in Draft RERC RE Tariff Regulation, 2020 as under:

"91.2 kVArh charges

91.2.1 Net kVArh drawal by generating plants from the Grid shall be billed at 15.00 paise / kVArh w.e.f 01.04.2020 escalated annually at 0.50 paise / kVArh, till the same are specified in any Regulation or in any Order issued by the Commission."

6.4.2 Import of power by Generating Stations

6.4.2.1 The Import of power by Generating Stations 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:

"Import of power by Generating Stations

Energy drawn by the generating station from the grid during shutdown and outages, and for restarting after shut down, shall be set off against the energy sold to the Distribution Licensee within the State on a quarterly basis:

Provided that in case of drawal by the generating station is more than its injection in a month, the excess drawal during the month shall be carried forward to the subsequent month and so on. Such cumulative excess drawal, if any, shall be settled on quarterly basis at tariff applicable to a Large Industrial consumer. The first quarter would begin from April 1 of the relevant year:

Provided further that where sale to Distribution Licensee is not being effected or where sale to distribution licensee is under REC mechanism, such drawal from the grid shall be billed at tariff for temporary supply applicable to HT

Industrial consumer (tariff category HT-5) on daily basis."

6.4.2.2 The Commission proposes to continue the existing provision in Draft RERC RE Tariff Regulation, 2020.

6.4.3 **Transmission & wheeling charges**

6.4.3.1 The Transmission & wheeling charges 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:

"***Transmission & wheeling charges***

In case of third party sale or for captive use both within the State or outside the State, the transmission charges and wheeling charges shall be recovered in cash and transmission losses and wheeling losses shall be recovered in kind as under:

(a) For use of transmission network, transmission charges and losses as determined by the Commission in respect of open access transactions would be applicable.

(b) For use of distribution licensee's network, the wheeling charges and losses as determined by the Commission in respect of open access transactions at respective voltage levels at which electricity is supplied, would be applicable.

(c) For use of both EHV and distribution network, both transmission and wheeling charges as well as losses, as applicable, shall be payable:

Provided that in case of Power Purchase Agreements executed and plants commissioned up to 31.03.2007 under the State Government Policies specified in Regulation 33, the charges as per Policy shall be applicable unless RE power plant opts otherwise."

6.4.3.2 The Commission proposes to continue the existing provision in Draft RERC RE Tariff Regulation, 2020 with above clarification. Further, the Commission has specified that Wheeling Charges for Renewable Energy Projects shall be applicable on per unit basis on the total energy wheeled and not on the basis of open access contracted capacity.

6.4.4 **SLDC Fees and Charges**

6.4.4.1 The SLDC Fees and Charges 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:

"SLDC Fees and Charges

SLDC fees and charges shall be as specified in RERC (Levy of fee and charges by the State Load Despatch Centre) Regulations, 2004 as amended from time to time."

6.4.4.2 The Commission proposes to continue the existing provision in Draft RERC RE

Tariff Regulation, 2020.

6.4.5 **Cross-Subsidy Surcharges and Additional Surcharge**

6.4.5.1 The Surcharges 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:

"Surcharges
The Cross-subsidy surcharge as determined by the Commission from time to time shall not be applicable in case of open access transactions based on Wind energy, Solar PV, Solar thermal power stations, Biomass, Biogas and Biomass Gasifier based power stations.

6.4.5.2 In the existing regulations, the open access transaction based on RE projects were exempted from levy of Cross-subsidy surcharge. However, as the technology is matured over a period of time, there is no need to provide any such exemption.

6.4.5.3 Since, Cross-subsidy surcharge and Additional Surcharge is determined by the Commission from time to time, the following proviso has been proposed in Draft RERC RE Tariff Regulation, 2020 as under:

"***91.6 Cross-Subsidy Surcharge and Additional Surcharge***

91.6.1 The Cross-subsidy surcharge and Additional Surcharge as determined by the Commission from time to time shall be applicable in case of open access transactions based on renewable energy power stations."

6.5 Renewable Energy Based Captive Power Plant

6.5.1 Regarding the provisions related to captive power plant, the Commission intends to provide more clarity to avoid any operational and commercial issues. Hence, the capacity limits and energy limits are proposed to be specified for new renewable energy captive generating plant.

6.5.2 The Commission has set minimum capacity limit for new renewable energy-based captive generating plant as one MW or one MWp. Further, the maximum permissible capacity of eligible individual plant behind the meter shall be limited to Average Annual Demand.

6.5.3 As regards the energy limits, it is proposed that energy to be consumed or banked shall be limited to the energy corresponding to the minimum Capacity Utilisation Factor/Plant Load Factor for respective RE technology.

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

"***92. Renewable Energy Based Captive Power Plants***

92.1 The capacity for new renewable energy-based captive generating plant

under these Regulations shall not be less than one MW or MWp as the case may be.

92.2 The maximum permissible capacity of eligible individual new renewable energy-based captive generating plant including renewable energy based plant installed behind the meter shall be limited to Average Annual Demand as specified in these Regulations:

Provided that eligible individual renewable energy captive generating plant shall utilise the same service line and installation for injection of power into the grid as well as drawal of power from the distribution licensee.

92.3The maximum permissible energy to be consumed or banked from new renewable energy captive generating plant shall be limited to the energy corresponding to the minimum Capacity Utilisation Factor/Plant Load Factor as applicable for respective technology as specified in these Regulations.

Provided the energy consumed in excess of the above limit shall be treated as deemed drawl from the distribution licensee and will be billed accordingly."

6.6 Banking

6.6.1 The Banking as per existing provisions in RERC RE Tariff Regulations for Wind and Solar Energy, 2014 and Second Amendment, 2019 and Biomass, Biogas and Biomass Gasifier, 2015, First Amendment, 2019 are as follows:

"Banking

(1) Energy shall be allowed to be banked at consumption end for only captive consumption within the State.

(2) Period of banking:
The banking shall be on monthly basis.

(3) Energy Accounting:
Notwithstanding anything contrary contained in any other Regulations time being in force the Energy Accounting shall be as under.

(a) If in any block injected energy is more than the energy drawn, the excess energy shall be computed. The excess energy of each time block shall be cumulated till the end of the month and shall be set off against the cumulative drawl Discom energy in the same month.

(b) For remaining excess injected energy, if any at the end of the month, the RE Power Generator/Developer would be entitled to get payment @60% of energy charges applicable for large industrial power tariff, excluding fuel surcharge, if any, in respect of 10% of unutilized banked energy after the end of the same month. Unutilized banked energy, in excess of 10% shall lapse.

(4) The RE Generator shall raise the monthly bill and after raising bill, the Distribution Licensee shall make the payment within 30 days from date of receipt of bill, beyond which, the Late Payment Surcharge (LPS) at the rate, at the rate of 1.25% per month, calculated on a daily basis would become applicable.

(5) Banking charges at the rate of 2% of banked energy in each month

would be payable in kind."

6.6.2 The Commission has initially introduced the banking facility for Renewable Energy projects in its earlier Regulations. However, with passage of time , with increased RE getting injected into the grid and impact on the distribution utilities, the Commission way back in 2014 introduced monthly banking and thereafter further rationalized it in 2019. At present, the banking facility is restricted to captive consumption only. Further, the Commission vide its Suo-motu Order dated March 5, 2020 regarding the policy directives issued by State Government with regard to Solar/Wind/Wind-Solar Hybrid power generation in the State of Rajasthan, held that no banking facility shall be allowed for third party sale. The same approach has been continued by the Commission in the present Draft Regulations. In addition to this, no banking facility is provided for for consumption from the Renewable Energy plant installed behind the meter without any bi-directional meter in the same premises.

6.6.3 Further, it is noted that the banking facility poses challenges in power purchase planning and effective distribution grid management. In order to minimize the impact of these issues, it is intended that the banking facility is to be provided only to consumers having certain drawal from distribution grid. The installation of captive consumption is for own use. In such case, it is envisaged that use of distribution system for intermittent generation shall be kept minimum. Hence, it is proposed that the Banking facility shall only be allowed for the consumers consuming upto 20% energy from the Captive Power plant on annual basis. No banking facility shall be allowed for the consumers, whose captive consumption is more than 20% of total consumption on annual basis.

6.6.4 It is noted that there is variation in generation on month to month basis in case of Solar and Wind Projects. Further, the Commission, in draft Regulations, has proposed the capacity and energy consumption limits for availing banking facility for captive consumption. Considering the variability in generation and applicable consumption limits, the banking facility is allowed on annual basis, instead of month to month basis, providing more flexibility to users. Further, it is also proposed that unutilized banked energy at the end of financial year shall lapse and no compensation shall be applicable on unutilized banked energy at the end of the financial year as banking facility is now made applicable on annual basis instead of monthly basis.

6.6.5 In order to keep the energy accounting appropriate, it is also proposed that no banking facility shall be allowed without any bi-directional meter in the same premises.

6.6.6 As per the existing regulations, the banking charges at the rate of 2% of banked energy in each month would be payable in kind. Further, it is noted that the distribution grid is being used as a bank/battery to store the energy generated,

which is taken back for consumption. The owner of RE plant also saves on the requirement and capital cost of battery systems and their related inefficiency, which would have to be installed, in case the banking facility was not provided. For providing such facility, no other charges are being levied. The role of distribution grid operation is crucial in facilitating the banking of energy for intermittent generation from RE sources. Hence, in order to protect interest of distribution licensee, it is proposed to increase the banking charges to 10% of banked energy in each month payable in kind.

6.6.7 Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020 as under:

"93. Banking

93.1 Energy shall be allowed to be banked at consumption end for only captive consumption within the State:

Provided that no banking facility shall be allowed for Renewable Energy plants supplying power to third party under open access and for consumption from the Renewable Energy plant installed behind the meter without any bi-directional meter in the same premises:

The Banking facility shall only be allowed for the consumers consuming upto 20% energy from the Captive Power plant on annual basis. No banking facility shall be allowed for the consumers, whose captive consumption is more than 20% of total consumption on annual basis.

93.2 Period of banking:

93.2.1 The banking shall be allowed on annual basis for the financial year.

93.3 Energy Accounting:

93.3.1 RE Power Generator/Developer shall intimate to SLDC and to the concerned Distribution Licensee on first day of every month, out of available energy for that particular month, the quantum of energy it wishes to bank for captive consumption within the State:

Provided that where no such intimation is received on or before first day of the month, the intimation last received would become applicable for the month.

93.3.2 Notwithstanding anything contrary contained in any other Regulations time being in force the Energy Accounting shall be as under.

(a) If in any block injected energy is more than the energy drawn, the excess energy shall be computed:
Provided that the excess energy of each time block shall be cumulated till the end of the month and shall be set off against the cumulative drawl of energy from Discom in the same month.

(b) The remaining excess injected energy, if any at the end of the

month shall be carried forward to the next month. The cumulative energy banked during each time block till the end of particular month shall be set off against the cumulative drawal during that particular block till the end of respective month. Unutilized banked energy at the end of financial year shall lapse and no compensation shall be applicable on unutilized banked energy at the end of the financial year.

93.4 Banking charges at the rate of 10% of banked energy in each month would be payable in kind."

6.7 Parallel Operation Charges

6.7.1 Regarding the applicability of the parallel operation charges, the Commission intends to provide more clarity in Draft Regulations in order to avoid any operation and commercial issues. While considering this, the Commission has taken into account various judgments of Hon'ble APTEL in these regards.

6.7.2 It is noted that consumers having captive generating plant and connected with the grid shall have to pay Parallel operation charges.

6.7.3 The Commission has made applicability of parallel operation charges to co-located captive generating plant. Accordingly, the Commission proposes following provision in Draft RERC RE Tariff Regulation, 2020 as under:

"***94. Parallel Operation Charges***

94.1 The connectivity of Renewable Energy Based Captive Power Plant to the Grid or State transmission system shall be governed by the connection conditions stipulated under State Grid Code and Connectivity Regulations of Central Electricity Authority notified in accordance with sub-section (b) of Section 73 of the Act.

94.2 The Commission may stipulate from time to time the 'parallel operation charges' based on Petition filed by Discom to be applicable for parallel operation of the Renewable Energy based Captive Power Plant (with co-located loads) or Renewable Energy based Co-Generating plants with the grid separately.

Provided that where Renewable Energy based Captive Power Plant is located at different place and part load of consumer is connected at place of CPP and part of load receives power through open access from Captive Power Plant located at different place, parallel operation charges shall be applicable on part load which is co-located with Renewable Energy based Captive Power Plant."