Consultation Paper on the Proposed Norms for Determining Generic Tariff for Electricity Generated from Mini-hydel, Bagasse based Co-generation and Biomass based Power Plants to be commissioned during the control period 01.04.2021 to 31.03.2024

I. Preamble:

1. In exercise of the powers conferred under Section 62(1) (a) read with Sections 64 and 86(1)(e) of the Electricity Act,2003 and Regulation 9 of the KERC (Power Procurement from Renewable sources by Distribution Licensee and Renewable Energy Certificate Frame work) Regulations, 2011, and all other powers enabling the Commission in this behalf, the Karnataka Electricity Regulatory Commission has been determining the tariff for the Renewable Energy (RE) based power generation plants from time to time since the year 2005.

2. The tariff determined in the Order dated 18.01.2005 was made applicable to all power purchase agreements filed before the Commission on and after 10.06.2004 and was applicable for a period of 10 years from the date of commercial operation of the respective plants. Further, the tariff so determined was subject to review after the end of the control period of five years. Hence, the Commission at the end of the control period had issued a Tariff Order for the RE sources on 11.12.2009. The Tariff determined in the said order was made applicable to all the Power Purchase Agreements submitted to the Commission for approval on or after 01.01.2010 and for a period of 10 years from the date of signing of PPA. Such tariff was subject to review after five years and was due for revision from 01.01.2015. Subsequently, the Commission passed order on 01.01.2015 determining the tariff for Mini-Hydel, Bagasse based co-generation and Rankine cycle-based biomass power plants with water cooled condenser. This tariff determined was made applicable to such power plants commissioned during the period between 01.01.2015 and 31.03.2018 for which PPAs have not been entered into prior to the date of issue of the said Order. Further, the said order also specified that the variable cost determined for Bagasse based co-generation and Rankine cycle-based biomass power plants with

water cooled condenser will be reviewed after 31.03.2018. Thereafter, the Commission passed orders on 14.05.2018 determining the tariff for Mini-Hydel, Bagasse based co-generation and Rankine Cycle-based biomass power plants with water cooled condenser as well as air cooled condenser. The tariff as determined by the Commission in the above Order was made applicable to all new Mini-hydel, Bagasse based co-generation and Rankine Cycle-based Biomass power projects that enter into PPA with any ESCOM after the date of the said Order and get commissioned during the period between 01.04.2018 and 31.03.2021. The levelized tariff for new Mini-hydel projects and the fixed tariff for new Bagasse based co-generation and Rankine cycle-based Biomass power projects determined in the Order was made applicable for the term of the PPA. The variable tariff determined by the Commission in the said Order for Bagasse based co-generation and Rankine Cycle-based Biomass power projects was made applicable for the period between 01.04.2018 to 31.03.2021 and also to the existing plants.

3. Subsequently, the Commission issued order on 05.06.2018, making it mandatory for distribution licensees that future procurement of power from Bagasse based Co-generation plants shall be through competitive e-reverse bidding and that the ceiling price for bidding shall be the generic tariff determined by the Commission from time to time.

4. The proposed generic tariff for bagasse-based co-generation power plants in this paper is for the purpose of fixing ceiling tariff for procuring bagasse-based co-gen power through e-reverse bidding.

5. In view of the above, there is a need to determine tariff for Mini-Hydel, Bagasse based co-generation and Rankine cycle-based biomass power plants with water cooled condenser as well as air-cooled condenser which are likely to be commissioned after 31.03.2021. Further, the variable charges for existing bagasse-based co-generation and Rankine cycle-based biomass power plants having concluded contracts with ESCOMs, also needs to be revised, keeping in view the proposed revision in fuel costs. Thus, the Commission proposes the norms for determination of tariff for the above power plants as envisaged in this discussion paper.

II. **In exercise of the powers conferred under Section 62(1)(a) read with Section 64 and Section 86(1)(e) and other enabling provisions of the**

Electricity Act, 2003 and the KERC (Procurement of Energy from Renewable Sources) Regulations,2011, the Karnataka Electricity Regulatory Commission hereby proposes to determine the generic tariff for Mini-hydel Plants, Bagasse based Co-Generation Power Plants and Biomass based Power Plants with water cooled condenser/air cooled condenser. The Commission also proposes to revise the tariff (variable charges) for existing bagasse-based co-generation and Rankine cycle-based biomass power plants keeping in view the proposed revision in fuel costs. Therefore, this consultation paper is being issued inviting comments/views/suggestions from the Stakeholders and interested persons.

III. Status of RE Projects in the State:

The RE-installed capacity in the State as on 30.11.2020 is as follows:

Source	Allotted capacity (MW)	Installed capacity MW*
Wind	18540.57	4859.54
Mini-Hydro	3010.25	903.46
Co-gen in sugar industry	2212.65	1731.16
Biomass/biogas	395.13	139.03
Waste to energy	51.00	0.00
Solar	9820.95	7354.03
Total	**34030.55**	**14987.22**

*Source: KREDL Website

It is noted that, out of the total allotted capacity of 34030.55 MW, allocation of 9979.24 MW capacity were cancelled by KREDL and 14987.22 MW capacity has been installed and commissioned so far.

IV. Tariff related issues:

1. Common Issues:

The following are the common issues involved in the determination of tariff:

(I) Applicability:

The proposals as made out in this consultation paper, shall be applicable for new Mini-hydel power Plants with installed capacity upto and including 25 MW, Bagasse based Co-Generation Power

Plants through competitive reverse e-bidding process and Biomass based power plants with water cooled condenser as well as air cooled condenser to be commissioned during the period from 01.04.2021 to 31.03.2024 and entering into PPA during the above period. The levelized fixed tariff determined shall be applicable for the period of the PPA in case of Mini-Hydel and Biomass based power projects. For the Co-generation power plant, it shall be the ceiling fixed tariff for calling bids. The variable cost in case of both Bagasse based & Biomass power plants shall be as determined by the Commission from time to time, including for those future projects coming under bid route.

Further, based on the fuel parameters proposed in this paper, the Commission proposes to revise the variable costs for existing Bagasse based Co-Generation Power Plants and Biomass based power plants with water cooled condenser as well as air-cooled condenser. The Fuel Cost proposed to be determined for Co-generation power plants, is subject to the outcome of the case pending before higher courts/tribunal. It is also proposed to retain the fixed cost for existing Bagasse based Co-Generation Power Plants and Biomass based power plants with water cooled condenser as approved in the order dated 22.01.2015 for power plants which have signed PPAs as per 2005 Order & earlier and as per 2009 Order for the term of the PPA. Also, for power plants which have signed PPAs as per the 2015 Order and 2018, the fixed cost as determined in the Order dated 01.01.2015 and 14.05.2018 is proposed to be retained for the term of the PPA.

(ii) Methodology:

The Commission proposes to determine a levelized tariff for the fixed costs over the life of the project. The variable cost, wherever fuel is involved, would be based on the specific fuel consumption and the approved fuel cost.

For the purpose of levelized tariff, it is proposed to consider the life period of the plant as 40 years for Mini-hydel plants; and 25 years for

bagasse-based cogeneration and biomass plants in line with the CERC Regulations,2020 in the matter.

Further to compute the levelized tariff, it is proposed to consider the normative weighted average cost of capital [WACC] as the discount factor.

(iii) Tariff to be single part or two parts:

The Commission proposes to continue single part tariff for Mini-hydel projects as there is no variable cost component. However, the single part tariff is proposed to be on levelized basis.

In the case of bagasse-based co-generation projects and biomass-based power plants, it is proposed to have two-part tariff, as these power plants use bio-fuel and thus have variable cost components. The fixed cost would be levelized for the life of the power plant and the variable cost would be determined for a period of three years.

(iv) Factoring of Incentives allowed by the Government in tariff computations:

At present the State has almost attained power surplus situation and with sufficient RE Capacity having been installed in the State and the State being able to meet its RPO target, not factoring the incentives/subsidies while determining tariff as it would impact tariff and affect the consumers' interest. Therefore, the Commission, as was decided in its previous order, proposes to factor only capital grants or capital subsidies, if any, extended by the Central or State Government, for tariff computations of RE generation projects.

(v) Power Purchase Agreements [PPAs]:

The RE generators selling electricity to the distribution licensees of the State shall enter into PPA in the standard format approved by the Commission. Any deviation to the clause(s) in the standard format shall be approved by the Commission.

(vi) Tariff for infirm power injected during stabilisation period and for energy generated beyond normative PLF:

Tariff for infirm power injected during stabilisation period, if any, is proposed to be continued at fifty percent of the generic tariff applicable to the specific type of the Renewable Project.

For energy generated beyond normative PLF, the tariff is proposed to be 75% of the levelized tariff determined as per the norms proposed in this paper for Mini-hydel power plants. For co-generation and biomass plants, it is proposed to be the variable cost/unit based on the proposed norms plus 2% of the variable cost. The renewable energy projects may sell such excess energy to any entity, provided that the first right of refusal for such excess energy shall vest with the concerned ESCOM having PPA.

(vii) Sharing of Clean Development Mechanism (CDM) benefits:

The Commission proposes that the sharing of CDM benefits, if any, shall be as detailed below:

a) 100% of gross proceeds on account of CDM benefit are to be retained by the project developer in the first year after the date of commercial operation of the generating station,

b) In the second year, the share of beneficiaries shall be 10%, which shall be progressively increased by 10% every year till it reaches 50%, whereafter, the proceeds shall be shared in equal proportion by the generating companies and the beneficiaries.

(viii) Wheeling charges and Surcharges, in the case of captive use/third party sales:

For Captive use and third-party sale of the energy generated, the Transmission charges, Wheeling charges, Cross-subsidy surcharge and additional Surcharge shall be as determined by the Commission in its orders issued from time to time.

(ix) Reactive power charges & Start-up Power Charges:

The reactive power charges of 40 paise/kVArh as approved in the 2018 RE Tariff Order is proposed to be continued.

For start-up power and power drawn by the generating units for other purposes (other than during construction), the charges shall be as per the terms of the PPA or orders issued by the Commission from time to time.

(x) Merit Order Dispatch:

As per Clause 8.5(8) of KERC Grid Code,2015, all renewable energy power plants, except biomass power plants and non-fossil fuel-based cogeneration plants, shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles. However, scheduling and dispatch from such RE sources shall be as per the KERC DSM Regulations issued from time to time.

2. Common Financial Parameters:

The following financial parameters, which are common to all the categories of renewable sources of generation is proposed to be adopted uniformly for the renewable energy power projects considered in this consultation paper:

(a) Debt Equity Ratio (DE Ratio):

The Commission proposes to continue the existing Debt Equity Ratio of 70:30.

(b) Return on Equity (RoE):

As per Tariff Policy,2016, the RoE as determined by CERC for Generation and Transmission has to be adopted by State Electricity Regulatory Commissions (SERCs). The CERC has adopted the RoE of 14% in its Regulations dated 23.06.2020. **Therefore, the Commission proposes adoption of RoE of 14% and to allow actual Income Tax paid by the generator on the applicable RoE as a pass through, as per tax rates applicable from time to time.**

(c) Interest on Term Loan:

The Commission in its RE Tariff Order dated 14.05.2018, has allowed 10.50% as the interest rate on term-loans. The interest rate

proposed/adopted by the CERC and some of the other State Regulatory Commissions is indicated below:

Regulatory Commission	Interest rate	Order dated
CERC Normative interest rate of two hundred (200) basis points above the average State Bank of India MCLR (Marginal Cost Lending Rate - one-year tenor) prevalent during the last available six months is considered	9.67%	21.07.2020
Tamil Nadu	9.28%	16.10.2020 Co-gen and 05.11.2020 Bio-mass Tariff Orders
Gujarat	11.40%	15.03.2018 Biomass power plants and bagasse-based co-generation plants Tariff Order
Madhya Pradesh	11.00%	21.12.2018 Small Hydro Order

It is noted that the interest rate adopted by various Commissions is in the range of 9.28% to 11.40%. The interest rates of Gujarat and Madhya Pradesh are on higher side as the order pertains to the year 2018.

The Commission notes that, with effect from 19.11.2018, Indian Renewable Energy Development Agency (IREDA) has revised the interest rates, which varies from 10.25% to 11.45% for RE projects other than wind/solar projects, with a reduction of 20, 15 and 10 base points for grades 1 to 3 respectively with external grading.

Similarly, PFC has revised the monthly rate of interest from 01.09.2020, which varies from 9.90% to 10.30% for State Sector and 10.05% to 11.40% for private sector with rating IR-1 to IR-5 respectively for RE sources other than Biomass Power Plants. For Biomass Power Plants, it varies from 10.90% to 11.40% for State Sector and 11.40% to 12.35% for Private Sector.

As per the latest data available for November,2020, the MCLR of SBI is ranging between 7.00% to 7.30% for loan tenure varying from one year to three years. Considering 200 bps above MCLR, the maximum interest rate would be 9.30%.

The above facts indicate that the domestic loan would attract interest rate in the range of 9.30% to 12.35%, depending upon the credit ratings of the RE generators.

In view of the above and keeping in view the interest rate approved by CERC, the Commission proposes 10.00% as the interest rate on term loans. The tenure of debt is considered as 15 years in tune with the latest CERC Regulations.

(d) Depreciation:

The Commission proposes to provide 4.67% of the capital cost as the depreciation per annum on straight-line method for the first fifteen years, to ensure debt servicing.

For the purpose of depreciation, excluding land cost, the value of depreciable assets (X=85% of CC) is proposed to be considered as 85% of the Capital Cost (CC). Thus, 90% of depreciable assets after considering 10% salvage value works out to 76.50% of Capital cost (0.90x.85 of CC). Since 70% of Capital cost is recovered in the first 15-years, the remaining 6.50% of depreciation is proposed to be recovered during the remaining period of the power plant life.

(e) Interest on working capital (IWC):

The Commission in its 2018 RE Tariff Order has considered 11.50% as the interest rate on working capital.

The interest rate adopted by the CERC and other SERCs are indicated below:

Regulatory Commission	IWC (%)	Order Dated
CERC	11.17	21.07.2020
TNERC	10.28	order for Bagasse based co-generation plants dated 16.10.2020
RERC	10.99	Order dated 08.03.2019
GERC	11.40	Order dated 15.03.2018
MERC	11.56	18.08.2018

It is noted that the interest rate adopted by various Commissions is in the range of 10.28% to 11.56%. The interest rates adopted by GERC and MERC are on higher side as the order pertains to the year 2018.

Considering the above fact, the Commission proposes to 10.50% as the interest on working capital.

The Commission in its tariff order dated 14.05.2018 has considered two months' receivables for mini-hydel and bagasse-based cogeneration power plants and two months' receivables plus two months' variable costs for biomass based RE power plants as working capital. The Commission proposes to continue the existing norms for computing working capital.

(f) Income Tax:

The Commission proposes to allow Income Tax, surcharge & cess as a pass-through without factoring the same in the tariff computations. The amount of Income Tax, surcharge & cess that has to be claimed shall be worked out on the amount of RoE approved by the Commission. The Income Tax at the rates [including surcharge & cess] prevailing in the relevant years shall be claimed separately from the ESCOMs, duly furnishing the necessary proof of tax payment.

V. **Issues applicable to specific RE projects:**

1. **Mini-hydel power plants:**

   a. **Capital cost:**

   The Commission in its order dated 14.05.2018 has approved a capital cost of Rs. 6.33 Crs/MW, net of subsidy of Rs.1.00 Cr./MW and including the evacuation cost and taxes.

   The capital cost considered by the various Commissions is indicated below:

Regulatory Commission	Capital cost- Rs. Crs/MW	Order dated
Gujarat	7.48 for 5 MW to 25 MW 8.20 for less than 5 MW	14.12.2016
Kerala	7.07 for 5 MW to 25 MW 7.79 for less than 5 MW	Kerala State Electricity Regulatory Commission (Renewable Energy and net metering) Regulations, 2020. Dated 07.02.2020
Maharashtra	5.21 > 5 MW and upto and including 25 MW 5.71> 1 MW and upto and including 5 MW	18.08.2018
Madya Pradesh	6.35 for 5 MW and above 6.50 for less than 5 MW	21.12.2018
CERC	9.00 for 5 MW to 25 MW 7.80 for less than 5 MW	21.07.2020

The Commission notes that the capital cost accepted by the SERCs in the neighbouring States of Kerala and Maharashtra is in the range of Rs. 5.21 Crs. to Rs. 7.79 Crs. /MW.

As per the information furnished by KREDL for three projects, the capital cost varies from 4.00 Crs/MW to 8.70 Crs/MW.

Considering the above facts, the Commission proposes Rs.6.35 Crs/MW, [Average of Rs.4.00 Crs. & 8.70 Crs.] as the capital cost including the power evacuation infrastructure cost and taxes and excluding capital subsidy, if any.

b. Plant Load factor:

In the order dated 01.01.2015, the Commission has approved a PLF of 30%. The PLF considered by other Commissions is indicated below:

Regulatory Commission	% PLF	Order dated
Gujarat	42	14.12.2016
Kerala	30	Kerala State Electricity Regulatory Commission (Renewable Energy and net metering) Regulations, 2020. Dated 07.02.2020
Maharashtra	30	18.08.2018
Madhya Pradesh	30	21.12.2018
CERC	30	21.07.2020

The PLF furnished by KREDL for three power projects varies from 41% to 67%.

In view of the above, the Commission proposes PLF of 35%.

c. **Auxiliary Consumption:**
The auxiliary consumption approved by the Commission in its order dated 14.05.2018, is 1% of the energy generated. The KSERC, the MERC, MPERC, the GERC, as well as the CERC have also approved auxiliary consumption of 1% for mini-hydel plants.

The auxiliary consumption furnished by KREDL for three power projects is 1.5%.

Keeping in view the efficiency of operation, the Commission proposes to continue with the existing auxiliary consumption at 1%.

d. **O & M expenses and annual escalation rate:**
The O & M expenses approved by the Commission in its Order dated 14.05.2018 works out to 2.316% of the capital cost with an annual escalation of 5.72%. The O & M expenses considered by other Commissions are indicated as follows:

Regulatory Commission	O & M expenses	Order dated
Gujarat	2.5% of CC for 5-25 MW capacity and 3.3% of CC for below 5 MW capacity with annual escalation of 5.72%	14.12.2016
Kerala	23.47 lakhs/MW [3.32% of CC] for 5 MW to 25 MW with annual escalation of 5.72% 32.41 lakhs/MW [4.16% of CC] for less than 5 MW with annual escalation of 5.72%	Kerala State Electricity Regulatory Commission (Renewable Energy and net metering) Regulations, 2020. Dated 07.02.2020
Maharashtra	17.36 lakhs/MW [3.34% of CC] for > 5 MW and upto and including 25 MW [2.80% of CC] with annual escalation of 4.27% 24.53 lakhs/MW [4.29% of CC]> 1 MW and upto and including 5 MW [3.60% of CC] with annual escalation of 4.27%	18.08.2018
Madhya Pradesh	3% of CC with 5.72% escalation per annum	21.12.2018
CERC	24.37 lakhs/MW [2.71% of CC] for 5 MW to 25 MW with annual escalation of 3.84% 33.66 lakhs/MW [4.32% of CC] for less than 5 MW with annual escalation of 3.84%	21.07.2020

The O & M expenses furnished by KREDL for three power projects is 1.5% of the Capital cost. The O & M expenses specified by CERC and SERCs mentioned above, varies from 2.50% to 4.32% of capital cost.

Thus, the O & M cost may vary from 1.50% to 4.32 % depending upon the project.

Thus, the Commission proposes to revise the O & M expenses to 2.50% of the capital cost from 2.316% approved earlier. The annual escalation is proposed at 5.00%.

2. **Bagasse based Co-generation power plants:**

   a. **Capital cost:**

   The Commission in its Order dated 14.05.2018 has approved a capital cost of Rs. 4.70 Crs/MW, net of capital subsidy of Rs.4.50 lakhs/MW, including the power evacuation infrastructure cost and taxes.

   The capital cost considered by other Commissions is indicated below:

Regulatory Commission	Capital cost-Rs. Crs/MW	Order dated
Tamil Nadu	4.95	16.10.2020
Maharashtra	4.56	18.08.2018
Gujarat	4.66	15.03.2018
Madhya Pradesh	4.36	01.04.2013
CERC	4.67	21.07.2020

The Commission notes that the capital cost adopted by other Commissions is in the range of Rs. 4.36 to 4.95 Crs./MW. As per the data furnished for two plants by KREDL, the capital cost is Rs. 0.40 Crs. /MW & Rs. 0.60 Crs. /MW. The Commission notes that KREDL data is too low and may pertain to R & M of the plants and hence, can't be relied upon.

Considering the above facts, the Commission proposes to continue the capital cost at Rs.4.70 Crs./MW, net of capital subsidy, including the power evacuation infrastructure cost and taxes.

   b. **Plant Load factor:**

   In its Order dated 14.05.2018, the Commission has approved a PLF of 60%. The PLF adopted by the CERC and some of the other State Commissions are indicated below:

Regulatory Commission	% PLF	Order dated
Tamil Nadu	60	16.10.2020
Maharashtra	60	18.08.2018
Gujarat	60	15.03.2018
Madhya Pradesh	53	01.04.2013
CERC	53	21.07.2020

The data furnished for one plant by KREDL indicates 90% PLF, which is considerably high compared to the PLF adopted in the States mentioned above.

Thus, the Commission proposes to continue with the existing PLF of 60% for the bagasse co-generation plants.

c. **Auxiliary Consumption:**

The auxiliary consumption approved by the Commission in its Tariff Order 14.05.2018, for the bagasse-based co-generation plants is 8.50%. The auxiliary consumption adopted by the CERC and some of the other State Commissions are indicated below:

Regulatory Commission	% auxiliary consumption	Order dated
Tamil Nadu	8.50	16.10.2020
Maharashtra	8.50	18.08.2018
Gujarat	8.50	15.03.2018
Madhya Pradesh	8.50	01.04.2013
CERC	8.50	21.07.2020

Considering the above facts, the Commission proposes to continue the auxiliary consumption to 8.50% for the bagasse co-generation plants.

d. **O & M expenses and annual escalation rate:**

In its Order dated 01.01.2015, the Commission has approved 3.0% of the Capital Cost [CC]as the allowable O & M expenses with 5.72% annual escalation. The O & M Cost adopted by the CERC and some of the other State Commissions are indicated below:

Regulatory Commission	O & M cost	Order dated
Tamil Nadu	Rs.24.52 lakhs/MW (4.95% of CC) with 5.72% annual escalation	16.10.2020
Maharashtra	19.49 lakhs/MW (4.27% OF CC) for FY19 with 4.27% annual escalation	18.08.2018
Gujarat	3% of CC with 5.72% escalation	15.03.2018
Madhya Pradesh	3% of CC with 5% escalation	01.04.2013
CERC	Rs. 24.52 lakhs/MW (5.25% OF CC) with 3.84% escalation	21.07.2020

The Commission proposes to continue 3.0% of the Capital cost as the allowable O & M expenses in the base year for the bagasse co-generation plants. The annual escalation is proposed at 5.00%.

e. **Specific fuel consumption:**

The Commission has approved specific fuel consumption of 1.60 kg/kWh for the existing plants considering the calorific value of bagasse as 2250 kcal/kg and heat rate of 3600 kcal/kWh. The specific fuel consumption adopted by other Commissions is as indicated below:

Regulatory Commission	Specific fuel consumption kg/kWh	Order dated
Tamil Nadu	1.41 SHR 3240 kcal/kWh GCV 2300 kcal/kg	16.10.2020
Maharashtra	1.60 SHR 3600 kcal/kWh GCV 2250 kcal/kg	18.08.2018
Gujarat	1.60 SHR 3600 kcal/kWh GCV 2250 kcal/kg	15.03.2018
Madhya Pradesh	1.60 SHR 3600 kcal/kWh GCV 2250 kcal/kg	01.04.2013
CERC	1.60 SHR 3600 kcal/kWh GCV 2250 kcal/kg	21.07.2020

The Commission proposes to continue with the existing specific fuel consumption of 1.60 kg/kWh.

f. **Fuel Cost:**

The Commission has approved the fuel cost of Rs. 1039/ MT with 5.72% annual escalation in its order dated 14.05.2018. Thus, the Commission has approved fuel cost of Rs. 1161.28 /MT for 2020-21. The fuel costs adopted by other Commissions is as indicated below:

Regulatory Commission	Fuel Cost Rs./MT	Order dated
Tamil Nadu	2023 with 5% escalation per annum	16.10.2020
Maharashtra	2387.44 with 5% escalation	18.08.2018
Gujarat	2075 with 5% escalation per annum	15.03.2018
Madhya Pradesh	1583 with 5% escalation per annum	01.04.2013
CERC	2274 with 5% escalation per annum	21.07.2020

Considering the approved cost of Rs. 1161.28 /MT for 2020-21 and 5.00% escalation factor per annum, **the Commission as an interim measure proposes the fuel cost of Rs.1220/ MT [after rounding off] for FY22, with annual escalation of 5.00% per annum, which is subject to final decision of the case pending before the higher courts/Tribunal.**

The above Fuel Cost is proposed to be made applicable to all the existing bagasse-based co-generation plants who have signed PPAs with ESCOMs as per RE Tariff Order-2005 & earlier, as per the RE Tariff Order-2009, as per the RE Tariff Order-2015 & as per Tariff Order-2018 and accordingly the tariff for these power plants would be revised for 2021-22 to 2023-24.

3. **Biomass based power plants with water cooled condenser and Air-cooled condenser:**

a. **Capital cost:**

The Commission in its order dated 14.05.2018, has approved a capital cost of Rs. 5.76 Crs./MW including the power evacuation infrastructure cost & taxes, for Rankine cycle-based biomass power plants with water cooled condenser and Rs.5.86 Crs./ MW including the power evacuation infrastructure cost & taxes for Rankine cycle-based biomass power plants with air cooled condenser. The capital cost considered by other Commissions is indicated below:

Regulatory Commission	Capital cost-Rs. Crs/MW	Order dated
Tamil Nadu	6.11 irrespective of technology	05.11.2020
Maharashtra	4.61 irrespective of technology	18.08.2018
Gujarat	Water Cooled Condenser: 4.77 Air-Cooled Condenser: 5.07	15.03.2018
Madhya Pradesh	4.63 irrespective of technology	03.05.2013
Rajasthan	Water Cooled Condenser: 5.28 Air-Cooled Condenser: 5.62	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'.
CERC	Water Cooled condenser: 5.21 for other than rice Straw & juliflora and 6.11 for rice Straw & juliflora. Air-Cooled Condenser: 6.00 for other than rice Straw & juliflora and 6.52 for rice Straw & juliflora.	21.07.2020

The Commission notes that the capital cost adopted by other Commissions, is in the range of Rs. 4.61 Crs to Rs 6.11 Crs/MW for water cooled condenser-based power plants and in the range of Rs. 4.61 Crs to Rs 6.52 Crs/MW air-cooled condenser-based power plants. The Cost furnished by KREDL for two power plants is Rs.4.50 Crs/MW & Rs.5.82 Crs/MW.

Considering the above facts, the Commission proposes to retain the capital cost including the power evacuation infrastructure cost and taxes, at Rs.5.76 Crs/MW for water cooled condenser-based power plants and at Rs.5.86 Crs/MW for air cooled condenser-based power plants.

b. Plant Load factor:

In the Order dated 14.05.2018, the Commission has approved a PLF of 75% for both water-cooled as well as air-cooled condenser-based

power plants. The PLF adopted by the CERC and some of the other State Commissions are indicated below:

Regulatory Commission	% PLF	Order dated
Tamil Nadu	80% Irrespective of technology used	05.11.2020
Maharashtra	60% during stabilisation period; 70% during remaining period of first year after stabilisation; 80% -second year onwards	18.08.2018
Gujarat	70% for 1st year & 80% from 2nd year Onwards irrespective of technology used	15.03.2018
Madhya Pradesh	60% during stabilisation period; 70% during remaining period of first year after stabilisation; 80% -second year onwards Irrespective of technology used	02.03.2012
Rajasthan	80%	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'.
CERC	80% -irrespective of technology used	21.07.2020

As per the data furnished by KREDL for two power plants, the PLF is 75% & 85%.

The Commission proposes to continue with the existing PLF of 75% for the biomass-based power generation plants, irrespective of the technology adopted.

c. **Auxiliary Consumption:**

The auxiliary consumption approved by the Commission for the existing Biomass plants is 10% for both water-cooled and air-cooled condenser-based power plants. The auxiliary consumption adopted by the CERC and some of the other State Commissions are indicated below:

Regulatory Commission	% auxiliary consumption	Order dated
Tamil Nadu	10% irrespective of technology	05.11.2020
Maharashtra	10% irrespective of technology	18.08.2018
Gujarat	10% irrespective of technology	15.03.2018
Madhya Pradesh	10% irrespective of technology	02.03.2012
Rajasthan	Water Cooled Condenser: 10.00% during stabilisation period of six months and 10% thereafter Air cooled condenser: 12.00% during stabilisation period of six months and 12% thereafter	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'.
CERC	Water Cooled Condenser: 10% Air cooled condenser: 12%	21.07.2020

As per the Data furnished by KREDL for two power plants, the Auxiliary consumption is 12.66% and 20.00%, which is considerably high when compared to the auxiliary consumption adopted in the States mentioned above.

The Commission proposes to continue with the existing auxiliary consumption of 10% for the biomass-based power generation plants, irrespective of the technology adopted.

d. O & M expenses and annual escalation rate:

The Commission, in the Order dated 14.05.2018, has approved 5% and 4% of capital cost as the allowable O & M expenses with 5.72% annual escalation for water cooled condenser-based power plants and air-cooled condenser-based power plants, respectively. The O & M cost adopted by the CERC and some of the other State Commissions is indicated below:

Regulatory Commission	O & M cost	Order dated
Tamil Nadu	Rs. 46.42 Lakhs/MW with 3.84% escalation per annum	05.11.2020
Maharashtra	29.60 lakhs/MW for FY19 considering 5.32% of CC for FY16 and applying escalation factors as per Regulations. For next control period escalation is specified as 4.27%.	18.08.2018
Gujarat	5% of CC escalated by 5.72% every year, irrespective of technology used	15.03.2018
Madhya Pradesh	4% of CC escalated by 5.72% every year, irrespective of technology used	02.03.2012
Rajasthan	Water cooled: 46.46 lakhs/MW for FY21 Annual Escalation :3.84%% Air-cooled: 49.53 Lakhs/MW for FY 21 Annual Escalation :3.84%	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'.
CERC	46.42 Lakhs/MW for FY21 escalated by 3.84% every year, irrespective of technology used	21.07.2020

As per the data furnished by KREDL for two power plants, the O & M expenses works out to 2.4 to 3.03% of Capital cost, which appears to be lower.

Therefore, the Commission proposes to continue 5.0% of the Capital Cost [CC]as the allowable O & M expenses in the base year FY22 for biomass power plants with water cooled condenser and 4% of CC for air-cooled condenser power plants. The annual escalation is proposed at 5.00%.

e. Specific fuel consumption:

The Commission has approved specific fuel consumption of 1.18 kg/kWh for the existing plants with air cooled condenser considering the calorific value of Biomass as 3300 kcal/kg and heat rate of 3900 kcal/kWh. Similarly, for water cooled power plants, the Commission has approved specific fuel consumption of 1.21 kg/kWh, considering the calorific value of Biomass as 3300 kcal/kg and heat rate of

4000 kcal/kWh. The specific fuel consumption adopted by other Commissions is as indicated below:

Regulatory Commission	Specific fuel consumption kg/kWh	Order dated
Tamil Nadu	1.33 irrespective of technology SHR: 4125 kcal/Unit; GCV: 3100 kcal/kg	05.11.2020
Maharashtra	1.16 irrespective of technology SHR: 4200 kcal/Unit; GCV: 3611 kcal/kg	18.08.2018
Gujarat	Water cooled:0.859 SHR:3800 kacl/kWh; GCV:4423 kcal/kg Air cooled:0.893 SHR:3950 kacl/kWh; GCV:4423 kcal/kg	15.03.2018
Madhya Pradesh	1.35 irrespective of technology SHR: 4200 kcal/Unit; GCV: 3100 kcal/kg	30.11.2016
Rajasthan	1.24 for travelling grate boiler SHR: 4200 kcal/unit; GCV:3400 kcal/kg 1.21 for AFBC boiler SHR: 4125 kcal/unit; GCV:3400 kcal/kg	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'
CERC	1.35 for travelling grate boiler SHR: 4200 kcal/unit; GCV:3100 kcal/kg 1.33 for AFBC boiler SHR: 4125 kcal/unit; GCV:3100 kcal/kg	21.07.2020

The Commission notes that the specific fuel consumption varies from 0.859 to 1.35 kg/unit across the States.

The Commission **proposes to continue specific fuel consumption of 1.21 kg/kWh for water cooled based power plants and 1.18 kg/kWh for air cooled condenser-based power plants.**

f. **Fuel Cost:**

The Commission notes that biomass fuel cost allowed by the following Commission is as follows:

Regulatory Commission	Fuel Cost-Rs/MT	Order dated
Tamil Nadu	3272 with 5% escalation per annum	05.11.2020
Maharashtra	4091.02 with 5% escalation per annum	18.08.2018
Gujarat	3764 with 5% escalation per annum	15.03.2018
Madhya Pradesh	2653 with 5% escalation per annum	03.05.2013
Rajasthan	2958.25 with 3% escalation per annum	'Rajasthan Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020'
CERC	3557 with 5% escalation per annum	21.07.2020

The Commission has approved the fuel cost of Rs. 2500/ MT with 5.72% annual escalation in its order dated 14.05.2018. Considering the 5.72% escalation, the fuel cost for FY22 works out to Rs. 2954/MT.

Thus, the Commission proposes a fuel cost of Rs.3000/MT for FY22, which shall be escalated at 5.00% per annum. The above Fuel Cost is proposed to be made applicable to all the existing biomass-based power plants with water cooled condenser, who have signed PPAs with ESCOMs as per RE Tariff Order-2005 & earlier, as per RE Tariff Order-2009, as per RE Tariff Order-2015and as per RE Tariff Order - 2018 and accordingly the tariff for these power plants would be revised for the period of 2021-22 to 2023-24.

In case of Biomass Power plants with air cooled condenser, the variable cost as determined in the order dated 10.07.2014 in OP No.18/2013 shall be applicable for the plants commissioned during the period from 01.04.2014 to 31.03.2018. For the plants commissioned after 31.03.2018, the variable charges as per Tariff Order 2018 shall be applicable for the plants commissioned during the period from 01.04.2018 to 31.03.2021 and for the control period FY2022 to FY2024, the variable charges proposed in this paper shall be applicable.

VI. Gist of the proposed parameters:

The gist of the proposed parameters is indicated below:

Parameter	Mini-Hydel		Co-generation		Biomass	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Debt: Equity	70:30	70:30	70:30	70:30	70:30	70:30
RoE	14%	14%	14%	14%	14%	14%
Income Tax	Pass through	Pass through	Pass through	Pass through	Pass through	Pass through
Interest on term loan	10.50%	10.00%	10.50%	10.00%	10.50%	10.00%
Depreciation	5.38% for the first 13-years, and the balance spread over the life of the project	4.67% for the first 15-years, and the balance spread over the life of the project	5.38% for the first 13-years, and the balance spread over the life of the project	4.67% for the first 15-years, and the balance spread over the life of the project	5.38% for the first 13-years, and the balance spread over the life of the project	4.67% for the first 15-years, and the balance spread over the life of the project
Interest on WC	11.50%	10.50%	11.50%	10.50%	11.50%	10.50%
Capital Cost [CC] -Rs Crs/MW	6.33	6.35	4.70	4.70	5.76 for water cooled & 5.86 for air cooled	5.76 for water cooled & 5.86 for air cooled
O& M as percentage of CC for base year	14.66 lakhs/MW in base year FY19	2.50%	3.0%	3.0%	5.00% for water cooled & 4.00% for air cooled	5.00% for water cooled & 4.00% for air cooled
O & M annual escalation	5.72%	5.00%	5.72%	5.00%	5.72%	5.00%
PLF	30%	35%	60%	60%	75%	75%
Auxiliary	1%	1%	8.50%	8.50%	10%	10%
Specific Fuel Consumption-Kg/kWh	Not applicable	Not applicable	1.60	1.60	1.21 for water cooled & 1.18 for air cooled	1.21 for water cooled and 1.18 for air cooled
Fuel Cost-Rs/MT	Not applicable	Not applicable	1039	1220	2500	3000
Fuel Cost Escalation	Not applicable	Not applicable	5.72%	5.00%	5.72%	5.00%

VII. The Commission invites written comments/views/ suggestions on the above proposals from the stakeholders so as to reach Commission latest by 05.02.2021. Stakeholders are requested substantiate their comments/views/ suggestions on various parameters duly furnishing supporting documents, to the Secretary, KERC at the following address:

The Secretary,
Karnataka Electricity Regulatory Commission,
No.16C-1, Miller Tank Bed Area,
Vasanthanagara, Bengaluru-560052

Approved by the Commission

Secretary