Chhattisgarh State Electricity Regulatory Commission
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Suo-Motu Petition No. 18 of 2023

In the matter of-

Determination of generic preferential tariff for FY 2022-23 and FY 2023-24 for Renewable Energy Sources based plants under Regulation 8.6 of the Chhattisgarh State Electricity Regulatory Commission (Terms and conditions for determination of generation tariff and related matters for electricity generated by plants based on renewable energy sources) Regulations, 2022

and

Energy charges for FY 2022-23 and FY 2023-24 for existing biomass power plants.

Present	:	Hemant Verma, Chairman
	:	Vinod Deshmukh, Judicial Member
	:	Pramod Kumar Gupta, Member

DRAFT ORDER

(March 01, 2022)

Regulation 8.6 of Chhattisgarh State Electricity Regulatory Commission (Terms and conditions for determination of generation tariff and related matters for electricity generated by plants based renewable energy sources) Regulations, 2022, (hereinafter referred to as "the RE Tariff Regulations 2022") mandates the Commission to

determine the generic tariff on the basis of the suo-motu petition, for the following renewable energy technologies (RE technologies) for which norms have been specified in the RE Tariff Regulations 2022;

(a) Small Hydro Projects;

(b) Non-fossil fuel-based co-generation Plants;

(c) Solar PV power project for 0.5 MW to 2 MW capacity; and

(d) Biogas based power project.

2. Generic tariff of the RE projects achieving COD during the first and second year of control period (i.e., FY 2022-23 and FY 2023-24) has been determined through this order. Tariff proposals are enclosed herewith this Order.

3. Energy charges for FY 2022-23 and FY 2023-24 for existing biomass power plants has also been determined through this order.

4. Comments /suggestions of the stakeholders on the above proposal are invited by xxxxxx and hearing will be held on xxxxxx at xxxx at the Commission’s courtroom.

Generic levellised generation tariff for various renewable energy technologies, for FY 2022-23 and FY 2023-24

1. The generic generation tariff for various renewable energy technologies are discussed below:

1.1 **Useful Life:** Regulation 2.1(ll) of the RE Tariff Regulations 2022 defines 'useful life' in relation to a unit of a generating station as per following from the date of commercial operation (COD) of such generation facility:

Renewable Energy Projects	Years
Small Hydro Plant	40
Non-fossil fuel-based co-generation Plants	25
Solar PV power projects	25
Biogas based power projects	25

1.2 **Tariff Period:** As per Regulation 6 of RE Tariff Regulations 2022, the tariff period, in respect of the RE projects, shall be considered from the COD of the renewable energy generating stations and shall be considered as useful life of the RE Projects.

1.3 **Tariff Structure:** As per Regulation 9.1 of the RE Tariff Regulations 2022, the tariff for RE projects shall be single part tariff consisting of the following fixed cost components:

(a) Return on equity;

(b) Interest on loan capital;

(c) Depreciation;

(d) Interest on working capital;
(e) Operation and maintenance expenses.

For renewable energy technologies having fuel cost component, like biomass power projects, biogas based power project and non-fossil fuel based co-generation projects, single-part tariff with two components, viz., fixed cost component and fuel cost component, shall be determined.

1.4 **Tariff Design:** As per para 10.1 in RE Tariff Regulations 2022, the generic tariff shall be determined on levellised basis for the Tariff Period from COD and levellisation of tariff is considered for useful life of the project.

2. Parameters for tariff determination

2.1 **Capital Cost:** Regulation 12 of the RE Tariff Regulations 2022 stipulates that the norms for the capital cost as specified in the technology specific chapter shall be inclusive of all capital works like plant and machinery, civil works, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point.
The Commission has specified the normative capital cost for first year of control period i.e., FY 2022-23 for various RE technologies viz Small Hydro Power, Non-Fossil Fuel based Cogeneration, Solar PV Projects for 0.5 MW to 2 MW capacity and Biogas based power project. Technology specific capital cost of RE projects is discussed herein under:

A. Capital cost of Small Hydro Projects:

Regulation 28.1 of the RE Tariff Regulation 2022, specify normative capital cost for small hydro projects for FY 2022-23.

Regulation 12.2 specifies that the capital cost for RE projects as specified for first year of control period shall remain valid for the entire duration of the control period unless reviewed by the Commission. Accordingly capital cost shall be as follows:

Project Size	FY 2022-23 Capital Cost (Rs. Lakh/MW)	FY 2023-24 Capital Cost (Rs. Lakh/MW)
Up to 5 MW	970.20	970.20
Above 5 MW to 25 MW	882.00	882.00

B. Capital Cost of Non-fossil fuel based Co-generation Projects:

Regulation 46.1 of the RE Tariff Regulation 2022, specify normative capital cost for non-fossil fuel based co-generations for FY 2022-23.

Regulation 12.2 specifies that the capital cost for RE projects as specified for first year of control period shall remain valid for the entire duration of the control period unless reviewed by the Commission. Accordingly capital cost for FY 2022-23 and FY 2023-24 shall be Rs. 492 Lakh/MW.

C. Capital Cost of Solar PV power project for 0.5 MW to 2 MW capacity:

Regulation 54.1 of the RE Tariff Regulation 2022, specify normative capital cost for Solar PV power project for 0.5 MW to 2 MW capacity for FY 2022-23.

Regulation 12.2 specifies that the capital cost for RE projects as specified for first year of control period shall remain valid for the entire duration of the control period unless reviewed by the Commission.

Accordingly capital cost for FY 2022-23 and FY 2023-24 shall be Rs. 4.5 Cr/MW.

D. Capital Cost of Biogas based power project:

Regulation 74.1 of the RE Tariff Regulation 2022, specify normative capital cost for Biogas based power project FY 2022-23.

Regulation 12.2 specifies that the capital cost for RE projects as specified for first year of control period shall remain valid for the entire duration of the control period unless reviewed by the Commission. Accordingly capital cost for FY 2022-23 and FY 2023-24 shall be Rs. 1186 Lakh/MW and after taking into account of capital subsidy net project cost for FY 2022-23 and FY 2023-24 shall be Rs. 886 Lakh/MW.

2.2 **Debt-Equity Ratio:** Regulation 13.1 of the RE Tariff Regulations 2022 provides that the debt equity ratio of 70:30 is to be considered for determination of generic tariff based on suo-motu petition.

2.3 **Loan and Finance Charges:** As per regulation 14 of the RE tariff Regulations 2022, for the purpose of determination of tariff, loan tenure of 15 years shall be considered. The normative interest rate shall be considered as two hundred (200) basis points above the average State Bank of India Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) prevalent during the last available six months shall be considered. Since, tariff will be applicable from 1st April of the respective years, State Bank of India MCLR, for period prior to six month from the 1st April has been considered. State Bank of India MCLR and average MCLR is shown below.

FY 2022-23		**FY 2023-24**	
Month	**One year tenor MCLR Rate, %**	**Month**	**One year tenor MCLR Rate, %**

	(SBI)		(SBI)
15th Oct 2021	7.00	15th Sept 2022	7.70
15th Nov 2021	7.00	15th Oct 2022	7.95
15th Dec 2021	7.00	15th Nov 2022	8.05
15th Jan 2022	7.00	15th Dec 2022	8.30
15th Feb 2022	7.00	15th Jan 2023	8.40
15th Mar 2022	7.00	15th Feb 2023	8.50
Average	7.00	**Average**	8.25

In terms of the above, the computations of interest on loan comes out as 9.00% for FY 2022-23 and 10.25% for FY 2023-24.

2.4 **Depreciation:** As specified in regulation 15 of the RE tariff Regulations 2022, value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset. The depreciation rate for the first 15 years of the Tariff Period shall be 4.67% per annum and the remaining depreciation shall be spread over the remaining useful life of the project from 16th year onwards on 'Straight Line Method'.

2.5 **Return on Equity:** Regulation 16.1 of the RE Tariff Regulations 2022 provides that the value base for the equity shall be 30% of the capital cost for generic tariff determination. Further regulation 16.2 stipulates the normative return on equity 14%, to be grossed up by prevailing MAT rate as on 1st April of the previous year. Average of MAT rate, as on 1st April 2021, (for companies having profit less than Rs. 1 Cr, between Rs. 1 Cr & 10 Cr and above Rs. 10 Cr are 15.6%, 16.69% and 17.47% respectively) is 16.59%. Similarly, average of

MAT rate as on 1st April 2022 is 16.59%. Accordingly, RoE for entire useful life of the project comes out to be 16.78% for FY 2022-23 and FY 2023-24.

2.6 **Interest on Working Capital:** As per regulation 17 of the RE tariff Regulations 2022, working capital requirement in respect of small hydro power, solar PV power projects shall be computed as per following:

I. Operation & Maintenance expenses for one month;

II. Receivables equivalent to 30 days of energy charges for sale of electricity calculated on the normative CUF;

III. Maintenance spare @ 15% of operation and maintenance expenses

The Working Capital requirement in respect of non-fossil fuel based co-generation projects and biogas based power project shall be computed as per following:

I. Fuel costs for four months equivalent to normative PLF;

II. Operation & Maintenance expense for one month;

III. Receivables equivalent to 30 days of fixed and variable charges for sale of electricity calculated on the target PLF;

IV. Maintenance spare @ 15% of operation and maintenance expenses

Interest on Working Capital shall be at interest rate equivalent to normative interest rate of three hundred fifty (350) basis points above the average State Bank of India MCLR (One Year Tenor) prevalent during the last available six months for the determination of tariff. Accordingly, interest rate comes out as 10.5% and 11.75 % for FY 2022-23 and FY 2023-24 respectively.

2.7 **Operation & Maintenance Expenses:** As per provisions in RE Tariff Regulations 2022, O&M expenses shall be determined for the

Tariff Period based on normative O&M expenses specified by the Commission for first year of the Control Period and shall be escalated at the rate of 3.84% per annum over the Tariff Period.

A. O& M Expenses for Small Hydro Projects:

As per regulation 31.1 of the RE Tariff Regulation 2022, O & M expenses for small hydro projects for FY 2022-23 and FY 2023-24 shall be as follows;

Project Size	FY 2022-23: O& M Expenses (Rs. Lakh/MW)	FY 2023-24: O& M Expenses (Rs. Lakh/MW)
Up to 5 MW	37.61	39.05
Above 5 MW to 10 MW	32.98	34.24
Above 10 MW to 25 MW	27.24	28.29

B. O & M Expenses for Non-fossil fuel based Cogeneration Projects:

As per regulations 52.1 of the RE Tariff Regulations 2022, normative O & M expenses for the Non-fossil fuel based Cogeneration Projects for the year 2022-23 shall be Rs. 27.40 Lakh/MW and for FY 2023-24 with escalation rate of 3.84% O & M expenses norms comes out to Rs. 28.45 Lakh/MW.

C. O& M Expenses for Solar PV power project:

As per regulations 56.1 of the RE Tariff Regulations 2022, normative O & M expenses for Solar Photovoltaic Power Project shall be Rs. 8.12 Lakh/MW for FY 2022-23 and for FY 2023-24, with escalation of 3.84%, it comes out to Rs. 8.43 Lakh/MW.

D. O& M Expenses for Biogas based power project:

As per regulations 77.1 of the RE Tariff Regulations 2022, normative O & M expenses for Biogas based power project shall be Rs. 66.1 Lakh/MW for FY 2022-23 and for FY 2023-24, with escalation of 3.84%, it comes out to Rs. 68.63 Lakh/MW.

2.8 **Capacity Utilisation Factor (CUF):** Regulations 29 and 55 of the RE Tariff Regulations 2022 specify the norms for Capacity Utilization Factor (CUF) in respect of the Small Hydro and Solar PV based power generating stations as per the details given in the table below which has been considered for determination of tariff.

RE Projects	CUF
Small Hydro projects	30%
Solar PV	19%

2.9 **Plant Load Factor (PLF):** Regulations 35, 47 and 75 of the RE Tariff Regulations 2022 specify the plant load factor for Biomass based power projects, Non fossil Fuel based Co-generation projects and Biogas based power project as given in the table below which has been considered for determination of fixed charges.

RE Projects	PLF
Biomass based power projects	80%
Non fossil Fuel based Co-generation projects	38%
Biogas based power projects	90%

2.10 **Auxiliary Power Consumption:** Regulations 30, 36, 48, 57 and 76 of the RE Tariff Regulations 2022 stipulate the auxiliary power consumption as under which has been considered for determination of tariff of the RE projects.

RE Projects	Aux Cons
Small Hydro projects	1.5%
Biomass based power projects	10%
Non fossil Fuel based Co-generation projects	8.5%
Solar PV	0.25%
Biogas based power projects	12%

2.11 **Station Heat Rate:** The Station Heat Rates (SHR) specified under Regulations 37 and 49 of the RE Tariff Regulations 2022 for biomass and non-fossil fuel based co-generation projects are as under:

RE Projects	SHR (Kcal/kWh)
Biomass based power projects	4000
Non fossil Fuel based Co-generation projects	3600

2.12 **Calorific Value:** In terms of Regulation 43 and 50 of the RE Tariff Regulations 2022 the calorific value of biomass and bagasse for determination of tariff is 3100 and 2250 Kcal/kg respectively.

2.13 **Fuel Cost:** The Commission, in terms of Regulation 44, 51 and 79 of the RE Regulations 2022, has specified the biomass, bagasse and feed stock price applicable during the period 2022-23 as Rs. 3922, Rs. 2507 and Rs. 2000 per MT respectively. Further, as per regulations 44.2, 51.3 and 79.1 these costs shall be escalated by 5% to arrive at price for subsequent years. Therefore, for FY 2023-24, biomass, bagasse and feed stock price shall be Rs. 4118.1, Rs. 2632.35 and Rs. 2100 per MT respectively.

2.14 **Specific Fuel Consumption:** The Specific Fuel Consumption specified under Regulations 78 of the RE Tariff Regulations 2022 for biogas based power projects shall be 3 kg of substrate mix per kWh.

2.15 **Discount Factor:** The discount factor considered for the purpose of tariff levellisation is equal to the Post Tax weighted average cost of the capital on the basis of normative debt: equity ratio (70:30) specified in the RE Tariff Regulations 2022. Considering the normative debt equity ratio and weighted average of the post tax rates for interest and equity component, the discount factor is calculated.

FY 2022-23

Interest Rate considered for the loan component (i.e.70%) of Capital Cost is 9%. For equity component (i.e. 30%) rate of Return on Equity (ROE) considered at Post Tax ROE of 14% considering the IT rate of 29.12%. The discount rate derived by this method for all RE technologies is 8.67%.

FY 2023-24

Similarly, interest Rate considered for the loan component (i.e.70%) of Capital Cost is 9.72%. For equity component (i.e. 30%) rate of Return on Equity (ROE) considered at Post Tax ROE of 14% considering the IT rate of 29.12%. The discount rate derived by this method for all RE technologies is 9.29%.

3. Generic Levellised Tariff FY 2022-23 and FY 2023-24

In the light of the discussion made in the preceding paragraphs, the generic levellised tariffs of the following RE projects achieving COD during the financial year 2022-23 and FY 2023-24 have been determined as under.

RE Projects	**FY 2022-23: Levellised Tariff, Rs/kWh**	**FY 2023-24: Levellised Tariff, Rs/kWh**
Small Hydro projects below 5 MW	6.69	6.96

RE Projects	FY 2022-23: Levellised Tariff, Rs/kWh	FY 2023-24: Levellised Tariff, Rs/kWh
Small Hydro projects 5 MW to 10 MW	6.00	6.25
Small Hydro projects 10 MW to 25 MW	5.65	5.89
Mini/Micro Hydro projects (upto2 MW)	7.19	7.46
Biomass based projects – energy charges	5.62	5.90
Non fossil Fuel based Co-generation projects– Fixed Cost	3.59	3.78
Non fossil Fuel based Co-generation projects– Variable Cost	4.38	4.60
Solar PV projects 0.5 MW to 2 MW	4.07	4.24
Biogas based power projects (without capital subsidy) – Fixed Charges	3.96	4.12
Biogas based power projects (with capital subsidy) – Fixed Charges	3.42	3.50
Biogas based power projects – Energy Charges	6.82	7.16

The detailed computations for the generic tariff for various RE technologies have been enclosed to this Order as per the details given hereunder;

RE Projects	FY 2022-23	FY 2023-24
Small Hydro projects below 5 MW	Annexure: 1A	Annexure: 6A
Small Hydro projects 5 MW to 10 MW	Annexure: 1B	Annexure: 6B
Small Hydro projects 10 MW to 25 MW	Annexure: 1C	Annexure: 6C
Mini/Micro Hydro projects (upto2 MW)	Annexure: 1D	Annexure: 6D
Biomass based projects – energy charges	Annexure: 2	Annexure: 7
Non fossil Fuel based Co-generation projects	Annexure: 3	Annexure: 8

RE Projects	FY 2022-23	FY 2023-24
Solar PV projects 0.5 MW to 2 MW	Annexure: 4	Annexure: 9
Biogas based power projects	Annexure: 5	Annexure: 10

Above generic levellised tariff has been determined for the RE power projects (considering entire useful life and levellisation of tariff for the entire useful life), which are achieving COD during the FY 2022-23 and FY 2023-24 having long term PPA for useful life with distribution companies in the State. Tariff period shall be considered as useful life of the project and shall be considered from the COD of the renewable energy generating stations.

Energy charges as determined in this Order shall be applicable for existing biomass based plants for FY 2022-23 and FY 2023-24.

We order accordingly.

Member **Member (Judicial)** **Chairman**