

Before

UTTARAKHAND ELECTRICITY REGULATORY COMMISSION

Petition No. 12 of 2016 (Suo-Motu)

Draft Order

In the matter of:

Review of the Benchmark Capital Cost for Solar PV, Solar Thermal and Grid Interactive Rooftop & Small Solar PV Plants to be applicable for FY 2016-17 and onwards till reviewed/revised by the Commission.

CORAM

Shri Subhash Kumar **Chairman**

Shri K.P. Singh **Member**

Date of Order: March 04, 2016

1. The Commission in exercise of powers vested in it under Section 61(h), 86(1)(e) read with Section 181(2)(zd) of the Electricity Act, 2003, notified the UERC (Tariff and Other Terms for Supply of Electricity from Renewable Energy Sources and non-fossil fuel based Co-generating Stations) Regulations, 2013 (hereinafter referred to as "RE Regulations, 2013") on 15.04.2013.
2. Regulation 11 of the RE Regulations, 2013 specifies as under:

"11. Control Period or Review Period
(1) The Control Period or Review Period under these Regulations shall be of five years, of which the first year shall be the financial year 2013-14.
Provided that the benchmark capital cost for Solar PV, Solar thermal and grid interactive roof top and small solar PV projects may be reviewed annually by the Commission.
Provided further that the tariff determined as per these Regulations for the RE projects commissioned during the Control Period, shall continue to be applicable for the entire Tariff Period (Useful life of the plant) as specified under Regulation 3(1)(nn)."
3. In exercise of power under Regulation 11 of aforesaid Regulations, the Commission, vide order dated July 23rd, 2015 in Suo-Motu petition no. 9 of 2015, determined the Benchmark Capital cost norms for the Financial Year 2015-16 for Solar PV, Solar Thermal and Grid connected Rooftop

Solar PV Plants & Small Solar PV projects as Rs. 719.63 Lakh/MW, Rs 1200 Lakh/MW and Rs. 688.00 Lakh/MW respectively. Accordingly, the generic tariff for Solar PV projects notified vide the aforesaid order and applicable for the financial year 2015-16 is Rs. 8.25/kWh and Rs. 7.60/kWh with Accelerated Depreciation benefit. For Solar Thermal projects, levellised tariff for FY 2015-16 is Rs. 12.55/kWh, and Rs. 11.50/kWh with AD benefit. Further, levellised tariff determined for Grid connected Rooftop Solar PV Plants & Small Solar PV projects for FY 2015-16 is Rs. 6.35/kWh and Rs. 5.70/kWh with AD benefit.

6. Having due consideration of the fact that with the passage of time and up-gradation of technologies in respect of the aforesaid solar projects, the declining trend of capital cost has been observed. Moreover, in discharge of the requirement of Regulation 11 of the RE Regulations, 2013, the Commission has decided to determine the benchmark capital cost norm for the Solar PV, Solar Thermal and Grid connected Rooftop Solar PV Plants & Small Solar PV projects and in turn the generic tariffs for the projects to be commissioned during FY 2016-17 as elaborated in Annexure- A enclosed herewith.
7. Comments/suggestions of the stakeholders on the draft proposal are invited latest by March 28, 2016.

(K.P. Singh)
Member

(Subhash Kumar)
Chairman

A. Normative benchmark capital cost for Solar PV, Solar Thermal technologies and Grid Interactive Rooftop & Small Solar PV Plants commissioned during FY 2016-17

- 1 In accordance with Regulation 33, 34 & 35 of the RE Regulations, 2013 the normative capital cost for Solar PV, Solar Thermal and Grid Interactive Rooftop & Small Solar PV Plants is inclusive of all capital works including plant and machinery, civil works, erection and commissioning, financing and interest during construction etc., and evacuation infrastructure upto the interconnection point.
- 2 Regulation 11 of the RE Regulations, 2013 specifies that the benchmark capital cost for Solar PV and Solar Thermal Power Plants and Grid Interactive Rooftop & Small Solar PV Plants may be reviewed annually by the Commission.
- 3 The proposed benchmark capital cost for the above referred solar technologies for FY 2016-17 and onwards are discussed below:

I. Solar PV Power Plants

- 4 CERC in its draft order dated 23rd December, 2015, in Petition No. 17/SM/2015, in the matter of determination of benchmark capital cost for Solar PV power projects and Solar Thermal power projects, has carried out the detailed analysis for evolving the benchmark capital cost norm for Solar PV power projects to be applicable during FY 2016-17.

CERC has in the aforesaid draft Order proposed to revise the module cost to Rs. 310.19 Lakh/MW for FY 2016-17 from Rs. 332.35 Lakh/MW for FY 2015-16 based on the trends in the spot prices of the modules and exchange rate and module degradation of about 0.6%.

In addition to the module cost CERC has also proposed to revise the costs of certain non-module components of Solar PV Plants such as civil & general works, power conditioning unit, cables & transformers and preliminary expenses.

In accordance with the said Order, CERC has determined the benchmark capital cost for Solar PV power projects, as Rs. 501.32 Lakh/MW. The breakup of benchmark capital cost norms for Solar PV projects as proposed by CERC in its aforesaid Order for FY 2016-17 are as follows:

Table 1: Benchmark Capital Cost Proposed by CERC for Solar PV Projects for FY 2016-17

S. No.	Particulars	Cost (Rs. Lakh/MW)	% of Total Cost
1	PV Modules	310.19	61.87%
2	Land Cost	25.00	4.99%
3	Civil and General Works	35.00	6.98%
4	Mounting Structures	35.00	6.98%
5	Power Conditioning Unit	30.00	5.98%
6	Cables and Transformers	40.00	7.98%
7	Preliminary and Pre-operative expenses IDC etc.	26.13	5.21%
	Total Capital Cost	501.32	100.00%

- 5 In RE Regulations, 2013, the Commission in the absence of any details on the capital cost, adopted the capital cost determined by CERC for Solar PV and Solar Thermal Plant. Further, as elaborated in the Order dated July 23, 2015 in Petition No. 9 of 2015 (Suo-Motu), the Commission had observed that the cost of land in the State is higher than that stipulated by CERC of Rs. 25 Lakh/MW. The Commission, therefore, considered Rs. 125 Lakh/MW as cost of land for arriving at the capital cost of Solar PV projects for FY 2015-16. The Commission proposes the same land cost, i.e. Rs. 125 Lakh/MW for FY 2016-17. Apart from Land cost and preliminary and pre-operative expenses including IDC and contingency, the costs of other components have been adopted as proposed by CERC in its draft order. CERC has considered 5.50% of the total capital cost, i.e. the hard cost, towards preliminary and pre-operative expenses including IDC and Contingency. The same percentage, i.e. 5.50% is proposed as preliminary and pre-operative expenses including IDC and contingency.
- 6 In light of the above discussion, the Commission proposes the capital cost of Rs. 606.83 Lakh/MW for Solar PV projects to be commissioned on or after 01.04.2016. Detailed breakup of the capital cost approved by the Commission for FY 2015-16 and that proposed for FY 2016-17 is as follows:

Table 2: Benchmark Capital Cost of Solar PV Project Approved for FY 2015-16 and proposed for FY 2016-17

S. No.	Particulars	Approved Capital Cost for FY 2015-16 (Rs. Lakh/MW)	% of Total Cost	Proposed Capital Cost for FY 2016-17 (Rs. Lakh/MW)	% of Total Cost
1	PV Modules	337.06	46.84%	310.19	51.12%
2	Land Cost	125.00	17.37%	125.00	20.60%
3	Civil and General Works	50.00	6.95%	35.00	5.77%
4	Mounting Structures	50.00	6.95%	35.00	5.77%
5	Power Conditioning Unit	45.00	6.25%	30.00	4.94%
6	Evacuation cost upto interconnection point (Cables and Transformers)	55.00	7.64%	40.00	6.59%
7	Preliminary & Pre-operative expenses including IDC & contingency etc.	57.57	8.00%	31.64	5.21%
	Total Capital Cost	719.63	100.00%	606.83	100%

II. Solar Thermal Power Plants

- 7 CERC, vide its draft Order dated 23.12.2015 in Petition no. 17/SM/2015, has retained the capital cost of Rs. 12.00 Crore/MW for FY 2016-17 which was determined for FY 2015-16. Relevant Para of the aforesaid order is as follows:

“Since CSP technologies have not seen economies of scale yet, and based on industry interactions, the Commission propose to retain benchmark capital cost of Solar Thermal power projects at INR 12.00 Crore/MW for FY 2016-17”.

- 8 The Commission also proposes to adopt the benchmark Capital Cost as proposed by CERC, i.e. Rs. 1200.00 Lakh/MW for Solar Thermal Projects to be commissioned on or after 01.04.2016.

III. Grid Interactive Rooftop & Small Solar PV Plants

- 9 CERC has not proposed the Cost of Grid Interactive Rooftop & Small Solar PV Plant in its draft order dated 23rd December, 2015 in Petition No. 17/SM/2015. In its notification dated 03.03.2015 also, CERC did not propose any separate mechanism for determination of Capital Cost of such projects.
- 10 The Commission in its Order dated 23rd July 2015 was of the view that so far as cost of module was concerned there was no difference between Solar PV Plants & Solar Rooftop PV Plants. Hence, in line with the same, module cost of Rooftop Solar Plant has been kept same as that proposed for Solar PV Plants. In case of Land cost, civil and general work cost, capital cost as approved in the Commission’s above referred Order has been considered for determination of benchmark capital cost of the Grid Interactive Rooftop & Small solar PV Plants for FY 2016-17.

Further, in respect of cost of power conditioning equipment including inverter, mounting structure and evacuation facility, the Commission had earlier decided to allow higher cost for such components. Accordingly, as considered in the Commission's Order dated 23rd July 2015, the Commission proposes to allow 35% higher cost of above mentioned components for Rooftop Solar Plants as compared to the Solar PV Plants. In view of the above, details of the capital cost approved for FY 2015-16 and details of the capital cost proposed for FY 2016-17 for Grid-Connected Rooftop Solar PV based Plant are as follows:

Table 3: Benchmark Capital Cost of Grid Interactive Rooftop & Small Solar PV Plants Approved for FY 2015-16 and proposed for FY 2016-17

S. No.	Particulars	Approved Capital Cost for FY 2015-16 (Rs. Lakh/MW)	Proposed Capital Cost for FY 2016-17 (Rs. Lakh/MW)
1	PV Module inc. degradation	337.06	310.19
2	Land Cost, Civil and General Works	75.00	75.00
3	Mounting Structures	67.50	47.25
4	Power Conditioning Units	60.75	40.50
5	Evacuation cost upto interconnection point (Cables and Transformers)	74.25	54.00
6	Preliminary & Pre-operative expenses including IDC & contingency etc.	53.44	28.98
	Total Capital Cost	668.00	555.92

IV. Revised Tariff

- 11 Based on the benchmark capital cost, as proposed above, the Commission has determined the generic tariff to be applicable for projects to be commissioned in FY 2016-17. Proposed tariffs for FY 2016-17 along with the applicable generic tariff for FY 2015-16 for Solar PV and Solar Thermal Plants are as follows:

Table 3: Existing and Proposed Generic Tariffs for Solar PV Plants and Solar Thermal Plants

Particulars	Solar PV Plant (Rs./kWh)		Solar Thermal Plant (Rs./kWh)	
	FY 2015-16	FY 2016-17	FY 2015-16	FY 2016-17
Gross Tariff	8.25	7.10	12.55	12.55
Less : Acc Dep Benefit	0.65	0.60	1.05	1.05
Net Tariff	7.60	6.50	11.50	11.50

- 12 The Commission had vide its Order dated 11.02.2016 also determined the tariffs for Grid connected Rooftop & Small Solar PV Plants corresponding to various level of subsidies such as 0%, 70% & 90% respectively. Accordingly, the Commission has also worked out the tariffs for Grid connected Rooftop & Small Solar PV Plants considering the level of subsidy ranging from 0% to 90%. Proposed tariffs for FY 2016-17 along with the applicable generic tariff for FY 2015-

16 are as follows:

Table 4: Existing and Proposed Generic Tariffs for Grid connected Rooftop & Small Solar PV Plants (Rs./kWh)

Level of Subsidy	0%		30%		70%		90%	
	FY 2015-16	FY 2016-17	FY 2015-16	FY 2016-17	FY 2015-16	FY 2016-17	FY 2015-16	FY 2016-17
Gross Tariff	7.75	6.60	6.35	5.45	4.80	4.20	4.35	3.80
Less : Acc Dep Benefit	0.60	0.55	0.65	0.55	0.65	0.60	0.65	0.60
Net Tariff	7.15	6.05	5.70	4.90	4.15	3.60	3.70	3.20

The proposed tariffs as mentioned above at Tables 3 & 4 shall be applicable on the projects commissioned on or after 01.04.2016 and shall continue to be applicable till further reviewed by the Commission. Furthermore, the tariffs determined shall be the ceiling tariffs and procurement of power shall be done through competitive bidding route by distribution licensee.