

**Before**

**UTTARAKHAND ELECTRICITY REGULATORY COMMISSION**

Petition No. 9 of 2015 (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 2015-16 and onwards till reviewed/revised by the Commission.

**CORAM**

**Shri Subhash Kumar      Chairman**

**Shri C.S. Sharma          Member**

**Date of Order: April 28, 2015**

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 aforesaid Regulations provides that:

***"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. Uttarakhand Renewable Energy Development Agency (UREDA, State Agency) had filed a Petition dated 18.07.2014 seeking clarification on certain issues in implementation of “Uttarakhand Grid Interacted Rooftop and Small SPV Power Plants Scheme” under UERC (Tariff and Other Terms for Supply of Electricity from Non-conventional and Renewable Energy Sources) Regulations, 2013. Through the aforesaid Petition UREDA had also requested to extend the prevailing benchmark capital cost and levelised tariff for excess energy fed into the grid for grid interactive small solar projects installed upto 31st March 2015. The Commission vide Order dated 07.11.2014, in the matter decided as hereunder:

*“2.2.3 However, in view of submissions made by UREDA and UPCL in this regard, with a view to remove any uncertainty and also with an intent to promote the installations of grid interactive solar rooftop projects in the State which as of now is in initial stage, the Commission decides not to review or amend the benchmark capital cost for grid interactive roof top and small solar PV projects specified in the RE Regulations, 2013 till March 31, 2015 and consequently the tariffs for the same. Accordingly, if any consumer installs a grid interactive roof top and small solar PV plants by the end of March 31, 2015, and injects surplus power into the distribution system of UPCL he shall be eligible for tariffs as specified in RE Regulations, 2013 for such surplus injection into the grid.”*

4. The normative capital cost, as specified in RE Regulations, 2013, in respect of Solar PV, Solar thermal and grid interactive roof top and small solar PV projects, have not been reviewed, so far, as required under the provisions of the Regulation and vide above Order, the benchmark capital cost of Grid Interactive Rooftop & Small Solar PV Plant has been extended till 31<sup>st</sup> March, 2015. Further, the Commission vide its Order dated March 20, 2015 while approving the draft Power Purchase Agreement between UPCL and the selected bidders for setting of Grid Connected Solar PV Power Projects had decided that the benchmark capital cost and generic tariffs thereof as ceiling tariffs, as provided in RE Regulations, 2013 would remain applicable for the 12 developers of Solar PV Plants subject to the condition that they execute their PPA with UPCL by 31.03.2015, and also commission their projects on or before 31.03.2016. In case the developers failed to comply with these conditions, rate of sale of power from such projects to the licensee would be as determined by the Commission after reviewing the benchmark capital cost for Solar PV Plants as provided for in the RE Regulations, 2013 if such notified rates were lower than the tariffs agreed in the PPA.
5. Further, Hon’ble ATE in its Judgment April 10, 2015 in Appeal No. 31 of 2015 had held that:

*“40. We find that FY 2014-15 is already over and generic tariff for FY 2015-16 has to be in place from 01.04.2015. The State Commission is directed to take immediate action in the matter as there should not*

*be any gap in date of validity of the previous years' tariff and the effective date of the tariff for the current year.*

41. ...

*(c) The State Commission shall notify a generic tariff for FY 2015-16 at the earliest if not already done."*

6. Hence, in accordance with the directions of the Hon'ble ATE and also considering 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. Accordingly, the Commission has decided to revisit the same so as to pass on the advantage of lower capital cost to end consumers.
7. The Commission, in due discharge of the mandate under the RE Tariff Regulations proposes to revise the benchmark capital cost for Solar PV, Solar Thermal and Grid Interactive Rooftop & Small Solar PV Plants and in turn the generic tariffs for the projects to be commissioned during FY 2015-16 as elaborated in Annexure- A enclosed herewith.
8. Comments/suggestions of the stakeholders on the draft proposal are invited latest by 18.05.2015.

**(C.S. Sharma)**  
**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 2015-16**

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. Further, the above referred Regulation 11 of the RE Regulations, 2013 specify that 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 plants for FY 2015-16 and onwards are discussed below:

**I. Solar PV Power Plants**

4. CERC in their Order dated 15<sup>th</sup> May, 2014, in the matter of determination of benchmark capital cost for Solar PV power projects and Solar Thermal power projects, had carried out detailed analysis for evolving the benchmark capital cost norm for Solar PV power projects to be applicable during FY 2014-15. In accordance with the said Order, CERC had determined benchmark capital cost for Solar PV power projects, as Rs. 6.91 Crore/MW for determination of tariff for FY 2014-15.
5. Recently, CERC vide notification dated 03.03.2015 issued a draft Order vide Petition No. SM/005/2015 (Suo-Motu). Based on the report of PV Insights, CERC has in the aforesaid Petition proposed to revise the module cost as follows:

*“1.6 The prevailing module prices offered by the Chinese manufacturers in India are around 0.54/US\$. Since we are determining benchmark capital cost for the FY 2015-16, any future expected reduction cannot be ignored. Therefore, the Commission has decided the average module cost of 0.52 US\$/Wp for determination of benchmark capital cost of Solar PV for FY 2015-16. Considering the Exchange Rate at Rs. 61.06/US\$ (average of daily exchange rate data available of RBI website of past six months), the Commission propose to consider the module cost at Rs. 317.50 Lakh/MW.*

*In addition to the above proposed module cost, the Commission also proposes to consider an additional 0.5 % of the modules cost (i.e. 5 kW of module per MW) every year after 4th year to 25th year of operation on notional basis considering module degradation as allowed in the past based on the study carried out by the*

Commission. Accordingly, the Commission proposes to consider the total module cost at Rs.327.33 Lakh/MW.”

Accordingly, CERC has proposed to revise the module cost from existing Rs. 377.09 Lakh/MW to Rs. 327.33 Lakh/MW.

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.

Revised breakup of benchmark capital cost norms for Solar PV projects as proposed by CERC in its aforesaid Petition vis-a-vis approved Capital Cost for FY 2014-15 are as follows:

S. No.	Particulars	Approved Capital Cost Norm for FY 2014-15 (Rs. Lakh/MW)	Proposed Capital Cost Norm for FY 2015-16 (Rs. Lakh/MW)
1	PV Modules (@ Rs 62/ US \$) inc. degradation	377.09	327.33
2	Land Cost	25.00	25.00
3	Civil and General Works	60.00	50.00
4	Mounting Structures	50.00	50.00
5	Power Conditioning Unit	50.00	45.00
6	Cables and Transformers	60.00	50.00
7	Preliminary and Pre-operative expenses IDC etc.	69.00	40.00
	<b>Total Capital Cost</b>	<b>691.09</b>	<b>587.33</b>

CERC has proposed to revise the benchmark capital cost for Solar PV power projects from existing cost of Rs. 691 Lakh/MW to Rs. 587.30 Lakh/MW.

6. MERC has vide their Order dated 07.07.2014 adopted the aforesaid capital cost as approved by CERC vide Order dated 15.05.2014 for FY 2014-15. However, RERC has also adopted the same vide Order dated 21.08.2014 with some modification based on Cost of Module per MW due to variation in exchange rate in Rs./USD and their state specific policy for land-acquisition.
7. In RE Regulations, 2013, the Commission in absence of any details on the capital cost adopted the capital cost determined by CERC for Solar PV, and Solar Thermal Plant. The Commission observes that the cost of land in the State is higher than that stipulated by CERC of Rs. 25 Lakh/MW. The Commission therefore proposes to fix the Capital Cost of Solar PV Plants keeping in view the present cost of land in State. Accordingly, the Commission through this Order proposes to fix benchmark Capital Cost of Solar PV Plant higher than the Capital Cost proposed by CERC. Accordingly, the Commission proposes to revise the benchmark capital cost from Rs. 1000.00 Lakh/MW to Rs. 600.00 Lakh/MW for the Solar PV projects to be

commissioned on or before 31.03.2016. As hitherto, these shall be ceiling rates and procurement of power shall be done through competitive bidding route only by the distribution licensee.

## **II. Solar Thermal Power Plants**

8. CERC had in its Order dated 15.05.2014 determined the Capital Cost of Rs. 1200.00 Lakh/MW in respect of Solar Thermal Projects. Further, in its Petition No. SM/005/2015 (Suo-Motu), CERC has proposed to revise the benchmark Capital Cost of Solar Thermal Projects for FY 2015-16 as follows:

*“Parabolic Trough technology has achieved close to full commercial status while cost data for the power Tower, Fresnel and Dish Stirling technologies are in the process of being established. Therefore, available cost data of Parabolic Trough technology, the Commission proposes the benchmark Capital cost of Solar Thermal project at Rs. 12.00 Crore / MW for FY 2015-16.”*

Accordingly, CERC has proposed to keep the benchmark Capital Cost of Solar Thermal Power Plant at existing benchmark cost of Rs. 1200.00 Lakh/MW.

9. RERC had vide its Order dated 21.08.2014 fixed Capital Cost of Rs. 1195 Lakh/MW for Solar Thermal Power Plant.
10. In light of the above discussion, the Commission 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 before 31.03.2016. As hitherto, these shall be ceiling rates and procurement of power shall be done through competitive bidding route by distribution licensee.

## **III. Grid Interactive Rooftop & Small Solar PV Plants**

11. During the CERC's proceedings for fixation of benchmark capital cost for FY 2014-15 in respect of RE based projects, stakeholders had submitted comments regarding separate capital cost and norms for different sizes of projects including Rooftop solar PV projects, projects using single/double axis trackers. In this regard, CERC had categorically clarified that:

*“8.2.5. Regarding suggestion on separate project cost depending upon size of the project, the Commission would like to clarify that from the beginning, has adopted approach of specifying project cost for a MW scale project applicable to all size of MW scale projects in determination of generic tariff for a solar PV project.”*

From the aforesaid Order dated 15.05.2014 of CERC it is apparent that Capital Cost of Grid Interactive Rooftop & Small Solar PV Plant had not been dealt with separately. In its recent notification dated 03.03.2015 also CERC has not proposed any separate mechanism for determination of Capital Cost of such projects. Further, MERC while referring to their RE

Regulations, vide its Order dated 07.07.2014 clarified that tariff of these projects shall be Rs. 0.50 per kWh higher than that of tariff specified for Solar PV projects. Whereas, tariff specified by RERC for such plants has been kept same as determined vide the Order dated 21.08.2014 for Solar PV plant.

12. In RE Regulations, 2013 the Commission had considered Capital Cost of Grid Interactive Rooftop & Small Solar PV Plants as 2.50% higher than that of Solar PV Plant. Accordingly, following the aforesaid approach, revised Capital Cost of Grid Interactive Rooftop & Small Solar PV Plants has been arrived as Rs. 615.00 Lakh/MW.
13. In light of the above discussion, the Commission proposes to adopt a benchmark capital cost of Rs. 615.00 Lakh/MW for Grid Interactive Rooftop & Small Solar PV Plants to be commissioned in FY 2015-16.

#### IV. Revised Tariff

14. Based on the revised capital cost, as proposed above, the Commission has determined the revised tariff to be applicable for projects to be commissioned in FY 2015-16 which is as follows:

Particulars	Solar PV Plant (Rs./kWh)		Solar Thermal Plant (Rs./kWh)		Grid connected Rooftop & Small Solar PV Plants (Rs./kWh)	
	Existing	Revised	Existing	Revised	Existing	Revised
Gross Tariff	11.10	7.20	13.30	12.55	9.20	6.05
Less : Acc Dep Benefit	0.95	0.60	1.15	1.05	1.05	0.60
Net Tariff	10.15	6.60	12.15	11.50	8.15	5.45

The above tariff shall be applicable on the projects commissioned on or after 01.04.2015 and will be applicable till reviewed by the Commission.