

HIMACHAL PRADESH ELECTRICITY REGULATORY COMMISSION, SHIMLA

Suo-Motu Petition No.: 11/2023

Date of Order: 31.03.2023

**CORAM: Sh. Devendra Kumar Sharma, Chairman
Sh. Yashwant Singh Chogal, Member (Law)
Sh. Shashi Kant Joshi, Member**

IN THE MATTER OF:-

Determination of Generic Levellised Tariff for Solar PV Projects for FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023) under Himachal Pradesh Electricity Regulatory Commission (Promotion of Generation from the Renewable Energy Sources and Terms and Conditions for Tariff Determination) Regulations, 2017.

ORDER

1. The Commission notified the Himachal Pradesh Electricity Regulatory Commission (Promotion of Generation from the Renewable Energy Sources and Terms and Conditions for Tariff Determination) Regulations, 2017 in the Rajpatra, Himachal Pradesh on 23rd November, 2017 and also made amendments from time to time. In the 4th amendment of the said Regulations, as carried out on 8th September, 2020 and notified in the Rajpatra, Himachal Pradesh on 15th September, 2020, the financial principles for the RE technologies, including Solar PV projects, in respect of the 3rd control period (i.e. 01.04.2020 to 30.09.2023) have been specified. The said Regulations of 23rd November, 2017, read with subsequent amendments as aforesaid, have hereinafter jointly referred to as "RE Tariff Regulations, 2017".
2. The Commission, in due discharge of the mandate under Regulation 18 of RE Tariff Regulations, 2017 issued the proposal dated 21.02.2023 for categorization of Solar PV projects, fixing the technology specific parameters and determination of the Generic Levellised Tariff for Solar PV projects (not exceeding 5.00 MW), alongwith associated terms and conditions, for FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023).
3. The Commission invited objections/suggestions from the public on its aforesaid proposal, by way of insertions in two News Papers i.e. "Hindustan Times" and "Amar Ujala" on 23rd February, 2023. The text of said proposal was also made available on the Commission's website www.hperc.org.
4. The Commission, vide letter dated 25.02.2023, also requested the major stakeholders, including the State Government, Directorate of Energy, HIMURJA, the Distribution Licensee i.e. HPSEBL, HPPCL, HPPTCL, SJVNL, the Consumer representative and the Industries Associations etc. to send their objections/ suggestions as per the aforesaid public notice on or before 20th March, 2023.
5. In response, the written comments/suggestions were received from the following stakeholders:-
 - (i) Sh. Roop Lal Sankhyan, VPO Dhar Tatoh, Tehsil Sadar, Distt. Bilaspur-174001, HP.
 - (ii) Sh. Tilak Raj Sharma, Shop No. 1, Opposite SBI Bank, Damtal, VPO Indora, Distt Kangra, HP.
 - (iii) Smt. Neelam Sharma, Shop No.-2, Opposite KCC Bank, Damtal, VPO Indora, Kangra, HP.

- (iv) Sh S.K. Patial, VPO Dhar Tatoh, Tehsil Sadar, Distt. Bilaspur-174001, HP.
 - (v) Shri. R.P. Suman & Co., VPO Jahu, Teh.-Bhoranj, Distt.- Hamirpur-176048, HP.
 - (vi) Shri. Hans Raj Thakur, Vill. Luhnu, PO. Bayla, Teh. Sundernagar, Distt Mandi-175018, HP.
 - (vii) Shri Arvind Guleria, VPO Samoh, Teh. Jhanduta, Distt. Bilaspur-174021, HP.
 - (viii) Shri Kuldeep Raj Singh, R/o Khundian, PO. Dodhru, Lagroo Abrol, Kangra-176031, HP.
 - (ix) Himachal Pradesh State Electricity Board Limited, Vidyut Bhawan, HPSEBL-171004, HP.
6. The public hearing in the matter was held on 25th March, 2023 in the premises of HPERC at Shimla. The list of stakeholders who participated in the hearing is annexed at **Annexure-“A”**. During the course of public hearing, the following views were expressed:-
- (a) Sh. S.K. Patial, Chairman of Solar Power Producers and Developers Trust stated that the Module cost considered Rs. 191.48 Lakhs per MW by the Commission in the proposal is on lower side and it should be around Rs. 300 Lakhs per MW. The assumption of annual gross generation of 18.40 Lakhs per MWp in the proposal need to be further looked into and it should not be more than 14.5 Lakhs per MW to make the projects viable in the State. He further elaborated his own experience relating to use solar PV power for own consumption by harnessing the same through erecting sheds so that the available empty area below the roof can be utilized for small scale industries such as mushroom cultivation, mineral water bottling etc. He further raised the issue that the IPPs are facing difficulty for getting funds from the banks. The representative of the Trust has also requested the Commission that the cases where the solar PV plants could not get commissioned due to various reasons, the connectivity fees of Rs. 2 Lakhs charged by the HPSEBL from the developers may be refunded.
 - (b) Shri. R.P. Suman, representative of M/s R.P. Suman & Co reiterated the written submissions and further stated that banks are demanding 100% collateral or BG to sanction the loan. The banks are providing loan upto 60% of total project cost and requested the Commission to intervene in the matter. He submitted that the State Government has announced 40% capital subsidy on solar PV projects upto certain capacity in the budget and requested that the adjustment of subsidy in the tariff may be deferred during the initial loan repayment period i.e. upto 7 years. PLI scheme of GoI have not shown the real impact on the cost of modules in country as far as procurement of such modules for smaller capacity plants. The compulsory installation of RTU system for lower capacity of solar PV plants is also required to be looked into.
 - (c) Sh. Roop Lal Sankhyan representative of M/s Sankhyan Solar has also reiterated the written submissions and further stated that the Commission may take the degradation factor into account while determining the tariff and 21% of CUF considered in the proposal need to be looked into keeping in view the lower annual generation data of installed solar PV projects in the State viz-a-viz as considered in the proposal.

- (d) Sh. Bhal Singh Chandel stated in the hearing that he is in the process of putting the solar PV plant at Burmana in Distt. Bilaspur and requested that the cost of solar PV module may be hiked from the level presently considered in the proposal.
- (e) The Chief Engineer (Comm.) representing the Distribution Licensee i.e. HPSEBL submitted in the hearing that they have no objection on the proposal and the Commission may finalise the same accordingly.

7. We now proceed further to consider the suggestions made by the stakeholders in their written submissions as well as the oral submissions made during the public hearing.-

(A) CAPITAL COST.-

- (i) M/s Sankhyan Solar and M/s Rajakhasa Solar Power have submitted that the HPERC in its draft order has worked out the average normative price of Solar PV Modules including GST and other taxes as Rs. 191.48 Lakhs/MW means Rs. 19.15 per watt. The normative capital cost proposed in draft, is far away from realistic and further suggested it should be based on the market survey and the price on which the modules are available in the country. He also mentioned the module rates quoted to him by the module suppliers. The stakeholder request that the tariff may be determined by taking the project cost as Rs. 5 Crore per MW in place of Rs. 407.78 Lakhs per MW considered in the proposal.
- (ii) M/s Thakur Solar Power Project has submitted that आपने सोलर पैनल की कीमत 191.41 लाख प्रस्तावित की है जो कि आजकल प्रति मैगावाट 3 करोड़ से अधिक है। कृपया दुरुस्त करें।
- (iii) R. P. SUMAN & Co. has submitted that the per MW capital cost upto 1 MW considered in the proposal as Rs. 407.78 Lakhs is on lower side, as present this cost varies from Rs. 450 Lakhs to Rs. 470 Lakhs due to introduction of BCD on the solar modules @40%. In normal practice 5% contingences expenses to be considered in the capital cost. Module manufactures are offering the panel rate @ Rs. 290-300 Lakhs per MWp.
- (iv) Sh. Kuldeep Raj Singh, R/o Khundian, Distt. Kangra, HP has submitted that normative price of Solar PV Modules considered as Rs. 191.48 Lakhs/MW on lower side and as per my information the cost of 1 MW modules is about 3.30 Crore. The stakeholder suggested that this normative cost of Modules should be taken as per market price.
- (v) The Jupiter Solar Power has submitted that सोलर पैनल की कीमत 191.4 लाख प्रस्तावित की है जो की आज कल प्रति मैगावाट 4 करोड़ से अधिक है। कृप्या दूरुस्त करें।
- (vi) The Solar Power Producers & Developers Trust suggested that the normative module cost considered as 191.48 Lakhs per MW means Rs. 19.15 per watt is far away from the realistic rates of modules i.e. Rs. 300 Lakhs per MW means Rs. 30 per watt and the same should be as per the local market serve.
- (vii) M/s Ikshvaku Solar Power Project suggested that the normative cost of PV modules considered in the proposal should be taken as per the market price.

Commission's View:-

The Commission is of the view that with the advancement of the technology, the increased efficiency is bound to result in cost savings of some other components

such as requirement of space etc. However, the normative capital cost also takes into account, the initial spares to be procured for the purpose but with the advancement of technology, the requirement of such running maintenance spares shall also get reduced considerably in future.

The Government of India has provided for the production linked incentive (PLI) of Rs. 4500 Crores, in addition to the PLI of Rs. 24000 Crore provided for in the budget proposals for FY 2023-24.

All these factors would have overlapping effects and would not only increase the competitiveness but such factors shall definitely impact the market rates at which the Solar PV Cells and Solar PV Modules shall be available from various sources. The Commission feels that all such developments in the recent years have resulted in increasing the production of solar module at the competitive rates in the Country. This trend is further likely to continue which may make the rates more and more competitive.

The Commission has considered all relevant factors associated with the solar PV plant commissioning and accordingly, per MW normative capital cost is considered in the tariff determination.

Comments of similar nature were received from the stakeholders while finalising the tariff for solar PV plants for FY 2022-23.

(B) Power Generation/CUF/Net Saleable Energy.-

- (i) M/s Ikshvaku Solar Power Project and Sh. Kuldeep Raj Singh, R/o Khundian, Distt. Kangra, HP have submitted that the annual generation of 18.40 Lakhs unit per MW is on higher side and suggested that the same may be considered as 14.5 Lakhs unit per MW.
- (ii) (a) The Solar Power Producers & Developers Trust, M/s Rajakhasa Solar Power and M/s Sankhyan Solar have submitted that the HPERC has considered normative Capacity Utilization Factor (CUF) for solar PV projects in its proposal for determination of generic levelled tariff as 21% in line with the CERC which is for whole of the country. CERC in its order has mentioned that the Commission may deviate from above norm in case of project specific tariff determination. In fact, as per the information of the Trust, the actual CUF of all the existing projects in the Himachal Pradesh having installed capacity in kW_{dc} is not more than 16% .
The solar PV project having installed module capacity of 1000 kW_p probably generates about 750 kW “AC”. To achieve 1000 kW “AC”, about 33% more modules (kW_{dc}) has to be added for getting 21% CUF. The additional installation of module results further increase in Capital Cost of the project. So, CUF should be kept as 16% instead of 21%.
- (b) The assumption of annual gross generation of 18.40 lakh/MWp in the proposal is far from actual generation. As per information the average generation data of last 3 years of Solar Power Projects at different locations across Himachal Pradesh, is not more than 14.5 Lakh/MWp. So, it is submitted that the assumption of gross generation 18.4 lakh/ MW is on the higher side and it should be 14.5 lakh to make the projects viable in the State.

- (iii) R. P. SUMAN & Co. has submitted that the Commission has considered capacity utilization factor as 21%. To achieve 21% CUF, the DC capacity has to be increased by 30-35% in this case the capital cost will increase. So CUF should be considered @ 17% instead of 21% while finalising the Generic Levellised Tariff.
- (iv) Thakur Solar Power Project has submitted that मैंने 500 kW का सोलर प्रोजेक्ट जो कि पिछले एक साल से चल रहा है लगा रखा है। उसकी एक साल में लगभग 7 लाख unit बिजली बनाने की क्षमता बनती है। जब मैंने प्रोजेक्ट लगाने की सोची थी तो मुझे बताया गया था कि इससे 9 लाख unit से ज्यादा बिजली बनेगी। आज हालात ऐसे हैं कि हर महीने बैंक की किस्त भरने हेतु घर से पैसे डालने पड़ते हैं।
- (v) Juptier Solar Power has submitted that मैंने 500 kWp का Solar System Ground Mouted Project जो की पिछले एक साल से बिजली उत्पन्न कर रहा है। उसकी एक साल में लगभग 6.75 से 7 लाख बिजली उत्तपन हो रही है। जब मैंने Solar System Project लगाने का आवेदन किया था आपके ड्राफ्ट और पता करने पर पता लगा की एक साल में 8.75 जव 9.75 लाख unit बिजली उत्तपन होगी पर अब हमें अपनी ही जेब से किस्त डालनी पड़ रही ।
- (vi) The stakeholders have also submitted that the normative capital cost is inclusive of power degradation. The approximate power degradation of solar cells is 2.5% during 1st year and thereafter 0.50%-0.68% every year upto 25 years and further requested the Commission to consider this factor separately.

Commission's View:-

The Commission observes that even as per the CERC Regulations, the CUF is required to be kept at least at 21%. The auxiliary consumption has, however, been considered separately as 0.75% as per the CERC norms. As far as degradation is concerned, the normative cost of solar PV module is escalated by 15% to account for various factors including degradation of cell, AC/DC ratio etc.

Comments/suggestions of similar nature received from the stakeholders while finalizing the tariff for Solar PV plants for FY 2021-22 and FY 2022-23 have been duly addressed.

In view of above, the Commission declines to make any changes in the proposal in this regard.

(C) Interest Rate.-

- (i) The Solar Power Producers & Developers Trust, M/s Sankhyan Solar and M/s Rajakhasa Solar Power have submitted that the RBI has increased interest rates thrice in last year. In view of uncertain interest rate hikes, the interest rate may please be considered 12% instead of current 10%.
- (ii) R.P. Suman & Co. has submitted that at present, the banks do not provide the term loan @ 10.02% so it should be considered @ 11%-12%.

Commission's View:-

The rate of interest has been considered in accordance with the provisions relating to the 3rd control period as specified in RE Tariff Regulations, 2017, which is also in line with the RE Regulations of Central Commission. It is beyond the scope of this proposal to consider any other rate. Even otherwise, with the availability of

assured market to the developers for sale of power to Discom under the Long term PPAs, risk perception shall be lower in such cases.

(D) **Miscellaneous.-**

(i) R.P. Suman & Co. has submitted the following suggestions:-

- The solar irradiation in Himachal is 1650 GHI, hence the generation will not be more than 5 kWh /kW/day.
- Banks are demanding 100% collateral or BG to sanction the loan. The banks are providing loan upto 60% of the total project cost. Thus, the viability of the project is affected.
- If any capital subsidy is granted by the Govt. of Himachal Pradesh, the same should not be adjusted in the PPA tariff, instead it can be recovered from the project holder once the bank loan is repaid. The subsidy can be deducted on percentage (%) thereafter. This will reduce the extra financial burden on the project developer.

(ii) Jupiter Solar Power has submitted that वर्ष 2020-21 में जब Solar Project लगाने हेतु विज्ञापन निकला था तो Tariff 3.98 पैसा था। कोविड बيمारी के कारण हम अपना Project समय पर नहीं पूरा कर पाए और हमें सरकार की तरफ से कोई समय सीमा नहीं दी गई और हमारे Tariff को घटा दिया गया और हमारा सोलर Solar Plant घाटे में चल रहा है। निवेदन है कि Tariff determination के समय इसका ध्यान रखा जाये ।

Commission's View:-

Some of the comments/suggestions made by the stakeholders during public hearing and also submitted to the Commission in writing are not specifically related to the matter under consideration. However, Commission feels that these issues of stakeholders are required to be resolved by the concerned entities.

- (i) As far as suggestion of the stakeholders for deferment of adjustment of capital subsidy/ incentive available to the developer during repayment period is concerned, the Commission is of the view that the Solar Developer Trust/Association or individual stakeholder may take up this matter with the appropriate Government, since it involves policy decision of the Government(s).
- (ii) As far as demand of 100% collateral or BG by the banks to sanction the loan, the Commission is also of the view that the solar PV power developers may take up this issue with the State Government for issuance of directions to banks including State Co-operative Bank to provide term loans to the solar project by considering the assured return on account of PPA execution with the HPSEBL.
- (iii) With regard to the suggestion of the stakeholder to refund the connectivity fee of Rs. 2 Lakhs charged by the HPSEBL from the projects which could not get commissioned, the Regulations do not provide the same since it is a non-refundable application fee for the grant of connectivity. However, the Commission in year 2021 has rationalized the fee structure by amending the Regulations and the same has been reduced from Rs. 2 Lakhs to Rs. 1 Lakhs for projects upto 2 MW capacity.
- (iv) On the suggestion to account for the COVID period as per MNRE notification during the construction period of the project, the Commission advises the stakeholders that the concerned Solar Power Developers may seek relief under

dispute resolution mechanism provided in the Power Purchase Agreement (PPA) and may also represent their cases to the Commission separately .

8. After having addressed the comments/suggestions of the stakeholders, the Commission now proceeds further to categorize the Solar PV plants, fix the technology specific norms for first six months of the FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023) and also to determine the generic levelled tariff for procurement of power by the Distribution Licensee from Solar PV plants by also taking into account latest updates of some parameters, as detailed in the succeeding paragraphs.

9. Categorization.-

The 2nd proviso of Sub-regulation (2) of Regulation 18 of RE Tariff Regulations, 2017 provides that the Commission may, by order, categorize the renewable energy technologies other than SHPs based on capacity of the projects, the available subsidy Scheme and such other factors as may be considered appropriate by it. The Commission, after taking into account various factors like geographical and topographical conditions in the State and in order to promote smaller capacities of solar PV plants at different locations across the State, categorized solar PV projects vide its previous orders of solar PV tariff determination. The Commission retained the similar categorization, as mentioned in the table below, for the solar PV generation capacity for the purposes of normative capital cost and determination of levelled tariff for FY 2023-24 (period 01.04.2023 to 30.09.2023) :-

Category	Capacity of Solar PV Project at one site
I	Upto 1 MW capacity
II	Above 1 MW to 5 MW capacity
III	Above 5 MW capacity

Since the capacity in the second category is considered to be limited to 5.00 MW, so the Commission expects that for higher capacities, the Distribution Licensee shall preferably purchase solar power through Solar Energy Corporation of India or else through the competitive bidding route. All the solar PV projects with a capacity of more than 5.00 MW shall accordingly fall under the third category.

10. Technology Specific Parameters.-

The Sub-regulation (2) of Regulation 18 of the RE Tariff Regulations, 2017 provides that the Commission may, in order to promote such technologies for smaller capacities, follow, mutatis mutandis, upto the limits as it may consider necessary separately for each such technology but not exceeding 5.00 MW for any such technology, the technological specific parameters, including capital cost, and other terms and conditions, or the tariff as specified or adopted by the Central Commission for determining project specific tariff for any project(s) or generic levelled tariff for any category of project(s); or the inputs available from any other sources, as the Commission may find appropriate.

The Central Commission has notified Renewable Energy Regulations, 2020 i.e. Central Electricity Regulatory Commission (Terms and Conditions for Tariff Determination from Renewable Energy Sources) Regulations, 2020 (hereinafter referred as "CERC RE Tariff Regulations, 2020". The Central Commission has specified the technological parameters i.e. normative Capacity Utilization Factor (CUF) for solar PV projects as 21%. However, for capital cost and O&M expenses, the CERC

RE Tariff Regulations, 2020 provides that for these parameters, only project specific parameter(s), based on prevailing market trends, shall be taken into consideration.

The CERC has not made any provision for determination of normative (benchmark) capital cost for solar PV projects and its RE Tariff Regulations, 2020 do not envisage such a generic tariff determination. Accordingly, the Commission evolved its own technology specific parameters after taking into account the various available inputs, including those notified by the CERC and considered by the HPERC in its previous solar PV tariff determination orders.

10.1 CAPITAL COST.-

- a) The capital cost of solar PV module is not only the single largest component of the capital cost of the project but is also highly sensitive to the market conditions and the impact of the rapid technological development. The Commission accordingly feels that the cost of this component should be considered after taking all relevant factors into account.

As per the website of www.pvinsights.com, the latest Solar PV Module Weekly support Price, as accessed on 22.03.2023, is as under:-

	USD/Watt
Item	Average
Poly Solar Module	0.188
Mono PERC Module	0.216

The average of these prices works out to 0.202 USD/Watt. The Commission finds it appropriate to consider the cost of Solar PV Module as Rs. 165.94 Lakhs/MW considering the exchange rate of Rs. 82.15/USD based on the average of six months, ending 29th March, 2023. The Commission, while determining the generic tariff for Solar PV Plants for FY 2021-22 as per its Order dated 22nd July, 2021, had escalated the average price, based on the data for the relevant period, by 15% to account for the various factors such as DC/AC ratio, degradation factor, taxes etc. etc. Subsequently, the Government of India has announced levy of import duty, w.e.f. 01.04.2022, on the import of Solar PV Cells and Solar PV Modules @ 25% and 40% respectively. The applicability period of safeguard duty, however, expired on 30.06.2021 and has not been renewed. Moreover, the GST rate for the goods component has also been increased from 5% to 12%. Apart from the above, the Government of India has provided for the production linked incentive (PLI) of Rs. 4500 Crores, in addition to the PLI of Rs. 24000 Crore provided for in the budget proposals for FY 2023-24.

All these factors would have overlapping and diverse effects and may also increase the competitiveness. Such factors shall definitely impact the market rates at which the Solar PV Cells and Solar PV Modules shall be available from various sources. The Commission feels that as a result of all such developments in the recent years has resulted in increasing the production of solar module at the competitive rates in the Country. This trend is further likely to continue which may make the rates more and more competitive. Moreover, the difference in the cost of Solar PV Cells and Solar PV modules as well as taxes thereon, if availed optimally, can also facilitate marginal reduction in the overall cost of the panels. After taking all related factors into account, the Commission has considered the normative cost of solar PV module as Rs. 165.94 Lakhs/MW and escalate the same by 15% to account for the various

factors as mentioned above. The average normative price of Solar PV Modules on the above basis works out to Rs. 190.83 Lakhs/MW.

- b) As regards, the normative cost of the other components which was considered as Rs. 216.30 Lakhs per MW in the tariff order 28.03.2022, the Commission retained the same without any change.
- c) On the above basis, the per MW normative capital cost of the project works out to Rs. 407. 13 Lakhs/MW as detailed in the following table:-

Sr. No.	Particulars	Normative Capital Cost (Rs. Lakh/MW)
1	PV Modules	190.83
2	Preliminary and Pre-operative expenses, Land Cost, Civil & General Works and Mounting Structures. Power Conditioning Units, Evacuation cost up to interconnection point etc.	216.30
Total Cost		407. 13

- d) As regards, the normative capital cost for the Solar PV projects upto 1.00 MW, the Commission feels that the normative per MW capital cost for category-I projects may now not be much different from the same for category-II projects. On one hand, the cost for the smaller projects may be slightly higher due to economy of scale consideration, but on the other hand there could be some saving in the smaller capacity solar PV projects.

As such, the Commission fixed the normative capital cost for the Solar PV projects upto 1.00 MW capacity by allowing increase of 1.0% and the same works out as Rs. 411.20 Lakh/MW.

The Commission also decides to allow marginally higher capital cost in respect of Solar PV project(s) to be set up in Urban Areas and Industrial Areas notified by the State Government so as to encourage installation of such plant in such areas, keeping in view the fact that location of plants in such areas may generally help the Distribution Licensee to utilize the power from such plant in more optimum manner. The additional capital cost for these area specific Solar PV project(s) is considered as Rs. 7.50 Lakh per MW (for capacity above 1.00 MW and upto 5.00 MW) over and above the normative capital cost considered for the project(s) to be set up in the areas other than Urban and Industrial areas. This additional cost of Rs. 7.50 Lakh per MW shall, however, be further increased by 1.0% for plants upto 1.00 MW located in the Urban Areas and Industrial Areas.

Explanation;-

For the purpose of this tariff order-

- (i) The “Urban Areas” mean the areas covered under a Municipal Corporation, Municipal Council or a Nagar Panchayat set up by the State Government under any law enacted by the State Legislative Assembly and shall also include the area falling under the Cantonment Board constituted by the Central Government under the Cantonment Act, 2006.

(ii) The “Industrial areas” mean the areas notified as such by the State Government through its Industries Department or through any such other department/ agency authorized by it.

(iii) For this purpose, a Solar PV project shall be considered to be situated in the Urban Area or Industrial Area, as the case may be, if any one or both of the main components of the project i.e. the generating plant and the interconnection point fall in any such area(s) on the date of filing the Petition for approval of PPA.

e) Accordingly, the Normative Capital Cost for respective categories of Solar PV plant is tabulated as under:-

Sr. No.	Category	Normative Capital Cost (Lakh Rs./MW)
1	Projects to be set up in areas other than urban areas and industrial areas	
(a)	Upto 1.00 MW	411.20
(b)	Above 1.00 MW & upto 5.00 MW	407.13
2	Projects to be set up in urban areas and industrial areas	
(a)	Upto 1.00 MW	418.78
(b)	Above 1.00 MW & upto 5.00 MW	414.63

10.2 OPERATION AND MAINTENANCE EXPENSES.-

The Commission considered the O&M expenses as Rs. 9.43 Lakhs/MW with escalation @ 3.84% for FY 2022-23 in its solar PV tariff order dated 28.03.2022.

The O&M expenses of Rs. 9.79 Lakh/MW is considered for FY 2023-24 (for first six months). These normative O&M charges shall also be escalated @ 3.84% per annum over the tariff period as per provision of Regulations 28-B of the RE Tariff Regulations, 2017.

10.3 NORMATIVE NET SALEABLE ENERGY.-

The CUF shall be considered as 21%. The gross generation based on the same shall be reduced by 1.45% on auxiliary consumption, transformation losses and project line losses upto interconnection point on normative basis.

10.4 The other technology specific parameters viz. useful life of the project and tariff period, have already been specified in the RE Tariff Regulations, 2017, which are otherwise in line with the CERC REC Tariff Regulations, 2010 also and the same shall be followed accordingly.

11. After fixing the technology specific parameters as above, the Commission now proceeds to determine the generic levellised tariff, based on the provisions of RE Tariff Regulations, 2017 (i.e. 01.04.2020 to 30.09.2023) for solar PV projects for FY 2022-23 under Regulation 18 of the RE Tariff Regulations, 2017. The main details of the tariff are as follows:-

11.1 TARIFF STRUCTURE.-

Regulation 12 of the RE Tariff Regulations, 2017 stipulates that single part levellised tariff structure, comprising of the following fixed cost components shall be followed and that in case, where, no fuel cost component is involved in power generation, the following parameters shall be considered:-

- (a) Return on Equity;
- (b) Interest on loan capital;
- (c) Depreciation;
- (d) Interest on working capital.

Accordingly, single part generic levellised tariff has been worked out for the respective categories of solar PV projects by adopting the methodology, discussed in succeeding paragraphs.

11.2 **USEFUL LIFE AND TARIFF PERIOD.-**

Regulation 10, read with clause (ac) of Sub-regulation (1) of Regulation 2 of the RE Tariff Regulations, 2017, specifies the 'useful life' and tariff period in relation to a Solar PV plant as 25 years from the date of commencement of operation of the project. Accordingly, the useful life and tariff period has been taken as 25 years which is also in line with CERC RE Tariff Regulations, 2020.

11.3 **DEBT EQUITY RATIO.-**

The normative debt equity ratio has been considered as 70:30 in accordance with Regulation 23-B of the RE Tariff Regulations, 2017.

11.4 **Return on Equity.-**

Regulation 26-B of the RE Tariff Regulations, 2017 provides that the value base for the equity (on which return on equity shall be calculated) shall be equal to the equity component computed in accordance with the provisions of Regulation 23-B.

It has also been specified that the normative Return on Equity (RoE for short) shall be 14%. The normative Return on Equity shall be grossed up by the latest available notified Minimum Alternate Tax (MAT) rate for the first 20 years of the Tariff Period and by the latest available notified Corporate Tax rate for the remaining Tariff Period.

Accordingly, the normative return on equity taken as 14% in accordance with the provisions of RE Tariff Regulations, 2017. The grossed-up RoE for the first 20 years of the useful life of the project worked out as 16.80% by considering MAT @ 16.70% (15% MAT rate+7% Surcharge+ 4% Health and Education cess) and for the remaining 5 years the same grossed-up as 19.39% by considering corporate tax @ 27.82% (25% tax rate+7% Surcharge+ 4% Health and Education cess).

11.5 **Interest on Loan.-**

The Sub-regulation (1) of Regulation 24-B of the RE Tariff Regulation, 2017 provides that the loan tenure of 15 years shall be considered for the purpose of determination of tariff for RE projects. Sub-regulation (2) of the said Regulation provides for computation of rate of interest of loan as under:-

“(2) Interest Rate.-

- (a) *The loan amount (i.e. the debt component) arrived at in the manner indicated in the regulation 23-B shall be considered as gross normative loan for calculation of interest on loan. The normative loan outstanding as on 1st April of every year shall be worked out by deducting the cumulative repayment up to 31st March of previous year from the gross normative loan.*
- (b) *For the purpose of computation of tariff(s) under these Regulations, normative interest rate of 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, prior to the respective date(s) from which such tariff(s) the respective generic levellised tariffs are to be made applicable, shall be considered:
Provided that in case where the project specific tariff*
- (c) *Notwithstanding any moratorium period availed by the renewable energy generator, the repayment of loan shall be considered from the first year of the tariff period and shall be equal to the annual depreciation allowed.*

(iv) *The loan repayment for a financial year or the relevant part period thereof shall be considered to have been done in the middle of that financial year or the relevant part period thereof, as the case may be.*”

In view of above, the interest rate has been worked out as 10.28% per annum by adding 200 basis points above the average of Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) of State Bank of India (SBI) prevailing during the last available six months as shown in the table below:-

Month	Tenor-wise MCLR of SBI
October, 2022	7.95
November, 2022	8.05
December, 2022	8.30
January, 2023	8.40
February, 2023	8.50
March, 2023	8.50
Avg. for last available 6 months.	8.28

11.6 Depreciation.-

(i) Regulation 25-B of the RE Tariff Regulations, 2017 provides as under:

“For the purpose of tariff determination, depreciation shall be computed in the following manner, namely:-

- (a) *the value base for the purpose of depreciation shall be equal to sum total of the debt and equity components as per the provisions of regulation 23-B;*
- (b) *the salvage value shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the value base as per clause (a) of this regulation:*

Provided that no depreciation shall be allowed to the extent of incentive, grant and capital subsidy available for the project.

- (c) *depreciation per annum shall be based on ‘Differential Depreciation Approach’. For tariff purposes, the depreciation shall be allowed @ 4.67% per annum of the value base as per clause (a) of this regulation till such time the requirement for repayment of loan component of the capital cost as per regulations 21-B, 23-B and 24-B is fully provided and the remaining depreciation shall be spread over the residual useful life of the project on straight line method;*

- (d) *depreciation shall be chargeable from the first year of commencement of operation of the project:*

Provided that purposes of project specific determination of tariff.”

Accordingly, the rate of depreciation for the first 15 years has been considered as 4.67% and the rate of depreciation from the 16th year onwards has been spread over the balance useful life as under:-

Details	Solar PV Power Plant
Useful life (in years)	25
Rate of depreciation for 15 years (%)	4.67
Rate of depreciation after first 15 years (%)	1.995

11.7 Interest on working capital.-

(i) In accordance with the Regulation 27-B of the RE Tariff Regulations, 2017, the working capital requirement of the Solar PV project has been considered by including the following:-

“(a) operation and maintenance expenses for one month;

(b) receivables equivalent to 45 days of energy charges for sale of electricity calculated on the net saleable energy corresponding to the CUF considered

*for tariff determination on normative basis;
(c) maintenance spare @ 15% of operation and maintenance expenses.”*

- (ii) Interest rate on working capital has been worked out as 11.78% per annum by the adding 350 basis points above the average of Marginal Cost of Funds based Lending Rate (MCLR) (one year tenor) of State Bank of India (SBI) prevalent during the last available six months prior to the respective date(s) from which the generic tariff(s) are to be made applicable.

11.8 Incentive and/or subsidy and/or grant/budgetary support by the Central/ State Government.-

The Sub-regulation (1) of Regulation 22-B of the RE Tariff Regulations, 2017 provides as under:-

“ (1) While determining the generic levellised or project specific levellised tariff, as the case may be, for the renewable energy project(s) under these Regulations, the Commission shall take into consideration any incentive and/or subsidy and/or grant available under the schemes of the Central or State Government or their agencies, but excluding accelerated depreciation benefit under the Income Tax Act:

Provided that the capital subsidy under the schemes of the Central or State Government or their agencies shall be adjusted in the normative capital cost and the cost so arrived, after such adjustment, shall be considered for computing Debt-Equity Components for the purposes of determination of generic levellised tariffs:

Provided further that where the Central Government or the State Government notifies, or has notified, any generation based incentive (GBI) scheme for a particular kind of renewable technology, such technology based generating station shall be assumed to have availed the benefit of such a scheme and their tariffs shall be reduced by the amount of generation based incentive (GBI) per unit for the period during which such incentive remains applicable.

(2) Where any additional project specific grant or budgetary support is available to any project, apart from the incentive and/or subsidy and/or grant available under sub-regulation (1) of this regulation, the Commission shall account for such budgetary support also, while determining project specific levellised tariff.

(3) The amount of subsidy shall be considered for each renewable source as per the applicable policy of the MNRE/ State Government/ Central Government and if the amount and/or mechanism of subsidy is changed by the MNRE/ State Government/ Central Government, consequent corrections in tariffs may be carried out by the Commission in accordance with regulation 20.”

- 11.9 No adjustment of incentive and/or subsidy and/or grant is being made in the tariff calculations. However, adjustment to be made in the rate on the basis of per million (rupees) of subsidy for each MW capacity has been worked out and mentioned in the attached calculation sheet of the project and adjustment, if any, on account of the same shall be made at appropriate stage while applying the tariff after taking into account the eligibility conditions in each case. Similarly, adjustment on account of any other subsidy Scheme(s) available under the Government (Central/State) shall also be made at appropriate stage(s) after taking into account the extent of subsidy(ies) available under such Scheme(s). The adjustments on account of subsidies, where available, are to be made at the rates indicated in the calculation sheet on normative basis by considering the provisions of Regulations 20-B, 23-B, 24-B, 25-B and 26-B. For this purpose the total amount (in million rupees) of incentive and/or subsidy and/or grant etc., shall be divided by the installed capacity of the projects and

the per MW amount (in million rupees) so arrived at, shall be multiplied by the rate indicated in the calculation sheet.

11.10 DISCOUNT FACTOR.-

In accordance with Sub-regulation (4) of Regulation 12 of the RE Tariff Regulations, 2017, the discount factor equivalent to the post tax weighted average cost of capital has been considered for the purpose of levelled tariff computation. The discount factor has been calculated on this basis of the normative debt equity ratio (70:30) and weighed average of the post tax rates for debt and equity component. For this purpose, the interest rate on the loan component (i.e. 70%) of capital cost is 10.28%. For equity component (i.e. 30%), rate of Return of Equity (RoE) is considered as post tax rate of 14%. The discount factor has been calculated as 9.39%. The Corporate tax has been taken as 27.82% (25% IT rate+7% Surcharge+4% Health and Education cess).

11.11 Rounding.-

The tariff so worked out for solar PV projects has been rounded to nearest paise/ kWh. The fraction of 0.5 paise/kWh or above has been rounded to next higher and fraction of less than 0.5 has been ignored.

12. GENERIC LEVELLED TARIFF AND ASSOCIATED TERMS & CONDITIONS.-

In light of the discussions made in the preceding paragraphs, the generic levelled tariff and the associated terms and conditions for solar PV power project for FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023) under the RE Regulations, 2017 have been arrived at and are determined as under:-

- A. The generic levelled tariff for Solar PV power projects for FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023) shall be:-

Sr. No.	Capacity	Generic levelled tariff (Rs. Per kWh)
1	Projects to be set up in other than industrial areas and urban areas	
(a)	Upto 1.00 MW	3.75
(b)	Above 1.00 MW & upto 5.00 MW	3.72
2	Projects to be set up in industrial areas and urban areas	
(a)	Upto 1.00 MW	3.81
(b)	Above 1.00 MW & upto 5.00 MW	3.78

- B. This tariff as per item A shall be subject to the RE Tariff Regulations, 2017 and the orders as may be issued by the Commission thereunder from time to time.
- C. This tariff is applicable to solar photovoltaic (PV) power projects which directly convert Solar Energy into Electricity, using the poly crystalline silicon or Mono PERC technology or any other technology as approved by the Ministry of New and Renewable Energy and are connected to the Grid.
- D. This tariff does not take into account any capital subsidy or any incentive or grant/budgetary support etc. and the adjustment in this regard shall be carried out in accordance with the RE Regulations, 2017. The adjustments, if any, to be made at the rate per kWh by considering Rs. 10.00 Lacs/MW subsidy have however been indicated in the tariff calculation sheets.
- E. The applicability of this tariff shall be governed as per the following provisions:-

- (i) in cases where the joint petition for approval of PPA is submitted to the Commission on or after 01.04.2023, but not later than 30.09.2023, this tariff shall be applicable for such capacity(ies) as are commissioned on or before 31.03.2025.
- (ii) in other cases, not covered in item (i) above, this tariff shall be applicable for such capacity(ies) for which the generic levellised tariff for FY 2023-24 is applicable in accordance with the provisions of the PPAs read with the applicable tariff Order(s) of previous years. However, subject to any further clarification as the Commission may impart in case it decides to determine the generic levellised tariff for the period 01.10.2023 to 31.03.2024.
- F. This tariff shall not be applicable in cases where the Distribution Licensee procures power through Solar Energy Corporation of India or through competitive bidding at its level in accordance with Section 63 of the Electricity Act, 2003.
- G. This tariff shall not be applicable in case of the solar PV projects which are installed by the consumers within their premises (rooftop or ground mounted) under net metering scheme.
13. The detailed computations for generic levellised tariff for FY 2023-24 (for a period w.e.f 01.04.2023 to 30.09.2023) for the categories of solar PV power projects, without considering any subsidies/incentives/grants as well as illustrations thereof are attached as per Appendix – “I & II” and “III & IV”.

Sd/-
(Shashi Kant Joshi)
Member

Sd/-
(Yashwant Singh Chogal)
Member (Law)

Sd/-
(Devendra Kumar Sharma)
Chairman

Place: Shimla.
Dated: 31st March, 2023.

Annexure-“A”

List of the stakeholders/participants who attended the public hearing on 25th March, 2023.

Sr. No.	Name
1	Er. Mandeep Singh, CE (Comm.), HPSEBL
2	Er. Rakesh Kapoor , SE (SERC/IT)), HPSEBL
3	Shri. R.P. Suman, R.P. Suman &Co.
4	Er. R.L. Sankhyan, M/s Sankhyan Solar
5	Shri Bhal Singh Chandel , Solar Power Developer
6	Er. Suresh Kumar Patial, Chairman, Solar Power Consumer Trust

Assumption Parameters for Solar PV Power Projects upto 1 MW
(for project(s) to be setup in area other than Industrial areas and Urban areas)

Sr. No	Assumption Head	Sub Head	Sub Head(2)	Unit	Value
1	Power Generation	Capacity	Installed Generation Capacity	KW	1000
			Capacity Utilisation Factor	%	0.21
			Transmission losses, Auxillary Consumption including Transformation Losses	%	1.45
			Useful Life	Years	25
2	Project Cost	Capital Cost /MW	Project Cost	Lakh Rs./MW	411.20
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
			Equity	%	30
		Debt Component	Loan Amount	Lakh Rs./MW	287.84
			Moratorium Period	Year	0
			Repayment Period	Year	15
			Interst Rate	%	10.28
		Equity Component	Equity Amount	Lakh Rs./MW	123.36
			Return of equity for first 20 Years	%	16.80
Return of equity from 21st Years onwards	%		19.39		
4	Subsidy Depreciation	Subsidy Depreciation	Recovery of Depreciation	%	0
Annual Rate of Depreciation till completion of Loan Repayment (balance spread in remaining years)			%	4.67	
16th year Onward			%	1.995	
6	Operation & Maintenance		Total O&M Expenses	Lakh Rs./MW	9.79
			Annual Escalation	%	3.84
7	Working Capital		O&M Charges	Month	1
			Maintenance Spares	% of O&M expenses of a Year	15
			Recievables	Months	1.5
			Interest on Working capital	%	11.78
8	Discount Factor		Discount Rate	%	9.39

Determination of Tariff for Solar PV Power Projects up to 1 MW

Unit Generation	unit	year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	KW		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Gross generation	MU		1.840	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Losses	MU		1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Net Generation	MU		1.813	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Fixed Cost		year																									
O&M Expences	Rs. lakh		9.79	10.166	10.56	10.96	11.38	11.82	12.27	12.74	13.23	13.74	14.27	14.82	15.39	15.98	16.59	17.23	17.89	18.58	19.29	20.03	20.80	21.60	22.43	23.29	24.18
Depriciation	Rs. lakh		19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	19.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20
Interest on Term Loan	Rs. lakh		28.60	26.63	24.66	22.69	20.71	18.74	16.77	14.79	12.82	10.85	8.88	6.90	4.93	2.96	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs. lakh		1.44	1.43	1.42	1.41	1.39	1.38	1.37	1.36	1.36	1.35	1.34	1.33	1.33	1.33	1.32	1.17	1.20	1.23	1.26	1.29	1.37	1.41	1.44	1.48	1.52
Return on Equity	Rs. lakh		20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	20.72	23.92	23.92	23.92	23.92	23.92
Total fixed Cost	Rs. lakh		79.76	78.15	76.56	74.98	73.42	71.87	70.34	68.83	67.34	65.87	64.42	62.98	61.58	60.19	58.83	47.33	48.02	48.73	49.48	50.25	54.29	55.13	55.99	56.89	57.82
Levellised CoG																											
Per unit CoG	Unit	levellised																									
O&M Expences	Rs/kWh	0.74	0.54	0.56	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.76	0.79	0.82	0.85	0.88	0.92	0.95	0.99	1.02	1.06	1.10	1.15	1.19	1.24	1.28	1.33
Depriciation	Rs/kWh	0.95	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Interest on Term Loan	Rs/kWh	0.82	1.58	1.47	1.36	1.25	1.14	1.03	0.92	0.82	0.71	0.60	0.49	0.38	0.27	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs/kWh	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Return on Equity	Rs/kWh	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.32	1.32	1.32	1.32	1.32	
Total CoG	Rs/kWh	3.75	4.40	4.3110	4.22	4.14	4.05	3.96	3.88	3.80	3.71	3.63	3.55	3.47	3.40	3.32	3.24	2.61	2.65	2.69	2.73	2.77	2.99	3.04	3.09	3.14	3.19
Discounted factor	%		1	0.91	0.84	0.76	0.70	0.64	0.58	0.53	0.49	0.45	0.41	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12
Levellised Tariff	Rs/kWh	3.75	4.40	3.9409	3.53	3.16	2.83	2.53	2.26	2.03	1.81	1.62	1.45	1.29	1.16	1.03	0.92	0.68	0.63	0.58	0.54	0.50	0.50	0.46	0.43	0.40	0.37

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 411.20 Lakh/MW = Rs. 3.75/kWh

Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.68/kWh

Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh

Assumption Parameters for Solar PV Power Projects above 1 MW upto 5 MW

(for project(s) to be setup in area other than Industrial areas and Urban areas)

Sr. No	Assumption Head	Sub Head	Sub Head(2)	Unit	Value
1	Power Generation	Capacity	Installed Generation Capacity	KW	1000
			Capacity Utilisation Factor	%	0.21
			Transmission losses, Auxillary Consumption including Transformation Losses	%	1.45
			Useful Life	Years	25
2	Project Cost	Capital Cost /MW	Project Cost	Lakh Rs./MW	407.13
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
		Debt Component	Equity	%	30
			Loan Amount	Lakh Rs./MW	284.991
			Moratorium Period	Year	0
			Repayment Period	Year	15
		Equity Component	Interest Rate	%	10.28
			Equity Amount	Lakh Rs./MW	122.139
Return of equity for first 20 Years	%		16.8		
Return of equity from 21st Years onwards	%		19.39		
4	Subsidy	Subsidy			0
5	Depreciation	Depreciation	Recovery of Depreciation	%	90
			Annual Rate of Depreciation till completion of Loan Repayment (balance spread in remaining years)	%	4.67
			16th year Onward	%	1.995
6	Operation & Maintenance		Total O&M Expenses	Lakh Rs./MW	9.79
			Annual Escalation	%	3.84
7	Working Capital		O&M Charges	Month	1
			Maintenance Spares	% of O&M expenses of a Year	15
			Recievables	Months	1.5
			Interest on Working capital	%	11.78
8	Discount Factor		Discount Rate	%	9.39

Determination of Tariff for Solar PV Power Projects above 1 MW upto 5 MW

Sheet of Appendix II

Unit Generation	unit	year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	KW		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Gross generation	MU		1.840	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Losses	MU		1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Net Generation	MU		1.813	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Fixed Cost		year																									
O&M Expences	Rs. lakh		9.79	10.166	10.56	10.96	11.38	11.82	12.27	12.74	13.23	13.74	14.27	14.82	15.39	15.98	16.59	17.23	17.89	18.58	19.29	20.03	20.80	21.60	22.43	23.29	24.18
Depriciation	Rs. lakh		19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	19.01	8.12	8.12	8.12	8.12	8.12	8.12	8.12	8.12	8.12	8.12
Interest on Term Loan	Rs. lakh		28.32	26.37	24.41	22.46	20.51	18.55	16.60	14.65	12.70	10.74	8.79	6.84	4.88	2.93	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs. lakh		1.43	1.42	1.41	1.40	1.38	1.37	1.36	1.36	1.35	1.34	1.33	1.33	1.32	1.32	1.32	1.17	1.19	1.22	1.25	1.29	1.37	1.40	1.44	1.47	1.51
Return on Equity	Rs. lakh		20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	20.52	23.68	23.68	23.68	23.68	23.68
Total fixed Cost	Rs. lakh		79.08	77.49	75.91	74.35	72.81	71.28	69.77	68.28	66.81	65.36	63.93	62.51	61.13	59.76	58.42	47.04	47.73	48.44	49.19	49.96	53.97	54.81	55.67	56.57	57.50
Levellised CoG																											
Per unit CoG	Unit	levellised																									
O&M Expences	Rs/kWh	0.74	0.54	0.56	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.76	0.79	0.82	0.85	0.88	0.92	0.95	0.99	1.02	1.06	1.10	1.15	1.19	1.24	1.28	1.33
Depriciation	Rs/kWh	0.95	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Interest on Term Loan	Rs/kWh	0.81	1.56	1.45	1.35	1.24	1.13	1.02	0.92	0.81	0.70	0.59	0.48	0.38	0.27	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs/kWh	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Return on Equity	Rs/kWh	1.14	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.31	1.31	1.31	1.31	1.31	1.31
Total CoG	Rs/kWh	3.72	4.36	4.2741	4.19	4.10	4.02	3.93	3.85	3.77	3.69	3.61	3.53	3.45	3.37	3.30	3.22	2.59	2.63	2.67	2.71	2.76	2.98	3.02	3.07	3.12	3.17
Discounted factor	%		1	0.91	0.84	0.76	0.70	0.64	0.58	0.53	0.49	0.45	0.41	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12
Levellised Tariff	Rs/kWh	3.72	4.36	3.9072	3.50	3.13	2.80	2.51	2.25	2.01	1.80	1.61	1.44	1.28	1.15	1.03	0.92	0.68	0.63	0.58	0.54	0.50	0.49	0.46	0.43	0.40	0.37

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 407.13 Lakh/MW = Rs. 3.72 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.65 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh

Assumption Parameters for Solar PV Power Projects upto 1 MW

(for project(s) to be setup in Industrial areas and Urban areas)

Sr. No	Assumption Head	Sub Head	Sub Head(2)	Unit	Value
1	Power Generation	Capacity	Installed Generation Capacity	KW	1000
			Capacity Utilisation Factor	%	0.21
			Transmission losses, Auxillary Consumption including Transformation Losses	%	1.45
			Useful Life	Years	25
2	Project Cost	Capital Cost /MW	Project Cost	Lakh Rs./MW	418.78
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
		Debt Component	Equity	%	30
			Loan Amount	Lakh Rs./MW	293.146
			Moratorium Period	Year	0
			Repayment Period	Year	15
		Equity Component	Interest Rate	%	10.28
			Equity Amount	Lakh Rs./MW	125.634
Return of equity for first 20 Years	%		16.8		
Return of equity from 21st Years onwards	%		19.39		
4	Subsidy	Subsidy			0
5	Depreciation	Depreciation	Recovery of Depreciation	%	90
			Annual Rate of Depreciation till completion of Loan Repayment (balance spread in remaining years)	%	4.67
			16th year Onward	%	1.995
6	Operation & Maintenance		Total O&M Expenses	Lakh Rs./MW	9.79
			Annual Escalation	%	3.84
7	Working Capital		O&M Charges	Month	1
			Maintenance Spares	% of O&M expenses of a Year	15
			Receivables	Months	1.5
			Interest on Working capital	%	11.78
8	Discount Factor		Discount Rate	%	9.39

Determination of Tariff for Solar PV Power Projects up to 1 MW

Sheet of Appendix III

Unit Generation	unit	year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	KW		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Gross generation	MU		1.840	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Losses	MU		1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Net Generation	MU		1.813	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Fixed Cost		year																									
O&M Expences	Rs. lakh		9.79	10.166	10.56	10.96	11.38	11.82	12.27	12.74	13.23	13.74	14.27	14.82	15.39	15.98	16.59	17.23	17.89	18.58	19.29	20.03	20.80	21.60	22.43	23.29	24.18
Depriciation	Rs. lakh		19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	19.56	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35
Interest on Term Loan	Rs. lakh		29.13	27.12	25.11	23.10	21.09	19.09	17.08	15.07	13.06	11.05	9.04	7.03	5.02	3.01	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs. lakh		1.46	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.34	1.33	1.18	1.21	1.24	1.27	1.30	1.38	1.41	1.45	1.49	1.53
Return on Equity	Rs. lakh		21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	24.36	24.36	24.36	24.36	24.36
Total fixed Cost	Rs. lakh		81.05	79.40	77.77	76.15	74.55	72.97	71.40	69.86	68.33	66.82	65.33	63.86	62.42	60.99	59.59	47.87	48.56	49.27	50.02	50.79	54.90	55.73	56.59	57.49	58.42
Levellised CoG																											
Per unit CoG	Unit	levellised																									
O&M Expences	Rs/kWh	0.74	0.54	0.56	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.76	0.79	0.82	0.85	0.88	0.92	0.95	0.99	1.02	1.06	1.10	1.15	1.19	1.24	1.28	1.33
Depriciation	Rs/kWh	0.97	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Interest on Term Loan	Rs/kWh	0.84	1.61	1.50	1.39	1.27	1.16	1.05	0.94	0.83	0.72	0.61	0.50	0.39	0.28	0.17	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs/kWh	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Return on Equity	Rs/kWh	1.18	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.34	1.34	1.34	1.34	1.34
Total CoG	Rs/kWh	3.81	4.47	4.3797	4.29	4.20	4.11	4.02	3.94	3.85	3.77	3.69	3.60	3.52	3.44	3.36	3.29	2.64	2.68	2.72	2.76	2.80	3.03	3.07	3.12	3.17	3.22
Discounted factor	%		1	0.91	0.84	0.76	0.70	0.64	0.58	0.53	0.49	0.45	0.41	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12
Levellised Tariff	Rs/kWh	3.81	4.47	4.0037	3.58	3.21	2.87	2.57	2.30	2.06	1.84	1.64	1.47	1.31	1.17	1.05	0.94	0.69	0.64	0.59	0.55	0.51	0.50	0.47	0.43	0.40	0.37

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 418.78 Lakh/MW = Rs. 3.81 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.73 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh

Assumption Parameters for Solar PV Power Projects above 1 MW upto 5 MW
(for project(s) to be setup in Industrial areas and Urban areas)

Sr. No	Assumption Head	Sub Head	Sub Head(2)	Unit	Value
1	Power Generation	Capacity	Installed Generation Capacity	KW	1000
			Capacity Utilisation Factor	%	0.21
			Transmission losses, Auxillary Consumption including Transformation Losses	%	1.45
			Useful Life	Years	25
2	Project Cost	Capital Cost /MW	Project Cost	Lakh Rs./MW	414.63
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
		Debt Component	Equity	%	30
			Loan Amount	Lakh Rs./MW	290.241
			Moratorium Period	Year	0
			Repayment Period	Year	15
		Equity Component	Interest Rate	%	10.28
			Equity Amount	Lakh Rs./MW	124.389
			Return of equity for first 20 Years	%	16.80
Return of equity from 21st Years onwards	%		19.39		
4	Subsidy Depreciation	Subsidy Depreciation	Recovery of Depreciation	%	0
Annual Rate of Depreciation till completion of Loan Repayment (balance spread in remaining years) 16th year Onward			%	90	
5					4.67
6	Operation & Maintenance		Total O&M Expenses	Lakh Rs./MW	9.79
			Annual Escalation	%	3.84
7	Working Capital		O&M Charges	Month	1
			Maintenance Spares	% of O&M expenses of a Year	15
			Receivables	Months	1.5
			Interest on Working capital	%	11.78
8	Discount Factor		Discount Rate	%	9.39

Determination of Tariff for Solar PV Power Projects above 1 MW upto 5 MW

Sheet of Appendix IV

Unit Generation	unit	year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	KW		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Gross generation	MU		1.840	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Losses	MU		1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Net Generation	MU		1.813	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Fixed Cost		year																									
O&M Expences	Rs. lakh		9.79	10.166	10.56	10.96	11.38	11.82	12.27	12.74	13.23	13.74	14.27	14.82	15.39	15.98	16.59	17.23	17.89	18.58	19.29	20.03	20.80	21.60	22.43	23.29	24.18
Depriciation	Rs. lakh		19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	19.36	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27
Interest on Term Loan	Rs. lakh		28.84	26.85	24.86	22.87	20.89	18.90	16.91	14.92	12.93	10.94	8.95	6.96	4.97	2.98	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs. lakh		1.45	1.44	1.43	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.17	1.20	1.23	1.26	1.29	1.38	1.41	1.44	1.48	1.52
Return on Equity	Rs. lakh		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	24.12	24.12	24.12	24.12	24.12
Total fixed Cost	Rs. lakh		80.34	78.72	77.11	75.51	73.93	72.37	70.82	69.29	67.79	66.30	64.83	63.38	61.96	60.55	59.17	47.57	48.26	48.98	49.72	50.49	54.57	55.40	56.26	57.16	58.10
Levellised CoG																											
Per unit CoG	Unit	levellised																									
O&M Expences	Rs/kWh	0.74	0.54	0.56	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.76	0.79	0.82	0.85	0.88	0.92	0.95	0.99	1.02	1.06	1.10	1.15	1.19	1.24	1.28	1.33
Depriciation	Rs/kWh	0.96	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Interest on Term Loan	Rs/kWh	0.83	1.59	1.48	1.37	1.26	1.15	1.04	0.93	0.82	0.71	0.60	0.49	0.38	0.27	0.16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	Rs/kWh	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Return on Equity	Rs/kWh	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.33	1.33	1.33	1.33	1.33
Total CoG	Rs/kWh	3.78	4.43	4.3421	4.25	4.17	4.08	3.99	3.91	3.82	3.74	3.66	3.58	3.50	3.42	3.34	3.26	2.62	2.66	2.70	2.74	2.79	3.01	3.06	3.10	3.15	3.20
Discounted factor	%		1	0.91	0.84	0.76	0.70	0.64	0.58	0.53	0.49	0.45	0.41	0.37	0.34	0.31	0.28	0.26	0.24	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.12
Levellised Tariff	Rs/kWh	3.78	4.43	3.9693	3.55	3.18	2.85	2.55	2.28	2.04	1.82	1.63	1.46	1.30	1.16	1.04	0.93	0.68	0.63	0.59	0.55	0.51	0.50	0.46	0.43	0.40	0.37

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 414.63 Lakh/MW = Rs. 3.78 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.70 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.08/kWh